RIVER STREET PUMP STATION UPGRADE
ROCHESTER, NH

ADDENDUM NO. 6

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To be considered as part of the contract drawings and specification for the River Street Pump Station Upgrade, Bid No. 20-14.

SPECIFICATIONS

1. In the Table of Contents, **AFTER** Division 16, **ADD** the following:

   "Appendices

   Appendix A – Geotechnical Engineering Report, River Street Pump Station Improvements"

2. **DELETE** Specification Section 01 11 01 in its entirety and **REPLACE** with Specification Section 01 11 01, attached.

3. **ADD** Appendix A, Geotechnical Engineering Report, River Street Pump Station Improvements, attached, after Specification Section 16999.

DRAWINGS

1. On Drawing E-05 under "Pump Control Panel Equipment Detail Notes", Note No. 3, **DELETE** reference to MCC Power Meter.

2. On Drawing C-04, Detail H, **DELETE** reference, "10" SST FEMALE BAUER COUPLING" and **REPLACE** with, "10" GALVANIZED STEEL FEMALE BAUER COUPLING".

3. On Drawing D-02, PLAN, **DELETE** reference, "10" SST FEMALE BAUER FITTING W/CAP" and **REPLACE** with, "10" GALVANIZED STEEL FEMALE BAUER FITTING W/CAP".

QUESTIONS

Q-1. Specification section 01 11 01 lists 6/30/20 as the project end date. Agreement C-520 lists 9/30/20 as the final completion date. Please confirm 9/30/20 is the final completion date.

A-1. Specification Section 01 11 01 has been reissued under Addendum 6 with the corrected final completion date of 9/30/20.

Q-2. Drawing E-07 under the "PUMP CONTROL PANEL AND ELEC EQUIPMENT SOFTWARE PROGRAMMING NOTES" note 1, the pump control panel supplier is required to perform the following field software programming: power meter, ATS, and VFDs. The pump control panel (to be supplied by the pump vendor) is a completely separate panel from the ATS and power meter. Note 2 requires the pump control panel supplier to perform power meter software installation and programming for remote station power monitoring and trending. The pump controls vendor would only perform programming of the VFDs—which are in his scope of supply. The pump controls vendor would not have programming of the power meter nor ATS (which are to be supplied by the Electrical Contractor). Trending and monitoring of station power via the remote power meter would typically be handled by the SCADA integrator. Please confirm that this understanding is correct for the controls responsibilities.

A-2. Ultimately, the General Contractor is responsible for programming and integration of all devices. It is the intent of Notes 1 and 2 on Drawing E-7 to ensure that a fully integrated controls system is provided.

Q-3. Drawing E-07 in the "POWER DISTRIBUTION SYSTEM RISER DIAGRAM II" and circuit lists on drawing E-11, the computerized power meter is shown to have an ethernet signal to the pump control panel (C-25) and another circuit to the pump control panel (C-24, PFA). As noted above the pump control panel vendor (same as the pump vendor) would not have the programming in their PLC to integrate the power meter output. This signal should be sent to the SCADA system. In addition, C-24 for utility power fail signal should also be sent to the SCADA is it does not affect the pump control panel. Please make design document adjustments as necessary to clearly define scope.

A-3. All signals and alarms go through the pump control panel and must be provided as specified.

Q-4. Drawing E-05 under "PUMPS CONTROL PANEL EQUIPMENT DETAIL NOTES" note 3 requires a 120VAC UPS circuit from the pump control panel to the remote power meter. The remote power meter riser diagram on E-07 does not show this circuit. Please confirm if this UPS circuit is required. Also, if necessary, consider feeding the remote power meter UPS circuit from the SCADA panel UPS.

A-4. The circuit to power the Remote Power Meter via UPS is not required.

Q-5. Drawing E-07 under the "POWER RISER DIAGRAM "II" NOTES" note 3, the Electrical Contractor is called out to program the VFD motor controllers. The VFDs for the pump controls are in the pump control vendor's scope of supply. Please confirm that the pump control vendor—NOT the EC—is responsible for programming the VFDs.

A-5. Ultimately, the General Contractor is responsible for programming and integration of all devices. It is the intent of Note 3 on Drawing E-7 to ensure that a fully integrated controls system is provided.

Q-6. Please confirm that the overall pump station integration of all vendor or contractor supplied equipment controls (i.e. ATS, generator, pump controls, remote power meter, etc.) will be performed by the SCADA panel supplier in the SCADA control system and PLC.

A-6. Ultimately, the General Contractor is responsible for programming and integration of all devices and to ensure that a fully integrated system is provided.

Q-7. Based on specification 15065, the 1″ air vent/pressure relief valve piping that runs from the centrifugal pumps, transitions to tubing, and then transitions back to 1″ pipe where it penetrates into the wet well, is schedule 80 PVC. Drawings and addendum 3 indicate the 1″ valves on the pump side of this air vent/relief piping in this pipe run are to be stainless. Please confirm the piping and fittings on either side of the stainless valves and those adjacent to the wet well penetrations are to be schedule 80 PVC.

A-7. The pipe material on either side of the stainless steel valves and adjacent to the wet well penetrations are to be schedule 80 PVC.

Q-8. It is understood the 1″ valves on the centrifugal pumps are to be flanged stainless ball valves for the vent/relief connections. Please confirm whether the isolation valves just upstream of the wet well penetration on the air vent/relief piping are to be stainless or PVC (reference Drawing D-02).

A-8. The air release isolation valves just upstream of the wet well penetration shall be 1" stainless steel ball valves.

Q-9. Multiple specifications require that contractor is to obtain AND pay for building, mechanical, electrical, etc. permits. Please confirm that the permit fees will be waived since this is a city project.

A-9. Bidders will need to confirm that fees will be waived by contacting the City of Rochester, Building, Zoning and Licensing Services at (603) 332-3508.

Q-10. Supplementary Conditions to 00700 items SC5.06 and 18.10 indicate there is pipe onsite to be demolished that is ACM. Please confirm which pipe is ACM and that bid item 5 Hazardous Material Survey, Abatement and Removal will cover the additional cost of the remediation for this work?

A-10. No known ACM pipe is on site. If ACM pipe is found, it will be removed under Addendum No. 3, Bid Item No. 5.

Q-11. Supplementary Conditions to 00700 items SC5.03 states that a soils report is included in the appendices. There are no appendices. Please provide the soils report for this project. Specifically, the existing soil type, depth to ledge and groundwater depth.

A-11. The soils report has been included in Addendum No. 6.

Q-12. Specification section 02730.3.01.3.1 states "a responsible operation shall be on hand at all times when pumps are operating". Please confirm this does not mean the contractor is to have an operator onsite the entire time the pumps are operating?

A-12. It is the intent that the Contractor have an operator to respond to a pump alarm or failure condition whenever the bypass pump system is in operation.

