APPENDIX E

TRAFFIC STUDY

NOTE TO READER
APPENDIX E

In April 2015, Treasury Metals submitted an Environmental Impact Statement (EIS) for the proposed Goliath Gold Project (the Project) to the Canadian Environmental Assessment Agency (the Agency) for consideration under the Canadian Environmental Assessment Act (CEAA), 2012. The Agency reviewed the submission and informed Treasury Metals that the requirements of the EIS Guidelines for the Project were met and that the Agency would begin its technical review of the submission. In June 2015, the Agency issued a series of information requests to Treasury Metals regarding the EIS and supporting appendices (referred to herein as the Round 1 information requests). The Round 1 information requests included questions from the Agency, other federal and provincial reviewers, and members of Indigenous communities, as well as interested stakeholders. As part of the Round 1 information request process, the Agency requested that Treasury Metals consolidate the responses to the information requests into a revised EIS for the Project.

Appendix E to the revised EIS (Traffic Study) presents a review of the existing roadways and traffic activities. The document presents an evaluation of the Project's anticipated impact on traffic volumes and highway function at the Highway 17/Anderson Road intersection. The report also evaluates whether transportation corridor improvements are required to ensure traffic safety is maintained and to mitigate the increased traffic volumes resulting from the Project. The information provided in this appendix was used in the evaluation of alternatives presented in Section 2 and Appendix X, as well as in the Project description (Section 3) used as the basis for the revised EIS. The results of this appendix were also relied on in various locations in the revised EIS where questions are raised regarding changes to traffic volumes and their potential effects (e.g., the assessment of effects for the Social component presented in Section 6.17).

Appendix E to the revised EIS (Traffic Study) includes a revised Figure 4- Proposed Site Plan to reflect the current design of the project.

As part of the process to revise the EIS, Treasury Metals has undertaken a review of the status for the various appendices. The status of each appendix to the revised EIS has been classified as one of the following:

- **Unchanged**: The appendix remains unchanged from the original EIS, and has been re-issued as part revised EIS.
- **Minor Changes:** The appendix remains relatively unchanged from the original EIS, and has been re-issued with relevant clarification.
- **Major Revisions**: The appendix has been substantially changed from the original EIS. A re-written appendix has been issued as part of the revised EIS.

- **Superseded:** The appendix is no longer required to support the EIS. The information in the original appendix has been replaced by information provided in a new appendix prepared to support the revised EIS.
- **New**: This is a new appendix prepared to support the revised EIS.

The following table provides a listing of the appendices to the revised EIS, along with a listing of the status of each appendix and their description.

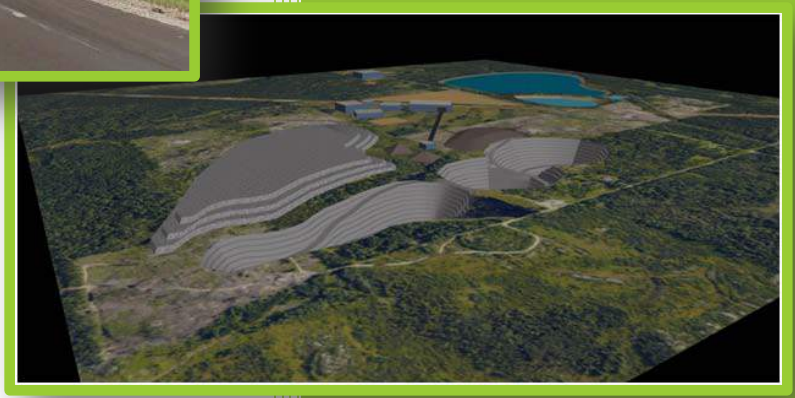
List of Appendices to the Revised EIS		
Appendix	Status	Description
Appendix A	Major Revisions	Table of Concordance
Appendix B	Unchanged	Optimization Study
Appendix C	Unchanged	Mining Study
Appendix D	Major Revisions	Tailings Storage Facility
Appendix E	Minor Changes	Traffic Study
Appendix F	Major Revisions	Water Management Plan
Appendix G	Superseded	Environmental Baseline
Appendix H	Minor Changes	Acoustic Environment Study
Appendix I	Unchanged	Light Environment Study
Appendix J	Minor Changes	Air Quality Study
Appendix K	Minor Changes	Geochemistry
Appendix L	Superseded	Geochemical Modelling
Appendix M	Minor Changes	Hydrogeology
Appendix N	Unchanged	Surface Hydrology
Appendix O	Superseded	Hydrologic Modeling
Appendix P	Unchanged	Aquatics DST
Appendix Q	Major Revisions	Fisheries and Habitat
Appendix R	Major Revisions	Terrestrial
Appendix S	Major Revisions	Wetlands
Appendix T	Unchanged	Socio-Economic
Appendix U	Minor Changes	Heritage Resources
Appendix V	Major Revisions	Public Engagement
Appendix W	Unchanged	Screening Level Risk Assessment
Appendix X	Major Revisions	Alternatives Assessment Matrix
Appendix Y	Unchanged	EIS Guidelines
Appendix Z	Unchanged	TML Corporate Policies
Appendix AA	Major Revisions	List of Mineral Claims
Appendix BB	Unchanged	Preliminary Economic Assessment

List of Appendices to the Revised EIS		
Appendix	Status	Description
Appendix CC	Unchanged	Mining, Dynamic And Dependable For Ontario's Future
Appendix DD	Major Revisions	Indigenous Engagement Report
Appendix EE	Unchanged	Country Foods Assessment
Appendix FF	Unchanged	Photo Record Of The Goliath Gold Project
Appendix GG	Minor Changes	TSF Failure Modelling
Appendix HH	Unchanged	Failure Modes And Effects Analysis
Appendix II	Major Revisions	Draft Fisheries Compensation Strategy and Plans
Appendix JJ	New	Water Report
Appendix KK	New	Conceptual Closure Plan
Appendix LL	New	Impact Footprints and Effects

Treasury Metals Inc.

Goliath Gold Project
TRAFFIC IMPACT STUDY

April 2014



KEEWATIN-ASKI LTD.
consulting engineers & architect

EXECUTIVE SUMMARY

Treasury Metals Inc. is presently in the approval and development stage of the Goliath Gold Project located in the Kenora Mining District in northwestern Ontario. The proposed gold mine will be accessed via the existing Anderson Road turn off from Highway 17, approximately 2.5 km west of the village of Wabigoon.

Accordingly, the purpose of this Traffic Impact Study (TIS) is twofold:

1) To evaluate the Project's anticipated impact on traffic volumes and highway function at the Highway 17 / Anderson Road intersection,
2) To evaluate if transportation corridor improvements are required to mitigate the increased volumes and ensure traffic safety is maintained.

In order to evaluate traffic impacts and potential corridor improvements, the following components are discussed within this study:

- Existing Conditions
- Study Area
- Proposed Land Use & Development Size
- Proposed Site Access
- Parking & Site Circulation
- Development Stages & Study Horizon
- Other Development & Planned Road Improvements
- Traffic Analysis Methodology
- Peak Hour Identification
- Turning Movement Count
- Trip Generation & Distribution
- Model Existing Traffic Conditions
- Model Background Traffic Conditions
- Model Background + Site Generated Traffic Conditions
- Sight Distances
- Entrance Layout, Geometry & Signage
- Illumination
- Conclusions & Recommendations

The primary conclusions and recommendations of this report are as follows:

Conclusions

1) **Highway 17 Peak Hours:** Based on MTO traffic data collected in 2013, the AM and PM peak hours for Highway 17 were determined to be 11 a.m. - 12 p.m. and 4 p.m. - 5 p.m. respectively.

2) **Site Peak Hours:** Based on Treasury's anticipated staffing and operations plan, the anticipated AM and PM peak hours for the mine during both construction and operation stages are 5 a.m. - 6 a.m. and 6 p.m. - 7 p.m. respectively.

3) **Turning Movement Count:** Based on the results of KAL's turning movement count conducted on February 19, 2014, the existing turning volumes at the intersection are very low (only 9 turning movements during the busiest hour)

4) **Model Existing Conditions**: The intersection level of service (LOS) was evaluated using Synchro 8 modeling software for the present year (2014) during the Highway 17 AM and PM peak hours. The results of the analysis indicate the following:

    - All traffic lanes maintain a LOS of 'A'
    - All lane volume-to-capacity (V/C) ratios are operating well below capacity
    - Control delay is negligible and within LOS 'A' tolerances for all approaches.
    - No geometric improvements or signalization is required to mitigate impacts from existing traffic volumes.

5) **Model Background Conditions:** The intersection LOS for background traffic volumes was modeled with Synchro 8 for 2015 (Start of Construction), 2017 (Start of Operation), 2020 (5 Year Horizon) and 2027 (10 Year Horizon). A 1% yearly growth factor was applied to the existing base volumes. Both the Highway 17 and mine peak hours were modeled for each study year. The results of the analysis indicate the following:

    - All traffic lanes maintain a LOS of 'A'

- All V/C ratios are operating well below capacity
- Control delay is negligible and within LOS 'A' tolerances for all approaches.
- No geometric improvements or signalization is required to mitigate impacts from background traffic volumes during any of the study horizons.

6) **Model Background + Site Generated Traffic Conditions:** Site generated traffic volumes were estimated based on Treasury's staffing, operational and production data for the Goliath Gold Project. The intersection LOS for background + site generated traffic volumes was then modeled with Synchro 8 for 2015 (Start of Construction), 2017 (Start of Operation), 2020 (5 Year Horizon) and 2027 (10 Year Horizon). Both the Highway 17 and mine peak hours were modeled for each study year. The results of the analysis indicate the following:

- All Highway 17 traffic lanes maintain a LOS of ‘A’ during all horizons
- Anderson Road maintains a LOS of 'B' or better during all horizons.
- Overall intersection LOS of 'A' during all horizons.
- All V/C ratios are operating well below capacity
- On Highway 17, control delay is negligible and is well within LOS 'A' tolerances. On Anderson Road, control delay is well within LOS 'B' tolerances.

7) **Sight Distances:** The Approach Sight Distance and Turning Movement Sight Distance were evaluated for the intersection with the following findings:

- Regarding Approach Sight Distance, sight triangles for the intersection were established. Review of aerial photography at the intersection indicates that there may be some tree clearing and bank height adjustments within the identified sight triangles. It is a recommendation of this study that the Proponent remove any shrubbery, trees or soil mounds that fall within the sight triangles and cause a visual obstruction of oncoming traffic.

- Regarding Turning Movement Sight Distance, the actual provided sight distance for vehicles stopped at Anderson Road to approaching vehicles on Highway 17 exceeds the minimum required sight distance.

8) **Entrance Design:** The existing Anderson Road 'T' intersection with Highway 17 was evaluated with the following findings:

   - At present, the Anderson Road intersection forms part of a snow plough turnaround which provides two access points to Highway 17. Once mine construction and operation commences, it is not recommended from a traffic safety standpoint to have two access points within 70m of each other. The northerly access point should be closed to highway traffic prior to the start of mine construction.

   - Once mine construction and operations begin, there will be an increase in heavy truck traffic that uses the Anderson Road turnoff. Accordingly, it is necessary to provide adequate entrance geometry to safely accommodate heavy trucks turning off or merging with Highway 17. Accordingly, the existing geometry of the Anderson Road entrance should be surveyed in snow free conditions to determine if it meets the requirements of the MTO's CSAS-23 entrance standard. If the entrance does not meet this standard, then it should be upgraded accordingly. The MTO's CSAS-23 entrance standard is capable of accommodating WB-15 design vehicles and larger (tractor-semitrailer combination).

9) **Entrance Signage:** The existing intersection signage was inventoried and evaluated. Based on the results of the Synchro 8 model analysis, dedicated turn lanes or traffic signals are not required to maintain an acceptable LOS of 'A' on Highway 17 during all study horizons. Accordingly, the existing signage that is in place will remain applicable for the stop sign control intersection. Additional regulatory signage is not anticipated unless requested by the MTO.

10) **Illumination:** Illumination requirements for the intersection were assessed in accordance with MTO Directive PLNG-B-05 which provides warrant criteria based on various traffic and geometry factors. Based on the warrant analysis, partial illumination is warranted for the intersection. Accordingly, a minimum of

two luminaries are required for partial illumination in accordance with Directive PLNG-B-05. The luminaries, pole design, locations and setback distances must conform with MTO standards.

Recommended Intersection Improvements

1) Clearing of any shrubbery, trees, soil mounds, etc. that fall within the sight triangles identified in Section 12.1 which cause a visual obstruction between vehicles on Anderson Road and Highway 17.

2) Anderson Road presently has two access points as part of a snow plough turn around. Implement one of the following options:

   - **Option 1** - Close the north access point and create a snow plough turnaround area immediately off of the south access point.
   - **Option 2** - Break the loop between south and north access points. The north access point would function as a snow plough turnaround only, without allowing access to Anderson Road.
   - **Option 3** - Close the north access point and operate without a snow plough turn around.

3) Upgrade the Anderson Road entrance to the MTO's CSAS-23 standard (if verified deficient).

4) Provide two luminaries for partial illumination of the intersection as defined by PLNG-B-05. Provide detailed illumination design to the MTO for review and approval prior to installation.

In conclusion, it is forecast that the intersection will continue to perform at a LOS 'A' during mine construction and operation without the need for turning lanes or traffic signals. The recommended improvements will increase sight distances, illumination and turning radii; improving the overall level of safety at the intersection once mine operations begin.

KEEWATIN-ASKI LTD.

consulting engineers & architect

<Original signed by>

Joe Cospito, P.Eng.

.

Table of Contents

List of Tables

List of Figures

1 INTRODUCTION

1.1 Study Purpose

Treasury Metals Inc. (Treasury) is presently in the approval and development stage of the Goliath Gold Project located in the Kenora Mining District in northwestern Ontario. The proposed gold mine will be accessed via the existing Anderson Road turn off from Highway 17, approximately 2.5 km west of the village of Wabigoon.

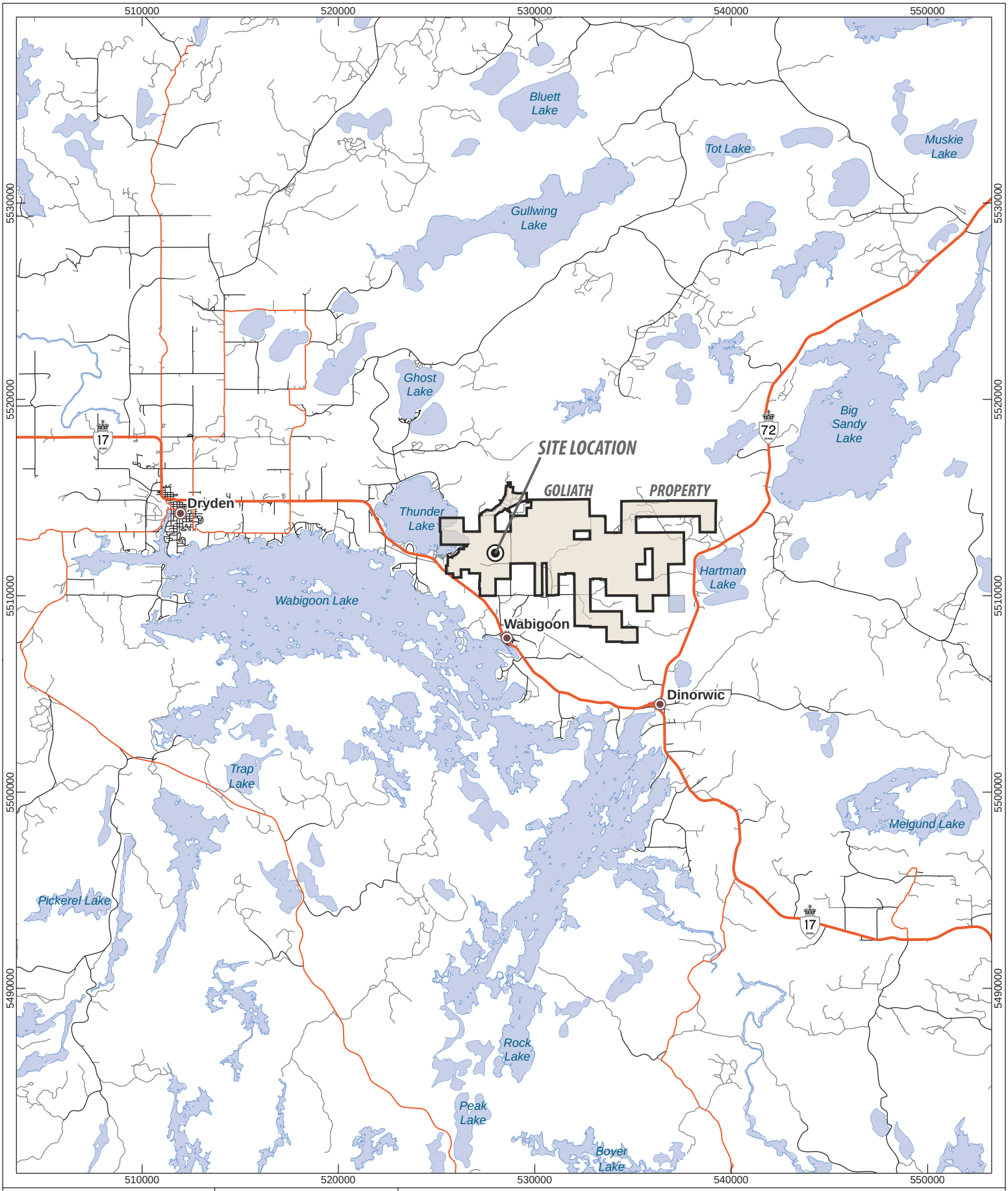
Accordingly, the purpose of this Traffic Impact Study (TIS) is twofold:

3) To evaluate the Project's anticipated impact on traffic volumes and highway function at the Highway 17 / Anderson Road intersection,

4) To evaluate if transportation corridor improvements are required to mitigate the increased volumes and ensure traffic safety is maintained.

1.2 Project Description

The proposed Goliath Gold Mine is located approximately 8 km northwest of the village of Wabigoon, 2 km north of the Trans Canada Highway (Highway 17). The mine will be accessed via Anderson Road off of Highway 17, approximately 2.5 km west of Wabigoon. The coordinates of the proposed Project are approximately centered on 49°45’25” N by 92°36’30” W. Figure 1 illustrates the location plan for the Goliath Gold Project.



GOLIATH GOLD PROJECT
DRYDEN, ONTARIO, CANADA

SCALE: 250 000

TREASURY METALS INC.

LOCATION OF GOLIATH GOLD PROJECT (LOCAL SCALE)

FIGURE: 1 | REV.00

DESIGN: AT 06 FEB. 2014
GIS: AT 14 APR, 2014
CHECK: MP 14 APR, 2014
REVIEW: MP 14 APR, 2014

LEGEND

- Populated Area
- Goliath Gold Project
- Waterbody
- Project Site
- Arterial Road
- Highway
- Local Road
- Recreational Road

N

0 2,000 4,000 6,000
Meters

REFERENCE
Projection: NAD83 UTM Zone 15N
GIS: NAD83 UTM Zone 15N

The Goliath Gold Project is a recently discovered gold resource of 1.6 million ounces of gold with an additional 5 million ounces of silver by-product. The Project entails the development, construction, operation and closure of a gold mine that would process 2,500 tonnes per day of gold bearing rock. The processing method will be a front end gravity circuit followed by a carbon in leach circuit. In total, the footprint of the Project will be approximately 300 hectares. The physical works of the project will include the following components:

- Open Pit Mining - 130-180m in depth, 1.5 km on strike
- Underground Mining
- Ore Stockpiles - 62,500 m^2 footprint
- Waste Rock Storage Area - 675,000 m^2 footprint
- Processing Plant Site - 18,000 m^2 footprint
- Tailing Storage Facility - 600,000 m^2 footprint
- Explosives Manufacturing and Storage Facility
- Makeup Water Intake and Pipeline
- Site Power
- Project Access Road - Tree Nursery Road via Anderson Road via Highway 17

1.3 Traffic Impact Study Components

The following components will be discussed within this study:

- Existing Conditions
- Study Area
- Proposed Land Use & Development Size
- Proposed Site Access
- Parking & Site Circulation
- Development Stages & Study Horizon
- Other Development & Planned Road Improvements
- Traffic Analysis Methodology
- Peak Hour Identification
- Turning Movement Count
- Trip Generation & Distribution
- Model Existing Traffic Conditions
- Model Background Traffic Conditions
- Model Background + Site Generated Traffic Conditions
- Sight Distances
- Entrance Layout, Geometry & Signage
- Illumination
- Conclusions & Recommendations

2 EXISTING CONDITIONS

2.1 Existing Land Use

The Goliath Gold Project is based approximately 8km northwest of the village of Wabigoon within the Eagle-Wabigoon-Manitou greenstone belt and 2km north of Trans-Canada Highway 17.

The Project property includes a total area of approximately 4,976 hectares which is presently forested with a mixture of both coniferous and deciduous trees and exhibits the typical rolling Canadian Shield topography of the area. Treasury holds the entire Project property, including the former MNR tree nursery property located on Anderson road.

Presently, the existing property is undeveloped and is suitable for mine development pending the completion of the Class Environmental Assessment process and other provincial permitting currently being undertaken by Treasury.

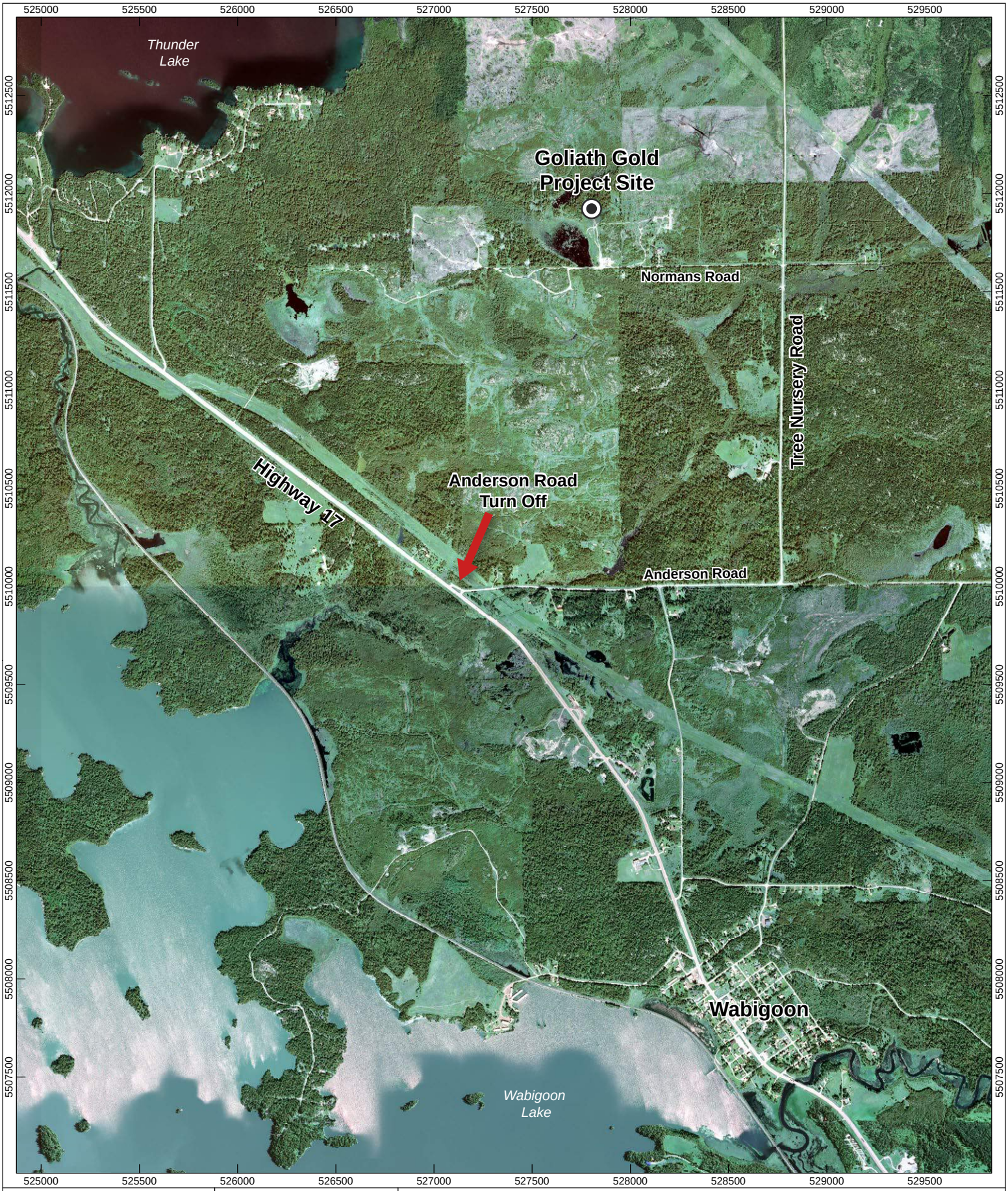
2.2 Existing Road Infrastructure

The existing road infrastructure linking the mine site to Highway 17 includes Tree Nursery Road, Anderson Road and Highway 17:

- Highway 17 is part of the Trans Canada Highway and is operated by the MTO. At the intersection location, Highway 17 has two lanes with a posted speed of 90 km/hr.
- Anderson Road and Tree Nursery Road are municipally controlled, two lane rural roads. Both roads are unpaved with no posted speed limit.

