LAC STE. ANNE COUNTY
PROVINCE OF ALBERTA
BYLAW #28-2017

A BYLAW TO CONTROL LAND USE.

WHEREAS, under the provisions of the Municipal Government Act, being Chapter M-26.1, Division 5, Sections 639 and 640 of the Revised Statutes of Alberta 2000 R.S.A, a municipality may adopt an Area Structure Plan.

AND WHEREAS the Council of Lac Ste. Anne County has decided to amend the Island View Area Structure Plan as a means to clarify the development use.

NOW THEREFORE the Council duly assembled hereby enacts as follows:

1. Lac Ste. Anne County Bylaw 10-2013 is hereby amended in accordance with attached Schedule "A":

2. That this Bylaw comes into full force and effect upon third reading of this Bylaw and the registration of the amended Condominium Bylaw.

First Reading carried the 4th day of October, A.D. 2017.

Mayor (Seal)

County Manager (Seal)

Read a second time the 1st day of November, AD. 2017.

Reeve (Seal)

County Manager (Seal)

Read a third and final time this the 1st day of November, A.D. 2017.

Reeve (Seal)

County Manager (Seal)

SCHEDULE "A"

BYLAW NO. 20-2017

A) Provisions to be amended

That the following Sections be amended as follows:

SECTION 5.0 Development Plan
That a Section 5.4 Labeled Seasonality be added as a section.

B) Provisions to be added

That the following Sections be inserted into section 5.4 follows:

Section 5.4 Seasonality

This Development is designed to be seasonal in nature. While the development is seasonal in nature all services shall be buried to depths so that they are not impacted by freezing. No RV or structure shall be occupied on a lot for 365 days in a calendar year.

Additionally due to this being a seasonal recreation based adult community the development will not incorporate the full services of a multi-parcel residential. There will be no permanent resident on the property and as such the services of school buses and postal services will never be made available to this site.

- Promote the inclusion of various energy efficiencies in the design of the community by orientating streets to maximize solar gain and reduce northern exposures.
- Promote crime deterrence through safe neighbourhood design by incorporating into the design, visible public spaces, clear boundaries between public and private spaces, and identifiable points of entry.
- Promote development which advocates live, work and play opportunities within a mixed use built environment.

6.0 CONCEPT PLAN

The land use prescribed for the site is reflected in Figure 5 *(Land Use Concept Plan)*. This concept plan outlines the land uses, transportation network, municipal reserve, open space and utility infrastructure for the Plan Area.

It is acknowledged that much of the plan area is considered as lands possessing limited agricultural capabilities. It is further acknowledged that existing development patterns, development pressures, existing parcel configuration, general public support and the needs of the community to broaden the economic base of the County suggests strong support for the proposed use of the lands.

As such, the plan area has been identified as having characteristics favorable for future development as per Figure 5 *(Land Use Concept Plan)*.

Development of the Plan Area could provide the opportunity for properties adjacent to the plan area to take advantage of upgraded infrastructure.

The Land Use Concept Plan proposed for the Lac St Anne Area Structure Plan is shown on Figure 5 *(Land Use Concept Plan)*.

Specifically, the Land Use Concept Plan responds to the following critical factors:

- The Lac Ste Anne County existing statutory plans and in particular the Municipal Development Plan.
- Acknowledgement of the existing conditions, such as natural features, current uses, land ownership boundaries, and subdivision and development opportunities, which result in both opportunities and constraints for future land uses.
- The existing transportation network infrastructure including proposed improvements.
- Acknowledgement that infrastructure services are readily available.
- The existence of an aggregate extraction activity which has ceased operation.

6.1 PHASED DEVELOPMENT

The Clearview Ridge Area Structure Plan envisions that the Plan Area will be a phased development, the timing of which is influenced by several factors notwithstanding:

- The immediate needs of the landowner.
- Market conditions.
- A coordinated approach in the provision and construction of 'on-site' infrastructure requirements such as road design, storm water

management, and shallow utility installation.

- The establishment of an economic model that reflects the nature of the development and the limitations of front-loading financial obligations.

- The completion of the Resource Extraction Reclamation Plan prepared by Aspen Land Group Inc. on behalf of Westrock Aggregates Ltd. dated December 2013, attached herewith, and referenced as Appendix 'E'.

6.2 PLAN POLICIES

The policies listed below are unique to the Clearview Ridge Area Structure Plan and are to be applied at the time of the new subdivision and development. All existing statutory plans and policies, particularly those policies referenced in the Lac Ste Anne County Municipal Development Plan, as well as the Land Use Bylaw shall be applied.

Municipal officials and industry representatives have indicated that the demand for a demand for lots ranging from two acres to parcels in excess of five acres in size. To address the need for flexibility in parcel size, a 'scalable' development is proposed in which parcels may be consolidated to achieve specific needs.

6.2.1 PHASE I

Phase I shall consist of 9 Country Residential lots, Municipal Reserve dedication and a Public Utility Lot, as well as, the provision of a road system necessary to support the phased development containing approximately 18.24 ha (45.07 acres) as shown in Figure 5 *(Future Land Use Concept Plan)*.

6.2.2 FUTURE PHASING

Future Phasing shall include the subdivision and development of the residual lands in title as shown in Figure 5 *(Land Use Concept Plan)*.

6.3 LAND USE

6.3.1 LAND USE POLICIES

Notwithstanding the above, all future subdivision and development within the Plan Area shall have regard to the spirit and intent of the Lac Ste Anne County Municipal Development Plan.

6.3.1.1 All future subdivision and development within the Plan Area shall comply with the generalized Land Use Concept shown in Figure 5 *(Land Use Concept Plan)*.

6.3.1.2 All future subdivision and development within the Plan Area shall be in accordance with the requirements of the Lac Ste Anne County.

6.3.1.3 Prior to approval of future phasing as shown in Figure 5 (*Land Use Concept Plan*), a comprehensive geotechnical investigation may be required by the developer in support of future phasing development

6.3.1.4 The introduction of future phasing shall be contingent on the completion of the reclamation works as identified in the reclamation plan as prepared by Aspen Land Group on behalf of Westrock Aggregate Ltd.

6.3.1.5 Development of land within the plan area shall be in strict accordance with provincially mandated setbacks from water bodies and environmentally sensitive areas

6.3.1.6 The Developer shall be required to enter into a deferred services agreement with the County prior to receipt of subdivision approval of Phase I, and the County may register a caveat respecting the said deferred services agreement for the purpose of informing lot owners of the requirement to connect to a municipal water and/or wastewater system when such services become available.

6.3.1.7 The resubdivision of lands contained within proposed Industrial Lot 6, as shown in Figure 5 (*Land Use Concept Plan*), the size of which are to be determined at the time of subdivision. The future industrial uses are intended to promote live, work and play opportunities.

6.4 TRANSPORTATION NETWORK

The proposed development is to be served by both a proposed access to Township Road 540 as well as an additional access point on Range Road 20 as shown in *Figure 5 (Land Use Concept Plan)*.

6.4.1 TRANSPORTATION POLICIES

6.4.1.1 All road improvements, including new construction shall be constructed to municipal standards as stipulated in the Lac Ste Anne County General Municipal Servicing Standards dated January 2008, and shall be at the sole cost and expense of the Developer.

6.4.1.2 Required future road widening to any existing roads including Township Road 540 shall be dedicated at the time of subdivision.

6.4.1.3 All internal development (Future Phasing) within the Plan Area will access a proposed internal road system as shown in Figure 5 (*Land*

Use Concept Plan).

6.4.1.4 The Developer shall (if necessary) dedicate land for the upgrading of the point of intersection of the proposed internal road with Range Road 20 as shown in Figure 5 (*Land Use Concept Plan*).

6.5 ENVIRONMENTALLY SIGNIFICANT FEATURES

Policies are proposed to ensure that the existing environmentally significant features within the Plan Area are protected, while also providing opportunities for the development of new environmental features.

6.5.1 ENVIRONMENTALLY SIGNIFICANT FEATURES & SUSTAINABLITY POLICIES

6.5.1.1 All development within the plan area shall be the subject of Smart development principles and the application of the Triple Bottom Line approach to development.

6.5.1.2 The use of high efficiency and energy efficient building materials, fixtures and appliances shall be encouraged.

6.5.1.3 The individual harvesting of rain water for irrigation purposes on each lot shall be encouraged.

6.5.1.4 Where possible buildings shall be orientated to provide the greatest exposure to the sun and create solar heating and solar capture opportunities.

6.5.1.5 Each lot owner shall be encouraged to plant shelter belts along the north boundary of their lot to provide additional protection from the northern winds.

6.5.1.6 Where feasible the harvesting of surface runoff and rainfall captured from buildings and used in the business process shall be encouraged.

6.6 MUNICIPAL RESERVE /OPEN SPACE

The Launch Ventures Area Structure Plan supports the policies within the Lac Ste Anne County Municipal Development Plan with respect to encouraging development of an integrated and contiguous trail system.

6.6.1 Municipal Reserve, as shown in Figure 5 (*Land Use Concept Plan*) will be dedicated in a manner which will enhance and compliment both the Plan Area and the community at large.

6.6.2 Municipal Reserve shall be provided by either the dedication of land, disposition through cash in lieu, or a combination of both. The disposition of reserve including the disposition of the existing reserve caveat shall be at the sole discretion of the Lac Ste Anne County at the time of subdivision.

6.6.3 Pedestrian and bicycle linkages to the adjacent community shall be incorporated into each phase of the development.

6.6.4 Pathways/trail systems shall be aligned with existing and future external pathway/trail systems.

6.6.5 Pathway/trail systems shall, where possible, be incorporated into landscape buffers and sound attenuation berms thereby increasing both the utility and the aesthetics of the berms and buffers.

6.6.6 Pathway/trail systems shall where possible serve as a 'transition' between differing proposed and existing land uses.

6.6.7 The location of a proposed community mail box as well as a school bus collection site are as shown in Figure 5 *(Land Use Concept Plan)*.

6.7 SERVICING INFRASTRUCTURE

The purpose of this strategy is to provide for the installation of appropriate utility infrastructure necessary to support the Plan area. Water and Waste Water will be the responsibility of the individual lot owner. Storm water ponding will be constructed within the Plan area to prevent downstream impacts due to surface water runoff.

Sizing and detailed design of the servicing infrastructure including the storm management will be completed in conjunction with the subdivision and development of the project and administered through the development agreement process.

All infrastructure service development shall be designed and constructed in accordance with the specifications and guidelines as provided in the Lac Ste Anne County General Municipal Servicing Standards dated January 2008.

6.7.1.1 All infrastructural development within the plan area shall have regard for the possible extension of services to adjacent lands.

6.7.1.2 Where identified, oversizing of infrastructural services within the plan area will be incorporated into the design and construction process.

6.7.1.3 Where possible, the developer in conjunction with the Lac Ste Anne County shall examine an innovative approach to infrastructure improvements and services that are based on sound economic business practices.

6.7.2 POTABLE WATER POLICIES

All subdivisions and development shall be serviced with individual water wells.

6.7.3 SANITARY SEWER SYSTEM

All subdivision and development shall be serviced with individual Private Sewage Disposal Systems and shall include secondary waste water treatment.

6.7.3.1 SANITARY SEWER SYSTEM POLICIES

6.7.3.1 Prior to the issuance of a development permit for any construction on each specific lot, the Developer shall provide the approved plans of the proposed construction including a site plan indicating the topographical features.

6.7.3.2 Design for constructed waste water collection system shall follow the 'Standards and Guidelines for Private Sewage Disposal Systems, Alberta Municipal Affairs, and latest edition as a minimum.

6.7.4 STORM WATER MANAGEMENT

The Storm water management system will consist primarily of piping and overland drainage. Storm water run-off from the Plan Area will be restricted to pre-development flows in accordance with the County and Alberta Environment and Parks standards unless otherwise approved by the Lac Ste Anne County. This will be accomplished by using dedicated public utility lots, joint use recreational lands, roadway ditches, culverts, and drainage swales along lot lines. Individual lots will be graded to direct runoff water to the drainage swales, ditches or catchment basins. These ditches will be used to convey water from the lots to the storm pond.

The layout of the overland flow system is designed to work closely with existing topography, as well as the lot layout. The slopes of the ditches and the drainage swales should be maintained between 0.5% and 2.0%. The ditches and swales should be protected with grass vegetation as soon as possible to reduce erosion, and help with storm water quality.

STORM WATER MANAGEMENT POLICIES

6.7.4.1 Prior to the subdivision and development of 'Future Phasing' the Developer shall implement a storm water management plan to the satisfaction of the Lac Ste Anne County.

6.7.4.2 Design for constructed storm water management facilities shall follow the 'Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems,' Alberta Environment and Parks, latest edition as a minimum.

6.7.4.3 Native soils shall be salvaged and stockpiled and reused as topsoil and planting bed material.

6.7.4.4 Prior to the subdivision and development, each lot a 'lot grading plan' in accordance with the Storm Water Management Plan will be provided for each lot created.

6.7.4.5 Prior to the subdivision and development of Phase I as shown in Figure 6 – *(Storm Water Management Plan)* the developer and the Lac Ste Anne County shall enter into an agreement with respect

CLEARVIEW RIDGE AREA STRUCTURE PLAN – FEBRUARY 2016
TABLE OF CONTENTS

Figures

Appendices

1.0 PURPOSE

The Clearview Ridge Area Structure Plan provides for the orderly and economic approach to the subdivision and development of the lands within that portion of the S.E. ¼ Section 1, Township 54, Range 2, West of the 5th Meridian which lies to the west of Range Road 20 and north of Township Road 540, (commonly referred to as the Heatherdown Road).

The Clearview Ridge Area Structure Plan is intended to identify key issues such as land use, servicing, aesthetic design, transportation network and reserve issues, and to provide viable options in the solution of these issues.

This Area Structure Plan is intended to establish a process of sequencing to ensure that development occurs in a logical, efficient and sequential manner.

1.1 PLAN AREA JURISDICTION

The Plan Area (as shown in Figure 1 Regional Context) is located within the municipal jurisdiction of Lac Ste Anne County. This plan consists of policy statements and conceptual representations that provide the framework to promote the following principles:

- Promote sustainable development;
- Promote the expansion of the tax base within Lac Ste Anne County;
- Acknowledge and enhance the development potential of the lands while recognizing the geographical importance within both the local and regional context;
- Create a visually appealing mixed use built environment.

1.2 PLAN COMPLIANCE

This Area Structure Plan (hereinafter referred to as the Plan Area), has been prepared as a requirement of Lac Ste Anne County and in particular the Municipal Development Plan # 23-2014 which requires that such plans be prepared for select study areas.

The Area Structure Plan is also prepared in accordance with the requirements as stipulated of the Municipal Government Act. The specific legislation under Section 633 of the MGA enabling the creation of Area Structure Plans states:

(1) For the purpose of providing a framework for subsequent subdivision and development of an area of land, a council may, by bylaw, adopt an area structure plan.

(2) An area structure plan

(a) must describe

(i) the sequence of development proposed for the area;

(ii) the land uses proposed for the area, either generally or with respect to specific parts of the area;

(iii) the density of population proposed for the area either generally or with respect to specific parts of the area;

(iv) the general location of major transportation routes and public utilities, and

(b) may contain any other matters the council considers necessary.

1.3 KEY ELEMENTS OF THE PLAN

The two key elements in the Area Structure Plan are:

- A process that is structured to coordinate development intensification in concert with transportation capacities, environmental compatibility and servicing capabilities.
- Policy Statements supplemented with a Land Use Concept Plan to establish a logical and sequential pattern of development.

1.4 POLICY INTERPRETATION

The explanatory text accompanying a policy within the Plan is provided for information purposes only to enhance the understanding of the policy. If an inconsistency arises between this text and a policy, the policy will take precedence.

Where "shall" is used in a policy, the policy is considered mandatory. However, where actual quantities or numerical standards are contained within the policy, such quantities or standards may be varied, provided that the variance is necessary to address unique circumstances that would otherwise render compliance impractical or impossible, and the general intent of the policy is still achieved.

Where "should" is used in a policy, the intent is that the policy is to be complied with. However, the policy may be varied in a specific situation provided that the variance is necessary to address unique circumstances that will otherwise render compliance impractical or impossible, or to introduce an acceptable alternate means to otherwise achieve the general intent of the policy.

1.5 PLAN AMENDMENTS

In order to amend this Plan, including any changes to the text or maps within, an amendment to the Plan will be required to be approved by Bylaw. An amendment will require the holding of a statutory public hearing together with public notification carried out in accordance with procedures established by Lac Ste Anne County.

Where an amendment to the Plan is requested, the applicant will be required to submit supporting information necessary to evaluate and justify the amendment. Such changes will be made from time to time as determined necessary to ensure that the text and maps remain accurate.

1.6 MAP INTERPRETATION

Unless otherwise specified within the Plan, the boundaries or locations of any symbols or areas shown on a map are approximate only, not absolute, and shall be interpreted as such. They are not intended to define exact locations except where they coincide with clearly recognizable physical features or fixed boundaries such as property lines or road and utility rights-of-way.

1.7 CONSISTENCY AND MONITORING OF THE PLAN

It is intended that consistency between the Plan and any other policy directives which have been approved by Council be maintained, including but not limited to, the Municipal Development Plan [illegible] 23-201[illegible] of Lac Ste Anne County.

In order to ensure the Plan remains current and relevant, it will be monitored over time. If any changes are deemed necessary as a result of future monitoring, the Plan will be modified through the amendment process.

2.0 PLAN AREA

2.1 REGIONAL CONTEXT

The Lac Ste Anne County is located at the junction of Highway 2A, Highway 13 and the Canadian Pacific railroad and approximately 12 kms east of Queen Elizabeth II Highway. In addition, the city is approximately 43 miles south of the City of Edmonton and the Edmonton International Airport. Anecdotally, Wetaskiwin as a stage coach stop between Edmonton and Calgary.

The Lac Ste Anne County is the center of a thriving mixed farming and oil and gas region, and is the gateway to some excellent recreational facilities centrally located amongst many lakes and rivers, and close to the foothills.

Based on the 2014 census the Lac Ste Anne County supports a primary trading area of 50,264 people and a secondary trading area population of 93,627.

3.0 EXISTING SITE FEATURES & CHARACTERISTICS

The Plan Area (as shown in Figure 2) consists of approximately 54.47 ha. (134.47Acres) of land intended to accommodate a mixed use development which shall include Industrial / Country Residential / Public Utilities, and Reserve.

3.1 SITE CHARACTERISTICS

The Plan Area as shown in Figure 3 *(Topographical Features)* has varied relief. The plan area varies approximately 25 meters in elevation with the high point located in the north west quadrant of the plan area to the lowest point within the south east quadrant of the plan area. Within the north quadrant of the parcel and north of the proposed development area is a ravine or channel which severs approximately 9 hectares of land from the remainder of the plan area.

3.2. DRAINAGE BASIN

The plan area is part of the Kilini Creek drainage system and as is the case with most undeveloped parcels of land the plan area is the subject of imperfect drainage.

Drainage within the parcel flows in an easterly direction. Historically there are two drainage patterns within the plan area. The first drainage pattern is the flow of surface drainage from higher elevation lands in the north west to lower elevation lands in the extreme south east. Again, this is surface drainage with no clearly defined channelization. The second drainage channel is clearly defined and is located within the north quadrant of the parcel and flows in an easterly direction towards lands east of the development. This drainage channel traditionally facilitated the flow of drainage from lands to the west of the plan area. However, aggregate extraction on lands west of the plan area have compromised this historic drainage channel and only drainage from the existing parcel are now captured within this channel. This view is supported through the interpretation of both current and historical aerial photography.

3.3 UTILITY RIGHTS OF WAY & ROAD DEDICATIONS

Road Right of Way Plan [illegible]-0078 has been removed from the lands in title. This Road Plan consists of approximately 2.0 acres (more or less) for road widening was removed from the east boundary of the parcel.

In addition, a Natural Gas Right of Way, as shown in *Figure 4 (Pipelines and Rights of Way)* is dedicated along the south boundary of the plan area, is owned operated by the Lac Ste Anne Gas Coop and serves the existing country residential parcels located within the plan area.

3.4 EXISTING USE OF LANDS

The existing use of lands can best be described as a mixed land use. This mixed use reflects the existence of a gravel extraction operation which has ceased to exist and is awaiting reclamation as per an reclamation permit issued by Alberta Environment and Parks. There are three (3) country residential parcels under separate certificates of title located in the south east corner of the quarter section. There is a dwelling unit located within proposed Lot # 8 as shown within Figure 5 *(Conceptual Plan)*. In addition, Lac Ste. Anne County has recently approved an industrial storage facility on the site as a discretionary use. The balance of the land is in agricultural production.

3.5 ADJACENT LAND USES

Lands to the north of the plan area have been reclaimed from aggregate removal activities and are in cultural production. Lands to the east of the plan area are industrial (aggregate extraction and wetlands) while south of the plan area the lands are predominantly cultivated lands.

The area to the west of the plan area contains both cultivated soils and a large aggregate extraction operation.

3.6 VEGETATION & SOILS

The CLI capability for agriculture is rated as class 4M (60%) and O (40%) within the Plan Area. Soils that are rated as class 4 have severe limitations and have restrictions on the range of crops or require special conservation practices due to moisture limitations. The areas that are rated as O are considered organic soils.

3.7 SURFICIAL GEOLOGY

Based on the Quaternary Geology, Central Alberta map (L. Shetsen 1990) the Plan Area is located in an area described as a stagnation moraine which typically exhibits till of uneven thickness with local water sorted material up to 30 m thick. This stagnation moraine also exhibits undulating to hummocky topography reflecting variations in till thickness. In this area, the topography is described as undulating with a local relief generally less than 3 m. Bedrock at the base of the deposit consists of grey feldspathic clayey sandstone, grey bentonitic mudstone and carbonaceous shale of the Horseshoe
Canyon Formation of the Cretaceous age. The bedrock unit is non marine and is often characterized by a quartz ferruginous ironstone beds, scattered coal and bentonite beds of variable thickness, minor limestone beds.

3.8 EXISTING TRANSPORTATION NETWORK

Figure 3 *(Pipelines & Rights of Way)* illustrates the major features of the area's existing transportation network. The system impacting the plan area is comprised of Range Road 20 which is constructed to a paved industrial road standard to the east and Township Road 540 to the south and is constructed to an "all weather" gravel standard.

3.9 ACCESS

There are two access points serving the plan area. The area north of the ravine has a direct access to Range Road 20 while access to the balance of the parcel is gained via Township Road 540 with an existing approach located along the west boundary of the plan area.

3.10 MAJOR FRANCHISED UTILITIES

Fortis Alberta owns an overhead power transmission line which is located on the west and south boundary of the Plan area. Future subdivision will require connection to this line for electrical servicing.

Lac Ste Anne Gas Coop is presently located along the south boundary of the plan area and serves the three existing country residential lots which are under separate titles. Future subdivision and subsequent development will require connection to this line for natural gas service.

3.11 ENCUMBERANCES

A restrictive Covenant pursuant to the Municipal Government Act is registered against the lands contained within the 'Plan Area'. The intent of the covenant was to restrict future residential development until the aggregate mining activity which was located in the north quadrant of the quarter section had been exhausted.

4.0 STRATEGY

4.1 PLAN PRINCIPLES

4.1.1 SUSTAINABLE DEVELOPMENT

The first principle is focused on a sustainable community or sense of place that will encompass the core values of a 'Triple Bottom Line' consisting of social responsibility, economic viability and ecological integrity.

- All development shall be in an environmentally sustainable manner, which includes the protection of groundwater supply to ensure that this resource lasts well into the future.
- Development shall be restricted to non-polluting uses and practices.

4.1.2 SIGNIFICANT ENVIRONMENTAL FEATURES

The second principle is one of identifying and protecting environmental features of significance.

- Low lying areas, which at the present time serve as a seasonal surface runoff retention area, need be protected where possible.

4.1.3 INTEGRITY OF TRANSPORTATION INFRASTRUCTURE

The third principle is maintaining the integrity of the transportation network:

- Ensuring that development is accommodated in a fashion that public safety is first and foremost.

4.1.4 EXPANSION OF THE TAX BASE

The fourth principle is taking the necessary steps to broaden the tax base of Lac Ste Anne County in a manner that limits the demands of new development on the County's existing infrastructure.

- Proposing the uses of land that demand reasonable and practical levels of service from the County of Lac Ste Anne.
- Encourage the location of land uses in which assessment are sustained at a high level (minimal depreciation).

4.1.5 GEOGRAPHICAL IMPORTANCE AND VISUAL APPEAL

The last principle relates to the highest and best use of lands:

- Ensuring that the nature of development is one that reflects positively on the County of Lac Ste Anne.
- Development espouses the values of a proud, prosperous, healthy, and vibrant community.
- Consistent site development guidelines are implemented to ensure that development within the Plan Area is visually appealing and environmentally sustainable.

4.2 PLAN PROCESS

The Plan preparation process began by gathering, reviewing and analyzing all relevant information pertaining to future development options within and around the Plan Area. In addition, inventories relating to hydrology and soil permeability are referenced in support of this Plan.

4.2.1 BIOPHYSICAL ASSESSMENT

The overall purpose of the Biophysical Assessment *(Appendix 'A')* was to determine the environmental features found on the subject property, including any watercourses or wetlands subject to the *Alberta Water Act* or the *Public Lands Act*.

- To determine the importance and conservation value of various natural areas located in the study area with respect to future development;
- To determine the value of existing wetlands, woodlots and other ecological features within the study area;
- To assess the connectivity with other surrounding ecological features;
- To identify potential environmental and municipal reserves;
- To identify applicable legislation; and
- Provide recommendations for conservation measures.

4.2.2 GEOTECHNICAL INVESTIGATION

In compliance with the requirements stipulated within Lac Ste Anne County Design Guidelines and Construction Standards for Development, a geotechnical investigation was undertaken by Twerdoff & Associates Inc. *(Appendix 'B')*. The objectives of the aggregate assessment were:

- Determine subsurface soil and groundwater conditions. This was completed by drilling a series of boreholes within the property and installing groundwater monitor wells.
- Evaluate the proposed work plan and make recommendations on soil densification and/or preloading for the foundation system.
- Provide a summary of the subsurface soil and groundwater conditions, summary of stratigraphy, suitability as fill soils, and make recommendations with respect to foundation types, pavement design and lateral earth pressure calculations to be used in the design limitations for local infrastructure and buildings.

4.2.3 TRAFFIC IMPACT ASSESSMENT

The purpose of the Traffic Impact Assessment *(Appendix 'C')* prepared by D & A Paulichuk Consulting Ltd. was to assess the potential impact of additional traffic on both the existing local and regional transportation network as a direct result of the proposed development.

The assessment identified and defined the study area, the planning horizon, the analysis period and estimated traffic demand coupled with existing traffic conditions.

In addition, the assessment incorporated a safety analysis, site access analysis, traffic collision analysis, sight distance evaluation and provides overall recommendations for addressing local and regional traffic impacts for incorporation into the ASP.

4.2.4 HYDROLOGICAL ASSESSMENT

A hydrological assessment was prepared by Groundwater Information Technologies Ltd. to determine if a safe 20 yield of potable water was available to sustain the proposed development. A copy of the analysis is attached hereto and referenced as Appendix 'D'.

5.0 PLAN OBJECTIVES

In the preparation of the ASP a detailed review of existing planning policy was conducted to ensure alignment with Lac Ste Anne County planning and policy principles. Without restricting the generality of the foregoing the following documents were referenced within the ASP:

- Lac Ste Anne County Land Use Bylaw;
- Lac Ste Anne County Municipal Development Plan;
- Lac Ste Anne County Development and Design Standards;
- Lac Ste Anne County Corporate Strategic Plan;
- Lac Ste Anne Rural Road Study;
- Lac Ste Anne Master Transportation Plan;

Having regard for the Lac Ste Anne County planning and policy principles and based on the premise of the triple bottom line as the foundation for creating a sustainable development the objectives of the ASP are to:

- Prepare a future development concept for the plan area and provide policy direction describing the manner in which land may be developed.
- Promote a transportation network that includes multiple modes of transportation which shall include automobiles, cycling and walking.
- Identify a strategy for providing open space and trails, including linkage to the existing open spaces and trail system and promote interconnected road and path systems that facilitate efficient provision of municipal services and maintenance.
- Provide for the efficient and phased conceptual design of development.
- Identify lands suitable for public recreational opportunities and include both active and passive recreational opportunities.
- Ensure proper protection for environmentally sensitive areas.
- Recognize and maintain the landscape and other environmental qualities of the plan area.
- Promote the diversification of the local economy by examining economic opportunities and economic viability.
- Incorporate diversity of use that may include and promote home, work and play in close proximity.

CLEARVIW RIDGE AREA STRUCTURE PLAN

JANUARY 2016

CLEARVIEW RIDGE AREA STRUCTURE PLAN

Within the

S.E. 1-54-2-5

COUNTY OF LAC ST ANNE

PREPARED FOR

LAUNCH VENTURES LTD.

BY

Robert Wescott, B.Sc. AICP

Wescott Consulting Group Ltd.

January 2016

CLEARVIEW RIDGE AREA STRUCTURE PLAN – FEBRUARY 2016
TABLE OF CONTENTS

Figures

Appendices

Appendix 'A'

Biophysical Inventory, S.E. 1-54-2-W5M, January, 2016. Prepared by MCA Environmental Management, dated January 2016.

Appendix 'B'

Aggregate Characterization Assessment for Wes Erickson, S.E. 1-54-2-W5M prepared by Twerdoff & Associates Inc., and dated June 2014.

Appendix 'C'

Traffic Impact Assessment, D&A Paulichuk Consultants Ltd. S.E. 1-54-2-W5M dated December 7th, 2015.

Appendix 'D'

Hydrological Assessment for W.E. 1-54-2-W5M prepared by Groundwater Information Technologies Ltd., dated May 6th, 2015.

Appendix 'E'

Pit Registration Application, Yeoman/Parker Pit in the E 1.2 Section 1, Township 54, Range 2, West of the 5th Meridian prepared by Aspen Land Group Inc. dated December 2013.

1.0 PURPOSE

The Clearview Ridge Area Structure Plan provides for the orderly and economic approach to the subdivision and development of the lands within that portion of the S.E. ¼ Section 1, Township 54, Range 2, West of the 5th Meridian which lies to the west of Range Road 20 and north of Township Road 540, (commonly referred to as the Heatherdown Road).

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- Create a visually appealing mixed use built environment.

1.2 PLAN COMPLIANCE

This Area Structure Plan hereinafter referred to as the Plan Area', has been prepared as a requirement of Lac Ste Anne County and in particular the Municipal Development Plan # 23-2014 which requires that such plans be prepared for select study areas.

The Area Structure Plan is also prepared in accordance with the requirements as stipulated of the Municipal Government Act. The specific legislation under Section 633 of the MGA enabling the creation of Area Structure Plans states:

(1) For the purpose of providing a framework for subsequent subdivision and development of an area of land, a council may, by bylaw, adopt an area structure plan.

(2) An area structure plan

(a) must describe

(i) the sequence of development proposed for the area;

(ii) the land uses proposed for the area, either generally or with respect to specific parts of the area;

(iii) the density of population proposed for the area either generally or with respect to specific parts of the area;

(iv) the general location of major transportation routes and public utilities, and

(b) may contain any other matters the council considers necessary.

1.3 KEY ELEMENTS OF THE PLAN

The two key elements in the Area Structure Plan are:

- A process that is structured to coordinate development intensification in concert with transportation capacities, environmental compatibility and servicing capabilities.
- Policy Statements supplemented with a Land Use Concept Plan to establish a logical and sequential pattern of development.

1.4 POLICY INTERPRETATION

The explanatory text accompanying a policy within the Plan is provided for information purposes only to enhance the understanding of the policy. If an inconsistency arises between this text and a policy, the policy will take precedence.

Where "shall" is used in a policy, the policy is considered mandatory. However, where actual quantities or numerical standards are contained within the policy, such quantities or standards may be varied, provided that the variance is necessary to address unique circumstances that would otherwise render compliance impractical or impossible, and the general intent of the policy is still achieved.

Where "should" is used in a policy, the intent is that the policy is to be complied with. However, the policy may be varied in a specific situation provided that the variance is necessary to address unique circumstances that will otherwise render compliance impractical or impossible, or to introduce an acceptable alternate means to otherwise achieve the general intent of the policy.

1.5 PLAN AMENDMENTS

In order to amend this Plan, including any changes to the text or maps within, an amendment to the Plan will be required to be approved by Bylaw. An amendment will require the holding of a statutory public hearing together with public notification carried out in accordance with procedures established by Lac Ste Anne County.

Where an amendment to the Plan is requested, the applicant will be required to submit supporting information necessary to evaluate and justify the amendment. Such changes will be made from time to time as determined necessary to ensure that the text and maps remain accurate.

1.6 MAP INTERPRETATION

Unless otherwise specified within the Plan, the boundaries or locations of any symbols or areas shown on a map are approximate only, not absolute, and shall be interpreted as such. They are not intended to define exact locations except where they coincide with clearly recognizable physical features or fixed boundaries, such as property lines or road and utility rights-of-way.

1.7 CONSISTENCY AND MONITORING OF THE PLAN

It is intended that consistency between the Plan and any other policy directives which have been approved by Council be maintained, including but not limited to, the Municipal Development Plan # 23-2014 of Lac Ste Anne County.

In order to ensure the Plan remains current and relevant, it will be monitored over time. If any changes are deemed necessary as a result of future monitoring, the Plan will be modified through the amendment process.

2.0 PLAN AREA

2.1 REGIONAL CONTEXT

The Lac Ste Anne County is located at the junction of Highway 2A, Highway 13 and the Canadian Pacific railroad and approximately 12 kms east of Queen Elizabeth II Highway. In addition, the city is approximately 43 miles south of the City of Edmonton and the Edmonton International Airport. Anecdotally, Wetaskiwin as a stage coach stop between Edmonton and Calgary.

The Lac Ste Anne County is the center of a thriving mixed farming and oil and gas region, and is the gateway to some excellent recreational facilities centrally located amongst many lakes and rivers, and close to the foothills.

Based on the 2014 census the Lac Ste Anne County supports a primary trading area of 50,264 people and a secondary trading area population of 93,637.

3.0 EXISTING SITE FEATURES & CHARACTERISTICS

The Plan Area (as shown in Figure 2) consists of approximately 54.47 ha. (134.47Acres) of land intended to accommodate a mixed use development which shall include Industrial / Country Residential / Public Utilities, and Reserve.

3.1 SITE CHARACTERISTICS

The Plan Area as shown in Figure 3 *(Topographical Features)* has varied relief. The plan area varies approximately 25 meters in elevation with the high point located in the north west quadrant of the plan area to the lowest point which is the south east quadrant of the plan area. Within the north quadrant of the parcel and north or the proposed development area is a ravine or channel which severs approximately 9 hectares of land from the remainder of the plan area.

3.2. DRAINAGE BASIN

The plan area is part of the Kilini Creek drainage system and as is the case with most undeveloped parcels of land the plan area is the subject of imperfect drainage.

Drainage within the parcel flows in an easterly direction. Historically there are two drainage patterns within the plan area. The first drainage pattern is the flow of surface drainage from higher elevation lands in the north west to lower elevation lands in the extreme south east. Again, this is surface drainage with no clearly defined channelization. The second drainage channel is clearly defined and is located within the north quadrant of the parcel and flows in an easterly direction towards lands east of the development. This drainage channel traditionally facilitated the flow of drainage from lands to the west of the plan area, however, aggregate extraction on lands west of the plan area have now altered that historic drainage channel and only drainage from the existing parcel are now captured within this channel. This view is supported through the interpretation of both current and historical aerial photography.

3.3 UTILITY RIGHTS OF WAY & ROAD DEDICATIONS

Road Right of Way Plan 782-0078 has been removed from the lands in title. This Road Plan consists of approximately 2.0 acres (more or less) for road widening was removed from the east boundary of the parcel.

In addition, a Natural Gas Right of Way, as shown in *Figure 4 (Pipelines and Rights of Way)* is dedicated along the south boundary of the plan area, is owned operated by the Lac Ste Anne Gas Coop and serves the existing country residential parcels located within the plan area.

3.4 EXISTING USE OF LANDS

The existing use of lands can best be described as a mixed land use. This mixed use reflects the existence of a gravel extraction operation which has ceased to exist and is awaiting reclamation as per an reclamation permit issued by Alberta Environment and Parks. There are three (3) country residential parcels under separate certificates of title located in the south east corner of the quarter section. There is a dwelling unit located within proposed Lot # 8 as shown within Figure 5 *(Conceptual Plan)*. In addition, Lac Ste Anne County has recently approved an industrial storage facility on the site as a discretionary use. The balance of the land is in agricultural production.

3.5 *ADJACE*NT LAND USES

Lands to the north of the plan area have been reclaimed from aggregate removal activities and are in cultural production. Lands to the east of the plan area are Industrial (aggregate extraction and wetlands) while south of the plan area the lands are predominantly cultivated lands.

The area to the west of the plan area contains both cultivated soils and a large aggregate extraction operation.

3.6 VEGETATION & SOILS

The CLI capability for agriculture is rated as class 4M (60%) and O (40%) within the Plan Area. Soils that are rated as class 4 have severe limitations and have restrictions on the range of crops or require special conservation practices due to moisture limitations. The areas that are rated as O are considered organic soils.

3.7 SURFICIAL GEOLOGY

Based on the Quarternary Geology, Central Alberta map (I. Shetsen 1990) the Plan Area is located in an area described as a stagnation moraine which typically exhibits till of uneven thickness with local water sorted material up to 30 m thick. This stagnation moraine also exhibits undulating to hummocky topography reflecting variations in till thickness. In this area, the topography is described as undulating with local relief generally less than 3 m. Bedrock at the base of the deposit consists of grey feldspathic, clayey sandstone, grey bentonitic mudstone and carbonaceous shale of the Horseshoe Canyon Formation of the Cretaceous age. The bedrock contact is non marine and is often characterized by a concretionary ironstone beds, scattered coal and bentonite beds of variable thickness, minor limestone beds.

3.8 EXISTING TRANSPORTATION NETWORK

Figure 3 *(Pipelines & Rights of Way)* illustrates the major features of the area's existing transportation network. The system impacting the plan area is comprised of Range Road 20 which is constructed to a paved industrial road standard to the east and Township Road 540 to the south and is constructed to an 'all weather' gravel standard.

3.9 ACCESS

There are two access points serving the plan area. The area north of the ravine has a direct access to Range Road 20 while access to the balance of the parcel is gained via Township Road 540 with an existing approach located along the west boundary of the plan area.

3.10 MAJOR FRANCHISED UTILITIES

Fortis Alberta owns an overhead power transmission line, which is located on the west and south boundary of the Plan area. Future subdivision will require connection to this line for electrical servicing.

Lac Ste Anne Gas Coop is presently located along the south boundary of the plan area and serves the three existing country residential lots which are under separate titles. Future subdivision and subsequent development will require connection to this line for natural gas service.

3.11 ENCUMBERANCES

A restrictive Covenant pursuant to the Municipal Government Act is registered against the lands contained within the ‘Plan Area’. The intent of the covenant was to restrict future residential development until the aggregate mining activity which was located in the north quadrant of the quarter section had been exhausted.

4.0 STRATEGY

4.1 PLAN PRINCIPLES

4.1.1 SUSTAINABLE DEVELOPMENT

The first principle is focused on a sustainable community or sense of place that will encompass the core values of a 'Triple Bottom Line' consisting of social responsibility, economic viability and ecological integrity.

- All development shall be in an environmentally sustainable manner, which includes the protection of groundwater supply to ensure that this resource lasts well into the future.
- Development shall be restricted to non-polluting uses and practices.

4.1.2 SIGNIFICANT ENVIRONMENTAL FEATURES

The second principle is one of identifying and protecting environmental features of significance.

- Low lying areas, which at the present time serve as a seasonal surface runoff retention area, need be protected where possible.

4.1.3 INTEGRITY OF TRANSPORTATION INFRASTRUCTURE

The third principle is maintaining the integrity of the transportation network:

- Ensuring that development is accommodated in a fashion that public safety is first and foremost.

4.1.4 EXPANSION OF THE TAX BASE

The fourth principle is taking the necessary steps to broaden the tax base of Lac Ste Anne County in a manner that limits the demands of new development on the County's existing infrastructure.

- Proposing the uses of land that demand reasonable and practical levels of service from the County of Lac Ste Anne.
- Encourage the location of land uses in which assessment are sustained at a high level (minimal depreciation).

4.1.5 GEOGRAPHICAL IMPORTANCE AND VISUAL APPEAL

The last principle relates to the highest and best use of lands:

- Ensuring that the nature of development is one that reflects positively on the County of Lac Ste Anne.
- Development espouses the values of a proud, prosperous, healthy, and vibrant community.
- Consistent site development guidelines are implemented to ensure that development within the Plan Area is visually appealing and environmentally sustainable.

4.2 PLAN PROCESS

The Plan preparation process began by gathering, reviewing and analyzing all relevant information pertaining to future development options within and around the Plan Area. In addition, inventories relating to hydrology and soil permeability are referenced in support of this Plan.

4.2.1 BIOPHYSICAL ASSESSMENT

The overall purpose of the Biophysical Assessment *(Appendix 'A')* was to determine the environmental features found on the subject property, including any watercourses or wetlands subject to the *Alberta Water Act* or the *Public Lands Act*.

- To determine the importance and conservation value of various natural areas located in the study area with respect to future development;
- To determine the value of existing wetlands, woodlots and other ecological features within the study area;
- To assess the connectivity with other surrounding ecological features;
- To identify potential environmental and municipal reserves;
- To identify applicable legislation; and
- Provide recommendations for conservation measures.

4.2.2 GEOTECHNICAL INVESTIGATION

In compliance with the requirements stipulated within Lac Ste Anne County Design Guidelines and Construction Standards for Development, a geotechnical investigation was undertaken by Twerdoff & Associates Inc. *(Appendix 'B')* The objectives of the aggregate assessment were:

- Determine subsurface soil and groundwater conditions. This was completed by drilling a series of boreholes within the property and installing groundwater monitor wells.

- Evaluate the proposed work plan and make recommendations on soil densification and/or preloading for the foundation system.

- Provide a summary of the subsurface soil and groundwater conditions, summary of stratigraphy, suitability as fill soils, and make recommendations with respect to foundation types, pavement design and lateral earth pressure calculations to be used in the design limitations for local infrastructure and buildings.

4.2.3 TRAFFIC IMPACT ASSESSMENT

The purpose of the Traffic Impact Assessment *(Appendix 'C')* prepared by D & A Paulichuk Consulting Ltd. was to assess the potential impact of additional traffic on both the existing local and regional transportation network as a direct result of the proposed development.

The assessment identified and defined the study area, the planning horizon, the analysis period and estimated traffic demand coupled with existing traffic conditions.

In addition, the assessment incorporated a safety analysis, site access analysis, traffic collision analysis, sight distance evaluation and provides overall recommendations for addressing local and regional traffic impacts for incorporation into the ASP.

4.2.4 HYDROLOGICAL ASSESSMENT

A hydrological assessment was prepared by Groundwater Information Technologies Ltd. to determine if a safe 20 yield of potable water was available to sustain the proposed development. A copy of the analysis is attached hereto and referenced as Appendix 'D'.

5.0 PLAN OBJECTIVES

In the preparation of the ASP a detailed review of existing planning policy was conducted to ensure alignment with Lac Ste Anne County planning and policy principles. Without restricting the generality of the foregoing the following documents were referenced within the ASP:

- Lac Ste Anne County Land Use Bylaw;
- Lac Ste Anne County Municipal Development Plan;
- Lac Ste Anne County Development and Design Standards;
- Lac Ste Anne County Corporate Strategic Plan;
- Lac Ste Anne Rural Road Study;
- Lac Ste Anne Master Transportation Plan;

Having regard for the Lac Ste Anne County planning and policy principles and based on the premise of the triple bottom line as the foundation for creating a sustainable development the objectives of the ASP are to:

- Prepare a future development concept for the plan area and provide policy direction describing the manner in which land may be developed.
- Promote a transportation network that includes multiple modes of transportation which shall include automobiles, cycling and walking.
- Identify a strategy for providing open space and trails, including linkage to the existing open spaces and trail system and promote interconnected road and path systems that facilitate efficient provision of municipal services and maintenance.
- Provide for the efficient and phased conceptual design of development.
- Identify lands suitable for public recreational opportunities and include both active and passive recreational opportunities.
- Ensure proper protection for environmentally sensitive areas.
- Recognize and maintain the landscape and other environmental qualities of the plan area.
- Promote the diversification of the local economy by examining economic opportunities and economic viability.
- Incorporate diversity of use that may include and promote home, work and play in close proximity.

- Promote the inclusion of various energy efficiencies in the design of the community by orientating streets to maximize solar gain and reduce northern exposures.
- Promote crime deterrence through safe neighbourhood design by incorporating into the design visible public spaces, clear boundaries between public and private spaces, and identifiable points of entry.
- Promote development which advocates live, work and play opportunities within a mixed use built environment.

6.0 CONCEPT PLAN

The land use prescribed for the site is reflected in Figure 5 *(Land Use Concept Plan).* This concept plan outlines the land uses, transportation network, municipal reserve, open space and utility infrastructure for the Plan Area.

It is acknowledged that much of the plan area is considered as lands possessing limited agricultural capabilities. It is further acknowledged that existing development patterns, development pressures, existing parcel configuration, general public input and the needs of the community to broaden the economic base of the County suggests strong support for the proposed use of the lands.

As such, the plan area has been identified as having characteristics favorable for future development as per Figure 5 *(Land Use Concept Plan).*

Development of the Plan Area could provide the opportunity for properties adjacent to the plan area to take advantage of upgraded infrastructure.

The Land Use Concept Plan proposed for the Lac St Anne Area Structure Plan is shown on Figure 5 *(Land Use Concept Plan).*

Specifically, the Land Use Concept Plan responds to the following critical factors:

- The Lac Ste Anne County existing statutory plans and in particular the Municipal Development Plan.
- Acknowledgment of the existing conditions, such as natural features, current uses of land, parcel boundaries, and subdivision and development opportunities, which result in both opportunities and constraints for future land use.
- The existing transportation network infrastructure including proposed improvements.
- Acknowledgement that infrastructure services are readily available.
- The existence of an aggregate extraction activity which has ceased operation.

6.1 PHASED DEVELOPMENT

The Clearview Ridge Area Structure Plan envisions that the Plan Area will be a phased development, the timing of which is influenced by several factors notwithstanding:

- The immediate needs of the landowner.
- Market conditions.
- A coordinated approach in the provision and construction of 'on-site' infrastructure requirements such as road design, storm water

management, and shallow utility installation.

- The establishment of an economic model that reflects the nature of the development and the limitations of front-loading financial obligations.

- The completion of the Resource Extraction Reclamation Plan prepared by Aspen Land Group Inc. on behalf of Westrock Aggregates Ltd. dated December 2013, attached herewith, and referenced as Appendix 'E'.

6.2 PLAN POLICIES

The policies listed below are unique to the Clearview Ridge Area Structure Plan and are to be applied at the time of the new subdivision and development. All existing statutory plans and policies, particularly those policies referenced in the Lac Ste Anne County Municipal Development Plan, as well as the Land Use Bylaw shall be applied.

Municipal officials and industry representatives have indicated that the demand for a demand for lots ranging from two acres to parcels in excess of five acres in size. To address the need for flexibility in parcel size, a 'scalable' development is proposed in which parcels may be consolidated to achieve specific needs

6.2.1 PHASE I

Phase I shall consist of 9 Country Residential lots, Municipal Reserve dedication and a Public Utility lot, as well as, the provision of a road system necessary to support the phase I development containing approximately 18.24 ha (45.07 acres) as shown in Figure 5 *(Future Land Use Concept Plan).*

6.2.2 FUTURE PHASING

Future Phasing shall include the subdivision and development of the residual lands in title as shown in Figure 5 *(Land Use Concept Plan).*

6.3 LAND USE

6.3.1 LAND USE POLICIES

Notwithstanding the above, all future subdivision and development within the Plan Area shall have regard to the spirit and intent of the Lac Ste Anne County Municipal Development Plan.

6.3.1.1 All future subdivision and development within the Plan Area shall comply with the generalized Land Use Concept shown in Figure 5 *(Land Use Concept Plan)*.

6.3.1.2 All future subdivision and development within the Plan Area shall be in accordance with the requirements of the Lac Ste Anne County.

6.3.1.3 Prior to approval of future phasing as shown in Figure 5 (*Land Use Concept Plan*), a comprehensive geotechnical investigation may be required by the developer in support of future phasing development.

6.3.1.4 The introduction of future phasing shall be contingent on the completion of the reclamation works as identified in the reclamation plan as prepared by Aspen Land Group on behalf of Westrock Aggregate Ltd.

6.3.1.5 Development of land within the plan area shall be in strict accordance with provincially mandated setbacks from water bodies and environmentally sensitive areas.

6.3.1.6 The Developer shall be required to enter into a deferred services agreement with the County prior to receipt of subdivision approval of Phase I, and the County may register a caveat respecting the said deferred services agreement for the purpose of informing lot owners of the requirement to connect to a municipal water and/or wastewater system when such services become available.

6.3.1.7 The re-subdivision of lands contained within proposed Industrial Lot # 16, as shown in Figure 5 (*Land Use Concept Plan*), the size of which are to be determined at the time of subdivision. The future industrial uses are intended to promote live, work and play opportunities.

6.4 TRANSPORTATION NETWORK

The proposed development is to be served by both a proposed access to Township Road 540 as well as an additional access point on Range Road 20 as shown in *Figure 5 (Land Use Concept Plan).*

6.4.1 TRANSPORTATION POLICIES

6.4.1.1 All road improvements, including new construction shall be constructed to municipal standards as stipulated in the Lac Ste Anne County General Municipal Servicing Standards dated January 2008, and shall be at the sole cost and expense of the Developer.

6.4.1.2 Required future road widening to any existing roads including Township Road 540 shall be dedicated at the time of subdivision.

6.4.1.3 All internal development (Future Phasing) within the Plan Area will access a proposed internal road system as shown in Figure 5 (*Land*

Use Concept Plan).

6.4.1.4 The Developer shall (if necessary) dedicate land for the upgrading of the point of intersection of the proposed internal road with Range Road 20 as shown in Figure 5 (*Land Use Concept Plan*).

6.5 ENVIRONMENTALLY SIGNIFICANT FEATURES

Policies are proposed to ensure that the existing environmentally significant features within the Plan Area are protected, while also providing opportunities for the development of new environmental features.

6.5.1 ENVIRONMENTALLY SIGNIFICANT FEATURES & SUSTAINABLITY POLICIES

6.5.1.1 All development within the plan area shall be the subject of Smart development principles and the application of the Triple Bottom Line approach to development.

6.5.1.2 The use of high efficiency and energy efficient building materials, fixtures and appliances shall be encouraged.

6.5.1.3 The individual harvesting of rain water for irrigation purposes on each lot shall be encouraged.

6.5.1.4 Where possible buildings shall be orientated to provide the greatest exposure to the sun and create solar heating and solar capture opportunities.

6.5.1.5 Each lot owner shall be encouraged to plant shelter belts along the north boundary of their lot to provide additional protection from the northern winds.

6.5.1.6 When feasible the harvesting of surface runoff and rainfall captured from buildings and used in the business process shall be encouraged.

6.6 MUNICIPAL RESERVE /OPEN SPACE

The Launch Ventures Area Structure Plan supports the policies within the Lac Ste Anne County Municipal Development Plan with respect to encouraging development of an integrated and contiguous trail system.

6.6.1 Municipal Reserve, as shown in Figure 5 *(Land Use Concept Plan)* will be dedicated in a manner which will enhance and compliment both the Plan Area and the community at large.

6.6.2 Municipal Reserve shall be provided by either the dedication of land, disposition through cash in lieu, or a combination of both. The disposition of reserve including the disposition of the existing reserve caveat shall be at the sole discretion of the Lac Ste Anne County at the time of subdivision.

6.6.3 Pedestrian and bicycle linkages to the adjacent community shall be incorporated into each phase of the development.

6.6.4 Pathways/trail systems shall be aligned with existing and future external pathway/trail systems.

6.6.5 Pathway/trail systems shall, where possible, be incorporated into landscape buffers and sound attenuation berms thereby increasing both the utility and the aesthetics of the berms and buffers.

6.6.6 Pathway/trail systems shall where possible serve as a 'transition' between differing proposed and existing land uses.

6.6.7 The location of a proposed community mail box as well as a school bus collection site are as shown in Figure 5 *(Land Use Concept Plan).*

6.7 SERVICING INFRASTRUCTURE

The purpose of the strategy is to provide for the installation of appropriate utility infrastructure necessary to support the Plan area. Water and Waste Water will be the responsibility of the individual lot owner. Storm water ponding will be constructed within the Plan area to prevent downstream impacts due to surface water runoff.

Sizing and detailed design of the servicing infrastructure including the storm management will be completed in conjunction with the subdivision and development of the project and administered through the development agreement process.

All infrastructure service development shall be designed and constructed in accordance with the specifications and guidelines as provided in the Lac Ste Anne County General Municipal Servicing Standards dated January 2008.

6.7.1.1 All infrastructural development within the plan area shall have regard for the possible extension of services to adjacent lands.

6.7.1.2 Where identified, oversizing of infrastructural services within the plan area will be incorporated into the design and construction process.

6.7.1.3. Where possible, the developer in conjunction with the Lac Ste Anne County shall examine an innovative approach to infrastructure improvements and services that are based on sound economic business practices.

6.7.2 POTABLE WATER POLICIES

All subdivisions and development shall be serviced with individual water wells.

6.7.3 SANITARY SEWER SYSTEM

All subdivision and development shall be serviced with individual Private Sewage Disposal Systems and shall include secondary waste water treatment.

6.7.3.1 SANITARY SEWER SYSTEM POLICIES

6.7.3.1 Prior to the issuance of a development permit for any construction on each specific lot, the Developer shall provide the approved plans of the proposed construction including a site plan indicating the topographical features.

6.7.3.2 Design for constructed waste water collection system shall follow the ‘Standards and Guidelines for Private Sewage Disposal Systems, Alberta Municipal Affairs, and latest edition as a minimum.

6.7.4 STORM WATER MANAGEMENT

The Storm water management system will consist primarily of piping and overland drainage. Storm water run-off from the Plan Area will be restricted to pre-development flows in accordance with the County and Alberta Environment and Parks standards unless otherwise approved by the Lac Ste Anne County. This will be accomplished by using dedicated public utility lots, joint use recreational lands, roadway ditches, culverts, and drainage swales along lot lines. Individual lots will be graded to direct runoff water to the drainage swales, ditches or catchment basins. These ditches will be used to convey water from the lots to the storm pond.

The layout of the overland flow system is designed to work closely with existing topography, as well as the lot layout. The slopes of the ditches and the drainage swales should be maintained between 0.5% and 2.0%. The ditches and swales should be protected with grass vegetation as soon as possible to reduce erosion, and help with storm water quality.

STORM WATER MANAGEMENT POLICIES

6.7.4.1 Prior to the subdivision and development of ‘Future Phasing’ the Developer shall implement a storm water management plan to the satisfaction of the Lac Ste Anne County.

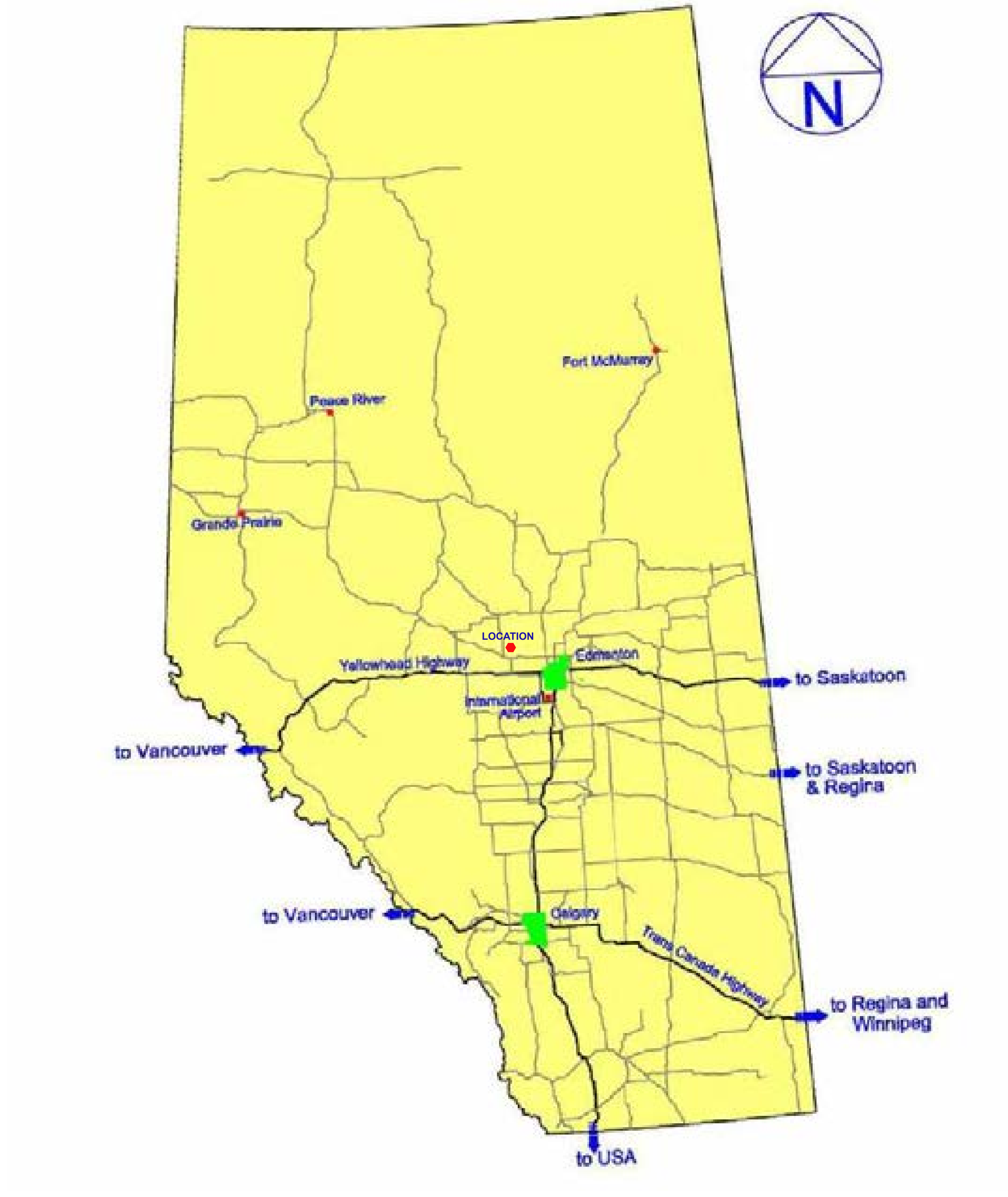
6.7.4.2 Design for constructed storm water management facilities shall follow the 'Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems,' Alberta Environment and Parks, latest edition as a minimum.

6.7.4.3 Native soils shall be salvaged and stockpiled and reused as topsoil and planting bed material.

6.7.4.4 Prior to the subdivision and development of each lot a 'lot grading plan' in accordance with the Storm Water Management Pan will be provided for each lot created.

6.7.4.5 Prior to the subdivision and development of Phase I as shown in Figure 6 – *(Storm Water Management Plan)* the developer and the Lac Ste Anne County shall enter into an agreement with respect to the implementation of a phased storm water management plan.

6.7.4.6 Storm water retention devices such as 'dry ponds' may be designed as joint utility/recreational uses.



FILE # RTW107		FIGURE 1 REGIONAL CONTEXT	**_WESCOTT CONSULTING GROUP_** 28 Cougarstone Common S.W. Calgary, Alberta T3H 5P5 Phone 403-981-7566 Cell 403-862-9323 bob_wescott@shaw.ca
DATE: NOV 2014	SCALE: 1: 1000	SIMPSON PARK AREA STRUCTURE PLAN	

FILE #RTW 087

DATE: MAY 2016

SCALE: 1: 1000

FIGURE 2 PLAN AREA

LAC STE ANNE AREA STRUCTURE PLAN

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FILE #RTW 087

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SCALE: 1: 1000

FIGURE 3 TOPOGRAPHICAL FEATURES

LAC STE ANNE AREA STRUCTURE PLAN

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SCALE: 1: 1000

FIGURE 4 PIPELINES & RIGHTS OF WAY

LAC STE ANNE AREA STRUCTURE PLAN

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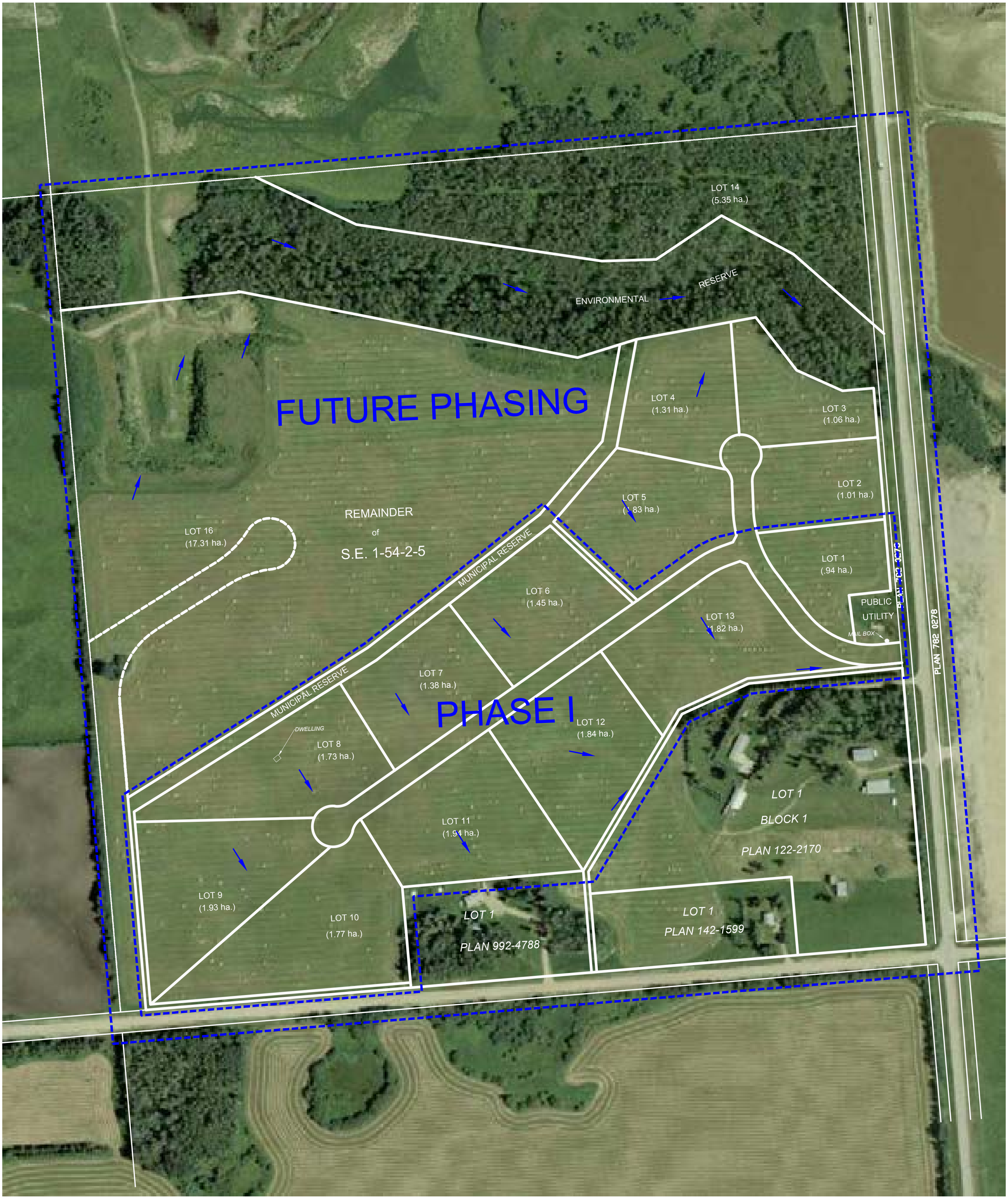

FILE #RTW 087

DATE: MAY 2016

SCALE: 1: 1000

FIGURE 5 CONCEPT PLAN

LAC STE ANNE AREA STRUCTURE PLAN

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FILE #RTW 087		FIGURE 6 STORM WATER MANAGEMENT
DATE: MAY 2016	SCALE: 1: 1000	LAC STE ANNE AREA STRUCTURE PLAN

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“LAC ST ANNE Biophysical Assessment”

S.E. 1-54-2-5

PREPARED BY

MCA Environmental Management

APPENDIX ‘A’

January 2016

Biophysical Inventory
For SE ¼ Section 1–54-2 W5M
County of Lac Ste. Anne
MCA File#2015-1222

Submitted to:

Wescott Consultants Ltd.

November 2015 (revised January 2016)

• RR2 Bluffton, Alberta, T0C 0M0 •
• Telephone: (403) 843-2960 - Fax: (403) 843-2978 - e-mail: melindam@mcaenviro.ca•

Executive Summary

This biophysical assessment has been completed for Launch Venture Ltd. and their consultants Wescott Consulting Group (Cochrane, Alberta), as part of the County of Lac Ste. Anne planning requirements. The client's objective is to develop a parcel of land that is approximately 44 ha at the northeast corner of Lac Ste. Anne, Alberta.

The land description of the property is a portion of the SE 1-54-2 W5M in the County of Lac Ste. Anne.

The biophysical assessment will serve as the base for planning the future development of the property as required by an area structure plan (ASP).

A biophysical assessment is a necessary requirement for the approval of a more detailed ASP for the proposed project site, as well as approval of the storm water management plan for the subdivision, under the *Alberta Water Act* and the *Environmental Protection and Enhancement Act.*

A biophysical assessment is conducted to identify significant and sensitive environmental components on the project site prior to the development of an ASP, and to make recommendations on the sustainability of the site, whether parts of it can or should be preserved in the natural state, and if so, what mitigation and monitoring measures are necessary to achieve sustainability. The Assessment provides recommendations for dedication of lands to be conserved in their existing state within the context of the proposed development project, for the purposes of conservation of habitat, hydrology, and protection of erodible land, water quality or other environmental needs.

The results of the biophysical assessment indicate that the property presents two distinct biological areas. The upland crop area where there is very low diversity with a small wetland on the east border and the creek ravine where there is a great deal of biological diversity. There were no indications of potential species at risk on either site however a detailed investigation on the south side of the ravine was not completed due to the naturally occurring steep slope. The ravine provides a significant ecological linkage with adjacent properties and is considered valuable not only to the property but also to the regional movement of species.

The County of Lac St Anne has identified this particular ravine as a main drainage area (creek) and requires setbacks of 70 meters from the top of the ravine. The ravine has a very steep banks and drivers for this designation may include value of the ecological setting as well as the lack of stability on the slope.

A former gravel pit in the north west corner of the property is registered under the name of Westrock Aggregates Ltd. The mine is exhausted and the pit owner has submitted a pit registration application to Alberta Environment in order to pursue pit reclamation. The reclamation plan encompasses an area of approximately 54 ha which includes the pits located in NE 1 and the SE 1 -54-2W5M. Specifics related to the proposed reclamation are provided in the registration application on file with Wescott.

The subject property has been in use for agricultural purposes since at least 1949 and consists of productive agricultural land in the form of a class 2 soil. While there are no specific limitations related to the development of the land for wildlife habitat, regulators and the developer will likely recognize that development of the site will result in a decrease to local productive agricultural land.

Recommendations for future studies prior to the development of the land include the following.

- Identify timing of the pit reclamation program

- Develop a master drainage plan prior to site development as per the Storm water management guidelines
- Fire prevention and control strategies
- Site hazard management planning
- Weed management and control

These recommendations are not intended to be exclusive. Regulators may have additional requirements not listed here. Reference should be made to the recommendations provided in this report along with the Lac St Anne Municipal Development Plan.

Table of Contents

Figures

Tables

APPENDICIES

1.0 INTRODUCTION

1.1 Project Purpose

This biophysical assessment has been completed for Launch Ventures Ltd. and their consultant Wescott Consulting Group (Cochrane, Alberta), as part of the County of Lac Ste. Anne Planning requirements. The client objective is to develop a parcel of land comprising approximately 55 ha. The proposed development will entail residential acreage properties on the central portion of the site and potential gravel extraction on the northwest portion of the property.

The legal land description of the property is SW 1-54-2 W5M. The land is located within the jurisdiction of County of Lac Ste. Anne. In order to allow for the land to be designated as country residential (for the purposes of subdivision), the County requires that an Area Structure Plan (ASP) be developed for the site.

A biophysical assessment is a necessary requirement for the approval of a more detailed ASP for the proposed project site, as well as approval of the storm water management plan for the subdivision, under the *Alberta Water Act* and the *Environmental Protection and Enhancement Act.*

A biophysical assessment is normally conducted in order to identify significant and sensitive environmental components on the project site prior to development. The biophysical assessment will provide recommendations on the sustainability of the site, whether parts of it can or should be preserved in the natural state, and if so, what mitigation and monitoring measures are necessary to achieve sustainability. The Assessment provides recommendations for dedication of lands to be conserved in their existing state within the context of the proposed development project, for the purposes of conservation of habitat, hydrology, and protection of erodible land, water quality or other environmental needs.

Accordingly, the purpose of this Assessment is:

- To identify and evaluate existing ecological features on the site as they appear at the present time;
- To provide practical recommendations for preserving or enhancing ecologically significant features within the context of the ASP;
- To provide general recommendations for mitigation of potential adverse environmental effects resulting from the development, on the site and on surrounding lands;
- To identify potential environmental and/or municipal reserves;
- To identify applicable legislation; and,
- Provide recommendations for conservation or mitigation measures.

1.2 Project Overview and Site Location

The quarter section of land containing the proposed development site is located at the northwest corner of the intersection of range road 20 and township road 540. The legal land description is SE 1-54-2 W5M containing approximately 55 ha. According to the Lac Ste. Anne Municipal Development Plan (Map 2) the site is currently located in an area identified for future rural residential development. This site however is still classified as agricultural however although there are two subdivided lots in the southeast corner of the site and a new residence located near the west access road.

Figure 1 Shows the location of the project site in regional contexts. Figure 2 shows the site location on the County Map. Figure 3 shows a legal survey of the property.

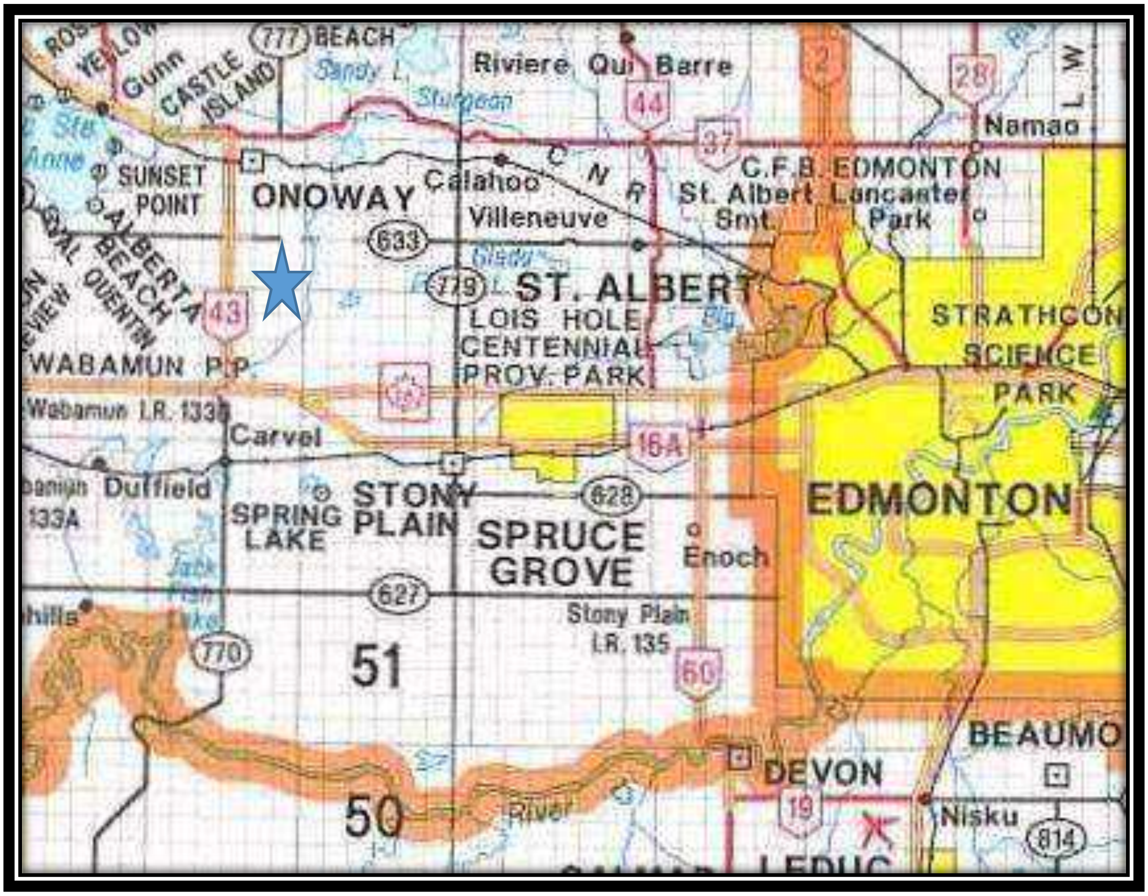

Figure 1: Site location ★

Figure 2: Site Location Lac Ste. Anne County Map

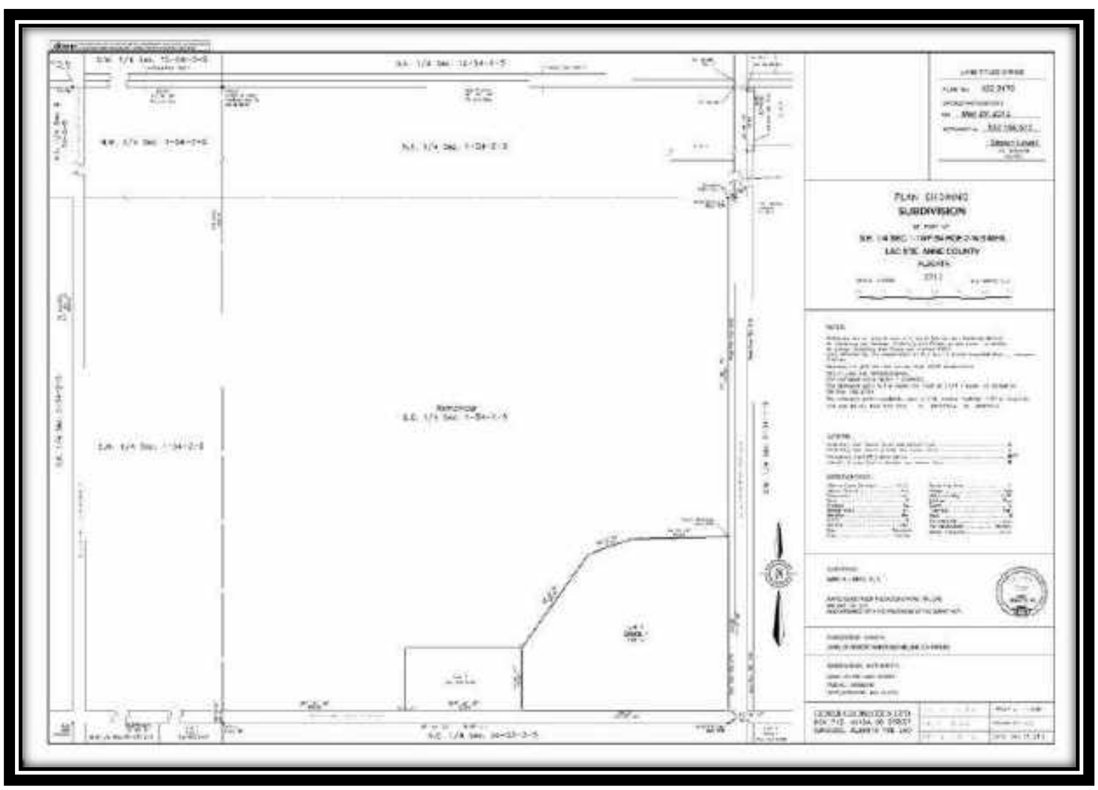

Figure 3: Legal Survey of Site Boundaries

1.3 Scope of the Assessment

The biophysical assessment addresses all parts of the natural environment, and includes:

- Topography, geology and soils;
- Hydrology (surface water, ground water);
- Vegetation (terrestrial, wetland);
- Wildlife (birds, fish, herptiles, invertebrates, mammals) and potential habitat;
- Sustainability of ecosystems;
- Linkages with adjacent ecosystems (connectivity); and,
- Biodiversity and species at risk (rare, threatened and endangered species).

The geographical scope of the assessment is the proposed project site, where boundaries are shown in Figure 3. The assessment also takes into account adjacent land uses and ecological linkages with the subject property in a regional context if warranted.

2.0 APPROACH AND METHODOLOGY

The biophysical assessment was conducted to describe and interpret site features as they existed at the time of the field reconnaissance, which took place on Tuesday August 25, 2015. The study included the following activities:

- Consultation with Wescott Consulting Group undertaking the detailed design of the proposed site development;
- Discussions with site owner on proposed future activities;
- Review of any maps, previous reports, etc., completed for this project;
- Examination of historical aerial photographs, to assess surrounding land use, vegetation areas, developments, etc.;
- Database searches, e.g., ANHIC database for tracked and listed species;
- Field reconnaissance of the site; and,
- Analysis of the information, and drafting the biophysical assessment report.

The scope of the field reconnaissance was to observe features of vegetation, drainage, wildlife and other components of the natural environment, as existed at the time of the field reconnaissance. The types and distribution of vegetation, the type of forest, drainage features, wildlife and wildlife signs (e.g., tracks, feces, hair, burrows, nests, rubs, scrapes, etc.), and any other environmental features, were noted by location and documented with photographs.

The contours of the site were observed on topographical map sheets and directly in the field, and note was made of any depressions which might form a wetland, gully or natural drainage course.

Digital historical aerial photos were obtained from Alberta Sustainable Resource Development (ASRD) and examined at intervals of 5 to 10 years from July 1949, through to August 2011 to learn about past and present vegetation cover, earthworks, human activities or places on the site water tends to collect. Potential wetlands were also identified by noting lower topographical areas, and dark-shaded areas in the aerial photographs. The potential wetlands were then observed in the field, and the vegetation growing there was examined. Classification of these areas as potential wetlands was done mainly according to the Stewart and Kantrud Wetland Classification System (Stewart and Kantrud, 1971). The historical aerial photographs were examined to determine the configuration of each low, wet area and the amount of surface water present in various years.

2.1 Previous Assessments and reports

Background information for the site were provided by Wescott Consulting and included the following.

- Aggregate Characterization Assessment
- Gravel permit (not reviewed)
- Pit registration application (Aspen Land Group Ltd.)

2.1.1 Aggregate Characterization Assessment

An aggregate characterization assessment was completed by Twerdof and Associates Inc. (June 2014). The characterization revealed gravel resources beneath the site at a depth of 7.6 to 11.3 meters (25 t0 37 feet) below overburden. The sand and gravel seam appears to be approximately 3 – 6 meters (10-20 feet) thick. The overburden to gravel ratio is estimated at around 3:1.

2.1.2 Pit registration application

A pit registration application was prepared for an exhausted gravel pit located in the northwest corner of the site. The former gravel pit is registered under the name of Westrock Aggregates Ltd. Aspen Lands Group Inc. prepared the pit registration submission in December 2013. The mine is exhausted and the pit owner has submitted a pit registration application to Alberta Environment in order to pursue pit reclamation. The reclamation plan encompasses an area of approximately 54 ha which includes the pits located in NE 1 and the SE 1 -54-2W5M referred to as the Yeoman and Parker Pits. Specifics related to the proposed reclamation are provided in the registration application on file with Wescott. It is unclear whether the application was accepted by the Alberta government. No dates appear to have been identified for the reclamation. Access into the site for reclamation was proposed from the NE 1 over the culvert in the ravine. The culvert was proposed to remain in place.

2.1.3 Site Development Plans

Plans for future development of the site entails rural residential development as per the plan below. A larger version of the plan is contained in Appendix F.

Figure 4: Phase 1 Proposed Site Development

3.0 REGULATORY REQUIREMENTS

The following is a listing of the primary Acts and Regulations at federal, provincial or municipal levels, which could be relevant to various aspects of the proposed development and possible effects on the environment or natural resources. Not all of the following legislation may be directly applicable to the development and the following is not a comprehensive list of any Act or regulation that could apply in any circumstance. Awareness of legislative requirements can be useful when timing site development.

3.1 Federal Legislation

3.1.1 Migratory birds Convention Act 1994

Under the Migratory Birds Regulation (under MBCA), no person shall hunt a migratory bird except under authority of a federal permit under this Act/Regulation. Subject to subsection 5(9), no person shall (a) disturb, destroy or take a nest, egg, nest shelter, eider duck shelter or duck box of a migratory bird, or (b) have in his possession a live migratory bird, or a carcass, skin, nest or egg of a migratory bird, except under authority of a permit licensed under this Act/Regulation. This Act and its Regulation become particularly important when removing trees or clearing open pasture to facilitate development, to landscape, or to regrade the land. The lack of tree cover on the property combined with the consistent agricultural land use appear to negate concerns related to migratory birds nesting and rearing on the upland area however, there is tree cover and bird habitat in the ravine to the north where birds may nest and rear young.

3.1.2 Fisheries Act

If there is any proposed activity that would destroy or adversely affect fish or fish habitat, such proposed activity would require an Authorization from Fisheries and Oceans Canada (DFO) under the *Fisheries Act (FA)*. The Fisheries Act {R.S. 1985, c. F14}, applies to all Canadian fisheries waters and assigns the Department of Fisheries and Oceans Canada (DFO) the responsibility to administer and enforce the conservation and protection of fish habitat on private property and on provincial and federal lands. Section 35 of the FA states " No person shall carry on any work, undertaking or activity that results in serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery".

A recent change to the FA defers fisheries management to local provinces where equivalent fisheries protection measures are in place. Section 36 of the fisheries act prohibits the deposit of deleterious substances. Environment Canada is responsible for administering this subsection.

There is no water body on this parcel of land to which the fisheries act would apply.

3.1.3 Species at Risk Act

The Species at Risk Act (SARA) was passed in 2002 as part of Canada's commitment to the international Convention on Biological Diversity. The intent of the SARA legislation is to prevent species that are listed in Schedule 1 of the Act from becoming extinct, threatened, or extirpated. Additionally, SARA strives to help in the recovery of any listed species through protecting the critical habitats of at-risk species. Under SARA, it is illegal to kill or harm any listed species, or to destroy the residences of any listed species that occur on federal lands. For listed species that that are found outside of federal lands, it is the duty of the province or territory to protect listed species through legislation. This legislation covers birds, plants, fish, mammals, insects, amphibians and reptiles.

In the present case, no rare or endangered species were expected or observed on the portion of the land in which development is proposed. The south slope in the ravine is quite steep and may have species located in areas that were not accessible during the biophysical assessment site visit. The preservation of the ravine as a wildlife corridor should offset any potential concerns related to species at risk in the area.

3.1.4 Federal Policy on Wetland Conservation

The Federal Policy on Wetland Conservation was passed by Cabinet in 1991, with the objective of promoting "the conservation of Canada's wetlands to sustain their ecological and socio-economic functions, now and in the future" (Government of Canada, 1991). The Federal Policy on Wetland Conservation applies to the full range of federal activities and drives management decisions regarding the protection of wetland habitat on federal lands.

The two key commitments of the Federal Policy on Wetland Conservation include:

- no net loss of wetland functions on federal lands and waters through mitigation of all impacts of development related to these wetlands; and
- enhancement and rehabilitation of wetlands in areas where the continuing loss or degradation of wetlands has reached critical levels

There is one small wetland observed on the subject property.

3.2 Provincial Legislation

3.2.1 Public Lands Act

The bed and shores of all watercourses and water bodies are considered public lands unless the Government of Canada owns them. As such, approvals under the Public Lands Act {R.S.A. 2000, c. P-40} are required for any activity on the bed or shore of Crown owned rivers, streams, or lakes. Any activity that alters or occupies the bed and shore of a water body may be done only after written approval.

A Licence of Occupation (LOC) would be required for in stream structures and permanent or temporary facilities on Crown Land. A Licence of Occupation (LOC) is required under the *Public Lands Act* to build any structures that could have a negative impact on the bed and shore of a water body (e.g., retaining walls, boat launching facilities, breakwater structures, and causeways).

There were no flowing creeks, streams or rivers observed on the subject property. The drainage area in the ravine on the north end however is shown on topographical map sheets.

3.2.2 Environmental Protection and Enhancement Act 1983

The Alberta *Environmental Protection and Enhancement Act (EPEA)* support and promote the protection, enhancement and wise use of the environment. It recognizes the impact of development, polluters paying for their actions, and other such acts.

The Act deals with the release of substances into the environment, regulating releases, and creating general prohibitions with respect to substance release, and also provide the necessary powers to regulate the handling of storm drainage and wastewater. A key part (Section 109) states that no person shall release or permit the release into the environment of a substance in an amount, concentration, or level or at a rate of release that causes or may cause a significant adverse effect, thus covering a very broad range of anti-pollution prohibitions.

Under the Wastewater and Storm Drainage Regulation, EPEA gives powers to Alberta Environment for the regulation of storm water drainage and wastewater systems. The Wastewater and Storm Drainage Regulation and the Wastewater and Storm Drainage (Ministerial) Regulation enable the Department to regulate the operation of storm drainage and wastewater systems and establish standards for such facilities and their operators. This legislation sets out requirements for the construction and operation of municipal plants for handling of storm water drainage and wastewater.

Among other things that the Act covers are the following:

- Harmful emissions to the air (Air Emissions Regulation);
- Release of harmful/toxic substances to the environment (Substance Release Regulation);
- Reclamation of disturbed lands (Conservation and Reclamation Regulation);
- Ozone-depleting substances (Ozone-Depleting Substances Regulation);
- Handling, use and application of pesticides and herbicides (Pesticide Sales, Handling, Use and Application Regulation);
- Potable water (Potable Water Regulation); and,
- Reporting of releases to the environment (Release Reporting Regulation).

EPEA allows for anti-litter orders to be issued for the control of waste on highways, water, ice and public and municipally owned land (which is referred to as enforcement orders). Orders for the cleanup of unsightly property are referred to as environmental protection orders. The forms of both types of orders are set out in the regulations.

EPEA regulates the handling, storage and disposal of hazardous wastes under the Waste Control Regulation. Hazardous wastes are defined in the Regulation.

The Wastewater and Storm Drainage Regulation under AEPEA gives Alberta Environment the responsibility of regulating storm drainage and wastewater systems, including the establishment of standards for such facilities in their operation. This includes naturalized wetlands, other storm water management facilities, outfalls and related piping.

3.2.3 Water Act

The Alberta *Water Act*, which came into force in 1999, supports and promotes the conservation and management of water. It regulates withdrawals and diversions of water, including drilling water wells, through a licensing and authorization system. It regulates water management works and undertakings, and authorizes temporary diversions through a licensing process.

Watercourse crossings (road, bridge, pipeline, telecommunications, etc.) are authorized/regulated through the Alberta Watercourse Crossings Codes of Practice. A Notification must be submitted to Alberta Environment detailing any watercourse crossing structures, and explaining how the construction and operation of the crossing meets the requirements of the Code.

Approval would be required under the *Water Act* from Alberta Environment in respect to any watercourses or wetlands that might be affected, or whose flows may be affected, by the proposed development.

An approval is required to conduct an activity in a water body. An activity is defined generally to include placing or constructing works within a water body, removing or disturbing ground and/or vegetation that results in altering the flow, level, direction and/or location of a water body. A license is required to divert or transfer water from a water body.

Construction of an outfall would also require that the Code of Practice for Outfall Structures on Water bodies under the Water Act be followed. This Code of Practice dictates restricted activity periods on water bodies, and requires that certain design standards be followed. The Code of Practice also requires that notice be issued to the Director, Alberta Environment, prior to commencement of the work. Hydrological issues are discussed later in this report.

Approvals would be required under the *Water Act* to modify or fill any wetlands that might occur on the Property, and to construct any outfall or drainage channel into a water body.

The Act would also apply if withdrawal of water from a Lake/wetland is being proposed as part of the operation, such as for a domestic water supply or other use.

There is one small wetland observed on the east side of the property.

3.2.4 Alberta Weed Control Act

On June 16, 2010, the new Alberta Weed Control Act received Proclamation and came into force. The new Act is a comprehensive re-write of the old Act for the purposes of re-organizing, updating, and providing greater clarity to the existing provisions of the latter.

This Act aims to regulate noxious weeds, prohibited noxious weeds, and weed seeds through various control measures, such as inspection and enforcement, together with provisions for recovery of expenses in cases of non-compliance. Additionally, it mandates the licensing of seed cleaning plants and mechanisms. The Act requires that the owner or occupant of lands control noxious weeds and destroy prohibited noxious weeds on land the person owns or occupies. In 2012 the Alberta Invasive Plant Identification Guide was published to facilitate the identification of prohibited noxious and noxious plants.

Under provincial legislation, only pesticides that have been registered for use in Canada by the Pest Management Regulatory Agency under the Canada *Pest Control Products Act* can be used in Alberta. Pesticides and herbicides are regulated in Alberta under the Alberta *Environmental Protection and Enhancement Act* and supporting regulation (Pesticide Sales, Handling, Use and Application Regulation).

This legislation provides for the regulation of sales (pesticide vendors) and use (pesticide applicators) of pesticides in Alberta. In addition, there is the Environmental Code of Practice for Pesticides which provides more detailed direction for pesticide sales and use in Alberta.

In the field reconnaissance, various weedy species were observed in the laydown area, but for the most part the land was either plowed for cultivation or dominated by grass species. It is recommended that invasive plant species be managed on site and during future site development (e.g., filling and stockpiling of soil) and that where feasible existing weeds be controlled. Manual and cultural methods should be the priority, but where this is not practical, chemical weed control should follow the above regulations and standards; and in such a manner as not to affect the vegetation of any wetland areas within or near the property.

3.2.5 Wildlife Act

Alberta's Wildlife Act is the main piece of provincial legislation that deals with wildlife. Under the Act, hunting without a licence or out of season is prohibited, as is the possession of wildlife and controlled animals (defined in the Act). The Act also covers diseased animals, damage or threat caused by private animals, and the closing of areas to the public to protect wildlife, where necessary. Licences and permits are issued under the Act to regulate hunting or other activities, as outlined above.

3.2.6 Historical Resources Act

Section 37 of the Historical Resources Act provides the framework for Historical Resources Impact Assessments (HRIAs) and mitigative studies. When, in the opinion of the Minister of Alberta Community Development (ACD), an activity will or will likely result in the alteration, damage or destruction of an historic resource, the person or company undertaking the activity can be required to

- conduct an HRIA on lands that may be affected by the activity;
- submit to ACD a report discussing the results of the HRIA;
- avoid any historic resources endangered by activity; or
- mitigate potential impacts by undertaking comprehensive studies.

HRIAs and mitigative studies are paid for by the person or company undertaking or proposing to undertake the activity. ACD regulates archaeological and paleontological fieldwork through a permit system. All decision-making concerning the management of historical resources rests with ACD.

One of the requirements of an HRIA is to address compliance requirements associated with the Historical Resources Act of Alberta. As such, it becomes incumbent for the proponent to comply with any government requirements that result from a Historical Overview if one has been done. At a minimum, ACD should be contacted, to determine if they have any concerns about the Property in question, from an historical, archaeological or related perspective.

3.2.7 Species At Risk Program

Alberta has a Species at Risk Program, which was initiated as a response to the provinces commitment to the Accord for the Protection of Species at Risk in Canada. The intent of the Accord is to prevent species in Canada from becoming extinct as a consequence of human activity. As part of the assessment procedure, all species of concern are generally assessed and are classified as one of the following categories 1) At Risk; 2) May Be at Risk; 3) Sensitive; 4) Undetermined; and 5) Secure. Any species that is designated as “At Risk” or “May Be at Risk” undergoes a detailed status assessment and is formally designated as Endangered, Threatened, Special Concern, Data Deficient, or Not At Risk. Any species that is designated as Endangered or Threatened becomes legally protected under Alberta’s Wildlife Act {R.S.A 2000, c.W-10}. This legal designation prohibits the disturbance, killing or trafficking of these species, and provides immediate protection of nests and den sites. Any species that is designated as “Sensitive” after a general assessment, or as "Special Concern" after a detailed assessment becomes eligible for special management actions designed to prevent the species from becoming "At Risk".

3.3 Standards Policies and Guidelines

Alberta Wetland policy (2013)

Interim policy for wetland management in the settled areas of Alberta and Guidelines for wetland habitat Compensation

Initially developed in 1993, this interim policy provides direction on the management of wetlands in the settled areas (white zone) of Alberta (Alberta Water Resources Commission, 1993). The primary goal of the policy is to "sustain the social, economic, and environmental benefits that functioning wetlands provide, now and in the future" by conserving wetlands in a natural state, mitigating the degradation and loss of wetlands, and enhancing, restoring, or creating wetlands in areas where they have been depleted or degraded.

If the flow of surface water is altered or blocked, or if a wetland is being altered or destroyed by filling in or draining, the Alberta Policy on Wetlands and the *Alberta Water Act* would apply. The Policy, in essence, requires that there be no *net* loss in wetland habitats in Alberta. If a wetland is destroyed, then compensation must be provided by the person or persons responsible for affecting such damage. Under the policy, compensation can be through directly creating equivalent wetland habitat in another location, or by paying a recognized wetland manager (e.g., Ducks Unlimited) to accomplish this. If the compensation sites are within a certain distance from the affected one, the compensation ratio is 3 hectares of new wetland to 1 hectare of affected wetland. Beyond a certain distance between compensated wetlands and affected wetlands, the ratio becomes higher, and increases with progressive distance. This would apply if any wetland that might occur on the Property was affected by the development or related construction activities.

3.3.1 Standards and Guidelines for Municipal Waterworks and wastewater and stormwater drainage systems

Alberta Environmental Protection has established standards and guidelines for the design and operation of municipal waterworks, wastewater and storm drainage systems (Alberta Environmental Protection, 1997). These standards and guidelines outline four types of requirements: Performance Standards, Design Standards, Design Guidelines, and Operating and Monitoring Requirements and Guidelines. These requirements are all directed towards ensuring public health and environmental protection.

3.3.2 Wastewater and Storm drainage regulation and wastewater and storm drainage (ministerial) regulation

The Wastewater and Storm Drainage Regulation {AR 119/93} and the Wastewater and Storm Drainage (Ministerial) Regulation {AR 120/93} fall under Part 4, Division 1 of the Environmental Protection and Enhancement Act {R.S.A. 2000, c. E-12}. These regulations create general prohibitions with respect to substance release to the environment and provide powers to regulate the handling of wastewater and storm drainage

3.3.3 Stormwater Management Guidelines for the Province of Alberta

These guidelines were developed as a result of increased urbanization and public expectation for improved runoff control. These guidelines direct the planning, analysis, design, construction, operation, and maintenance of storm water management systems to address concerns associated with storm water runoff and its impact on urban and rural development, and aquatic resources. These guidelines include Best Management Practices for storm water management and quality control.

3.3.4 Municipal Government

Most Municipal Government bodies in Alberta now require that a biophysical assessment and/or Environmental Impact Assessment or the equivalent be done prior to subdivision of land, and before the completion of an ASP or other site-specific development plan. One of the purposes of this Assessment is to provide a specific assessment process for dedication of Environmental Reserve, Municipal Reserve and Conservation Easement based on municipal, community and environmental needs. In addition, it makes recommendations as to how to avoid, minimize or control adverse effects on the existing environment resulting from the development, if it is to proceed, and how to incorporate the principles of sustainability in designing and constructing the development.

The County of Lac St Anne currently has a draft municipal development plan (MDP) on the public website. The MDP Map 12 Setbacks from Key Water Bodies, identifies the ravine as a key waterbody requiring a 70 meter setback from the top of the ravine. Other relevant parts of the MDP for this site include the following sections as an example.

Part II – Administrative Procedures section 3.7.1 The Development Authority may require a complete Hydrological Ground Water Impact Report for any commercial, industrial, or multi-parcel development.

Part IV – Development Regulations

Aggregate Resource Extraction and Aggregate Resource Processing

11.1.9 All sites must be re-districted as AR – Aggregate Resources Extraction and Processing prior to any application for Aggregate resource extraction and/or processing and will be subject to the regulations as set out in that land use district.

11.1.10 Aggregate resource extraction operations are classified as follows:

a) Class I: Operations equal to or greater than 5.0 ha (12.35 acres) of disturbed area on a site. Operations under this classification shall require municipal development approval. Reclamation plans shall be under the direction of AESRD and the Development Authority.

b) Class II: Operations less than 5.0 ha (12.35 acres) of disturbed area on a site. Operations under this classification shall require municipal development approval. Reclamation plans for existing pits shall be under the direction of County administration. New Class II pits shall be prohibited in Lac Ste. Anne County.

Minimum Separation Distance and Restrictive Covenants

11.1.11 For lands districted as country residential, all uses within the district shall comply with the following minimum separation distances from all aggregate resource extraction or aggregate resource processing uses based on the nature of the resource development. The minimum separation distance shall be measured from the property line of the lands districted as country, residential. The minimum separation distances are outlined in Table 11.1.1 and Figure 11.1.1.

Table 11.1.1 – Minimum Separation Distances from Aggregate

Operations

Operation Separation Distance

Extraction: 800.0 m (2,624.67 ft)

Reclamation: 800.0 m (2,624.67 ft)

Crushing: 1,500.0 m (4,921.26 ft)

Wash Plant: 1,500.0 m (4,921.26 ft)

Asphalt Plant: 1,500.0 m (4,921.26 ft)

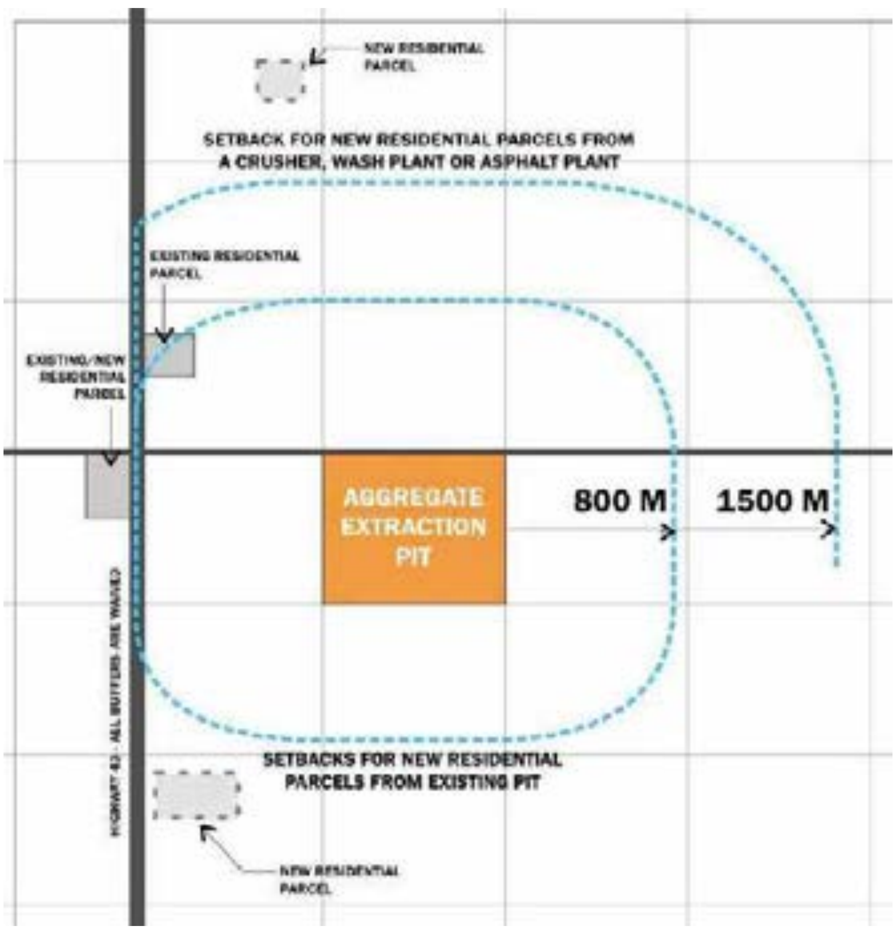

Figure 11.1.1 Setbacks from Aggregate Resource Extraction

(Upon receipt of scaled drawings of existing sites, the minimum separation distance can be determined. Measurement is related to the distance that a new dwelling can be from an aggregate area.)

Land Use By-Law 24-2014

10.2.19 Development shall not be allowed to detrimentally affect natural features such as non-artificial ponds, streams, wetlands and forested areas, but shall preserve and incorporate such features into the site design so that their key functions can be maintained. In addition:

a) Development of, or in proximity to, wetland areas shall only be undertaken where:

i) It minimizes alterations in the natural flow of water, including surface and groundwater sources,

which nourishes the wetlands; and

ii) It protects wetlands from adverse dredging or infilling practices, situation, or the addition of pesticides, salts, or toxic materials.

b) The location of natural features and the site's topography shall be considered in designing and siting of all physical improvements.

10.2.20 Developments must adhere to the following land management practices:

a) Stripping of vegetation or grading shall be done in a manner that will minimize soil erosion by ensuring that the extent of the disturbed area and the duration of its exposure is minimized, and that all grading work should be designed to blend with the natural contours of the land;

b) Natural vegetation shall be retained and protected whenever possible;

c) Natural drainage patterns should not be disturbed and changes to watercourses shall be avoided except where controlled improvements are warranted subject to approval from AESRD; and

d) Developments shall not adversely affect groundwater resources or increase storm water runoff velocity in a way that water levels on other lands are substantially raised or the danger from flooding increased.

This report should address the County of Lac Ste. Anne requirements for a biophysical assessment. The investigation also provides information that would be useful for regulatory determinations under the *Water Act,* the *Public Lands* Act and other applicable acts and policies as outlined above.

3.3.5 Code of Practice for Pits

Gravel pits 5 ha (12.5 acres) or larger on private land are regulated through the Code of Practice for Pits. The Code of Practice outlines the requirements for all phases of pit development, operation, and responsibilities. Registration holders are required to meet the requirements of the code of practice and must obtain written permission from the current land owner prior to any activity or access to the pit. A new land owner means new written permission must be obtained. The end use of the pit must be discussed with the land owner to ensure they concur.

The code of practice outlines the requirements to be met in order ensure compliance with current environmental legislation and approvals. Setbacks from unstable slopes, drainage areas and sensitive areas are specifically addressed. A copy of the code of practice has been provided as reference in Appendix C.

4.0 CURRENT AND HISTORICAL LAND USE

4.1 Site Visit

A site visit was completed in August, 2015 by Melinda McLauchlin of MCA Environmental Management. Observations were made from the road side on the east and south borders of the property and from on site in the north and central portion of the site. The site is bounded on the east by range road 20 and further east by a gravel pit and Kilini Creek. The gravel pit to the east of the site goes north for another quarter section. To the south is township road 540, and agricultural lands and further south more agricultural land. To the west is agricultural land and more gravel extraction to the north and west of the site. The activities in the surrounding area is predominantly gravel extraction and smaller acreage sized developments.

The site was accessed from the west boundary of the property. The access road provides access to a new residential unit near the center of the west side of the site and continues north to a laydown area for heavy equipment.

The site is discussed in five general areas for ease of reference. North ravine, laydown area, former gravel pit, central crop and south farm land.

The North ravine is a steeply sloped forested corridor with the signs of a dry creek bed at the base. There are access trails cut through the forest along the top of the ravine on the north side. The current owner indicated that past owners had cut the trails for hiking or horseback riding. The ravine appears to provide surface water drainage across the northern portion of the site from west to east. Drainage from the west contributes to the ravine flows which ultimately end up at Kilini Creek in the section to the east.

There are berms just south of the forested area on the top of the ravine on the south side (Figure 2). The current owner said he was told the berm was created from topsoil or overburden taken from the gravel pit in the northwest.

The laydown area in the northwest of the property has been cleared in order to create visual barriers in the form of berms and therefore most of the productive soils have been scraped into the surrounding berms. This has opened the site up to a range of weed species. The equipment storage area contains a range of heavy equipment, culverts metal towers or scaffolds, small sheds for additional storage and various other materials. There are a few piles of debris in the form of wood and sheet metal noted on site as well.

The former gravel pit is located north of the laydown area and was previously accessed from the north quarter. Access to the gravel pit from the north crosses a shallow portion of the ravine that may have been previously filled. A large diameter culvert was observed with some flowing water draining to the east. Access to the site from the north was blocked by large concrete barriers put in place by the current owner. The gravel pit appears to have been mined out with only fine grained materials observed on site.

The central portion of the site is currently canola crop. A new residence was observed in the central west portion of the site just south of the laydown area. There were no other structures or storage of materials or equipment noted in the crop portion of the site.

The southeast portion of the quarter shows two privately owned acreage properties as shown on the survey plan in Figures 3 & 4.

4.2 Historical Aerial Photo Review

A random sample of historical aerial photos was selected for examination based on the best available scale, variation in the time of year, and level of coverage. The earliest photo on file at ASRD was 1949 and the most recent was from 2011. An aerial photo from Wescott Consulting was examined from 2012 as well. The following paragraphs provide a summary of relevant site observations. A table of the aerial photo review is provided as Table 1.0.

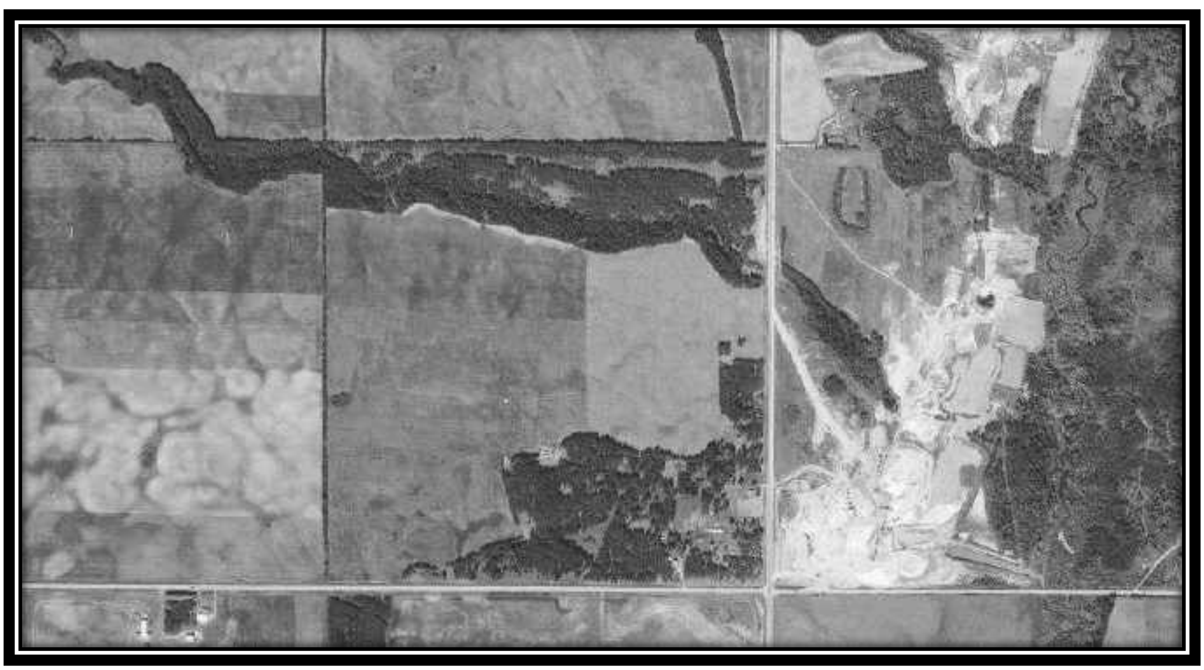

Figure 5: Aerial photo gravel extraction 1967

Figure 6: Aerial photo showing gravel pit on site in 2000

Table 1: Aerial Photo Review

Year	Observations	Scale
1949	No time of year indicated but leaves are visible. The north side of the ravine is sparsely treed. From the Ravine south the majority of the central portion of the quarter section appears fully cleared and cultivated but growth is not yet evident (Spring?). The south end and southeast is still forested and there is a farm located to the southeast. There is a building or something at the central portion of the west side of the quarter. The majority of the site appears well drained Township road 540 is fully developed to the south and range road 21 is fully developed to the east. No sign of gravel extraction in the surrounding quarters. Agriculture dominates the surrounding area.	1:40,000
1967	(August) Date on the photo is August. The north side of the ravine appears to be infilling with vegetation. The site is cultivated with little change from 1949. The central west portion of the site has a cluster of trees where an anomaly appeared in 1949. In the centre of the quarter there is a disturbance visible and may be equipment storage. The farm in the southeast now appears to have two separate driveways and maybe two farms. Two entrances are on the southeast and the other is on the east side. There is gravel extraction east of the site in the adjacent quarter. Agriculture is on all other surrounding lands.	1:31,680

Year	Observations	Scale
1976	(September) Site is fully cultivated and very little change on site is evident from previous photo with the exception of increased density of trees on the north side of the ravine. The gravel extraction to the east appears to have expanded north and there are several settling ponds adjacent the Kilini Creek.	1:20,000
1984	(June) The site is cultivated. Looks like there has been some clearing of trees on the south side of the ravine at the north end of the site to expand cultivated lands. There is a wetland at the east central portion of the site visible at this scale and very clear. There is extensive sand and gravel extraction to the east still and now in the quarter to the north.	1:15,000
1992	(May) The same cultivated lands are still visible and there appears to be more clearing at the south end of the site around the farm. The north and east side of the ravine shows signs of an extensive trail network in the forest. The gravel extraction from the north has dipped into the north west corner of the quarter on the north side of the ravine.	1:10,000
2000	(August) The quarter is cultivated. There is a gravel extraction in the northwest corner on the south side of the ravine and access to the pit is from the north. A crossing over the creek/ravine has been constructed from the north. Clearing for the gravel extraction area appears to have created stockpiles of soil near the middle of the quarter at the north end adjacent the ravine. Long berms are evident and they appear to be vegetated. The wetland at the east side of the quarter is visible as a depression but there does not appear to be open water. Many of the trees in the southeast around the farm have been cleared and it appears there are two distinct access routes to the farm in the south east one from the south and one from the east. There appears to be another residence in the central part of the south side of the quarter. The residences are separated by cultivated and cleared lands where previously there was forest. The gravel pit to the east of the site appears to be	1:20,000
2005	(May) The gravel extraction in the northwest corner is still visible. The majority of the land is still cultivated. The wetland re are rows of round bales visible. No sign of wet area in the north anymore.	1:20,000
2011	(Time of year unknown) Fully cultivated. No signs of wet area but vegetation is evident in the low area. Gravel pit does not appear to be in use.	1:20,000

Aerial photos reveal that the site has been cultivated since prior to 1949 and gravel extraction in the quarter to the east was observed as early as 1967. The ravine across the north boundary provides a history of intermittent drainage to the east. Observations also seem to indicate that the wetland in the east portion of the site may once had been a class V with open water however field observations in August of 2015 show cattails dominate the vegetation across the entire low area. Periods of low precipitation have been evident this summer impacting wetlands, local agriculture and crops in Central Alberta.

5.0 THE EXISTING ENVIRONMENT

5.1 Climate and Air Quality

The proposed development site lies very near the division between the Dry Mixedwood Sub-Region of the Boreal Forest Natural Region of northeastern Alberta, and the Central Parkland Sub-Regions (Alberta Environmental Protection, 2006 Natural Regions and Sub-Regions of Alberta (map).

The climate is sub-humid, continental with short, cool summers and long, cold winters. The mean May - September temperature within the Sub-Region is about 11-13 degrees celcius and the growing period is about 80 - 90 days. Annual precipitation averages about 380 mm with June and July the wettest months. Winters are relatively dry with about 60 mm of precipitation.

The most frequent wind direction varies minimally over the year. Wind directions are mainly from the northwest except during February, April, July and December when they are predominately from the west. Monthly wind speeds are fairly consistent throughout the year (9.3 to 11.9 km/hr.).

Climatic data from Environment Canada was compiled for the 30 year period, 1978 to 2008, from the Edmonton Stony Plain Station; located approximately 10 km southwest of the Property.

Over the period 1978 to 2008, the average monthly temperature for the winter months (December to February) was -9°C with extreme monthly temperature fluctuations (-17.5°C to +39°C) over the 30 year period. Average monthly winter precipitation is 19.15 mm; 92% of which consists of snow.

The average monthly temperature for the spring months (March to May) was 4.3°C; increasing from a March average of -2.7°C to a May average of 10.8°C, with extreme (average) monthly temperature fluctuations of -11°C to +20°Cover the 30 year period. Average monthly precipitation is 33 mm; 67.6% of which consists of rain.

The average monthly temperature for the summer months (June to August) was 15.8°C; with mean minimum and maximum temperatures of 10°C and 20°C, respectively, over the 30 year period. Average monthly precipitation is 85 mm; all of which consists of rain.

The average monthly temperature for the fall months (September to November) was 4.1°C; decreasing from a September average of -11°C, an October average of 5.6°C, to a November average of -4°C over the 30 year period. Average monthly precipitation is 32 mm; with 97% falling as rain in September, 54% as rain in October and <1% as rain in November.

Gravel extraction related industrial activities would be expected to contribute to local air emissions. Higher particulate air quality levels may occur on a temporary basis as a result of agricultural and industrial (e.g., construction, road dust, fires) activity. Vehicle exhaust fumes may be another source of minor air pollution, given the proximity to populated areas and roads.

5.2 Physiography and Topography

Dominant Landforms of the Dry mixed wood region include undulating plains and hummocky uplands.

The slope of the Property is generally trending to the southeast. At the north end of the site the land drops steeply into the Ravine that bisects the northern portion of the quarter from west to east. The base of the ravine shows evidence of an intermittent drainage course flowing to the east. The 1:50:000 topographic map sheet 83G/9 shows prior to any manmade intervention, elevations on site ranged from 740 in the northwest to 720m in the southeast.

One of the lowest drainage areas on site is near the wet land on the east boarder of the property. This low area acts as a minor collection point for surface water drainage during spring melt and major precipitation events.

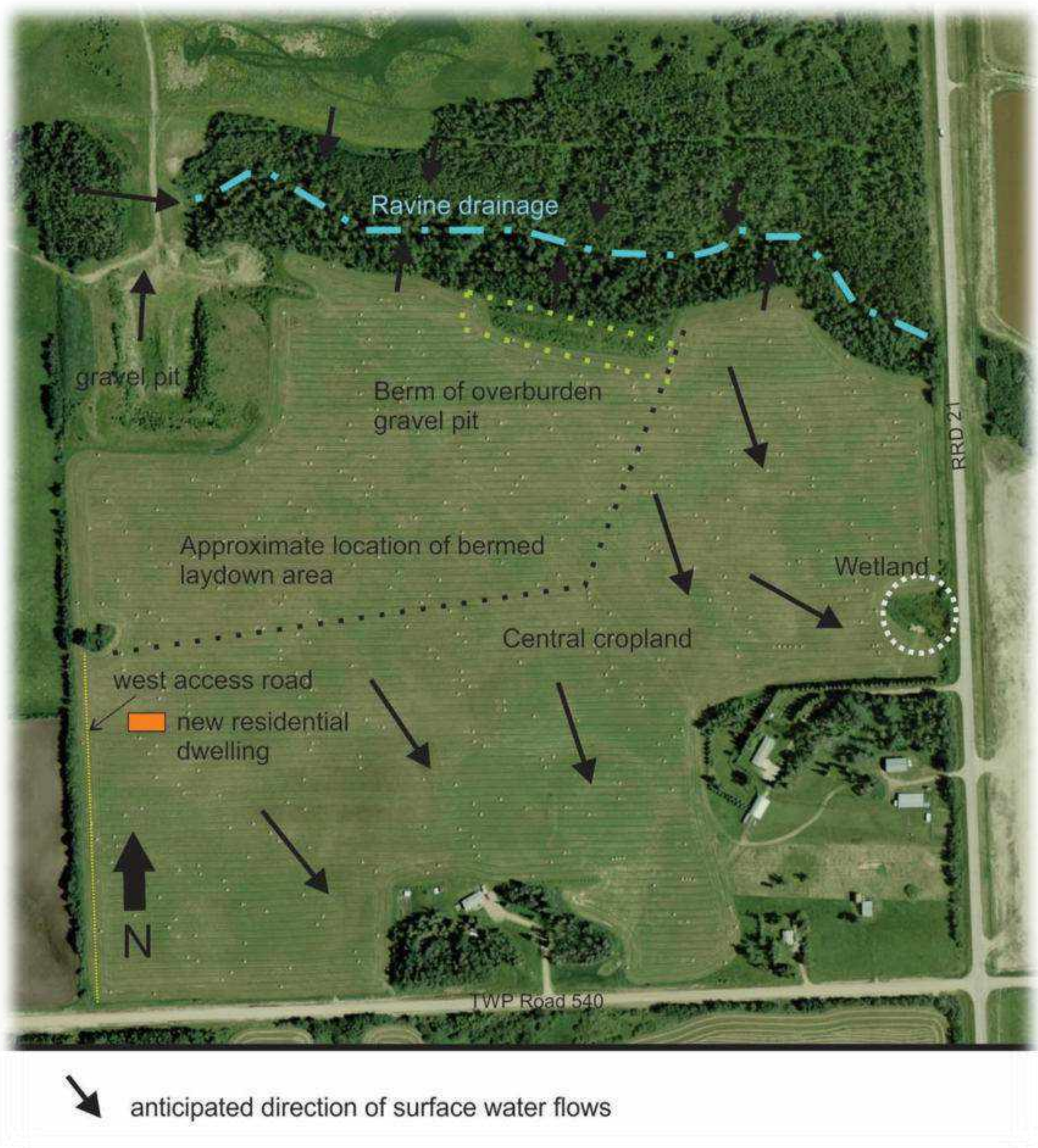

Figure 7: Site Drainage (2011 Aerial photo)

On-site topography was recently confirmed through a survey completed by Airborne Imaging. The site surveys indicate drainage is toward the south and southeast towards areas of lower elevation on site. A copy of the survey figures is contained in Appendix B.

5.3 Geology and Soils

Surficial materials are dominantly medium to moderately fine textured, moderately calcareous glacial till that may be a thin (less than 2 m) blanket over bedrock in some of the low-relief plains. In the eastern part of the Natural Subregion, about 15 percent of the area is covered by glaciolacustrine and glaciofluvial sediments occurring as inclusions within the till plains.

The AGRISID database search was completed for the parcel of land. The database listed the central portion of site as polygon 19125 WSR16/IUh. Based on published information within Agrisid, native soils on site are expected to consist of Orthic Gray Luvisol (CL, SCL, SiCL) on moderately fine textured sediments deposited by water. This area also includes Chernozemic soils (16).

The land suitability rating is listed as 2H10 which indicates the site is 80% class 2 soils sub-class H, and 20% class 2 sub-class W. As mentioned previously the soils on site are considered productive for agricultural land.

5.4 Surface Water

5.4.1 Drainage Patterns on the Property

Surface water drainage on site appears to follow topographic contours directing overland flows toward the southeast portion of the site. The ravine provides periodic drainage service for the regional set to the north and west.

From the recent contour data it appears that generally the surface drainage flows in a south to east direction however local drainage does accumulate in the east border of the site as a small wetland. Over time the wetland appears to have transitioned from an open water wetland to more of a depression. This may be the result of lower than average ranges of precipitation during 2014 and 2015.

5.4.2 Drainage around the property

The closest mapped water body within 5 km of the site is Kilini creek, located approximately 2 km to the east. Based on a review of elevations on the topographic map sheet for the area it appears that the general regional trend of surface water drainage is to the north and east of the subject site towards Coal Lake. Highway 13 shows a definite drop in elevation as it moves east from Lac Ste. Anne. This tends to be reflected in the contours on the map sheet of the area as well

5.5 Groundwater

A search of the Alberta water well database revealed six groundwater well records for the SE 1-54-2 W5M. Based on an overview of the six records on file groundwater could be encountered at depths of approximately 8.5 meters to 20 meters below ground level. A summary of the wells reconnaissance report is listed in Appendix G.

5.6 Vegetation

The biophysical assessment was conducted in part to describe and interpret vegetation communities as they existed at the time of the field reconnaissance, which took place in late August 2015. Most species of plants are visible and identifiable at that time of year but because they are not all in flower some may have been missed. In some cases, while the genus of the plant was recognized, it may not have been possible to identify it to species. In addition the slope on the south side of the ravine was too steep to closely inspect vegetation.

This section provides a description of the vegetation communities observed on the site in the field reconnaissance, preceded by a general description of vegetation in a regional context

5.6.1 Regional Context

The Property is located within the Dry mixed wood Natural Sub-region. This sub-region is characterized by warm summers and a long growing season. Aspen forests with mixed understories are normally found in the uplands and fens with sedges or shrubs commonly found in the low areas

5.6.2 Site Context

The following basic types of vegetation community were observed on the study site:

Central crop land – one new residential house, canola and various weeds such as Canada thistle, scentless chamomile, and

Ravine – the ravine consists of an Aspen and Balsam forest ranging in size from 2-3 cm to 40 cm at breast height (ABH). A few white spruce were noted in the base of the ravine. Understory species included a combination of beaked hazelnut, highbush cranberry, wildrose and bearberry with sasparilla, horsetail and fern. Ground cover included strawberry and grasses.

North side of the Ravine – the north side of the ravine has a gradual slope where the south side is very steep. Both sides are forested but understory vegetation appears more dense on the north side likely due to the more gradual and stable slope. There is a range of trails on this side of the ravine providing access east and west across the top of the ravine as well as offshoots that provide access south into the ravine base. There is a good range of size in Aspen and Balsam poplar from 2-3 cm up to 30 cm ABH. Suckering of the trees is evident into the trails and open cut areas. The understory here is similar to the lower ravine but includes Saskatoon berry, as well. No spruce was observed on the upland sites on either side of the of the ravine. For the most part, the trees in this stand appeared to be vigorous, without signs of excessive or abnormal dieback, breakage or signs of disease. There were some snags and hanging branches and some trees showing signs of fungus which did not seem abnormally represented. The canopy seems robust and healthy.