Q-13. Where the 16" and 12" plug valves are shown to be removed and replaced, please explain where each line comes from and goes too so we can figure out what the bypassing needs are for this work? We understand there is a siphon on the site that backflows to the influent manhole.

A-13. Refer to Record Drawing 6 of 19, attached.

Flow from River Street goes through a manhole upstream of the pump station. This manhole has a flow control weir. Downstream of this manhole are two pipes. One is a siphon that carries wastewater under the Cocheco River to the gravity sewer on the opposite side of the river. The second pipe carries wastewater to the pump station wetwell when the siphon flow water level reaches the weir elevation in the upstream manhole.

One 12-inch valve is located on the forcemain, downstream of the cross connect to the siphon. This valve is normally open. When closed, it isolates the downstream forcemain.

The second 12-inch valve is located on the cross connect line to the siphon. This valve is normally closed and prevents the forcemain from discharging into the siphon.

The 16-inch valve is located on the siphon and is normally open. When closed, this valve isolates the siphon and forces all flow through the pump station.

Q-14. In Section 13322 Part 1.3. it calls out a PS-PSH-1 Pressure Switch High for Pump Station, and in the same section 4.2.A.6.e.i (page 4) it calls out a Pressure Switch with adjustable delay setpoint as a trigger for Pump Failure to start, but the sensor isn't mentioned anywhere providing a spec for it, and I didn't find it anywhere in the electrical drawings.

A-14. This is the same device as the discharge pressure sensor (PSPT).

Q-15. On the last station we had a discharge pressure sensor that trended discharge pressure and also provided a redundant fail to start and an over pressure alarm to indicate forcemain blockage. Is this intended to be mirrored in the River Street Station, or should we omit the sensor and alarm trigger?

A-15. The discharge pressure senor (PSPT)shall be provided.

Q-16. On drawing sheet E13 (page 40 of 40) under the Pump Control Panel Input/Output List Digital Inputs 22-27 appear to be coming from the SCADA to facilitate those functions in remote control when the high level float trips. The issue here is that if my PLC fails, there's no way for the signals to run the pumps.

I know the Pro Control can handle the alternation internally, so my proposal would be to have contacts that run straight to the VFD from the SCADA box to allow it to run the VFDs completely independently of any other control circuitry in my panel.

A-16. The intent is to operate the pump station from the EOS Pro Control system in the event of main PLC failure.

Q-17. I received a call yesterday from someone asking about drawing sheet D02 (25 of 40). In the section view it shows a 10" tee with some stainless steel fittings, and a pressure relief valve. Is this intended to be the air release valve, or an actual pressure relief valve?

A-17. The "pressure relief valve" called out on D-02 was intended to be called out as an air release valve. Due to lay lengths of standard fittings and couplings shown in the designed piping configuration, it was not apparent that a tap for an air release valve could be physically located before the check valve with the use of a 90 degree elbow. If an air release can be installed, per the manufacturer's recommendation without the use of a tee as shown, the contractor may install the pump with a 90 degree elbow at the discharge in lieu of a tee.

Q-18. Drawing C-04, and D-02 shows the installation of a 10″ SST Female Bauer Fitting w/ Cap. Finding a 10″ Bauer fitting in the specified material has proven to be difficult. Can you please provide the manufacturer, and the model number of the product used for the basis of design?

A-18. Provide a 10" galvanized fitting and cap in lieu of stainless.

END OF ADDENDUM 6

BY ORDER CITY OF ROCHESTER, NH

ADDENDUM No. 6

SECTION 01 11 01

CONTRACT TIME

PART 1 – GENERAL

1.01 SCOPE OF WORK

The Contractor shall be responsible for the scheduling, managing, and executing the Work as described in Section 01 11 00 in accordance with the requirements of this Section.

1.02 SPECIFIC DATE SCHEDULE

The following schedule contains dates which shall be adhered to and are the last acceptable date unless modified in writing between the Owner and Contractor.

Activity	Date
Bid Opening	10/3/19
Award Contract	12/31/19
Issue Notice to Proceed	1/24/20
Substantial Completion	9/15/20
Final Completion	9/30/20

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

Nobis
Engineering a Sustainable Future

June 15, 2018
File No. 94820.00

Mr. Mark Allenwood, PE
Brown and Caldwell
One Tech Drive, Suite 310
Andover, MA 01810

Re: Geotechnical Engineering Report
Proposed River Street Pump Station Improvements
Rochester, New Hampshire

Dear: Mr. Allenwood:

Nobis Engineering, Inc. (Nobis) has completed our geotechnical engineering services for the above referenced project. Services were performed in general accordance with our proposal dated March 29, 2018, and your subsequent authorization. This geotechnical engineering report presents the results of the subsurface explorations and provides geotechnical recommendations concerning the design and construction of foundations and floor slabs for the proposed project. This report is subject to the limitations contained in **Appendix A**.

We appreciate the opportunity to be of service to you on this project. If you have questions concerning this report, or if we may be of further service, please contact us.

Sincerely,
NOBIS ENGINEERING, INC.

Scott M. Carter, PE
Sr. Project Engineer

Michael A. Ciance, PE
Sr. Project Manager

Attachment
cc: File No. 94820.00 (w/attach.)

Nobis Engineering, Inc.
18 Chenell Drive
Concord, NH 03301
T (603) 224-4182

TABLE OF CONTENTS

Attachments

EXECUTIVE SUMMARY

The executive summary should be used in conjunction with the entire report for design and/or construction purposes. It should be recognized that specific details are not included or fully developed in this section, and the report must be read in its entirety for a comprehensive understanding of the items contained herein. **Appendix A** should be read for an understanding of the report limitations.

Nobis Engineering, Inc. (Nobis) has completed a geotechnical engineering investigation for the proposed River Street Pump Station Improvements in Rochester, New Hampshire. Our geotechnical engineering scope of services included advancing two (2) test borings within the project area.

Based on the information obtained from our subsurface investigation, the following geotechnical considerations were identified:

- Subsurface conditions within the project area generally consist of a fill underlain by glacial deposits of clay and sand, and glacial till. Fill was observed to depths of approximately 12.0 feet and 6.0 feet below existing grade at test borings NB-1 and NB-2, respectively. Based on the variable relative density and composition, existing fill is not suitable for support of proposed building foundations or floor slabs and should be over-excavated from the building footprint and foundation bearing zone.

- Subsurface conditions within the project area are generally favorable for supporting the proposed development on conventional shallow spread footing foundations bearing on a minimum 12-inch thick layer of compacted structural fill or crushed stone placed above the prepared native glacial deposits. Total and differential settlement should be within tolerable limits assuming proper site and subgrade preparation.

- Groundwater was encountered at depths ranging from approximately 6.0 to 10.0 feet below existing grade. Based on observed groundwater levels, anticipated excavation depths and finish grades, dewatering should be anticipated for the required over-excavation of existing fill.

