MUNICIPALITY OF THE COUNTY OF
ANTIGONISH

ASSET MANAGEMENT AGENDA

Tuesday, May 7, 2019, 5:30 pm
Council Chambers
Municipal Administration Building
285 Beech Hill Road
Beech Hill, NS B2G 0B4

---

1. Call to Order – Chairman, Councillor Bill MacFarlane
2. Approval of Agenda
3. Approval of April 16th, 2019 Asset Management Minutes
4. Business Arising from the Minutes
5. Continuing Business
   a. Capital Plan Update

      Staff will provide an update on planned projects.
6. New Business
   a. PCAP Application

      A Provincial Capital Assistance Program application for upgrades to the Pomquet Sewer System has been completed for the Committee's consideration. This application is requesting $80,000 in funding to support Phase 2 of replacement of residential sewage pumps and installation of the manufactures recommended pump chamber. The application is attached for your review.
7. Additions to the Agenda
8. In Camera Items
9. Adjournment

MUNICIPALITY OF THE COUNTY OF
ANTIGONISH

Asset Management Meeting Minutes

Tuesday, April 16, 2019, 5:30 pm
Council Chambers
Municipal Administration Building
285 Beech Hill Road
Beech Hill, NS B2G 0B4

Present were:	Warden Owen McCarron Deputy Warden Hugh Stewart Councillor Mary MacLellan Councillor Vaughan Chisholm	Councillor John Dunbar Councillor Gary Mattie Councillor Neil Corbett Councillor Bill MacFarlane
Regrets:	Councillor Donnie MacDonald	Councillor Remi Deveau
Staff Present:	Beth Schumacher, Deputy Clerk	Daryl Myers, Director of Public Works

1. Call to Order – Chairman, Councillor Bill MacFarlane

The meeting of the Asset Management Committee was called to order by the Chair, Councillor MacFarlane, at 5:30 pm.

2. Approval of Agenda

Councillor MacFarlane called for any additions or deletions to the agenda.

Moved By Councillor MacLellan
Seconded By Councillor Mattie

That the agenda be approved.

Motion Carried

3. Approval of March 5th, 2019 Asset Management Minutes

Councillor MacFarlane called for any errors or omissions to the minutes of March 5, 2019.

Moved By Councillor Corbett
Seconded By Councillor Chisholm

That the Asset Management minutes of March 5, 2019 be approved as presented.

Motion Carried

4. Business Arising from the Minutes

There was no business arising from the minutes.

5. Continuing Business

a. Approval of the 2019/20 Capital Plan

Mr. Myers reviewed the Capital Plan that was included in the agenda package. Staff is looking to go to tender with two projects: paving the Municipal Parking Lot and for the acquisition of a new garbage truck.

Moved By Deputy Warden Stewart
Seconded By Councillor Corbett

The Committee recommends that Municipal Council approve authorizing staff to advertise tenders for items noted in the Capital Plan.

Motion Carried

Moved By Councillor Dunbar
Seconded By Councillor MacLellan

The Committee recommends that Municipal Council approve the Capital Plan as presented.

Motion Carried

6. New Business

There was no new business.

7. Additions to the Agenda

There were no additions to the agenda.

8. Adjournment

Moved By Councillor Chisholm

That the Committee of the Whole meeting be adjourned at 5:33 pm.

Motion Carried

Councillor Bill MacFarlane

Beth Schumacher, Deputy Clerk

POMQUET SANITARY SEWER COLLECTION SYSTEM

Pumping System Evaluation *(Draft)*

August 14, 2015

Prepared for:

Municipality of the County of Antigonish
Attention: Daryl Myers, Director of Public Works
285 Beech Hill Road
Antigonish, NS
B2G 0B4

Prepared by:
C. J. MacLellan & Associates Inc.
65 Beech Hill Road, Suite 2
Antigonish, NS
B2G 2P9

File No. 628651-03

C. J. MacLellan & Associates Inc.
Highland Professional Centre, Suite 2
65 Beech Hill Road, Antigonish, Nova Scotia B2G 2P9
TEL: 902-863-1220
FAX: 902-863-3225
CONSULTING ENGINEERS AND PLANNERS
Email: hilda.dunnewold@snclavalin.com
www.cjmac.ns.ca

August 14, 2015 File # 628651-03

Municipality of the County of Antigonish
Attention: Daryl Myers, Director of Public Works
285 Beech Hill Road
Antigonish, NS
B2G 0B4

Dear Mr. Myers:

RE: Pomquet Sanitary Sewer Collection System – Pumping System Evaluation

C. J. MacLellan & Associates Inc. is pleased to provide our draft report on the evaluation of the Pomquet Sanitary Sewer collection System (pumping portion). There are a few pieces of information that need confirmation however we provide the draft version for your preliminary review and comments.

Should you have any questions, or if you require any clarification, please do not hesitate to contact the undersigned at (902) 863-1220.

Sincerely,
C.J. MacLellan & Associates Inc.

Hilda Dunnewold, P.Eng.
Environmental Engineer

HD/

TABLE OF CONTENTS

List of Tables

List of Figures

Appendices

1 INTRODUCTION

C J MacLellan & Associates Inc. (CJMac) were engaged by the Municipality of the County of Antigonish (MOCA) to undertake a study of the existing sanitary sewer collection system located in the community of Pomquet. It is CJMac's understanding that MOCA is incurring significant costs associated with repairing and/or replacing multiple residential sewage pumps that form the small diameter forcemain sanitary sewage system along the Pomquet Monks Head Road. MOCA has noted that the majority of residential pumps are housed in aging septic tanks which may be susceptible to inflow and infiltration. The Municipality has also noted that the Pomquet STP is experiencing high flows during rain events. The study was to specifically focus on operation of the residential grinder pumps, determine possible causes for failure and recommend possible solutions to ongoing maintenance problems.

2 PURPOSE

2.1 Objectives

The objectives of the project are to evaluate the operation of the existing residential grinder pumps and recommend possible solutions that would result in decreased maintenance expenditures of time and money in MOCA's operation of the collection system.

2.2 Scope of Work

The following scope of work was presented in our proposal dated May 8, 2015:

- Obtain and review any background information available from MCA;
- Perform an inspection of a several representative pump stations to determine typical arrangement and conditions;
- Obtain and review pump station and STP flow data from MCA;
- Liaise with pump manufacturer, E-One;
- Examination of failed pump hardware and electrical components;
- Review sanitary system hydraulics; and,
- Based on the findings provide MCA with long term solution options and the associated costs with the goal to reduce operation and maintenance costs with the current system.

3 EXISTING SYSTEM

3.1 Background

The sanitary sewer collection system was installed in the community of Pomquet in 2002. The collection system was installed along with a new sewage treatment plant. The collection system generally consisted of 2,285 m of gravity sewer, 1,925 m of low pressure forcemain, three duplex pumping stations, and approximately 60 gravity and pressure lateral connections. The service laterals were installed to the property line by MOCA with connection to the system by the homeowner at a later date. The pressure lateral connections required individual sewage grinder pumps to be installed by the homeowner on their property, either in new package pump systems complete with wet well or in the existing septic tank. The grinder pumps were supplied by MOCA for installation by the homeowner. The grinder pumps were the E-One GP2010 model. Homeowners were not compelled to connect and could do so if they were experiencing malfunction of their on-site sewage disposal system. Maintenance of the individual grinder pumps were intended to be the responsibility of the homeowner however as time went on, MOCA assumed a greater role in maintenance of the units as service requirements increased.

3.2 General Residential Installation Overview

The majority of grinder pumps (GP) installed along Monks Head Road are installed in existing home septic tank chambers (concrete). Of the estimated 30 installations, 25 are installed in either an existing septic tank, or a concrete pump chamber. The five (5) remaining installations use the manufacturer recommended HDPE residential pump chamber. For installations in existing septic tanks, the GP utilizes a pump support stand that attaches to the bottom of the pump and allows the pump inlet to be located approximately 300 mm above the chamber floor. Pump electrical power cable, electrical connector, pressure equalizer, and lifting rope are suspended from an upper steel tie bar that spans the access cover (see Figure 3.2-1).

