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Oct. 30th , 2024
Our Ref. No. 14.102

Corporation of the City of London
Environmental and Engineering Services - Water Engineering
300 Dufferin Ave.
8Th Floor.
London, ON N6A 4L9

Re: 801 Sarnia Road – Water Distribution System Analysis – Revision 3, 10 storey, 182 units apartment building

This report outlines the analysis of the water distribution system for the proposed development of residential apartment building located at 801 Sarnia Road, in the City of London. The apartment building has changed from the approved site plan to be 10-storey with 182 units apartment building

The analysis has been completed in accordance with the requirements of the City of London and the Ontario Building Code (2012). The proposed water distribution system has been evaluated using EPANET 2.0. As part of this submission, digital files of the network model for the proposed system have been provided.

Design Parameters and Assumptions

This analysis determines whether the proposed water distribution network can adequately satisfy the flow and pressure requirements for the condominiums and apartment building under the following demand conditions:).

The design parameters used in this analysis are in accordance with the City of London's Water Design Standards outlined in the City's Design Specifications and Requirements Manual. A summary of these parameters can be found in Appendix A.

The network was modelled assuming the minimum hydraulic grade line (HGL) conditions apply; a pressure head of 317.0m was used for the Hyde Park Pumping Station. A fire hydrant flow test was provided by the City of London and is attached to the report for reference.

Input Data

There is a 200mm diameter service stub provided to the property line to service the development. The proposed water distribution network was modelled using reservoirs at the connection to represent a pressure head of 317.0m in the existing 400mm diameter water main on Sarnia Road. Refer to Appendix A for a diagram of the water main network layout.

Water Supply for Fire-Fighting

The proposed 10 storey residential building is to have a sprinkler system installed, therefore the fire-fighting demand is determined as per NFPA-13 (relevant information provided in **Appendix A**), as outlined in the OBC, Section A-3.2.5.13. The proposed residential building will be considered to have 'Light Occupancy' for residential occupancy.

As per the attached NFPA-13 Flow Demand Requirements Table, the required flow for light hazard residential buildings (including both the sprinkler flow and hydrant allowance) is estimated to be 250 U.S. gpm (15.8 L/s). In addition, the domestic water demand (maximum day demand) of 3 L/s was added to the fire flow demand for a total required demand of 18.8 L/s.

Modeling and Results

The proposed water main network was modelled for each of the above mentioned flow demands using the domestic water demands and peaking factors provided by the City of London.

Resulting pressures from the EPANET model are summarized in the table below.

Operating Condition	Minimum Pressure Req'd	Design Pressure	Water Quality (hours)
Average Day Demand	275 kPa / 40 psi / 28m	350 kPa / 51 psi / 34.7m	0.35
Max. Hour Demand	275 kPa / 40 psi / 28m	349 kPa / 51 psi / 34.3m	---
Max. day Demand + Fire Flow	140 kPa / 20 psi / 14m	348 kPa / 51 psi / 34.2m	---

Refer to Appendix A for the complete output data from the EPANET model.

Water Quality Analysis

As indicted in the above table, the turnover rate for the proposed water distribution network is within the three (3) day limit under the average day demand.

EPAnet calculations are attached.

Conclusions

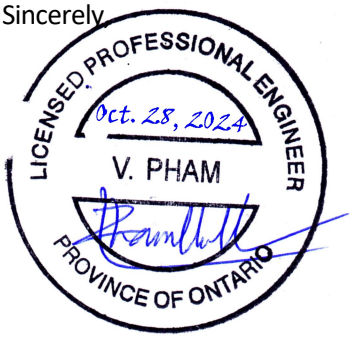
Based on the available pressure in the existing 400mm water main on Sarnia Road, the proposed water distribution network can adequately satisfy the flow and

pressure requirements of the subject development under average day and maximum hour demands. There is also adequate water flow and pressure available for firefighting in accordance with the Ontario Building Code.

Also, as per results from the EPANET model, the water quality turnover rate is within the three (3) day limit under the average day demand.

We trust this analysis satisfies the requirements of the City of London. Should you have any questions or concerns regarding the information presented above, please do not hesitate to contact our office.

Sincerely



Vinh Pham, P.Eng.
Eng Plus Ltd.

