ST. MARYS CEMENT INC.

TRAFFIC IMPACT ASSESSMENT

for

PROPOSED CODRINGTON GRAVEL PIT
BRIGHTON, ONTARIO

Prepared By

Grant A. Bacchus *limited*

June 25, 2007

Grant A. Bacchus *limited*

Consultants in Transportation Planning

June 20, 2007 File No. 2006-06 (C0398)

Mr. Amarjit Sandu, B.Sc.
MHBC
10 Davey Crescent
Kingston, ON
K7N 1X6

Dear Sir:

Re: Traffic Impact Study
Proposed Codrington Pit Application – St. Mary's Cement Inc.
Brighton, Ontario

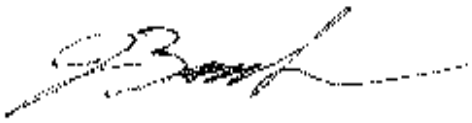
Please find enclosed our traffic report for the above-noted gravel pit application. This study has been prepared by Grant A. Bacchus Limited with technical assistance provided by Sernas Transtech. CV's for Mr. Bacchus and for key Sernas personnel are appended.

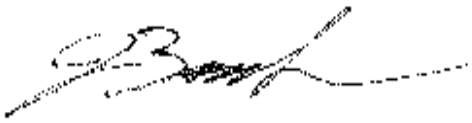
This study examines and presents the traffic operations of the existing roadway system within influence of the proposed gravel pit, estimates the future background growth on area roadways, provides projections of future gravel pit-generated truck traffic, provides an assessment of the associated site traffic impacts and recommends mitigation to accommodate future traffic flows.

The study concludes that with implementation of the recommended site access improvements at the proposed connection to County Road 30 and with the construction of the private haul road from the site directly to County Road 30, the proposed gravel pit traffic can ve efficiently and safely accommodated by the existing roadway system without undue operational impacts.

Yours very truly,

GRANT A. BACCHUS LIMITED





for Grant A. Bacchus, P.Eng.
President

J.A. (Jim) Bacchus, B.A.
General Manager
(Sernas Transtech)

JAB/jb

Encl.

60 Renfrew Drive, Suite #300 Markham, Ontario L3R 0E1
Telephone: 905-470-2010 Facsimile: 905-470-2050

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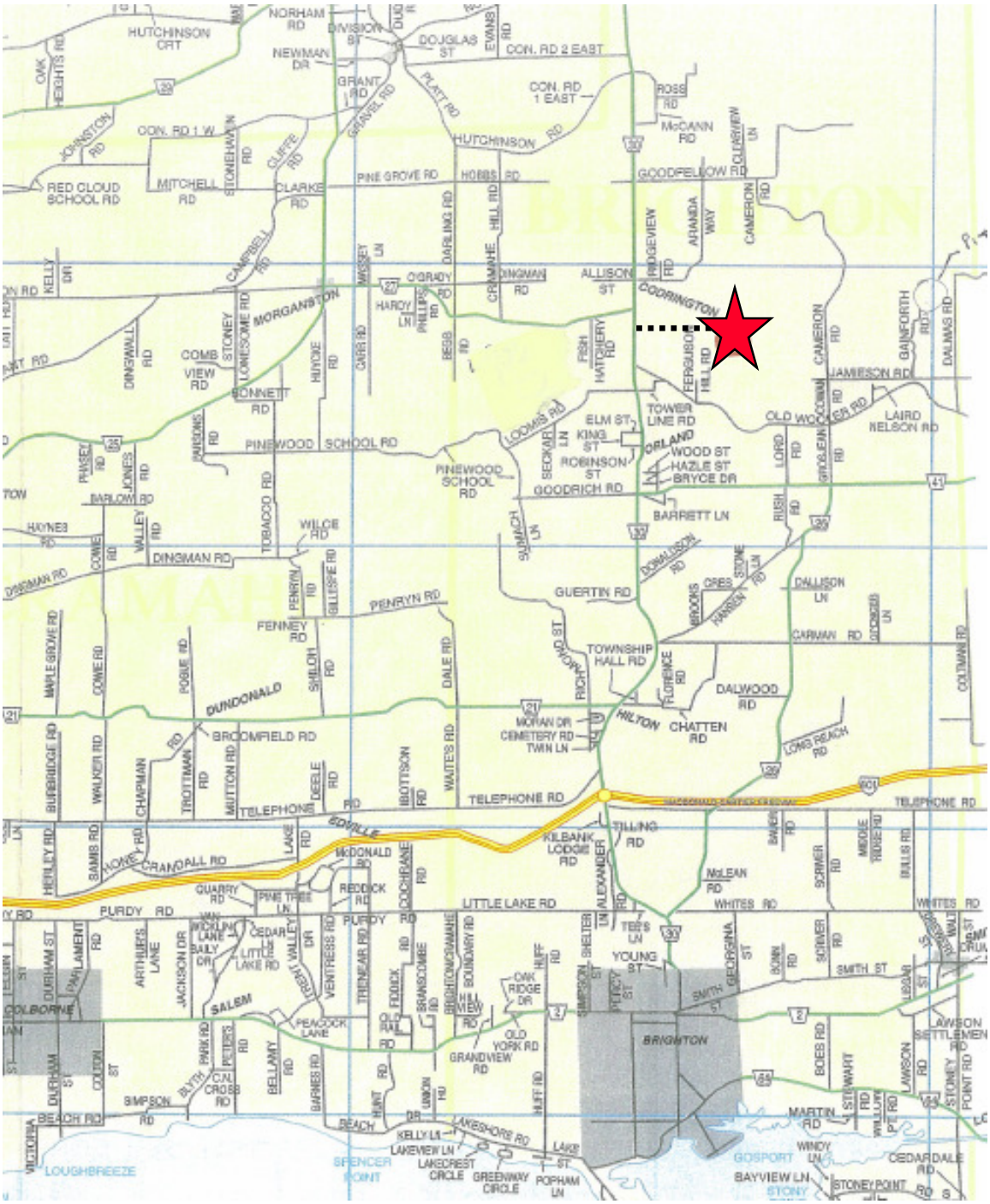
1.0 INTRODUCTION

St. Mary's Cement Inc. has acquired an interest in a parcel of land in Brighton, Ontario with the intention of establishing a gravel pit operation. The subject lands are located north of the Old Wooler Road, east of Northumberland County Road No. 30 south of the Village of Codrington. The location is identified in **Figure 1** in a regional context and on **Figure 2** in a local context.

Grant A. Bacchus Limited (curriculum vitae attached in **Appendix A**) has been retained to examine the existing and future traffic operations on the portion of County Road No. 30 where the proposed access to the pit is planned. Included in this assessment is a review of existing traffic movements on County Road No. 30, estimates of future background traffic growth, projections of gravel extraction-related truck movements and subsequent traffic impacts from their introduction onto the County Road No. 30 traffic stream. Also included are road improvement recommendations to accommodate the subject site generated traffic at the proposed access.

This report contains the results of our investigations.



Legend:

★ - Subject Site Location

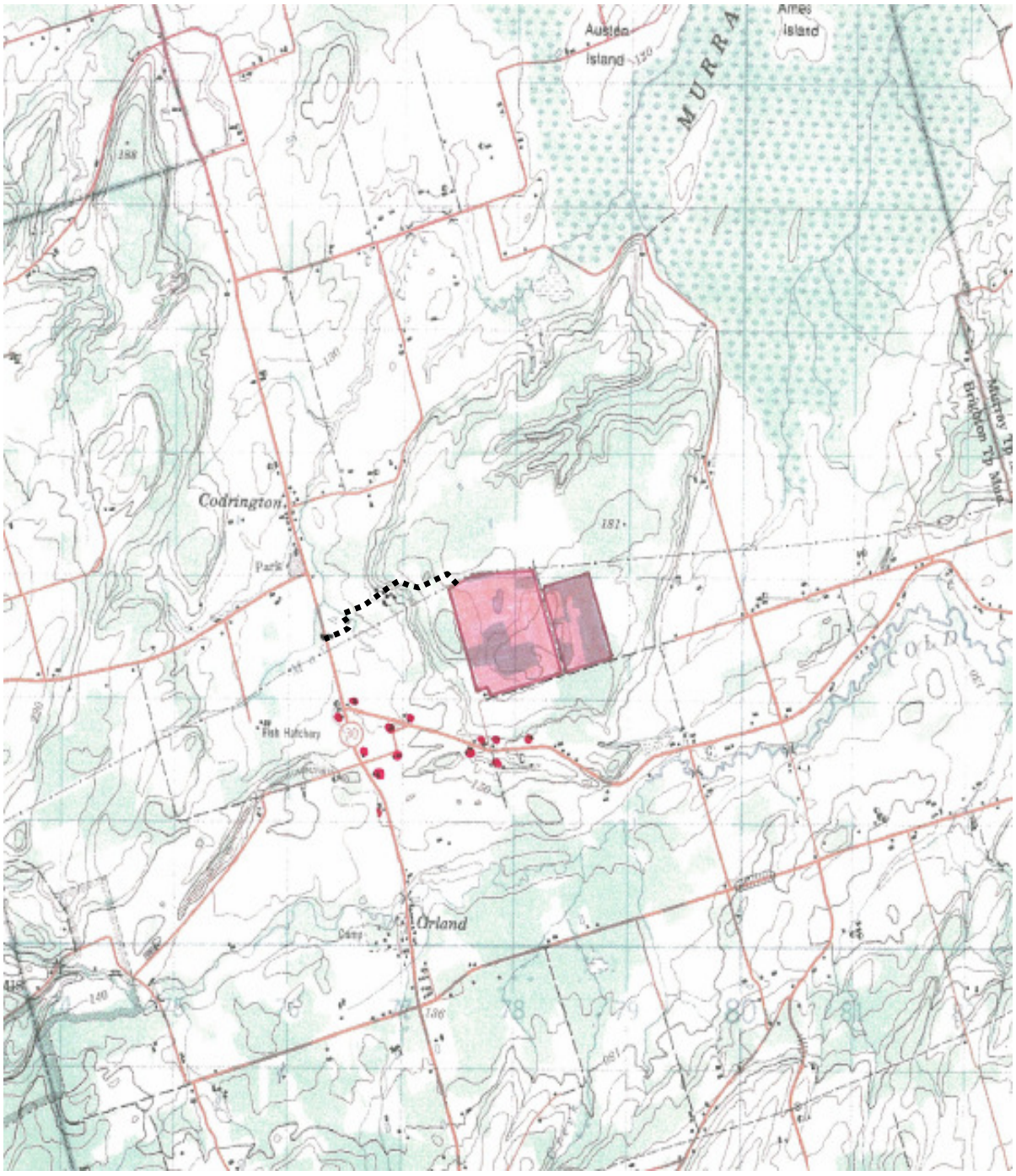
▪▪▪▪▪▪ - Proposed Access (Approximate Location)

Not to Scale

Figure 1

PROPOSED CODRINGTON PIT

Pit Location – Regional Context



Legend:

- Subject Site Location

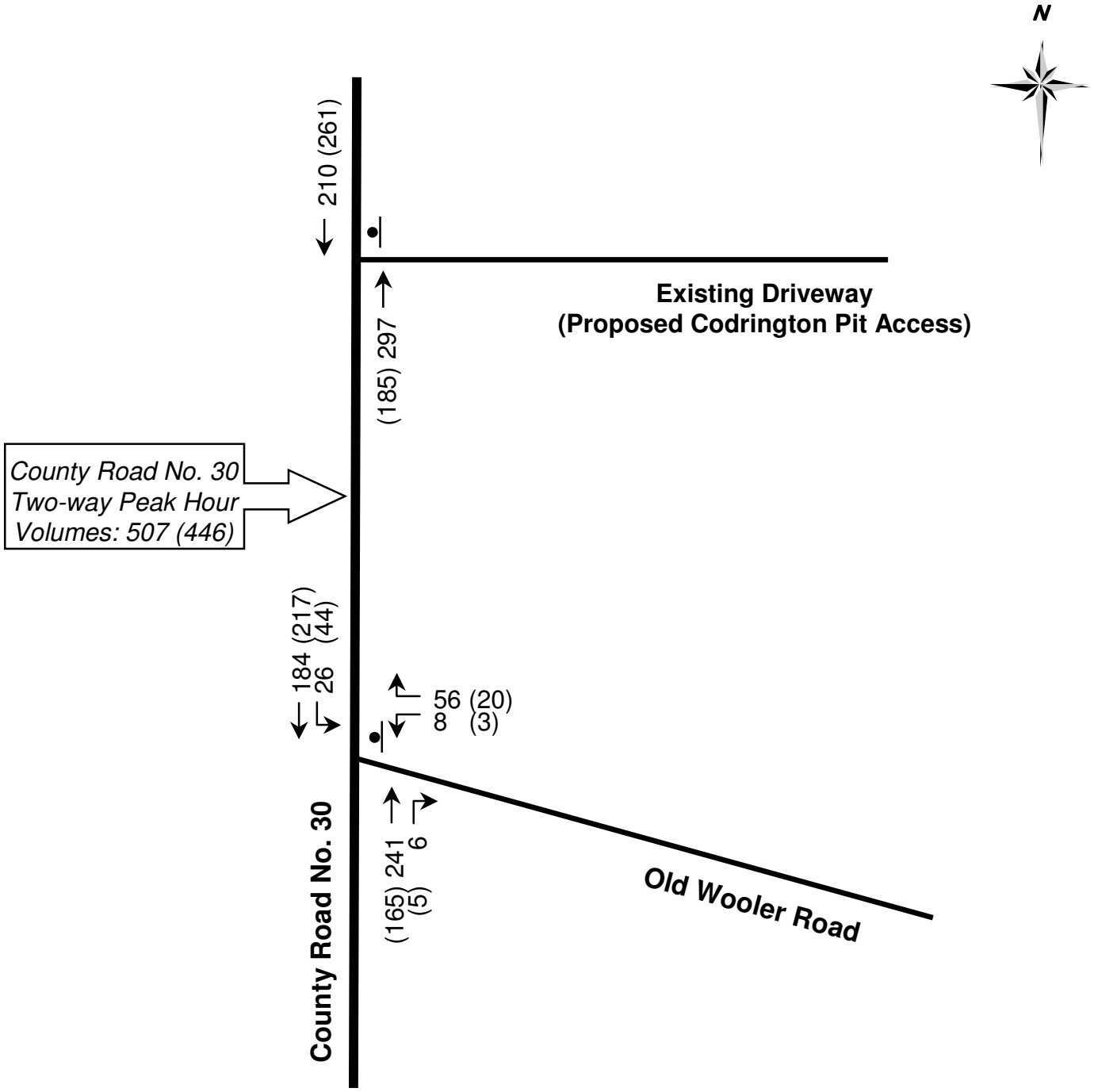
- Proposed Access (Approximate Location)

Not to Scale

Figure 2

PROPOSED CODRINGTON PIT

Pit Location – Local Context



Legend:

XX (XX) – AM (PM) Peak Hour Traffic Movements

- Stop Sign Control

Not to Scale

Figure 3

PROPOSED CODRINGTON PIT

2007 Composite Baseline Traffic Volumes

2.0 EXISTING AND FUTURE BACKGROUND TRAFFIC CONTITIONS

2.1 Haul Route Location

As illustrated in **Figure 2**, the subject property has access to a minor road connection to the Old Wooler Road, which in turn connects with County Road No. 30. Rather than attempting to use these roadways as a haul route from the Pit to the County Road system and then south to Highway 401, it has been decided by St. Mary's Cement Inc. to construct a private haul roadway from an area near the north-west corner of the property and connect directly to County Road No. 30.