- Based on the 2009 International Building Code, the seismic site classification is Class D. The site does not appear susceptible to liquefaction within the limits of exploration.

Earthwork on the project should be evaluated by the geotechnical engineer of record (GER). The evaluation of earthwork should include review of engineered fill, subgrade preparation, and other geotechnical conditions exposed during construction. The observation and testing of engineered fill should be accomplished by a qualified testing agency.

1.0 INTRODUCTION

This report presents the results of our geotechnical engineering services performed for the proposed improvements to the River Street Pump Station, located off of River Street in Rochester, New Hampshire. Our geotechnical engineering scope of services included advancing two (2) test borings within the proposed project area to depths of approximately 22.0 feet below existing grade.

An Existing Conditions/Exploration Location Plan is included as **Figure 1**. Test boring logs are included in **Appendix B**. The purpose of our services is to provide information and geotechnical engineering recommendations related to the following:

- Subsurface soil conditions
- Foundation design and construction
- Seismic design considerations
- Floor slab design and construction
- Groundwater conditions
- Earthwork construction

2.0 PROJECT INFORMATION

2.1 Site Location and Description

Location	The existing pump station is located off of River Street, approximately 200 feet east of the intersection of River Street and Gagne Street in Rochester, New Hampshire.
Existing Improvements & Ground Cover	The site is currently developed with a single-story masonry block structure, and associated wet well and metering manhole within the existing pump station fenced compound.
Existing Topography (1)	Topographic site plans are not available at this time. Based on a review of available topographic data and onsite observations, regional topography generally slopes downward from northwest to southeast towards the Cocheco River. Topography within the existing fenced compound is generally level.

2.2 Project Description

Proposed Improvements	The project consists of constructing a new, approximately 16 foot by 14 foot structure southeast of the existing masonry block structure.
Building Construction	We understand the proposed structure will consist of a single-story building with concrete masonry unit (CMU) walls with conventional shallow spread footing foundations and slab-on-grade construction.
Lowest Finish Floor Elevation	Finish floor elevation has not been finalized, but is anticipated to be near existing grade.

-table continued from previous page-

Maximum Loads	Structural loads provided include an estimated floor slab dead load of approximately 500 pounds per square foot (psf). Based on our experience with structures of similar size and use, we anticipated wall loads to be on the order of 2 to 4 kips per linear foot (klf).
Maximum Allowable Settlement	*Total*: 1-inch (assumed) Differential: ½-inch over 40 feet (assumed)
Proposed Grades/ Retaining Walls	Proposed grading plans are not available at this time; however, based on existing site topography and the proposed building location it is anticipated that only minor cuts and fills will be required to achieve design grades.

3.0 SUBSURFACE CONDITIONS

3.1 Typical Subsurface Profile

Based on the results of the explorations, subsurface conditions can be generalized as follows:

Stratum	Approximate Depth to Bottom of Stratum (feet)	Material Description	Density/ Consistency
Fill	6.0 to 12.0	Varies from gray-brown, fine to medium SAND, some to little Silt to gray-brown, Clayey SILT.	Loose to Very Dense or Soft
Glacio-Lacustrine (NB-2)	8.0	Brown, Silty CLAY.	Stiff
Glacio-Fluvial	14.0 to 16.0	Light brown to gray, fine to medium SAND, little Silt, little to trace Gravel.	Medium Dense to Dense
Glacial Till	>22.0	Gray, fine SAND, and to some Silt.	Medium Dense to Very Dense

Visual soil classifications and conditions encountered at each exploration location are indicated on the individual exploration logs. Stratification boundaries on the logs represent the approximate location of changes in soil types; in-situ, the transition between materials may be gradual. Details for each of the explorations can be found on the logs in **Appendix B**. A discussion of field sampling procedures is also included in **Appendix B**.

3.2 Groundwater

At the time of drilling, groundwater was encountered at depths ranging from approximately 6.0 to 10.0 feet below existing grade. Groundwater may be seasonally perched on or within the fine grained glacio-lacustrine and glacial till deposits. Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff, and other factors not evident at the time the

explorations were performed. Therefore, groundwater levels during construction or at other times in the life of the structure may be higher or lower than the levels indicated on the boring logs. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

4.0 EVALUATION OF SUBSURFACE CONDITIONS

4.1 Building Foundations and Floor Slabs

As presented above, subsurface conditions within the project area generally consist of fill underlain by glacial deposits of clay and sand, and glacial till. Groundwater was encountered at depths ranging from approximately 6.0 to 10.0 feet below existing grade.

We understand the propose building will be located southeast of the existing structure, in the vicinity of test boring NB-2. Based on the subsurface conditions encountered within NB-2 and our understanding of the project, it is our opinion the subsurface conditions at the project site are suitable for supporting the proposed building on conventional shallow spread footing foundations bearing on compacted structural fill placed above the native glacial clay and/or sand deposits.

Undocumented existing fill is not a suitable bearing material and should be over-excavated from the building footprint and foundation bearing zone (defined as the area beneath 1 horizontal to 1 vertical [1H:1V] lines extending downward and outward from footing edges). Based on subsurface conditions encountered at NB-2, over-excavation on the order of 2-feet below foundation elevation is anticipated to remove unsuitable existing fill.

Floor slabs may be designed as a soil-supported slab bearing on compacted structural fill or crushed stone placed above properly prepare native glacial clay and/or sand subgrades.

4.2 Reuse of Excavated Soil

Excavated onsite soil is anticipated to consist of primarily of existing fill. Excavated existing fill may be selectively reused as common fill outside foundation bearing zones and as backfill above foundations provided it is free of deleterious material, the maximum particle size is limited to 8 inches and it can be adequately compacted, as discussed in **6.3. Fill Material and Placement**.

4.3 Construction Dewatering

Based on conditions encountered at the time of the subsurface investigation, dewatering should be anticipated for the required over-excavation of existing fill.

5.0 RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION

Geotechnical engineering recommendations for foundation systems and other earth-connected phases of the project are outlined below. The recommendations contained in this report are based upon the results of field testing, engineering analyses and our current understanding of the proposed development.

5.1 Foundations

The proposed development can be supported by shallow foundations bearing on a minimum 12-inch thick layer of compacted structural fill or crushed stone placed above a prepared native glacio-lacustrine and/or glacio-fluvial subgrade. Existing fill, where encountered, should be replaced with structural fill as discussed herein. Design recommendations for shallow foundations for the proposed structures are presented in the following paragraphs.