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Appendix A

- Design Criteria & Input Data
- EPANET Output Data
- Fire Flow Calculation for Apartment Building
- City of London Water Supply Department Flow Tests

Hydraulic Criteria and EPANET Input Data
801 Sarnia Road - City of London
10-STOREY APARTMENT BUILDING

Number of Units	182	Units
Population	**291.2**	persons (1.6 persons/Units)
Total Population	**291.2**	
Average Day Domestic Flow Requirement	255	L/cap/day
Fire Flow Requirement	150	L/s (Based on Ontario Bulding Code) (see attached calculation)
Minimum Average Day Demand	275	kPa (40psi, pressure head=28m)
Minimum Max. Peak Hourly Demand	275	kPa (40psi, pressure head=28m)
Minimum Max. Day Demand plus Fire Flow	140	kPa (20psi, pressure head=14m)

C value	
100mm and 150mm	100
200mm and 250mm	110
300mm	120

Maximum Velocity - Max Hour Domestic Flow	1.5	m/s
Maximum Velocity - Fire Flow Conditions	2.4	m/s

Demand Input

Node	Number of Units	Person/Unit	Base Demand l/s	Peak Factor	Peak Demand l/s
Building	182	1.6	**0.859**		
	Maximum Day Demand			3.5	**3.008**
	Maximum Hour Demand			7.8	**6.704**

Fire-Fighting Flow NFPA #13
129-131 Base Line Road W - City of London
RESIDENTIAL APARTMENT BUILDING

Table 19.3.3.1.2 Hose Stream Allowance and Water Supply Duration Requirements for Hydraulically Calculated Systems

Occupancy	Inside Hose		Total Combined Inside and Outside Hose		Duration (minutes)
	gpm	L/min	gpm	L/min	
Light hazard	0, 50, or 100	0, 190, or 380	100	380	30
Ordinary hazard	0, 50, or 100	0, 190, or 380	250	950	60–90
Extra hazard	0, 50, or 100	0, 190, or 380	500	1900	90–120

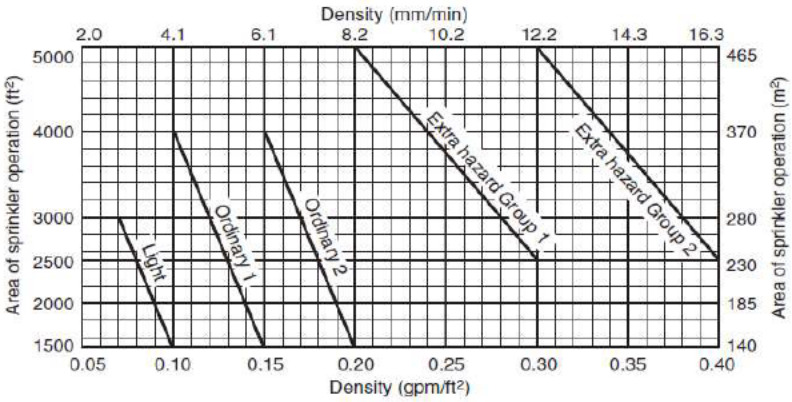


FIGURE 19.3.3.1.1 Density/Area Curves.

Proposed Development: Residential - Light hazard

Water Demand for Sprinkler

Select design area of proteciton of 1,500 square feet

Light hazard occupancy

the density on the curve is 0.1 gpm / square feet (Figure 19.3.3.1.1)

Total Water demand for the design area of protection is 150 gpm (=1,500*0.1)

