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June 8, 2011

Reference No. 009954

Mr. Brian Sadowski
NYSDEC
270 Michigan Avenue
Buffalo, NY 14203-2999

Mr. Gregory Sutton
NYSDEC, Region 9
270 Michigan Avenue
Buffalo, NY 14203-2999

Dear Messrs. Sadowski and Sutton:

Re: Colvin Boulevard and 96th Street - Sanitary Sewer Repair
Supplemental Subsurface Investigation Work Plan
Niagara Falls, New York

Glenn Springs Holdings, Inc (GSH) is submitting the attached report: "Colvin Sewer Repair – Supplemental Subsurface Investigation Work Plan".

If you have any questions or comments regarding the attached report, please feel free to contact me at 231-680-6809 or by email at joseph_branch@oxy.com.

Yours truly,

GLENN SPRINGS HOLDINGS, INC.

Joseph Branch
Project Manager

JB/JP/adh/3
Encl.

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S. Radon, NYSDEC
J. Strickland, NYSDEC

COLVIN SEWER REPAIR
SUPPLEMENTAL SUBSURFACE INVESTIGATION WORK PLAN

COLVIN BOULEVARD AND 96TH STREET

GLENN SPRINGS HOLDINGS, INC.
NIAGARA FALLS, NEW YORK

DISCLAIMER:
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1.0 INTRODUCTION

This Colvin Sewer Repair-Subsurface Investigation Work Plan (Work Plan) was prepared to describe the procedures for the implementation of the recommendations presented in the March 4, 2011, Sanitary Sewer Investigation and Remediation Report (SSIR Report) written by Conestoga-Rovers & Associates (CRA) on behalf of Glenn Springs Holdings, Inc. (GSH), an affiliate of Occidental Chemical Corporation (OCC). The SSIR Report was prepared to document activities performed by GSH to investigate and address chemical impacts to sediments found within a sanitary sewer pipe along Colvin Boulevard east of 96th Street in Niagara Falls, New York. The impacted sediments have been addressed and the sanitary sewer repaired. This Work Plan will outline the procedures to collect additional data on any potential residual impacts and provide monitoring locations in the sewer repair area. The Site Vicinity Plan is presented on Figure 1. The Location of Sewer Replacement Area is presented on Figure 2.

This report presents the Work Plan to install monitoring wells that will be used to monitor the residually impacted sewer bedding material. Additionally, soil borings will be installed to verify that the residual impacts are limited to the sewer bedding around the repaired sewer. This Work Plan outlines the field activities that will be completed and includes:

- Installation and monitoring of two bedrock groundwater monitoring wells
- Installation of two soil borings along the Colvin Boulevard Sanitary Sewer system to the east of the repair area
- Installation of one flush-mount observation/monitoring well within the bedding material of the newly repaired Colvin Boulevard sanitary sewer line at the downgradient end of the repair

1.1 BACKGROUND

On January 11, 2011, a contractor employed by the City of Niagara Falls (CNF) and the Niagara Falls Water Board (NFWB) found chemical-impacted sediments during work to correct a deflection (i.e., low spot) within a 50-foot length of sanitary sewer piping. The sanitary sewer is located under Colvin Boulevard just east of 96th Street in Niagara Falls, New York. This sewer repair site was the last of 17 sewer repairs near the Love Canal containment area, which is managed by GSH, an affiliate of OCC.

NFWB informed GSH of the impacted sediments. GSH verbally notified the New York State Department of Environmental Conservation (NYSDEC) and New York State Department of Health (NYSDOH) of the discovery of the impacted sediments. GSH immediately commenced an investigation to determine the potential source of the impacted sediments.

GSH and its environmental consultant, CRA, met with representatives from the NFWB, CNF, United States Environmental Protection Agency (USEPA), NYSDEC, and NYSDOH to present the preliminary results of the investigation and discuss a path forward that included GSH completing the Colvin Boulevard sanitary sewer replacement. GSH submitted a letter to NYSDEC formally presenting the preliminary results of the investigation and a work plan to replace the 50-foot sewer section and address any impacts found.

GSH commenced fieldwork on February 1, 2011 and completed the work on February 23, 2011. GSH completed the following activities:

- Replaced approximately 50 feet of sanitary sewer beneath Colvin Boulevard between 97th and 96th Streets
- Removed impacted soil materials down to bedrock to the extent possible from within the sewer trench
- Removed liquids from the excavation, which included sanitary sewer water and a limited amount of non-aqueous phase liquid (NAPL)
- Collected confirmatory samples from the bottom, sidewalls, and end walls of the sewer trench
- Removed sediments from the Colvin Boulevard sanitary sewer from 97th Street to the 91st Street lift station
- Conducted a video inspection of the sanitary sewer from 97th Street to the 91st Street lift station to verify the sewer was free of sediment
- Interim restoration (due to weather conditions) of the road surface above the repaired section of Colvin Boulevard consisting of cold patch

Final restoration of the road surface above the repaired sanitary sewer section was completed in late May/June 2011. Any required landscaping and topsoil and sod placement will be completed as soon as the weather permits.