Northwest side of the ravine – there is an open area just north of the forest where the grade and elevation of the area is higher than the surrounding. It is possible that topsoil or subsoils were located in this area when gravel was extracted. The site is now occupied by willow, purple pea vine and low brush species.

Northwest laydown area – extensive weeds such as thistle, scentless chamomile, meadow hawkweed, dandylion, common tansy and leafy spurge.

Wetland – cattails, sedges, and willow.

5.7 Wetlands and Other water bodies

There is one wetland in the east central portion of the site where historically it appears surface water periodically collects and pools. The vegetation on site includes cat tails, grasses sedges and willow. The wetland was not closely assessed on foot for additional detailed species list. Historical aerial photos show open water during past years and the presence of Typha latifolia (cattails) around the perimeter of the site would indicate a class V wetland. The lower levels of precipitation this year however appear to have reduced the amount of open water and cat tails appear to be filling in toward the middle of the wetland thus it could be considered a class IV.

5.8 Wildlife

5.8.1 Regional Context

The subject Property is located in the Dry mixed wood sub-region of Alberta. Bird species typically inhabiting forested areas in the area include, warblers, like Black-And-White Warblers, American Redstart, Song Sparrow, Northern Water Thrush, Fox Sparrow and Philadelphia Vireo.

Some of the species listed in this sub-region include, Canadian Toad, Northern Leopard frog, red-sided garter snake. Also expected in the area would deer, coyote, cougar, and moose.

5.8.2 Wildlife on the property

With the exception of birds, warbler and woodpecker, wildlife was not observed on the property. Signs of scat from coyotes and ungulates were observed in various locations. The Fish and wildlife internet mapping tool was used to generate a list of species expected in the area. Animals in the area include Canadian Toad, Red Sided Garter Snake and Northern Leopard Frog. A copy of the results is provided in Appendix E.

6.0 BIODIVERSITY

6.1 Species Richness

Site observations were made in August, when flowers were still evident and in some cases seeds. The three areas on site offer very different ecological settings. The central agricultural lands under crop provides little variation in ecological setting and therefore low biodiversity.

The ravine presented a wide range of species from the upland slopes down into the base of the ravine. There is a good amount of succession evident in the deciduous tree species with diameter at breast height ranging from 3 cm to 40 cm. The understorey is well developed with a healthy ground cover presenting a wide range of species including fungi and lichen. There are several fallen logs and leaners left to decay offering a suitable habitat for a range of plant and animal species.

The wetland to the east is somewhat isolated from the ravine and is bordered by the cropland. There is a bit of a buffer around the wetland where some transitional vegetation such as willow are evident.

6.2 Species at Risk

No rare, threatened or endangered species of plants or animals were observed during the field surveys however site visits are limited by the time of year and the extent of the survey limited to a one-day visit.

A database search for rare, endangered or listed species by the Alberta Conservation Information Management System (ACIMS) was completed for this Property. In its response, ACIMS showed no sensitive occurrences noted in the study area. Nonsensitive occurrence's included *Cladonia stygia* commonly referred to as reindeer lichen. No provincially protected areas (PPA's) were returned by the inquiry. A copy of the ACIMS generated report is provided as Appendix D.

In respect to animal species, there were no reported occurrences received from the ACIMS enquiry. This information indicates that the site has little potential to provide habitat for sensitive species.

6.3 Threats to Biodiversity

In general, disturbance to, or loss of undisturbed vegetation translates into loss of ecological habitat niches, resulting in a decline in biodiversity. The more sensitive and the less resilient the predominant vegetation community is, the greater the risk of biodiversity loss in a given area. The ravine provides a unique and meaningful area for biodiversity and an important natural corridor for wildlife to travel safely and take cover.

Risks to biodiversity include the following:

- Soil erosion and instability near the top of the ravine bank,
- Weed infestations, and;
- Changes in run off patterns which could affect the trees and other vegetation through desiccation or flooding or;
- Run off patterns that would divert drainage from the wetland at the east central portion of the site.

7.0 SUSTAINABILITY

Ecosystem sustainability can be impacted by several variables such as, the size of the system (e.g., the length and width of a stand of trees), the health and sensitivity of the soil, land slope angles and aspect, soil drainage and supply of moisture, the depth of the water table and supply of groundwater, and the exposure and susceptibility of the system to the extremes of weather. The ravine at the north end of the site provides a setting for a sustainable ecosystem to exist. The preservation of buffer zones around the top of the Ravine will help maintain structural stability of the ravine as well as provide a valuable drainage area and support diversity in the overall ecosystem for the long term. The maintenance of the feature as a drainage route will also help preserve the ecological setting. The ecosystem has evolved to act as a drainage route during higher than usual precipitation events, meltwater and heavy overland flows.

The crop land in the central area does not represent a sustainable natural ecosystem as it has been cultivated since prior to 1949. The wetland at the east border of the site has appeared over time to act as a natural drainage feature which is protected through legislation. The depression in that area appears to have recently been impacted by lower than average precipitation reducing its visible surface water size, however vegetation observed on site indicate that it is a permanent pond and should be considered a class V wetland. The wetland has the potential to expand during years of increased precipitation. The sustainability of a wetland is dependent on the maintenance of the surrounding lands that contribute drainage to the site. The key concern in future development of the central portion of the site will be to design storm water management plans in such a manner that post-development surface water flows are approximately similar in flow rates and periodicity to what was prevalent in the pre-development condition.

7.1 Ecological linkages

In the central parkland ecological region, ecological connectivity has been impacted by the extensive agricultural and resource extraction land uses. Linkages that do exist rely mainly on forested areas, river and creek valleys which provide visual and thermal cover for many forms of wildlife, as well as nutritional support. Moose and deer, for example, move readily along corridors of forest, because it provides them with visual cover from predators, as well as providing them with a source of food in the form of leafy vegetation. Although they venture out into the open to travel or to access other sources of food, deer prefer to stay within about 180 m of forest cover. Extensive forest areas, therefore, serve as movement corridors for these animals.

Similarly, birds use forest corridors for habitat, visual and thermal cover and the acquisition of food, and because they can fly, easily disperse among patches of forest on the landscape. Mammalian wildlife such as moose, deer, coyotes, furbearers and even amphibians, also use patches of treed areas to disperse with greater safety. These adjacent patches are referred to as "stepping stones", while long bands of forest are called "corridors". Patches of forest that is sufficiently large to support all of the life-cycle activities of animals are equally important. Wetland habitats are also important as stepping stones to habitat with secure brood water. Generally, smaller temporary wetlands are used by waterfowl to disperse pairs into nesting habitat on the landscape, thereby maximizing breeding opportunity. However, after nests have hatched broods are often moved to more secure water until young have fledged.

Amphibians, generally, require upland sites in which to feed and over-winter, but must return to water to reproduce. The distance between wetlands or other waterbodies, and suitable undisturbed upland sites becomes critical when land developments threaten amphibian habitats of one type or another.

In the broader context, aerial photos of the property and surrounding lands as they appeared in 1949 and 2011, shown in Figures 4 and 5 respectively, indicate that the ravine has offered sustainable ecological linkages to adjacent areas.

Figure 8: *Potential ecological linkages, based on wooded areas and wetland/thicket areas in the vicinity of the project site (imagery from Google Earth, 2011). White arrows indicate potentially "permeable" wooded corridors or stepping stone patches amongst core habitats (implies travel in both directions). Orange line indicates boundary of the study site*

7.2 Mapped and Classed Waterbodies in the Area

The Alberta Environment classification system for waterbodies in Alberta is based generally on the abundance and quality of fish habitat. Class A is the highest priority class, and class D is the lowest (except for "unmapped" watercourses which are not shown on the maps at all). Any mapped waterbody must follow the Code of Practice for Watercourse Crossings, which falls under the Alberta *Water Act*. Any classed waterbody must also observe a Restricted Activity Period specified for it, for conducting in-stream construction or related activities.

The only mapped waterbody within 5 km of the site is Kilini Creek, which is 0.8 km east of the subject site. Drainage from the ravine is expected to flow to the east toward Kilini Creek.

8.0 RECOMMENDATIONS

The following recommendations are made for consideration in the possible future development of residential lots at the site for design, construction and post-construction phases. If gravel extraction is to be pursued at the site the specific requirements for pit development, operation and management can be found at Alberta Environment and Parks. A copy of the Code of Practice for pits has been included as Appendix B as part of this report.

8.1 Residential subdivision design

To the extent feasible, the natural contours of the land should be considered in order to conserve the natural drainage patterns and flows, and to moderate storm water drainage patterns, thus damping out extremes of overland flow, avoiding erosion and promoting the settling of solid particulate matter.

Gradual slopes and vegetated swales should be incorporated in the contouring and landscaping of the development in the flat areas surrounding the laydown area. By slowing down the runoff, this provides more opportunity for particulate matter to settle, and nutrients to be removed.

8.2 Opportunities for habitat conservation

The ravine and surrounding upland should be protected with a development buffer. Opportunities to enhance habitat around the subdivision development can be taken through the addition of trees as part of site restoration and landscaping efforts.

Invasive weedy plants should be prevented upon construction completion through the use of re-vegetation strategies where applicable. The use of native grasses will reduce future management requirements if pursued immediately upon construction completion

8.3 Surface water and groundwater

In addition to any Lac St Anne MDP requirements, a master drainage plan as per the Storm water Management Guidelines for the Province of Alberta would be beneficial as part of the overall storm water surface water management plan for any developed area on the Property. The plan should aim at maintaining overland runoff at approximately pre-development conditions, to reduce the risk of flood on adjacent properties as a result of altered runoff patterns. Consideration of changing weather systems as a result of climate change should be incorporated into future designs. This may require anticipation of major rainfall events and related impacts on surface water drainage.

Preservation of the existing wetland on the east central portion of the site should be made a priority by preserving existing drainage to and around the area.

The subdivision should be designed to achieve effective settlement of suspended solids in accordance with the current Alberta Environment guidelines (see above). Otherwise, discharge points from the ditches should be into a vegetated or other area where energy dissipation will occur, or the equivalent, in order to prevent local erosion. Where necessary, roads and their ditches should have flow-limiting structures (e.g., ditch blocks) along sloped stretches so that water draining off or along them does not cause erosion.

Surface paving should be minimized, other than what is necessary for transportation, parking and other infrastructure in order to maintain permeability and thus groundwater re-charge.

Where excavated, topsoil should be conserved and stockpiled with protection from wind and water erosion, and then replaced after construction, being careful not to mix topsoil and subsoil layers

Where any clearing or earthworks are necessary, strict erosion control and reclamation measures should be taken. Contouring should avoid significantly increasing the angle of slopes, such as would lead to erosion and instability.

In order to conserve water landscaping should be completed through the use of native, drought-tolerant plants. This will reduce the need to water plants and reduce the need to use chemical fertilizers.

8.4 Environmental sustainability and Community Participation

The use of fixtures that reduce light pollution, especially avoiding projecting light into natural areas. Fixture design and placement should ensure that most of the light produced should be projected downwards, rather than laterally into the surrounding environment. The use of long wavelength bulbs should be encouraged, as they have less impact on wildlife.

8.5 Ecological linkages

The ravine located on the north end of the property offers important ecological linkages to the properties to the east and west of the site. The ravine provides a movement corridor, food and shelter for wildlife. The Lac St Anne MDP has identified this creek as an important waterway with a 70 meter set back buffer.

8.6 Hazards Wastes and Disturbances

The laydown area in the northwest contains heavy equipment such as graders, backhoes, forklifts, trucks and trailers. There are also wooden rig matts, metal towers, plastic containers, metal culverts, and smaller storage sheds. Various piles of debris on site appeared to contain metals and wood. There is also an ATCO trailer on site. Should the land use in this area change it may be necessary to complete a phase I ESA to verify the environmental integrity of the area as this land use offers the potential to cause contamination as a result of leaks or spills from equipment and storage.

8.7 Gravel Pit Reclamation

Prior to gravel pit reclamation the registration application must be accepted by the Alberta Government and the plan deemed acceptable. Access to the site will need to be coordinated with the current land owner. Due to the ecological significance of the drainage area and the extremely steep slope, adequate buffers from the top of the ravine must be maintained. The site reclamation plan has been outlined in the Pit registration application mentioned in section 2.1.2.

9.0 CONCLUSIONS

Due to the agricultural activities on site, the majority of the upland property presents a lack of biological diversity with poor range of habitat available for plant and animal species. There do not appear to be any biological restrictions to the development of this area.

The ravine across the north end of the property does provide an ecologically diverse setting that provides valuable habitat and cover for a wide range of species. The area serves as a movement corridor providing cover and habitat as well as an ecological linkage across property borders. This area should be protected from future development through the maintenance of setbacks and buffers. There were no species at risk noted for the property

There is one small wetland located on the east border of the property that has been evident in aerial photos since 1949. The wetland is a naturally occurring low area and serves as a catchment for the north and east side of the property. Drainage toward the wetland should not be significantly modified so as to allow for the wetland to continue to thrive and provide a catchment for local overland flows.

The subject property has been in use for agricultural purposes since at least 1949 and consists of productive agricultural land in the form of a class 2 soil. While there are no specific limitations related to the development of the land for wildlife habitat, regulators and the developer will likely recognize that development of the site will result in a decrease to local productive agricultural land. This can be considered a common consequence of development however it should be planned around compatible land uses at appropriate times.

Recommendations for future studies prior to the development of the land include the following.

- Master drainage plan and erosion control strategies
- Fire prevention and control strategies
- Site hazard management planning
- Gravel extraction planning and timing of activities

These recommendations are not intended to be exclusive. Regulators may have additional requirements not listed here. Reference should be made to the recommendations provided in this report along with various other planning tools during future site development including the municipal Development Plan.

10.0 CLOSURE

We trust this report meets your current requirements. If you require any additional information please do not hesitate to contact the undersigned.

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APPENDIX A

Photo 1: Southeast corner of the property has a sign warning against the spread of weeds.

Photo 2: North east side of the laydown area in the northwest corner of the property. Various weed species present due to clearing of topsoil.

Photo 3: Berm surrounding the laydown area provides a visual barrier between cropland and weeds.

Photo 4: Forested area at the base of the ravine where evidence of cut trails exist.

Photo 5: Typical understory in the base of the ravine.

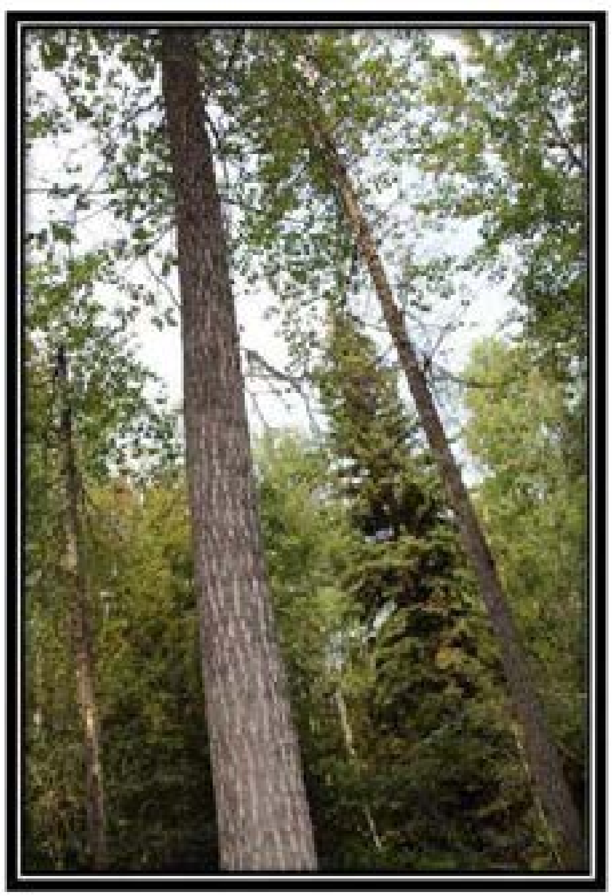


Photo 6: Larger diameter trees in the base of the ravine ~45 cm ABH

Photo 7: Creek in this portion of the ravine did not have running water evident. Portion of the creek in the base of the ravine.

Photo 8: Healthy detris in the base of the ravine provides valuable habitat.

Photo 9: Sample of the understorey in the ravine on the north side of the drainage course.

Photo 10: North side of the ravine part way up the hill. Slope on the north side is gradual.

Photo 11: Upland species on the north side of the ravine surrounding the trail system.

Photo 12: Trees are starting to show some succession but average DBH is about 20 cm.

Photo 13: Diverse health understory at the junction of trails to the north and south as well as east and west.

Photo 14: Trail system on the north side of the ravine shows smaller diameter trees similar in diameter.

Photo 15: At the edge of the forested ravine on the north side Peavine.

Photo 16: At the northwest side of the ravine. Forest to field transition with willow.

Photo 17: Snags provide habitat.

Photo 18: Looking south at the ravine/creek crossing at the north west.

Photo 19: Water in the culvert at the crossing site in the northwest.

Photo 20: Looking north from the NW gravel pit at access road blocked by concrete. .

Photo 21: Gravel pit in the northwest has not been reclaimed.

Photo 22: Equipment storage in the laydown area.

Photo 23: Sheds and material storage.

Photo 24: Looking south on the access road from the laydown area.

Photo 25: New house at the west side of the crop land.

Photo 26: Wetland at the east side of the property. Cattails are infilling.

Photo 27: Shrubs surrounding the wetland at the east side of the property.

APPENDIX B

APPENDIX B: List of plant species observed in vegetation survey of Lac St. Anne property, August 2015. *Arranged in alphabetical order by scientific name*

A. Trees and Shrubs:

Common Name	Scientific Name
Alder	*Alnus rugosa*
Saskatoon	*Amelanchier alnifolia*
White birch	*Betula papyrifera*
Siberian Peashrub	*Caragana arborescens*
Red-osier dogwood	*Cornus stolonifera*
Beaked Hazelnut	*Corylus cornuta*
White Spruce	*Picea glauca*
Balsam poplar	*Populus balsamifera*
Trembling aspen	*Populus tremuloides*
Chokecherry	*Prunus virginiana*
Beaked Willow	*Salix bebbiana*
Sandbar Willow	*Salix exigua*
Western Shining Willow	*Salix lasiandra*
High bush cranberry	*Viburnum opulus*

B. Forbs, Herbs and Other Vascular Plants:

Common Name	Scientific Name
Yarrow	*Achillea millefolia*
Baneberry	*Actaea rubra*
Slender wheat grass	*Agropyron trachycaulum*
Rough hair grass	*Agrostis scabra*
Canada anemone	*Anemone canadensis*
Wild sarsaparilla	*Aralia nudicaulis*
Fringed aster	*Aster ciliolatus*
Milk vetch	*Astragalus sp.*
Slender wheat grass	*Agropyron trachycaulum*
Short-awned foxtail	*Alopecurus aequalis*
Blunt-leaved sandwort	*Arenaria lateriflora*
Brome grass	*Bromus spp..*
Marsh Reed Grass	*Calamagrostis canadensis*
Shepherd's purse	*Capsella bursa-pastoris*
Awned Sedge	*Carex atherodes*
Canada thistle	*Cirsium arvense*
Bunchberry	*Cornus canadensis*
Fairy bells	*Disporum trachycarpum*
Shield fern	*Dryopteris spinulosa*

Spike rush	*Eleocharis sp.*
Fireweed	*Epilobium angustifolium*
Common Horsetail	*Equisetum arvense*
Swamp Horsetail	*Equisetum fluviatile*
Meadow Horsetail	*Equisetum pratense*
Fescue	*Festuca sp.*
Wild strawberry	*Fragaria virginiana*
Narrow-leaved Hawkweed	*Hieracium umbellatum*
Foxtail barley	*Hordeum jubatum*
Creamy Peavine	*Lathyrus ochroleucus*
Twining honeysuckle	*Lonicera dioica*
Bracted honeysuckle	*Lonicera involucrata*
Wild lily-of-the-valley	*Maianthemum canadense*
Yellow sweet-clover	*Melilotus officinalis*
Tall Lungwort	*Mertensia paniculata*
Timothy	*Phleum pratense*
Common Plantain	*Plantago major*
Fowl bluegrass	*Poa palustris*
Wintergreen, Pink	*Pyrola asarifolia*
Yellow Water-crowfoot	*Ranunculus gmelinii*
Skunk currant	*Ribes glandulosum*
Northern gooseberry	*Ribes oxacanthoides*
Prickly rose	*Rosa acicularis*
Wild raspberry	*Rubus idaeus*
Trailing raspberry	*Rubus pubescens*
Arum-leaved arrowhead	*Sagittaria cuneata*
Buffaloberry	*Shepherdia canadensis*
Star-flowered False Solomon's Seal	*Smilacina stellata*
Goldenrod	*Solidago canadensis*
Sow thistle	*Sonchus arvensis*
Bur-reed	*Sparganium sp.*
Marsh Hedge Nettle	*Stachys palustris*
Chickweed	*Stellaria, Cerastrium sp.*
Snowberry	*Symphoricarpos albus*
Dandelion	*Taraxacum officinale*
Veiny meadow rue	*Thalictrum venulosum*
Cattail	*Typha latifolia*
Stinging nettle	*Urtica dioica*
Wild vetch	*Vicia americana*
Western violet	*Viola canadensis*
Kidney-leaved Violet	*Viola renifolia*

C. Non-Vascular Plants:

Sphagnum moss	*Sphagnum sp.*
Club moss	*Lycopodium sp.*
Forest floor moss	*Polytrichum sp.*

Feather moss	*Bracythecium sp.*

APPENDIX C

Alberta Code of Practice for Pits

http://www.qp.alberta.ca/documents/codes/PITS.PDF

Guide to the Code of Practice for Pits

http://environment.gov.ab.ca/info/library/5997.pdf

APPENDIX D

Search ACIMS Data

Updated: July 22, 2015
Today: September 16, 2015

1 Select Requester: *
Consultant

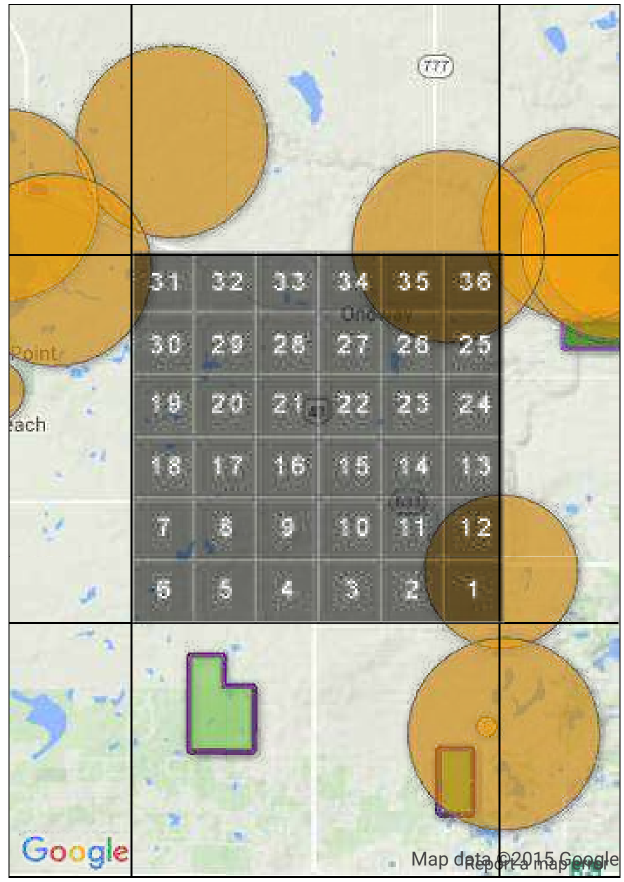
2 Select Reason for Request: *
Land Use Planning

3 **SEC** **TWP** **RGE** **MER**

01 054 02 W5M

(option) Convert Lat/Long to Township

Submit



Layers

- ☑ Element Occurrences (part one, non-sensitive)
- ☑ Element Occurrence (part two, sensitive)
- ☑ Protected Areas
- ☑ Crown Reservation/Notation
- ☑ 100 m Proximity - Protected Areas
- ☑ 100 m Proximity - Crown Reservation/Notation

* *Required*

Table of Results Print Preview

Date: 16/9/2015
Requestor: Consultant
Reason for Request: Land Use Planning
SEC: 01 **TWP:** 054 **RGE:** 02 **MER:** 5

Alberta Parks

Non-sensitive EOs: 1 *(Data Updated:July 2015)*

M-RR-TTT-SS	EO_ID	ECODE	S_RANK	SNAME	SCOMNAME	LAST_OBS_D

Table of Results Print Preview

Date: 16/9/2015
Requestor: Consultant
Reason for Request: Land Use Planning
SEC: 01 **TWP:** 054 **RGE:** 02 **MER:** 5

Non-sensitive EOs: 1 (*Data Updated:July 2015*)

M-RR-TTT-SS	EO_ID	ECODE	S_RANK	SNAME	SCOMNAME	LAST_OBS_D
5-02-054-01	6059	NLTEST7190	S2S4	Cladonia stygia	reindeer lichen	1-Jun-87

Next Steps: See FAQ

Sensitive EOs: 0 (*Data Updated:July 2015*)

M-RR-TTT	EO_ID	ECODE	S_RANK	SNAME	SCOMNAME	LAST_OBS_D

No Sensitive EOs Found: Next Steps - See FAQ

Protected Areas: 0 (*Data Updated:May 2015*)

M-RR-TTT-SS	PROTECTED AREA NAME	TYPE	IUCN

No Protected Areas Found

Crown Reservations/Notations: 0 (*Data Updated:May 2015*)

M-RR-TTT-SS	NAME	TYPE

No Crown Reservations/Notations Found

Next Steps: See FAQ

Sensitive EOs: 0 (*Data Updated:July 2015*)

M-RR-TTT	EO_ID	ECODE	S_RANK	SNAME	SCOMNAME	LAST_OBS_D

No Sensitive EOs Found: Next Steps - See FAQ

Protected Areas: 0 (*Data Updated:May 2015*)

M-RR-TTT-SS	PROTECTED AREA NAME	TYPE	IUCN

No Protected Areas Found

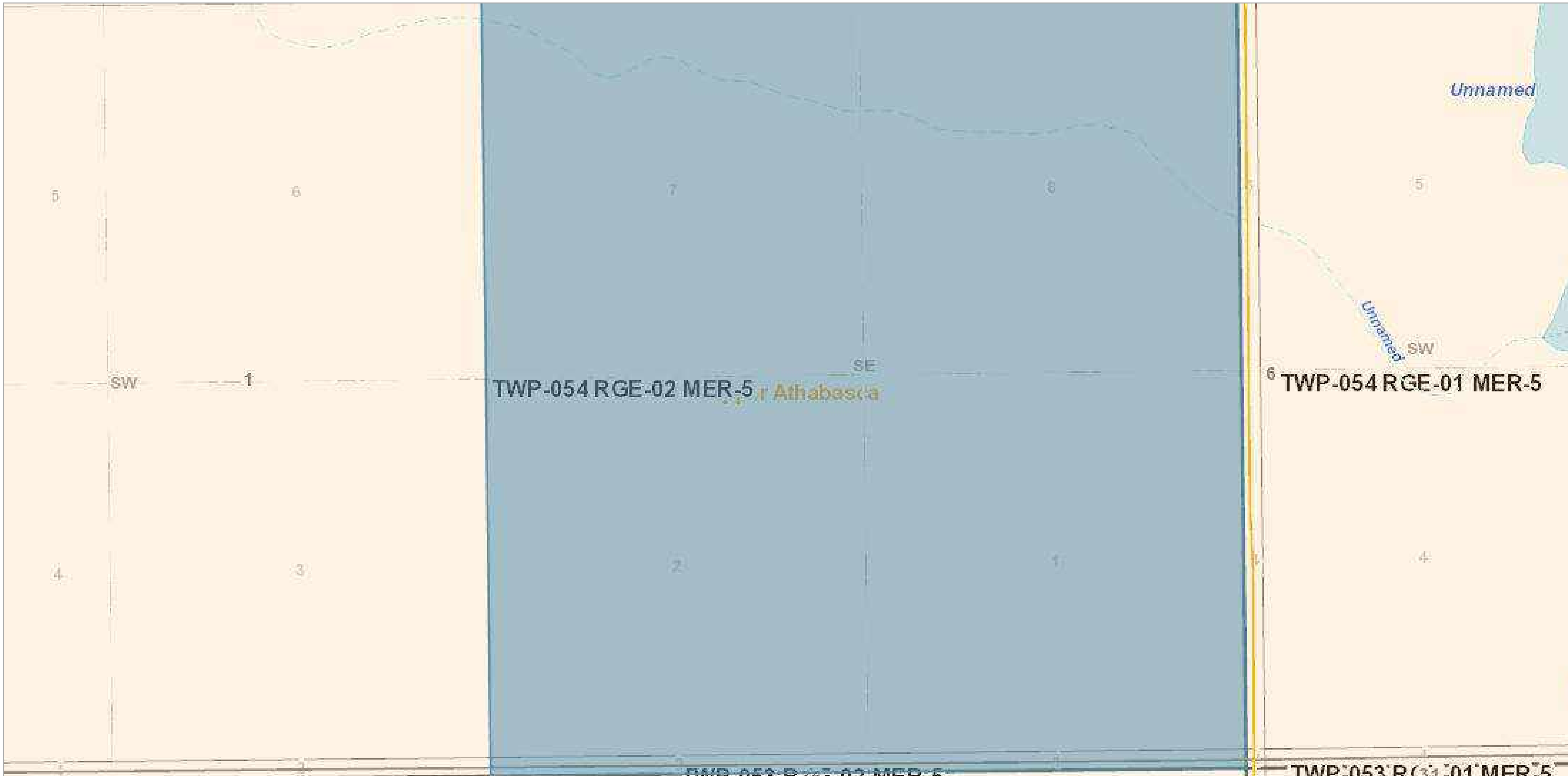
Crown Reservations/Notations: 0 (*Data Updated:May 2015*)

M-RR-TTT-SS	NAME	TYPE

No Crown Reservations/Notations Found

APPENDIX E

Fish and Wildlife Internet Mapping Tool



Alberta Environment and Parks

0.1 0 0.03 0.1 Miles

Projection: NAD_1983_10TM_AEP_Forest

Map Scale: 5,735

Printed on: September 16, 2015 14:17:20 -06:00

Legend

Stocked Waterbodies
FWMIS River and Stream Label
FWMIS Lake Label
Other Waterbody Label
FWMIS River and Stream
- River or Stream
- Indefinite Stream
- Canal
- Aqueduct
- Representational Flow

FWMIS Major Waterbody
- Perennial Lake
- Intermittent Lake
- River
- Icefield

Other Waterbody
- Perennial Oxbow
- Intermittent Oxbow
- Canal
- Wetland
- Lagoon
- Reservoir
- Dugout

Provincial Sanctuary Corridor Wildlife
Provincial Sanctuary Game Bird
Provincial Sanctuary Restricted Area
Provincial Sanctuary Seasonal
Paved Road Label (20K)
Paved Road (20K)
- Primary Divided
- Primary Undivided 4L
- Primary Undivided 2L
- Primary Undivided 1L
- Interchange Ramp
- Secondary Divided
- Secondary Undivided 4L
- Secondary Undivided 2L
- Secondary Undivided 1L

Gravel Road Label (20K)
Gravel Road (20K)
- Primary Undivided 2L
- Primary Undivided 1L
- Secondary Undivided 2L
- Secondary Undivided 1L

Lake/River (20K)
- Lake or River
- Reservoir
- Icefield
- Major Canal
- Oxbow
- Quarry
- Dugout

Intermittent Lake (20K)
- Intermittent Lake
- Intermittent Oxbow

Sandbar / Wetland / Lagoon
- Sandbar
- Wetland
- Lagoon

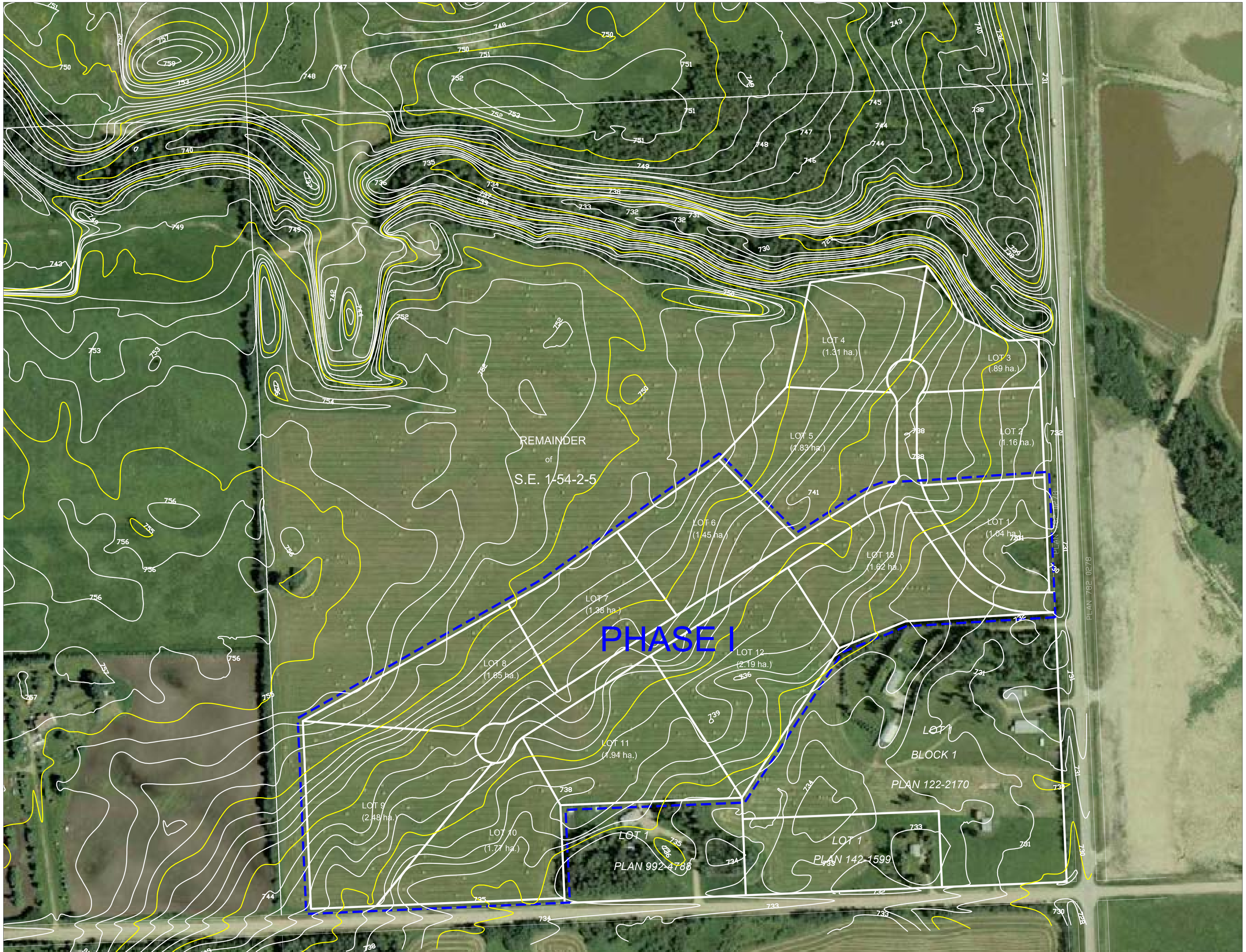
Stream (20K)
- Stream
- Canal
- Oxbow
- Ditch

Intermittent Stream / Aqueduct / Spillway
- Recurring Stream
- Indefinite Stream
- Arbitrary Flow
- Recurring Oxbow
- Aqueduct
- Spillway

ATS Township Index
ATS Section with Road Allowance
ATS Quarter Section with Road Allowance
ATS Legal SubDivision with Road Allowance
Town
Urban Service Area
City
Exploration Restricted Area Label
Exploration Restricted Area
- Active
- Cancelled

Environment and Sustainable Resource Development Operations

APPENDIX F



PROPOSED DEVELOPMENT
OF
S.E. SEC. 1-54-2-W5M
WITHIN
COUNTY OF LAC ST ANNE
FOR
LAUNCH VENTURES

PLAN AREA SHOWN

C OF T AREA 134.6 ac.

PHASE I BOUNDARY

NOTES:

1. ALL DISTANCES ARE IN METRES AND DECIMALS THEREOF.
2. ELEVATIONS ARE GEODETIC AND DERIVED FROM ALSCM.

NO	DD/MM/YY	DESCRIPTION	BY
6			
5			
4			
3			
2			
1			
		REVISIONS	

PROJECT
PROPOSED DEVELOPMENT

CLIENT
LAUNCH VENTURES LTD.

DRAWING TITLE
SITE PLAN OPTION # 2

FILE #	SCALE	DATE	DRAWN BY:
RTW087	1:2000	15/3/15	RTW

WESCOTT CONSULTING GROUP
28 Cougarstone Common S.W. Calgary, Alberta T3H 5P5
Phone 403-981-7566 Cell 403-862-9323
bob_wescott@shaw.ca

APPENDIX G

Lac St Anne

Projection
Web Mercator (Auxillary Sphere)
Datum
WGS 84
Date
9/9/2015 11:10:08 AM

Legend
- Groundwater Drilling Report
- Baseline Water Well Report

http://groundwater.alberta.ca/WaterWells/d/

Reconnaissance Report

View in Metric

Export to Excel

Groundwater Wells

Please click the water Well ID to generate the Water Well Drilling Report.

Well ID	LSD	SEC	TWP	RGE	M	DRILLING COMPANY	DATE COMPLETED	DEPTH (ft)	TYPE OF WORK	USE	CHM	LT	PT	WELL OWNER	STATIC LEVEL (ft)	TEST RATE (igpm)	SC_DIAM (ft)
362774	SE	01	054	02	5	GERALD MCGINN DRILLING LTD.	1992-01-23	105.00	New Well	Domestic & Stock		8		PARKER, CHARLES	40.00	7.00	6.00
364955	SE	01	054	02	5	UNKNOWN DRILLER		110.00	Chemistry	Domestic				DUBE, LEO			0.00
444095	SE	01	054	02	5	GERALD MCGINN DRILLING LTD.	1974-10-23	94.00	New Well	Domestic		11		PARKER, CHARLIE	38.00	7.00	4.50
444096	SE	01	054	02	5	GERALD MCGINN DRILLING LTD.	1971-05-08	106.00	New Well	Domestic		12		PARKER, CHARLES	68.00	3.00	4.50
444097	SE	01	054	02	5	GERALD MCGINN DRILLING LTD.	1983-09-30	94.00	New Well	Domestic & Stock		7		PARKER, CHARLES	40.00	3.50	5.56
495878	SE	01	054	02	5	RODCO DRILLING	1999-09-14	108.00	New Well	Domestic		11	7	DUBE, LEO	50.80	9.00	6.00

“AGREGATE & GEOTECHNICAL ASSESSMENT”

S.E. 1-54-2-5

PREPARED BY

TWERDOFF & ASSOCIATE

APPENDIX ‘B’

June 2014

Aggregate Characterization Assessment

Prepared for:

Wes Erickson

On
SE 1-54-2-W5M

Prepared by:

TWERDOFF & ASSOCIATES INC.

Dennis Twerdoff, M.Sc., P.Geol., P.Ag.
Senior Project Manager

June 2014

TWERDOFF & ASSOCIATES INC.
ENVIRONMENT GEOSCIENCE

TABLE OF CONTENTS

LIST OF APPENDICES

1 Introduction

Twerdoff & Associates (Twerdoff) was retained by Wes Erickson determine the location and extent of potential aggregate reserves within SE 1-54-2-W5M (Figure 1). This land is surrounded on 3 sides by aggregate operations. An old pit is present in the far northwest corner of the property.

The property is located approximately 5 miles southeast of the town of Onoway, Alberta. The land is currently agricultural with areas being developed into a lay-down yard. There are also 2 subdivision lots with 3 residences on the south and southeast portions of the ¼ section.

1.1 Objective

The objective of the Aggregate Characterization Assessment was to delineate potential aggregate reserves, to assess the general aggregate quality and provide a general estimate of potential reserves.

1.2 Scope

The scope of work for this Assessment included the following principle tasks:

- Review Alberta Geological Survey (ASG) sand and gravel information for the area,
- Design a rough exploration plan,
- Attend auger drilling and log test hole lithology,
- Prepare an Aggregate Characterization Assessment report to summarize findings.

1.3 Geology

A search of surficial geology on the property was conducted. The AGS identified areas within the SE 1-54-2-W5M along with surrounding land as having Dirty Sandy Gravel with an average of 5 m of aggregate (AGS, 2014) (Figure 2).

Quaternary geology consists Stagnation Moraine. The Stagnation Moraine is characterized by till of uneven thickness, local water sorted material, it is up to 30 m thick, and is undulating hummocky reflecting variations in till thickness. Topography is undulating with local relief of up to 3 m (Shetson, 1990).

A Water Well search was conducted on the Alberta Environment Water Well Information Database website for wells located within SE 1-54-2-W5M. Five (5) water well records were returned. Well lithology on records that recorded lithology did not show any layers of sand and gravel.

Bedrock geology consists of the Horseshoe Canyon Formation of Mesozoic age (Abadata,2013).

2 Methods

2.1 Drill Program

Mobile Augers from Edmonton Alberta conducted auger drill testing from May 5 to May 9, 2014. A 6" auger was used to drill boreholes between 27 and 74 feet below ground level. A total of 20 boreholes were advanced throughout the property.

Subsurface lithology was recorded by Dennis Twerdoff, P.Geol. P.Ag.

The testhole number, location and general lithology for each test hole is illustrated in Figure 3, **Appendix A**.

A detailed description of each test hole lithology is outlined in **Appendix B**.

3 Results

3.1 2014 Drill Program

In general, testholes encountered a silty sand on the surface followed by a brown clay layer. In northwest portions of the property, a seam of sand and gravel was observed under the brown clay which seemed to pinch out into a gravelly clay south and east where topography dropped in elevation. Below this, another layer of clay was observed with a few holes drilled to bedrock.

The sand and gravel seam was encountered in the northwest portion of the property. The potentially mineable area is outlined in Figure 3, **Appendix A**.

The deposit was relatively sandy with an estimated 40% gravel content and 60 % sand content. The sand and gravel seam along the edges of the deposit were mixed with clay while the majority of the seam was quite clean. Within the heart of the deposit, the sand and gravel seam was covered with 25-37 feet of overburden and the seam was approximately 10-20 feet thick. The approximate overburden to gravel ratio was 3:1.

4 Discussions and Conclusions

There are active sand and gravel pits north, west and east of the property. Very old gravel pits are located approximately 2 miles south. The gravel pit west and northwest of the property are thought to be operated by Lafarge Canada. The gravel pit immediately north of the property is now operated by The Fath Group of Edmonton, AB (pers. comm. with pit operator).

The Alberta Geological survey identified this property as possessing sand and gravel. Water well logs on the SE 1-54-2-W5M did not reveal any sand and gravel layers within reported logs. There is an old excavation approximately 1.4 ha in size in the northwest corner of the property that appears to be largely depleted.

Test hole results indicated that sand and gravel was present in the northwest portion of the property. Typically, when sand and gravel is mixed with clay, as in the outer fringes of this deposit, reserves are not economic because it is difficult to separate the clay from the gravel using conventional processing.

The sand and gravel seam was present on the north side of the steep valley and creek that intersects the northern portion of the property. Typically, a 10 m buffer from the valley break would be required if mining operations encroached on the steep valley and creek.

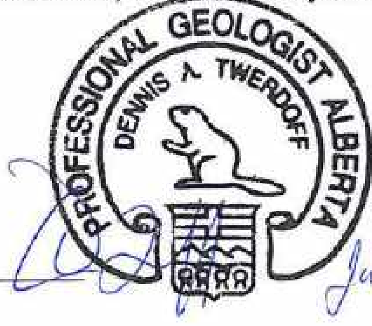
The area where the sand and gravel seam was present was approximately 18 ha in size, less 1.4 ha that have been previously excavated and another approximately 4 ha encompassed by a steep valley and creek.

It is estimated that there is approximately 12.6 ha of area that is potentially mineable. It is estimated that there are approximately 400,000 m^3 of sandy gravel reserves within the mineable area. There is an approximate 3:1 overburden to aggregate ratio.

Since Wes Erickson is not in the sand and gravel business, it is recommended that Mr. Erickson contact Lafarge Canada and The Fath Group to see if they would be interested in mining the area under a lease agreement. This should be done fairly soon as both pits operated by both operators appear to be nearly depleted and they may commence with reclamation soon. Getting an operator in the future may be difficult because the area is relatively small and there are large amounts of overburden to move to access the gravel seam.

4 Closure

This report, entitled *Aggregate Characterization Assessment*, prepared for Wes Erickson.; prepared by Twerdoff & Associates Inc.; June 2014, was produced by the following individual(s):



June 24, 2014

Dennis Twerdoff, M.Sc., P.Geol., P.Ag.
Senior Project Manager

APEGA Permit to Practice

Permit No. 12187

5 References

1. Abadata, 2014. Abacus Datagraphics. http://www.abacusdatagraphics.com/
2. Shetson, 1990. Quaternary Geology. Central Alberta. Alberta Research Council. http://www.ags.gov.ab.ca/publications/MAP/PDF/MAP_213.PDF
3. http://groundwater.alberta.ca/WaterWells/d/

Appendix A

Figures

WES ERICKSON

FIGURE 1: SITE DIAGRAM
WITHIN SE SEC. 1, TWP. 54, RGE. 2, W5M
LAC STE. ANNE COUNTY, ALBERTA

Taken From:http://www.gov.lacsteanne.ab.ca/departments/administration/county-map

Scale

0 1000 2000 3000

METRES

LEGEND

FEATURES

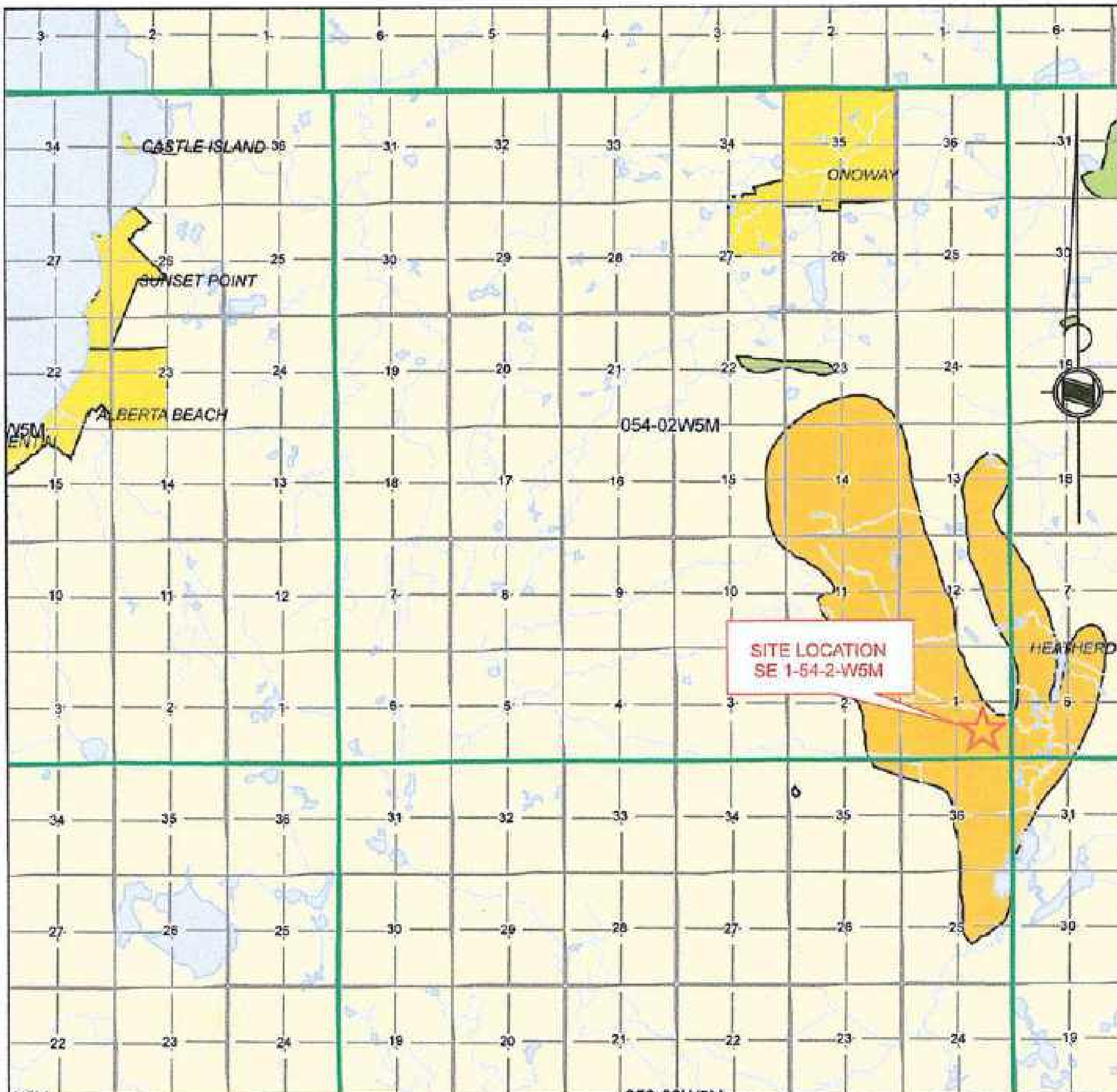
Site Location.. ☆

TWERDOFF & ASSOCIATES INC.
ENVIRONMENT GEOSCIENCE

Rev.	Description		Date
0	ORIGINAL ISSUE		Jun 24, 2014
Airphoto Date: 2013/9/22	Drawn CCS	Checked DT	
TWERDOFF & ASSOCIATES INC.		File No. 14-102	

WES ERICKSON

FIGURE 2: AGS MAP
WITHIN SE SEC. 1, TWP. 54, RGE. 2, W5M
LAC STE. ANNE COUNTY, ALBERTA



Taken From:http://www.gov.lacsteanne.ab.ca/departments/administration/county-map

Scale
0 1000 2000 3000
METRES

LEGEND

FEATURES

Site Location.. ☆
Dirty Sandy Gravel..
(Defined by the Alberta Geological Survey)

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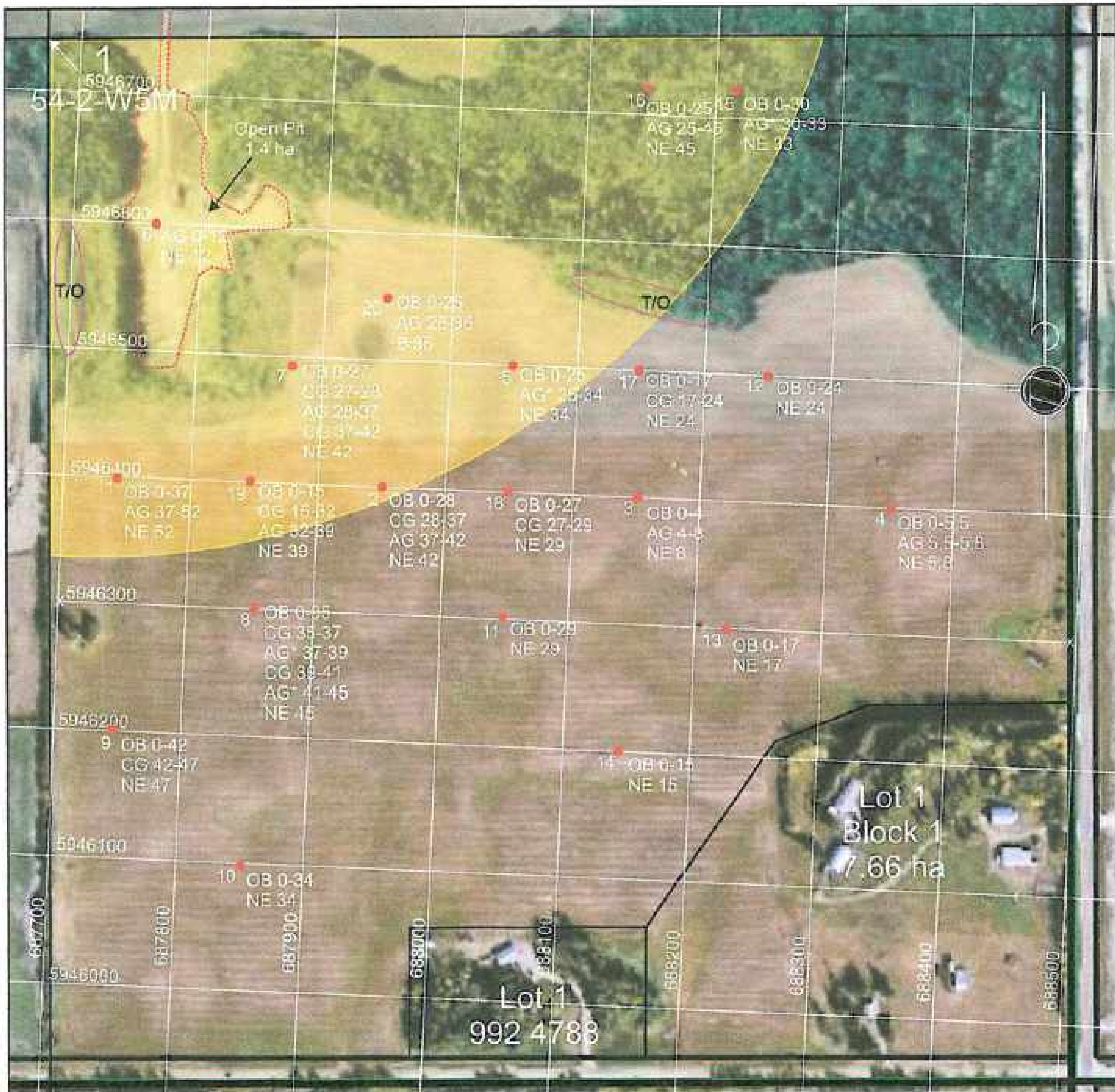
Rev.	Description		Date
0	ORIGINAL ISSUE		Jun 24, 2014
Airphoto Date: 2013/9/22	Drawn CCS	Checked DT	
TWERDOFF & ASSOCIATES INC.		File No. 14-102	



WES ERICKSON

FIGURE 3: TEST HOLE DIAGRAM WITHIN SE SEC. 1, TWP. 54, RGE. 2, W5M LAC STE. ANNE COUNTY, ALBERTA

Taken From:http://www.gov.lacsteanne.ab.ca/departments/administration/county-map

Scale= 1:5 000

0 50 100 200 300 400

METRES

LEGEND

FEATURES

Property Boundary
Test Location
Topsoil/Overburden Stockpiles
Potential Mineable Reserves

Overburden .... OB
Clay/Gravel .... CG
Good Quality Gravel .... AG*
Aggregate .... AG
None Economic Material .... NE
(measurements in feet)

TWERDOFF & ASSOCIATES INC.
ENVIRONMENT GEOSCIENCE

Rev.	Description		Date
0	ORIGINAL ISSUE		Jun 24, 2014
Airphoto Date: 2013/9/22	Drawn CCS	Checked DT	
TWERDOFF & ASSOCIATES INC.		File No. 14-102	

Appendix B

TEST HOLE LOGS

Test Hole #1	Description	UTM Zone 11
Depth (ft)		5946400 N, 687750 E
0-10	Sand and silt	
10-15	Clay w/ small amount of gravel	
15-26	Dark brown clay	
26-37	Clay w/ small amount of gravel	
37-39	Sand w/ minor gravel	
39-42	Sandy gravel	
42-44	Sand	
44-50	Sandy gravel	
50-52	Gravel	
52-57	Clay	
57-68	Clay	
68-74	Hard clay	
74	Bedrock	

Test Hole #2	Description	UTM Zone 11
Depth (ft)		5946400 N, 687950 E
0-5	Sandy clay	
5-6	Gravel lense	
6-12	Clay w/ minor gravel	
12-28	Clay	
28-37	Clay gravel	
37-39	Gravel	
39-42	Sandy gravel	
42-52	Clay	
52-62	Clay/sand	

Test Hole #3	Description	UTM Zone 11
Depth (ft)		5946400 N, 688150 E
0-4	Sand silt	
4-5	Sand/gravel	
5-8	Sand	
8-37	Clay	
37-52	Hard clay/sand	
52	Bedrock	

Test Hole #4	Description	UTM Zone 11
Depth (ft)		5946400 N, 688450 E
0-5.5	Sand silty	
5.5-5.8	Gravel seam	
5.8-37	Clay	
39-47	Hard clay/sand	

Test Hole #5	Description	UTM Zone 11
Depth (ft)		5946500 N, 688050 E
0-3	Sand silty	
3-8	Clay	
8-25	Brown clay/dark brown clay	
25-34	Gravel*	
34-37	Clay	
37-38	Gravel	
38-42	Clay/silt	
42-47	Brown clay/sand	

Test Hole #6	Description	UTM Zone 11
Depth (ft)		5946600 N, 687750 E
0-12	Sandy gravel	
12-17	Sandy clay	
17-27	Clay/silt	

Test Hole #7	Description	UTM Zone 11
Depth (ft)		5946500 N, 687850 E
0-5	Clay till	
5-8	Sand (medium - course grained)	
8-12	Sandy clay	
12-27	Dark grey clay	
27-28	Clay w/ minor gravel	
28-37	Sand w/ minor gravel	
37-42	Clay w/ sand and gravel	
42-47	Hard sandy clay	
47-52	Silty clay	

Test Hole #8	Description	UTM Zone 11
Depth (ft)		5946300 N, 687850 E
0-0.25	Medium grained sand	
2.5-25	Clay	
25-35	Dark grey clay	
35-37	Clay w/ gravel	
37-39	Gravel*	
39-41	Clayish gravel	
31-45	Gravel*	
45-47	Clay w/ sand and gravel	
47-52	Clay w/ minor sand and gravel	
52-57	Light brown hard sandy clay	

Test Hole #9	Description	UTM Zone 11
Depth (ft)		5946200 N, 687750 E
0-3	Sand silty	
2-18	Brown clay	
18-42	Dark grey clay	
42-45	Gravel and sand w/ clay	
45-46	Gravel lense	
46-47	Gravel and sand w/ clay	
47-52	Bownish grey clay	

Test Hole #10	Description	UTM Zone 11
Depth (ft)		5946400 N, 688050 E
0-2	Sand silty	
2-15	Brown clay	
15-34	Dark grey clay	
34-37	Light brown clay sand	

Test Hole #11	Description	UTM Zone 11
Depth (ft)		5946300 N, 688050 E
0-2	Sand silty	
2-18	Brown clay	
18-29	Dark grey clay	
29-47	Light brown dry platy hard sand/clay	

Test Hole #12	Description	UTM Zone 11
Depth (ft)		5946500 N, 688250 E
0-3	Sand silty	
3-24	Brown clay	
24-37	Dark grey clay	

Test Hole #13	Description	UTM Zone 11
Depth (ft)		5946300 N, 688250 E
0-2	Sand silty	
2-17	Brown clay	
17-42	Dark grey clay	

Test Hole #14	Description	UTM Zone 11
Depth (ft)		5946200 N, 688150 E
0-1.5	Sand silty	
1.5-15	Brown clay	
15-33	Dark grey clay	
33-37	Light brown sand/clay	

Test Hole #15	Description	UTM Zone 11
Depth (ft)		5946750 N, 688250 E
0-6	Silty sand	
6-12	Clay sand	
12-25	Brown clay	
25-30	Dark grey clay	
30-33	Gravel*	
33-40	Brown clay	
40-46	Light brown sand/clay	

Test Hole #16	Description	UTM Zone 11
Depth (ft)		5946750 N, 688150 E
0-2	Silty sand	
2-25	Brown clay	
25-27	Gravel	
27-30	Sand	
30-45	Gravel	
45-52	Brown clay	

Test Hole #17	Description	UTM Zone 11
Depth (ft)		5946500 N, 688150 E
0-2	Silty sand	
2-17	Brown clay	
17-24	Dark grey clay w/ gravel	
24-34	Brown clay	
34-37	Light brown sand/clay	

Test Hole #18	Description	UTM Zone 11
Depth (ft)		5946400 N, 688050 E
0-4	Silty sand	
4-15	Brown clay	
15-27	Dark grey clay	
27-29	Dark grey clay w/ gravel	
29-34	Dark grey clay	
34-36	Light brown sand/clay	

Test Hole #19	Description	UTM Zone 11
Depth (ft)		5946400 N, 687850 E
0-2	Silty sand	
2-8	Clay w/ sand	
8-15	Brown clay	
15-32	Dark grey clay w/ minor gravel	
32-39	Sandy gravel	
39-42	Light brown sand/clay	

Test Hole #20	Description	UTM Zone 11
Depth (ft)		5946550 N, 687950 E
0-2	Silty sand	
2-16	Brown clay	
16-25	Dark grey clay	
25-36	Sand (coarser w/ depth)	
36	Boulder	

“TRAFFIC IMPACT ASSESSMENT”

S.E. 1-54-2-5

PREPARED BY

D & A PAULICHUK CONSULTANTS LTD.

APPENDIX ‘C’

DECEMBER 2015

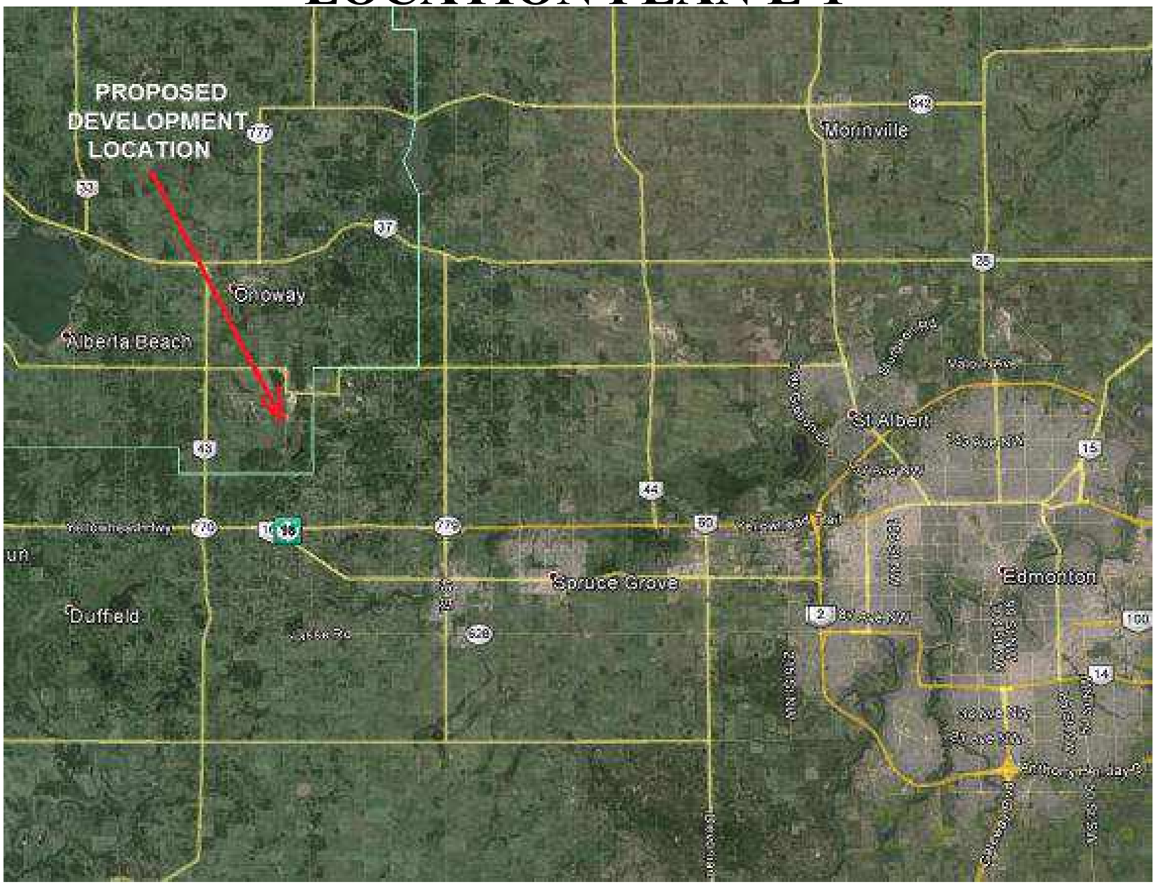
TRAFFIC IMPACT ASSESSMENT

LAUNCH VENTURES RESIDENTIAL DEVELOPMENT
SE 1-54-2-W5M
Lac Ste. Anne County
Twp. Rd. 540, Hwy. 43, Rge. Rd. 20, Hwy. 16:14

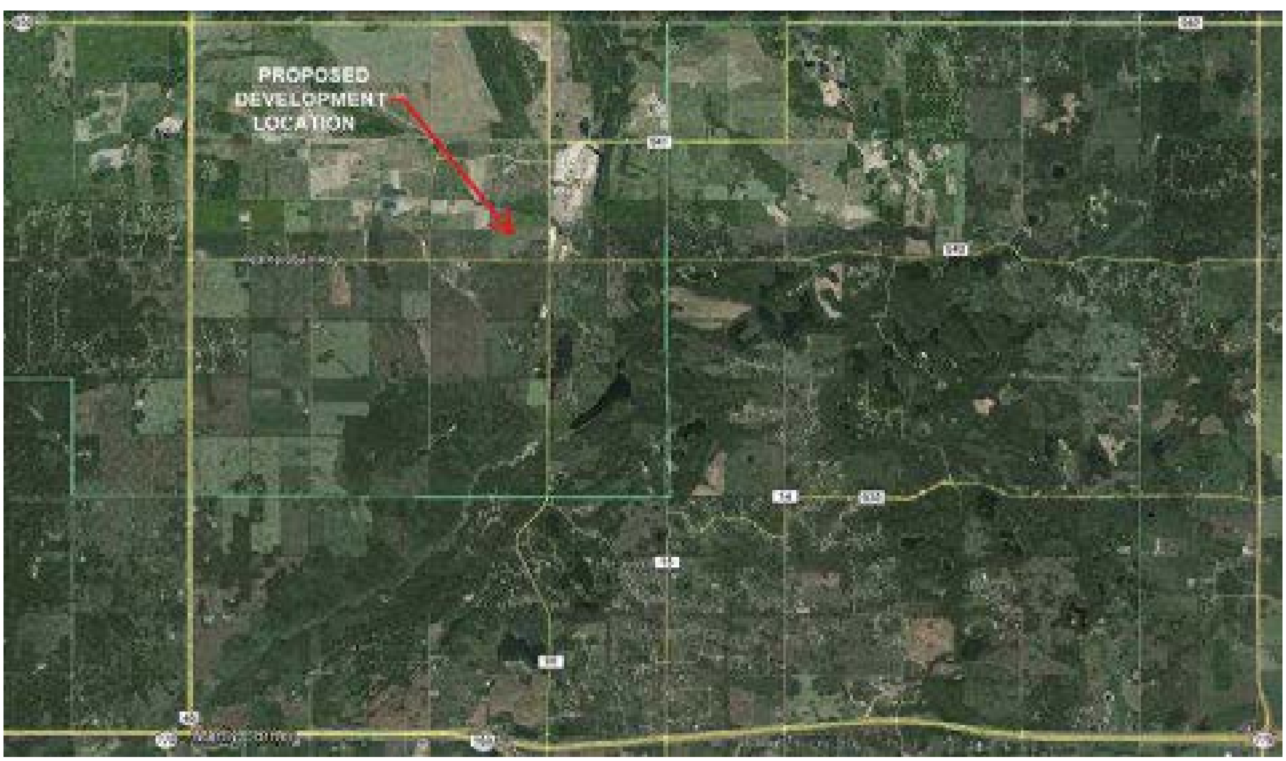
D&A PAULICHUK CONSULTING LTD.

December 7, 2015

LOCATION PLAN L-1



LOCATION PLAN L-2



LOCATION PLAN L-3

LOCATION PLAN L-4

DEVELOPMENT PLAN D-1

TABLE OF CONTENTS

APPENDIX A - ALBERTA HIGHWAYS TRAFFIC VOLUME HISTORY
TRAFFIC DATA – TURNING MOVEMENT DIAGRAMS
TRAFFIC COUNT DATA

APPENDIX B - **Development Access & Rge. Rd. 20**
TURNING MOVEMENT DIAGRAMS

APPENDIX C - **Hwy. 16:14 & Rge. Rd. 20**
TURNING MOVEMENT DIAGRAMS
SYNCHRO ANALYSIS

APPENDIX D - **Hwy. 43:22 & Twp. Rd. 540**
TURNING MOVEMENT DIAGRAMS
SYNCHRO ANALYSIS
ILLUMINATION WARRANT

1. INTRODUCTION

This report is a Traffic Impact Assessment (TIA) report for a Residential development located in the SE quarter section of Section 1, Township 54, Range 2, West of 5th Meridian. See Location Plans before this report. The residential subdivision is proposed to contain 13 lots.

This report has been prepared to determine the impact of the proposed development on traffic using Highway 43:22 & Township Road 540 (Heatherdown Road) and Hwy. 16:14 & Range Road 20 which are the anticipated access routes to the proposed development. The scope of work in this case, is to assess the existing roadways and any required intersection treatment as a result of the increased traffic volumes and turning movements attributed to the development. This document will address the following:

- Retrieve any available traffic volume data, including conducting traffic counts.
- Determine present traffic volumes for 2016.
- Determine projected traffic volumes to 2016, 2021, 2026 and 2036.
- Determine traffic volumes generated from the development.
- Determine combined traffic volumes for 2016, 2021, 2026 and 2036.
- Complete intersectional analysis of the roadways if required.
- Identifies geometric deficiencies based on current 3R/4R guidelines.
- Review sight distance requirements.
- Complete illumination and signalization warrant analysis, if required.
- Provides a preliminary engineering cost estimate for recommended improvements.

This report is based on information provided by the developers of the 13 lots in SE 1-54-2-W5M, site observations from Mr. Darcy Paulichuk, P. Eng., traffic volume data from Alberta Transportation, intersectional analysis procedures and standards documented in Alberta Infrastructure and Transportation's "Highway Geometric Design Guide", 1999, and Alberta Infrastructure and Transportation's "Traffic Impact Assessment Guideline", 2005.

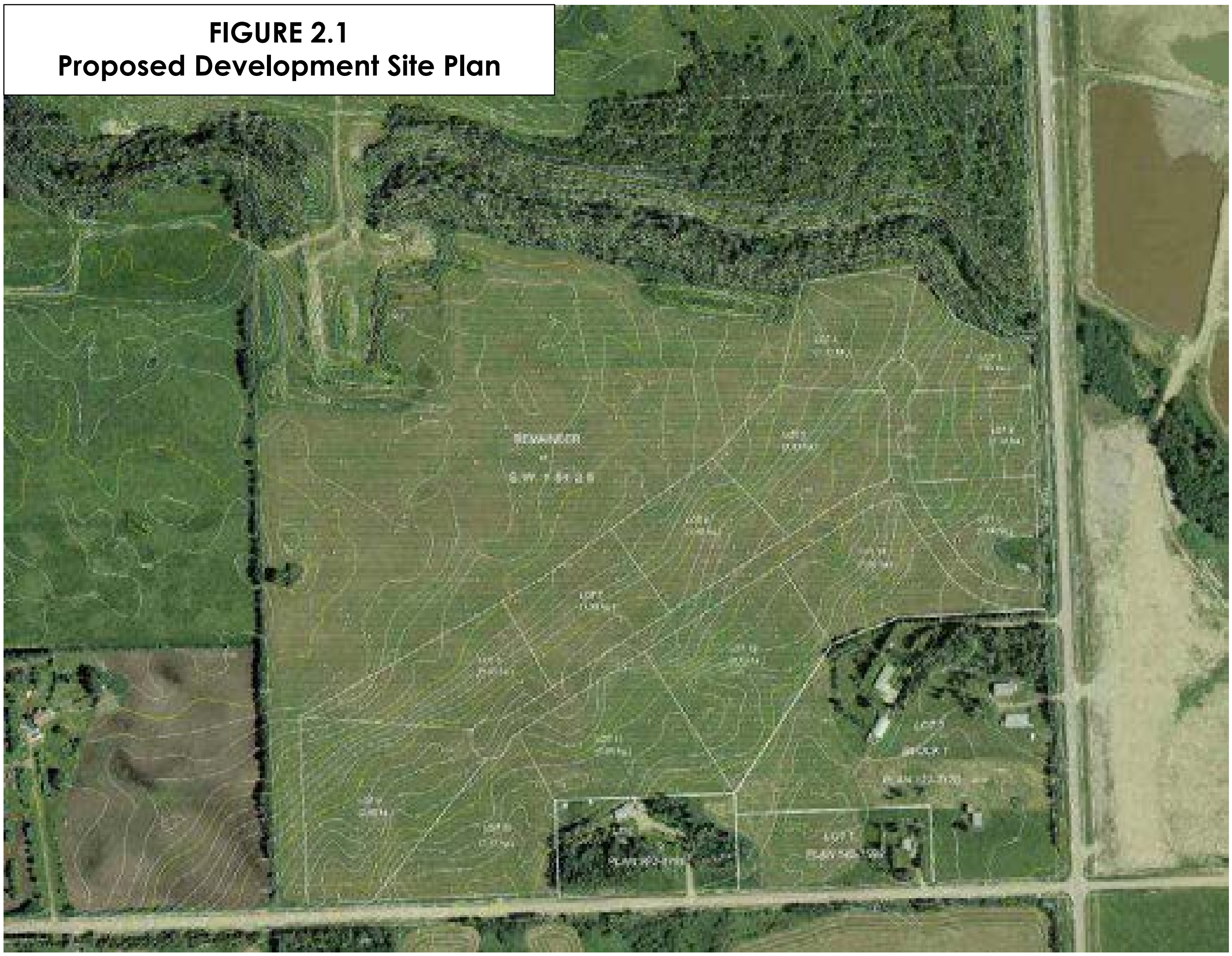
This report has been prepared for developers of the 13 lots in SE 1-54-2-W5M for the purposes of gaining approval from municipal and provincial governments for the development of this site.

2. DEVELOPMENT DETAILS

2.1 Development Site

The proposed development is for a 13 lot Residential rural subdivision within SE 1-54-2-W5M. The site will utilize Range Road 20 for access to the east and then south on Rge. Rd. 20 to the south to Hwy 16 or west on Twp. Rd. 540 (Heatherdown Road) to Hwy. 43. See below:

FIGURE 2.1
Proposed Development Site Plan

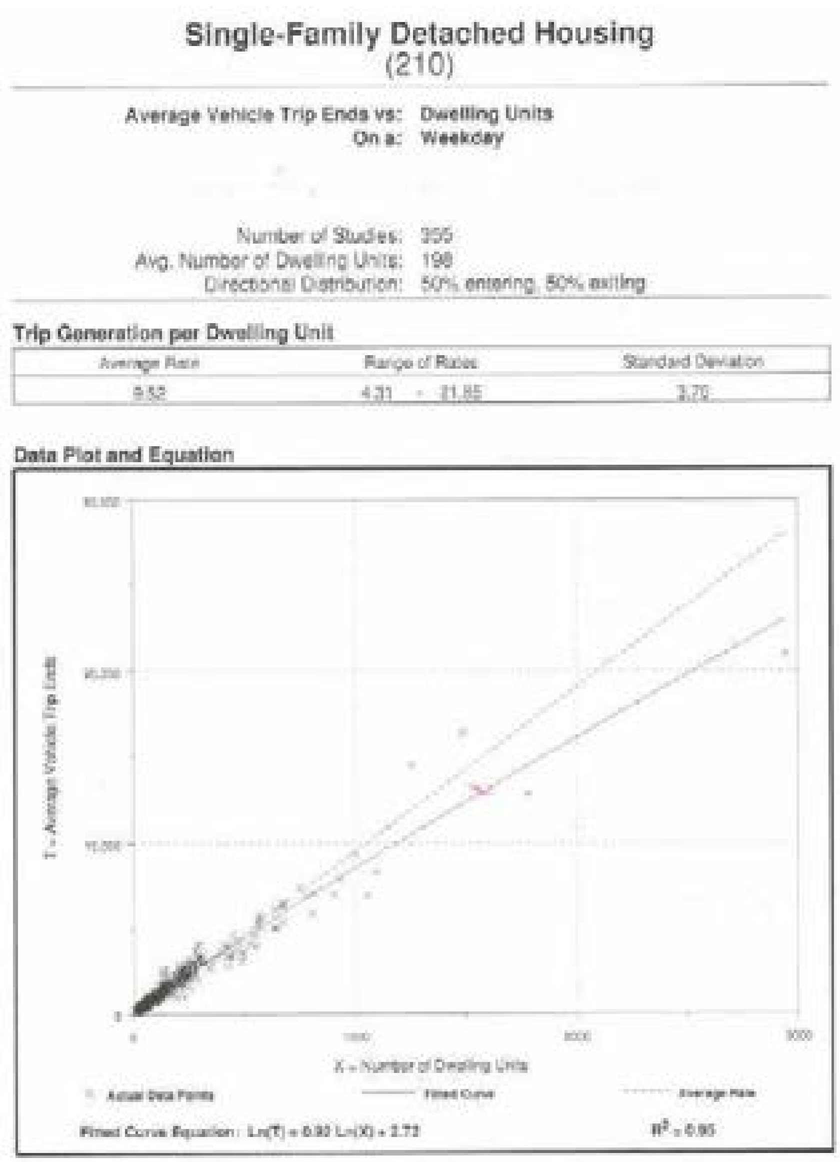


2.2 Development Trip Generation

The proposed development will comprise of 13 lots.

For the **Residential** development lots, ITE 210 – "Single-Family Detached Housing" Land Use from the Institute of Transportation Engineers (ITE) Trip Generation Manual, 9th Edition, can used. The following data is available from the manual:

Time Period	Trips per Lot
Daily	9.52
Peak Hour of Adjacent Street Traffic One Hour Between 7 and 9 a.m.	0.75
Peak Hour of Adjacent Street Traffic One Hour Between 4 and 6 p.m.	1.00



Single-Family Detached Housing
(210)

Average Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Number of Studies: 355
Avg. Number of Dwelling Units: 198
Directional Distribution: 50% entering, 50% exiting

Trip Generation per Dwelling Unit

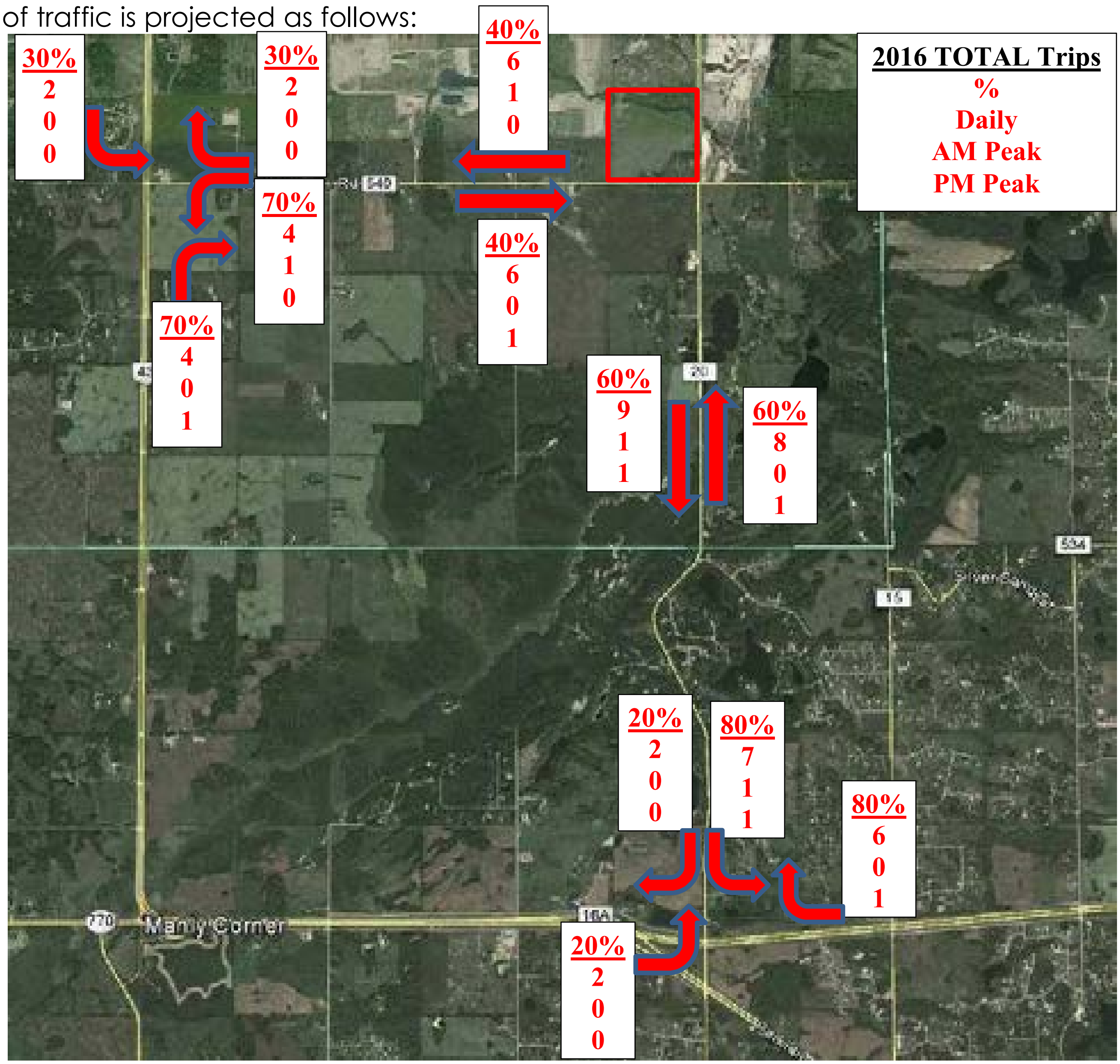
Average Rate	Range of Rates	Standard Deviation
9.52	4.31 - 21.85	3.70

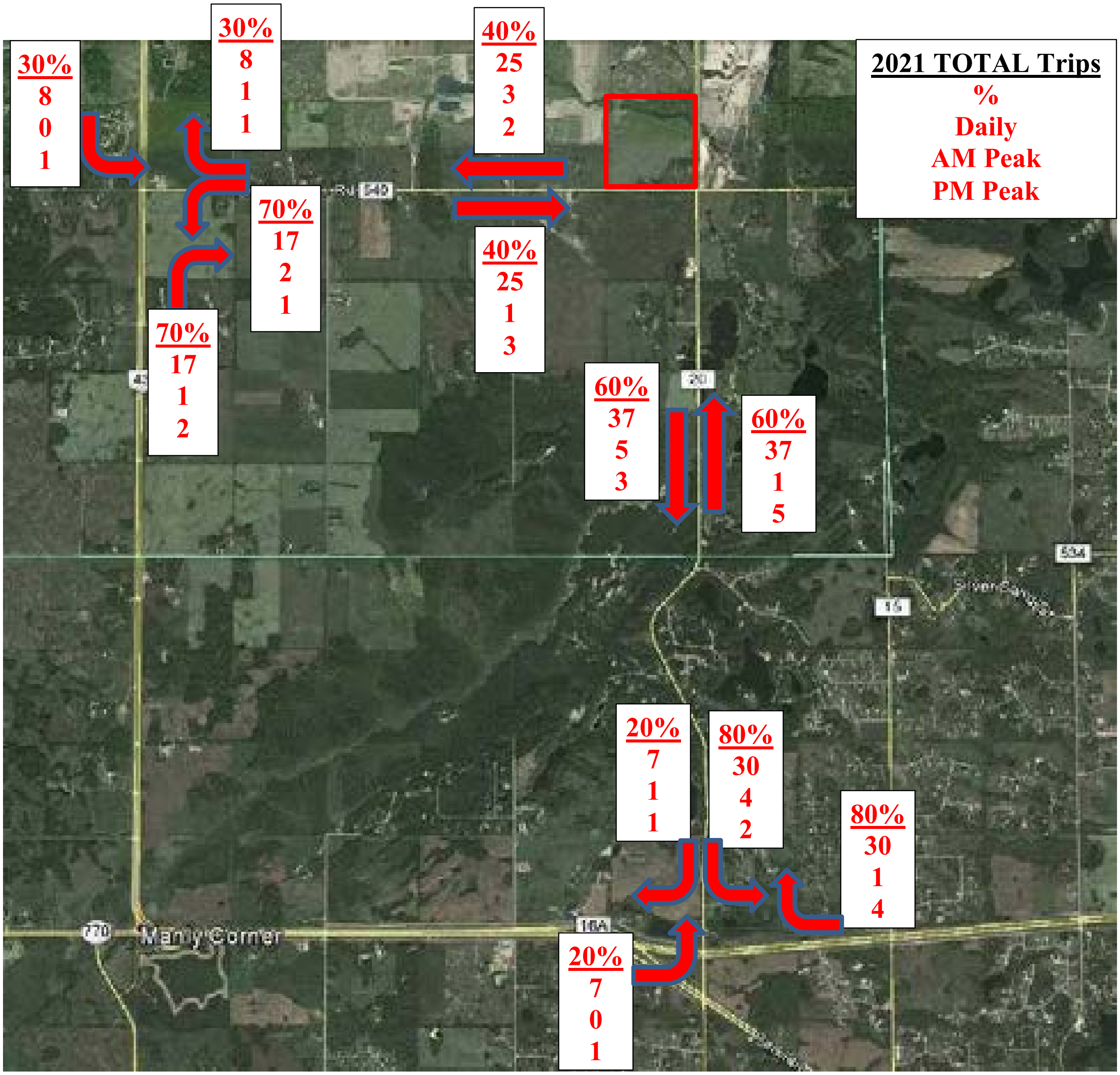
Data Plot and Equation

Therefore, the estimated trip generation of the proposed development with 13 new lots is as follows:

Daily Traffic:	13 lots x 9.52 trips/day	=	124 trips per day
AM Peak Hour:	13 lots x 0.75 trips/hour	=	10 trips per hour
PM Peak Hour:	13 lots x 1.00 trips/hour	=	13 trips per hour

These values above represent the traffic generation once all 13 lots are built, homes are constructed and then occupied. Since this number is fairly low, it is estimated that 3 lots will be occupied in 2016 and the remaining 10 lots will be occupied in 2021 (Year 5). The trip distribution is anticipated to be 40% to the west on Twp. Rd. 540 to Hwy. 43 and 60% to the south on Range Road 20 to Hwy. 16, with 25% entering/75% exiting in the AM Peak and 63% entering/37% exiting in the PM Peak. The distribution of traffic is projected as follows:



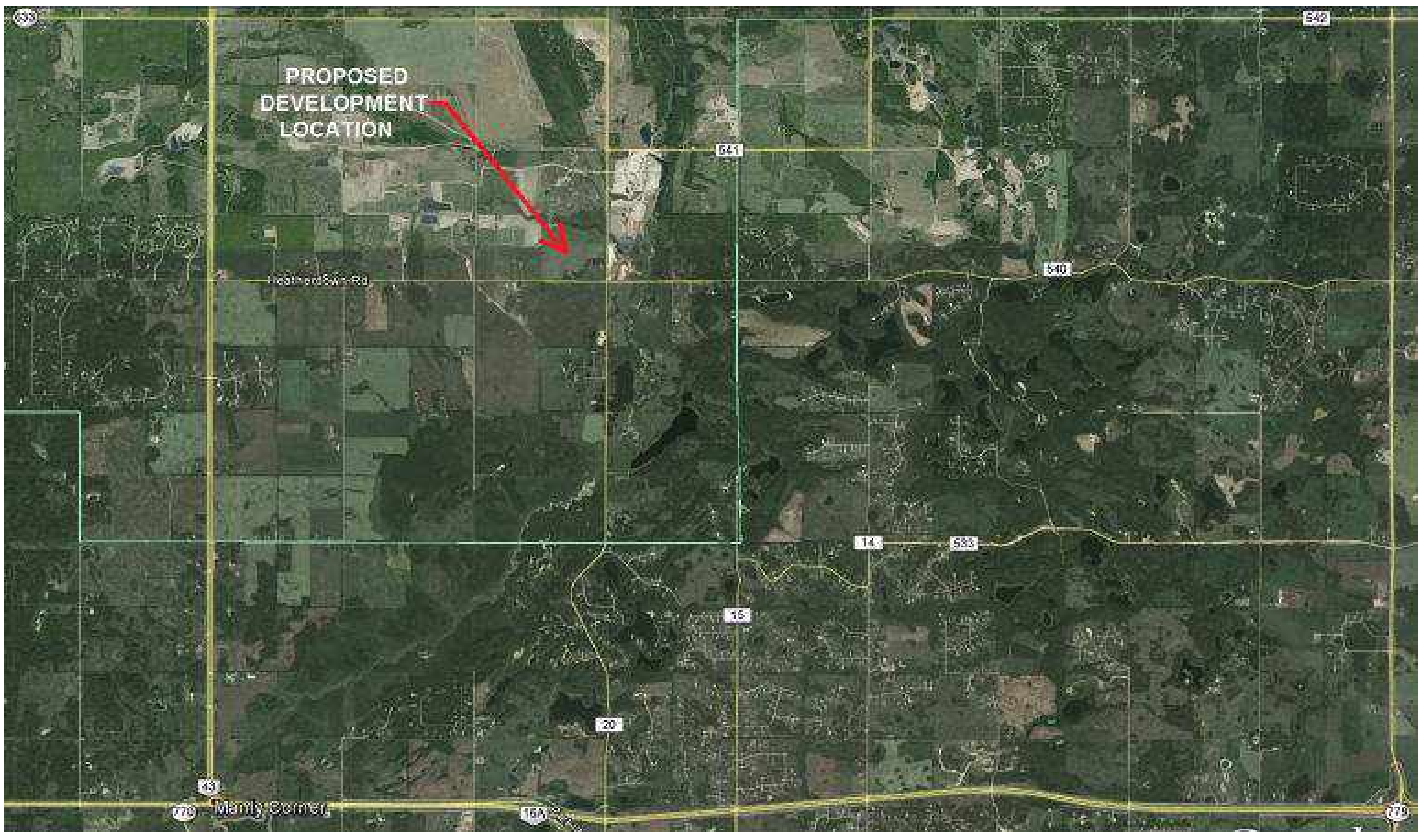

2021 TOTAL Trips
%
Daily
AM Peak
PM Peak
30%
8
0
1
30%
8
1
1
70%
17
2
1
70%
17
1
2
40%
25
3
2
40%
25
1
3
60%
37
5
3
60%
37
1
5
20%
7
1
1
80%
30
4
2
80%
30
1
4
20%
7
0
1
Manly Corner

3. EXISTING CONDITIONS – LOCAL ROADS

The focus of this traffic impact assessment is mainly on Twp. Rd. 540 to Hwy. 43 and Rge. Rd. 20 to Hwy. 16 in which it is anticipated that the development will use.

3.1 Development Routes of Travel

Range 20 traverses between Highway 16 to the south and Highway 633 to the north. Twp. Rd. 540 traverses between Highway 43 and Hwy. 779 to the east.

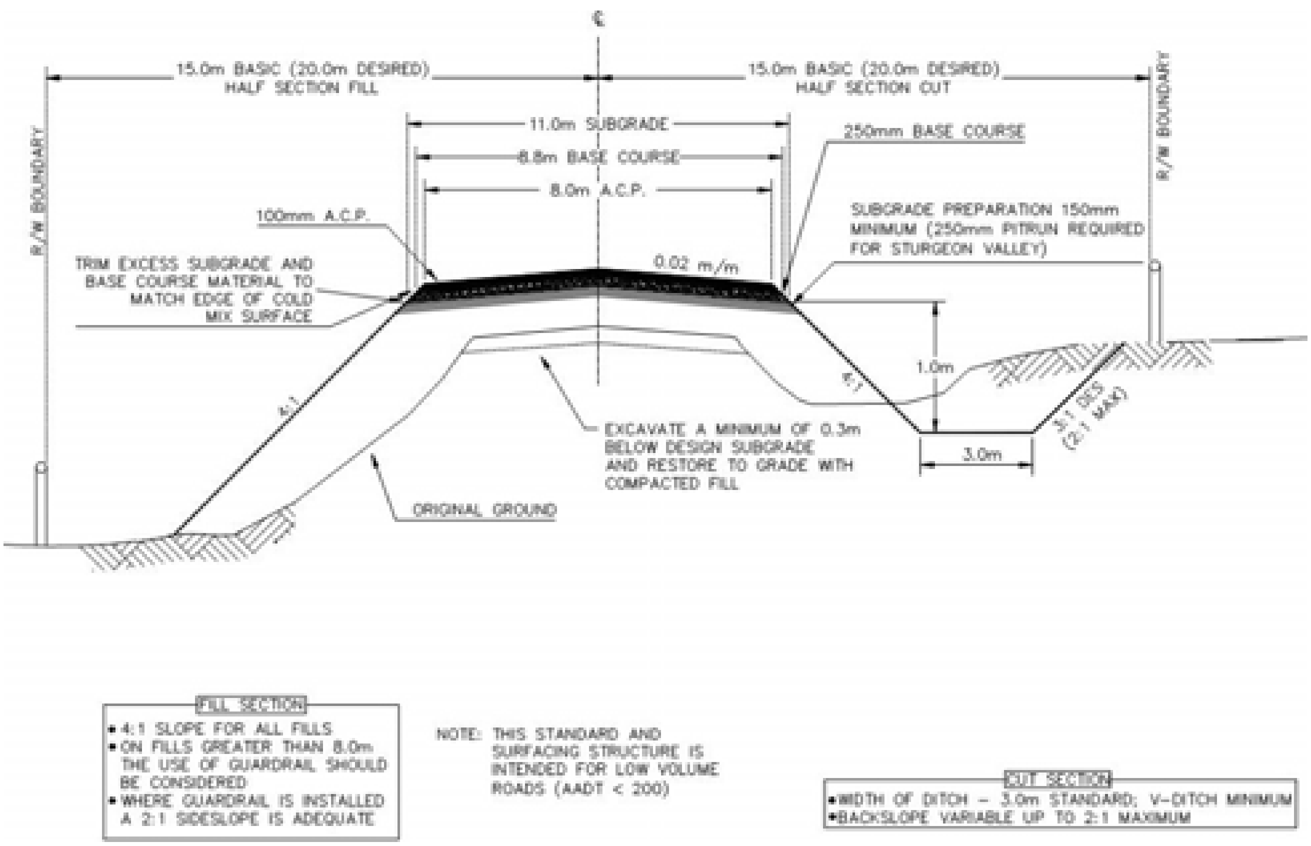


3.2 Range Road 20

Range Road 20 can be classified as a minor to major collector roadway. The existing width is approximately 8.2m from Hwy. 16 to Twp. Rd. 541, and 9.2m wide from Twp. Rd. 541 to Hwy. 633 (west leg)/Twp. Rd. 542. Range Road 20 is surfaced with a full surfacing structure comprised of granular base course and asphalt concrete pavement. The pavement thickness appears to be 100 – 150mm in thickness. The roadway also contains roadway paint lines for the centreline and shoulders. Range Road 20 provides collection of traffic from the local area and provides connections to the provincial highway system. It also is a route constructed for the haul of natural resources from the area such as aggregate.

The section of Range Road 20 from Hwy. 16 to Hwy. 633 is posted at 80 km/hr. This usually implies a 90 km/hr. design speed.

The section of Range Road 20 from Hwy. 16 to Twp. Rd. 541 was constructed several years ago and likely to a RLU-208 standard (8m paved width standard) as shown below as Lac Ste. Anne County Standard Drawing G-07:



This standard is dated March 2008, however this section of Range Road 20 was constructed several years before this, likely with a lesser standard. This can be recognized with physical aspects such as a 3:1 fill slope in some locations.

This present County standard would be most representative for this section.

Below is an air photo view and ground photo of this section of Range Road 20.

The following table is from Lac Ste. Anne County's General Municipal Servicing Standards and represents the roadway design parameters for the various road standards. The two standards that are being used as comparable standards for Range Road 20 are noted below.

Table 1 – Geometric Design Requirements

Designation	Surface	AADT*	Truck Traffic	Min. ROW** (m)	Preferred ROW** (m)	Design Speed (km/h)	Posted Speed (km/h)	SSD' (m)	Crest k (m)	Sag k (m)	Min. Horiz. Radius (m)
RLU-207G	Gravel	< 25	None	20	30	40	30	65	7	11	
RLU-208G(a)	Gravel	< 100	Minimal	20	30	60	50	85	15	20	90
RLU-208G(b)	Gravel	< 200	Minimal	20	30	60	50	85	15	20	90
RLU-209G	Gravel	> 200		20	40	60	50	85	15	20	90
RLU-210G	Gravel	> 200	Significant	20	40	70	60	140	35	30	190
RLU-208(a)	Cold Mix	< 200	Minimal	20	40	60	50	85	15	20	90
RLU-208(b)	ACP	< 200		20	40	60	50	85	15	20	90
RLU-209(a)	Cold Mix	< 500	Minimal	20	40	60	50	85	15	20	90
RLU-209(b)	ACP	< 500		40	40	60	50	85	15	20	90
RLU-210	ACP	< 2000		40	40	70	60	140	35	30	190
RLU-211	ACP	> 2000	Significant	40	40	70	60	140	35	30	190
ULU-209	ACP	< 2000		20	30	60	50	85	15	20	90
ULU-211.5	ACP	> 2000	Significant	30	30	70	60	140	35	30	190

* AADT = Average Annual Daily Traffic
** ROW = Right-of-Way
' SSD = Stopping Sight Distance
Note: The recommended design speeds for internal roadway systems only.

For both road standards, the posted and design speeds appear to be lower than the existing posted speed on Range Road 20. The lower posted speed on the standards above mostly are reflected in the vertical and horizontal alignment.

Using the Transportation Association of Canada standards shown below, the following minimum vertical and horizontal parameters can be used for an 80 km/hr. posted speed (design speed = 90 km/hr.):

Minimum Horizontal Radius:	340m
Maximum Gradient:	5 – 7%
Minimum K value for Crest Curves:	53
Minimum K value for Sag Curves:	40

Table 2.1.2.3 Minimum Radii for Limiting Values of e and f for Rural and High Speed Urban Roadways[1]

Design Speed (km/h)	e_{max} (m/m)	Design Value for f	e + f	Minimum Radius (m) (calculated)	Minimum Radius for Design (m)
40	0.04	0.17	0.21	60	60
50	0.04	0.16	0.20	98	100
60	0.04	0.15	0.19	149	150
70	0.04	0.15	0.19	203	200
80	0.04	0.14	0.18	280	280
90	0.04	0.13	0.17	375	380
100	0.04	0.12	0.16	492	490
40	0.06	0.17	0.23	55	55
50	0.06	0.16	0.22	89	90
60	0.06	0.15	0.21	135	130
70	0.06	0.15	0.21	184	190
80	0.06	0.14	0.20	252	250
90	0.06	0.13	0.19	336	340
100	0.06	0.12	0.18	437	440
110	0.06	0.10	0.16	595	600
120	0.06	0.09	0.15	756	750
130	0.06	0.08	0.14	951	950
40	0.08	0.17	0.25	50	50
50	0.08	0.16	0.24	82	80
60	0.08	0.15	0.23	123	120
70	0.08	0.15	0.23	168	170
80	0.08	0.14	0.22	229	230
90	0.08	0.13	0.21	304	300
100	0.08	0.12	0.20	394	390
110	0.08	0.10	0.18	529	530
120	0.08	0.09	0.17	667	670
130	0.08	0.08	0.16	832	830

controls or considerations influencing the horizontal alignment and superelevation.

Moreover, in low speed urban conditions, drivers are accustomed to a greater level of discomfort while traversing curves. Hence, increased lateral friction factors resulting from lower superelevation rates or no superelevation at all, are permissible. In these cases, the maximum lateral friction factors as defined by Table 2.1.2.2 are used in calculating minimum radii.

To allow for the fact that in low speed urban designs various limits for maximum permissible superelevation may exist, the minimum radius is provided for a number of commonly used rates of superelevation.

Table 2.1.2.4 provides rounded design values for minimum radii for low speed urban design, 30 km/h to 60 km/h, normally representative of retrofit conditions. Minimum radii are stated for normal crown (-0.02 m/m, or adverse superelevation), reverse crown (0.02 m/m superelevation) and maximum superelevation rates of 0.04 and 0.06 m/m. Table 2.1.2.4 also provides a summary of the minimum radii for a range of high design speeds, 70 km/h to 100 km/h, associated with maximum superelevation values of 0.04 m/m and 0.06 m/m. The values are the same as the high speed urban values in Table 2.1.2.3.

Distribution of 'e' and 'f' Over a Range of Curves: Design Domain

Overview

There are a number of methods of distributing e and f over a range of curves flatter than the

Maximum Grade: Design Domain Quantitative Aids

Although the relationship between design speeds and maximum grade is relatively subjective, reasonable guides for maximum grade have been developed.

The guidelines for maximum gradients are given in Table 2.1.3.1.

Maximum Grade: Design Domain Application Heuristics

1. The range of values shown in Table 2.1.3.1 recognizes that maximum grade selected for design varies with topography and the general financial capability of the road authority to fund the capital works. For lower classification urban roads, land use is an additional consideration and land use is incorporated into the guidelines for urban local and urban undivided collectors.
2. The values shown may be adjusted to suit local and economic conditions. Maximum gradients by classification and land use are often a matter of policy, and as a result, vary from jurisdiction to jurisdiction. Normally, the local policy is established at a senior engineering and planning level. In any event, in adjusting these figures, designers should ensure that they explicitly consider the impact of such alternative maximum grade values on safety.

Table 2.1.3.1 Maximum Gradients[1-3]

Design Speed (km/h)	30/40/50		60		70		80		90		100		110		120/130	
Topography	R	M	R	M	R	M	R	M	R	M	R	M	R	M	R	M
RLU	7	11	7	11	6	9	6	8	5	7	5	7	-	-	-	-
RCU	-	-	6	10	6	9	5	8	5	7	5	7	-	-	-	-
RCD	-	-	-	-	6	9	5	8	5	7	5	7	-	-	-	-
RAU	-	-	-	-	-	-	4	7	4	6	3	6	3	6	3	5
RAD	-	-	-	-	-	-	4	7	4	6	3	6	3	5	3	5
RFD	-	-	-	-	-	-	-	-	-	-	3	5	3	5	3	5
ULU – Residential	8	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ULU – Industrial/ Commercial	8	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UCU – Residential	8	12	7	11	7	10	-	-	-	-	-	-	-	-	-	-
UCU – Industrial/ Commercial	8	12	6	11	6	9	6	8	-	-	-	-	-	-	-	-
UCD	6	10	6	9	5	8	5	7	-	-	-	-	-	-	-	-
UAU	6	10	6	9	5	8	5	7	-	-	-	-	-	-	-	-
UAD	-	-	3	6	3	6	3	6	3	6	3	5	-	-	-	-
UED	-	-	-	-	-	-	5	6	4	5	4	5	4	5	3	5
UFD	-	-	-	-	-	-	-	-	4	5	3	5	3	5	3	5

Notes:
1. Short grades less than 150 m in length, and one-way down grades may be 1% higher on urban roads, and 2% higher on low volume rural roads.
2. R refers to rolling topography.
3. M refers to mountainous topography.

In calculating K values for various sight distances, the height of driver's eye is 1.05 m, and the height of object is as outlined following, and discussed in more detail in Chapter 1.2.

- For stopping sight distance the most common object a vehicle has to stop for is another vehicle ahead on the road, the height of tail light is used. The legislated minimum is 0.38 m and is adopted for design. Other heights of objects can be used if necessary.
- For decision sight distance the more common height of object is 0.15 m, although other heights, such as zero for pavement markings, are not uncommon.
- For passing sight distance the height of object is 1.30 m, which represents the height of the opposing vehicle.

Crest Vertical Curves: Design Domain Quantitative Aid

Based on the above most commonly used heights of object, and on sight distances from Tables 1.2.5.3 and 1.2.5.5, the K values for stopping sight distance are provided in Table 2.1.3.2 and for passing sight distance the K values are provided in Table 2.1.3.3. The decision sight distance K values are not included because the vertical curvature depends on the height of object which is variable (depending on what the driver has to see).

The calculated K values are based on the length of curve exceeding the sight distance and they can be used without significant error when the length of curve is less than the sight distance. Appreciable differences occur only where A is small and little or no additional cost is involved in obtaining longer vertical curves.

On undivided roads non-striping sight distance is used to determine when no-passing pavement markings are required. It is desirable to provide passing sight distance wherever possible but non-striping sight distance is generally adequate for safe passing manoeuvres.

Non-striping sight distance is less than passing sight distance, at each design speed. Passing manoeuvres can be completed in less than the full passing sight distance because of the timing of oncoming vehicles.

Table 2.1.3.2 K Factors to Provide Stopping Sight Distance on Crest Vertical Curves

Design Speed (km/h)	Assumed Operating Speed (km/h)	Stopping Sight Distance (m)	Rate of Vertical Curvature (K) Computed	Rate of Vertical Curvature (K) Rounded
30	30	29.6	1.6	2
40	40	44.4	3.7	4
50	47-50	57.4-62.8	6.1-7.3	6-7
60	55-60	74.3-84.6	10.2-13.3	10-13
70	63-70	99.1-110.8	16.4-22.8	16-23
80	70-80	112.8-139.4	23.6-36.1	24-36
90	77-90	131.2-168.7	32.0-52.8	32-53
100	85-100	157.0-205.0	45.8-78.0	45-80
110	91-110	179.5-246.4	59.8-112.7	60-110
120	98-120	202.9-285.6	76.4-151.4	75-150
130	105-130	227.9-327.9	96.4-199.6	95-200

Note: The above are minimum values, use higher K factors whenever possible.

Table 2.1.3.4 K Factors to Provide Minimum Stopping Sight Distance on Sag Vertical Curves[1]

Design Speed (km/h)	Assumed Operating Speed (km/h)	Stopping Sight Distance (m)	Rate of Sag Vertical Curvature (K) Headlight Control Calculated	Headlight Control Rounded	Comfort Control Calculated	Comfort Control Rounded
30	30	29.9	3.9	4	2.3	2
40	40	44.4	7.1	7	4.1	4
50	47-50	57.4-62.8	10.2-11.5	11-12	5.6-6.3	5-6
60	55-60	74.3-84.6	14.5-17.1	15-18	7.7-9.1	8-9
70	63-70	99.1-110.8	19.8-24.1	20-25	10.0-12.4	10-12
80	70-80	112.8-139.4	24.8-31.9	25-32	12.4-16.2	12-16
90	77-90	131.2-168.7	29.6-40.1	30-40	15.0-20.5	15-20
100	85-100	157.0-205.0	36.7-50.1	37-50	18.3-25.3	18-25
110	91-110	179.5-246.4	43.0-61.7	43-62	21.0-30.6	21-30
120	98-120	202.9-285.6	49.5-72.7	50-73	24.3-36.4	24-36
130	105-130	227.9-327.9	56.7-85.0	57-85	27.9-42.8	28-43

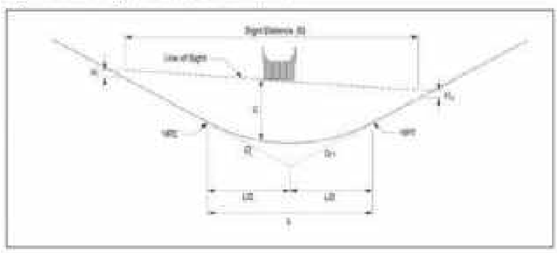
Values for sag curvature based on the comfort criterion are shown in Table 2.1.3.4.

These K values for sag curves are useful in urban situations such as underpasses where it is often necessary for property and access reasons to depart from original ground elevations for as short a distance as possible. Minimum values are normally exceeded where feasible, in consideration of possible power failures and other malfunctions to the street lighting systems. Designing sag vertical curves along curved roadways for decision sight distance is normally not feasible due to the inherent flat grades and resultant surface drainage problems.

2.1.3.4 Sight Distance at Underpasses

While not a frequent design problem, the sight distance at underpasses may be restricted due to the overpass structure or signs hanging below the bottom of the overpass structure restricting the line of sight. The sight distance through a grade separation should be equal to or greater than the minimum stopping sight distance. Figure 2.1.3.3 illustrates the sight distance from an eye height of h_1 to an object height of h_2 with an underpass clearance of C. Case 1 is for a sight distance greater than the length of the vertical curve (S>L) and Case 2 is for a sight

Figure 2.1.3.3 Sight Distance at Underpass



The existing horizontal curvatures on Range Road 20 appear to be between 300 to 350m presently, which is near the standard for an 80 km/hr. posted speed. These curves are within Parkland County. The horizontal alignment of Range Road 20 through Lac Ste. Anne County is straight and on tangent.

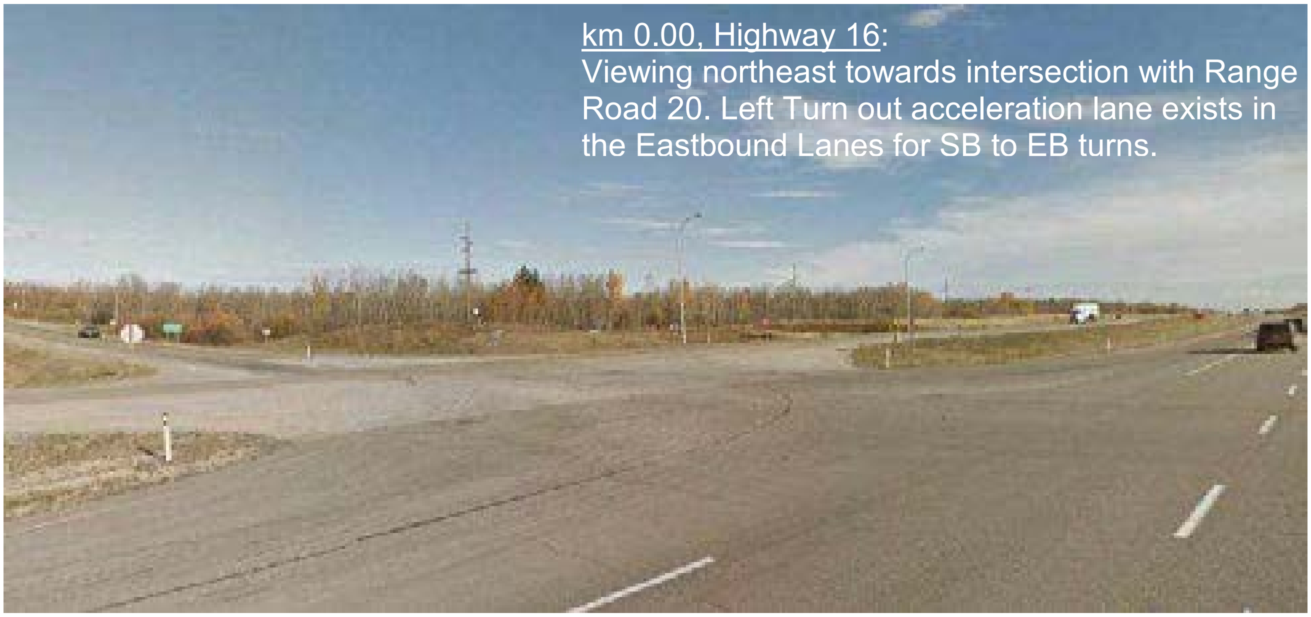
The existing vertical profile contains some crest and sag curves that appear to be within the 80km/hr. posted speed standard within Parkland County. Range Road 20 is fairly flat within Lac Ste. Anne County.

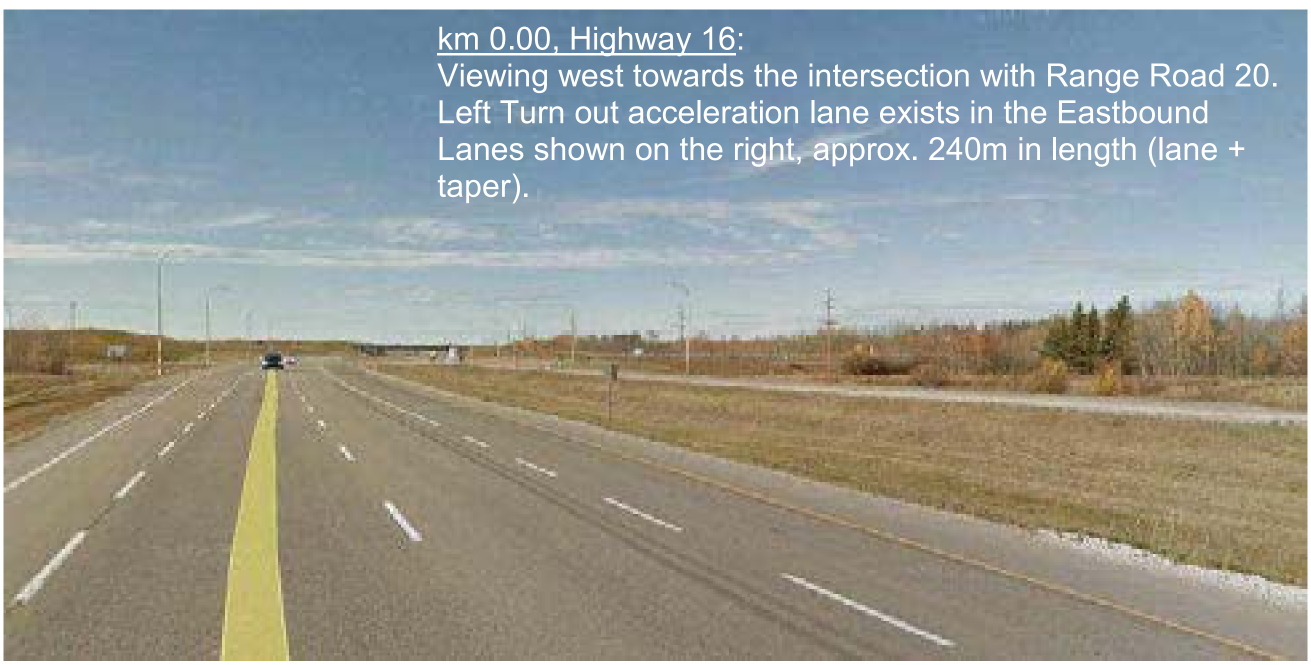
All grades appear to be less than 8%.

3.2.1 Site Observations

Site observations of Range Road 20 between September 10 to14 are shown below:

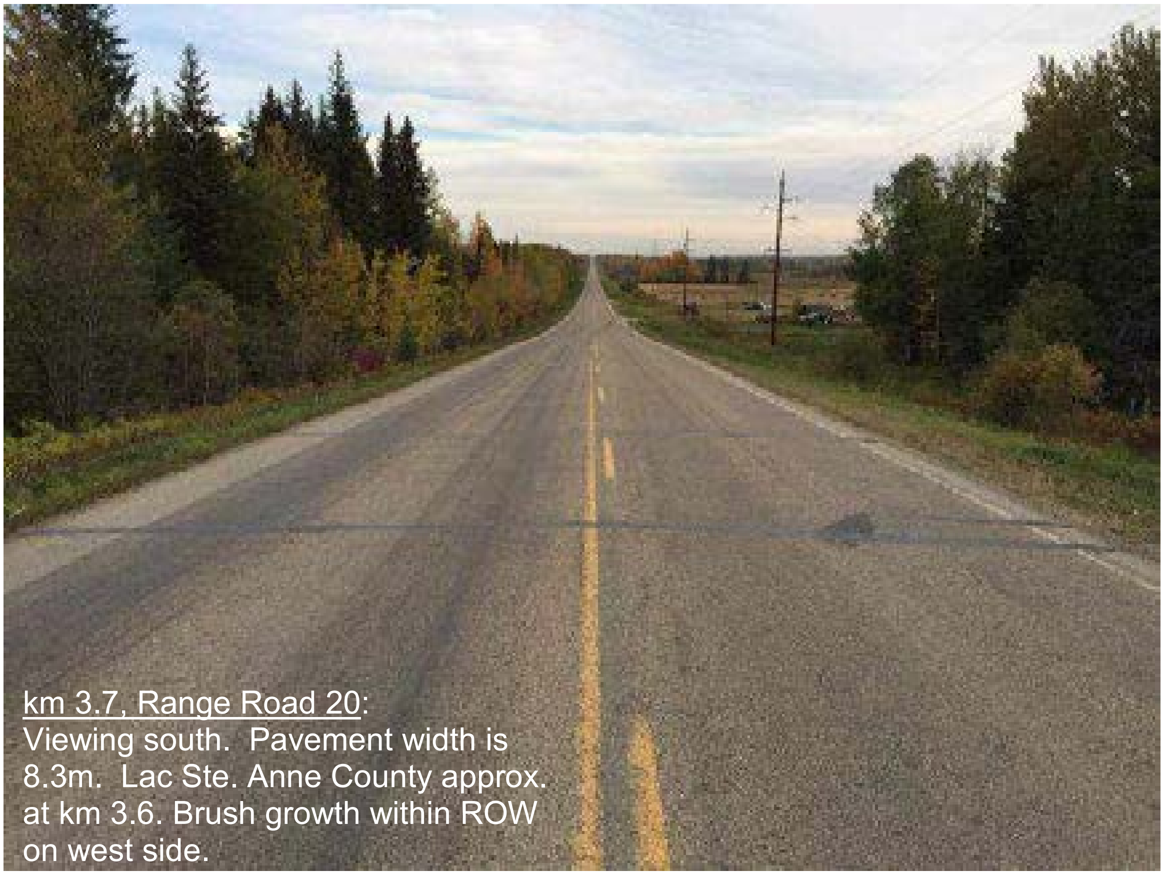
km 0.00, Rge. Rd. 20: Viewing south towards intersection with Highway 16.


km 0.00, Highway 16:
Viewing northeast towards intersection with Range Road 20. Left Turn out acceleration lane exists in the Eastbound Lanes for SB to EB turns.

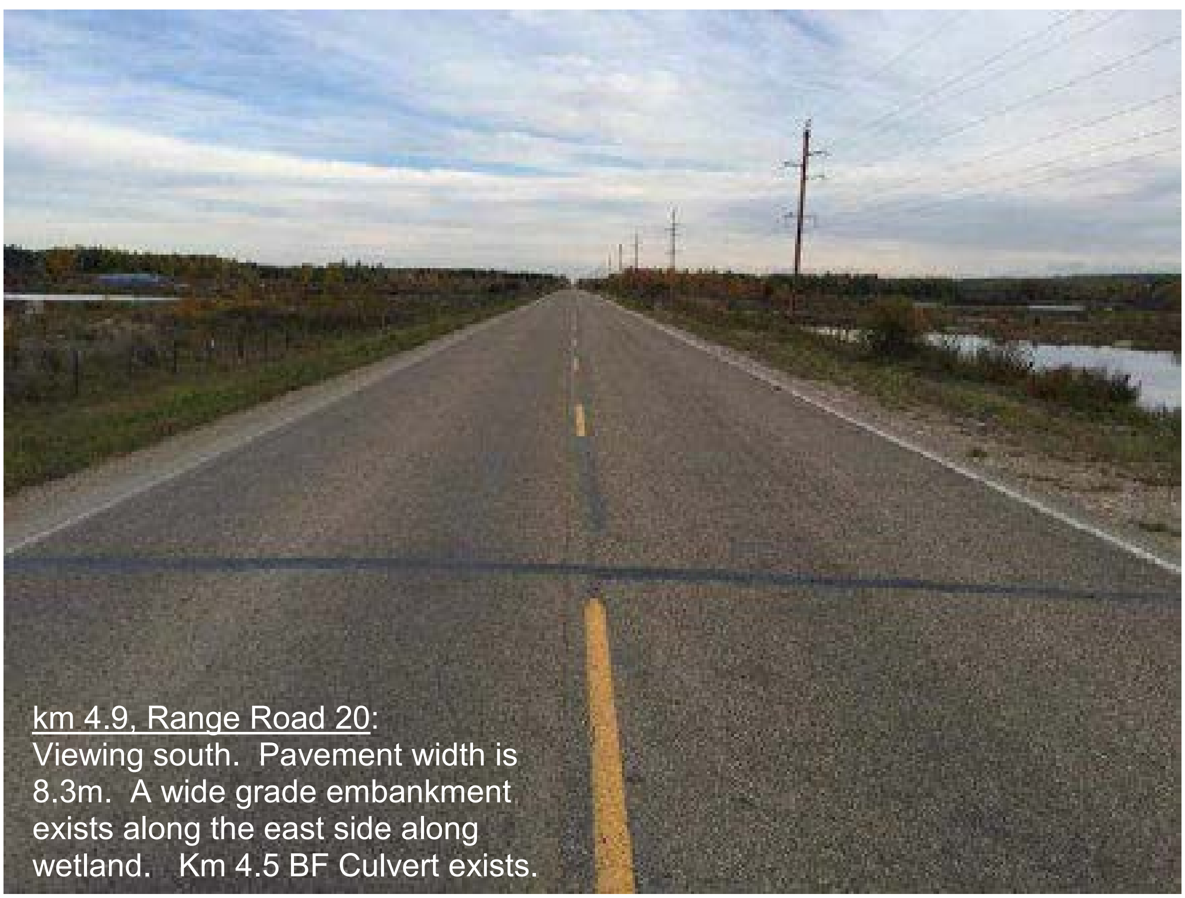

km 0.00, Highway 16:
Viewing west towards the intersection with Range Road 20. Left Turn out acceleration lane exists in the Eastbound Lanes shown on the right, approx. 240m in length (lane + taper).

km 0.00, Range Road 20:
Viewing south just north of the Hwy. 16 intersection.
Range Road 20 is paved with roadway line markings.

