

July 12, 2021

Clayton Developments Limited

255 Lacewood Drive

Halifax, NS B3M 4G2

Attention: Scott MacCallum

RE: Water Servicing Review of Proposed Bedford South Development

DesignPoint Project #: 21-176

Introduction

Clayton Developments Limited (Clayton) is assessing the serviceability of two parcels of land in Bedford South, PIDs 41316548 and 41318049, as per the latest Master Plan Study (2021-04-09) completed for Shannex Parkland Bedford. These lands are bordered on the southeast side by Fleetview Drive, on the southwest side by Starboard Drive, and on the North side by various commercial properties which have frontage on Larry Uteck Boulevard. These lands are currently undeveloped, and the intent is to develop them into mixed-use residential/commercial lands with private driveways. At full build-out, the proposed development will include the following:



- Housing for 2,059 people
- Approximately 8,000 m² of gross floor area for commercial, restaurant, and mixed-use spaces

Clayton has hired DesignPoint to assess the water servicing to the site and to determine if the proposed concept for development can be adequately serviced by the existing water infrastructure in the area.

Water Servicing

The existing lands slope from the northeast edge of the property down towards Starboard Drive, with elevations ranging from 91-74 m, respectively. Based on GIS data provided by Halifax Water, there are two pressure zones which border these lands.

The first pressure zone is the Hemlock High Zone which has a hydraulic grade line (HGL) of approximately 120 m (395 ft). The water mains on Starboard Drive and Larry Uteck are within this zone and are 500 mm dia. and 400 mm dia., respectively. This pressure zone is supplied by a PRV at the end of Masthead Court, which is ultimately supplied by the 750 mm transmission main running along Highway 102. Static pressures for this zone are 43-67 psi based on the existing elevations of the site.

The second pressure zone in the area is the Hemlock Super High Zone, with an HGL of approximately 130 m (427 ft). There is a 250 mm dia. water main on Fleetview Drive that is supplied by this zone, which is also fed

from a PRV at the end of Masthead Court. This PRV is also supplied by the 750 mm dia. transmission main running along Highway 102. Static pressures for this zone are 55-80 psi based on the existing elevations of the site.

There are several existing water lateral stubs on Starboard Drive which were installed to provide water service to these lands, and they range in diameter from 200-300 mm. The proposed buildings will be serviced by these existing water services where possible to reduce the amount of additional water infrastructure and to take advantage of what is already in place. The existing water system, including the lateral stubs on Starboard Drive and Fleetview Drive, is shown on the attached Water Servicing Schematic (C-WA01).

There are two existing office buildings at civic 621 Starboard Drive (PID 41316514) which are currently serviced via a 250 mm water lateral on Starboard Drive, as shown on the Water Servicing Schematic. As these buildings are already serviced, we have not included the water demands for these buildings in the hydraulic water model for the proposed development.

There are also two proposed office buildings on the lot (PID 41316522) which is adjacent to the lot with the existing office buildings. It is anticipated that these buildings will be serviced off the existing 250 mm water lateral to the property which connects to the existing 400 mm water main on Larry Uteck Boulevard, as shown on the Water Servicing Schematic. As this lot will be serviced by water main outside of the proposed development, the water demands resulting from these proposed buildings have not been included in the hydraulic water model.

System Flow Testing

To better understand the hydraulic characteristics of the two pressure zones under various flow demands, two hydrant flow tests were conducted by Turner & Stacey Fire on June 2, 2021. The first test was conducted on Fleetview Drive, which is within the Hemlock Super High Zone. This test involved measuring the static pressure, then flowing out of the hydrant across from civic 370, while measuring the residual pressure at the hydrant in front of civic 332. The second test was conducted on Starboard Drive, which is within the Hemlock High Zone. This test involved measuring the static pressure, then flowing out of the hydrant between civic 81 and civic 89 Peakview Way, while measuring the residual pressure at the hydrant in front of civic 530 Starboard Drive. The hydrant flow test results are attached.