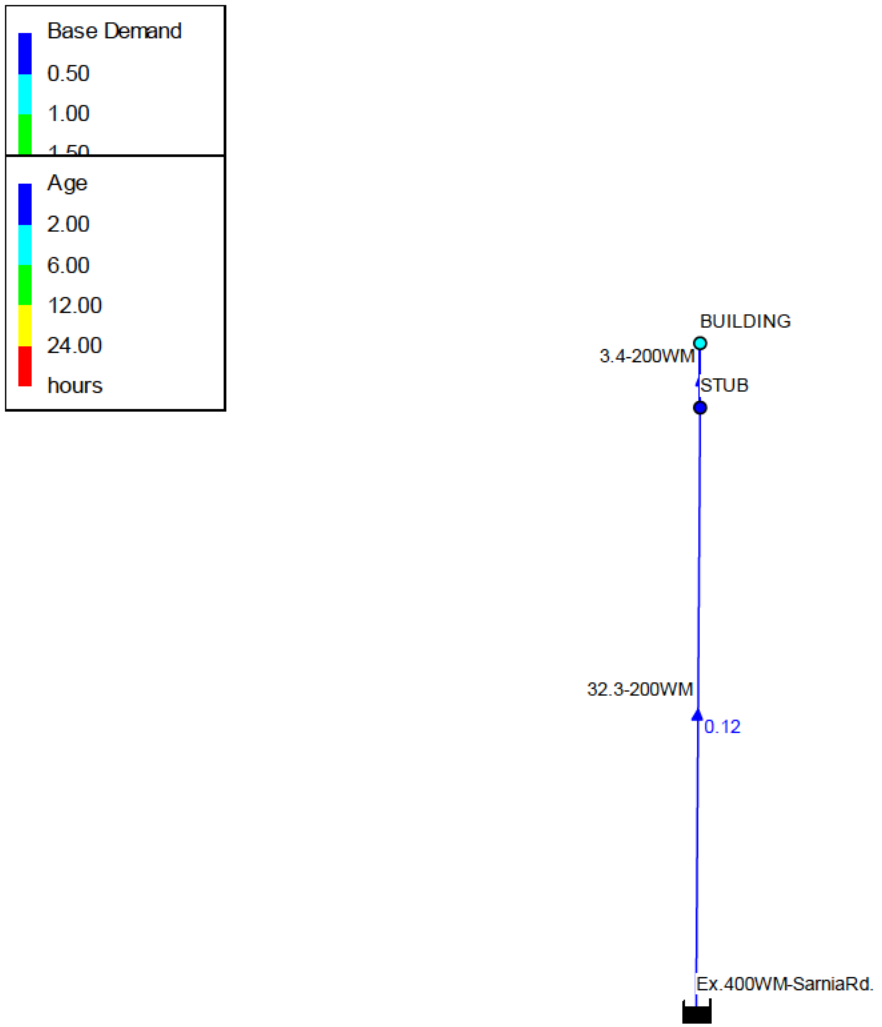
Table 1 Hose Stream Allowance and Sprinkler Flow

Hazard	Sprinkler Flow		Hose Stream Allowance		Total Flow	
	GPM	L/min	GPM	L/min	GPM	L/min
Light hazard	150	570	100	380	250	950

Required Fire Flow (Sprinker + Hydrant) (table above)	250.0 USGPM	
	15.8 l/s	
Maximum Day Demand for the prop. Development	3.0 l/s	
Required supply Fire Flow + Max. day demand	**18.8**	**l/s**

Water Distribution Network Model -801 Sarnia Road

Day 1, 12:(



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*********************************************************************
*                            E P A N E T                            *
*                     Hydraulic and Water Quality                   *
*                     Analysis for Pipe Networks                    *
*                           Version 2.2                             *
*********************************************************************

Input File: 14.102 Average Day Deman-2024-10-31.net
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Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
32.3-200WM	Ex.400WM-SarniaRd.	STUB	32.3	200
3.4-200WM	STUB	BUILDING	3.4	200

Node Results:

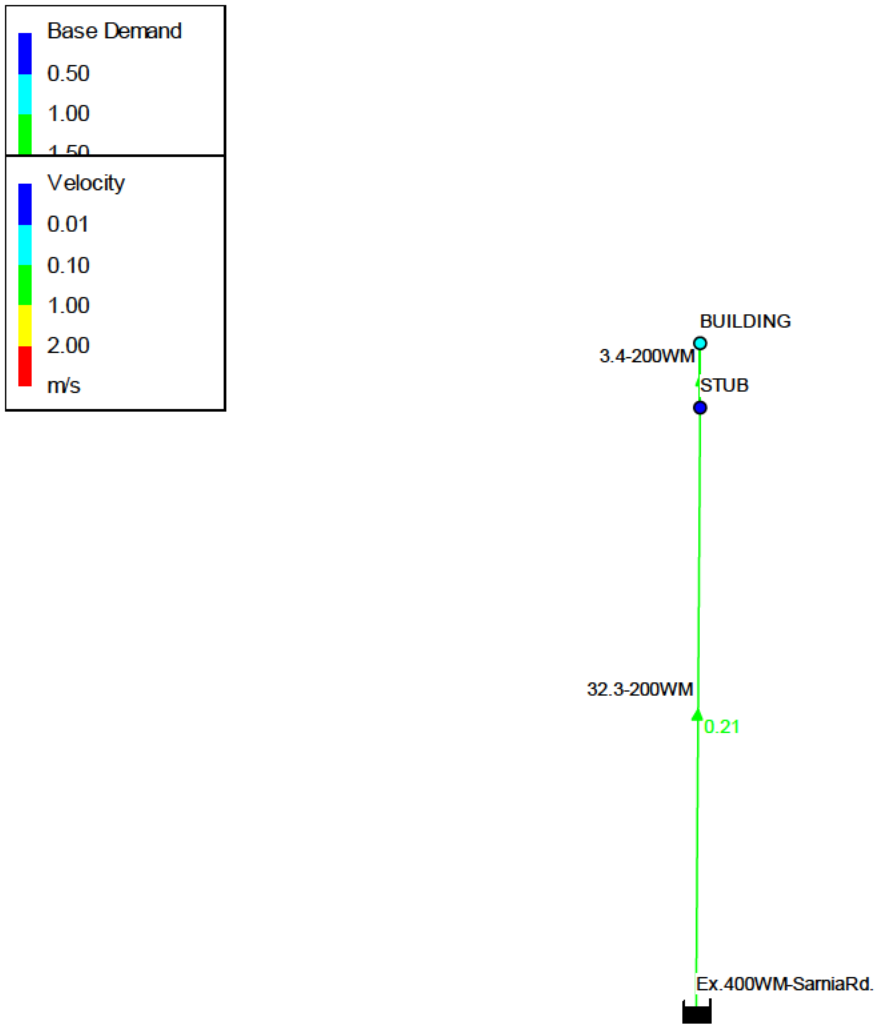
Node ID	Demand LPS	Head m	Pressure m	Quality hours	
STUB	0.00	317.00	34.70	0.32	
BUILDING	0.86	317.00	34.30	0.35	
Ex.400WM-SarniaRd.	-0.86	317.00	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
32.3-200WM	0.86	0.03	0.01	Open
3.4-200WM	0.86	0.03	0.02	Open

Water Distribution Network Model -801 Sarnia Road

Day 1, 12:(



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*                          E P A N E T                           *
*                   Hydraulic and Water Quality                  *
*                   Analysis for Pipe Networks                   *
*                         Version 2.2                            *
******************************************************************
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Input File: 14.102 Peak Hour Demand-2024-10-31.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
32.3-200WM	Ex.400WM-SarniaRd.	STUB	32.3	200
3.4-200WM	STUB	BUILDING	3.4	200

Node Results:

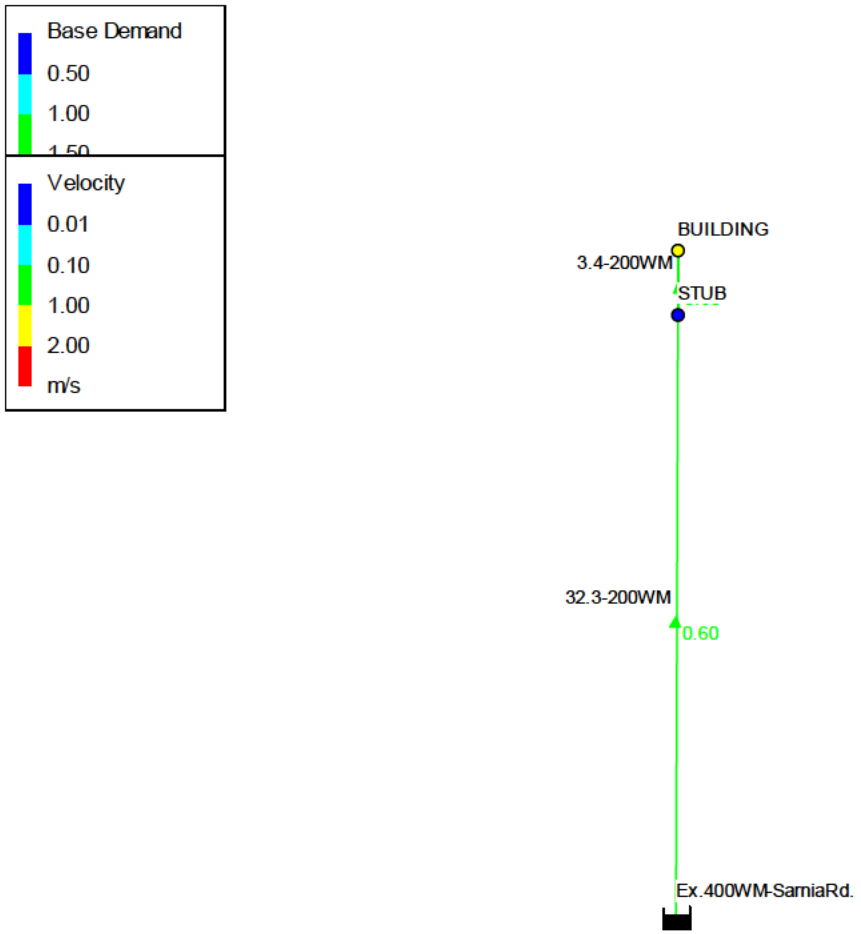
Node ID	Demand LPS	Head m	Pressure m	Quality hours	
STUB	0.00	316.99	34.69	0.04	
BUILDING	6.70	316.98	34.28	0.04	
Ex.400WM-SarniaRd.	-6.70	317.00	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
32.3-200WM	6.70	0.21	0.44	Open
3.4-200WM	6.70	0.21	0.83	Open