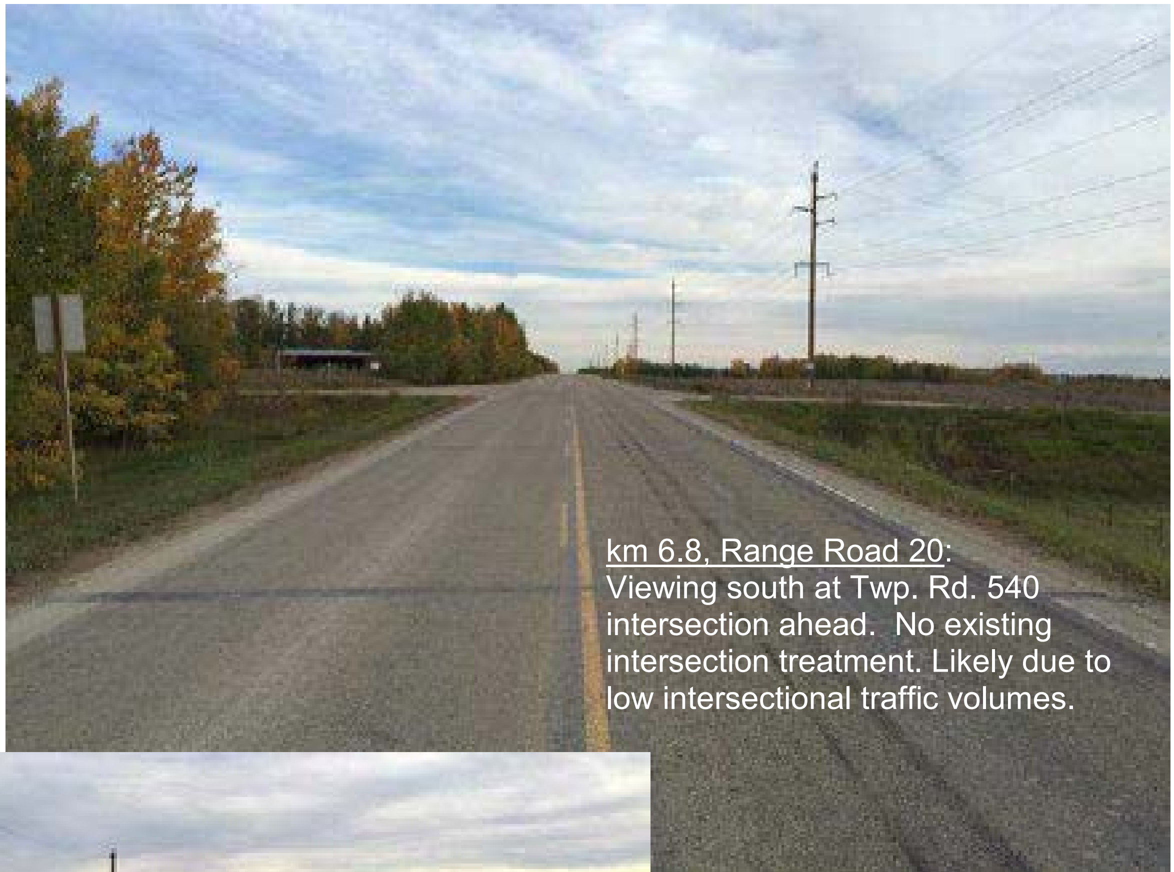
km 0.00, Range Road 20:
Viewing south. Pavement width is 8.2m. Pavement thickness appears to be 100 to 150mm.



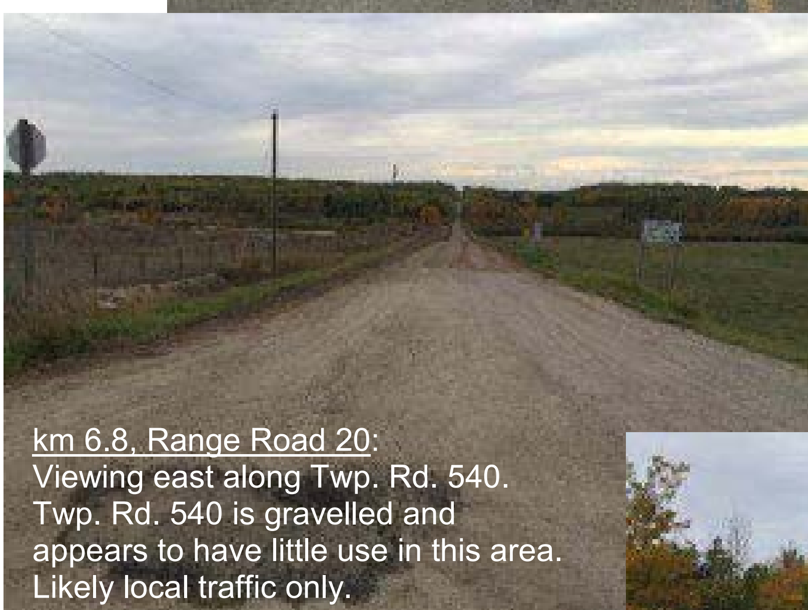
<u>km 3.7, Range Road 20</u>:
Viewing south. Pavement width is 8.3m. Lac Ste. Anne County approx. at km 3.6. Brush growth within ROW on west side.



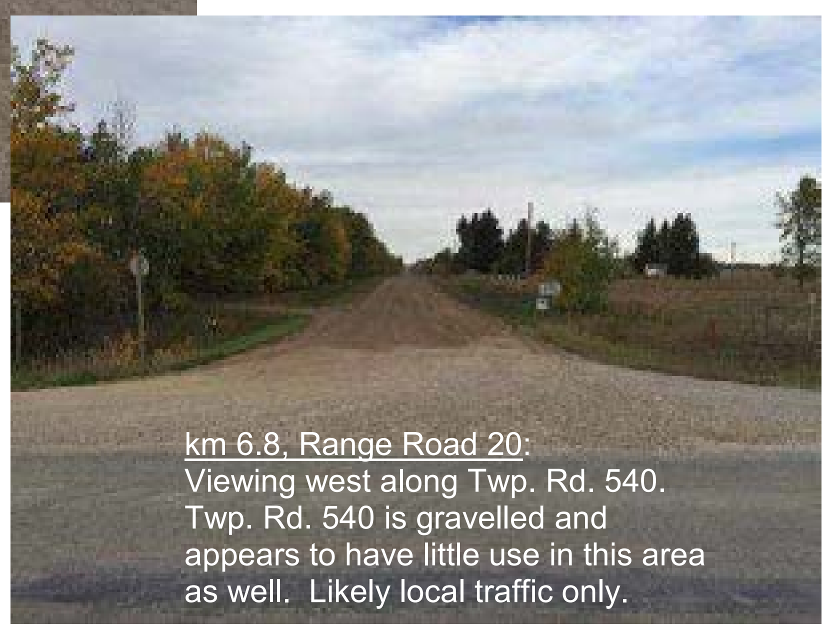
<u>km 4.9, Range Road 20</u>:
Viewing south. Pavement width is 8.3m. A wide grade embankment exists along the east side along wetland. Km 4.5 BF Culvert exists.



km 6.8, Range Road 20:
Viewing south at Twp. Rd. 540 intersection ahead. No existing intersection treatment. Likely due to low intersectional traffic volumes.



km 6.8, Range Road 20:
Viewing east along Twp. Rd. 540. Twp. Rd. 540 is gravelled and appears to have little use in this area. Likely local traffic only.



km 6.8, Range Road 20:
Viewing west along Twp. Rd. 540. Twp. Rd. 540 is gravelled and appears to have little use in this area as well. Likely local traffic only.

SUMMARY

Upon inspection, Range Road 20 appears to be consistent with a Rural Local Road County standard with widths from 8 to 9m. The existing roadway exhibits cross sectional attributes near or within the standard that includes sideslopes, ditch widths and backslopes. The horizontal and vertical alignments also appear satisfactory and consistent with standard.

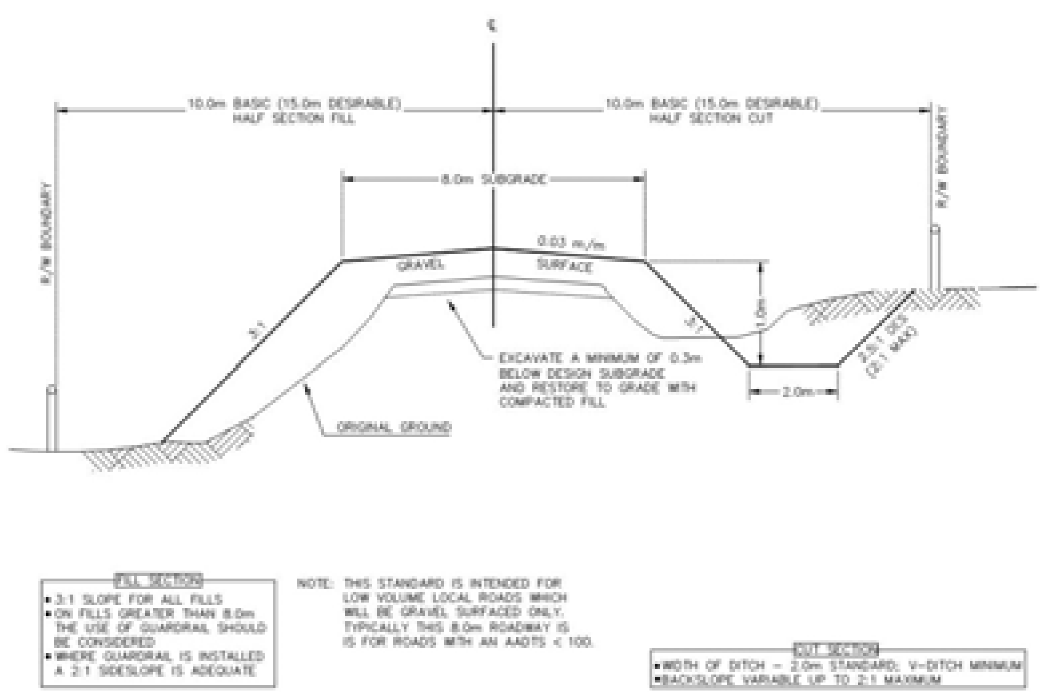
There are no concerns with the present geometric, sight distances and condition of Range Road 20.

3.3 Township Road 540 (Heatherdown Road)

Township Road 540 can be classified as a minor to major collector roadway. It presently collects traffic from the area and distributes it to other collectors or arterial roads such as highways. The existing width is approximately 7 - 9m from Hwy. 43 to Hwy. 779. Range Road 20 is gravel surfaced between Hwy. 43 to RR 20. Township Road 540 will be an important internal local road route once the at-grade intersections close onto Hwy. 43 and Hwy. 16.

The section of Township Road 540 from Hwy. 43 to RR 20 is posted at 80 km/hr. This usually implies a 90 km/hr. design speed.

The section of Range Road 20 from Hwy. 16 to Twp. Rd. 541 was constructed several years ago and likely to a RLU-208a standard (8m gravelled width standard) as shown below as Lac Ste. Anne County Standard Drawing G-02:



This standard is dated March 2008, however this section of Township Road 20 was constructed several years before this, likely with a lesser standard. This can be recognized with physical aspects such as a 3:1 fill slope in some locations. This present County standard would be most representative for this section. Below is an air photo view and ground photo of this section of Range Road 20.

The following table is from Lac Ste. Anne County's General Municipal Servicing Standards and represents the roadway design parameters for the various road standards. The two standards that are being used as comparable standards for Township Road 540 are noted below.

Table 1 – Geometric Design Requirements

Designation	Surface	AADT*	Truck Traffic	Min. ROW** (m)	Preferred ROW** (m)	Design Speed (km/h)	Posted Speed (km/h)	SSD' (m)	Crest k (m)	Sag k (m)	Min. Horiz. Radius (m)
RLU-207G	Gravel	< 25	None	20	30	40	30	65	7	11	
RLU-208G(a)	Gravel	< 100	Minimal	20	30	60	50	85	15	20	90
RLU-208G(b)	Gravel	< 200	Minimal	20	30	60	50	85	15	20	90
RLU-209G	Gravel	> 200		20	40	60	50	85	15	20	90
RLU-210G	Gravel	> 200	Significant	20	40	70	60	140	35	30	190
RLU-208(a)	Cold Mix	< 200	Minimal	20	40	60	50	85	15	20	90
RLU-208(b)	ACP	< 200		20	40	60	50	85	15	20	90
RLU-209(a)	Cold Mix	< 500	Minimal	20	40	60	50	85	15	20	90
RLU-209(b)	ACP	< 500		40	40	60	50	85	15	20	90
RLU-210	ACP	< 2000		40	40	70	60	140	35	30	190
RLU-211	ACP	> 2000	Significant	40	40	70	60	140	35	30	190
ULU-209	ACP	< 2000		20	30	60	50	85	15	20	90
ULU-211.5	ACP	> 2000	Significant	30	30	70	60	140	35	30	190

* AADT – Average Annual Daily Traffic
** ROW – Right-of-Way
' SSD – Stopping Sight Distance
Note: The recommended design speeds are for internal roadway systems only.

For both road standards, the posted and design speeds appear to be lower than the existing posted speed on Range Road 20. The lower posted speed on the standards above mostly are reflected in the vertical and horizontal alignment.

Using the Transportation Association of Canada standards shown below, the following minimum vertical and horizontal parameters can be used for an 80 km/hr. posted speed (design speed = 90 km/hr.):

Minimum Horizontal Radius:	340m
Maximum Gradient:	5 – 7%
Minimum K value for Crest Curves:	53
Minimum K value for Sag Curves:	40

Table 2.1.2.3 Minimum Radii for Limiting Values of e and f for Rural and High Speed Urban Roadways[1]

Design Speed (km/h)	e_{max} (m/m)	Design Value for f	e + f	Minimum Radius (m) (calculated)	Minimum Radius for Design (m)
40	0.04	0.17	0.21	60	60
50	0.04	0.16	0.20	98	100
60	0.04	0.15	0.19	149	150
70	0.04	0.15	0.19	203	200
80	0.04	0.14	0.18	280	280
90	0.04	0.13	0.17	375	380
100	0.04	0.12	0.16	492	490
40	0.06	0.17	0.23	55	55
50	0.06	0.16	0.22	89	90
60	0.06	0.15	0.21	135	130
70	0.06	0.15	0.21	184	190
80	0.06	0.14	0.20	252	250
90	0.06	0.13	0.19	336	340
100	0.06	0.12	0.18	437	440
110	0.06	0.10	0.16	595	600
120	0.06	0.09	0.15	756	750
130	0.06	0.08	0.14	951	950
40	0.08	0.17	0.25	50	50
50	0.08	0.16	0.24	82	80
60	0.08	0.15	0.23	123	120
70	0.08	0.15	0.23	168	170
80	0.08	0.14	0.22	229	230
90	0.08	0.13	0.21	304	300
100	0.08	0.12	0.20	394	390
110	0.08	0.10	0.18	529	530
120	0.08	0.09	0.17	667	670
130	0.08	0.08	0.16	832	830

controls or considerations influencing the horizontal alignment and superelevation.

Moreover, in low speed urban conditions, drivers are accustomed to a greater level of discomfort while traversing curves. Hence, increased lateral friction factors resulting from lower superelevation rates or no superelevation at all, are permissible. In these cases, the maximum lateral friction factors as defined by Table 2.1.2.2 are used in calculating minimum radii.

To allow for the fact that in low speed urban designs various limits for maximum permissible superelevation may exist, the minimum radius is provided for a number of commonly used rates of superelevation.

Table 2.1.2.4 provides rounded design values for minimum radii for low speed urban design, 30 km/h to 60 km/h, normally representative of retrofit conditions. Minimum radii are stated for normal crown (-0.02 m/m, or adverse superelevation), reverse crown (0.02 m/m superelevation) and maximum superelevation rates of 0.04 and 0.06 m/m. Table 2.1.2.4 also provides a summary of the minimum radii for a range of high design speeds, 70 km/h to 100 km/h, associated with maximum superelevation values of 0.04 m/m and 0.06 m/m. The values are the same as the high speed urban values in Table 2.1.2.3.

Distribution of 'e' and 'f' Over a Range of Curves: Design Domain

Overview

There are a number of methods of distributing e and f over a range of curves flatter than the

Maximum Grade: Design Domain Quantitative Aids

Although the relationship between design speeds and maximum grade is relatively subjective, reasonable guides for maximum grade have been developed.

The guidelines for maximum gradients are given in Table 2.1.3.1.

Maximum Grade: Design Domain Application Heuristics

1. The range of values shown in Table 2.1.3.1 recognizes that maximum grade selected for design varies with topography and the general financial capability of the road authority to fund the capital works. For lower classification urban roads, land use is an additional consideration and land use is incorporated into the guidelines for urban local and urban undivided collectors.

2. The values shown may be adjusted to suit local and economic conditions. Maximum gradients by classification and land use are often a matter of policy, and as a result, vary from jurisdiction to jurisdiction. Normally, the local policy is established at a senior engineering and planning level. In any event, in adjusting these figures, designers should ensure that they explicitly consider the impact of such alternative maximum grade values on safety.

Table 2.1.3.1 Maximum Gradients[1-3]

Design Speed (km/h)	30/40/50		60		70		80		90		100		110		120/130	
Topography	R	M	R	M	R	M	R	M	R	M	R	M	R	M	R	M
RLU	7	11	7	11	6	9	6	8	5	7	5	7	-	-	-	-
RCU	-	-	6	10	6	6	5	8	5	7	5	7	-	-	-	-
RCD	-	-	-	-	6	9	5	8	5	7	5	7	-	-	-	-
RAU	-	-	-	-	-	-	4	7	4	6	3	6	3	6	3	5
RAD	-	-	-	-	-	-	4	7	4	6	3	6	3	5	3	5
RFD	-	-	-	-	-	-	-	-	-	-	3	5	3	5	3	5
ULU – Residential	8	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ULU – Industrial/ Commercial	8	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UCU – Residential	8	12	7	11	7	10	-	-	-	-	-	-	-	-	-	-
UCU – Industrial/ Commercial	6	12	6	11	6	9	6	8	-	-	-	-	-	-	-	-
UCD	6	10	6	9	5	8	5	7	-	-	-	-	-	-	-	-
UAU	6	10	6	9	5	8	5	7	-	-	-	-	-	-	-	-
UAD	-	-	3	6	3	6	3	6	3	6	3	5	-	-	-	-
UED	-	-	-	-	-	-	5	6	4	5	4	5	4	5	3	5
UFD	-	-	-	-	-	-	-	-	4	5	3	5	3	5	3	5

Notes:
1. Short grades less than 150 m in length, and one-way down grades may be 1% higher on urban roads, and 2% higher on low volume rural roads.
2. R refers to rolling topography.
3. M refers to mountainous topography.

In calculating K values for various sight distances, the height of driver's eye is 1.05 m, and the height of object is as outlined following, and discussed in more detail in Chapter 1.2.

- For stopping sight distance the most common object a vehicle has to stop for is another vehicle ahead on the road, the height of tail light is used. The legislated minimum is 0.38 m and is adopted for design. Other heights of objects can be used if necessary.
- For decision sight distance the more common height of object is 0.15 m, although other heights, such as zero for pavement markings, are not uncommon.
- For passing sight distance the height of object is 1.30 m, which represents the height of the opposing vehicle.

Crest Vertical Curves: Design Domain Quantitative Aid

Based on the above most commonly used heights of object, and on sight distances from Tables 1.2.5.3 and 1.2.5.5, the K values for stopping sight distance are provided in Table 2.1.3.2 and for passing sight distance the K values are provided in Table 2.1.3.3. The decision sight distance K values are not included because the vertical curvature depends on the height of object which is variable (depending on what the driver has to see).

The calculated K values are based on the length of curve exceeding the sight distance and they can be used without significant error when the length of curve is less than the sight distance. Appreciable differences occur only where A is small and little or no additional cost is involved in obtaining longer vertical curves.

On undivided roads non-striping sight distance is used to determine when no-passing pavement markings are required[2]. It is desirable to provide passing sight distance wherever possible but non-striping sight distance is generally adequate for safe passing manoeuvres.

Non-striping sight distance is less than passing sight distance, at each design speed. Passing manoeuvres can be completed in less than the full passing sight distance because of the timing of oncoming vehicles.

Table 2.1.3.2 K Factors to Provide Stopping Sight Distance on Crest Vertical Curves

Design Speed (km/h)	Assumed Operating Speed (km/h)	Stopping Sight Distance (m)	Rate of Vertical Curvature (K) Computed	Rounded
30	30	29.6	1.6	2
40	40	44.4	3.7	4
50	47-50	57.4-62.8	6.1-7.3	6-7
60	55-60	74.3-84.6	10.2-13.3	10-13
70	63-70	99.1-110.8	16.4-22.8	16-23
80	70-80	112.8-139.4	23.6-36.1	24-36
90	77-90	131.2-168.7	32.0-52.8	32-53
100	85-100	157.0-205.0	45.8-78.0	45-80
110	91-110	179.5-246.4	59.8-112.7	60-110
120	98-120	202.9-285.6	76.4-151.4	75-150
130	105-130	227.9-327.9	96.4-199.6	95-200

Note: The above are minimum values, use higher K factors whenever possible.

Table 2.1.3.4 K Factors to Provide Minimum Stopping Sight Distance on Sag Vertical Curves[1]

Design Speed (km/h)	Assumed Operating Speed (km/h)	Stopping Sight Distance (m)	Rate of Sag Vertical Curvature (K): Headlight Control – Calculated	Headlight Control – Rounded	Comfort Control – Calculated	Comfort Control – Rounded
30	30	29.9	3.9	4	2.3	2
40	40	44.4	7.1	7	4.1	4
50	47-50	57.4-62.8	10.2-11.5	11-12	5.6-6.3	5-6
60	55-60	74.3-84.6	14.5-17.1	15-18	7.7-9.1	8-9
70	63-70	99.1-110.8	19.8-24.1	20-25	10.0-12.4	10-12
80	70-80	112.8-139.4	24.8-31.9	25-32	12.4-16.2	12-16
90	77-90	131.2-168.7	29.6-40.1	30-40	15.0-20.5	15-20
100	85-100	157.0-205.0	36.7-50.1	37-50	18.3-25.3	18-25
110	91-110	179.5-248.4	43.0-61.7	43-62	21.0-30.6	21-30
120	98-120	202.9-285.6	49.5-72.7	50-73	24.3-36.4	24-36
130	105-130	227.9-327.9	56.7-85.0	57-85	27.9-42.8	28-43

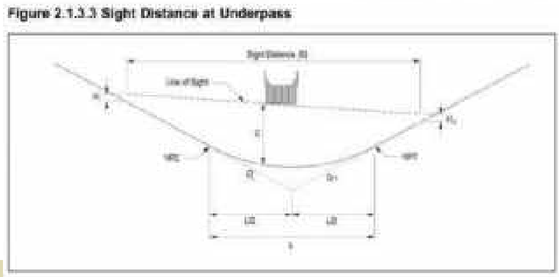
Values for sag curvature based on the comfort criterion are shown in Table 2.1.3.4.

These K values for sag curves are used in urban situations such as underpasses where it is often necessary for property and access reasons to depart from original ground elevations for as short a distance as possible. Minimum values are normally exceeded where feasible, in consideration of possible power failures and other malfunctions to the street lighting systems. Designing sag vertical curves along curved roadways for decision sight distance is normally not feasible due to the inherent flat grades and resultant surface drainage problems.

2.1.3.4 Sight Distance at Underpasses

While not a frequent design problem, the sight distance at underpasses may be restricted due to the overpass structure or signs hanging below the bottom of the overpass structure restricting the line of sight. The sight distance through a grade separation should be equal to or greater than the minimum stopping sight distance. Figure 2.1.3.3 illustrates the sight distance from an eye height of h_1 to an object height of h_2 with an underpass clearance of C. Case 1 is for a sight distance greater than the length of the vertical curve (S>L) and Case 2 is for a sight

Figure 2.1.3.3 Sight Distance at Underpass



The horizontal alignment of Township Road 20 is straight and on tangent. The existing vertical profile contains some crest and sag curves that appear to be within the 80km/hr. posted speed standard and is fairly flat. All grades appear to be less than 8%.

3.3.1 Site Observations

Site observations of Township Road 540 between September 10 to14 are shown below:

Twp. Rd. 540: Viewing west from Range Road 20

SUMMARY

Upon inspection, Township Road 540 appears to be consistent with a Rural Local Road County standard with widths from 8 to 9m. The existing roadway exhibits cross sectional attributes near or within the standard that includes sideslopes, ditch widths and backslopes. The horizontal and vertical alignments also appear satisfactory and consistent with standard.

There are no concerns with the present geometric, sight distances and condition of Township Road 540.

4. EXISTING CONDITIONS - HIGHWAYS

4.1 Existing Intersection Treatment – Hwy. 16:14 & RR 20

The details of the Hwy. 16:14 & RR 20 intersection site are as follows:

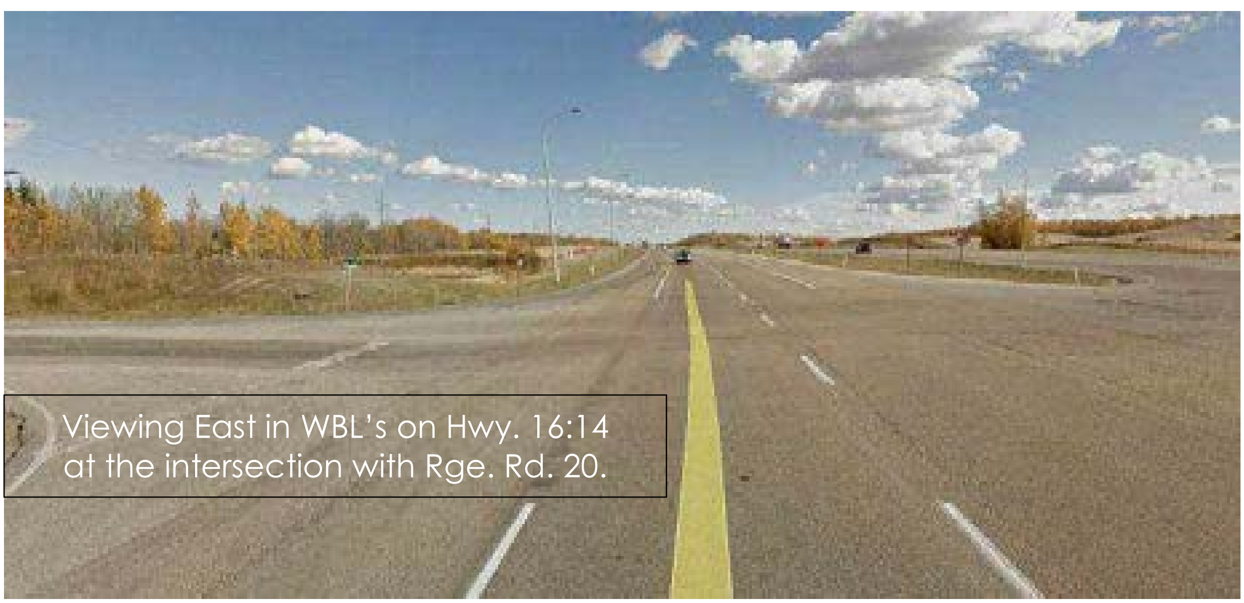
- Highway 16:14 is a four-laned roadway and is paved.

- The intersection has an existing treatment as follows:
  - EBL's: Right Turn
    - Deceleration: 80m 25:1 Taper with 100m parallel 3.5m right turn lane;
    - Acceleration: 90m parallel 3.5m right turn lane with a 110m 30:1 Taper;
  - EBL's Left Turn
    - Deceleration: 70m 20:1Taper with 100m parallel 3.5m left turn lane;
    - **Acceleration: 120m 25:1Taper with 120m parallel 3.5m left turn lane**;
  - WBL's Right Turn
    - Deceleration: 140m 40:1 Taper with 100m parallel 3.5m right turn lane;
    - Acceleration: 75m Taper
  - WBL's Left Turn
    - Deceleration: 120m 35:1 Taper with 90m parallel left turn lane.
    - Acceleration: None

- There is existing full intersection illumination.
- The side slopes seem to be 5:1 or better throughout.

Viewing East in EBL's on Hwy. 16:14, just west of the intersection with Rge. Rd. 20. Note Left Turn lane acceleration lane for SB to EB turns.

Viewing West in WBL's on Hwy. 16:14, just east of the intersection with Rge. Rd. 20.



Viewing East in WBL's on Hwy. 16:14 at the intersection with Rge. Rd. 20.

4.2 Existing Intersection Treatment – Hwy. 43:22 & Twp. Rd. 540

The details of the Hwy. 43:22 & Twp. Rd. 540 intersection site are as follows:

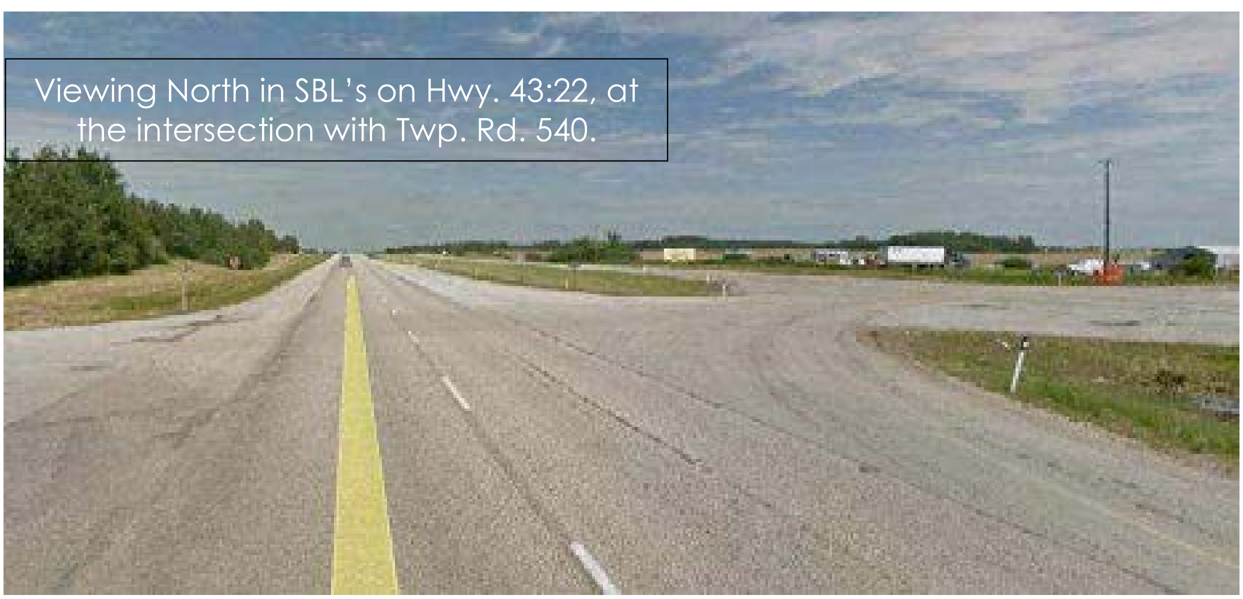
- Highway 43:22 is a four-laned roadway and is paved.

- The intersection has an existing treatment as follows:
  - NBL's: Right Turn
    - Deceleration: None;
    - Acceleration: None;
  - NBL's Left Turn
    - Deceleration: 90m 30:1Taper with 120m parallel 3.0m left turn lane;
    - Acceleration: None
  - SBL's Right Turn
    - Deceleration: 140m 40:1 Taper with 50m parallel 3.0m right turn lane;
    - Acceleration: None
  - SBL's Left Turn
    - Deceleration: 80m 25:1 Taper with 110m parallel 3.0- 3.5m left turn lane.
    - Acceleration: None

- There is no existing illumination.
- The side slopes seem to be 5:1 or better throughout.

Viewing South in NBL's on Hwy. 43:22, at the intersection with Twp. Rd. 540.

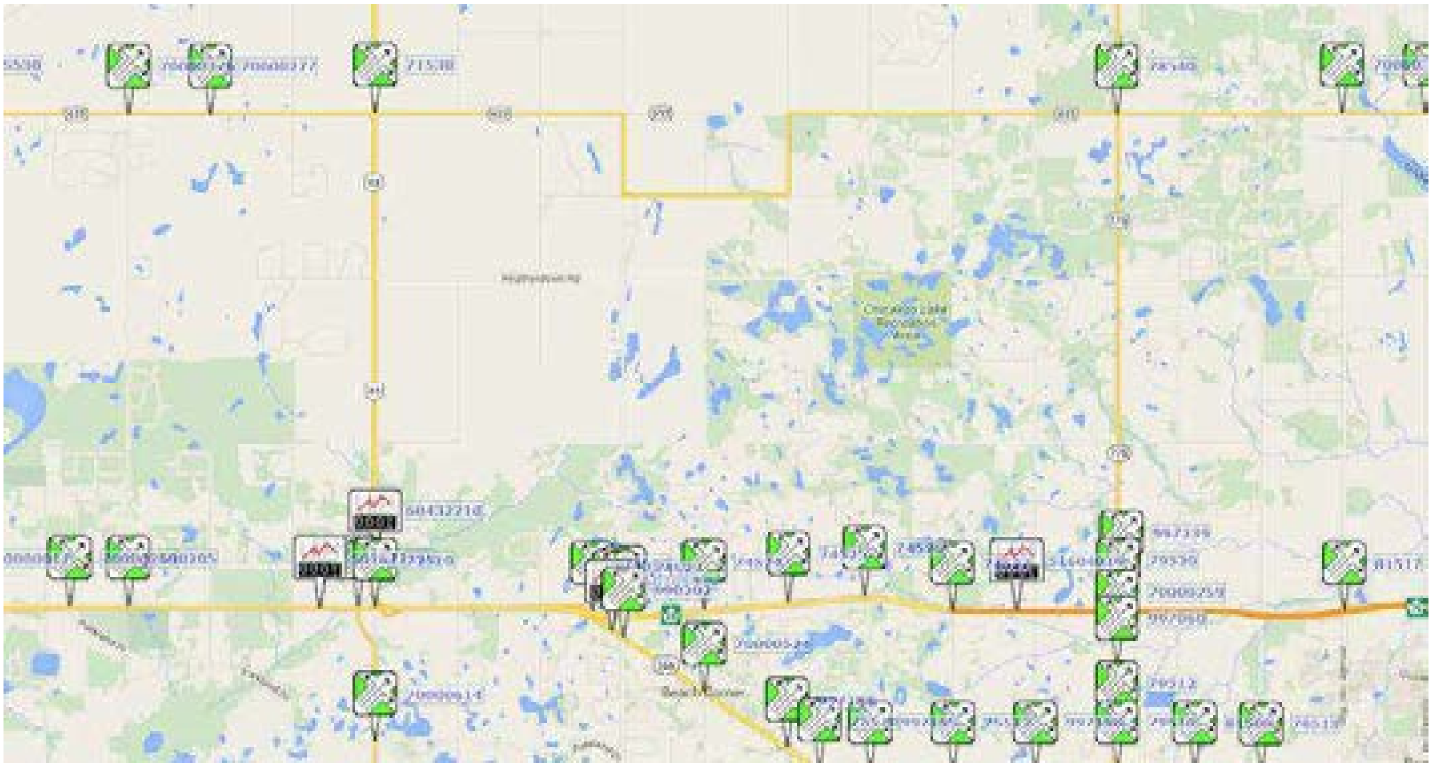
Viewing North in NBL's on Hwy. 43:22, at the intersection with Twp. Rd. 540.



Viewing North in SBL's on Hwy. 43:22, at the intersection with Twp. Rd. 540.

4.3 Available Traffic Data

Existing Alberta Transportation intersectional traffic count locations are shown in the map below:

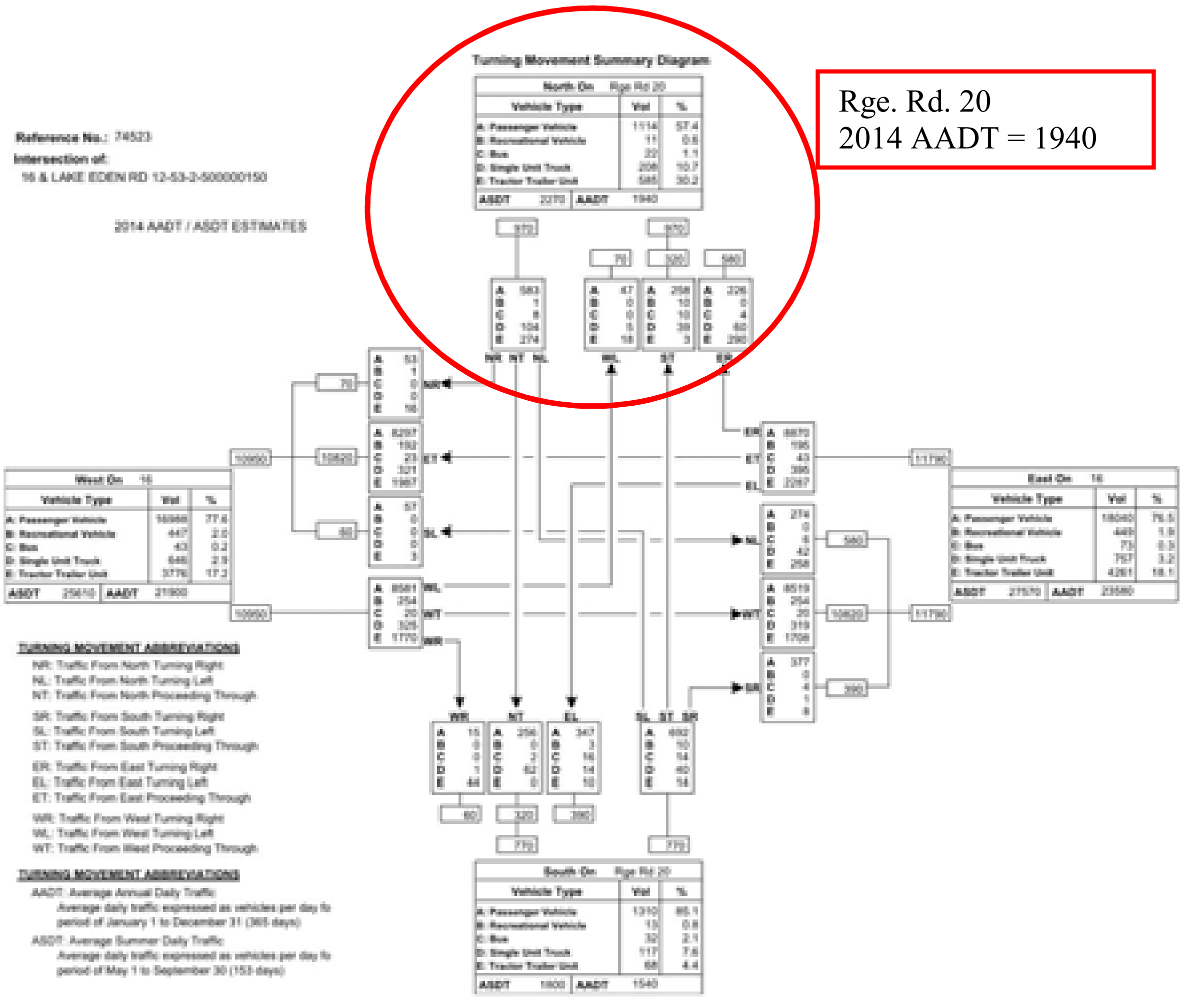


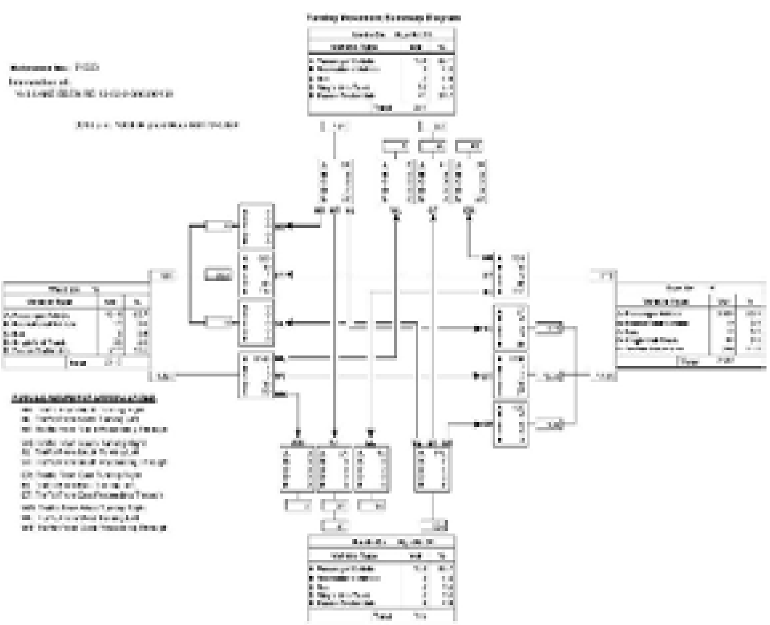
AT website http://www.transportation.alberta.ca/3460.htm has traffic counts available that are relevant for comparison purposes for this assessment.

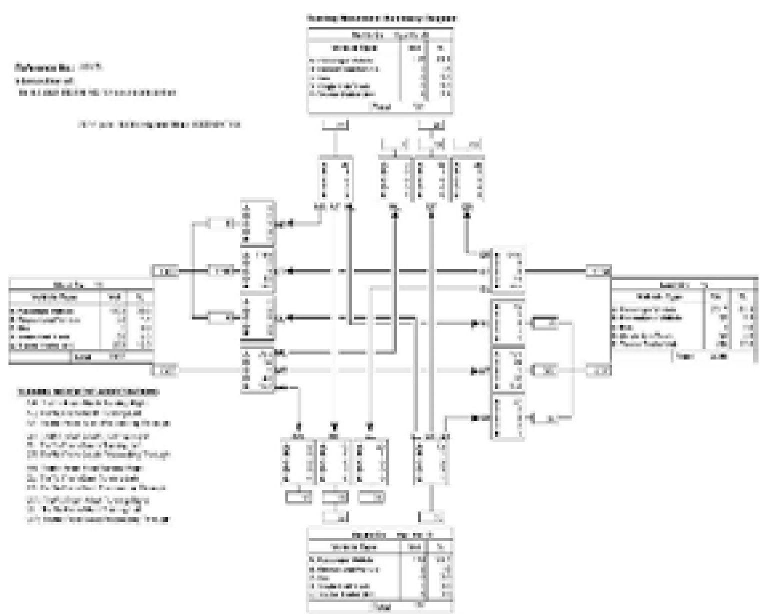
There are two specific traffic counts available of interest for this assessment as shown below:

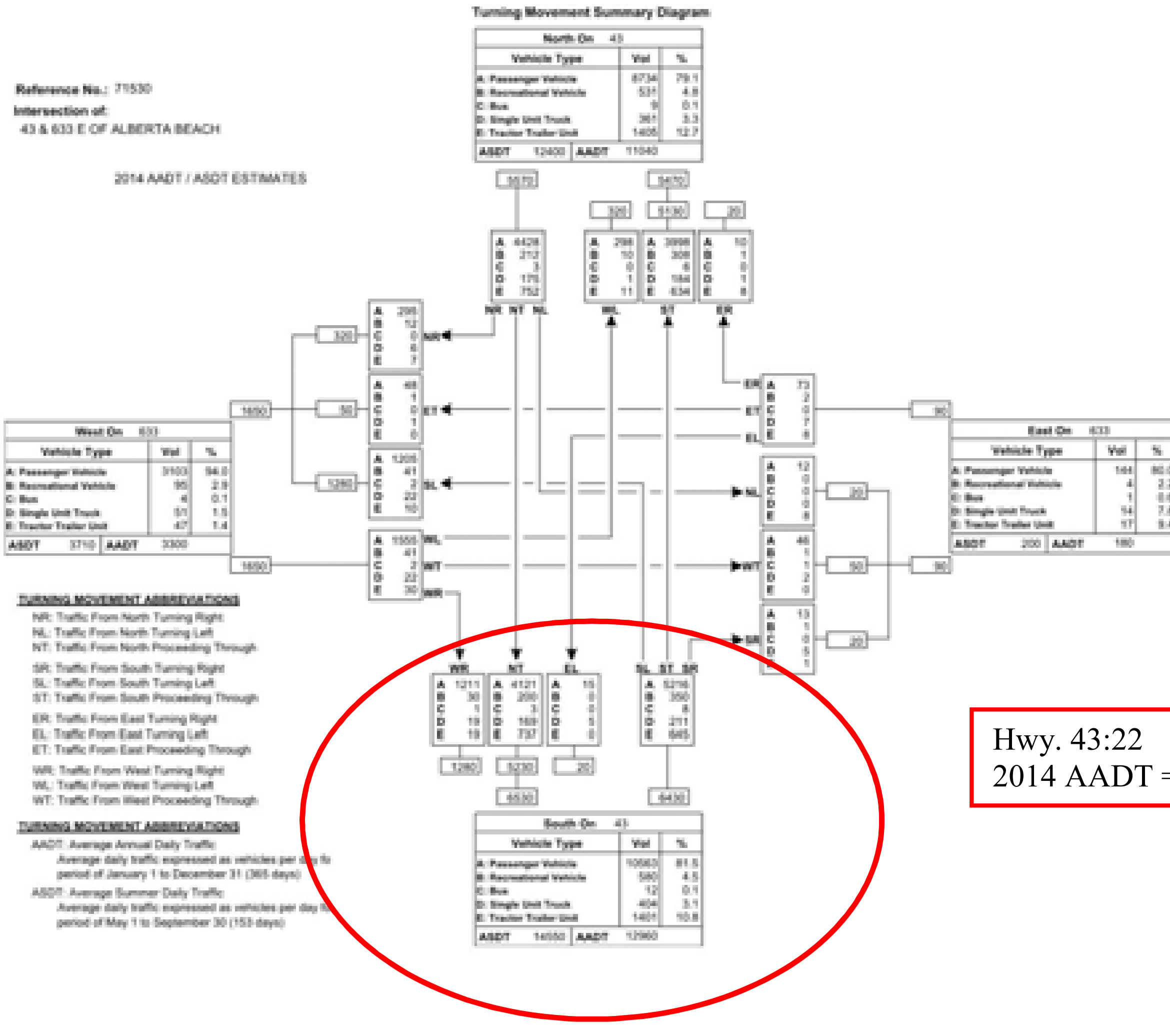
Table-4.1a: 2014 AADT and ASDT from Alberta Highways Traffic Volume History

Intersection Leg	2014 AADT	
16 & Lake Eden Rd (74523)	23580 - Hwy. 16	1940 - RR 20
43 & 633 E of Alberta Beach (71530)	12960 - Hwy. 43	
16 & 43 at Manly Corner (72510)	13360 - Hwy. 43	

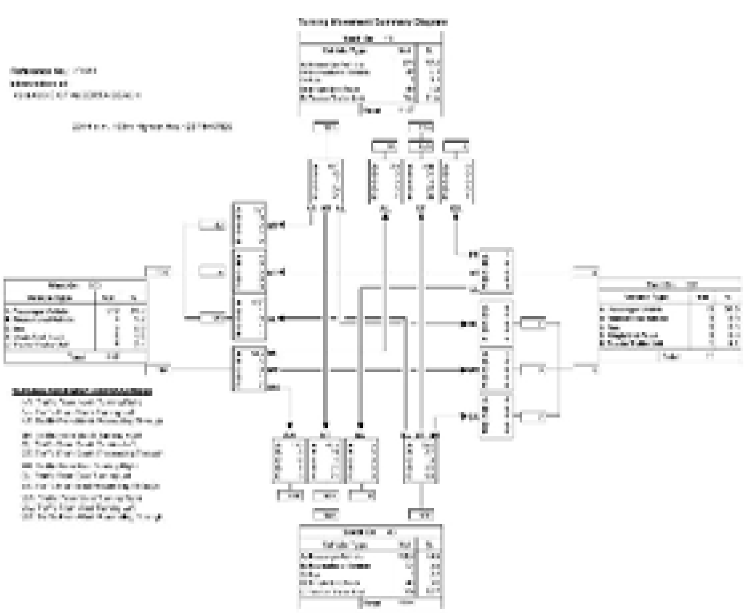

Rge. Rd. 20
2014 AADT = 1940
Turning Movement Summary Diagram
Reference No.: 74523
Intersection of:
16 & LAKE EDEN RD 12-53-2-500000150
2014 AADT / ASDT ESTIMATES
North On Rge Rd 20
Vehicle Type
Vol
%
A: Passenger Vehicle
B: Recreational Vehicle
C: Bus
D: Single Unit Truck
E: Tractor Trailer Unit
ASDT
AADT
West On 16
East On 16
South On Rge Rd 20
TURNING MOVEMENT ABBREVIATIONS
NR: Traffic From North Turning Right
NL: Traffic From North Turning Left
NT: Traffic From North Proceeding Through
SR: Traffic From South Turning Right
SL: Traffic From South Turning Left
ST: Traffic From South Proceeding Through
ER: Traffic From East Turning Right
EL: Traffic From East Turning Left
ET: Traffic From East Proceeding Through
WR: Traffic From West Turning Right
WL: Traffic From West Turning Left
WT: Traffic From West Proceeding Through
AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day fo period of January 1 to December 31 (365 days)
ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehicles per day fo period of May 1 to September 30 (153 days)

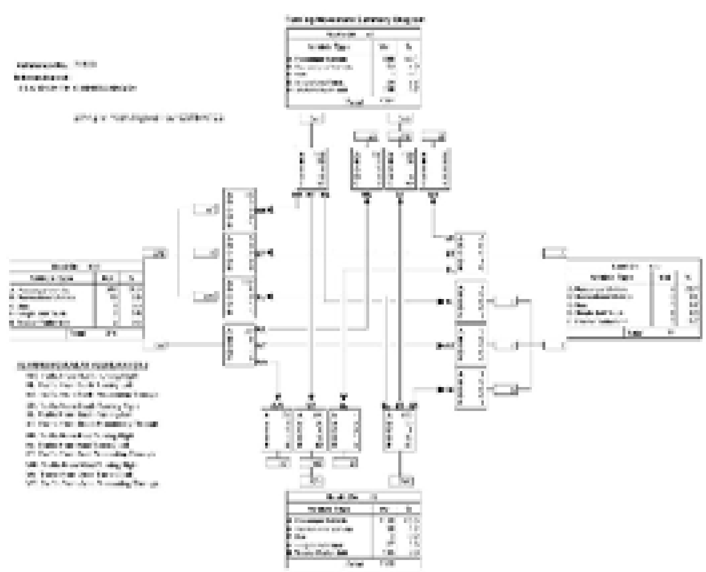






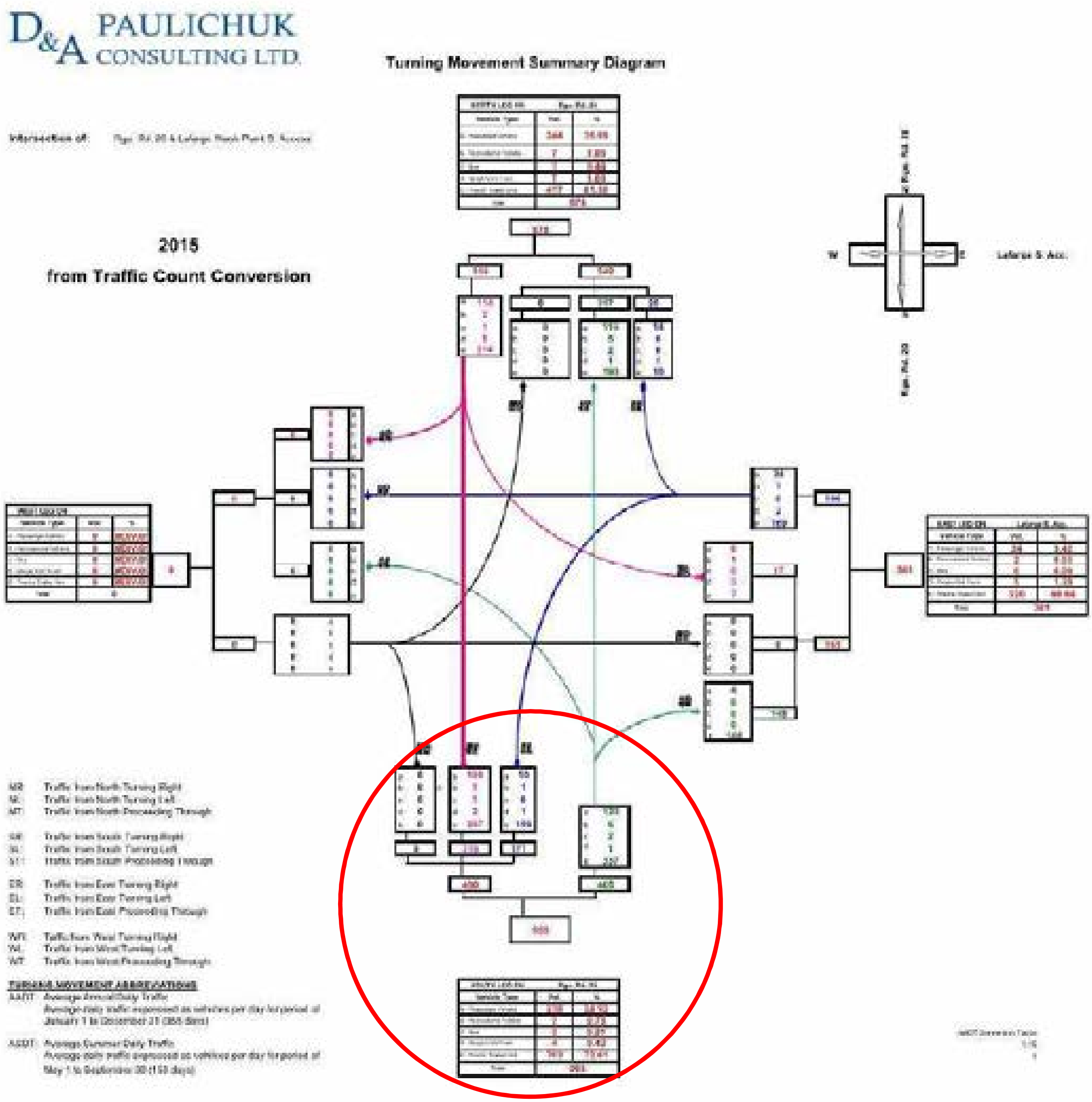
Hwy. 43:22
2014 AADT = 12960





4.4 Traffic Counts

A traffic count was recently on Sept. 10, 2015, conducted by D&A Paulichuk Consulting Ltd. on Rge. Rd. 20, just north of the proposed development. The results indicate that the 2015 AADT for RR 20 at the development access is approximately 995.



4.5 Traffic Growth - Hwy. 16:14

The following historical traffic data for Highway 16:14 is available from the Alberta Transportation's website, which indicates a growth of approximately 6.72% growth for the east leg of Hwy. 16 at RR 20, from 1989 to 2014 (25 years) and a 2.26% from 2007 to 2014 (7 years).

Historical Traffic Volumes – Hwy. 16:14

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
AADT	15630	16390	18760	20360	20480	21300	21660	20690	22400	23040	23580

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
AADT	9940	10130	10020	9760	10490	11280	11570	12830	13550	14290	14280

Year	1989	1990	1991	1992
AADT	8800	9060	9040	9250

Since there has been a noticeable growth rate change between the longer term and shorter term, 4.5% will be used for projecting the next 20 years.

4.6 Traffic Growth - Hwy. 43:22

The following historical traffic data for Highway 43:22 is available from the Alberta Transportation's website, which indicates a growth of 4.03% per annum non-compounded from 1986 to 2014 (28 years), 3.46% from 1994 to 2014 (20 years), 3.08% from 2004 to 2104 (10 years) and a 3.00% from 2009 to 2014 (5 years) for the south leg of Hwy. 43 from Hwy. 633.

Historical Traffic Volumes – Hwy. 43:22

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
AADT	9910	10230	11030	11770	11320	11280	11530	11510	12050	12270	12960

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
AADT	7390	7660	7700	7650	7910	8290	8290	8530	8920	9250	9600

Year	1984	1985	1986	1987	1988	1989	1990	1991	1992
AADT			6090	6490		6720	6850	6860	7000

A growth rate of 3.39% will be used for the next 20 years, which is the average of the four rates shown above.

4.7 Traffic Growth – Rge. Rd. 20 & Twp. Rd. 540

The following historical traffic data for Range Road 20 north of Hwy. 16 is available from the Alberta Transportation's website, which indicates a growth of approximately 0.80% growth for north leg off of Hwy. 16:14 intersection, from 2002 to 2014 (12 years).

Historical Traffic Volumes – Rge. Rd. 20

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
AADT	1810	1830	2280	2460	2540	2640	2680	1770	1840	1900	1940

Year	2002	2003
AADT	1770	1740

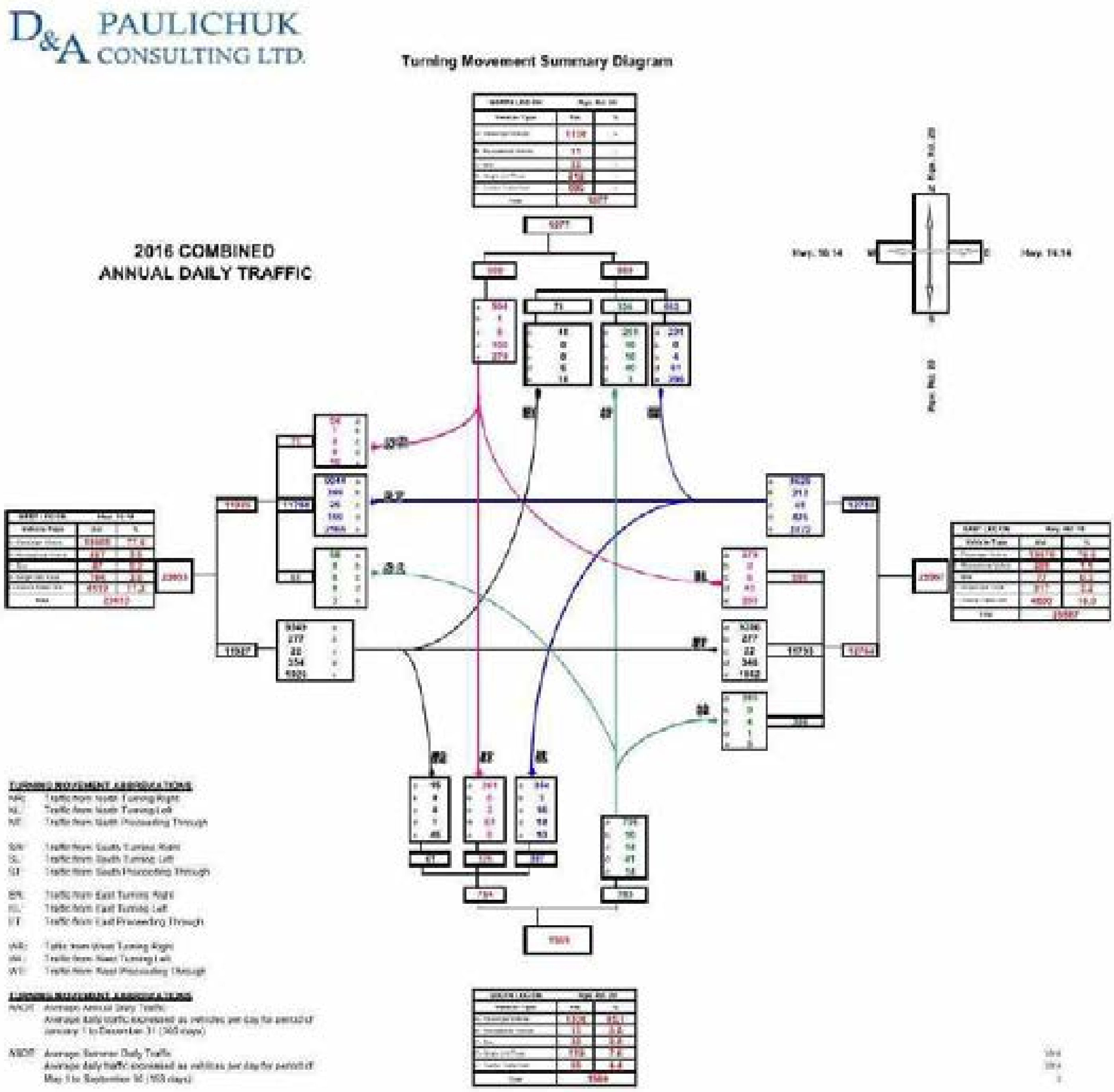
A growth rate of 1.0% per year will be used for Range Road 20 for analysis purposes.

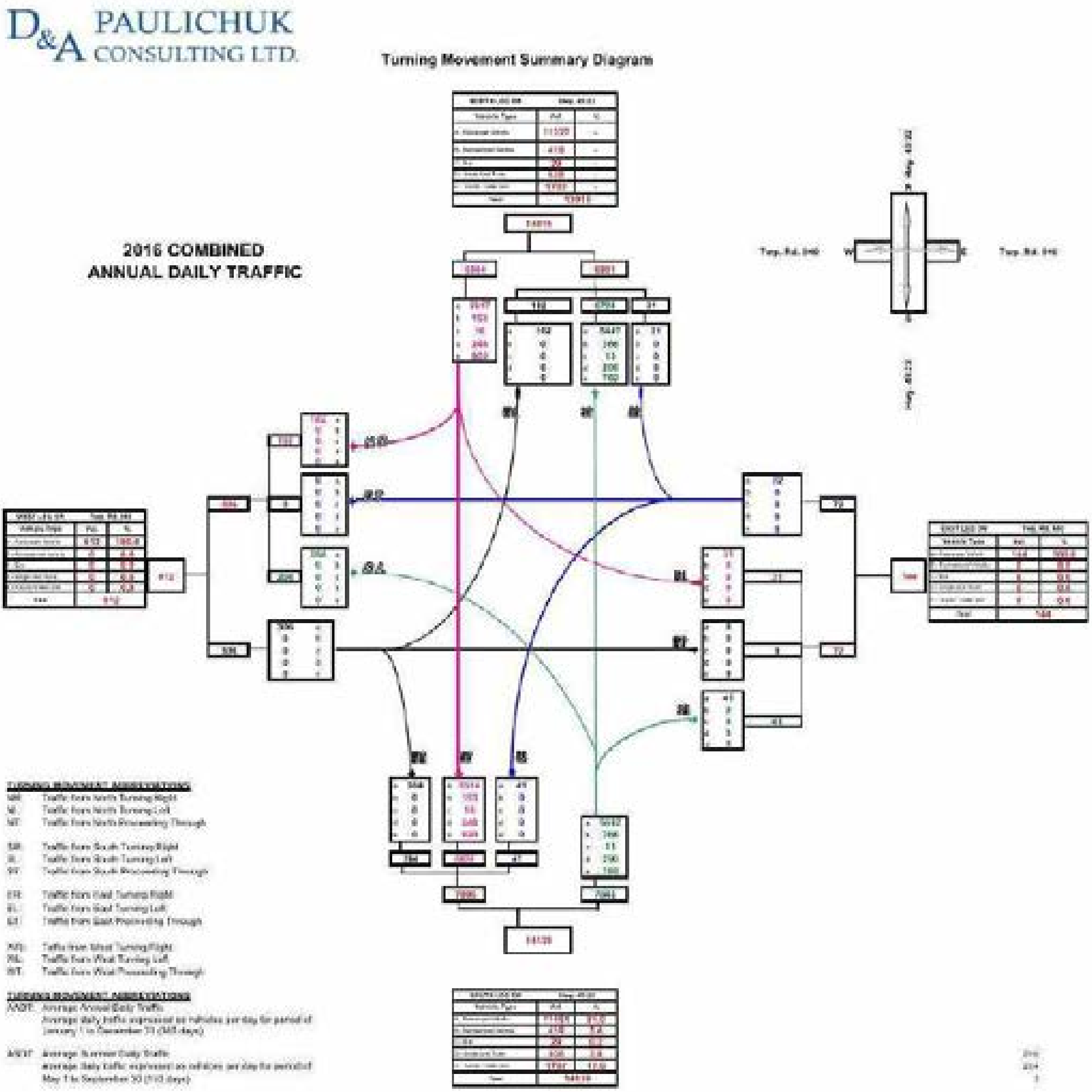
For Twp. Rd. 540 between Hwy. 43 and RR 20, there is no historical data available. A growth rate of 1.0% per year will be used for Twp. Rd. 540 for analysis purposes.

4.8 Back Ground Traffic Turning Movement Diagrams

The background traffic turning movement diagrams are shown below for 2016.

The 2014 AADT for Twp. Rd. 540 is estimated to be 600 to the west and 140 to the east based on existing development in the area.


D&A PAULICHUK CONSULTING LTD.
Turning Movement Summary Diagram
2016 COMBINED
ANNUAL DAILY TRAFFIC


D&A PAULICHUK CONSULTING LTD.
Turning Movement Summary Diagram
2016 COMBINED
ANNUAL DAILY TRAFFIC

5. ANALYSIS – DEVELOPMENT ACCESS & RGE. RD. 20

The proposed development is to access Range Road 20 to the east as shown below.

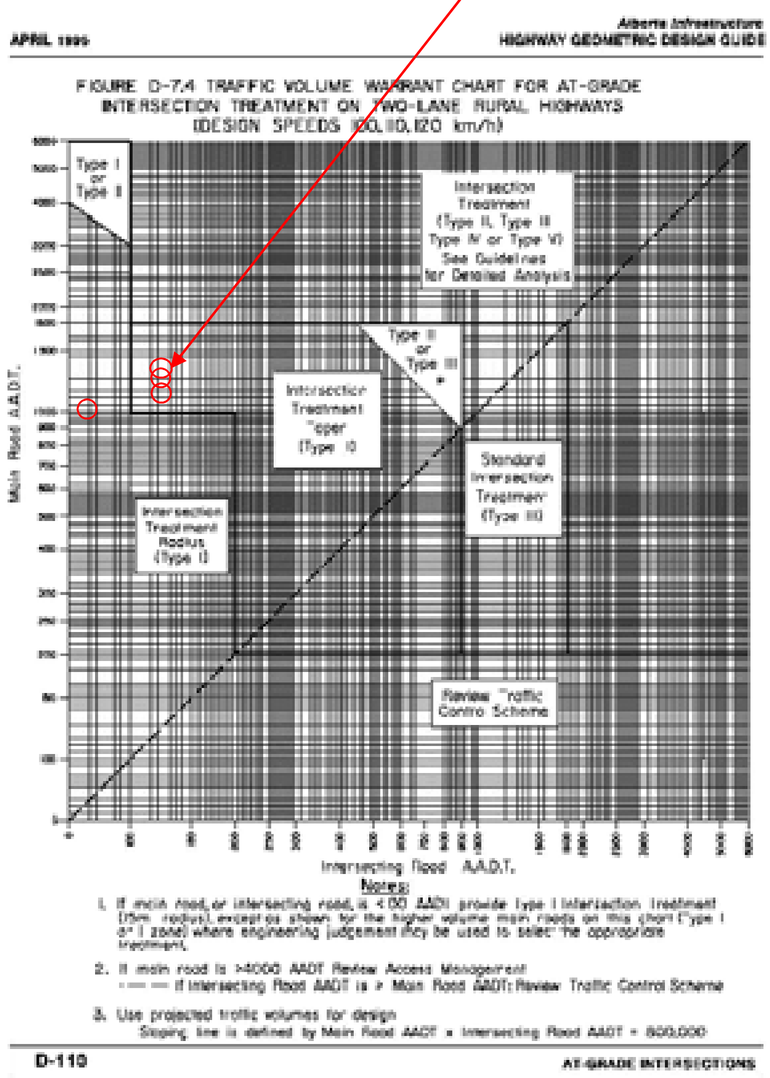
The projected traffic volumes for the next 20 years is as follows:

Existing Highway Traffic Forecast, Daily Volumes

Year	Range Road 20 South Leg	Dev. Ent. West Leg
2016	1043	29
2021 (5 Year)	1187	124
2026 (10 Year)	1239	124
2036 (20 Year)	1336	124

5.1 Initial Determination based on Traffic Volume Warrant Chart

The 2016, 2021, 2026 and 2036 AADT values for the Rge. Rd. 20 and Development Access intersection indicate from referencing Figure D-7.4, "Traffic Volume Warrant Chart for At-Grade Intersection Treatment on Two-Lane Rural Highways (Design Speeds 100/110/120 km/h)", that a <u>Type II intersection maybe warranted for 2021, 2026 and 2036.</u>



Due to the 80 km/hr. posted speed limit, a detailed analysis is required to further determine the appropriate intersection treatment type. It is important to note, that the **<u>above chart is for design speeds of 110 km/h and greater.</u>**

5.2 Design Speed

The posted speed limit on Range Road 20 is 80 km/hr. It is therefore reasonable to conclude that a design speed of 90 km/h is suitable.

5.3 Detailed Analysis

Right Turn

In accordance with Alberta Transportation's "Highway Geometric Design Guide" (Section D.7.7), an exclusive right turn lane is warranted on an undivided highway when all three of the following conditions are met:

- Main (or though) road AADT ≥ 1,800
- Intersecting road AADT ≥ 900
- Right turn daily traffic volume ≥ 360 for the movement in question.

The following table indicates the status of these requirements for right turns from Range Road 20.

Table 5.3a - Right Turn Warrant

Condition	Base Year (2016)	5 Year (2021)	10 Year (2026)	20 Year (2036)
	(Condition Met)	(Condition Met)	(Condition Met)	(Condition Met)
Main Road (Rge. Rd. 20)	1043	1187	1239	1336
AADT ≥ 1800	(No)	(No)	(No)	(No)
Intersecting Road (Dev. Ent.)	29	124	124	124
AADT ≥ 900	(No)	(No)	(No)	(No)
Right turn daily traffic ≥ 360	0	0	0	0
	(No)	(No)	(No)	(No)
For movement in question	(No)	(No)	(No)	(No)

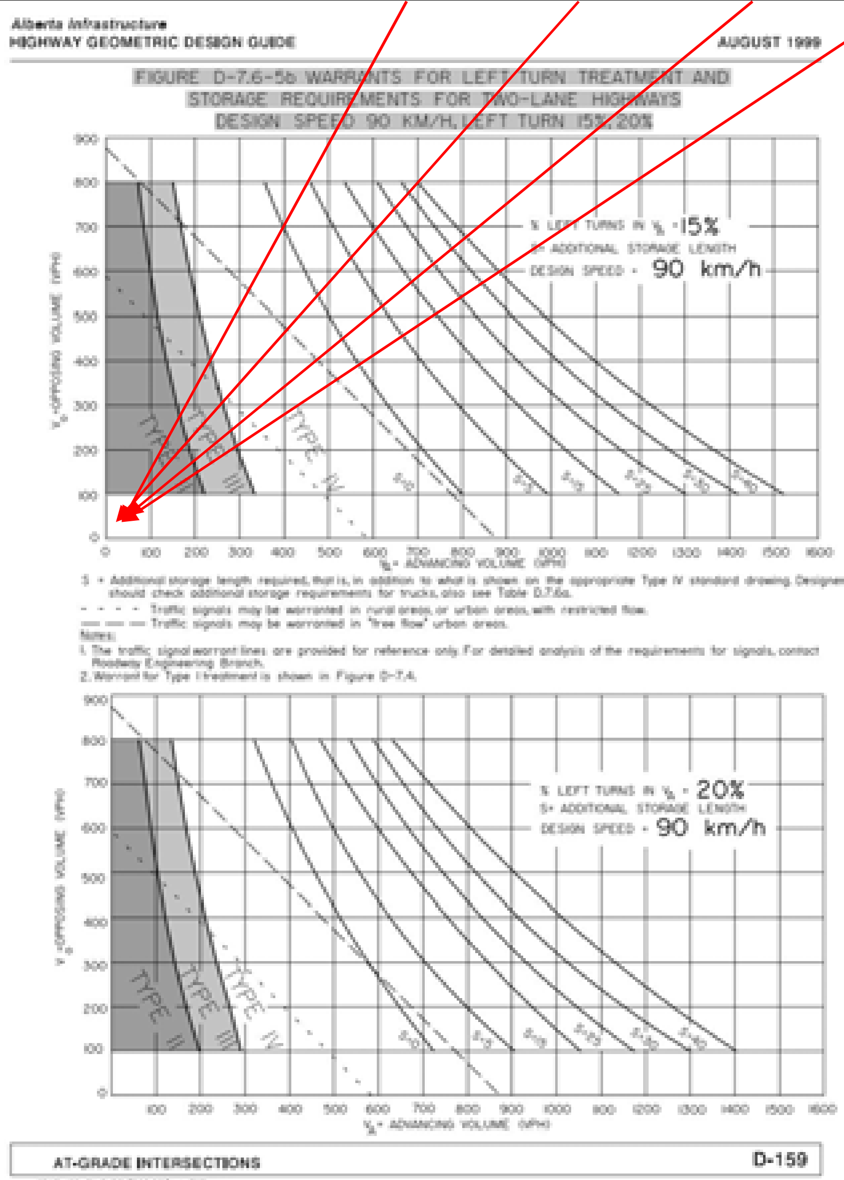
Based on the projected volumes, an exclusive right turn lane is **not** required for the next 20 years with the added development traffic.

Left Turn

The Highway Geometric Design Guide Section D.7.6 gives graphical guidelines for determining left turn warrant. The graphs use peak (100th highest) hour volumes and factor in percent turning and design speed to identify the required treatment for the intersection. The following table shows the treatments needed for current and projected traffic volumes.

Table 5.3b - Required Treatment Type PM PEAK

	Base Year (2016)	5 Year (2021)	10 Year (2026)	20 Year (2036)
Peak 100th Hour - p.m.				
% Left Turns	5.9%	18.6%	18.2%	17.0%
V_a = Advancing Volume (VPH)	34	43	44	47
V_0 = Opposing Volume (VPH)	34	36	37	41
Vl = Left turning Volume (VPH)	2	8	8	8
Design Speed	90 km/hr	90 km/hr	90 km/hr	90 km/hr
Required Treatment Type	**Type I**	**Type I**	**Type I**	**Type I**



Intersection Analysis

Main Rd: Range Road 20
Minor Rd: Development Entrance

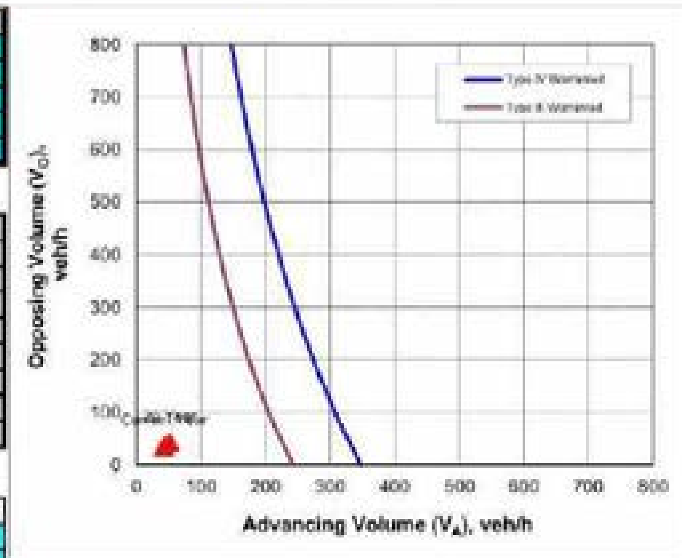
Direction: NB
Count date or year: 2021

INPUT	Value
85th percentile speed, km/h:	90
Left turn volume (V_L), veh/h:	8
Advancing volume (V_A), veh/h:	43
Opposing volume (V_O), veh/h:	36
Yearly Linear Growth Rate, %:	1.0%

OUTPUT		Value
Percent of left-turns in advancing volume (V_L/V_A), %:		18.6%
20 year advancing volume, veh/h:		82
20 year opposing volume, veh/h:		43
Confidence:		98.80%
Conflicts per hour:	% of advancing volume:	0.02%
	veh/h:	0.01
Refer to FIGURE D-7.4 of the Highway Geometric Desgin Guide		

CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time to clear, s:	1.9

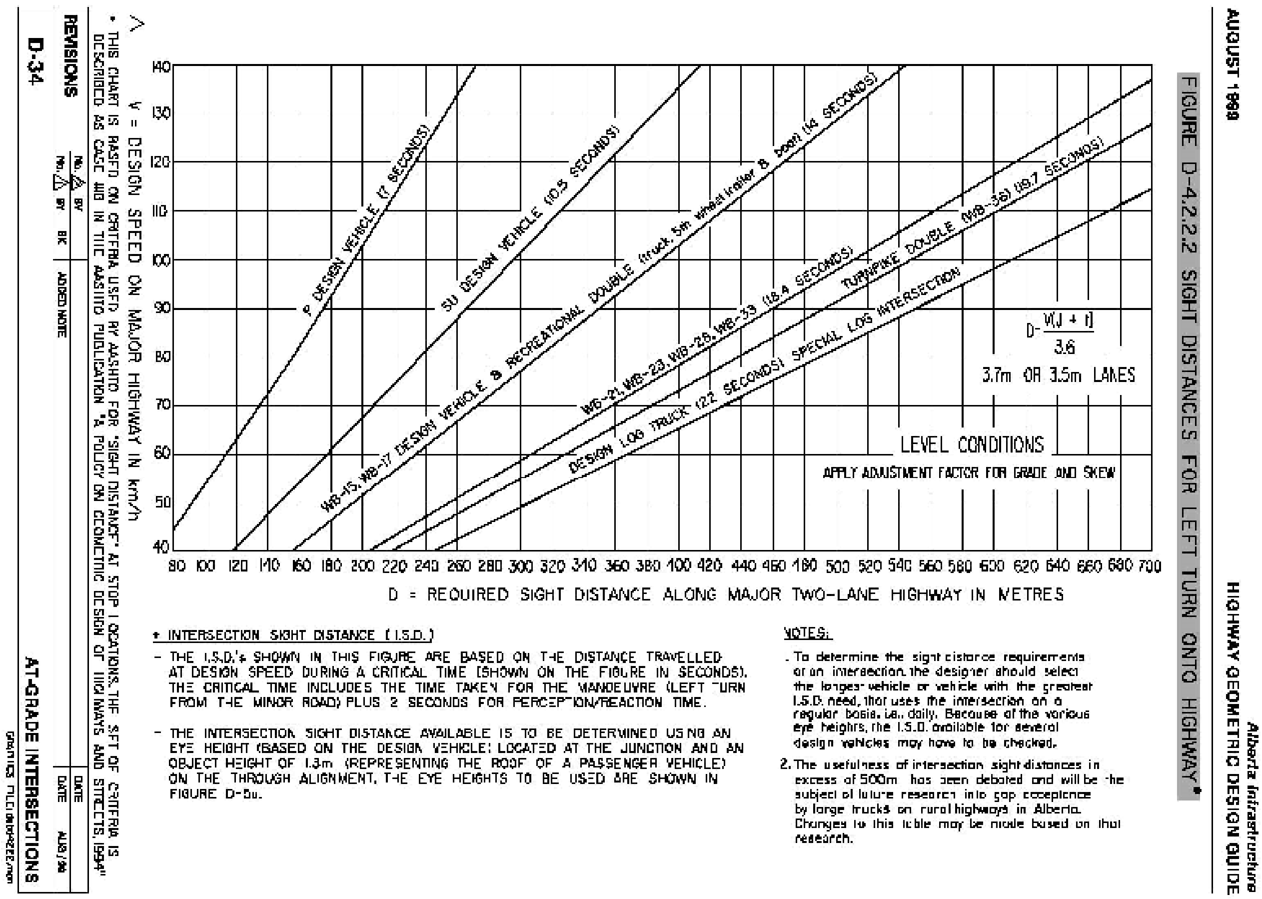


The Alberta Transportation hourly analysis charts are both indicating a result to the far bottom, against the x-axis. This is indication that an intersection treatment above a Type I is not required since the opposing traffic and advancing traffic are minimal and provide significant opportunity to make a left turn. Based on this, a Type I intersection treatment is warranted between 2016 – 2036.

5.4 Intersectional Sight Distance

In accordance with section D.4, "Sight Distances at Intersections", the sight distance for left turning vehicles from the approach, without interfering with vehicles nearing the intersection, is used for determination of minimum sight distance requirements. Using Fig. D-4.2.2.2 below, the required sight distances for various vehicle types with a 110 km/hr design speed are as follows:

Vehicle Type	Required Sight Distance – 90 kph
Passenger Vehicle (P)	175 m
Single Unit or Bus (SU)	265 m
Semi-Trailer Combination (WB15)	350 m
Semi-Trailer Combination (WB21, WB23, WB28, WB33)	462 m



It is anticipated that the largest vehicle type to use the intersection will be WB-15 which requires 350m of sight distance. Presently there is more than 350m of sight distance available to the south and north of this intersection.

6. ANALYSIS – HWY. 16:14 & RGE. RD. 20

The following tables show the estimated combined traffic volumes at the intersection.

Combined Traffic Forecast, Daily Volumes

Year	Hwy. 16:14 East Leg Combined	Range Road 20 North Leg Combined
2016	25580	1994
2021	30590	2149
2026	35556	2246
2036	45668	2618

Projected peak hour traffic loading (100th highest hour) is shown below for am/pm:

Combined Traffic Forecast, Peak Hour Volumes

Year	Hwy. 16:14 East Leg Combined am/pm	Range Road 20 North Leg Combined am/pm
2016	2590 / 2601	229 / 135
2021	3080 / 3120	245 / 147
2026	3565 / 3638	256 / 153
2036	4542 / 4675	281 / 166

6.1 Design Speed

The posted speed on Highway 16:14 at this location is 110 km/hr. It is therefore reasonable to conclude that a design speed of 120 km/h is suitable.

6.2 Intersecting Road Classification

Intersection treatment on divided highways are characterized into three general formats:

- No Treatment; very low intersecting volumes (approx. less than 200 AADT)
- MINOR Roadway (i.e. Road Allowances)
- MAJOR Roadway (i.e. Highways, Town Access Roads, Park Access Roads)

However it is best to verify the proper treatment by completing a more detail analysis of each separate movement using the projected turning movement traffic volumes as per the following sections.

6.3 Detailed Analysis

6.3.1 Right Turn Lane

In accordance with Section D.8.7, "Warrants for Right Turn Lanes on Four-Lane Divided Highways", the following is apparent:

- The Right Turn Lane Volume must be at least 360 vehicles per day to warrant a Right Turn Lane. This is summarized in the following Table:

Table: Right Turn Lane Warrant

Condition	Base Year (2016)	5 Year (2021)	10 Year (2026)	20 Year (2036)
Range Road 20	**(Condition Met)**	**(Condition Met)**	**(Condition Met)**	**(Condition Met)**
Right turn daily traffic ≥ 360	598	651	679	915
For movement in question	(Yes)	(Yes)	(Yes)	(Yes)

Based on the projected volumes, a Right Turn Lane is presently warranted. A 100m right turn lane and 140m taper presently exists which satisfies this warrant.

6.3.2 Left Turn Lane

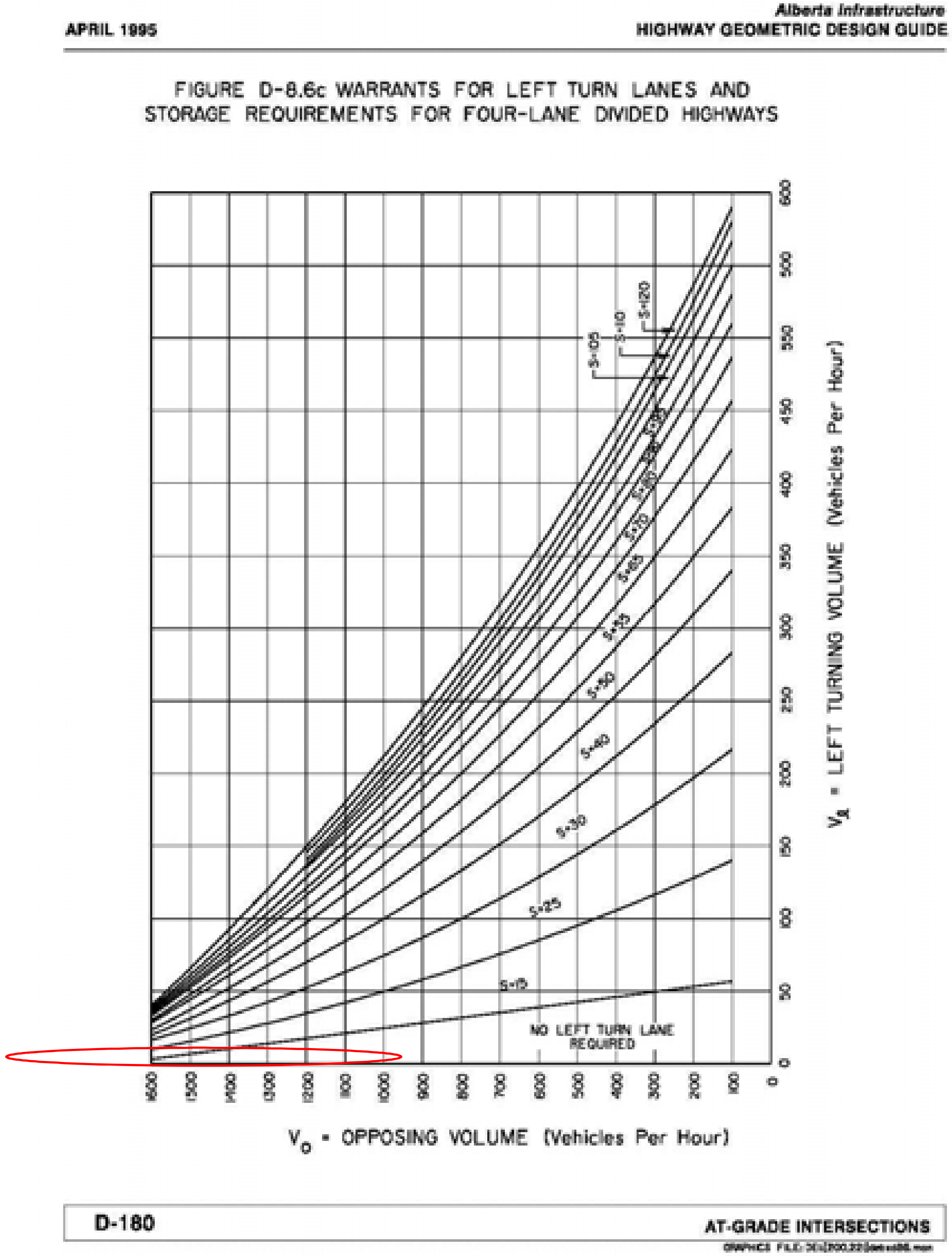
The Highway Geometric Design Guide Section D.8.6, "Warrants for Left Turn Lanes on Four-Lane Divided Highways" gives graphical guidelines for determining left turn warrant. The graphs use peak (100th highest) hour volumes and factor in percent turning and design speed to identify the required treatment for the intersection. The following table shows the treatments needed for current and projected traffic volumes.

Table: Required Treatment Type

	Base Year (2016)	5 Year (2021)	10 Year (2026)	20 Year (2036)
Range Road 20				
Peak am 100th Hour				
V_l = Turning Volume (VPH)	7	8	8	10
V_0 = Opposing Volume (VPH)	1474	1768	2061	2649
Treatment Required	**No**	**Yes**	**Yes**	**Yes**

The above values are then used on Figure D-8.6c, "Warrants for Left Turn Lanes and Storage Requirements for Four-Lane Divided Highways", shown below.

Based on the projected volumes, a Left Turn Lane is not warranted until 2020 for the EB to NB left turning movement. A full left turn lane and taper already exists at this location and meets the requirements.



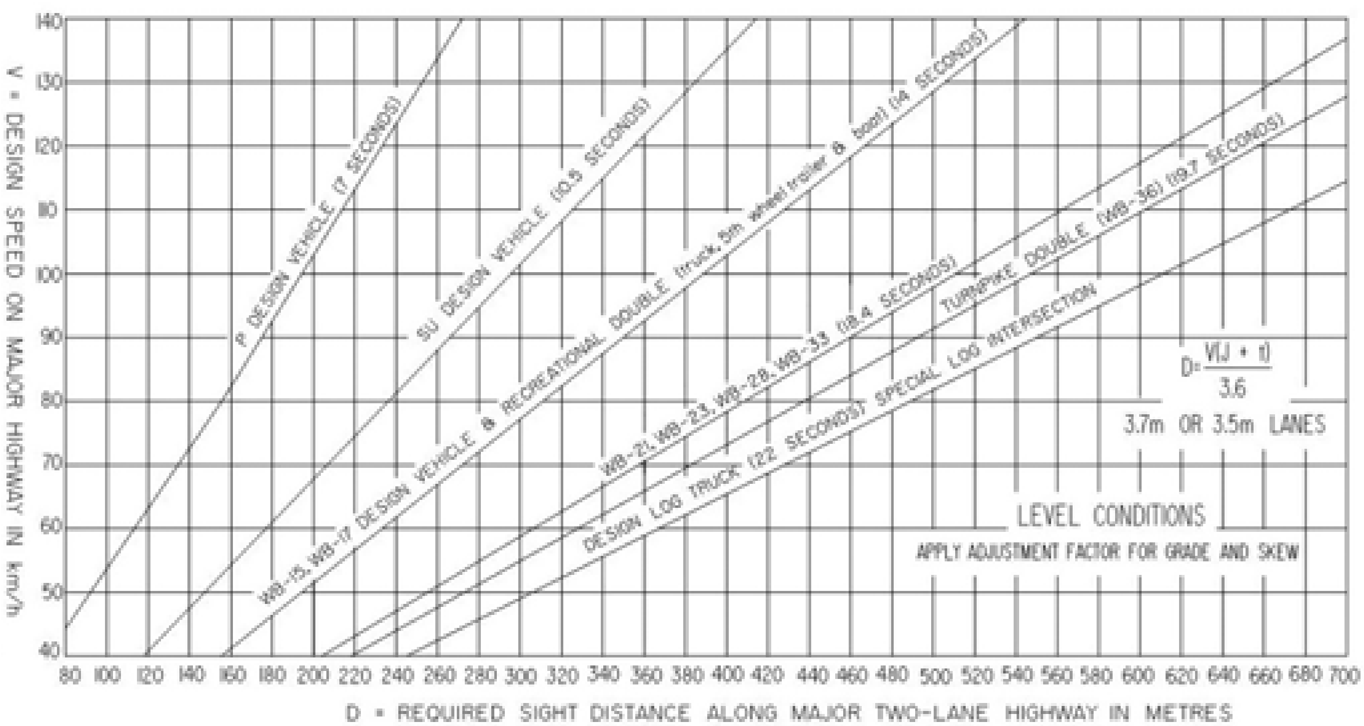
SUMMARY:

Presently, the intersection already contains a "Major Road Intersection on Four-Lane Divided Highway" intersection treatment and therefore no improvements are required for the next 20 years.

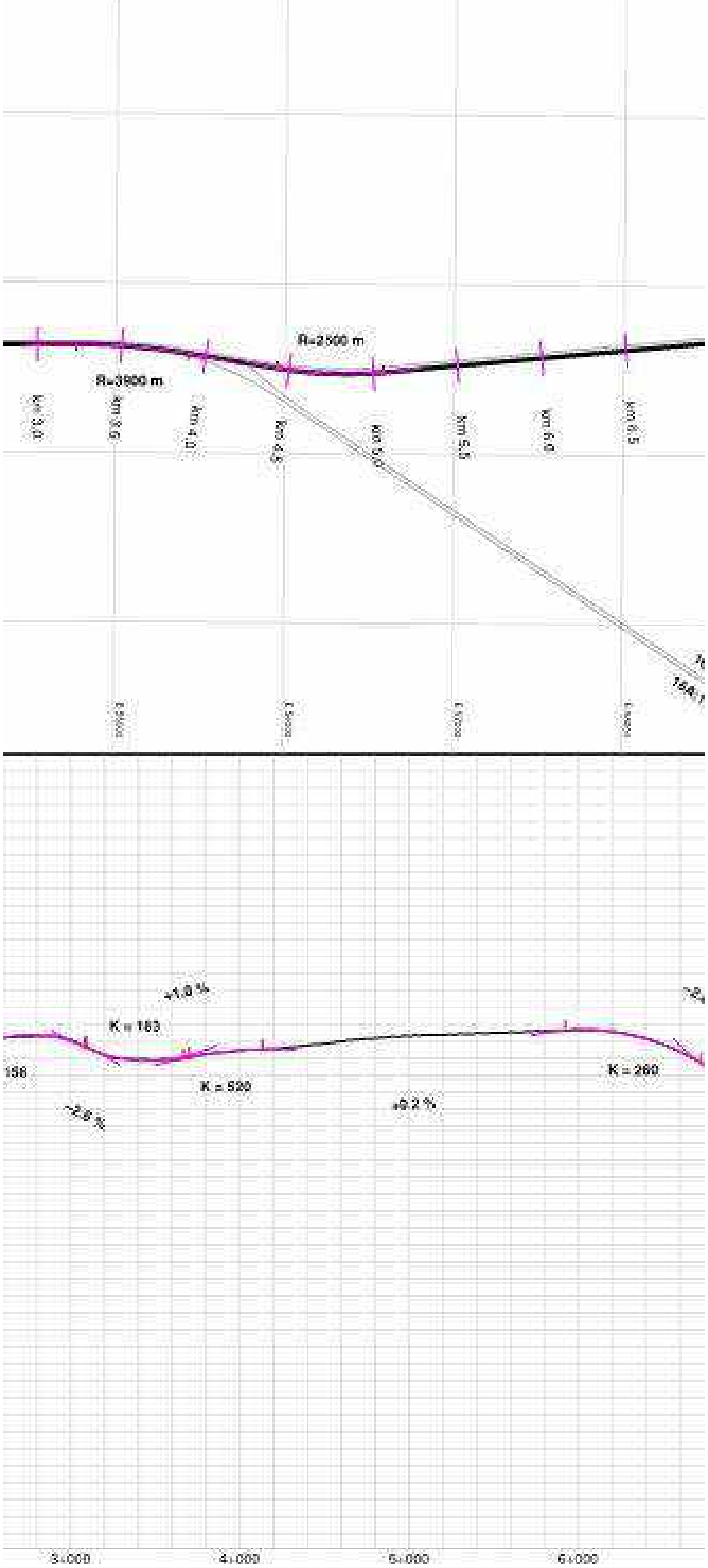
6.4 Intersectional Sight Distance

In accordance with section D.4, "Sight Distances at Intersections", the sight distance for left turning vehicles from the approach, without interfering with vehicles nearing the intersection, is used for determination of minimum sight distance requirements. Using Fig. D-4.2.2.2, shown in Appendix C, the required sight distances for various vehicle types with a 120 km/hr design speed are as follows:

Vehicle Type	Required Sight Distance – 120 km/hr.
Passenger Vehicle (P)	233 m
Single Unit or Bus (SU)	355 m
Semi-Trailer Combination (WB15)	470 m
Semi-Trailer Combination (WB21, WB23, WB28, WB33)	613 m



Hwy. 16:14 EBL's



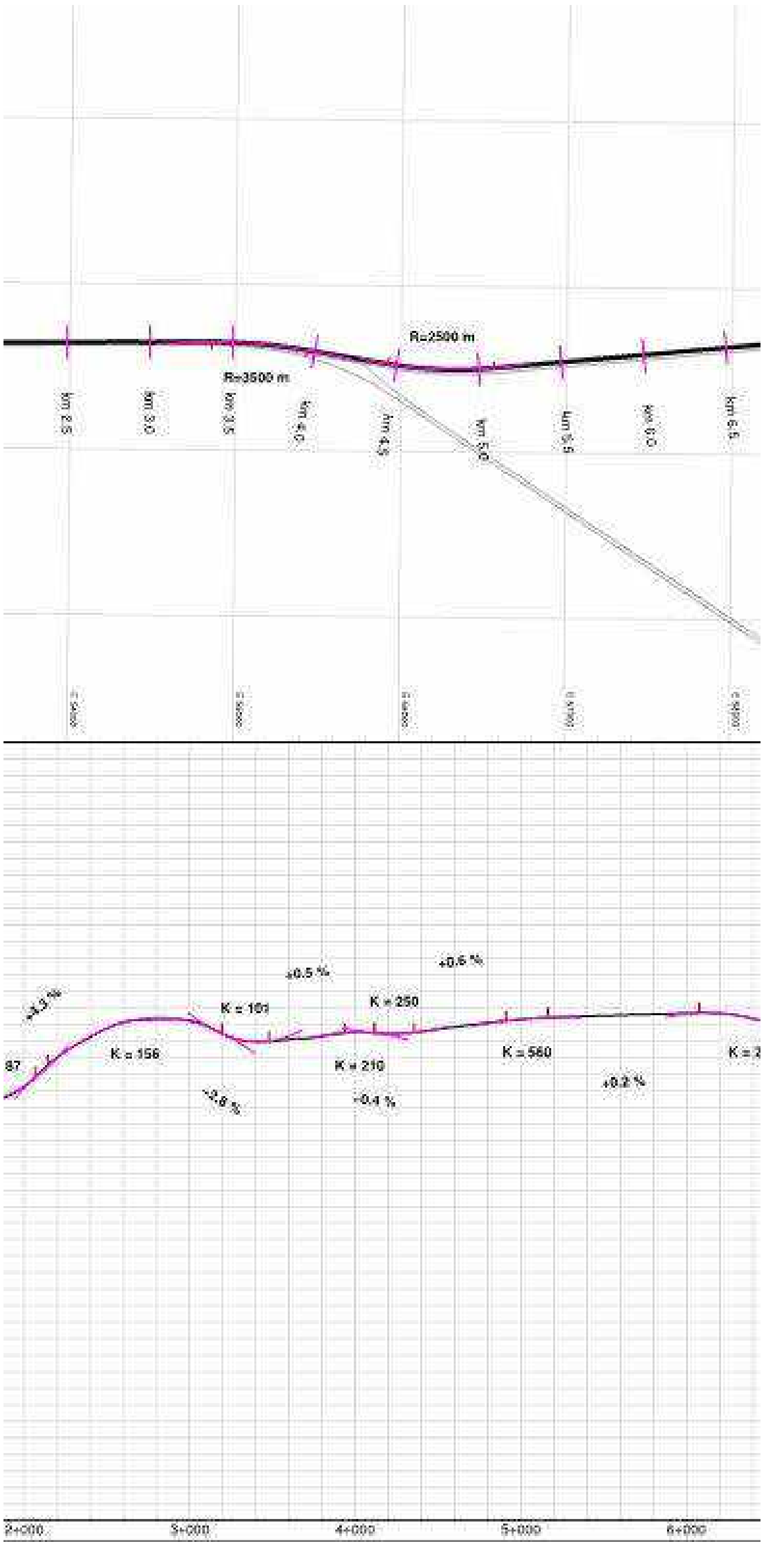
The intersection of Hwy. 16:14 and Range Road 20 is approximately at km 4.8.

The intersection is on a horizontal curve of 2500m radius alignment in an east west direction.

The intersection is on a grade of +0.2%.

The sight distance from RR 20 to the west is >800m to the east.

Hwy. 16:14 WBL's

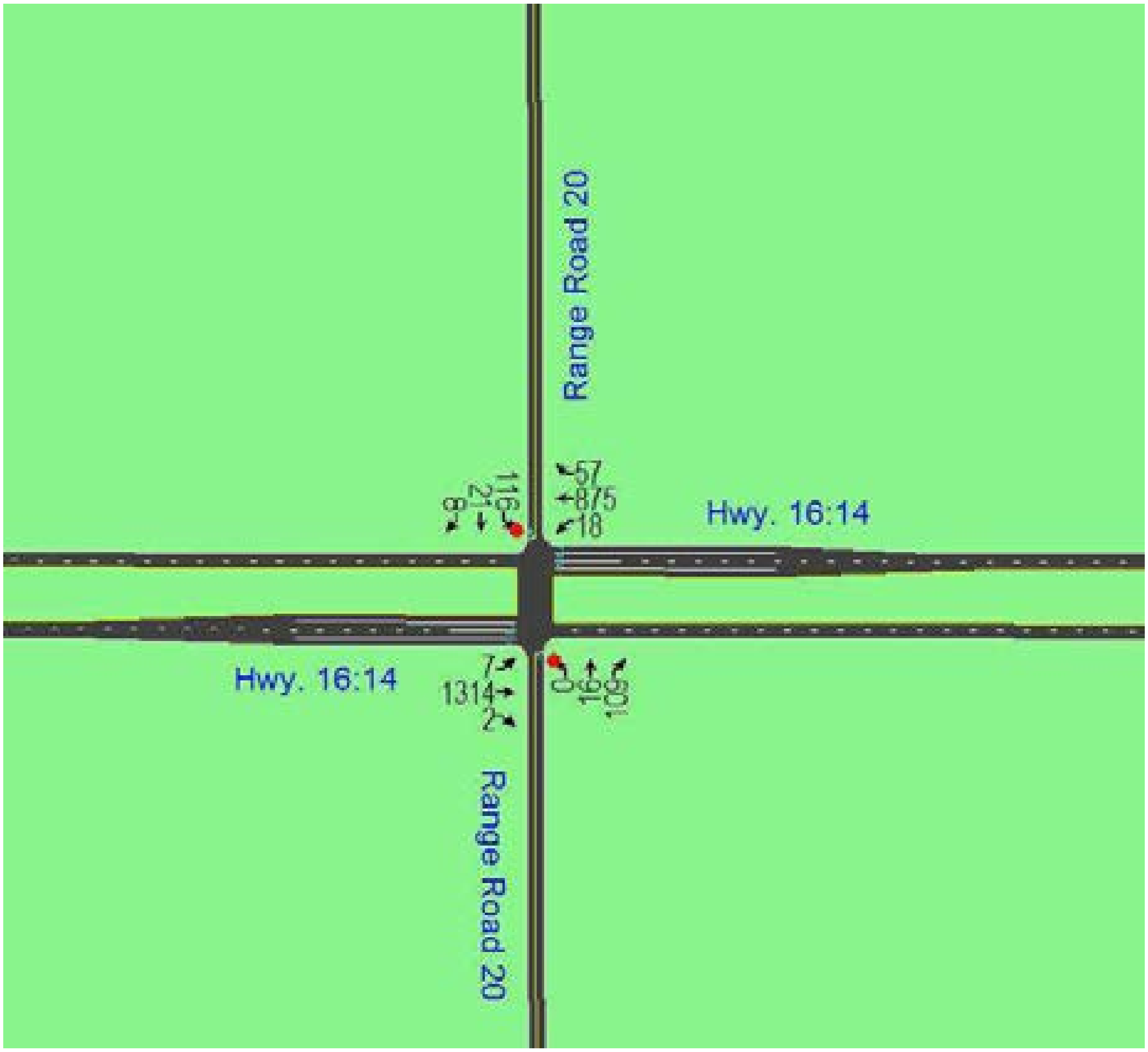


The sight distance from RR 20 to the east is >800m.

The site distance is greater than 650 metres in both directions on Hwy. 16 at the intersection of Range Road 20.

6.5 Highway Capacity Analysis

The capacity analysis was performed for the intersection for the 100th highest hour for the AM Peak for Years 2016, 2021, 2026 and 2036. The traffic analysis was completed using **Synchro 9** software based on HCM 2010 methodology. A saturation flow of 1700 vpl was used in this analysis. See the tables below for the results.



It is important to note that Synchro does not take into account acceleration lanes. As seen in the above schematic, deceleration lanes are shown but not acceleration lanes. Acceleration lanes exist for right turns coming out of Range Road 20 as well as a left turn acceleration for the SB to EB movement onto Hwy. 16.

For this reason, some of the results below will be incorrect.

YEAR	TIME PERIOD	PARAMETERS	Highway 16:14 EB Left	EB Thru	EB Right	WB Left	WB Thru	WB Right	Rge. Rd. 20 NB All Turns	SB All Turns
Year 2016	AM Peak	LOS	B	A	A	C	A	A	D	F*
		Delay (s)	11.7	0.0	0.0	15.6	0.0	0.0	26.3	165.3
		v/c Ratio	0.01	0.44	0.00	0.06	0.29	0.04	0.45	1.10
		95th Que	0.4	0.0	0.0	1.4	0.0	0.0	17.9	69.7
	PM Peak	LOS	C	A	A	B	A	A	E	E*
		Delay (s)	16.1	0.0	0.0	12.9	0.0	0.0	42.6	47.1
		v/c Ratio	0.02	0.35	0.01	0.06	0.45	0.03	0.48	0.35
		95th Que	0.6	0.0	0.0	1.5	0.0	0.0	18.2	11.5
Year 2021	AM Peak	LOS	B	A	A	C	A	A	E	F*
		Delay (s)	13.2	0.0	0.0	19.8	0.0	0.0	42.7	548.6
		v/c Ratio	0.02	0.53	0.00	0.08	0.35	0.04	0.62	1.96
		95th Que	0.4	0.0	0.0	2.1	0.0	0.0	29.1	119.4
	PM Peak	LOS	C	A	A	C	A	A	F	F*
		Delay (s)	20.4	0.0	0.0	15.8	0.0	0.0	93.5	98.6
		v/c Ratio	0.04	0.43	0.01	0.08	0.54	0.03	0.74	0.60
		95th Que	0.9	0.0	0.0	2.1	0.0	0.0	32.8	21.8
Year 2026	AM Peak	LOS	C	A	A	D	A	A	F	F*
		Delay (s)	15.1	0.0	0.0	25.8	0.0	0.0	84.0	>500
		v/c Ratio	0.02	0.62	0.00	0.11	0.41	0.04	0.84	4.71
		95th Que	0.6	0.0	0.0	3.0	0.0	0.0	47.5	>250
	PM Peak	LOS	D	A	A	C	A	A	F	F*
		Delay (s)	26.5	0.0	0.0	18.4	0.0	0.0	241.2	247.1
		v/c Ratio	0.05	0.49	0.01	0.11	0.63	0.15	1.15	1.00
		95th Que	1.0	0.0	0.0	2.6	0.0	0.0	47.8	30.2
Year 2036	AM Peak	LOS	C	A	A	E	A	A	F	F*
		Delay (s)	20.5	0.0	0.0	49.4	0.0	0.0	409.2	>500
		v/c Ratio	0.04	0.80	0.00	0.23	0.53	0.05	1.65	
		95th Que	1.0	0.0	0.0	6.6	0.0	0.0	103.1	>250

	LOS	E	A	A	D	A	A	F	F*
PM Peak	Delay (s)	49.2	0.0	0.0	28.8	0.0	0.0	>500	>500
	v/c Ratio	0.12	0.63	0.01	0.19	0.82	0.03	4.31	
	95th Que	3.1	0.0	0.0	5.4	0.0	0.0	>250	>250

*Note: The SB turns are showing a LOS of F and high delay times which is inaccurate since Synchro does provide calculation for efficiencies due to acceleration lanes.

As noted above, the above results indicate that the southbound turns are all at a Level of Service (LOS) of F. This does not represent the actual operation on site since a 120m left turn acceleration and 120m taper exists for the southbound to eastbound movement. In order to validate this, a site inspection was conducted on Sept. 8 to 10, 2015, and the wait times were measured. The results indicated an average wait time of 20 seconds to 55 seconds during the AM Peak (average approximately 35 seconds). This is significantly lower than the Synchro result of 126.7 seconds shown above. Again, this likely due to the fact that Synchro does not use calculations that account for acceleration lanes. Therefore in extrapolating this analysis, the NB and SB turns will both likely be at a LOS of E in 2020. In 2025, the NB and SB turns will both likely be at a LOS of F. The proposed development fractionally increased the results above, since it only adds 4 left turns in the AM Peak Hour and 2 left turns in the PM Peak Hour.

Therefore, in summary, the intersection is performing near capacity presently. Full capacity maybe reached within the next 10 – 15 years, mostly depending on the growth of Highway 16. The intersection should be monitored in about 5 - 10 years to further evaluate the operation and safety.

LEVEL OF SERVICE (LOS) CRITERIA

Control Delay Per Vehicle (s)	LOS by Volume to Capacity Ratio	
	≤1	>1
≤10	A	F
>10 and ≤15	B	F
>15 and ≤25	C	F
>25 and ≤35	D	F
>35 and ≤50	E	F
>50	F	F


Level of Service "A"


Level of Service "B"


Level of Service "C"

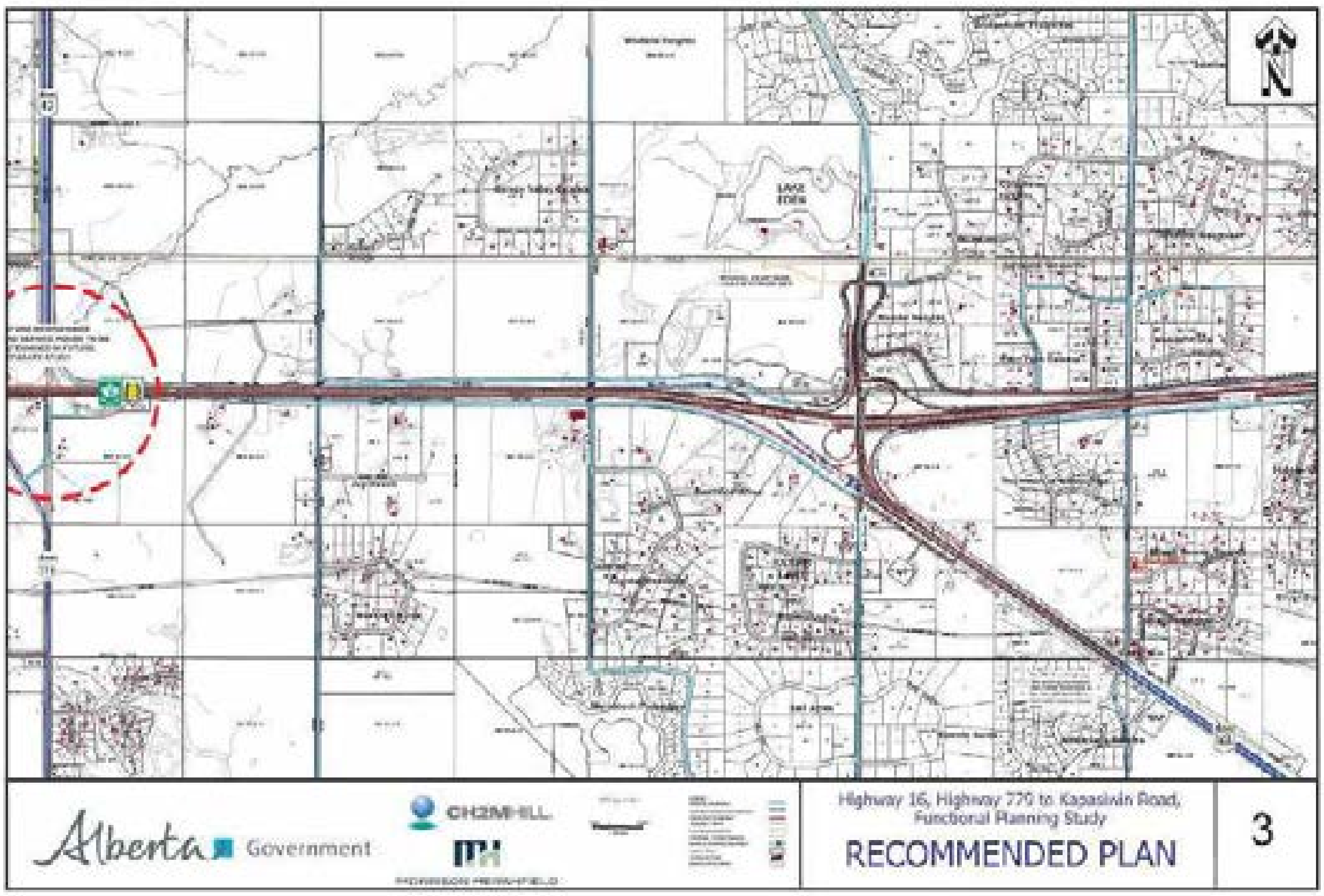

Level of Service "D"


Level of Service "E"


Level of Service "F"

6.6 Future Freeway Planning

It is important to complete a review on how the traffic in the area will be integrated into the future freeway system. Highway 16 is designated as a future freeway in Alberta. Access to this future freeway will only be made via a grade separation or interchange. Presently, Alberta Transportation's long range plan is to construct an interchange at the Highway 16 and Range Road 20 intersection location. See below:



Therefore, the present Range Road 20 will be directly connected to the future interchange. No re-routing of Range Road 20 will be required. The timing of this improvement is not known at this time. Traffic volume on Range Road 20 is likely to increase due to the consolidation of traffic in the area occurs with the implementation of the interchange.

7. ANALYSIS – HWY. 43:22 & TWP. RD. 540

The following tables show the estimated combined traffic volumes at the intersection.

Combined Traffic Forecast, Daily Volumes

Year	Hwy. 43:22 South Leg Combined	Twp. Rd. 540 East Leg Combined
2016	14147	156
2021	16364	200
2026	18554	208
2036	22935	222

Projected peak hour traffic loading (100th highest hour) is shown below for am/pm:

Combined Traffic Forecast, Peak Hour Volumes

Year	Hwy. 43:22 South Leg Combined am/pm	Twp. Rd. 540 East Leg Combined am/pm
2016	1437 / 1442	15 / 15
2021	1661 / 1667	18 / 19
2026	1882 / 1890	18 / 19
2036	2329 / 2338	22 / 23

7.1 Design Speed

The posted speed on Highway 43:22 at this location is 110 km/hr. It is therefore reasonable to conclude that a design speed of 120 km/h is suitable.

7.2 Intersecting Road Classification

Intersection treatment on divided highways are characterized into three general formats:

- No Treatment; very low intersecting volumes (approx. less than 200 AADT)
- MINOR Roadway (i.e. Road Allowances)
- MAJOR Roadway (i.e. Highways, Town Access Roads, Park Access Roads)

However it is best to verify the proper treatment by completing a more detail analysis of each separate movement using the projected turning movement traffic volumes as per the following sections.

7.3 Detailed Analysis

7.3.1 Right Turn Lane

In accordance with Section D.8.7, "Warrants for Right Turn Lanes on Four-Lane Divided Highways", the following is apparent:

- The Right Turn Lane Volume must be at least 360 vehicles per day to warrant a Right Turn Lane. This is summarized in the following Table:

Table: Right Turn Lane Warrant

Condition	Base Year (2016)	5 Year (2021)	10 Year (2026)	20 Year (2036)
Twp. Rd. 540	**(Condition Met)**	**(Condition Met)**	**(Condition Met)**	**(Condition Met)**
Right turn daily traffic ≥ 360	45	60	62	66
For movement in question	(No)	(No)	(No)	(No)

Based on the projected volumes, a Right Turn Lane is not warranted for the next 20 years.

7.3.2 Left Turn Lane

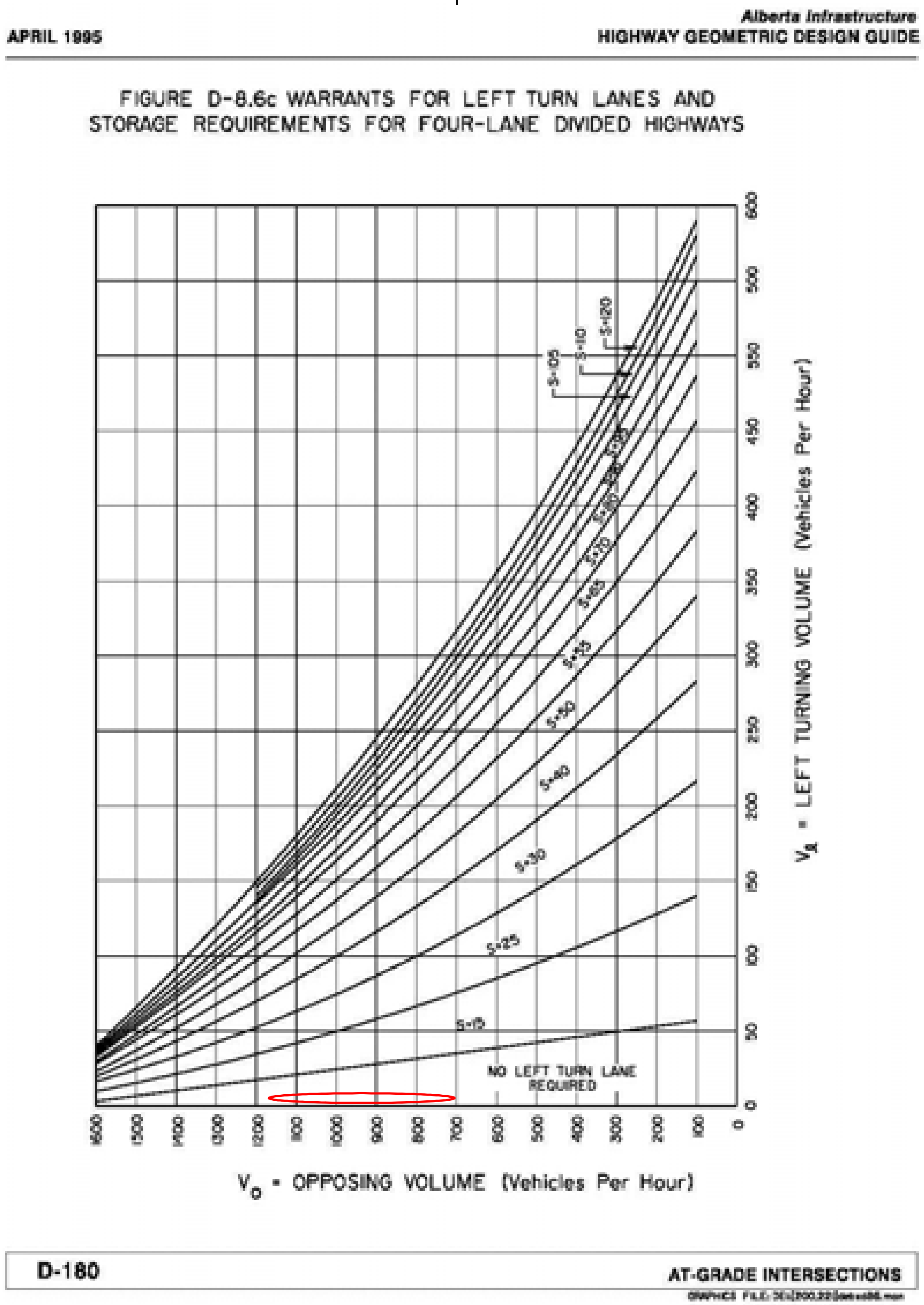
The Highway Geometric Design Guide Section D.8.6, "Warrants for Left Turn Lanes on Four-Lane Divided Highways" gives graphical guidelines for determining left turn warrant. The graphs use peak (100th highest) hour volumes and factor in percent turning and design speed to identify the required treatment for the intersection. The following table shows the treatments needed for current and projected traffic volumes.

Table: Required Treatment Type

	Base Year (2016)	5 Year (2021)	10 Year (2026)	20 Year (2036)
Twp. Rd. 540				
Peak PM 100th Hour				
V_l = Turning Volume (VPH)	3	4	4	5
V_0 = Opposing Volume (VPH)	718	830	941	1165
Treatment Required	**No**	**No**	**No**	**Yes**

The above values are then used on Figure D-8.6c, "Warrants for Left Turn Lanes and Storage Requirements for Four-Lane Divided Highways", shown below.

Based on the projected volumes, a Left Turn Lane is not warranted for the next 20 years for the BB to EB left turning movement. A full left turn lane and taper already exists at this location and exceeds this requirement.



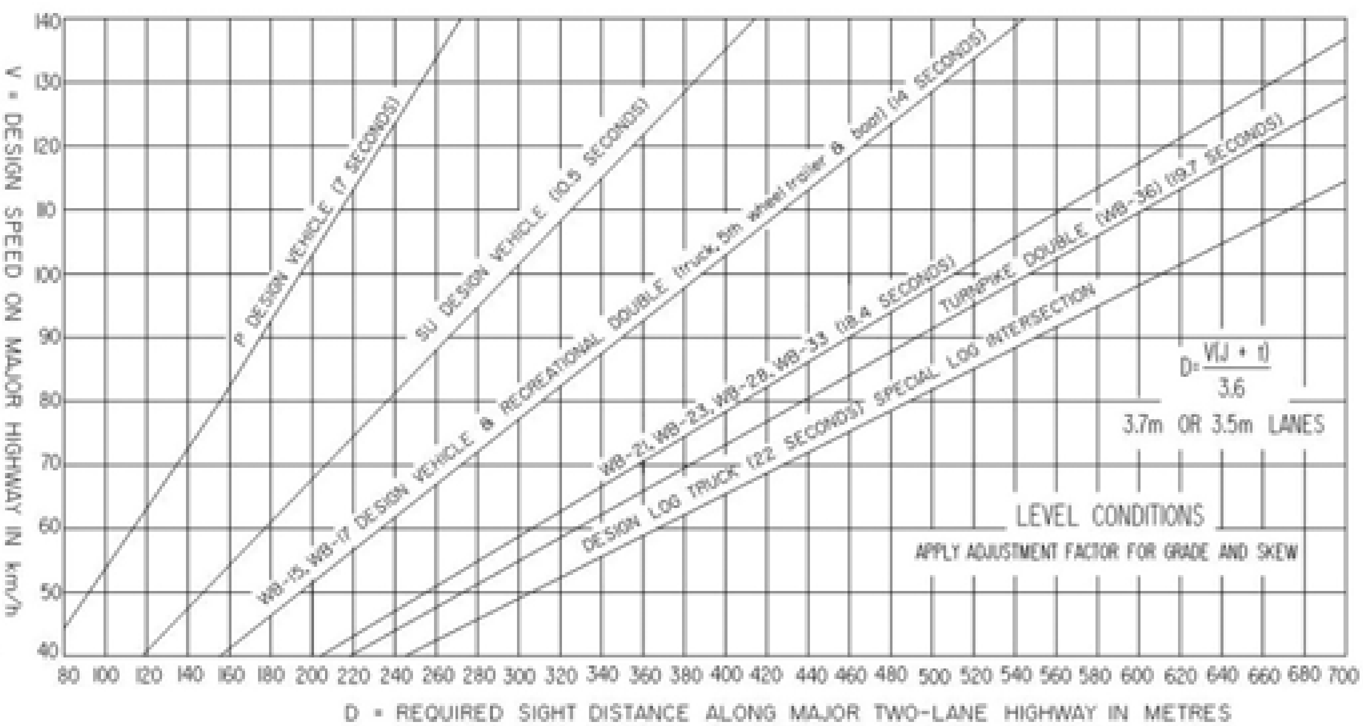
SUMMARY:

Presently, the intersection already contains a left turn lane for SB to EB left turns. There is no right turn lane and tapers for NB to EB, however this not warranted due to the low turning volumes. Therefore no improvements are required for the next 20 years.