5.1.1 Design Recommendations

Bearing Material	Minimum 12-inch thick layer of compacted structural fill or crushed stone, placed above native glacial deposits properly prepared and proof-rolled, as discussed herein.(1)
Maximum Net Allowable Bearing Pressure (2)	4,000 pounds per square foot (psf) (DL+LL)
Minimum Footing Depth (3)	48 inches (frost protection) (3)
Minimum Footing Width	*Strip Footings: 24 inches* *Isolated Spread Footings*: 36 inches
Estimated Settlement (4)	*Total:* < 1-inch Differential: < ½-inch over 40 feet
Ultimate Coefficient of Friction, tanδ (5)	Structural Fill or Crushed Stone: 0.55

1. Crushed stone, if used, should be separated from soil subgrade, excavation sidewalls and backfill using a geotextile separation fabric such as Mirafi 140N, or equivalent.
2. The recommended net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. Assumes unsuitable or soft soil, where present, will be replaced with compacted structural fill or crushed stone.
3. Minimum 48-inch embedment for frost protection of perimeter footings and footings beneath unheated areas. Minimum recommended embedment for interior footings beneath heated areas is 18 inches below finish grade.
4. Foundation settlement will depend upon the variations within the subsurface soil profile, the structural loading conditions, the embedment depth of the footing, the thickness of compacted fill, and the quality of the earthwork operations.
5. Friction values are for mass concrete; for pre-cast concrete the friction coefficient is 80 percent of the values for mass concrete.

The allowable foundation bearing pressure applies to dead loads plus design live load conditions. The design bearing pressure may be increased by one-third when considering total loads that include wind or seismic conditions. The weight of the foundation concrete below grade may be neglected in dead load computations.

5.1.2 Construction Considerations

Where fill is encountered at or below design footing subgrade elevation, it should be over-excavated from the building footprint and foundation bearing zone, and replaced with compacted structural fill or crushed stone. Based on subsurface conditions encountered at NB-2, over-excavation on the order of 2 feet is anticipated to remove unsuitable fill.

Requirements for subgrade preparation, and review and approval are presented in **6.0 General Construction Considerations** of this report. These requirements should be reviewed and understood prior to commencing with construction.

Excavated existing fill may be selectively reused as common fill outside foundation bearing zones and as backfill above foundations provided it is free of deleterious material, the maximum particle size is limited to 8 inches and it can be adequately compacted, as discussed in **6.3. Fill Material and Placement**.

Foundation excavations and subgrade preparation should be observed by the geotechnical engineer of record (GER). If the subsurface conditions encountered differ from those presented in this report, supplemental recommendations will be required.

5.2 Floor Slabs

Floor Slab Support [(1)]	Minimum 24-inch-thick layer of compacted structural fill or crushed stone placed above native glacial deposits properly prepared and proof-rolled, as discussed herein. [(2)]
Modulus of Subgrade Reaction (k)	200 pounds per square inch per inch (psi/in)

1. Floor slabs should be structurally independent of building foundations or walls to reduce the possibility of floor slab cracking caused by differential movements between the slab and foundation.
2. Crushed stone, if used, should be separated from soil subgrade using a geotextile separation fabric such as Mirafi 140N, or equivalent.

The use of a vapor retarder/barrier should be considered beneath concrete slabs that will be covered with wood, tile, carpet, or other moisture-sensitive or impervious coverings, or when the slab will support equipment sensitive to moisture. When conditions warrant the use of a vapor retarder/barrier, the slab designer and slab contractor should refer to the American Concrete Institute (ACI) 302 and ACI 360 standards for procedures and cautions regarding the use and placement of a vapor retarder/barrier. Additional floor slab design and construction recommendations follow:

- Positive separations and/or isolation joints should be provided between slabs and all foundations, columns, or utility lines to allow independent movement.
- Control joints should be provided in slabs to control the location and extent of cracking.
- Other design and construction considerations, as outlined in the ACI Design Manual, Section 302.1R are recommended.

5.3 Seismic Design Criteria

Code Used	2009 International Building Code
Site Class	Site Class D (1)
Maximum Considered Earthquake (MCE) Spectral Acceleration (5 percent damping)	S_S= 0.372 g (0.2 second spectral response acceleration) S_1= 0.082 g (1.0 second spectral response acceleration)
Liquefaction Potential	Not considered susceptible to liquefaction.

1. In general accordance with the 2009 International Building Code (IBC); Site Class is based on the average characteristics of the upper 100 feet of the subsurface profile. The Code requires a site soil profile determination extending a depth of 100 feet for seismic site classification. The current scope does not include the required 100-foot soil profile determination. Test borings extended to a maximum depth of 22.0 feet below existing grade. The seismic site class definition considers that dense soil conditions continue below the maximum depth of the subsurface explorations.
2. Maximum considered earthquake (MCE) values based on site coordinates and values provided by USGS U.S. Seismic Design Maps web application at URL: http://earthquake.usgs.gov/designmaps/us/application.php

6.0 GENERAL CONSTRUCTION CONSIDERATIONS

The following sections present recommendations for site preparation, excavation, subgrade preparation, and placement of fill for the project. The recommendations presented for design and construction of earth-supported elements are contingent upon the recommendations outlined in this section.

Earthwork and foundations on the project should be evaluated by the GER. The evaluation of earthwork should include review of engineered fill, suitability of onsite soil for reuse, subgrade preparation, foundation bearing soil and other geotechnical conditions exposed during construction. The observation and testing of engineered fill and other construction materials should be accomplished by a qualified testing agency.

6.1 Initial Site Preparation

Initial site preparation should commence with the over-excavation of existing fill from within the planned building footprint and foundation bearing zones. Based on the planned building location southeast of the existing structure (near NB-2), over-excavation depths of approximately 6 feet below existing grade should be anticipated (approximately 2 feet below anticipated design foundation grade); however, depths may vary across the site. A Nobis representative or a qualified testing agency should monitor the stripping operations to observe that unsuitable materials have been adequately removed.

6.2 Soil Subgrade Preparation

Following the required over-excavation of unsuitable fill and before placing structural fill or crushed stone, native glacial clay and/or sand deposits (glacio-lacustrine and/or glacio-fluvial) subgrades should be firm, stable, and unyielding. Subgrades should be proof-rolled with at least

six passes in perpendicular directions using a minimum 10-ton vibratory roller in open areas, or a 1-ton vibratory roller or large plate compactor, such as a Wacker DPU4545 or equivalent, in trenches or restricted areas.

Excavations should be accomplished using a smooth edge bucket to reduce the potential for subgrade disturbance. Depending upon the proximity of the excavation bottom to the groundwater table, proof-rolling may need to be accomplished statically to reduce the potential for disturbance.

Stability of the subgrade will be affected by precipitation, repetitive construction traffic or other factors. If unstable conditions develop, replacement with structural fill or crushed stone may be necessary. Excavated subgrades should not be left exposed overnight unless the forecast calls for above-freezing, clear conditions.

The GER, or his/her representative, should review the subgrade during the proof-rolling process. Soft/unstable zones should be over-excavated to competent material and replaced with compacted structural fill or crushed stone as necessary.

Following proof-rolling, structural fill or crushed stone may be placed and compacted to achieve design footing and slab subgrade elevation. Where subgrades become wet, unstable and/or difficult to proof-roll, the use of crushed stone should be considered in lieu of structural fill. Crushed stone, if used, should be separated from the excavation subgrade, sidewalls, and granular backfill above the stone with a geotextile separation fabric, such as Mirafi 140N or equivalent.