The new private roadway connection to the County Road would partially utilize an existing driveway which historically has served as an access for an existing gravel pit located between the proposed Codrington Pit and County Road No. 30. This driveway is located about 600 metres north of the County Road No. 30 / Old Wooler Road intersection and about 400 metres south of the south limits of the village of Codrington. Therefore, the access is spatially well located with respect to upstream and downstream intersections. The proposed access location is within a section of County Road No. 30 having an 80 kph speed limit and our site investigations reveal that it is relatively flat and has excellent sight visibility in both directions. An out-of-business restaurant/café is located on the west side of Road 30, opposite the existing pit access driveway.

2.2 Traffic Surveys

In order to obtain a measure of current traffic volume levels on County Road No. 30 adjacent to the location of the proposed pit access, turning movement and vehicle classification surveys were conducted on Thursday, September 21, 2006 and on Monday June 11, 2007 (both from 7:30 a.m. to 6:00 p.m.) at the intersection of County Road No. 30 and Old Wooler Road (about 600 metres to the south of the proposed site access). The survey data is contained in **Appendix B.**

In order to provide a worst-case scenario with respect to the observed traffic volumes, the two data points were compared and the highest volume for each movement during each peak hour period was employed for the composite 2007 Baseline Conditions shown in **Figure 3**.

Level of Service calculations (definitions for which are attached as **Appendix C**) were conducted for these AM and PM peak hour conditions and the calculation sheets are contained in **Appendix D.**

The results summarized in **Table 1** indicate that the intersection of County Road No. 30 / Old Wooler Road is operating at excellent levels of service with minimal delay to drivers performing critical moves. Further, the peak hour traffic volumes along county Road No. 30 are well within the operating capacity of a two-lane highway (two-way peak hour traffic volumes are in the range of 450 to 500 vehicles per hour, while the typical capacity of a roadway facility with County Road No. 30 characteristics is in excess of 2,000 two-way vehicles per hour).

Table 1: 2007 Baseline Intersection Operations

Subject Intersections ***(Critical Movement Operations)***	Weekday AM Peak Hour		Weekday PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
County Road No. 30 @ Old Wooler Road				
Southbound Shared Left/Through;	1	A	2	A
Westbound Shared Left/Right	11	B	<10	A

2.3 Future Background Traffic

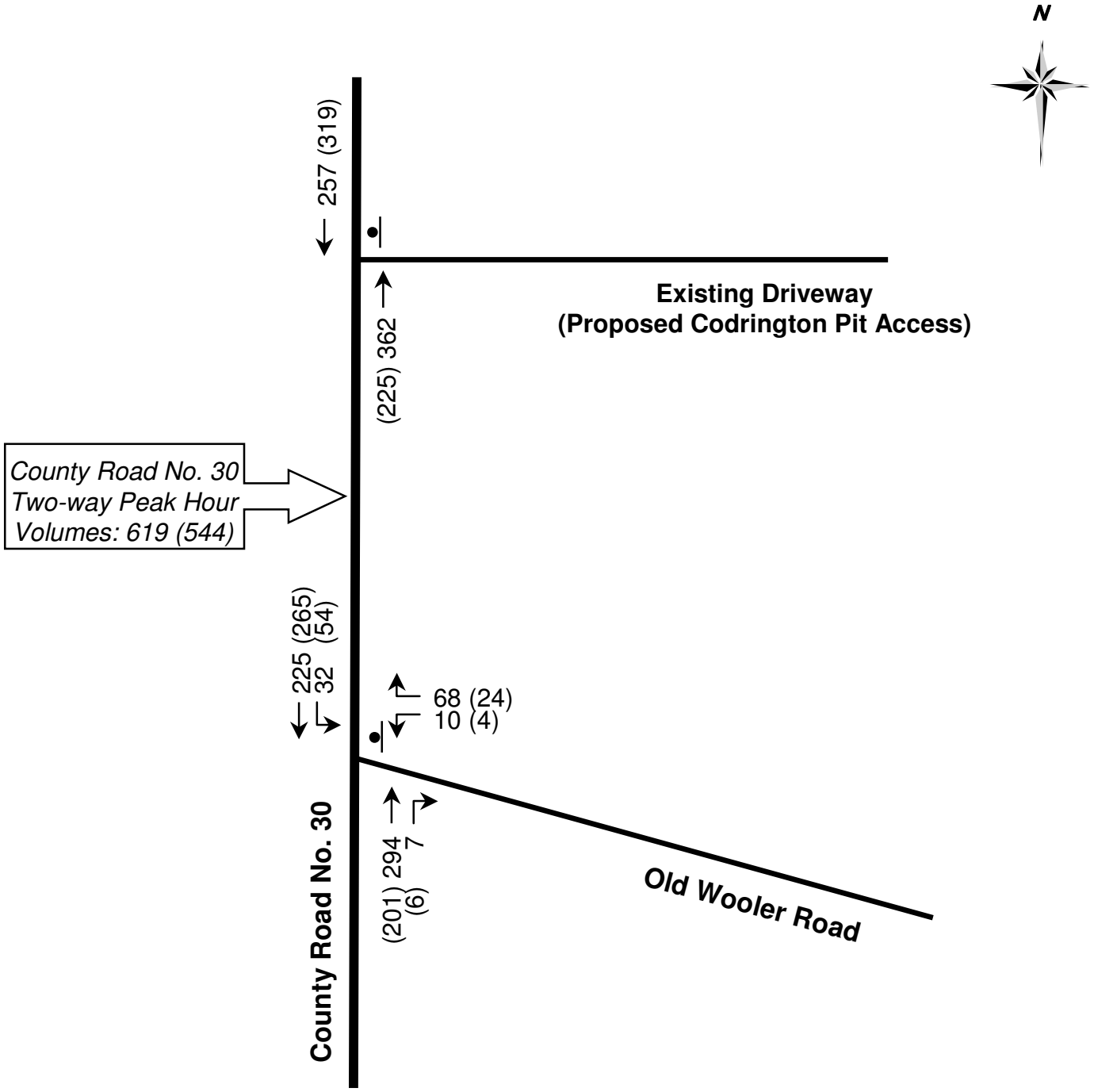
In order to prepare estimates of future background traffic, discussions were held with Mr. Peter Nielsen, Manager of Design and Construction for the County of Northumberland and Mr. Ken Hurford, Planning Director of Brighton. Both agreed that a ten year projection period was appropriate for use as a future analysis horizon and that although somewhat high a 2% per year compounded traffic growth rate would be reasonable for this study. We have therefore applied the 2% per annum compounded growth rate (equating to 22% total growth) to the baseline 2007 volumes for a ten year time horizon to simulate the future background 2017 traffic volumes.

The simulated future traffic volumes at the intersection of County Road No. 30 / Old Wooler Road and along County Road No. 30 at the proposed pit access are shown on **Figure 4.** Levels of Service calculations were then conducted with calculation sheets contained in **Appendix E.**

It is noted that the results of these calculations (summarized in **Table 2**) shows continued excellent intersection Levels of Service for the 2017 future background traffic condition, which are virtually unchanged from existing conditions. Further, County Road No. 30 two-way traffic volumes (estimated in the range of 550 to 620 two-way vehicles per hour) are expected to remain well within the design capacity of this roadway.

Table 2: 2017 Future Background Intersection Operations

Subject Intersections ***(Critical Movement Operations)***	Weekday AM Peak Hour		Weekday PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
County Road No. 30 @ Old Wooler Road				
Southbound Shared Left/Through;	1	A	2	A
Westbound Shared Left/Right	12	B	>10	B



Legend:

XX (XX) – AM (PM) Peak Hour Traffic Movements

- Stop Sign Control

Not to Scale

Figure 4

PROPOSED CODRINGTON PIT

2017 Future Background Traffic Volumes

3.0 PROPOSED PIT OPERATIONS AND TRUCK TRAFFIC GENERATION

3.1 Proposed Pit Operations

The current proposal is to extract, process and ship a maximum of 750,000 tonnes of aggregate per year over a full 12 month period. Shipping would be done from 6:00 am to 7:00 pm on weekdays and from 7:00 am to noon on Saturdays with no activity on Sundays or Holidays (Employment Standards Act). Some night time operations might be considered at certain times of the year to meet contract requirements but for our hourly truck volume estimates we have not included these possible extra shipping hours. Trucks would typically be a mix of 22 tonne tri-axles and 35 to 38 tonne trailers for an average truck load of 30 tonnes.

Statistics obtained from other 12 month pit operations indicate that 65% of the total yearly output is shipped from mid April to mid October with average hourly flows fairly uniform during that period. Since this period will produce the highest volume of daily trucks generated by the Codrington Pit, we have focused the analysis on this busiest of haulage seasons.

3.2 Peak Truck Traffic Generation

Using the aforementioned peak season operations statistics we have estimated the anticipated peak daily and hourly truck generation as follows:

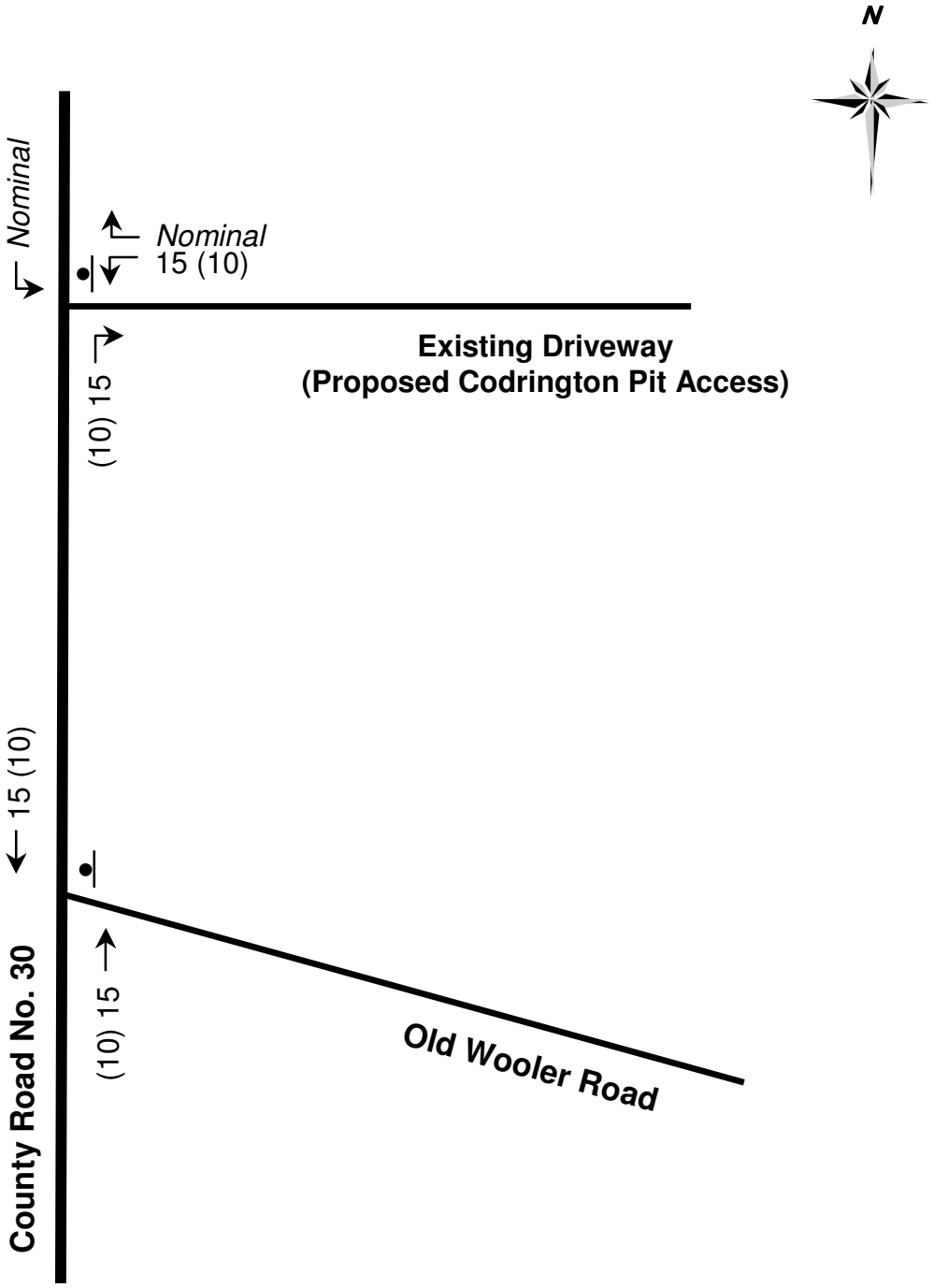
- Number of weekdays from mid-April to mid-October: 129
- Number of weekday Statutory Holidays 5
- Net number of weekdays 124
- Number of daily weekday operating hours: 13
- Number of net weekday shipping hours: 124 x 13 = 1,612 hours
- Number of Saturdays: 27
- Number of daily Saturday operating hours: 5
- Number of Saturday shipping hours: 27 x 5 = 135 hours
- Total shipping hours: 1612 + 135 = 1,747 hours
- Total tonnage shipped from mid April to mid October: 750,000 x 65% = 487,500 tonnes
- Average tonnage shipped per hour in peak season: 487,500 / 1,747 = 279 tonnes
- Average load weight per truck: 30 tonnes
- **Average outbound trucks per hour (peak season): 279/30 = 9.3 (rounded to 10)**

Peak hours in the AM usually experience volumes about 50% greater than the typical calculated hourly average (10 x 1.5 = 15). Therefore, for our analysis we have used 15 loaded trucks exiting the site during the AM peak hour with a companion 15 empty trucks returning.