7.4 Intersectional Sight Distance

In accordance with section D.4, "Sight Distances at Intersections", the sight distance for left turning vehicles from the approach, without interfering with vehicles nearing the intersection, is used for determination of minimum sight distance requirements. Using Fig. D-4.2.2.2, shown in Appendix C, the required sight distances for various vehicle types with a 120 km/hr design speed are as follows:

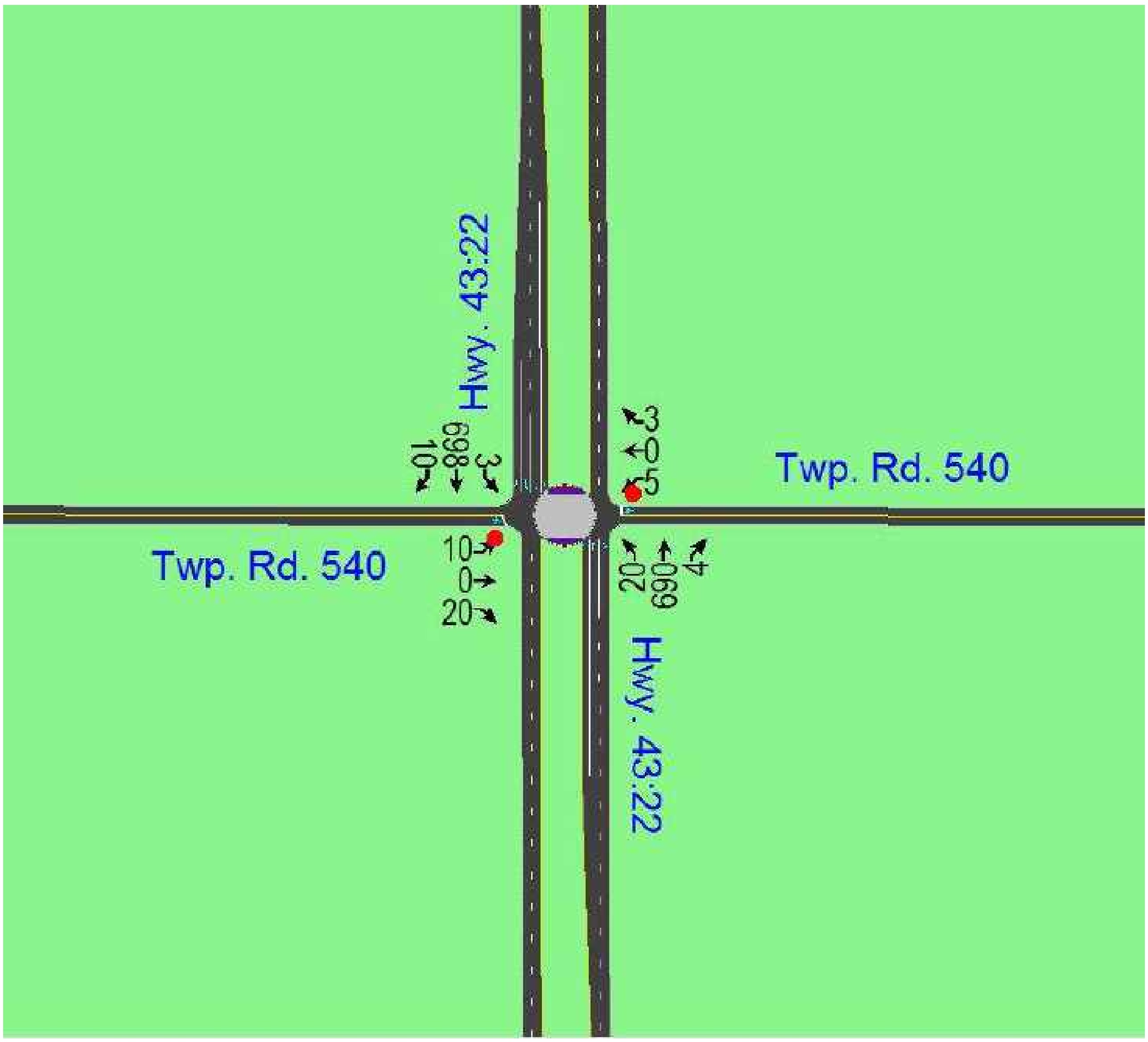
Vehicle Type	Required Sight Distance – 120 km/hr.
Passenger Vehicle (P)	233 m
Single Unit or Bus (SU)	355 m
Semi-Trailer Combination (WB15)	470 m
Semi-Trailer Combination (WB21, WB23, WB28, WB33)	613 m



The sight distance from Twp. Rd. 540 to the south and north is >650m.

7.5 Highway Capacity Analysis

The capacity analysis was performed for the intersection for the 100th highest hour for the AM Peak for Years 2016, 2021, 2026 and 2036. The traffic analysis was completed using **Synchro 9** software based on HCM 2010 methodology. A saturation flow of 1700 vpl was used in this analysis. See the tables below for the results.



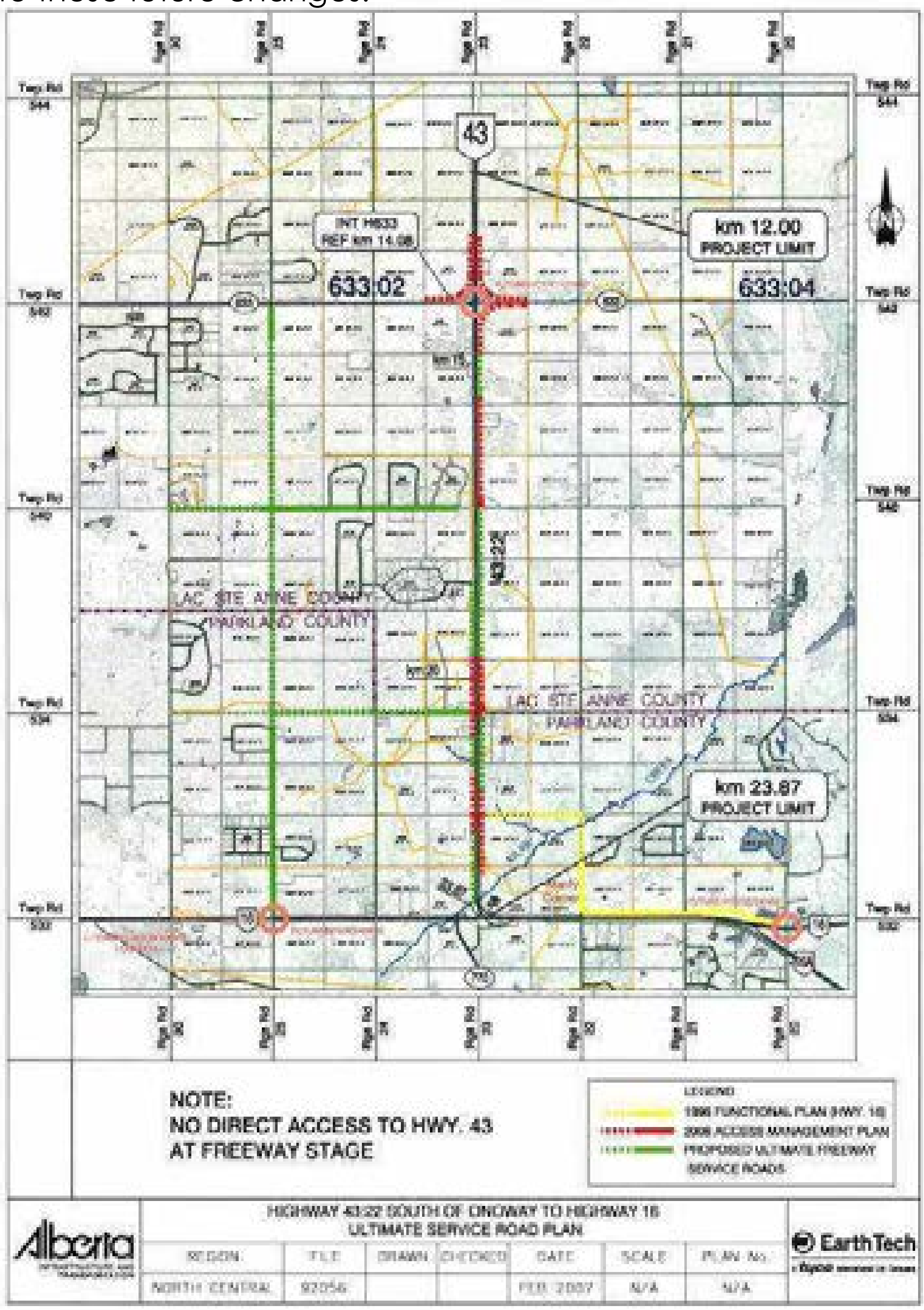
YEAR			Highway 43:22						Twp. Rd. 540	
	TIME PERIOD	PARAMETERS	NB Left	NB Thru	NB Right	SB Left	SB Thru	SB Right	EB All Turns	WB All Turns
Year 2016	AM Peak	LOS	A	A	A	A	A	A	B	B
		Delay (s)	9.5	0.0	0.0	9.3	0.0	0.0	13.4	15.0
		v/c Ratio	0.03	0.29	0.15	0.00	0.22	0.01	0.07	0.02
		95th Que	0.7	0.0	0.0	0.1	0.0	0.0	1.8	0.5
	PM Peak	LOS	A	A	A	A	A	A	B	B
		Delay (s)	9.5	0.0	0.0	9.4	0.0	0.0	13.4	14.6
		v/c Ratio	0.03	0.30	0.15	0.00	0.22	0.01	0.07	0.02
		95th Que	0.7	0.0	0.0	0.1	0.0	0.0	1.8	0.4
Year 2021	AM Peak	LOS	B	A	A	A	A	A	B	C
		Delay (s)	10.0	0.0	0.0	9.8	0.0	0.0	14.7	16.9
		v/c Ratio	0.03	0.34	0.17	0.00	0.26	0.01	0.09	0.04
		95th Que	0.8	0.0	0.0	0.1	0.0	0.0	2.3	0.9
	PM Peak	LOS	B	A	A	A	A	A	B	C
		Delay (s)	10.0	0.0	0.0	9.9	0.0	0.0	14.8	16.2
		v/c Ratio	0.03	0.34	0.18	0.01	0.26	0.01	0.09	0.03
		95th Que	0.8	0.0	0.0	0.1	0.0	0.0	2.3	0.7
Year 2026	AM Peak	LOS	B	A	A	B	A	A	C	C
		Delay (s)	10.6	0.0	0.0	10.4	0.0	0.0	16.2	19.0
		v/c Ratio	0.04	0.39	0.20	0.00	0.29	0.01	0.10	0.04
		95th Que	0.9	0.0	0.0	0.1	0.0	0.0	2.7	1.0
	PM Peak	LOS	B	A	A	B	A	A	C	C
		Delay (s)	10.6	0.0	0.0	10.4	0.0	0.0	16.3	18.2
		v/c Ratio	0.04	0.39	0.20	0.01	0.29	0.01	0.10	0.03
		95th Que	0.9	0.0	0.0	0.1	0.0	0.0	2.7	0.8
Year 2036	AM Peak	LOS	B	A	A	B	A	A	C	C
		Delay (s)	12.1	0.0	0.0	11.7	0.0	0.0	20.4	24.6
		v/c Ratio	0.05	0.48	0.24	0.01	0.36	0.01	0.14	0.07
		95th Que	1.2	0.0	0.0	0.2	0.0	0.0	3.9	1.7

PM Peak	LOS	B	A	A	B	A	A	C	C
	Delay (s)	12.1	0.0	0.0	11.7	0.0	0.0	20.5	24.1
	v/c Ratio	0.05	0.48	0.25	0.01	0.37	0.01	0.14	0.06
	95^{th} Que	1.2	0.0	0.0	0.2	0.0	0.0	4.0	1.5

The above results indicate that the intersection will operate with sufficient capacity for the next 20 years.

7.6 Future Freeway Planning

It is important to complete a review on how the traffic in the area will be integrated into the future freeway system. Highway 43 is designated as a future freeway in Alberta. Access to this future freeway will only be made via a grade separation or interchange. Presently, Alberta Transportation's long range plan is to construct an interchange at the Highway 43 and Hwy. 633 intersection location. The at-grade Hwy. 43:22 and Twp. Rd. 540 intersection will be closed. This will require the re-direction of traffic via service roads and local roads in order to access the nearest interchange. Twp. Rd. 540 will likely be one of these collector roads that will increase in traffic due to these future changes.



8. ILLUMINATION & SIGNALIZATION WARRANTS

Street lighting presently exists at the intersection of Hwy. 16:14 and Rge. Rd. 20. Signalization is not allowed on Hwy. 16 as it is designated as a future freeway.

Street lighting does not exist at the intersection of Hwy. 43:22 and Twp. Rd. 540. Illumination warrants were reviewed. The results are summarized in the Table below:

Location	Year	Illumination Warrant Score	Illumination Warrant Met? (Min. 120)	Signalization Warrant Score	Signalization Warrant Met?
Hwy. 43:22 & Twp. Rd. 540	2016	96	No	Not Allowed	N/A
Hwy. 43:22 & Twp. Rd. 540	2021	96	No	Not Allowed	N/A
Hwy. 43:22 & Twp. Rd. 540	2026	96	No	Not Allowed	N/A
Hwy. 43:22 & Twp. Rd. 540	2036	96	No	Not Allowed	N/A

Illumination is not warranted at the Hwy. 43:22 & Twp. Rd. 540 intersection. Signalization is not allowed on Hwy. 43 as it is designated as a future freeway.

For the other intersections along Range Road 20 and Township Road 540, there is no requirement for illumination or signalization since the traffic volumes are too low, as demonstrated by the warranted intersection treatments discussed earlier.

9. CONCLUSIONS & RECOMMENDATIONS

9.1 Conclusions & Recommendations

The proposed development is for a 13 lot Residential rural subdivision within SE 1-54-2-W5M. The site will utilize Range Road 20 for access to the east and then south on Rge. Rd. 20 to the south to Hwy 16 or west on Twp. Rd. 540 (Heatherdown Road) to Hwy. 43. See below:

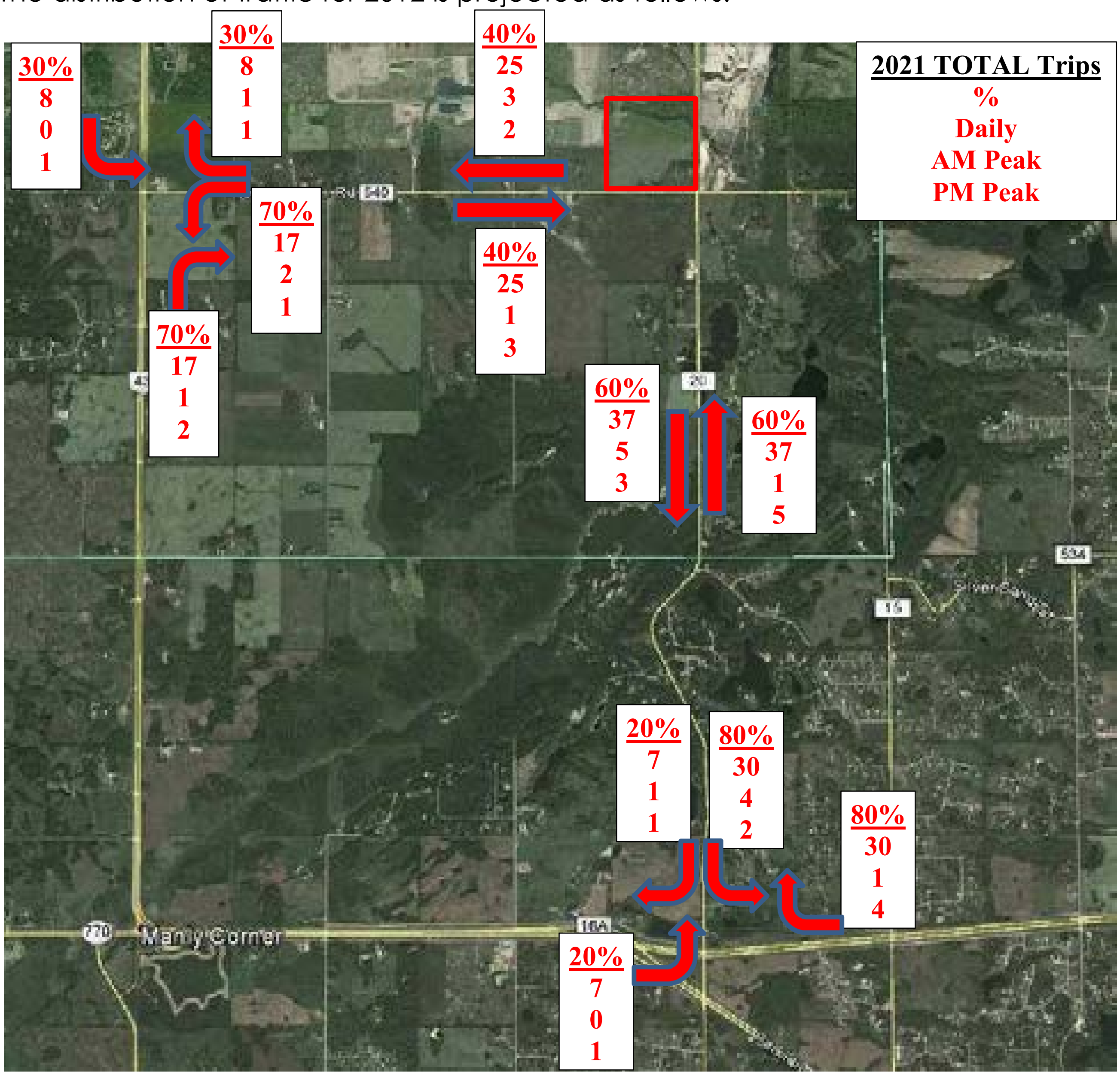
For the **Residential** development lots, ITE 210 – "Single-Family Detached Housing" Land Use from the Institute of Transportation Engineers (ITE) Trip Generation Manual, 9th Edition, can used. The following data is available from the manual:

Time Period	Trips per Lot
Daily	9.52
Peak Hour of Adjacent Street Traffic One Hour Between 7 and 9 a.m.	0.75
Peak Hour of Adjacent Street Traffic One Hour Between 4 and 6 p.m.	1.00

Therefore, the estimated trip generation of the proposed development with 13 new lots is as follows:

Daily Traffic:	13 lots x 9.52 trips/day	=	124 trips per day
AM Peak Hour:	13 lots x 0.75 trips/hour	=	10 trips per hour
PM Peak Hour:	13 lots x 1.00 trips/hour	=	13 trips per hour

It is estimated that 3 lots will be occupied in 2016 and the remaining 10 lots will be occupied in 2021 (Year 5). The trip distribution is anticipated to be 40% to the west on Twp. Rd. 540 to Hwy. 43 and 60% to the south on Range Road 20 to Hwy. 16, with 25% entering/75% exiting in the AM Peak and 63% entering/37% exiting in the PM Peak. The distribution of traffic for 2012 is projected as follows:



A detailed intersection analysis was completed on three potentially impacted intersections. The analysis concluded the following:

Development Access and Range Road 20intersection

- A Type I intersection treatment is warranted between 2016 – 2036.
- It is anticipated that the largest vehicle type to use the intersection will be WB-15 which requires 350m of sight distance. Presently there is more than 350m of sight distance available to the south and north of this intersection.
- A highway capacity analysis was not performed at this location as the traffic volumes are low and the intersection should have sufficient capacity above a LOS of D for the next 20 years.
- Illumination or signalization is not required for this location as the traffic volumes are too low.

Range Road 20 and Highway 16:14 intersection

- Presently, the intersection already contains a "Major Road Intersection on Four-Lane Divided Highway" intersection treatment with left turn acceleration lane for SB to EB left turns. No improvements are required for the next 20 years.
- The site distance is greater than 650 metres in both directions on Hwy. 16 at the intersection of Range Road 20.
- Upon completing a highway capacity analysis, the intersection is performing near capacity presently. Full capacity maybe reached within the next 10 – 15 years, mostly depending on the growth of Highway 16. The intersection should be monitored in about 5 - 10 years to further evaluate the operation and safety.
- Street lighting presently exists at the intersection of Hwy. 16:14 and Rge. Rd. 20. Signalization is not allowed on Hwy. 16 as it is designated as a future freeway.

Township Road 540 and Highway 43:22 intersection

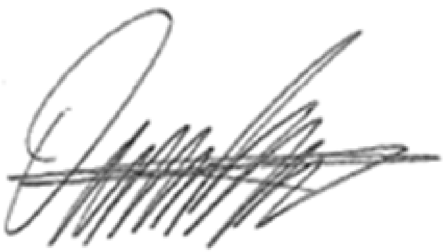
- No improvements are required for the next 20 years.
- The sight distance from Twp. Rd. 540 to the south and north is >650m.
- Upon completing a highway capacity analysis, the intersection will operate with sufficient capacity for the next 20 years.

- Illumination is not warranted at the Hwy. 43:22 & Twp. Rd. 540 intersection. Signalization is not allowed on Hwy. 43 as it is designated as a future freeway.

The internal locals roads, Range Road 20 and Township Road 540 appear to be acceptable for transporting the proposed development traffic and are within acceptable parameters of the road standards for rural collector roadways.

9.2 Closure

We trust the information provided meets your present requirements. Should any questions arise, please contact our office at your convenience.



Darcy O. Paulichuk, P. Eng.

Dec. 9, 2015

APEGGA Permit to Practice Number: P12132

APPENDIX A

ALBERTA HIGHWAYS TRAFFIC VOLUME HISTORY
TRAFFIC DATA – TURNING MOVEMENT DIAGRAMS

Turning Movement Summary Diagram

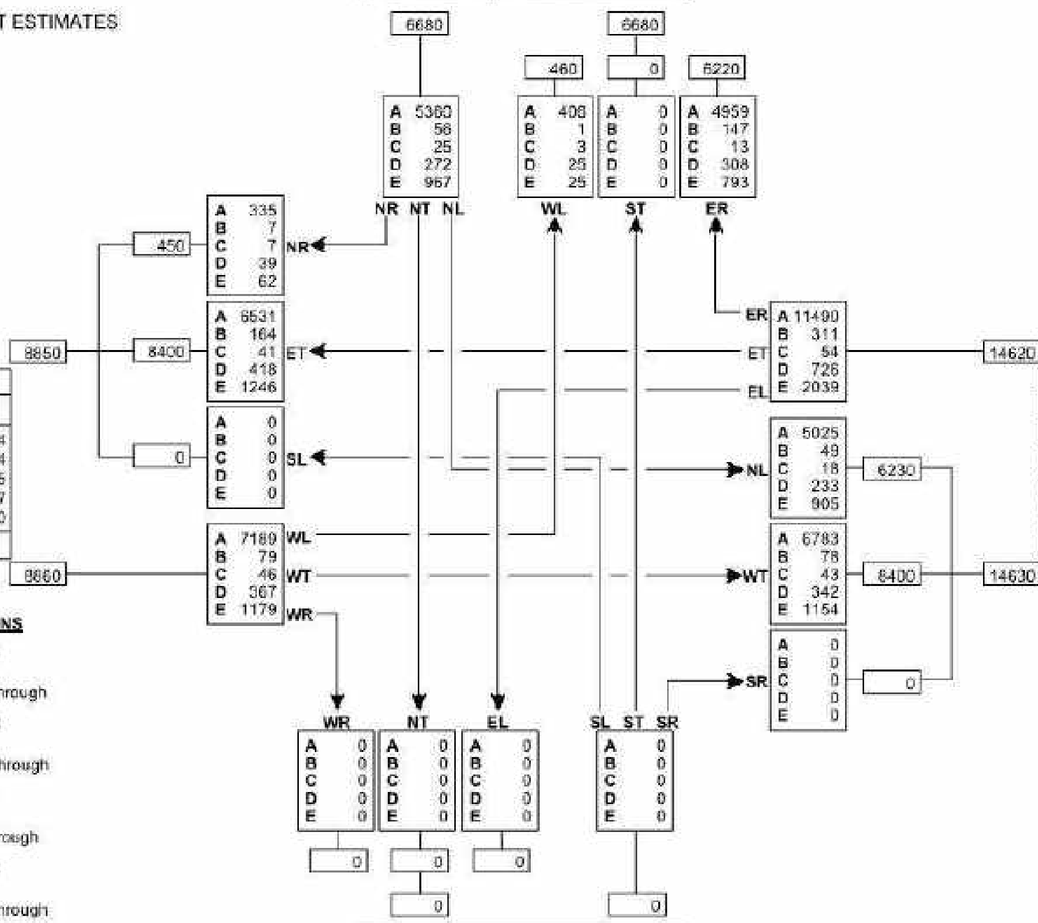
Reference No.: 72510

Intersection of:
16 & 43 AT MANLY CORNER

2014 AADT / ASDT ESTIMATES

North On 43

Vehicle Type	Vol	%
A: Passenger Vehicle	10725	80.3
B: Recreational Vehicle	204	1.5
C: Bus	41	0.3
D: Single Unit Truck	605	4.5
E: Tractor Trailer Unit	1785	13.4
ASDT 16000	AADT	13360



West On 16

Vehicle Type	Vol	%
A: Passenger Vehicle	14055	79.4
B: Recreational Vehicle	250	1.4
C: Bus	94	0.5
D: Single Unit Truck	824	4.7
E: Tractor Trailer Unit	2487	14.0
ASDT 21730	AADT	17710

East On 16

Vehicle Type	Vol	%
A: Passenger Vehicle	23298	79.7
B: Recreational Vehicle	438	1.5
C: Bus	115	0.4
D: Single Unit Truck	1301	4.4
E: Tractor Trailer Unit	4098	14.0
ASDT 32840	AADT	29250

South On

Vehicle Type	Vol	%
A: Passenger Vehicle	0	0.0
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	0	0.0
E: Tractor Trailer Unit	0	0.0
ASDT	AADT	0

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic From North Turning Right
NL: Traffic From North Turning Left
NT: Traffic From North Proceeding Through

SR: Traffic From South Turning Right
SL: Traffic From South Turning Left
ST: Traffic From South Proceeding Through

ER: Traffic From East Turning Right
EL: Traffic From East Turning Left
ET: Traffic From East Proceeding Through

WR: Traffic From West Turning Right
WL: Traffic From West Turning Left
WT: Traffic From West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day fo period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehicles per day fo period of May 1 to September 30 (153 days)

Turning Movement Summary Diagram

Reference No.: 72510

Intersection of:
16 & 43 AT MANLY CORNER

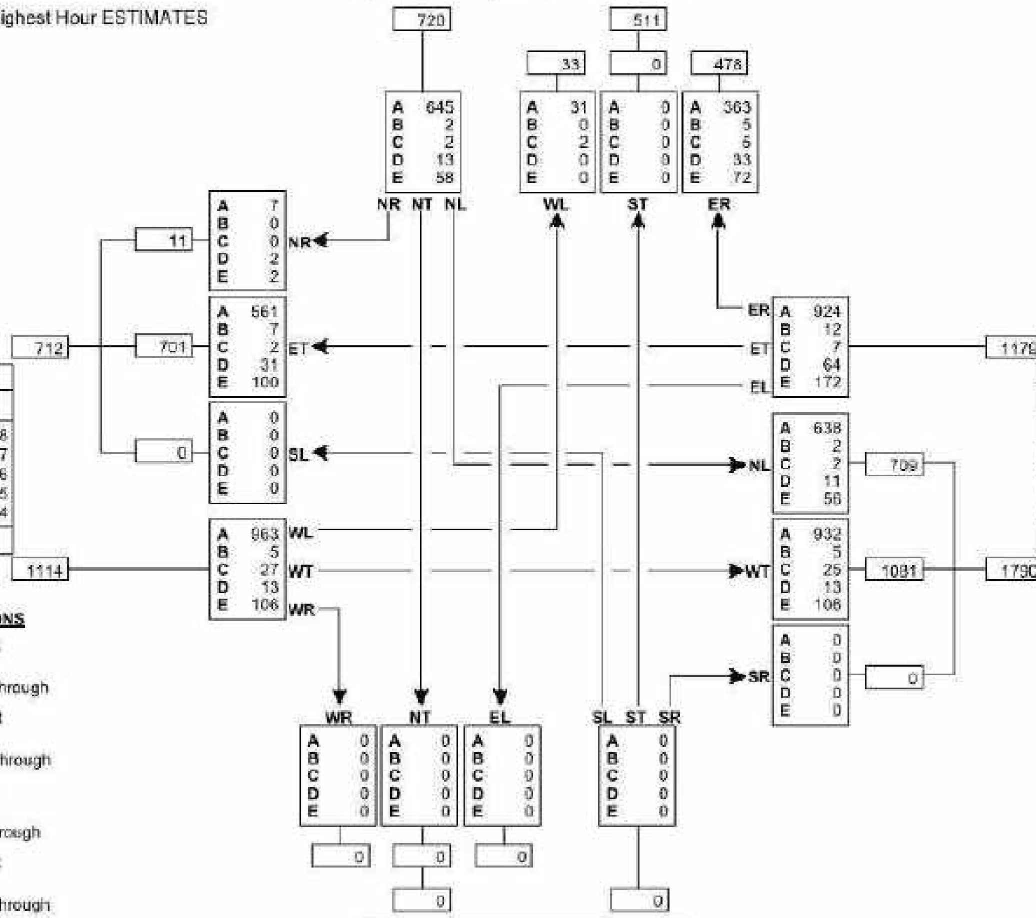
2014 a.m. 100th Highest Hour ESTIMATES

North On 43

Vehicle Type	Vol	%
A: Passenger Vehicle	1039	84.4
B: Recreational Vehicle	7	0.6
C: Bus	9	0.7
D: Single Unit Truck	46	3.7
E: Tractor Trailer Unit	130	10.6
Total	1231	

West On 16

Vehicle Type	Vol	%
A: Passenger Vehicle	1531	83.8
B: Recreational Vehicle	12	0.7
C: Bus	29	1.6
D: Single Unit Truck	46	2.5
E: Tractor Trailer Unit	208	11.4
Total	1826	



East On 16

Vehicle Type	Vol	%
A: Passenger Vehicle	2494	84.0
B: Recreational Vehicle	19	0.6
C: Bus	34	1.1
D: Single Unit Truck	88	3.0
E: Tractor Trailer Unit	334	11.2
Total	2969	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic From North Turning Right
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NT: Traffic From North Proceeding Through

SR: Traffic From South Turning Right
SL: Traffic From South Turning Left
ST: Traffic From South Proceeding Through

ER: Traffic From East Turning Right
EL: Traffic From East Turning Left
ET: Traffic From East Proceeding Through

WR: Traffic From West Turning Right
WL: Traffic From West Turning Left
WT: Traffic From West Proceeding Through

South On

Vehicle Type	Vol	%
A: Passenger Vehicle	0	0.0
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	0	0.0
E: Tractor Trailer Unit	0	0.0
Total	0	

Turning Movement Summary Diagram

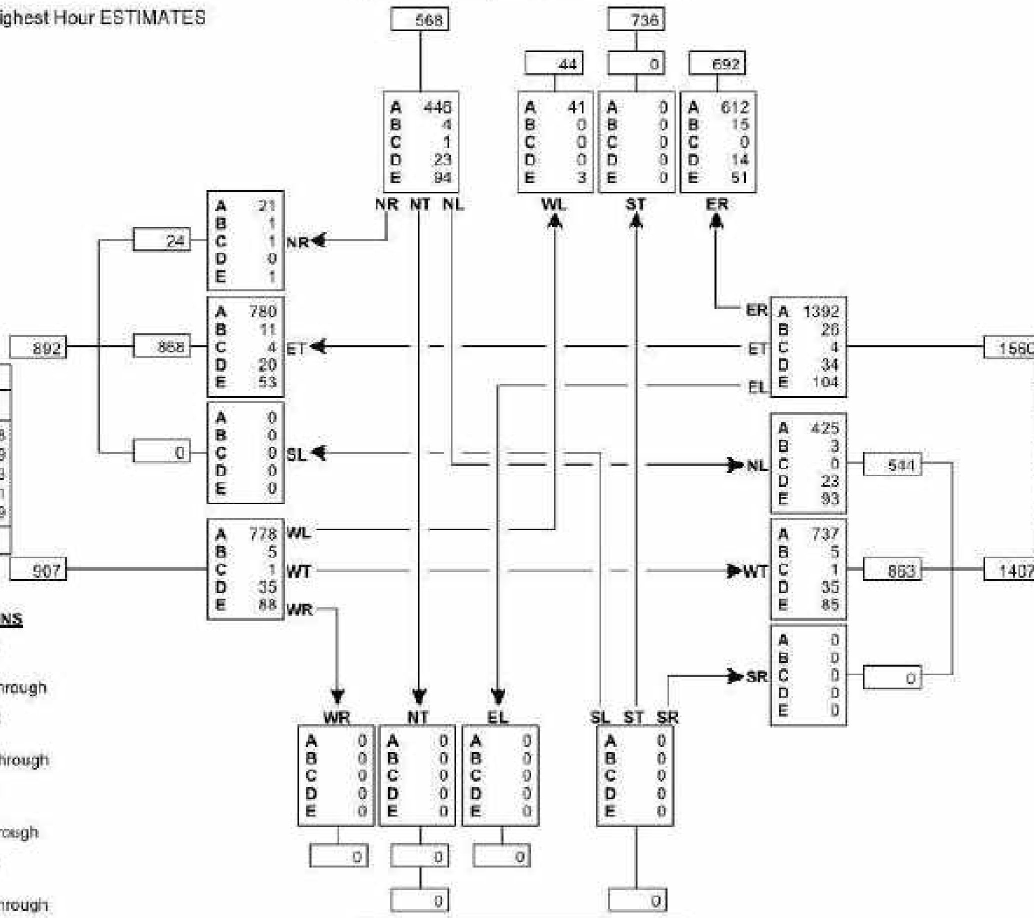
Reference No.: 72510

Intersection of:

16 & 43 AT MANLY CORNER

2014 p.m. 100th Highest Hour ESTIMATES

North On 43		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	1099	84.3
B: Recreational Vehicle	19	1.5
C: Bus	1	0.1
D: Single Unit Truck	37	2.8
E: Tractor Trailer Unit	148	11.3
Total	1304	



West On 16		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	1579	87.8
B: Recreational Vehicle	17	0.9
C: Bus	6	0.3
D: Single Unit Truck	55	3.1
E: Tractor Trailer Unit	142	7.9
Total	1799	

East On 16		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	2554	86.1
B: Recreational Vehicle	34	1.1
C: Bus	5	0.2
D: Single Unit Truck	92	3.1
E: Tractor Trailer Unit	282	9.5
Total	2967	

TURNING MOVEMENT ABBREVIATIONS

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ST: Traffic From South Proceeding Through

ER: Traffic From East Turning Right
EL: Traffic From East Turning Left
ET: Traffic From East Proceeding Through

WR: Traffic From West Turning Right
WL: Traffic From West Turning Left
WT: Traffic From West Proceeding Through

South On		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	0	0.0
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	0	0.0
E: Tractor Trailer Unit	0	0.0
Total	0	

Turning Movement Summary Diagram

Reference No.: 71530

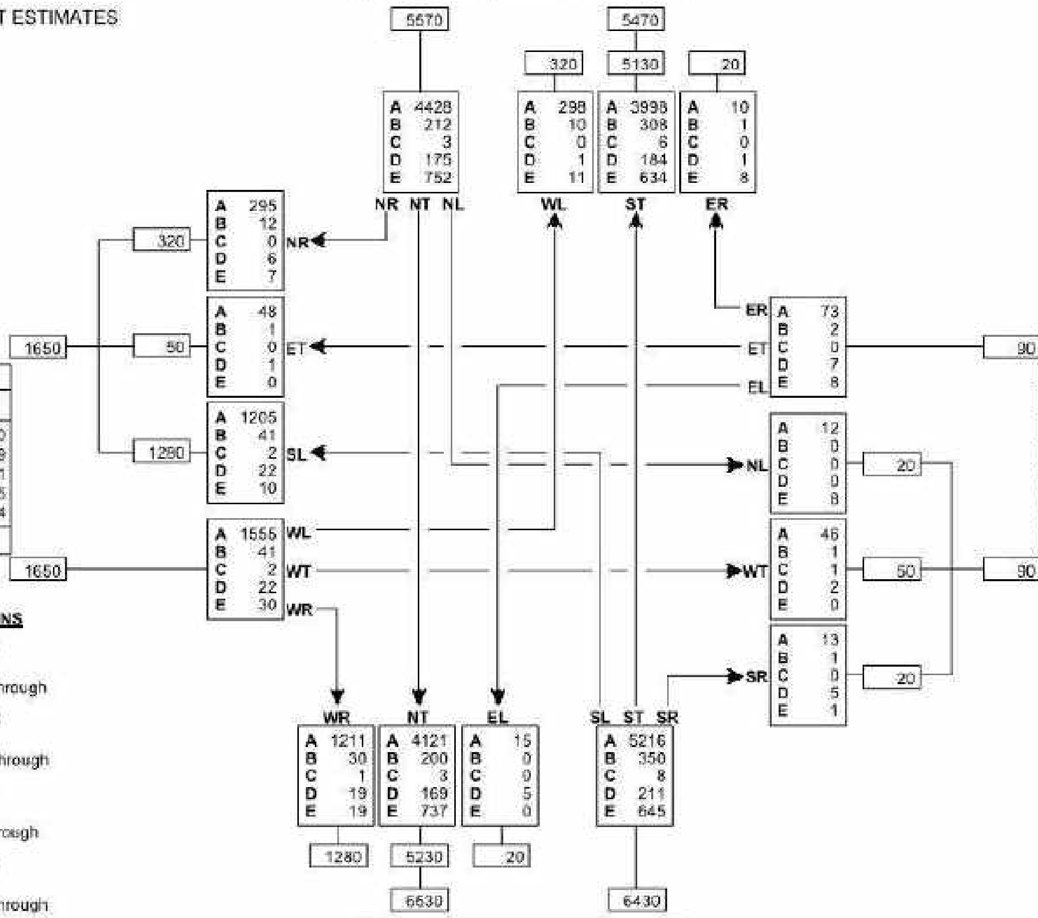
Intersection of:

43 & 633 E OF ALBERTA BEACH

2014 AADT / ASDT ESTIMATES

North On 43		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	8734	79.1
B: Recreational Vehicle	531	4.8
C: Bus	9	0.1
D: Single Unit Truck	361	3.3
E: Tractor Trailer Unit	1405	12.7
ASDT 12400	**AADT** 11040	

West On 633		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	3103	94.0
B: Recreational Vehicle	95	2.9
C: Bus	4	0.1
D: Single Unit Truck	51	1.5
E: Tractor Trailer Unit	47	1.4
ASDT 3710	**AADT** 3300	



East On 633		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	144	80.0
B: Recreational Vehicle	4	2.2
C: Bus	1	0.6
D: Single Unit Truck	14	7.8
E: Tractor Trailer Unit	17	9.4
ASDT 200	**AADT** 180	

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SL: Traffic From South Turning Left
ST: Traffic From South Proceeding Through

ER: Traffic From East Turning Right
EL: Traffic From East Turning Left
ET: Traffic From East Proceeding Through

WR: Traffic From West Turning Right
WL: Traffic From West Turning Left
WT: Traffic From West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day fo period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehicles per day fo period of May 1 to September 30 (153 days)

South On 43		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	10563	81.5
B: Recreational Vehicle	580	4.5
C: Bus	12	0.1
D: Single Unit Truck	404	3.1
E: Tractor Trailer Unit	1401	10.8
ASDT 14550	**AADT** 12960	

Turning Movement Summary Diagram

Reference No.: 71530

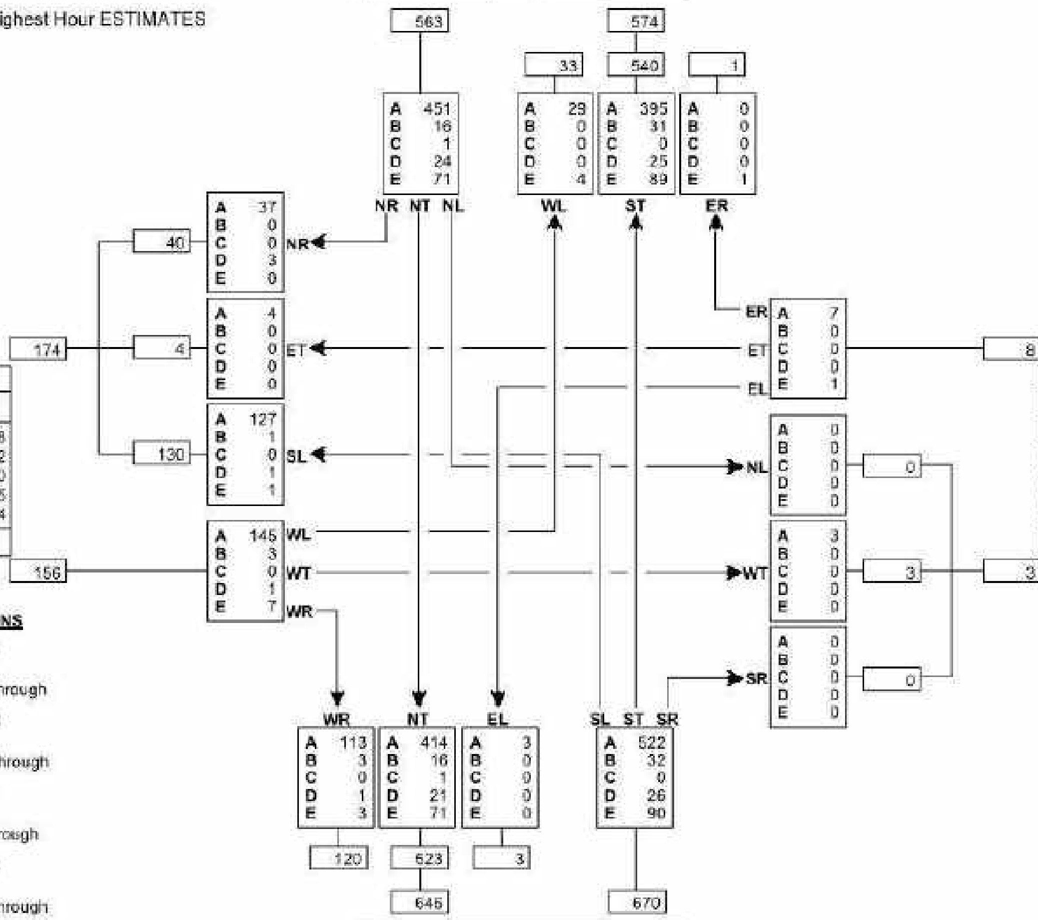
Intersection of:
43 & 633 E OF ALBERTA BEACH

2014 a.m. 100th Highest Hour ESTIMATES

North On 43		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	875	77.0
B: Recreational Vehicle	47	4.1
C: Bus	1	0.1
D: Single Unit Truck	49	4.3
E: Tractor Trailer Unit	165	14.5
Total	1137	

West On 633		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	313	94.8
B: Recreational Vehicle	4	1.2
C: Bus	0	0.0
D: Single Unit Truck	5	1.5
E: Tractor Trailer Unit	8	2.4
Total	330	

East On 633		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	10	90.9
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	0	0.0
E: Tractor Trailer Unit	1	9.1
Total	11	



TURNING MOVEMENT ABBREVIATIONS

NR: Traffic From North Turning Right
NL: Traffic From North Turning Left
NT: Traffic From North Proceeding Through

SR: Traffic From South Turning Right
SL: Traffic From South Turning Left
ST: Traffic From South Proceeding Through

ER: Traffic From East Turning Right
EL: Traffic From East Turning Left
ET: Traffic From East Proceeding Through

WR: Traffic From West Turning Right
WL: Traffic From West Turning Left
WT: Traffic From West Proceeding Through

South On 43		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	1052	79.9
B: Recreational Vehicle	51	3.9
C: Bus	1	0.1
D: Single Unit Truck	48	3.6
E: Tractor Trailer Unit	164	12.5
Total	1316	

Reference No.: 71530

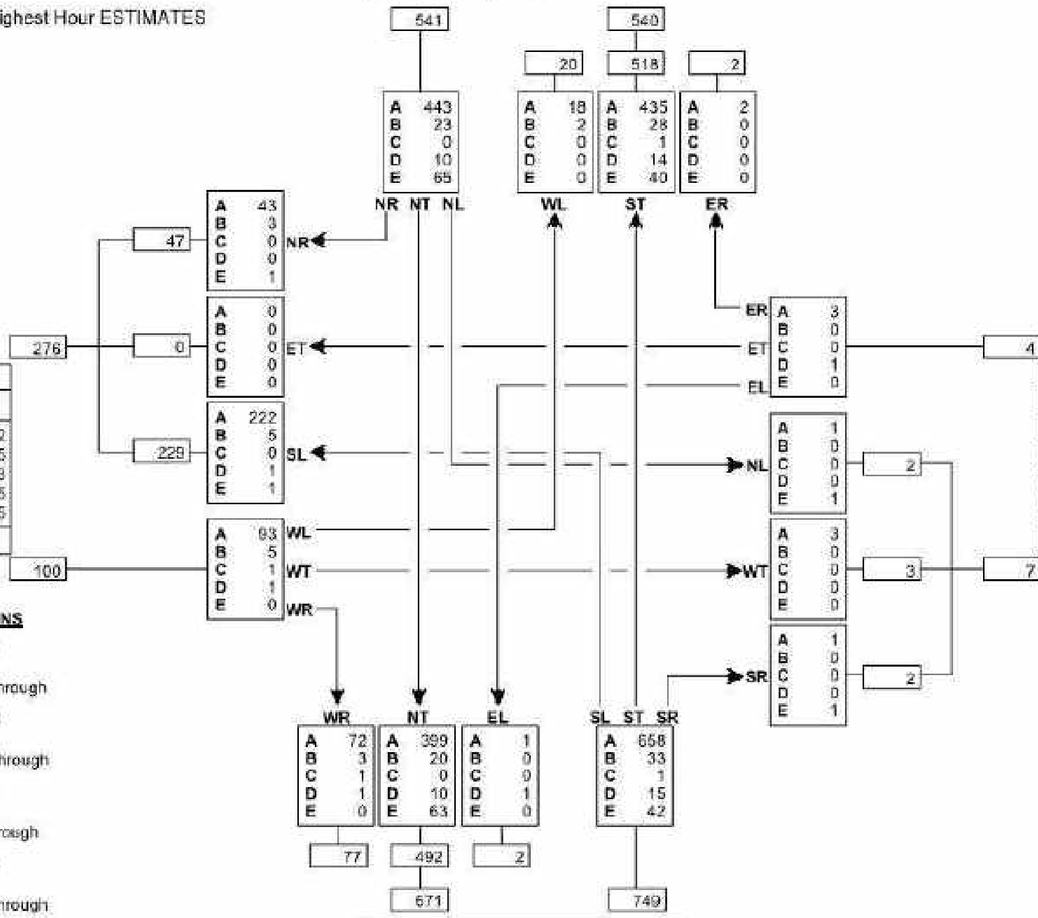
Intersection of:
43 & 633 E OF ALBERTA BEACH

2014 p.m. 100th Highest Hour ESTIMATES

Turning Movement Summary Diagram

North On 43		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	898	83.1
B: Recreational Vehicle	53	4.9
C: Bus	1	0.1
D: Single Unit Truck	24	2.2
E: Tractor Trailer Unit	105	9.7
Total	1081	

West On 633		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	358	95.2
B: Recreational Vehicle	13	3.5
C: Bus	1	0.3
D: Single Unit Truck	2	0.5
E: Tractor Trailer Unit	2	0.5
Total	376	



East On 633		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	8	72.7
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	1	9.1
E: Tractor Trailer Unit	2	18.2
Total	11	

TURNING MOVEMENT ABBREVIATIONS

- NR: Traffic From North Turning Right
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- NT: Traffic From North Proceeding Through

- SR: Traffic From South Turning Right
- SL: Traffic From South Turning Left
- ST: Traffic From South Proceeding Through

- ER: Traffic From East Turning Right
- EL: Traffic From East Turning Left
- ET: Traffic From East Proceeding Through

- WR: Traffic From West Turning Right
- WL: Traffic From West Turning Left
- WT: Traffic From West Proceeding Through

South On 43		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	1130	85.6
B: Recreational Vehicle	56	4.2
C: Bus	2	0.2
D: Single Unit Truck	27	2.0
E: Tractor Trailer Unit	105	8.0
Total	1320	

APPENDIX B
Development Access & Rge. Rd. 20

TURNING MOVEMENT DIAGRAMS

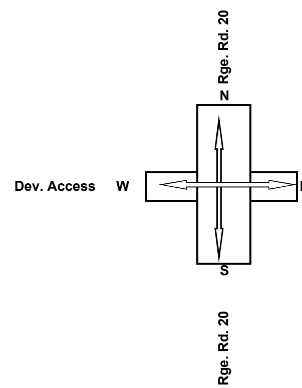
D&A PAULICHUK CONSULTING LTD.

Turning Movement Summary Diagram

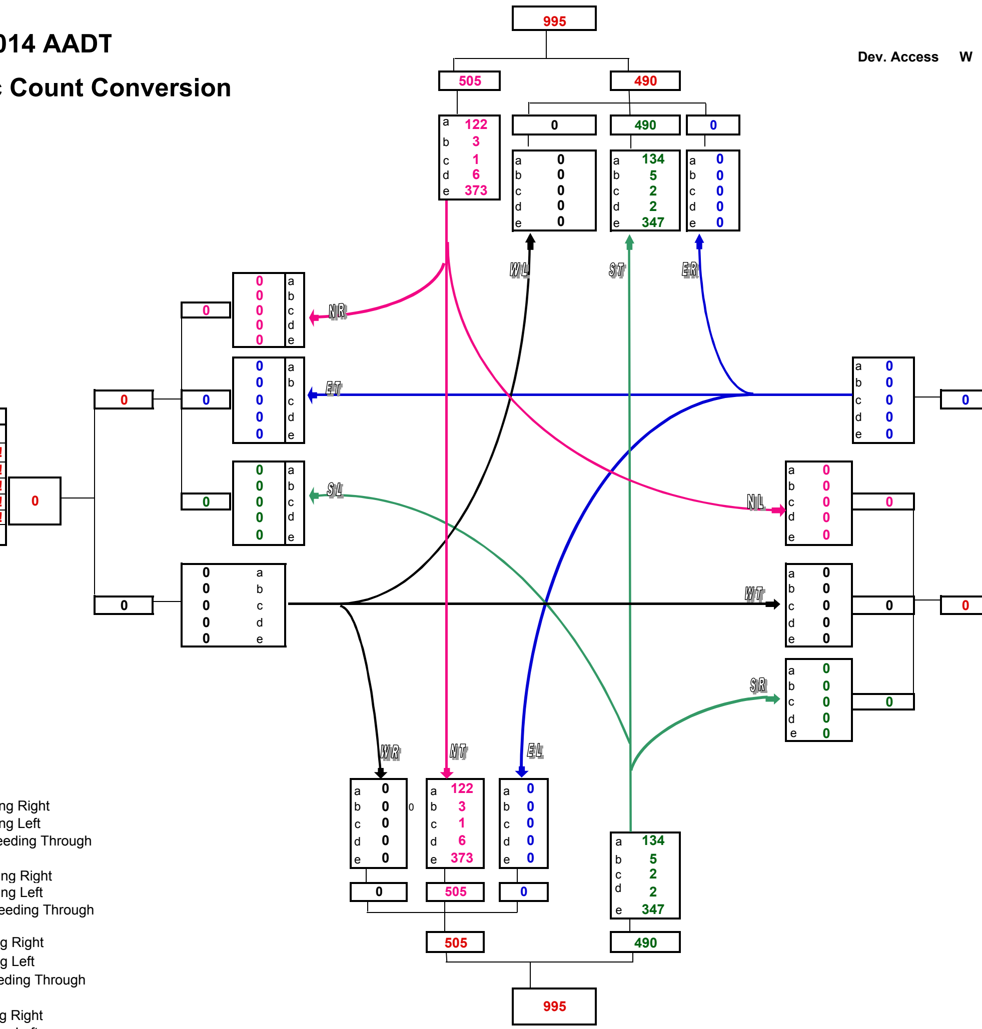
Intersection of: Rge. Rd. 20 & Development Access

2014 AADT
from Traffic Count Conversion

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	256	25.73
B - Recreational Vehicle	8	0.80
C - Bus	3	0.30
D - Single Unit Truck	8	0.80
E - Tractor Trailer Unit	720	72.36
Total	995	



WEST LEG ON	Dev. Access	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	



EAST LEG ON		
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

NR: Traffic from North Turning Right
NL: Traffic from North Turning Left
NT: Traffic from North Proceeding Through

SR: Traffic from South Turning Right
SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Taffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	256	25.73
B - Recreational Vehicle	8	0.80
C - Bus	3	0.30
D - Single Unit Truck	8	0.80
E - Tractor Trailer Unit	720	72.36
Total	995	

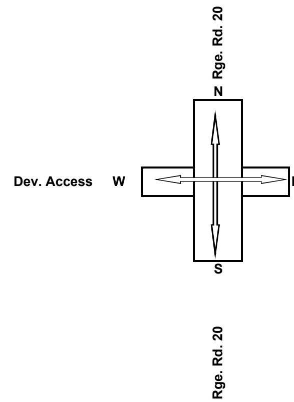
AADT Conversion Factor
1.15
1

D&A PAULICHUK CONSULTING LTD.

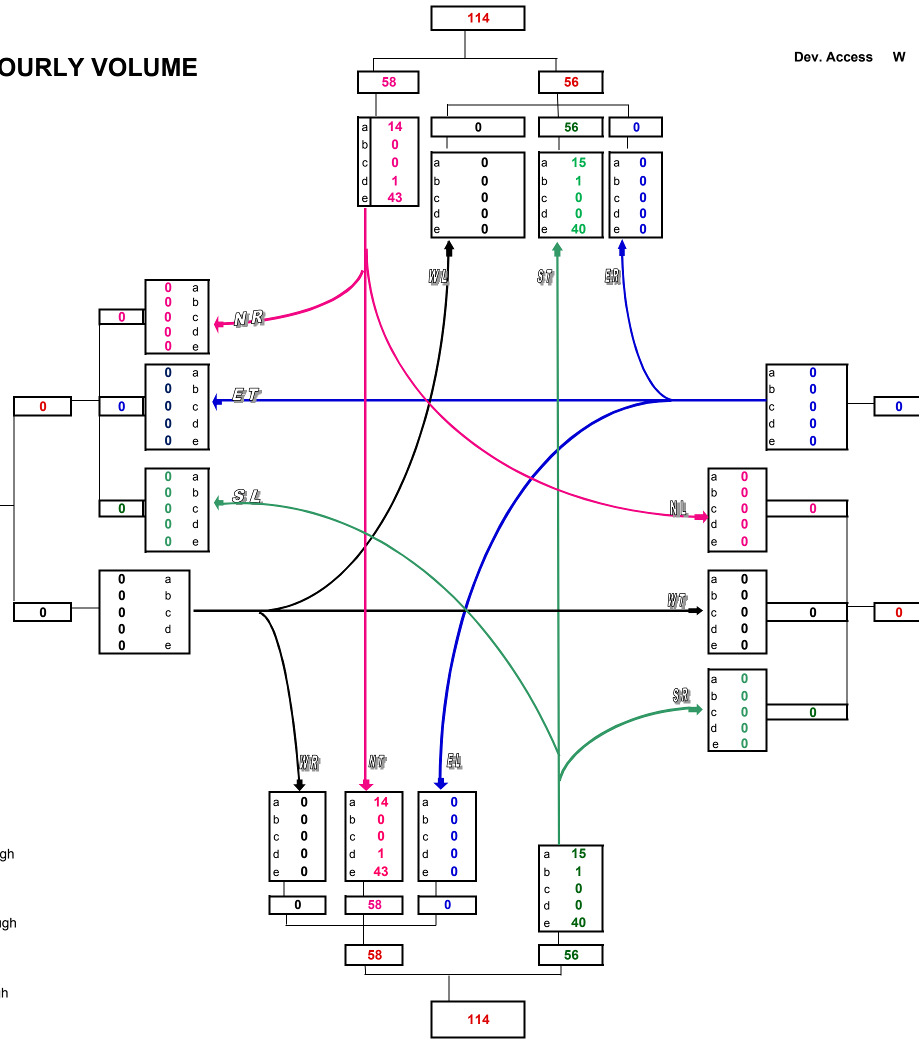
Turning Movement Summary Diagram

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	29	25.4
B - Recreational Vehicle	1	0.9
C - Bus	0	0.0
D - Single Unit Truck	1	0.9
E - Tractor Trailer Unit	83	72.8
Total	114	

2014 AM PEAK HOURLY VOLUME



WEST LEG ON	Dev. Access	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	



EAST LEG ON		
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic from North Turning Right
NL: Traffic from North Turning Left
NT: Traffic from North Proceeding Through

SR: Traffic from South Turning Right
SL: Traffic from South Turning Left
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ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
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Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	29	25.4
B - Recreational Vehicle	1	0.9
C - Bus	0	0.0
D - Single Unit Truck	1	0.9
E - Tractor Trailer Unit	83	72.8
Total	114	

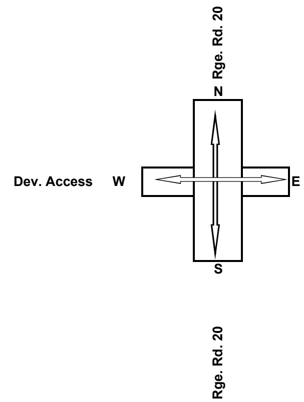
AM Peak	0.1154639
PM Peak	0.0675258

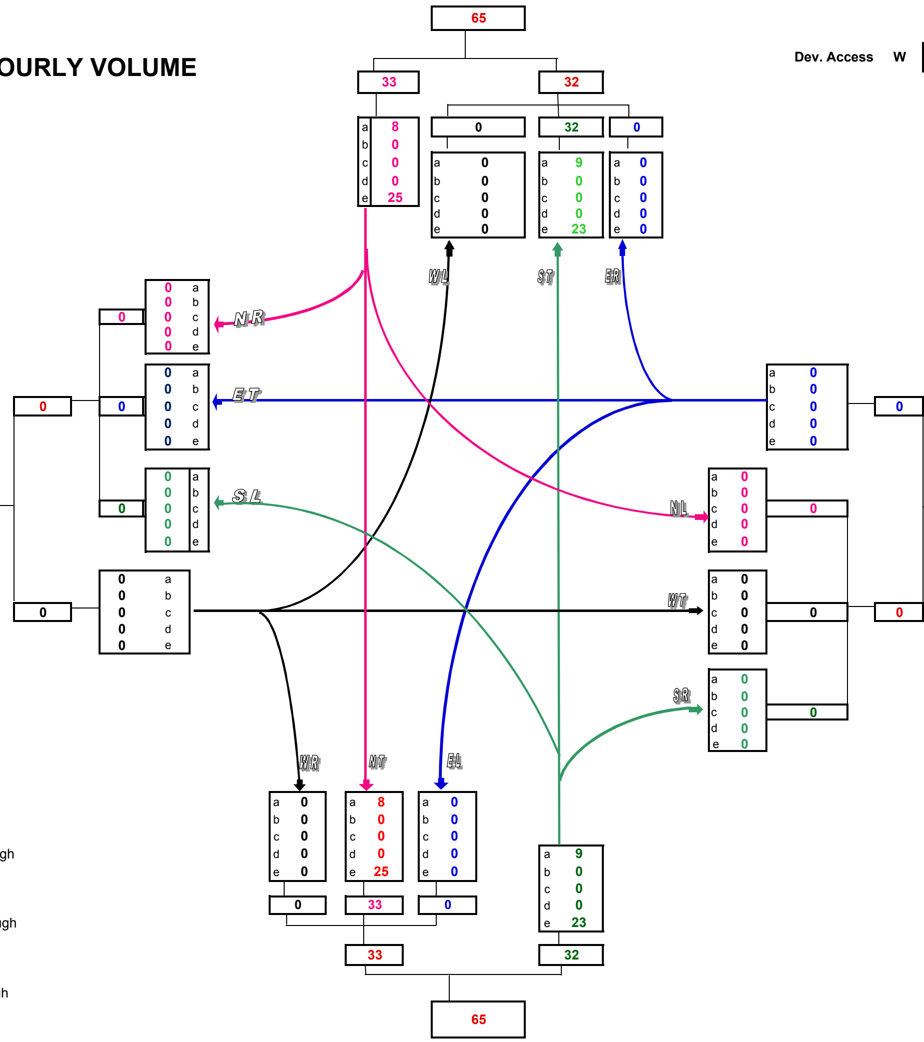
D&A PAULICHUK CONSULTING LTD.

Turning Movement Summary Diagram

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	17	26.2
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	48	73.8
Total	65	

2014 PM PEAK HOURLY VOLUME





WEST LEG ON	Dev. Access	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

EAST LEG ON		
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic from North Turning Right
NL: Traffic from North Turning Left
NT: Traffic from North Proceeding Through

SR: Traffic from South Turning Right
SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	17	26.2
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	48	73.8
Total	65	

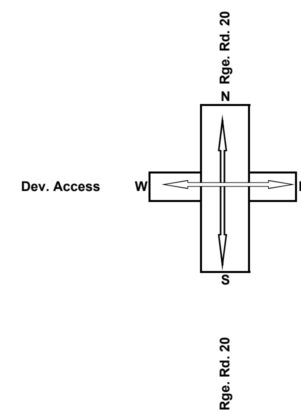
AM Peak	0.1154639
PM Peak	0.0675258

D&A PAULICHUK CONSULTING LTD.

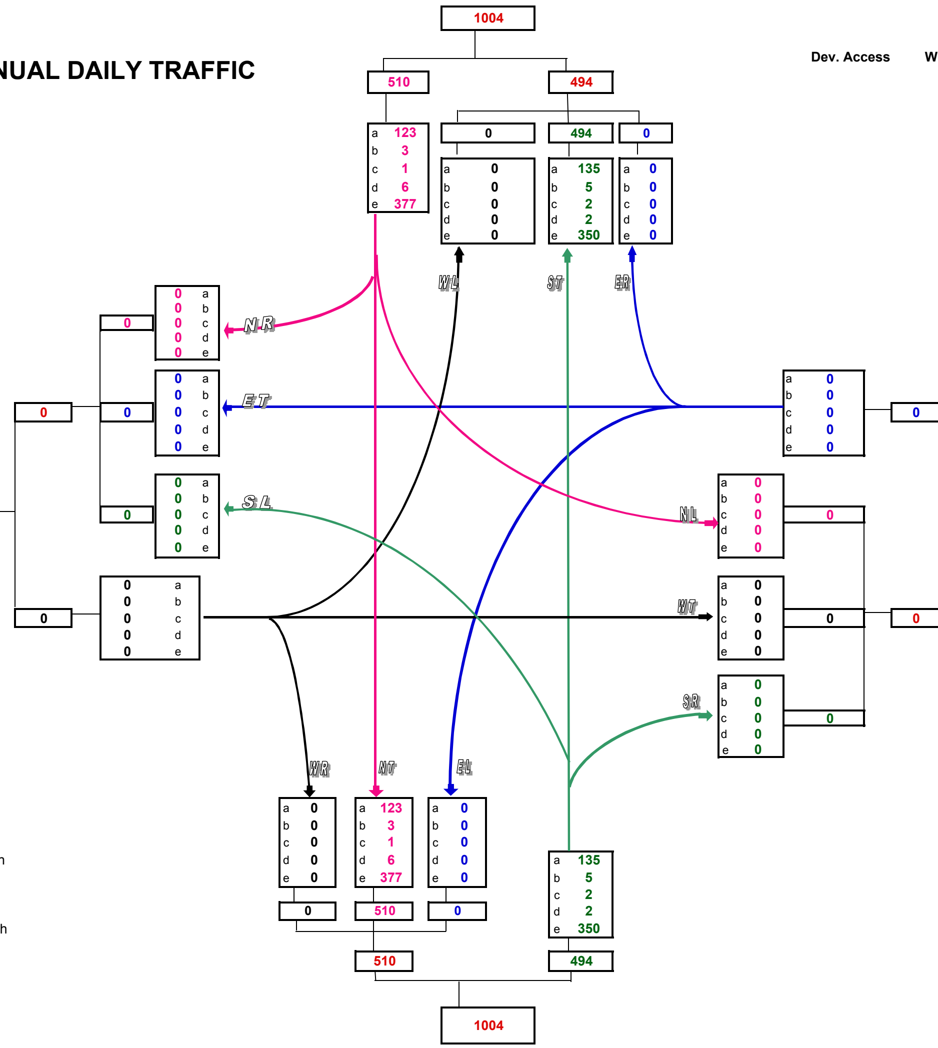
Turning Movement Summary Diagram

2015 ESTIMATED ANNUAL DAILY TRAFFIC

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	258	-
B - Recreational Vehicle	8	-
C - Bus	3	-
D - Single Unit Truck	8	-
E - Tractor Trailer Unit	727	-
Total	1004	



WEST LEG ON	Dev. Access	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	



EAST LEG ON		
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic from North Turning Right
NL: Traffic from North Turning Left
NT: Traffic from North Proceeding Through

SR: Traffic from South Turning Right
SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

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EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Taffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
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Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	258	25.7
B - Recreational Vehicle	8	0.8
C - Bus	3	0.3
D - Single Unit Truck	8	0.8
E - Tractor Trailer Unit	727	72.4
Total	1004	

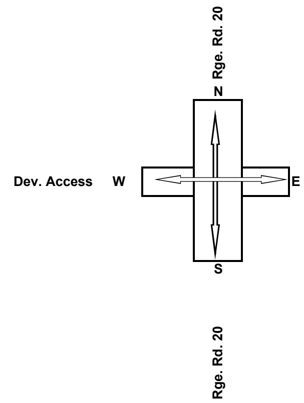
2015
2014
1

D&A PAULICHUK CONSULTING LTD.

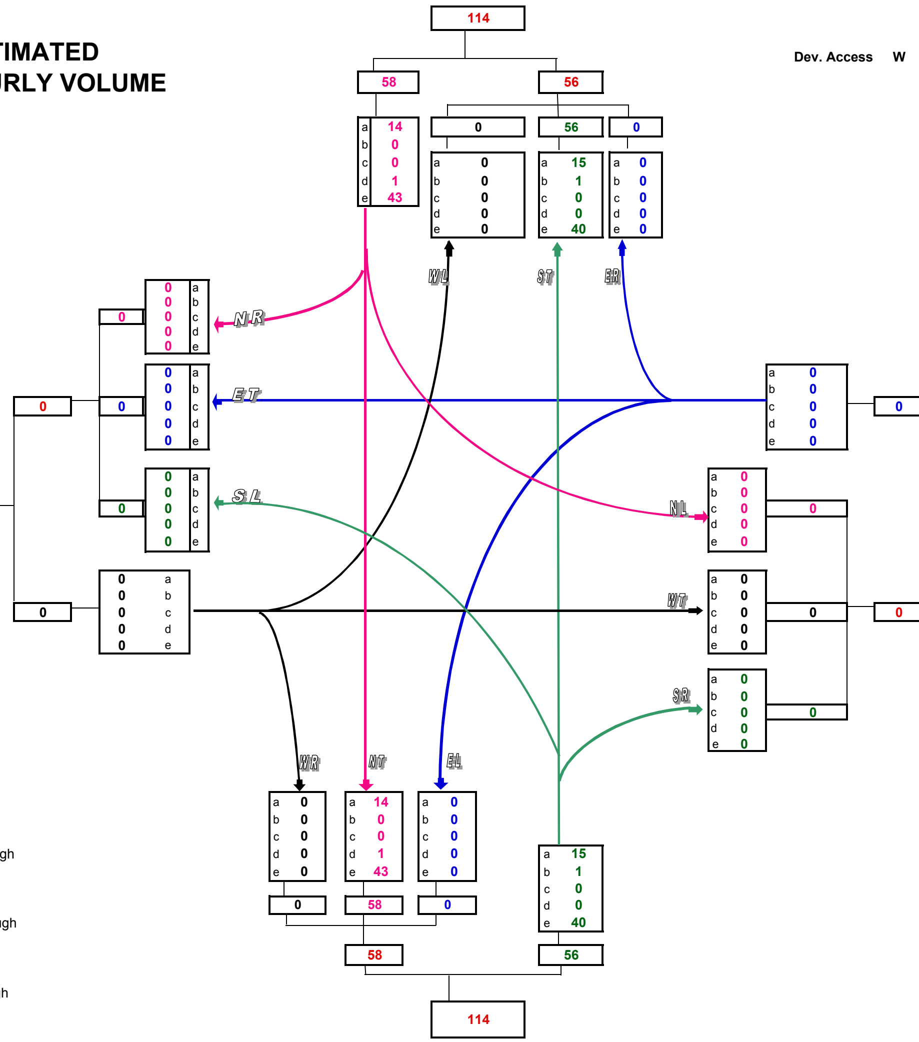
Turning Movement Summary Diagram

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	29	25.4
B - Recreational Vehicle	1	0.9
C - Bus	0	0.0
D - Single Unit Truck	1	0.9
E - Tractor Trailer Unit	83	72.8
Total	114	

2015 ESTIMATED
AM PEAK HOURLY VOLUME



WEST LEG ON	Dev. Access	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	



EAST LEG ON		
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic from North Turning Right
NL: Traffic from North Turning Left
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SR: Traffic from South Turning Right
SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	29	25.4
B - Recreational Vehicle	1	0.9
C - Bus	0	0.0
D - Single Unit Truck	1	0.9
E - Tractor Trailer Unit	83	72.8
Total	114	

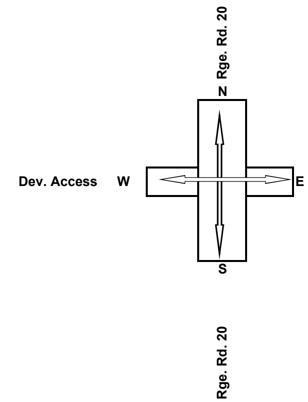
2015
2014
1

D&A PAULICHUK CONSULTING LTD.

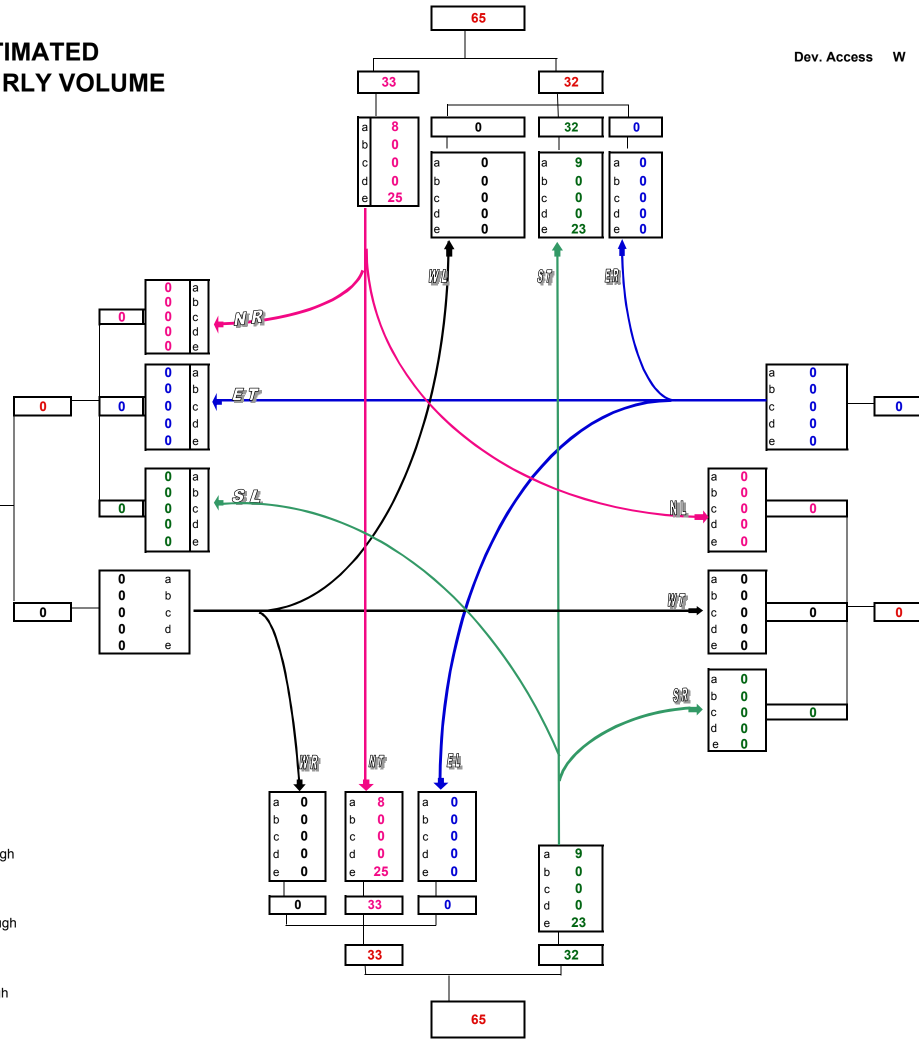
Turning Movement Summary Diagram

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	17	26.2
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	48	73.8
Total	65	

2015 ESTIMATED PM PEAK HOURLY VOLUME



WEST LEG ON	Dev. Access	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	



EAST LEG ON		
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic from North Turning Right
NL: Traffic from North Turning Left
NT: Traffic from North Proceeding Through

SR: Traffic from South Turning Right
SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

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EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

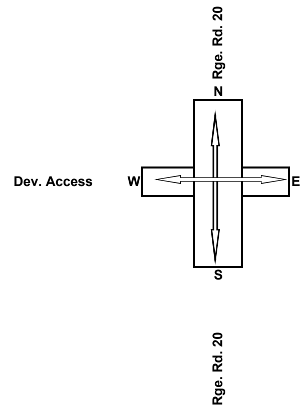
SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	17	26.2
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	48	73.8
Total	65	

2015
2014
1

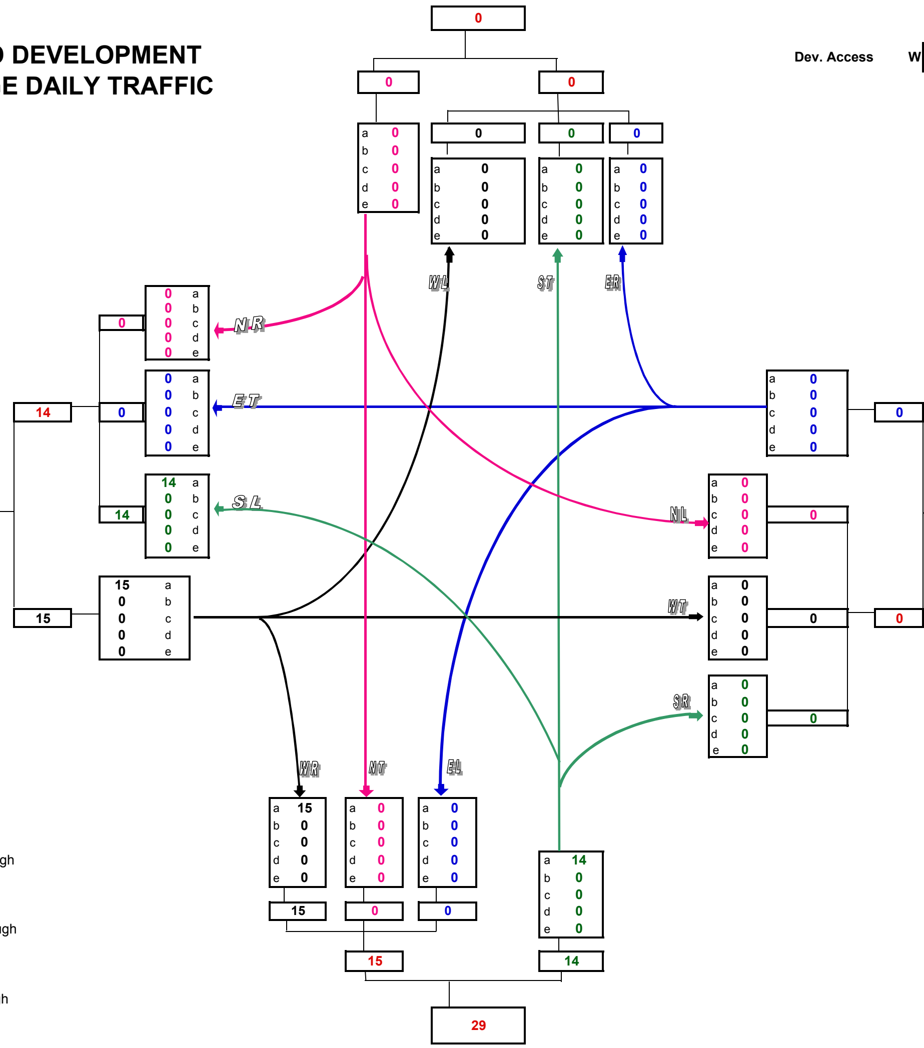
D&A PAULICHUK CONSULTING LTD.

Turning Movement Summary Diagram

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	



2016 PROJECTED DEVELOPMENT ANNUAL AVERAGE DAILY TRAFFIC



WEST LEG ON	Dev. Access	
Vehicle Type	Vol.	%
A - Passenger Vehicle	29	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	29	

EAST LEG ON		
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic from North Turning Right
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SL: Traffic from South Turning Left
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EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Traffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

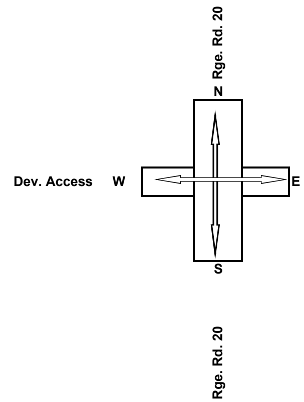
ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehicles per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	29	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	29	

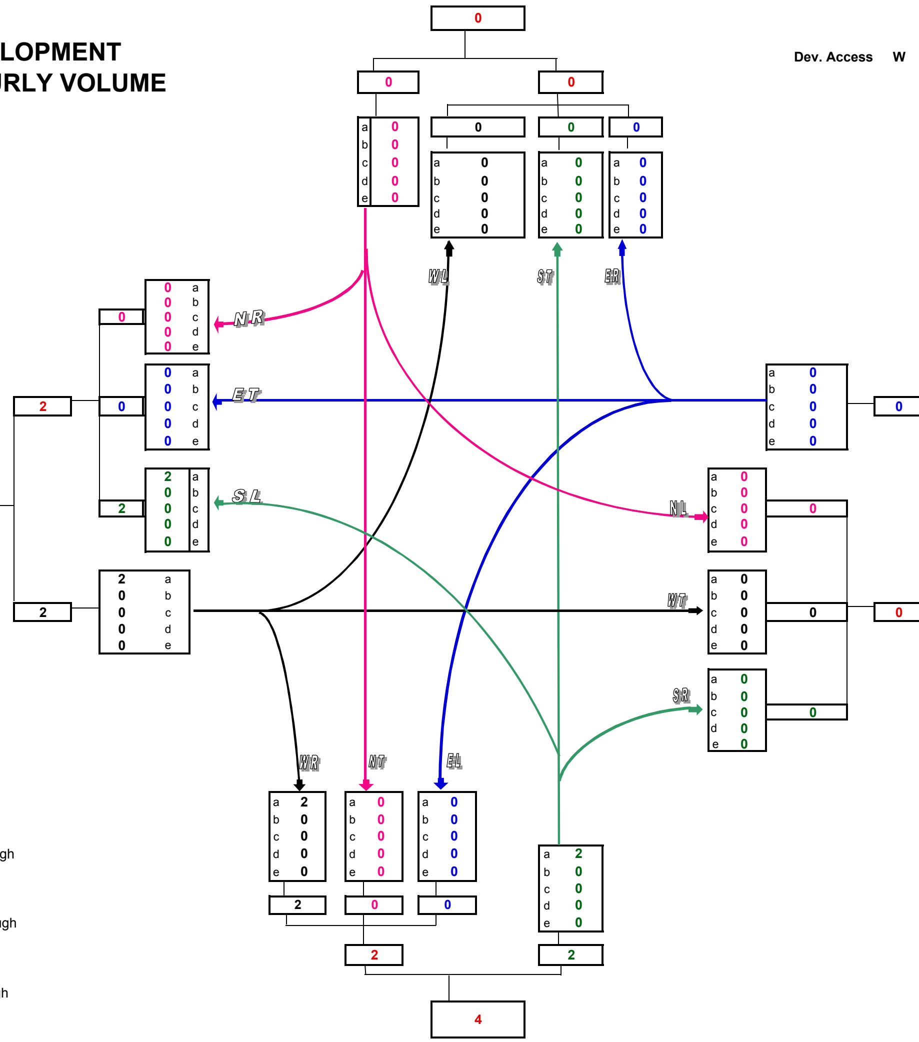
Turning Movement Summary Diagram

2016 DEVELOPMENT
AM PEAK HOURLY VOLUME

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	



WEST LEG ON	Dev. Access	
Vehicle Type	Vol.	%
A - Passenger Vehicle	4	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	4	



EAST LEG ON		
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic from North Turning Right
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NT: Traffic from North Proceeding Through

SR: Traffic from South Turning Right
SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

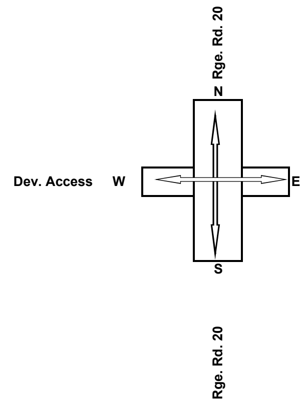
ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	4	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	4	

D&A PAULICHUK CONSULTING LTD.

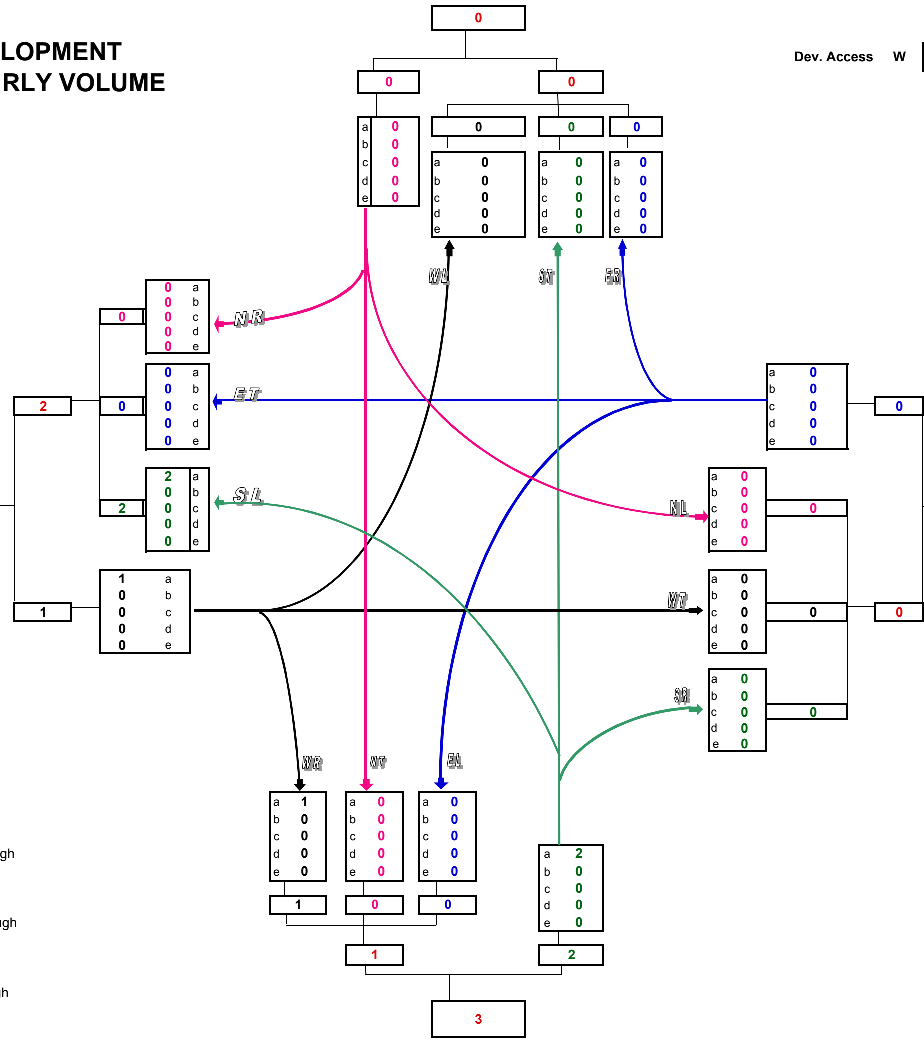
Turning Movement Summary Diagram

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	



2016 DEVELOPMENT
PM PEAK HOURLY VOLUME

WEST LEG ON	Dev. Access	
Vehicle Type	Vol.	%
A - Passenger Vehicle	3	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	3	



EAST LEG ON		
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic from North Turning Right
NL: Traffic from North Turning Left
NT: Traffic from North Proceeding Through

SR: Traffic from South Turning Right
SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

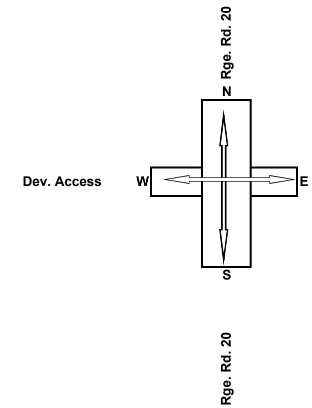
SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	3	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	3	

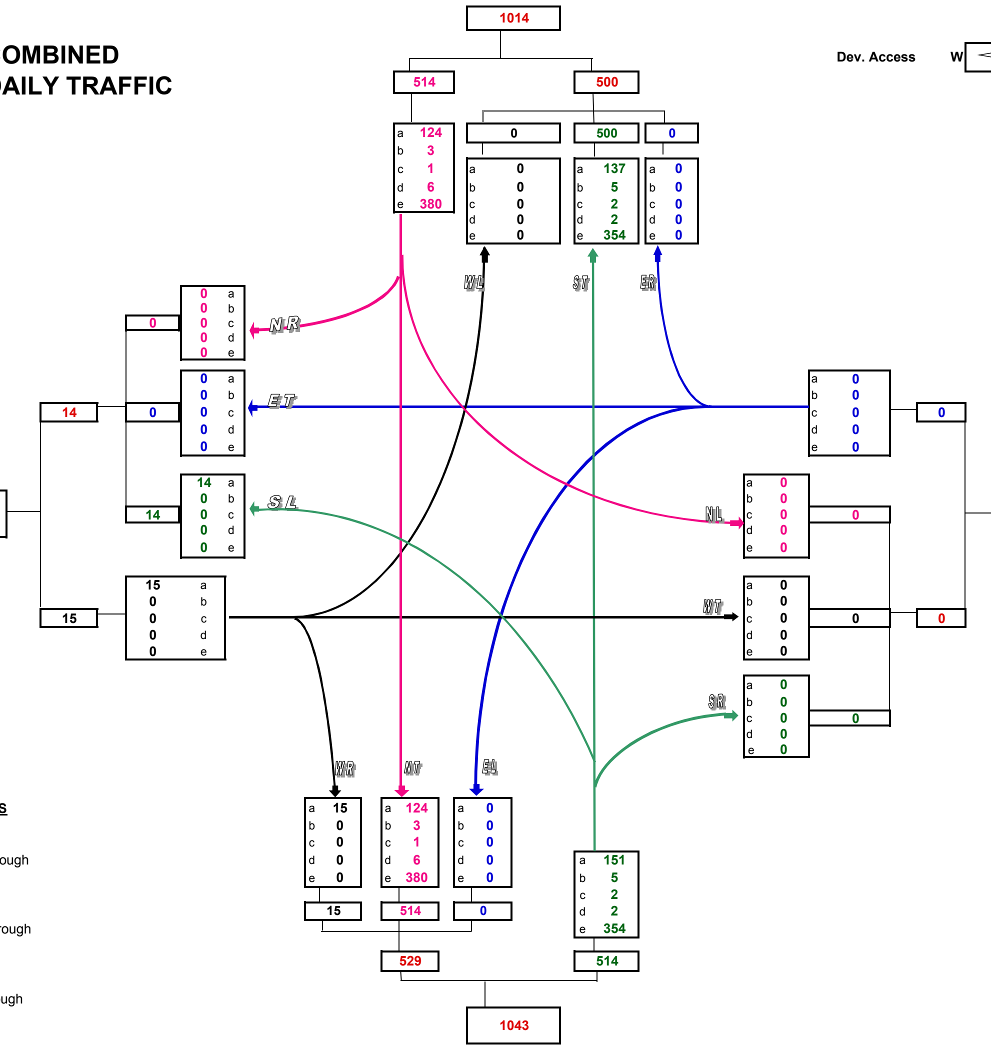
D&A PAULICHUK CONSULTING LTD.

Turning Movement Summary Diagram

2016 COMBINED ANNUAL DAILY TRAFFIC

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	261	-
B - Recreational Vehicle	8	-
C - Bus	3	-
D - Single Unit Truck	8	-
E - Tractor Trailer Unit	734	-
Total	1014	





WEST LEG ON	Dev. Access	
Vehicle Type	Vol.	%
A - Passenger Vehicle	29	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	29	

EAST LEG ON		
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

TURNING MOVEMENT ABBREVIATIONS

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EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Taffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
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Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

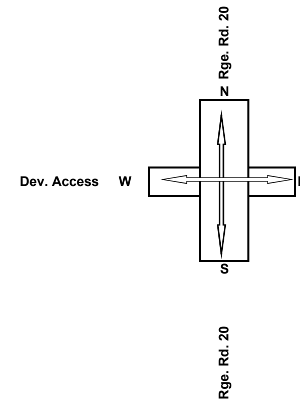
SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	290	27.8
B - Recreational Vehicle	8	0.8
C - Bus	3	0.3
D - Single Unit Truck	8	0.8
E - Tractor Trailer Unit	734	70.4
Total	1043	

2016
2014
2

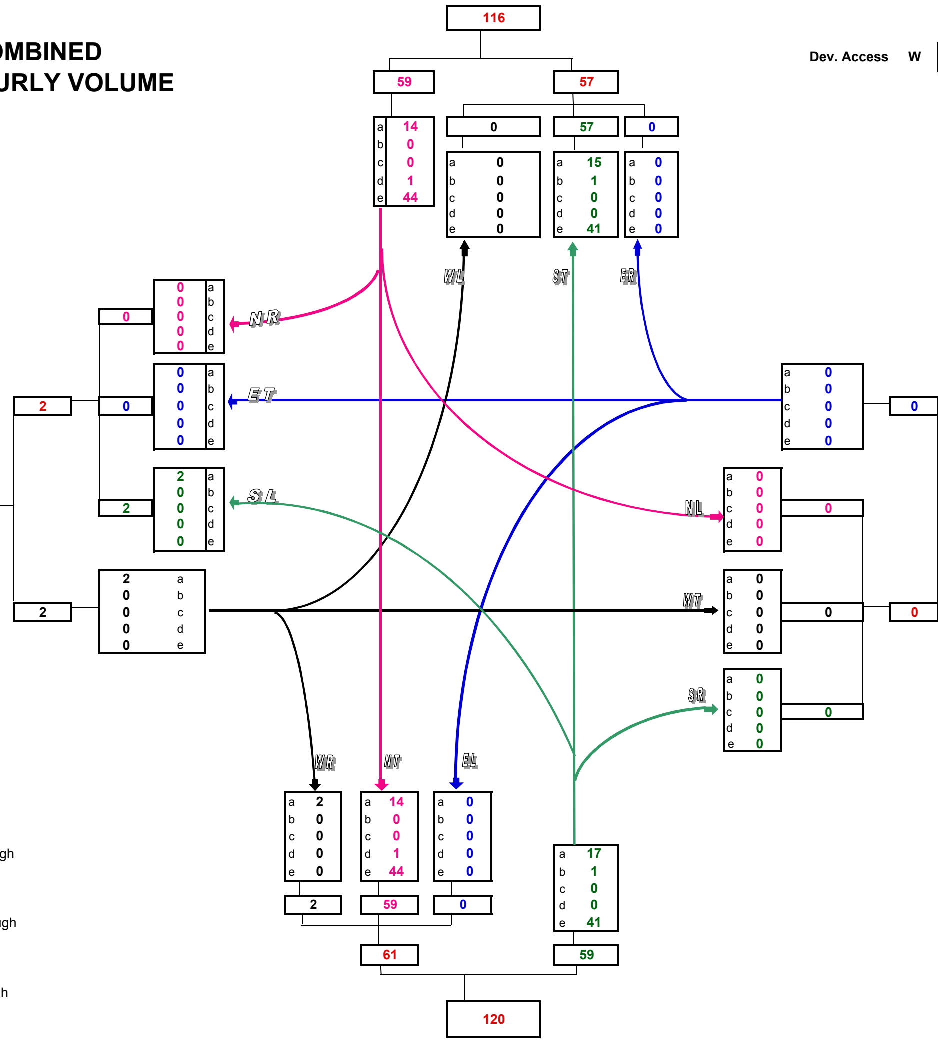
D&A PAULICHUK CONSULTING LTD.

Turning Movement Summary Diagram

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	29	25.0
B - Recreational Vehicle	1	0.9
C - Bus	0	0.0
D - Single Unit Truck	1	0.9
E - Tractor Trailer Unit	85	73.3
Total	116	



2016 COMBINED AM PEAK HOURLY VOLUME



WEST LEG ON	Dev. Access	
Vehicle Type	Vol.	%
A - Passenger Vehicle	4	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	4	

EAST LEG ON		
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

TURNING MOVEMENT ABBREVIATIONS

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ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
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TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	33	27.5
B - Recreational Vehicle	1	0.8
C - Bus	0	0.0
D - Single Unit Truck	1	0.8
E - Tractor Trailer Unit	85	70.8
Total	120	

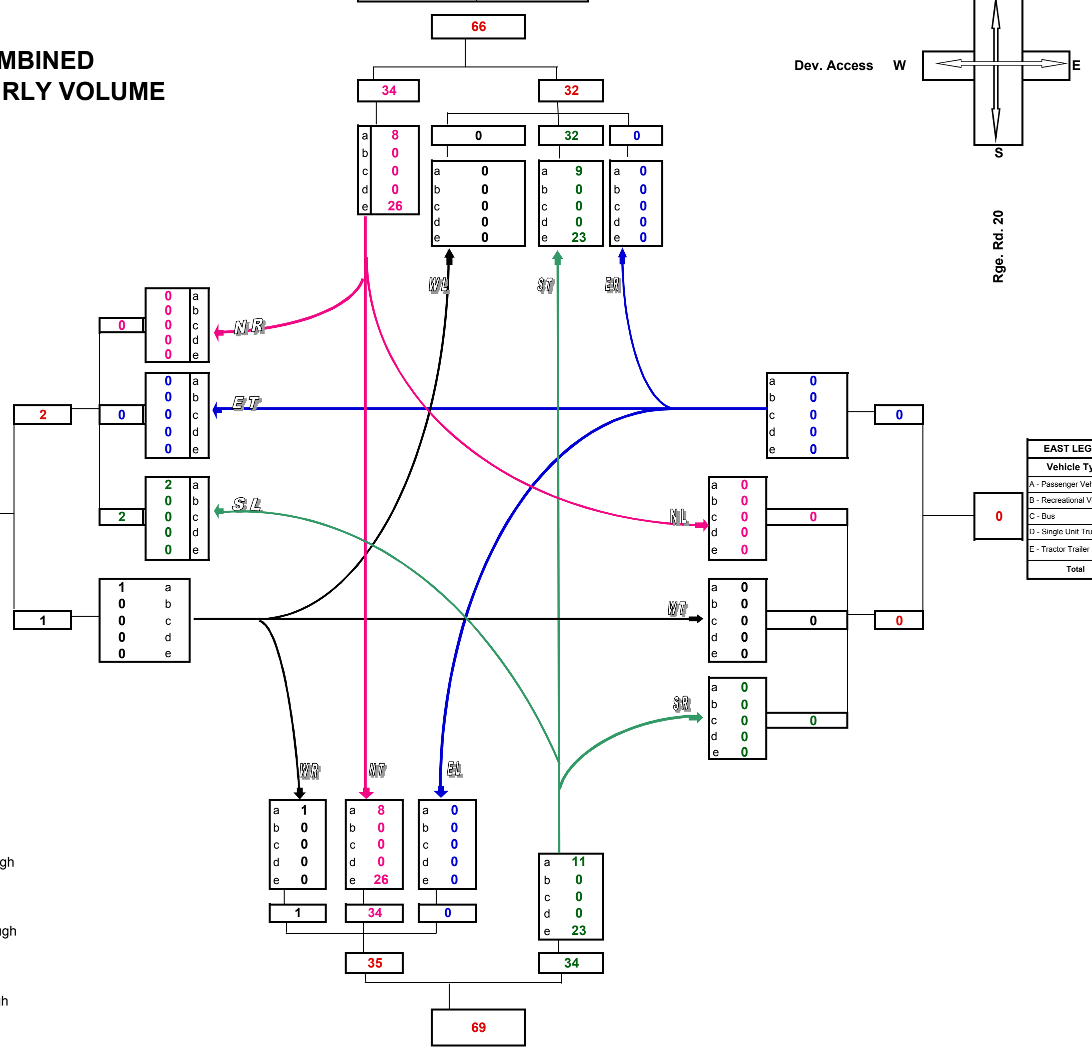
2016
2014
2

D&A PAULICHUK CONSULTING LTD.

Turning Movement Summary Diagram

2016 COMBINED PM PEAK HOURLY VOLUME

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	17	25.8
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	49	74.2
Total	66	



WEST LEG ON	Dev. Access	
Vehicle Type	Vol.	%
A - Passenger Vehicle	3	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	3	

3

EAST LEG ON		
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

0

TURNING MOVEMENT ABBREVIATIONS

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WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

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Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	20	29.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	49	71.0
Total	69	

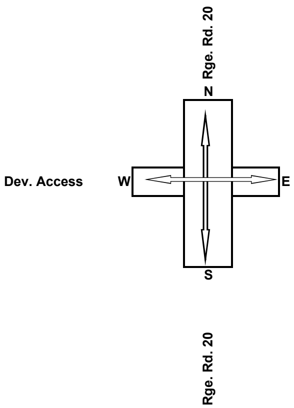
2016
2014
2

D&A PAULICHUK CONSULTING LTD.

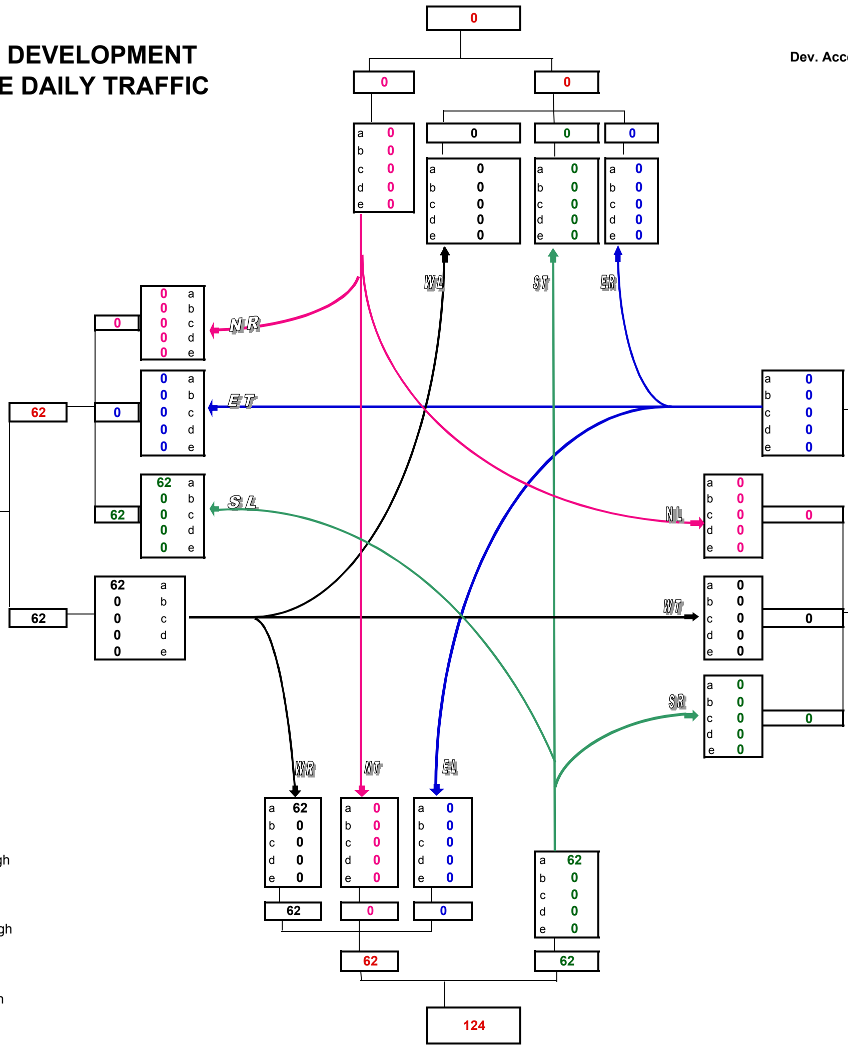
Turning Movement Summary Diagram

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

2021 PROJECTED DEVELOPMENT ANNUAL AVERAGE DAILY TRAFFIC



WEST LEG ON	Dev. Access	
Vehicle Type	Vol.	%
A - Passenger Vehicle	124	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	124	



EAST LEG ON		
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

TURNING MOVEMENT ABBREVIATIONS

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WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

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ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

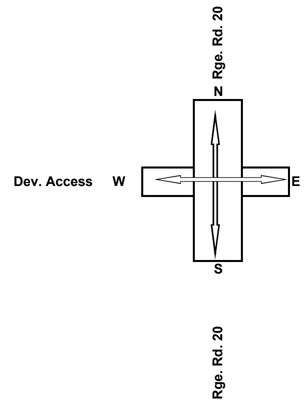
SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	124	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	124	

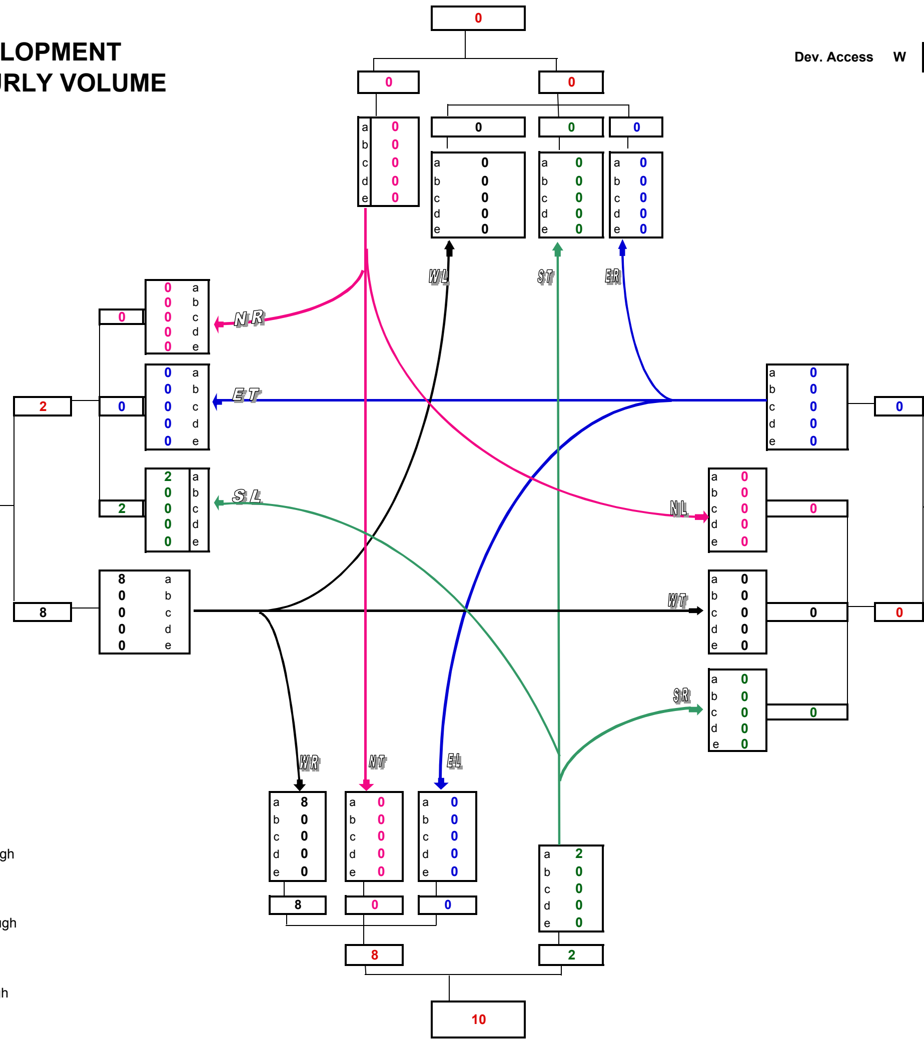
D&A PAULICHUK CONSULTING LTD.

Turning Movement Summary Diagram

2021 DEVELOPMENT
AM PEAK HOURLY VOLUME

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	





WEST LEG ON	Dev. Access	
Vehicle Type	Vol.	%
A - Passenger Vehicle	10	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	10	

EAST LEG ON		
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

TURNING MOVEMENT ABBREVIATIONS

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TURNING MOVEMENT ABBREVIATIONS

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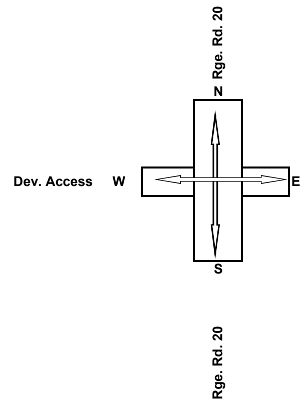
SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	10	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	10	

D&A PAULICHUK CONSULTING LTD.

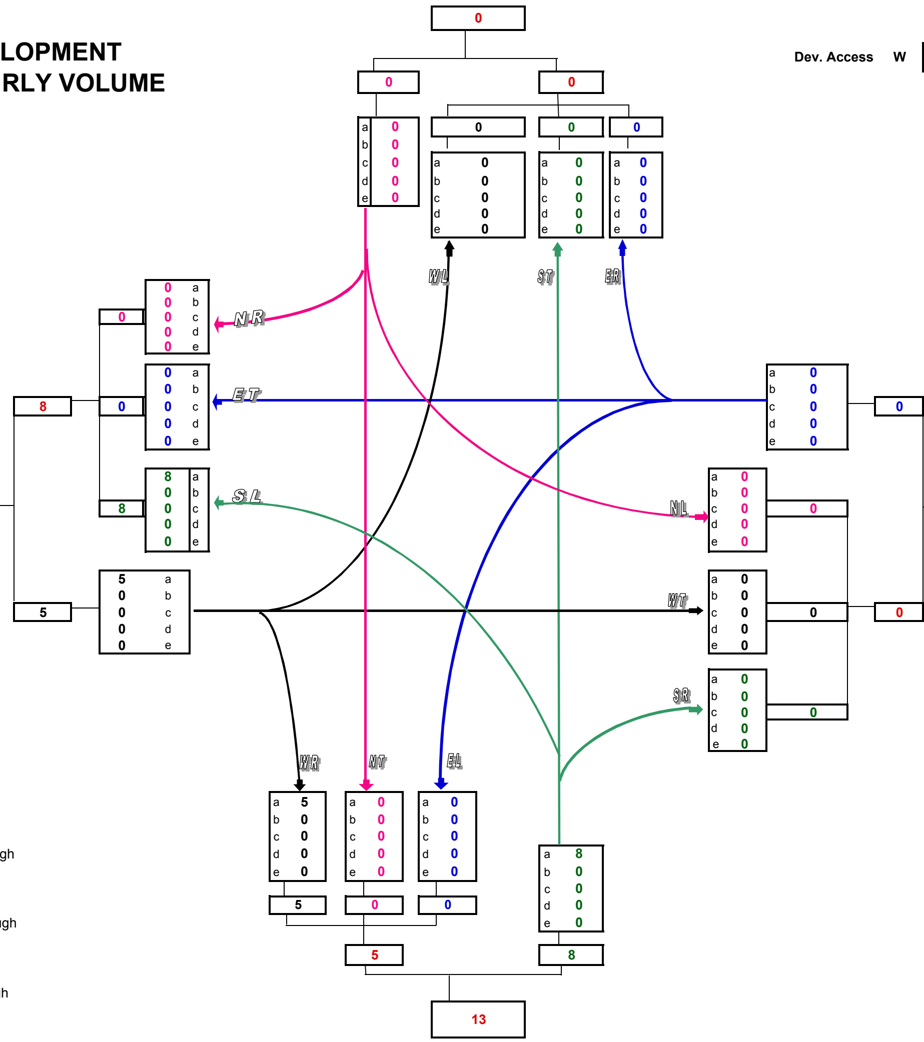
Turning Movement Summary Diagram

2021 DEVELOPMENT
PM PEAK HOURLY VOLUME

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	



WEST LEG ON	Dev. Access	
Vehicle Type	Vol.	%
A - Passenger Vehicle	13	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	13	



EAST LEG ON		
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

TURNING MOVEMENT ABBREVIATIONS

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EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

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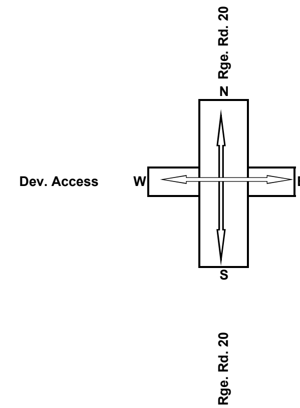
SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	13	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	13	

D&A PAULICHUK CONSULTING LTD.

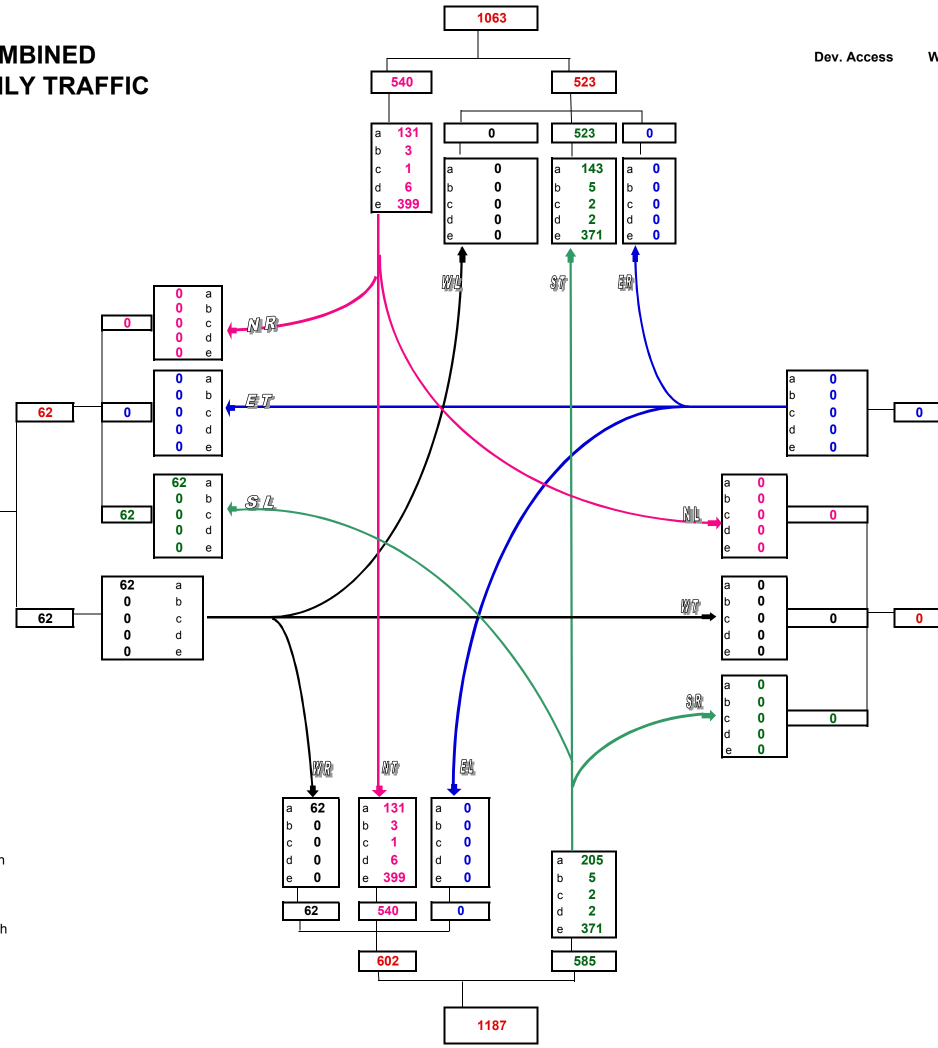
Turning Movement Summary Diagram

2021 COMBINED ANNUAL DAILY TRAFFIC

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	274	-
B - Recreational Vehicle	8	-
C - Bus	3	-
D - Single Unit Truck	8	-
E - Tractor Trailer Unit	770	-
Total	1063	



WEST LEG ON	Dev. Access	
Vehicle Type	Vol.	%
A - Passenger Vehicle	124	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	124	



EAST LEG ON		
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

TURNING MOVEMENT ABBREVIATIONS

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SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

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EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Taffic from West Turning Left
WT: Taffic from West Proceeding Through

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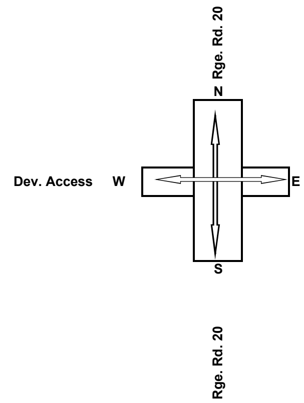
SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	398	33.5
B - Recreational Vehicle	8	0.7
C - Bus	3	0.3
D - Single Unit Truck	8	0.7
E - Tractor Trailer Unit	770	64.9
Total	1187	

D&A PAULICHUK CONSULTING LTD.

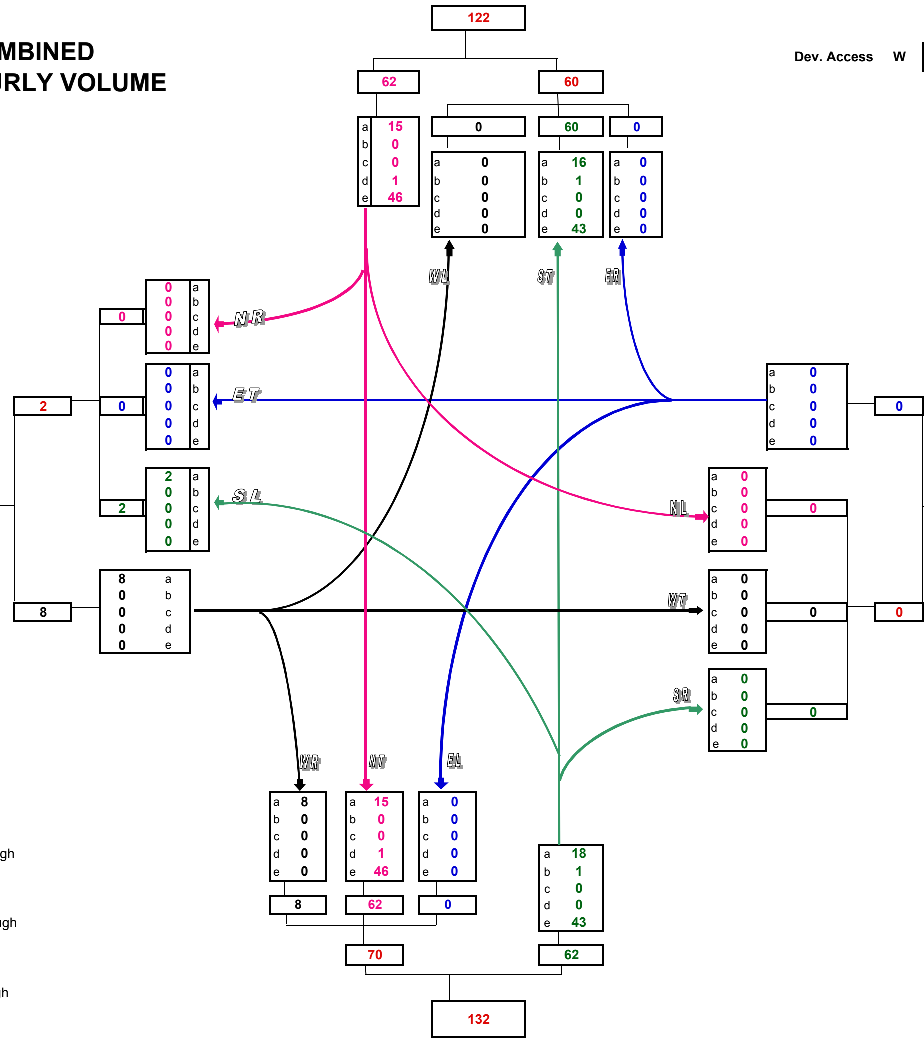
Turning Movement Summary Diagram

2021 COMBINED
AM PEAK HOURLY VOLUME

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	31	25.4
B - Recreational Vehicle	1	0.8
C - Bus	0	0.0
D - Single Unit Truck	1	0.8
E - Tractor Trailer Unit	89	73.0
Total	122	



WEST LEG ON	Dev. Access	
Vehicle Type	Vol.	%
A - Passenger Vehicle	10	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	10	



EAST LEG ON		
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

TURNING MOVEMENT ABBREVIATIONS

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TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
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SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	41	31.1
B - Recreational Vehicle	1	0.8
C - Bus	0	0.0
D - Single Unit Truck	1	0.8
E - Tractor Trailer Unit	89	67.4
Total	132	

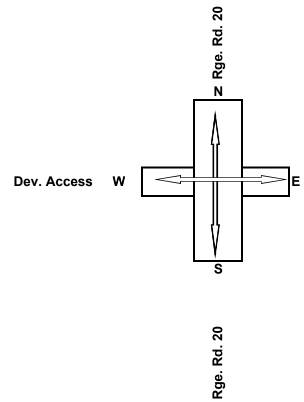
2021
2014
7

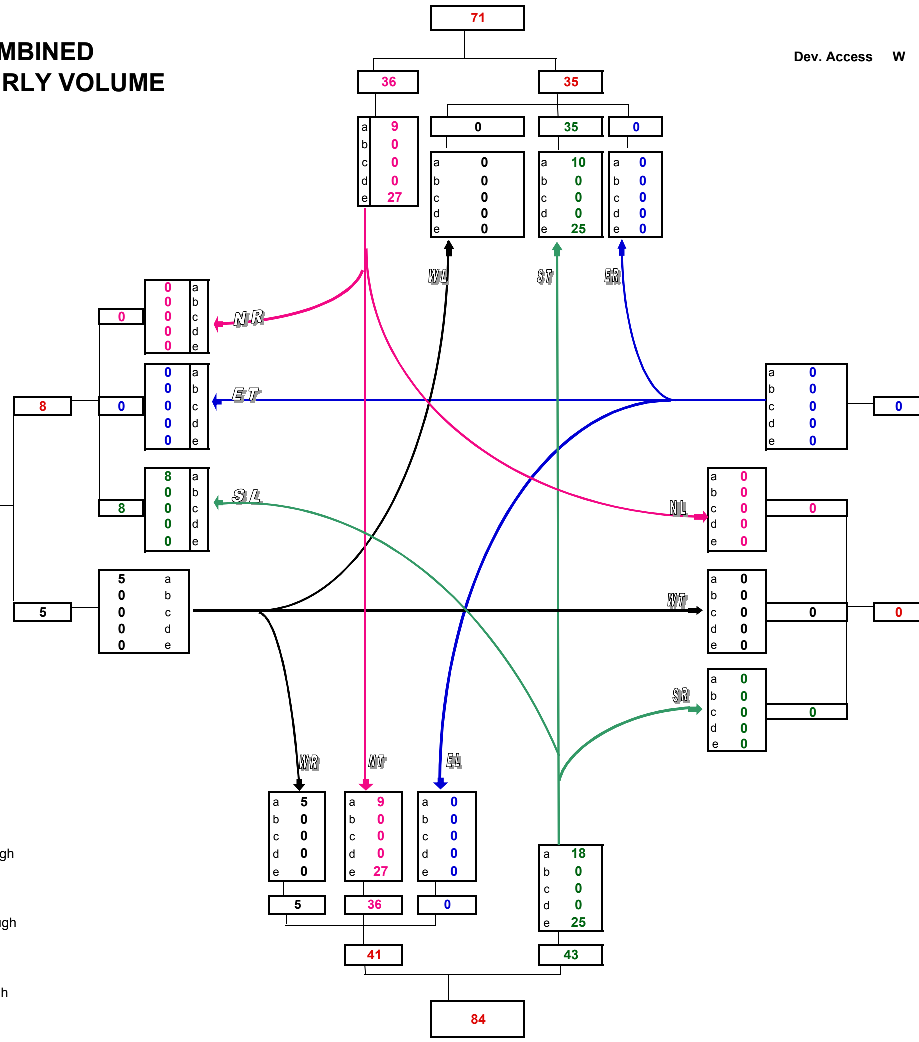
D&A PAULICHUK CONSULTING LTD.

Turning Movement Summary Diagram

2021 COMBINED
PM PEAK HOURLY VOLUME

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	19	26.8
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	52	73.2
Total	71	





WEST LEG ON	Dev. Access	
Vehicle Type	Vol.	%
A - Passenger Vehicle	13	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	13	

EAST LEG ON		
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

TURNING MOVEMENT ABBREVIATIONS

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SL: Traffic from South Turning Left
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EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
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Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	32	38.1
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	52	61.9
Total	84	

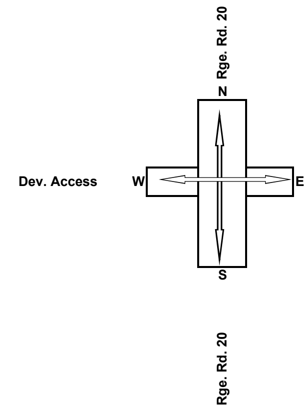
2021
2014
7

D&A PAULICHUK CONSULTING LTD.