The intersection of Anderson Road and Highway 17 is an unsignalized 'T' intersection with stop sign control on Anderson Road. There are no signalized entrances located on Highway 17 in the area of the development.

Figure 2 provides an aerial view of the existing road network between Highway 17 and the mine site.



GOLIATH GOLD PROJECT DRYDEN, ONTARIO, CANADA	SCALE: 25 000 *TREASURY METALS INC.*	N 0 200 400 600 800 Meters
EXISTING ROAD NETWORK	*DESIGN: AT 06 FEB. 2014* *GIS: AT 14 APR. 2014* *CHECK: MP 14 APR. 2014* *REVIEW: MP 14 APR. 2014*	***REFERENCE*** *Projection: NAD83 UTM Zone 15N* *GIS: Treasury Metals Inc.*
FIGURE: 2 | REV.00		TREASURY METALS INCORPORATED

3 STUDY AREA

3.1 Study Area Boundaries

The focal point of this TIS is the Anderson Road intersection with Highway 17, which will serve as the access point to the mining development. This stretch of Highway 17 is located within primarily undeveloped, forested land with sparse rural residential development which radiates outwards from Wabigoon and Dryden. There are no signalized intersections or other significant intersections with major roads / highways located in the immediate vicinity. To the east, the nearest rural road intersection is Maggrah Road which is approximately 2 km from the intersection. To the west, the nearest rural road intersection is East Thunder Lake Road, which is approximately 1.9 km from the intersection. Accordingly, the study area boundaries will be limited to the intersection and a short distance (approximately 450 m) along Highway 17 to account for sight distance calculations and geometric improvement considerations.

Figure 3 illustrates the proposed study boundaries for this TIS.

GOLIATH GOLD PROJECT DRYDEN, ONTARIO, CANADA	SCALE: 5 000	0 50 100 150 200 Meters
	TREASURY METALS INC.	
STUDY AREA BOUNDARY	*DESIGN: AT 06 FEB. 2014* *GIS: AT 14 APR. 2014* *CHECK: MP 14 APR. 2014* *REVIEW: MP 14 APR. 2014*	***REFERENCE*** *Projection: NAD83 UTM Zone 15N* *GIS: Treasury Metals Inc.*
FIGURE: 3 / REV.00		

TREASURY METALS INCORPORATED

4 PROPOSED DEVELOPMENT

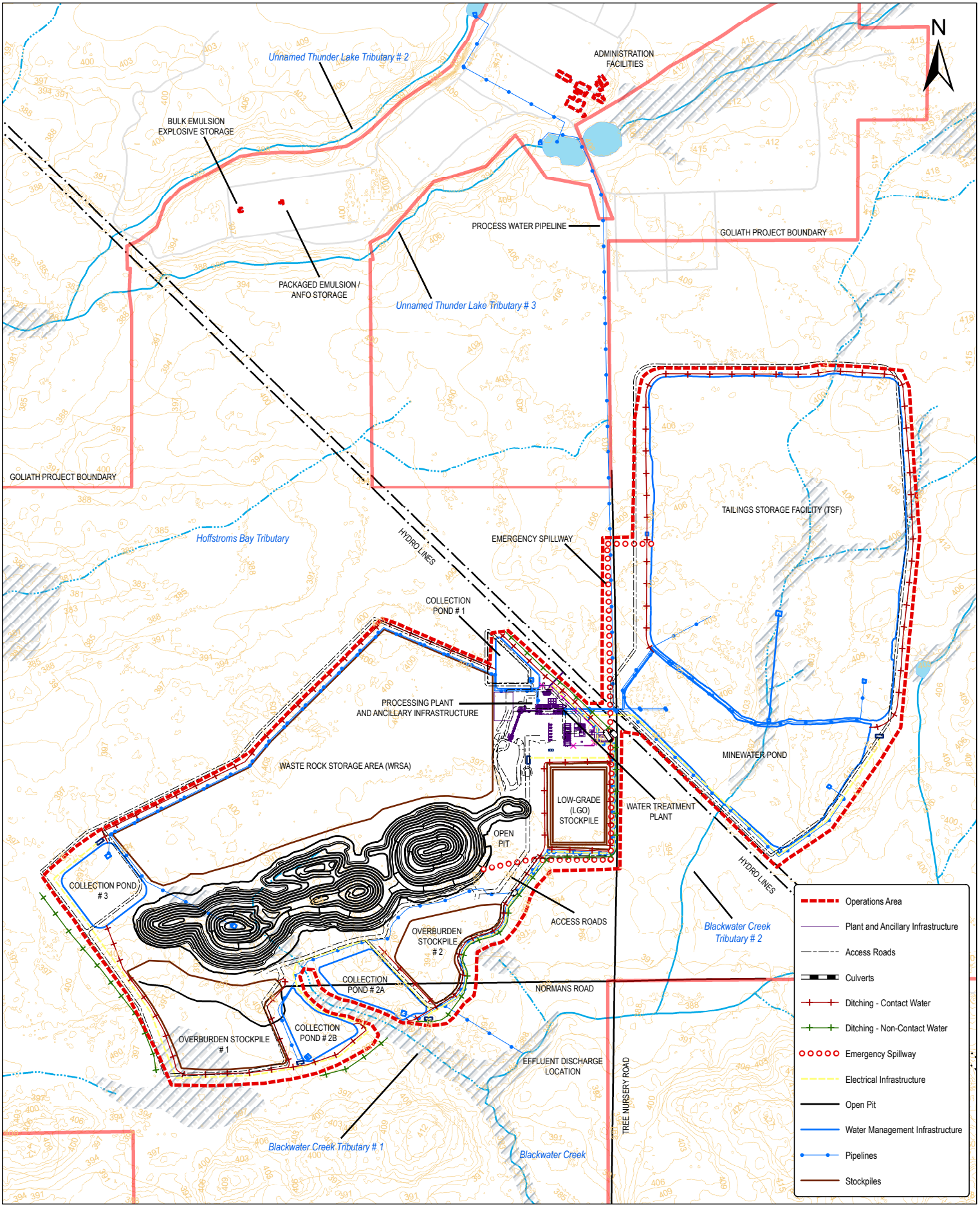
4.1 Proposed Land Use & Development Size

The proposed land use of the Goliath Gold Project is an industrial gold mining operation. In total, the footprint of the Project will be approximately 300 hectares. The physical works of the project will include the following components:

- Open Pit Mining - 130-180m in depth, 1.5 km on strike
- Underground Mining
- Ore Stockpiles - 62,500 m^2 footprint
- Waste Rock Storage Area - 675,000 m^2 footprint
- Processing Plant Site - 18,000 m^2 footprint
- Tailing Storage Facility - 600,000 m^2 footprint
- Explosives Manufacturing and Storage Facility
- Makeup Water Intake and Pipeline
- Site Power

The mine site will be located approximately 2 km north of Highway 17, and will be accessed via Tree Nursery Road off of Anderson Road. Figure 4 illustrates the proposed mine site plan, indicating structures, mining operation areas and site circulation.

Revised Figure 4 – Proposed Site Plan



GOLIATH GOLD PROJECT
DRYDEN, ONTARIO, CANADA

General Arranagement
Operations Phase

Appendix E Figure 4 | REV.01

TREASURY METALS INC.

DESIGN:	MP	01/08/2017
GIS:	MP	01/08/2017
CHECK:	MW	01/08/2017
REVIEW:	MW	01/08/2017

- Hydro Line
- Natural Gas Pipeline
- Provincial Parks
- Railway
- Expressway / Highway
- Local Roads
- Resource / Recreation
- Contours (3 meters)
- Intermittent Watercourses
- Permanent Watercourses
- Waterbody
- Wetland

SCALE 1:16,000

Coordinate System: NAD 1983 UTM Zone 15N
Projection: Transverse Mercator
Datum: North American 1983

0 250 500 750
Meters

Base Data:
Treasury Metals Inc., LIO Database, KBM Resources Group

Notes:
All details preliminary and subject to change as engineering designs are updated.

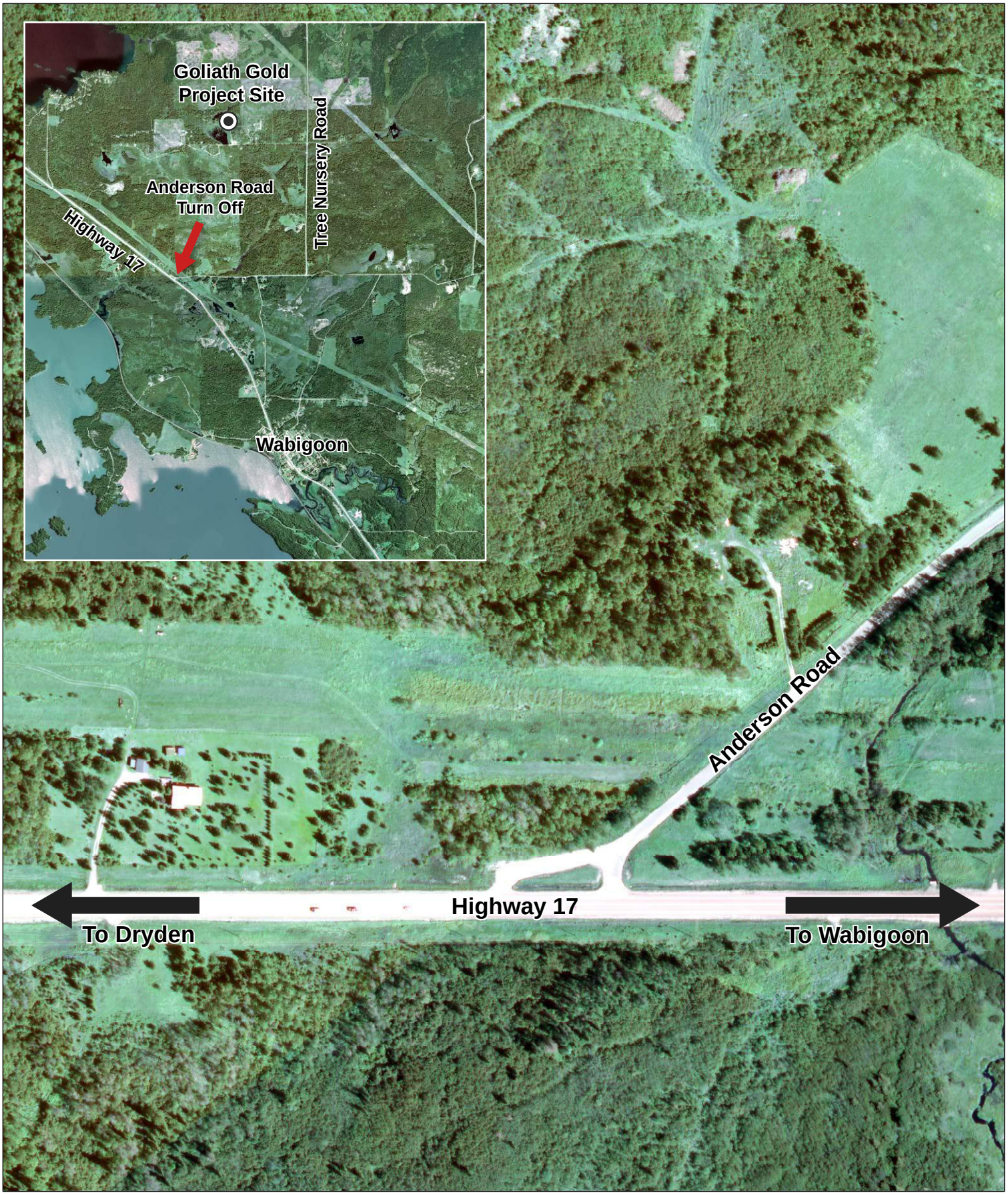
4.2 Proposed Site Access

Access to the mine will be from Tree Nursery Road via the Anderson Road turnoff on Highway 17, approximately 2.5 km west of the village of Wabigoon. The final 2.5 km northern section of Tree Nursery Road will be closed to public use at the mine entrance security gate.

Anderson Road is a municipally controlled, unpaved, two lane road. The road also provides access to a handful of residences, the Wabigoon waste disposal site and the former MNR tree nursery (now owned by Treasury). However, Anderson Road is not the sole point of access for the few residences or waste disposal site, which are accessed more directly from Wabigoon by other municipal roads.

The intersection of Anderson Road and Highway 17 is an unsignalized 'T' intersection with stop sign control on Anderson Road. The intersection also forms part of a truck turn around, with two access points to Highway 17. A later recommendation of this report will be to close the north entrance of the truck turn around so that the intersection only has one access point from Highway 17. Entrance design elements are evaluated in Section 13.

Figure 5 provides an aerial view of the existing Highway 17 / Anderson Road intersection which is the primary focal point of this TIS.



GOLIATH GOLD PROJECT DRYDEN, ONTARIO, CANADA	SCALE: 3 000	
	TREASURY METALS INC.	
AERIAL VIEW OF ANDERSON ROAD & HIGHWAY 17 INTERSECTION	*DESIGN: AT 06 FEB. 2014* *GIS: AT 14 APR. 2014* *CHECK: MP 14 APR. 2014* *REVIEW: MP 14 APR. 2014*	
FIGURE: 5 REV.00		

0 25 50 75
Meters

REFERENCE
Projection: NAD83 UTM Zone 15N
GIS: Treasury Metals Inc.

TREASURY METALS
INCORPORATED

4.3 Parking & Site Circulation

Various building infrastructure will be located on the mine site as illustrated in Figure 6; suitably sized parking areas will be established around these buildings.

Figure 6 also illustrates the site circulation road network. The most significant site circulation roads include two mine access roads, approximately 2.5 km each, which will encompass the tailings storage area and open pit.

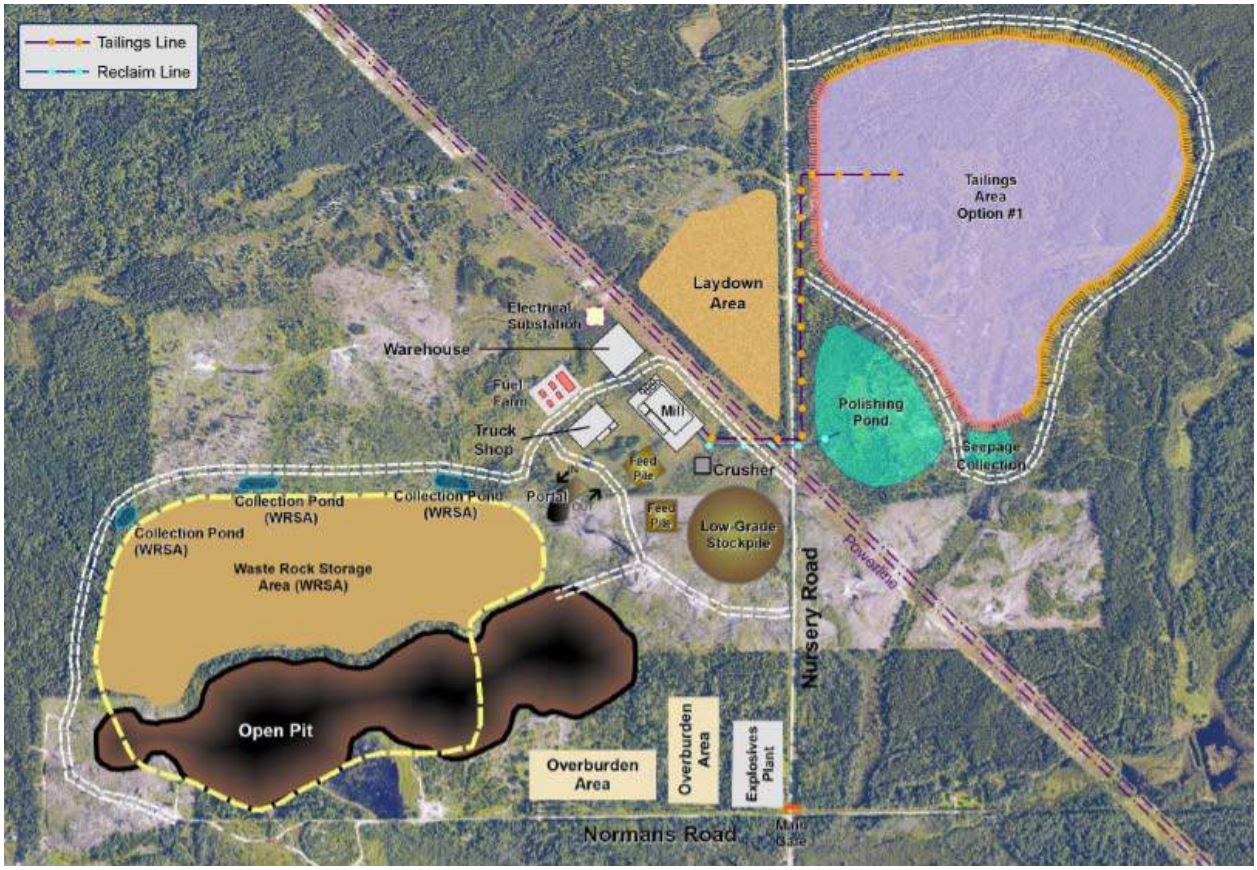


Figure 6 – Site Circulation

The final 2.5 km northern section of Tree Nursery Road will be closed to the public at the mine entrance security gate. This effectively eliminates public use of the site circulation road network. Consequently, neither parking nor the internal site circulation road network are expected to impact Highway 17 operation.

4.4 Development Stages & Study Horizon

It is critical to establish the development stages of the Goliath Gold Project in order to identify the study horizon over which to evaluate the traffic growth and the subsequent impacts on Highway 17. Treasury provided the following planned development stages, based on the mine plan of operations:

Development Stage	Description	Time Frame
Stage 1 - Construction	Involves clearing, grubbing, construction of access roads and mine infrastructure including machinery buildings, warehouses, laydown areas, tailings storage facilities, electrical substation, sewage waste management facility and underground portal construction.	2 years (2015 - 2017)
Stage 2 - Operation	Involves open pit and underground mining operations as well as reclamation upon mine closure.	10 years (2017 - 2027)

Table 1 – Development Stages

Accordingly, this TIS will evaluate traffic impacts over the following study horizon:

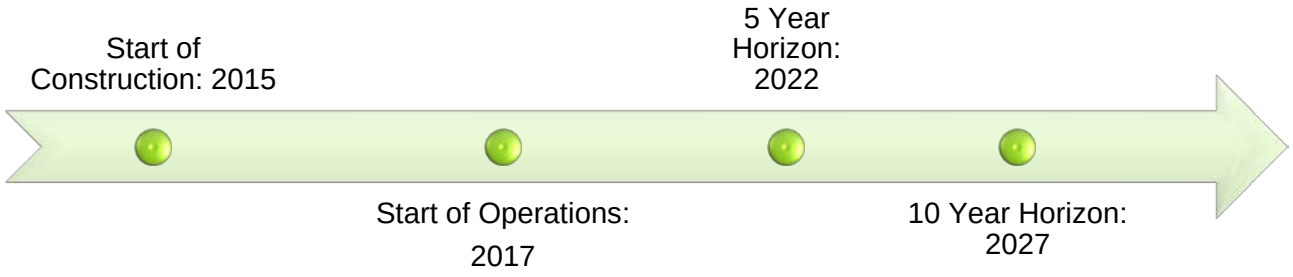


Figure 7 – Study Horizons

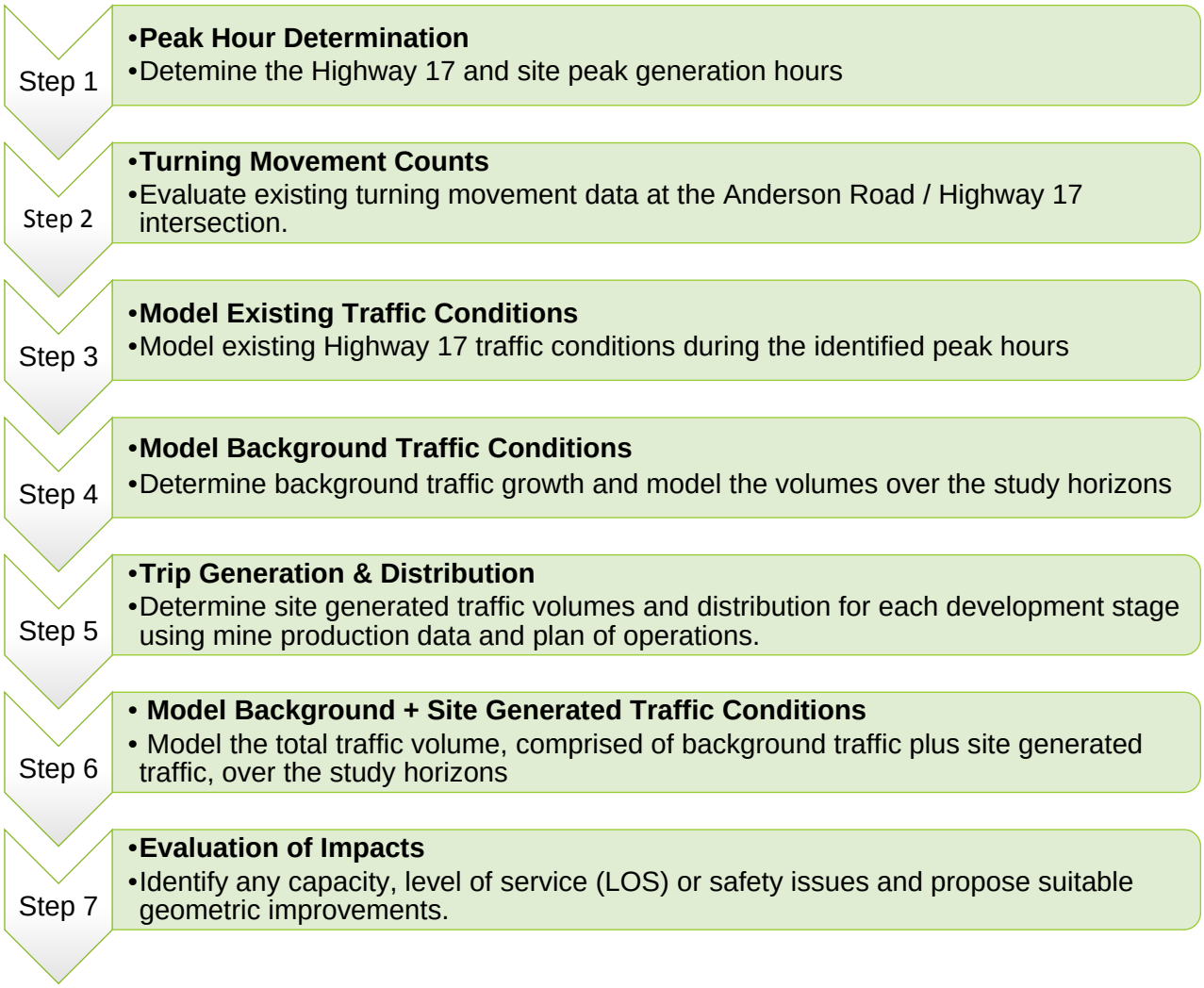
4.5 Other Development & Planned Road Improvements

To our knowledge, there are no other developments within the study area that are under construction, are approved or are in the approval process that will impact Highway 17 and create synergies with traffic generated by the Goliath Gold Project. There are currently no corridor improvements in progress within the vicinity of the Anderson Road turn off.

5 TRAFFIC ANALYSIS METHODOLOGY

5.1 Methodology

In order to determine the impact and necessity for improvements to the Highway 17 corridor, the peak hour volumes (PHV) and distribution for both Highway 17 and the Goliath Gold Project must first be determined. The following methodology is used to determine the peak hour volumes for each of the study horizons:



5.2 Modeling Approach

The capacity analysis for the intersection will be modeled for existing conditions, background growth and background growth + site generated traffic over the identified study horizons. The capacity analysis was completed using the traffic software package Synchro 8 which utilizes the methodology outlined in the *Highway Capacity Manual 2010* (HCM) to evaluate the capacity of both unsignalized and signalized intersections.