Hourly volumes usually drop off in late afternoon to less than the hourly average depending upon haulage distances. For our analysis, however, we have used the average of 10 per hour during the PM peak period (10 loaded trucks exiting and 10 empty trucks entering the site access).

While there could be some local delivery of material to destinations north of the site, we have been advised that the predominant market for the movement of aggregate material would be to the south along County Road No. 30 to its connections with Highway No. 401. We have, therefore, assigned all of the peak hour truck traffic to the south to produce a "worst case" traffic movement condition involving left turns from the site access onto County Road 30.

Figure 5 shows the estimated truck trip assignment generated by the Codrington Pit during the AM and PM peak hours for the peak haulage season.



Legend:

XX (XX) – AM (PM) Peak Hour Traffic Movements

- Stop Sign Control

Not to Scale

Figure 5

PROPOSED CODRINGTON PIT

Codrington Pit Peak Generated Truck Traffic Volumes

4.0 TRAFFIC IMPACT ASSESSMENT

4.1 Total Future Traffic Conditions

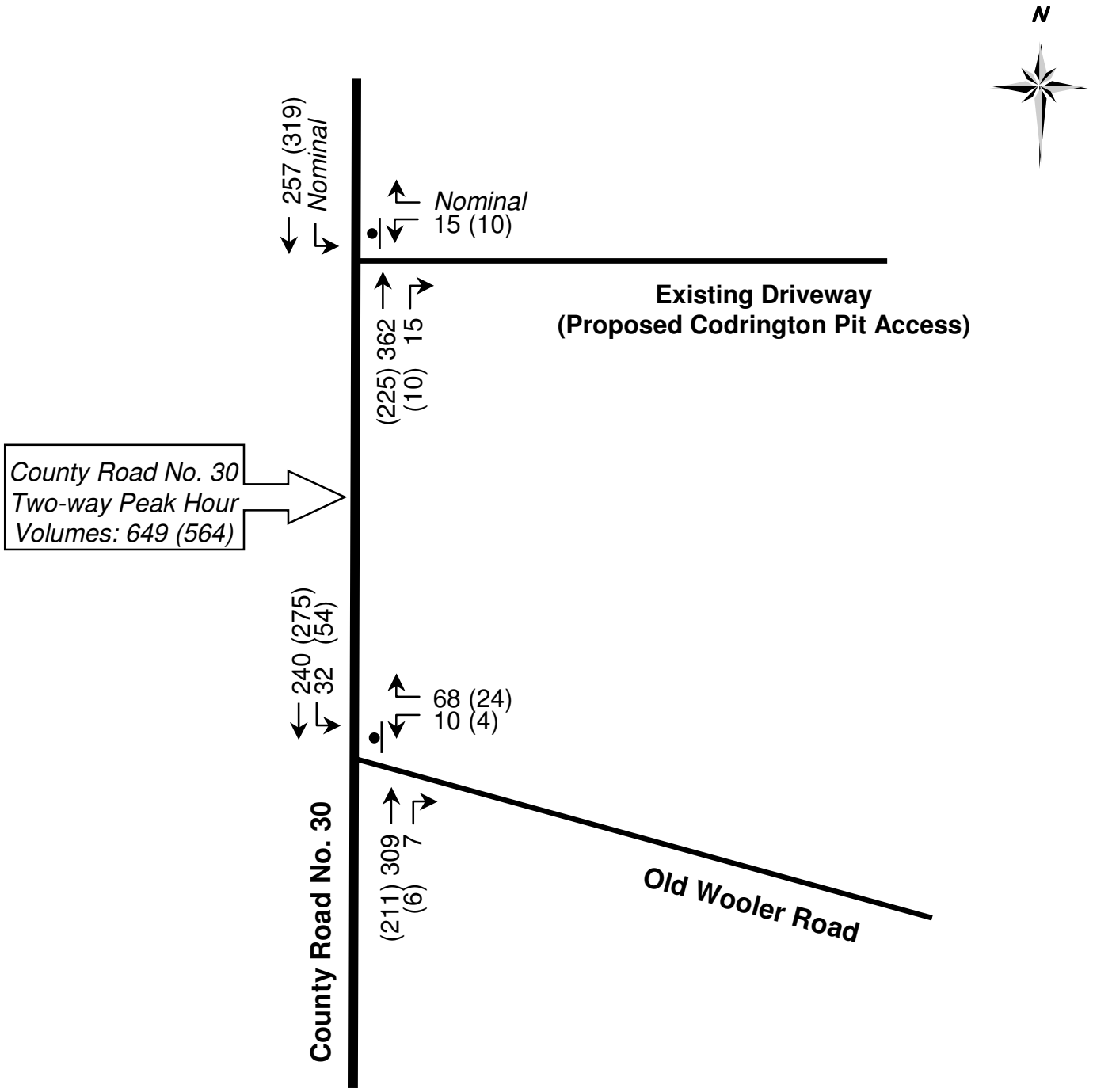
The calculated truck movement estimates shown on **Figure 5** have been added to the 2017 Future Background Traffic on **Figure 4** to produce estimates of Total Future 2017 Peak Traffic Flows shown on **Figure 6.**

Level of Service calculations have been conducted for this total future condition with the calculation sheets contained in **Appendix F. Table 3** summarizes the results of the analysis after introduction of Codrington Pit generated truck traffic at the intersection of County Road No. 30 / Old Wooler Road and the proposed County Road No. 30 site access.

Table 3: 2017 Total Future Intersection Operations

Subject Intersections ***(Critical Movement Operations)***	Weekday AM Peak Hour		Weekday PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
County Road No. 30 @ Old Wooler Road				
Southbound Shared Left/Through;	1	A	2	A
Westbound Shared Left/Right	12	B	>10	B
County Road No. 30 @ Proposed Site Access				
Southbound Left turn;	Negligible	A	Negligible	A
Westbound Shared Left/Right;	18	C	16	C

It is noted that the results of these calculations shows continued good intersection Levels of Service and brief delays after introduction of pit-generated trips. Further, County Road No. 30 traffic volumes will still remain well within the design capacity of the roadway and the additional truck traffic generated by the pit will not significantly alter the overall composition of traffic travelling the abutting roadway system.



Legend:

XX (XX) – AM (PM) Peak Hour Traffic Movements

- Stop Sign Control

Not to Scale

Figure 6

PROPOSED CODRINGTON PIT

2007 Total Future Traffic Volumes

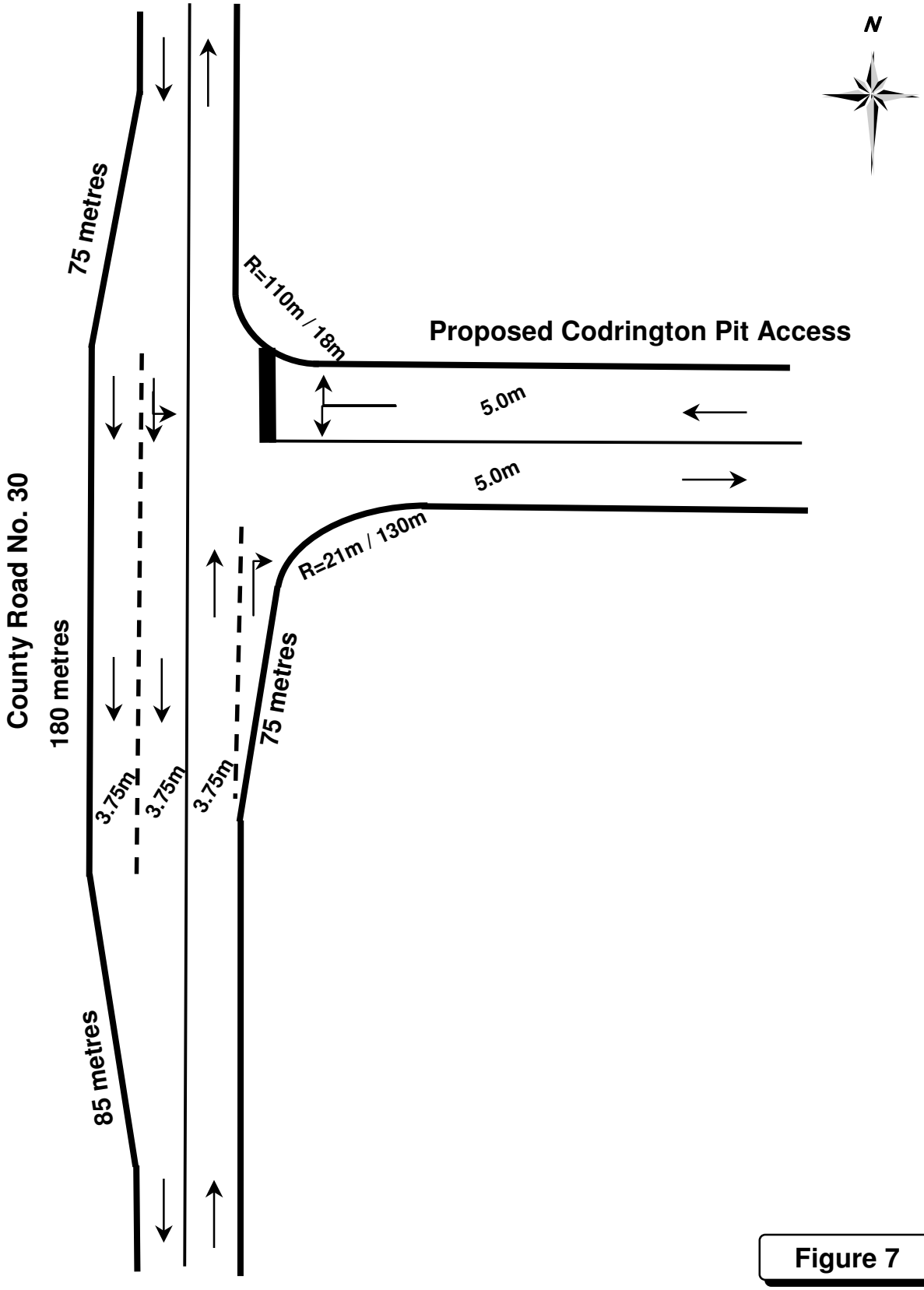
4.2 Proposed Site Access Design

The private roadway connecting the proposed pit to County Road No. 30 should have a standard two lane design of 5.0 metres per lane near the access to facilitate the safe movement of large aggregate vehicles as they exit and enter the site. Appropriate corner radii should also be provided to accommodate the turning movements of large gravel pit vehicles. At its connection to County Road No. 30 the access should be stop controlled for existing vehicles.

A southbound "By-Pass" through lane should be constructed on County Road No. 30 to permit adequate acceleration distance for southbound loaded trucks to gather sufficient speed before mixing with County Road 30 passing vehicles and to accommodate the occasional inbound left turning site-generated vehicle. For entering empty trucks arriving from the south, a northbound right turn taper with appropriate corner radius to facilitate inbound right turn movements of large tractor trailer vehicles should be constructed.

Advance warning "truck entrance" signs should also be installed on County Road No. 30 north and south of the site access.

These recommended roadway improvements are illustrated conceptually on **Figure 7** and are based upon Ministry of Transportation criteria using the projected future volumes and existing design speed of County Road No. 30 (assumed to be 90 km/h – 10 km/h above the posted speed limit). All final design elements would be required to satisfy County of Northumberland engineering standards and design criteria.



Not to Scale

Figure 7

PROPOSED CODRINGTON PIT

Recommended Codrington Pit Access Concept

5.0 CONCLUSIONS AND RECOMMENDATIONS

The findings and conclusions of this study are summarized as follow:

1. The intersection of County Road No. 30 and Old Wooler Road is currently operating at excellent levels of service during AM and PM peak hours with little delays experienced. Existing County Road No. 30 volumes are well within the design capacity of the road.

2. Based on consultations with the road authorities, a 2% annual growth factor was utilized to predict the background traffic growth to a ten-year time horizon (2017). Level of service calculations reveal that good peak hour intersections operations will continue to the 2017 horizon (and likely well beyond). Further, County Road No. 30 will continue to operate well within its design capacity.

3. Based on the proposed operations of the Codrington Pit, the hourly truck traffic during the peak haulage season will be 30 two-way trucks in the AM peak (15 inbound and 15 outbound) and 20 two-way trucks in the PM (10 inbound and 10 outbound). Distribution of loaded outgoing and empty returning trucks will be primarily to/from the south.

4. After introduction of estimated Codrington Pit trucks, good intersection and roadway operations are expected to continue. The proposed site access will likewise operate at good peak hour levels of service with minimal delays.