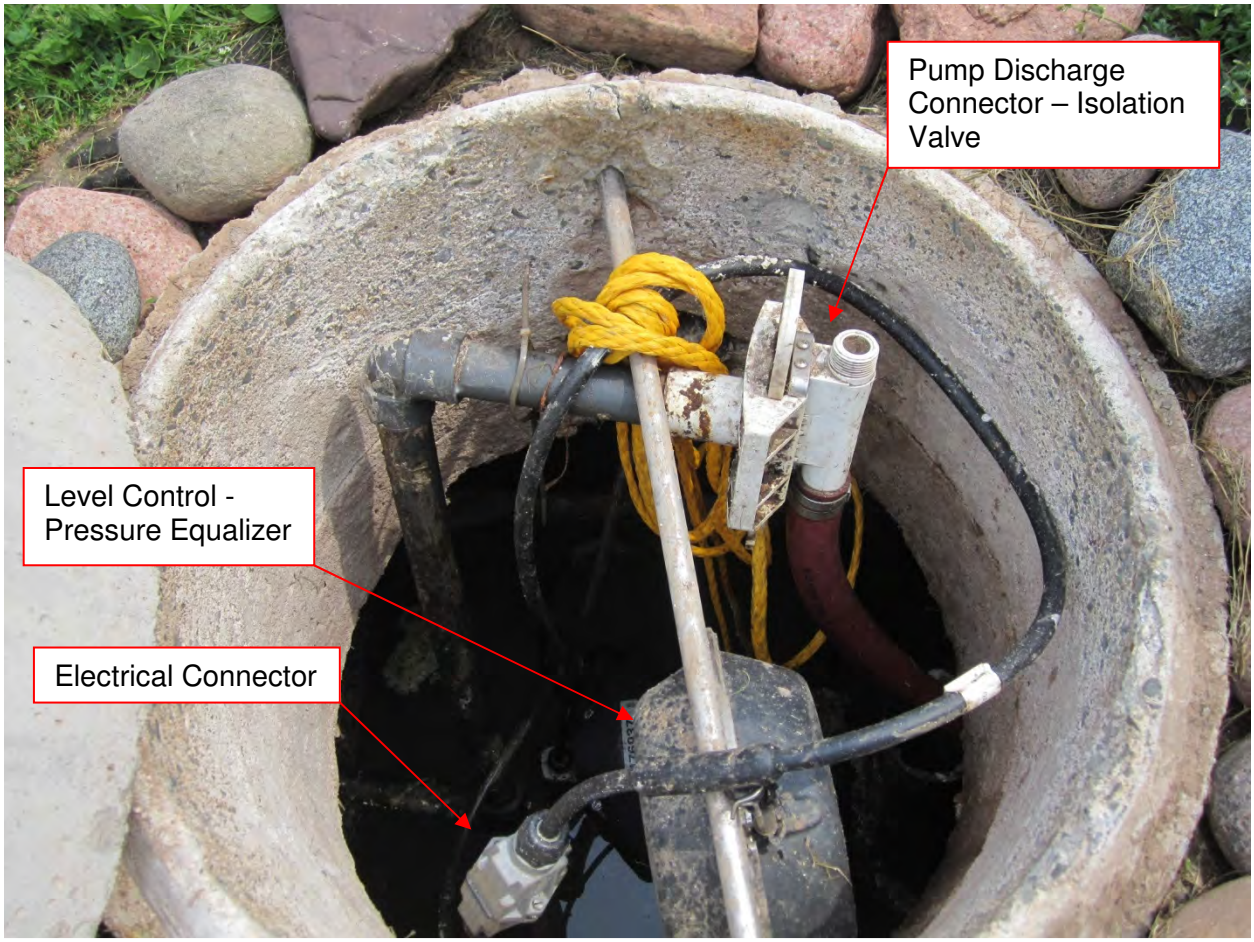


Figure 3.2-1 Concrete Pump Chamber - Access Cover Removed

3.3 Hydraulic Analysis

CJMac completed a review of the existing pressure sewer hydraulics to evaluate if grinder pump deadhead (pump running but not pumping) would be an issue. Based on this review, the main lift station pumps pressurize the forcemain to 32 psig, with a maximum deadhead pressure of 44 psig. The E-One pumps are capable of generating upwards of 80 psig of pressure, so deadhead of residential grinder pumps is unlikely. There is a small possibility that grinder pumps could be reduced to a low flow condition if many (greater than 10) grinder pumps are running at the same time. This is an unlikely scenario, but could potentially happen during period of high infiltration during heavy rains. It appears unlikely that this scenario is contributing to pump failures.

3.4 Observations

CJMac conducted an onsite review of three (3) residential pump station installations on July 7, 2015. Ben Theuerkauf, P. Eng. And Hilda Dunnewold, P. Eng. were accompanied during the site visit by Josh Chisholm, Public Works Supervisor for MOCA. The three pump stations chosen for inspection were selected based on their higher failure rate. In addition to the site visit, CJMac also reviewed data provided by MOCA, as well as liaised with Hart Electric Motor (MOCA E-One pump repair service provider) to investigate the grinder pump failures. It is evident from this review that pumps located in existing septic tanks (concrete) as well as new concrete chambers are experiencing the highest rate of failure. Table 3.4-1 below illustrates these findings:

Table 3.4-1 HDPE vs Concrete Chamber Installations along Monk's Head Road

Type of Installation	# installations	Failures	Failure / Installation
HDPE Chamber	5	4	0.8
Concrete Chamber	25	50	2.0

GP's installed in the HDPE chamber are obtaining 250% longer pump life as compared to the concrete installation. In discussions with Hart Electric Motor (HEM) they have indicated the following failure mechanisms:

- EPM (rubber) pump stator failure (+/- 50% failures);
- Grinder teeth failure;
- Level sensor failure;
- Contact switch failure; and,
- Cast iron body failure.

3.4.1 Pump Stator / Grinder Teeth

The grinder pump uses a steel rotating disc with carbide grinder teeth to grind all effluent before being passed along to the pump cavity. The pump is a progressive cavity semi-positive displacement pump which has a stainless steel helical rotor encased in an EPM (rubber) stator. A small tolerance between the rotor / stator is essential to provide the positive displacement to pump the fluid. HEM has indicated that a large portion of the failures were caused by failure of the EPM stator and a loss of tolerance. HEM has noted that sand / grit damage to the stator is evident, and in some circumstances sand / grit has been removed during pump tear down. This sand / grit has also caused failure of the carbide grinder teeth. HEM notes this type of failure occurs most frequently at approximately 50% of total failures.

3.4.2 Level Sensor / Contact Switches

The E-one GP uses an integral air column complete with pressure switches to monitor level in the chamber and control pump on / off function as well as alarm function. The pressure equalizer (pancake assembly) is to be located in a separate dry vented space and its purpose is to adjust for changes in atmospheric pressure. Grease / fats tend to plug up the level sensor assembly over time. Contact switches tend to also wear out over time based on discussion with HEM.

3.4.3 Cast Iron Body

HEM noted that the cast iron body of some GP's have corrosion damage, especially at the water line. In some cases the body is too badly worn to warrant a pump rebuild.

3.4.4 Septic Tank / Concrete Chamber Installation

Over 80% of the pumps installed along the Pomquet Monk's Head Rd. are in existing concrete septic tanks or concrete chambers. These installations have had the highest failure rate with an average pump replacement every six (6) years per installation. For one installation, pump replacement has been every 1.5 years. According to manufacturer data, pump replacement should only be required every 10-15 years. HEM has indicated that a majority of failures have resulted from sand / grit within the pump cavity.

Three (3) potential sources of the sand / grit include i) homeowner, ii) infiltration thru septic joints, iii) concrete degradation. It would be expected that if homeowner sand / grit was the source then pump failures would be isolated, however failures are wide spread across the system. Infiltration is known to be an issue within this collection system. Pressure Sewer systems should exhibit lower infiltration than a conventional gravity system, but this is not the case with this system. It is suspected that older septic installations are the source of the high infiltration. The soil in the area is generally clay based, so marginal sand carryover is anticipated. However, infiltration may be high in sulphate content which can lead to creation of hydrogen sulfide & sulfuric acid gas. These two gases are corrosive to metals, and can cause degradation of concrete. In addition high infiltration will result in longer / more frequent pump run times during periods of heavy rain.

The last source of sand / grit is from the existing concrete septic tank / chamber. Hydrogen Sulfide (H_2S) is a byproduct of the anaerobic digestion than occurs in a common septic tank. The gas accumulates in the headspace above the water line in the tank and when it mixes with water vapour and low levels of oxygen they form sulfuric acid (H_2SO_4). Sulfuric acid can cause severe damage to concrete. Typical signs of attack are spalling of the concrete surface, white formations of ettringite on the surface of concrete just above the water line, and corrosion of steel components. These were all evident during the onsite inspection (Reference Figures 3.4-1, 3.4-2, and 3.4-3). Any aggregate that spalls and falls lose is a source of sand / grit. As the

existing septic tanks age, it would be expected that degradation of the concrete would increase, resulting in more frequent pump failure. HEM has also noted cast iron corrosion, indicative of a corrosive environment.