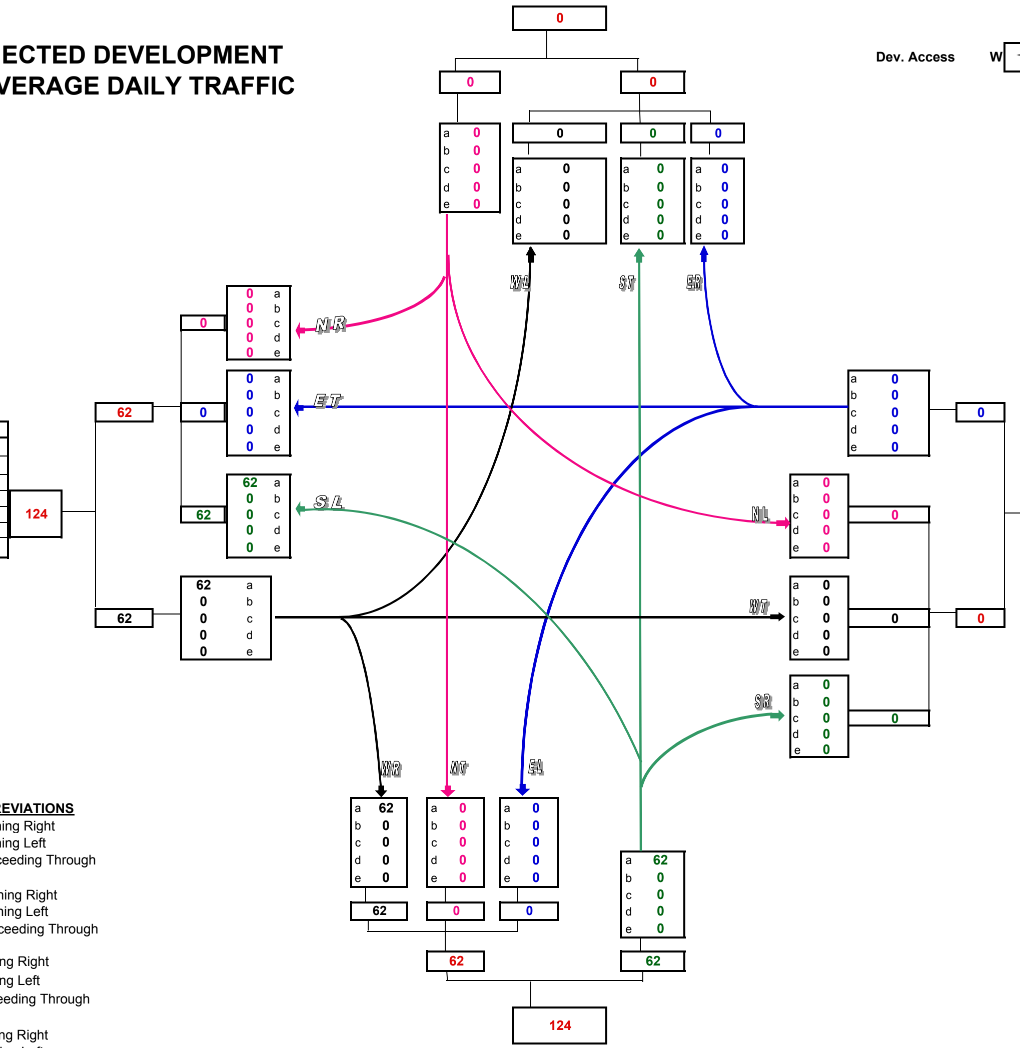
Turning Movement Summary Diagram

2026 PROJECTED DEVELOPMENT ANNUAL AVERAGE DAILY TRAFFIC

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	



WEST LEG ON	Dev. Access	
Vehicle Type	Vol.	%
A - Passenger Vehicle	124	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	124	



EAST LEG ON		
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic from North Turning Right
NL: Traffic from North Turning Left
NT: Traffic from North Proceeding Through

SR: Traffic from South Turning Right
SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

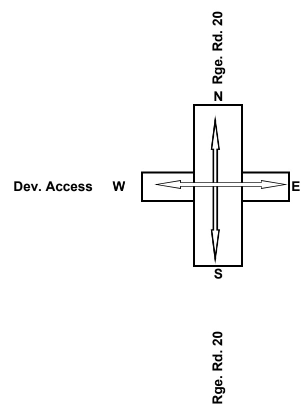
SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	124	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	124	

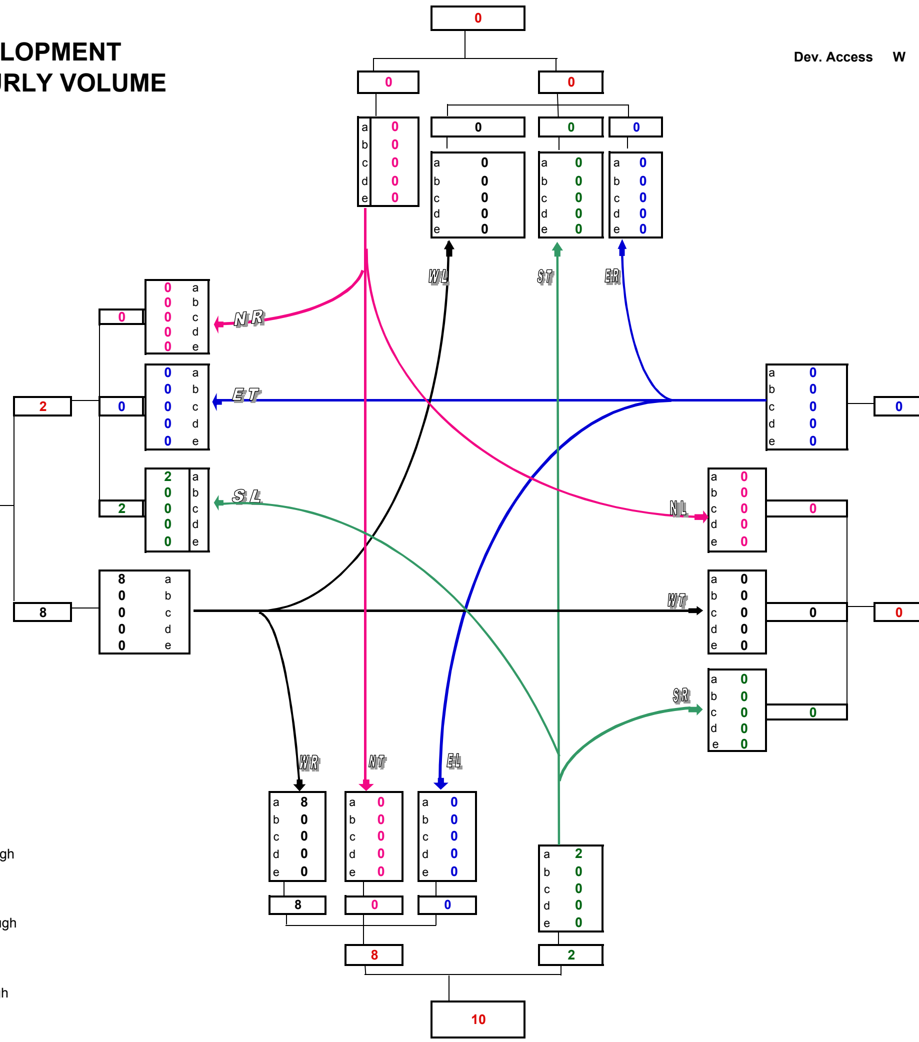
D&A PAULICHUK CONSULTING LTD.

Turning Movement Summary Diagram

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

2026 DEVELOPMENT
AM PEAK HOURLY VOLUME





WEST LEG ON	Dev. Access	
Vehicle Type	Vol.	%
A - Passenger Vehicle	10	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	10	

EAST LEG ON		
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic from North Turning Right
NL: Traffic from North Turning Left
NT: Traffic from North Proceeding Through

SR: Traffic from South Turning Right
SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

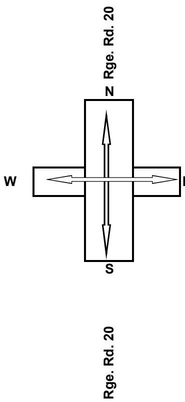
ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	10	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	10	

D&A PAULICHUK CONSULTING LTD.

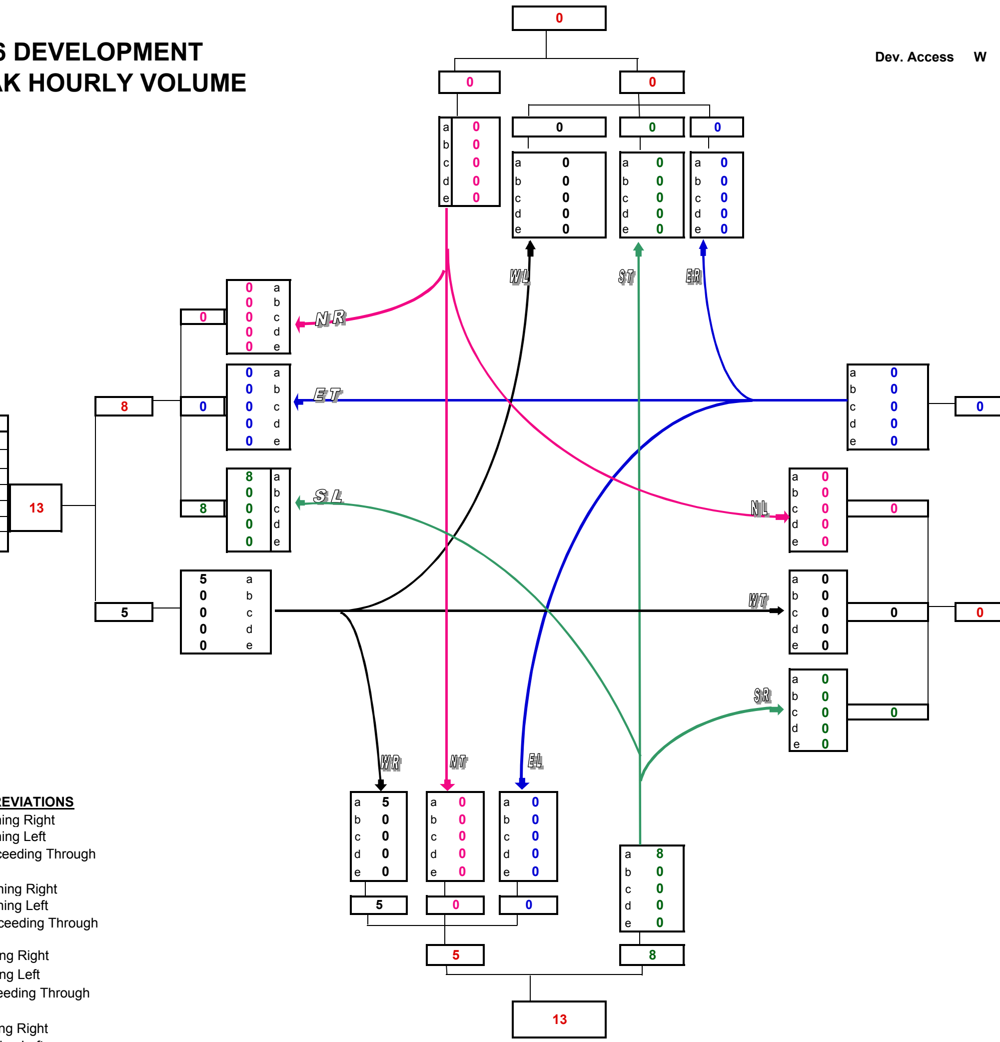
Turning Movement Summary Diagram

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	



2026 DEVELOPMENT
PM PEAK HOURLY VOLUME

WEST LEG ON	Dev. Access	
Vehicle Type	Vol.	%
A - Passenger Vehicle	13	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	13	



EAST LEG ON		
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic from North Turning Right
NL: Traffic from North Turning Left
NT: Traffic from North Proceeding Through

SR: Traffic from South Turning Right
SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

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EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

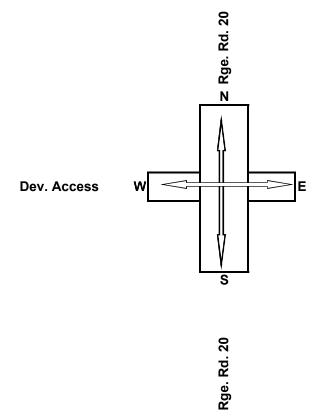
SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	13	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	13	

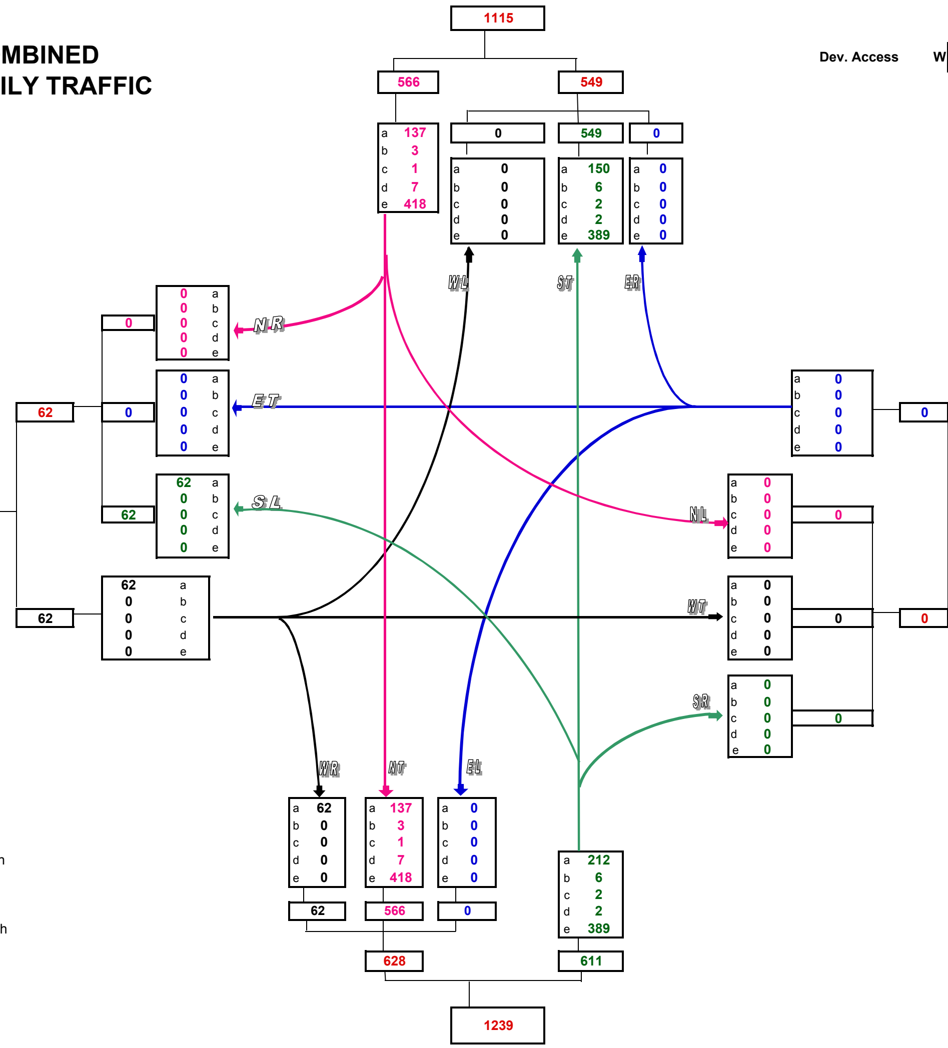
D&A PAULICHUK CONSULTING LTD.

Turning Movement Summary Diagram

2026 COMBINED ANNUAL DAILY TRAFFIC

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	287	-
B - Recreational Vehicle	9	-
C - Bus	3	-
D - Single Unit Truck	9	-
E - Tractor Trailer Unit	807	-
Total	1115	





WEST LEG ON	Dev. Access	
Vehicle Type	Vol.	%
A - Passenger Vehicle	124	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	124	

EAST LEG ON		
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

TURNING MOVEMENT ABBREVIATIONS

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EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Taffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
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SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	411	33.2
B - Recreational Vehicle	9	0.7
C - Bus	3	0.2
D - Single Unit Truck	9	0.7
E - Tractor Trailer Unit	807	65.1
Total	1239	

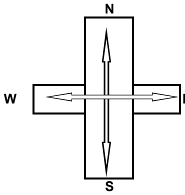
2026
2014
12

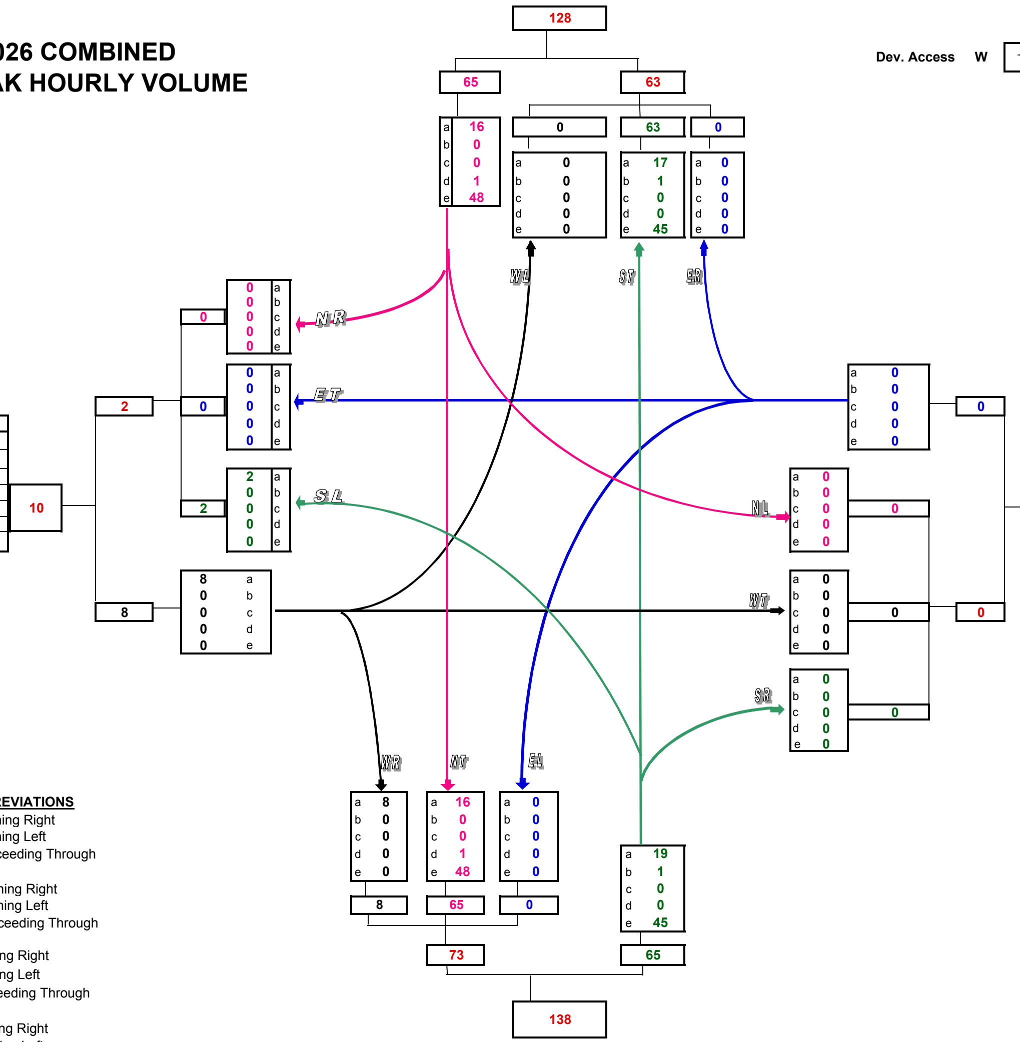
D&A PAULICHUK CONSULTING LTD.

Turning Movement Summary Diagram

2026 COMBINED
AM PEAK HOURLY VOLUME

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	33	25.8
B - Recreational Vehicle	1	0.8
C - Bus	0	0.0
D - Single Unit Truck	1	0.8
E - Tractor Trailer Unit	93	72.7
Total	128	





WEST LEG ON	Dev. Access	
Vehicle Type	Vol.	%
A - Passenger Vehicle	10	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	10	

EAST LEG ON		
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

TURNING MOVEMENT ABBREVIATIONS

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SL: Traffic from South Turning Left
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ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	43	31.2
B - Recreational Vehicle	1	0.7
C - Bus	0	0.0
D - Single Unit Truck	1	0.7
E - Tractor Trailer Unit	93	67.4
Total	138	

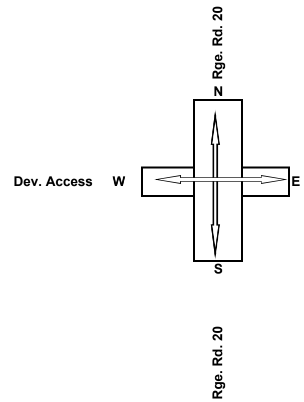
2026
2014
12

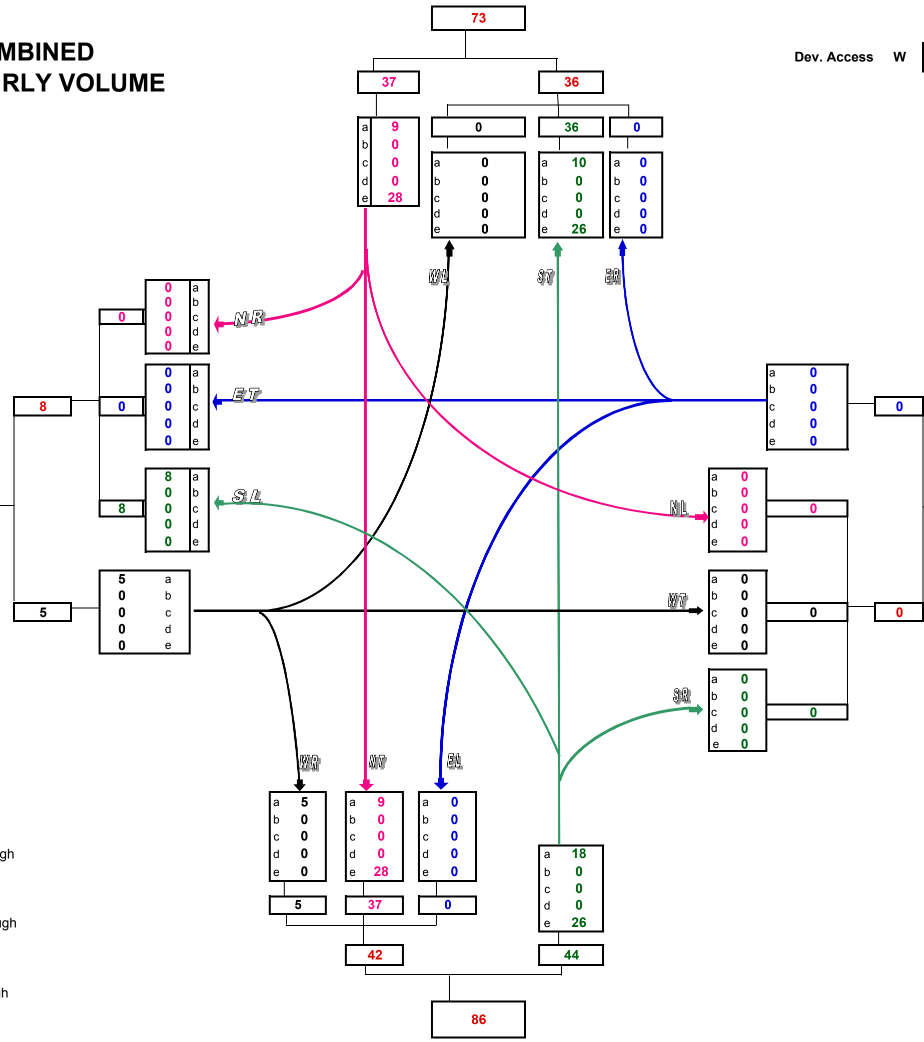
D&A PAULICHUK CONSULTING LTD.

Turning Movement Summary Diagram

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	19	26.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	54	74.0
Total	73	

2026 COMBINED PM PEAK HOURLY VOLUME





WEST LEG ON	Dev. Access	
Vehicle Type	Vol.	%
A - Passenger Vehicle	13	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	13	

EAST LEG ON		
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic from North Turning Right
NL: Traffic from North Turning Left
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SR: Traffic from South Turning Right
SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	32	37.2
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	54	62.8
Total	86	

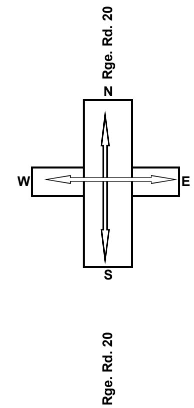
2026
2014
12

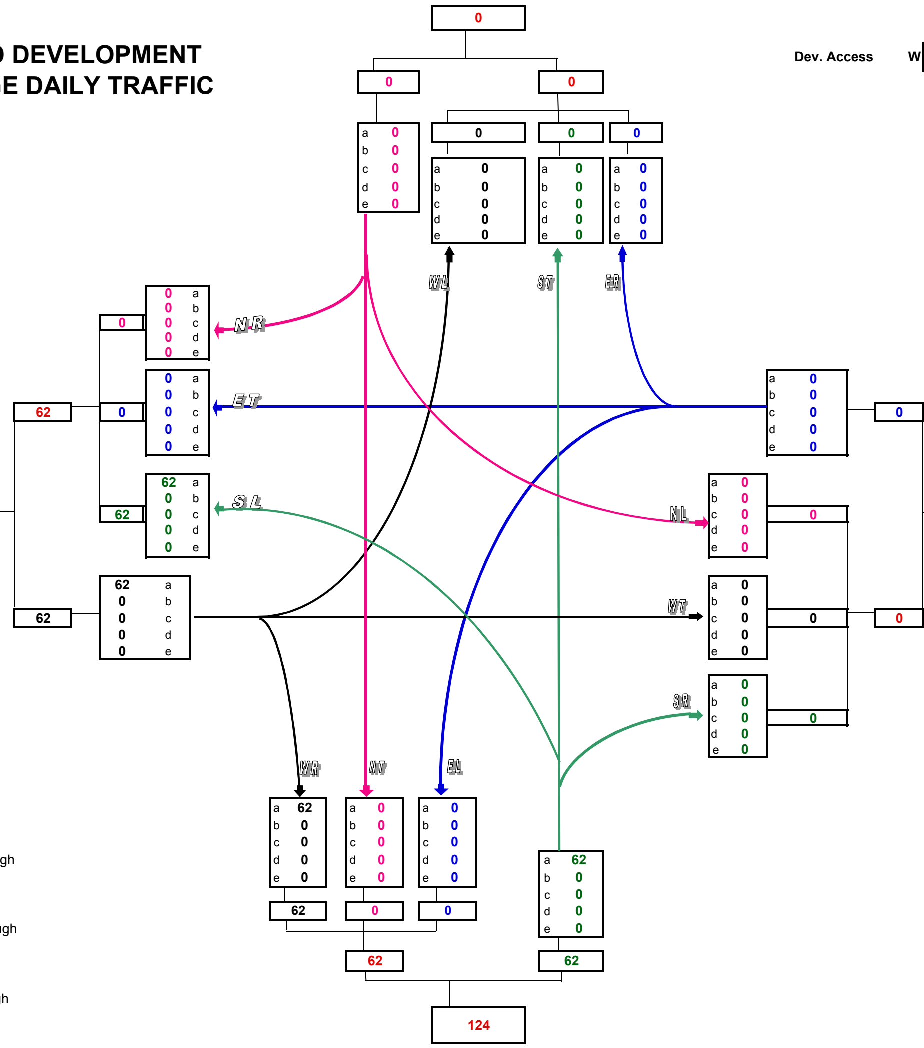
D&A PAULICHUK CONSULTING LTD.

Turning Movement Summary Diagram

2036 PROJECTED DEVELOPMENT ANNUAL AVERAGE DAILY TRAFFIC

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	





WEST LEG ON	Dev. Access	
Vehicle Type	Vol.	%
A - Passenger Vehicle	124	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	124	

EAST LEG ON		
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic from North Turning Right
NL: Traffic from North Turning Left
NT: Traffic from North Proceeding Through

SR: Traffic from South Turning Right
SL: Traffic from South Turning Left
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ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

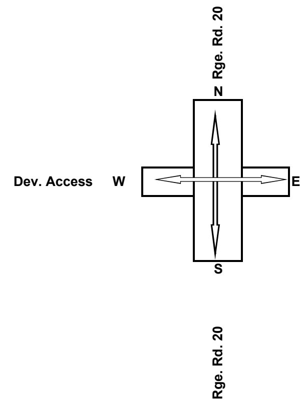
SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	124	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	124	

D&A PAULICHUK CONSULTING LTD.

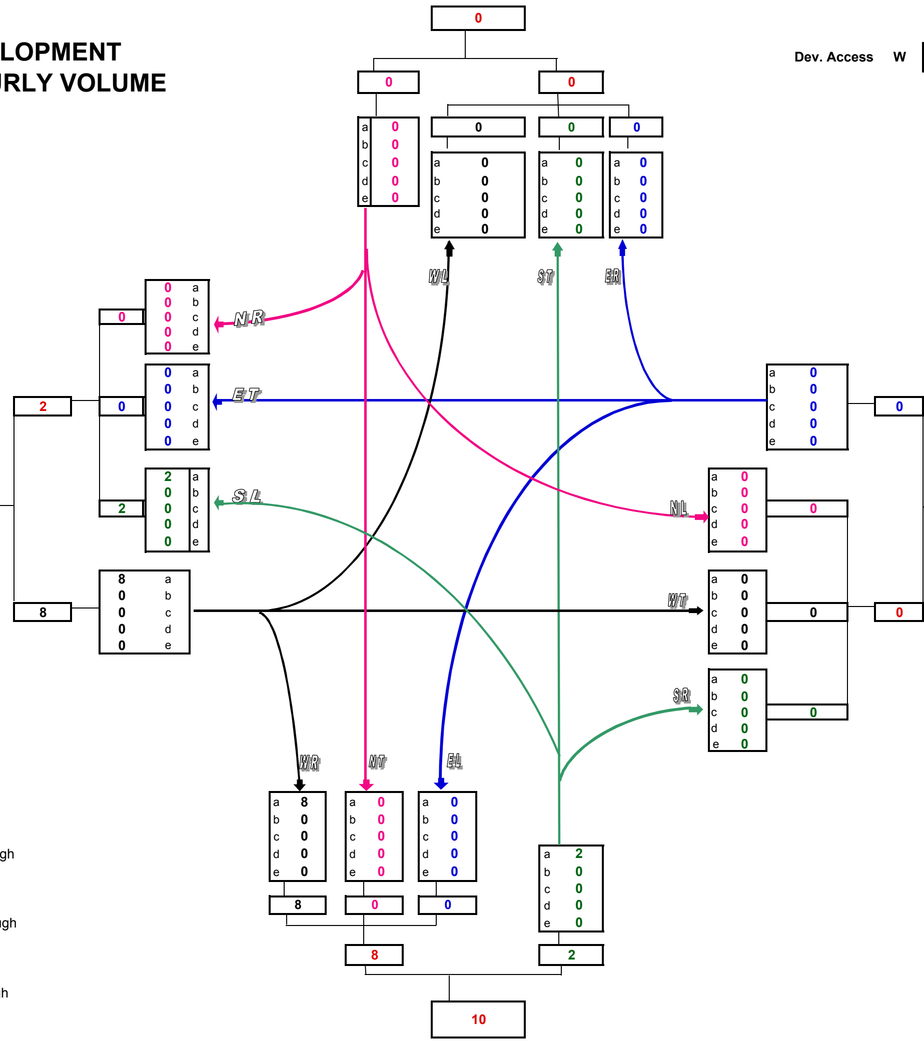
Turning Movement Summary Diagram

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

2036 DEVELOPMENT
AM PEAK HOURLY VOLUME



WEST LEG ON	Dev. Access	
Vehicle Type	Vol.	%
A - Passenger Vehicle	10	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	10	



EAST LEG ON		
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic from North Turning Right
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SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

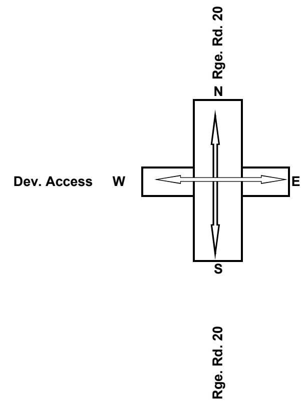
SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	10	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	10	

D&A PAULICHUK CONSULTING LTD.

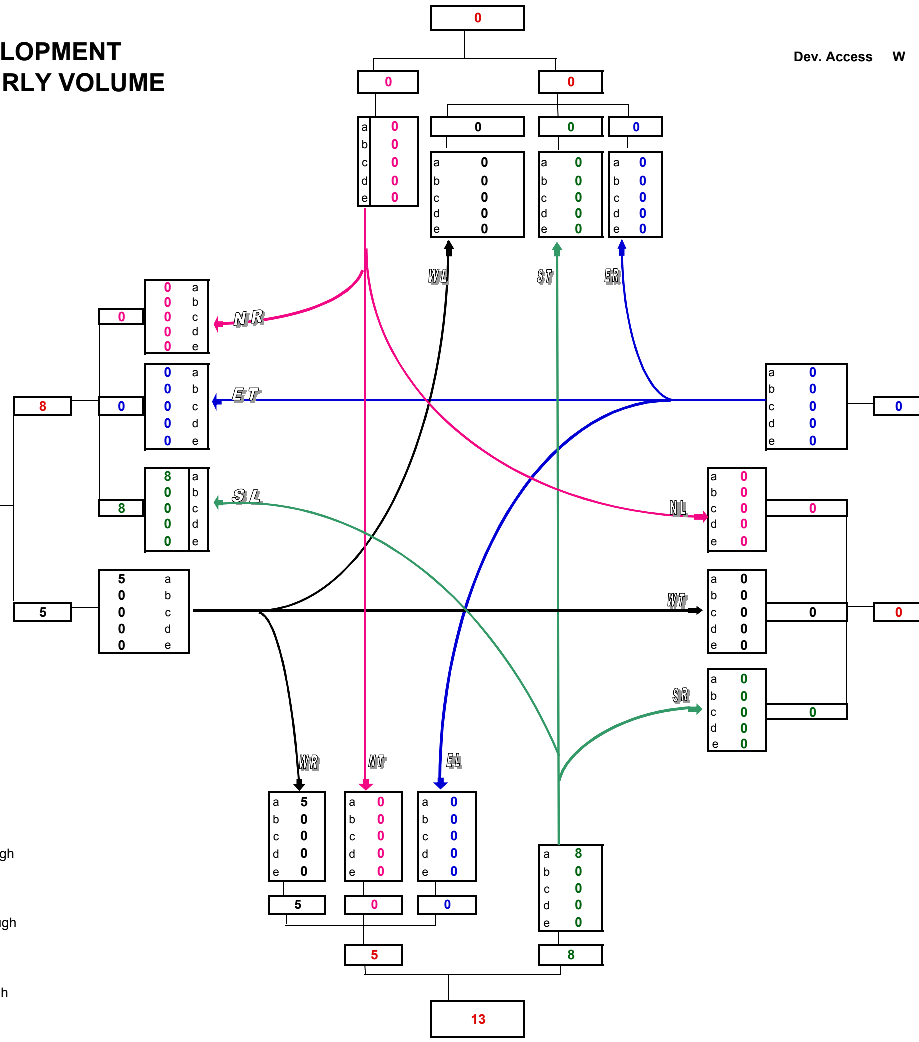
Turning Movement Summary Diagram

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

2036 DEVELOPMENT
PM PEAK HOURLY VOLUME



WEST LEG ON	Dev. Access	
Vehicle Type	Vol.	%
A - Passenger Vehicle	13	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	13	



EAST LEG ON		
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

TURNING MOVEMENT ABBREVIATIONS

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SR: Traffic from South Turning Right
SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
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ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

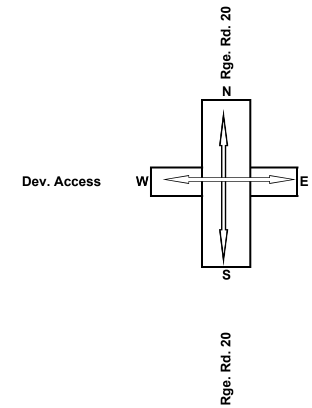
SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	13	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	13	

D&A PAULICHUK CONSULTING LTD.

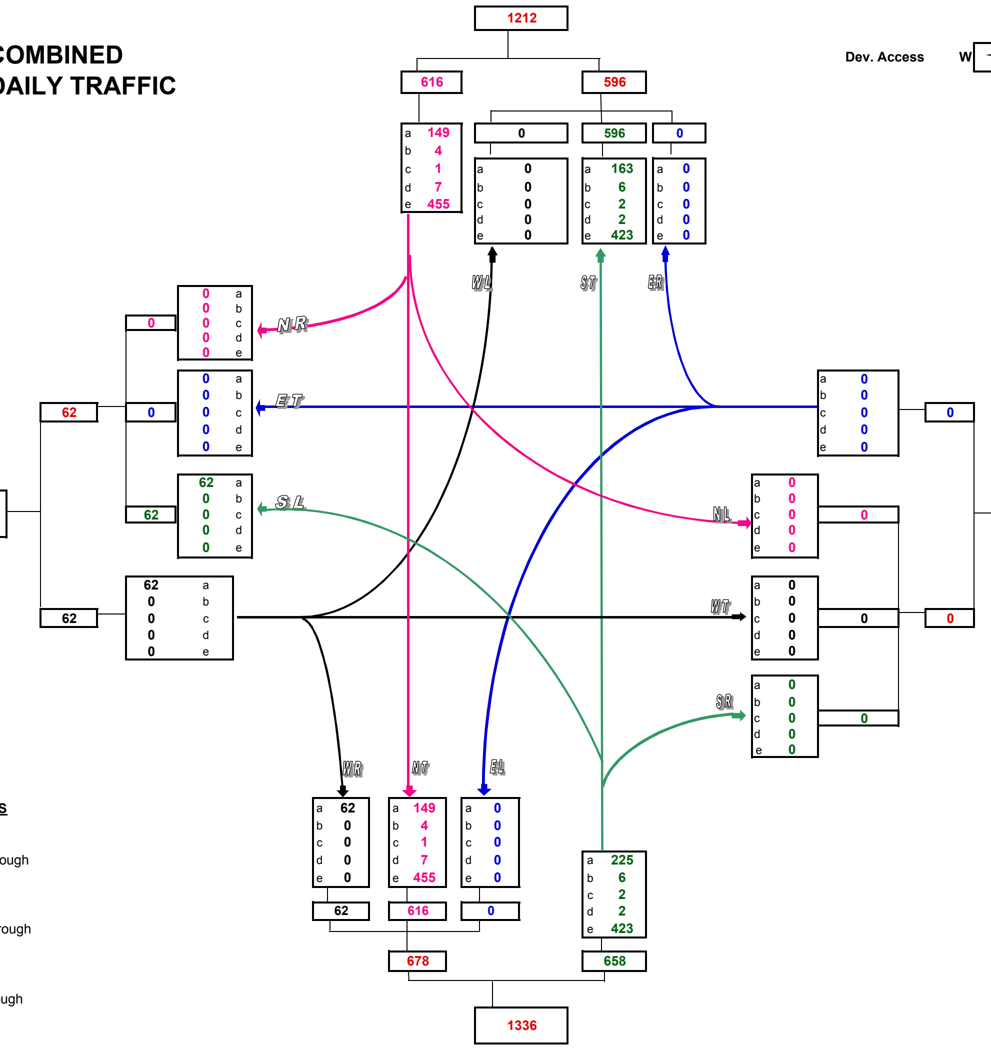
Turning Movement Summary Diagram

2036 COMBINED ANNUAL DAILY TRAFFIC

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	312	-
B - Recreational Vehicle	10	-
C - Bus	3	-
D - Single Unit Truck	9	-
E - Tractor Trailer Unit	878	-
Total	1212	



WEST LEG ON	Dev. Access	
Vehicle Type	Vol.	%
A - Passenger Vehicle	124	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	124	



EAST LEG ON		
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic from North Turning Right
NL: Traffic from North Turning Left
NT: Traffic from North Proceeding Through

SR: Traffic from South Turning Right
SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Taffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	436	32.6
B - Recreational Vehicle	10	0.7
C - Bus	3	0.2
D - Single Unit Truck	9	0.7
E - Tractor Trailer Unit	878	65.7
Total	1336	

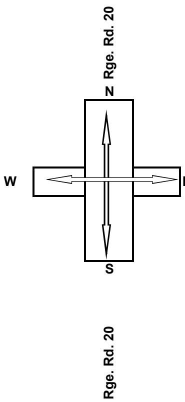
2036
2014
22

D&A PAULICHUK CONSULTING LTD.

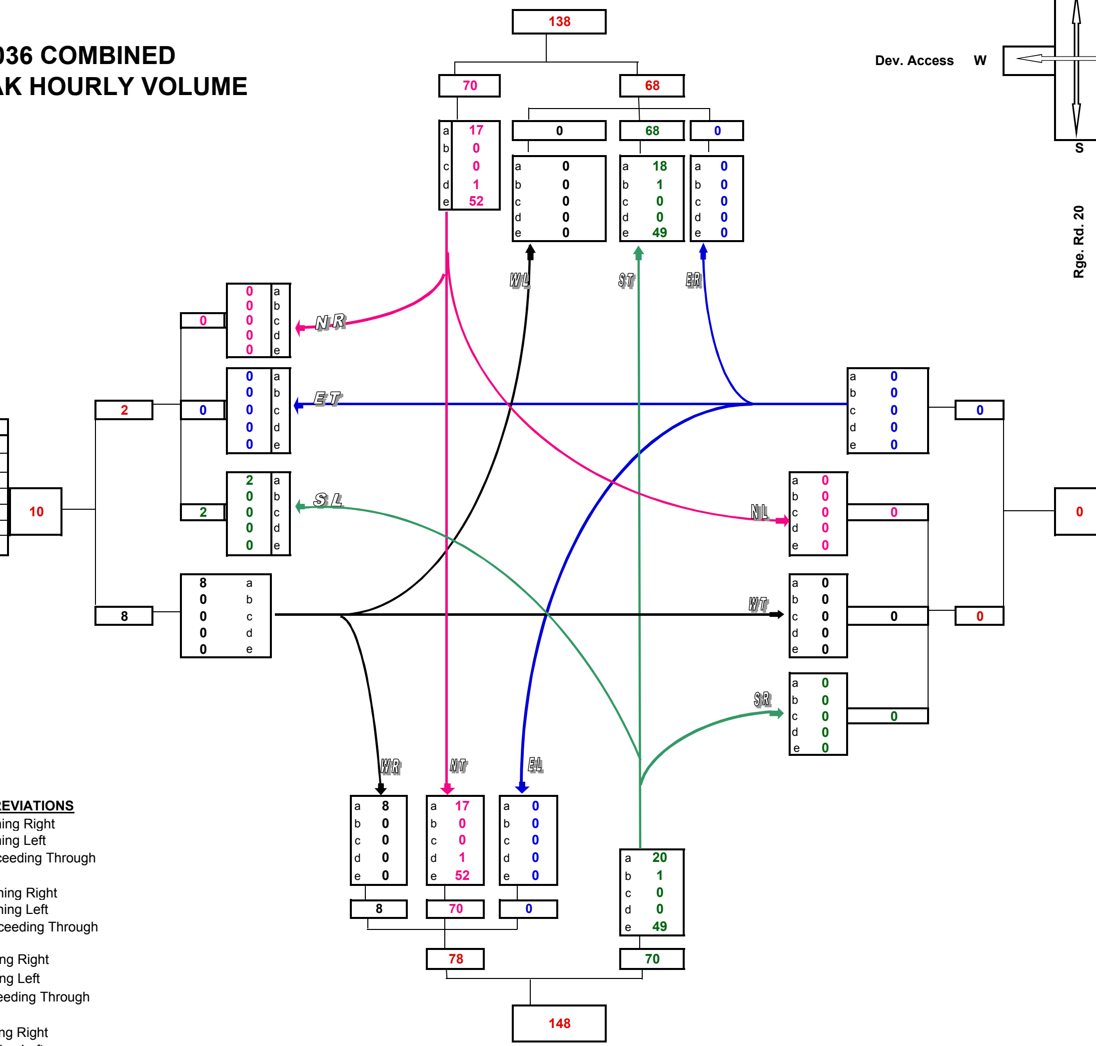
Turning Movement Summary Diagram

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	35	25.4
B - Recreational Vehicle	1	0.7
C - Bus	0	0.0
D - Single Unit Truck	1	0.7
E - Tractor Trailer Unit	101	73.2
Total	138	

2036 COMBINED
AM PEAK HOURLY VOLUME



WEST LEG ON	Dev. Access	
Vehicle Type	Vol.	%
A - Passenger Vehicle	10	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	10	



EAST LEG ON		
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic from North Turning Right
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SR: Traffic from South Turning Right
SL: Traffic from South Turning Left
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ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

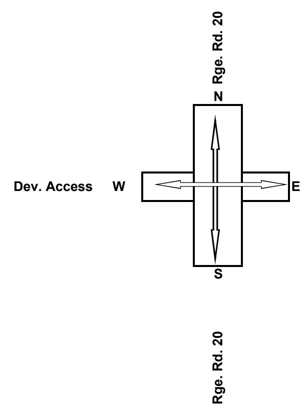
SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	45	30.4
B - Recreational Vehicle	1	0.7
C - Bus	0	0.0
D - Single Unit Truck	1	0.7
E - Tractor Trailer Unit	101	68.2
Total	148	

2036
2014
22

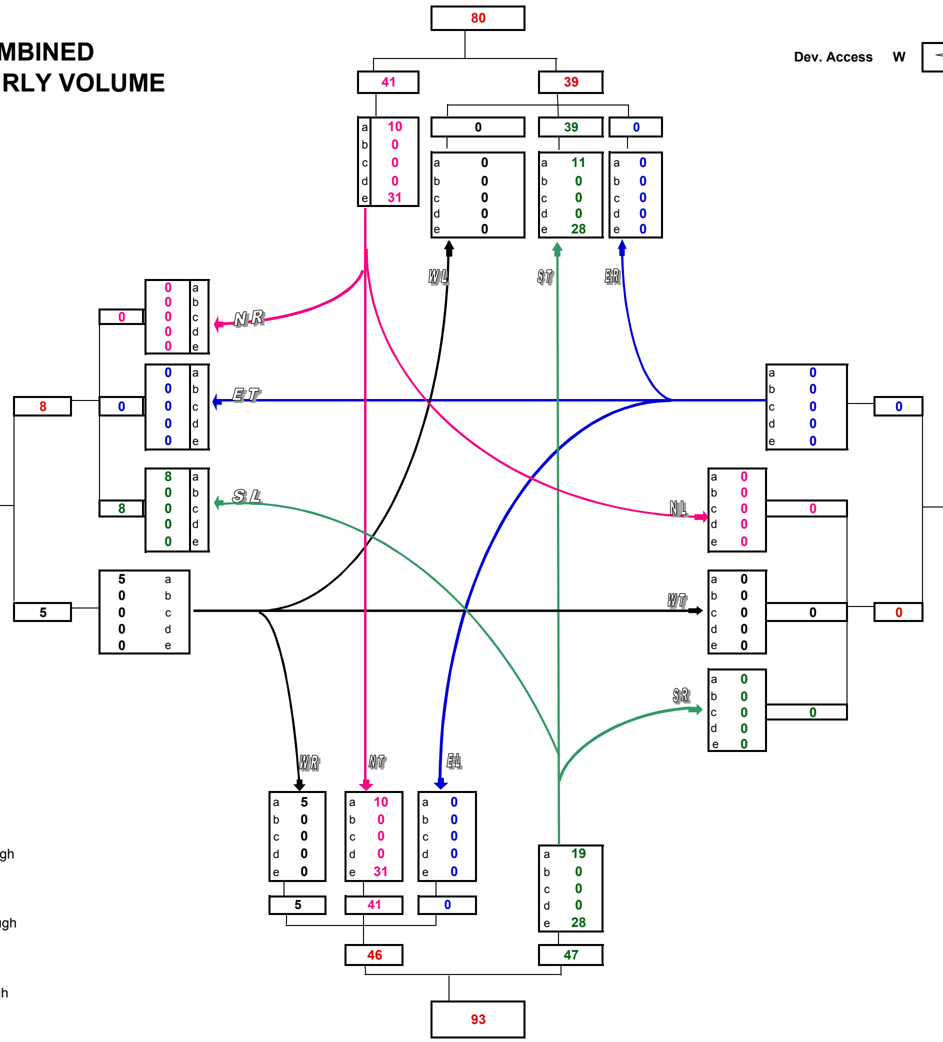
Turning Movement Summary Diagram

2036 COMBINED
PM PEAK HOURLY VOLUME

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	21	26.3
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	59	73.8
Total	80	



WEST LEG ON	Dev. Access	
Vehicle Type	Vol.	%
A - Passenger Vehicle	13	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	13	



EAST LEG ON		
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic from North Turning Right
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SR: Traffic from South Turning Right
SL: Traffic from South Turning Left
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ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

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SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	34	36.6
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	59	63.4
Total	93	

2036
2014
22

APPENDIX C – Hwy. 16 & Rge. Rd. 20

TURNING MOVEMENT DIAGRAMS
SYNCHRO ANALYSIS

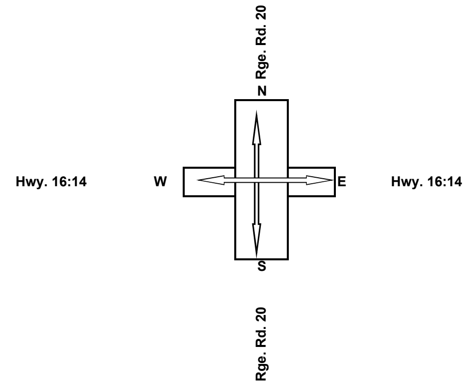
D&A PAULICHUK CONSULTING LTD.

Turning Movement Summary Diagram

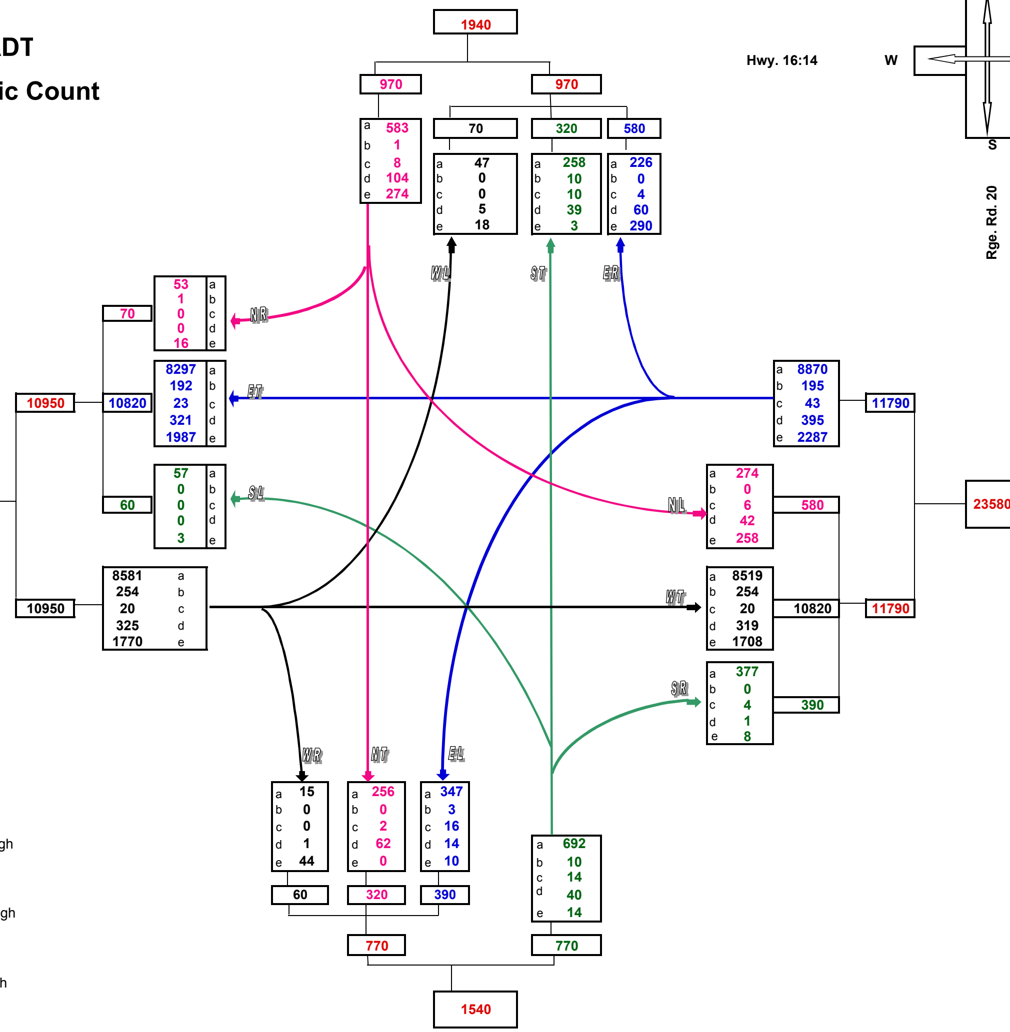
Intersection of: **Highway 16:14 & Rge. Rd. 20**

2014 AADT
from AT Traffic Count

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1114	57.42
B - Recreational Vehicle	11	0.57
C - Bus	22	1.13
D - Single Unit Truck	208	10.72
E - Tractor Trailer Unit	585	30.15
Total	1940	



WEST LEG ON	Hwy. 16:14	
Vehicle Type	Vol.	%
A - Passenger Vehicle	16988	77.571
B - Recreational Vehicle	447	2.04
C - Bus	43	0.20
D - Single Unit Truck	646	2.95
E - Tractor Trailer Unit	3776	17.24
Total	21900	



EAST LEG ON	Hwy. 661:10	
Vehicle Type	Vol.	%
A - Passenger Vehicle	18040	76.51
B - Recreational Vehicle	449	1.90
C - Bus	73	0.31
D - Single Unit Truck	757	3.21
E - Tractor Trailer Unit	4261	18.07
Total	23580	

NR: Traffic from North Turning Right
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SL: Traffic from South Turning Left
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EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Taffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
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SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1310	85.06
B - Recreational Vehicle	13	0.84
C - Bus	32	2.08
D - Single Unit Truck	117	7.60
E - Tractor Trailer Unit	68	4.42
Total	1540	

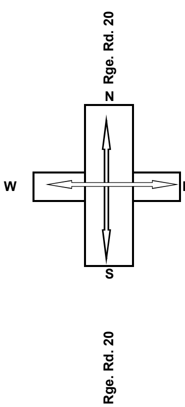
AADT Conversion Factor
1

D&A PAULICHUK CONSULTING LTD.

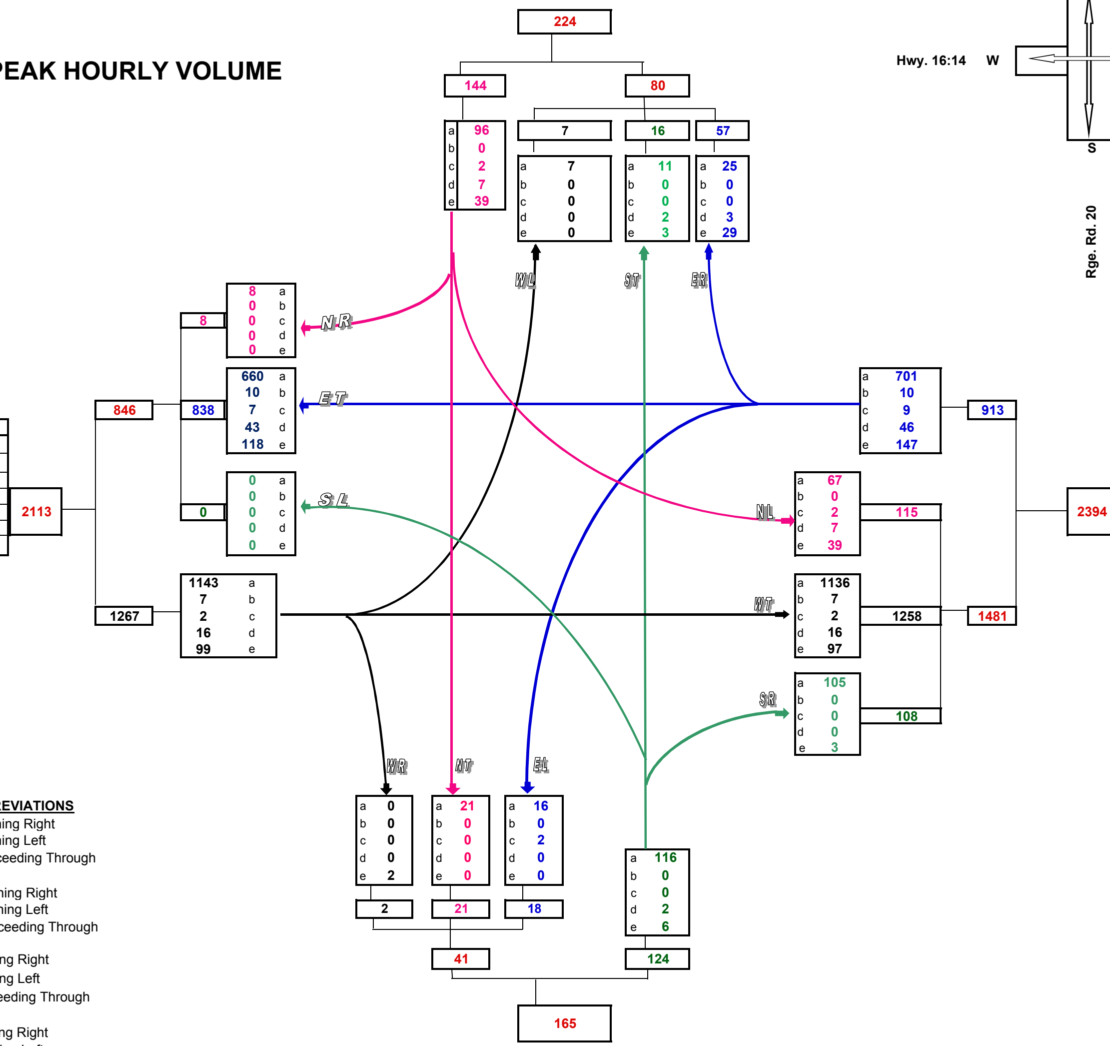
Turning Movement Summary Diagram

2014 AM PEAK HOURLY VOLUME

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	139	62.1
B - Recreational Vehicle	0	0.0
C - Bus	2	0.9
D - Single Unit Truck	12	5.4
E - Tractor Trailer Unit	71	31.7
Total	224	



WEST LEG ON	Hwy. 16:14	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1811	85.7
B - Recreational Vehicle	17	0.8
C - Bus	9	0.4
D - Single Unit Truck	59	2.8
E - Tractor Trailer Unit	217	10.3
Total	2113	



EAST LEG ON	Hwy. 661:10	
Vehicle Type	Vol.	%
A - Passenger Vehicle	2009	83.9
B - Recreational Vehicle	17	0.7
C - Bus	13	0.5
D - Single Unit Truck	69	2.9
E - Tractor Trailer Unit	286	11.9
Total	2394	

TURNING MOVEMENT ABBREVIATIONS

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ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
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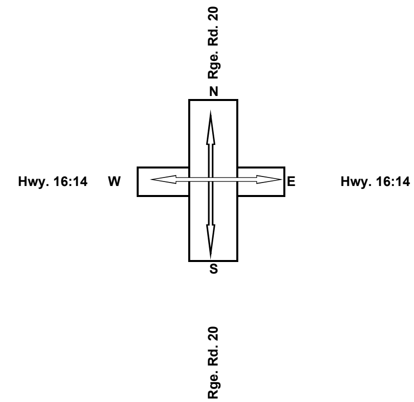
SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	153	92.7
B - Recreational Vehicle	0	0.0
C - Bus	2	1.2
D - Single Unit Truck	2	1.2
E - Tractor Trailer Unit	8	4.8
Total	165	

AM Peak	0.11625
PM Peak	0.10625

D&A PAULICHUK CONSULTING LTD.

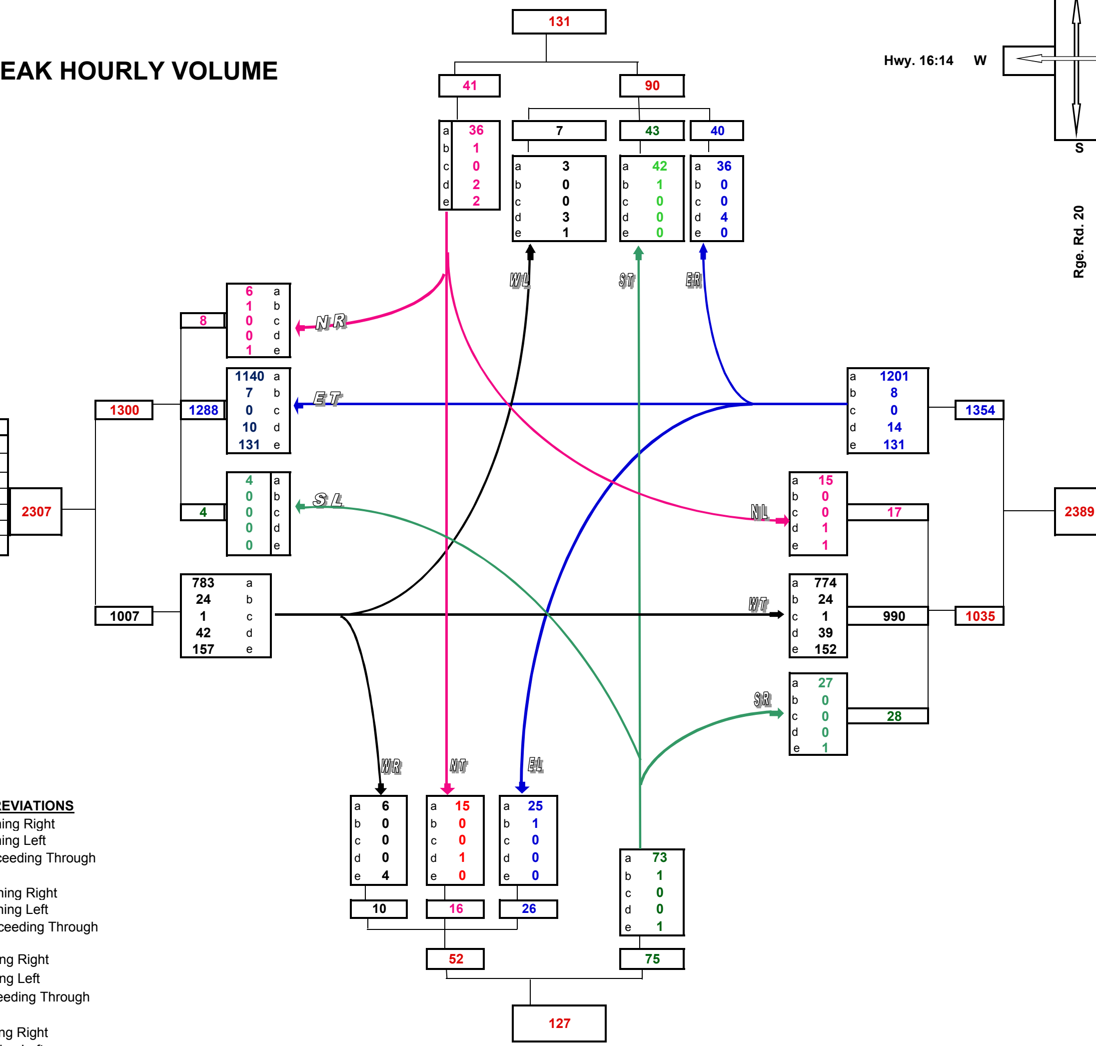
Turning Movement Summary Diagram

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	117	89.3
B - Recreational Vehicle	2	1.5
C - Bus	0	0.0
D - Single Unit Truck	9	6.9
E - Tractor Trailer Unit	3	2.3
Total	131	



2014 PM PEAK HOURLY VOLUME

WEST LEG ON	Hwy. 16:14	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1933	83.8
B - Recreational Vehicle	32	1.4
C - Bus	1	0.0
D - Single Unit Truck	52	2.3
E - Tractor Trailer Unit	289	12.5
Total	2307	



EAST LEG ON	Hwy. 661:10	
Vehicle Type	Vol.	%
A - Passenger Vehicle	2017	84.4
B - Recreational Vehicle	32	1.3
C - Bus	1	0.0
D - Single Unit Truck	54	2.3
E - Tractor Trailer Unit	285	11.9
Total	2389	

TURNING MOVEMENT ABBREVIATIONS

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SL: Traffic from South Turning Left
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EL: Traffic from East Turning Left
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WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
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Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	119	93.7
B - Recreational Vehicle	2	1.6
C - Bus	0	0.0
D - Single Unit Truck	1	0.8
E - Tractor Trailer Unit	5	3.9
Total	127	

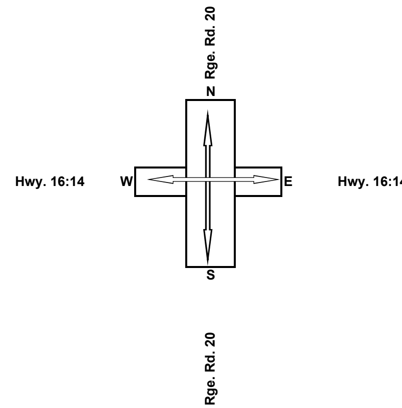
AM Peak	0.11625
PM Peak	0.10625

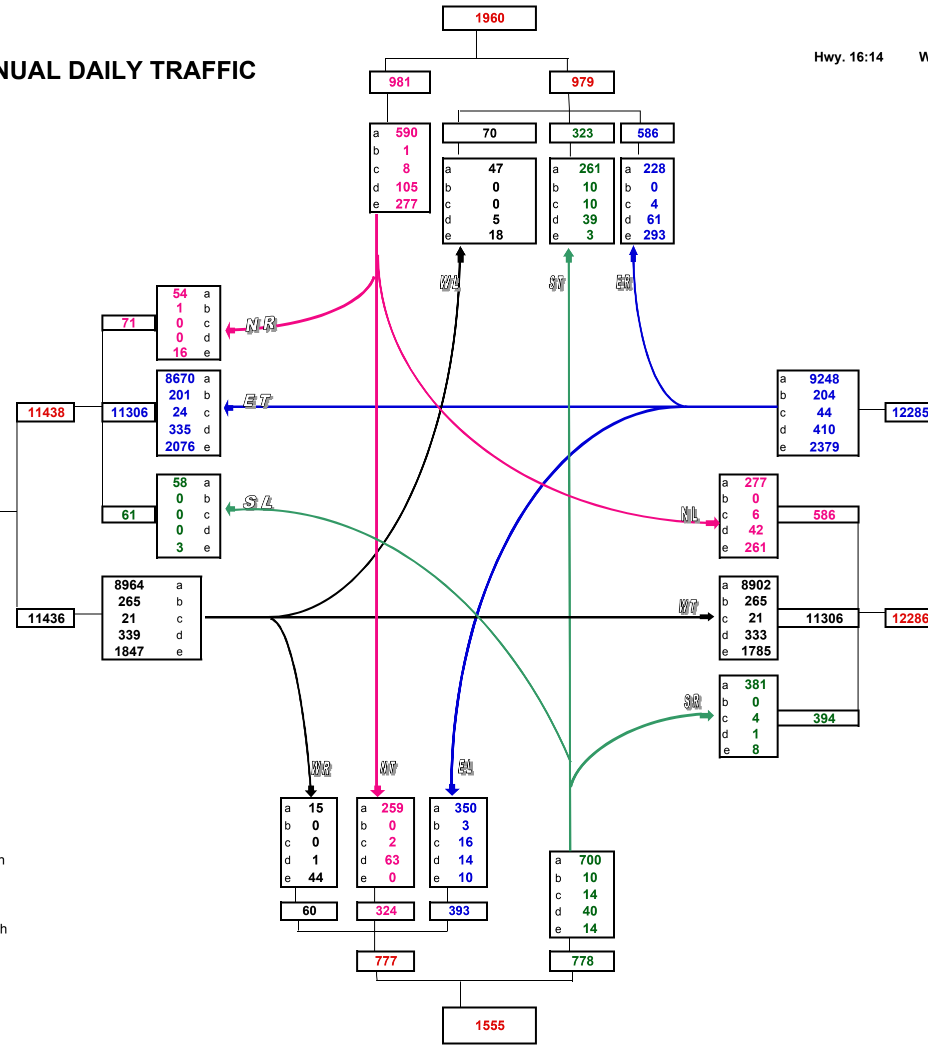
D&A PAULICHUK CONSULTING LTD.

Turning Movement Summary Diagram

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1126	-
B - Recreational Vehicle	11	-
C - Bus	22	-
D - Single Unit Truck	210	-
E - Tractor Trailer Unit	591	-
Total	1960	

2015 ESTIMATED ANNUAL DAILY TRAFFIC





WEST LEG ON	Hwy. 16:14	
Vehicle Type	Vol.	%
A - Passenger Vehicle	17746	77.6
B - Recreational Vehicle	467	2.0
C - Bus	45	0.2
D - Single Unit Truck	674	2.9
E - Tractor Trailer Unit	3942	17.2
Total	22874	

EAST LEG ON	Hwy. 661:10	
Vehicle Type	Vol.	%
A - Passenger Vehicle	18808	76.5
B - Recreational Vehicle	469	1.9
C - Bus	75	0.3
D - Single Unit Truck	786	3.2
E - Tractor Trailer Unit	4433	18.0
Total	24571	

TURNING MOVEMENT ABBREVIATIONS

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EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Taffic from West Turning Left
WT: Taffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
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SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1324	85.1
B - Recreational Vehicle	13	0.8
C - Bus	32	2.1
D - Single Unit Truck	118	7.6
E - Tractor Trailer Unit	68	4.4
Total	1555	

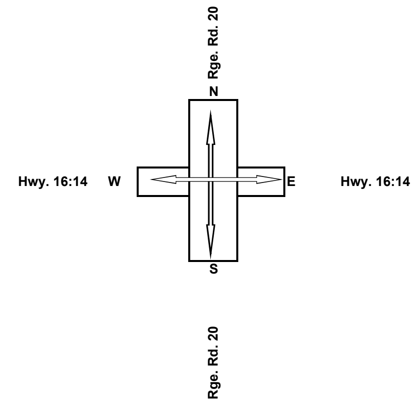
2015
2014
1

D&A PAULICHUK CONSULTING LTD.

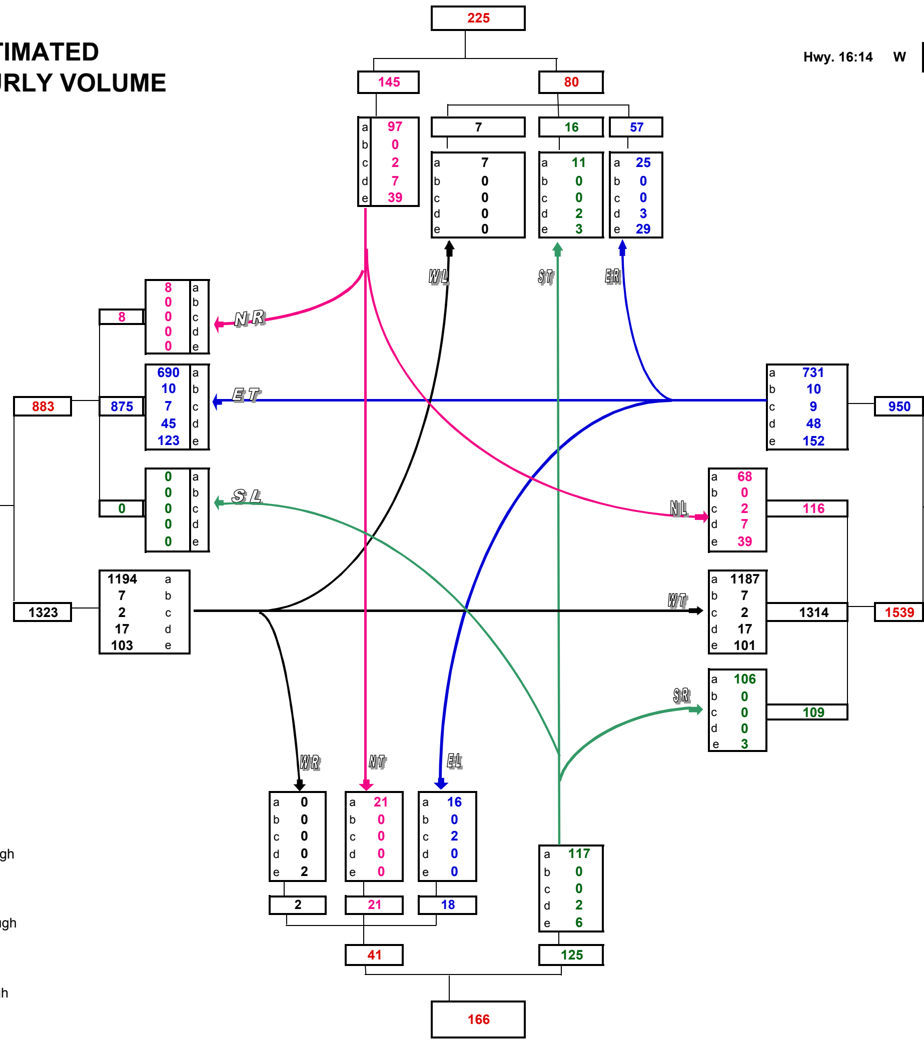
Turning Movement Summary Diagram

2015 ESTIMATED
AM PEAK HOURLY VOLUME

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	140	62.2
B - Recreational Vehicle	0	0.0
C - Bus	2	0.9
D - Single Unit Truck	12	5.3
E - Tractor Trailer Unit	71	31.6
Total	225	



WEST LEG ON	Hwy. 16:14	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1892	85.8
B - Recreational Vehicle	17	0.8
C - Bus	9	0.4
D - Single Unit Truck	62	2.8
E - Tractor Trailer Unit	226	10.2
Total	2206	



EAST LEG ON	Hwy. 661:10	
Vehicle Type	Vol.	%
A - Passenger Vehicle	2092	84.0
B - Recreational Vehicle	17	0.7
C - Bus	13	0.5
D - Single Unit Truck	72	2.9
E - Tractor Trailer Unit	295	11.9
Total	2489	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic from North Turning Right
NL: Traffic from North Turning Left
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SR: Traffic from South Turning Right
SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

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Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	154	92.8
B - Recreational Vehicle	0	0.0
C - Bus	2	1.2
D - Single Unit Truck	2	1.2
E - Tractor Trailer Unit	8	4.8
Total	166	

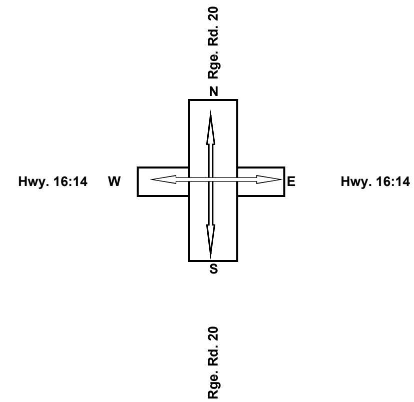
2015
2014
1

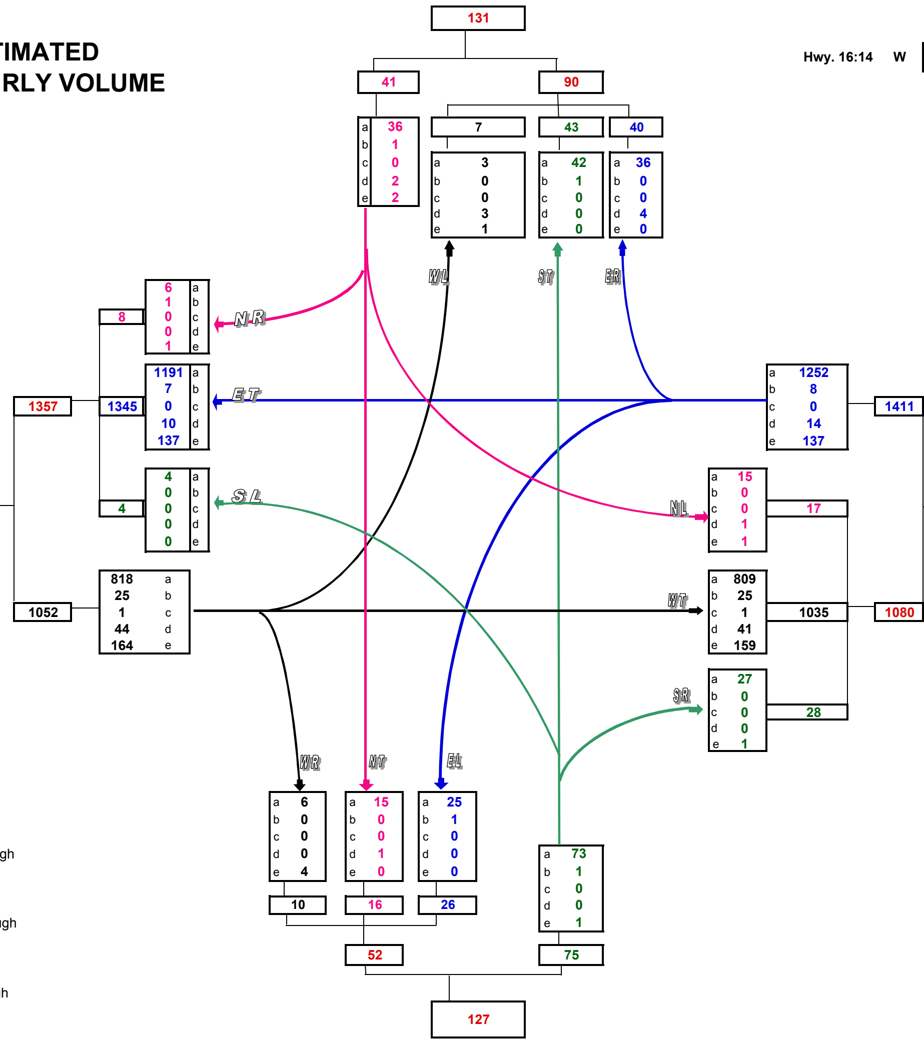
D&A PAULICHUK CONSULTING LTD.

Turning Movement Summary Diagram

2015 ESTIMATED
PM PEAK HOURLY VOLUME

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	117	89.3
B - Recreational Vehicle	2	1.5
C - Bus	0	0.0
D - Single Unit Truck	9	6.9
E - Tractor Trailer Unit	3	2.3
Total	131	





WEST LEG ON	Hwy. 16:14	
Vehicle Type	Vol.	%
A - Passenger Vehicle	2019	83.8
B - Recreational Vehicle	33	1.4
C - Bus	1	0.0
D - Single Unit Truck	54	2.2
E - Tractor Trailer Unit	302	12.5
Total	2409	

2409

EAST LEG ON	Hwy. 661:10	
Vehicle Type	Vol.	%
A - Passenger Vehicle	2103	84.4
B - Recreational Vehicle	33	1.3
C - Bus	1	0.0
D - Single Unit Truck	56	2.2
E - Tractor Trailer Unit	298	12.0
Total	2491	

2491

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EL: Traffic from East Turning Left
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WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

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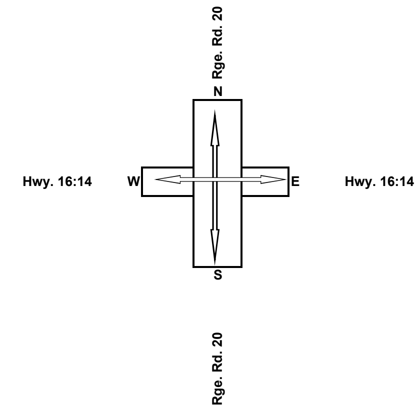
SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	119	93.7
B - Recreational Vehicle	2	1.6
C - Bus	0	0.0
D - Single Unit Truck	1	0.8
E - Tractor Trailer Unit	5	3.9
Total	127	

2015
2014
1

D&A PAULICHUK CONSULTING LTD.

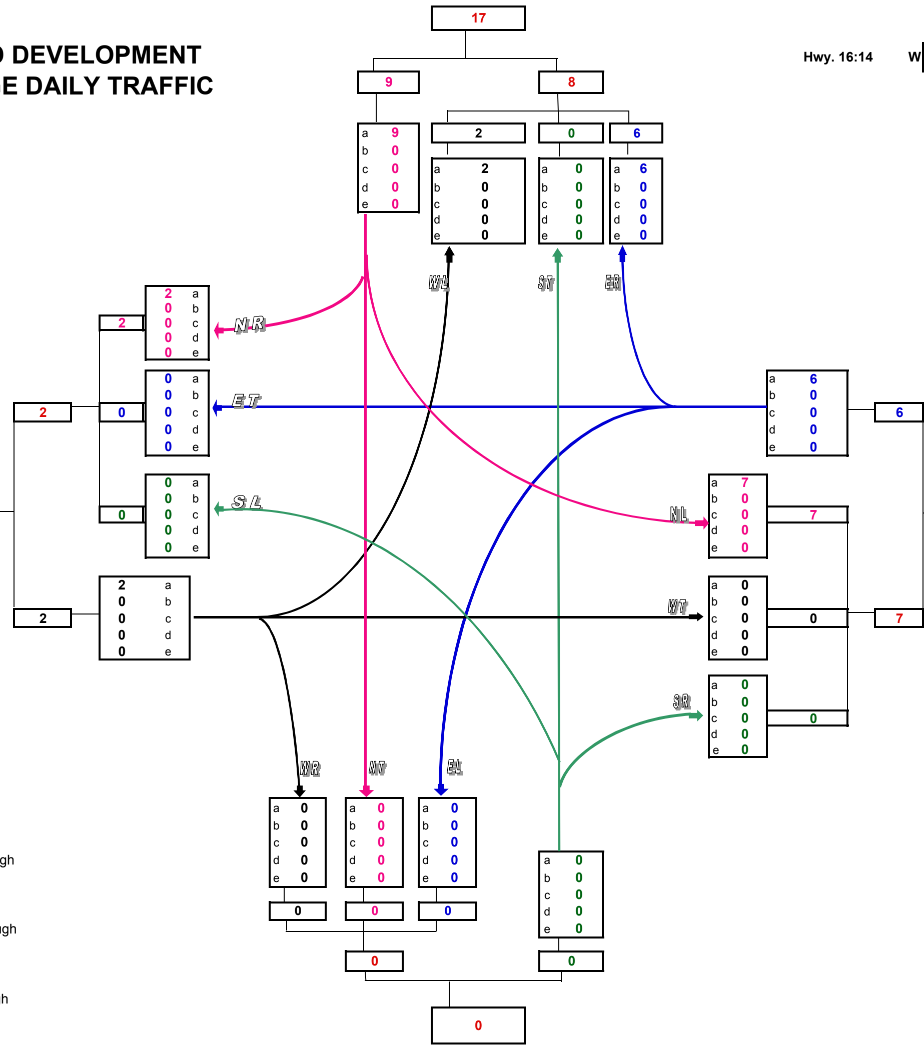
Turning Movement Summary Diagram

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	17	100.0%
B - Recreational Vehicle	0	0.0%
C - Bus	0	0.0%
D - Single Unit Truck	0	0.0%
E - Tractor Trailer Unit	0	0.0%
Total	17	



2016 PROJECTED DEVELOPMENT ANNUAL AVERAGE DAILY TRAFFIC

WEST LEG ON	Hwy. 16:14	
Vehicle Type	Vol.	%
A - Passenger Vehicle	4	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	4	



EAST LEG ON	Hwy. 661:10	
Vehicle Type	Vol.	%
A - Passenger Vehicle	13	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	13	

TURNING MOVEMENT ABBREVIATIONS

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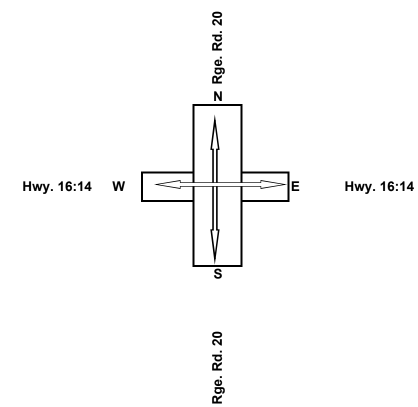
SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

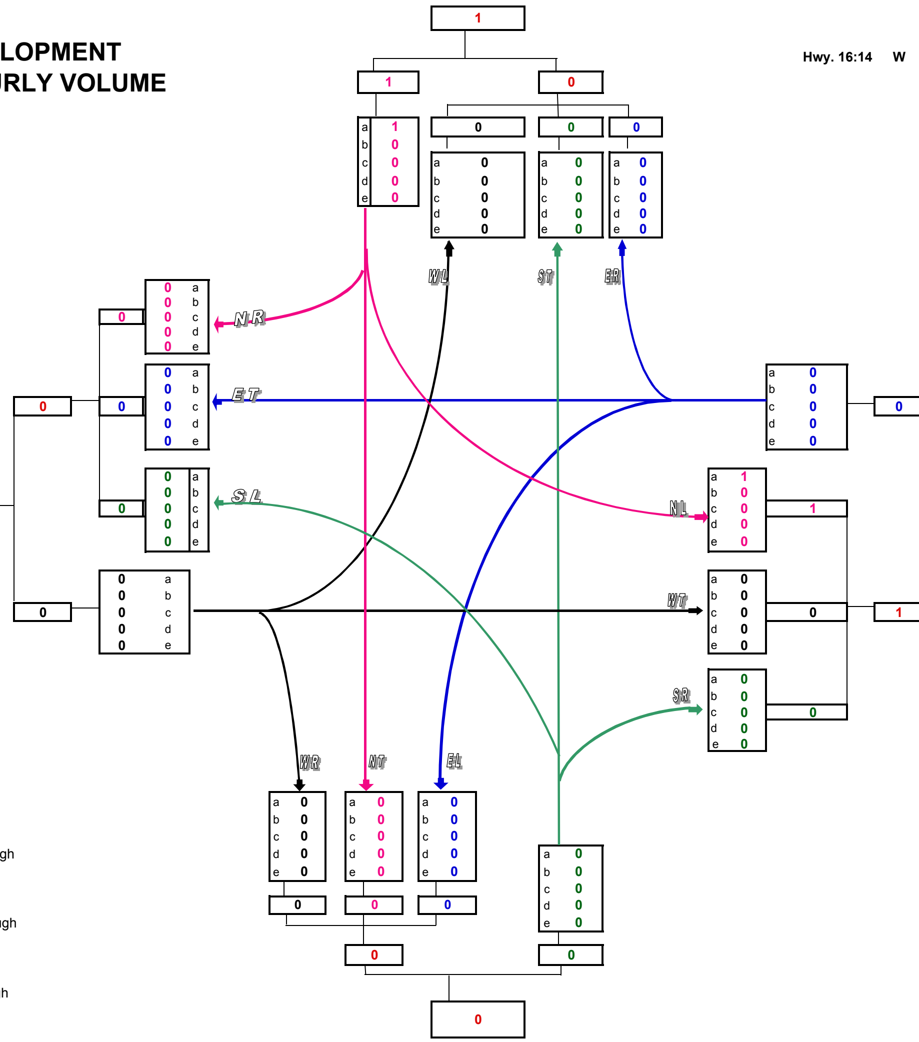
D&A PAULICHUK CONSULTING LTD.

Turning Movement Summary Diagram

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	1	

2016 DEVELOPMENT
AM PEAK HOURLY VOLUME





WEST LEG ON	Hwy. 16:14	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

EAST LEG ON	Hwy. 63:01	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	1	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic from North Turning Right
NL: Traffic from North Turning Left
NT: Traffic from North Proceeding Through

SR: Traffic from South Turning Right
SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

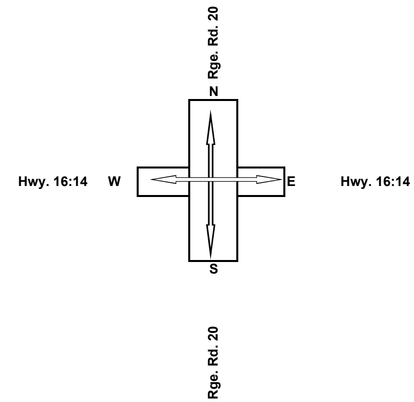
SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

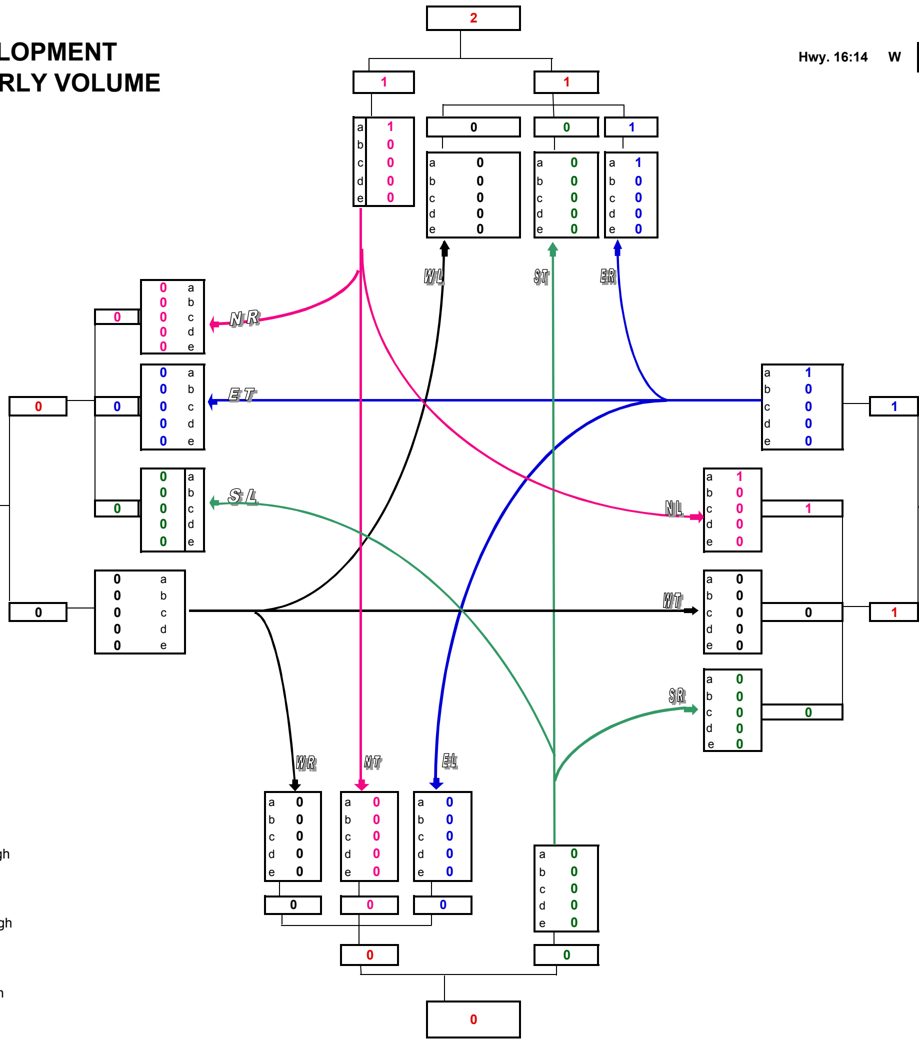
D&A PAULICHUK CONSULTING LTD.

Turning Movement Summary Diagram

2016 DEVELOPMENT
PM PEAK HOURLY VOLUME

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	2	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	2	





WEST LEG ON	Hwy. 63:01	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

EAST LEG ON	Hwy. 63:01	
Vehicle Type	Vol.	%
A - Passenger Vehicle	2	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	2	

TURNING MOVEMENT ABBREVIATIONS

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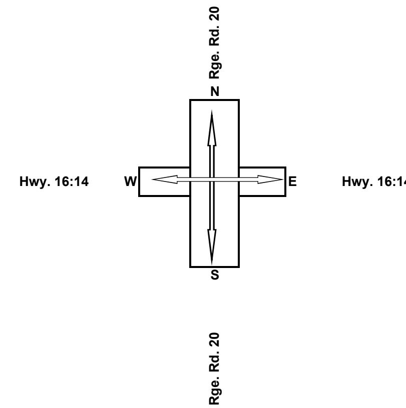
SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

D&A PAULICHUK CONSULTING LTD.

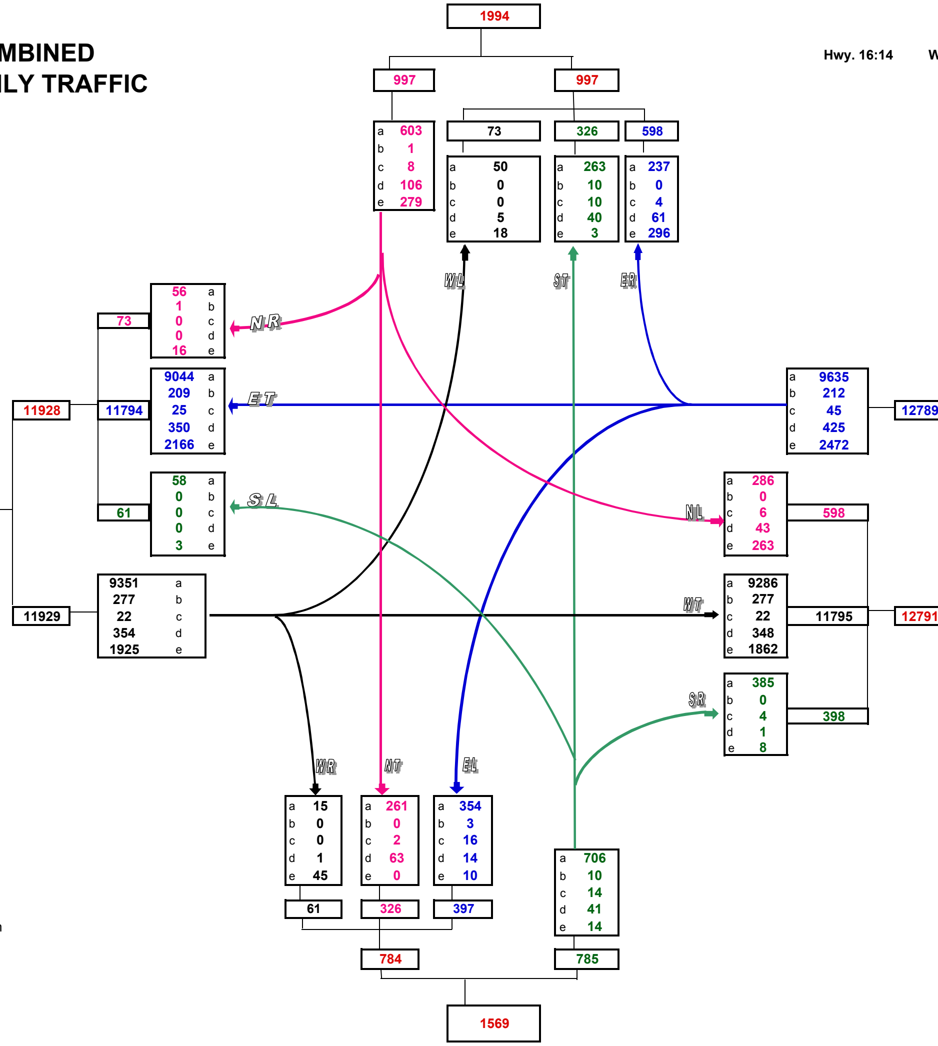
Turning Movement Summary Diagram

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1153	-
B - Recreational Vehicle	11	-
C - Bus	22	-
D - Single Unit Truck	212	-
E - Tractor Trailer Unit	596	-
Total	1994	



2016 COMBINED ANNUAL DAILY TRAFFIC

WEST LEG ON	Hwy. 16:14	
Vehicle Type	Vol.	%
A - Passenger Vehicle	18509	77.6
B - Recreational Vehicle	487	2.0
C - Bus	47	0.2
D - Single Unit Truck	704	3.0
E - Tractor Trailer Unit	4110	17.2
Total	23857	



EAST LEG ON	Hwy. 661:10	
Vehicle Type	Vol.	%
A - Passenger Vehicle	19592	76.6
B - Recreational Vehicle	489	1.9
C - Bus	77	0.3
D - Single Unit Truck	817	3.2
E - Tractor Trailer Unit	4605	18.0
Total	25580	

TURNING MOVEMENT ABBREVIATIONS

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TURNING MOVEMENT ABBREVIATIONS

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SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1336	85.1
B - Recreational Vehicle	13	0.8
C - Bus	32	2.0
D - Single Unit Truck	119	7.6
E - Tractor Trailer Unit	69	4.4
Total	1569	

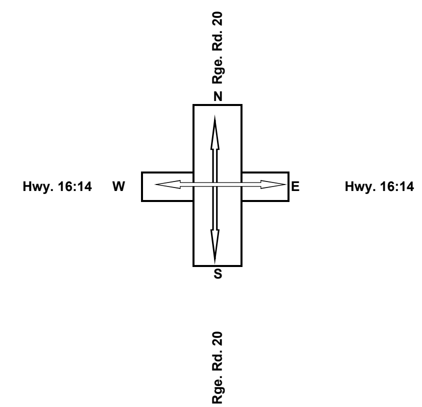
2016
2014
2

D&A PAULICHUK CONSULTING LTD.

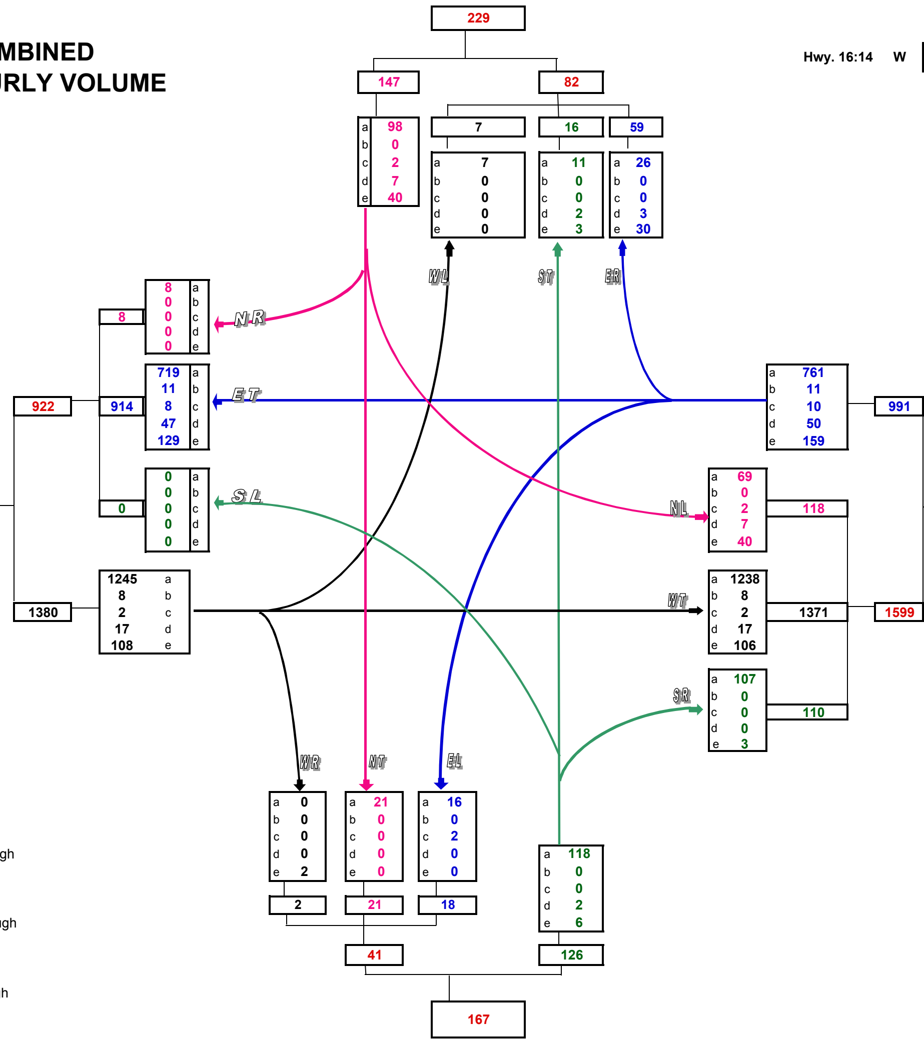
Turning Movement Summary Diagram

2016 COMBINED
AM PEAK HOURLY VOLUME

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	142	62.0
B - Recreational Vehicle	0	0.0
C - Bus	2	0.9
D - Single Unit Truck	12	5.2
E - Tractor Trailer Unit	73	31.9
Total	229	



WEST LEG ON	Hwy. 16:14	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1972	85.7
B - Recreational Vehicle	19	0.8
C - Bus	10	0.4
D - Single Unit Truck	64	2.8
E - Tractor Trailer Unit	237	10.3
Total	2302	



EAST LEG ON	Hwy. 661:10	
Vehicle Type	Vol.	%
A - Passenger Vehicle	2175	84.0
B - Recreational Vehicle	19	0.7
C - Bus	14	0.5
D - Single Unit Truck	74	2.9
E - Tractor Trailer Unit	308	11.9
Total	2590	

TURNING MOVEMENT ABBREVIATIONS

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WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

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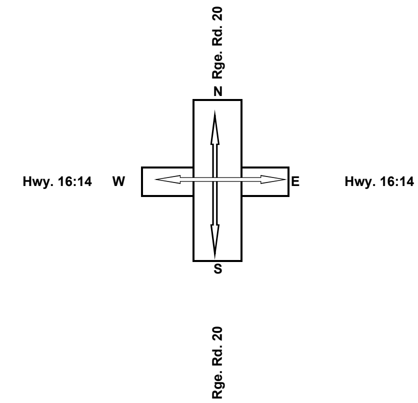
SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	155	92.8
B - Recreational Vehicle	0	0.0
C - Bus	2	1.2
D - Single Unit Truck	2	1.2
E - Tractor Trailer Unit	8	4.8
Total	167	

D&A PAULICHUK CONSULTING LTD.

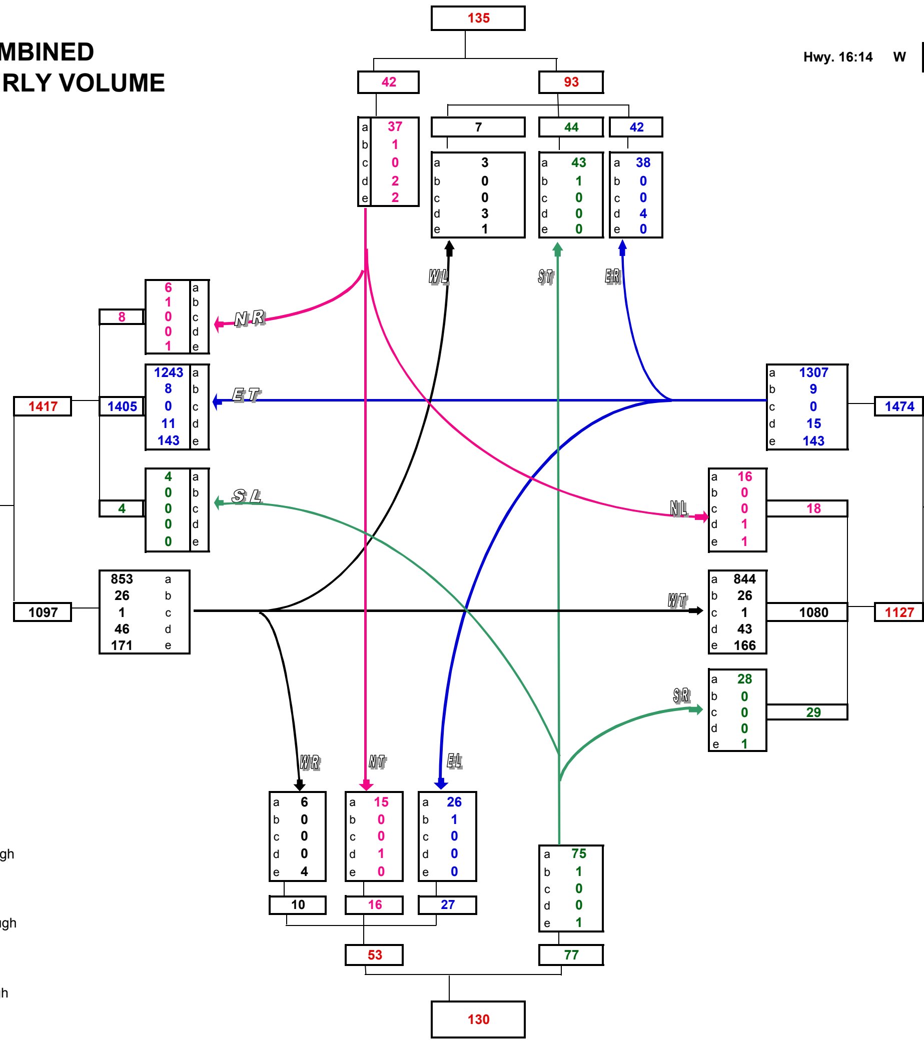
Turning Movement Summary Diagram

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	121	89.6
B - Recreational Vehicle	2	1.5
C - Bus	0	0.0
D - Single Unit Truck	9	6.7
E - Tractor Trailer Unit	3	2.2
Total	135	

2016 COMBINED PM PEAK HOURLY VOLUME



WEST LEG ON	Hwy. 16:14	
Vehicle Type	Vol.	%
A - Passenger Vehicle	2106	83.8
B - Recreational Vehicle	35	1.4
C - Bus	1	0.0
D - Single Unit Truck	57	2.3
E - Tractor Trailer Unit	315	12.5
Total	2514	



EAST LEG ON	Hwy. 661:10	
Vehicle Type	Vol.	%
A - Passenger Vehicle	2195	84.4
B - Recreational Vehicle	35	1.3
C - Bus	1	0.0
D - Single Unit Truck	59	2.3
E - Tractor Trailer Unit	311	12.0
Total	2601	

TURNING MOVEMENT ABBREVIATIONS

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ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

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SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	122	93.8
B - Recreational Vehicle	2	1.5
C - Bus	0	0.0
D - Single Unit Truck	1	0.8
E - Tractor Trailer Unit	5	3.8
Total	130	

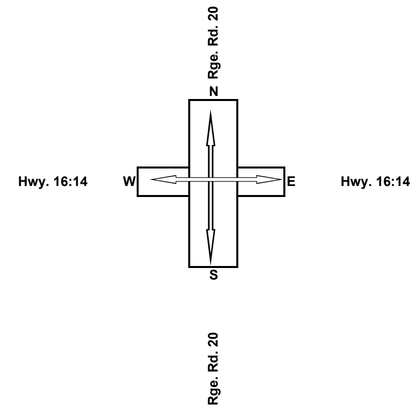
2016
2014
2

D&A PAULICHUK CONSULTING LTD.

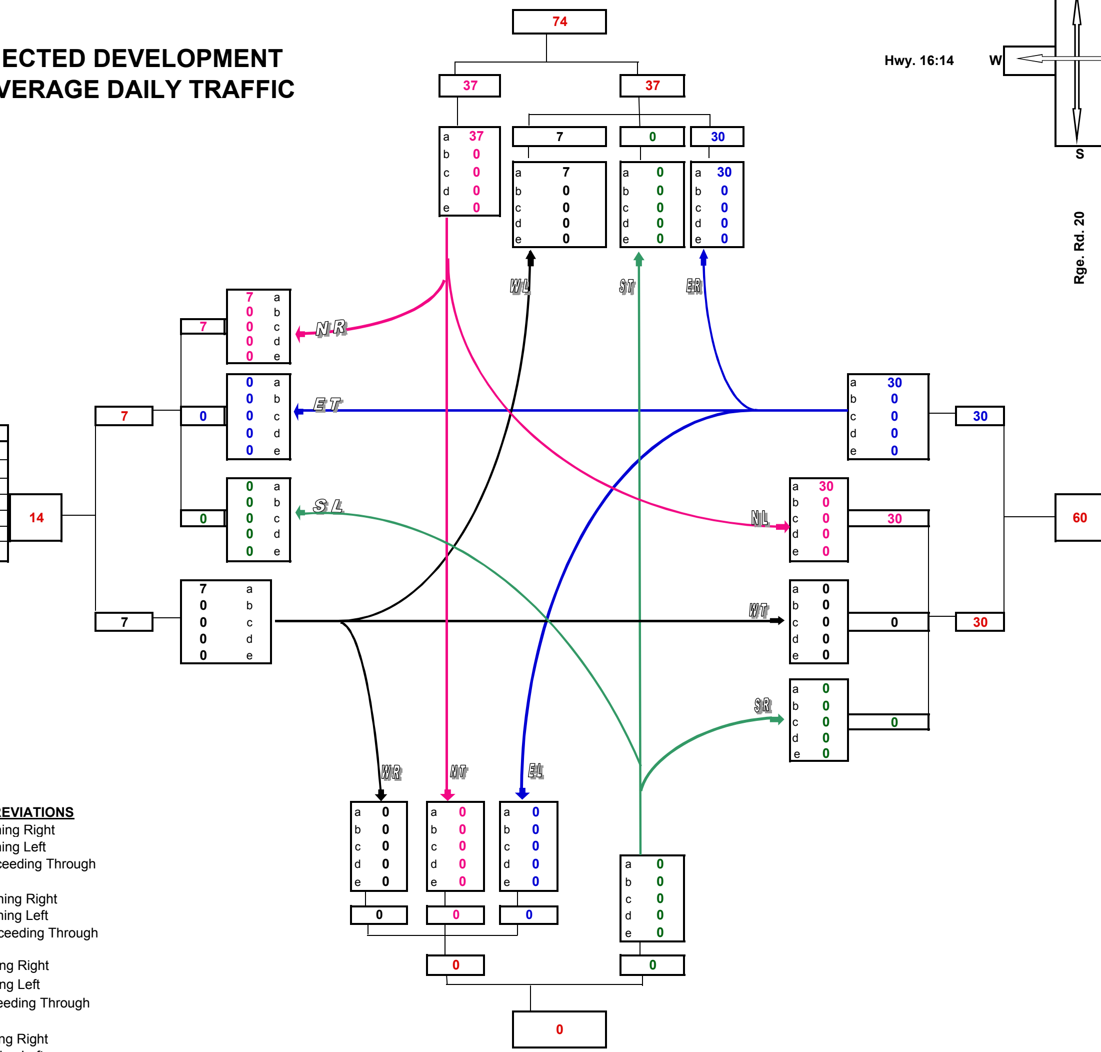
Turning Movement Summary Diagram

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	74	100.0%
B - Recreational Vehicle	0	0.0%
C - Bus	0	0.0%
D - Single Unit Truck	0	0.0%
E - Tractor Trailer Unit	0	0.0%
Total	74	

2021 PROJECTED DEVELOPMENT ANNUAL AVERAGE DAILY TRAFFIC



WEST LEG ON	Hwy. 16:14	
Vehicle Type	Vol.	%
A - Passenger Vehicle	14	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	14	



EAST LEG ON	Hwy. 661:10	
Vehicle Type	Vol.	%
A - Passenger Vehicle	60	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	60	

TURNING MOVEMENT ABBREVIATIONS

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ET: Traffic from East Proceeding Through

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TURNING MOVEMENT ABBREVIATIONS

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Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

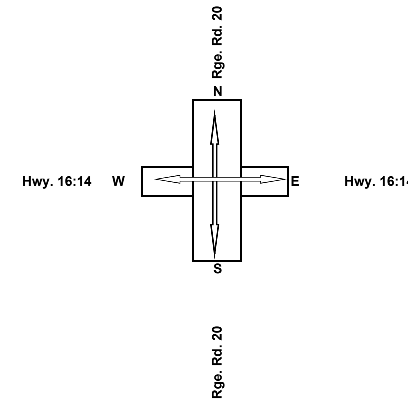
SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

D&A PAULICHUK CONSULTING LTD.

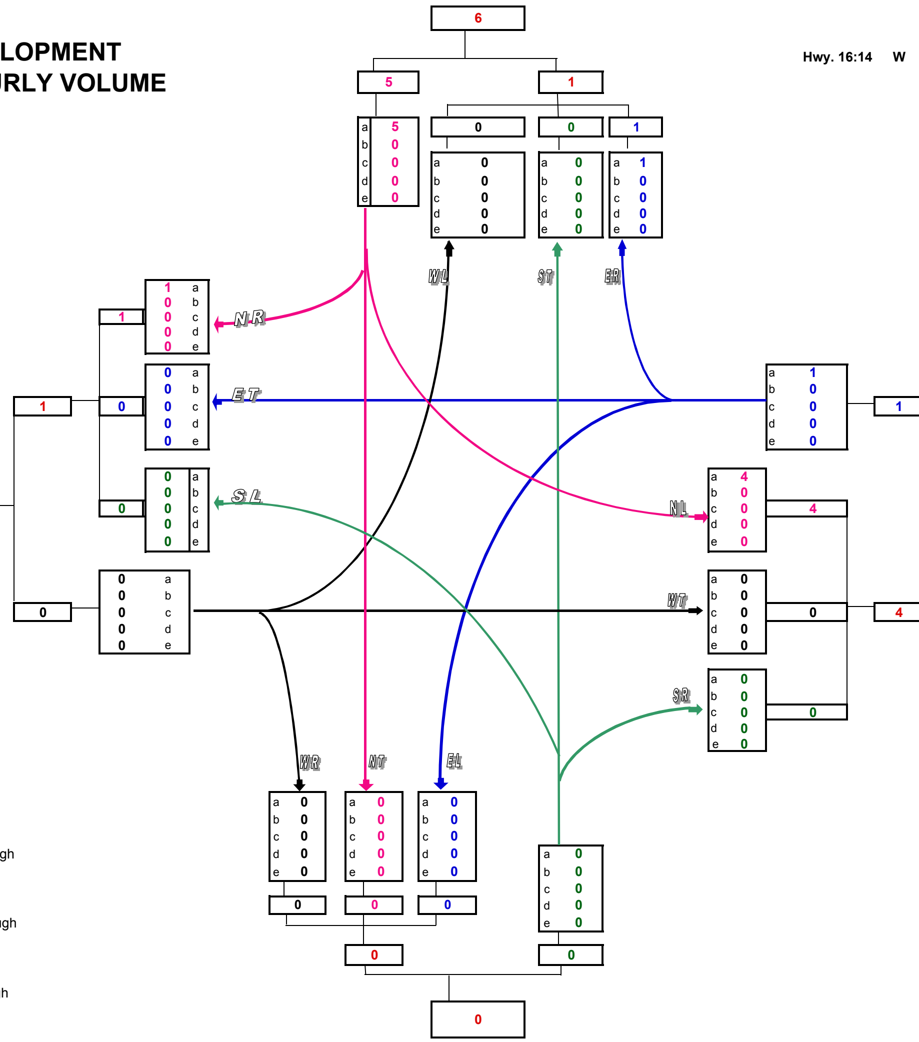
Turning Movement Summary Diagram

2021 DEVELOPMENT
AM PEAK HOURLY VOLUME

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	6	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	6	



WEST LEG ON	Hwy. 63:01	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	1	



EAST LEG ON	Hwy. 63:01	
Vehicle Type	Vol.	%
A - Passenger Vehicle	5	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	5	

TURNING MOVEMENT ABBREVIATIONS

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WL: Traffic from West Turning Left
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TURNING MOVEMENT ABBREVIATIONS

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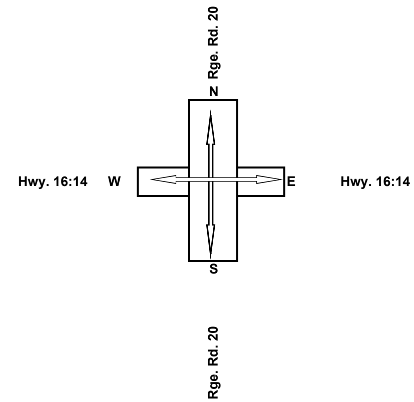
SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

D&A PAULICHUK CONSULTING LTD.

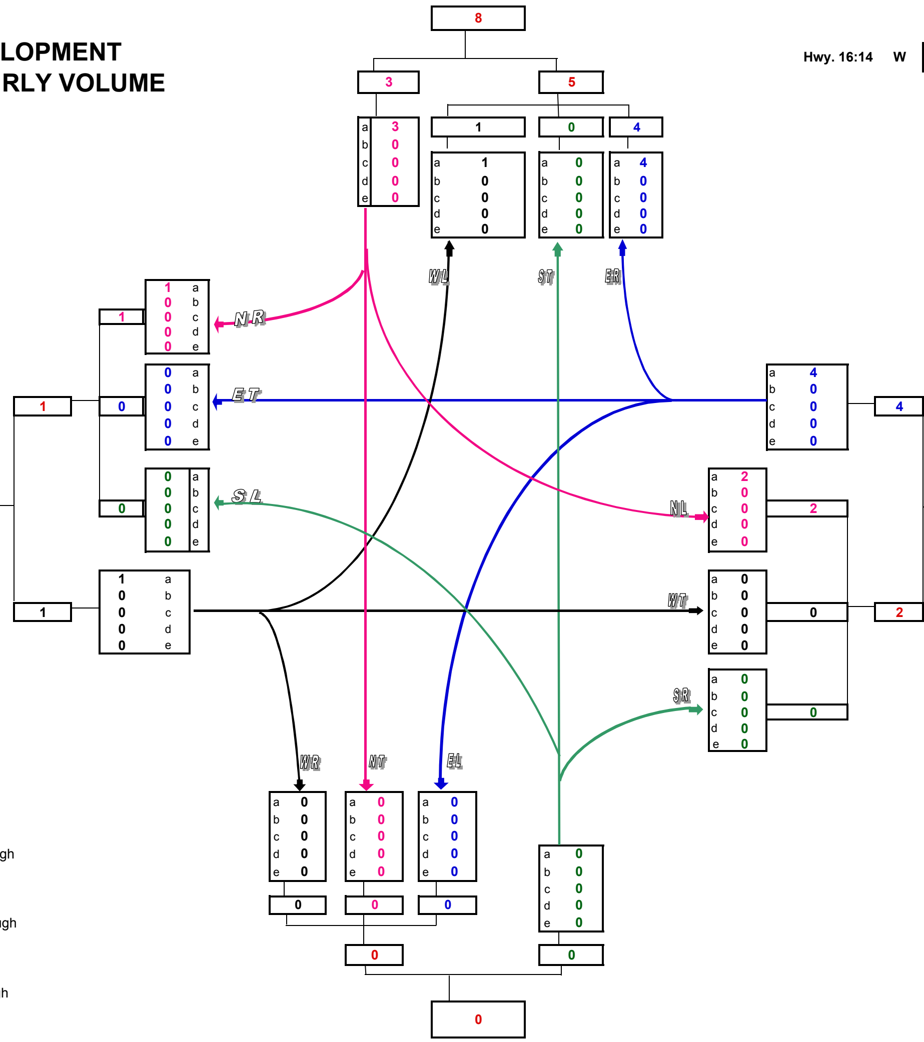
Turning Movement Summary Diagram

2021 DEVELOPMENT
PM PEAK HOURLY VOLUME

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	8	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	8	



WEST LEG ON	Hwy. 63:01	
Vehicle Type	Vol.	%
A - Passenger Vehicle	2	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	2	



EAST LEG ON	Hwy. 63:01	
Vehicle Type	Vol.	%
A - Passenger Vehicle	6	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	6	

TURNING MOVEMENT ABBREVIATIONS

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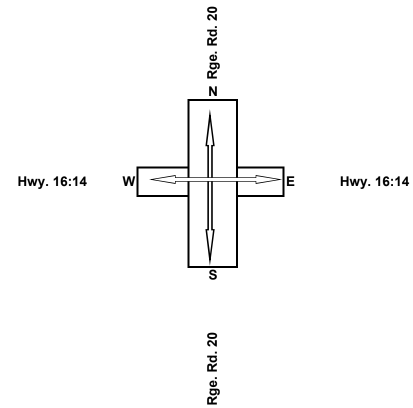
SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

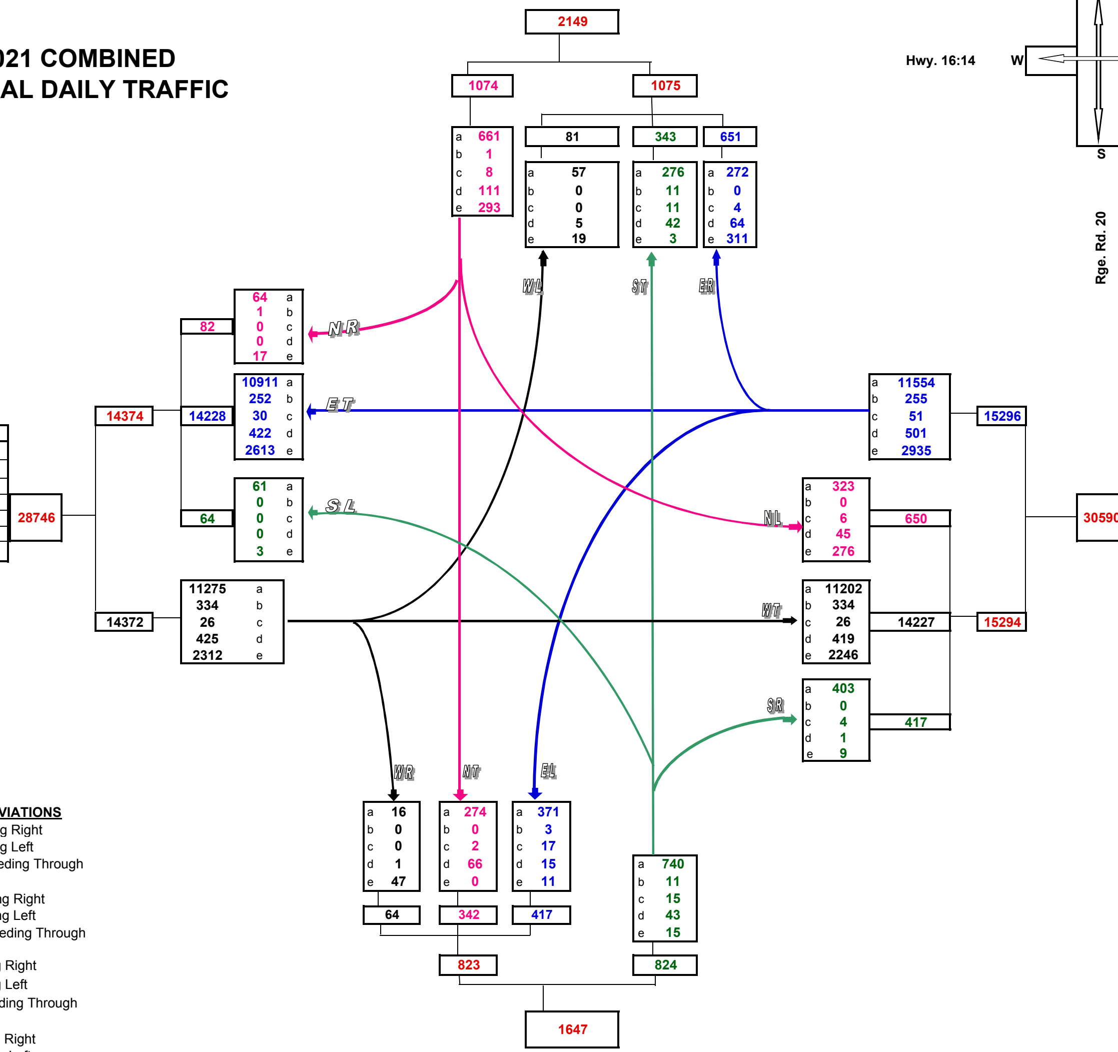
D&A PAULICHUK CONSULTING LTD.