5. It is recommended that the proposed Pit access to County Road No. 30 include the following design elements:
   a. Northbound right turn taper;
   b. Southbound left turn lane slip-lane/acceleration lane;
   c. Shared lane approach for the entrance (with 5.0 metre lane widths) with stop-control;
   d. 'Truck Turning' advance warning signs on northbound/southbound County Road No. 30.

APPENDIX A: CV's for Mr. Grant Bacchus, P.Eng. and Sernas Transtech (Key Staff)

GRANT A. BACCHUS
President

Born in Toronto in 1929, graduated from University of Toronto in 1951 with a B.A.Sc. in Civil Engineering followed by courses in the Engineering Aspects of Town Planning, Statistics for Traffic Engineers and in Management (A.M.A.).

EMPLOYMENT EXPERIENCE:

1951 - 1956	Department of Highways of Ontario Traffic Studies Engineer
1956 - 1959	Metropolitan Toronto Planning Board Assistant Traffic Engineer
1959 - 1975	A.D. Margison and Associates Limited:
1959 - 1961	Asst. Traffic Engineer
1961 - 1966	Senior Traffic Engineer
1966 - 1975	Manager, Transportation and Municipal Division
1975 - Present	Operate a private practice as a consultant in traffic engineering, parking, and transportation planning. Major specialization is in the assessment of the transportation implications and requirements of land development for both landowners and governmental agencies.

PROFESSIONAL ASSOCIATIONS:

Association of Professional Engineers of Ontario

Lambda Alpha International - Past President of Toronto Chapter

Board of Trade of Metropolitan Toronto
- Member of Council (1987-1991)
- Transportation Committee
- Advisory Committee on Future of Toronto Waterfront
- Country Club Board of Administration (1987-1991); Chairman 1989-90
- Canadian National Exhibition Association; Associate Director 1992-1994

Institute of Transportation Engineers - Fellow and Life Member
- Member and Past President, Canadian District
- International Board of Direction 1980 - 1982
- Member, Florida Section
- Member, Consultants Council
- Founding Member, Expert Witness Council
- Recipient, 1998 H. Robert Burton Distinguished Service Award

PROJECT EXPERIENCE:

Transportation planning projects involving large-scale road needs assessments for significant road networks have been a specialty. Our considerable experience in the approvals process for the development of municipally and privately held lands includes:

- Town of Holland Landing;
  Provided advice on the Town's most recent Official Plan for major urban growth within the Town. Duties included large network needs assessment and presentation at the Ontario Municipal Board.
- City of Guelph;
  Advisor to the City study team on road planning aspects of new Official Plan for the Eastview area of the City.
- Government of Ontario;
  Provided advice on road planning for a 'new town' (Heritage Green) near Stoney Creek for the Ontario Land Corporation.
- Town of Richmond Hill;
  Transportation Planning advisor on the redevelopment of the Langstaff Jail Farm into residential, retail/commercial, and office uses.
- City of Welland;
  For over ten years have provided transportation planning services on a large variety of residential, retail/commercial, and industrial developments for private land developers and the City of Welland.
- University of Guelph;
  Advisor to the university on campus road planning and development planning for unused university lands.

Over the past forty years provided traffic planning input to new Official Plans in and for; Richmond Hill, Vaughan, York County, North York (former City), and Mississauga. Also was project director on early transportation studies for Kingston, Trenton, Guelph, Kitchener-Waterloo, London, and Sarnia

Specific retail development projects over the past 30 years, consulting services have been provided on over 500 projects involving retail commercial uses. These have included a variety of shopping centres all across Canada plus specific assignments on free standing stores.

Site access and circulation plus parking analyses and design are typical of the services provided to clients such as:

- Hudson's Bay Company
- Sears Canada Inc.
- Canadian Tire Corporation
- Loblaws
- A & P

- Dominion Stores
- Steinbergs
- Cadillac Fairview
- Landawn Shopping Centres
- Campeau Corporation

Research has also been conducted on the parking requirements of shopping centres while serving as "Consultant for Canada" on a major study for the International Council of Shopping Centres.

Specific truck movement analysis carried out by Grant A. Bacchus for the past fifteen years have involved both sanitary land fill and gravel pit extraction sites. A vast number of such projects have been handled for clients such as:

- TCG Materials Limited
- Beamish Construction Company
- York Sanitation Limited (Markham Site)
- Metropolitan Toronto Works Department (Transfer Station)
- Canada Building Materials (CBM)
- Dufferin Construction Company
- Capital Paving Company
- City of Guelph-New Wet/Dry Recycling Plant and Eastview Land Fill Site
- Fowler Construction
- Mardon Farms
- Blue Circle Aggregates

These assignments included detailed traffic analysis of truck routes, site access and internal truck circulation design, impact analysis on external road systems, and provision of expert testimony at Ontario Municipal Board hearings.

JAMES A. BACCHUS, B.A. General Manager

Sernas Transtech
General Manager **2008 - Present**

Mr. Bacchus is the General Manager for Sernas Transtech. His services to clients include transportation planning; traffic engineering and parking; site access analysis, circulation and operations; and project management. He has over 15 years experience in the traffic, parking and transportation planning fields.

RELEVANT EXPERIENCE

Mr. Bacchus' considerable domestic and international experience has consisted of the marketing, project management, and preparation of transportation-related studies in support of small and large-scale private development applications and public infrastructure projects. Assignments have included identification and mitigation of traffic impacts from land development, and preparation of conceptual roadway/highway layouts, site access schemes, internal circulation systems, plus queuing studies, speed studies, and parking needs reviews.

Mr. Bacchus' responsibilities include the marketing, project management, preparation and presentation of Traffic Impact Studies, Parking Needs Assessments, Site Access Investigations, and Internal Functional Design Studies on behalf of both private and public sector clients. Mr. Bacchus is also responsible for the coordination and management of traffic impact components of Transportation Master Plans, Secondary Plans, Corridor Studies, Class Environmental Assessments, plus public sector transportation planning assignments and Peer Reviews. He is proficient in many International / Canadian industry-standard traffic analysis and simulation software packages used in the examination of traffic impacts, transportation system modelling, and traffic operations for intersections, roundabouts and road corridors. These include SYNCHRO/SIMTRAFFIC, VISSIM, SIDRA, HCS, HiCAP, CCGCALC, MTOP, and FORTRAN signal progression. Mr. Bacchus also has experience with the transportation demand modelling packages of TRANSCAD, EMME/2 and VISUM.

RELEVANT PROJECTS – Domestic

- Yonge Steeles Corridor Study, Town of Markham
- Downtown Parking Study, comprehensive parking analysis, City of Orillia
- Comprehensive Road inventory and Needs Assessment for Public Schools, Region of Durham
- Green Lane GO Station EA, Traffic Impact Study, Town of Newmarket
- BramWest Secondary Plan, Riverview Heights System Alternatives Assessment, City of Brampton
- Waste Management, Haul Route Impact Study, Richmond & Warwick Landfill Expansions
- Britannia Landfill, landfill expansion, City of Mississauga
- Aggregate Extraction, haul route analyses for sites throughout southern Ontario
- Fletcher's Meadow Community, City of Brampton
- Leitchcroft Farms Master Plan, Town of Richmond Hill
- Escarpment Business Community, Traffic Impact Study, Town of Milton
- Foster Creek Subdivision, Traffic Impact Study and Traffic Calming Concepts, Town of Newcastle
- Caledon Industrial Park, Traffic Impact Study, Town of Caledon
- Royal Empress Gardens, Traffic Impact Study, City of Vaughan (Vaughan Corporate Centre)
- Wayne Gretzky Parkway Retail Mall/Traffic Impact and Parking Study, City of Brantford
- Toronto Congress Centre, Traffic Impact and Parking Study, City of Etobicoke

- ClubLink Properties Inc, Kinghaven Golf and Country Club, King City

RELEVANT PROJECTS – International

- Port of Spain East-West Corridor Transportation Study, Trinidad and Tobago
- Burj Dubai, Transportation Impact Study, Dubai, U.A.E.
- Emirates Airlines Operations Centre & Headquarters, Transportation Impact Study, Dubai, U.A.E.
- Dubai Festival City, Transportation Impact Study, Dubai, U.A.E.
- Al Bahia Corniche Road, Transportation Impact Study, Abu Dhabi, U.A.E.
- Doha City Centre, Transportation Impact Study, Doha Qatar
- Qatar Petroleum Education City, Transportation Impact Study, Doha, Qatar

PROFESSIONAL BACKGROUND

Sernas Transtech **2007 – 2008**
Project Manager

UMA Engineering Limited (formerly Cansult Limited), Markham
Senior Project Manager **2007**

Cansult Limited, Markham
Project Manager **2005 – 2007**

Cansult Limited, Dubai, United Arab Emirates
Project Coordinator/Manager **2003 - 2005**

Cansult Limited, Markham
Transportation Planner **1998 – 2003**

Cansult Limited, Dubai, United Arab Emirates
Transportation Planning Technician **1997**

Cansult Limited, Markham
Transportation Planning Technician **1991 - 1997**

EDUCATION

B.A., Saint Mary's University **1991**
Halifax, Nova Scotia

SPECIALIZED TRAINING

Canadian Capacity Guide Seminar, Institute of Transportation Engineers (ITE)	**1995**
Canadian Guide to Traffic Calming Seminar, ITE	**1999**
Professional Traffic Operations Engineer (PTOE) Preparation Course, ITE	**2002**
Pedestrian and Bicycling Seminar, ITE	**2002**
Project Manager's Boot Camp, PSMJ Resources Inc.	**2006**
Traffic Calming Seminar, Recommended Practices, ITE	**2007**
Transportation Impact Analyses for Site Development, ITE	**2007**
Management and Leadership Training, Ontario Society of Professional Engineers	**2007**
Principal's Bootcamp, PSMJ Resources Inc.	**2009**

PROFESSIONAL ASSOCIATIONS

Institution of Transportation Engineers (ITE):

- International and Canadian Chapter ITE Member
- Transportation Planning Council Member
- Traffic Engineering Council Member
- Parking Council Member
- Expert Witness Council Member

PRESENTATIONS

Burj Dubai – A Case Study:
Transportation Assessment and Mitigation for the World's Tallest Tower and Largest Retail Mall
Society of Engineers, United Arab Emirates **2004**

APPENDIX B: Traffic Data Summaries

Intersection: County Road 30 @ Old Wooler Road
Project Name: Hilton Pit
Project #: 2006-06 (C0398)

Major Road: 30
Intersection Control: Stop Control - Wooler Road

Municipality: Brighton
Date: Thu. Sep 21, 2006
Weather: Overcast
Name: Grant A. Bacchus Ltd.

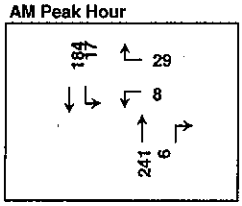
A.M. Specified Count Period: 7:30 AM to 12:00 AM

TOTAL VEHICLES	EASTBOUND			WESTBOUND			NORTHBOUND			SOUTHBOUND				
street name		*Stop*		*Old Wooler Rd.*	*Stop*		*County Road 30*	*free flow*		*County Road 30*	*free flow*			
traffic control	LT	THRU	RT	LT	THRU	RT	LT	THRU	RT	LT	THRU	RT	TOTAL	TOTAL HOUR
approach lanes	>	*	<	>	*	<	>	*	<	>	*	<		
7:30 - 8:00	0	0	0	5	0	18	0	117	2	7	85	0	234	
8:00 - 8:30	0	0	0	3	0	11	0	124	4	10	99	0	251	485
8:30 - 9:00	0	0	0	3	0	12	0	109	3	11	53	0	191	442
9:00 - 9:30	0	0	0	2	0	16	0	109	3	8	50	0	188	379
9:30 - 10:00	0	0	0	3	0	6	0	92	0	5	60	0	166	354
10:00 - 10:30	0	0	0	0	0	14	0	83	0	2	54	0	153	319
10:30 - 11:00	0	0	0	2	0	5	0	69	2	6	57	0	141	294
11:00 - 11:30	0	0	0	3	0	5	0	66	0	5	57	0	136	277
11:30 - 12:00	0	0	0	3	0	4	0	58	2	8	71	0	146	282
AM Peak Hour														
7:30 - 8:30	**0**	**0**	**0**	**8**	**0**	**29**	**0**	**241**	**6**	**17**	**184**	**0**	**485**	
# of Bus in peak	0	0	0	1	0	1	0	1	0	0	2	0	5	
# of gravel trucks in peak	0	0	0	0	0	0	0	3	1	0	2	0	6	
# of other heavies in peak	0	0	0	0	0	0	0	13	0	0	5	0	18	
% all heavies combined				13%		3%		7%	17%	0%	5%		6%	

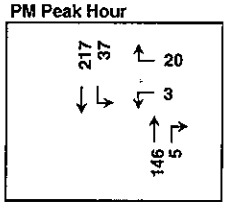
P.M. Specified Count Period: 12:30 PM to 6:00 PM

0:30 - 1:00	0	0	0	1	0	8	0	57	1	7	58	0	132	
1:00 - 1:30	0	0	0	1	0	9	0	58	4	10	73	0	155	287
1:30 - 2:00	0	0	0	1	0	5	0	64	2	4	64	0	140	295
2:00 - 2:30	0	0	0	3	0	9	0	70	4	7	82	0	175	315
2:30 - 3:00	0	0	0	0	0	17	0	72	1	8	87	0	185	360
3:00 - 3:30	0	0	0	1	0	6	0	90	3	13	95	0	208	393
3:30 - 4:00	0	0	0	1	0	12	0	66	3	14	108	0	204	412
4:00 - 4:30	0	0	0	2	0	8	0	80	2	23	109	0	224	428
4:30 - 5:00	0	0	0	2	0	6	0	79	1	15	91	0	194	418
5:00 - 5:30	0	0	0	3	0	7	0	83	2	6	102	0	203	397
5:30 - 6:00	0	0	0	0	0	14	0	67	2	15	59	0	157	360
PM Peak Hour														
3:30 - 4:30	**0**	**0**	**0**	**3**	**0**	**20**	**0**	**146**	**5**	**37**	**217**	**0**	**428**	
# of Bus in peak	0	0	0	0	0	0	0	0	0	1	1	0	2	
# of gravel trucks in peak	0	0	0	0	0	0	0	2	1	0	4	0	7	
# of other heavies in peak	0	0	0	0	0	0	0	0	0	0	5	0	5	
% all heavies combined				0%		0%		1%	20%	3%	5%		3%	