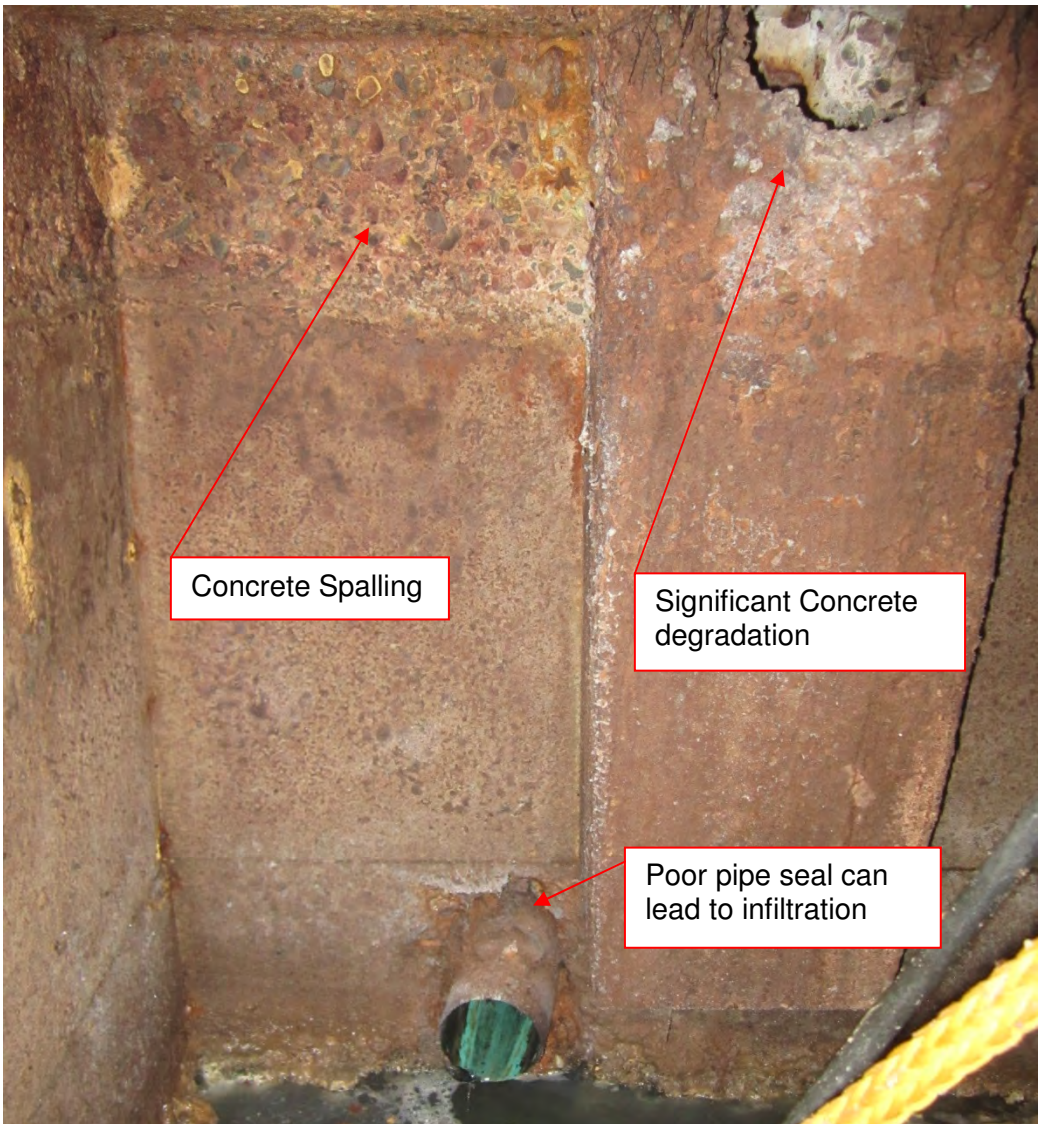


Figure 3.4-1 Existing Septic Tank Installation

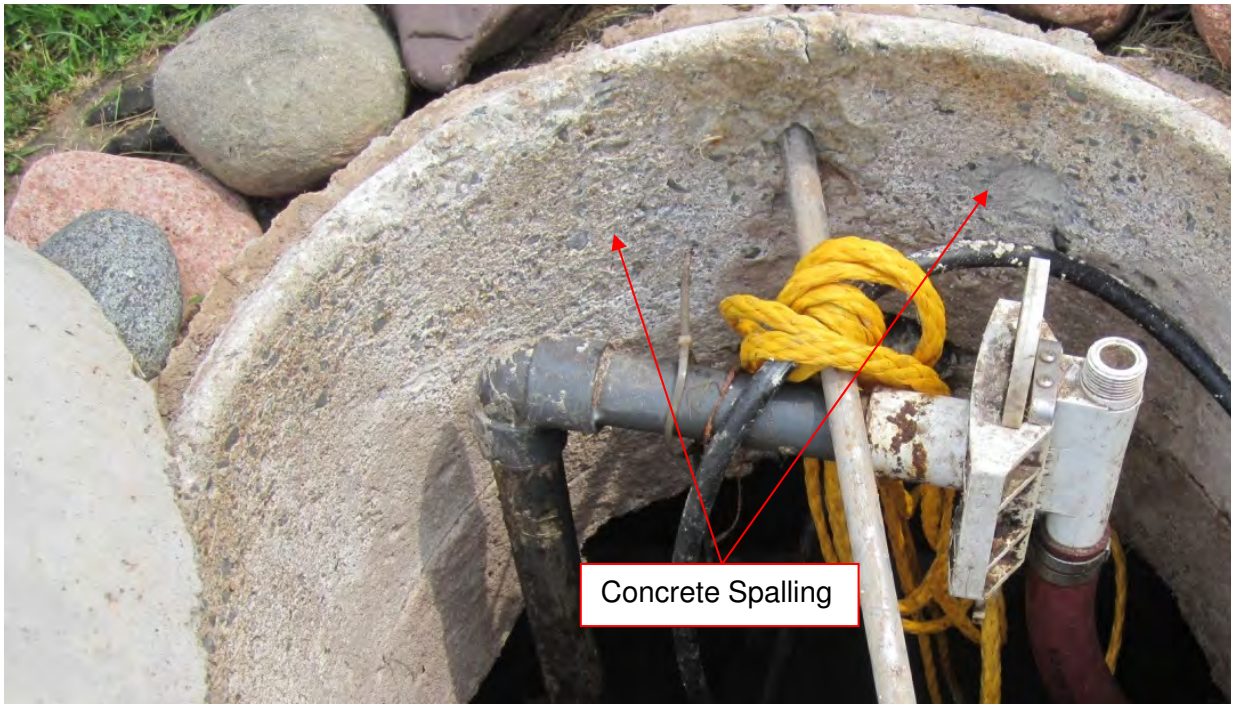


Figure 3.4-2 Existing Septic Tank Installation

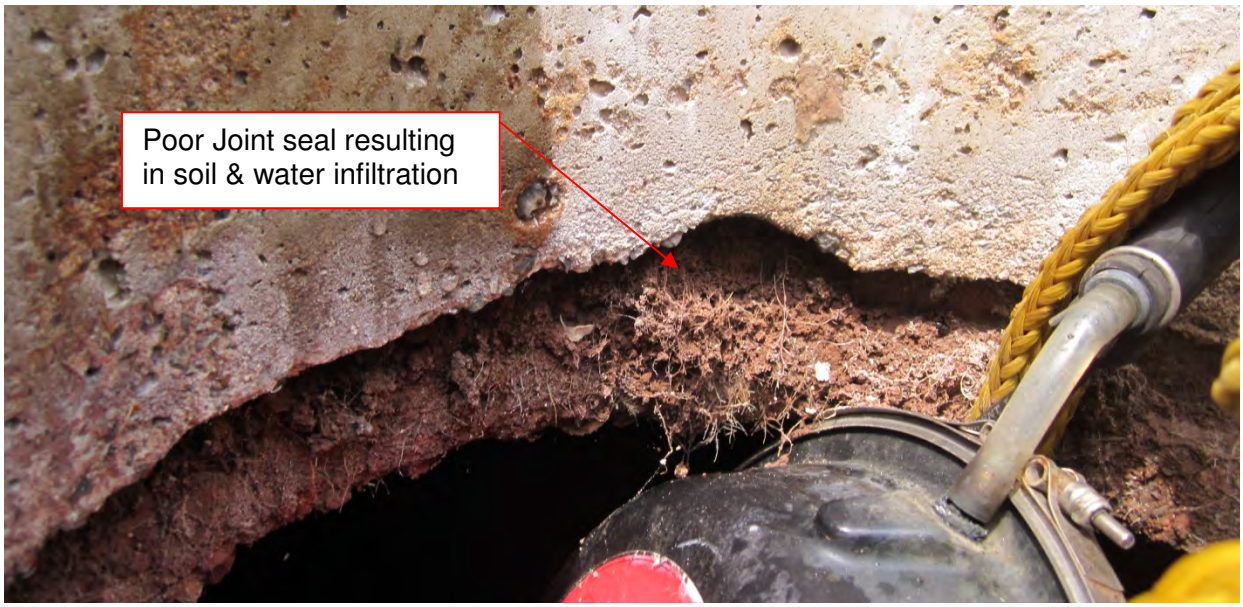


Figure 3.4-3 Existing Septic Tank Installation

4 DISCUSSION

Based on the information provided & review of several installations it is concluded that installation of E-One grinder pumps in concrete chambers is resulting in a higher than normal grinder pump failure rate. E-One grinder pumps are poor at handling grit / sand because of the EPM (rubber) stator within the pump assembly. The sand / grit's abrasive nature wears away the stator. It is evident from the field inspection that concrete degradation is occurring in both the existing septic tanks & newer Shaw concrete pump chambers. It is suspected that the concrete chamber degradation is resulting in high levels of sand, grit, and aggregate within the tank. Concrete degradation is likely accelerated by high levels of H_2S & sulfuric acid present within the concrete chamber and lack of adequate venting of the chamber. In addition, infiltration during heavy rain events will result in longer pump run times & heavier loading on the Pomquet sewage treatment plant.

Additional sources of sand / grit can be caused by i) infiltration during heavy rain, high ground water and ii) home owner via kitty litter, sand, coffee grinds, etc. These sources have been discounted based on discussion in section 3.4.4, however they are still possible. It is of the opinion of this author that the concrete tanks are the largest contributing factor to sand / grit; however only a detailed forensic analysis of problematic septic tanks can confirm this. Section 5 presents options for MOCA to consider.