The test results were initially used to develop the sources in the hydraulic model, which were modelled as pumps with reservoirs. The source pump curves were created to best match the results from the two hydrant tests.

Hemlock Reservoir Project

As we understand it, there is a new water reservoir currently being constructed adjacent to the existing PRVs at the end of Masthead Court which will service the Hemlock High Zone. Based on the Issued for Tender drawings for this reservoir, the top water level will be at an elevation of 122.8 m, with the low level at 116.2 m before reaching the fire storage volume. For modelling purposes, the low level HGL of 116.2 m was applied to the system to represent the lowest HGL which can be expected at the downstream side of the tank.

Domestic Analysis

The following criteria were used to calculate the domestic flows to the project site. Unless stated otherwise these criteria were obtained from 2020 edition of the Halifax Water Design Guidelines:

- Average water demand of 375 L/day/cap for the proposed residential;

- Average water demand for proposed commercial land of 7.5 L/m²/day (based on Atlantic Canada Wastewater Guidelines section 2.3.4 and 2.3.5, assumes wastewater represents 80% of water demand);
- Peaking factors of 1.30 for maximum day and 2.50 for peak hour scenarios for multi-unit residential units;
- Peaking factors of 2.0 for maximum day and 3.0 for peak hourly for commercial development (assumed values).

Preliminary calculations based on the unit and floor area estimates provided by Clayton result in a maximum daily water demand of 780 L/min and a peak hourly demand of 1,465 L/min. These flows were applied to some of the existing water laterals on Starboard Drive in the model, as well as new laterals serviced by new water main within the development.

Due to the Hemlock Super High Zone being fed only by a 250 mm diameter water main, the necessary fire flow demands to the development cannot be serviced by the existing water main on Fleetview Drive without exceeding the maximum pipe velocity of 2.4 m/s as specified in the Halifax Water guidelines. Because of this, all domestic demands in the model have been applied to the Hemlock High Zone and will be serviced by the existing 500 mm dia. water main on Starboard Drive.

The following table provides domestic pressures to the development for maximum day and peak hourly scenarios for both the current system, as well as for the future system once the Hemlock Reservoir has been commissioned.

Water Supply to Hemlock High Zone	Maximum Day Pressure Range (psi)	Peak Hour Pressure Range (psi)
Existing PRV	48-64	45-61
Hemlock Reservoir (Low Water Level = 116.2 m)	40-56	40-56
Hemlock Reservoir (Max Water Level = 122.8 m)	49-65	49-65

The results in this table demonstrate that the existing PRV supply, as well as the future Hemlock Reservoir supply with both maximum and minimum water levels, can supply domestic flows to the proposed development while remaining within the allowable pressure limits of 40-90 psi. To remain above the minimum pressure of 40 psi, the finished grade elevation of the roads within the development should not exceed 88 m.

Many of the proposed buildings are multi-storey buildings. Due to the lower pressures, especially for the areas at higher elevations, it is anticipated that many of these buildings will require individual booster pumps. These pumps will be necessary to service the upper floors with domestic flows and fire protection. Booster pump requirements for the individual buildings should be determined by the engineer(s) responsible for the water servicing within the building.

Fire Flow Analysis

In addition to the domestic demand analysis, a fire flow analysis was completed to check the capacity of the existing and proposed systems for the proposed development. The fire flow applies the fire demand to a junction, checks all the remaining junctions for residual pressure, and then repeats this process for each junction of interest until all the junctions have been analyzed. The fire flow requirements set forth by Halifax Water for new multi-unit / commercial buildings are as follows:

- Fire flow demand of 13,620 L/min (3,600 usgpm);
- Minimum residual and system pressure of 22 psi, and;
- Maximum pipe velocity of 2.4 m/s.

The results for the fire flow analysis to the proposed development for the various water supplies are shown in the table below.