AM Peak Hour



PM Peak Hour



Intersection: County Road 30 @ Old Wooler Road
Project Name: Hilton Pit

Municipality: Brighton

PASSENGER VEHICLES

	EASTBOUND			WESTBOUND *Old Wooler Rd.*			NORTHBOUND *30*			SOUTHBOUND *30*				
	LT >	THRU *	RT <	LT >	THRU *	RT <	LT >	THRU *	RT <	LT >	THRU *	RT <	TOTAL	TOTAL HOUR
7:30 - 8:00	0	0	0	4	0	17	0	108	2	7	81	0	219	
8:00 - 8:30	0	0	0	3	0	11	0	116	3	10	94	0	237	456
8:30 - 9:00	0	0	0	2	0	11	0	100	2	10	49	0	174	411
9:00 - 9:30	0	0	0	2	0	16	0	104	2	7	45	0	176	350
9:30 - 10:00	0	0	0	2	0	6	0	82	0	5	54	0	149	325
10:00 - 10:30	0	0	0	0	0	14	0	77	0	2	49	0	142	291
10:30 - 11:00	0	0	0	1	0	5	0	60	1	5	52	0	124	266
11:00 - 11:30	0	0	0	3	0	5	0	57	0	5	53	0	123	247
11:30 - 12:00	0	0	0	3	0	4	0	55	2	8	62	0	134	257
Unique Peak Hour	0	0	0	7	0	28	0	224	5	17	175	0	456	
Composite peak	0	0	0	7	0	28	0	224	5	17	175	0	456	

0:30 - 1:00	0	0	0	1	0	8	0	51	1	6	54	0	121	
1:00 - 1:30	0	0	0	1	0	9	0	56	4	10	65	0	145	266
1:30 - 2:00	0	0	0	1	0	5	0	60	2	4	58	0	130	275
2:00 - 2:30	0	0	0	2	0	7	0	63	4	7	75	0	158	288
2:30 - 3:00	0	0	0	0	0	17	0	68	1	8	75	0	169	327
3:00 - 3:30	0	0	0	1	0	6	0	83	2	12	83	0	187	356
3:30 - 4:00	0	0	0	1	0	12	0	65	2	13	101	0	194	381
4:00 - 4:30	0	0	0	2	0	8	0	79	2	23	106	0	220	414
4:30 - 5:00	0	0	0	2	0	6	0	77	1	15	88	0	189	409
5:00 - 5:30	0	0	0	3	0	7	0	81	2	6	96	0	195	384
5:30 - 6:00	0	0	0	0	0	13	0	63	2	15	58	0	151	346
Unique Peak Hour	0	0	0	3	0	20	0	144	4	36	207	0	414	
Composite peak	0	0	0	3	0	20	0	144	4	36	207	0	414	

Intersection: County Road 30 @ Old Wooler Road
Project Name: Hilton Pit

Municipality: Brighton

Gravel Trucks

	EASTBOUND			WESTBOUND *Old Wooler Rd.*			NORTHBOUND *30*			SOUTHBOUND *30*				
	LT ->	THRU *	RT <	LT >	THRU *	RT <	LT >	THRU *	RT <	LT >	THRU *	RT <	TOTAL	TOTAL HOUR
7:30 - 8:00	0	0	0	0	0	0	0	1	0	0	1	0	2	
8:00 - 8:30	0	0	0	0	0	0	0	2	1	0	1	0	4	6
8:30 - 9:00	0	0	0	1	0	0	0	2	0	0	1	0	4	8
9:00 - 9:30	0	0	0	0	0	0	0	1	1	0	1	0	3	7
9:30 - 10:00	0	0	0	1	0	0	0	1	0	0	1	0	3	6
10:00 - 10:30	0	0	0	0	0	0	0	1	0	0	1	0	2	5
10:30 - 11:00	0	0	0	1	0	0	0	1	1	0	1	0	4	6
11:00 - 11:30	0	0	0	0	0	0	0	2	0	0	1	0	3	7
11:30 - 12:00	0	0	0	0	0	0	0	1	0	0	2	0	3	6
Unique Peak Hour	0	0	0	1	0	0	0	4	1	0	2	0	8	
Composite peak	0	0	0	0	0	0	0	3	1	0	2	0	6	

0:30 - 1:00	0	0	0	0	0	0	0	3	0	0	1	0	4	
1:00 - 1:30	0	0	0	0	0	0	0	1	0	0	2	0	3	7
1:30 - 2:00	0	0	0	0	0	0	0	1	0	0	2	0	3	6
2:00 - 2:30	0	0	0	0	0	0	0	2	0	0	2	0	4	7
2:30 - 3:00	0	0	0	0	0	0	0	0	0	0	1	0	1	5
3:00 - 3:30	0	0	0	0	0	0	0	2	0	0	1	0	3	4
3:30 - 4:00	0	0	0	0	0	0	0	1	1	0	2	0	4	7
4:00 - 4:30	0	0	0	0	0	0	0	1	0	0	2	0	3	7
4:30 - 5:00	0	0	0	0	0	0	0	0	0	0	0	0	0	3
5:00 - 5:30	0	0	0	0	0	0	0	0	0	0	1	0	1	1
5:30 - 6:00	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Unique Peak Hour	0	0	0	0	0	0	0	2	1	0	4	0	7	
Composite peak	0	0	0	0	0	0	0	2	1	0	4	0	7	

Intersection: County Road 30 @ Old Wooler Road
Project Name: Hilton Pit

Municipality: Brighton

Other Heavies

	EASTBOUND			WESTBOUND *Old Wooler Rd.*			NORTHBOUND *30*			SOUTHBOUND *30*			TOTAL	TOTAL HOUR
	LT >	THRU *	RT <	LT >	THRU *	RT <	LT >	THRU *	RT <	LT >	THRU *	RT <		
7:30 - 8:00	0	0	0	0	0	0	0	8	0	0	1	0	9	
8:00 - 8:30	0	0	0	0	0	0	0	5	0	0	4	0	9	18
8:30 - 9:00	0	0	0	0	0	1	0	5	0	0	3	0	9	18
9:00 - 9:30	0	0	0	0	0	0	0	2	0	1	4	0	7	16
9:30 - 10:00	0	0	0	0	0	0	0	8	0	0	5	0	13	20
10:00 - 10:30	0	0	0	0	0	0	0	5	0	0	4	0	9	22
10:30 - 11:00	0	0	0	0	0	0	0	8	0	1	4	0	13	22
11:00 - 11:30	0	0	0	0	0	0	0	7	0	0	3	0	10	23
11:30 - 12:00	0	0	0	0	0	0	0	2	0	0	7	0	9	19
Unique Peak Hour	0	0	0	0	0	0	0	15	0	1	7	0	23	
Composite peak	0	0	0	0	0	0	0	13	0	0	5	0	18	

0:30 - 1:00	0	0	0	0	0	0	0	3	0	0	3	0	6	
1:00 - 1:30	0	0	0	0	0	0	0	1	0	0	6	0	7	13
1:30 - 2:00	0	0	0	0	0	0	0	3	0	0	4	0	7	14
2:00 - 2:30	0	0	0	0	0	1	0	5	0	0	2	0	8	15
2:30 - 3:00	0	0	0	0	0	0	0	4	0	0	10	0	14	22
3:00 - 3:30	0	0	0	0	0	0	0	2	0	1	10	0	13	27
3:30 - 4:00	0	0	0	0	0	0	0	0	0	0	4	0	4	17
4:00 - 4:30	0	0	0	0	0	0	0	0	0	0	1	0	1	5
4:30 - 5:00	0	0	0	0	0	0	0	2	0	0	3	0	5	6
5:00 - 5:30	0	0	0	0	0	0	0	2	0	0	5	0	7	12
5:30 - 6:00	0	0	0	0	0	1	0	4	0	0	1	0	6	13
Unique Peak Hour	0	0	0	0	0	0	0	6	0	1	20	0	27	
Composite peak	0	0	0	0	0	0	0	0	0	0	5	0	5	

Intersection: County Road 30 @ Old Wooler Road
Project Name: Hilton Pit

Municipality: Brighton

School Buses

	EASTBOUND			WESTBOUND *Old Wooler Rd.*			NORTHBOUND *30*			SOUTHBOUND *30*			TOTAL	TOTAL HOUR
	LT >	THRU *	RT <	LT >	THRU *	RT <	LT >	THRU *	RT <	LT >	THRU *	RT <		
7:30 - 8:00	0	0	0	1	0	1	0	0	0	0	2	0	4	
8:00 - 8:30	0	0	0	0	0	0	0	1	0	0	0	0	1	5
8:30 - 9:00	0	0	0	0	0	0	0	2	1	1	0	0	4	5
9:00 - 9:30	0	0	0	0	0	0	0	2	0	0	0	0	2	6
9:30 - 10:00	0	0	0	0	0	0	0	1	0	0	0	0	1	3
10:00 - 10:30	0	0	0	0	0	0	0	0	0	0	0	0	0	1
10:30 - 11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00 - 11:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30 - 12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unique Peak Hour	0	0	0	0	0	0	0	4	1	1	0	0	6	
Composite peak	0	0	0	1	0	1	0	1	0	0	2	0	5	

0:30 - 1:00	0	0	0	0	0	0	0	0	0	1	0	0	1	
1:00 - 1:30	0	0	0	0	0	0	0	0	0	0	0	0	0	1
1:30 - 2:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:00 - 2:30	0	0	0	1	0	1	0	0	0	0	3	0	5	5
2:30 - 3:00	0	0	0	0	0	0	0	0	0	0	1	0	1	6
3:00 - 3:30	0	0	0	0	0	0	0	3	1	0	1	0	5	6
3:30 - 4:00	0	0	0	0	0	0	0	0	0	1	1	0	2	7
4:00 - 4:30	0	0	0	0	0	0	0	0	0	0	0	0	0	2
4:30 - 5:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 - 5:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 - 6:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unique Peak Hour	0	0	0	0	0	0	0	3	1	1	2	0	7	
Composite peak	0	0	0	0	0	0	0	0	0	1	1	0	2	

Old Wooler Road & # 30 / Monday June 11, 2007 / Codrington Pit **PROJECT NO.: C0398 (G146 - 400)**

Weather: sunny **total vehicles** **NAME: Sernas**

		SOUTHBOUND			WESTBOUND			NORTHBOUND			EASTBOUND			TOTAL	TOTAL
		RT	THRU	LT	RT	THRU	LT	RT	THRU	LT	RT	THRU	LT	30-min	HOUR
AM	**7:00 - 7:30**	0	75	15	19	0	2	1	53	0	0	0	0	165	
	7:30 - 8:00	0	98	18	29	0	5	0	86	0	0	0	0	236	401
	8:00 - 8:30	0	70	8	27	0	3	1	90	0	0	0	0	199	435
	8:30 - 9:00	0	53	8	11	0	2	0	74	0	0	0	0	148	347
	9:00 - 9:30	0	55	7	10	0	0	1	62	0	0	0	0	135	283
	9:30 - 10:00	0	48	3	3	0	1	0	58	0	0	0	0	113	248
	10:00 - 10:30	0	71	9	5	0	0	2	40	0	0	0	0	127	240
	10:30 - 11:00	0	49	7	4	0	1	0	54	0	0	0	0	115	242
	11:00 - 11:30	0	55	6	4	0	0	2	56	0	0	0	0	123	238
	11:30 - 12:00	0	53	6	7	0	2	3	47	0	0	0	0	118	241
Peak Hour	**7:30 - 8:30**	0	168	26	56	0	8	1	176	0	0	0	0	435	
	# of buses in peak	0	3	0	1	0	1	0	0	0	0	0	0	5	
	# of Gravel Trucks in peak	0	4	0	0	0	0	0	3	0	0	0	0	7	
	# of other trucks in peak	0	3	0	0	0	0	0	6	0	0	0	0	9	
	% all heavies (combined)	0%	6%	0%	2%	0%	13%	0%	5%	0%	0%	0%	0%	5%	

PM	**12:00 - 12:30**	0	58	3	6	0	1	1	43	0	0	0	0	112	
	12:30 - 13:00	0	54	6	3	0	1	0	54	0	0	0	0	118	230
	13:00 - 13:30	0	61	7	6	0	0	0	51	0	0	0	0	125	243
	13:30 - 14:00	0	54	10	9	0	0	1	61	0	0	0	0	135	260
	14:00 - 14:30	0	80	12	7	0	0	1	73	0	0	0	0	173	308
	14:30 - 15:00	0	97	10	14	0	2	3	83	0	0	0	0	209	382
	15:00 - 15:30	0	77	17	9	0	1	2	70	0	0	0	0	176	385
	15:30 - 16:00	0	75	23	11	0	1	1	78	0	0	0	0	189	365
	16:00 - 16:30	0	66	21	6	0	0	3	87	0	0	0	0	183	372
	16:30 - 17:00	0	59	19	12	0	2	3	77	0	0	0	0	172	355
	17:00 - 17:30	0	68	9	18	0	2	3	81	0	0	0	0	181	353
	17:30 - 18:00	0	64	8	16	0	0	1	68	0	0	0	0	157	338
Peak Hour	**14:30 - 15:30**	0	174	27	23	0	3	5	153	0	0	0	0	385	
	# of buses in peak	0	1	0	0	0	0	1	4	0	0	0	0	6	
	# of Gravel Trucks in peak	0	7	0	0	0	0	0	2	0	0	0	0	9	
	# of other trucks in peak	0	6	1	0	0	0	0	4	0	0	0	0	11	
	% all heavies (combined)	0%	8%	4%	0%	0%	0%	20%	7%	0%	0%	0%	0%	7%	