5 OPTIONS

Three options are being presented as possible solutions to the ongoing maintenance problems:

- Replace a selection of pumps to evaluate the effectiveness of a different pump installation and/or technology;
- Replace all grinder pump installations in septic tanks with new package grinder pump units complete with plastic wet wells; and,
- Abandon the grinder pump system and replace with conventional gravity and forcemain collection system.

5.1 Option 1 – Partial Grinder Pump Replacement as Trial

The first option would be to test the theory that specific conditions in Pomquet do not promote the use of either the E-One grinder pump in concrete tanks or the use of these pumps at all. Since it not conclusive what the problem is replace a selection of pumps to evaluate the effectiveness of a different pump installation and/or technology. Barnes pumps offers a competitive equal to the E-One grinder pump. The Barnes EcoTRAN OGP pump is a residential sewage pump and uses duplex centrifugal vortex impellers. All rotating parts are metal, so this option may be better at handling sand / grit. This pump was designed as a direct replacement for E-one Grinder pumps, and fits within the E-One plastic chamber. Installation of this type of pump within a concrete chamber would have to be validated by the manufacturer. Information on the Barnes EcoTRAN OGP is found in Appendix A. The costs for Option 1 would be a function of the number of units replaced, whether just the chamber is replaced or the whole pump package, and the brand of pump used. Unit pricing for each of these options is presented in Appendix B (Option 2 costs).

5.2 Option 2 – Complete Grinder Pump Replacement

The second option would be to replace all of the existing grinder pump installations that are within concrete septic tanks with new package grinder pump units complete with plastic wet wells. The municipality could consider replacing the existing concrete septic tank with a HDPE wet well, and reuse the existing pump. However, it is recommended that if this option is chosen, that the pump be rebuilt / serviced. The costs for Option 2 are presented in Appendix B. The sub-options A, B and C are presented.

5.3 Option 3 – Conventional Collection System

At the request of MOCA, a third option of abandoning the existing grinder pump and low pressure forcemain system and replace those portions with a conventional gravity and forcemain collection system. The parts of the collection system that would be replaced extend from approximately the air relief chamber at the north end of the collection system on Pomquet Mok's head Road, south to the intersection with Taylors Road. A preliminary sketch of the conventional system is presented on the existing As-Built drawings for the original collection

system project. These sketches are found in Appendix C. The Costs for Option 3 are found in Appendix B.

6 RECOMMENDATIONS

It is recommended that all existing residential homes with septic tanks / concrete pump chambers be replaced with E-One HDPE pump chambers or equivalent (Option 2). This option could be implemented in a phased process if required. It is recommended to replace five (5) of the most problematic locations & monitor the pump performance over the first 1-2 years. Following a successful trial remaining concrete septic installations should be replaced with HDPE tanks.

Respectfully Submitted,
C.J. MacLellan & Associates Inc.

Hilda Dunnewold, P.Eng.
Environmental Engineer

Ben Theuerkauf, P. Eng.
Mechanical Engineer

APPENDIX A
ECO-TRAN INFORMATION

Homeowner Features

Barnes EcoTRAN Pressure Sewer System is dependable, safe and aesthetically pleasing to homeowners.

The EcoTRAN is equipped with a sealed pressure switch, eliminating costly maintenance frequently required of float systems where grease is present or in areas where mercury float switches are banned or restricted. Additionally, a highly dependable centrifugal grinder pump eliminates wearing components for trouble-free operation.

Equipped with a low profile, non-rusting alarm box with silence button, the system provides both light and horn notification in the event of pump malfunction. The EcoTRAN System is also equipped with lockable rock-shaped cover which makes the system safe and completely childproof. This unique cover design also blends well with its surroundings, reducing visual impact, which makes the system both out of sight and out of mind.

Maintenance

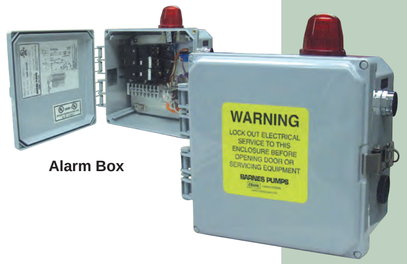
Barnes EcoTRAN Pressure Sewer System is easy to maintain. All system maintenance is performed from topside so confined space entry is never required.

The cover is easily removed by unlocking the padlock, twisting the cover to unlock and then lifting off. The level control can be readily removed without handling the pump. The pump-mounted check valve, discharge diaphragm and anti-siphon valve are all easily serviced. A pre-attached two-point lifting harness allows quick and easy removal of the pump with no unbolting required.

To facilitate repair, the pump motor is bolted to frame components, rather than press or shrink-fit to the housing. The shut-off valve, connected to the pod, is easily removed from above. The isolation valve is also operated from above with a color-coded actuation cord.

Quick-connect cords were designed to simplify pump and level control connection, allowing for rapid component swapping if needed. All systems are equipped with standard alarm boxes with circuit breakers, eliminating the need to decipher through complicated, customized control panels, or optional boxes with generator receptacles.

The Barnes EcoTRAN System basin cover readily adapts to virtually any landscape design, blending in with the natural environment surrounding it.



Alarm Box

Frequently Asked Questions

Q. Barnes offers a choice of two different grinder pumps with an EcoTRAN System. Which pump should I choose?

A. The Omni Grind (OGV) is rated for low to medium heads, up to 95 feet or 41 PSIG, while the Omni Grind Plus (OGP) is designed for higher heads, up to 180 feet or 78 PSIG at 10GPM. The project Engineer or a Barnes Pressure Sewer specialist can advise the expected head based on the system piping design, or you can simply select the OGP for any head up to 180 feet.

Q. Are progressing cavity grinder pumps available with the EcoTRAN System?

A. No. In order to provide the best possible grinder pump life, we have chosen to use grinder pumps with the proven centrifugal vortex design. Progressing cavity pumps continuously wear, and the wear is accelerated under certain operating conditions; centrifugal pumps by their nature are not affected by pressure extremes or high flow rates.

Q. The Barnes EcoTRAN System is fairly compact. What do I do if additional retention capacity is required?

A. Barnes offers an extensive line of engineered pressure sewer systems with available depths up to 20 feet and diameters up to 6 feet. Larger capacity stations are readily available for your specific needs.

Q. Many specifications call for a minimum 24" diameter basin. Why was the riser on the EcoTRAN System selected with an 18" diameter?

A. The size of the external cover (effective diameter) depends primarily on the riser diameter; an 18" diameter was chosen to reduce the visual impact of the cover in the homeowner's yard. The specifications calling for a 24" diameter require a worker to enter the basin to perform shutoff valve maintenance. With the removable POD design, all maintenance is performed from topside eliminating the need for confined space entry.

Q. How are children prevented from gaining access to the basin or the alarm box?

A. The EcoTRAN is provided with brass padlocks for both the basin cover and the alarm box.

Q. What happens if solid materials or drain cleaners enter the system from house?

A. The EcoTRAN has been thoroughly tested and qualified to NSF/ANSI 46, a specification that requires successful operation despite the occasional entry of a wide range of challenging materials, including cloth.

Visit our website to read Case Studies on Pressure Sewer *SUCCESS* stories!

CERTIFIED TO NSF/ANSI 46

CRANE PUMPS & SYSTEMS

A Crane Co. Company

Crane Pumps & Systems
420 Third Street
Piqua, Ohio 45356
(937) 778-8947
Fax (937) 773-7157
www.cranepumps.com

Crane Pumps & Systems Canada
83 West Drive
Brampton, Ont. Canada L6T 2J6
(905) 457-6223
Fax (905) 457-2650

brands you trust.

BARNES burks DEMING WEINMAN CROWN PROSSER

BARNES®

Pressure Sewer Systems

brands you trust.

The Barnes EcoTRAN™ Pressure Sewer System preserves groundwater *eco*logy by collecting and grinding residential sewage in an underground basin and *tran*smitting the waste under pressure to a remote private or municipal waste treatment plant.

CRANE PUMPS & SYSTEMS

BARNES PRESSURE SEWER ECOTRAN

Why Use a Pressure Sewer System?

Pressure sewer systems are an effective method to move residential wastewater through small diameter pipes to collection facilities where other methods are less economical or less feasible. The primary differences between conventional gravity sewer systems and pressure sewer systems are in the piping network and the reduction of solids size in the wastewater. Pressure sewer systems use specialized submersible grinder pumps, which are designed to reduce sewage particulate size to easily move the sewage through small diameter pipes.

Adapted from SWPA White Paper, "A Pressure Sewer Overview"

The application of grinder pumps and pressure sewer systems is a cost-effective, long life answer to allow more home sites, both existing and new, access to a public sewer system or regional private waste water treatment system.

The Heart of the System is the Grinder Pump

The Barnes Omni Grind Plus™ (OGP) provides heads up to 200' and flows to 28gpm. With the high head capabilities of a progressing cavity pump and the long life of Barnes centrifugal grinder pumps, the Omni Grind Plus is truly a universal grinder pump for single family residences.