Water Supply to Hemlock High Zone	Available Fire Flow (L/min)	Minimum Residual/System Pressure (psi)	Maximum Pipe Velocity (m/s)
Existing PRV	10,119	22	1.70
Hemlock Reservoir (Low Water Level = 116.2 m)	13,620	33	2.17
Hemlock Reservoir (Max Water Level = 122.8 m)	13,620	42	2.17

As shown by the results in the table, the existing system supplied by the PRV at the end of Masthead Court does not have adequate capacity to supply the full fire flow to the proposed development as per the Halifax Water specifications while maintaining the minimum residual/system pressure. However, based on preliminary fire flow calculations in accordance with the Fire Underwriters Survey, the largest fire flow requirement is expected to be approximately 10,000 L/min, which the system would be able to provide.

Once the Hemlock Reservoir becomes operational, there will be adequate capacity to supply the full fire flow demand of 13,620 L/min to the site while maintaining the necessary minimum residual/system pressure and maximum pipe velocity. It is our understanding that this reservoir is scheduled to be commissioned in December 2021 and will therefore be the supply to the Hemlock High Zone when the development begins construction. If for some reason the Hemlock Reservoir is not operational by the time building construction starts, more detailed fire flow calculations for each building will be required to demonstrate that the existing system can adequately supply the necessary fire flow.

The attached Water Servicing Schematic (C-WA01) shows the proposed water servicing for the site.

Closing

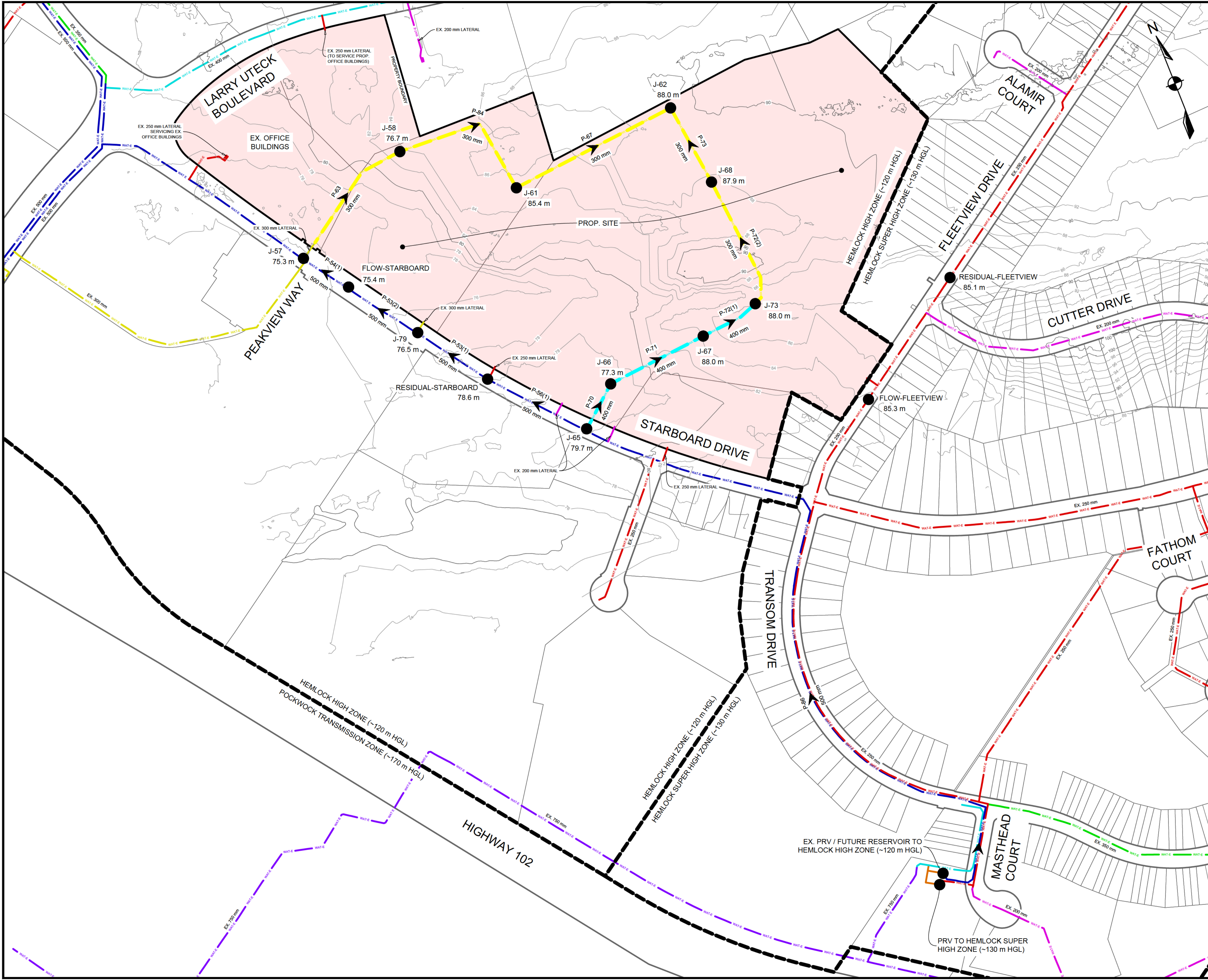
As demonstrated, both the existing PRV supply to the Hemlock High Zone and the soon-to-be constructed Hemlock Reservoir can supply domestic flows to the proposed development while maintaining minimum/maximum pressures as per the Halifax Water specifications. The Hemlock Reservoir can supply the required fire flow to the proposed development while maintaining minimum residual/system pressures and not exceeding maximum pipe velocities. The construction of the Hemlock Reservoir is scheduled to finish much sooner than the proposed development will be built, therefore the site will be able to be adequately serviced with both domestic and fire flow supply.