Old Wooler Road & # 30 / Monday June 11, 2007 / Codrington Pit **PROJECT NO.: C0398 (G146 - 400)**

Weather: sunny **Passenger veh.** **NAME: Sernas**

		SOUTHBOUND			WESTBOUND			NORTHBOUND			EASTBOUND			TOTAL	TOTAL
		RT	THRU	LT	RT	THRU	LT	RT	THRU	LT	RT	THRU	LT	30-min	HOUR
AM	**7:00 - 7:30**		69	15	19		1	1	48					153	
	7:30 - 8:00		93	18	28		4		82					225	378
	8:00 - 8:30		65	8	27		3	1	85					189	414
	8:30 - 9:00		46	8	11		2		67					134	323
	9:00 - 9:30		51	7	10		0	1	53					122	256
	9:30 - 10:00		42	3	3		1		51					100	222
	10:00 - 10:30		65	9	5		0	2	37					118	218
	10:30 - 11:00		47	7	4		1		49					108	226
	11:00 - 11:30		51	6	4		0	2	44					107	215
	11:30 - 12:00		50	6	7		2	3	45					113	220
Peak Hour	**-**														
	overall peak	0	158	26	55	0	7	1	167	0	0	0	0	414	

PM	**12:00 - 12:30**		53	3	5		1	1	39					102	
	12:30 - 13:00		49	6	3		1	0	50					109	211
	13:00 - 13:30		55	7	6		0	0	47					115	224
	13:30 - 14:00		50	10	9		0	1	58					128	243
	14:00 - 14:30		72	12	7		0	1	71					163	291
	14:30 - 15:00		88	9	14		2	3	80					196	359
	15:00 - 15:30		72	17	9		1	1	63					163	359
	15:30 - 16:00		73	22	11		1	1	73					181	344
	16:00 - 16:30		63	21	6		0	3	80					173	354
	16:30 - 17:00		58	19	12		2	3	72					166	339
	17:00 - 17:30		61	9	18		2	3	80					173	339
	17:30 - 18:00		59	8	16		0	1	67					151	324
Peak Hour	**-**														
	overall peak	0	160	26	23	0	3	4	143	0	0	0	0	359	

Old Wooler Road & # 30 / Monday June 11, 2007 / Codrington Pit **PROJECT NO.: C0398 (G146 - 400)**

Weather: sunny **GRAVEL TRUCKS** **NAME: Sernas**

		SOUTHBOUND			WESTBOUND			NORTHBOUND			EASTBOUND			TOTAL	TOTAL
		RT	THRU	LT	RT	THRU	LT	RT	THRU	LT	RT	THRU	LT	30-min	HOUR
AM	**7:00 - 7:30**		2				1		0					3	
	7:30 - 8:00		1						1					2	5
	8:00 - 8:30		3						2					5	7
	8:30 - 9:00		1						5					6	11
	9:00 - 9:30		1						4					5	11
	9:30 - 10:00		3						2					5	10
	10:00 - 10:30		3						1					4	9
	10:30 - 11:00		1						4					5	9
	11:00 - 11:30		1						4					5	10
	11:30 - 12:00		2						1					3	8
Peak Hour	**-**														
	overall peak	0	4	0	0	0	0	0	3	0	0	0	0	7	

PM	**12:00 - 12:30**		2						1					3	
	12:30 - 13:00		3						3					6	9
	13:00 - 13:30		1						2					3	9
	13:30 - 14:00		1						2					3	6
	14:00 - 14:30		0						0					0	3
	14:30 - 15:00		5						1					6	6
	15:00 - 15:30		2						1					3	9
	15:30 - 16:00		1						3					4	7
	16:00 - 16:30		1						2					3	7
	16:30 - 17:00		0						3					3	6
	17:00 - 17:30		2						0					2	5
	17:30 - 18:00		3						0					3	5
Peak Hour	**-**														
	overall peak	0	7	0	0	0	0	0	2	0	0	0	0	9	

Old Wooler Road & # 30 / Monday June 11, 2007 / Codrington Pit **PROJECT NO.: C0398 (G146 - 400)**

Weather: sunny **OTHER HEAVY TRUCKS** **NAME: Sernas**

		SOUTHBOUND			WESTBOUND			NORTHBOUND			EASTBOUND			TOTAL	TOTAL
		RT	THRU	LT	RT	THRU	LT	RT	THRU	LT	RT	THRU	LT	30-min	HOUR
AM	**7:00 - 7:30**		3						4					7	
	7:30 - 8:00		2						3					5	12
	8:00 - 8:30		1						3					4	9
	8:30 - 9:00		6						2					8	12
	9:00 - 9:30		3						4					7	15
	9:30 - 10:00		3						3					6	13
	10:00 - 10:30		3						2					5	11
	10:30 - 11:00		1						1					2	7
	11:00 - 11:30		3						8					11	13
	11:30 - 12:00		1						1					2	13
Peak Hour	**-**														
	overall peak	0	3	0	0	0	0	0	6	0	0	0	0	9	
PM	**12:00 - 12:30**		3		1				3					7	
	12:30 - 13:00		2						1					3	10
	13:00 - 13:30		5						2					7	10
	13:30 - 14:00		3						1					4	11
	14:00 - 14:30		7						2					9	13
	14:30 - 15:00		4	1					1					6	15
	15:00 - 15:30		2						3					5	11
	15:30 - 16:00		1						1					2	7
	16:00 - 16:30		2						5					7	9
	16:30 - 17:00		1						2					3	10
	17:00 - 17:30		5						1					6	9
	17:30 - 18:00		2						1					3	9
Peak Hour	**-**														
	overall peak	0	6	1	0	0	0	0	4	0	0	0	0	11	

Old Wooler Road & # 30 / Monday June 11, 2007 / Codrington Pit **PROJECT NO.: C0398 (G146 - 400)**

Weather: sunny **Busses** **NAME: Sernas**

		SOUTHBOUND			WESTBOUND			NORTHBOUND			EASTBOUND			TOTAL	TOTAL
		RT	THRU	LT	RT	THRU	LT	RT	THRU	LT	RT	THRU	LT	30-min	HOUR
AM	**7:00 - 7:30**		1				0		1					2	
	7:30 - 8:00		2		1		1							4	6
	8:00 - 8:30		1											1	5
	8:30 - 9:00		0											0	1
	9:00 - 9:30		0						1					1	1
	9:30 - 10:00		0						2					2	3
	10:00 - 10:30		0											0	2
	10:30 - 11:00		0											0	0
	11:00 - 11:30		0											0	0
	11:30 - 12:00		0											0	0
Peak Hour	**-**														
	overall peak	0	3	0	1	0	1	0	0	0	0	0	0	5	

PM	**12:00 - 12:30**													0	
	12:30 - 13:00													0	0
	13:00 - 13:30													0	0
	13:30 - 14:00													0	0
	14:00 - 14:30		1											1	1
	14:30 - 15:00								1					1	2
	15:00 - 15:30		1					1	3					5	6
	15:30 - 16:00			1					1					2	7
	16:00 - 16:30													0	2
	16:30 - 17:00													0	0
	17:00 - 17:30													0	0
	17:30 - 18:00													0	0
Peak Hour	**-**														
	overall peak	0	1	0	0	0	0	1	4	0	0	0	0	6	

Project No. C0398
(G146-400)

DIRECTIONAL TURNING MOVEMENT

VEHICLE VOLUME SUMMARY

Location OLD WOOLER ROAD Date JUNE 11. 2007

Time 7^00 am - 13^00 pm Compiled by KEN Day MONDAY

	Southbound on #30			Northbound on #30			Eastbound on —			Westbound on OLD WOOLER RD			Hourly Totals
Time	L	S	R	L	S	R	L	S	R	L	S	R	
7^00-7^30	15	69	X	X	48	1	X	X	X	1	X	19	153
7^30-8^00	18	93	X	X	82	ϕ	X	X	X	4	X	28	225
8^00-8^30	8	65	X	X	85	1	X	X	X	3	X	27	189
8^30-9^00	8	46	X	X	67	ϕ	X	X	X	2	X	11	134
9^00-9^30	7	51	X	X	53	1	X	X	X	ϕ	X	10	122
9^30-10^00	3	42	X	X	51	ϕ	X	X	X	1	X	3	100
10^00-10^30	9	65	X	X	37	2	X	X	X	ϕ	X	5	118
10^30-11^00	7	47	X	X	49	ϕ	X	X	X	1	X	4	108
11-11^30	6	51	X	X	44	2	X	X	X	0	X	4	107
11^30-12^00	6	50	X	X	45	3	X	X	X	2	X	7	113
12^00-12^30	3	53	X	X	39	1	X	X	X	1	X	5	102
12^30-1^00	6	49	X	X	50	ϕ	X	X	X	1	X	3	109
1^00-1^30	7	55	X	X	47	ϕ	X	X	X	ϕ	X	6	115
1^30-2^00	10	50	X	X	58	1	X	X	X	ϕ	X	9	128
2^00-2^30	12	72	X	X	71	1	X	X	X	ϕ	X	7	163
2^30-3^00	9	88	X	X	80	3	X	X	X	2	X	14	196

Project No. _____

DIRECTIONAL TURNING MOVEMENT

VEHICLE VOLUME SUMMARY

Location OLD WOOLER ROAD Date JUNE 11. 2007

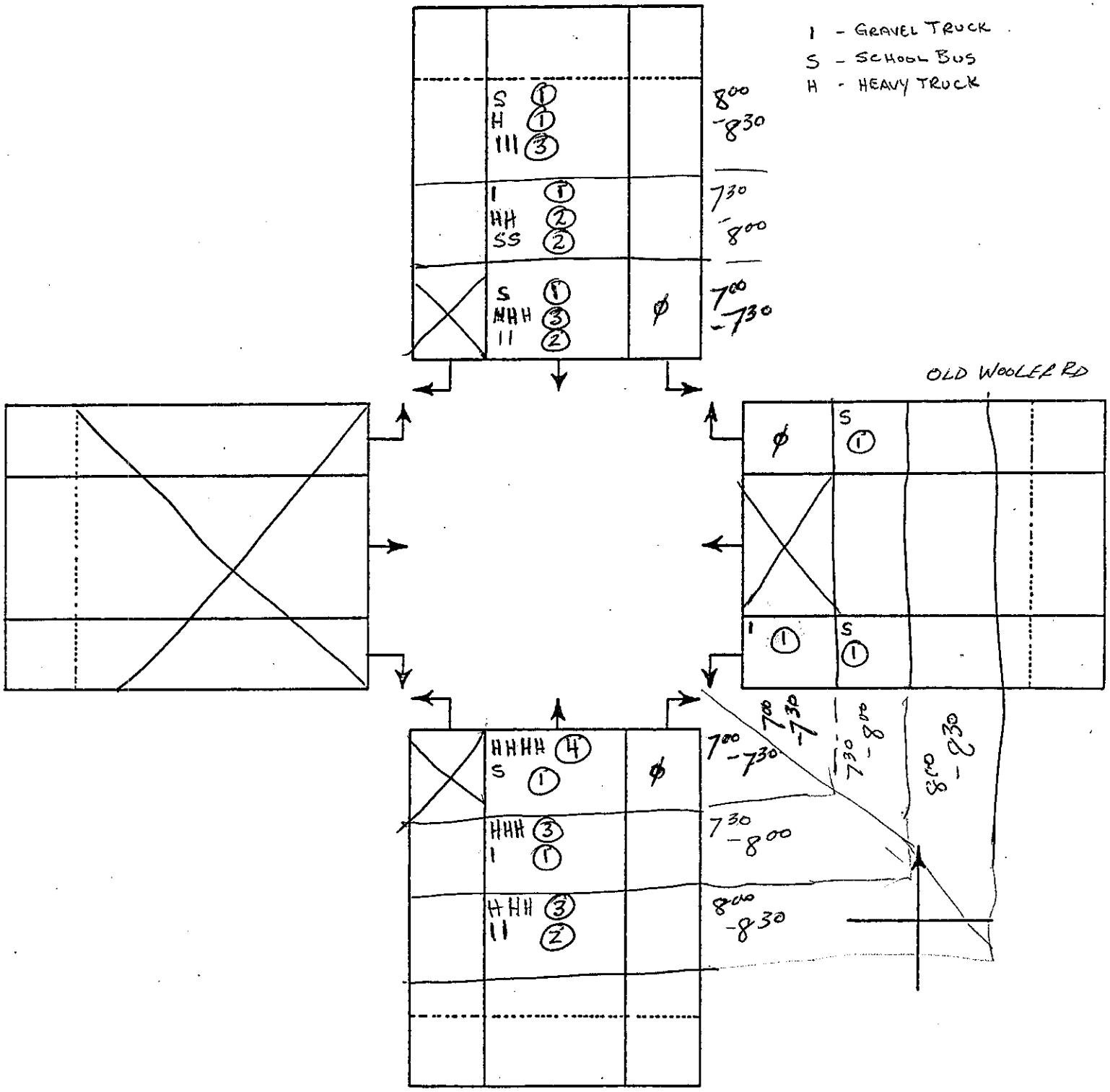
Time 3^00 pm - 6^00 pm Compiled by KEN Day MONDAY

	Southbound on #30			Northbound on #30			Eastbound on ———			Westbound on OLD WOOLER ROAD			Hourly Totals
Time	L	S	R	L	S	R	L	S	R	L	S	R	
3^00 - 3^30	17	72	X	X	63	1	X	X	X	1	X	9	163
3^30 - 4^00	22	73	X	X	73	1	X	X	X	1	X	11	181
4^00 - 4^30	21	63	X	X	80	3	X	X	X	0	X	6	173
4^30 - 5^00	19	58	X	X	72	3	X	X	X	2	X	12	166
5^00 - 5^30	9	61	X	X	80	3	X	X	X	2	X	18	173
5^30 - 6^00	8	59	X	X	67	1	X	X	X	0	X	16	151