Turning Movement Summary Diagram

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1266	-
B - Recreational Vehicle	12	-
C - Bus	23	-
D - Single Unit Truck	222	-
E - Tractor Trailer Unit	626	-
Total	2149	



2021 COMBINED ANNUAL DAILY TRAFFIC



WEST LEG ON	Hwy. 16:14	
Vehicle Type	Vol.	%
A - Passenger Vehicle	22311	77.6
B - Recreational Vehicle	587	2.0
C - Bus	56	0.2
D - Single Unit Truck	847	2.9
E - Tractor Trailer Unit	4945	17.2
Total	28746	

EAST LEG ON	Hwy. 661:10	
Vehicle Type	Vol.	%
A - Passenger Vehicle	23482	76.8
B - Recreational Vehicle	589	1.9
C - Bus	87	0.3
D - Single Unit Truck	966	3.2
E - Tractor Trailer Unit	5466	17.9
Total	30590	

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SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1401	85.1
B - Recreational Vehicle	14	0.9
C - Bus	34	2.1
D - Single Unit Truck	125	7.6
E - Tractor Trailer Unit	73	4.4
Total	1647	

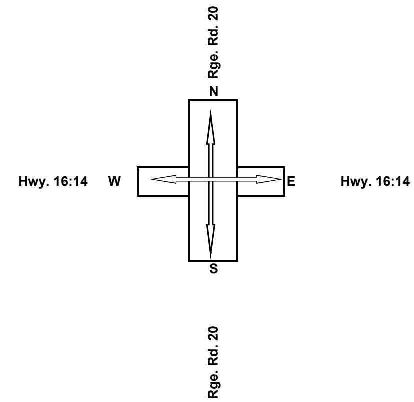
2021
2014
7

D&A PAULICHUK CONSULTING LTD.

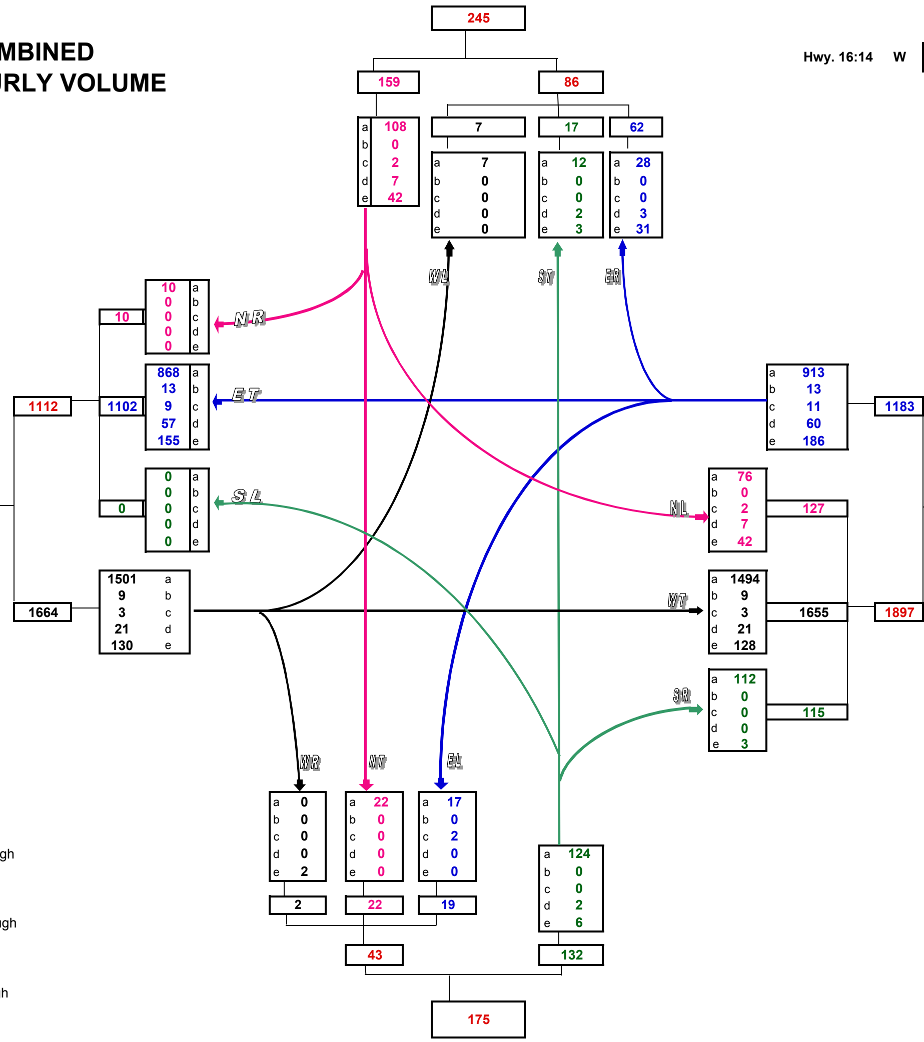
Turning Movement Summary Diagram

2021 COMBINED
AM PEAK HOURLY VOLUME

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	155	63.3
B - Recreational Vehicle	0	0.0
C - Bus	2	0.8
D - Single Unit Truck	12	4.9
E - Tractor Trailer Unit	76	31.0
Total	245	



WEST LEG ON	Hwy. 16:14	
Vehicle Type	Vol.	%
A - Passenger Vehicle	2379	85.7
B - Recreational Vehicle	22	0.8
C - Bus	12	0.4
D - Single Unit Truck	78	2.8
E - Tractor Trailer Unit	285	10.3
Total	2776	



EAST LEG ON	Hwy. 661:10	
Vehicle Type	Vol.	%
A - Passenger Vehicle	2595	84.3
B - Recreational Vehicle	22	0.7
C - Bus	16	0.5
D - Single Unit Truck	88	2.9
E - Tractor Trailer Unit	359	11.7
Total	3080	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic from North Turning Right
NL: Traffic from North Turning Left
NT: Traffic from North Proceeding Through

SR: Traffic from South Turning Right
SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	163	93.1
B - Recreational Vehicle	0	0.0
C - Bus	2	1.1
D - Single Unit Truck	2	1.1
E - Tractor Trailer Unit	8	4.6
Total	175	

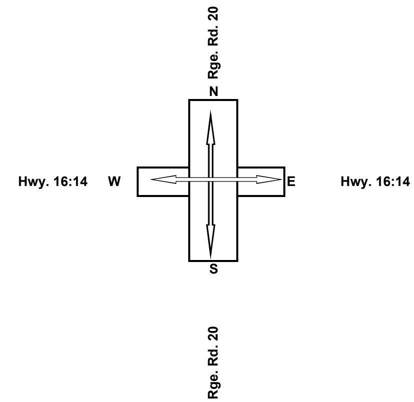
2021
2014
7

D&A PAULICHUK CONSULTING LTD.

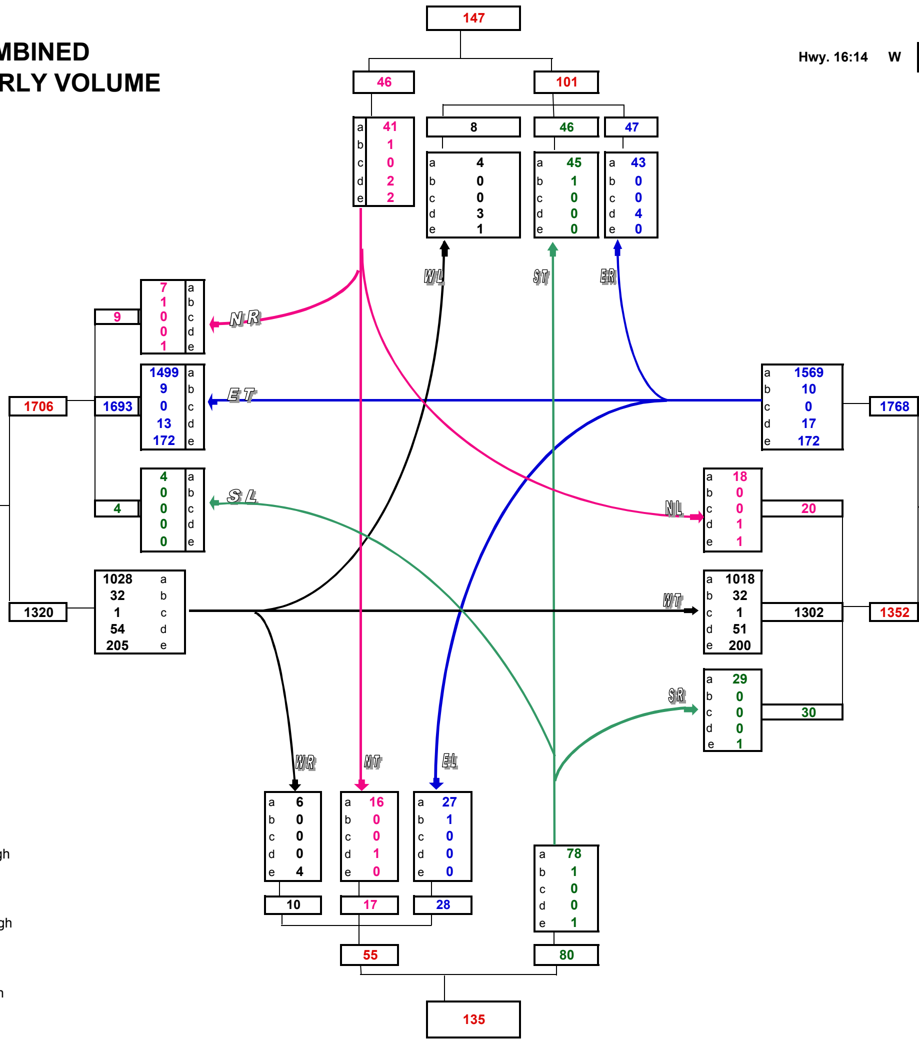
Turning Movement Summary Diagram

2021 COMBINED
PM PEAK HOURLY VOLUME

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	133	90.5
B - Recreational Vehicle	2	1.4
C - Bus	0	0.0
D - Single Unit Truck	9	6.1
E - Tractor Trailer Unit	3	2.0
Total	147	



WEST LEG ON	Hwy. 16:14	
Vehicle Type	Vol.	%
A - Passenger Vehicle	2538	83.9
B - Recreational Vehicle	42	1.4
C - Bus	1	0.0
D - Single Unit Truck	67	2.2
E - Tractor Trailer Unit	378	12.5
Total	3026	



EAST LEG ON	Hwy. 661:10	
Vehicle Type	Vol.	%
A - Passenger Vehicle	2634	84.4
B - Recreational Vehicle	42	1.3
C - Bus	1	0.0
D - Single Unit Truck	69	2.2
E - Tractor Trailer Unit	374	12.0
Total	3120	

TURNING MOVEMENT ABBREVIATIONS

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SL: Traffic from South Turning Left
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EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	127	94.1
B - Recreational Vehicle	2	1.5
C - Bus	0	0.0
D - Single Unit Truck	1	0.7
E - Tractor Trailer Unit	5	3.7
Total	135	

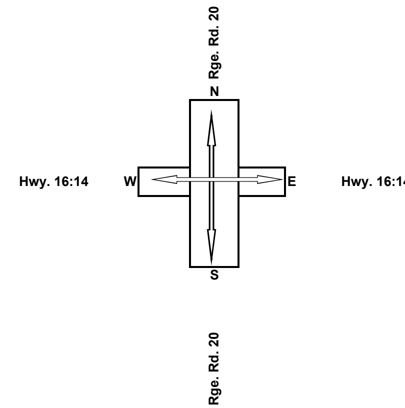
2021
2014
7

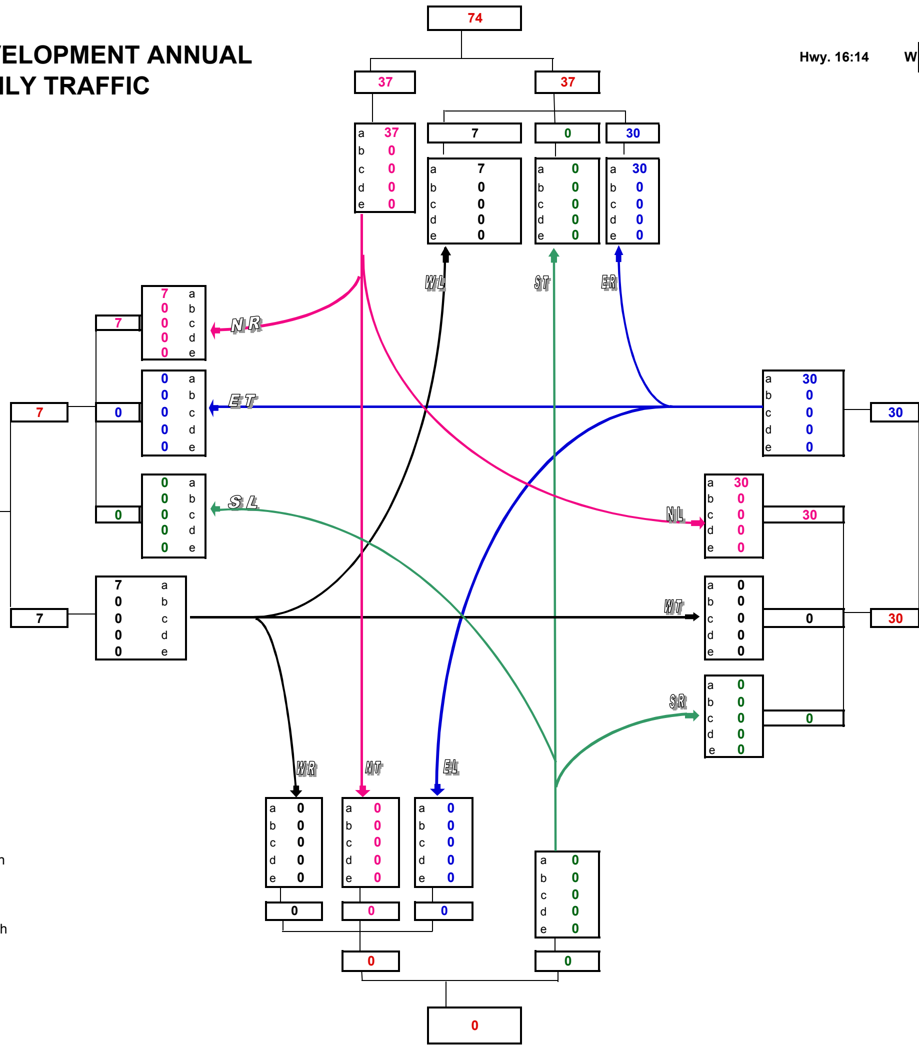
D&A PAULICHUK CONSULTING LTD.

Turning Movement Summary Diagram

2026 PROJECTED DEVELOPMENT ANNUAL AVERAGE DAILY TRAFFIC

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	**Vol.**	**%**
A - Passenger Vehicle	74	100.0%
B - Recreational Vehicle	0	0.0%
C - Bus	0	0.0%
D - Single Unit Truck	0	0.0%
E - Tractor Trailer Unit	0	0.0%
Total	74	





WEST LEG ON	Hwy. 16:14	
Vehicle Type	**Vol.**	**%**
A - Passenger Vehicle	14	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	14	

EAST LEG ON	Hwy. 661:10	
Vehicle Type	**Vol.**	**%**
A - Passenger Vehicle	60	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	60	

TURNING MOVEMENT ABBREVIATIONS

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SL: Traffic from South Turning Left
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ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Taffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

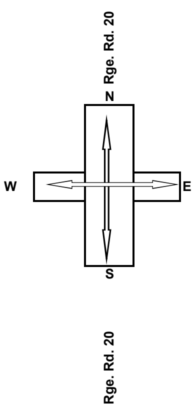
SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	**Vol.**	**%**
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

D&A PAULICHUK CONSULTING LTD.

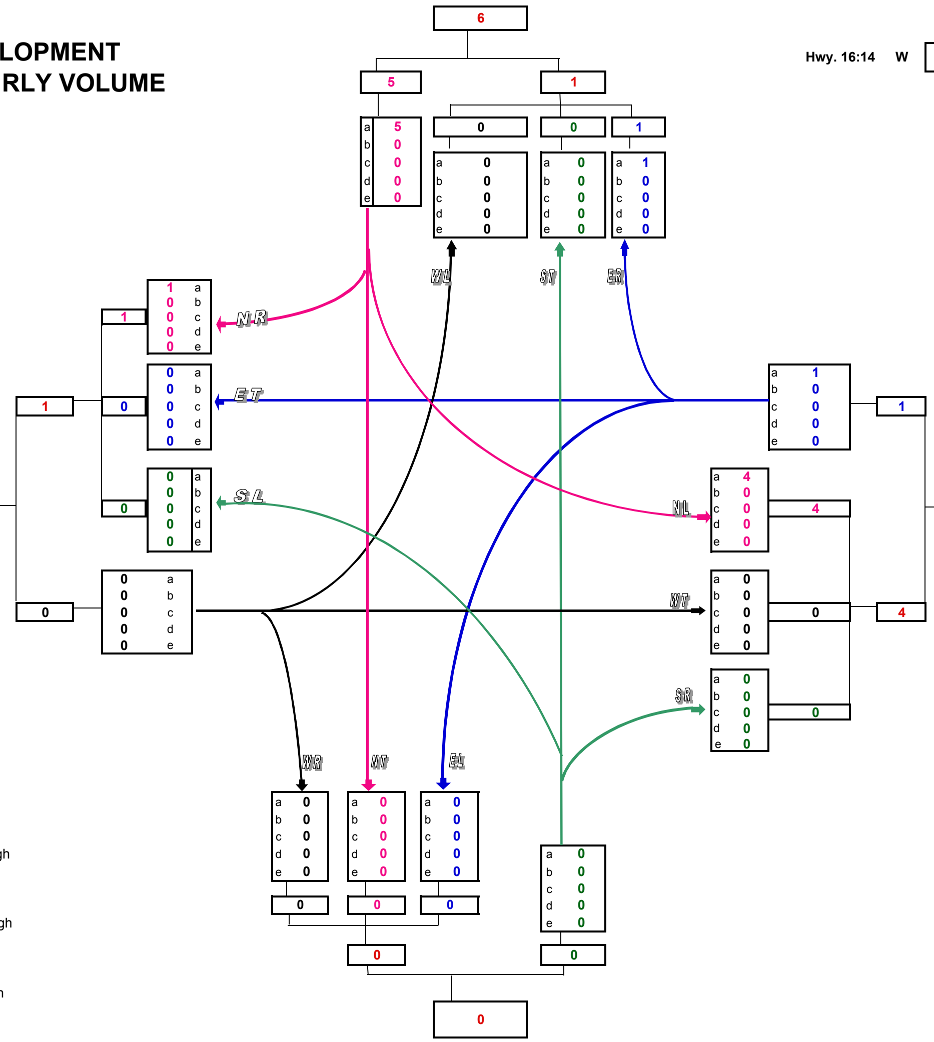
Turning Movement Summary Diagram

2026 DEVELOPMENT
AM PEAK HOURLY VOLUME

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	6	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	6	



WEST LEG ON	Hwy. 63:01	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	1	



EAST LEG ON	Hwy. 63:01	
Vehicle Type	Vol.	%
A - Passenger Vehicle	5	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	5	

TURNING MOVEMENT ABBREVIATIONS

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ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
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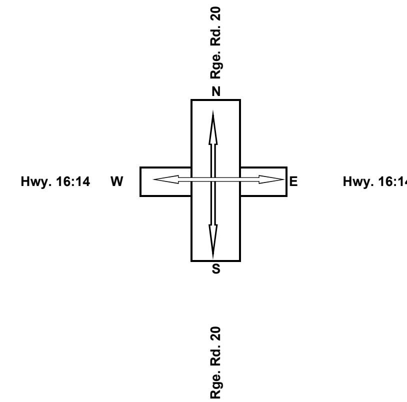
ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

D&A PAULICHUK CONSULTING LTD.

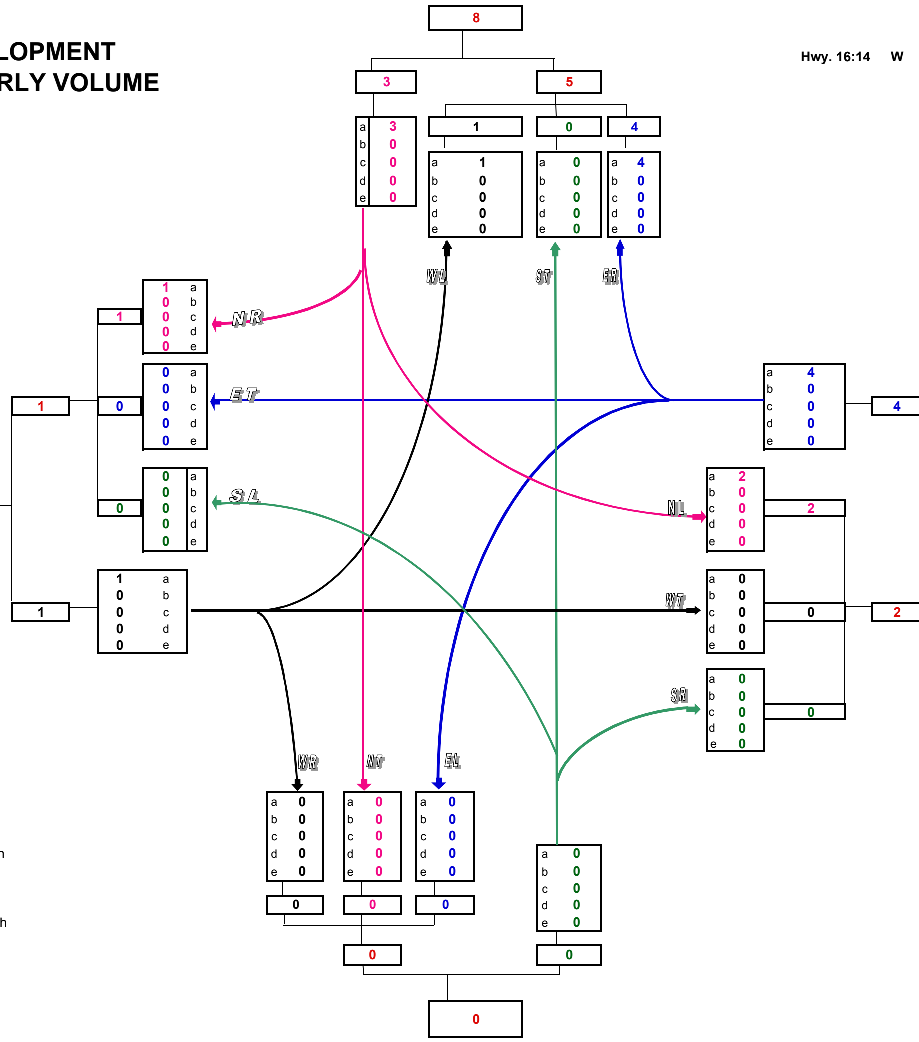
Turning Movement Summary Diagram

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	8	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	8	



2026 DEVELOPMENT
PM PEAK HOURLY VOLUME

WEST LEG ON	Hwy. 63:01	
Vehicle Type	Vol.	%
A - Passenger Vehicle	2	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	2	



EAST LEG ON	Hwy. 63:01	
Vehicle Type	Vol.	%
A - Passenger Vehicle	6	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	6	

TURNING MOVEMENT ABBREVIATIONS

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ET: Traffic from East Proceeding Through

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WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
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ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

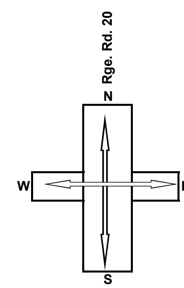
Turning Movement Summary Diagram

2026 COMBINED
ANNUAL DAILY TRAFFIC

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1322	-
B - Recreational Vehicle	12	-
C - Bus	24	-
D - Single Unit Truck	233	-
E - Tractor Trailer Unit	655	-
Total	2246	

Rge. Rd. 20

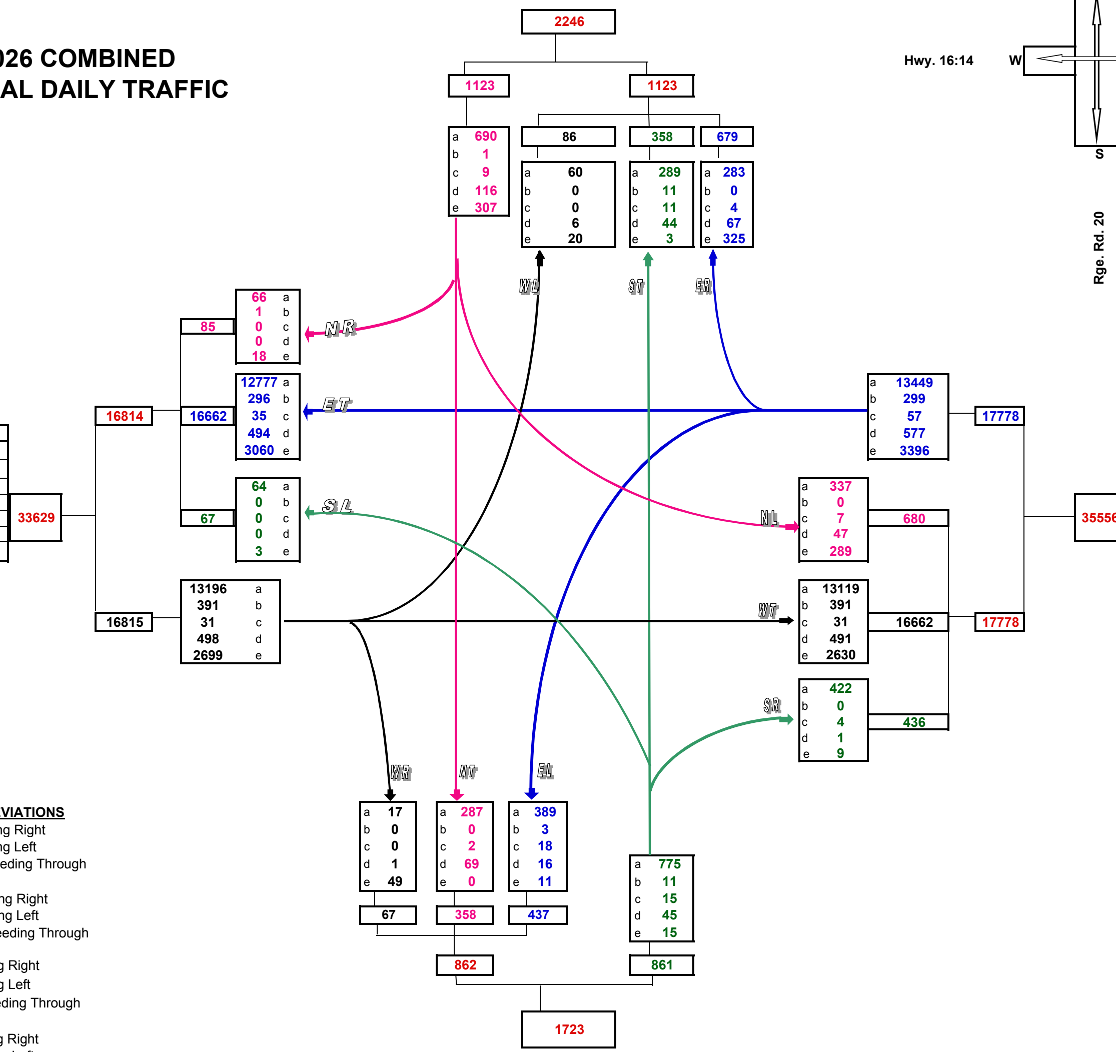
Hwy. 16:14



Hwy. 16:14

Rge. Rd. 20

WEST LEG ON	Hwy. 16:14	
Vehicle Type	Vol.	%
A - Passenger Vehicle	26103	77.6
B - Recreational Vehicle	688	2.0
C - Bus	66	0.2
D - Single Unit Truck	992	2.9
E - Tractor Trailer Unit	5780	17.2
Total	33629	



EAST LEG ON	Hwy. 661:10	
Vehicle Type	Vol.	%
A - Passenger Vehicle	27327	76.9
B - Recreational Vehicle	690	1.9
C - Bus	99	0.3
D - Single Unit Truck	1116	3.1
E - Tractor Trailer Unit	6324	17.8
Total	35556	

TURNING MOVEMENT ABBREVIATIONS

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ER: Traffic from East Turning Right
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ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
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ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1468	85.2
B - Recreational Vehicle	14	0.8
C - Bus	35	2.0
D - Single Unit Truck	131	7.6
E - Tractor Trailer Unit	75	4.4
Total	1723	

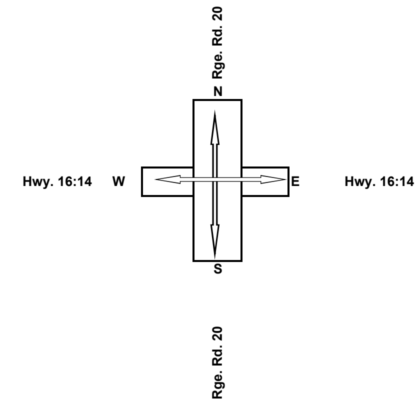
2026
2014
12

D&A PAULICHUK CONSULTING LTD.

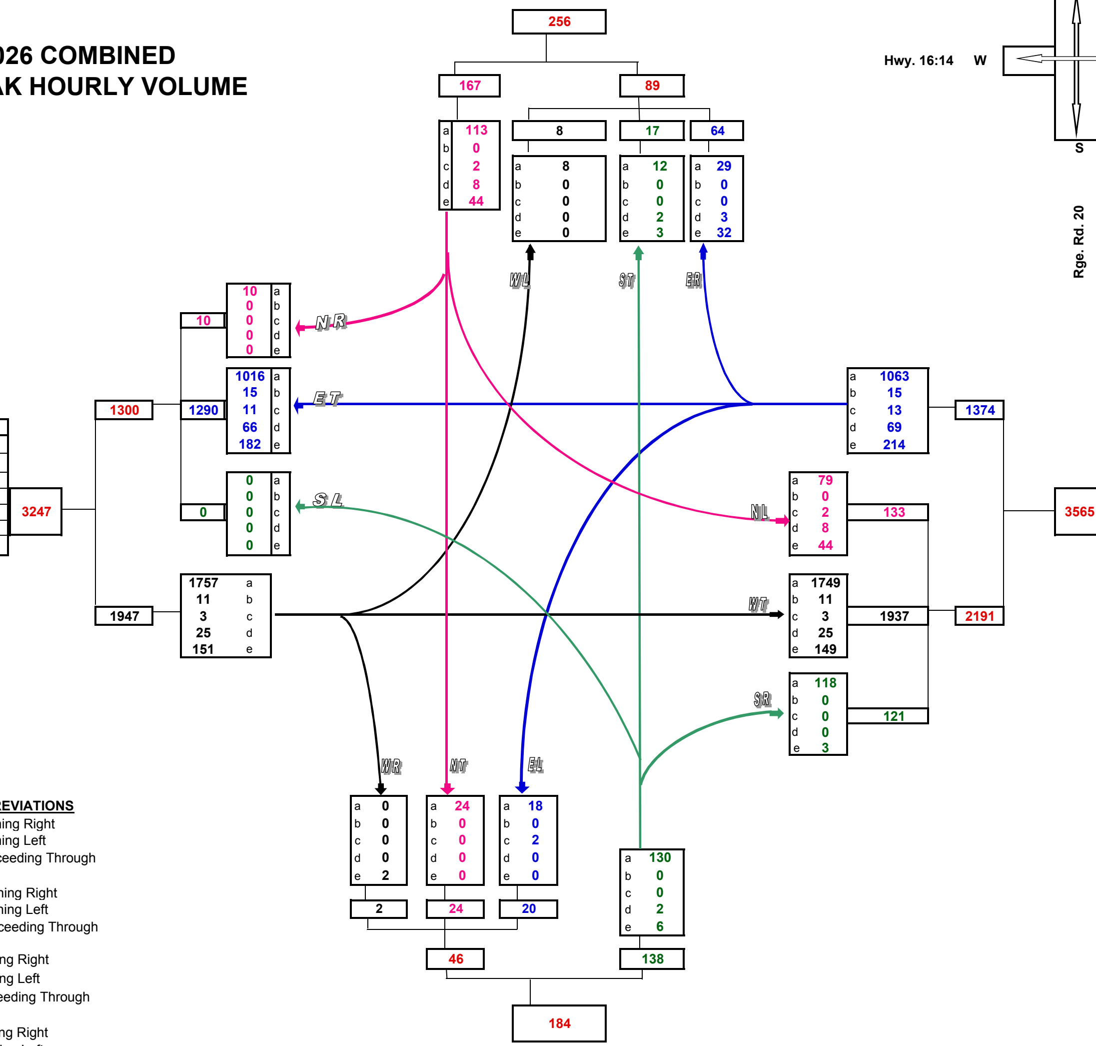
Turning Movement Summary Diagram

2026 COMBINED
AM PEAK HOURLY VOLUME

NORTH LEG ON		Rge. Rd. 20
Vehicle Type	Vol.	%
A - Passenger Vehicle	162	63.3
B - Recreational Vehicle	0	0.0
C - Bus	2	0.8
D - Single Unit Truck	13	5.1
E - Tractor Trailer Unit	79	30.9
Total	256	



WEST LEG ON		Hwy. 16:14
Vehicle Type	Vol.	%
A - Passenger Vehicle	2783	85.7
B - Recreational Vehicle	26	0.8
C - Bus	14	0.4
D - Single Unit Truck	91	2.8
E - Tractor Trailer Unit	333	10.3
Total	3247	



EAST LEG ON		Hwy. 661:10
Vehicle Type	Vol.	%
A - Passenger Vehicle	3009	84.4
B - Recreational Vehicle	26	0.7
C - Bus	18	0.5
D - Single Unit Truck	102	2.9
E - Tractor Trailer Unit	410	11.5
Total	3565	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic from North Turning Right
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NT: Traffic from North Proceeding Through

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SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON		Rge. Rd. 20
Vehicle Type	Vol.	%
A - Passenger Vehicle	172	93.5
B - Recreational Vehicle	0	0.0
C - Bus	2	1.1
D - Single Unit Truck	2	1.1
E - Tractor Trailer Unit	8	4.3
Total	184	

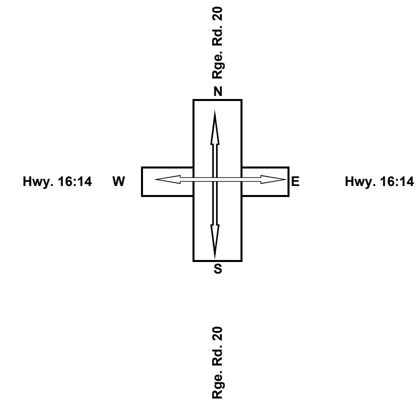
2026
2014
12

D&A PAULICHUK CONSULTING LTD.

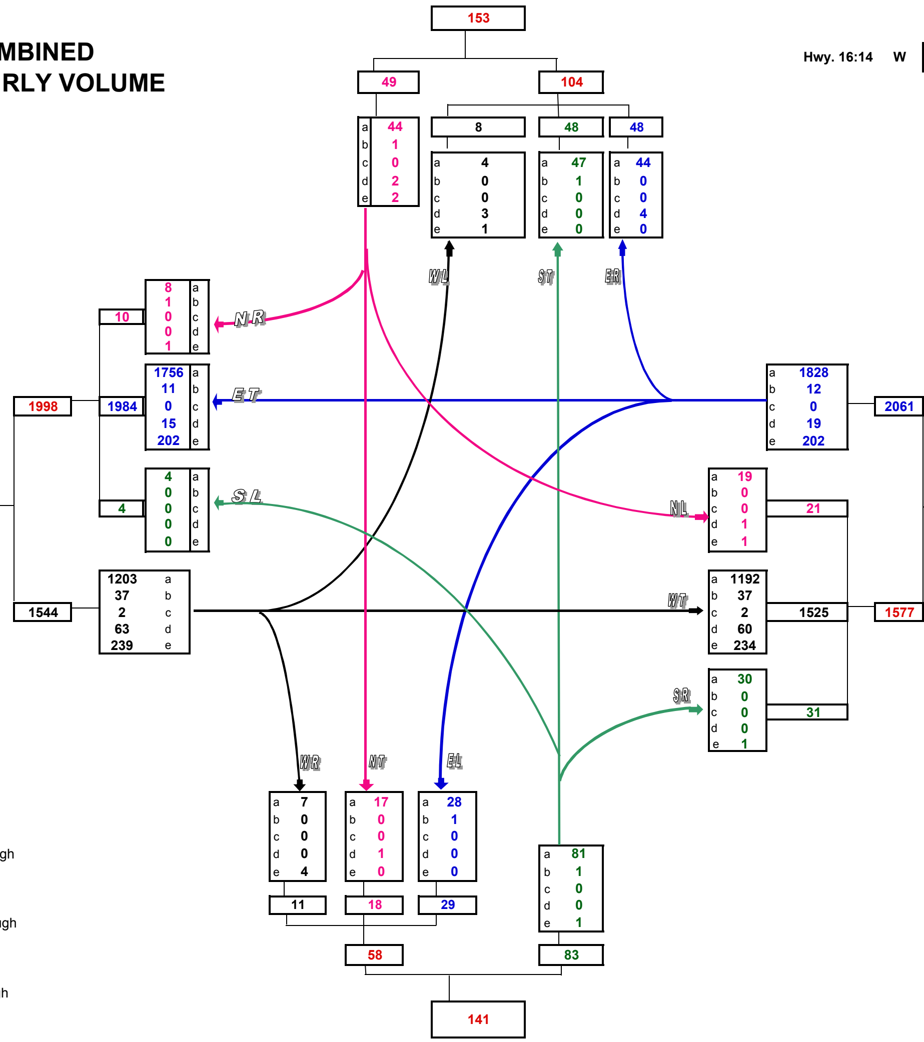
Turning Movement Summary Diagram

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	139	90.8
B - Recreational Vehicle	2	1.3
C - Bus	0	0.0
D - Single Unit Truck	9	5.9
E - Tractor Trailer Unit	3	2.0
Total	153	

2026 COMBINED
PM PEAK HOURLY VOLUME



WEST LEG ON	Hwy. 16:14	
Vehicle Type	Vol.	%
A - Passenger Vehicle	2971	83.9
B - Recreational Vehicle	49	1.4
C - Bus	2	0.1
D - Single Unit Truck	78	2.2
E - Tractor Trailer Unit	442	12.5
Total	3542	



EAST LEG ON	Hwy. 661:10	
Vehicle Type	Vol.	%
A - Passenger Vehicle	3069	84.4
B - Recreational Vehicle	49	1.3
C - Bus	2	0.1
D - Single Unit Truck	80	2.2
E - Tractor Trailer Unit	438	12.0
Total	3638	

TURNING MOVEMENT ABBREVIATIONS

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NT: Traffic from North Proceeding Through

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SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

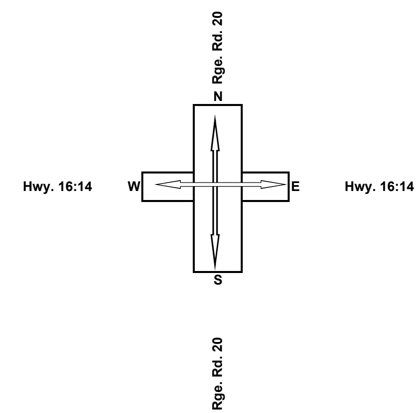
SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	133	94.3
B - Recreational Vehicle	2	1.4
C - Bus	0	0.0
D - Single Unit Truck	1	0.7
E - Tractor Trailer Unit	5	3.5
Total	141	

2026
2014
12

D&A PAULICHUK CONSULTING LTD.

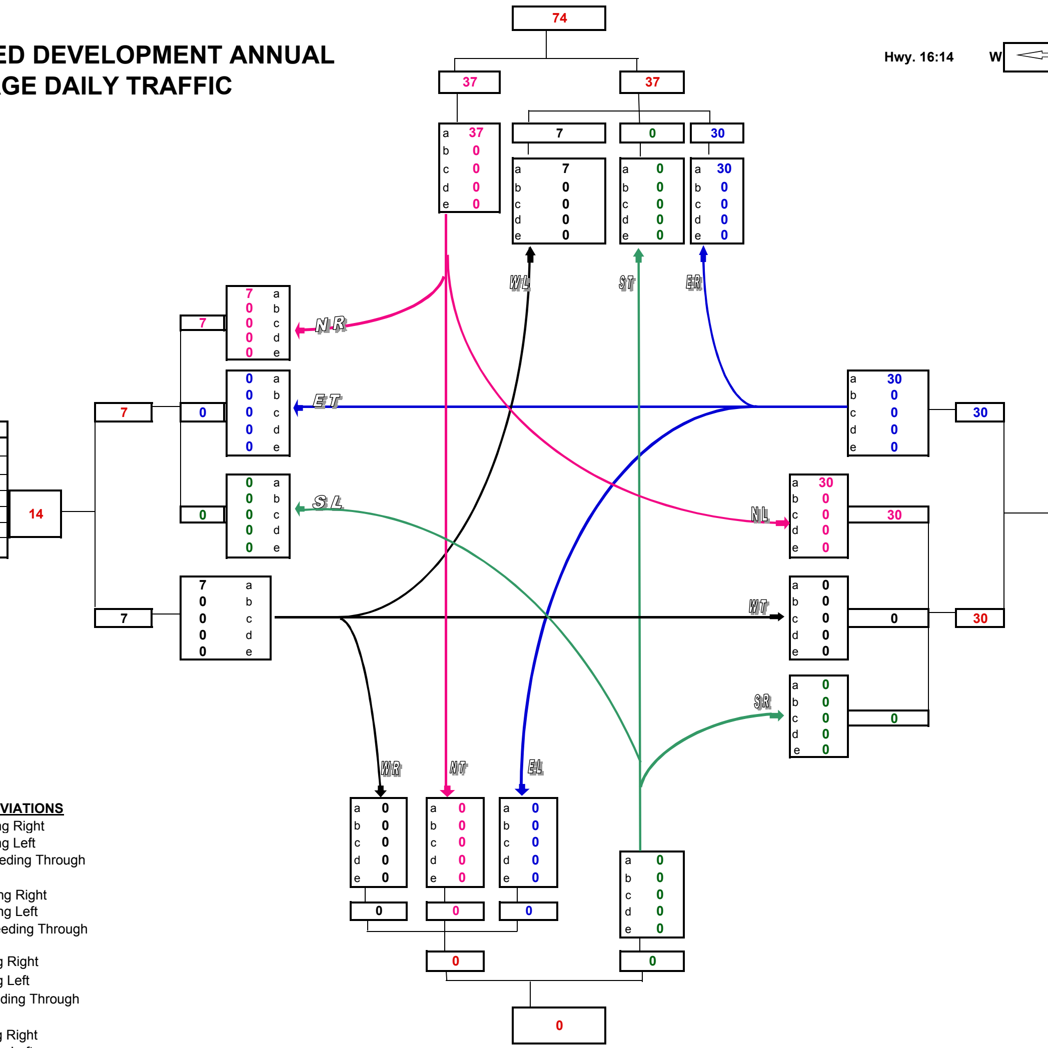
Turning Movement Summary Diagram

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	74	100.0%
B - Recreational Vehicle	0	0.0%
C - Bus	0	0.0%
D - Single Unit Truck	0	0.0%
E - Tractor Trailer Unit	0	0.0%
Total	74	



2036 PROJECTED DEVELOPMENT ANNUAL AVERAGE DAILY TRAFFIC

WEST LEG ON	Hwy. 16:14	
Vehicle Type	Vol.	%
A - Passenger Vehicle	14	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	14	



EAST LEG ON	Hwy. 661:10	
Vehicle Type	Vol.	%
A - Passenger Vehicle	60	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	60	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic from North Turning Right
NL: Traffic from North Turning Left
NT: Traffic from North Proceeding Through

SR: Traffic from South Turning Right
SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

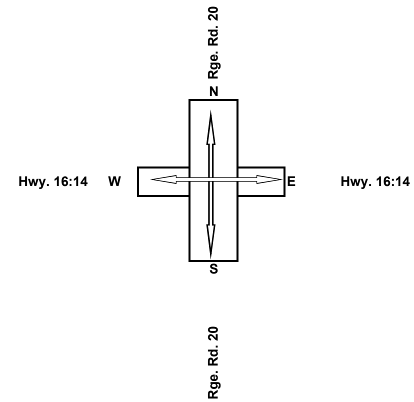
ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

D&A PAULICHUK CONSULTING LTD.

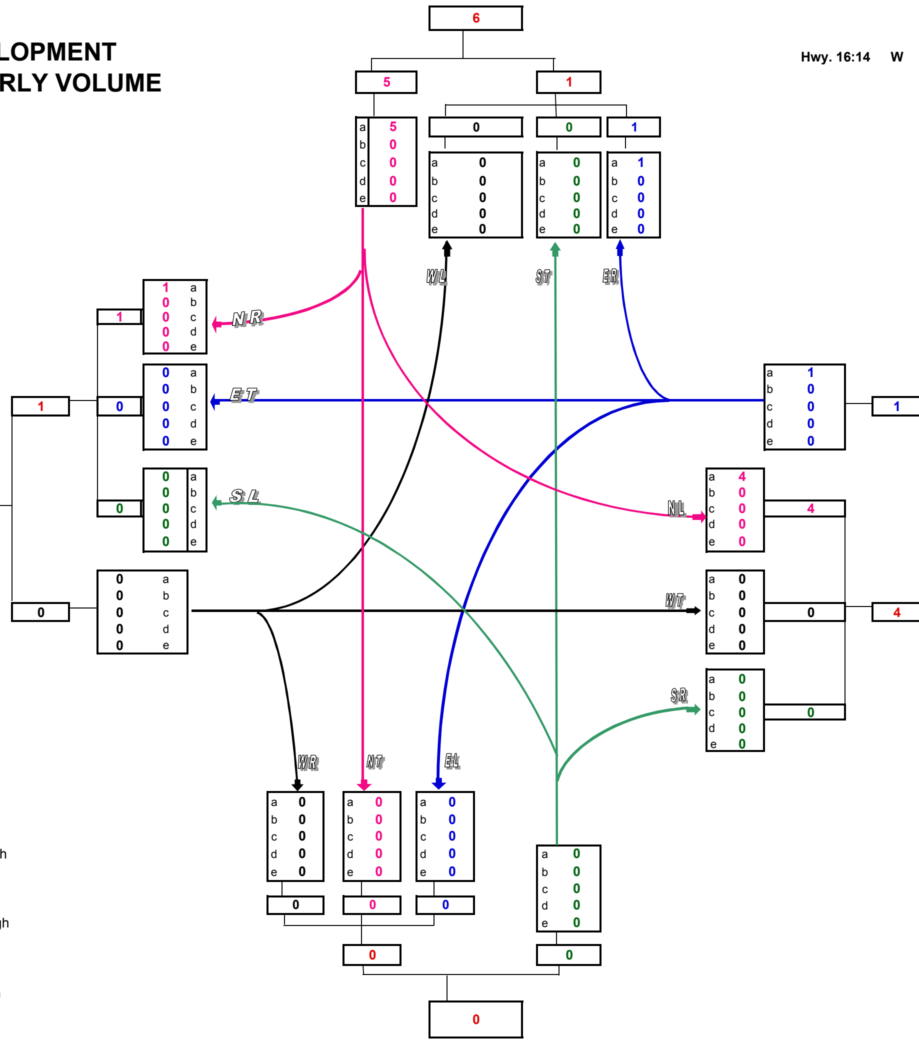
Turning Movement Summary Diagram

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	6	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	6	



2036 DEVELOPMENT
AM PEAK HOURLY VOLUME

WEST LEG ON	Hwy. 63:01	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	1	



EAST LEG ON	Hwy. 63:01	
Vehicle Type	Vol.	%
A - Passenger Vehicle	5	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	5	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic from North Turning Right
NL: Traffic from North Turning Left
NT: Traffic from North Proceeding Through

SR: Traffic from South Turning Right
SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

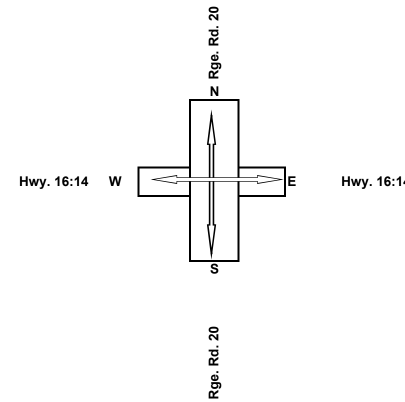
SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

D&A PAULICHUK CONSULTING LTD.

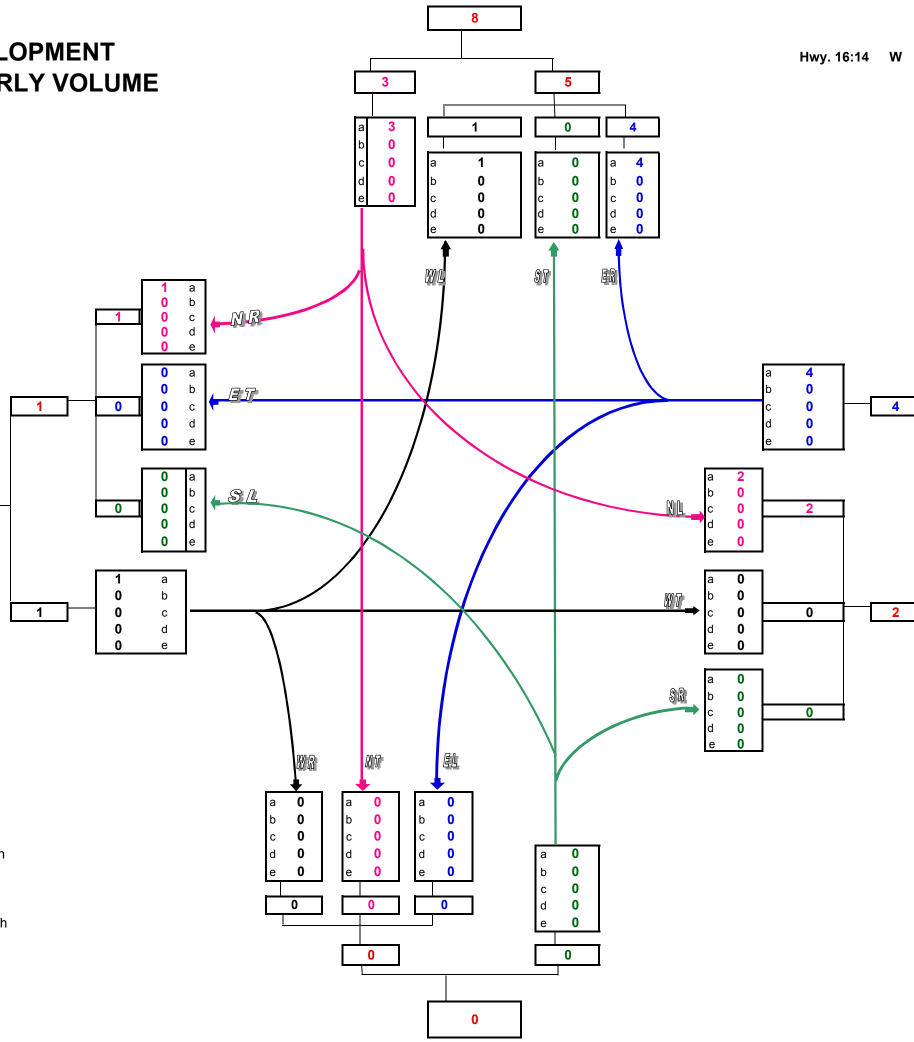
Turning Movement Summary Diagram

2036 DEVELOPMENT
PM PEAK HOURLY VOLUME

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	8	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	8	



WEST LEG ON	Hwy. 63:01	
Vehicle Type	Vol.	%
A - Passenger Vehicle	2	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	2	



EAST LEG ON	Hwy. 63:01	
Vehicle Type	Vol.	%
A - Passenger Vehicle	6	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	6	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic from North Turning Right
NL: Traffic from North Turning Left
NT: Traffic from North Proceeding Through

SR: Traffic from South Turning Right
SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

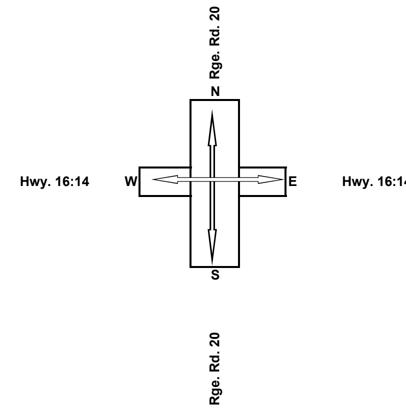
ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

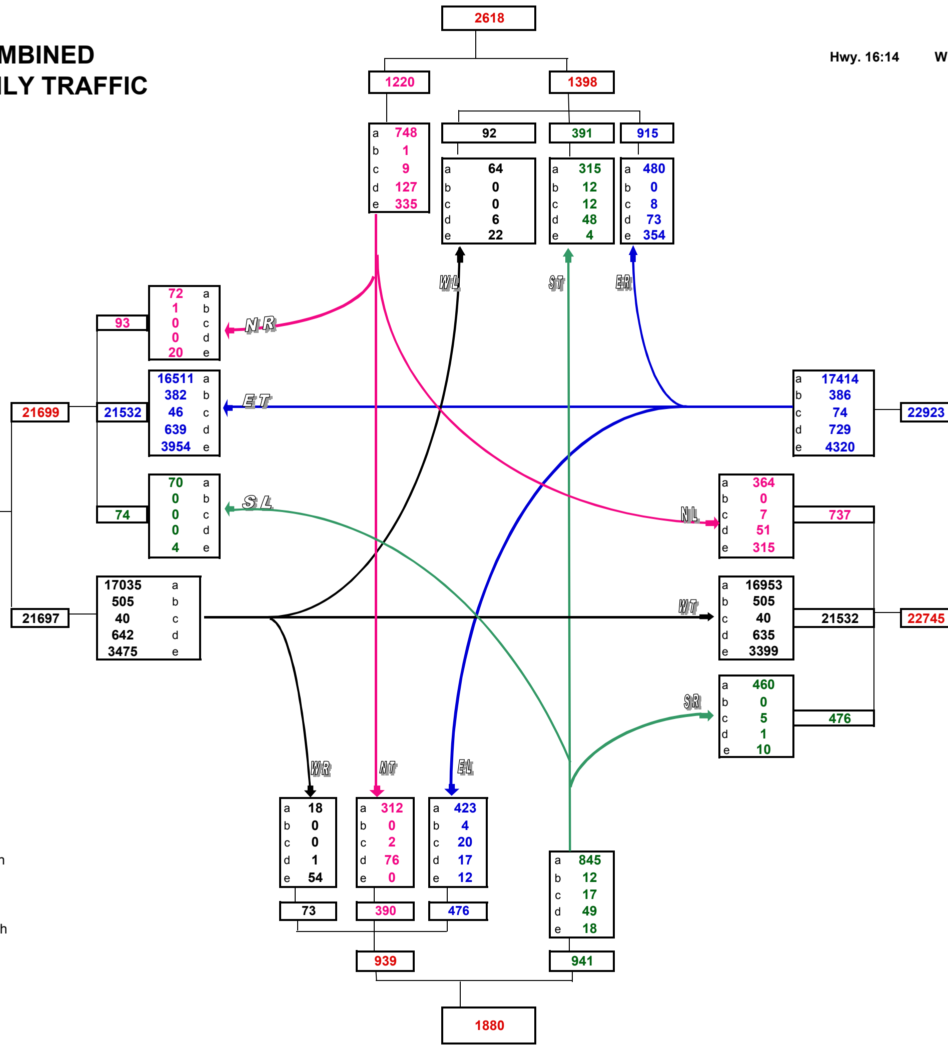
SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

Turning Movement Summary Diagram

2036 COMBINED
ANNUAL DAILY TRAFFIC

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1607	-
B - Recreational Vehicle	13	-
C - Bus	29	-
D - Single Unit Truck	254	-
E - Tractor Trailer Unit	715	-
Total	2618	





WEST LEG ON	Hwy. 16:14	
Vehicle Type	Vol.	%
A - Passenger Vehicle	33688	77.6
B - Recreational Vehicle	888	2.0
C - Bus	86	0.2
D - Single Unit Truck	1281	3.0
E - Tractor Trailer Unit	7453	17.2
Total	43396	

EAST LEG ON	Hwy. 661:10	
Vehicle Type	Vol.	%
A - Passenger Vehicle	35191	77.1
B - Recreational Vehicle	891	2.0
C - Bus	126	0.3
D - Single Unit Truck	1416	3.1
E - Tractor Trailer Unit	8044	17.6
Total	45668	

TURNING MOVEMENT ABBREVIATIONS

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ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1598	85.0
B - Recreational Vehicle	16	0.9
C - Bus	39	2.1
D - Single Unit Truck	143	7.6
E - Tractor Trailer Unit	84	4.5
Total	1880	

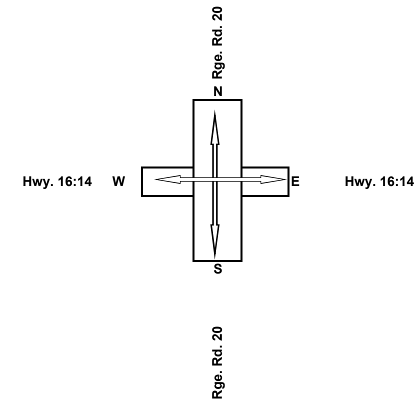
2036
2014
22

D&A PAULICHUK CONSULTING LTD.

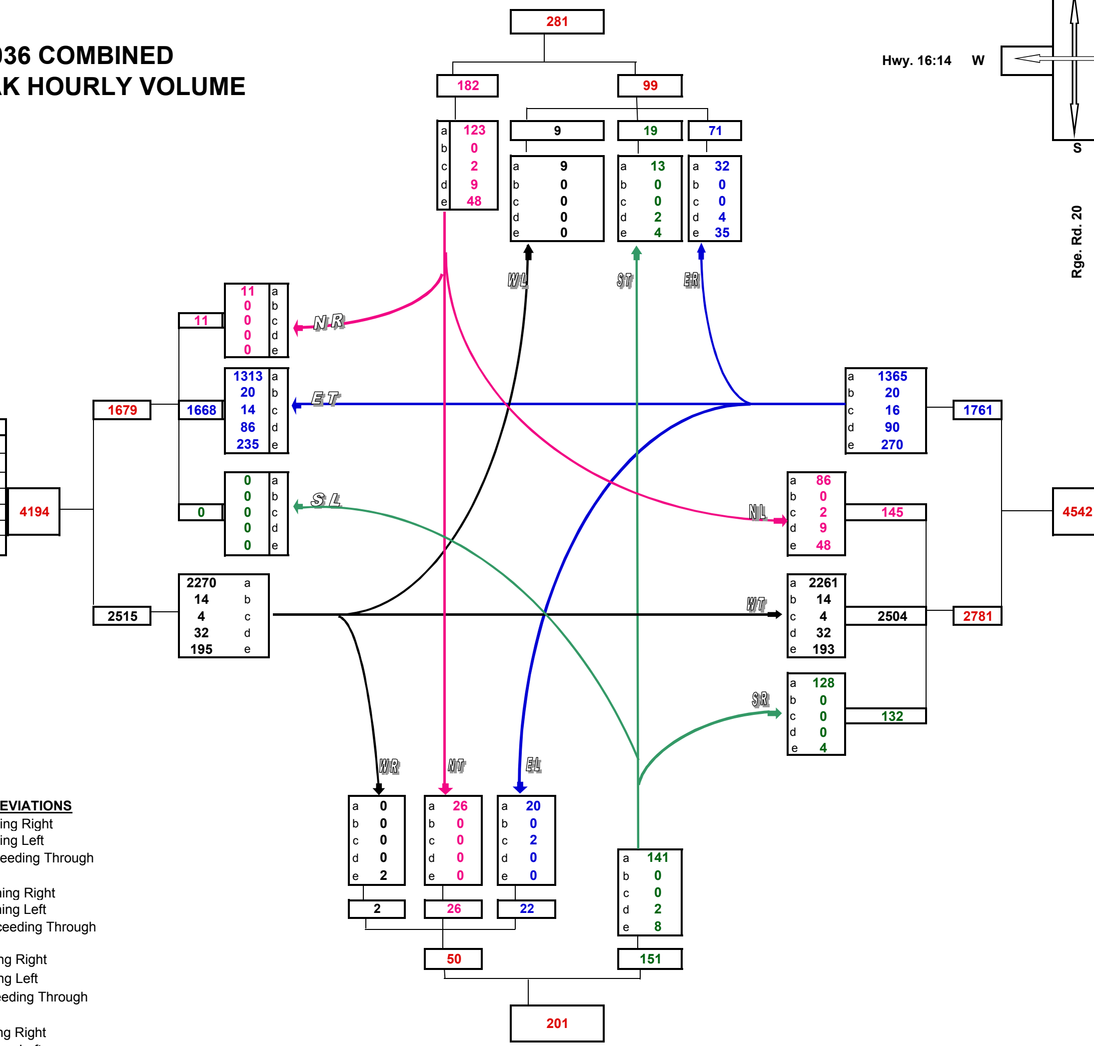
Turning Movement Summary Diagram

2036 COMBINED
AM PEAK HOURLY VOLUME

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	177	63.0
B - Recreational Vehicle	0	0.0
C - Bus	2	0.7
D - Single Unit Truck	15	5.3
E - Tractor Trailer Unit	87	31.0
Total	281	



WEST LEG ON	Hwy. 16:14	
Vehicle Type	Vol.	%
A - Passenger Vehicle	3594	85.7
B - Recreational Vehicle	34	0.8
C - Bus	18	0.4
D - Single Unit Truck	118	2.8
E - Tractor Trailer Unit	430	10.3
Total	4194	



EAST LEG ON	Hwy. 661:10	
Vehicle Type	Vol.	%
A - Passenger Vehicle	3840	84.5
B - Recreational Vehicle	34	0.7
C - Bus	22	0.5
D - Single Unit Truck	131	2.9
E - Tractor Trailer Unit	515	11.3
Total	4542	

TURNING MOVEMENT ABBREVIATIONS

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WL: Traffic from West Turning Left
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TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	187	93.0
B - Recreational Vehicle	0	0.0
C - Bus	2	1.0
D - Single Unit Truck	2	1.0
E - Tractor Trailer Unit	10	5.0
Total	201	

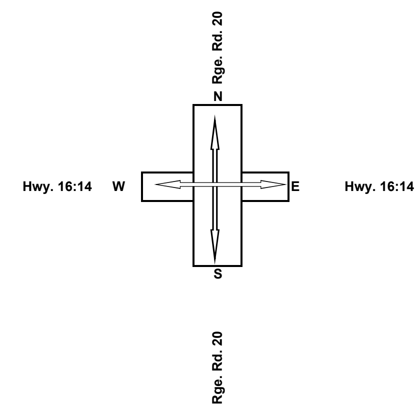
2036
2014
22

D&A PAULICHUK CONSULTING LTD.

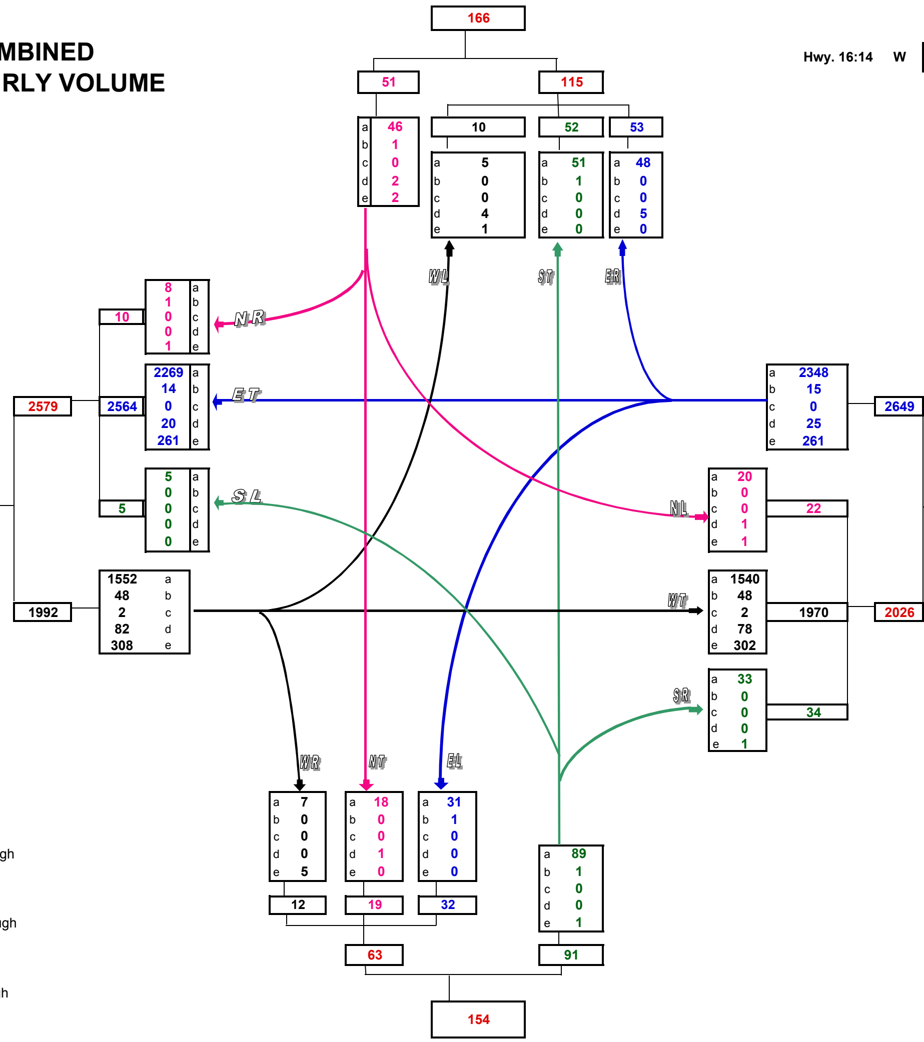
Turning Movement Summary Diagram

NORTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	150	90.4
B - Recreational Vehicle	2	1.2
C - Bus	0	0.0
D - Single Unit Truck	11	6.6
E - Tractor Trailer Unit	3	1.8
Total	166	

2036 COMBINED
PM PEAK HOURLY VOLUME



WEST LEG ON	Hwy. 16:14	
Vehicle Type	Vol.	%
A - Passenger Vehicle	3834	83.9
B - Recreational Vehicle	63	1.4
C - Bus	2	0.0
D - Single Unit Truck	102	2.2
E - Tractor Trailer Unit	570	12.5
Total	4571	



EAST LEG ON	Hwy. 661:10	
Vehicle Type	Vol.	%
A - Passenger Vehicle	3941	84.3
B - Recreational Vehicle	63	1.3
C - Bus	2	0.0
D - Single Unit Truck	104	2.2
E - Tractor Trailer Unit	565	12.1
Total	4675	

TURNING MOVEMENT ABBREVIATIONS

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ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Rge. Rd. 20	
Vehicle Type	Vol.	%
A - Passenger Vehicle	145	94.2
B - Recreational Vehicle	2	1.3
C - Bus	0	0.0
D - Single Unit Truck	1	0.6
E - Tractor Trailer Unit	6	3.9
Total	154	

2036
2014
22

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	1371	2	18	914	59	0	16	110	118	21	8
Future Volume (Veh/h)	7	1371	2	18	914	59	0	16	110	118	21	8
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	1490	2	20	993	64	0	17	120	128	23	9
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		Raised			Raised							
Median storage veh)		3			3							
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1057			1492			2063	2603	745	1922	2541	496
vC1, stage 1 conf vol							1506	1506		1033	1033	
vC2, stage 2 conf vol							557	1097		890	1508	
vCu, unblocked vol	1057			1492			2063	2603	745	1922	2541	496
tC, single (s)	4.5			4.5			7.6	6.6	7.0	7.6	6.6	7.0
tC, 2 stage (s)							6.6	5.6		6.6	5.6	
tF (s)	2.4			2.4			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			94			100	89	66	8	84	98
cM capacity (veh/h)	548			359			119	156	350	139	145	511

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1
Volume Total	8	745	745	2	20	496	496	64	137	160
Volume Left	8	0	0	0	20	0	0	0	0	128
Volume Right	0	0	0	2	0	0	0	64	120	9
cSH	548	1700	1700	1700	359	1700	1700	1700	303	145
Volume to Capacity	0.01	0.44	0.44	0.00	0.06	0.29	0.29	0.04	0.45	1.10
Queue Length 95th (m)	0.4	0.0	0.0	0.0	1.4	0.0	0.0	0.0	17.9	69.7
Control Delay (s)	11.7	0.0	0.0	0.0	15.6	0.0	0.0	0.0	26.3	165.3
Lane LOS	B				C				D	F
Approach Delay (s)	0.1				0.3				26.3	165.3
Approach LOS									D	F

Intersection Summary			
Average Delay	10.6		
Intersection Capacity Utilization	76.6%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	1080	10	27	1405	42	4	44	29	18	16	8
Future Volume (Veh/h)	7	1080	10	27	1405	42	4	44	29	18	16	8
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	1174	11	29	1527	46	4	48	32	20	17	9
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		Raised			Raised							
Median storage veh)		3			3							
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1573			1185			2029	2821	587	2244	2786	764
vC1, stage 1 conf vol							1190	1190		1585	1585	
vC2, stage 2 conf vol							839	1631		659	1201	
vCu, unblocked vol	1573			1185			2029	2821	587	2244	2786	764
tC, single (s)	4.5			4.5			7.6	6.6	7.0	7.6	6.6	7.0
tC, 2 stage (s)							6.6	5.6		6.6	5.6	
tF (s)	2.4			2.4			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			94			98	62	93	80	87	97
cM capacity (veh/h)	332			484			165	127	445	100	134	340

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1
Volume Total	8	587	587	11	29	764	764	46	84	46
Volume Left	8	0	0	0	29	0	0	0	4	20
Volume Right	0	0	0	11	0	0	0	46	32	9
cSH	332	1700	1700	1700	484	1700	1700	1700	177	130
Volume to Capacity	0.02	0.35	0.35	0.01	0.06	0.45	0.45	0.03	0.48	0.35
Queue Length 95th (m)	0.6	0.0	0.0	0.0	1.5	0.0	0.0	0.0	18.2	11.5
Control Delay (s)	16.1	0.0	0.0	0.0	12.9	0.0	0.0	0.0	42.6	47.1
Lane LOS	C				B				E	E
Approach Delay (s)	0.1				0.2				42.6	47.1
Approach LOS									E	E

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	64.5%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	1655	2	19	1102	62	0	17	115	127	22	10
Future Volume (Veh/h)	7	1655	2	19	1102	62	0	17	115	127	22	10
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	1799	2	21	1198	67	0	18	125	138	24	11
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		Raised			Raised							
Median storage veh)		3			3							
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1265			1801			2479	3122	900	2290	3057	599
vC1, stage 1 conf vol							1815	1815		1240	1240	
vC2, stage 2 conf vol							664	1307		1050	1817	
vCu, unblocked vol	1265			1801			2479	3122	900	2290	3057	599
tC, single (s)	4.5			4.5			7.6	6.6	7.0	7.6	6.6	7.0
tC, 2 stage (s)							6.6	5.6		6.6	5.6	
tF (s)	2.4			2.4			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			92			100	84	55	0	75	97
cM capacity (veh/h)	448			265			76	110	276	82	96	437

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1
Volume Total	8	900	900	2	21	599	599	67	143	173
Volume Left	8	0	0	0	21	0	0	0	0	138
Volume Right	0	0	0	2	0	0	0	67	125	11
cSH	448	1700	1700	1700	265	1700	1700	1700	232	88
Volume to Capacity	0.02	0.53	0.53	0.00	0.08	0.35	0.35	0.04	0.62	1.96
Queue Length 95th (m)	0.4	0.0	0.0	0.0	2.1	0.0	0.0	0.0	29.1	119.4
Control Delay (s)	13.2	0.0	0.0	0.0	19.8	0.0	0.0	0.0	42.7	548.6
Lane LOS	B				C				E	F
Approach Delay (s)	0.1				0.3				42.7	548.6
Approach LOS									E	F

Intersection Summary			
Average Delay	29.8		
Intersection Capacity Utilization	87.7%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	1352	10	28	1693	47	4	46	30	20	17	9
Future Volume (Veh/h)	8	1352	10	28	1693	47	4	46	30	20	17	9
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	1470	11	30	1840	51	4	50	33	22	18	10
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		Raised			Raised							
Median storage veh)		3			3							
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1891			1481			2487	3439	735	2711	3399	920
vC1, stage 1 conf vol							1488	1488		1900	1900	
vC2, stage 2 conf vol							999	1951		811	1499	
vCu, unblocked vol	1891			1481			2487	3439	735	2711	3399	920
tC, single (s)	4.5			4.5			7.6	6.6	7.0	7.6	6.6	7.0
tC, 2 stage (s)							6.6	5.6		6.6	5.6	
tF (s)	2.4			2.4			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			92			96	39	91	64	80	96
cM capacity (veh/h)	242			363			107	82	355	61	89	267

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1
Volume Total	9	735	735	11	30	920	920	51	87	50
Volume Left	9	0	0	0	30	0	0	0	4	22
Volume Right	0	0	0	11	0	0	0	51	33	10
cSH	242	1700	1700	1700	363	1700	1700	1700	118	83
Volume to Capacity	0.04	0.43	0.43	0.01	0.08	0.54	0.54	0.03	0.74	0.60
Queue Length 95th (m)	0.9	0.0	0.0	0.0	2.1	0.0	0.0	0.0	32.8	21.8
Control Delay (s)	20.4	0.0	0.0	0.0	15.8	0.0	0.0	0.0	93.5	98.6
Lane LOS	C				C				F	F
Approach Delay (s)	0.1				0.2				93.5	98.6
Approach LOS									F	F

Intersection Summary			
Average Delay	3.9		
Intersection Capacity Utilization	74.6%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	1937	2	20	1290	64	0	17	121	133	24	10
Future Volume (Veh/h)	8	1937	2	20	1290	64	0	17	121	133	24	10
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	2105	2	22	1402	70	0	18	132	145	26	11
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		Raised			Raised							
Median storage veh)		3			3							
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1472			2107			2892	3639	1052	2658	3571	701
vC1, stage 1 conf vol							2123	2123		1446	1446	
vC2, stage 2 conf vol							769	1516		1212	2125	
vCu, unblocked vol	1472			2107			2892	3639	1052	2658	3571	701
tC, single (s)	4.5			4.5			7.6	6.6	7.0	7.6	6.6	7.0
tC, 2 stage (s)							6.6	5.6		6.6	5.6	
tF (s)	2.4			2.4			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			89			100	76	39	0	56	97
cM capacity (veh/h)	366			195			48	77	218	34	60	374

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1
Volume Total	9	1052	1052	2	22	701	701	70	150	182
Volume Left	9	0	0	0	22	0	0	0	0	145
Volume Right	0	0	0	2	0	0	0	70	132	11
cSH	366	1700	1700	1700	195	1700	1700	1700	178	39
Volume to Capacity	0.02	0.62	0.62	0.00	0.11	0.41	0.41	0.04	0.84	4.71
Queue Length 95th (m)	0.6	0.0	0.0	0.0	3.0	0.0	0.0	0.0	47.5	Err
Control Delay (s)	15.1	0.0	0.0	0.0	25.8	0.0	0.0	0.0	84.0	Err
Lane LOS	C				D				F	F
Approach Delay (s)	0.1				0.4				84.0	Err
Approach LOS									F	F

Intersection Summary			
Average Delay	465.0		
Intersection Capacity Utilization	98.3%	ICU Level of Service	F
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	1525	11	29	1984	48	4	48	31	21	18	10
Future Volume (Veh/h)	8	1525	11	29	1984	48	4	48	31	21	18	10
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	1658	12	32	2157	52	4	52	34	23	20	11
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		Raised			Raised							
Median storage veh)		3			3							
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	2209			1670			2840	3949	829	3128	3909	1078
vC1, stage 1 conf vol							1676	1676		2221	2221	
vC2, stage 2 conf vol							1164	2273		907	1688	
vCu, unblocked vol	2209			1670			2840	3949	829	3128	3909	1078
tC, single (s)	4.5			4.5			7.6	6.6	7.0	7.6	6.6	7.0
tC, 2 stage (s)							6.6	5.6		6.6	5.6	
tF (s)	2.4			2.4			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			89			95	2	89	38	67	95
cM capacity (veh/h)	176			301			75	53	308	37	60	209

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1
Volume Total	9	829	829	12	32	1078	1078	52	90	54
Volume Left	9	0	0	0	32	0	0	0	4	23
Volume Right	0	0	0	12	0	0	0	52	34	11
cSH	176	1700	1700	1700	301	1700	1700	1700	78	54
Volume to Capacity	0.05	0.49	0.49	0.01	0.11	0.63	0.63	0.03	1.15	1.00
Queue Length 95th (m)	1.3	0.0	0.0	0.0	2.8	0.0	0.0	0.0	52.6	36.1
Control Delay (s)	26.5	0.0	0.0	0.0	18.4	0.0	0.0	0.0	241.2	247.1
Lane LOS	D				C				F	F
Approach Delay (s)	0.1				0.3				241.2	247.1
Approach LOS									F	F

Intersection Summary			
Average Delay	8.8		
Intersection Capacity Utilization	84.8%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	2504	2	22	1668	71	0	19	132	145	26	11
Future Volume (Veh/h)	9	2504	2	22	1668	71	0	19	132	145	26	11
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	2722	2	24	1813	77	0	21	143	158	28	12
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		Raised			Raised							
Median storage veh)		3			3							
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1890			2724			3722	4680	1361	3396	4605	906
vC1, stage 1 conf vol							2742	2742		1861	1861	
vC2, stage 2 conf vol							980	1938		1534	2744	
vCu, unblocked vol	1890			2724			3722	4680	1361	3396	4605	906
tC, single (s)	4.5			4.5			7.6	6.6	7.0	7.6	6.6	7.0
tC, 2 stage (s)							6.6	5.6		6.6	5.6	
tF (s)	2.4			2.4			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			77			100	41	0	0	0	96
cM capacity (veh/h)	242			105			18	36	134	0	14	273

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1
Volume Total	10	1361	1361	2	24	906	906	77	164	198
Volume Left	10	0	0	0	24	0	0	0	0	158
Volume Right	0	0	0	2	0	0	0	77	143	12
cSH	242	1700	1700	1700	105	1700	1700	1700	99	0
Volume to Capacity	0.04	0.80	0.80	0.00	0.23	0.53	0.53	0.05	1.65	Err
Queue Length 95th (m)	1.0	0.0	0.0	0.0	6.6	0.0	0.0	0.0	103.1	Err
Control Delay (s)	20.5	0.0	0.0	0.0	49.4	0.0	0.0	0.0	409.2	Err
Lane LOS	C				E				F	F
Approach Delay (s)	0.1				0.6				409.2	Err
Approach LOS									F	F

Intersection Summary			
Average Delay	Err		
Intersection Capacity Utilization	119.8%	ICU Level of Service	H
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
3: Range Road 20 & Hwy. 16:14

10/12/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	1970	12	32	2564	53	5	52	34	22	19	10
Future Volume (Veh/h)	10	1970	12	32	2564	53	5	52	34	22	19	10
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	2141	13	35	2787	58	5	57	37	24	21	11
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		Raised			Raised							
Median storage veh)		3			3							
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	2845			2154			3648	5078	1070	4015	5033	1394
vC1, stage 1 conf vol							2163	2163		2857	2857	
vC2, stage 2 conf vol							1485	2915		1158	2176	
vCu, unblocked vol	2845			2154			3648	5078	1070	4015	5033	1394
tC, single (s)	4.5			4.5			7.6	6.6	7.0	7.6	6.6	7.0
tC, 2 stage (s)							6.6	5.6		6.6	5.6	
tF (s)	2.4			2.4			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	88			81			62	0	83	0	11	91
cM capacity (veh/h)	92			186			13	15	212	0	24	128

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1
Volume Total	11	1070	1070	13	35	1394	1394	58	99	56
Volume Left	11	0	0	0	35	0	0	0	5	24
Volume Right	0	0	0	13	0	0	0	58	37	11
cSH	92	1700	1700	1700	186	1700	1700	1700	23	0
Volume to Capacity	0.12	0.63	0.63	0.01	0.19	0.82	0.82	0.03	4.31	Err
Queue Length 95th (m)	3.1	0.0	0.0	0.0	5.4	0.0	0.0	0.0	Err	Err
Control Delay (s)	49.2	0.0	0.0	0.0	28.8	0.0	0.0	0.0	Err	Err
Lane LOS	E				D				F	F
Approach Delay (s)	0.2				0.3				Err	Err
Approach LOS									F	F

Intersection Summary			
Average Delay	Err		
Intersection Capacity Utilization	104.9%	ICU Level of Service	G
Analysis Period (min)	15		

APPENDIX D – Hwy. 43 & Twp. Rd. 540

TURNING MOVEMENT DIAGRAMS
SYNCHRO ANALYSIS
ILLUMINATION WARRANT

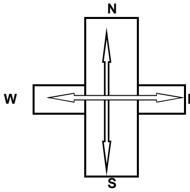
D&A PAULICHUK CONSULTING LTD.

Turning Movement Summary Diagram

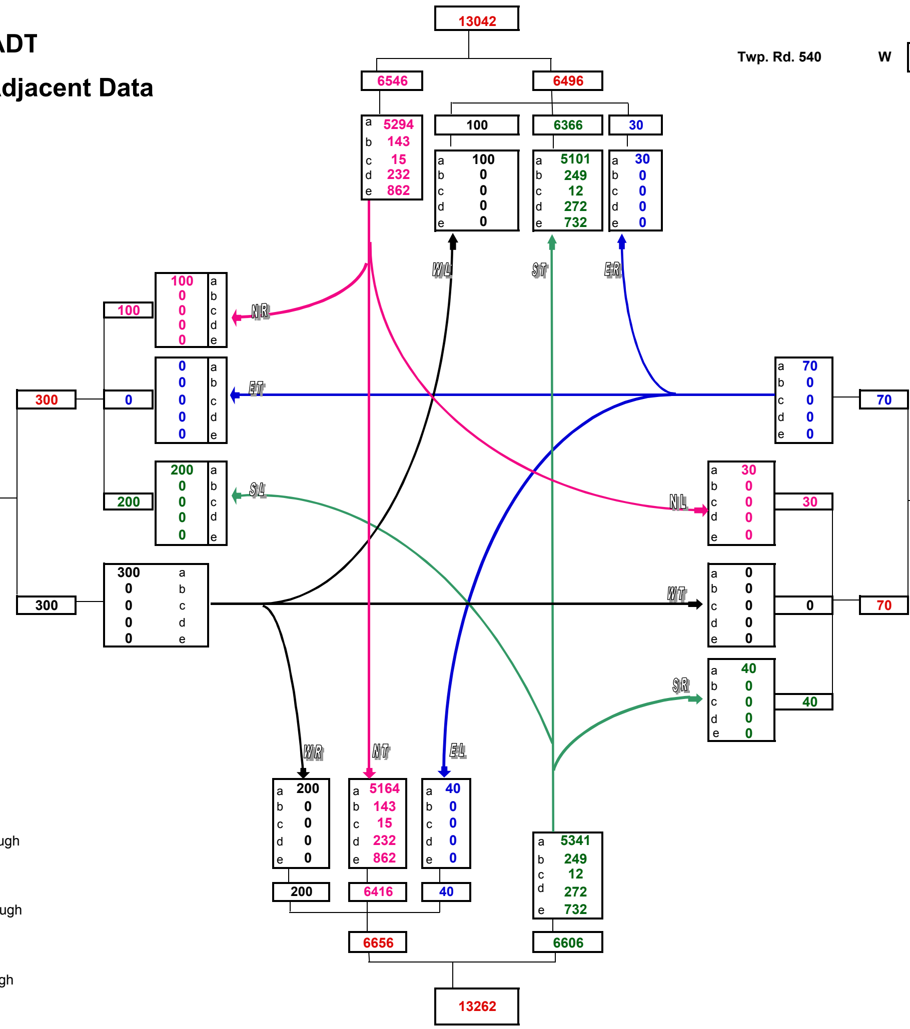
Intersection of: **Highway 43:22 & Twp. Rd. 540**

2014 AADT
Estimated from Adjacent Data

NORTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	10525	80.70
B - Recreational Vehicle	392	3.01
C - Bus	27	0.21
D - Single Unit Truck	504	3.86
E - Tractor Trailer Unit	1594	12.22
Total	13042	



WEST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	600	100
B - Recreational Vehicle	0	0.00
C - Bus	0	0.00
D - Single Unit Truck	0	0.00
E - Tractor Trailer Unit	0	0.00
Total	600	



EAST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	140	100.00
B - Recreational Vehicle	0	0.00
C - Bus	0	0.00
D - Single Unit Truck	0	0.00
E - Tractor Trailer Unit	0	0.00
Total	140	

NR: Traffic from North Turning Right
NL: Traffic from North Turning Left
NT: Traffic from North Proceeding Through

SR: Traffic from South Turning Right
SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	10745	81.02
B - Recreational Vehicle	392	2.96
C - Bus	27	0.20
D - Single Unit Truck	504	3.80
E - Tractor Trailer Unit	1594	12.02
Total	13262	

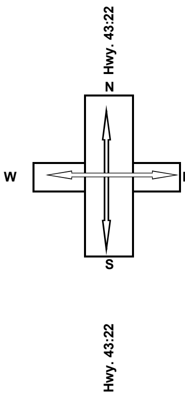
AADT Conversion Factor
1

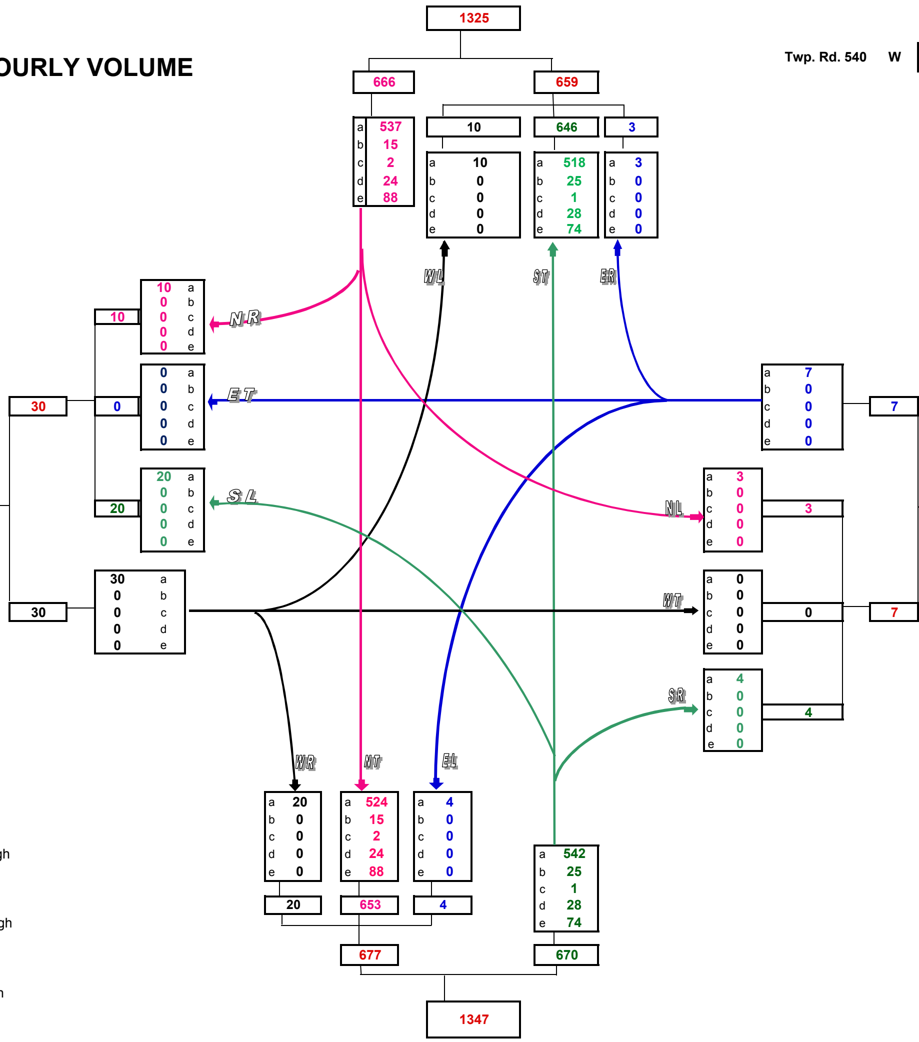
D&A PAULICHUK CONSULTING LTD.

Turning Movement Summary Diagram

2014 AM PEAK HOURLY VOLUME

NORTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1068	80.6
B - Recreational Vehicle	40	3.0
C - Bus	3	0.2
D - Single Unit Truck	52	3.9
E - Tractor Trailer Unit	162	12.2
Total	1325	





WEST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	60	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	60	

EAST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	14	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	14	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic from North Turning Right
NL: Traffic from North Turning Left
NT: Traffic from North Proceeding Through

SR: Traffic from South Turning Right
SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1090	80.9
B - Recreational Vehicle	40	3.0
C - Bus	3	0.2
D - Single Unit Truck	52	3.9
E - Tractor Trailer Unit	162	12.0
Total	1347	

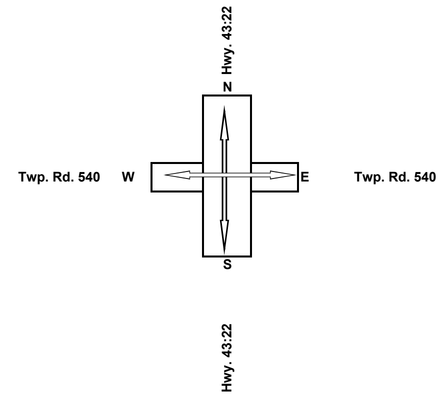
AM Peak	0.1015432
PM Peak	0.10185185

D&A PAULICHUK CONSULTING LTD.

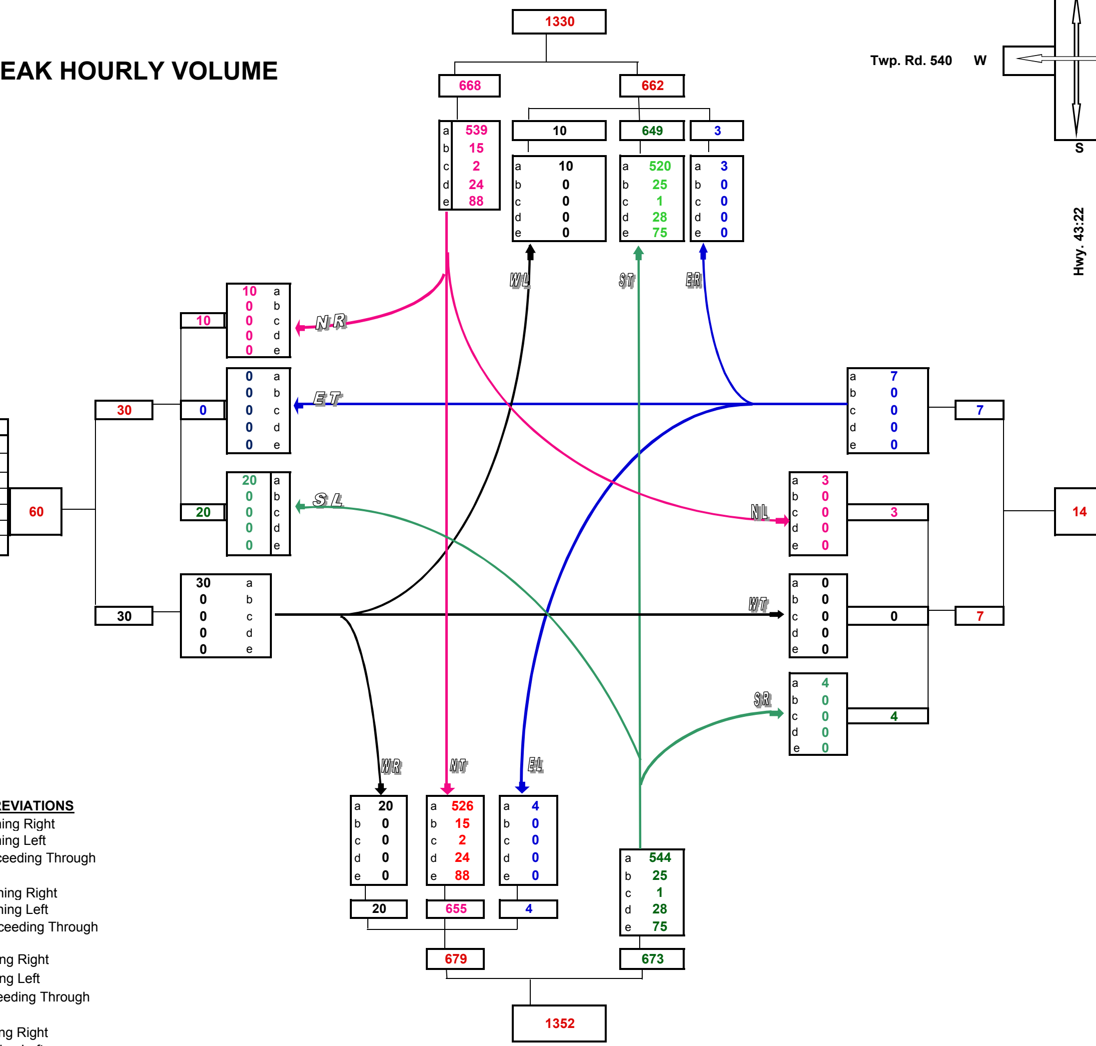
Turning Movement Summary Diagram

2014 PM PEAK HOURLY VOLUME

NORTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1072	80.6
B - Recreational Vehicle	40	3.0
C - Bus	3	0.2
D - Single Unit Truck	52	3.9
E - Tractor Trailer Unit	163	12.3
Total	1330	



WEST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	60	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	60	



EAST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	14	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	14	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic from North Turning Right
NL: Traffic from North Turning Left
NT: Traffic from North Proceeding Through

SR: Traffic from South Turning Right
SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1094	80.9
B - Recreational Vehicle	40	3.0
C - Bus	3	0.2
D - Single Unit Truck	52	3.8
E - Tractor Trailer Unit	163	12.1
Total	1352	

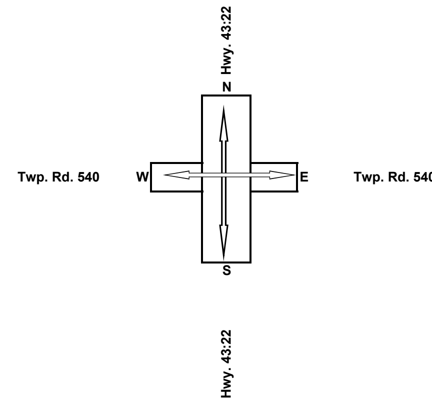
AM Peak	0.1015432
PM Peak	0.10185185

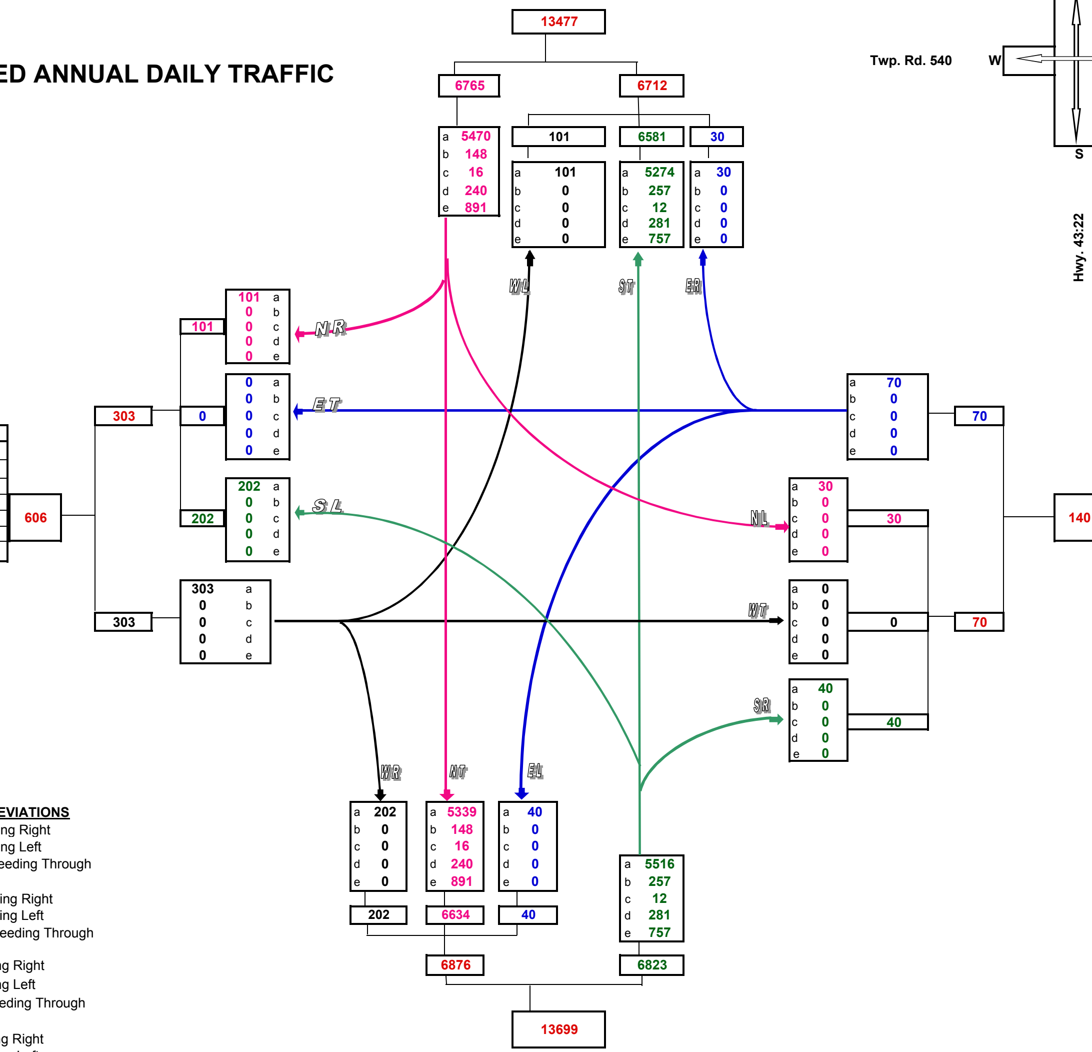
D&A PAULICHUK CONSULTING LTD.

Turning Movement Summary Diagram

NORTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	10875	-
B - Recreational Vehicle	405	-
C - Bus	28	-
D - Single Unit Truck	521	-
E - Tractor Trailer Unit	1648	-
Total	13477	

2015 ESTIMATED ANNUAL DAILY TRAFFIC





WEST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	606	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	606	

EAST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	140	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	140	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic from North Turning Right
NL: Traffic from North Turning Left
NT: Traffic from North Proceeding Through

SR: Traffic from South Turning Right
SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

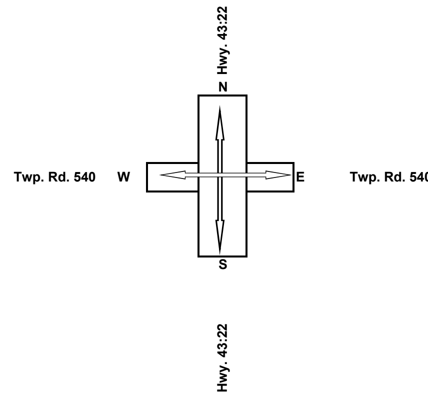
SOUTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	11097	81.0
B - Recreational Vehicle	405	3.0
C - Bus	28	0.2
D - Single Unit Truck	521	3.8
E - Tractor Trailer Unit	1648	12.0
Total	13699	

2015
2014
1

D&A PAULICHUK CONSULTING LTD.

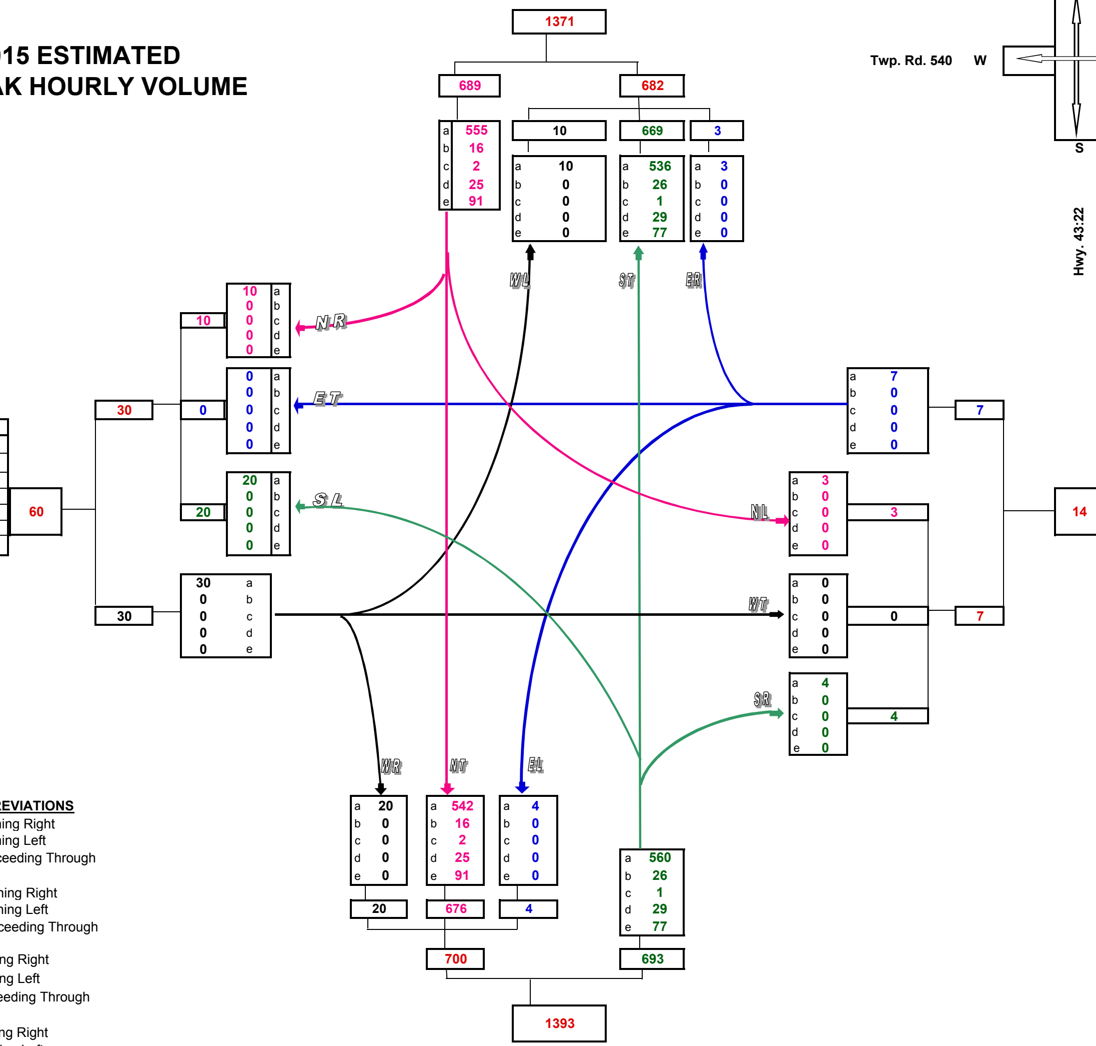
Turning Movement Summary Diagram

NORTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1104	80.5
B - Recreational Vehicle	42	3.1
C - Bus	3	0.2
D - Single Unit Truck	54	3.9
E - Tractor Trailer Unit	168	12.3
Total	1371	



2015 ESTIMATED
AM PEAK HOURLY VOLUME

WEST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	60	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	60	



EAST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	14	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	14	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic from North Turning Right
NL: Traffic from North Turning Left
NT: Traffic from North Proceeding Through

SR: Traffic from South Turning Right
SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1126	80.8
B - Recreational Vehicle	42	3.0
C - Bus	3	0.2
D - Single Unit Truck	54	3.9
E - Tractor Trailer Unit	168	12.1
Total	1393	

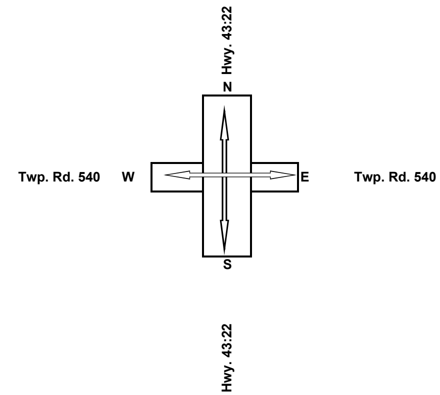
2015
2014
1

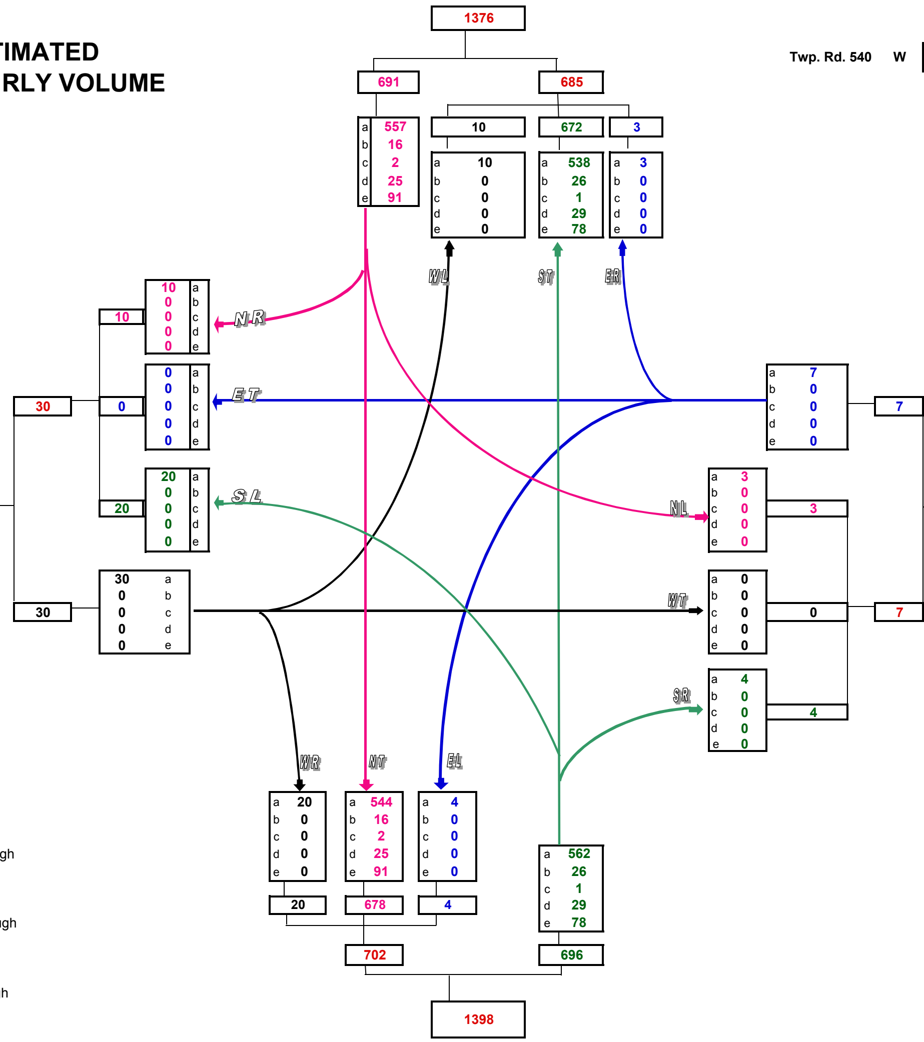
D&A PAULICHUK CONSULTING LTD.

Turning Movement Summary Diagram

2015 ESTIMATED
PM PEAK HOURLY VOLUME

NORTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1108	80.5
B - Recreational Vehicle	42	3.1
C - Bus	3	0.2
D - Single Unit Truck	54	3.9
E - Tractor Trailer Unit	169	12.3
Total	1376	





WEST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	60	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	60	

EAST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	14	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	14	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic from North Turning Right
NL: Traffic from North Turning Left
NT: Traffic from North Proceeding Through

SR: Traffic from South Turning Right
SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

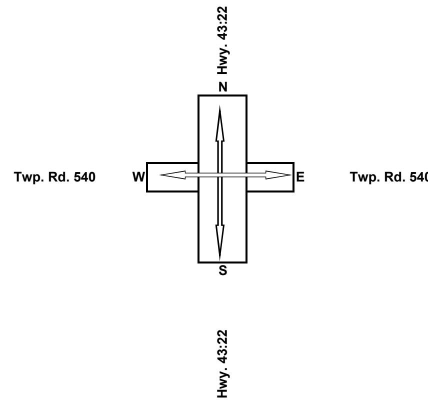
SOUTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1130	80.8
B - Recreational Vehicle	42	3.0
C - Bus	3	0.2
D - Single Unit Truck	54	3.9
E - Tractor Trailer Unit	169	12.1
Total	1398	

2015
2014
1

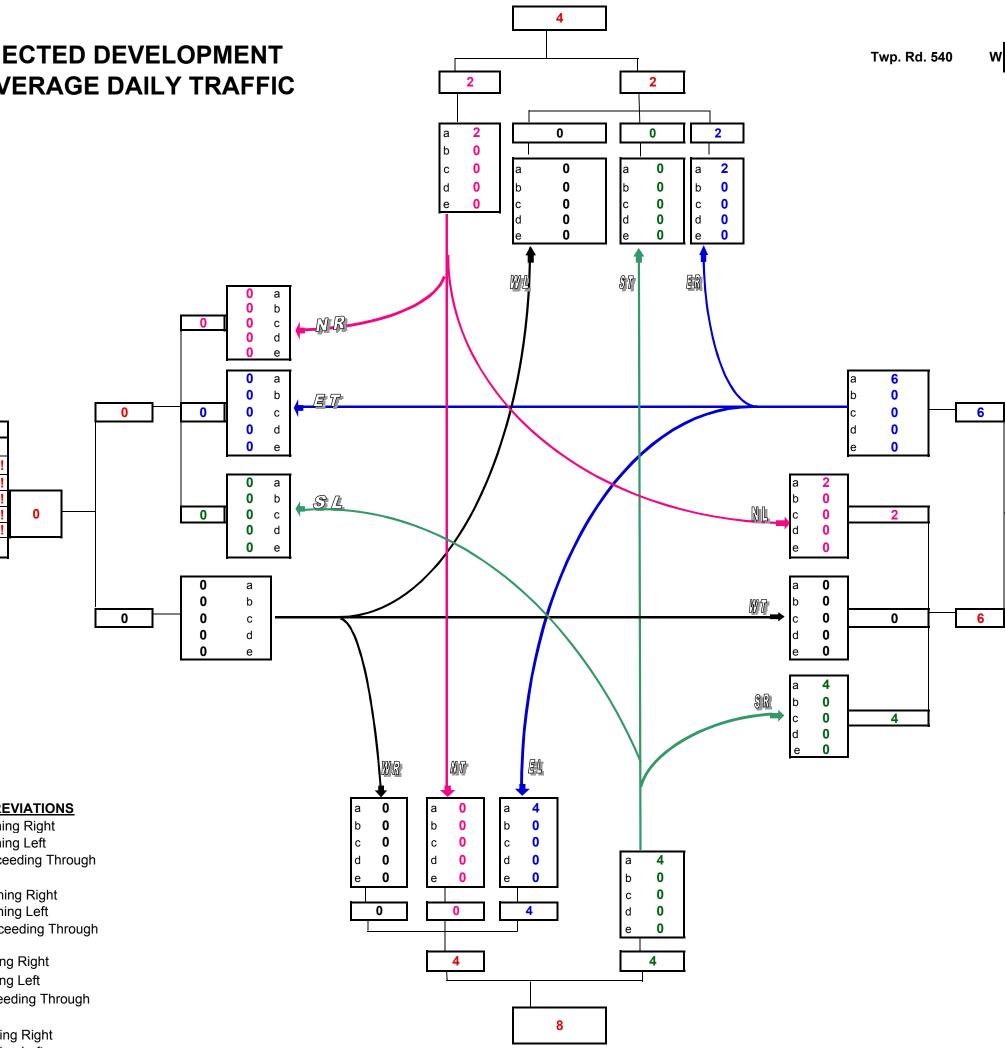
D&A PAULICHUK CONSULTING LTD.

Turning Movement Summary Diagram

NORTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	4	100.0%
B - Recreational Vehicle	0	0.0%
C - Bus	0	0.0%
D - Single Unit Truck	0	0.0%
E - Tractor Trailer Unit	0	0.0%
Total	4	



2016 PROJECTED DEVELOPMENT ANNUAL AVERAGE DAILY TRAFFIC



WEST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

EAST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	12	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	12	

TURNING MOVEMENT ABBREVIATIONS

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SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Traffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehicles per day for period of May 1 to September 30 (153 days)

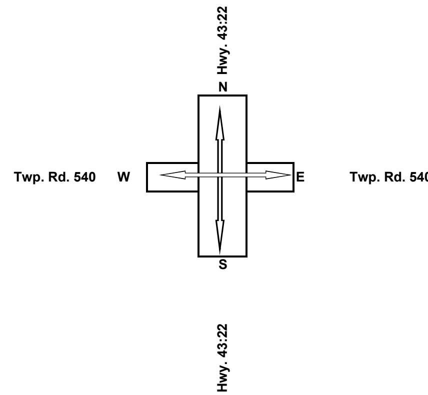
SOUTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	8	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	8	

D&A PAULICHUK CONSULTING LTD.

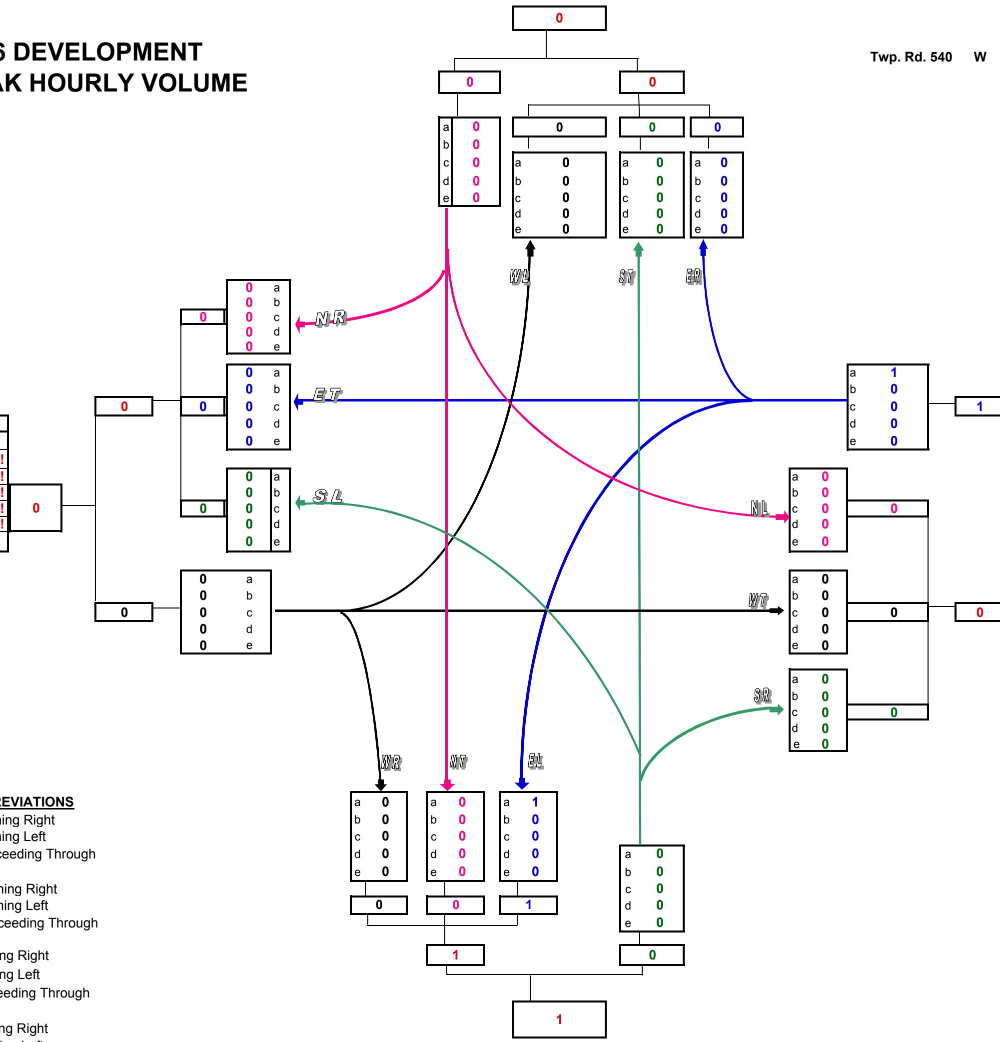
Turning Movement Summary Diagram

NORTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

2016 DEVELOPMENT
AM PEAK HOURLY VOLUME



WEST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	



EAST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	1	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic from North Turning Right
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SL: Traffic from South Turning Left
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WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
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ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

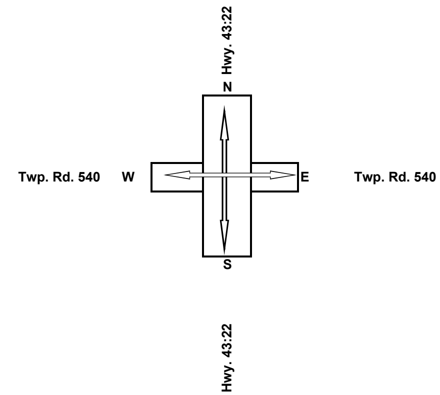
SOUTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	1	

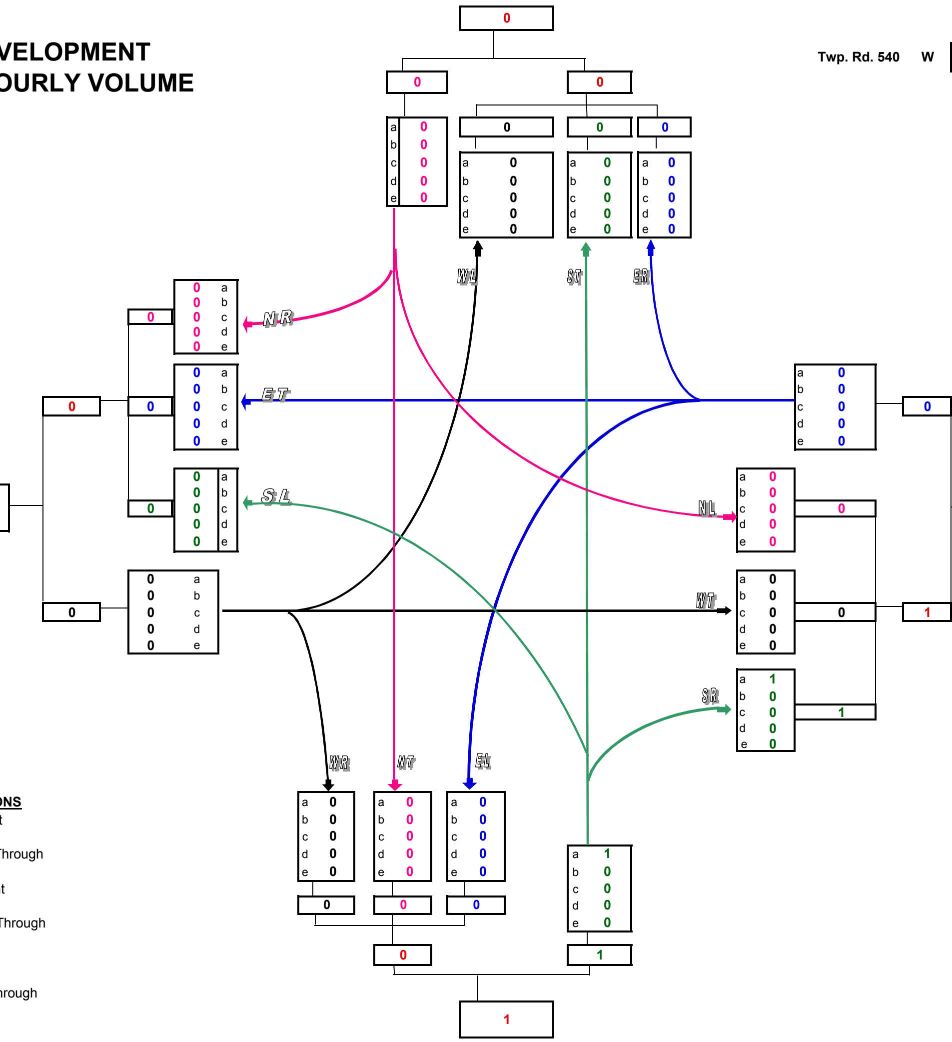
D&A PAULICHUK CONSULTING LTD.