After completion of the fieldwork, the SSIR Report was issued. The SSIR Report summarized the fieldwork completed and presented the collected data. Additionally,

the SSIR Report recommended the installation of a monitoring network for the Colvin Boulevard sanitary sewer repair and to collect additional investigative data. The following sections of this report present the procedures for the implementation of this recommended fieldwork.

2.0 PROPOSED SUBSURFACE INVESTIGATION ACTIVITIES

2.1 BEDROCK GROUNDWATER MONITORING WELL INSTALLATION

Two bedrock groundwater monitoring wells will be installed at the Site; one to be installed to the north of the Colvin Boulevard sanitary sewer repair area (downgradient) and one to be installed to the south of the Colvin Boulevard sanitary sewer repair area (upgradient). The proposed locations of the bedrock monitoring wells are in the City right-of-way directly adjacent to the City Street. Figure 3 shows the approximate locations; however, the final locations will be determined in the field after the utility mark-out.

Prior to mobilization of the drilling sub-contractor, CRA will mark out the proposed drilling locations with white pin flags. The drilling sub-contractor will have notified Dig Safely New York, Inc. and received drilling clearance from all participating utilities. Drilling locations will be subject to additional utility clearance by the property owners, if applicable. In addition, as per CRA's Quality System and Health and Safety policies, the OSF-019, Property Access – Utility Clearance Data Sheet will be completed and appropriately signed prior to any subsurface penetrating activities.

The bedrock monitoring wells will be installed in such a way that any overburden groundwater is isolated from the bedrock groundwater preventing any potential cross-contamination of the aquifers. The bedrock groundwater monitoring wells will be completed as open core holes. Soil borings for bedrock wells will be advanced to the top of the bedrock using 6¼-inch hollow stem augers with continuous split-spoon sampling. The sampled soil will be classified utilizing the Unified Soil Classification System and screened with a photoionization detector (PID). If PID screening identifies any readings above background, a headspace analysis of the soil will be completed. The headspace analysis will consist of:

- Placing the soil in a jar
- Covering the jar with foil
- Waiting approximately 2 minutes for the vapors to accumulate
- Piercing the foil with the tip of the PID
- Recording of the reading

No laboratory analysis of the soil samples is proposed. However, an analytical sample will be collected if physical observations and/or PID headspace readings indicate the

potential for chemical impact. After competent bedrock is identified by auger refusal, a roller bit will be used to drill approximately 2 feet into the bedrock, enabling the placement of a 4-inch diameter steel casing to be sealed into the top of the bedrock unit. The installation of the casing will effectively seal off the overburden ensuring no transport between the overburden and bedrock units. These casings will be installed as follows:

i) The casing will be set in place with placement of grout into the annular space between the well pipe and borehole by positive displacement using a tremie tube. The grout shall consist of Portland cement, bentonite, and clean water. The grout mixture will consist of one 94-pound bag of Portland cement and 3 to 5 pounds of powdered bentonite added per bag of cement. The grout will be thoroughly mixed with 6.5 gallons of potable water per bag of cement.

ii) A portion of the grout mixture will be poured into the inside of the casing to create a plug at the base of the casing, or a grout plug will be placed in the end of the casing prior to installation. The grout will be allowed to set for a minimum 24 hours.

iii) After a minimum 24 hours, a hydrostatic test will be performed on the casing to ensure that the grout has set properly and the shallow overburden is sealed off from the bedrock. The hydrostatic test will be conducted as follows:

- The casing will be filled to the top with clean potable water and the time noted.
- At 5-minute intervals for 30 minutes, the water level in the casing will be inspected to determine if it is falling.
- If the water level is falling, the level will be measured and recorded.
- After 30 minutes, if the total drop in water level is less than 0.25 foot, the casing can be considered sealed. If the water level drops more that 0.25 foot, the grout in the casing will be reamed out, and new grout will be poured inside. The hydrostatic test will then be repeated after a minimum 24 hours have passed. This process will be repeated as many times as it takes to seal the casing.

After the well casing passes the hydrostatic test, bedrock coring may commence.

The bedrock will be cored in 5-foot runs. Upon completion of each 5 feet of coring, the water producing characteristics of the open interval will be determined by conducting "bail-down" and recovery tests. Coring will be terminated when the first interval producing sufficient water recharge for sampling is encountered.

Bedrock cores will be logged noting the rock description, the core run, the depth of the run, the percent recovery, and the rock quality designation (RQD). The cores will be retained and stored at the Love Canal Site.

The bedrock monitoring wells will be finished at the surface with a flush-mount, water-tight curb box. Figure 4 illustrates the typical bedrock well construction.