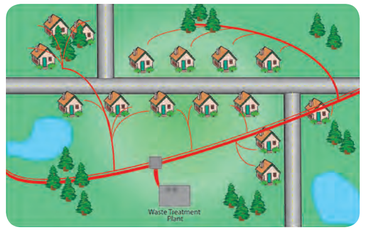
Superior Performance

- Two stage pump design provides high head capability.
- Installed with the Barnes ESPS™, (Environmentally Sealed Pressure Switch) problems with grease build up are nonexistent.
- Start and run capacitors are located in the motor housing so no expensive control panel required.
- UL and CSA listed to assure quality and electrical safety.

Dependable Activation Depends on a Reliable Level Control

The ESPS, is a highly dependable level control designed specifically for use with standardized low pressure sewer packaged systems.

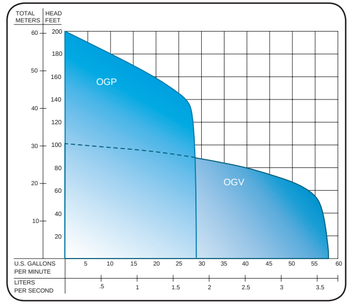
- Pressure switch parts are protected from the basin environment with a Barnes exclusive sealed design.
- Slim, rigid column with no external moving parts. Unit is unaffected by solids, grease build up, or liquid swirling in basin.
- No field adjustment required because operating levels are factory preset.
- Barnes exclusive quick connect power cord seals tight and reduces strain.
- Overflow protection with separate air bells for operating control and high-level alarm.

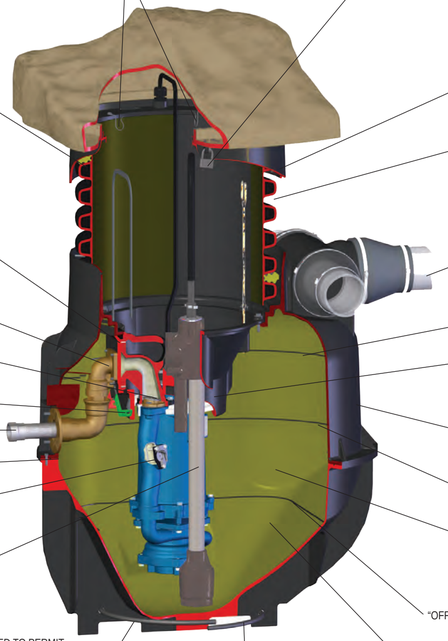


Omni Grind Plus

This product may be covered by one or more of the following patents and other patent(s) pending: US Patent 7,357,341 & US Patent 7,578,657

Barnes ESPS





CABLE HOOKS ALLOW FOR EASY STORAGE OF POWER CORDS AND HARNESSES

LOCKABLE ROCK-SHAPED COVER ROTATES TO LOCKED POSITION, INCLUDES LOCK HASPS. VENTED TO ATMOSPHERE

ENGINEERED GASKETS SEAL SYSTEM AT UPPER AND LOWER ENDS OF RISER

ADAPTER CONNECTS COVER TO RISER, INCLUDES POWER CORD CONDUIT

DISCHARGE FLANGE SLIDES INTO MOLDED GUIDE RAIL AND SEALS AUTOMATICALLY UNDER PRESSURE. THE DIAPHRAGM SEAL IS FULLY SERVICEABLE WHEN REMOVED AS PART OF THE PUMP ASSEMBLY

RISER PIPE EASILY CUT FOR DAY OF INSTALLATION LENGTH ADJUSTMENT

3 INLET PORT POSITIONS PROVIDED FOR PIPING INSTALLATION FLEXIBILITY

BALL-TYPE SHUT-OFF VALVE IS ATTACHED TO POD FOR EASY MAINTENANCE WITHOUT BASIN ENTRY. GASKETED LOWER END SLIDES INTO RECEIVER

"ALARM LEVEL"

FULLY SERVICEABLE FLAP STYLE CHECK VALVE INTEGRAL TO PUMP ASSEMBLY

POLYPROPYLENE COPOLYMER "POD" POSITIONS AND FACILITATES EASY REMOVAL OF PUMP AND LEVEL CONTROL. CAN BE REMOVED TO MAINTAIN SHUT OFF VALVE WITHOUT CONFINED SPACE ENTRY

VALVE HANDLE CONTROLLED FROM ADAPTER AT TOP OF RISER WITH COLOR-CODED CORDS

STAINLESS STEEL FLEXIBLE DISCHARGE COUPLING

MOLDED CORROSION-RESISTANT POLYPROPYLENE COPOLYMER TANK UTILIZE STRUCTURAL GUSSETS FOR HIGH STRENGTH

FACTORY ASSEMBLED AND TESTED FOR RELIABILITY

"ON LEVEL"

FLAP-STYLE ANTI-SIPHON VALVE PROTECTS AGAINST NEGATIVE HEAD

"OFF" TO "ON" VOLUME 25% GREATER THAN COMPETITION

ESPS- AUTOMATIC PRESSURE SWITCH LEVEL CONTROL INCLUDES SOLID-STATE RELAY AND OVER-TEMPERATURE SWITCH. ELIMINATES CONTROL PANEL. NO SETTING ADJUSTMENTS REQUIRED

"OFF LEVEL"

GUSSETS ORIENTED TO PERMIT LIFTING WITH LIFT TRUCK

FIBERGLASS REBAR FACTORY-INSTALLED FOR SIMPLE CONCRETE ANTI-FLOTATION BALLAST

TAPERED TANK ASSURES LOWER "OFF" RETENTION THAN COMPETITIVE UNITS AND FOCUSES SOLIDS TOWARD GRINDER

"Inlet" to "Alarm"	15.5 Gal.
"Alarm" to "On"	18.5 Gal.
"On" to "Off"	20.0 Gal.
Residual Volume Below "Off"	10.5 Gal.

Certifications/Listings
UL 778
UL 508
UL 1951
CSA 108
NSF/ANSI 46

Engineer / Specifier

The Barnes EcoTRAN Pressure Sewer System has been designed, tested, and certified to ensure long term, trouble-free operation. The system components and basin package, as a whole, were tested and certified to UL and CSA electrical standards and NSF/ANSI 46 grinder pump and station requirements.

All non-metallic components in polypropylene, polyethylene and thermoset vinyl ester provide outstanding corrosion resistance and high strength. All metallic components in cast iron, stainless steel or bronze offer proven resistance to corrosion in sewage applications.

Two grinder pump alternatives, the Omni Grind Plus (OGP) or Omni Grind™ (OGV), provide system design flexibility and "universal" residential hydraulic coverage. The OGP high-head grinder pumps can be used universally, while the medium-head OGV grinder pumps can be used as a cost-savings measure for lower system heads.

Factory pre-set ESPS , is immune to the effects of grease build-up and requires no field adjustment.

Both vented and "flood plain" covers are also available.

Simple Installation

The Barnes EcoTRAN Pressure Sewer System is easy to install and designed to eliminate time consuming callbacks.

Direct burial cable, alarm box and all needed parts and gaskets are supplied with the EcoTRAN unit. Wiring and lifting harnesses stow neatly with cable hooks at top of the riser.

To install the system, a 36" auger or backhoe can be used for excavation. Pre-installed, fiberglass rebar allows simple anti-flotation ballasting with poured concrete. Only 1/3 yard of concrete is required for any installation depth. The riser design also permits day-of-installation depth setting.

Three inlet positions provide piping location flexibility and a flexible outlet connector prevents potential misalignment due to settling. Pre-wired waterproof power connectors dramatically simplify electrical wiring and the alarm box readily attaches to a residence or post.

All components are easily installed, including the level control and pump. The level control drops into factory pre-set position, with no adjustments required. The pump then slides easily into position and does not need to be powered up until system start-up.

APPENDIX B
COST TABLES

Opinion of Probable Cost - Option # 2

Project: **Pomquet Sanitary Sewer Collection System - Pumping System Evaluatic**

Subject: **Preliminary Construction Cost (No Design)**

Job No: **628561-03**

Date: **August 14, 2015**

CJMac
ENGINEERS & SURVEYORS
65 BEECH HILL ROAD, ANTIGONISH, N.S. B2G 2P9
Tel: (902)863-1220 Fax: (902)863-3225 Email: cjmac@cjmac.ns.ca
C. J. MacLellan and Associates Inc.

Item	Description	Unit	QTY	Unit Price	Total Price	
Sanitary System - Option2A						
21	**Supply and Install New Grinder Pump Units**					
	Supply ***E-One*** Package Grinder Pumps	ea	25	$5,975.00	$149,375.00	
	Install ***E-One*** Package Grinder Pumps	ea	25	$2,000.00	$50,000.00	
					SUB-TOTAL (Excluding HST)	**$199,375.00**
					25% Contingency	**$49,843.75**
					TOTAL (Excluding HST)	**$249,218.75**

Sanitary System - Option2B						
21	**Supply and Install New Grinder Pump Units**					
	Supply ***Eco-Tran*** Package Grinder Pumps	ea	25	$4,035.00	$100,875.00	
	Install ***Eco-Tran*** Package Grinder Pumps	ea	25	$2,000.00	$50,000.00	
					SUB-TOTAL (Excluding HST)	**$150,875.00**
					25% Contingency	**$37,718.75**
					TOTAL (Excluding HST)	**$188,593.75**

Sanitary System - Option2C						
21	**Supply and Install New Pump Chambers & Reuse Existing E-One Pumps**					
	Supply ***E-One*** Pump Chamber Only	ea	25	$1,000.00	$25,000.00	
	Install ***E-One*** Pump Chamber Only	ea	25	$2,000.00	$50,000.00	
					SUB-TOTAL (Excluding HST)	**$75,000.00**
					25% Contingency	**$18,750.00**
					TOTAL (Excluding HST)	**$93,750.00**

*Note: This is an "Opinion of Probable Cost" based on past experience and judgment. The above cost does not consider items beyond the control of CJMac such as non-competitive bidding, market trends, unforeseen labour and material fluctuations, etc. Actual tender and constructions costs may vary from the opinion provided.