6.3 Fill Materials and Placement

Fill materials should consist of mineral soil free of organics, debris, or other deleterious materials. Frozen material should not be used and fill should not be placed on frozen subgrades. Recommended material property requirements for fill on the project, and their acceptable locations for placement, are as follows:

6.3.1 Reuse of Onsite Soil – Common Fill

Excavated existing fill may be selectively reused as common fill outside of the building footprint and foundation bearing zones, and as backfill above foundations, provided it is free of deleterious material and particles larger than 8 inches, and it can be adequately compacted.

6.3.2 Imported Structural Fill

Placement/Location	Material Properties
Recommended below footings, within footing bearing zones, below floor slabs, and under settlement-sensitive structures.	Imported structural fill should meet the following gradation: **Sieve Size** — **Percent Passing by Weight** 8-inch — 100* 3-inch — 70-100** ¾-inch — 45-95 No. 4 — 30-90 No. 10 — 25-80 No. 40 — 10-50 No. 200 — 0-10 * Maximum particle size limited to 2/3 the loose lift thickness. ** Maximum 3-inch particle size within 12 inches of the underside of footings and floor slabs.

6.3.3 Imported Common Fill

Placement/Location	Material Properties
May be used for site grading and fill outside footing bearing zones. Common fill should not be used under settlement sensitive structures.	The maximum particle size is recommended to be limited to 2/3 the loose lift thickness. Imported common fill should be limited to no more than 30 percent by weight should pass the No. 200 sieve.

6.3.4 Crushed Stone

Placement/Location	Material Properties
Recommended below footings, within footing bearing zones, below floor slabs, under settlement-sensitive structures, or as drainage.	Crushed stone shall be meet the requirements of a #57 Stone (Standard Stone Size) as specified in the *NH Department of Transportation* (NHDOT) *Standard Specifications for Road & Bridge Construction* (Latest Edition), Section 703-1.
Note: Crushed stone, if used, should be separated from soil subgrades, excavation sidewalls, and soil backfill with a geotextile separation fabric such as Mirafi 140N, or equivalent.	

6.4 Compaction Requirements

Fill Lift Thickness	*Vibratory Rollers:*	12 inches or less in loose thickness
	Plate Compactors:	8 inches or less in loose thickness
Compaction Requirements	*Structural Fill:*	95% maximum dry density
	Common Fill:	92% maximum dry density
Moisture Content	± 3% of Optimum Moisture Content	

1. Maximum dry density as determined by ASTM D-1557, Method C (Modified Proctor).
2. Fill should be tested for moisture content and percent compaction during placement. If in-place density test results indicate the specified moisture or compaction limits have not been met, the area represented by the test should be reworked and retested, as required, until the specified moisture and compaction requirements are achieved.

6.5 Temporary Excavations, Grading and Drainage

The individual contractor(s) is responsible for designing and constructing stable, temporary excavations or temporary bracing, as required, to maintain stability of the excavation sides and the excavation bottom. Instability in the form of slope raveling, caving, and sloughing should be expected in all excavations and trenches which extend into the granular materials with little to no cohesion. Excavations should be sloped or shored in the interest of safety following local and federal regulations, including current Occupational Safety and Health Administration (OSHA) excavation and trench safety standards. Lateral earth support systems, if used, should be designed by a licensed engineer.

Construction slopes should be reviewed for signs of mass movement. If potential stability problems are observed, work should cease and the GER should be contacted immediately. The responsibility for excavation safety and stability of temporary construction slopes should lie solely with the contractor.

Stockpiles should be placed well away from the edge of the excavation and their height should be controlled so they do not surcharge the sides of the excavation. Positive drainage should be provided during construction and maintained throughout the life of the development. Infiltration of water into utility trenches or foundation excavations should be prevented during construction.

6.6 Dewatering

Based on observed groundwater levels, anticipated finish grades, and anticipated excavation depths, dewatering should be anticipated for over-excavation of unsuitable fill. Regardless of excavation depths, limited construction dewatering may be required to maintain a stable subgrade during construction and prevent surface water runoff from collecting in excavations. If dewatering becomes necessary, the contractor should select a dewatering method to lower groundwater at least 2 feet below the excavation subgrade in order to minimize bearing surface disturbance during fill placement and compaction, and construction of footings and utilities.

The contractor should be required to maintain a dewatered and stable subgrade during construction. Efforts should be made to prevent surface water runoff from collecting in excavations. Subgrade soil that becomes unstable should be replaced with crushed stone or structural fill as necessary. Crushed stone, if used, should be enveloped with a geotextile to avoid separation of fines from the subgrade and backfill. Discharge of groundwater to surface water during construction may require permits from the New Hampshire Department of Environmental Services (NHDES).

7.0 DESIGN SERVICES AND CONSTRUCTION OBSERVATION

Nobis should be retained to review final design plans and specifications so comments can be made regarding interpretation and implementation of our geotechnical recommendations in the design and specifications. The GER and an independent testing agency should also be retained

to provide observation and testing services during grading, excavation, foundation construction and other earth-related construction phases of the project.

FIGURES

NOTES:

1. LOCATIONS AND SITE FEATURES DEPICTED ARE APPROXIMATE AND GIVEN FOR ILLUSTRATIVE PURPOSES.
2. SOIL BORINGS WERE DRILLED BY GEOSEARCH, INC., OF STERLING, MASSACHUSETTS AND OBSERVED BY NOBIS ON MAY 29, 2018.

LEGEND

NB-1 — APPROXIMATE BORING LOCATION OBSERVED BY NOBIS

0 10' 20'

GRAPHIC SCALE

Nobis
Engineering a Sustainable Future
Nobis Engineering, Inc.
18 Chenell Drive
Concord, NH 03301
T(603) 224-4182
www.nobiseng.com
Client - Focused, Employee - Owned

FIGURE 1

EXISTING CONDITIONS/EXPLORATION LOCATION PLAN

GEOTECHNICAL ENGINEERING REPORT
RIVER STREET PUMP STATION IMPROVEMENTS
ROCHESTER, NEW HAMPSHIRE

DRAWN BY: SMC	CHECKED BY: MAC
PROJECT NO. 94820.00	DATE: JUNE 2018

J:\94820.00 – River Street Pump Station & Forcemain\CAD\dwg\94820 EC_ELP.dwg 6/15/2018 11:37 AM

APPENDIX A
Limitations

GEOTECHNICAL LIMITATIONS

Explorations and Subsurface Conditions

1. The analyses and design recommendations submitted in this report are based in part upon the data obtained from subsurface explorations. The nature and extent of variations between these explorations may not become evident until construction. If variations then appear evident, it will be necessary to reevaluate the recommendations of this report.