In the HCM, operating conditions are commonly described in terms of a Level of Service (LOS). LOS is a qualitative measurement describing operating conditions in terms of V/C ratio[1], vehicle delay, freedom to maneuver, interruptions and driver comfort. There are six defined levels of service ranging from A to F, with LOS 'A' representing optimal operating conditions and LOS 'F' representing failing operating conditions. Table 2 provides the HCM's definitions for each LOS.

(LOS)	V/C	Delay (sec)	Description
A	0 - 0.6	0 - 10	Free flow conditions with no delays. Traffic flows at or above the posted speed limit and motorists have complete mobility between lanes. Average vehicle spacing is about 550 ft or 27 car lengths.
B	0.61 - 0.70	> 10 - 15	Reasonably free flow with only slight traffic stream restrictions. Average vehicles spacing is about 330 ft or 16 car lengths.
C	0.71 - 0.80	> 15 - 25	Stable flow, at or near free flow, posted speed is maintained. Ability to maneuver through lanes is noticeably restricted and lane changes require more driver awareness. Minimum vehicle spacing is about 220 ft or 11 car lengths. This is the target LOS for most rural highways.
D	0.81 - 0.90	> 25 - 35	Approaching unstable flow. Speeds slightly decrease as traffic volumes slightly increase. Ability to maneuver within traffic stream is limited and driver comfort level decreases. Vehicles are spaced about 160 ft or 8 car lengths.
E	0.91 - 1.00	> 35 - 50	Unstable flow, operating at capacity. Flow becomes irregular and speed varies rapidly because there are virtually no usable gaps to maneuver in the traffic stream and speeds rarely reach the posted limit. Vehicle spacing is about 6 car lengths. Drivers' comfort level is poor.
F	> 1.00	> 50	Forced or breakdown flow. Every vehicle moves in lockstep with the vehicle in front of it, with frequent slowing required.

Table 2 – HCM LOS Criteria

[1] V/C ratio is the ratio of volume to capacity for a roadway element.

In this study, the target performance level for all intersection movements is LOS A through C (V/C ratio of 0 - 0.80. Unacceptable performance is considered LOS D through F (V/C ratio greater than 0.81). In the *General Guidelines for the Preparation of Traffic Impact Studies, December 2009*, the MTO recommends that movements with a V/C ratio of 0.85 or greater be given consideration for geometric improvements. Accordingly this study will consider geometric improvements such as dedicated turn lanes or traffic signals if a V/C ratio of 0.80 is exceeded or if an acceptable LOS A-C is not maintained.

6 PEAK HOUR IDENTIFICATION

6.1 Highway 17 Peak Hours

In order to determine the existing AM and PM peak hours for Highway 17, the MTO was contacted for recent traffic count data in the vicinity of the Anderson Road turnoff. The MTO provided traffic count data for Highway 17, approximately 8 km east of the Anderson Road turnoff, which was collected in March, July, and September of 2013. This existing traffic data is included in Appendix 'A'. Table 3 summarizes the peak hour data identified for each season's traffic count.

	Spring Data		Summer Data		Fall Data	
	AM PH	PM PH	AM PH	PM PH	AM PH	PM PH
Sunday	11am - 12 pm (221 vph)	4pm - 5pm (224 vph)	11am - 12 pm (320 vph)	4pm - 5pm (304 vph)	11am - 12 pm (299 vph)	4pm - 5pm (254 vph)
Monday	11am - 12 pm (170 vph)	4pm - 5pm (179 vph)	11am - 12 pm (298 vph)	4pm - 5pm (274 vph)	11am - 12 pm (186 vph)	4pm - 5pm (267 vph)
Tuesday	11am - 12 pm (169 vph)	4pm - 5pm (210 vph)	11am - 12 pm (244 vph)	4pm - 5pm (242 vph)	11am - 12 pm (251 vph)	4pm - 5pm (298 vph)
Wednesday	11am - 12 pm (192 vph)	4pm - 5pm (239 vph)	11am - 12 pm (301 vph)	4pm - 5pm (290 vph)	11am - 12 pm (272 vph)	4pm - 5pm (286 vph)
Thursday	11am - 12 pm (215 vph)	4pm - 5pm (197 vph)	11am - 12 pm (293 vph)	4pm - 5pm (310 vph)	11am - 12 pm (255 vph)	4pm - 5pm (274 vph)
Friday	11am - 12 pm (206 vph)	4pm - 5pm (198 vph)	11am - 12 pm (333 vph)	4pm - 5pm (352 vph)	11am - 12 pm (275 vph)	4pm - 5pm (298 vph)
Saturday	11am - 12 pm (228 vph)	4pm - 5pm (243 vph)	11am - 12 pm (316 vph)	4pm - 5pm (274 vph)	11am - 12 pm (250 vph)	4pm - 5pm (260 vph)

Table 3 – Highway 17 AM & PM Peak Hours

Review of the data reveals that all three seasons share the same AM peak hour of 11 a.m. - 12 p.m. and the same PM peak hour of 4 p.m. - 5 p.m. However, the summer data exhibits the highest overall peak hour volumes and therefore will be referenced as the existing volume profile for conservative purposes.

Highway 17 Peak Hours:

AM Peak Hour: 11 a.m. - 12 p.m.

PM Peak Hour: 4 p.m. - 5 p.m.

6.2 Site Peak Hours

It is important to determine the site generated peak hours to determine if there is overlap with the Highway 17 peak hours. Treasury provided KAL with information on the staffing and operational times of the mine for both Stage 1 - Construction and Stage 2 - Operation. This information is summarized in the table below.

Development Stage	Staffing Volume	Shift Change	Anticipated Site Peak Hours
Stage 1 - Construction	250 employees on site each day.	Day Shift: 6 a.m. - 6 p.m. No Night Shift	AM PH: 5 a.m. - 6 a.m. PM PH: 6 p.m. - 7 p.m.
Stage 2 - Operation	200 employees with 1/3 working day shift, 1/3 working night shift and 1/3 on time off	Day shift: 6 a.m. - 6 p.m. Night Shift: 6 p.m. - 6 a.m.	AM PH: 5 a.m. - 6 a.m. PM PH: 6 p.m. - 7 p.m.

Table 4 – Anticipated Site Peak Hours

It is worthy to note that Stage 1 and Stage 2 are expected to have the same AM and PM peak hours based on shift start and end times. The table below compares the existing Highway 17 peak hours to the anticipated site peak hours:

	Existing Highway 17 Peak Hours	Forecast Site Peak Hours
AM Peak Hour	11 a.m. - 12 p.m.	5 a.m. - 6 a.m.
PM Peak Hour	4 p.m. - 5 p.m.	6 p.m. - 7 p.m.

Table 5 – Highway 17 & Site Peak Hours

As illustrated in Table 5, the mine's peak hours are not expected to overlap with Highway 17's peak hours. Accordingly, each of the four peak hours will be evaluated for each horizon to determine the impact on Highway 17 traffic flow.

7 TURNING MOVEMENT COUNT

A turning movement count was conducted by Keewatin-Aski Ltd. at the Highway 17 / Anderson Road intersection on February 19, 2014, over a twelve hour period from 7 a.m. to 7 p.m. Table 6 presents the existing turning movement data collected at the Highway 17 / Anderson Road intersection on February 19, 2014.

NB = Northbound; SB = Southbound; RT = Right Turn; LT = Left Turn

	Time Interval		Highway 17				Anderson Road				Vehicles Per Hour (VPH)
	From	To	NB RT on Anderson	SB LT on Anderson	Total	% Trucks	RT on Hwy 17	LT on Hwy 17	Total	% Trucks	
	7:00 a.m.	8:00 a.m.	0	6	6	0%	2	0	3	33%	9
	Trucks		0	0			1	0			
	8:00 a.m.	9:00 a.m.	0	0	0	0%	2	1	4	25%	4
	Trucks		0	0			1	0			
	9:00 a.m.	10:00 a.m.	1	1	2	0%	1	0	1	0%	3
	Trucks		0	0			0	0			
	10:00 a.m.	11:00 a.m.	0	2	2	0%	1	0	1	0%	3
	Trucks		0	0			0	0			
Hwy 17 PH	11:00 a.m.	12:00 p.m.	0	0	0	0%	2	0	2	0%	2
	Trucks		0	0			0	0			
	12:00 p.m.	1:00 p.m.	0	0	0	0%	0	0	1	100%	1
	Trucks		0	0			1	0			
	1:00 p.m.	2:00 p.m.	0	2	2	0%	2	0	3	33%	5
	Trucks		0	0			1	0			
	2:00 p.m.	3:00 p.m.	3	0	4	25%	3	0	3	0%	7
	Trucks		1	0			0	0			
	3:00 p.m.	4:00 p.m.	0	1	1	0%	2	1	3	0%	4
	Trucks		0	0			0	0			
Hwy 17 PH	4:00 p.m.	5:00 p.m.	0	2	2	0%	6	0	6	0%	8
	Trucks		0	0			0	0			
	5:00 p.m.	6:00 p.m.	1	1	2	0%	0	0	0	0%	2

NB = Northbound; SB = Southbound; RT = Right Turn; LT = Left Turn

	Time Interval		Highway 17				Anderson Road				Vehicles Per Hour (VPH)
	From	To	NB RT on Anderson	SB LT on Anderson	Total	% Trucks	RT on Hwy 17	LT on Hwy 17	Total	% Trucks	
	Trucks		0	0			0	0			
Site PH	6:00 p.m.	7:00 p.m.	1	1	2	0%	0	0	0	0%	2
	Truck		0	0			0	0			

Table 6 – Turning Movement Count: Anderson Road & Highway 17

Review of the data presented in Table 6 illustrates that the existing turning movement volumes utilizing the Anderson Road intersection are quite small. The busiest hour for the intersection was 7 a.m. - 8 a.m. with 9 vehicles.

These low turning volumes appear to match the present level of low development on Anderson Road. The former MNR Tree Nursery is no longer operational, and that property is now owned by Treasury. KAL counted approximately four (4) private dwelling driveways along Anderson Road up to the intersection with Tree Nursery Road. It is also possible some of these vehicles originated in Wabigoon as Anderson Road eventually merges with the Municipal road network.

These existing AM and PM peak hour turning volumes will be accounted for in the analysis of background growth and total aggregate volumes over the study horizon.

8 MODEL EXISTING TRAFFIC CONDITIONS

The MTO provided 2013 traffic count data for Highway 17, approximately 8 km east of the Anderson Road turnoff. As discussed in Section 6, the summer traffic count data will be used as it exhibits the highest peak hour volumes throughout the seven day count. Review of the MTO's 2013 summer traffic count data in Section 6 indicates that the busiest day in the seven day count was Friday. Accordingly, the traffic volume data for a summer Friday will be used to determine the existing peak hour volume on Highway 17 as this is the conservative scenario.

Since the MTO's traffic data was collected in 2013, a yearly growth factor of 1%[2] is applied to both northbound and southbound traffic to forecast the current 2014 Highway 17 traffic volumes. The turning movement data collected by KAL was added to the MTO's data to determine the existing traffic volumes at the Anderson Road intersection. Figure 8 illustrates the existing movement volumes at the intersection.

[2] Highway 17 yearly growth rate of 1% provided by Nancy Chu-McKercher, Traffic Supervisor, Ministry of Transportation, March 4, 2014 email.

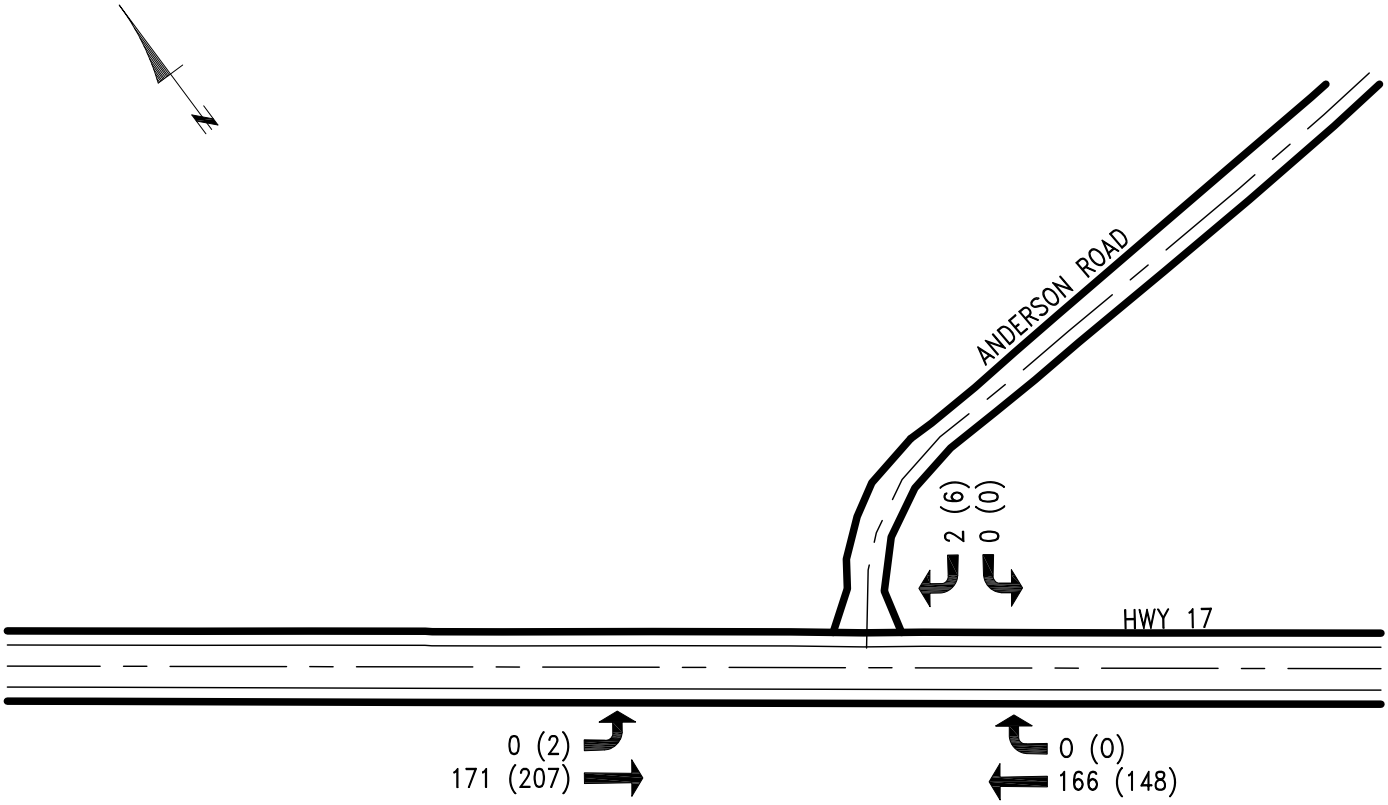


FIGURE 8– EXISTING HWY 17 TRAFFIC VOLUMES (2014)

LEGEND

xx VPH AM Peak Hour

(xx) VPH PM Peak Hour

KEEWATIN-ASKI LTD.
consulting engineers & architect
web: www.keewatin-aski.on.ca

CLIENT

PROJECT
GOLIATH GOLD PROJECT
TRAFFIC IMPACT STUDY

DRAWING TITLE
EXISTING HWY 17 TRAFFIC VOLUMES (2014)

PROJECT NUMBER
14006

DESIGN JC
DRAWN AK
CHECKED JC
SCALE N.T.S.
DATE MAR. 2014
DRAWING NUMBER
FIGURE 8

P:\Projects\2014\14006 Goliath Gold Project TIS\14006 Traffic Data\Traffic Impact Study Drawings V4.dwg Andreas 18/03/14 – 2:45 P

An evaluation of the existing traffic volumes for the present year (2014) was completed using the Synchro 8 software package. The LOS and V/C ratio for each movement during the Highway 17 AM and PM peak hours is presented in the table below. The detailed Synchro 8 model output is included in Appendix 'B'.

Traffic Lane	AM Peak Hour			PM Peak Hour		
	LOS	V/C	Delay	LOS	V/C	Delay
Hwy. 17 Northbound	A	0.11	0	A	0.09	0
Hwy. 17 Southbound	A	0.00	0	A	0.00	0.1
Anderson Road	A	0.00	9.2	A	0.01	9.1
Overall Intersection LOS	A			A		

Table 7 – LOS for Existing Traffic Conditions

8.1 Evaluation of Impacts

The results of the model analysis for existing traffic conditions indicate the following:

- All traffic lanes maintain a LOS of ‘A’
- All V/C ratios are operating well below capacity
- Control delay is negligible and within LOS 'A' tolerances for all approaches.

Accordingly, no geometric improvements or signalization is required to mitigate impacts from existing traffic volumes.

9 MODEL BACKGROUND TRAFFIC CONDITIONS

Over the study horizons, it is anticipated that the background vehicle usage of Highway 17 will increase. This background growth must be estimated for each of the study horizons during both Highway 17's and the mine's unique peak hours.

A yearly growth factor of 1% is applied to the MTO's base 2013 traffic data and KAL's turning movement volumes in order to forecast the background traffic volumes for each of the following study horizons:

- Construction: 2015
- Start of Operations: 2017
- 5 Year Horizon: 2022
- 10 Year Horizon: 2027

Figures 9 through 12 illustrate the forecast background traffic volumes for each study horizon during both Highway 17's and the mine's unique peak hours.

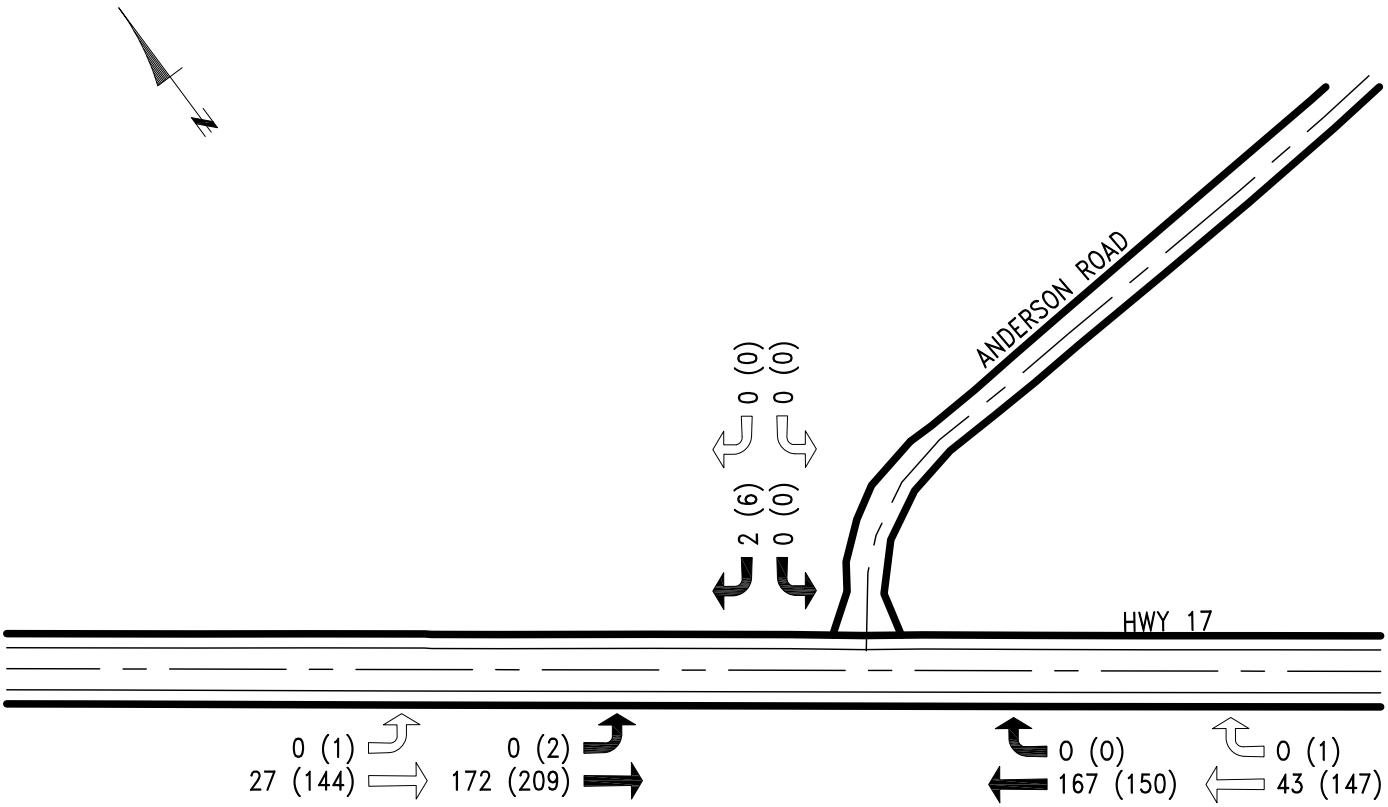


FIGURE 9 – BACKGROUND TRAFFIC :
START OF CONSTRUCTION (2015)

LEGEND

➡	xx VPH	DURING HWY 17 AM PH (11am–12pm)
	(xx) VPH	DURING HWY 17 PM PH (4pm–5pm)
⇨	xx VPH	DURING MINE AM PH (5am–6am)
	(xx) VPH	DURING MINE PM PH (6pm–7pm)

KEEWATIN-ASKI LTD.
consulting engineers & architect
web: www.keewatin-aski.on.ca

CLIENT

PROJECT
GOLIATH GOLD PROJECT
TRAFFIC IMPACT STUDY

DRAWING TITLE
BACKGROUND TRAFFIC :
START OF CONSTRUCTION 2015

PROJECT NUMBER
14006

DESIGN	JC
DRAWN	AK
CHECKED	JC
SCALE	N.T.S.
DATE	MAR. 2014

DRAWING NUMBER
FIGURE 9

P:\Projects\2014\14006 Goliath Gold Project TIS\14006 Traffic Data\Traffic Impact Study Drawings V4.dwg Andreas 18/03/14 – 2:45 P

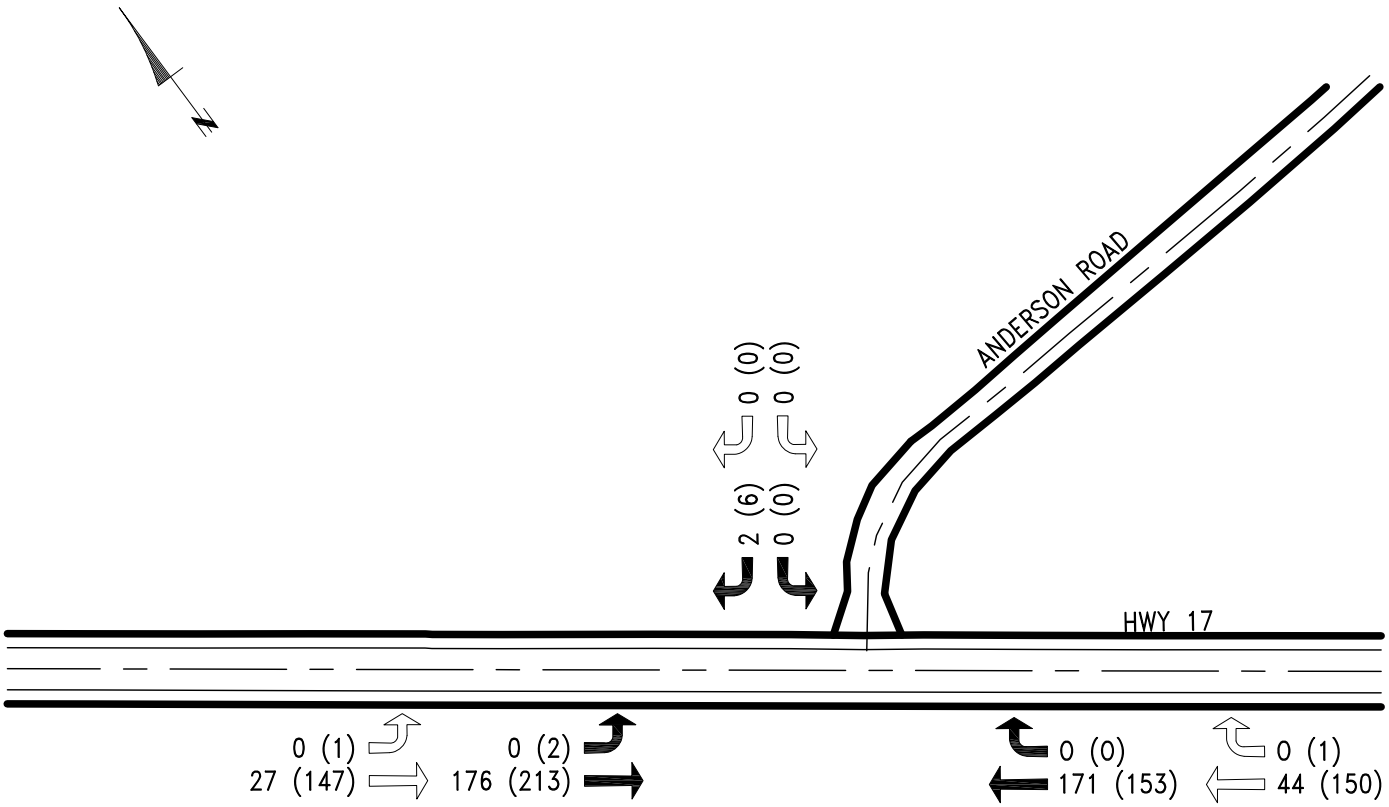


FIGURE 10 – BACKGROUND TRAFFIC :
START OF OPERATION (2017)