Opinion of Probable Cost - Option # 3

Project: **Pomquet Sanitary Sewer Collection System - Pumping System Evaluatio**

Subject: **Preliminary Construction Cost (No Design)**

Job No: **628561-03**

Date: **July 25, 2015**

CJMac
ENGINEERS & SURVEYORS
65 BEECH HILL ROAD, ANTIGONISH, N.S. B2G 2P9
Tel: (902)863-1220 Fax: (902)863-3225 Email: cjmac@cjmac.ns.ca
C. J. MacLellan and Associates Inc.

Item	Description	Unit	QTY	Unit Price	Total Price	
Sanitary System						
21	**Pomquet Monks Head Road Gravity Pipe**					
	200mm DR35 PVC	m	960	$275.00	$264,000.00	
22	**Forcemain**					
	100mm Forcemain	m	1080	$200.00	$216,000.00	
23	**Manholes**					
	1050mm diameter concrete	each	9	$4,500.00	$40,500.00	
24	**Services**					
	100mm DR28	each	20	$2,500.00	$50,000.00	
	100mm DR28 (directional drill)	each	17	$4,500.00	$76,500.00	
25	Connection to Existing	each	2	$3,000.00	$6,000.00	
27	Pump Station	each	1	$250,000.00	$250,000.00	
		SUB-TOTAL (Excluding HST)				**$903,000.00**
Street System Reinstatement						
53	Gravel					
	Type 1 (150mm)	m^2	2600	$8.00	$20,800.00	
	Type 2 (350mm)	m^2	2600	$13.00	$33,800.00	
		SUB-TOTAL (Excluding HST)				**$54,600.00**
		TOTAL (Excluding HST & Contingency)				**$957,600.00**

*Note: This is an "Opinion of Probable Cost" based on past experience and judgment. The above cost does not consider items beyond the control of CJMac such as non-competitive bidding, market trends, unforeseen labour and material fluctuations, etc. Actual tender and constructions costs may vary from the opinion provided.

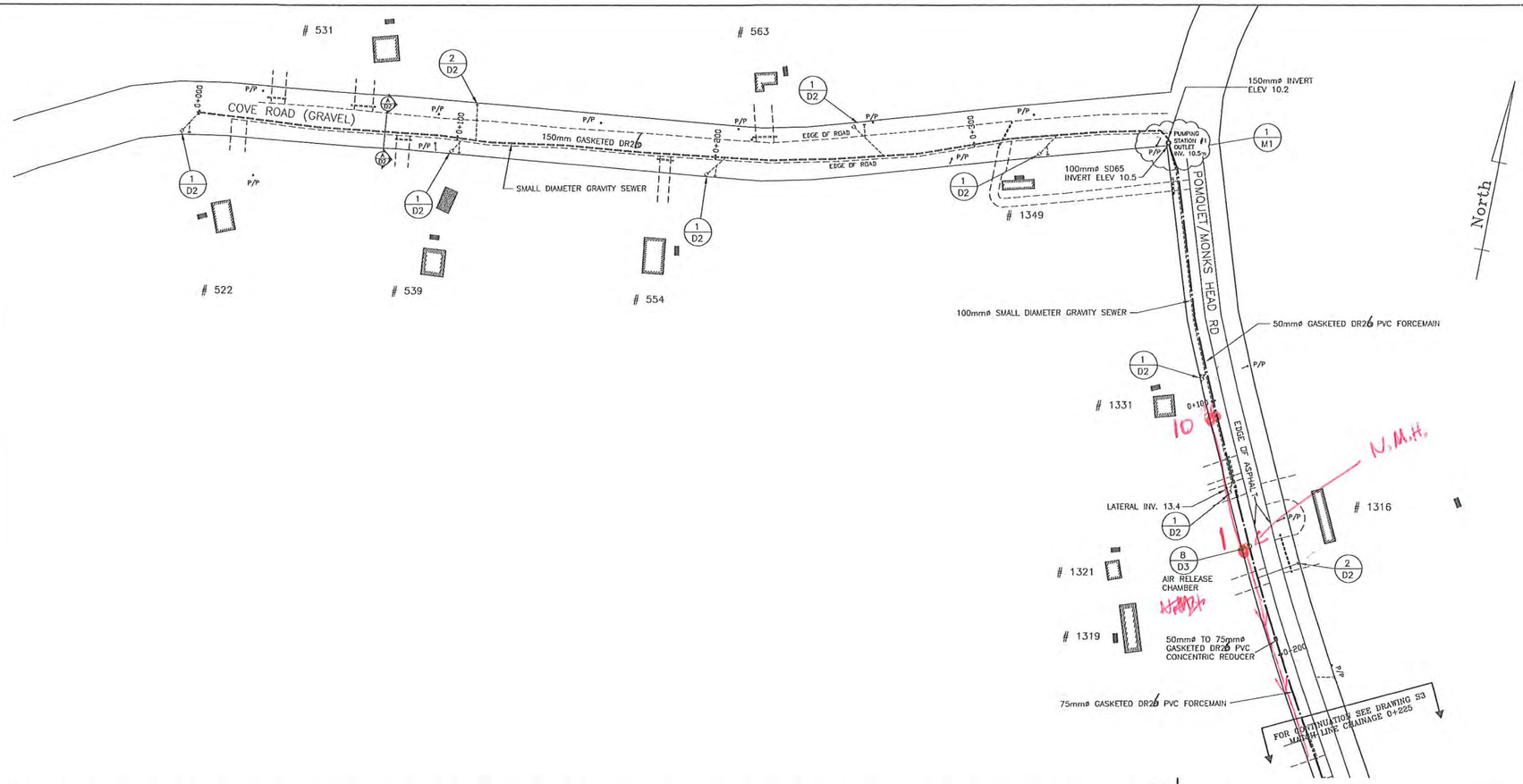
POMQUET SANITARY SYSTEM - OPINION OF PROBABLE COST - OPTION 3

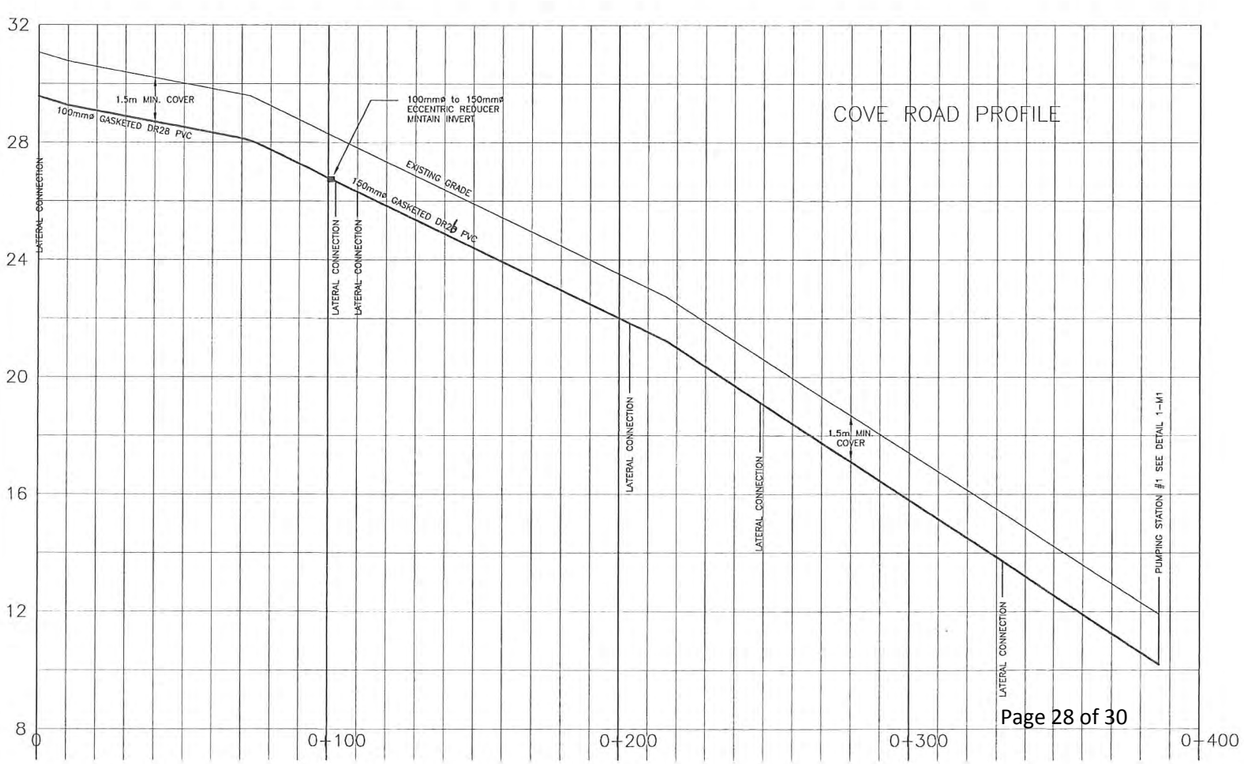
Project Name: Pomquet Conventional System	Discipline: Civil (Preliminary)	Client: **MOCA**
SLI Project #: 628561-07	Drawing: NA	Date: 25-Jul-15
Prepared By: BM	Drawing Revision: NA	Approved By: BM