Water Distribution Network Model -801 Sarnia Road

Day 1, 12:(



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******************************************************************
*                          E P A N E T                           *
*                   Hydraulic and Water Quality                  *
*                   Analysis for Pipe Networks                   *
*                         Version 2.2                            *
******************************************************************
```

Input File: 14.102 Max Hour Plus FireDemand-2024-10-31.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
32.3-200WM	Ex.400WM-SarniaRd.	STUB	32.3	200
3.4-200WM	STUB	BUILDING	3.4	200

Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality hours	
STUB	0.00	316.90	34.60	0.01	
BUILDING	18.80	316.88	34.18	0.02	
Ex.400WM-SarniaRd.	-18.80	317.00	0.00	0.00	Reservoir

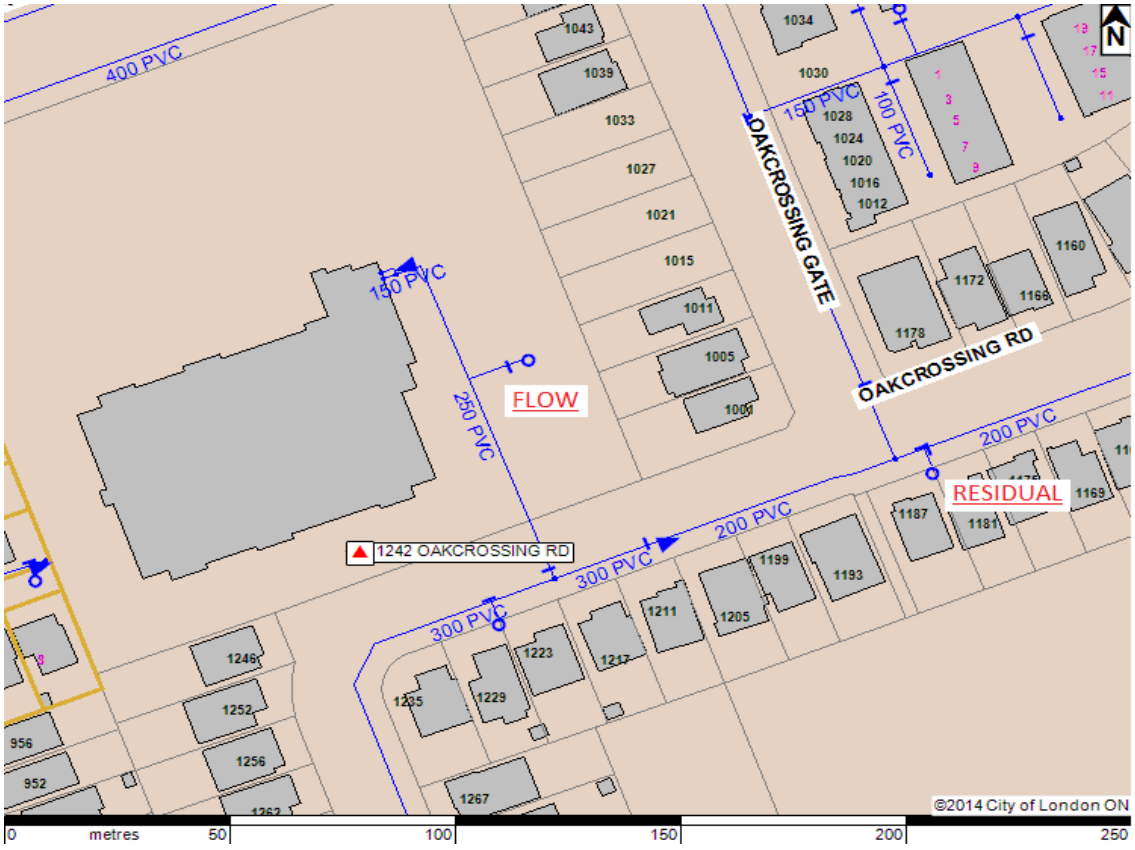
Link Results:

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
32.3-200WM	18.80	0.60	2.97	Open
3.4-200WM	18.80	0.60	6.07	Open

WATER SUPPLY DEPARTMENT
FLOW TESTS

DATE:	Tuesday, June 03, 2014	FLOW TEST No.			**14-29**
TIME:	2:00 AM	HYDRANT ID			H12035
OPERATOR:	Mike Thibault	CHLORINE RESIDUAL mg/L			0.92
OPERATOR:	Fraser McConnell	WATER QUALITY AFTER TEST	POOR	GOOD	EXCELLENT
REQUESTED BY:	London Fire Dept.				✔
LOCATION:	1242 Oakcrossing Road	T ME USED FOR FLUSHING			0

	FLOW HYDRANT					RESIDUAL HYDRANT	
TEST NUMBER	STATIC PRESSURE P.S.I.	OUTLET SIZE IN.	PITOT READING P.S.I.	INDIVIDUAL FLOW U.S.G.P.M	TOTAL FLOW U.S.G.P.M.	RESIDUAL PRESSURE P.S.I.	STATIC PRESSURE P.S.I.
1	46				980	37	46
		2 1/2	34	980			
2		2 1/2	26	860	1720	32	
		2 1/2	26	860			
3							



Information contained in this report is representative of flows and pressure losses at the time of the test and depends on reservoir levels, pump operation and customer water demand. Results will vary throughout the day and time of year. Available pressure at other times should be based on a design hydraulic grade line for the pressure zone in which the hydrants are located. By issuing this information report, neither the City nor any of its employees makes any warranty, express or implied, concerning the location, type or extent of services described in this report. Furthermore, neither the City nor any of its employees shall be liable in any manner for any personal injury or property damage or loss of any kind arising from or connected with this information or incomplete information.

09-20
H11591

WATER SUPPLY DEPARTMENT
FLOW TESTS

DATE June 9-2009
TIME 13:00
TEST BY R. Horton, R. Amorgowick
REQUESTED BY Jamie Tomes
LOCATION Sarnia Rd & Oakcrossing Rd.

TEST NUMBER	FLOW: OUTLET SIZE	FLOW: PITOT READING P.S.I.	FLOW: INDIVIDUAL FLOW U.S.G.P.M	FLOW: TOTAL FLOW U.S.G.P.M.	RESIDUAL PRESSURE P.S.I.	STATIC PRESSURE P.S.I.
1	2½	32	950	950	36	46
TEST #1 2	2½	20	750	1500	31	
	2½	20	750			
3	2½	32	950	950	38	46
TEST #2 4	2½	20	750	1500	30	
	2½	20	750			

VALVE SHEET: 74-59
CHLORINE RES.: 0.84 mg/l

N

SKETCH