LEGEND

➡	xx VPH	DURING HWY 17 AM PH (11am–12pm)
	(xx) VPH	DURING HWY 17 PM PH (4pm–5pm)
⇨	xx VPH	DURING MINE AM PH (5am–6am)
	(xx) VPH	DURING MINE PM PH (6pm–7pm)

KEEWATIN-ASKI LTD.
consulting engineers & architect
web: www.keewatin-aski.on.ca

CLIENT

PROJECT
GOLIATH GOLD PROJECT
TRAFFIC IMPACT STUDY

DRAWING TITLE
BACKGROUND TRAFFIC :
START OF OPERATION 2017

PROJECT NUMBER
14006

DESIGN	JC
DRAWN	AK
CHECKED	JC
SCALE	N.T.S.
DATE	MAR. 2014

DRAWING NUMBER
FIGURE 10

P:\Projects\2014\14006 Goliath Gold Project TIS\14006 Traffic Data\Traffic Impact Study Drawings V4.dwg Andreas 18/03/14 – 2:45 P

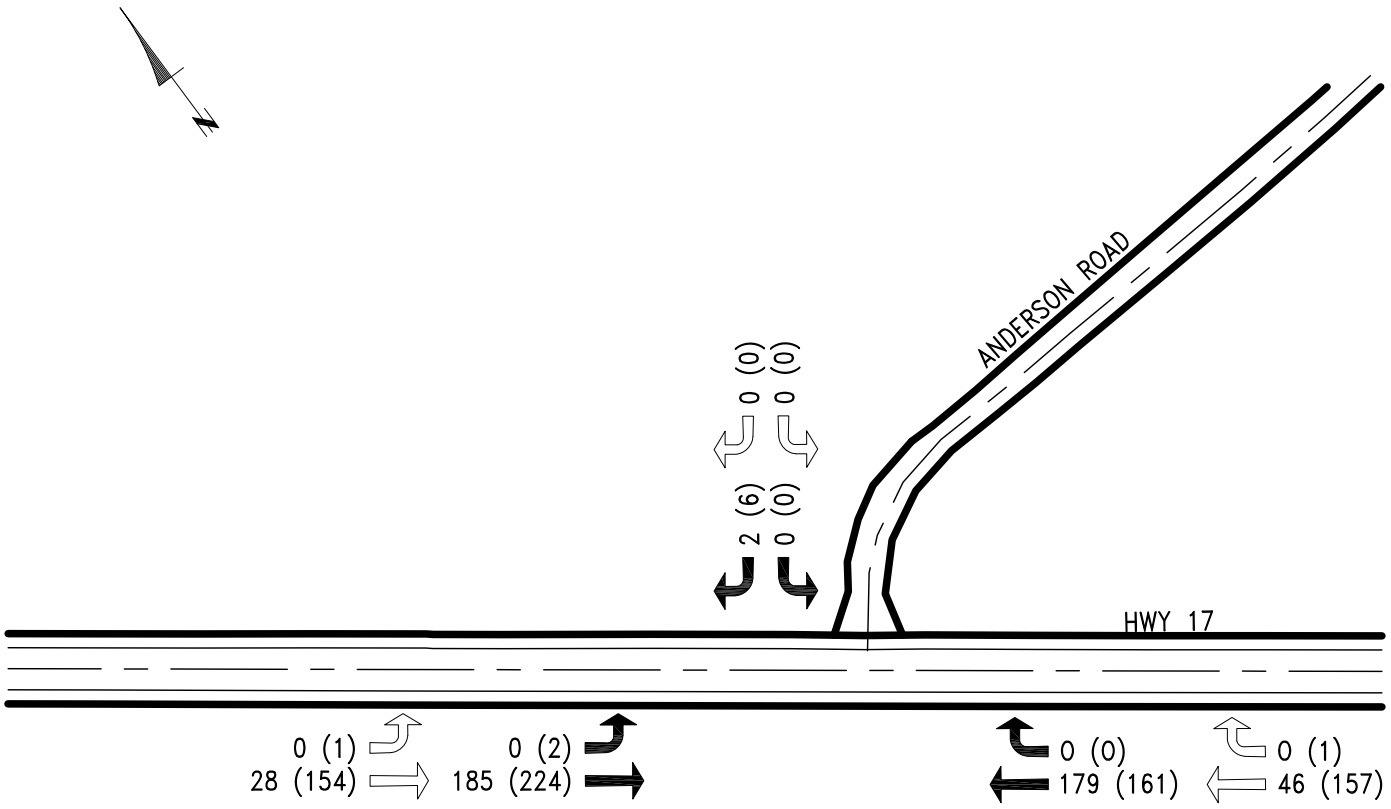


FIGURE 11 – BACKGROUND TRAFFIC :
5 YEAR HORIZON (2022)

LEGEND

➡	xx VPH	DURING HWY 17 AM PH (11am–12pm)
	(xx) VPH	DURING HWY 17 PM PH (4pm–5pm)
⇨	xx VPH	DURING MINE AM PH (5am–6am)
	(xx) VPH	DURING MINE PM PH (6pm–7pm)

KEEWATIN-ASKI LTD.
consulting engineers & architect
web: www.keewatin-aski.on.ca

CLIENT

PROJECT
GOLIATH GOLD PROJECT
TRAFFIC IMPACT STUDY

DRAWING TITLE
BACKGROUND TRAFFIC :
5 YEAR HORIZON - 2022

PROJECT NUMBER
14006

DESIGN	JC
DRAWN	AK
CHECKED	JC
SCALE	N.T.S.
DATE	MAR. 2014

DRAWING NUMBER
FIGURE 11

P:\Projects\2014\14006 Goliath Gold Project TIS\14006 Traffic Data\Traffic Impact Study Drawings V4.dwg Andreas 18/03/14 – 2:46 P

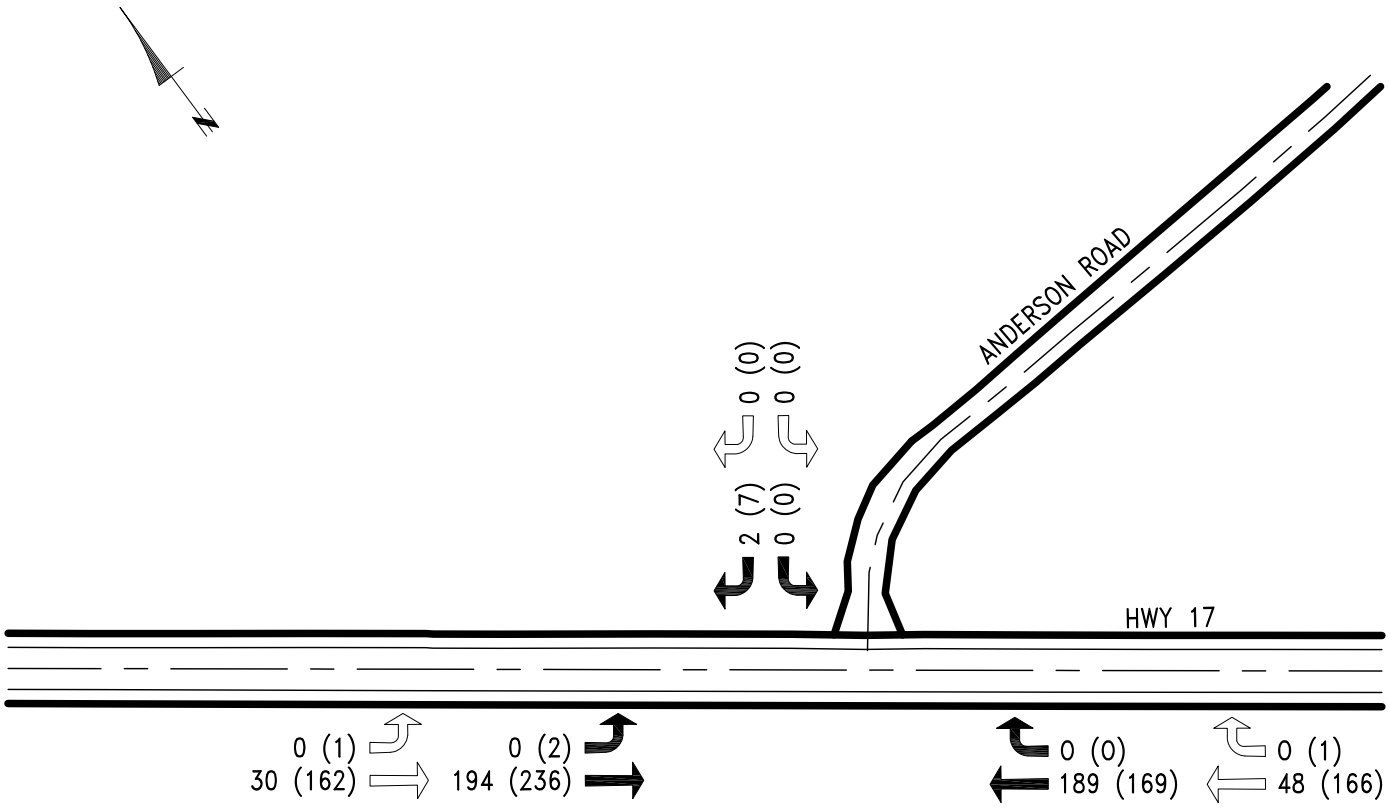


FIGURE 12 – BACKGROUND TRAFFIC :
10 YEAR HORIZON (2027)

LEGEND

➡	xx VPH	DURING HWY 17 AM PH (11am–12pm)
	(xx) VPH	DURING HWY 17 PM PH (4pm–5pm)
⇨	xx VPH	DURING MINE AM PH (5am–6am)
	(xx) VPH	DURING MINE PM PH (6pm–7pm)

KEEWATIN-ASKI LTD.
consulting engineers & architect
web: www.keewatin-aski.on.ca

CLIENT

PROJECT
GOLIATH GOLD PROJECT
TRAFFIC IMPACT STUDY

DRAWING TITLE
BACKGROUND TRAFFIC :
10 YEAR HORIZON - 2027

PROJECT NUMBER
14006

DESIGN	JC
DRAWN	AK
CHECKED	JC
SCALE	N.T.S.
DATE	MAR. 2014

DRAWING NUMBER
FIGURE 12

P:\Projects\2014\14006 Goliath Gold Project TIS\14006 Traffic Data\Traffic Impact Study Drawings V4.dwg Andreas 18/03/14 – 2:46 P

Synchro 8 was used to evaluate the background traffic volumes for each of the study horizons. The LOS and V/C ratio for each movement during both the AM and PM peak hours is presented in the following tables for each horizon. The detailed Synchro 8 model output is included in Appendix 'B'.

Study Horizon	Traffic Lane	Highway 17 Peak Hours						Mine Peak Hours					
		AM PH *11 a.m. - 12 p.m.*			PM PH *4 p.m. - 5 p.m.*			AM PH *5 a.m. - 6 a.m.*			PM PH *6 p.m. - 7 p.m.*		
		LOS	V/C	Delay (s)	LOS	V/C	Delay (s)	LOS	V/C	Delay (s)	LOS	V/C	Delay (s)
Start of Construction (2015)	Hwy. 17 Northbound	A	0.11	0	A	0.10	0	A	0.03	0	A	0.09	0
	Hwy. 17 Southbound	A	0.00	0	A	0.00	0.1	A	0.00	0	A	0.00	0.1
	Anderson Road	A	0.00	9.2	A	0.01	9.1	A	0.00	0	A	0.00	0
	Overall Intersection LOS	A			A			A			A		
Start of Operations (2017)	Hwy. 17 Northbound	A	0.11	0	A	0.10	0	A	0.03	0	A	0.10	0
	Hwy. 17 Southbound	A	0.00	0	A	0.00	0.1	A	0.00	0	A	0.00	0.1
	Anderson Road	A	0.00	9.2	A	0.01	9.1	A	0.00	0	A	0.00	0
	Overall Intersection LOS	A			A			A			A		
5 Year Horizon (2022)	Hwy. 17 Northbound	A	0.03	0	A	0.10	0	A	0.11	0	A	0.10	0
	Hwy. 17 Southbound	A	0.00	0	A	0.00	0.1	A	0.00	0	A	0.00	0.1
	Anderson Road	A	0.00	9.3	A	0.00	9.2	A	0.00	0	A	0.01	0
	Overall Intersection LOS	A			A			A			A		
10 Year Horizon (2027)	Hwy. 17 Northbound	A	0.12	0	A	0.11	0	A	0.03	0	A	0.11	0
	Hwy. 17 Southbound	A	0.00	0	A	0.00	0.1	A	0.00	0	A	0.00	0.1
	Anderson Road	A	0.00	9.3	A	0.01	9.2	A	0.00	0	A	0.00	0
	Overall Intersection LOS	A			A			A			A		

Table 8 – LOS for Background Traffic Volumes: All Horizons

9.1 Evaluation of Impacts

The results of the model analysis for background traffic volumes indicate the following:

- All traffic lanes maintain a LOS of ‘A’
- All V/C ratios are operating well below capacity
- Control delay is negligible and within LOS 'A' tolerances for all approaches.

Accordingly, no geometric improvements or signalization is required to mitigate impacts from background traffic volumes during any of the study horizons.

10 TRIP GENERATION & DISTRIBUTION

10.1 Trip Generation

The proposed Goliath Gold Project will generate traffic volumes entering and exiting the site at the Anderson Road turnoff and consequently will increase traffic volumes on Highway 17. Ultimately, these site generated volumes will be added to the background volumes, the sum of which will be evaluated by Synchro 8 to determine if an acceptable LOS is maintained or if improvements are required.

Typically, the *Trip Generation Manual* (TGM) published by the Institute of Transportation Engineers is used to forecast site generated traffic for proposed new developments. The TGM presents trip generation data collected across North America for completed commercial, institutional, industrial and recreational facilities. The relevant data pool is then adjusted to fit the proposed development, typically by square footage or number of employees. This allows for a reasonable estimate of site generated traffic based on a wide sample size of similar type developments.

Upon review of the TGM's land use data, mining industries are not specifically covered by either the light industrial or heavy industrial land use definitions. However, discussions with Treasury provided specific staffing, operational and production information used to establish the following trip generation rates unique to the Goliath Gold Project:

Generator	Description	Construction Stage		Operation Stage	
		Trip Count	*Frequency*	*Trip Count*	*Frequency*
EMPLOYEES	Construction Stage: - 250 employees - Day shift only for all employees - 20% of workforce assumed to carpool Operation Stage: - 200 employees - 1/3 on Day Shift, 1/3 on Night Shift, 1/3 on Time Off. - 20% of shift workforce assumed to carpool				
Employees Trips	Employee vehicle trips	440	Daily	250	Daily
Gold Transport	Removal of gold product from site	0	Daily	4	Weekly
SUPPLIES					
Office	Deliveries and supplies for the mine site office.	10	Daily	10	Daily
Warehouse	Deliveries and supplies for the mine site warehouse.	10	Weekly	10	Weekly
CHEMICALS					

Generator	Description	Construction Stage		Operation Stage	
		Trip Count	*Frequency*	*Trip Count*	*Frequency*
Ore Processing	Assumed based on similar mine TIS's	2	Daily	2	Daily
Explosives	Assumed based on similar mine TIS's	2	Daily	2	Daily
Dust Suppression	Assumed	2	Weekly	2	Weekly
Water Purification	Assumed	4	Monthly	4	Monthly
FUEL					
Back-up Generators	Assumed based on similar mine TIS's	2	Weekly	2	Weekly
Fuel Related Vehicle Trips	Assumed	4	Daily	4	Daily
WASTE					
Waste Disposal	Trips to landfill	2	Daily	4	Daily
INFRASTRUCTURE					
Maintenance	Assumed	2	Monthly	2	Monthly
Repairs	Assumed	2	Monthly	2	Monthly
Inspection	Assumed	2	Annually	6	Annually
CONSTRUCTION					
Construction Deliveries	Goliath project construction operations plan	2000	Annually	0	Annually
Construction Removals from Site	Goliath project construction operations plan	600	Annually	0	Annually
TOTALS	**Total Annual Trips**	**171326**	**per year**	**100464**	**per year**
	Total Daily Trips	**469**	**per day**	**275**	**per day**
	PEAK HOUR VOLUME (Occurs at Shift Start / End)	**200**	**per hour**	**119**	**per hour**
	AVERAGE NON-PEAK HOUR VOLUME (Safety Factor of 5)	**35**	**per hour**	**19**	**per hour**

Table 9 – Goliath Gold Project Trip Generation

The peak hour volumes for both the construction and operation stages are comprised of employee trips at the shift start and end times of 5 - 6 a.m. and 6 - 7 p.m. The non-employee related trips were used to forecast the average non-peak hour volumes which will overlap with the Highway 17 peak hour volumes during 11 a.m. - 12 p.m. and 4 p.m. - 5 p.m. The mine's staffing volume is not expected to change significantly over the duration of operations.

Accordingly, the site generated peak hour traffic volumes are forecast as follows:

	AM PHV (5 a.m. - 6 a.m.)	PM PHV (6 p.m. - 7 p.m.)	Average Non-Peak Hour Volume
Construction Phase (2015 -2016)	200	200	35
Operational Phase (2016-2026)	119	119	19

Table 10 – Site Generated Peak Hour Volumes

10.2 Trip Distribution

The site generated volumes identified in Table 10 must be distributed to the road network before the volumes can be added to the background growth volumes. Trip distribution is the analysis of the road network that vehicles will take to enter and exit the site and assigning proportionate volumes to those roads.

Typically, a new development generates two major categories of vehicles trips which are distributed differently:

1) **Primary Trips:** These are trips generated by the site where the site is the primary destination.

2) **Pass-by Trips:** These are trips generated by the site where the site is only a temporary, intermediate stop made by a vehicle on the way to a final destination.

Commercial establishments such as restaurants and shopping centers typically have a mix of these two trip types which may be distributed to the road network differently. However, in the case of the Goliath Gold Mine, the majority of trips are expected to be generated by employee traffic where the mine site is the primary destination. The site will not offer commercial or retail services and accordingly, pass-by trips of visiting vehicles is expected to be very limited by comparison. Accordingly, for the purposes of this TIS, it will be assumed that all of the site generated traffic are primary trips.

The primary access route to the mine site is Tree Nursery Road via Anderson Road via Highway 17. Accordingly, it will be assumed that all mine traffic accesses the site via Highway 17 at the Anderson Road turnoff.

Discussions with Treasury indicate that 80% of the work force and deliveries are expected to originate from Dryden and the remaining 20% from Wabigoon and further eastwards. This split is expected for both the construction and operation stages of the mine. Accordingly, the following trip distribution percentages are assumed:

Construction Stage Trip Distribution		
Peak Hour	**Split**	**Description**
Mine AM Peak Hour (5 a.m. - 6 a.m.	• 80% arrive via SB Hwy. 17 and 20% via NB Hwy. 17	Trips associated with arrival of the work crew.
Hwy. 17 AM Peak Hour (11 a.m. - 12 p.m.)	• 40% of site traffic arrive via SB Hwy. 17 and 10% via NB Hwy.17 • 40% of site traffic depart via NB Hwy. 17 and 10% via SB Hwy. 17	Trips associated with non-peak hour site traffic.
Hwy. 17 PM Peak Hour (4 p.m. - 5 p.m.)		
Mine PM Peak Hour (6 p.m. - 7 p.m.	• 80% depart via NB Hwy. 17 and 20% via SB Hwy. 17	Trips associated with departure of the work crew.
Operations Stage Trip Distribution		
Peak Hour	**Split**	**Description**
Mine AM Peak Hour (5 a.m. - 6 a.m.	• 80% of day crew arrive via SB Hwy. 17 and 20% via NB Hwy. 17 • 80% of night crew depart via NB Hwy. 17 and 20% via SB Hwy. 17	Trips associated with arrival of day crew and departure of night crew
Hwy. 17 AM Peak Hour (11 a.m. - 12 p.m.)	• 40% of site traffic arrive via SB Hwy. 17 and 10% via NB Hwy. 17 • 40% of site traffic depart via NB Hwy. 17 and 10% via SB Hwy. 17	Trips associated with non-peak hour site traffic
Hwy. 17 PM Peak Hour (4 p.m. - 5 p.m.)		
Mine PM Peak Hour (6 p.m. - 7 p.m.	• 80% of night crew arrive via SB Hwy. 17 and 20% via NB Hwy. 17 • 80% of day crew depart via NB Hwy. 17 and 20% via SB Hwy. 17	Trips associated with arrival of night crew and departure of day crew

Table 11 – Trip Distribution Assumptions

Figures 13 and 14 illustrate the site generated peak hour volumes on the road network with the above distribution percentages applied.