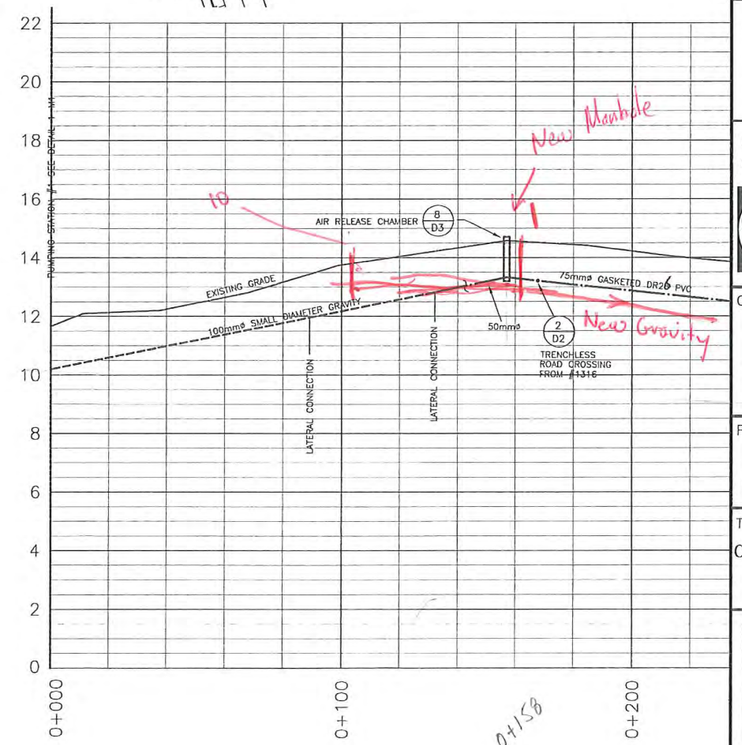
CIVIL WORKS	PRICE
Sanitary System	$903,000
Street System Reinstatement	$54,600
SUB-TOTAL	$957,600
25% CONTINGENCY	$239,400
TOTAL (Excluding HST)	$1,197,000

*Note: This is an "Opinion of Probable Cost" based on past experience and judgment. The above cost does not consider items beyond the control of CJMac such as non-competitive bidding, market trends, unforeseen labour and material fluctuations, etc. Actual tender and construction costs may vary from the opinion provided.

APPENDIX C
OPTION 3 SKETCHES







GENERAL NOTES:

ALL WORK TO BE PERFORMED ACCORDING TO: "STANDARD SPECIFICATIONS FOR MUNICIPAL SERVICES" CURRENT ISSUE.

ALL MATERIALS TO BE AS SHOWN ON DRAWINGS OR AS SPECIFIED.

ALL AREAS DISTURBED BY THIS CONSTRUCTION ARE TO BE RETURNED TO THEIR ORIGINAL OR BETTER CONDITION. ALL CULVERTS PIPES DISTURBED BY THIS WORK ARE TO BE REMOVED DURING CONSTRUCTION THEN REINSTALLED TO THEIR ORIGINAL OR BETTER CONDITION UNLESS NOTED.

ALL EXISTING SERVICES ARE SHOWN IN APPROXIMATE LOCATIONS ONLY. USE CAUTION !! CONTRACTOR IS TO COORINATE HIS WORK WITH ALL UTILITIES CONCERNED AND & GIVE NOTICE WHEN WORKING IN THESE AREAS. NOTE IN PARTICULAR, POLE LOCATIONS.
. IT IS THE CONTRACTORS RESPONSIBILITY TO REPAIR ANY DAMAGE.

ALL ELEVATIONS ARE REFERENCED TO THE NOVA SCOTIA COORDINATE SYSTEM. IF ANY CONTROL MONUMENTS ARE DISTURBED BY THIS WORK, BRASS CAP IS TO BE RETAINED AND GIVEN TO ENGINEER. SURVEY MARKERS, IRON BARS TO BE REPLACED AT CONTRACTORS EXPENSE IF DISTURBED BY THIS WORK. USE CAUTION !! MAIL BOXES DISTURBED BY THIS WORK ARE TO BE REINSTATED TO ORIGINAL OR BETTER CONDITION.

PROPERTY BOUNDARIES OBTAINED FROM LAND INFORMATION CENTRE, DATED MAR. 3, 1998 AND IS PROVIDED FOR GENERAL INFORMATION ONLY. IT DOES NOT CONSTITUTE A LEGAL SURVEY AND SHOULD NOT BE USED FOR BOUNDARY DEFINITION.

MAINTAIN A MINIMUM COVER OF 1.5m OVER PIPE.

SLOPE PRESSURE SEWER TOWARDS AIR RELIEF HIGH POINTS

MINIMUM GRADE ON GRAVITY SEWER IS TO BE 2% SLOPE.

LEGEND

- New Valve
- 45 Degree Bend
- Tee
- 45° wye
- Proposed Service Lateral Detail as Referenced
- Grinder Pump Chamber
- Manhole
- Proposed Force Main
- Proposed Gravity Sewer
- Culvert
- P/P Power Pole
- 16.32 Existing Elevation
- 123547 Control Monument

NO.	DATE	REVISION
2	02/10/2	"Record" Drawing
1	02/05/29	FOR CONSTRUCTION INCLUDING CC#1; ADJUST FOR GP DELETE & TYPE 2 REPLACEMENT

ISSUED:
DATE OCT. 25, 02 BY HAD
TO: ■ CLIENT ■ CONTRACTOR ■ REGULATORY
☐ FOR INFORMATION ☐ PRELIMINARY COPY ☐ FOR REVIEW ☐ FOR TENDER ☐ FOR CONSTRUCTION ■ RECORD DRAWINGS

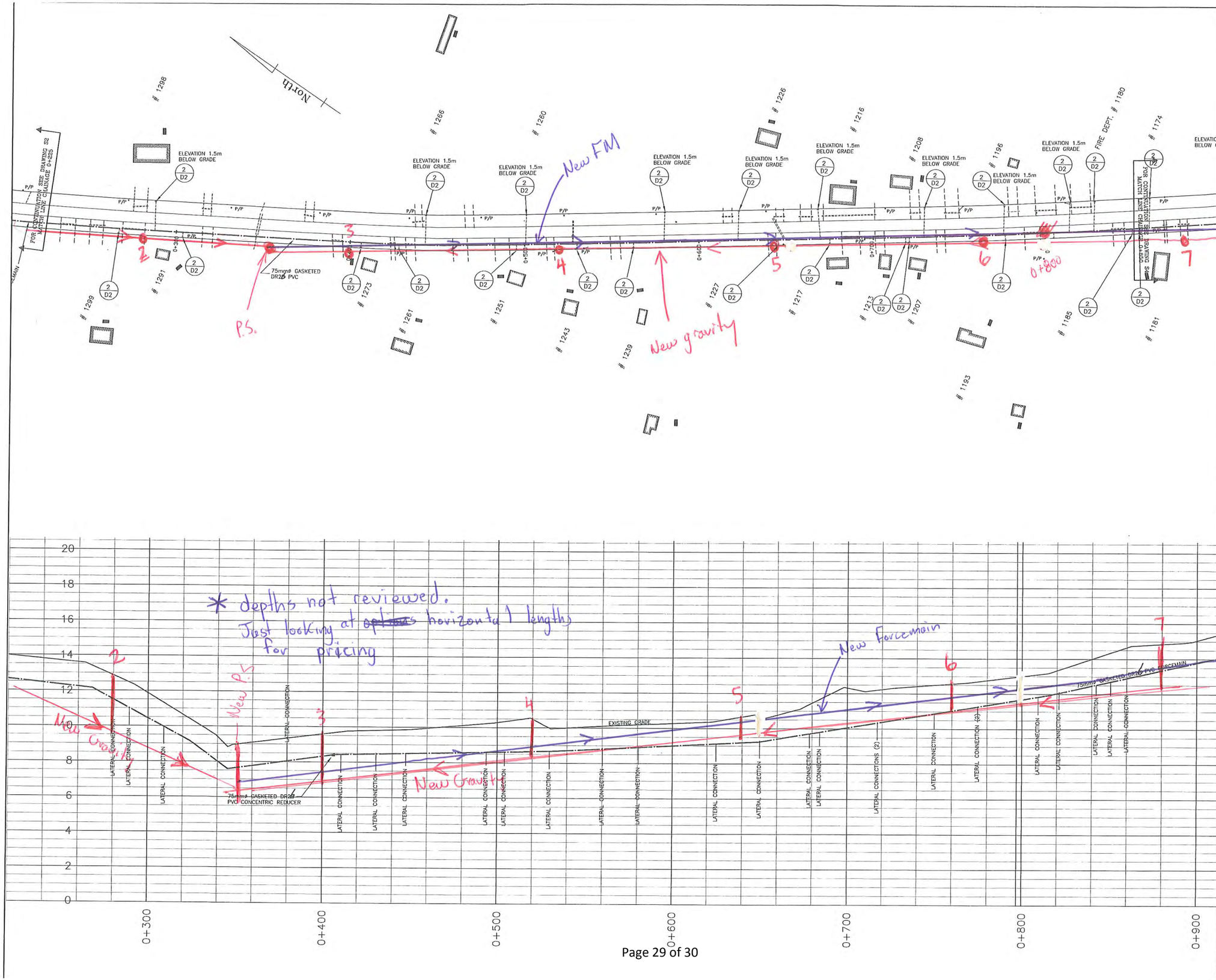
C.J. MacLellan & Associates In
CONSULTING ENGINEERS AND PLANNE
HIGHLAND PROFESSIONAL CENTR
SUITE 2
65 BEECH HILL ROAD
ANTIGONISH, NOVA SCOTIA
CANADA B2G 2P9
TELEPHONE (902) 863-1220
FACSIMILE (902) 863-3225
EMAIL: cjmac@cjmac.ns.ca