   In preparing this report, Nobis relied on certain information provided by the Client and other parties referenced therein which were made available to Nobis at the time of our evaluation. Nobis did not attempt to independently verify the accuracy or completeness of all information reviewed or received during the course of this evaluation.

2. The generalized soil profile described in the text is intended to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized and have been developed by interpretations of widely spaced explorations and samples; actual soil transitions are probably more erratic. For specific information, refer to the exploration logs.

3. Water level readings have been made in the explorations at times and under conditions stated on the logs. These data have been reviewed and interpretations have been made in the text of this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature, and other factors occurring since the time measurements were made. The water table encountered in the course of the work may differ from that indicated in the Report.

   Recommendations for foundation drainage, waterproofing, and moisture control address the conventional geotechnical engineering aspects of seepage control. These recommendations may not preclude an environment that allows the infestation of mold or other biological pollutants.

4. Nobis' geotechnical services did not include an assessment of the presence of oil or hazardous materials at the property. Consequently, we did not consider the potential impacts (if any) that contaminants in soil or groundwater may have on construction activities, or the use of structures on the property.

Additional Services

5. Nobis recommends that we be retained to provide services during future site observations, design, implementation activities, construction and/or property development/ redevelopment. This will allow us the opportunity to: i) observe conditions and compliance with our recommendations, design concepts and/or opinions; ii) allow for changes in the event that conditions are other than anticipated; iii) provide modifications to our design recommendations; and iv) assess the consequences of changes in technologies and/or regulations.

Use of Report

6. Nobis prepared this report on behalf of, and for the exclusive use of our Client for the stated purpose(s) and location(s) identified in our proposal and/or report. Use of this report, in whole or in part, at other locations, or for other purposes, may lead to inappropriate conclusions; and we do not accept any responsibility for the consequences of such use(s). Reliance by any party not expressly identified in the agreement, for any use, without our prior written permission, shall be at that party's sole risk, and without any liability to Nobis.

   This report is for design purposes only and is not sufficient to prepare an accurate construction bid. Contractors wishing a copy of the report may secure it with the understanding that its scope is limited to design considerations only.

7. Nobis' findings and conclusions are based on the work conducted as part of the scope of work set forth in our proposal and/or report, and reflect our professional judgment. These findings and conclusions must be considered not as scientific or engineering certainties, but rather as our professional opinions considering the limited data gathered during the course of our work. If conditions other than those described in this report are found at the subject location(s), or the project design has been altered in any way, Nobis shall be so notified and afforded the opportunity to revise the report, as appropriate, to reflect the unanticipated changed conditions.

8. Nobis' services were performed using the degree of skill and care ordinarily exercised by qualified professionals performing the same type of services, at the same time, under similar conditions, at the same or a similar property. No warranty, expressed or implied, is made.

Compliance with Codes and Regulations

9. Nobis used reasonable care in identifying and interpreting applicable codes and regulations. These codes and regulations are subject to various, and possibly contradictory, interpretations. Compliance with codes and regulations by other parties is beyond our control.

Opinion of Cost

10. This report may contain or be based on comparative cost opinions for the purpose of evaluating alternative foundation schemes. These opinions may also involve approximate quantity evaluations. It should be noted that quantity estimates may not be accurate enough for construction bids. In addition, since we are not professional estimators of labor and materials cost, the evaluation of construction costs should be considered as approximate guidelines and could vary significantly from actual costs. Nobis does not guarantee the accuracy of our cost opinions as compared to contractor's bids for construction costs.

END OF LIMITATION

APPENDIX B
Description of Field Explorations
Test Boring Logs

DESCRIPTION OF FIELD EXPLORATIONS

In total, two (2) test borings were advanced within the project area on May 29, 2018. Test borings were advanced to depths of approximately 22.0 feet below the existing ground surface by GeoSearch, Inc. of Sterling, Massachusetts using off-road mounted drilling equipment, and hollow-stem auger drilling techniques.

Soil samples were generally obtained continuously from the ground surface to the limit of exploration using a standard 2-inch outside-diameter split-barrel sampler. Standard Penetration Tests (SPTs) were performed in general accordance with industry standards. Density of soil samples are based on N-values, which is determined by the number of hammer blows required to advance the sampler from 6 to 18 inches.

An automatic SPT hammer was used to advance the split-barrel sampler in the borings performed on this site. A greater efficiency is typically achieved with the automatic hammer compared to the conventional safety hammer operated with a cathead and rope. Published correlations between the SPT values and soil properties are based on the lower efficiency cathead and rope method. This higher efficiency affects the standard penetration resistance blow count (N) value by increasing the penetration per hammer blow over what would obtained using the cathead and rope method. The effect of the automatic hammer's efficiency has been considered in the interpretation and analysis of the subsurface information for this report.

Explorations were located in the field by tape measurement and line-of-site referencing existing site features. The accuracy of boring locations should only be assumed to the level implied by the method used.

Visual classifications of soil are shown on the test boring logs included in **Appendix B**. Groundwater conditions were evaluated in each exploration at the time of site investigation.

BORING LOG

Nobis — Engineering a Sustainable Future

Project: River Street Pump Station
Location: Rochester, New Hampshire
Nobis Project No.: 94820.00

Boring No.: NB-1
Boring Location: See Figure 1
Checked by:
Date Start: May 29, 2018
Date Finish: May 29, 2018

Contractor: Geosearch, Inc.
Driller:
Nobis Rep.: S. Carter

Rig Type / Model: ATV Track Rig / CME 55 LC
Hammer Type: Automatic Hammer
Hammer Hoist: Automatic

Ground Surface Elev.:
Datum:

	Drilling Method	Sampler
Type	Hollow Stem Auger	Split-Spoon
Size ID (in.)	4-1/4	1-3/8
Advancement	Augered	140-lb Hammer

Groundwater Observations

Date	Time	Depth Below Ground (ft.)	Depth of Casing (ft.)	Depth to Bottom of Hole (ft.)	Stabilization Time
▽ 05/29/18	00:00	6	4	8	ws(2)