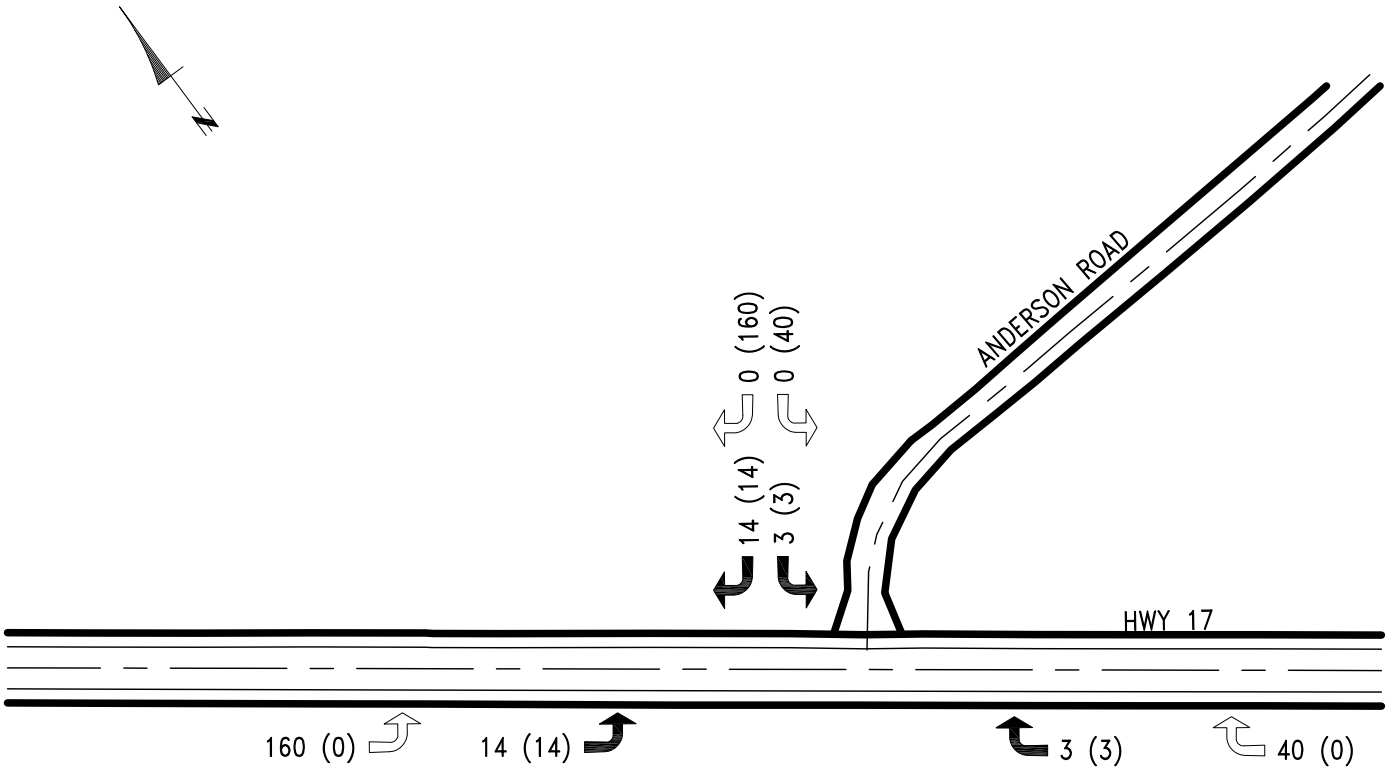


FIGURE 13 – SITE GENERATED TRAFFIC :
CONSTRUCTION (2015–2017)

LEGEND

➡	xx VPH	DURING HWY 17 AM PH (11am–12pm)
	(xx) VPH	DURING HWY 17 PM PH (4pm–5pm)
⇨	xx VPH	DURING MINE AM PH (5am–6am)
	(xx) VPH	DURING MINE PM PH (6pm–7pm)

KEEWATIN-ASKI LTD.
consulting engineers & architect
web: www.keewatin-aski.on.ca

CLIENT

PROJECT
GOLIATH GOLD PROJECT
TRAFFIC IMPACT STUDY

DRAWING TITLE
SITE GENERATED TRAFFIC :
CONSTRUCTION (2015-2017)

PROJECT NUMBER
14006

DESIGN	JC
DRAWN	AK
CHECKED	JC
SCALE	N.T.S.
DATE	MAR. 2014

DRAWING NUMBER
FIGURE 13

P:\Projects\2014\14006 Goliath Gold Project TIS\14006 Traffic Data\Traffic Impact Study Drawings V4.dwg Andreas 18/03/14 – 2:46 P

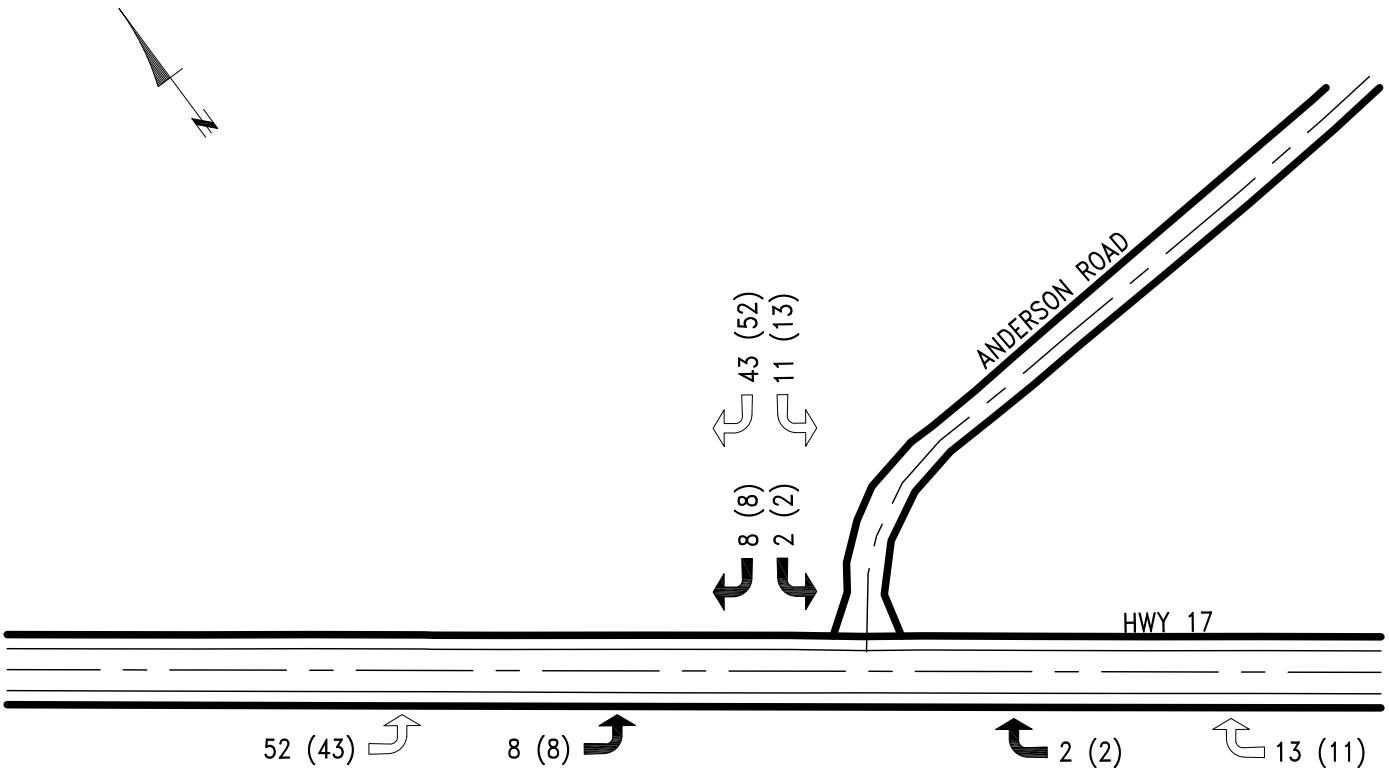


FIGURE 14 – SITE GENERATED TRAFFIC : OPERATION (2017–2027)

LEGEND

xx VPH	DURING HWY 17 AM PH (11am–12pm)
(xx) VPH	DURING HWY 17 PM PH (4pm–5pm)
xx VPH	DURING MINE AM PH (5am–6am)
(xx) VPH	DURING MINE PM PH (6pm–7pm)

KEEWATIN-ASKI LTD.
consulting engineers & architect
web: www.keewatin-aski.on.ca

CLIENT: TREASURY METALS INCORPORATED

PROJECT: GOLIATH GOLD PROJECT
TRAFFIC IMPACT STUDY

DRAWING TITLE: SITE GENERATED TRAFFIC : OPERATION(2017-2027)

PROJECT NUMBER: 14006

DESIGN	JC
DRAWN	AK
CHECKED	JC
SCALE	N.T.S.
DATE	MAR. 2014
DRAWING NUMBER	FIGURE 14

P:\Projects\2014\14006 Goliath Gold Project TIS\14006 Traffic Data\Traffic Impact Study Drawings V4.dwg Andreas 18/03/14 – 2:47 P

11 MODEL BACKGROUND + SITE GENERATED TRAFFIC CONDITIONS

The total traffic volumes for the Highway 17 / Anderson Road intersection is forecast by adding the site generated traffic for each study horizon to the corresponding background traffic for that same year.

The total traffic volumes for each study horizon during both the Highway and Mine AM and PM peak hours are illustrated in Figures 15 through 18. These figures illustrate the combined volumes of the background traffic determined in Section 9 and the site traffic determined in Section 10.

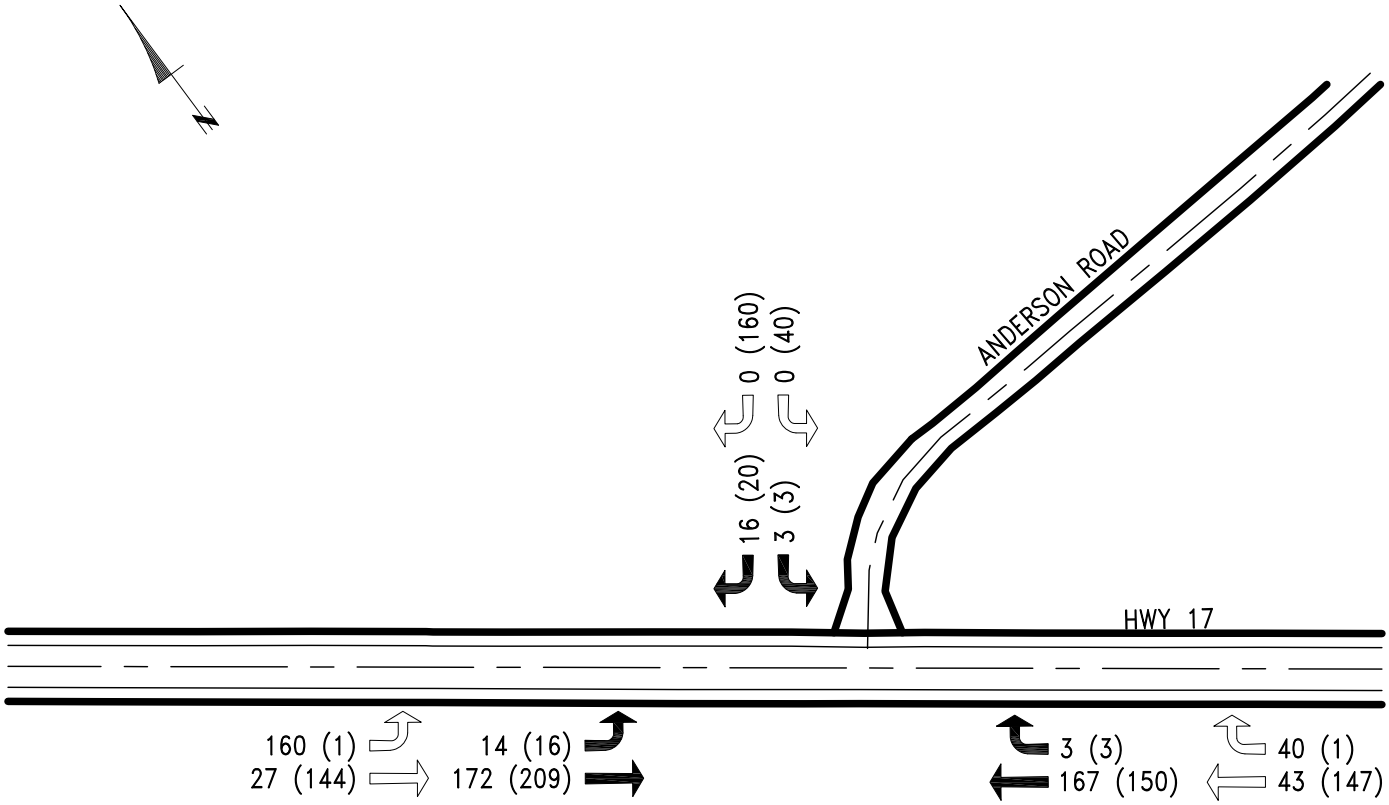


FIGURE 15 – TOTAL TRAFFIC :
START OF CONSTRUCTION (2015)

LEGEND

xx VPH	DURING HWY 17 AM PH (11am–12pm)
(xx) VPH	DURING HWY 17 PM PH (4pm–5pm)
xx VPH	DURING MINE AM PH (5am–6am)
(xx) VPH	DURING MINE PM PH (6pm–7pm)

KEEWATIN-ASKI LTD.
consulting engineers & architect
web: www.keewatin-aski.on.ca

CLIENT: TREASURY METALS INCORPORATED

PROJECT: GOLIATH GOLD PROJECT
TRAFFIC IMPACT STUDY

DRAWING TITLE: TOTAL TRAFFIC :
START OF CONSTRUCTION 2015

PROJECT NUMBER: 14006

DESIGN	JC
DRAWN	AK
CHECKED	JC
SCALE	N.T.S.
DATE	MAR. 2014

DRAWING NUMBER: FIGURE 15

P:\Projects\2014\14006 Goliath Gold Project TIS\14006 Traffic Data\FIGURES\Traffic Impact Study Drawings V5.dwg Andreas 20/03/14 - 1:57 P

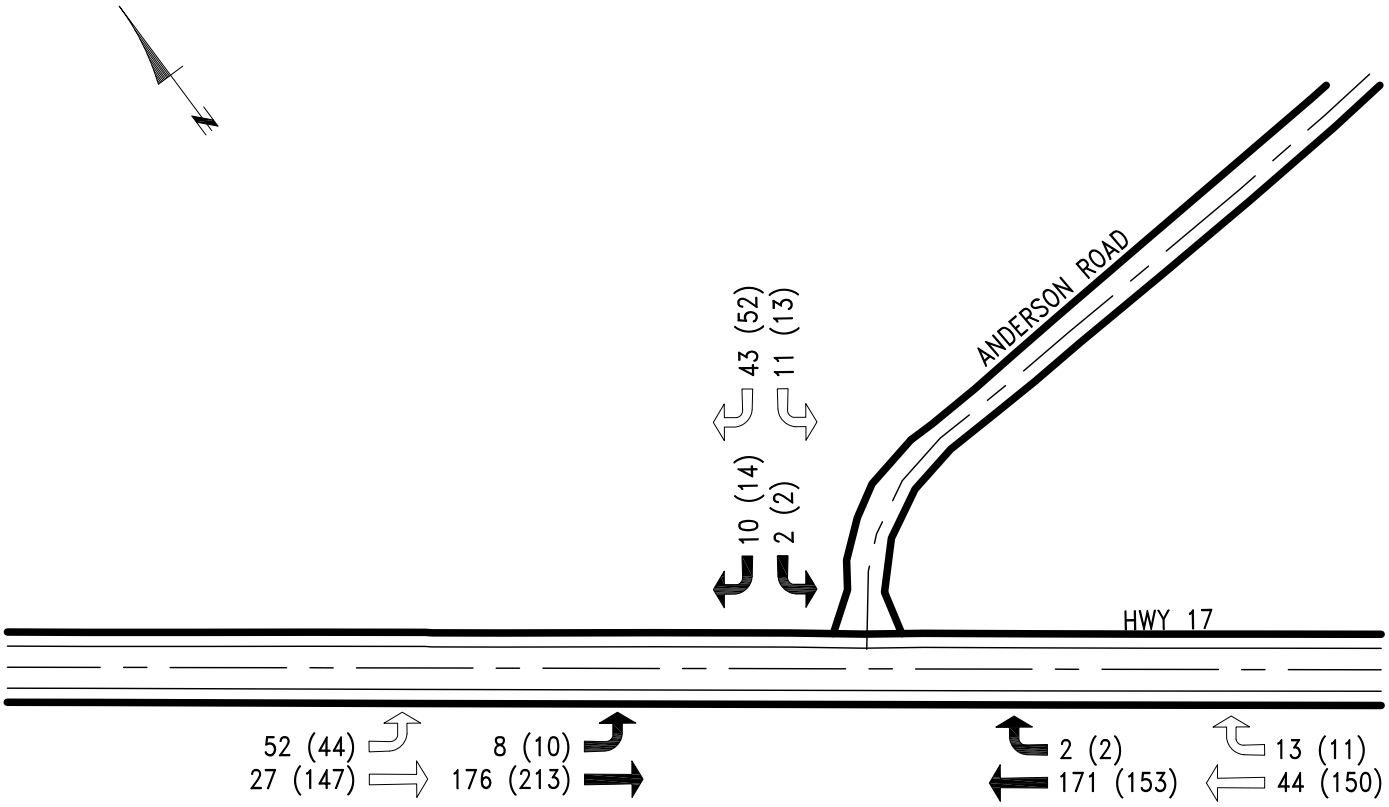


FIGURE 16 – TOTAL TRAFFIC :
START OF OPERATION (2017)

LEGEND

→	xx VPH	DURING HWY 17 AM PH (11am–12pm)
	(xx) VPH	DURING HWY 17 PM PH (4pm–5pm)
⇨	xx VPH	DURING MINE AM PH (5am–6am)
	(xx) VPH	DURING MINE PM PH (6pm–7pm)

KEEWATIN-ASKI LTD.
consulting engineers & architect
web: www.keewatin-aski.on.ca

CLIENT

PROJECT
GOLIATH GOLD PROJECT
TRAFFIC IMPACT STUDY

DRAWING TITLE
TOTAL TRAFFIC :
START OF OPERATION 2017

PROJECT NUMBER
14006

DESIGN	JC
DRAWN	AK
CHECKED	JC
SCALE	N.T.S.
DATE	MAR. 2014

DRAWING NUMBER
FIGURE 16

P:\Projects\2014\14006 Goliath Gold Project TIS\14006 Traffic Data\FIGURES\Traffic Impact Study Drawings V5.dwg Andreas 20/03/14 - 1:57 P

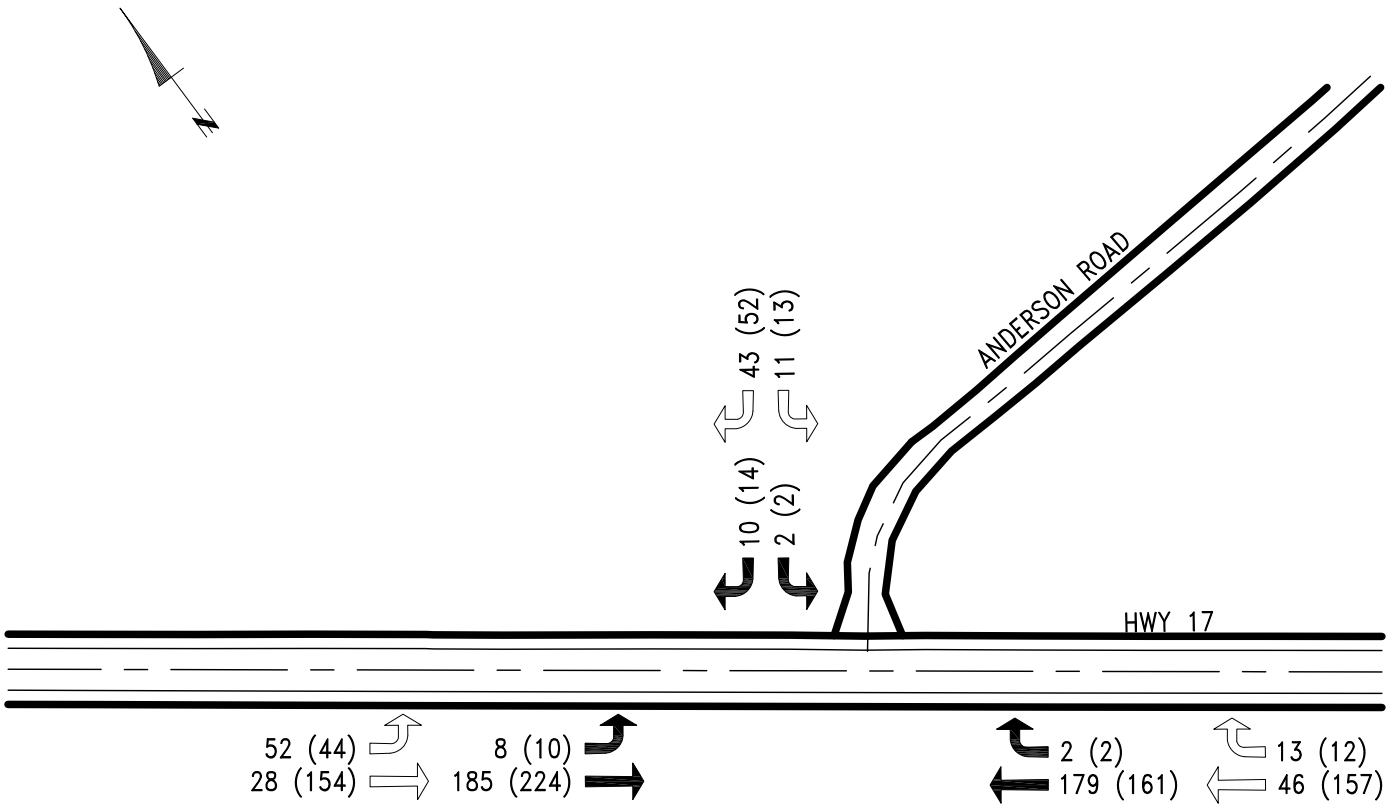


FIGURE 17 – TOTAL TRAFFIC :
5 YEAR HORIZON (2022)

LEGEND

➡	xx VPH	DURING HWY 17 AM PH (11am–12pm)
	(xx) VPH	DURING HWY 17 PM PH (4pm–5pm)
⇨	xx VPH	DURING MINE AM PH (5am–6am)
	(xx) VPH	DURING MINE PM PH (6pm–7pm)

KEEWATIN-ASKI LTD.
consulting engineers & architect
web: www.keewatin-aski.on.ca

CLIENT: TREASURY METALS INCORPORATED

PROJECT: GOLIATH GOLD PROJECT
TRAFFIC IMPACT STUDY

DRAWING TITLE: TOTAL TRAFFIC :
5 YEAR HORIZON - 2022

PROJECT NUMBER: 14006

DESIGN JC
DRAWN AK
CHECKED JC
SCALE N.T.S.
DATE MAR. 2014
DRAWING NUMBER: FIGURE 17

P:\Projects\2014\14006 Goliath Gold Project TIS\14006 Traffic Data\FIGURES\Traffic Impact Study Drawings V5.dwg Andreas 20/03/14 - 1:57 P

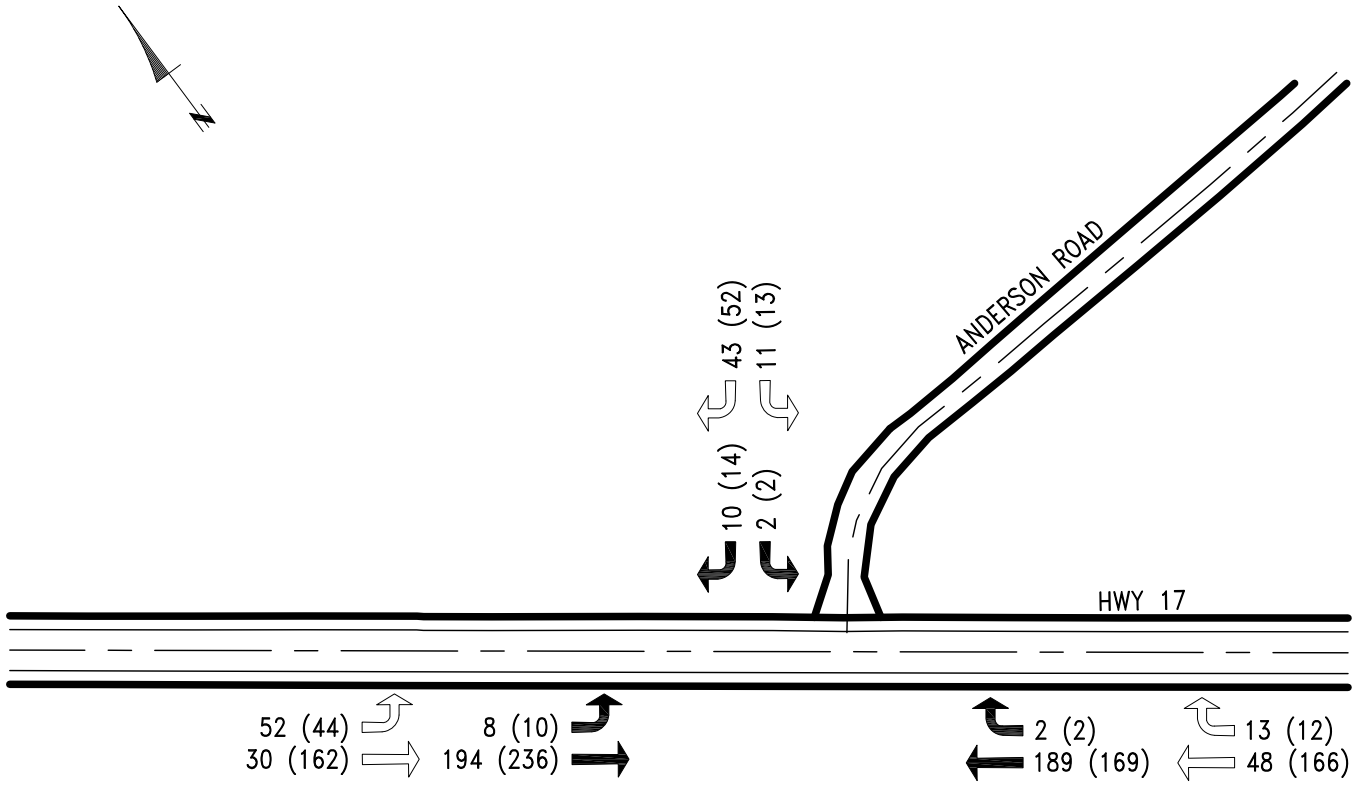


FIGURE 18 – TOTAL TRAFFIC :
10 YEAR HORIZON (2027)

LEGEND

xx VPH	DURING HWY 17 AM PH (11am–12pm)
(xx) VPH	DURING HWY 17 PM PH (4pm–5pm)
xx VPH	DURING MINE AM PH (5am–6am)
(xx) VPH	DURING MINE PM PH (6pm–7pm)

KEEWATIN-ASKI LTD.
consulting engineers & architect
web: www.keewatin-aski.on.ca

CLIENT

PROJECT
GOLIATH GOLD PROJECT
TRAFFIC IMPACT STUDY

DRAWING TITLE
TOTAL TRAFFIC :
10 YEAR HORIZON - 2027

PROJECT NUMBER
14006

DESIGN	JC
DRAWN	AK
CHECKED	JC
SCALE	N.T.S.
DATE	MAR. 2014

DRAWING NUMBER
FIGURE 18

Synchro 8 was used to evaluate the total traffic volumes for each of the study horizons illustrated in the previous figures. The LOS and V/C ratio for each movement during both the AM and PM peak hours is presented in the following tables for each horizon. The detailed Synchro 8 model output is included in Appendix 'B'.