CLIENT
MUNICIPALITY OF THE COUNTY OF ANTIGONISH

PROJECT
POMQUET WASTEWATER COLLECTION & CONVEYANCI

TITLE
PLAN AND PROFILE
COVE ROAD 0+00 TO STA. 0+31
POMQUET MONKS HEAD ROAD.
0+00 TO STA. 0+225

Scale 1:1000
Date 02.10.25
Drawn GSMITH
Checked
Job
Number



LATERAL CONNECTS WITHIN THE DETAILED ARE NOT SHOWN ON PROFILE. SEE DRAWING D1 AND D2 FOR SPECIFICS.

PROFILE IS FOR FORCEMAIN(W) ON WEST SIDE OF ROAD WHIC HAS GREATER COMPLEXITY DUE TO DITCHING AND GRINDER PU CHAMBER. THE EAST FORCEMAIN (E) IS ESSENTIALLY 1.5m INVERT BELOW GRADE.

NO.	DATE	REVISION	C
2	02/10/25	"Record" Drawing	
1	02/05/29	FOR CONSTRUCTION INCLUDING CC#1; ADJUST FOR GP DELETE & TYPE 2 REPLACEMENT	

ISSUED:
DATE OCT. 25, 02 BY HAD
TO: ■ CLIENT ■ CONTRACTOR ■ REGULATORY ☐ _____ ☐ _____ ☐ _____
☐ FOR INFORMATION ☐ PRELIMINARY COPY ☐ FOR REVIEW ☐ FOR TENDER ☐ FOR CONSTRUCTION ■ RECORD DRAWINGS

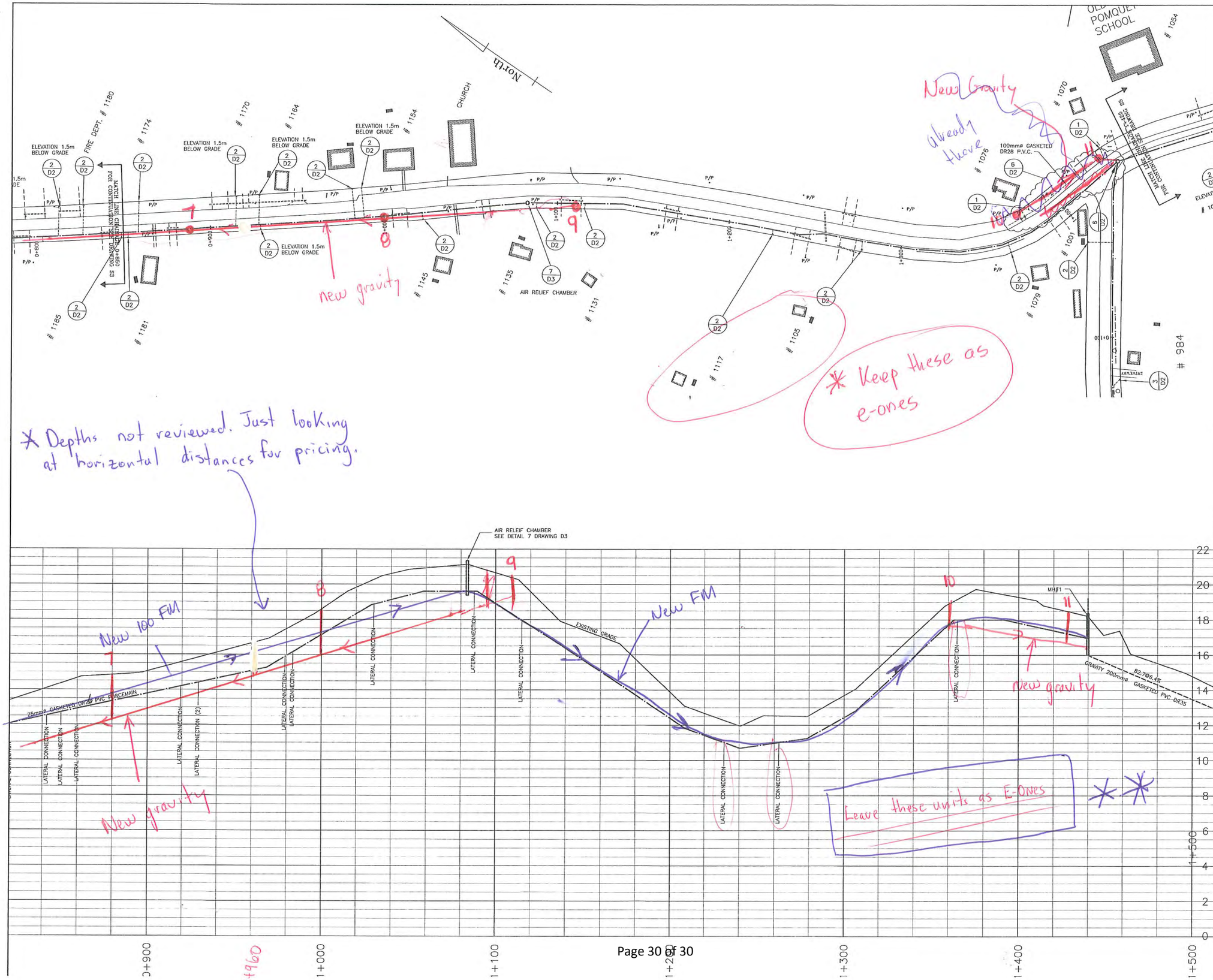
C.J. MacLellan & Associates In
CONSULTING ENGINEERS AND PLANNEF
HIGHLAND PROFESSIONAL CENTRI
SUITE 2
65 BEECH HILL ROAD
ANTIGONISH, NOVA SCOTIA
CANADA B2G 2P9
TELEPHONE (902) 863-1220
FACSIMILE (902) 863-3225
EMAIL: cjmac@cjmac.ns.ca

CLIENT
MUNICIPALITY OF THE COUNTY OF ANTIGONISH

PROJECT
POMQUET WASTEWATER COLLECTION & CONVEYANCE

TITLE
PLAN AND PROFILE POMQUET/MONKS HEAD ROAD. STA 0+225 TO STA. 0+850

Scale	1:1000
Date	02.10.25
Drawn	JDM
Checked	
Job Number	



LATERAL CONNECTS WITHIN THE DETAILED AREA NOT SHOWN PROFILE. SEE DRAWING D1 AND D2 FOR SPECIFICS.

PROFILE IS FOR FORCEMAIN(W) ON WEST SIDE OF ROAD WHI HAS GREATER COMPLEXITY DUE TO DITCHING AND GRINDER P CHAMBER. THE EAST FORCEMAIN (E) IS ESSENTIALLY 1.5m INVERT BELOW GRADE.

NO.	DATE	REVISION
1	02/10/25	"Record" Drawing

ISSUED:
DATE OCT. 25, 02 BY HAD

TO:
- ■ CLIENT
- ■ CONTRACTOR
- ■ REGULATORY
- ☐ _____
- ☐ _____
- ☐ _____

- ☐ FOR INFORMATION
- ☐ PRELIMINARY COPY
- ☐ FOR REVEW
- ☐ FOR TENDER
- ☐ FOR CONSTRUCTION
- ■ RECORD DRAWINGS

C.J. MacLellan & Associates lı
CONSULTING ENGINEERS AND PLANNE
HIGHLAND PROFESSIONAL CENT
SUITE 2
65 BEECH HILL ROAD
ANTIGONISH, NOVA SCOTIA
CANADA B2G 2P9
TELEPHONE (902) 863-1220
FACSIMILE (902) 863-3225
EMAIL: cjmac@cjmac.ns.ca

CLIENT

MUNICIPALITY OF THE COUNTY OF ANTIGONISI

PROJECT

POMQUET WASTEWATER COLLECTION & CONVEYANC

TITLE

PLAN AND PROFILE
POMQUET/MONKS HEAD ROAD
STA. 0+850 TO STA. 1+425

Scale	1:1000
Date	02.10.25
Drawn	J.MCKENNA
Checked	
Job	Number