Depth (ft.)	Type & No.	Rec (in.)	Depth (ft.)	Blows/ 6 in.	Ground Water	Graphic	Stratum Elev. / Depth (ft.)	SAMPLE DESCRIPTION AND REMARKS (Classification System: Modified Burmister)	NOTES
1	1	20	0-2	3 8				SS-1: Medium dense, gray-brown, fine to medium SAND, little Silt, trace fine Gravel. moist. (FILL).	
2				8 7					
3	2	12	2-4	7 14			Fill	SS-2: Very dense, gray-brown, fine SAND, some Silt, broken rock in sample at approximately 3 feet. (FILL).	
4				43 29					
5	3	12	4-6	28 13				SS-3: Medium dense, gray-brown, fine to medium SAND, some Silt.	
6				5 6	▽				
7	4	4	6-8	3 3				SS-4: Soft, gray-brown, Clayey SILT, some fine to medium Sand. wet. (FILL).	
8				2 3					
9	5	14	8-10	woh/ 12"			Fill	SS-5: Similar to SS-4.	
10				4 2					
11	6	12	10-12	woh 2				SS-6: Similar to SS-4.	
12				2 2			/ 12.0		
13	7	10	12-14	7 9			Glacio-Fluvial	SS-7: Medium dense, gray-brown to light brown, fine to medium SAND, little Silt. wet.	
14				11 19			/ 14.0		
15	8	8	14-16	12 14				SS-8: Medium dense, gray, SILT, little fine Sand. moist. (GLACIAL TILL).	
16				14 14					
17	9	10	16-18	10 10				SS-9: Similar to SS-8.	
18				15 18			Till		
19	10	12	18-20	10 10				SS-10: Similar to SS-8, moist to wet.	
20				12 12					
21	11	14	20-22	11 12				SS-11: Similar to SS-8, wet. Tip of sampler contained broken rock.	
22				18 26			/ 22.0		
23								Boring terminated at 22 feet.	
24									
25									

Soil	Percentage	Non-Soil
trace	5 - 10	very few
little	10 - 20	few
some	20 - 35	several
and	35 - 50	numerous

NOTES:
1) Borehole backfilled with auger cuttings upon completion.
2) ws - while sampling.

Soil descriptions are based on visual classifications and should be considered approximate. Stratification lines are approximate boundaries between stratums; transitions may be gradual.

BORING LOG

Nobis — Engineering a Sustainable Future

Project: River Street Pump Station

Location: Rochester, New Hampshire

Nobis Project No.: 94820.00

Boring No.: **NB-2**

Boring Location: See Figure 1

Checked by:

Date Start: May 29, 2018

Date Finish: May 29, 2018

Contractor: Geosearch, Inc.

Driller:

Nobis Rep.: S. Carter

Rig Type / Model: ATV Track Rig / CME 55 LC

Hammer Type: Automatic Hammer

Hammer Hoist: Automatic

Ground Surface Elev.:

Datum:

	Drilling Method	Sampler
Type	Hollow Stem Auger	Split-Spoon
Size ID (in.)	4-1/4	1-3/8
Advancement	Augered	140-lb Hammer

Groundwater Observations

Date	Time	Depth Below Ground (ft.)	Depth of Casing (ft.)	Depth to Bottom of Hole (ft.)	Stabilization Time
▽ 05/29/18	00:00	10	10	12	ws(2)

Depth (ft.)	SAMPLE INFORMATION Type & No.	Rec (in.)	Depth (ft.)	Blows/ 6 in.	Ground Water	LITHOLOGY Graphic	Stratum Elev. / Depth (ft.)	SAMPLE DESCRIPTION AND REMARKS (Classification System: Modified Burmister)	NOTES
1	1	14	0-2	2, 4, 6, 6			Fill	SS-1: Medium dense, brown, fine to medium SAND, little Silt, trace fine Gravel. moist. (FILL).	
2									
3	2	18	2-4	7, 7, 7, 7			Fill	SS-2: Medium dense, gray, fine to medium SAND, some Silt. moist. (FILL).	
4									
5	3	16	4-6	2, 2, 3, 2			/ 6.0	SS-3: Loose, similar to SS-2.	
6									
7	4	14	6-8	5, 4, 4, 5			Glacio-Lacustrine / 8.0	SS-4: Stiff, brown, Silty CLAY. moist.	
8									
9	5	12	8-10	7, 12, 20, 26	▽		Glacio-Fluvial	SS-5: Dense, light brown, fine to medium SAND, little Silt, trace Gravel. moist.	
10									
11	6	12	10-12	5, 16, 15, 20				SS-6: Similar to SS-5, wet.	
12									
13	7	10	12-14	19, 19, 16, 17				SS-7: Similar to SS-5, wet.	
14									
15	8	6	14-16	17, 22, 15, 12				SS-8: Dense, gray, fine to medium SAND, some Silt, little Gravel. wet.	
16							/ 16.0		
17	9	14	16-18	17, 20, 21, 26			Till	SS-9: Dense, gray, fine SAND, some Silt. moist. (GLACIAL TILL).	
18									
19	10	8	18-20	19, 33, 23, 24				SS-10: Very dense, gray, SILT and fine Sand, trace Gravel. moist. (GLACIAL TILL).	
20									
21	11	12	20-22	11, 18, 19, 21				SS-11: Dense, gray, fine SAND, some Silt, trace Gravel. moist. (GLACIAL TILL).	
22							/ 22.0		
23								Boring terminated at 22 feet.	
24									
25									

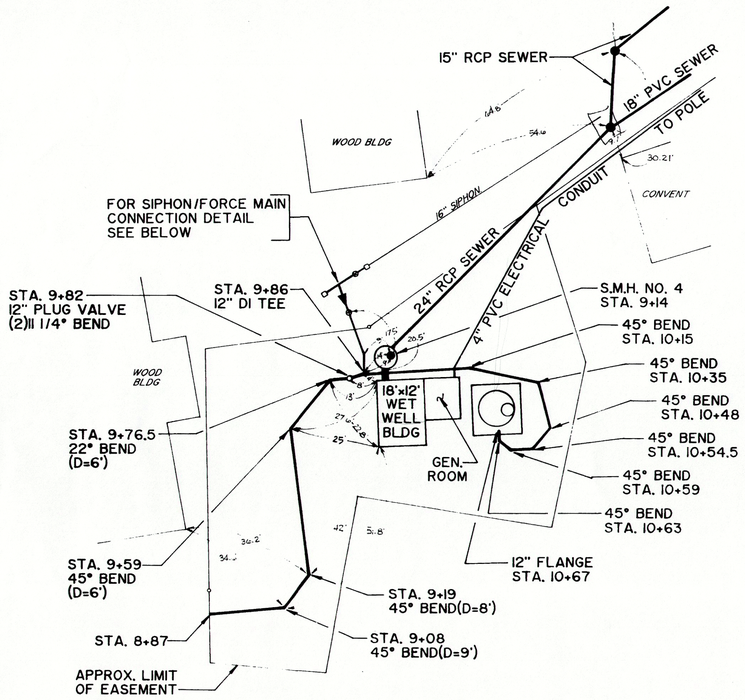
Soil	Percentage	Non-Soil
trace	5 - 10	very few
little	10 - 20	few
some	20 - 35	several
and	35 - 50	numerous

NOTES:

1) Borehole backfilled with auger cuttings upon completion.
2) ws - while sampling.