INTERSECTION TRAFFIC COUNT

Location Old Wooler Road / #30

Date JUNE 11. 2007 Recorder KEN



Time 7^00 - 7^30

7^30 - 8^00

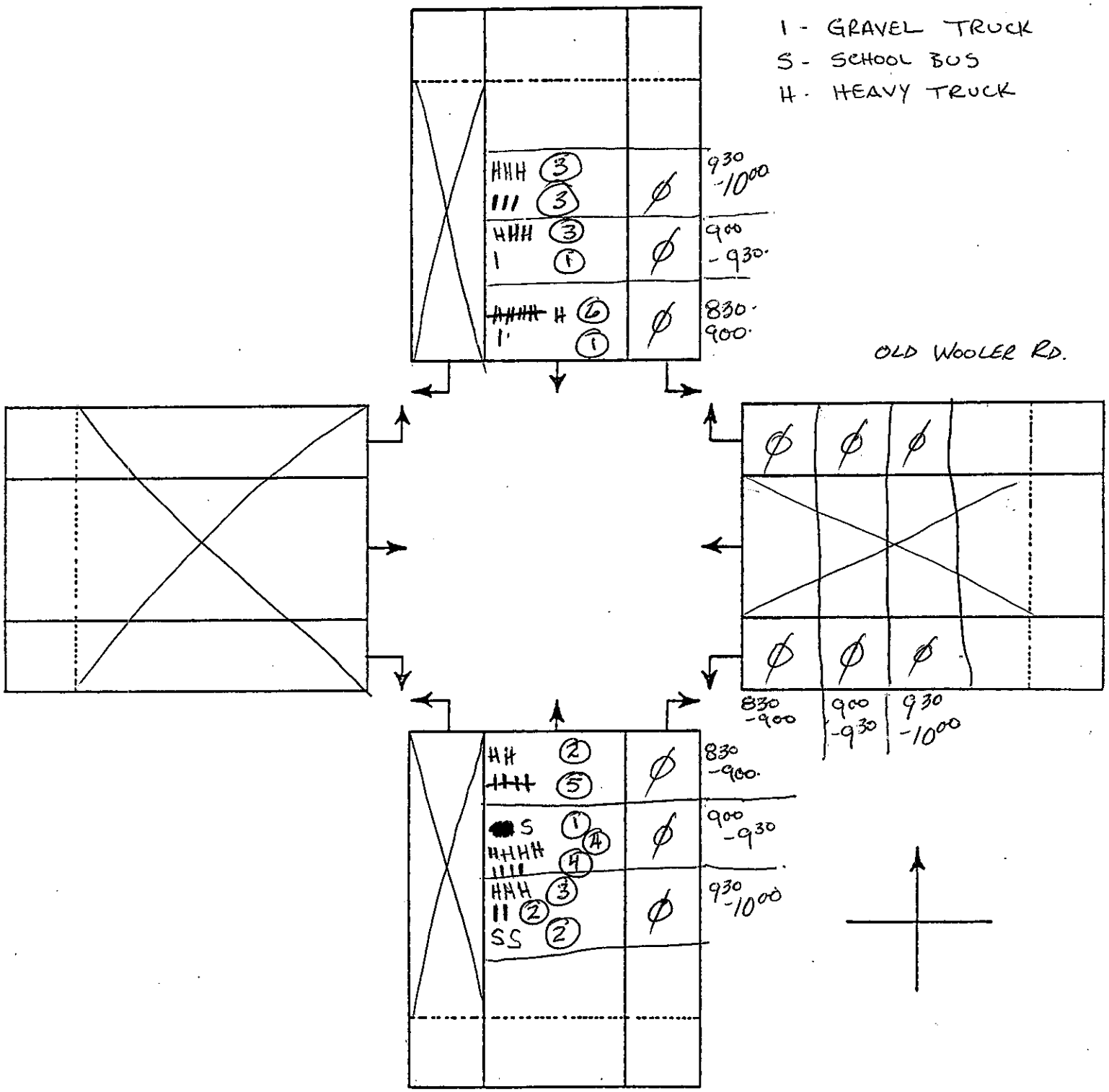
8^00 - 8^30

INTERSECTION TRAFFIC COUNT

Location OLD WOOLER RD. / #30.

Date JUNE 11, 2007 Recorder KEN

I - GRAVEL TRUCK
S - SCHOOL BUS
H - HEAVY TRUCK



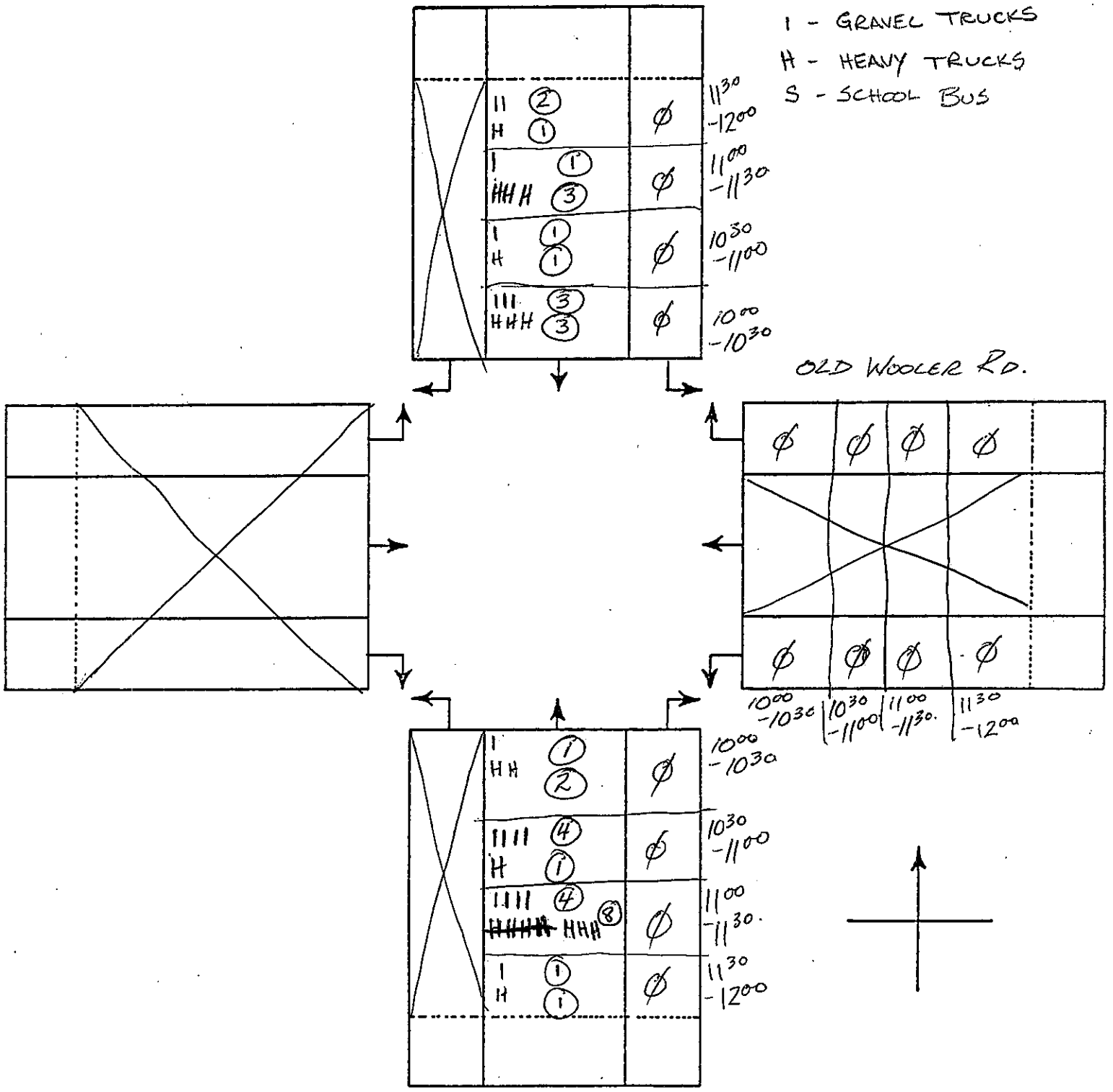
Time 830-900
900-930
930-1000

INTERSECTION TRAFFIC COUNT

Location OLD WOOLER RD / #30.

Date JUNE 11, 2007 Recorder KEN

I - GRAVEL TRUCKS
H - HEAVY TRUCKS
S - SCHOOL BUS



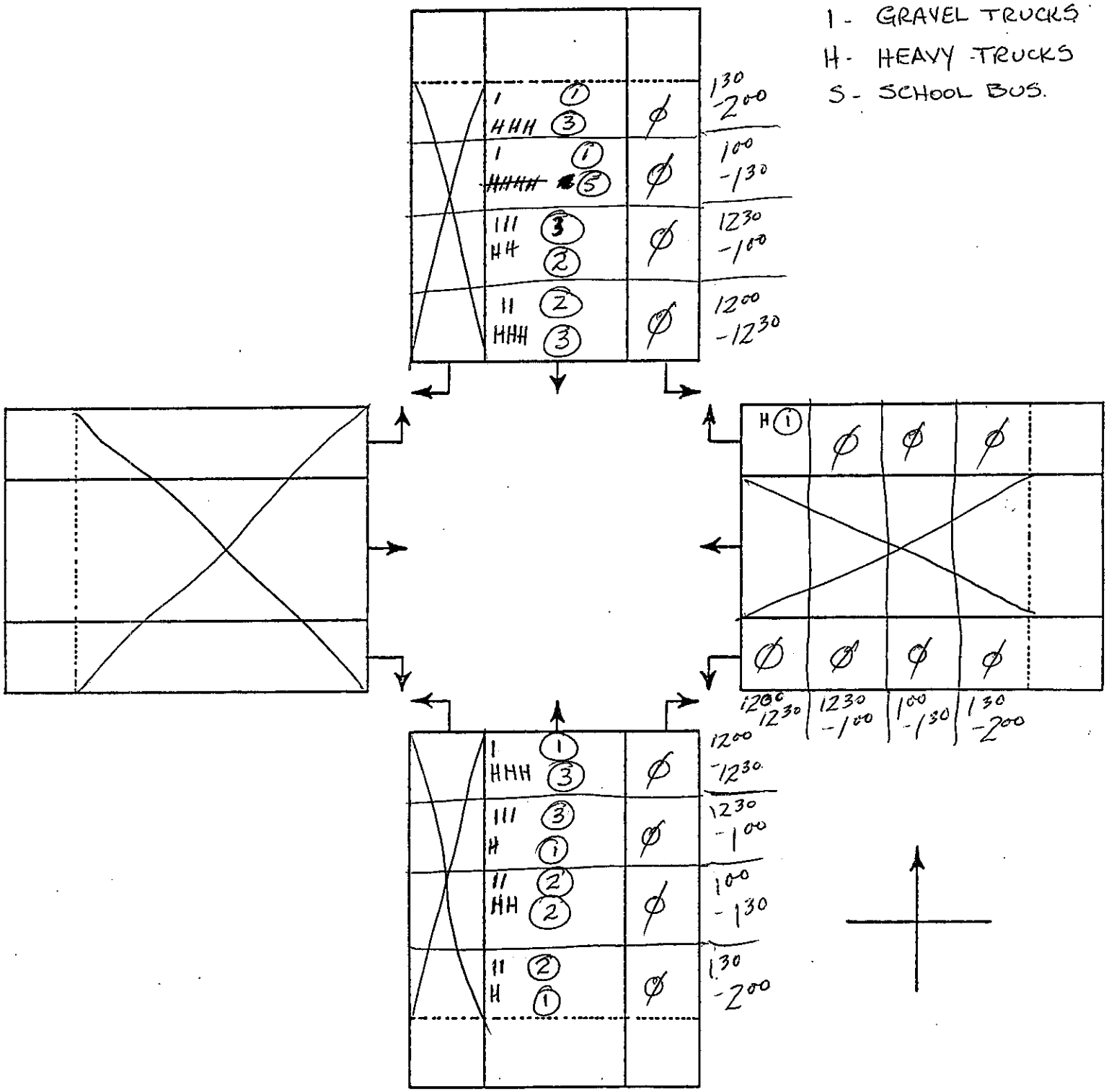
Time 10⁰⁰ - 10³⁰.
10³⁰ - 11⁰⁰.
11⁰⁰ - 11³⁰
11³⁰ - 12⁰⁰

INTERSECTION TRAFFIC COUNT

Location OLD WOOLER RD / #30

Date JUNE 11. 2007 Recorder KEN

I - GRAVEL TRUCKS
H - HEAVY TRUCKS
S - SCHOOL BUS.