Study Horizon	Traffic Lane	Highway 17 Peak Hours						Mine Peak Hours					
		AM PH *11 a.m. - 12 p.m.*			PM PH *4 p.m. - 5 p.m.*			AM PH *5 a.m. - 6 a.m.*			PM PH *6 p.m. - 7 p.m.*		
		LOS	V/C	Delay (s)	LOS	V/C	Delay (s)	LOS	V/C	Delay (s)	LOS	V/C	Delay (s)
Start of Construction (2015)	Hwy. 17 Northbound	A	0.11	0	A	0.10	0	A	0.05	0	A	0.09	0
	Hwy. 17 Southbound	A	0.01	0.7	A	0.01	0.7	A	0.12	6.7	A	0.00	0.1
	Anderson Road	B	0.03	10	A	0.03	9.9	A	0.00	0	B	0.26	10.8
	Overall Intersection LOS	A			A			A			A		
Start of Operations (2017)	Hwy. 17 Northbound	A	0.11	0	A	0.10	0	A	0.04	0	A	0.10	0
	Hwy. 17 Southbound	A	0.01	0.4	A	0.01	0.4	A	0.04	5	A	0.03	2
	Anderson Road	A	0.02	9.8	A	0.02	9.7	A	0.06	9	B	0.09	10
	Overall Intersection LOS	A			A			A			A		
5 Year Horizon (2022)	Hwy. 17 Northbound	A	0.12	0	A	0.10	0	A	0.04	0	A	0.11	0
	Hwy. 17 Southbound	A	0.01	0.4	A	0.01	0.4	A	0.04	4.9	A	0.03	1.9
	Anderson Road	A	0.02	9.9	A	0.02	9.8	A	0.06	9.1	B	0.09	10.1
	Overall Intersection LOS	A			A			A			A		
10 Year Horizon (2027)	Hwy. 17 Northbound	A	0.12	0	A	0.11	0	A	0.04	0	A	0.11	0
	Hwy. 17 Southbound	A	0.01	0.4	A	0.01	0.4	A	0.04	4.8	A	0.03	1.9
	Anderson Road	A	0.02	10	A	0.02	A	A	0.06	9.1	B	0.09	10.2
	Overall Intersection LOS	A			A			A			A		

Table 12 – LOS for Total Traffic Volumes: All Horizons

11.1 Evaluation of Impacts

The results of the model analysis for total traffic conditions indicate the following:

- All Highway 17 traffic lanes maintain a LOS of ‘A’ during all horizons
- Anderson Road maintains a LOS of 'B' or better during all horizons.
- Overall intersection LOS of 'A' during all horizons.
- All V/C ratios are operating well below capacity
- On Highway 17, control delay is negligible and is well within LOS 'A' tolerances. On Anderson Road, control delay is well within LOS 'B' tolerances.

Accordingly, no geometric improvements or signalization is required to mitigate impacts from total traffic volumes during any of the study horizons.

12 SIGHT DISTANCES

The following sight distances were evaluated for this intersection:

1) **Approach Sight Distance**. Vehicles on Highway 17 must be provided with sufficient sight distance to the intersection in case a vehicle on Anderson Road violates the stop sign. This is established by minimum sight triangles.

2) **Turning Movement Sight Distance.** Vehicles stopped at Anderson Road waiting to merge with Highway 17 must have sufficient sight distance to approaching vehicles in order to turn and assume highway operating speed before being overtaken.

12.1 Approach Sight Distance

The MTO's *Geometric Design Manual* (GDM) provides the calculation methodology for determining sight triangles for stop control intersections. The sight triangle is defined by the line of sight from a vehicle on the side road to the vehicle approaching on the highway, and is a function of highway speed, number/width of lanes and right-of-way width. The area within these minimum sight triangles must be free of visual obstructions. The GDM's Table E3-3, shown below, identifies the minimum required sight triangle legs given Highway 17's design speed of 110 km/hr and right-of-way width of 32 m on the north side of Highway 17.

Design speed on Highway	Approach Distance 'a' based on 3 s	Visibility Triangle: X & Y											
		Highway Right of Way (m)											
		20		26		30		35		40		45	
km/h	m	X	Y	X	Y	X	Y	X	Y	X	Y	X	Y
40	30	8	7	5	4	2	2	-	-	-	-	-	-
50	40	15	10	10	7	7	5	3	2	-	-	-	-
60	50	22	11	16	8	12	6	7	4	2	1	-	-
70	60	29	12	22	9	17	7	11	5	5	2	-	-
80	65	32	12	24	9	19	7	13	5	6	2	-	-
90	75	39	14	30	10	24	8	17	6	9	3	2	1
100	85	46	14	36	10	29	8	20	6	12	3	3	1
110	95	53	14	41	11	34	9	24	6	15	4	5	1

Figure 19 – GDM Table E3-3: Minimum Property Requirements at 90° Intersections for Approaches with Stop Control

Figure 20 illustrates the minimum required sight triangles defined by the parameters provided in GDM Table E3-3. Any objects within these triangles that obstruct line of sight are to be removed. A visual obstruction is defined as an object that appears in the cone of vision of the side road driver's eye height (1.05 m) to the top of the approaching vehicle on the main road (1.3 m height).

Figure 20 – Highway 17 & Anderson Road Sight Triangles

The approach distances of 100 m and 116 m indicated in the figure above are the minimum distances required by highway traffic to perform an avoidance maneuver should a vehicle on Anderson Road violate the stop sign.

Review of aerial photography at the intersection indicates that there may be some tree clearing and bank height adjustment within the identified sight triangles. It is a recommendation of this report that the Proponent remove any shrubbery, trees or soil mounds that exist within the sight triangles between a height of 1.05m (car on side road) and 1.3 m (car on Highway 17) and cause a visual obstruction of oncoming traffic.

12.2 Turning Movement Sight Distance

Vehicles stopped at Anderson Road waiting to merge with Highway 17 must have sufficient sight distance to approaching vehicles in order to turn and assume highway operating speed before being overtaken by an approaching vehicle traveling in the same direction. The GDM's Figure E3-6, shown below, identifies this minimum required sight distance to be 330 m, based on Highway 17's design speed of 110 km/hr.

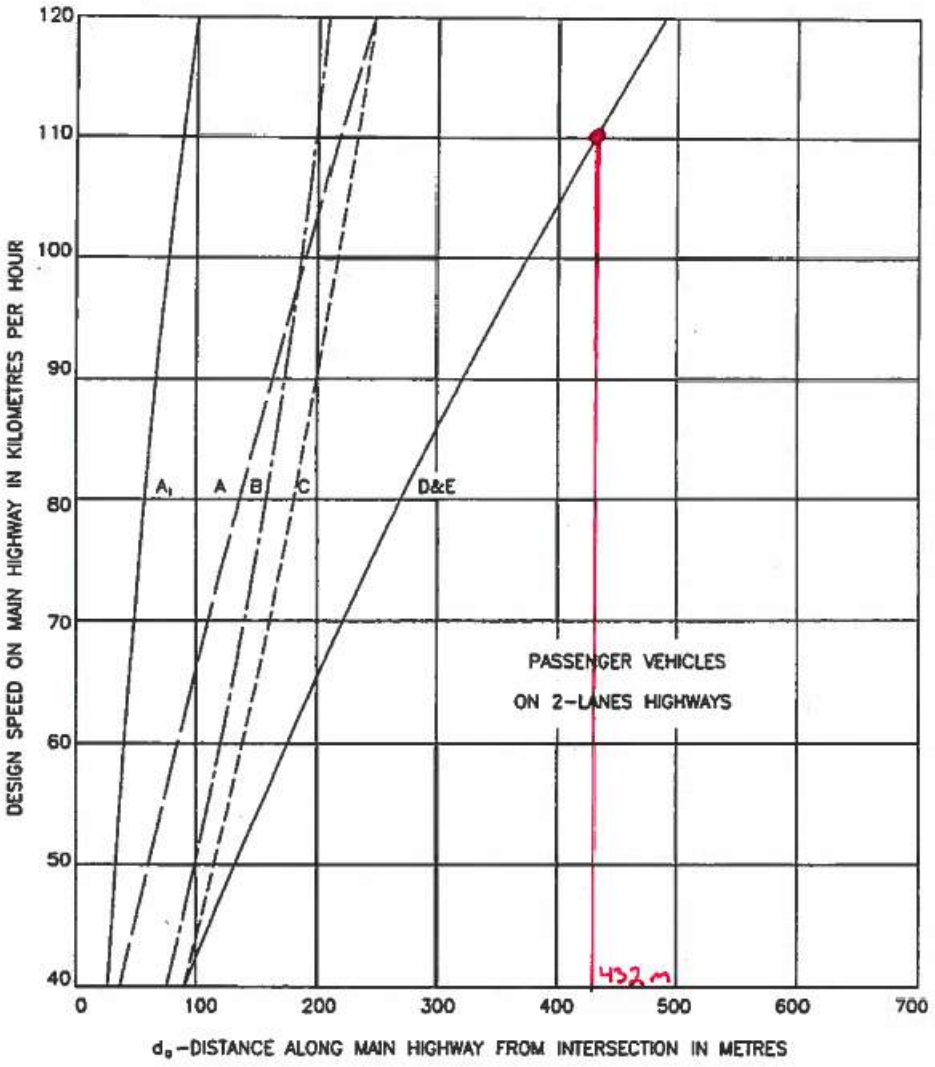


Figure 21 – GDM Figure E3-6: Sight Distance Requirements for Stopping, Crossing and Turning Movements

A comparison of the actual approach sight distance and minimum required turning sight distance is provided in the table below.

Anderson Road Turning Movement	Actual Approach Sight Distance on Highway 17	Minimum Required Sight Distance
Right Turn on Highway 17 (Northbound)	900 m	432 m
Left Turn on Highway 17 (Southbound)	490 m	432 m

Table 13 – Turning Movement Sight Distance

As illustrated in Table 13, the actual provided sight distance for vehicles stopped at Anderson Road to approaching vehicles on Highway 17 exceeds the minimum required sight distance.

13 ENTRANCE DESIGN

The Anderson Road entrance from Highway 17 was evaluated to determine the following:

1) To determine if the present layout promotes traffic safety given the anticipated increase in traffic volumes which will use the entrance.

2) To determine if the entrance geometric characteristics are in accordance GDM requirements for a truck access entrance.

13.1 Entrance Layout

The intersection of Anderson Road and Highway 17 is an unsignalized 'T' intersection with stop sign control on Anderson Road. The intersection also forms part of a truck turnaround which provides two access points to Highway 17. Existing signage on the turnaround identifies that it is used as a snow plough turnaround. Figure 22 illustrates the existing intersection layout.

GOLIATH GOLD PROJECT DRYDEN, ONTARIO, CANADA	SCALE: 1 500	N 0 25 50 Meters
	TREASURY METALS INC.	
EXISTING ANDERSON ROAD ENTRANCE LAYOUT	*DESIGN: AT 06 FEB. 2014* *GIS: AT 14 APR. 2014* *CHECK: MP 14 APR. 2014* *REVIEW: MP 14 APR. 2014*	***REFERENCE*** *Projection: NAD83 UTM Zone 15N* *GIS: Treasury Metals Inc.*
FIGURE: 22 REV.00		

TREASURY METALS INCORPORATED

TREASURY METALS
INCORPORATED

At present, the low traffic volumes using Anderson Road have a choice of which entrance to use depending on which direction the vehicle is approaching on Highway 17. However, once mine construction begins, the volume of traffic on Anderson Road will increase significantly. It is not desirable from a traffic safety standpoint to have two stop sign controlled access points to the same road within 70m of each other. Accordingly, it is the recommendation of this TIS to close Access Point #2 to general highway traffic.

Regarding a turnaround for snow ploughs at this intersection, three options are possible:

- **Option 1** - Close Access Point #2 and create a snow plough turnaround area immediately off of Access Point #1. This would be a cul-de-sac type turnaround with a radius of at least 15m to satisfy the GDM's minimum turning radius for the Single Unit Truck Design Type vehicle (Table E5-3 in the GDM).
- **Option 2** - Break the loop between Access Point #1 and #2. Access Point #2 would function as a snow plough turnaround only, without allowing access to Anderson Road.
- **Option 3** - Close Access Point #2 and operate without a snow plough turnaround.

Whichever option is selected for the snow plough turn around, this TIS recommends that Access Point #2 is closed to highway traffic prior to the start of mine construction.

13.2 Entrance Geometry

Once mine construction and operations begin, there will be an increase in heavy truck traffic that uses the Anderson Road turnoff. Accordingly, it is necessary to provide adequate entrance geometry to provide a safe access point that can accommodate heavy trucks turning off or merging with Highway 17. According to the MTO's *Commercial Site Access Policy & Standard Designs Manual* (CSAS), detail CSAS-23 is provided which specifies the geometric parameters for a side road intersecting with a main road which can accommodate service trucks and buses. Detail CSAS-23 is illustrated below and is also included in Appendix 'C' of this TIS.

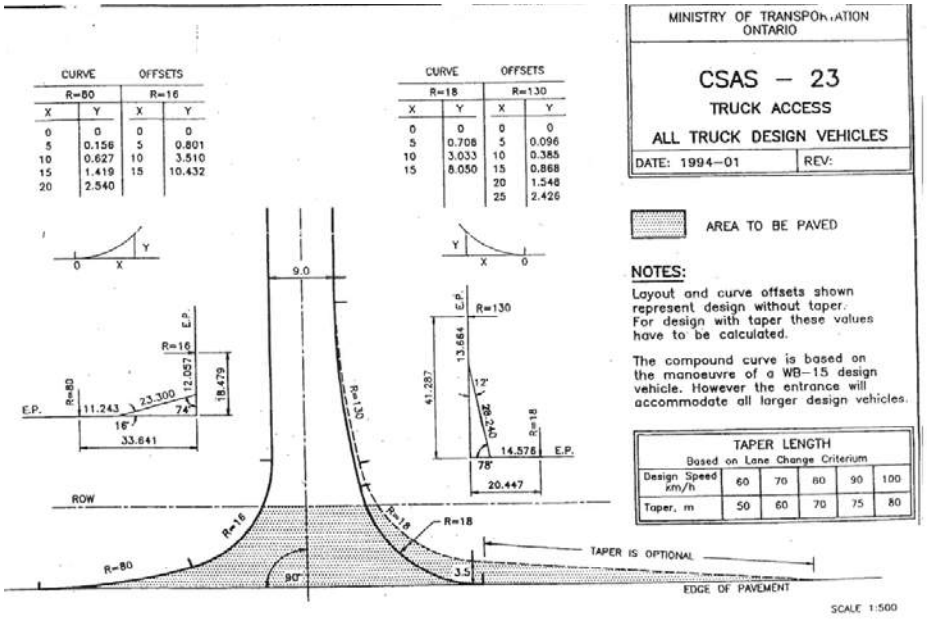


Figure 23 – MTO CSAS-23 Truck Access

Detail CSAS-23 is capable of accommodating WB-15[3] design vehicles and larger. This is the maximum vehicle size anticipated which would be associated with mine construction and operations.

It is the recommendation of this TIS that Access Point #1 meet the CSAS-23 standard. This will require a survey in snow free conditions to verify if the existing entrance geometry meets this standard. If the entrance does not meet this standard, then it should be upgraded accordingly.

[3] Per Table E5-1 of the GDM a WB-15 vehicle is a tractor-semitrailer combination vehicle with a wheel base of 15.2m.

13.3 Entrance Signage

The following existing signage is presently in place at the Highway 17 / Anderson Road intersection:

Sign	Location	Photo
Ra-101 Stop Sign	Stop sign control on Anderson Road	
WA-8B T-Intersection Checkerboard Sign	South side of Highway 17, directly facing traffic stopped at Anderson Road.	
WA-13R Concealed Road Sign	Located on north side of Highway 17 approximately 55 m south of the intersection. Faces northbound traffic.	
G.r-106 Roadway Identification Sign for Anderson Road	Located on north side of Highway 17 approximately 95 m south of the intersection. Faces northbound traffic.	
G.r-106 Roadway Identification Sign for Anderson Road	Located on south side of Highway 17 approximately 100 m north of the intersection. Faces southbound traffic.	

Table 14 – Existing Intersection Signage

Based on the results of the Synchro 8 model analysis, dedicated turn lanes or traffic signals are not required to maintain an acceptable LOS of 'A' on Highway 17 during all study horizons. Accordingly, the existing signage that is in place will remain applicable for the stop sign control intersection; additional regulatory signage is not anticipated unless requested by the MTO.

14 ILLUMINATION

Illumination requirements for a highway as a result of a proposed development are assessed in accordance with MTO Directive PLNG-B-05.

Directive PLNG-B-05 provides warrant criteria for partial illumination of an intersection on a non-freeway highway (Form 3). The warrant criteria considers various traffic and geometry factors which are scored using the MTO's rating system. If the sum total of the category scores is 62 points or higher, then partial illumination is warranted. The following intersection criteria were evaluated and scored according to the Directive PLNG-B-05:

GEOMETRIC CONSIDERATIONS ***Points Accrued:*** ***43.2 (out of 53.5 possible)***	•Number of Legs •Approach Lane Width •Turn Lanes •Approach Sight Distance •Curvature & Grades on Approach Streets •Parking in Vicinity of Intersection
OPERATIONAL FACTORS ***Points Accrued:*** ***11 (out of 19 possible)***	• Operating Speed on Approach Legs • Type of Control • Level of Service (any dark hour) • Total Pedestrian Volume
ENVIRONMENTAL FACTORS ***Points Accrued:*** ***2.4 (out of 12 possible)***	• Adjacent Development • Type of Development Near Intersection • Illumination Adjacent to Intersection
ACCIDENTS ***Points Accrued:*** ***8 (out of 40 possible)***	• % of Nights-to-Total Accidents (3 yr. avgerage)

Figure 24 – MTO Form 3 Evaluation Criteria for Partial Illumination

The MTO Form 3 illumination scorecard taken from PLNG-B-05 is included in Appendix 'D'. The sum total of points scored for the Highway 17 / Anderson Road intersection is 64.6 points. Since this exceeds the minimum warrant score of 62 points, partial illumination is warranted for the intersection.

Aside from Form 3, good engineering judgment suggests that illumination should be provided for the intersection, since the mine's peak traffic hours are anticipated to occur during low light hours (5 - 6 am and 6 - 7 pm).

Directive PLNG-B-05 stipulates that a minimum of two luminaires is required for partial illumination of an intersection where warranted. The luminaires used must conform to the MTO Luminaire Photometric List and the lighting pole design / setback distances must conform with MTO standards. It is recommended that Treasury seek a detailed design for the illumination layout and intensity and submit the design to the MTO for review and approval. The suggested locations for partial illumination lighting is illustrated in Figure 25. These locations were selected based on the partial illumination layout presented in Figure 1 of Directive PLNG-B-05.

GOLIATH GOLD PROJECT DRYDEN, ONTARIO, CANADA	SCALE: 1 500	N 0 25 50 Meters
	TREASURY METALS INC.	
SUGGESTED LOCATIONS FOR PARTIAL ILLUMINATION	*DESIGN: AT 06 FEB. 2014* *GIS: AT 14 APR. 2014* *CHECK: MP 14 APR. 2014* *REVIEW: MP 14 APR. 2014*	***REFERENCE*** *Projection: NAD83 UTM Zone 15N* *GIS: Treasury Metals Inc.*
FIGURE: 25 REV.00		TREASURY METALS INCORPORATED

15 CONCLUSIONS & RECOMMENDATIONS

This study has evaluated the impacts that the Goliath Gold Project is forecast to have on traffic volumes and highway function at the intersection of Highway 17 and Anderson Road. The primary conclusions and recommendations of this study are as follows:

Conclusions

1) **Highway 17 Peak Hours:** Based on MTO traffic data collected in 2013, the AM and PM peak hours for Highway 17 were determined to be 11 a.m. - 12 p.m. and 4 p.m. - 5 p.m. respectively.

2) **Site Peak Hours:** Based on Treasury's anticipated staffing and operation plan, the anticipated AM and PM peak hours for the mine during both construction and operation stages are 5 a.m. - 6 a.m. and 6 p.m. - 7 p.m. respectively.

3) **Turning Movement Count:** Based on the results of KAL's turning movement count conducted on February 19, 2014, the existing turning volumes at the intersection are very low (only 9 turning movements during the busiest hour)

4) **Model Existing Conditions**: The intersection LOS was evaluated using Synchro 8 modeling software for the present year (2014) during the Highway 17 AM and PM peak hours. The results of the model analysis indicate the following:

    - All traffic lanes maintain a LOS of ‘A’
    - All V/C ratios are operating well below capacity
    - Control delay is negligible and within LOS 'A' tolerances for all approaches.
    - No geometric improvements or signalization is required to mitigate impacts from existing traffic volumes.

5) **Model Background Conditions:** The intersection LOS for background traffic volumes was modeled with Synchro 8 for 2015 (Start of Construction), 2017 (Start of Operation), 2020 (5 Year Horizon) and 2027 (10 Year Horizon). A 1% yearly growth factor was applied to the existing base volumes. Both the Highway 17 and mine peak hours were modeled for each study year. The results of the model analysis indicate the following:

    - All traffic lanes maintain a LOS of ‘A’
    - All V/C ratios are operating well below capacity

- Control delay is negligible and within LOS 'A' tolerances for all approaches.
- No geometric improvements or signalization is required to mitigate impacts from background traffic volumes during any of the study horizons.

6) **Model Background + Site Generated Traffic Conditions:** Site generated traffic volumes were estimated based on Treasury's staffing, operational and production data for the Goliath Gold Project. The intersection LOS for background + site generated traffic volumes was then modeled with Synchro 8 for 2015 (Start of Construction), 2017 (Start of Operation), 2020 (5 Year Horizon) and 2027 (10 Year Horizon). Both the Highway 17 and mine peak hours were modeled for each study year. The results of the analysis indicate the following:

   - All Highway 17 traffic lanes maintain a LOS of ‘A’ during all horizons
   - Anderson Road maintains a LOS of 'B' or better during all horizons.
   - Overall intersection LOS of 'A' during all horizons.
   - All V/C ratios are operating well below capacity
   - On Highway 17, control delay is negligible and is well within LOS 'A' tolerances. On Anderson Road, control delay is well within LOS 'B' tolerances.

7) **Sight Distances:** The Approach Sight Distance and Turning Movement Sight Distance were evaluated for the intersection with the following findings:

   - Regarding Approach Sight Distance, sight triangles for the intersection were established. Review of aerial photography at the intersection indicates that there may be some tree clearing and bank height adjustment within the identified sight triangles. It is a recommendation of this study that the Proponent remove any shrubbery, trees or soil mounds that fall within the sight triangles and cause a visual obstruction of oncoming traffic.
   - Regarding Turning Movement Sight Distance, the actual provided sight distance for vehicles stopped at Anderson Road to approaching vehicles on Highway 17 exceeds the minimum required sight distance.

8) **Entrance Design:** The existing Anderson Road 'T' intersection with Highway 17 was evaluated with the following findings:

- At present, the Anderson Road intersection forms part of a snow plough turnaround which provides two access points to Highway 17. Once mine construction and operation commences, it is not recommended from a traffic safety standpoint to have two access points within 70m of each other. The north access point should be closed to highway traffic prior to the start of mine construction.
- Once mine construction and operations begin, there will be an increase in heavy truck traffic that uses the Anderson Road turnoff. Accordingly, it is necessary to provide adequate entrance geometry to safely accommodate heavy trucks turning off or merging with Highway 17. Accordingly, the existing geometry of the Anderson Road entrance should be surveyed in snow free conditions to determine if it meets the requirements of the MTO's CSAS-23 entrance standard. If the entrance does not meet this standard, then it should be upgraded accordingly. The MTO's CSAS-23 entrance standard is capable of accommodating WB-15 design vehicles and larger (tractor-semitrailer combination).

9) **Entrance Signage:** The existing intersection signage was inventoried and evaluated. Based on the results of the Synchro 8 model analysis, dedicated turn lanes or traffic signals are not required to maintain an acceptable LOS of 'A' on Highway 17 during all study horizons. Accordingly, the existing signage that is in place will remain applicable for the stop sign control intersection. Additional regulatory signage is not anticipated unless requested by the MTO.