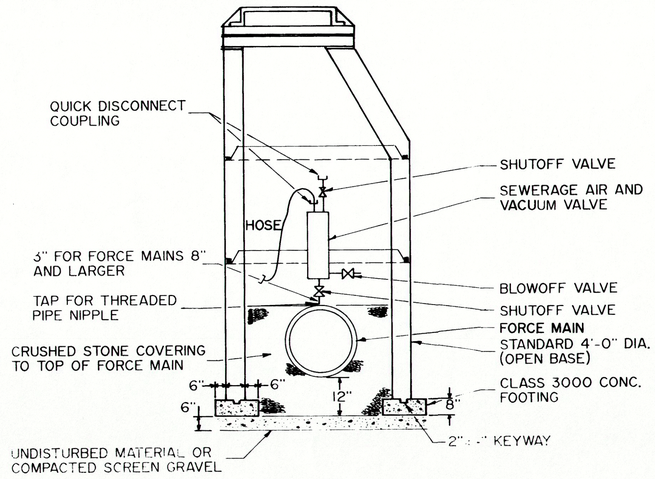
Soil descriptions are based on visual classifications and should be considered approximate. Stratification lines are approximate boundaries between stratums; transitions may be gradual.

BOREHOLE LOG - NOBIS GINT DATA TEMPLATE OCT 7 2011.GDT - 6/15/18 11:42 - J:\94820.00 - RIVER STREET PUMP STATION & FORCEMAIN\GEOTECHNICAL\EXPLORATION\BORING LOGS\GINT\94820 BORING LOGS.GPJ



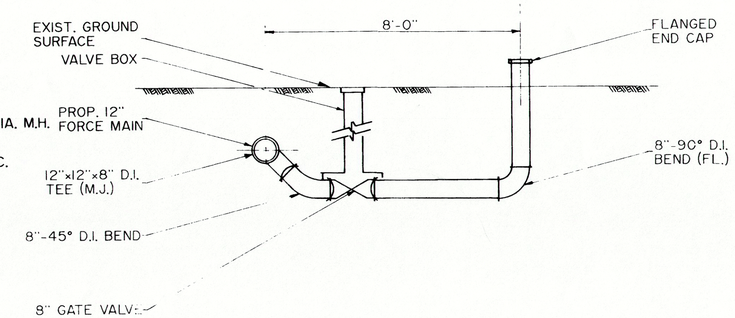
PUMP STATION SITE PLAN

SCALE : 1" = 20'



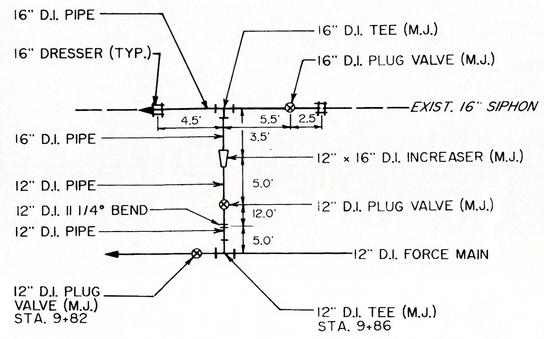
S.M.H. NO. 3 STA. 4+23 , CONGRESS ST.

N.T.S.



BLOW OFF DETAIL

SCALE : 3/8" = 1'-0"



SIPHON/FORCE MAIN CONNECTION DETAIL

N.T.S.

NOTES:

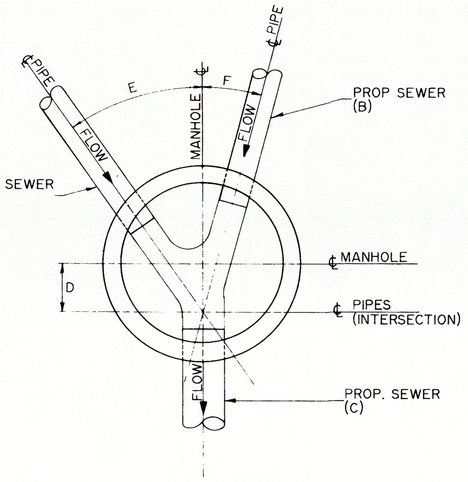
1. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL SUBMIT AN EXCAVATION SHEETING, BRACING AND DEWATERING PLAN FOR CONSTRUCTION OF THE PROPOSED PUMPING STATION AND INFLUENT SEWERS, PREPARED BY A REGISTERED PROFESSIONAL GEOTECHNICAL ENGINEER.

2. THE CONTRACTOR SHALL EXCAVATE BELOW PUMPING STATION AND WET WELL TO ELEVATION 168± TO REMOVE ALL CLAY FROM BELOW FOUNDATION. OVEREXCAVATION SHALL BE REFILLED WITH TYPE 3 SAND AND GRAVEL, COMPACTED IN 6 INCH LIFTS TO 95% MAXIMUM DRY DENSITY.

3. ALL WORK FOR THE PUMPING STATION SHALL BE INCLUDED IN LUMP SUM ITEM NO. 6B. LUMP SUM ITEM 6B SHALL INCLUDE ALL EXCAVATION, SITE WORK, PAVING, INSTALLATION OF PREFABRICATED PUMP STATION, WET WELL, BRICK BUILDING GENERATOR, ELECTRICAL SERVICE, PIPING BETWEEN PUMP STATION AND WET WELL, AND FORCE MAIN AND INFLUENT SEWER WITHIN 5 FEET OF PUMPING STATION AND WET WELL.

4. ALL WORK REQUIRED TO PAVE THE PUMP STATION ENTRANCE ROAD FROM THE EXISTING ROAD TO THE PUMP STATION SHALL BE INCLUDED UNDER LUMP SUM ITEM NO. 6B.

5. PROPOSED STEEL SHEETING SHALL BE ACCEPTABLE AND SHALL BE OF 183' AT A MINIMUM. THE SHEETING SHALL BE LEFT IN PLACE AND SHALL BE CUT 5' BELOW GRADE. ASSOCIATED WITH SHEETING SHALL BE INCLUDED IN LUMP SUM ITEM 6B.



SPECIAL S.M.H. DETAIL

N.T.S.

MANHOLE SCHEDULE

STA.	LOCATION	PLAN NO.	PIPE DIA. (A) IN.	PIPE DIA. (B) IN.	PIPE DIA. (C) IN.	CENTER-LINE OFFSET (D) IN.	PIPE ANGLE (E) DEG.	PIPE ANGLE (F) DEG.
[illegible]	CHARLES ST.	3	24	24	24	22	5	5
[illegible]	RIVER ST.	4	15	18	24	12	45	45

RECORD DRAWING
NOVEMBER 1989

CITY OF ROCHESTER , NEW HAMPSHIRE
ADDITIONS TO SEWERAGE SYSTEM

PUMP STATION SITE PLAN PROFILE AND DETAILS

THE STATE OF NEW HAMPSHIRE · FREDERICK J. GERSEY · NO. 5206 · PROFESSIONAL ENGINEER

GCG ASSOCIATES, INC.
LYNNFIELD MASSACHUSETTS

SCALE: AS NOTED

APPROVED:	DESIGNED BY: M.J.C.	PLAN NO.
DATE:	DRAWN BY: R.E.B.	6 OF 19
	CHECKED BY: F.J.G.	