Turning Movement Summary Diagram

2016 DEVELOPMENT
PM PEAK HOURLY VOLUME

NORTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	





WEST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

EAST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	1	

TURNING MOVEMENT ABBREVIATIONS

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WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
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Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

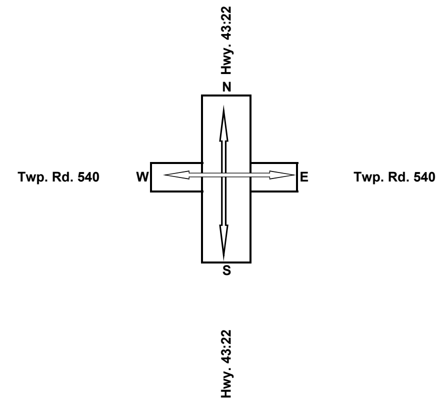
SOUTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	1	

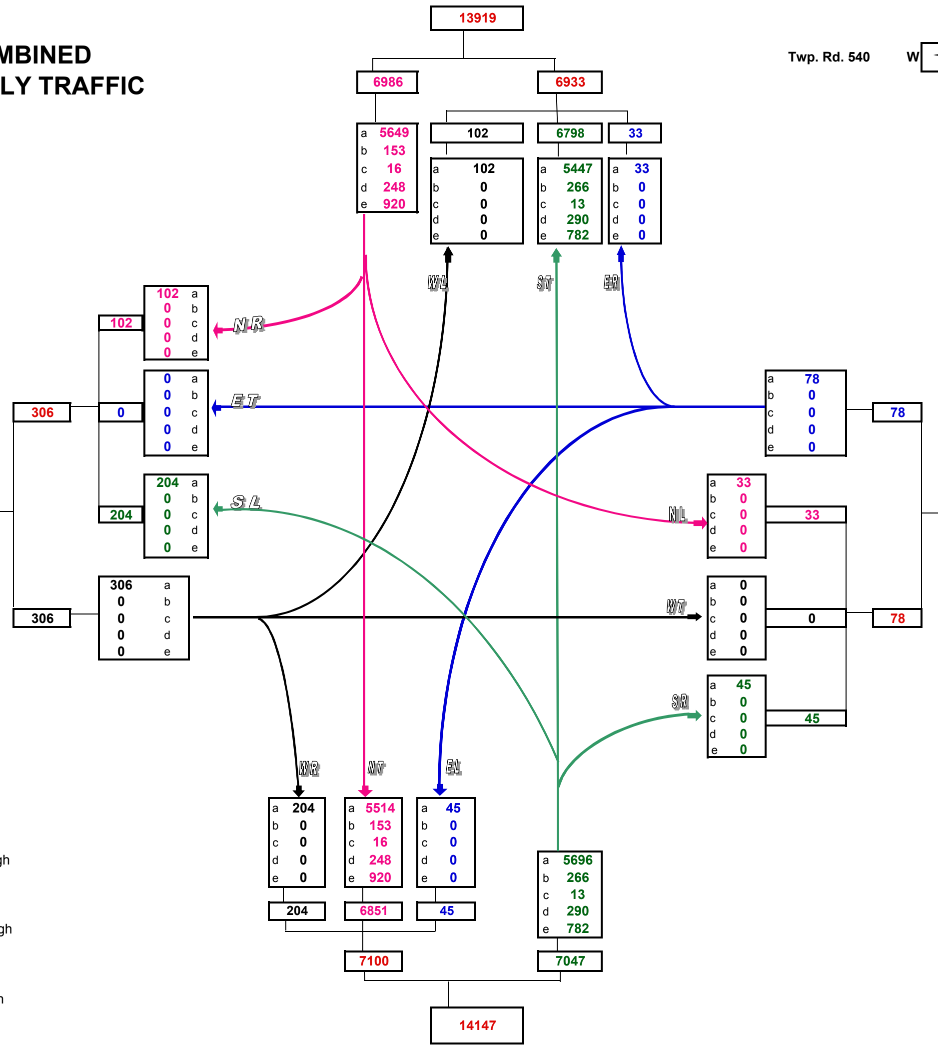
D&A PAULICHUK CONSULTING LTD.

Turning Movement Summary Diagram

NORTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	11231	-
B - Recreational Vehicle	419	-
C - Bus	29	-
D - Single Unit Truck	538	-
E - Tractor Trailer Unit	1702	-
Total	13919	

2016 COMBINED ANNUAL DAILY TRAFFIC





WEST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	612	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	612	

612

EAST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	156	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	156	

TURNING MOVEMENT ABBREVIATIONS

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SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
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ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	11459	81.0
B - Recreational Vehicle	419	3.0
C - Bus	29	0.2
D - Single Unit Truck	538	3.8
E - Tractor Trailer Unit	1702	12.0
Total	14147	

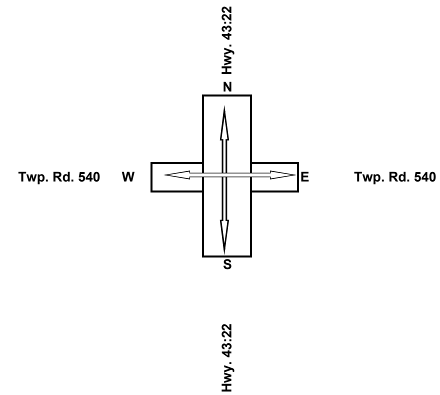
2016
2014
2

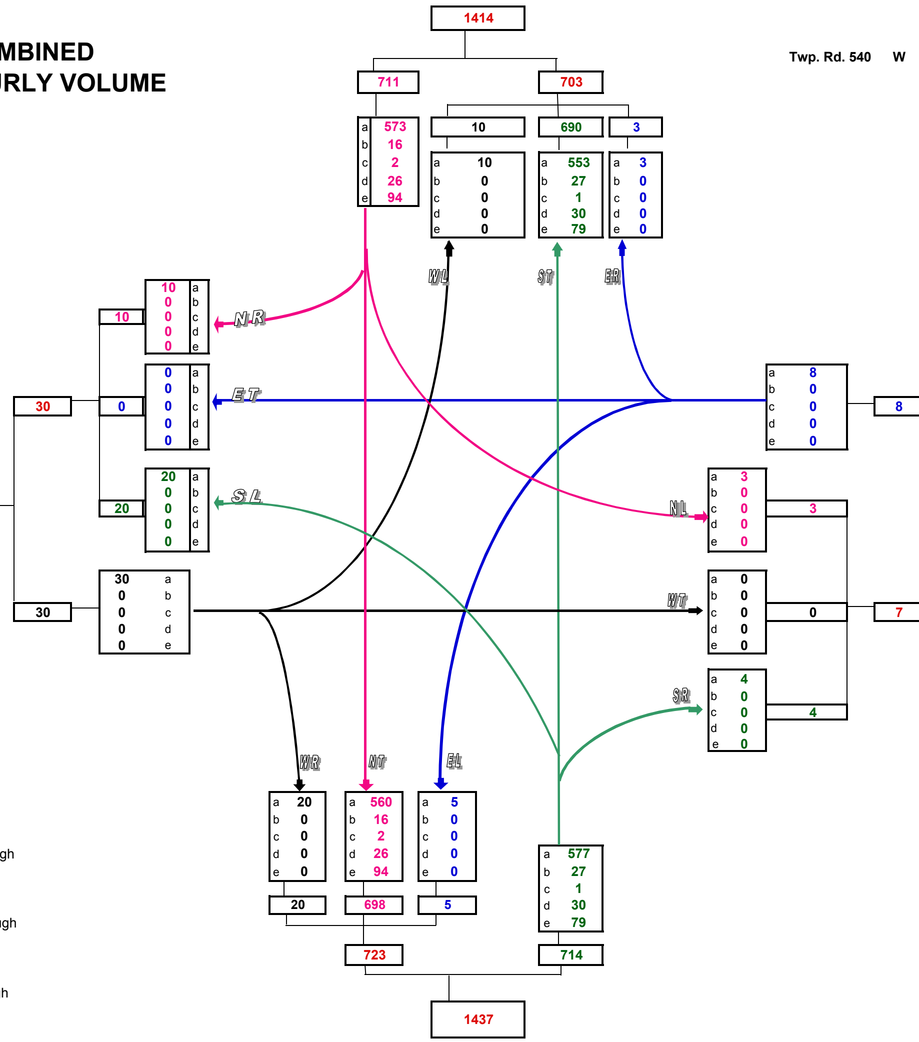
D&A PAULICHUK CONSULTING LTD.

Turning Movement Summary Diagram

2016 COMBINED
AM PEAK HOURLY VOLUME

NORTH LEG ON		Hwy. 43:22
Vehicle Type	**Vol.**	**%**
A - Passenger Vehicle	1139	80.6
B - Recreational Vehicle	43	3.0
C - Bus	3	0.2
D - Single Unit Truck	56	4.0
E - Tractor Trailer Unit	173	12.2
Total	1414	





WEST LEG ON		Twp. Rd. 540
Vehicle Type	**Vol.**	**%**
A - Passenger Vehicle	60	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	60	

EAST LEG ON		Twp. Rd. 540
Vehicle Type	**Vol.**	**%**
A - Passenger Vehicle	15	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	15	

TURNING MOVEMENT ABBREVIATIONS

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NT: Traffic from North Proceeding Through

SR: Traffic from South Turning Right
SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON		Hwy. 43:22
Vehicle Type	**Vol.**	**%**
A - Passenger Vehicle	1162	80.9
B - Recreational Vehicle	43	3.0
C - Bus	3	0.2
D - Single Unit Truck	56	3.9
E - Tractor Trailer Unit	173	12.0
Total	1437	

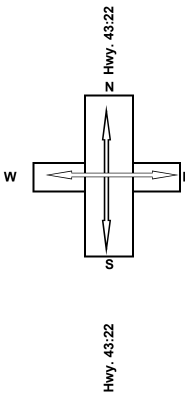
2016
2014
2

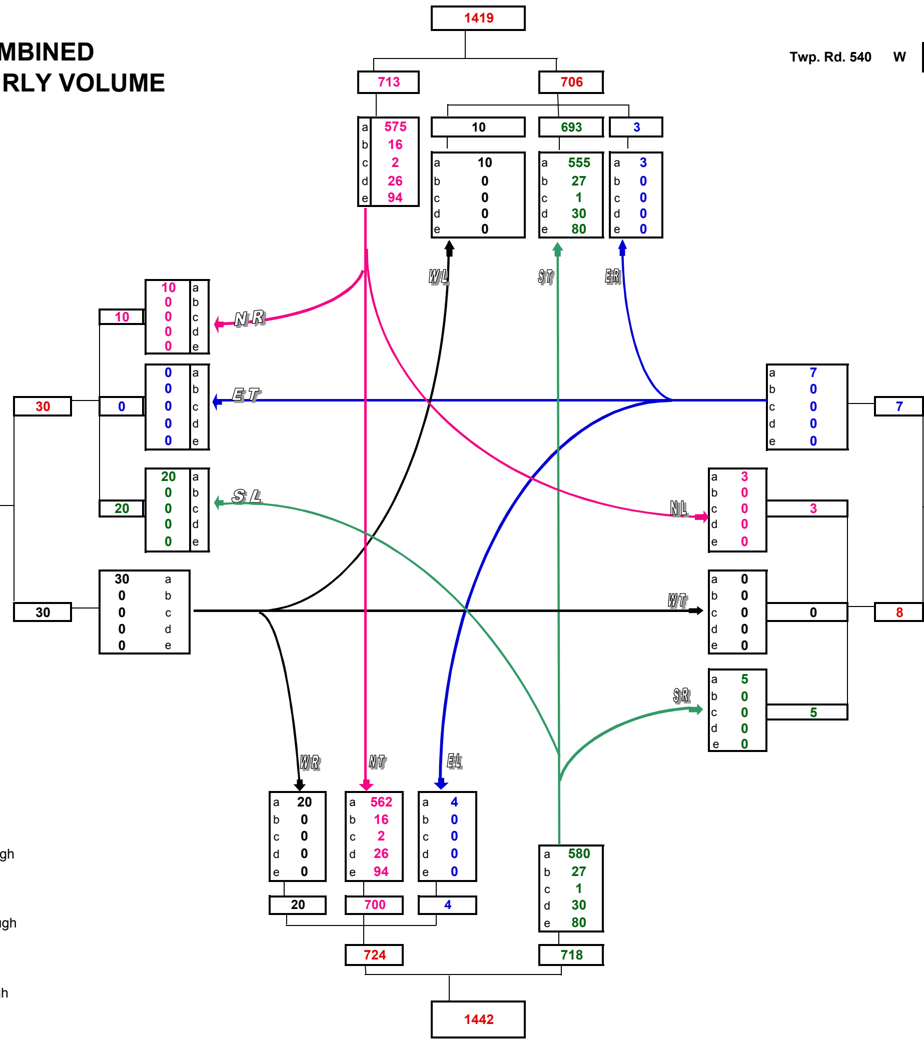
D&A PAULICHUK CONSULTING LTD.

Turning Movement Summary Diagram

2016 COMBINED PM PEAK HOURLY VOLUME

NORTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1143	80.5
B - Recreational Vehicle	43	3.0
C - Bus	3	0.2
D - Single Unit Truck	56	3.9
E - Tractor Trailer Unit	174	12.3
Total	1419	





WEST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	60	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	60	

EAST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	15	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	15	

TURNING MOVEMENT ABBREVIATIONS

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SR: Traffic from South Turning Right
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ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1166	80.9
B - Recreational Vehicle	43	3.0
C - Bus	3	0.2
D - Single Unit Truck	56	3.9
E - Tractor Trailer Unit	174	12.1
Total	1442	

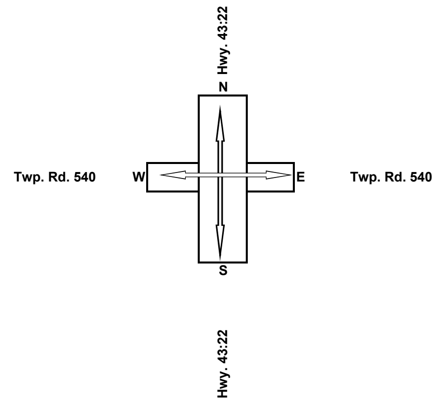
2016
2014
2

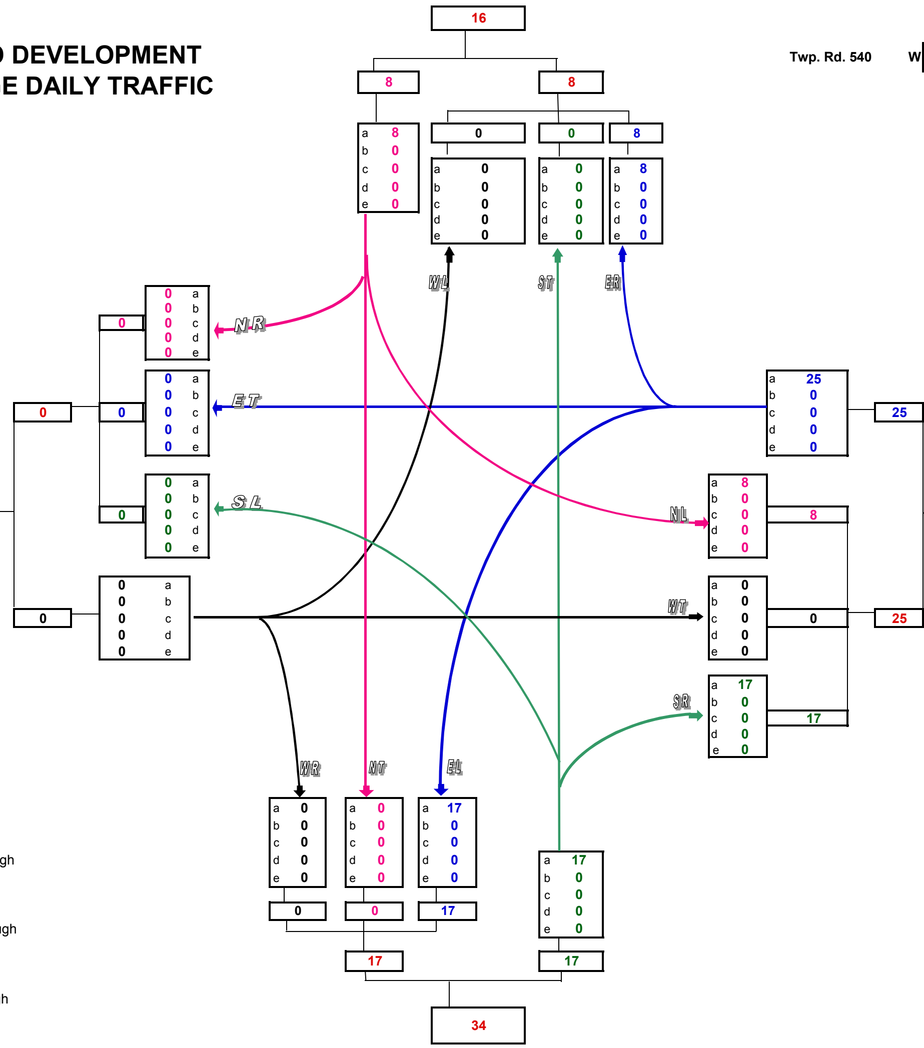
D&A PAULICHUK CONSULTING LTD.

Turning Movement Summary Diagram

NORTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	16	100.0%
B - Recreational Vehicle	0	0.0%
C - Bus	0	0.0%
D - Single Unit Truck	0	0.0%
E - Tractor Trailer Unit	0	0.0%
Total	16	

2021 PROJECTED DEVELOPMENT ANNUAL AVERAGE DAILY TRAFFIC





WEST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

EAST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	50	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	50	

TURNING MOVEMENT ABBREVIATIONS

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ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Taffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
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ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	34	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	34	

D&A PAULICHUK CONSULTING LTD.

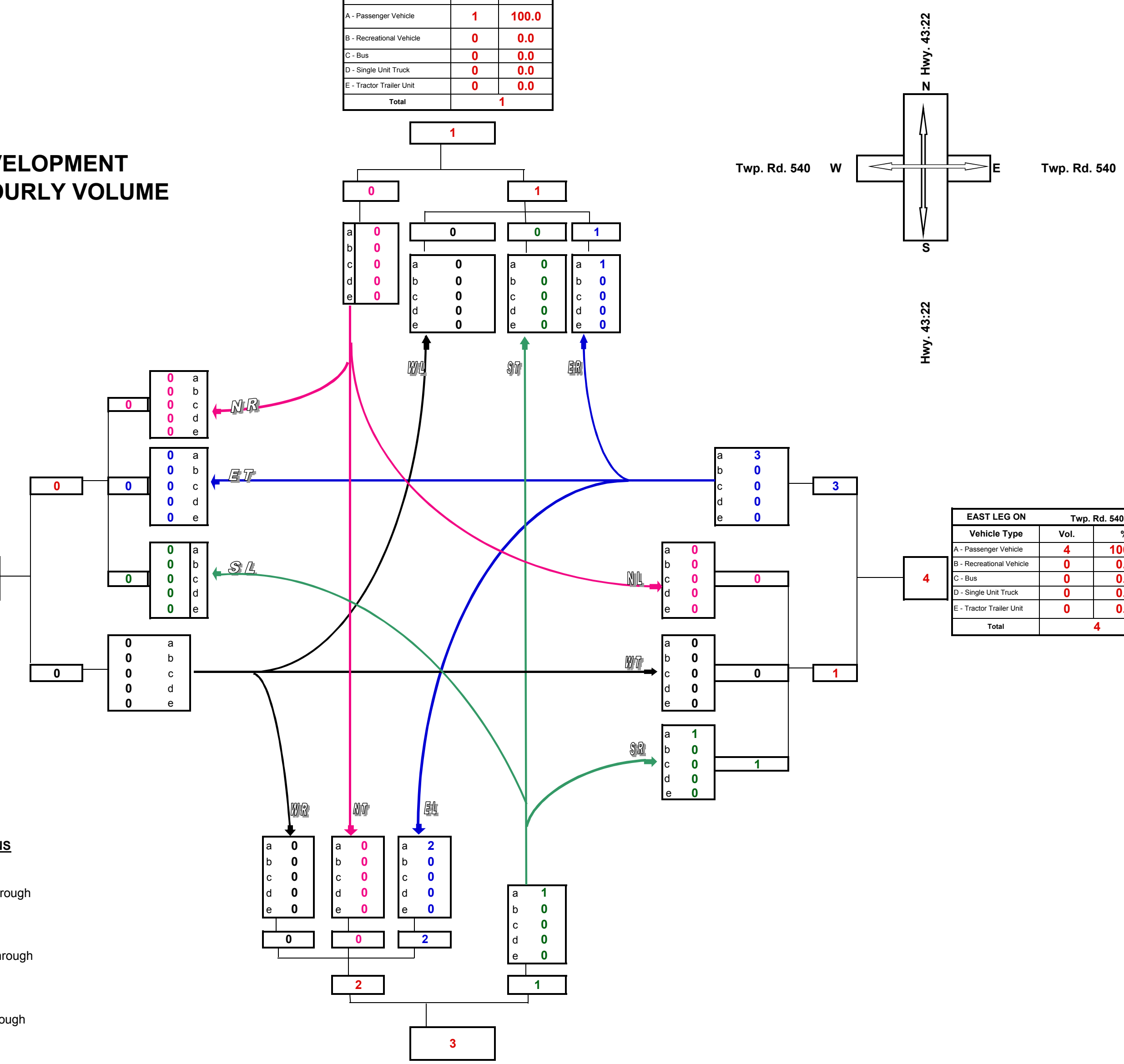
Turning Movement Summary Diagram

2021 DEVELOPMENT
AM PEAK HOURLY VOLUME

NORTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	1	

WEST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

EAST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	4	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	4	



SOUTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	3	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	3	

TURNING MOVEMENT ABBREVIATIONS

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ST: Traffic from South Proceeding Through

ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

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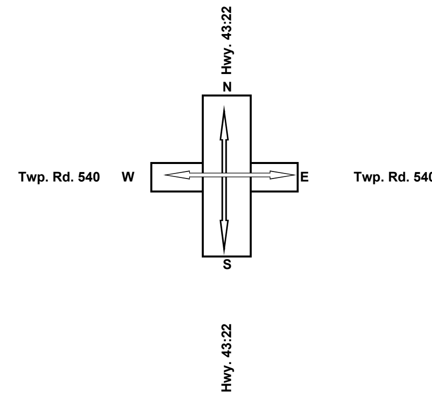
D&A PAULICHUK CONSULTING LTD.

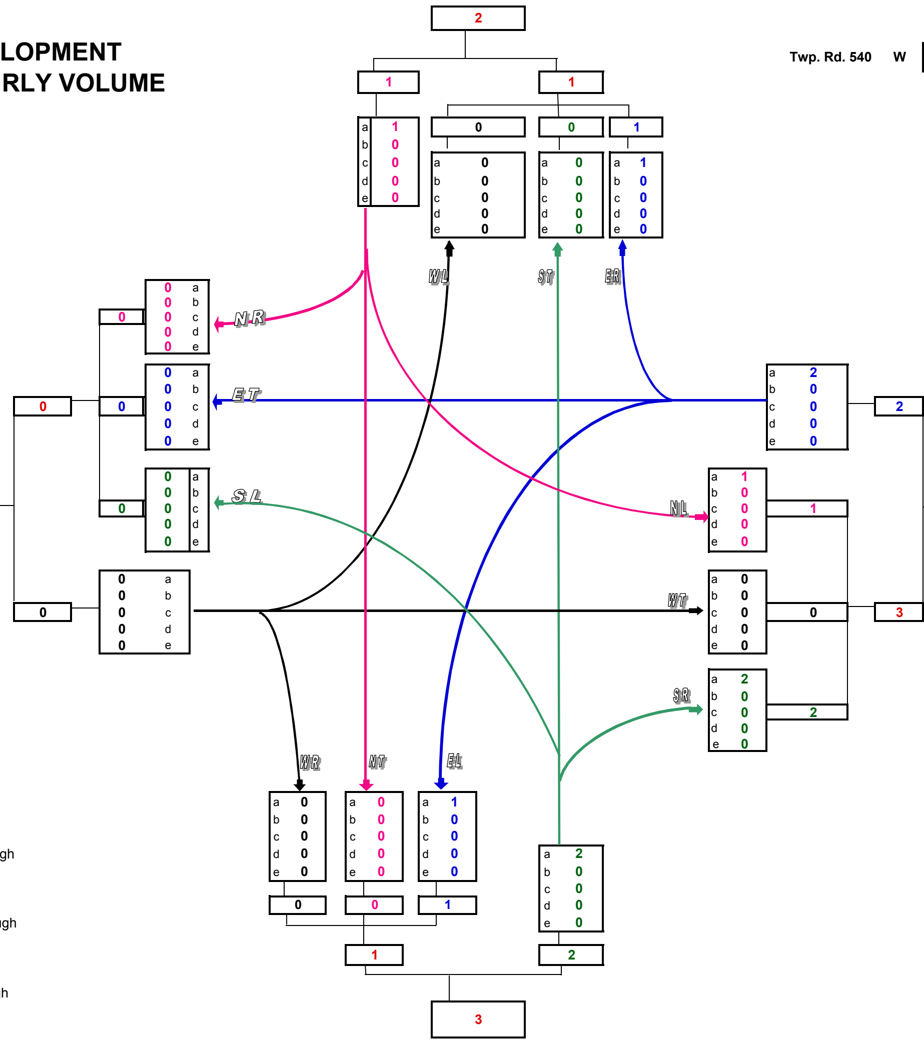
Turning Movement Summary Diagram

2021 DEVELOPMENT
PM PEAK HOURLY VOLUME

NORTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	2	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	2	



WEST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	



EAST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	5	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	5	

TURNING MOVEMENT ABBREVIATIONS

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EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

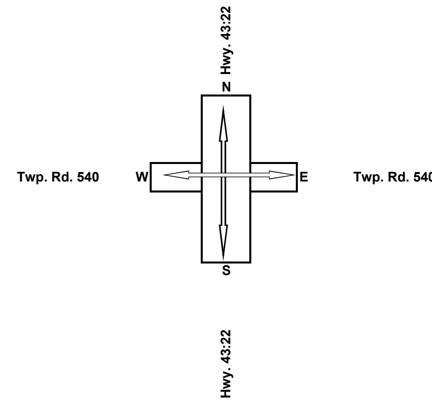
SOUTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	3	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	3	

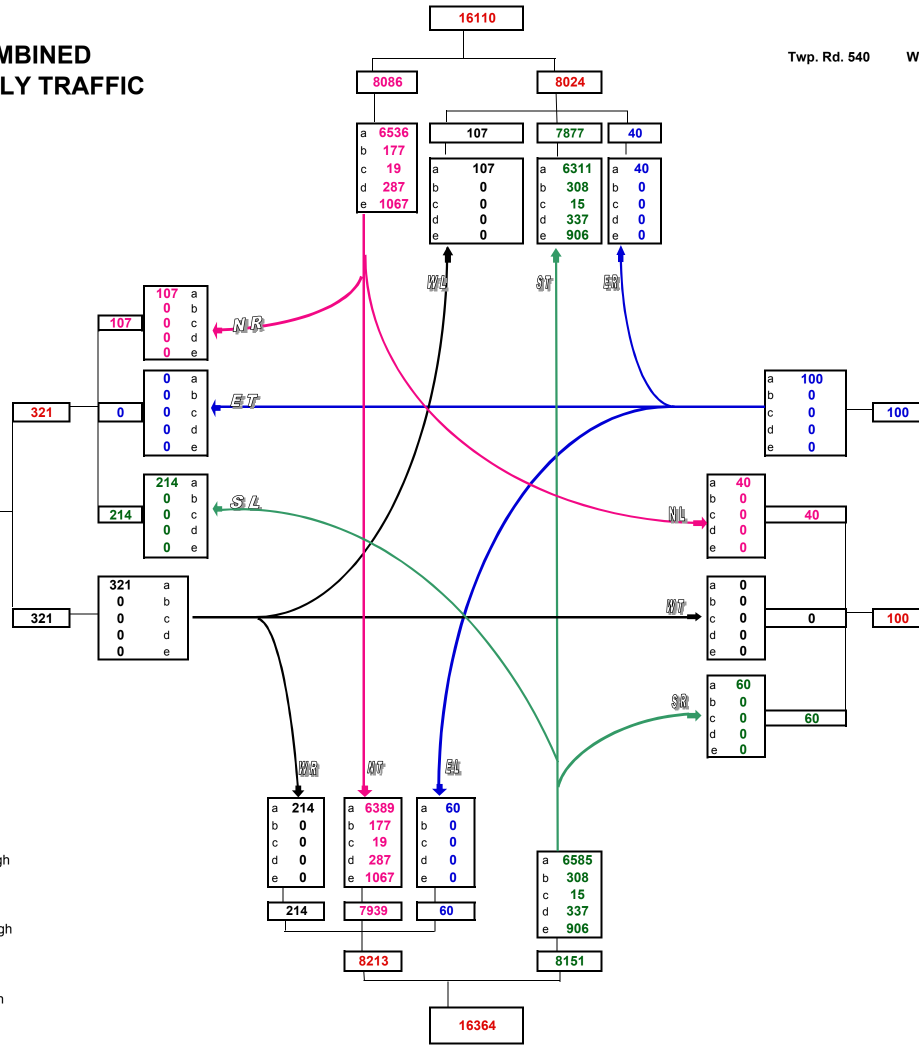
D&A PAULICHUK CONSULTING LTD.

Turning Movement Summary Diagram

NORTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	12994	-
B - Recreational Vehicle	485	-
C - Bus	34	-
D - Single Unit Truck	624	-
E - Tractor Trailer Unit	1973	-
Total	16110	

2021 COMBINED ANNUAL DAILY TRAFFIC





WEST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	642	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	642	

EAST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	200	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	200	

TURNING MOVEMENT ABBREVIATIONS

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NT: Traffic from North Proceeding Through

SR: Traffic from South Turning Right
SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	13248	81.0
B - Recreational Vehicle	485	3.0
C - Bus	34	0.2
D - Single Unit Truck	624	3.8
E - Tractor Trailer Unit	1973	12.1
Total	16364	

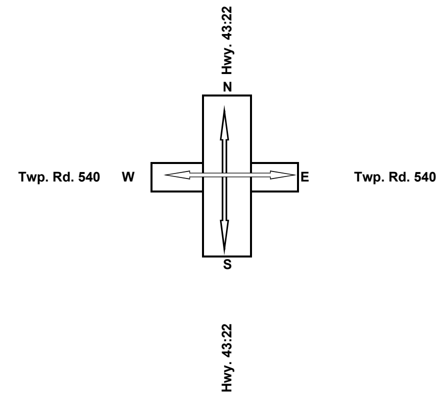
2021
2014
7

D&A PAULICHUK CONSULTING LTD.

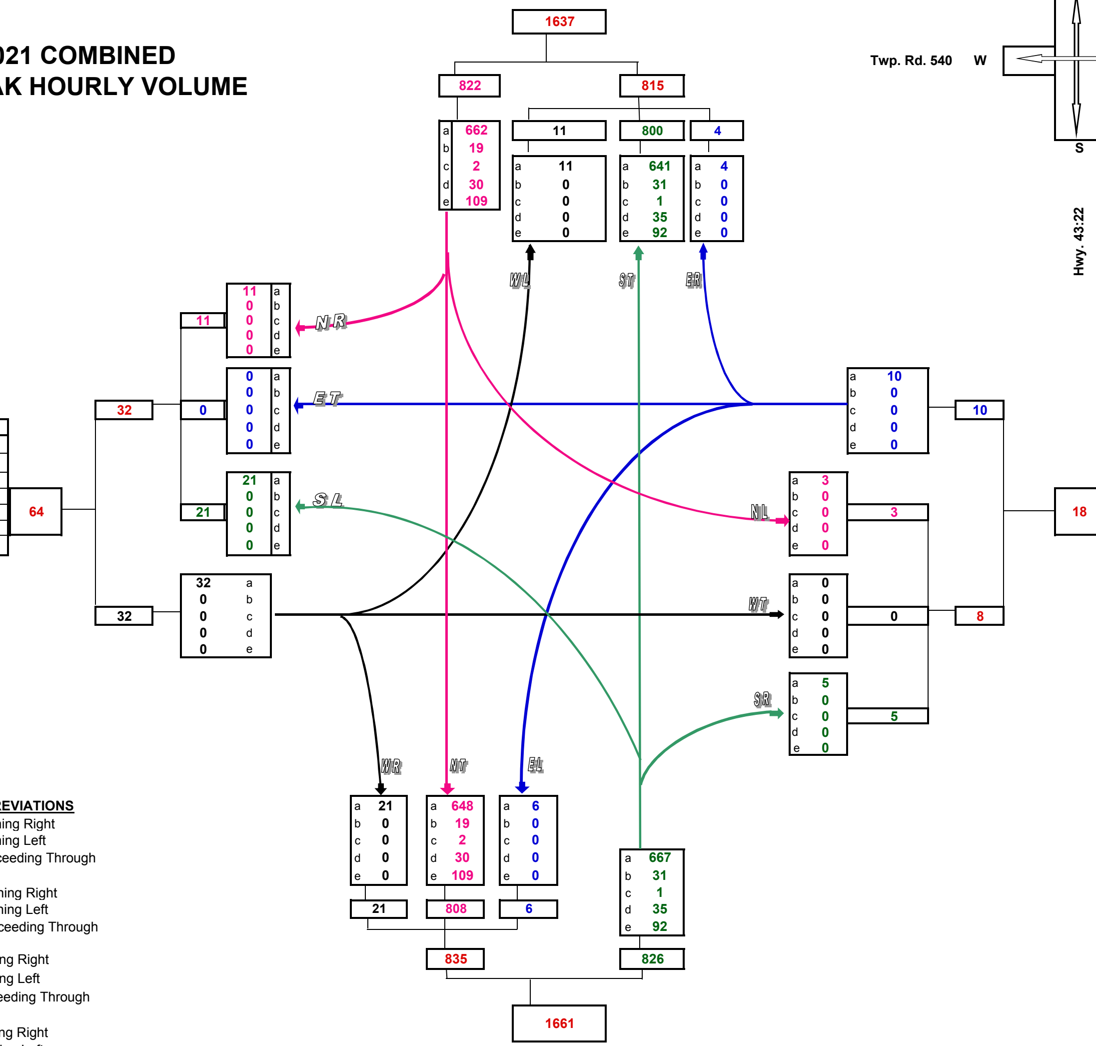
Turning Movement Summary Diagram

NORTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1318	80.5
B - Recreational Vehicle	50	3.1
C - Bus	3	0.2
D - Single Unit Truck	65	4.0
E - Tractor Trailer Unit	201	12.3
Total	1637	

2021 COMBINED AM PEAK HOURLY VOLUME



WEST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	64	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	64	



EAST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	18	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	18	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic from North Turning Right
NL: Traffic from North Turning Left
NT: Traffic from North Proceeding Through

SR: Traffic from South Turning Right
SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1342	80.8
B - Recreational Vehicle	50	3.0
C - Bus	3	0.2
D - Single Unit Truck	65	3.9
E - Tractor Trailer Unit	201	12.1
Total	1661	

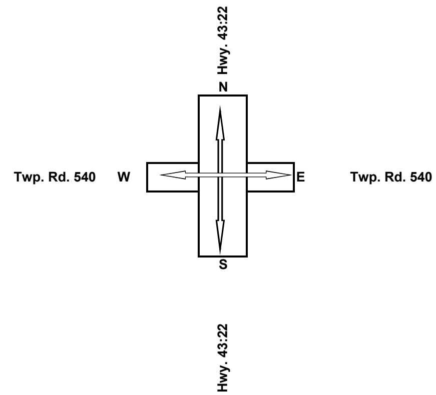
2021
2014
7

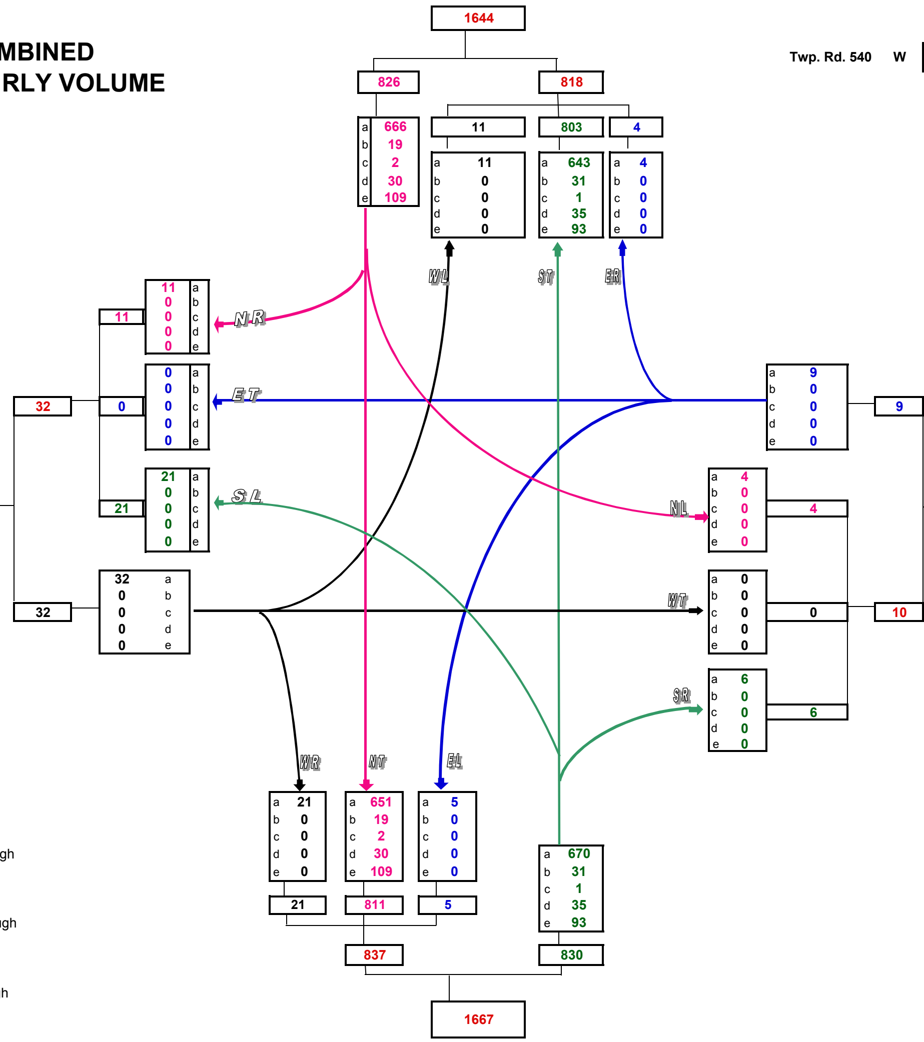
D&A PAULICHUK CONSULTING LTD.

Turning Movement Summary Diagram

2021 COMBINED
PM PEAK HOURLY VOLUME

NORTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1324	80.5
B - Recreational Vehicle	50	3.0
C - Bus	3	0.2
D - Single Unit Truck	65	4.0
E - Tractor Trailer Unit	202	12.3
Total	1644	





WEST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	64	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	64	

EAST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	19	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	19	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic from North Turning Right
NL: Traffic from North Turning Left
NT: Traffic from North Proceeding Through

SR: Traffic from South Turning Right
SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

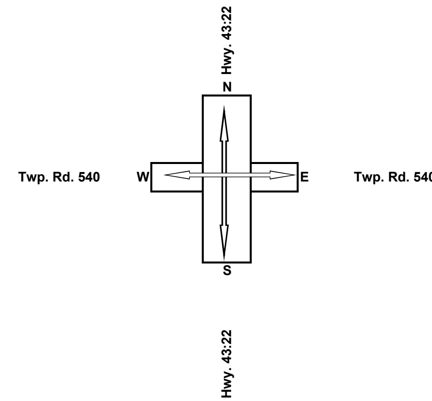
SOUTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1347	80.8
B - Recreational Vehicle	50	3.0
C - Bus	3	0.2
D - Single Unit Truck	65	3.9
E - Tractor Trailer Unit	202	12.1
Total	1667	

2021
2014
7

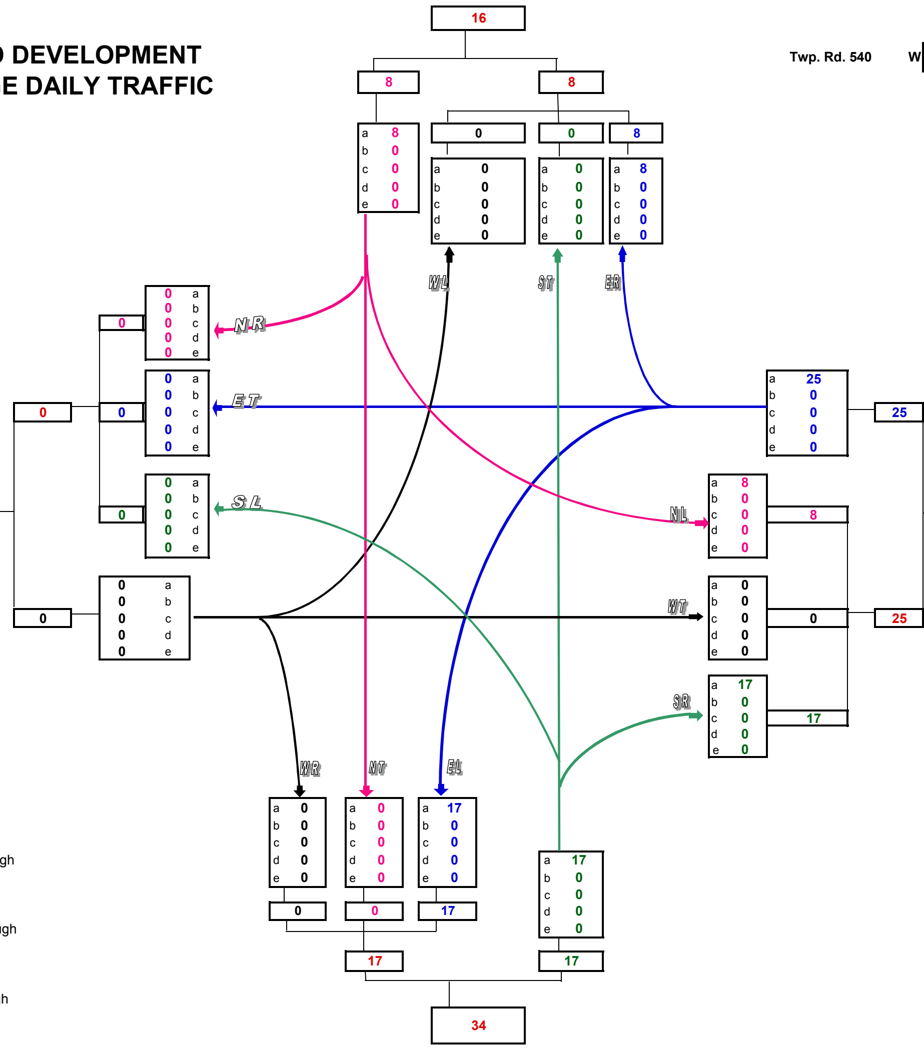
D&A PAULICHUK CONSULTING LTD.

Turning Movement Summary Diagram

NORTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	16	100.0%
B - Recreational Vehicle	0	0.0%
C - Bus	0	0.0%
D - Single Unit Truck	0	0.0%
E - Tractor Trailer Unit	0	0.0%
Total	16	



2026 PROJECTED DEVELOPMENT ANNUAL AVERAGE DAILY TRAFFIC



WEST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

EAST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	50	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	50	

TURNING MOVEMENT ABBREVIATIONS

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SR: Traffic from South Turning Right
SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Taffic from West Turning Left
WT: Taffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	34	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	34	

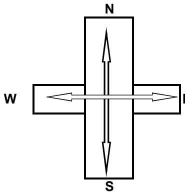
D&A PAULICHUK CONSULTING LTD.

Turning Movement Summary Diagram

NORTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	1	

Hwy. 43:22

Twp. Rd. 540 W

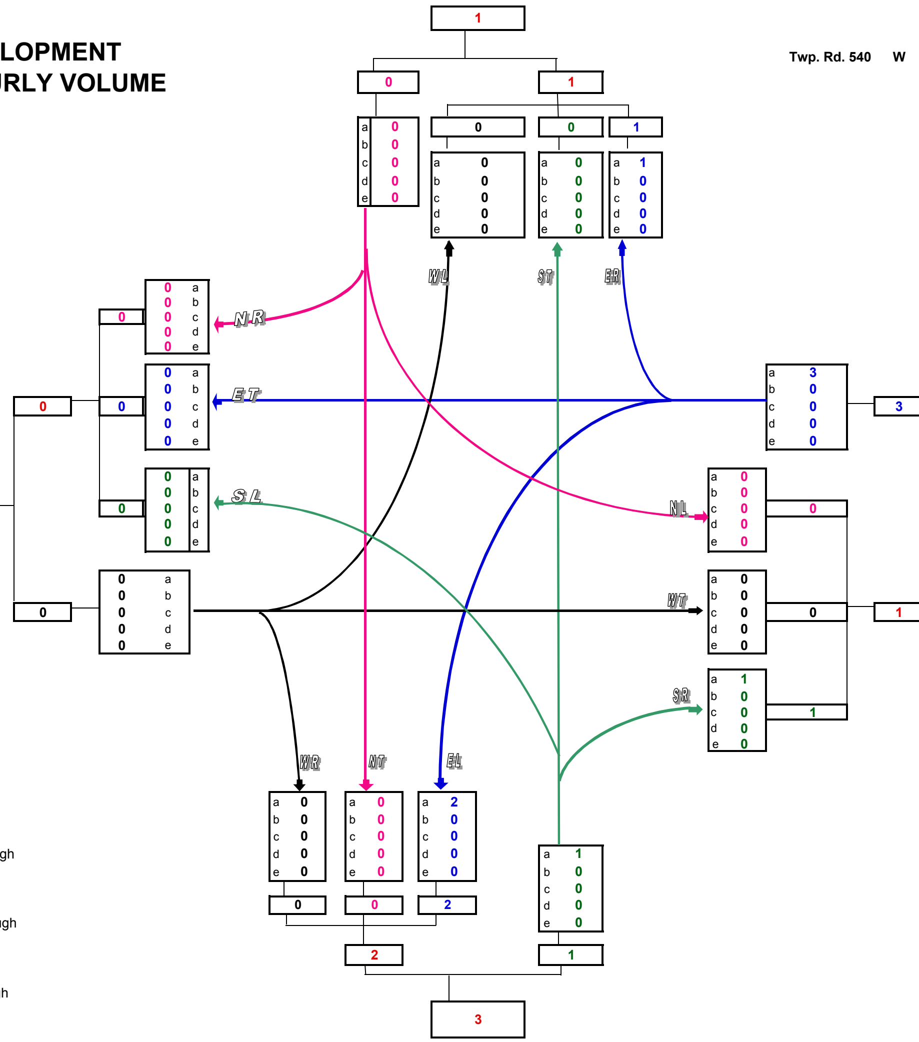


Twp. Rd. 540

Hwy. 43:22

2026 DEVELOPMENT
AM PEAK HOURLY VOLUME

WEST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	



EAST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	4	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	4	

TURNING MOVEMENT ABBREVIATIONS

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SR: Traffic from South Turning Right
SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Taffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
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ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

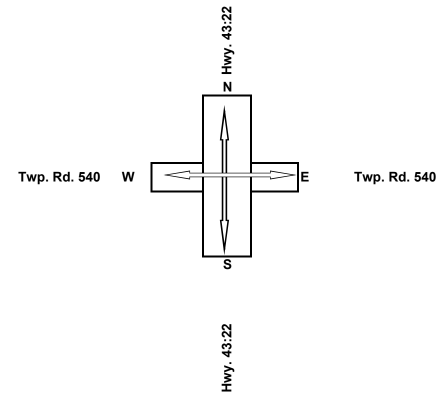
SOUTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	3	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	3	

D&A PAULICHUK CONSULTING LTD.

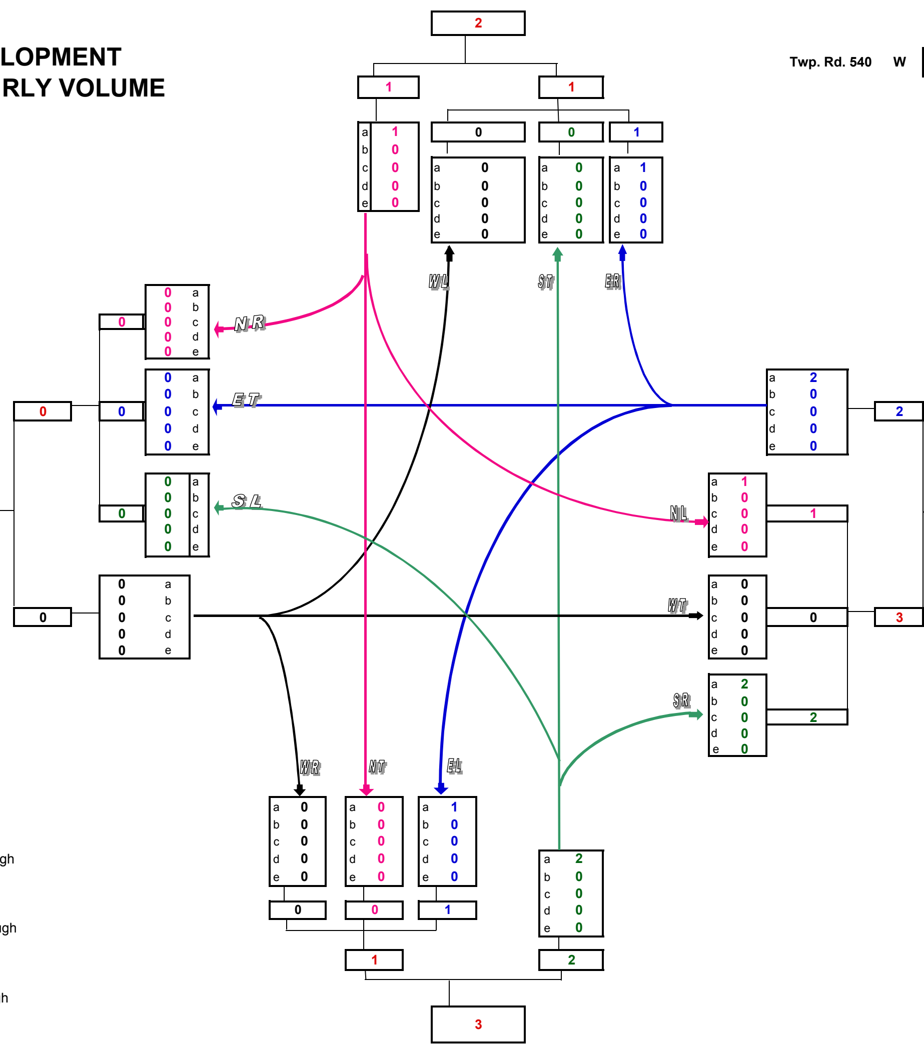
Turning Movement Summary Diagram

2026 DEVELOPMENT
PM PEAK HOURLY VOLUME

NORTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	2	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	2	



WEST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	



EAST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	5	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	5	

TURNING MOVEMENT ABBREVIATIONS

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NT: Traffic from North Proceeding Through

SR: Traffic from South Turning Right
SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

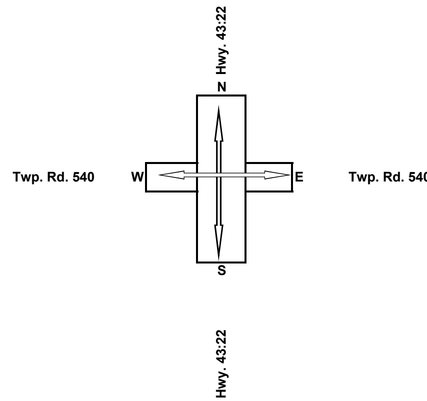
ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	3	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	3	

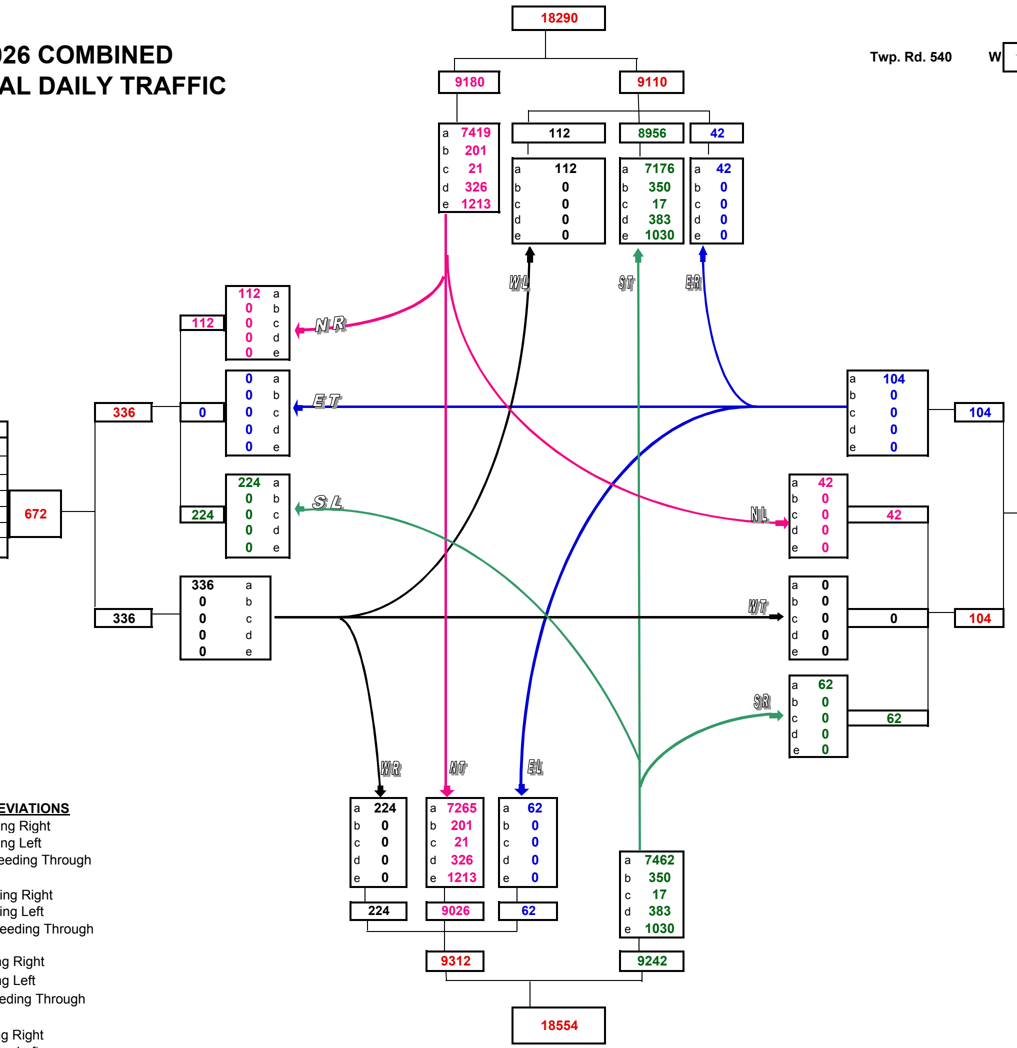
Turning Movement Summary Diagram

2026 COMBINED
ANNUAL DAILY TRAFFIC

NORTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	14749	-
B - Recreational Vehicle	551	-
C - Bus	38	-
D - Single Unit Truck	709	-
E - Tractor Trailer Unit	2243	-
Total	18290	



WEST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	672	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	672	



EAST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	208	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	208	

TURNING MOVEMENT ABBREVIATIONS

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NL: Traffic from North Turning Left
NT: Traffic from North Proceeding Through

SR: Traffic from South Turning Right
SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Taffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	15013	80.9
B - Recreational Vehicle	551	3.0
C - Bus	38	0.2
D - Single Unit Truck	709	3.8
E - Tractor Trailer Unit	2243	12.1
Total	18554	

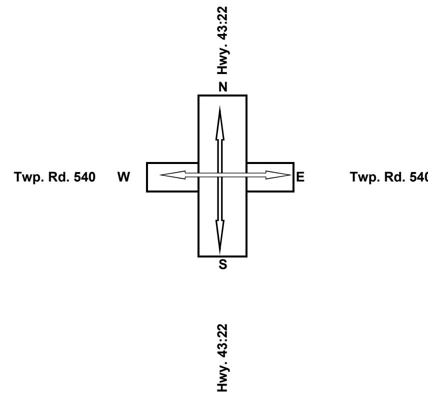
2026
2014
12

D&A PAULICHUK CONSULTING LTD.

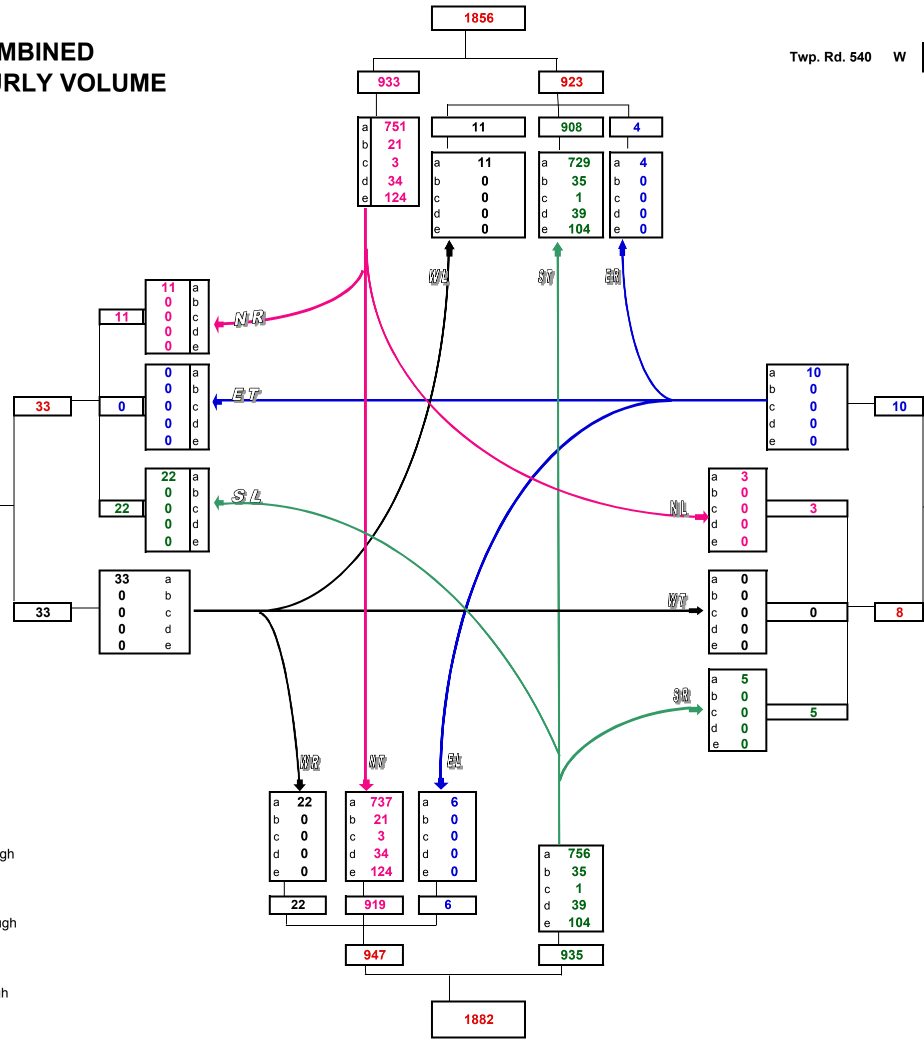
Turning Movement Summary Diagram

2026 COMBINED
AM PEAK HOURLY VOLUME

NORTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1495	80.5
B - Recreational Vehicle	56	3.0
C - Bus	4	0.2
D - Single Unit Truck	73	3.9
E - Tractor Trailer Unit	228	12.3
Total	1856	



WEST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	66	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	66	



EAST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	18	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	18	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic from North Turning Right
NL: Traffic from North Turning Left
NT: Traffic from North Proceeding Through

SR: Traffic from South Turning Right
SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1521	80.8
B - Recreational Vehicle	56	3.0
C - Bus	4	0.2
D - Single Unit Truck	73	3.9
E - Tractor Trailer Unit	228	12.1
Total	1882	

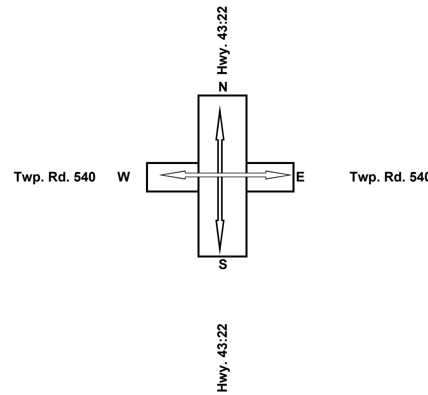
2026
2014
12

D&A PAULICHUK CONSULTING LTD.

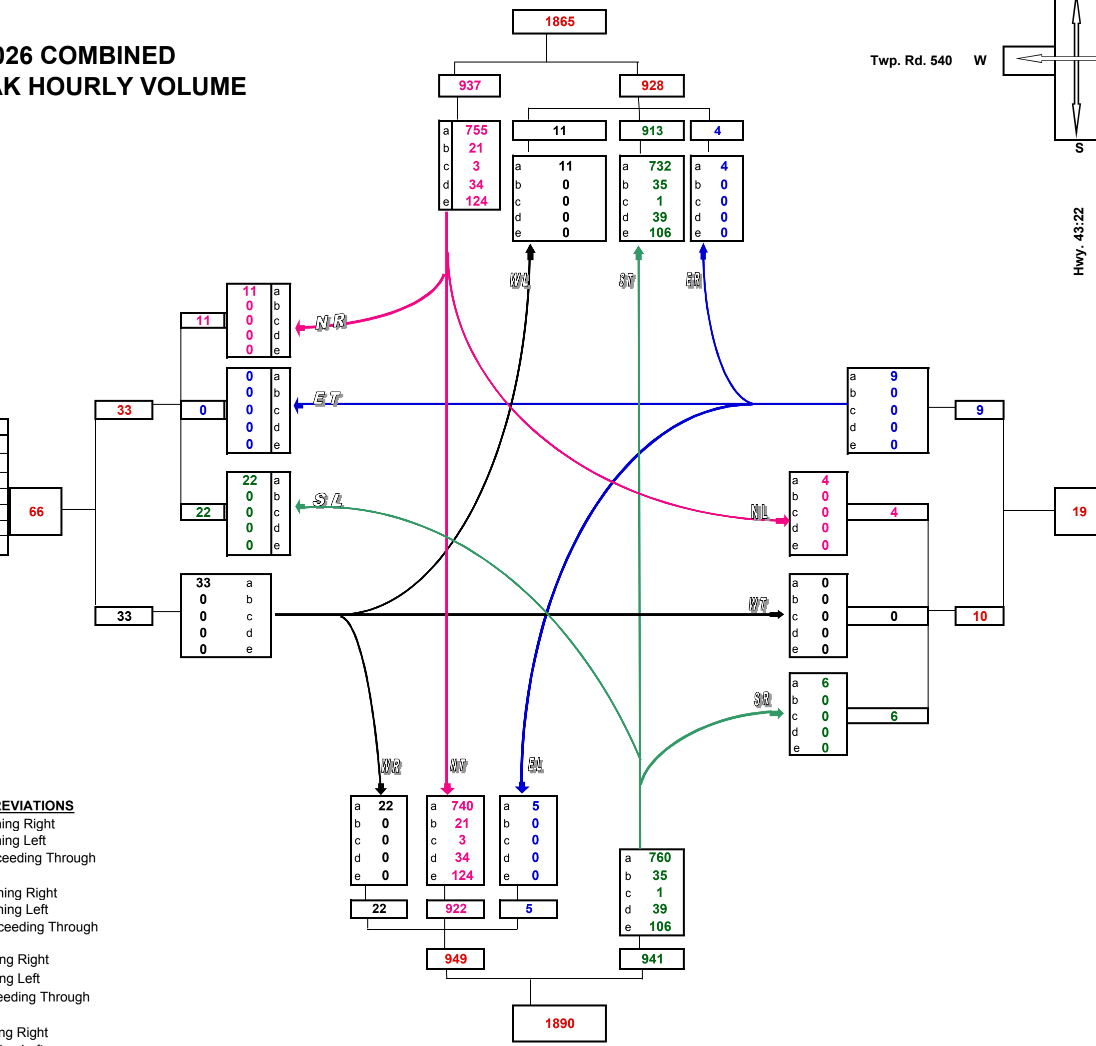
Turning Movement Summary Diagram

NORTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1502	80.5
B - Recreational Vehicle	56	3.0
C - Bus	4	0.2
D - Single Unit Truck	73	3.9
E - Tractor Trailer Unit	230	12.3
Total	1865	

2026 COMBINED
PM PEAK HOURLY VOLUME



WEST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	66	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	66	



EAST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	19	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	19	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic from North Turning Right
NL: Traffic from North Turning Left
NT: Traffic from North Proceeding Through

SR: Traffic from South Turning Right
SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1527	80.8
B - Recreational Vehicle	56	3.0
C - Bus	4	0.2
D - Single Unit Truck	73	3.9
E - Tractor Trailer Unit	230	12.2
Total	1890	

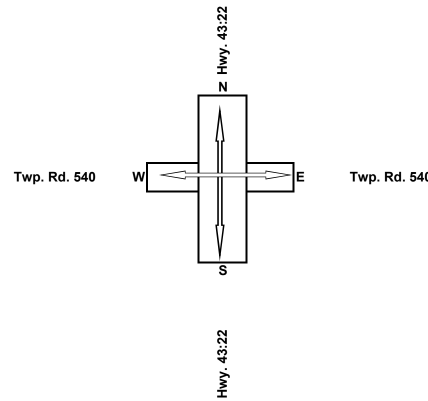
2026
2014
12

D&A PAULICHUK CONSULTING LTD.

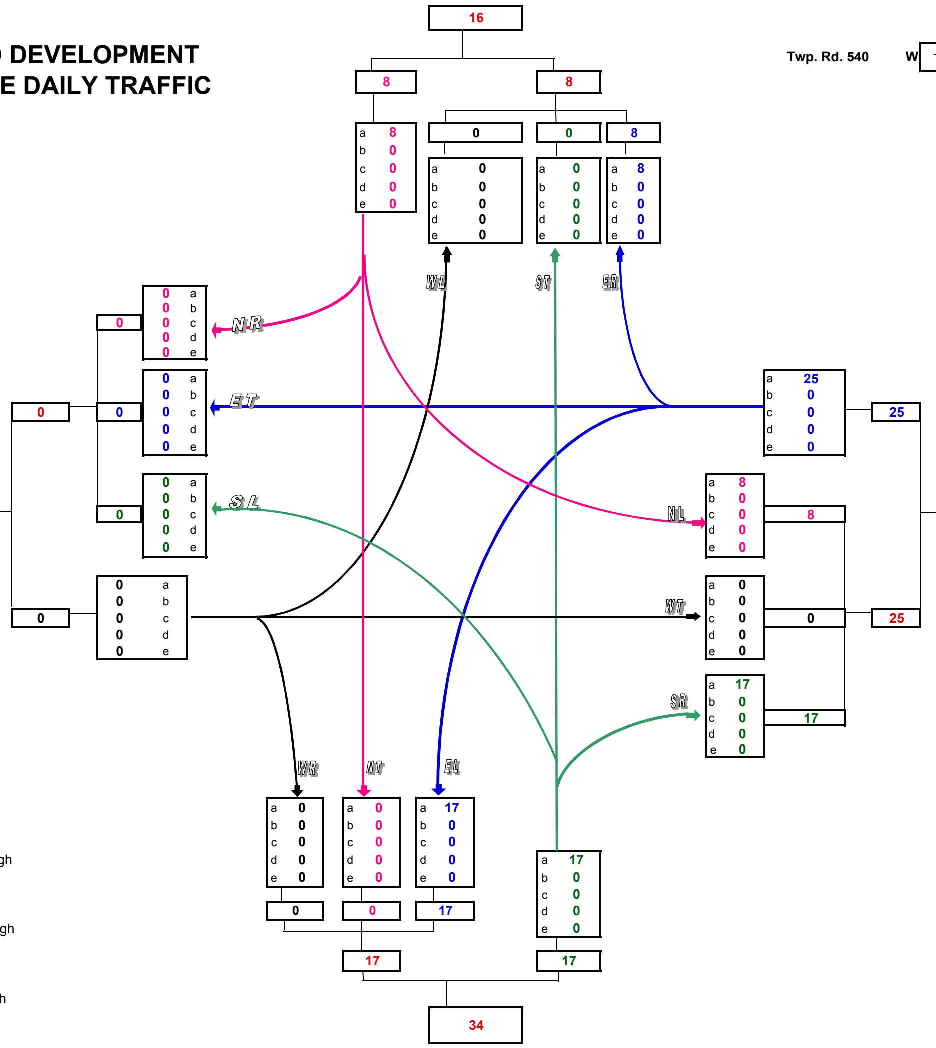
Turning Movement Summary Diagram

NORTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	16	100.0%
B - Recreational Vehicle	0	0.0%
C - Bus	0	0.0%
D - Single Unit Truck	0	0.0%
E - Tractor Trailer Unit	0	0.0%
Total	16	

2036 PROJECTED DEVELOPMENT ANNUAL AVERAGE DAILY TRAFFIC



WEST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	



EAST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	50	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	50	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic from North Turning Right
NL: Traffic from North Turning Left
NT: Traffic from North Proceeding Through

SR: Traffic from South Turning Right
SL: Traffic from South Turning Left
ST: Traffic from South Proceeding Through

ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

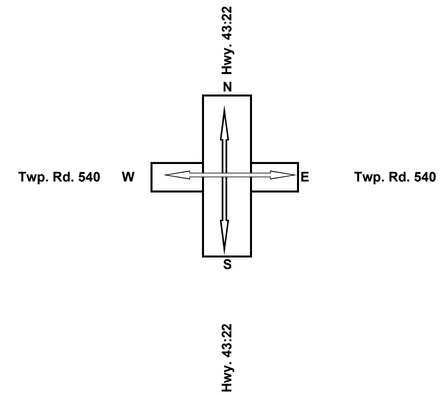
SOUTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	34	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	34	

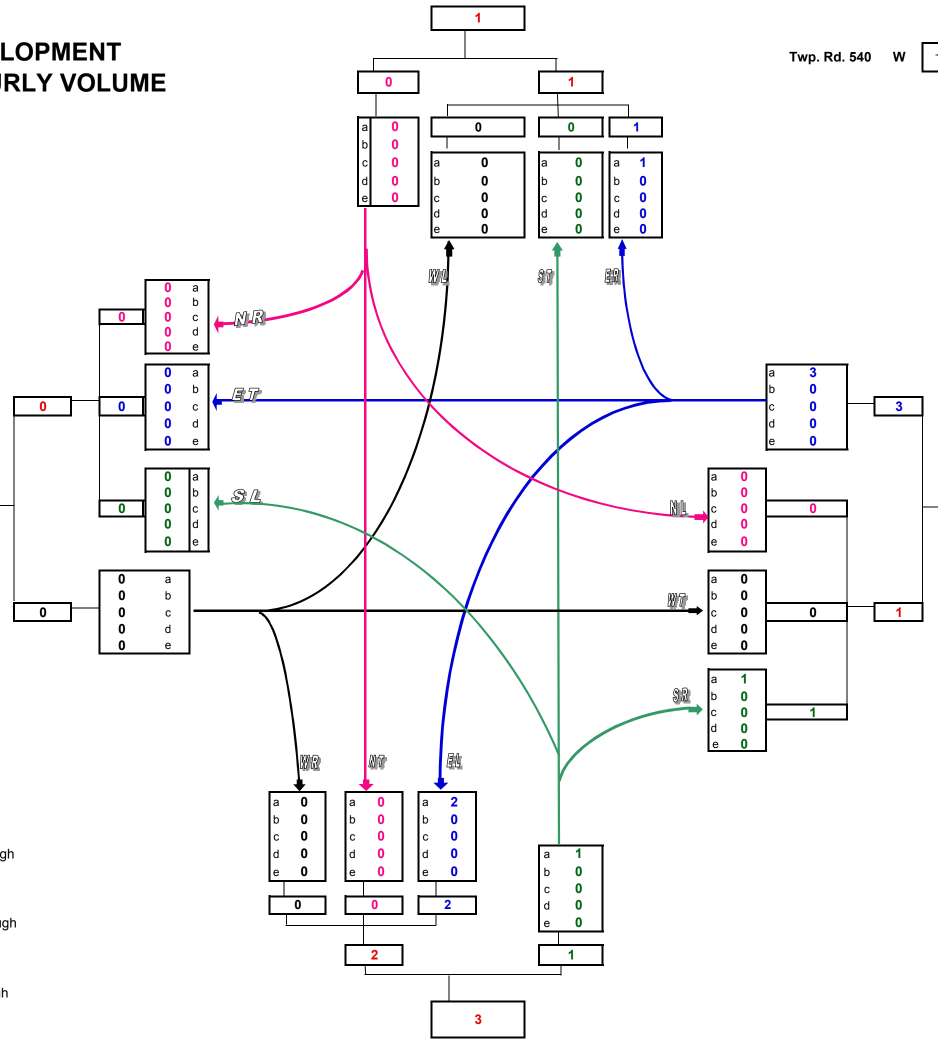
D&A PAULICHUK CONSULTING LTD.

Turning Movement Summary Diagram

2036 DEVELOPMENT
AM PEAK HOURLY VOLUME

NORTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	1	





WEST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	

EAST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	4	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	4	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic from North Turning Right
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ST: Traffic from South Proceeding Through

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EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

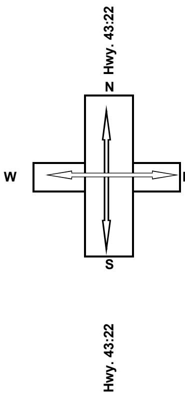
SOUTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	3	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	3	

D&A PAULICHUK CONSULTING LTD.

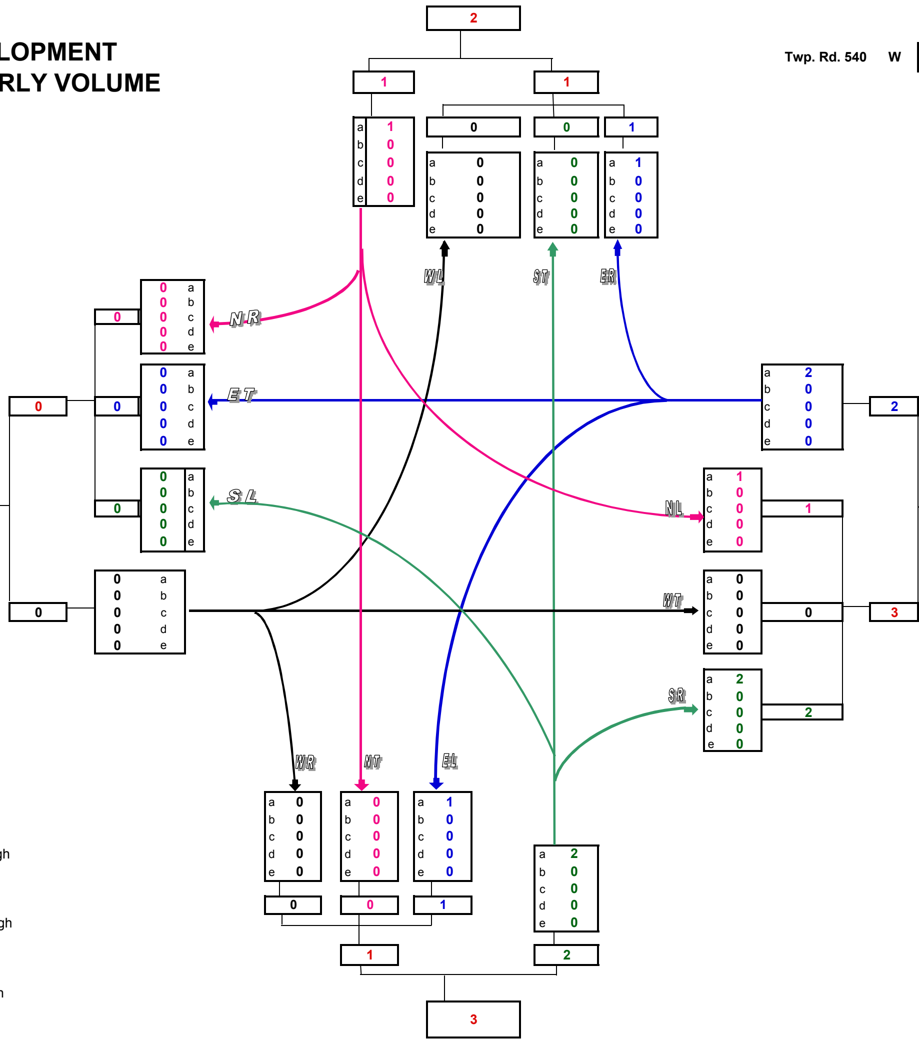
Turning Movement Summary Diagram

2036 DEVELOPMENT
PM PEAK HOURLY VOLUME

NORTH LEG ON		Hwy. 43:22
Vehicle Type	Vol.	%
A - Passenger Vehicle	2	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	2	



WEST LEG ON		Hwy. 43:22
Vehicle Type	Vol.	%
A - Passenger Vehicle	0	#DIV/0!
B - Recreational Vehicle	0	#DIV/0!
C - Bus	0	#DIV/0!
D - Single Unit Truck	0	#DIV/0!
E - Tractor Trailer Unit	0	#DIV/0!
Total	0	



EAST LEG ON		Hwy. 43:22
Vehicle Type	Vol.	%
A - Passenger Vehicle	5	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	5	

TURNING MOVEMENT ABBREVIATIONS

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WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

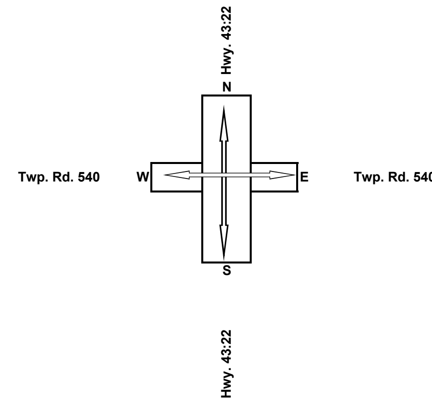
SOUTH LEG ON		Hwy. 43:22
Vehicle Type	Vol.	%
A - Passenger Vehicle	3	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	3	

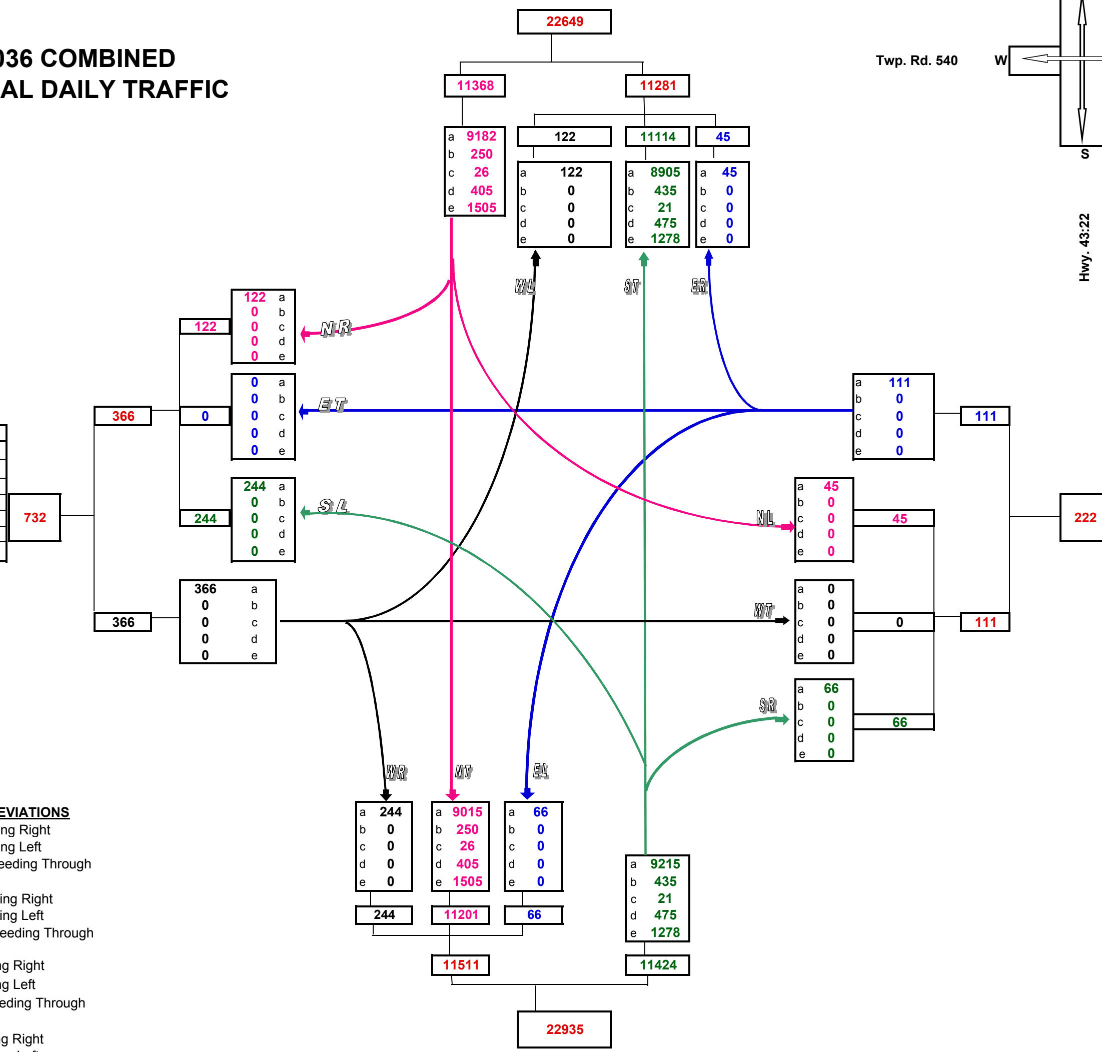
D&A PAULICHUK CONSULTING LTD.

Turning Movement Summary Diagram

NORTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	18254	-
B - Recreational Vehicle	685	-
C - Bus	47	-
D - Single Unit Truck	880	-
E - Tractor Trailer Unit	2783	-
Total	22649	

2036 COMBINED ANNUAL DAILY TRAFFIC





WEST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	732	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	732	

EAST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	222	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	222	

TURNING MOVEMENT ABBREVIATIONS

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ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Taffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	18540	80.8
B - Recreational Vehicle	685	3.0
C - Bus	47	0.2
D - Single Unit Truck	880	3.8
E - Tractor Trailer Unit	2783	12.1
Total	22935	

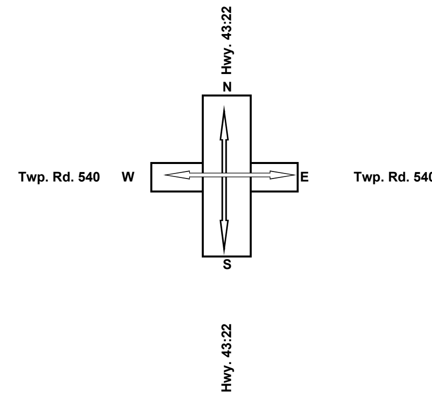
2036
2014
22

D&A PAULICHUK CONSULTING LTD.

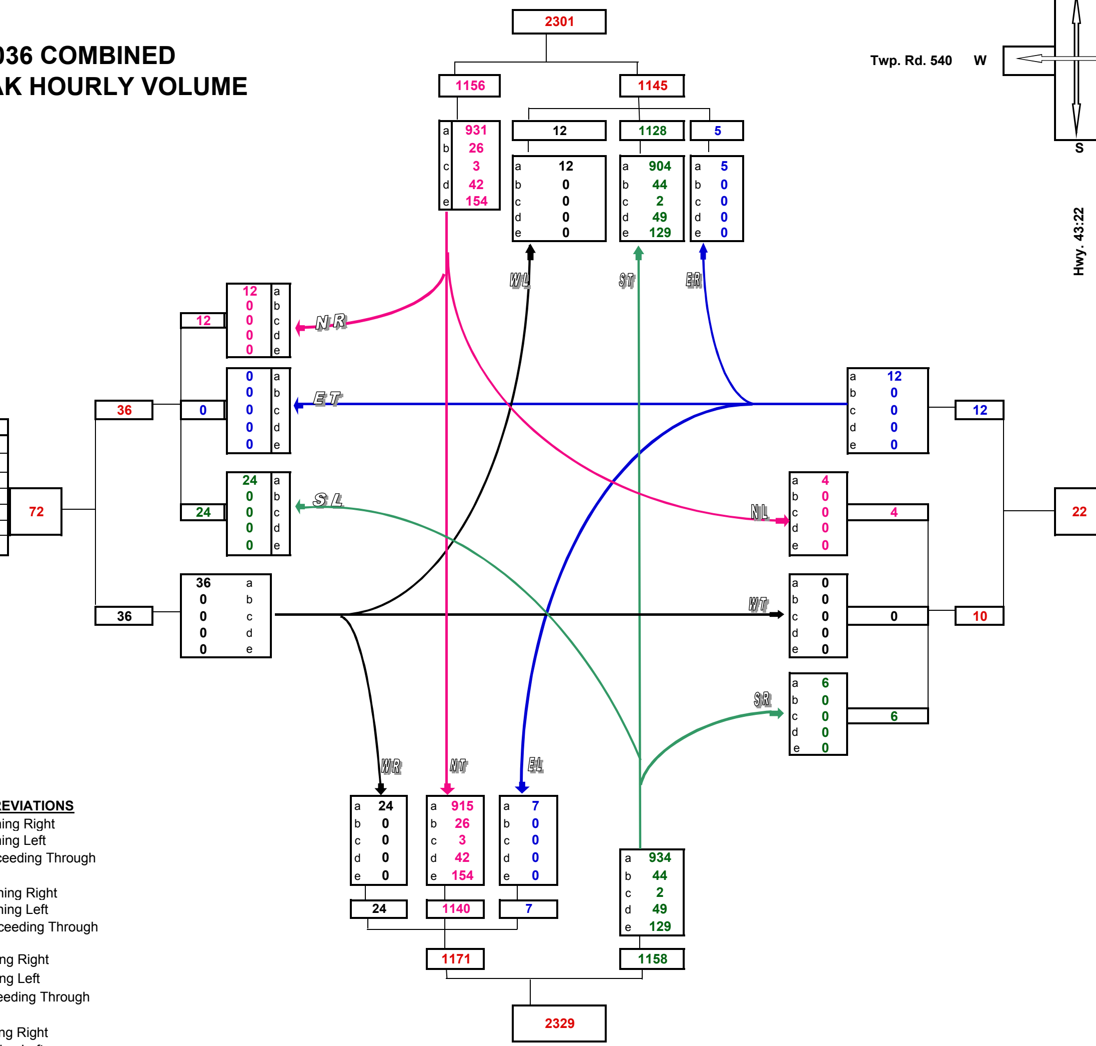
Turning Movement Summary Diagram

2036 COMBINED
AM PEAK HOURLY VOLUME

NORTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1852	80.5
B - Recreational Vehicle	70	3.0
C - Bus	5	0.2
D - Single Unit Truck	91	4.0
E - Tractor Trailer Unit	283	12.3
Total	2301	



WEST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	72	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	72	



EAST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	22	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	22	

TURNING MOVEMENT ABBREVIATIONS

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EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1880	80.7
B - Recreational Vehicle	70	3.0
C - Bus	5	0.2
D - Single Unit Truck	91	3.9
E - Tractor Trailer Unit	283	12.2
Total	2329	

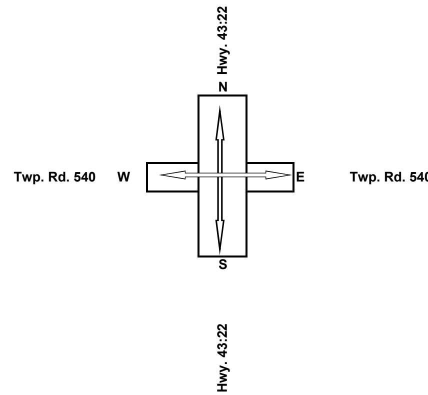
2036
2014
22

D&A PAULICHUK CONSULTING LTD.

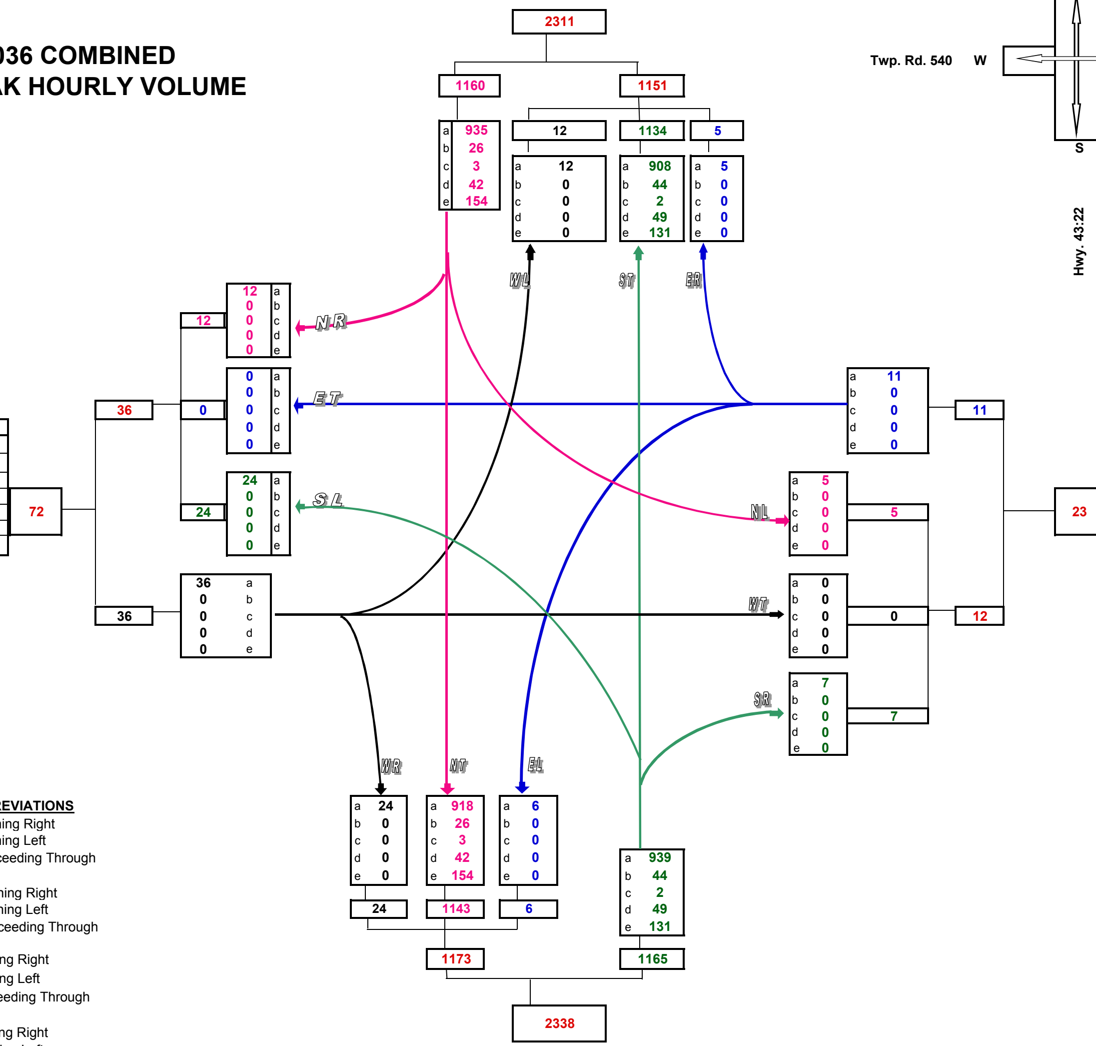
Turning Movement Summary Diagram

NORTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1860	80.5
B - Recreational Vehicle	70	3.0
C - Bus	5	0.2
D - Single Unit Truck	91	3.9
E - Tractor Trailer Unit	285	12.3
Total	2311	

2036 COMBINED PM PEAK HOURLY VOLUME



WEST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	72	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	72	



EAST LEG ON	Twp. Rd. 540	
Vehicle Type	Vol.	%
A - Passenger Vehicle	23	100.0
B - Recreational Vehicle	0	0.0
C - Bus	0	0.0
D - Single Unit Truck	0	0.0
E - Tractor Trailer Unit	0	0.0
Total	23	

TURNING MOVEMENT ABBREVIATIONS

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ER: Traffic from East Turning Right
EL: Traffic from East Turning Left
ET: Traffic from East Proceeding Through

WR: Taffic from West Turning Right
WL: Traffic from West Turning Left
WT: Traffic from West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day for period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehilces per day for period of May 1 to September 30 (153 days)

SOUTH LEG ON	Hwy. 43:22	
Vehicle Type	Vol.	%
A - Passenger Vehicle	1887	80.7
B - Recreational Vehicle	70	3.0
C - Bus	5	0.2
D - Single Unit Truck	91	3.9
E - Tractor Trailer Unit	285	12.2
Total	2338	

2036
2014
22

HCM Unsignalized Intersection Capacity Analysis
3: Hwy. 43:22 & Twp. Rd. 540

10/12/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	0	20	5	0	3	20	690	4	3	698	10
Future Volume (Veh/h)	10	0	20	5	0	3	20	690	4	3	698	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	0	22	5	0	3	22	750	4	3	759	11
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								Raised			Raised	
Median storage veh)								2			2	
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1184	1563	380	1182	1572	377	770			754		
vC1, stage 1 conf vol	765	765		796	796							
vC2, stage 2 conf vol	419	798		386	776							
vCu, unblocked vol	1184	1563	380	1182	1572	377	770			754		
tC, single (s)	7.6	6.6	7.0	7.6	6.6	7.0	4.2			4.2		
tC, 2 stage (s)	6.6	5.6		6.6	5.6							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	96	100	96	98	100	100	97			100		
cM capacity (veh/h)	313	286	610	298	279	612	821			833		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3	SB 4
Volume Total	33	8	22	500	254	3	380	380	11
Volume Left	11	5	22	0	0	3	0	0	0
Volume Right	22	3	0	0	4	0	0	0	11
cSH	464	369	821	1700	1700	833	1700	1700	1700
Volume to Capacity	0.07	0.02	0.03	0.29	0.15	0.00	0.22	0.22	0.01
Queue Length 95th (m)	1.8	0.5	0.7	0.0	0.0	0.1	0.0	0.0	0.0
Control Delay (s)	13.4	15.0	9.5	0.0	0.0	9.3	0.0	0.0	0.0
Lane LOS	B	B	A			A			
Approach Delay (s)	13.4	15.0	0.3			0.0			
Approach LOS	B	B							

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	34.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	0	20	4	0	3	20	693	5	3	700	10
Future Volume (Veh/h)	10	0	20	4	0	3	20	693	5	3	700	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	0	22	4	0	3	22	753	5	3	761	11
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								Raised			Raised	
Median storage veh)								2			2	
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1188	1569	380	1186	1578	379	772			758		
vC1, stage 1 conf vol	767	767		800	800							
vC2, stage 2 conf vol	420	802		386	778							
vCu, unblocked vol	1188	1569	380	1186	1578	379	772			758		
tC, single (s)	7.6	6.6	7.0	7.6	6.6	7.0	4.2			4.2		
tC, 2 stage (s)	6.6	5.6		6.6	5.6							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	96	100	96	99	100	100	97			100		
cM capacity (veh/h)	313	285	609	297	278	610	819			830		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3	SB 4
Volume Total	33	7	22	502	256	3	380	380	11
Volume Left	11	4	22	0	0	3	0	0	0
Volume Right	22	3	0	0	5	0	0	0	11
cSH	463	381	819	1700	1700	830	1700	1700	1700
Volume to Capacity	0.07	0.02	0.03	0.30	0.15	0.00	0.22	0.22	0.01
Queue Length 95th (m)	1.8	0.4	0.7	0.0	0.0	0.1	0.0	0.0	0.0
Control Delay (s)	13.4	14.6	9.5	0.0	0.0	9.4	0.0	0.0	0.0
Lane LOS	B	B	A			A			
Approach Delay (s)	13.4	14.6	0.3			0.0			
Approach LOS	B	B							

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	34.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	0	21	6	0	4	21	800	5	3	808	11
Future Volume (Veh/h)	11	0	21	6	0	4	21	800	5	3	808	11
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	0	23	7	0	4	23	870	5	3	878	12
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								Raised			Raised	
Median storage veh)								2			2	
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1365	1805	439	1364	1814	438	890			875		
vC1, stage 1 conf vol	884	884		918	918							
vC2, stage 2 conf vol	481	921		445	896							
vCu, unblocked vol	1365	1805	439	1364	1814	438	890			875		
tC, single (s)	7.6	6.6	7.0	7.6	6.6	7.0	4.2			4.2		
tC, 2 stage (s)	6.6	5.6		6.6	5.6							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	95	100	96	97	100	99	97			100		
cM capacity (veh/h)	265	245	557	250	237	559	739			748		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3	SB 4
Volume Total	35	11	23	580	295	3	439	439	12
Volume Left	12	7	23	0	0	3	0	0	0
Volume Right	23	4	0	0	5	0	0	0	12
cSH	404	313	739	1700	1700	748	1700	1700	1700
Volume to Capacity	0.09	0.04	0.03	0.34	0.17	0.00	0.26	0.26	0.01
Queue Length 95th (m)	2.3	0.9	0.8	0.0	0.0	0.1	0.0	0.0	0.0
Control Delay (s)	14.7	16.9	10.0	0.0	0.0	9.8	0.0	0.0	0.0
Lane LOS	B	C	B			A			
Approach Delay (s)	14.7	16.9	0.3			0.0			
Approach LOS	B	C							

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	37.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	0	21	5	0	4	21	803	6	4	811	11
Future Volume (Veh/h)	11	0	21	5	0	4	21	803	6	4	811	11
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	0	23	5	0	4	23	873	7	4	882	12
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								Raised			Raised	
Median storage veh)								2			2	
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1372	1816	441	1372	1824	440	894			880		
vC1, stage 1 conf vol	890	890		922	922							
vC2, stage 2 conf vol	482	926		449	902							
vCu, unblocked vol	1372	1816	441	1372	1824	440	894			880		
tC, single (s)	7.6	6.6	7.0	7.6	6.6	7.0	4.2			4.2		
tC, 2 stage (s)	6.6	5.6		6.6	5.6							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	95	100	96	98	100	99	97			99		
cM capacity (veh/h)	263	242	556	248	235	557	736			745		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3	SB 4
Volume Total	35	9	23	582	298	4	441	441	12
Volume Left	12	5	23	0	0	4	0	0	0
Volume Right	23	4	0	0	7	0	0	0	12
cSH	402	329	736	1700	1700	745	1700	1700	1700
Volume to Capacity	0.09	0.03	0.03	0.34	0.18	0.01	0.26	0.26	0.01
Queue Length 95th (m)	2.3	0.7	0.8	0.0	0.0	0.1	0.0	0.0	0.0
Control Delay (s)	14.8	16.2	10.0	0.0	0.0	9.9	0.0	0.0	0.0
Lane LOS	B	C	B			A			
Approach Delay (s)	14.8	16.2	0.3			0.0			
Approach LOS	B	C							

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	37.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	0	22	6	0	4	22	908	5	3	919	11
Future Volume (Veh/h)	11	0	22	6	0	4	22	908	5	3	919	11
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	0	24	7	0	4	24	987	5	3	999	12
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								Raised			Raised	
Median storage veh)								2			2	
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1546	2045	500	1543	2054	496	1011			992		
vC1, stage 1 conf vol	1005	1005		1038	1038							
vC2, stage 2 conf vol	542	1040		506	1017							
vCu, unblocked vol	1546	2045	500	1543	2054	496	1011			992		
tC, single (s)	7.6	6.6	7.0	7.6	6.6	7.0	4.2			4.2		
tC, 2 stage (s)	6.6	5.6		6.6	5.6							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	95	100	95	97	100	99	96			100		
cM capacity (veh/h)	224	210	509	210	202	511	664			675		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3	SB 4
Volume Total	36	11	24	658	334	3	500	500	12
Volume Left	12	7	24	0	0	3	0	0	0
Volume Right	24	4	0	0	5	0	0	0	12
cSH	357	267	664	1700	1700	675	1700	1700	1700
Volume to Capacity	0.10	0.04	0.04	0.39	0.20	0.00	0.29	0.29	0.01
Queue Length 95th (m)	2.7	1.0	0.9	0.0	0.0	0.1	0.0	0.0	0.0
Control Delay (s)	16.2	19.0	10.6	0.0	0.0	10.4	0.0	0.0	0.0
Lane LOS	C	C	B			B			
Approach Delay (s)	16.2	19.0	0.3			0.0			
Approach LOS	C	C							

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	41.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	0	22	5	0	4	22	913	6	4	922	11
Future Volume (Veh/h)	11	0	22	5	0	4	22	913	6	4	922	11
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	0	24	5	0	4	24	992	7	4	1002	12
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								Raised			Raised	
Median storage veh)								2			2	
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1554	2057	501	1552	2066	500	1014			999		
vC1, stage 1 conf vol	1010	1010		1044	1044							
vC2, stage 2 conf vol	544	1047		509	1022							
vCu, unblocked vol	1554	2057	501	1552	2066	500	1014			999		
tC, single (s)	7.6	6.6	7.0	7.6	6.6	7.0	4.2			4.2		
tC, 2 stage (s)	6.6	5.6		6.6	5.6							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	95	100	95	98	100	99	96			99		
cM capacity (veh/h)	222	208	508	208	200	509	662			671		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3	SB 4
Volume Total	36	9	24	661	338	4	501	501	12
Volume Left	12	5	24	0	0	4	0	0	0
Volume Right	24	4	0	0	7	0	0	0	12
cSH	355	282	662	1700	1700	671	1700	1700	1700
Volume to Capacity	0.10	0.03	0.04	0.39	0.20	0.01	0.29	0.29	0.01
Queue Length 95th (m)	2.7	0.8	0.9	0.0	0.0	0.1	0.0	0.0	0.0
Control Delay (s)	16.3	18.2	10.6	0.0	0.0	10.4	0.0	0.0	0.0
Lane LOS	C	C	B			B			
Approach Delay (s)	16.3	18.2	0.2			0.0			
Approach LOS	C	C							

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	41.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	0	24	7	0	5	24	1128	6	4	1140	12
Future Volume (Veh/h)	12	0	24	7	0	5	24	1128	6	4	1140	12
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	0	26	8	0	5	26	1226	7	4	1239	13
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								Raised			Raised	
Median storage veh)								2			2	
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1912	2532	620	1909	2542	616	1252			1233		
vC1, stage 1 conf vol	1247	1247		1282	1282							
vC2, stage 2 conf vol	665	1285		628	1260							
vCu, unblocked vol	1912	2532	620	1909	2542	616	1252			1233		
tC, single (s)	7.6	6.6	7.0	7.6	6.6	7.0	4.2			4.2		
tC, 2 stage (s)	6.6	5.6		6.6	5.6							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	92	100	94	95	100	99	95			99		
cM capacity (veh/h)	159	153	424	147	146	426	535			545		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3	SB 4
Volume Total	39	13	26	817	416	4	620	620	13
Volume Left	13	8	26	0	0	4	0	0	0
Volume Right	26	5	0	0	7	0	0	0	13
cSH	273	197	535	1700	1700	545	1700	1700	1700
Volume to Capacity	0.14	0.07	0.05	0.48	0.24	0.01	0.36	0.36	0.01
Queue Length 95th (m)	3.9	1.7	1.2	0.0	0.0	0.2	0.0	0.0	0.0
Control Delay (s)	20.4	24.6	12.1	0.0	0.0	11.7	0.0	0.0	0.0
Lane LOS	C	C	B			B			
Approach Delay (s)	20.4	24.6	0.2			0.0			
Approach LOS	C	C							

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	49.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	0	24	6	0	5	24	1134	7	5	1143	12
Future Volume (Veh/h)	12	0	24	6	0	5	24	1134	7	5	1143	12
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	0	26	7	0	5	26	1233	8	5	1242	13
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								Raised			Raised	
Median storage veh)								2			2	
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1920	2545	621	1920	2554	620	1255			1241		
vC1, stage 1 conf vol	1252	1252		1289	1289							
vC2, stage 2 conf vol	668	1293		631	1265							
vCu, unblocked vol	1920	2545	621	1920	2554	620	1255			1241		
tC, single (s)	7.6	6.6	7.0	7.6	6.6	7.0	4.2			4.2		
tC, 2 stage (s)	6.6	5.6		6.6	5.6							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	92	100	94	95	100	99	95			99		
cM capacity (veh/h)	158	152	423	145	144	423	534			541		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3	SB 4
Volume Total	39	12	26	822	419	5	621	621	13
Volume Left	13	7	26	0	0	5	0	0	0
Volume Right	26	5	0	0	8	0	0	0	13
cSH	271	200	534	1700	1700	541	1700	1700	1700
Volume to Capacity	0.14	0.06	0.05	0.48	0.25	0.01	0.37	0.37	0.01
Queue Length 95th (m)	4.0	1.5	1.2	0.0	0.0	0.2	0.0	0.0	0.0
Control Delay (s)	20.5	24.1	12.1	0.0	0.0	11.7	0.0	0.0	0.0
Lane LOS	C	C	B			B			
Approach Delay (s)	20.5	24.1	0.2			0.0			
Approach LOS	C	C							

Intersection Summary				
Average Delay	0.6			
Intersection Capacity Utilization	49.2%	ICU Level of Service		A
Analysis Period (min)	15			

Illumination of Isolated Rural Intersections
LIGHTING WARRANT SPREADSHEET

This spreadsheet is to be used in conjunction with *Illumination of Isolated Rural Intersections*, Transportation Association of Canada, February 2001.

Please enter information in the cells with yellow background

INTERSECTION CHARACTERISTICS

Hwy. 43:22	Main Road	**Date**	December 9, 2015
Twp. Rd. 540	Minor Road	**Other**	YEAR 2036
	City/Town		

GEOMETRIC FACTORS

	Value	Rating	Weight	Comments	Check	Score
Channelization Rating	Descriptive	0		Refer to Table 1(A) to determine rating value	OK	
Presence of raised channelization? (Y / N)	n				OK	
Highest operating speed on raised, channelized approach (km/h)	50		5		OK	
Channelization Factor					OK	0
Approach Sight Distance on most constrained approach (%)	100	0	10	Relative to the recommended minimum sight distance	OK	0
Posted Speed limit (in 10's of km/h)	110				OK	
Radius of Horizontal Curve (m)	T			Enter "T" for tangent (no horizontal curve at the intersection)	OK	
Posted Speed Category =	A	0				
Posted Speed Category =		0				
Posted Speed Category =		0				
Posted Speed Category =		0				
Horizontal Curvature Factor		0	5		OK	0
Angle of Intersection (10's of Degrees)	90	0	5		OK	0
Downhill Approach Grade (x.x%)	1.0	0	3	Rounded to nearest tenth of a percent	OK	0
Number of Intersection Legs	4	2	3	Number of legs = 3 or more	OK	6
					Geometric Factors Subtotal	**6**

OPERATIONAL FACTORS

	Value	Rating	Weight	Comments	Check	Score
Is the intersection signalized ? (Y/ N)	n			Calculate the Signalization Warrant Factor		
AADT on Major Road (2-way)	22935	4	10	Either Use the two AADT inputs **OR** the Descriptive Signalization Warrant (Unused values should be set to Zero) Refer to Table 1(B) for description and rating values for signalization warrant.	OK	40
AADT on Minor Road (2-way)	222	0	20		OK	0
Signalization Warrant	Descriptive	0	30		OK	0
					OK	
Night-Time Hourly Pedestrian Volume	0	0	10	Refer to Table 1(B), note #2, to account for children and seniors	OK	0
Intersecting Roadway Classification	Descriptive	0	5	Refer to Table 1(B) for ratings.	OK	0
Operating Speed or Posted Speed on Major Road (km/h)	110	4	5	Refer to Table 1(B), note #3	OK	20
Operating Speed on Minor Road (km/h)	80	3	5	Refer to Table 1(B), note #3	OK	15
					Operational Factors Subtotal	**75**

ENVIRONMENTAL FACTOR

	Value	Rating	Weight	Comments	Check	Score
Lighted Developments within 150 m radius of intersection	0	0	5	Maximum of 4 quadrants	OK	0
					Environmental Factor Subtotal	**0**

COLLISION HISTORY

	Value	Rating	Weight	Comments	Check	Score
Average Annual night-time collision frequency due to inadequate lighting (collisions/yr, rounded to nearest whole #)	1.0	1	15	Enter **either** the annual frequency (See Table 1(C), note #4)	OK	15
OR				**OR** the number of collisions / MEV		
Collision Rate over last 3 years, due to inadequate lighting (/MEV)	0	0	0	(Unused values should be set to Zero)	OK	0
Is the average ratio of **all** night to day collisions >= 1.5 (Y/N)	n	0			OK	
					OK	
					Collision History Subtotal	**15**

Check Intersection Signalization:
Intersection is not Signalized

LIGHTING IS NOT WARRANTED

SUMMARY	
Geometric Factors Subtotal	6
Operational Factor Subtotal	75
Environmental Factor Subtotal	0
Collision History Subtotal	15
TOTAL POINTS	**96**

“HYDROLOGICAL ASSESSMENT”

S.E. 1-54-2-5

PREPARED BY

GROUNDWATER INFORMATION TECHNOLOGIES LTD.

APPENDIX ‘D’

DECEMBER 2015

Groundwater Information
Technologies Ltd.

Phase I Aquifer Analysis

SE – 01 – 54 – 2W5

Lac Ste. Anne County

Prepared For:

Westcott Consulting Group

Prepared By:

Groundwater Information Technologies Ltd.

Ken Hugo, P.Geol.

APEGA P12077

August 13, 2015

File: 15 – 1217

Executive Summary

A review of available data was undertaken for a proposed 13 lot country residential subdivision in SE – 01 – 54 – 2W5 to determine expected water well yield and aquifer zones. Previously geological and hydrogeological studies were examined along with an examination of water well drillers' reports and groundwater quality analysis reports for the area.

According to the Water Act, if a well is installed on each lot, each lot is required to be supplied with water at a rate of 1250 m^3/year and water wells should be capable of providing water at a minimum rate of 1 imperial gallon per minute. If a community well is installed water needs are less, approximately 400 m^3/year for each lot.

Groundwater use in the area is primarily from domestic demands, with some wells installed for stock or industrial use.

The surficial deposits which immediately underlay the site are unconsolidated glacial deposits, which are underlain by the sandstones, siltstones and mudstones of the Horseshoe Canyon Formation. The sands and gravels of the surficial aquifer may be silty or dry underlying the site, and the primary aquifer present beneath the Site are bedrock sandstones and siltstones of the Horseshoe Canyon Formation. This formation is generally found at depths greater than 20 meters and is up to 100 metres in thickness.

Analysis of available pumping test data shows that the Horseshoe Canyon Aquifer is capable of supplying water at a rate of approximately 16,940 m^3/year (7.1 imperial gallons per minute). This value is sufficient to supply individual lots by a well on each lot. Aquifer supplies for a single community well may not be available.

A review of water quality records for the area show that the groundwater is a sodium bicarbonate type water of Total Dissolved Solids concentration of around less than 500 mg/L and should be acceptable to most users. It is recommended that water samples be collected and analyzed for routine dissolved salts and bacterial parameters from each well prior to use as a potable supply in the house.

Contents

List of Tables and Figures

Introduction

At the request of Robert Westcott of Westcott Consulting Group, an aquifer analysis was conducted for a proposed 13- lot residential subdivision located within SE¼ – 01– 54 – 2W5. Lots range in size from 0.89 to 2.48 hectares (ha). A site plan outlining the proposed subdivision is shown below:

Figure 1 – Site plan of proposed subdivision

Water is to be supplied by a groundwater source. According to the Water Act, if individual wells are located on each lot then water requirements are to be supplied at a rate of 1250 cubic metres per year (m^3/year) and wells should be capable of supplying water at a minimum rate of 1 imperial gallon per minute (igpm). If water needs are supplied by a community well supply, water needs are based on house size and number of bedrooms, and are generally around 250 gallons per day per lot.

This review consists of an examination of currently available information and should provide an estimate into depths, yields and quality of water from the aquifer(s) underlying the site. As no drilling or pumping tests were performed as part of the investigation, the review provides a representative analysis; however, no guarantee is provided as to actual water quantity or quality that may be obtained by a well on any particular parcel on the site.

Site Description

The site is located approximately 55 kilometers (km) east of the City of Edmonton within a mixed cropland, forested and country residential area of Lac Ste. Anne County. A portion of the 1:50,000 topographic map showing the topography and surface water features of the area is as follows:

Figure 2 - Topographic map showing subject location

The site is located in an area with gently undulating terrain at an elevation of approximately **730** meters above sea level (masl). Locally, topography dips slightly towards the east, towards the Kilini River which flows at an elevation of approximately 710 masl.

Geological Description

The nature of strata underlying the site was reviewed with the aid of the *Regional Groundwater Assessment of Lac Ste. Anne County* (Hydrogeological Consultants Ltd. 1998). *Surficial Geology of Wabamum Lake Alberta, NTS 83G* (Alberta Research Council, 1979). A review of the nearby water well records was also conducted to correlate the lithology record from the well with the published geological information. According to this assessment regional well capabilities from bedrock wells are on the order of 1.5 – 4.5 imperial gallons per minute.

The area is immediately underlain by approximately up to 20 m of quaternary age glaciofluvial deposits consisting of fine to coarse-grained sand and gravels. Also present are hummocky tills consisting of mixed sand, silt and clay with pebbles, cobbles and boulders. The presence of this formation may influence the migration of surface contaminants, such as septic field effluent, into underlying aquifers. Generally the gravels are dry or too poorly developed to serve as groundwater supply aquifers.

The Upper Horseshoe Canyon Formation of the Edmonton Group underlies the surficial deposits at the Site. This formation consists of interbedded sandstones, siltstones and mudstones and is classified as an aquifer. The Upper Horseshoe Canyon Formation is approximately 100 m in thickness and is underlain by the middle and lower sections of the Formation.

In the area, the Onoway Valley Channel represents a significant surficial aquifer, however this channel is located approximately 8 km north of the subject site and therefore cannot be expected to be used for water supply for the proposed subdivision.

Water Wells and Groundwater Usage in Area

A search of the Alberta Environment water well database indicates that 59 wells have been installed within 1.6 km of the site indicating a moderate amount of groundwater usage. Domestic Use well depths range from 2 – 129 m, with most wells obtaining water from the Upper Horseshoe Canyon aquifer from depths below 12 m to 129 m. Most wells are used for domestic purposes with some used for a combination of domestic and stock uses. Three oilfield monitoring wells were installed in NW-6-54-1 W5.

Initial well yields range from 2-20 igpm, with most well yields ranging around 5 – 10 igpm, indicating that moderate to good aquifers are generally encountered.

A review of Alberta Environment's water license and registration database was undertaken to determine large users of groundwater. A search of license and registrations of the subject section and adjoining eight sections was completed. One groundwater diversion licence was found within the area. Surface water diversion licenses are present in sections 11-54-2 W5, and 6&8-54-1 W5. Registrations are present in Sections 7-54-1 W5M. Overall groundwater usage in the area can be described as to moderate.

Wells on Subject Site

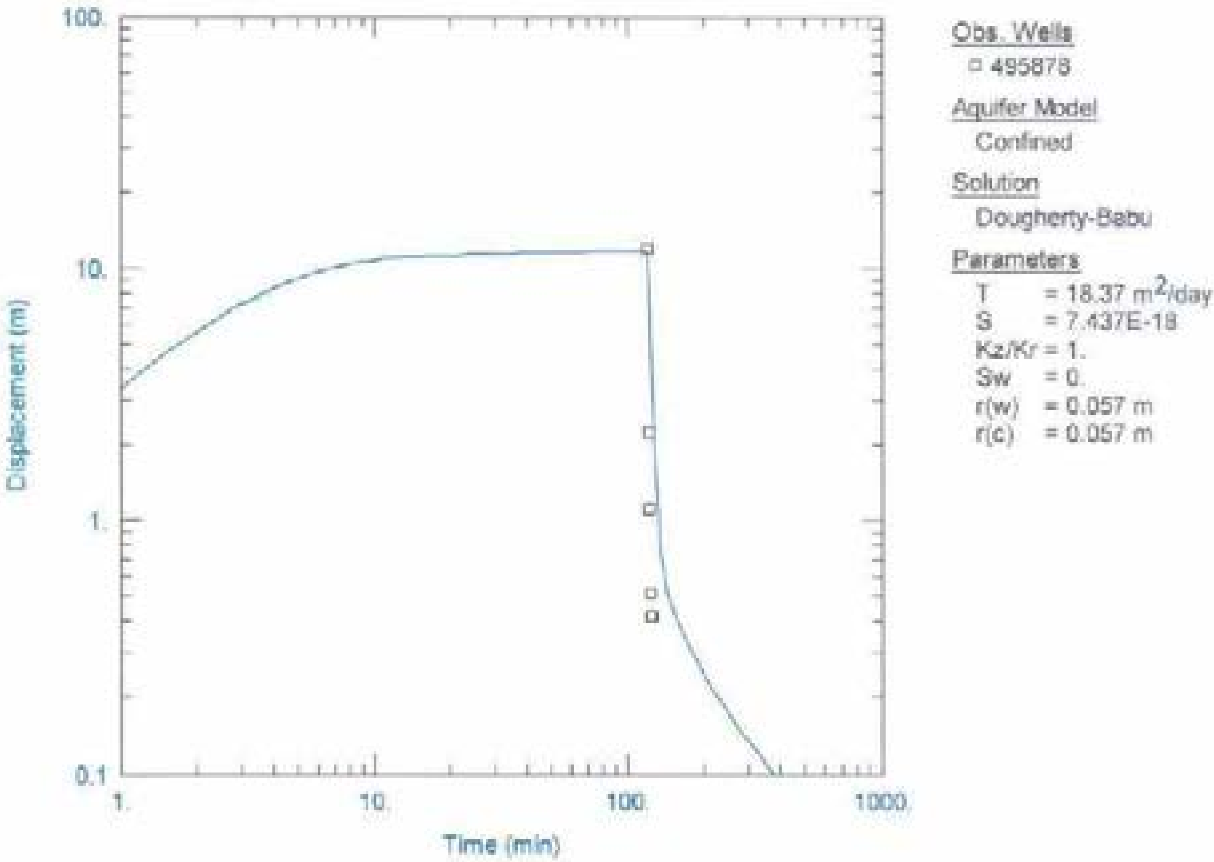
There are six domestic use wells listed within the same quarter section as the proposed subdivision, however their exact locations are unknown. All six wells are completed in the bedrock aquifer at depths of approximately 28-32 m. Static water levels in these wells ranged between 11.58 m and 20.73 m. Records indicate that water was removed from the wells at rates between 3.5 to 9 imperial gallons per minute (igpm), or 16 to 40 Litres per minute (L/min) indicating a productive aquifer.

Aquifer Parameters

The closest well with available data to allow calculation of aquifer parameters is 0495878, located within SE-01-54-2 W5. This well was installed in 1999 at a depth of 33 m, within the sandstones and shales of the Upper Horseshoe Canyon Formation. The well was pumped for 2 hours at a rate of 41 litres per minute (10 igpm), and data was collected during the recovery.