10) **Illumination:** Illumination requirements for the intersection were assessed in accordance with MTO Directive PLNG-B-05 which provides warrant criteria based on various traffic and geometry factors. Based on the warrant analysis, partial illumination is warranted for the intersection. Accordingly, a minimum of two luminaries are required for partial illumination in accordance with Directive PLNG-B-05. The luminaries, pole design, locations and setback distances must conform with MTO standards.

Recommended Intersection Improvements

1) Clearing of any shrubbery, trees, soil mounds, etc. that fall within the sight triangles identified in Section 12.1 which cause a visual obstruction between vehicles on Anderson Road and Highway 17.

2) Anderson Road presently has two access points as part of a snow plough turn around. Implement one of the following options:

   - **Option 1** - Close the north access point and create a snow plough turnaround area immediately off of the south access point.
   - **Option 2** - Break the loop between south and north access points. The north access point would function as a snow plough turnaround only, without allowing access to Anderson Road.
   - **Option 3** - Close the north access point and operate without a snow plough turnaround.

3) Upgrade the Anderson Road entrance to the MTO's CSAS-23 standard (if verified deficient).

4) Provide two luminaries for partial illumination of the intersection in accordance with PLNG-B-05. Provide detailed illumination design to the MTO for review and approval prior to installation.

In conclusion, it is forecast that the intersection will continue to perform at a LOS 'A' during mine construction and operation without the need for turning lanes or traffic signals. The recommended improvements will increase sight distances, illumination and turning radii; improving the overall level of safety at the intersection once mine operations begin.

We trust the foregoing report satisfies Treasury's requirements for forecasting the impact that the new Goliath Gold Project will have on the performance of the Highway 17 / Anderson Road intersection.

Should you require additional information pertaining to this report, please do not hesitate to call.

KEEWATIN-ASKI LTD.

consulting engineers & architect

<Original signed by>

Joe Cospito, P.Eng.

APPENDIX A

MTO HIGHWAY 17 TRAFFIC COUNT DATA

KEEWATIN-ASKI LTD.
consulting engineers & architect

Ministry of Transportation
Engineering Office

Traffic Section
Northwestern Region
615 South James Street
Thunder Bay, Ontario
P7E 6P6
PH: 807-473-2138
FAX: 807-473-2168

Ministère des Transports

Bureau de genie

Section de la circulation routière
615 rue James
3ième étage
Thunder Bay (Ontario) P7E 6P6
Tél: (807) 473-2061
Télé: (807) 473-2168

January 29, 2014

Mr. Joe Cospito
Keewatin-Aski Ltd.
Box 510
61 Queen Street
Sioux Lookout, Ontario
P8T 1A8

Re: Traffic Information Request
Hwy 17, Near Anderson Lake Rd

This is further to your request of January 28, 2014, enclosed are unofficial 2013 (spring, summer, fall) traffic data on Highway 17, 3.2 km W of Hwy 72 (approximately 8 km E of Anderson Lake Rd)

If you require clarification, pls contact me at your convenience.

Yours truly,

<Original signed by>

Nancy Chu-McKercher
Traffic Supervisor

attach

Traffic Engineering Software

Weekly Volume Summary

Wed, Jan 29, 2014

Location: 3.2 KM W OF HWY 72

LHRS/Offset: 22030 / 0.0 **Region:** Northwest

Pattern Type: Low Tourist **PCS#:** 49 **Hwy. TVIS#:** 17730

Count Direction: NB/SB **Report Dates:** Mar 21, 2013 **to** Mar 27, 2013

Hour Interval	Thu 13/03/21	Fri 22	Sat 23	Sun 24	Mon 25	Tue 26	Wed 27	Thu 28
0:00- 1:00		45	60	54	43	33	58	38
1:00- 2:00		37	56	41	24	34	44	35
2:00- 3:00		35	49	45	29	33	51	55
3:00- 4:00		29	49	39	25	29	56	39
4:00- 5:00		32	57	38	38	23	40	38
5:00- 6:00		45	57	55	38	43	66	49
6:00- 7:00		82	64	63	84	71	96	87
7:00- 8:00		106	84	102	112	119	132	142
8:00- 9:00		169	167	115	136	124	185	174
9:00-10:00		167	169	163	142	148	195	188
10:00-11:00		194	197	197	175	163	201	197
11:00-12:00		206	228	221	170	169	192	215
AM Total	0	1,147	1,237	1,133	1,016	989	1,316	1,257
12:00-13:00	242	217	213	223	182	196	187	
13:00-14:00	252	192	231	245	161	178	175	
14:00-15:00	285	217	220	261	173	192	207	
15:00-16:00	271	208	236	247	201	208	227	
16:00-17:00	197	198	243	224	179	210	239	
17:00-18:00	214	247	232	205	179	235	219	
18:00-19:00	161	201	183	175	141	199	200	
19:00-20:00	137	162	142	144	90	133	127	
20:00-21:00	109	124	156	86	80	127	140	
21:00-22:00	99	111	109	87	51	113	103	
22:00-23:00	78	83	99	52	66	110	83	
23:00-24:00	52	80	104	47	30	73	59	
PM Total	2,097	2,040	2,168	1,996	1,533	1,974	1,966	0
24 Hr. Total	2,097	3,187	3,405	3,129	2,549	2,963	3,282	1,257
Noon - Noon		3,244	3,277	3,301	3,012	2,522	3,290	3,223

ADT	AWD	AADT	AAWD	SADT	SAWDT	WADT	DHV
3,124	3,070	3,686	3,653	4,940	4,822	2,728	468

Traffic Engineering Software

Weekly Volume Summary

Wed, Jan 29, 2014

Location: 3.2 KM W OF HWY 72

LHRS/Offset: 22030 / 0.0 **Region:** Northwest

Pattern Type: Low Tourist **PCS#:** 49 **Hwy. TVIS#:** 17730

Count Direction: NB **Report Dates:** Mar 21, 2013 **to** Mar 27, 2013

Hour Interval	Thu 13/03/21	Fri 22	Sat 23	Sun 24	Mon 25	Tue 26	Wed 27	Thu 28
0:00- 1:00		17	39	22	28	21	26	22
1:00- 2:00		17	38	11	16	27	23	20
2:00- 3:00		18	28	13	14	21	27	27
3:00- 4:00		18	34	20	18	18	31	20
4:00- 5:00		19	39	24	22	15	17	22
5:00- 6:00		28	40	28	30	26	41	32
6:00- 7:00		51	45	28	53	46	65	58
7:00- 8:00		62	49	44	65	68	79	86
8:00- 9:00		74	76	47	62	72	79	99
9:00-10:00		76	70	60	62	69	92	81
10:00-11:00		74	84	80	71	65	83	82
11:00-12:00		66	91	81	80	86	88	110
AM Total	0	520	633	458	521	534	651	659
12:00-13:00	101	77	101	87	76	89	88	
13:00-14:00	109	88	111	106	74	78	90	
14:00-15:00	132	92	113	111	96	92	97	
15:00-16:00	122	91	120	138	84	102	107	
16:00-17:00	87	73	126	122	83	96	117	
17:00-18:00	81	104	100	109	84	111	89	
18:00-19:00	65	84	88	95	83	83	82	
19:00-20:00	58	79	70	52	46	60	52	
20:00-21:00	38	51	70	35	46	61	73	
21:00-22:00	48	59	39	39	28	51	57	
22:00-23:00	36	46	43	15	26	41	50	
23:00-24:00	28	52	53	22	17	36	30	
PM Total	905	896	1,034	931	743	900	932	0
24 Hr. Total	905	1,416	1,667	1,389	1,264	1,434	1,583	659
Noon - Noon		1,425	1,529	1,492	1,452	1,277	1,551	1,591

Traffic Engineering Software

Weekly Volume Summary

Wed, Jan 29, 2014

Location: 3.2 KM W OF HWY 72

LHRS/Offset: 22030 / 0.0 **Region:** Northwest

Pattern Type: Low Tourist **PCS#:** 49 **Hwy. TVIS#:** 17730

Count Direction: SB **Report Dates:** Mar 21, 2013 to Mar 27, 2013

Hour Interval	Thu 13/03/21	Fri 22	Sat 23	Sun 24	Mon 25	Tue 26	Wed 27	Thu 28
0:00- 1:00		28	21	32	15	12	32	16
1:00- 2:00		20	18	30	8	7	21	15
2:00- 3:00		17	21	32	15	12	24	28
3:00- 4:00		11	15	19	7	11	25	19
4:00- 5:00		13	18	14	16	8	23	16
5:00- 6:00		17	17	27	8	17	25	17
6:00- 7:00		31	19	35	31	25	31	29
7:00- 8:00		44	35	58	47	51	53	56
8:00- 9:00		95	91	68	74	52	106	75
9:00-10:00		91	99	103	80	79	103	107
10:00-11:00		120	113	117	104	98	118	115
11:00-12:00		140	137	140	90	83	104	105
AM Total	0	627	604	675	495	455	665	598
12:00-13:00	141	140	112	136	106	107	99	
13:00-14:00	143	104	120	139	87	100	85	
14:00-15:00	153	125	107	150	77	100	110	
15:00-16:00	149	117	116	109	117	106	120	
16:00-17:00	110	125	117	102	96	114	122	
17:00-18:00	133	143	132	96	95	124	130	
18:00-19:00	96	117	95	80	58	116	118	
19:00-20:00	79	83	72	92	44	73	75	
20:00-21:00	71	73	86	51	34	66	67	
21:00-22:00	51	52	70	48	23	62	46	
22:00-23:00	42	37	56	37	40	69	33	
23:00-24:00	24	28	51	25	13	37	29	
PM Total	1,192	1,144	1,134	1,065	790	1,074	1,034	0
24 Hr. Total	1,192	1,771	1,738	1,740	1,285	1,529	1,699	598
Noon - Noon	1,819		1,748	1,809	1,560	1,245	1,739	1,632

Traffic Engineering Software

Weekly Volume Summary

Wed, Jan 29, 2014

Location: 3.2 KM W OF HWY 72

LHRS/Offset: 22030 / 0.0 **Region:** Northwest

Pattern Type: Low Tourist **PCS#:** 49 **Hwy. TVIS#:** 17730

Count Direction: NB/SB **Report Dates:** Jul 15, 2013 to Jul 21, 2013

Hour Interval	Mon 13/07/15	Tue 16	Wed 17	Thu 18	Fri 19	Sat 20	Sun 21	Mon 22
0:00- 1:00		38	62	69	59	57	46	37
1:00- 2:00		32	52	59	38	51	60	24
2:00- 3:00		35	62	39	46	48	37	17
3:00- 4:00		22	39	59	40	38	41	24
4:00- 5:00		26	53	38	43	61	33	45
5:00- 6:00		57	67	73	68	56	54	56
6:00- 7:00		106	124	134	113	108	83	82
7:00- 8:00		159	197	186	168	167	102	154
8:00- 9:00		210	233	229	186	245	166	186
9:00-10:00		212	247	252	281	276	234	252
10:00-11:00		268	267	289	321	285	281	281
11:00-12:00		244	301	293	333	316	320	298
AM Total	0	1,409	1,704	1,720	1,696	1,708	1,457	1,456
12:00-13:00	326	260	306	328	327	292	337	
13:00-14:00	301	290	268	300	351	291	314	
14:00-15:00	286	277	288	327	320	279	319	
15:00-16:00	321	251	280	296	334	343	325	
16:00-17:00	274	242	290	310	352	274	304	
17:00-18:00	252	280	307	305	348	252	262	
18:00-19:00	201	229	252	254	285	234	248	
19:00-20:00	156	159	216	174	203	184	206	
20:00-21:00	136	159	139	146	209	174	156	
21:00-22:00	98	129	126	141	158	139	117	
22:00-23:00	86	96	97	81	123	123	122	
23:00-24:00	46	65	84	84	90	99	51	
PM Total	2,483	2,437	2,653	2,746	3,100	2,684	2,761	0
24 Hr. Total	2,483	3,846	4,357	4,466	4,796	4,392	4,218	1,456
Noon - Noon		3,892	4,141	4,373	4,442	4,808	4,141	4,217

ADT	AWD	AADT	AAWD	SADT	SAWDT	WADT	DHV
4,288	4,212	2,975	3,010	3,987	3,973	2,201	378

Traffic Engineering Software

Weekly Volume Summary

Wed, Jan 29, 2014

Location: 3.2 KM W OF HWY 72

LHRS/Offset: 22030 / 0.0 **Region:** Northwest

Pattern Type: Low Tourist **PCS#:** 49 **Hwy. TVIS#:** 17730

Count Direction: NB **Report Dates:** Jul 15, 2013 **to** Jul 21, 2013

Hour Interval	Mon 13/07/15	Tue 16	Wed 17	Thu 18	Fri 19	Sat 20	Sun 21	Mon 22
0:00- 1:00		24	24	27	18	24	16	19
1:00- 2:00		20	25	26	16	23	16	13
2:00- 3:00		30	29	17	30	25	14	6
3:00- 4:00		17	22	37	21	19	18	17
4:00- 5:00		17	32	17	24	34	14	34
5:00- 6:00		33	46	43	42	27	32	38
6:00- 7:00		63	82	88	59	56	46	46
7:00- 8:00		95	122	111	81	89	57	92
8:00- 9:00		123	133	132	96	130	72	86
9:00-10:00		108	118	112	143	140	101	120
10:00-11:00		128	117	113	154	130	118	126
11:00-12:00		123	146	144	164	148	123	118
AM Total	0	781	896	867	848	845	627	715
12:00-13:00	141	131	142	151	168	129	136	
13:00-14:00	152	146	121	149	187	148	126	
14:00-15:00	142	146	148	151	160	153	137	
15:00-16:00	171	135	132	142	150	172	155	
16:00-17:00	131	119	142	148	147	151	139	
17:00-18:00	129	124	146	132	166	132	122	
18:00-19:00	126	90	94	123	144	111	122	
19:00-20:00	69	71	87	79	94	97	94	
20:00-21:00	66	72	62	67	97	59	71	
21:00-22:00	51	59	44	72	75	48	65	
22:00-23:00	30	36	50	43	66	56	45	
23:00-24:00	28	27	40	36	58	37	27	
PM Total	1,236	1,156	1,208	1,293	1,512	1,293	1,239	0
24 Hr. Total	1,236	1,937	2,104	2,160	2,360	2,138	1,866	715
Noon - Noon		2,017	2,052	2,075	2,141	2,357	1,920	1,954

Traffic Engineering Software

Weekly Volume Summary

Wed, Jan 29, 2014

Location: 3.2 KM W OF HWY 72

LHRS/Offset: 22030 / 0.0 **Region:** Northwest

Pattern Type: Low Tourist **PCS#:** 49 **Hwy. TVIS#:** 17730

Count Direction: SB **Report Dates:** Jul 15, 2013 to Jul 21, 2013

Hour Interval	Mon 13/07/15	Tue 16	Wed 17	Thu 18	Fri 19	Sat 20	Sun 21	Mon 22
0:00- 1:00		14	38	42	41	33	30	18
1:00- 2:00		12	27	33	22	28	44	11
2:00- 3:00		5	33	22	16	23	23	11
3:00- 4:00		5	17	22	19	19	23	7
4:00- 5:00		9	21	21	19	27	19	11
5:00- 6:00		24	21	30	26	29	22	18
6:00- 7:00		43	42	46	54	52	37	36
7:00- 8:00		64	75	75	87	78	45	62
8:00- 9:00		87	100	97	90	115	94	100
9:00-10:00		104	129	140	138	136	133	132
10:00-11:00		140	150	176	167	155	163	155
11:00-12:00		121	155	149	169	168	197	180
AM Total	0	628	808	853	848	863	830	741
12:00-13:00	185	129	164	177	159	163	201	
13:00-14:00	149	144	147	151	164	143	188	
14:00-15:00	144	131	140	176	160	126	182	
15:00-16:00	150	116	148	154	184	171	170	
16:00-17:00	143	123	148	162	205	123	165	
17:00-18:00	123	156	161	173	182	120	140	
18:00-19:00	75	139	158	131	141	123	126	
19:00-20:00	87	88	129	95	109	87	112	
20:00-21:00	70	87	77	79	112	115	85	
21:00-22:00	47	70	82	69	83	91	52	
22:00-23:00	56	60	47	38	57	67	77	
23:00-24:00	18	38	44	48	32	62	24	
PM Total	1,247	1,281	1,445	1,453	1,588	1,391	1,522	0
24 Hr. Total	1,247	1,909	2,253	2,306	2,436	2,254	2,352	741
Noon - Noon		1,875	2,089	2,298	2,301	2,451	2,221	2,263

Traffic Engineering Software

Weekly Volume Summary

Wed, Jan 29, 2014

Location: 3.2 KM W OF HWY 72

LHRS/Offset: 22030 / 0.0 **Region:** Northwest

Pattern Type: Low Tourist **PCS#:** 49 **Hwy. TVIS#:** 17730

Count Direction: NB/SB **Report Dates:** Sep 21, 2013 to Sep 27, 2013

Hour Interval	Sat 13/09/21	Sun 22	Mon 23	Tue 24	Wed 25	Thu 26	Fri 27	Sat 28
0:00- 1:00		43	33	29	63	65	58	50
1:00- 2:00		59	27	38	50	50	32	42
2:00- 3:00		47	22	25	35	34	51	43
3:00- 4:00		43	16	32	52	54	37	21
4:00- 5:00		45	35	37	44	51	38	48
5:00- 6:00		48	56	48	60	71	59	54
6:00- 7:00		98	98	106	100	108	107	61
7:00- 8:00		99	129	157	170	165	145	116
8:00- 9:00		121	181	170	228	211	210	179
9:00-10:00		182	188	212	218	214	223	211
10:00-11:00		235	228	209	260	219	247	238
11:00-12:00		299	186	251	272	255	275	250
AM Total	0	1,319	1,199	1,314	1,552	1,497	1,482	1,313
12:00-13:00	221	269	243	238	242	256	241	
13:00-14:00	283	248	240	238	255	250	274	
14:00-15:00	271	276	212	267	272	270	305	
15:00-16:00	237	315	223	243	263	249	325	
16:00-17:00	260	254	267	298	286	274	298	
17:00-18:00	241	296	216	236	268	265	299	
18:00-19:00	225	230	182	205	215	204	250	
19:00-20:00	170	155	126	156	187	158	163	
20:00-21:00	171	113	104	118	119	125	155	
21:00-22:00	112	73	76	120	105	109	117	
22:00-23:00	116	90	69	90	117	88	80	
23:00-24:00	93	37	51	73	79	71	77	
PM Total	2,400	2,356	2,009	2,282	2,408	2,319	2,584	0
24 Hr. Total	2,400	3,675	3,208	3,596	3,960	3,816	4,066	1,313
Noon - Noon		3,719	3,555	3,323	3,834	3,905	3,801	3,897

ADT	AWD	AADT	AAWD	SADT	SAWDT	WADT	DHV
3,719	3,716	3,422	3,456	4,585	4,562	2,532	434

Traffic Engineering Software

Weekly Volume Summary

Wed, Jan 29, 2014

Location: 3.2 KM W OF HWY 72

LHRS/Offset: 22030 / 0.0 **Region:** Northwest

Pattern Type: Low Tourist **PCS#:** 49 **Hwy. TVIS#:** 17730

Count Direction: NB **Report Dates:** Sep 21, 2013 **to** Sep 27, 2013

Hour Interval	Sat 13/09/21	Sun 22	Mon 23	Tue 24	Wed 25	Thu 26	Fri 27	Sat 28
0:00- 1:00		16	22	16	26	30	27	22
1:00- 2:00		16	18	31	25	29	18	19
2:00- 3:00		13	11	14	13	13	29	24
3:00- 4:00		19	11	20	22	25	21	11
4:00- 5:00		14	22	23	24	21	22	27
5:00- 6:00		25	37	26	34	39	38	35
6:00- 7:00		48	64	72	74	60	67	41
7:00- 8:00		49	76	100	107	109	87	60
8:00- 9:00		61	101	97	128	113	115	80
9:00-10:00		68	85	105	98	102	108	80
10:00-11:00		103	84	86	119	104	108	92
11:00-12:00		120	87	112	128	118	109	110
AM Total	0	552	618	702	798	763	749	601
12:00-13:00	113	112	112	105	114	129	106	
13:00-14:00	142	114	116	105	113	104	121	
14:00-15:00	154	130	97	134	128	121	146	
15:00-16:00	121	151	102	120	131	114	145	
16:00-17:00	126	101	114	128	123	107	132	
17:00-18:00	118	146	103	99	98	124	123	
18:00-19:00	98	96	96	88	91	83	121	
19:00-20:00	73	63	58	61	81	61	88	
20:00-21:00	67	43	49	52	49	57	81	
21:00-22:00	38	39	37	49	54	51	55	
22:00-23:00	47	34	28	25	47	42	48	
23:00-24:00	41	18	26	22	34	34	44	
PM Total	1,138	1,047	938	988	1,063	1,027	1,210	0
24 Hr. Total	1,138	1,599	1,556	1,690	1,861	1,790	1,959	601
Noon - Noon		1,690	1,665	1,640	1,786	1,826	1,776	1,811

Traffic Engineering Software

Weekly Volume Summary

Wed, Jan 29, 2014

Location: 3.2 KM W OF HWY 72

LHRS/Offset: 22030 / 0.0 **Region:** Northwest

Pattern Type: Low Tourist **PCS#:** 49 **Hwy. TVIS#:** 17730

Count Direction: SB **Report Dates:** Sep 21, 2013 **to** Sep 27, 2013

Hour Interval	Sat 13/09/21	Sun 22	Mon 23	Tue 24	Wed 25	Thu 26	Fri 27	Sat 28
0:00- 1:00		27	11	13	37	35	31	28
1:00- 2:00		43	9	7	25	21	14	23
2:00- 3:00		34	11	11	22	21	22	19
3:00- 4:00		24	5	12	30	29	16	10
4:00- 5:00		31	13	14	20	30	16	21
5:00- 6:00		23	19	22	26	32	21	19
6:00- 7:00		50	34	34	26	48	40	20
7:00- 8:00		50	53	57	63	56	58	56
8:00- 9:00		60	80	73	100	98	95	99
9:00-10:00		114	103	107	120	112	115	131
10:00-11:00		132	144	123	141	115	139	146
11:00-12:00		179	99	139	144	137	166	140
AM Total	0	767	581	612	754	734	733	712
12:00-13:00	108	157	131	133	128	127	135	
13:00-14:00	141	134	124	133	142	146	153	
14:00-15:00	117	146	115	133	144	149	159	
15:00-16:00	116	164	121	123	132	135	180	
16:00-17:00	134	153	153	170	163	167	166	
17:00-18:00	123	150	113	137	170	141	176	
18:00-19:00	127	134	86	117	124	121	129	
19:00-20:00	97	92	68	95	106	97	75	
20:00-21:00	104	70	55	66	70	68	74	
21:00-22:00	74	34	39	71	51	58	62	
22:00-23:00	69	56	41	65	70	46	32	
23:00-24:00	52	19	25	51	45	37	33	
PM Total	1,262	1,309	1,071	1,294	1,345	1,292	1,374	0
24 Hr. Total	1,262	2,076	1,652	1,906	2,099	2,026	2,107	712
Noon - Noon		2,029	1,890	1,683	2,048	2,079	2,025	2,086

APPENDIX B

SYNCHRO 8 MODEL REPORTS

KEEWATIN-ASKI LTD.
consulting engineers & architect

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	0	171	166	0	0	2
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	186	180	0	0	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	180				366	180
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	180				366	180
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1395				633	862

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	186	180	2
Volume Left	0	0	0
Volume Right	0	0	2
cSH	1395	1700	862
Volume to Capacity	0.00	0.11	0.00
Queue Length 95th (m)	0.0	0.0	0.1
Control Delay (s)	0.0	0.0	9.2
Lane LOS			A
Approach Delay (s)	0.0	0.0	9.2
Approach LOS			A

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	19.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	2	207	148	0	0	6
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	225	161	0	0	7
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	161				390	161
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	161				390	161
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	99
cM capacity (veh/h)	1418				613	884

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	227	161	7
Volume Left	2	0	0
Volume Right	0	0	7
cSH	1418	1700	884
Volume to Capacity	0.00	0.09	0.01
Queue Length 95th (m)	0.0	0.0	0.2
Control Delay (s)	0.1	0.0	9.1
Lane LOS	A		A
Approach Delay (s)	0.1	0.0	9.1
Approach LOS			A

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	22.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	0	172	167	0	0	2
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	187	182	0	0	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	182				368	182
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	182				368	182
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1394				632	861