Due to the relatively low pressures resulting from the elevations of the site, it is anticipated that many of the proposed multi-storey buildings will require individual booster pumps to be able to service the upper floors of the buildings.

Thank you,
DesignPoint Engineering & Surveying Ltd.



Logan King, P.Eng.
 Project Engineer, Principal
 Enclosures (2): Water Servicing Schematic (C-WA01), Hydrant Flow Tests



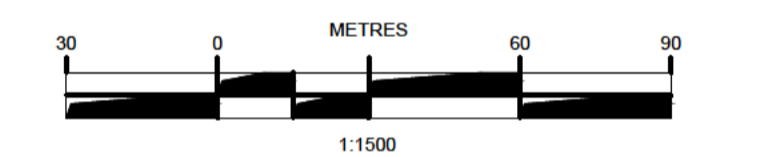
LEGEND

PROPERTY BOUNDARY	---
PRESS. ZONE BOUNDARY	---
PROPOSED 300 mm PIPE	---
PROPOSED 400 mm PIPE	---
EXISTING 200 mm PIPE	---
EXISTING 250 mm PIPE	---
EXISTING 300 mm PIPE	---
EXISTING 350 mm PIPE	---
EXISTING 400 mm PIPE	---
EXISTING 500 mm PIPE	---
EXISTING 600 mm PIPE	---
EXISTING 750 mm PIPE	---