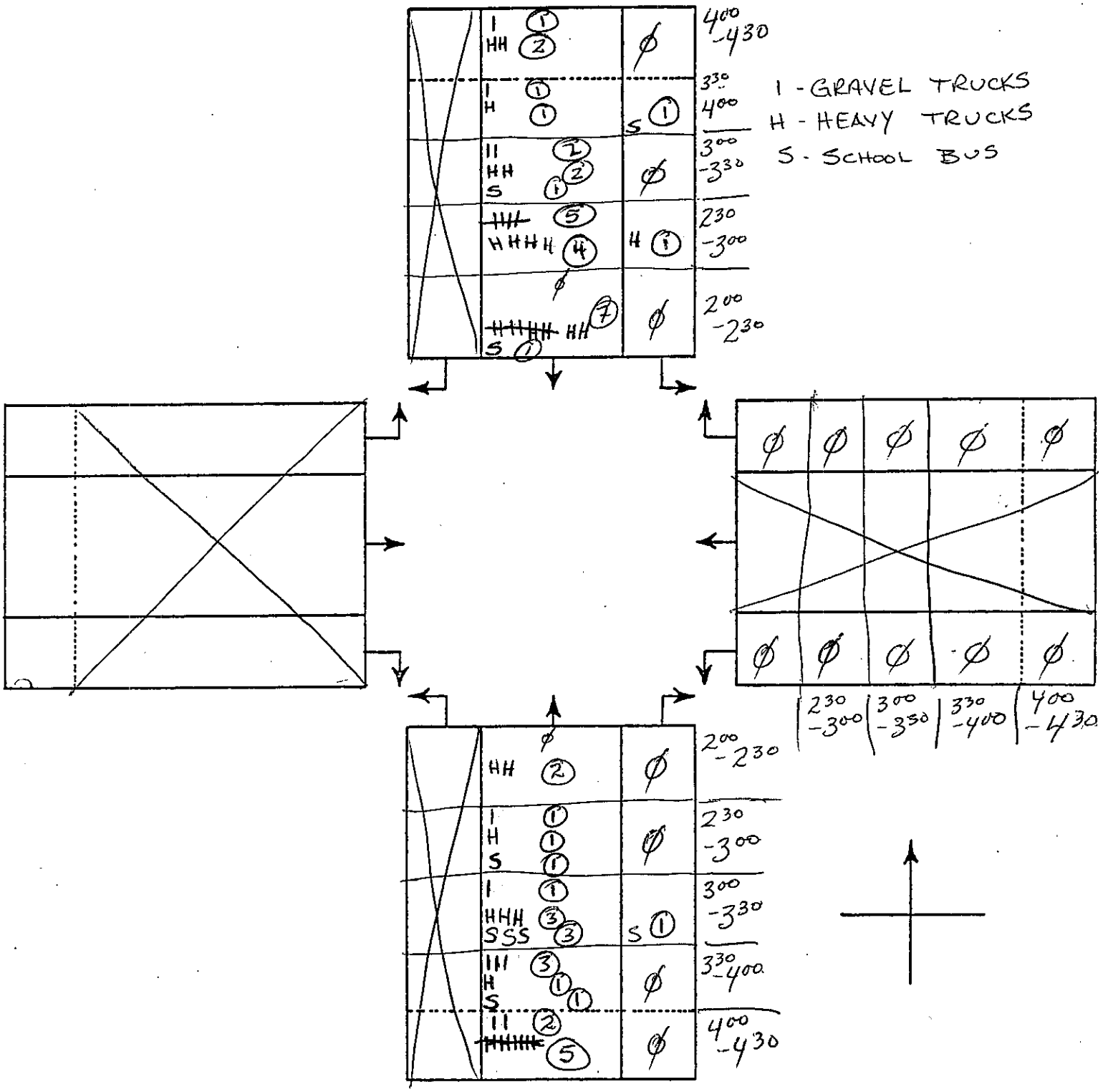


Time 1200 - 1230
1230 - 100
100 - 130
130 - 200

INTERSECTION TRAFFIC COUNT

Location OLD WOOLER RD. / #30

Date JUNE 11. 2007 Recorder KEN



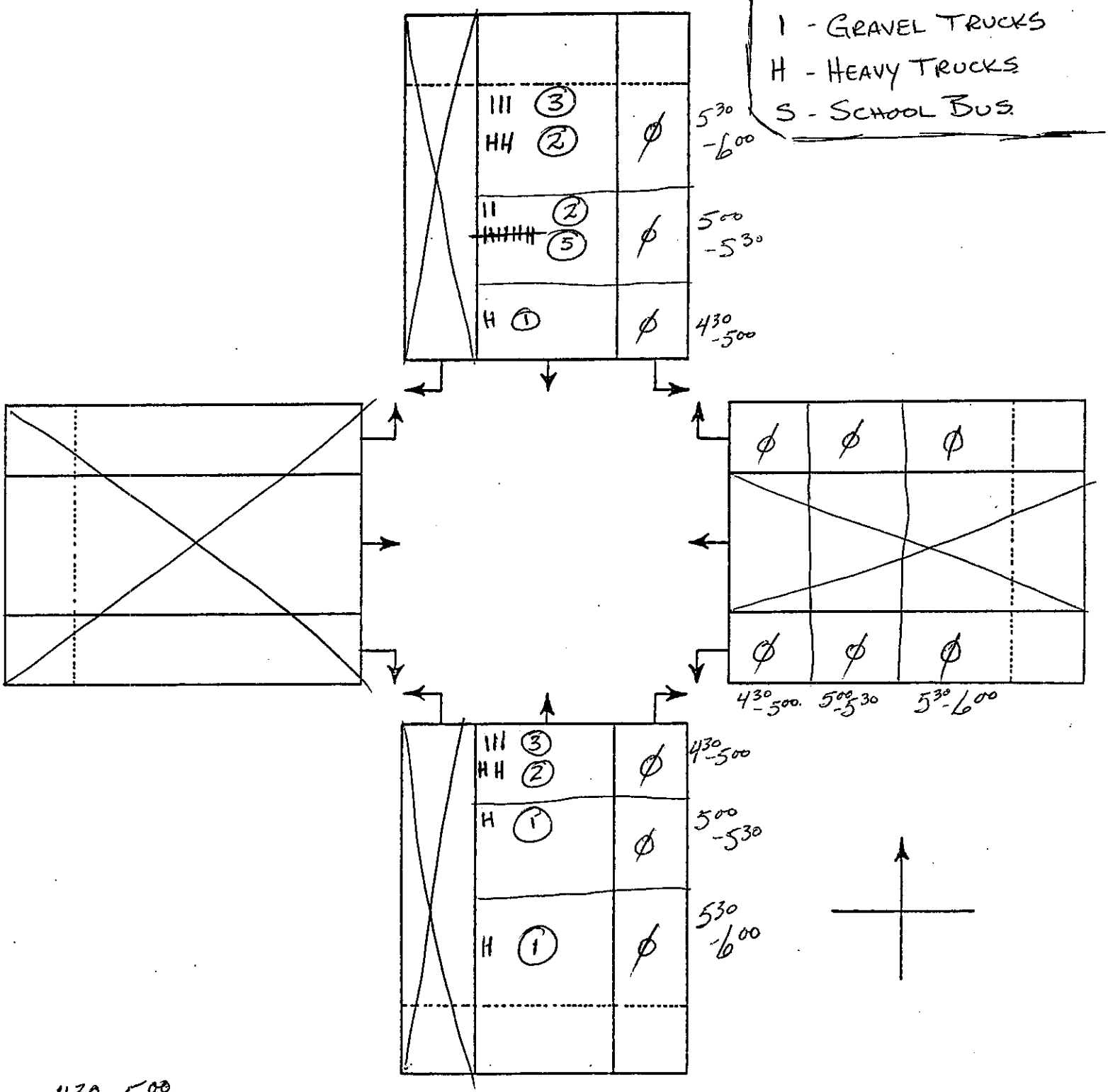
Time 200 - 230
230 - 300
300 - 330
330 - 400
400 - 430

INTERSECTION TRAFFIC COUNT

Location OLD WOOLER RD. / #30

Date JUNE 11. 2007 Recorder KEN

I - GRAVEL TRUCKS
H - HEAVY TRUCKS
S - SCHOOL BUS



Time 4:30 - 5:00
5:00 - 5:30
5:30 - 6:00

APPENDIX C: Level of Service Definitions

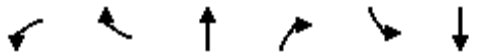
LEVEL OF SERVICE
FOR
UNSIGNALIZED INTERSECTIONS
(TWO–WAY AND ALL–WAY STOP CONTROL)
(Highway Capacity Manual, 2000)

The assessment of operations at unsignalized intersections is based on the methodology in the Highway Capacity Manual, 2000. Typical software providers, such as Trafficware and McTrans, have developed industry-accepted analysis programs (SYNCHRO and HCS2000) which incorporate these methodologies.

Level of service for two-way stop controlled intersections is defined in terms of delay, which is a measure of drivers discomfort and frustration, fuel consumption, and lost travel time. Specifically, level of service (LOS) criteria is stated in terms of average control delay per vehicle for a 15-minute analysis period.

Level of Service	Delay (Seconds / Vehicle)
A	≤ 10.0
B	> 10.0 and ≤ 15.0
C	> 15.0 and ≤ 25.0
D	> 25.0 and ≤ 35.0
E	> 35.0 and ≤ 50.0
F	> 50.0

APPENDIX D: 2007 Baseline Conditions Capacity Calculation Sheets



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	8	56	241	6	26	184
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	9	62	268	7	29	204
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	533	271			274	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	533	271			274	
tC, single (s)	6.5	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.6	3.3			2.2	
p0 queue free %	98	92			98	
cM capacity (veh/h)	478	768			1300	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	71	274	233
Volume Left	9	0	29
Volume Right	62	7	0
cSH	713	1700	1300
Volume to Capacity	0.10	0.16	0.02
Queue Length 95th (m)	2.5	0.0	0.5
Control Delay (s)	10.6	0.0	1.1
Lane LOS	B		A
Approach Delay (s)	10.6	0.0	1.1
Approach LOS	B		

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	41.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	3	20	165	5	44	217
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	3	22	183	6	49	241
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	525	186			189	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	525	186			189	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	97			96	
cM capacity (veh/h)	498	861			1373	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	26	189	290
Volume Left	3	0	49
Volume Right	22	6	0
cSH	786	1700	1373
Volume to Capacity	0.03	0.11	0.04
Queue Length 95th (m)	0.8	0.0	0.8
Control Delay (s)	9.7	0.0	1.6
Lane LOS	A		A
Approach Delay (s)	9.7	0.0	1.6
Approach LOS	A		

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	38.9%	ICU Level of Service	A
Analysis Period (min)	15		

APPENDIX E: Future Background Conditions Capacity Calculation Sheets

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	10	68	294	7	32	225
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	11	76	327	8	36	250
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	652	331			334	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	652	331			334	
tC, single (s)	6.5	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.6	3.3			2.2	
p0 queue free %	97	89			97	
cM capacity (veh/h)	404	711			1236	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	87	334	286
Volume Left	11	0	36
Volume Right	76	8	0
cSH	648	1700	1236
Volume to Capacity	0.13	0.20	0.03
Queue Length 95th (m)	3.5	0.0	0.7
Control Delay (s)	11.4	0.0	1.2
Lane LOS	B		A
Approach Delay (s)	11.4	0.0	1.2
Approach LOS	B		

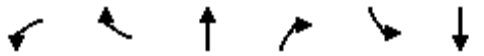
Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	48.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	4	24	201	6	54	265
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	4	27	223	7	60	294
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	641	227			230	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	641	227			230	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	97			95	
cM capacity (veh/h)	422	818			1326	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	31	230	354
Volume Left	4	0	60
Volume Right	27	7	0
cSH	721	1700	1326
Volume to Capacity	0.04	0.14	0.05
Queue Length 95th (m)	1.0	0.0	1.1
Control Delay (s)	10.2	0.0	1.7
Lane LOS	B		A
Approach Delay (s)	10.2	0.0	1.7
Approach LOS	B		

Intersection Summary			
Average Delay		1.5	
Intersection Capacity Utilization		44.5%	ICU Level of Service A
Analysis Period (min)		15	

APPENDIX F: 2017 Total Future Conditions Capacity Calculation Sheets



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	10	68	309	7	32	240
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	11	76	343	8	36	267
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	685	347			351	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	685	347			351	
tC, single (s)	6.5	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.6	3.3			2.2	
p0 queue free %	97	89			97	
cM capacity (veh/h)	386	696			1219	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	87	351	302
Volume Left	11	0	36
Volume Right	76	8	0
cSH	631	1700	1219
Volume to Capacity	0.14	0.21	0.03
Queue Length 95th (m)	3.6	0.0	0.7
Control Delay (s)	11.6	0.0	1.2
Lane LOS	B		A
Approach Delay (s)	11.6	0.0	1.2
Approach LOS	B		

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	50.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	15	1	362	15	1	257
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	17	1	402	17	1	286
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	690	402			419	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	690	402			419	
tC, single (s)	7.4	7.2			5.1	
tC, 2 stage (s)						
tF (s)	4.4	4.2			3.1	
p0 queue free %	94	100			100	
cM capacity (veh/h)	293	480			764	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	18	402	17	1	286
Volume Left	17	0	0	1	0
Volume Right	1	0	17	0	0
cSH	300	1700	1700	764	1700
Volume to Capacity	0.06	0.24	0.01	0.00	0.17
Queue Length 95th (m)	1.4	0.0	0.0	0.0	0.0
Control Delay (s)	17.7	0.0	0.0	9.7	0.0
Lane LOS	C			A	
Approach Delay (s)	17.7	0.0		0.0	
Approach LOS	C				

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	31.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	4	24	211	6	54	275
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	4	27	234	7	60	306
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	663	238			241	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	663	238			241	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	97			95	
cM capacity (veh/h)	410	806			1314	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	31	241	366
Volume Left	4	0	60
Volume Right	27	7	0
cSH	708	1700	1314
Volume to Capacity	0.04	0.14	0.05
Queue Length 95th (m)	1.0	0.0	1.1
Control Delay (s)	10.3	0.0	1.7
Lane LOS	B		A
Approach Delay (s)	10.3	0.0	1.7
Approach LOS	B		

Intersection Summary			
Average Delay		1.5	
Intersection Capacity Utilization		45.7%	ICU Level of Service A
Analysis Period (min)		15	

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	10	1	225	10	1	319
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	11	1	250	11	1	354
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	607	250			261	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	607	250			261	
tC, single (s)	7.4	7.2			5.1	
tC, 2 stage (s)						
tF (s)	4.4	4.2			3.1	
p0 queue free %	97	100			100	
cM capacity (veh/h)	333	599			896	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	12	250	11	1	354
Volume Left	11	0	0	1	0
Volume Right	1	0	11	0	0
cSH	347	1700	1700	896	1700
Volume to Capacity	0.04	0.15	0.01	0.00	0.21
Queue Length 95th (m)	0.8	0.0	0.0	0.0	0.0
Control Delay (s)	15.8	0.0	0.0	9.0	0.0
Lane LOS	C			A	
Approach Delay (s)	15.8	0.0		0.0	
Approach LOS	C				

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	28.8%	ICU Level of Service	A
Analysis Period (min)	15		