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	187	182	2
Volume Left	0	0	0
Volume Right	0	0	2
cSH	1394	1700	861
Volume to Capacity	0.00	0.11	0.00
Queue Length 95th (m)	0.0	0.0	0.1
Control Delay (s)	0.0	0.0	9.2
Lane LOS			A
Approach Delay (s)	0.0	0.0	9.2
Approach LOS			A

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	19.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	2	209	150	0	0	6
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	227	163	0	0	7
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	163				395	163
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	163				395	163
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	99
cM capacity (veh/h)	1416				609	882

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	229	163	7
Volume Left	2	0	0
Volume Right	0	0	7
cSH	1416	1700	882
Volume to Capacity	0.00	0.10	0.01
Queue Length 95th (m)	0.0	0.0	0.2
Control Delay (s)	0.1	0.0	9.1
Lane LOS	A		A
Approach Delay (s)	0.1	0.0	9.1
Approach LOS			A

Intersection Summary			
Average Delay		0.2	
Intersection Capacity Utilization		22.6%	ICU Level of Service A
Analysis Period (min)		15	

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	0	27	43	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	29	47	0	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	47				76	47
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	47				76	47
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1561				927	1023

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	29	47	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1561	1700	1700
Volume to Capacity	0.00	0.03	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS			A
Approach Delay (s)	0.0	0.0	0.0
Approach LOS			A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	6.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	1	144	147	1	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	157	160	1	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	161				319	160
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	161				319	160
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1418				674	885

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	158	161	0
Volume Left	1	0	0
Volume Right	0	1	0
cSH	1418	1700	1700
Volume to Capacity	0.00	0.09	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.1	0.0	0.0
Lane LOS	A		A
Approach Delay (s)	0.1	0.0	0.0
Approach LOS			A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	11.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	0	176	171	0	0	2
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	191	186	0	0	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	186				377	186
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	186				377	186
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1389				624	856

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	191	186	2
Volume Left	0	0	0
Volume Right	0	0	2
cSH	1389	1700	856
Volume to Capacity	0.00	0.11	0.00
Queue Length 95th (m)	0.0	0.0	0.1
Control Delay (s)	0.0	0.0	9.2
Lane LOS			A
Approach Delay (s)	0.0	0.0	9.2
Approach LOS			A

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	19.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	2	213	153	0	0	6
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	232	166	0	0	7
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	166				402	166
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	166				402	166
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	99
cM capacity (veh/h)	1412				603	878

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	234	166	7
Volume Left	2	0	0
Volume Right	0	0	7
cSH	1412	1700	878
Volume to Capacity	0.00	0.10	0.01
Queue Length 95th (m)	0.0	0.0	0.2
Control Delay (s)	0.1	0.0	9.1
Lane LOS	A		A
Approach Delay (s)	0.1	0.0	9.1
Approach LOS			A

Intersection Summary			
Average Delay		0.2	
Intersection Capacity Utilization		22.8%	ICU Level of Service
Analysis Period (min)		15	

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	0	27	44	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	29	48	0	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	48				77	48
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	48				77	48
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1559				926	1021

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	29	48	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1559	1700	1700
Volume to Capacity	0.00	0.03	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS			A
Approach Delay (s)	0.0	0.0	0.0
Approach LOS			A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	6.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	1	147	150	1	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	160	163	1	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	164				326	164
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	164				326	164
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1414				668	881

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	161	164	0
Volume Left	1	0	0
Volume Right	0	1	0
cSH	1414	1700	1700
Volume to Capacity	0.00	0.10	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.1	0.0	0.0
Lane LOS	A		A
Approach Delay (s)	0.1	0.0	0.0
Approach LOS			A

Intersection Summary			
Average Delay		0.0	
Intersection Capacity Utilization		11.9%	ICU Level of Service
Analysis Period (min)		15	

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	0	185	179	0	0	2
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	201	195	0	0	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	195				396	195
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	195				396	195
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1379				609	847

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	201	195	2
Volume Left	0	0	0
Volume Right	0	0	2
cSH	1379	1700	847
Volume to Capacity	0.00	0.11	0.00
Queue Length 95th (m)	0.0	0.0	0.1
Control Delay (s)	0.0	0.0	9.3
Lane LOS			A
Approach Delay (s)	0.0	0.0	9.3
Approach LOS			A

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	19.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	2	224	161	0	0	6
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	243	175	0	0	7
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	175				423	175
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	175				423	175
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	99
cM capacity (veh/h)	1401				587	868

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	246	175	7
Volume Left	2	0	0
Volume Right	0	0	7
cSH	1401	1700	868
Volume to Capacity	0.00	0.10	0.01
Queue Length 95th (m)	0.0	0.0	0.2
Control Delay (s)	0.1	0.0	9.2
Lane LOS	A		A
Approach Delay (s)	0.1	0.0	9.2
Approach LOS			A

Intersection Summary			
Average Delay		0.2	
Intersection Capacity Utilization		23.4%	ICU Level of Service
Analysis Period (min)		15	

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	0	28	46	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	30	50	0	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	50				80	50
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	50				80	50
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1557				922	1018

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	30	50	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1557	1700	1700
Volume to Capacity	0.00	0.03	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS			A
Approach Delay (s)	0.0	0.0	0.0
Approach LOS			A

Intersection Summary			
Average Delay		0.0	
Intersection Capacity Utilization		6.7%	ICU Level of Service
Analysis Period (min)		15	

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	1	154	157	1	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	167	171	1	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	172				341	171
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	172				341	171
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1405				655	873

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	168	172	0
Volume Left	1	0	0
Volume Right	0	1	0
cSH	1405	1700	1700
Volume to Capacity	0.00	0.10	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.1	0.0	0.0
Lane LOS	A		A
Approach Delay (s)	0.1	0.0	0.0
Approach LOS			A

Intersection Summary			
Average Delay		0.0	
Intersection Capacity Utilization		12.2%	ICU Level of Service
Analysis Period (min)		15	

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	0	194	189	0	0	2
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	211	205	0	0	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	205				416	205
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	205				416	205
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1366				593	835

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	211	205	2
Volume Left	0	0	0
Volume Right	0	0	2
cSH	1366	1700	835
Volume to Capacity	0.00	0.12	0.00
Queue Length 95th (m)	0.0	0.0	0.1
Control Delay (s)	0.0	0.0	9.3
Lane LOS			A
Approach Delay (s)	0.0	0.0	9.3
Approach LOS			A

Intersection Summary			
Average Delay		0.0	
Intersection Capacity Utilization		20.2%	ICU Level of Service
Analysis Period (min)		15	

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	2	236	169	0	0	7
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	257	184	0	0	8
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	184				445	184
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	184				445	184
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	99
cM capacity (veh/h)	1391				570	859

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	259	184	8
Volume Left	2	0	0
Volume Right	0	0	8
cSH	1391	1700	859
Volume to Capacity	0.00	0.11	0.01
Queue Length 95th (m)	0.0	0.0	0.2
Control Delay (s)	0.1	0.0	9.2
Lane LOS	A		A
Approach Delay (s)	0.1	0.0	9.2
Approach LOS			A

Intersection Summary			
Average Delay		0.2	
Intersection Capacity Utilization		24.0%	ICU Level of Service
Analysis Period (min)		15	

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	0	30	48	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	33	52	0	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	52				85	52
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	52				85	52
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1554				917	1015

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	33	52	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1554	1700	1700
Volume to Capacity	0.00	0.03	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS			A
Approach Delay (s)	0.0	0.0	0.0
Approach LOS			A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	6.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	1	162	166	1	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	176	180	1	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	182				359	181
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	182				359	181
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1394				639	862

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	177	182	0
Volume Left	1	0	0
Volume Right	0	1	0
cSH	1394	1700	1700
Volume to Capacity	0.00	0.11	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.1	0.0	0.0
Lane LOS	A		A
Approach Delay (s)	0.1	0.0	0.0
Approach LOS			A

Intersection Summary			
Average Delay		0.0	
Intersection Capacity Utilization		12.7%	ICU Level of Service
Analysis Period (min)		15	

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	14	172	167	3	3	16
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	187	182	3	3	17
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	185				401	183
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	185				401	183
tC, single (s)	4.4				6.7	6.5
tC, 2 stage (s)						
tF (s)	2.5				3.8	3.6
p0 queue free %	99				99	98
cM capacity (veh/h)	1238				548	792

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	202	185	21
Volume Left	15	0	3
Volume Right	0	3	17
cSH	1238	1700	740
Volume to Capacity	0.01	0.11	0.03
Queue Length 95th (m)	0.3	0.0	0.7
Control Delay (s)	0.7	0.0	10.0
Lane LOS	A		B
Approach Delay (s)	0.7	0.0	10.0
Approach LOS			B

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	30.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	16	209	150	3	3	20
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	17	227	163	3	3	22
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	166				427	165
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	166				427	165
tC, single (s)	4.4				6.7	6.5
tC, 2 stage (s)						
tF (s)	2.5				3.8	3.6
p0 queue free %	99				99	97
cM capacity (veh/h)	1259				528	812

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	245	166	25
Volume Left	17	0	3
Volume Right	0	3	22
cSH	1259	1700	759
Volume to Capacity	0.01	0.10	0.03
Queue Length 95th (m)	0.3	0.0	0.8
Control Delay (s)	0.7	0.0	9.9
Lane LOS	A		A
Approach Delay (s)	0.7	0.0	9.9
Approach LOS			A

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	33.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	160	27	43	40	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	174	29	47	43	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	90				446	68
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	90				446	68
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	88				100	100
cM capacity (veh/h)	1505				504	995

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	203	90	0
Volume Left	174	0	0
Volume Right	0	43	0
cSH	1505	1700	1700
Volume to Capacity	0.12	0.05	0.00
Queue Length 95th (m)	3.1	0.0	0.0
Control Delay (s)	6.7	0.0	0.0
Lane LOS	A		A
Approach Delay (s)	6.7	0.0	0.0
Approach LOS			A

Intersection Summary			
Average Delay	4.7		
Intersection Capacity Utilization	20.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	1	144	147	1	40	160
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	157	160	1	43	174
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	161				319	160
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	161				319	160
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				94	80
cM capacity (veh/h)	1418				674	885

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	158	161	217
Volume Left	1	0	43
Volume Right	0	1	174
cSH	1418	1700	833
Volume to Capacity	0.00	0.09	0.26
Queue Length 95th (m)	0.0	0.0	8.4
Control Delay (s)	0.1	0.0	10.8
Lane LOS	A		B
Approach Delay (s)	0.1	0.0	10.8
Approach LOS			B

Intersection Summary			
Average Delay	4.4		
Intersection Capacity Utilization	27.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	8	176	171	2	2	10
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	191	186	2	2	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	188				396	187
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	188				396	187
tC, single (s)	4.3				6.6	6.4
tC, 2 stage (s)						
tF (s)	2.4				3.7	3.5
p0 queue free %	99				100	99
cM capacity (veh/h)	1285				572	811

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	200	188	13
Volume Left	9	0	2
Volume Right	0	2	11
cSH	1285	1700	758
Volume to Capacity	0.01	0.11	0.02
Queue Length 95th (m)	0.2	0.0	0.4
Control Delay (s)	0.4	0.0	9.8
Lane LOS	A		A
Approach Delay (s)	0.4	0.0	9.8
Approach LOS			A

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	25.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	10	213	153	2	2	14
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	232	166	2	2	15
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	168				421	167
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	168				421	167
tC, single (s)	4.3				6.6	6.4
tC, 2 stage (s)						
tF (s)	2.4				3.7	3.5
p0 queue free %	99				100	98
cM capacity (veh/h)	1307				552	832

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	242	168	17
Volume Left	11	0	2
Volume Right	0	2	15
cSH	1307	1700	782
Volume to Capacity	0.01	0.10	0.02
Queue Length 95th (m)	0.2	0.0	0.5
Control Delay (s)	0.4	0.0	9.7
Lane LOS	A		A
Approach Delay (s)	0.4	0.0	9.7
Approach LOS			A

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	29.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	52	27	44	13	11	43
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	57	29	48	14	12	47
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	62				197	55
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	62				197	55
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				98	95
cM capacity (veh/h)	1541				762	1012

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	86	62	59
Volume Left	57	0	12
Volume Right	0	14	47
cSH	1541	1700	949
Volume to Capacity	0.04	0.04	0.06
Queue Length 95th (m)	0.9	0.0	1.6
Control Delay (s)	5.0	0.0	9.0
Lane LOS	A		A
Approach Delay (s)	5.0	0.0	9.0
Approach LOS			A

Intersection Summary			
Average Delay	4.6		
Intersection Capacity Utilization	21.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	44	147	150	11	13	52
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	48	160	163	12	14	57
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	175				424	169
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	175				424	169
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				98	94
cM capacity (veh/h)	1401				566	875

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	208	175	71
Volume Left	48	0	14
Volume Right	0	12	57
cSH	1401	1700	789
Volume to Capacity	0.03	0.10	0.09
Queue Length 95th (m)	0.8	0.0	2.4
Control Delay (s)	2.0	0.0	10.0
Lane LOS	A		B
Approach Delay (s)	2.0	0.0	10.0
Approach LOS			B

Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	32.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	8	185	179	2	2	10
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	201	195	2	2	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	197				414	196
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	197				414	196
tC, single (s)	4.3				6.6	6.4
tC, 2 stage (s)						
tF (s)	2.4				3.7	3.5
p0 queue free %	99				100	99
cM capacity (veh/h)	1275				558	802

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	210	197	13
Volume Left	9	0	2
Volume Right	0	2	11
cSH	1275	1700	747
Volume to Capacity	0.01	0.12	0.02
Queue Length 95th (m)	0.2	0.0	0.4
Control Delay (s)	0.4	0.0	9.9
Lane LOS	A		A
Approach Delay (s)	0.4	0.0	9.9
Approach LOS			A

Intersection Summary			
Average Delay		0.5	
Intersection Capacity Utilization		26.2%	ICU Level of Service
Analysis Period (min)		15	

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	10	224	161	2	2	14
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	243	175	2	2	15
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	177				441	176
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	177				441	176
tC, single (s)	4.3				6.6	6.4
tC, 2 stage (s)						
tF (s)	2.4				3.7	3.5
p0 queue free %	99				100	98
cM capacity (veh/h)	1297				537	823

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	254	177	17
Volume Left	11	0	2
Volume Right	0	2	15
cSH	1297	1700	771
Volume to Capacity	0.01	0.10	0.02
Queue Length 95th (m)	0.2	0.0	0.6
Control Delay (s)	0.4	0.0	9.8
Lane LOS	A		A
Approach Delay (s)	0.4	0.0	9.8
Approach LOS			A

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	29.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	52	28	46	13	11	43
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	57	30	50	14	12	47
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	64				201	57
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	64				201	57
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				98	95
cM capacity (veh/h)	1538				759	1009

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	87	64	59
Volume Left	57	0	12
Volume Right	0	14	47
cSH	1538	1700	946
Volume to Capacity	0.04	0.04	0.06
Queue Length 95th (m)	0.9	0.0	1.6
Control Delay (s)	4.9	0.0	9.1
Lane LOS	A		A
Approach Delay (s)	4.9	0.0	9.1
Approach LOS			A

Intersection Summary			
Average Delay	4.6		
Intersection Capacity Utilization	21.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	44	154	157	12	13	52
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	48	167	171	13	14	57
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	184				440	177
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	184				440	177
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				97	93
cM capacity (veh/h)	1391				555	866

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	215	184	71
Volume Left	48	0	14
Volume Right	0	13	57
cSH	1391	1700	778
Volume to Capacity	0.03	0.11	0.09
Queue Length 95th (m)	0.9	0.0	2.4
Control Delay (s)	1.9	0.0	10.1
Lane LOS	A		B
Approach Delay (s)	1.9	0.0	10.1
Approach LOS			B

Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	33.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	8	194	189	2	2	10
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	211	205	2	2	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	208				435	207
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	208				435	207
tC, single (s)	4.3				6.6	6.4
tC, 2 stage (s)						
tF (s)	2.4				3.7	3.5
p0 queue free %	99				100	99
cM capacity (veh/h)	1263				542	791

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	220	208	13
Volume Left	9	0	2
Volume Right	0	2	11
cSH	1263	1700	734
Volume to Capacity	0.01	0.12	0.02
Queue Length 95th (m)	0.2	0.0	0.4
Control Delay (s)	0.4	0.0	10.0
Lane LOS	A		A
Approach Delay (s)	0.4	0.0	10.0
Approach LOS			A

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	26.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	10	236	169	2	2	14
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	257	184	2	2	15
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	186				463	185
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	186				463	185
tC, single (s)	4.3				6.6	6.4
tC, 2 stage (s)						
tF (s)	2.4				3.7	3.5
p0 queue free %	99				100	98
cM capacity (veh/h)	1287				521	813

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	267	186	17
Volume Left	11	0	2
Volume Right	0	2	15
cSH	1287	1700	760
Volume to Capacity	0.01	0.11	0.02
Queue Length 95th (m)	0.2	0.0	0.6
Control Delay (s)	0.4	0.0	9.8
Lane LOS	A		A
Approach Delay (s)	0.4	0.0	9.8
Approach LOS			A

Intersection Summary			
Average Delay		0.6	
Intersection Capacity Utilization		30.5%	ICU Level of Service A
Analysis Period (min)		15	

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	52	30	48	13	11	43
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	57	33	52	14	12	47
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	66				205	59
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	66				205	59
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				98	95
cM capacity (veh/h)	1535				755	1006

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	89	66	59
Volume Left	57	0	12
Volume Right	0	14	47
cSH	1535	1700	942
Volume to Capacity	0.04	0.04	0.06
Queue Length 95th (m)	0.9	0.0	1.6
Control Delay (s)	4.8	0.0	9.1
Lane LOS	A		A
Approach Delay (s)	4.8	0.0	9.1
Approach LOS			A

Intersection Summary			
Average Delay	4.5		
Intersection Capacity Utilization	21.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	44	162	166	12	13	52
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	48	176	180	13	14	57
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	193				459	187
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	193				459	187
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				97	93
cM capacity (veh/h)	1380				541	855

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	224	193	71
Volume Left	48	0	14
Volume Right	0	13	57
cSH	1380	1700	766
Volume to Capacity	0.03	0.11	0.09
Queue Length 95th (m)	0.9	0.0	2.4
Control Delay (s)	1.9	0.0	10.2
Lane LOS	A		B
Approach Delay (s)	1.9	0.0	10.2
Approach LOS			B

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	34.4%	ICU Level of Service	A
Analysis Period (min)	15		

APPENDIX C

DRAWINGS

MINISTRY OF TRANSPORTATION
ONTARIO

CSAS – 23

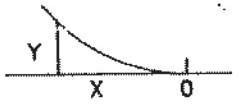
TRUCK ACCESS

ALL TRUCK DESIGN VEHICLES

DATE: 1994–01 | REV:

CURVE		OFFSETS	
R=80		R=16	
X	Y	X	Y
0	0	0	0
5	0.156	5	0.801
10	0.627	10	3.510
15	1.419	15	10.432
20	2.540		

CURVE		OFFSETS	
R=18		R=130	
X	Y	X	Y
0	0	0	0
5	0.708	5	0.096
10	3.033	10	0.385
15	8.050	15	0.888
		20	1.548
		25	2.426



AREA TO BE PAVED

NOTES:

Layout and curve offsets shown represent design without taper. For design with taper these values have to be calculated.

The compound curve is based on the manaeuvre of a WB–15 design vehicle. However the entrance will accommodate all larger design vehicles.

TAPER LENGTH Based on Lane Change Criterium					
Design Speed km/h	60	70	80	90	100
Taper, m	50	60	70	75	80

SCALE 1:500

APPENDIX D

MTO FORM 3 NON-FREEWAY INTERSECTION ILLUMINATION (PLNG-B-05)

KEEWATIN-ASKI LTD.
consulting engineers & architect

FORM 3
NON-FREEWAY - INTERSECTION ILLUMINATION

Highway: *Highway 17* ***WP No.:*** *KAL Project 14006*

Location: *Highway 17 at Anderson Road* ***Name:*** *Goliath Gold Project TIS* ***Date:*** *March 2014*

2 pages

CLASSIFICATION FACTOR	RATING (i)					UNLIT WEIGHT (A)	LIGHTED WEIGHT (B)	DIFF. (A - B)	SCORE [RATING X (A - B)]
	1	**2**	**3**	**4**	**5**				
Geometric Factors Number of Legs		**3**	4	5	6 or more (including traffic circles)	3.0	2.5	0.5	**1**
Approach Lane Width (m)	**3.75**	3.50	3.25	3.00	< 3.00	3.0	2.5	0.5	**0.5**
Turn Lanes	**no turn lanes**	left turn lanes on major legs	left turn lanes on all legs, right turn lanes on major legs	left and right turn lanes on major legs	left and right turn lanes on all legs	2.0	1.0	1.0	**1**
Approach Sight Distance (m)	**> 210**	151 - 210	91 - 150	60 - 90	< 60	2.0	1.8	0.2	**0.2**
Grades on Approach Streets	**< 3%**	3.0 - 3.9%	4.0 - 4.9%	5.0 - 6.9%	7%	3.2	2.8	0.4	**0.4**
Curvature on Approach Legs m (deg.)	>600 (< 3.0^{o})	600-290 (3.0 - 6.0^{o})	289-220 (6.1 - 8.0^{o})	219-170 (8.1 - 10.0 ^{o})	**<170 (> 10^{o}) (Anderson Road Approach)**	13.0	5.0	8.0	**40**
Parking in Vicinity of Intersection	**prohibited both sides**	loading zones only	off-peak only	permitted one side only	permitted both sides	0.2	0.1	0.1	**0.1**
							Geometric Total		**43.2**
Operational Factors Operating Speed on Approach Legs (km/hr)	40 or less	50	55	65	**70 or greater**	1.0	0.2	0.8	**4**
Type of Control	traffic signal control (always partial illumination)			4-way stop control	**stop control to minor legs or no control**	3.0	2.0	1.0	**5**
Level of Service (ii) (any dark hour)	**A**	B	C	D	E, F	1.2	0.2	1.0	**1**
Total Pedestrian Volume (peds/night crossing)	**0 - 10**	11 - 50	51 - 100	101 - 200	> 200	1.5	0.5	1.0	**1**
							Operational Total		**11**

FORM 3
NON-FREEWAY - INTERSECTION ILLUMINATION

Highway: *Highway 17* ***WP No.:*** *KAL Project 14006*

Location: *Highway 17 at Anderson Road* ***Name:*** *Goliath Gold Project TIS* ***Date:*** *March 2014*

2 pages

CLASSIFICATION FACTOR	RATING (i) 1	2	3	4	5	UNLIT WEIGHT (A)	LIGHTED WEIGHT (B)	DIFF. (A - B)	SCORE [RATING X (A - B)]
Environmental Factors Adjacent Development	**none**	1 quad	2 quad	3 quad	4 quad	0.5	0.3	0.2	**0.2**
Type of Development near Intersection	**undeveloped**	residential	50% residential 50% industrial or commercial	industrial or commercial	strip industrial or commercial	0.5	0.3	0.2	**0.2**
Illumination adjacent to intersection	**none**	1 quad	2 quad	3 quad	4 quad	3.0	1.0	2.0	**2.0**
							Environmental Total		**2.4**
Accidents % of Night-to-Total Accidents (3 yr. avg.) (iii)	**< 20% (Assumed)**	20 - 30%	31 - 40%	41 - 50%	> 50%	10.0	2.0	8.0	**8**
							Accidents Total		**8**

Benefit Cost Ratio (B/C)

GEOMETRIC TOTAL	= **43.2**
OPERATIONAL TOTAL	= **11**
ENVIRONMENTAL TOTAL	= **2.4**
ACCIDENT TOTAL	= **8**
SUM	= **64.6 POINTS**
PARTIAL ILLUMINATION WARRANTING CONDITION	= **62 points**

i. A rating of between 1 and 5 shall be assigned for each factor in the FORM depending on the conditions that are encountered by motorists on the roadway. The higher the rating, the more critical the need for illumination with regard to that particular factor.

ii. Use LOS methodology approved by the MTO. If not available for unsignalized intersection, use Level of Service C.

iii. For night-to-total accident ratio, accidents during darkness are used (including dusk/dawn).

Iv. The number of points for the warranting condition is based on 50% of the total points attainable, if all factors were rated 5.

Note: Worst case scenarios should be considered when assigning the ratings. For example, a section of roadway could have rush hour volumes during the hours of darkness in wintertime.
Partial illumination is always installed at signalized intersections.
Full illumination of intersection is installed when mainline has continuous illumination.