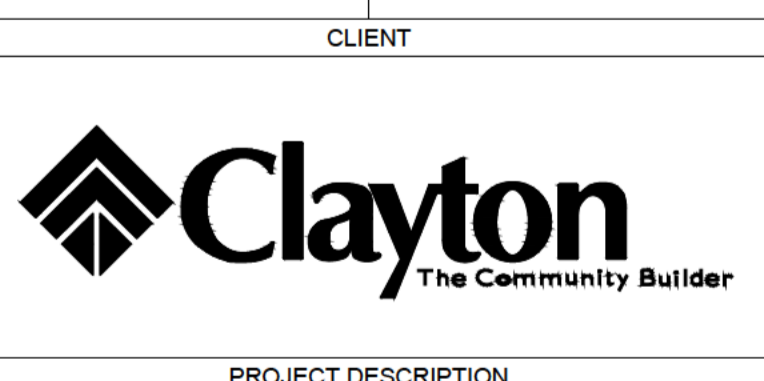
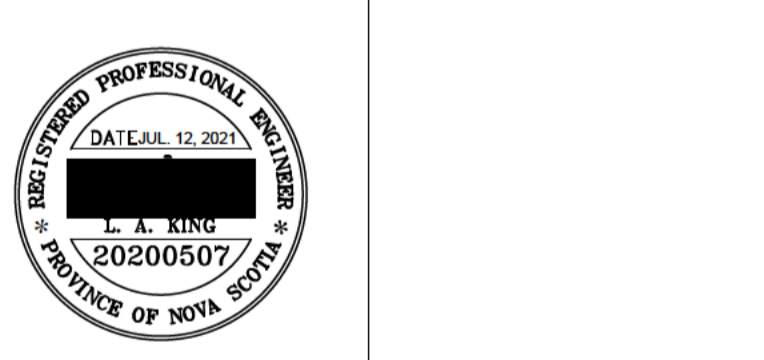
NOTES:

1. CONTOURS OBTAINED FROM LIDAR ELEVATION DATA. CONTOUR INTERVAL = 2 m.
2. EXISTING INFRASTRUCTURE BASED ON BEST AVAILABLE RECORD INFORMATION PROVIDED BY HALIFAX WATER.

ISSUED FOR REVIEW, NOT FOR CONSTRUCTION



ISSUE	DATE	DESCRIPTION	CONSULTANT
1	JUL. 12, 2021	ISSUED FOR REVIEW	DESIGN POINT



PROJECT DESCRIPTION

BEDFORD SOUTH DEVELOPMENT

BEDFORD, NOVA SCOTIA

SHEET DESCRIPTION

WATER SERVICING SCHEMATIC

Drawn L. KING	Engineer L. KING	Project No. 21-176	Drawing No. C-WA01
Scale 1:1500	Filename 21-176 Water.dwg		1 of 1



Water Flow Test Summary

Type of Test: Flow Test Test # : #1

Location: See Below Tested By: Mike McLaughlin

Municipality: HRM Date: June 2, 2021

*SYSTEM DATA

Size of Main: 10" Dead Ends: Grid: Loop: X

Source Reliable: Yes If No - Explain

Comments: All flows are in USGPM

*TEST DATA

Location of Hydrants: Residual: Hydrant # H42556 - See attached Map
Flow: Hydrant # H41887 - See attached Map

Normal Pressure: 65 psi Time: 10:00 PM

Test #	# of Outlets	Oriface Size	Pitot Reading (PSIG)	Equivalent Flow (GPM)	Total Flow (GPM)	Residual Pressure (PSIG)	Comments
0						65	Used 2 /12" Hose Monster
1	1	2 1/2"	16	675	675	55	
2	2	2 1/2"	11	559	1143	48	
		2 1/2"	12	584			



Water Flow Test Summary

Type of Test: Flow Test Test # : #1

Location: See Below Tested By: Mike McLaughlin

Municipality: HRM Date: June 2, 2021

***SYSTEM DATA**

Size of Main: 20" Dead Ends: Grid: Loop: X

Source Reliable: Yes If No - Explain

Comments: All flows are in USGPM

***TEST DATA**

Location of Hydrants: Residual: Hydrant # H21978 (See attached map)
Flow: Hydrant # H21977 (See attached map)

Normal Pressure: 62 psi Time: 10:45 PM

Test #	# of Outlets	Oriface Size	Pitot Reading (PSIG)	Equivalent Flow (GPM)	Total Flow (GPM)	Residual Pressure (PSIG)	Comments
0						62	Used 2 1/2" Hose Monster
1	1	2 1/2"	24	826	826	57	
2	2	2 1/2"	18	716	1470	52	
		2 1/2"	20	754			