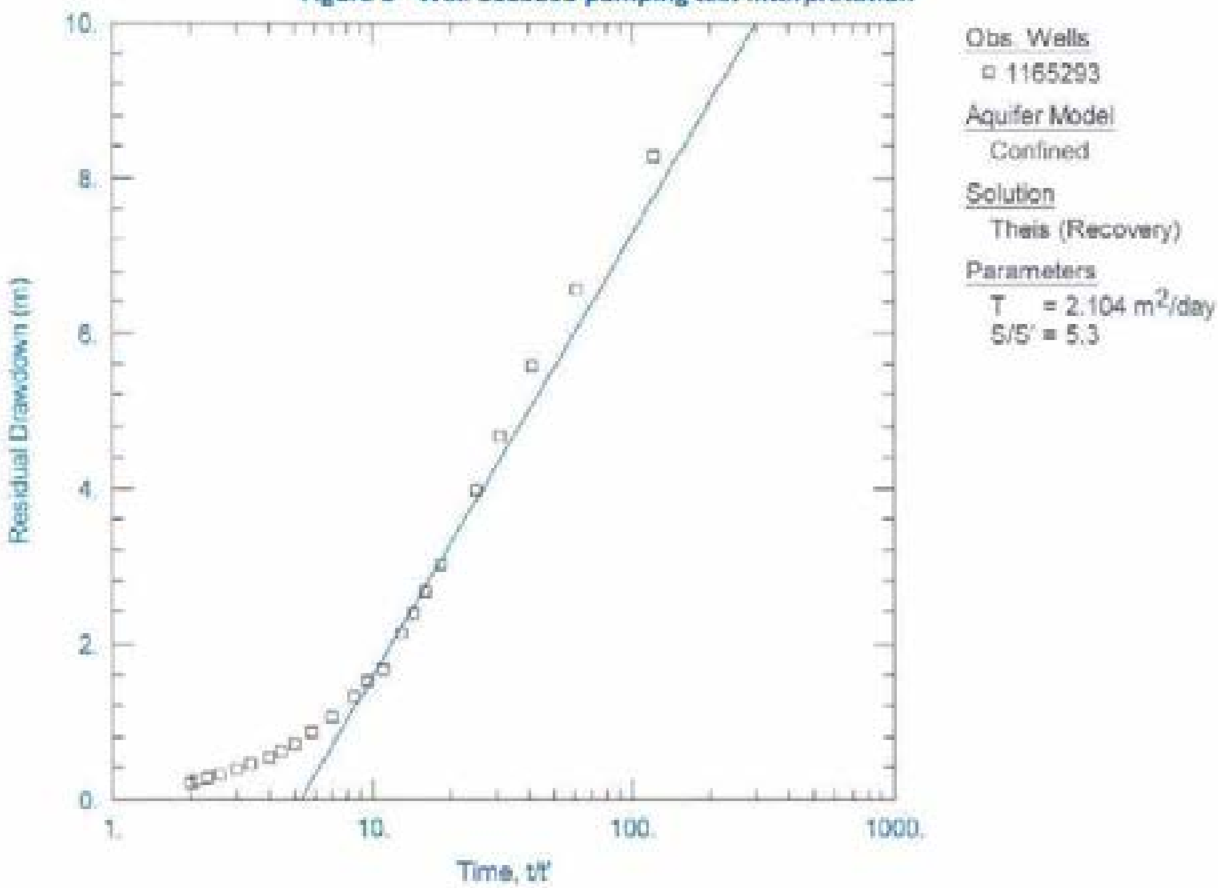
The pumping test data was interpreted with the aid of the AQTESOLV program developed by HydroSoft Inc. A confined radial flow model with full penetration and the Dougherty-Babu solution was applied. The water well drillers report for this well is attached in the appendix and a graph showing water displacement with time and the calculated aquifer parameters is as follows:

Figure 2 – Well 495878 Pumping Test Interpretation

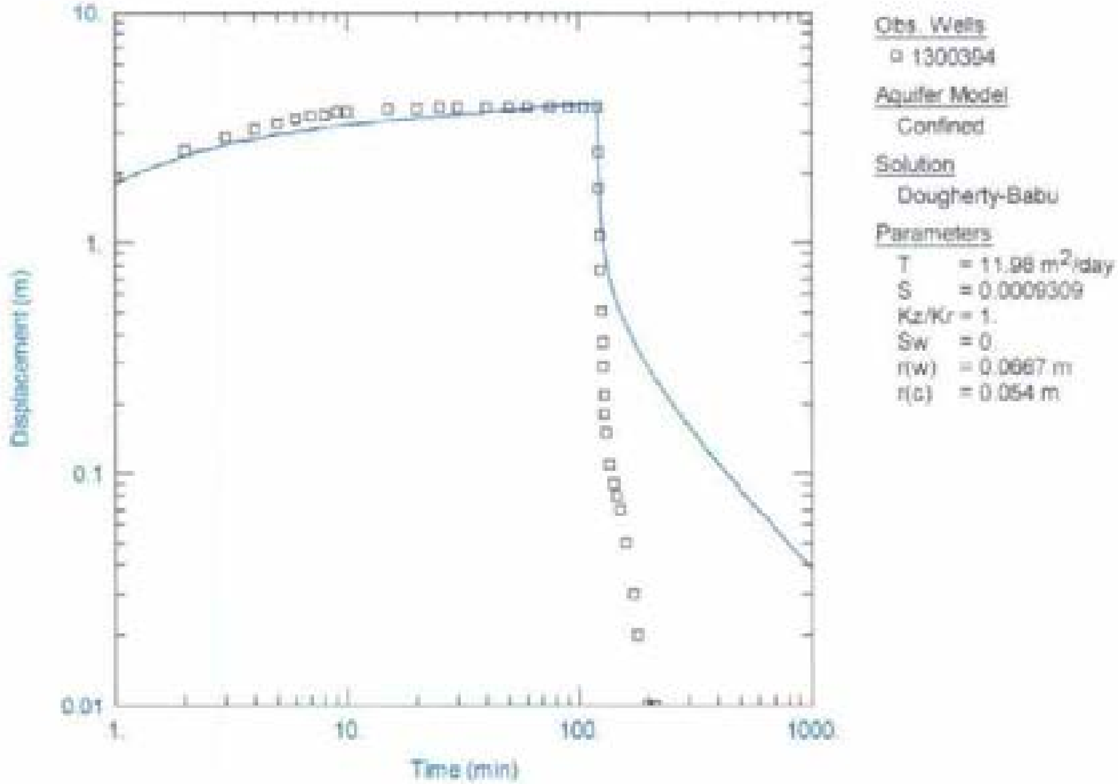


A 120 minute pumping test was undertaken on a well 01-04-54-02 W5 west of the site in 2007 (Well ID 1165293). This well also obtains water from the Horseshoe Canyon Aquifer from 56.08 – 79.25 m. The solution from the pumping test is as follows:

Figure 3 - Well 1165293 pumping test interpretation



A 120 minute pumping test followed by a 120 minute recovery test was undertaken on a well at SW-5-54-1 W5M in 2012 (Well ID 1300394). This well also obtains water from the Horseshoe Canyon Aquifer from 58.83 – 73.15 m. A confined radial flow model with full penetration and the Dougherty-Babu solution was applied. The water well drillers report for this well is attached in the appendix and a graph showing water displacement with time and the calculated aquifer parameters is as follows:



Transmissivity values range from 2 to 18 m^3/day from these tests. The average available head of the three wells is 12.7 m. The long term yield of a well, assuming no well bore losses, can be calculated by utilizing the Cooper and Jacob non-equilibrium equation:

$$Q \quad = \quad \frac{TH}{0.183} \;/ \log\left(2.25\,T \times t \,/\, r_w^2 \times S\right)$$

Where

Q	=	Pumping rate
H	=	Available Head (12.7 m)
T	=	Transmissivity (Average of 10 m^3/day)
S	=	Aquifer Storativity (5×10^{-5} – representative of the Horseshoe Canyon Formation)
t	=	Time (20 years or 7305 days)
r_w	=	Well bore radius (0.07 m)

A 20 year yield of 66 m^3/day (24,200 m^3/year) is calculated. Alberta Environment and Sustainable Resource Development recommends a safety factor of 0.7 be applied, such that an average safe yield of 16,940 m^3/year (7.1 imperial gallons per minute) is calculated. These values show that the average well should be able to supply sufficient water for individual lots.

The values indicated that the average well in the area may have sufficient capability to provide enough water to be used as a community well, however a fair risk exists that there may be insufficient capability for a community supply well.

Water Quality

Water quality analyses reports from the Alberta Environment and Parks water well were examined to illustrate water quality in Upper Horseshoe Canyon Formation. Chemical analysis reports from a well in SW-01-054-02 W5M (well ID 446859) and NW-36-053-02 W5M (well ID 458677), which are screened through the Upper Horseshoe River aquifer, were collected. The laboratory reports are attached in Appendix 3 with a summary of the results is as follows:

Table 1 - Water Quality Analysis

Parameter	446859	458677	Drinking Water Quality
Lab pH	N/A	N/A	6.5 – 8.5
Lab Electrical Conductivity	581	779	
Calcium	56	80	
Magnesium	10	16	
Sodium	63	78	200
Potassium	1	2	
Iron	<1	2	0.3
Manganese	N/A	N/A	0.05
Chloride	3	<1	250
Fluoride	<1	<1	1.5
Nitrate	N/A	N/A	10
Sulfate	<1	22	500
Bicarbonate	346	496	
Total Dissolved Solids	315	443	500

All results in mg/L except conductivity in µS/cm and pH in pH units. N/A = Not Analyzed

The results show that the groundwater from both wells within the aquifer are a sodium bicarbonate type water with total dissolved solids concentration of less than 500 mg/L and should generally be acceptable for drinking water use.

It is recommended that water samples be collected and analyzed for routine dissolved salts and bacterial parameters from each well prior to use as a potable supply.

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Reconnaissance Report

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Well ID	LSD	SEC	TWP	RGE	M	DRILLING COMPANY	DATE COMPLETED	DEPTH (m)	TYPE OF WORK	USE	CHM	LT	PT	WELL OWNER	STATIC LEVEL (m)	TEST RATE (L/min)	SC DIAM (m)
459505	NW	31	053	01	5	GERALD MCGINN DRILLING LTD.	1979-10-25	10.67	New Well	Domestic		2		MILLER, GORDON	3.35	29.55	11.43
459506	NW	31	053	01	5	GERALD MCGINN DRILLING LTD.	1970-06-05	12.80	New Well	Domestic		5		MILLER, GORDON	5.49	45.46	0.00
459507	NW	31	053	01	5	GERALD MCGINN DRILLING LTD.	1978-09-15	46.94	New Well	Domestic		15		MILLER, GORDON	4.27	34.10	11.43
459508	NE	31	53	1	5	BIG IRON DRILLING LTD.	1975-09-03	57.91	New Well	Domestic		8		STEFFLER, CLAYTON	13.72	22.73	14.12
459508	NE	31	53	1	5	UNKNOWNDRILLINGCOMP11		57.91	Old Well - Abandoned	Unknown		1		STEFFLER, ROBERT			
459509	NE	31	053	01	5	UNKNOWN DRILLER		12.19	Chemistry	Domestic	1			WENDKOWSKI, R.	9.45		0.00
459510	NE	31	053	01	5	GERALD MCGINN DRILLING LTD.	1978-10-24	83.40	New Well	Domestic	1	8		STEFFLER, DOUG	0.00	11.37	11.43
459511	NE	31	053	01	5	UNKNOWN DRILLER		62.18	Chemistry	Domestic	1			STEFFLER, D.	56.08		0.00
459513	NE	31	053	01	5	GERALD MCGINN DRILLING LTD.	1979-04-12	120.24	New Well	Domestic		24		STEFFLER, DOUG	45.72	6.82	11.43
459514	NE	31	053	01	5	GERALD MCGINN DRILLING LTD.	1979-10-13	60.66	New Well	Domestic		10		GAGNAUX, LOU	29.38	15.91	11.43
459515	NE	31	053	01	5	GERALD MCGINN DRILLING LTD.	1984-05-28	28.04	New Well	Domestic		8		STEFFLER, CLAYTON	0.00	15.91	11.58
459516	NE	31	053	01	5	MCAULEY DRILLING CO. LTD.	1977-12-21	95.10	New Well	Domestic		11					11.58
459512	00	31	053	01	5	UNKNOWN DRILLER	1979-03-17	79.25	Chemistry	Domestic	1			CORGEL L.D.			0.00
493404	NE	31	053	01	5	D&D WATER WELL DRILLING & SERVICING LTD.	1995-07-19	87.78	New Well	Domestic		10	16	GOSKI, LEONARD	43.59	90.92	15.24
495878	SE	01	054	02	5	RODCO DRILLING	1999-09-14	32.92	New Well	Domestic		11	7	DUBE, LEO	15.48	40.91	15.24
498028	NW	31	053	01	5	D&D WATER WELL DRILLING & SERVICING LTD.	2000-09-26	23.16	New Well	Domestic		3	10	STEFFLER, ROBERT	12.19	68.19	15.24
1715115	NE	31	053	01	5	SUMMERS DRILLING LTD.	2000-10-23	62.48	New Well	Domestic		6	25	BELANGER, EDWARD	10.00	18.18	15.24
1716143	NW	6	54	1	5	SUMMERS DRILLING LTD.	2015-03-11	15.24	Piezometer	Monitoring		3		LAFARGE CANADA INC			
1716144	NW	6	54	1	5	SUMMERS DRILLING LTD.	2015-02-11	9.45	Piezometer	Monitoring		3		LAFARGE CANADA INC			
1716145	NW	6	54	1	5	SUMMERS DRILLING LTD.	2015-02-11	7.92	Piezometer	Monitoring		3		LAFARGE CANADA INC			

Alberta

Reconnaissance Report

View in Imperial

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Well ID	LSD	SEC	TWP	RGE	M	DRILLING COMPANY	DATE COMPLETED	DEPTH (m)	TYPE OF WORK	USE	CHM	LT	PT	WELL OWNER	STATIC LEVEL (m)	TEST RATE (L/min)	SC_DIAM (m)
459505	NW	31	053	01	5	GERALD MCGINN DRILLING LTD.	1974-10-25	10.67	New Well	Domestic		2		MILLER, GORDON	3.35	29.55	11.43
459506	NW	31	053	01	5	GERALD MCGINN DRILLING LTD.	1970-06-05	12.80	New Well	Domestic		5		MILLER, GORDON	5.49	45.46	0.00
459507	NW	31	053	01	5	GERALD MCGINN DRILLING LTD.	1978-09-15	45.94	New Well	Domestic		15		MILLER, GORDON	4.27	34.10	11.43
459508	NE	31	53	1	5	BIG IRON DRILLING LTD.	1975-09-03	57.91	New Well	Domestic		8		STEFFLER, CLAYTON	13.72	22.73	14.12
459508	NE	31	53	1	5	UNKNOWNDRILLINGCOMP11		57.91	Old Well - Abandoned	Unknown		1		STEFFLER, ROBERT			
459509	NE	31	053	01	5	UNKNOWN DRILLER		12.19	Chemistry	Domestic	1			WENCKOWSKI, R.	9.45		0.00
459510	NE	31	053	01	5	GERALD MCGINN DRILLING LTD.	1978-10-24	63.40	New Well	Domestic	1	8		STEFFLER, DOUG	0.00	11.37	11.43
459511	NE	31	053	01	5	UNKNOWN DRILLER		62.18	Chemistry	Domestic	1			STEFFLER, D.	56.08		0.00
459513	NE	31	053	01	5	GERALD MCGINN DRILLING LTD.	1979-04-12	129.24	New Well	Domestic		24		STEFFLER, DOUG	45.72	6.82	11.43
459514	NE	31	053	01	5	GERALD MCGINN DRILLING LTD.	1979-10-12	60.66	New Well	Domestic		10		GAGNAUX, LOU	24.38	15.91	11.43
459515	NE	31	053	01	5	GERALD MCGINN DRILLING LTD.	1984-05-28	28.04	New Well	Domestic		8		STEFFLER, CLAYTON	0.00	15.91	11.58
459516	NE	31	053	01	5	MCAULEY DRILLING CO. LTD.	1977-12-21	95.10	New Well	Domestic		11					11.58
459517	00	31	053	01	5	UNKNOWN DRILLER	1979-03-17	79.25	Chemistry	Domestic	1			CONGER, L.D.			0.00
493404	NE	31	053	01	5	D&D WATER WELL DRILLING & SERVICING LTD.	1995-07-19	67.78	New Well	Domestic		10	16	GOSKI, LEONARD	43.59	90.92	15.24
495278	SE	01	054	02	5	RODOO DRILLING	1999-09-14	32.92	New Well	Domestic		11	7	DUBE, LEO	15.48	40.91	15.24
498020	NW	31	053	01	5	D&D WATER WELL DRILLING & SERVICING LTD.	2000-09-26	23.16	New Well	Domestic		3	10	STEFFLER, ROBERT	12.19	68.19	15.24
1715115	NE	31	053	01	5	SUMMERS DRILLING LTD.	2000-10-23	62.48	New Well	Domestic		6	25	BELANGER, EDWARD	16.00	18.18	15.24
1716143	NW	6	54	1	5	SUMMERS DRILLING LTD.	2015-02-11	15.24	Piezometer	Monitoring		3		LAFARGE CANADA INC			
1716144	NW	6	54	1	5	SUMMERS DRILLING LTD.	2015-02-11	9.45	Piezometer	Monitoring		3		LAFARGE CANADA INC			
1716145	NW	6	54	1	5	SUMMERS DRILLING LTD.	2015-02-11	7.92	Piezometer	Monitoring		3		LAFARGE CANADA INC			

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Well ID	LSD	SEC	TWP	RGE	M	DRILLING COMPANY	DATE COMPLETED	DEPTH (m)	TYPE OF WORK	USE	CHM	LT	PT	WELL OWNER	STATIC LEVEL (m)	TEST RATE (L/min)	SC_DIAM (m)
459505	NW	31	053	01	5	GERALD MCGINN DRILLING LTD.	1974-10-25	10.67	New Well	Domestic		2		MILLER, GORDON	3.35	29.55	11.43
459506	NW	31	053	01	5	GERALD MCGINN DRILLING LTD.	1970-06-05	12.80	New Well	Domestic		5		MILLER, GORDON	5.49	45.46	0.00
459507	NW	31	053	01	5	GERALD MCGINN DRILLING LTD.	1978-09-15	46.94	New Well	Domestic		15		MILLER, GORDON	4.27	34.10	11.43
459508	NE	31	53	1	5	BIG IRON DRILLING LTD.	1975-09-03	57.91	New Well	Domestic		8		STEFFLER, CLAYTON	13.72	22.73	14.12
459508	NE	31	53	1	5	UNKNOWNDRILLINGCOMP11		57.91	Old Well - Abandoned	Unknown		1		STEFFLER, ROBERT			
459509	NE	31	053	01	5	UNKNOWN DRILLER		13.18	Chemistry	Domestic	1			WENCKOWSKI, R.	9.45		0.00
459510	NE	31	053	01	5	GERALD MCGINN DRILLING LTD.	1978-10-24	63.40	New Well	Domestic	1	8		STEFFLER, DOUG	0.00	11.37	11.43
459511	NE	31	053	01	5	UNKNOWN DRILLER		62.18	Chemistry	Domestic	1			STEFFLER, D.	56.08		0.00
459513	NE	31	053	01	5	GERALD MCGINN DRILLING LTD.	1979-04-12	129.24	New Well	Domestic		24		STEFFLER, DOUG	45.72	6.82	11.43
459514	NE	31	053	01	5	GERALD MCGINN DRILLING LTD.	1979-10-13	60.66	New Well	Domestic		10		GAGNAUK, LOU	24.38	15.91	11.43
459515	NE	31	053	01	5	GERALD MCGINN DRILLING LTD.	1984-05-28	28.04	New Well	Domestic		8		STEFFLER, CLAYTON	0.00	15.91	11.58
459516	NE	31	053	01	5	MCAULEY DRILLING CO. LTD.	1977-12-21	95.10	New Well	Domestic		11					11.58
459517	00	31	053	01	5	UNKNOWN DRILLER	1979-03-17	79.25	Chemistry	Domestic	1			CONGER, L.D.			0.00
492404	NE	31	053	01	5	D&D WATER WELL DRILLING & SERVICING LTD.	1995-07-19	87.78	New Well	Domestic		10	16	GOSKI, LEONARD	43.59	90.92	15.24
495878	SE	01	054	02	5	RODCO DRILLING	1999-09-14	32.92	New Well	Domestic		11	7	DUBE, LEO	15.48	40.91	15.24
498028	NW	31	053	01	5	D&D WATER WELL DRILLING & SERVICING LTD.	2000-09-26	23.16	New Well	Domestic		3	10	STEFFLER, ROBERT	12.19	68.19	15.24
1715113	NE	31	053	01	5	SUMMERS DRILLING LTD.	2000-10-23	62.48	New Well	Domestic		6	25	BELANGER, EDWARD	16.00	18.18	15.24
1716143	NW	6	54	1	5	SUMMERS DRILLING LTD.	2015-02-11	15.24	Piezometer	Monitoring		3		LAFARGE CANADA INC			
1716144	NW	6	54	1	5	SUMMERS DRILLING LTD.	2015-02-11	9.45	Piezometer	Monitoring		3		LAFARGE CANADA INC			
1716145	NW	6	54	1	5	SUMMERS DRILLING LTD.	2015-02-11	7.92	Piezometer	Monitoring		3		LAFARGE CANADA INC			

Water Well Drilling Report

Alberta

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The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

GOWN ID

GIC Well ID	496878
GoA Well Tag No.	
Drilling Company Well ID	
Date Report Received	2000/01/20

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
DUBE, LEO	ONOWAY				

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	SE	01	054	02	5				

Measured from Boundary of
______ m from
______ m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 53.832161 Longitude -114.155218
How Location Obtained
Not Verified

Elevation ______ m
How Elevation Obtained
Not Obtained

Drilling Information

Method of Drilling
Rotary

Type of Work
New Well

Proposed Well Use
Domestic

Formation Log

Measurement in Metric

Depth from ground level (m)	Water Bearing	Lithology Description
3.18		Clay & Boulders
11.89		Blue Clay
15.24		Yellow Clay
15.85		Light Brown Shale
16.46		Green Shale
18.29		Gray Shale
21.95		Gray Silty Shale
23.16		Green Shale
28.65		Gray Shale
31.09		Sandstone
32.92		Gray Shale

Yield Test Summary

Measurement in Metric

Recommended Pump Rate 40.91 L/min

Test Date	Water Removal Rate (L/min)	Static Water Level (m)
1999/09/14	40.91	15.48

Well Completion

Measurement in Metric

Total Depth Drilled	Finished Well Depth	Start Date	End Date
32.92 m		1999/09/14	1999/09/14

Borehole

Diameter (cm)	From (m)	To (m)
0.00	0.00	32.92

Surface Casing (if applicable)
Plastic
Size OD: 15.24 cm
Wall Thickness: 0.953 cm
Bottom at: 22.56 m

Well Casing/Liner
Plastic
Size OD: 11.43 cm
Wall Thickness: 0.635 cm
Top at: 21.34 m
Bottom at: 31.39 m

Perforations

From (m)	To (m)	Diameter or Slot Width(cm)	Slot Length(cm)	Hole or Slot Interval(cm)
25.30	31.39	0.000		0.32

Perforated by Hand Drill

Annular Seal Driven & Shale Trap
Placed from 22.25 m to 22.56 m
Amount ______

Other Seals

Type	At (m)

Screen Type
Size OD: 0.00 cm

From (m)	To (m)	Slot Size (cm)

Attachment ______
Top Fittings ______ Bottom Fittings ______

Pack
Type ______ Grain Size ______
Amount

Contractor Certification

Name of Journeyman responsible for drilling/construction of well
UNKNOWN NA DRILLER

Company Name
BODCO DRILLING

Certification No
1

Copy of Well report provided to owner   Date approval holder signed

Alberta

Water Well Drilling Report

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The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

GOWN ID

GIC Well ID	495878
GoA Well Tag No.	
Drilling Company Well ID	
Date Report Received	2000/01/20

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
DUBE, LEO	ONOWAY				

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	SE	01	054	02	5				

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 53.632161 Longitude -114.155218
How Location Obtained
Not Verified

Elevation m
How Elevation Obtained
Not Obtained

Additional Information

Measurement in Metric

Distance From Top of Casing to Ground Level cm
Is Artesian Flow
Rate L/min
Is Flow Control Installed
Describe

Recommended Pump Rate 40.91 L/min
Recommended Pump Intake Depth (From TOC) 25.91 m
Pump Installed Yes
Type SUB
Depth m
Make
H.P. .5
Model (Output Rating)

Did you Encounter Saline Water (>4000 ppm TDS)
Depth m
Gas
Depth m
Well Disinfected Upon Completion
Geophysical Log Taken
Submitted to ESRD
Sample Collected for Potability
Submitted to ESRD

Additional Comments on Well
DRILLER REPORTS DISTANCE FROM TOP OF CASING TO GROUND LEVEL: 2'.

Yield Test

Taken From Ground Level — Measurement in Metric

Test Date	Start Time	Static Water Level
1999/09/14	12:00 AM	15.48 m

Method of Water Removal
Type Air
Removal Rate 40.91 L/min
Depth Withdrawn From 27.43 m

If water removal period was < 2 hours, explain why

Depth to water level

Drawdown (m)	Elapsed Time Minutes:Sec	Recovery (m)
	0:00	27.43
	1:30	17.73
	2:00	16.59
	3:00	16.00
	4:00	15.90
	5:00	15.90
27.43	120:00	

Water Diverted for Drilling

Water Source	Amount Taken	Diversion Date & Time
	L	

Contractor Certification

Name of Journeyman responsible for drilling/construction of well
UNKNOWN NA DRILLER

Certification No.
1

Company Name
RODCO DRILLING

Copy of Well report provided to owner
Date approval holder signed

Water Well Drilling Report

View in Imperial | Export to Excel

GIC Well ID: 1165293
GoA Well Tag No.
Drilling Company Well ID
Date Report Received

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

GOWN ID

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
CLARKE, DALE	RR 3 SITE 310 COMP 7	ONOWAY	AB	CA	T0E 1V0

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	01	04	054	02	5	7	3	0328055	HEATHERDOWN

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 53.631639 Longitude -114.229053
How Location Obtained
Map

Elevation m
How Elevation Obtained
Not Obtained

Drilling Information

Method of Drilling
Rotary

Type of Work
New Well

Proposed Well Use
Domestic

Formation Log

Measurement in Metric

Depth from ground level (m)	Water Bearing	Lithology Description
7.32		Brownish Yellow Till
17.68		Blue Gray Clay
36.27		Blue Gray Till & Rocks
39.62		Gravel
40.84		Green Soft Shale
44.81		Gray Medium Grained Sandstone
56.08		Green Shale
64.31		Gray Medium Grained Sandstone
69.49		Green Shale
71.93		Gray Medium Grained Sandstone
75.59		Green Shale
78.33		Gray Medium Grained Sandstone
79.25		Green Shale

Yield Test Summary

Measurement in Metric

Recommended Pump Rate 27.28 L/min

Test Date	Water Removal Rate (L/min)	Static Water Level (m)
2007/10/04	45.46	36.15

Well Completion

Measurement in Metric

Total Depth Drilled	Finished Well Depth	Start Date	End Date
79.25 m		2007/10/03	2007/10/04

Borehole

Diameter (cm)	From (m)	To (m)
22.23	0.00	79.25

Surface Casing (if applicable)
Plastic
Size OD: 15.24 cm
Wall Thickness: 0.991 cm
Bottom at: 53.04 m

Well Casing/Liner
Plastic
Size OD: 11.43 cm
Wall Thickness: 0.602 cm
Top at: 51.21 m
Bottom at: 79.25 m

Perforations

From (m)	To (m)	Diameter or Slot Width(cm)	Slot Length(cm)	Hole or Slot Interval(cm)
56.08	64.31	0.159		30.48
69.49	71.93	0.159		30.48
75.59	78.33	0.159		30.48

Perforated by Saw

Annular Seal Shale Trap & Bentonite
Placed from 0.00 m to 53.04 m
Amount

Other Seals

Type	At (m)

Screen Type
Size OD: cm

From (m)	To (m)	Slot Size (cm)

Attachment
Top Fittings
Bottom Fittings

Pack
Type Unknown
Grain Size
Amount Unknown

Contractor Certification

Name of Journeyman responsible for drilling/construction of well
RANDY RIEDLINGER

Certification No
4584Q

Company Name
CALIBRE DRILLING LTD.

Copy of Well report provided to owner
Date approval holder signed

Domestic

Water Well Drilling Report

View in Imperial | Export to Excel

GIC Well ID: 1165293
GoA Well Tag No.
Drilling Company Well ID
Date Report Received

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GOWN ID

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
CLARKE, DALE	RR 5 SITE 310 COMP 7	ONOWAY	AB	CA	T0E 1V0

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	01	04	054	02	5	7	3	0326065	HEATHERDOWN

Measured from Boundary of
_____ m from
_____ m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 53.831639 Longitude -114.229053
How Location Obtained
Map

Elevation _____ m
How Elevation Obtained
Not Obtained

Additional Information

Measurement in Metric

Distance From Top of Casing to Ground Level 50.90 cm
Is Artesian Flow _____
Rate _____ L/min
Is Flow Control Installed _____
Describe _____

Recommended Pump Rate 27.28 L/min
Recommended Pump Intake Depth (From TOC) 54.90 m
Pump Installed _____ Depth _____ m
Type _____ Make _____ H.P. _____
Model (Output Rating) _____

Did you Encounter Saline Water (>4000 ppm TDS) _____ Depth _____ m
Gas _____ Depth _____ m
Well Disinfected Upon Completion _____
Geophysical Log Taken _____
Submitted to ESRD
Sample Collected for Potability _____ Submitted to ESRD _____

Additional Comments on Well
18000 LITRES OF WATER USED FOR DRILLING. BOREHOLE DIAMETER 6.75" & 5".

Yield Test

Taken From Ground Level — Depth to water level
Measurement in Metric

Test Date: 2007/10/04
Start Time: 9:35 AM
Static Water Level: 36.15 m

Method of Water Removal
Type: Air
Removal Rate: 45.46 L/min
Depth Withdrawn From: 54.90 m

If water removal period was < 2 hours, explain why
MEASUREMENTS FROM GROUND

Drawdown (m)	Elapsed Time Minutes:Sec	Recovery (m)
36.15	0:00	45.31
	1:00	44.42
	2:00	42.71
	3:00	41.73
	4:00	40.81
	5:00	40.11
	6:00	39.59
	7:00	39.16
	8:00	38.91
	9:00	38.53
	10:00	38.28
	12:00	37.82
	14:00	37.67
	16:00	37.46
	20:00	37.20
	25:00	37.00
	30:00	36.86
	35:00	36.77
	40:00	36.69
	50:00	36.60
	60:00	36.54
	75:00	36.47
	90:00	36.42
	105:00	36.39
45.31	120:00	36.36

Water Diverted for Drilling

Water Source | Amount Taken L | Diversion Date & Time

Contractor Certification

Name of Journeyman responsible for drilling/construction of well
RANDY RIEDLINGER
Certification No
4564Q
Company Name
CALIBRE DRILLING LTD.
Copy of Well report provided to owner | Date approval holder signed

Alberta

Water Well Drilling Report

View in Imperial | Export to Excel

GIC Well ID 1105293
GoA Well Tag No.
Drilling Company Well ID
Date Report Received

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

GOWN ID

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
CLARKE, DALE	RR 3 SITE 310 COMP 7	ONOWAY	AB	CA	T0E 1V0

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	01	04	054	02	5	7	3	0328055	HEATHERDOWN

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 53.631639 Longitude -114.229063
How Location Obtained
Map

Elevation m
How Elevation Obtained
Not Obtained

Additional Information

Measurement in Metric

Distance From Top of Casing to Ground Level 59.99 cm
Is Artesian Flow
Rate L/min
Is Flow Control Installed
Describe

Recommended Pump Rate 27.28 L/min
Pump Installed
Depth m
Recommended Pump Intake Depth (From TOC) 54.90 m
Type
Make
H.P.
Model (Output Rating)

Did you Encounter Saline Water (>4000 ppm TDS) Depth m
Gas Depth m
Well Disinfected Upon Completion
Geophysical Log Taken
Submitted to ESRD
Sample Collected for Potability
Submitted to ESRD

Additional Comments on Well
18000 LITRES OF WATER USED FOR DRILLING. BOREHOLE DIAMETER 8.75" & 5".

Yield Test

Taken From Ground Level — Measurement in Metric

Test Date	Start Time	Static Water Level
2007/10/04	9:39 AM	36.15 m

Method of Water Removal

Type Air
Removal Rate 45.46 L/min
Depth Withdrawn From 54.90 m

If water removal period was < 2 hours, explain why
MEASUREMENTS FROM GROUND

Depth to water level

Drawdown (m)	Elapsed Time Minutes:Sec	Recovery (m)
36.15	0:00	45.31
	1:00	44.42
	2:00	42.71
	3:00	41.73
	4:00	40.81
	5:00	40.11
	6:00	39.59
	7:00	39.16
	8:00	38.81
	9:00	38.53
	10:00	38.28
	12:00	37.82
	14:00	37.67
	16:00	37.46
	20:00	37.20
	25:00	37.00
	30:00	36.86
	35:00	36.77
	40:00	36.69
	50:00	36.60
	60:00	36.54
	75:00	36.47
	90:00	36.42
	105:00	36.39
45.31	120:00	36.36

Water Diverted for Drilling

Water Source	Amount Taken	Diversion Date & Time
	L	

Contractor Certification

Name of Journeyman responsible for drilling/construction of well
RANDY RIEDLINGER

Certification No
45640

Company Name
CALIBRE DRILLING LTD.

Copy of Well report provided to owner
Date approval holder signed

Alberta CHEMICAL ANALYSIS REPORT

WELL NAME	WADDELL, PAT	**GIC WELL ID**	458077
LOCATION	LSD NW SEC 36 TWP 053 RG 02 M 5	**SAMPLE NO.**	5249
WELL DEPTH	124.00 ft	**WATER LEVEL**	ft
AQUIFER		**LABORATORY**	AE
SAMPLING DATE	1985-05-22		

FIELD	MG/L	FIELD	MG/L
BICARBONATE		CARBONATE	
CHLORIDE		CONDUCTIVITY	
DISSOLVED OXYGEN		EH	
IRON		MANGANESE	
PH		SULPHATE	
S2		TEMPERATURE(C)	0
TOTAL ALKALINITY		TOTAL HARDNESS	

LABORATORY		Analysis Date 1985-06-04	
COD		CONDUCTIVITY	779
DIC		FLUORIDE	0.1000
ION BALANCE	1.0100	PH	7.90
SAR		SIO2	13.9000
TOTAL ALKALINITY	407.0000	TC	
TDS	443	TN	
DOC			
AMMONIUM-N		BICARBONATE	496.0498
CALCIUM	79.9997	CARBONATE	
CHLORIDE	-1.0011	MAGNESIUM	16.0135
NITRATE-N		NITRITE-N	-0.0504
PHOSPHATE		POTASSIUM	1.9440
SODIUM	77.9999	SULPHATE	22.0298
NO2 + NO3	-0.0504	TOTAL HARDNESS	266.0000
ALUMINUM		ARSENIC	
BARIUM		BERYLLIUM	
CADMIUM		CHROMIUM	
COBALT		COPPER	
IRON	2.1400	LEAD	
MANGANESE		MERCURY	
MOLYBDENUM		NICKEL	
SELENIUM		STRONTIUM	
VANADIUM		ZINC	
HYDROCARBONS		PESTICIDES	
PHENOLICS			

Remarks:

NATURE OF ALK AND HARDNESS IS CACO3

Temperature reported in Degree Centigrade. Conductivity reported in microsiemens/cm, pH in pH units. Alkalinity and Hardness expressed as Calcium Carbonate. FE, VA, PB, AL, AG expressed as extractable. FE in field measurements and all remaining metals expressed as total. '-' indicates concentrations less than.

EH	- Oxidation-Reduction Potential	SAR	- Sodium Adsorption Ratio	DIC	- Dissolved Inorganic Carbon
COD	- Chemical Oxygen Demand	DOC	- Dissolved Organic Carbon	TN	- Total Particulate Nitrogen
TDS	- Total Dissolved Solids	TC	- Total Particulate Carbon		

Note: this data may not be fully checked. The Province disclaims all responsibility for its accuracy

Alberta CHEMICAL ANALYSIS REPORT

WELL NAME	FOSSUM, PAIGE	GIC WELL ID	446859
LOCATION	LSD SW SEC 01 TWP 054 RG 02 M 5	SAMPLE NO.	7950
WELL DEPTH	130.00 ft	WATER LEVEL	ft
AQUIFER		LABORATORY	AE
SAMPLING DATE	1978-07-28		

FIELD	MG/L	FIELD	MG/L
BICARBONATE		CARBONATE	
CHLORIDE		CONDUCTIVITY	
DISSOLVED OXYGEN		EH	
IRON		MANGANESE	
PH		SULPHATE	
S2		TEMPERATURE(C)	0
TOTAL ALKALINITY		TOTAL HARDNESS	

LABORATORY		Analysis Date 1978-08-10	
COD		CONDUCTIVITY	581
DIC		FLUORIDE	0.0800
ION BALANCE	1.0700	PH	8.10
SAR		SIO2	13.9000
TOTAL ALKALINITY	284.0000	TC	
TDS	315	TN	
DOC			
AMMONIUM-N		BICARBONATE	346.0357
CALCIUM	55.9998	CARBONATE	
CHLORIDE	3.0033	MAGNESIUM	10.0077
NITRATE-N		NITRITE-N	-0.0504
PHOSPHATE		POTASSIUM	1.2280
SODIUM	62.9993	SULPHATE	-10.0144
NO2 + NO3	0.2702	TOTAL HARDNESS	183.0000
ALUMINUM		ARSENIC	
BARIUM		BERYLLIUM	
CADMIUM		CHROMIUM	
COBALT		COPPER	
IRON	0.0800	LEAD	
MANGANESE		MERCURY	
MOLYBDENUM		NICKEL	
SELENIUM		STRONTIUM	
VANADIUM		ZINC	
HYDROCARBONS		PESTICIDES	
PHENOLICS			

Remarks:

Temperature reported in Degree Centigrade. Conductivity reported in microsiemens/cm, pH in pH units. Alkalinity and Hardness expressed as Calcium Carbonate. FE, VA, PB, AL, AG expressed as extractable. FE in field measurements and all remaining metals expressed as total. '-' indicates concentrations less than.

EH	- Oxidation-Reduction Potential	SAR	- Sodium Adsorption Ratio	DIC	- Dissolved Inorganic Carbon
COD	- Chemical Oxygen Demand	DOC	- Dissolved Organic Carbon	TN	- Total Particulate Nitrogen
TDS	- Total Dissolved Solids	TC	- Total Particulate Carbon		

Note: this data may not be fully checked. The Province disclaims all responsibility for its accuracy

“PIT REGISTRATION APPLICATION -YEOMAN/PARKER PIT”

S.E. 1-54-2-5

PREPARED BY

ASPEN LAND GROUP INC..

APPENDIX ‘E’

DECEMBER 2013

Pit Registration Application
Yeoman/Parker Pit

October 2013
(Revised December 2013)

Prepared For:

Westrock Aggregates Ltd.

Prepared by:

ASPEN LAND GROUP INC.

#201, 18311 105 Avenue NW. Edmonton, AB T5S 2K9

Executive Summary

For many years sand and gravel mining operations have been ongoing within the E 1-54-2-W5M. Based on a review of historical aerial photographs, mining operations began within the northern portion of the NE 1-54-2-W5M in the 70's. Mining operations then continued southward across the majority of the quarter and eventually into the northwest corner of the SE 1-54-2-W5M until the early 90's.

Although the history is somewhat unclear, it would appear that the pit was initially opened up and operated by Yeoman Aggregates Ltd. (Yeoman). In the late 80's the pit was then taken over by Westrock Aggregates Ltd. (Westrock). Approvals for the pit had been acquired under the former *Land Surface Conservation and Reclamation Act* (LSCRA) in 1986 and again in 1990. In 1990 a revised application was submitted under LSCRA and in 1997 an application was submitted under the *Environmental Protection and Enhancement Act* (EPEA). As neither of these applications received approval, mining operations were discontinued in the early to mid 90's and the pit has been inactive since that time.

Given that Westrock now plan to reclaim the pit, Aspen Land Group Inc. was retained to prepare a focused registration application that will allow Alberta Environment and Sustainable Resource Development (ESRD) to register the pit under the *Code of Practice for Pits* (the Code) for reclamation purposes.

Table of Contents

Executive Summary

List of Appendices

1.0 Introduction

1.1 Overview

Westrock Aggregates Ltd. (Westrock) is proposing to finish reclaiming the 56.29 ha disturbance associated with the sand and gravel pit located in the E 1-54-2-W5M. The pit is located along the west side of Range Road 20 approximately 5 km east of Hwy. 43 as shown on Drawing No. 1. Pit operations will include the removal of all remaining stockpiled product, the importation of topsoil and overburden material, and reclamation of the current disturbance.

The purpose of this report is to provide information required by Alberta Environment and Sustainable Resource Development (ESRD) to register this pit under the *Code of Practice for Pits* (the Code) for the sole purpose of reclaiming the pit. The schedules required as part of the registration process are included in Appendix B.

1.2 Land Ownership

Westrock currently owns the NE 1-54-2-W5M while Charles and Melanie Parker currently own the SE 1-54-2-W5M. Copies of the Certificate of Titles are included in Appendix A.

2.0 Existing Conditions

2.1 History

Based on a review of historical aerial photographs, mining within the NE 1-54-2-W5M commenced sometime between the 1973 and 1977 as shown on Drawing No. 4. On the 1977 aerial photograph it is evident that mining activities had begun to take place within the northern portion of the quarter and that an area of approximately 8.5 ha had been disturbed. As shown on the 1981 aerial photograph included on Drawing No. 4, this active mining area had expanded southward and that approximately 24.67 ha had been disturbed.

A Sand and Gravel Pit Inventory Report that was conducted by ESRD (formerly Alberta Environment) in 1985 indicated that 70 to 80 acres had been disturbed with approximately 40 acres of reserves remaining to be mined. Some reclamation was ongoing in terms of overburden placement while the older area within the eastern portion of the pit was beginning to re-vegetate itself naturally. Topsoil thickness was reported to be 6 to 8 inches with overburden varying from 10 to 25 feet.

In 1986, Yeoman Construction Ltd. (Yeoman) submitted an application for a Development and Reclamation Approval under the *Land Surface Conservation and Reclamation Act* (LSCRA). A five year approval was issued in March of 1986 (Approval No. SG-39-86) that sanctioned a 10 acre parcel out of a 120 acre development. Although it is not entirely clear why only 10 acres were sanctioned; it is assumed that the balance of the disturbed lands may have been considered as a pre-78 disturbance. Financial security was obtained in the amount of $2,500.00. It is important to note that in the application submitted in support of this approval that the topsoil depth was reported at 3 to 5 inches with the overburden depth ranging from 4 to 40 feet.

In the summer of 1989, a site inspection conducted by ESRD revealed a number of compliance issues associated with the pit. When Westrock had taken over the pit, they provided updated applications on October 24, 1989 and on February 9, 1990 in an attempt to address the compliance issues. On December 5, 1990 an approval was issued under LSCRA for a sanctioned area of 20 acres. This sanctioned area included future mining areas to the north of an intermittent drainage course within the SE 1-54-2-W5M as shown on Drawing No. 3. At that time financial security was assessed at $5,000.00 but it was never submitted.

On January 24, 1991 Westrock submitted an application under LSCRA to amend their approval to allow mining operations to proceed along the western side of the SE 1-54-2-W5M south of the intermittent drainage course as shown on Drawing No. 3. This amendment was never finalized; however, a 1500 mm concrete culvert was installed across the creek and mining commenced within an area south of the creek.

An application for approval was submitted under EPEA on May 26, 1997 that was subsequently revised on September 26, 1997. Although the application was deemed sufficiently complete to initiate the public review process, an approval was never issued.

Pit sizes for the different years/milestones are outlined below:

Extraction area pre-1978	8.5 ha
Extraction area post-1978	24.67 ha
Sanctioned area 1986 LSCRA approval	4.1 ha (10 acres)
Sanctioned area 1990 LSCRA approval	8.1 ha (20 acres)
Current/overall disturbed area	56.29 ha

2.2 Current and Adjacent Land Use Activities

The total disturbance associated with pit activities to date is approximately 56.29 ha. As the pit has been relatively inactive for a number of years, some of the disturbed areas are beginning to revegetate themselves. This is especially evident in areas where the overburden material had been re-contoured along the eastern side of the pit within the NE 1-54-2-W5M. The majority of the disturbed areas where are vegetated with trees and typical understory species along with well established grasses.

Lafarge Canada Inc. (Lafarge) maintains a haul road that extends across the north central part of the NE 1-54-2-W5M in an east/west direction. This road is used to haul product from their pits to the west to their wash plant located on the eastside of Rge. Rd. 20 within the W 6-54-1-W5M. A large maintenance shop and associated buildings are located to the north of the Lafarge haul road. Although located in an area that once formed part of the pit, this shop was previously rented out and will remain in place as an improvement to the end land use.

The majority of the area located to the north of the Lafarge haul road represents a pre-78 disturbance while the area to the south of the Lafarge haul road within the NE 1-54-2-W5M for the most part forms the un-reclaimed pit area.

Apart from the treed area associated with the creek that extends across the northern portion of the SE 1-54-2-W5M and the area that was disturbed as a result of mining activities, the balance of the area within this quarter is under cultivation and is used for agricultural purposes.

Lafarge is currently mining a pit in the NW 1-54-2-W5M. Over the past couple years, Lafarge has mined the aggregate and reclaimed a portion of the common property line between the NE 1 and the NW 1-54-2-W5M as shown on Drawing No. 3. Yellowhead Aggregates (Yellowhead) is currently mining a pit within the SW 1-54-2-W5M. At this time Westrock and Yellowhead are in discussions about mining out the common property boundary between these two quarters, however, an agreement has not been made at this time. In the event that an agreement is reached to mine out this common property line, Westrock will submit an updated activities plan.

As depicted on Drawing No. 2 and 3, there are existing excavations associated with past mining activity currently located to the south within the NE 1-54-2-W5M and to the northwest in the SE 1-54-2-W5M. The remaining disturbed area has been stripped or had overburden material directly placed in low areas over undisturbed land to level out the area and to increase the arable land.

2.3 Topography and Surface Drainage

The topography of the area consists of a high relief landform or ridge sloping from west to east. Elevations range from 755 masl to 730 masl. Contours and existing surface drainage patterns are shown on Drawing No. 2.

The undisturbed land and partially reclaimed lands within the NE1-54-2-W5M generally slope from the west to the east or to the northeast. There is an intermittent drainage course crossing the northern part of the SE 1-54-2-W5M that conveys water in an easterly direction to a culvert under Rge. Rd. 20 and eventually to Kilini Creek. Although this intermittent drainage course also conveyed runoff from the lands to the west of the subject property, surrounding aggregate operations to the west have removed the majority of the upstream catchment basin, significantly reducing its natural flow. The majority of the surface runoff from within the SE 1-54-2-W5M drains directly to the east or to the northeast towards the intermittent drainage course located within the northern part of the quarter.

2.4 Soils

Based on the Alberta Soils Information Viewer, the soils within the general area of the E 1-54-2-W5M are comprised of three different soil polygons.

Polygon 18958 includes the west half of the SE 1-54-2-W5M and is comprised of well drained soils of the Dark Gray Luvisol and Orthic Gray Luvisol subgroups of the Uncas and

Cooking Lake soil series. Polygon 19049 includes the southwest corner of the NE 1-54-2-W5M and is comprised 80% of very poorly drained soils of the Rego Humic Gleysol subgroup of the Kerensky series and 20% of well drained soils of the Dark Grey Luvisol subgroup of the Elk Point Series. Polygon 19130 comprises the remaining area of the NE 1-54-2-W5M and is comprised of well drained miscellaneous coarse-textured soils in the black soil zone. This polygon also includes soils with Rego profiles that have highly variable landscape characteristics and soils series distribution that may be the result of past mining activities.

Based on a site assessment conducted on August 30, 2013 no subsoil stockpiles were found within the NE 1-54-2-W5M nor was there any evidence of replaced subsoil in the reclaimed areas. Considering when this part of the pit was operated, salvaging of topsoil and subsoil may have not been stripped to meet current criteria. Therefore, subsoil will not be available for reclamation in the NE 1-54-2-W5M.

As shown Drawing No. 3, topsoil and subsoil was salvaged and stockpiled separately for pit operations within the SE 1-54-02-W5M. The texture of the stockpiled topsoil and subsoil was primarily textured as a sandy loam; however, there were some sample locations that reflected more of a sandy clay loam texture.

2.5 Land Capability for Agriculture

The CLI capability for agriculture is rated as class 4M (60%) and O (40%) within the E 1-54-2-W5M. Soils that are rated as class 4 have severe limitations and have restrictions on the range of crops or require special conservation practices due to moisture limitations. The areas that are rated as O are considered organic soils.

2.6 Surficial Geology

Based on the Quarternary Geology, Central Alberta map (I. Shetsen 1990) the subject property is located in an area described as a stagnation moraine which typically exhibits till of uneven thickness with local water sorted material up to 30 m thick. This stagnation moraine also exhibits undulating to hummocky topography reflecting variations in till thickness. In this area, the topography is described as undulating with local relief generally less than 3 m.

Bedrock at the base of the deposit consists of grey feldspathic, clayey sandstone, grey bentonitic mudstone and carbonaceous shale of the Horseshoe Canyon Formation of the Cretaceous age. The bedrock contact is non marine and is often characterized by a concretionary ironstone beds, scattered coal and bentonite beds of variable thickness, minor limestone beds.

2.7 Stratigraphy

Drawing No. 6 through 9 depict the current surface conditions. Based on a review of ESRD's file material, the average undisturbed soil depths within the pit area would have been as follows:

Topsoil	- 6 to 8 in (0.15 to 0.20 m)
Subsoil	- not available
Overburden	- 10 to 25 ft (3.0 to 7.60 m)
Aggregate	- not available

As outlined in Section 2.4, subsoil was not appropriately salvaged within the NE 1-54-2-W5M. Subsoil material that was salvaged in the SE 1-54-2-W5M will be evenly distributed in that part of the pit prior to topsoil placement.

There is limited information available as to where and how much aggregate was removed by the previous Yeoman or Westrock operations. Although no formal aggregate test hole information is available, Westrock has concluded that no economical gravel remains to be mined within the pit. Consequently, as no further aggregate extraction is proposed, the provision of aggregate testing information is not considered required for the proposed reclamation activities.

2.8 Groundwater

The previous operations did not appear to have intercepted groundwater. As reclamation is the only activity proposed, groundwater is not expected to be encountered.

2.9 Vegetation and Wildlife

The proposed reclamation activities will only impact those areas that have already been previously disturbed and will not result in the loss of any naturally vegetated areas or negatively impact wildlife in the area. Common throughout the Onoway area, considerable tansy was noted onsite along with other noxious weeds such as Canada thistle and yellow toadflax.

3.0 Reclamation Plan

3.1 Current Development

Although at one time relatively active, as the aggregate resource within the pit has now been depleted Westrock would like to register the current pit disturbance of 56.29 ha for reclamation. All areas south of the Lafarge haul road will be reclaimed while the processing/shop area will be maintained. A portion of the Lafarge haul road from Rge. Rd. 20 to the processing/shop will also remain in order to provide secondary access to the shop. That portion of the haul road that extends from the shop area to the western boundary of the NE 1-54-2-W5M will be reclaimed and integrated with the surrounding landscape. In addition to the portion of the Lafarge haul road that will remain in place, the southern access road developed between 1977 and 1981 off of Rge. Rd. 20 will also remain in place.

In the unlikely event that aggregate material is encountered during reclamation that is economical to mine, an updated activities plan will be submitted prior to extraction.

3.2 Pit Access

As shown on Drawing No. 2, access to the pit is off of Twp. Rd. 541 and Rge. Rd. 20 with the pit being located approximately 8 km north of Highway 16.

3.3 Property Line Buffers, Pit Faces and Extraction Setbacks

A portion of the common property boundary between the NE and the NW 1-54-2-W5M has been mined out by Lafarge with their mining operations within the NW 1-54-2-W5M. In order to mine out this common property boundary, Lafarge extended their operations by approximately 130 to150 m into the Yeoman Pit. As this mined out common property boundary has now been reclaimed and properly integrated with the adjacent lands, the standard 3:1 slopes that are typically constructed adjacent to undisturbed property boundaries are no longer required.

For pit activities located within the SE 1-54-2-W5M, there are stockpiles of reclamation material encroaching within the 3 m undisturbed buffer along the common property between the SE 1 and the SW 1-54-2-W5M. Unless an agreement to mine out this common property boundary can be made between Westrock and Yellowhead as outlined in Section 2.2, the 3 m undisturbed buffer will be reestablished with reclaimed slopes of 3:1 or gentler constructed along the pit face as shown on Drawing No. 8.

The culvert which provides access from the south portion of the SE 1-54-2-W5M to the north portion, will also remain in place as part of the reclaimed landscape.

If the reclamation of this pit should not proceed within the next two years, as an interim measure any areas within the pit that have slopes that are greater than 2:1 will be re-sloped to 2:1 or gentler to ensure public safety and to avoid the potential loss of reclamation material due to erosion or slumping.

3.4 Measures to Control Dust, Wind and Water Erosion

In terms of mitigation measures to control wind and water erosion, all stockpiles of reclamation material will remain vegetated until they are ready to be distributed over the re-contoured landscape. Once reclamation material has been put in place, re-vegetation of the area will occur as soon as possible. Surface runoff from the disturbed areas within the active pit area will, as much as possible, be maintained onsite and redirected to existing excavations or other low areas within the pit.

3.5 Contouring and Soil Replacement

The objective in terms of reclamation is to ensure that the disturbed lands associated with the pit are reclaimed to an equivalent land capability. Due to the timing difference between the operations within the NE 1 and the SE 1-54-2-W5M, the reclamation objectives will be slightly different while trying to meet equivalent land capability.

Contouring and Soil Replacement for the SE 1-54-2-W5M (Parker Pit)

The disturbance south of the channel represents approximately 6 ha of the current disturbed area. Slopes along the west property line will be reclaimed to no steeper than 3:1; while the remaining slopes along the pit boundary will be reclaimed to no steeper then 10:1.

That being said, Westrock may have the opportunity to import up to 100,000 m^3 of fill material to raise the elevation of this area to match pre-disturbance elevations, as shown on Drawing No. 8 and 9. If Westrock is unable to bring or fill or brings in less than 100,000m^3 of fill, the reclaimed landscape will be to a lower elevation, as shown on Drawing No. 8 and 9. Utilizing material stockpiled within this quarter, the topsoil replacement depth will be approximately 18 cm while the subsoil replacement depth will be approximately 9 cm.

Contouring and Soil Replacement for the NE 1-54-2-W5M (Yeoman Pit)

Areas where dense volunteer tree vegetation or hayland has developed will remain in place as shown on Drawing No. 3. Areas that are comprised of haphazard excavations and stockpiles of soil material will be leveled out and integrated to develop a harmonious landscape. It is anticipated that the slopes of these reclaimed areas will for the most part be 10:1 or gentler but there may be areas where the slopes are closer to 4:1 as conditioned in LSCRA Approval No. SG-39-86. It is anticipated that the land will be reclaimed back to an agricultural end land use (pasture/cultivation) with some treed areas.

As mentioned in Section 3.3, the property line buffer and associated 3:1 slopes are not required along the west portion of the NE1-54-2-W5M given that it has been mined out and reclaimed by Lafarge.

Once the site is re-contoured, all available topsoil that is currently stockpile or exhumed during reclamation activities will be spread evenly over all re-contoured areas. In order to increase agricultural production Westrock may import up to 100,000 m^3 of topsoil to the pit. Imported topsoil will only be placed within the reclaimed areas in the NE 1-54-2-W5M.

Prior to the placement of topsoil material, any areas exhibiting compaction will be alleviated.

3.6 Revegetation

The reclaimed areas within the NE 1-54-2-W5M will be revegetated using a hayland seed mix while in the SE 1-54-2-W5M a seed mix will be used for the reclaimed area that matches the landowner’s current crop rotation.

3.7 Importation of Reclamation Materials Handing Plan

As mentioned in Section 3.5, Westrock may import material to augment the reclamation of the pit. It is anticipated that up to 100,000 m^3 of topsoil and 100,000 m^3 of overburden material could be imported from around the Edmonton area.

All imported material will be from sites with no previous disturbance (i.e., agriculture to residential). An inventory of the material received will be maintained that will include such things as:

- the location where the material was obtained and placed;
- the quantity of the material received; and
- random sample analysis to confirm no contaminants.

As there is sufficient topsoil material in the SE 1-54-2-W5M to properly reclaim the site, no imported topsoil material will be applied to this area. Up to 100,000 m^3 of imported overburden fill material will be used to fill the excavation area to reestablish positive drainage to the intermittent creek and avoid ponding of water.

To make up for the lack of topsoil material available for the NE 1-54-2-W5M, imported topsoil material may utilized to establish a topsoil layer to a maximum depth of 30 cm.

Imported material will only be brought onsite when it can be direct placed. No imported material will be stockpiled.

3.8 Environmental Management Plan

To minimize the impact on the environment during reclamation, Westrock will implement a number of environmental management practices. These environmental management practices include:

- having spill kits on all equipment used for mining purposes;
- use of double wall fuel storage tanks and/or containment berms;
- properly storing and regularly hauling any industrial waste generated at the pit to an approved municipal or class II landfill;
- properly collecting and regularly hauling all sanitary waste to an approved waste management treatment facility;
- an active weed control program that includes mowing, hand pulling, spot spraying, seeding stockpiles of reclamation material, etc. to prevent the initial establishment of weeds;
- the proper application of herbicides; and
- ensuring that no herbicides, pesticides or any other hazardous substance will be stored onsite.

4.0 Financial Security

As Westrock has no future intentions of gravel extraction operations, the reclamation security estimate of $190,705.46 represents the maximum conservation and reclamation costs (i.e., full-cost security) to reclaim the remainder of the pit. The main cost associated with the security estimate is the amount of reclamation material that is stockpiled. The maximum area of disturbance that will be secured at third party costs is the current limit area of disturbance less the process site/access roads (4.26 ha) of 52.03 ha.

Security Estimate

Mobilization and Demobilization	**$ 5,000.00**
Third Party Costs for the NE 1-54-2-W5M (46.03 ha)	
Reclamation Material	
Topsoil Material Placement – 4,863 m^3 @ $2.50/$m^3$	$ 12,157.50
Overburden Material Placement – 10,314 m3 @ $2.50/$m^3$	$ 25,785.00
Recontouring	
D8R Crawler Tractor (Non-Current) – 110 hrs @ $264.00/hr	$ 29,040.00
Decompaction	
D7H Crawler Tractor with ripper (Non-Current) – 40 hrs @ $266.25/hr	$ 10,650.00
Seedbed Preparation	
Tractor with disc – 20 hrs @ $125.00/hr	$ 2,500.00
Seeding	
Tractor with seed drill/seed – 46.03 ha @ $135.00/ha	$ 6,214.05
Fertilizing	
Tractor with fertilizer attachment – 46.03 ha @ $135.00/ha	$ 6,214.05
Subtotal	**$ 92,560.60**
Third Party Costs for the SE 1-54-2-W5M (6.0 ha)	
Reclamation Material	
Topsoil Material Placement – 11,197 m^3 @ $2.50/$m^3$	$ 27,992.50
Subsoil Material Placement – 5,775 m3 @ $2.50/$m^3$	$ 14,437.50
Overburden Material Placement – 10,334 m3 @ $2.50/$m^3$	$ 25,835.00
Recontouring	
D8R Crawler Tractor (Non-Current) – 12 hrs @ $264.00/hr	$ 3,168.00
Decompaction	
D7H Crawler Tractor with ripper (Non-Current) – 8 hrs @ $266.25/hr	$ 2,130.00
Seedbed Preparation	
Tractor with disc – 5 hrs @ $125.00/hr	$ 625.00
Seeding	
Tractor with seed drill/seed – 6.0 ha @ $135.00/ha	$ 810.00
Fertilizing	
Tractor with fertilizer attachment – 6.0 ha @ $135.00/ha	$ 810.00
Subtotal	**$ 75,808.00**
Total Subtotal at Third Party Costs	**$ 173,368.60**
Administration @ 10 % of Total Third Party Costs	$ 17,336.86
Total Security	**$ 190,705.46**

Rates are based on the Alberta Roadbuilders and Heavy Construction Association 2013 Equipment Rental Rates Guide and Membership Roster in combination with ESRD's standard rate of $2.50/$m^3$ for the movement of reclamation material.

5.0 Limitations

This report has been prepared for the sole benefit of Westrock Aggregates Inc. This document may not be used by any other person or entity without the express written consent of Aspen Land Group Inc. and Westrock Aggregates Inc., with the exception of Alberta Environment and Sustainable Resource Development. Any use of this report by a third party, or any reliance on decisions made based on it, or damages suffered as a result of the use of this report are the sole responsibility of the user.

The information and conclusions contained in this report are based upon work undertaken by trained professional and technical staff in accordance with generally accepted scientific practices current at the time the work was performed. The conclusions and recommendations presented represent the best judgment of Aspen Land Group Inc. based on the data obtained during the assessment. Due to the nature of the assessment and the data available, Aspen Land Group Inc. cannot warrant against undiscovered environmental liabilities. Conclusions and recommendations presented in this report should not be considered legal advice.

Appendix A: Certificate of Titles

LAND TITLE CERTIFICATE

S

LINC	SHORT LEGAL	TITLE NUMBER
0035 230 200	5;2;54;1;SE	122 166 512 +1

LEGAL DESCRIPTION

MERIDIAN 5 RANGE 2 TOWNSHIP 54
SECTION 1
QUARTER SOUTH EAST
CONTAINING 64.7 HECTARES (160 ACRES) MORE OR LESS.
EXCEPTING THEREOUT :

			HECTARES	(ACRES) MORE OR LESS
A)	PLAN 7820078	ROAD	0.809	2.00
B)	PLAN 9924788	DESCRIPTIVE	1.81	4.47
C)	PLAN 1222170	SUBDIVISION	7.66	18.93

EXCEPTING THEREOUT ALL MINES AND MINERALS

ESTATE: FEE SIMPLE

MUNICIPALITY: LAC STE. ANNE COUNTY

REFERENCE NUMBER: 992 218 766 +1

REGISTERED OWNER(S)

REGISTRATION	DATE(DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
122 166 512	29/05/2012	SUBDIVISION PLAN		

OWNERS

CHARLES HERBERT PARKER

AND
MELANIE LOU PARKER
BOTH OF:
BOX 43, SITE 320, RR #3
STONY PLAIN
ALBERTA T7Z 1X3
AS JOINT TENANTS
(DATA UPDATED BY: CHANGE OF ADDRESS 122413751)

(CONTINUED)

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
762 116 447	02/07/1976	UTILITY RIGHT OF WAY GRANTEE - STE ANNE NATURAL GAS CO-OP LIMITED.
992 113 698	03/05/1999	CAVEAT RE : ROAD WIDENING CAVEATOR - LAC STE. ANNE COUNTY. BOX 219 SANGUDO ALBERTA T0E2A0
122 166 511	29/05/2012	CAVEAT RE : RESTRICTIVE COVENANT PURSUANT TO MUNICIPAL GOVERNMENT ACT CAVEATOR - LAC STE. ANNE COUNTY. BOX 219 SANGUDO ALBERTA T0E2A0
122 166 513	29/05/2012	CAVEAT RE : DEFERRED RESERVE CAVEATOR - LAC STE. ANNE COUNTY. BOX 219 SANGUDO ALBERTA T0E2A0

TOTAL INSTRUMENTS: 004

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 26 DAY OF AUGUST, 2013 AT 02:13 P.M.

ORDER NUMBER: 24248750

CUSTOMER FILE NUMBER:

END OF CERTIFICATE

LAND TITLE CERTIFICATE

S

LINC	SHORT LEGAL	TITLE NUMBER
0011 350 360	5;2;54;1;NE	892 276 384

LEGAL DESCRIPTION

THE NORTH EAST QUARTER OF SECTION ONE (1)
TOWNSHIP FIFTY FOUR (54)
RANGE TWO (2)
WEST OF THE FIFTH MERIDIAN
CONTAINING 64.7 HECTARES (160 ACRES), MORE OR LESS.
EXCEPTING THEREOUT:
(A) 0.809 HECTARES (2 ACRES), MORE OR LESS, AS SHOWN
ON ROAD PLAN 1583T
(B) ALL THAT PORTION DESCRIBED AS FOLLOWS:
COMMENCING AT A POINT OF THE EASTERLY BOUNDARY OF SAID
QUARTER SECTION WHERE THE SOUTHERLY BOUNDARY OF A ROADWAY
AS SHOWN ON ROAD PLAN 1583T INTERSECTS THE SAID EASTERLY
BOUNDARY THENCE WESTERLY ALONG THE SAID SOUTHERLY BOUNDARY
OF SAID ROADWAY A DISTANCE OF THREE HUNDRED AND THIRTY
(330) FEET TO A POINT THENCE SOUTHERLY AND PARALLEL TO THE
SAID EASTERLY BOUNDARY A DISTANCE OF FIVE HUNDRED AND TWENTY
EIGHT (528) FEET TO A POINT THENCE EASTERLY AND PARALLEL TO
THE SAID SOUTHERLY BOUNDARY OF SAID ROADWAY A DISTANCE OF
THREE HUNDRED AND THIRTY (330) FEET MORE OR LESS TO A POINT
ON THE SAID EASTERLY BOUNDARY THENCE NORTHERLY ALONG SAID
EASTERLY BOUNDARY TO THE POINT OF COMMENCEMENT CONTAINING
1.62 HECTARES (4 ACRES), MORE OR LESS.
(C) 0.639 HECTARES (1.58 ACRES), MORE OR LESS, AS SHOWN
ON ROAD PLAN 7820078
EXCEPTING THEREOUT ALL MINES AND MINERALS

ESTATE: FEE SIMPLE

MUNICIPALITY: LAC STE. ANNE COUNTY

REFERENCE NUMBER: 792 031 710

REGISTERED OWNER(S)

REGISTRATION	DATE(DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
892 276 384	25/10/1989	TRANSFER OF LAND	$17,500	$17,500

(CONTINUED)

OWNERS

WESTROCK AGGREGATES LTD.
OF 10410 - 81 AVENUE, EDMONTON
ALBERTA T6E 1X5

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
882 016 255	26/01/1988	MORTGAGE MORTGAGEE - PROVINCE OF ALBERTA TREASURY BRANCHES. 1764, 8770 - 170 STREET, EDMONTON ALBERTA T5T4J2 ORIGINAL PRINCIPAL AMOUNT: $1,000,000
892 276 385	25/10/1989	MORTGAGE MORTGAGEE - PROVINCE OF ALBERTA TREASURY BRANCHES. 1764, 8770 - 170 STREET, EDMONTON ALBERTA T5T4J2 ORIGINAL PRINCIPAL AMOUNT: $750,000
992 299 717	05/10/1999	UTILITY RIGHT OF WAY GRANTEE - STE ANNE NATURAL GAS CO-OP LIMITED.

TOTAL INSTRUMENTS: 003

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 26 DAY OF AUGUST, 2013 AT 02:13 P.M.

ORDER NUMBER: 24248750

CUSTOMER FILE NUMBER:

END OF CERTIFICATE

(CONTINUED)

Appendix B: Schedules under the *Code of Practice for Pits*

Code of Practice for Pits
Registration Application (Schedule 1)

Date: October 11, 2013 (Revised December 27, 2013)

Previous *Environmental Protection and Enhancement Act* Registration Number: SG-39-86
Water Act authorization required? ☐ Yes ☒ No

If Yes, ☐ application submitted and current *Water Act* Authorization Numbers: application submitted

Name of Applicant (company or person in whose name the pit will be registered):

Company:	Westrock Aggregates Ltd.
Address:	10410 - 81 Ave Edmonton, AB T6E 1X5
Phone:	(780) 434-8555 Facsimile: (780) 438-1390
e-mail:	thomasfath@ohanlonpaving.com

Name of Person Submitting Application:

Name:	Lesley Foy
Company Name:	Aspen Land Group Inc.
Job Title:	Senior Agrologist
Address:	#201 18311 – 105 Avenue, Edmonton, Alberta T5S 2K9
Phone:	(780) 667-7081 Facsimile: Not Available
e-mail:	lfoy@aspenlandgroup.com

Signature: Lesley Foy

Name of Primary Contact for Pit:

Name:	Dean Maurier
Address:	10410 - 81 Ave Edmonton, AB T6E 1X5
Phone:	(780) 434-8555 Facsimile: (780) 438-1390
e-mail:	dmaurier@fathindustries.com

Pit Location Municipal Address or LSD-Sec-Twp-Rge-Mer	Registered Owners Name, Address and Phone Number	Occupants Name, Address and Phone Number
NE 1-54-2-W5M	Westrock Aggregates Ltd. 10410 – 81 Ave Edmonton AB, T6E 1X5	N/A
SE 1-54-2-W5M	Charles and Melanie Parker Box 43, Site 320, RR#3 Stony Plain AB, T7Z 1X3 780-967-5443	N/A

Activities Plan (Schedule 2)

Part 1 Information

Aggregate Type (check off all that apply): ☒ Gravel ☒ Sand ☐ Clay ☐ Marl

Current Size of Pit: 56.29 ha

Average Thickness (indicate metres or centimetres for each one):
Topsoil: 6-8 inches*
Subsoil: n/a*
Overburden: 10 - 25 feet*
Aggregate: 25 – 50 feet*

**Information obtained from Yeoman Construction Ltd. – June 1985 Sand and Gravel Pit Inventory Report*

Topsoil Texture (check all that apply):
☐ organic soil ☐ mineral soil ☐ clay loam ☐ silty loam ☐ sand ☒ sandy loam
☐ loam ☐ clay ☐ silt ☐ other

Description of techniques to prevent wind and water erosion, and to limit the movement of dust from the pit: Refer to Section 3.4 of the report.

Participation in local or regional air monitoring initiative: n/a

Inactive pit conservation and reclamation techniques: All inactive pit slopes will be backsloped to a 2:1 slope.

☒ Scale drawings and cross-sections of existing pit conditions and planned sequence of operation attached.

Part 2 Information

Maximum planned size of pit: 56.29 ha

Depth to groundwater (metres) in test holes (indicate each depth if multiple holes): n/a

Planned activities at the pit (check off all that apply): ☐ wet pit excavation
☐ concrete production ☐ mixing salt and aggregate ☐ mixing recycled asphalt and concrete with aggregate ☐ spraying truck boxes ☐ aggregate washing ☐ use of alternative materials for reclamation ☒ other: reclamation and importing topsoil and overburden material

Mitigative measures for all of the above activities: Refer to Section 3.7of the report.

Proposed land uses for reclaimed pit (check all appropriate boxes):
☐ cultivation ______% ☒ hayland 92.4 % ☐ pasture______%
☐ native range ______% ☐ grassland ______% ☐ forest ______%
☐ wildlife habitat ______% ☐ waterbody ______% ☐ proposed subdivision ______%
☒ other Processing Site & Access Roads - 7.6 %

Pit water release (rationale for release, techniques and discharge points): n/a

Yeoman Property
Average topsoil replacement depth (cm): approximately 2 cm
Average subsoil replacement depth (cm): no subsoil available for replacement

Parker Property

Average topsoil replacement depth (cm): 18 cm
Average subsoil replacement depth (cm): 9 cm

☒ Scale drawings and cross-sections of reclaimed pit conditions attached.

Description of surface water bodies in the reclaimed pit: n/a
Design: n/a
Intended use: n/a
Water elevations at full supply level: n/a
Slope of land one metre above and one metre below full supply level: n/a
Slope of land one metre below full supply level: n/a

Signature and title of person who developed Activities Plan: ______________________
Lesley Foy
Senior Agrologist

Security Estimate (Schedule 3)

Acres of land secured at $250/acre:___ Acres x $250 = $___(a)

☒ Detailed full-cost security calculation attached Total full-cost = $190,705.46 (b)

Area of land at full-cost: 52.03 (hectares/acres) Cost/hectare = $3,665.30

Total security required ((a) + (b)): $190,705.46

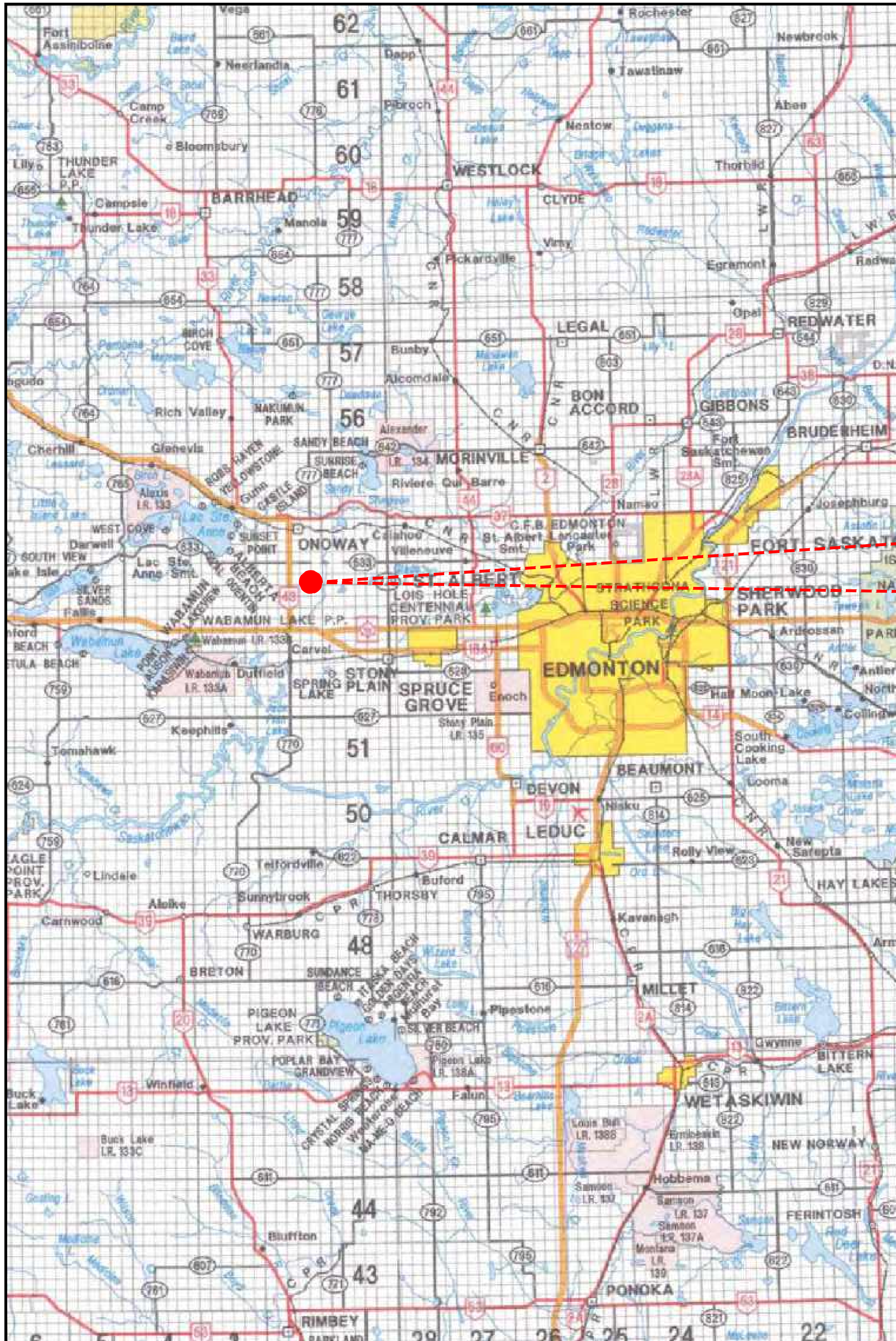
Previous method of payment: ☒ Letter of Credit ☐ Cash ☐ Other (explain) ________________

Signature and title of person submitting estimate: ________________________________

Lesley Foy
Senior Agrologist

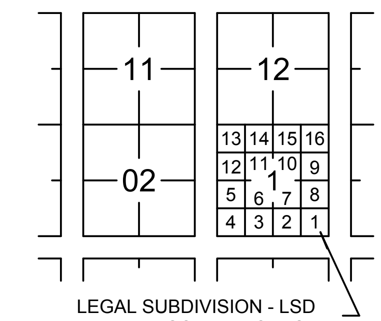
See Section 4.0 of the report for the full-cost security calculation.

Appendix C: Conservation and Reclamation Plans



LEGAL LAND DESCRIPTION

(E 01-54-02 W5M)



LEGAL SUBDIVISION - LSD
1/4 MILE SQ. - 40 ACRES

LOCATION PLAN

LEGEND

PROPERTY LINE

PIT BOUNDARY (56.29 HA)

Prepared By

ASPEN LAND GROUP INC.

Client

WESTROCK AGGREGATES LTD.

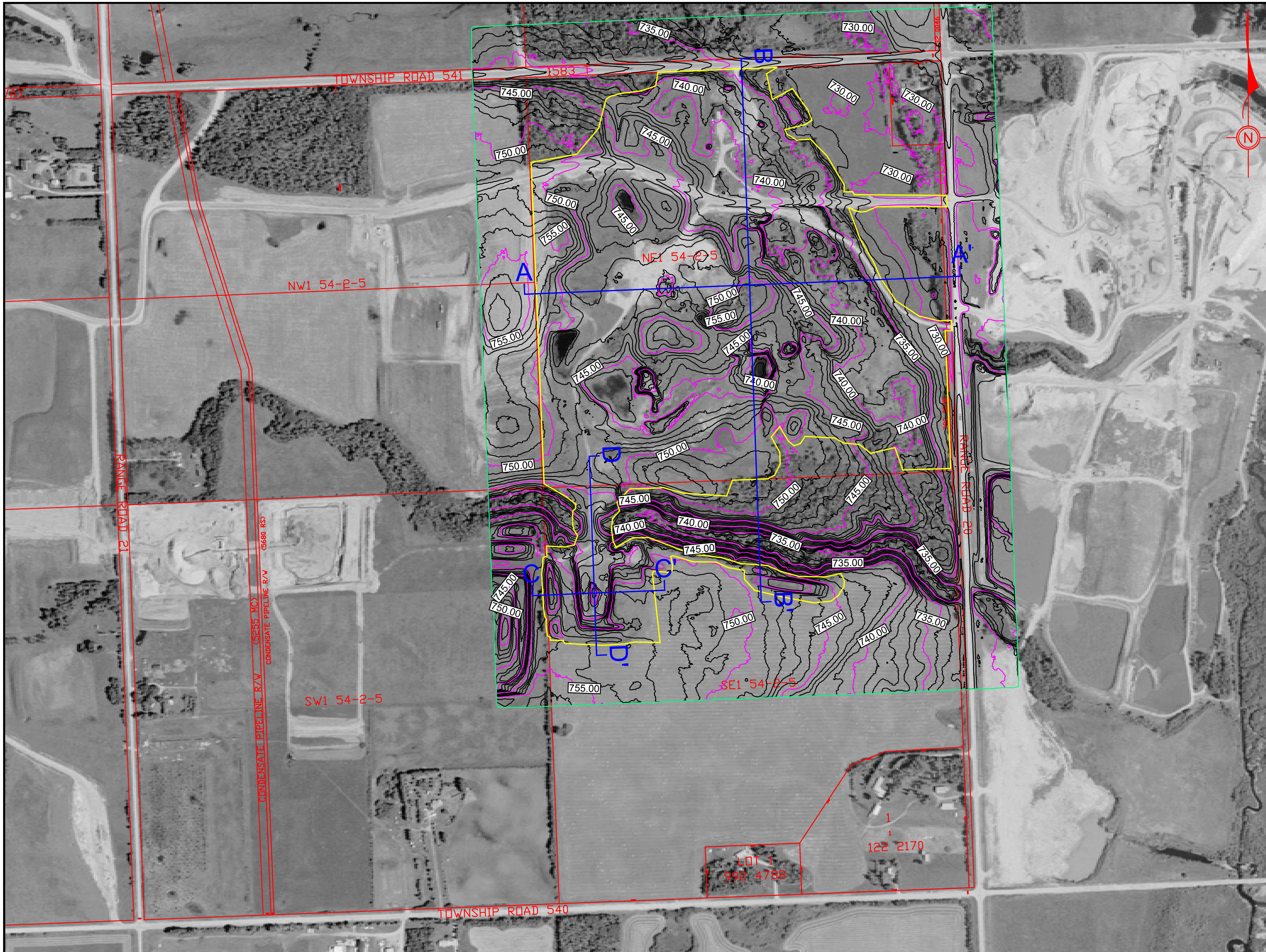
Project

YEOMAN PARKER PIT
(REGISTRATION APPLICATION)

Title

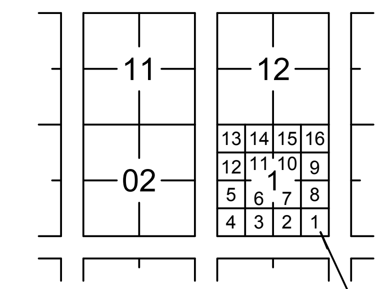
LOCATION PLAN

Checked By:	L. FOY & G. FOY	Scale	NTS
Designed By:	L. FOY & T. FOY	Drawing No.	1 - 11
Drawn By:	T. FOY		
Air Photo:	JULY 05, 2007 TO OCT. 08, 2007		
DATE:	OCT. 02, 2013		



LEGAL LAND DESCRIPTION

(E 01-54-02 W5M)



LEGAL SUBDIVISION - LSD
1/4 MILE SQ. - 40 ACRES

LOCATION PLAN

LEGEND

PROPERTY LINE

PIT BOUNDARY (56.29 HA)

Prepared By

ASPEN
LAND GROUP INC.

Client

WESTROCK AGGREGATES LTD.

Project

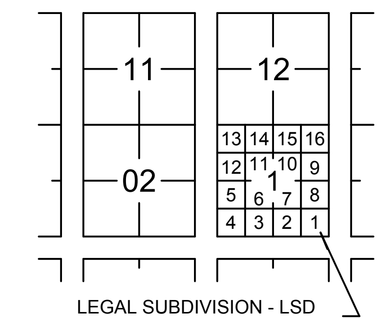
YEOMAN PARKER PIT
(REGISTRATION APPLICATION)

Title

CONTOUR PLAN

Checked By:	L. FOY & G. FOY	Scale	1: 7000
Designed By:	L. FOY & T. FOY	Drawing No.	2 - 11
Drawn By:	T. FOY		
Air Photo:	JULY 05, 2007 TO OCT. 08, 2007		
DATE:	OCT. 02, 2013		

LEGAL LAND DESCRIPTION
(E 01-54-02 W5M)



LEGAL SUBDIVISION - LSD
1/4 MILE SQ. - 40 ACRES

LOCATION PLAN

LEGEND

- PROPERTY LINE
- PIT BOUNDARY (56.29 HA)
- PROCESSING SITE/ACCESS ROADS (4.26 HA)
- CURRENT RECLAIMED AREAS (15.78 HA)
- PRODUCT STOCKPILE LOCATIONS (0.34 HA)
- REJECT PILES (1.23 HA)
- OVERBURDEN STOCKPILE LOCATIONS (0.80 HA)
- SUBSOIL STOCKPILE (0.20 HA)
- TOPSOIL STOCKPILE LOCATIONS (0.68 HA)
- FILL MATERIAL LOCATION (1.06 HA)

STOCKPILE VOLUMES

PILE	MATERIAL	VOLUME (m^3)
1	TS	7850
2	TS	2594
3	SS	5775
4	OB	522
5	OB	9812
6	TS	753
7	TS	4863
8	OB	10314
TOTAL (TS)	**NA**	**16060**
TOTAL (SS)	**NA**	**5775**
TOTAL (OB)	**NA**	**20648**
TOTAL	**NA**	**42483**

Prepared By

ASPEN LAND GROUP INC.

Client

WESTROCK AGGREGATES LTD.

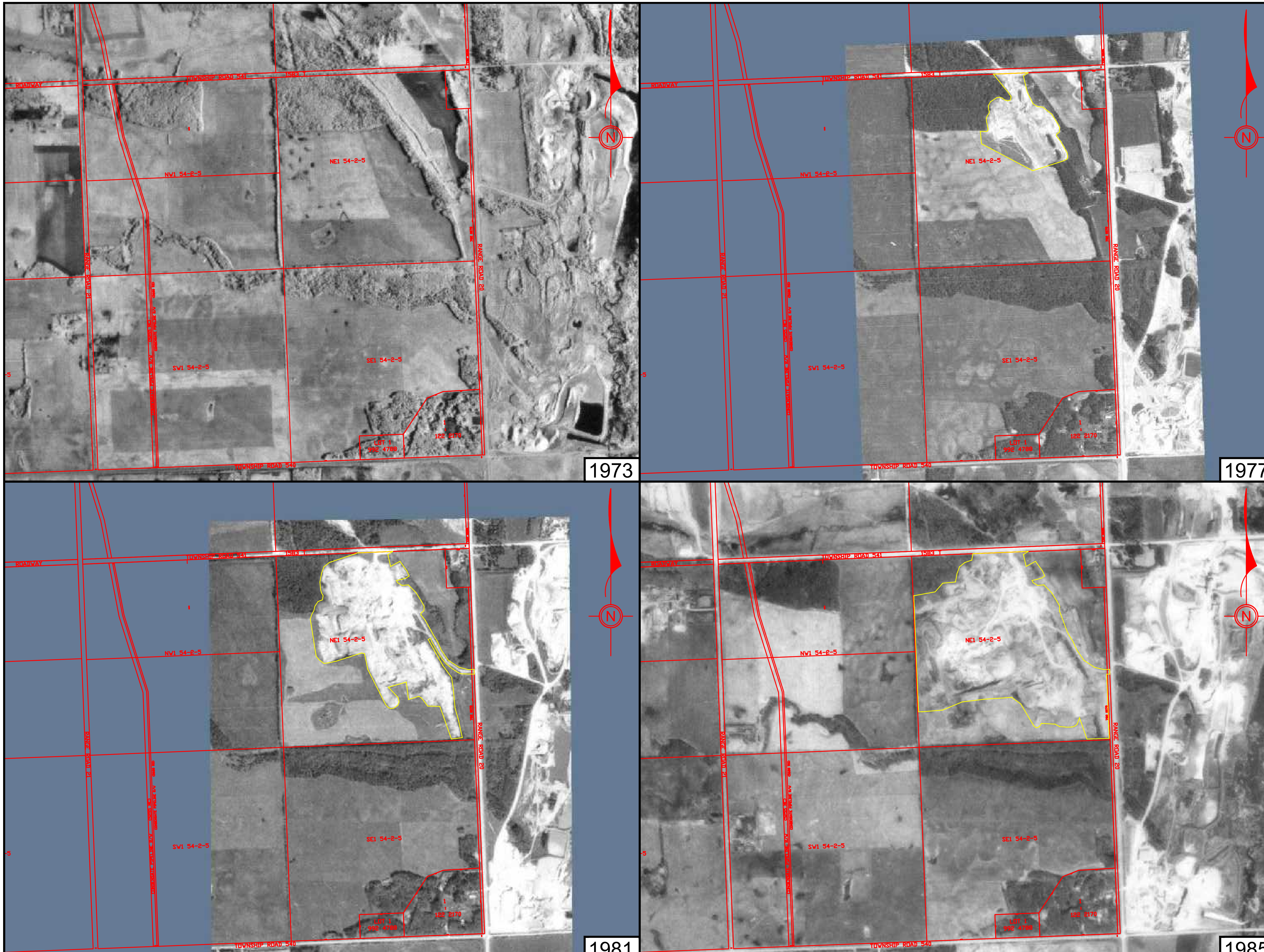
Project

YEOMAN PARKER PIT
(REGISTRATION APPLICATION)

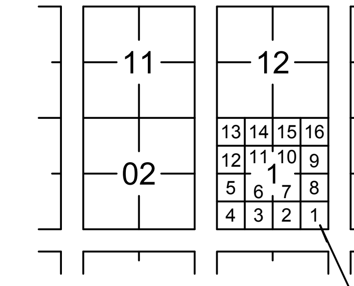
Title

EXISTING FEATURES

Checked By:	L. FOY & G. FOY	Scale	1: 7000
Designed By:	L. FOY & T. FOY	Drawing No.	3 - 11
Drawn By:	T. FOY		
Air Photo:	JULY 05, 2007 TO OCT. 08, 2007		
DATE:	OCT. 02, 2013		



LEGAL LAND DESCRIPTION
(E 01-54-02 W5M)



LEGAL SUBDIVISION - LSD
1/4 MILE SQ. - 40 ACRES

LOCATION PLAN

LEGEND

PROPERTY LINE

PIT BOUNDARY

AREA TABLE
(DIMENSIONS IRREGULAR)

YEAR	ACRES	HECTARES
1973	NA	NA
1977	21.00	8.50
1981	60.96	24.67
1985	100.65	40.73

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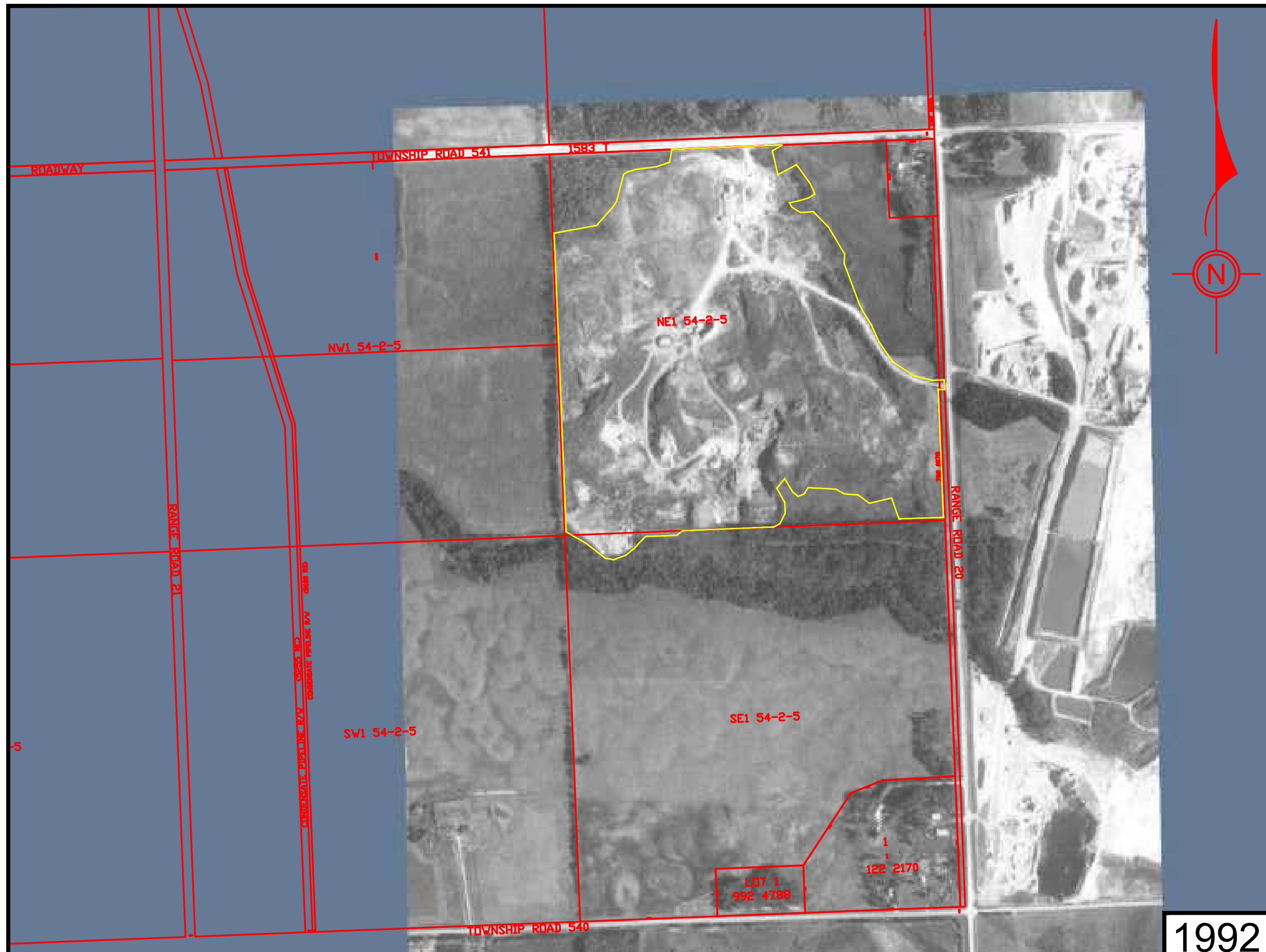
Project

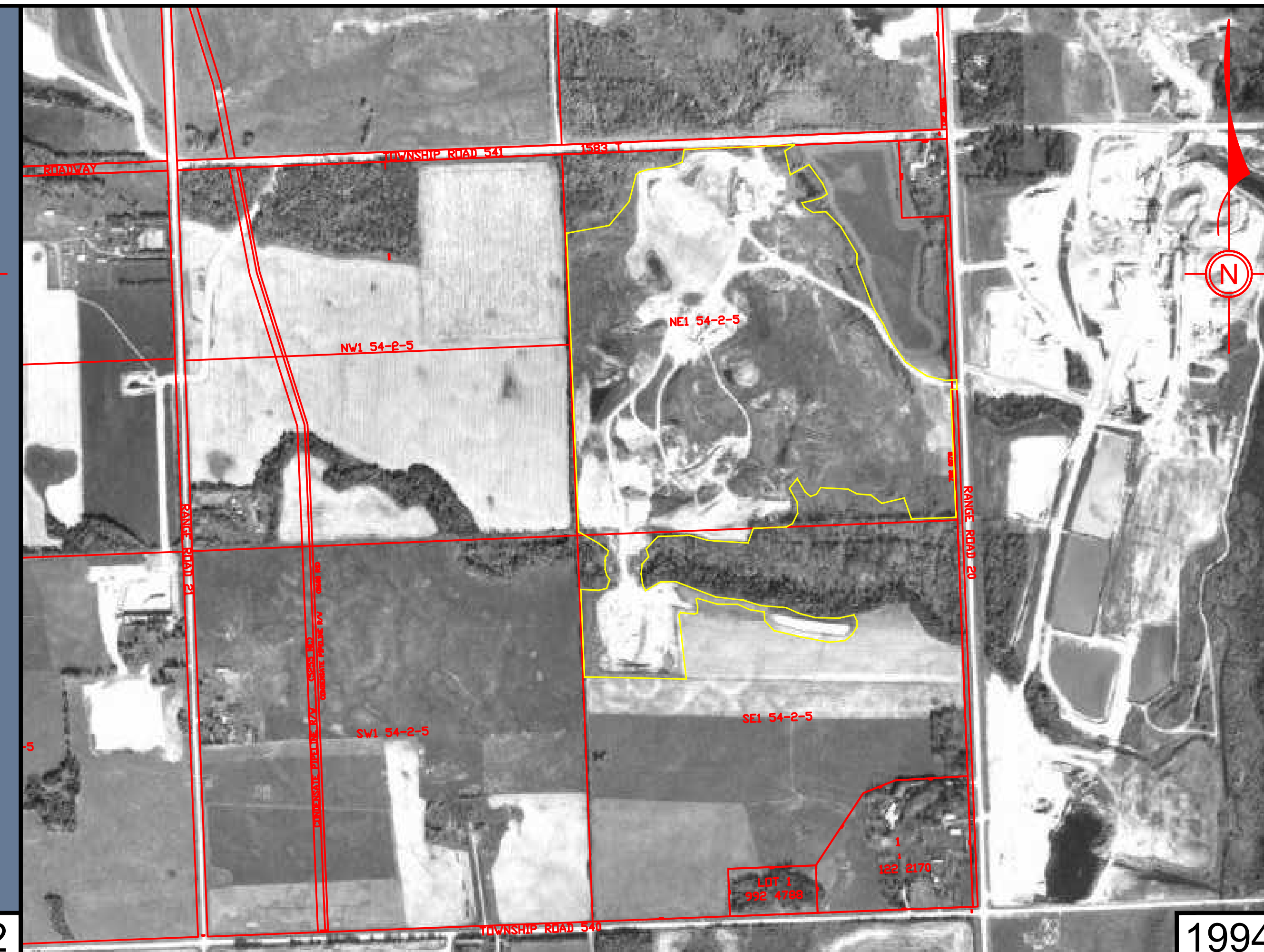
YEOMAN PARKER PIT
(REGISTRATION APPLICATION)

Title

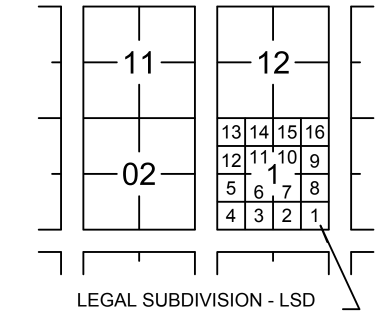
AERIAL PHOTOGRAPHY HISTORICAL OVERVIEW
(1973 - 1985)

Checked By:	L. FOY & G. FOY	Scale	1: 15000
Designed By:	L. FOY & T. FOY	Drawing No.	4 - 11
Drawn By:	T. FOY		
Air Photo:	AS SHOWN		
DATE:	OCT. 02, 2013		





LEGAL LAND DESCRIPTION
(E 01-54-02 W5M)



LEGAL SUBDIVISION - LSD
1/4 MILE SQ. - 40 ACRES

LOCATION PLAN

LEGEND

- PROPERTY LINE
- PIT BOUNDARY

AREA TABLE
(DIMENSIONS IRREGULAR)

YEAR	ACRES	HECTARES
1992	122.47	49.56
1994	137.34	55.58
2000	139.10	56.29
2005	139.10	56.29

Prepared By
ASPEN LAND GROUP INC.

Client
WESTROCK AGGREGATES LTD.

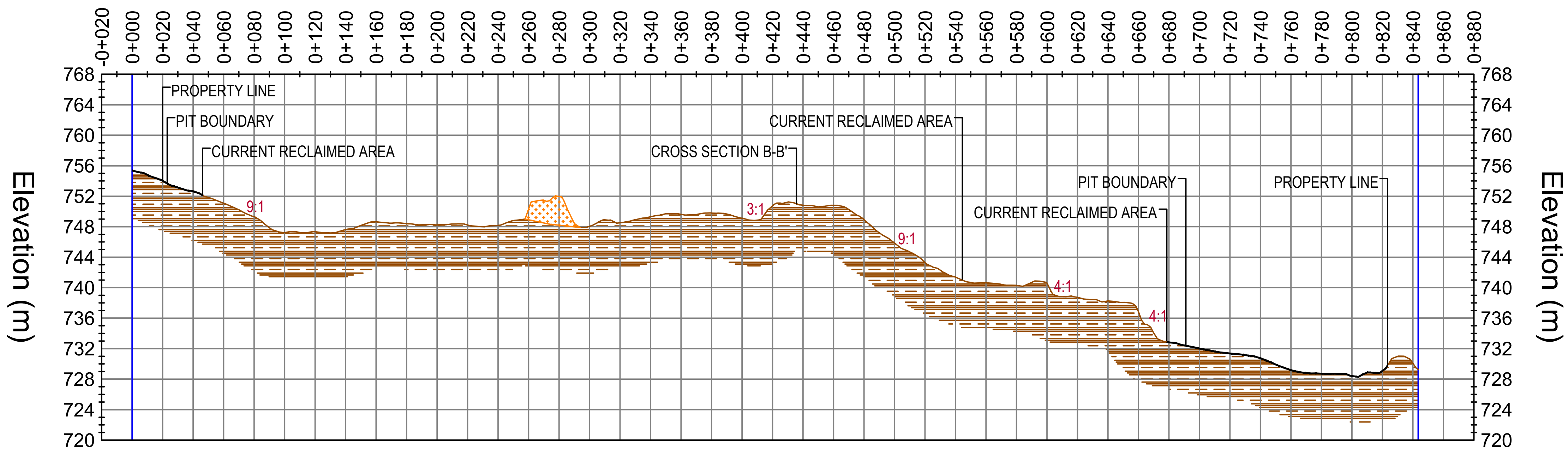
Project
YEOMAN PARKER PIT
(REGISTRATION APPLICATION)

Title
AERIAL PHOTOGRAPHY
HISTORICAL OVERVIEW
(1992 - 2005)

Checked By: L. FOY & G. FOY
Designed By: L. FOY & T. FOY
Drawn By: T. FOY
Air Photo: AS SHOWN
DATE: OCT. 02, 2013
Scale 1:15000
Drawing No. 5 - 11

SCALE:
V=1:700
H=1:3500

Cross Section A-A' Existing



SCALE:
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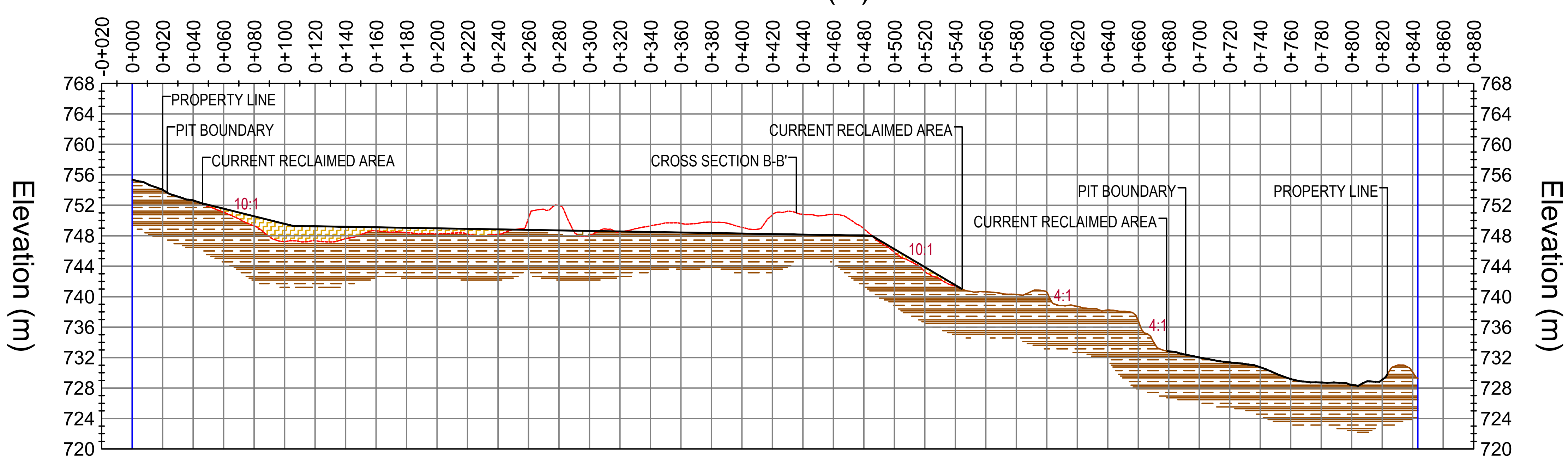
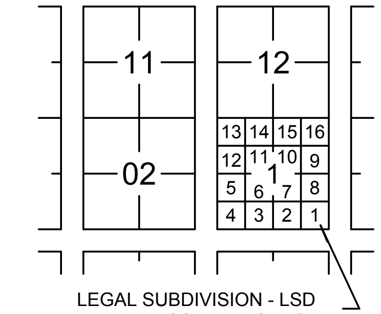
H=1:3500

Cross Section A-A' Reclaimed



LEGAL LAND DESCRIPTION
(E 01-54-02 W5M)



LOCATION PLAN

LEGEND

- TOPSOIL
- EXISTING SURFACE
- OVERBURDEN, REJECT SAND AND/OR AGGREGATE
- SAND AND/OR REJECT SAND
- REPLACED MATERIAL (OVERBURDEN, REJECT SAND AND/OR AGGREGATE)

Prepared By

ASPEN LAND GROUP INC.

Client

WESTROCK AGGREGATES LTD.

Project

YEOMAN PARKER PIT
(REGISTRATION APPLICATION)

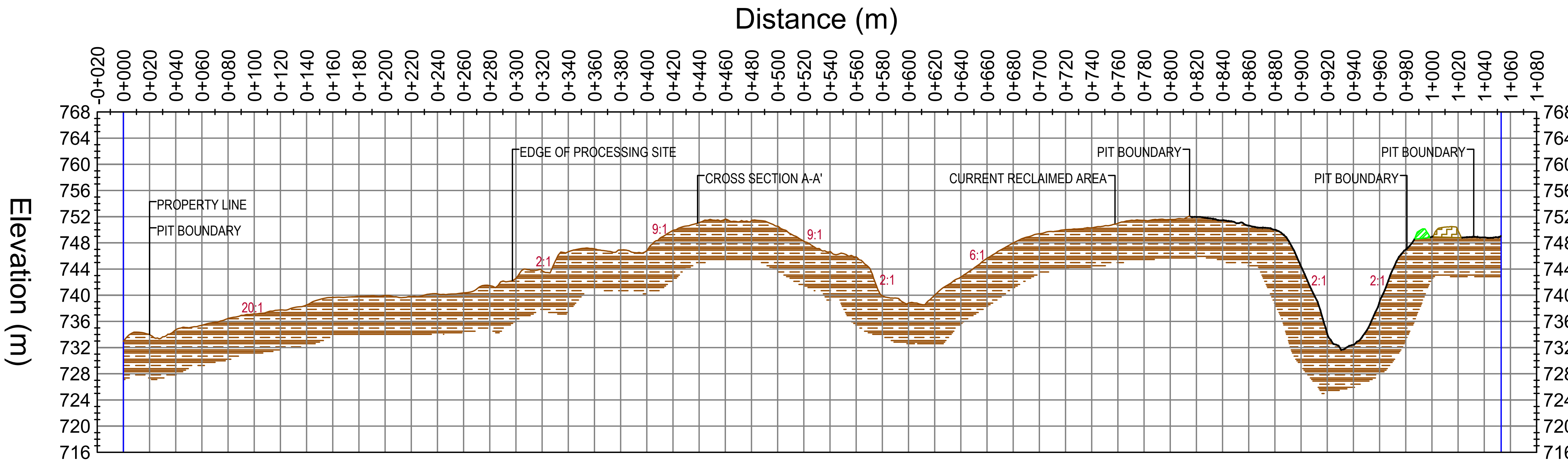
Title

CROSS SECTION A-A'
EXISTING AND RECLAIMED CONDITIONS

Checked By:	L. FOY & G. FOY	Scale	AS SHOWN
Designed By:	L. FOY & T. FOY	Drawing No.	6 - 11
Drawn By:	T. FOY		
Air Photo:	NA		
DATE:	OCT. 02, 2013		

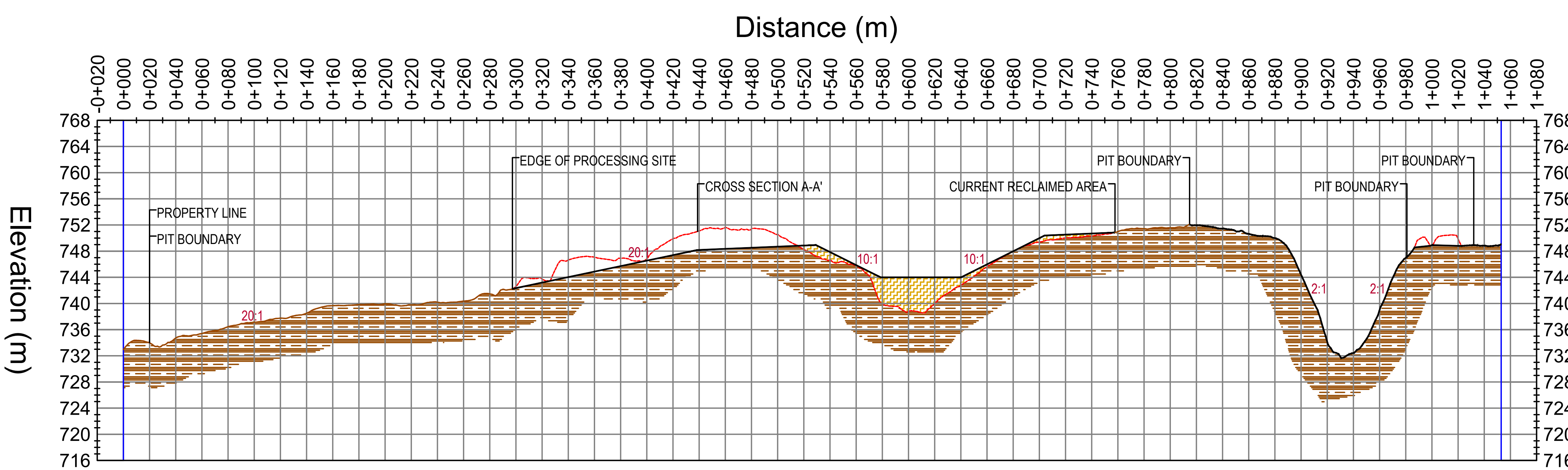
SCALE:
V=1:800
H=1:4000

Cross Section B-B' Existing

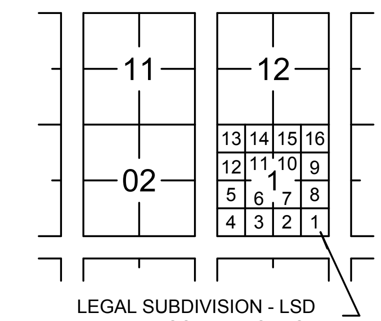


SCALE:
V=1:800
H=1:4000

Cross Section B-B' Reclaimed



LEGAL LAND DESCRIPTION
(E 01-54-02 W5M)



LEGAL SUBDIVISION - LSD
1/4 MILE SQ. - 40 ACRES

LOCATION PLAN

LEGEND

- TOPSOIL
- EXISTING SURFACE
- OVERBURDEN, REJECT SAND AND/OR AGGREGATE
- TOPSOIL STOCKPILE
- OVERBURDEN STOCKPILE
- REPLACED MATERIAL (OVERBURDEN, REJECT SAND AND/OR AGGREGATE)

Prepared By

ASPEN LAND GROUP INC.

Client

WESTROCK AGGREGATES LTD.

Project

YEOMAN PARKER PIT
(REGISTRATION APPLICATION)

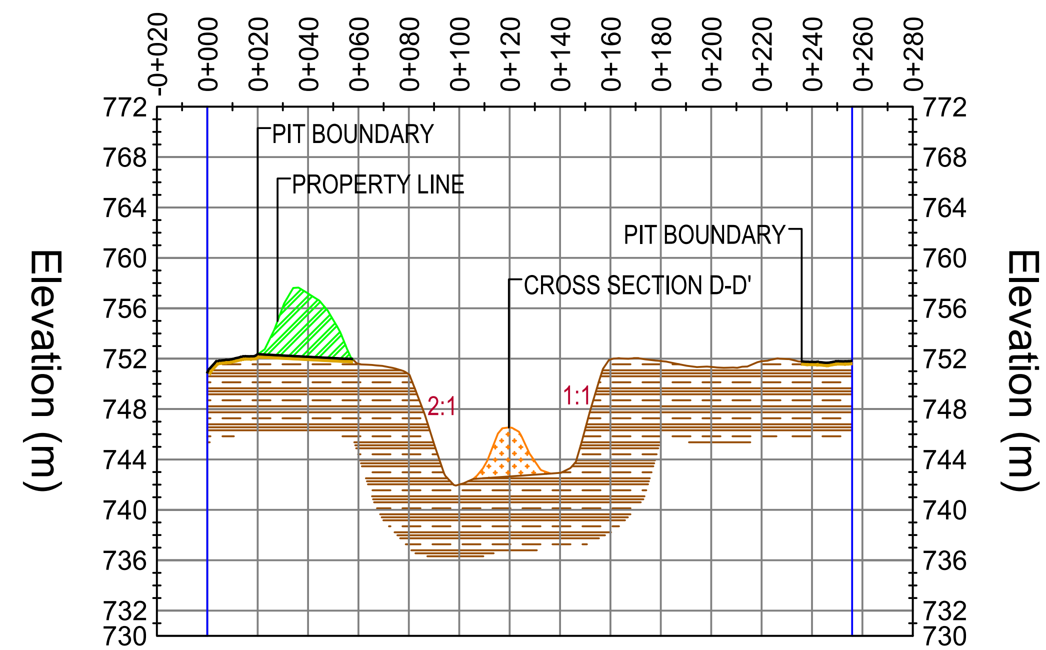
Title

CROSS SECTION B-B'
EXISTING AND RECLAIMED CONDITIONS

Checked By:	L. FOY & G. FOY	Scale	AS SHOWN
Designed By:	L. FOY & T. FOY	Drawing No.	7 - 11
Drawn By:	T. FOY		
Air Photo:	NA		
DATE:	OCT. 02, 2013		

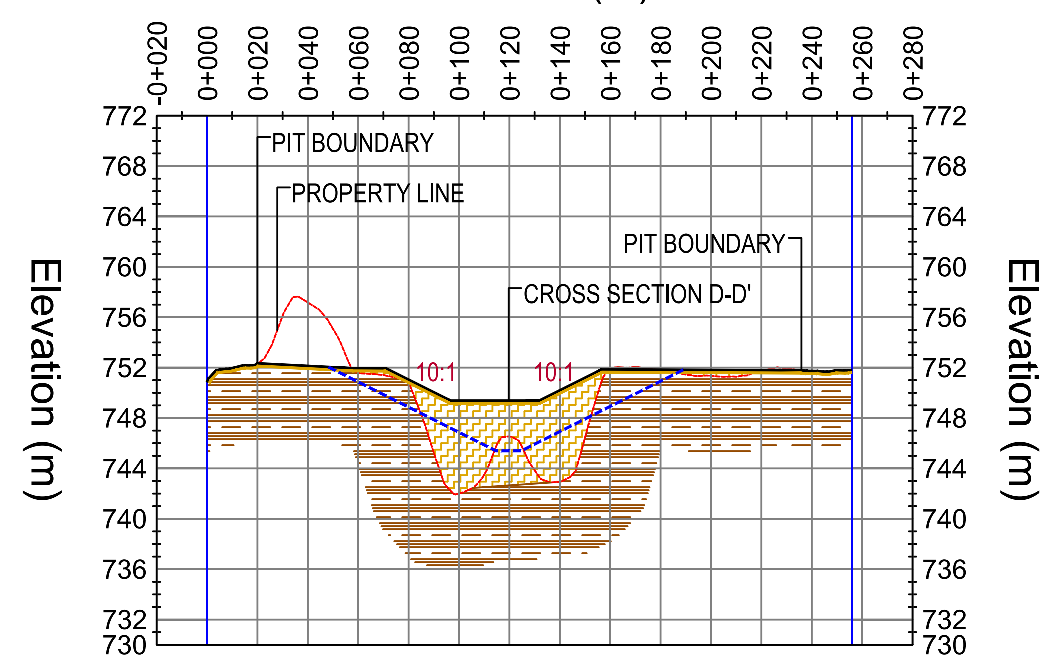
SCALE:
V=1:600
H=1:3000

Cross Section C-C' Existing

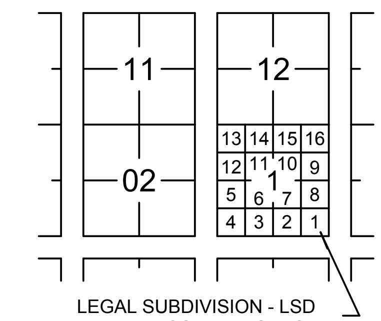


SCALE:
V=1:600
H=1:3000

Cross Section C-C' Reclaimed



LEGAL LAND DESCRIPTION
(E 01-54-02 W5M)



LEGAL SUBDIVISION - LSD
1/4 MILE SQ. - 40 ACRES

LOCATION PLAN

LEGEND

- TOPSOIL
- SUBSOIL
- EXISTING SURFACE
- SURFACE WITHOUT IMPORTED FILL MATERIAL
- OVERBURDEN, REJECT SAND AND/OR AGGREGATE
- TOPSOIL STOCKPILE
- SAND AND/OR REJECT SAND
- REPLACED MATERIAL (OVERBURDEN, REJECT SAND AND/OR AGGREGATE)

Prepared By

ASPEN LAND GROUP INC.

Client

WESTROCK AGGREGATES LTD.

Project

YEOMAN PARKER PIT
(REGISTRATION APPLICATION)

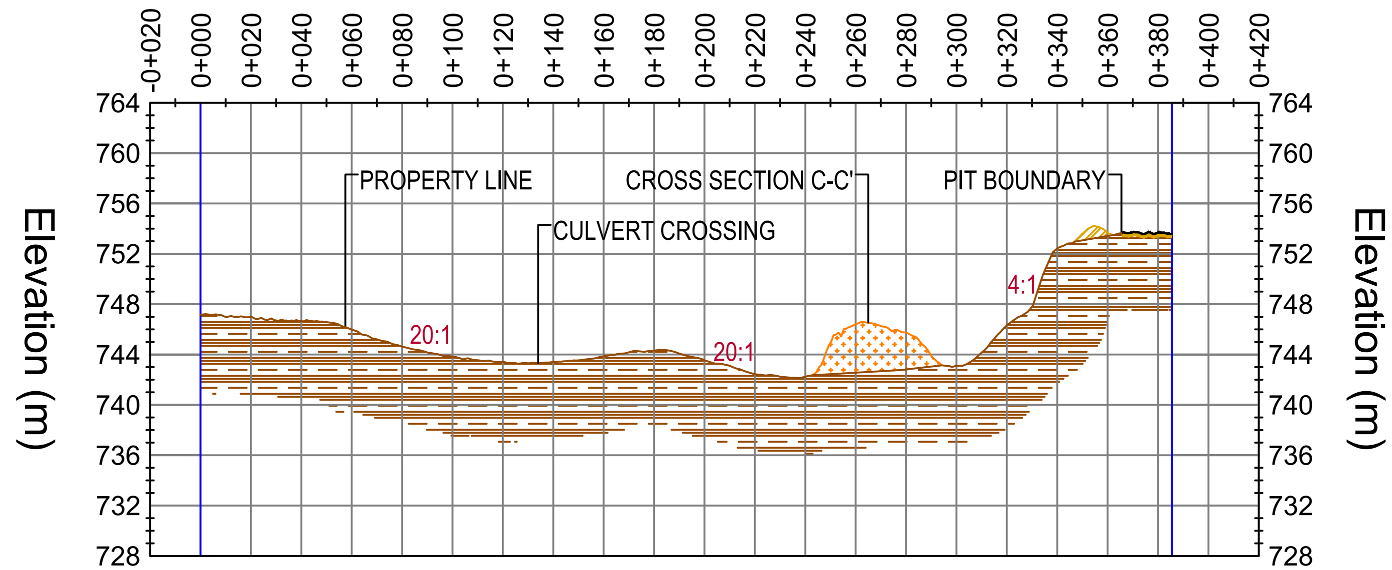
Title

CROSS SECTION C-C'
EXISTING AND RECLAIMED CONDITIONS

Checked By:	L. FOY & G. FOY	Scale	AS SHOWN
Designed By:	L. FOY & T. FOY	Drawing No.	8 - 11
Drawn By:	T. FOY		
Air Photo:	NA		
DATE:	OCT. 02, 2013		

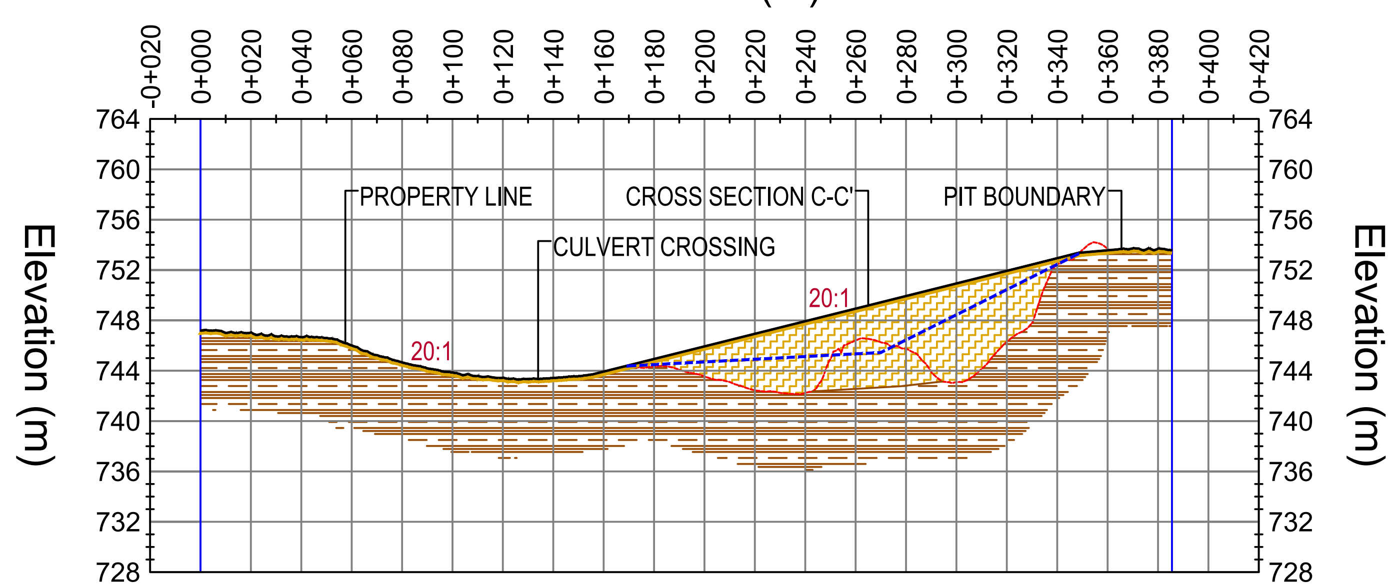
SCALE:
V=1:600
H=1:3000

Cross Section D-D' Existing

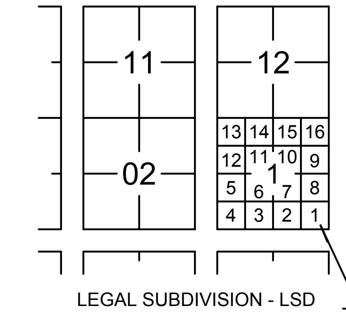


SCALE:
V=1:600
H=1:3000

Cross Section D-D' Reclaimed



LEGAL LAND DESCRIPTION
(E 01-54-02 W5M)



LOCATION PLAN

LEGEND

- TOPSOIL
- SUBSOIL
- EXISTING SURFACE
- SURFACE WITHOUT IMPORTED FILL MATERIAL
- OVERBURDEN, REJECT SAND AND/OR AGGREGATE
- SUBSOIL STOCKPILE
- SAND AND/OR REJECT SAND
- REPLACED MATERIAL (OVERBURDEN, REJECT SAND AND/OR AGGREGATE)

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ASPEN LAND GROUP INC.

Client

WESTROCK AGGREGATES LTD.

Project

YEOMAN PARKER PIT
(REGISTRATION APPLICATION)

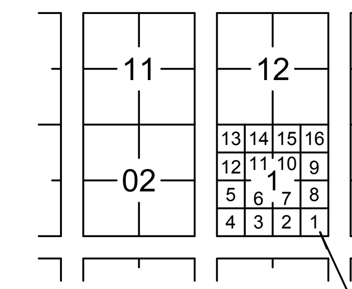
Title

CROSS SECTION D-D'
EXISTING AND RECLAIMED CONDITIONS

Checked By:	L. FOY & G. FOY	Scale	AS SHOWN
Designed By:	L. FOY & T. FOY	Drawing No.	9 - 11
Drawn By:	T. FOY		
Air Photo:	NA		
DATE:	OCT. 04, 2013		

LEGAL LAND DESCRIPTION

(E 01-54-02 W5M)



LEGAL SUBDIVISION - LSD
1/4 MILE SQ. - 40 ACRES

LOCATION PLAN

LEGEND

- PROPERTY LINE
- PIT BOUNDARY (56.29 HA)
- PROCESSING SITE/ACCESS ROADS (4.26 HA)
- CURRENT RECLAIMED AREAS (15.78 HA)
- IMPORTED TOPSOIL FILL AREA (30.92 HA)
- IMPORTED OVERBURDEN FILL AREA (5.33 HA)

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YEOMAN PARKER PIT
(REGISTRATION APPLICATION)

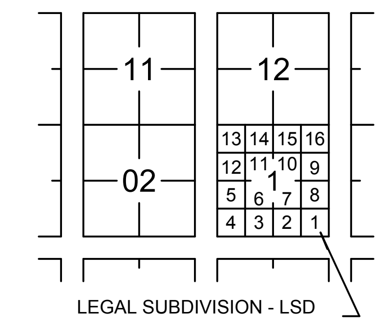
Title

PLAN SHOWING EXISTING/PROPOSED RECLAMATION LOCATIONS

Checked By: L. FOY & G. FOY	Scale 1: 7000
Designed By: L. FOY & T. FOY	Drawing No. 10 - 11
Drawn By: T. FOY	
Air Photo: JULY 05, 2007 TO OCT. 08, 2007	
DATE: OCT. 02, 2013	

LEGAL LAND DESCRIPTION

(E 01-54-02 W5M)



LEGAL SUBDIVISION - LSD
1/4 MILE SQ. - 40 ACRES

LOCATION PLAN

LEGEND

- PROPERTY LINE
- PIT BOUNDARY (56.29 HA)
- PROCESSING SITE/ACCESS ROADS (4.26 HA)
- RECLAIMED AREA (52.03 HA)
- DRAINAGE ARROWS

Prepared By

ASPEN LAND GROUP INC.

Client

WESTROCK AGGREGATES LTD.

Project

YEOMAN PARKER PIT
(REGISTRATION APPLICATION)

Title

FINAL RECLAMATION

Checked By: L. FOY & G. FOY	Scale 1: 7000
Designed By: L. FOY & T. FOY	Drawing No.
Drawn By: T. FOY	11 - 11
Air Photo: JULY 05, 2007 TO OCT. 08, 2007	
DATE: OCT. 02, 2013	