All drilling waste, soil cuttings, and used Personal Protective Equipment (PPE) will be drummed and transferred to the Love Canal Drum Barn to be characterized and properly disposed.

2.2 SANITARY SEWER BEDDING MONITORING WELL INSTALLATION

One monitoring well will be installed within the bedding material of the newly repaired Colvin Boulevard sanitary sewer line at the downgradient end of the repair. The purpose of this well is to monitor for the presence of residual NAPL that was observed during construction activities. The proposed location of the monitoring well is presented on Figure 3.

The monitoring well will be installed in a soil boring advanced into the sewer bedding material to the top of the bedrock, approximately 20 feet beneath Colvin Boulevard. The soil boring will be installed using 4¼-inch hollow stem augers. No split-spoon sampling is proposed because the area has been recently excavated and backfilled with new granular material.

The monitoring well will be constructed with an appropriate length of 2-inch diameter stainless steel (SS) riser pipe attached to 10-foot long, 2-inch diameter, SS well screen. The well screen will be 10-slot screen size. The anticipated screened interval is from 8 feet to 18 feet below grade surface (bgs). The typical overburden monitoring well construction is illustrated on Figure 5. The monitoring well will be installed as follows:

i) The 4¼-inch hollow stem augers will be advanced to auger refusal at the bedrock surface

ii) A bedrock seal of approximately 0.25 foot of bentonite will be installed

iii) 0.25 foot of 00-size well sand will be installed in the borehole

iv) The 10-foot SS screen and SS riser will be installed in the borehole

v) The well sand pack (00 sand) will be installed to 2 feet over the top of the screen

vi) A minimum of 2 feet of bentonite well seal will be installed and hydrated with 5 gallons or more of potable water

vii) A grout mixture consisting of one 94-pound bag of Portland cement and 3 to 5 pounds of powdered bentonite added per bag of cement will be used to fill the reaming open annulus

viii) An appropriate designed heavy duty, water-tight, reinforced concrete curb box will be installed as the flush-mount surface finish of the well

All drilling waste, soil cuttings, and used PPE will be drummed and transferred to the Love Canal Drum Barn to be characterized and properly disposed.

2.3 INSTALLATION OF SOIL BORINGS

Two soil borings (SB-01 and SB-02) will be installed along the Colvin Boulevard Sanitary Sewer system to the east of the repair area. These soil borings are to verify no additional chemistry is present east of the repair area. The proposed locations of the soil borings are presented on Figure 3. The final locations will be determined in the field after the utility mark-out. If observations of potential impact are noted during the installation of the eastern most soil boring (SB-02), an additional soil boring will be installed approximately 50 feet further east.

The soil borings will be advanced to the bottom of the sewer bedding material or to the top of the bedrock, whichever is encountered first. It is anticipated that the soil borings will be approximately 20 feet deep. The soil borings will be installed using 4¼-inch hollow stem augers with continuous split-spoon sampling. The sampled soil will be classified utilizing the Unified Soil Classification System and screened with a PID. If PID screening identifies any readings above background, a headspace analysis of the soil will be completed following the procedures outlined in Section 2.1. A minimum of one soil sample from each soil boring will be collected for laboratory analyses. If no PID headspace readings above background are observed, the bedding material from the final split-spoon will be submitted for analysis. An additional analytical sample will be collected from an additional interval if physical observations and/or PID readings indicate the potential for chemical impact. The soil sample selected for chemical analysis will be submitted to TestAmerica-Knoxville and analyzed for volatile organic compounds (VOCs) plus tentatively identified compounds (TICs), semi-volatile organic compounds (SVOCs), and pesticides consistent with the Love Canal suite of parameters.

Once the soil boring is complete, the open borehole will be abandoned by filling the boring with hydrated bentonite chips or cement bentonite grout. The ground surface will be repaired as appropriate.

All drilling waste, soil cuttings, and used PPE will be drummed and transferred to the Love Canal Drum Barn to be characterized and properly disposed.

2.4 MONITORING WELL DEVELOPMENT

Each monitoring well will be developed by bailing or pumping and surging in accordance with standard CRA protocols. The well development section (Section 6.14) from the CRA Monitoring Well Design and Construction Standard Operating Procedure is included as Appendix A. Well development will not occur until at least 1 week after well installation. This is necessary to allow the grout to cure properly. To ensure hydraulic stabilization of a well, ten well volumes will be removed. The removal of well volumes will aid in achieving a sediment-free condition with the lowest possible turbidity. Details of well development will be recorded on a Well Development and Stabilization Form or in a standard CRA field book and must include:

1. Well identification number
2. Date of development
3. Development method
4. Well type including diameter and construction
5. Measuring point location and elevation (if known)
6. Measured water level
7. Measured bottom depth
8. Water column length
9. Screened interval
10. Well volume
11. Volumes purged
12. All field measurements (pH, temperature, conductivity, and turbidity per well volume)

Groundwater removed during the development of the monitoring wells will be transferred to the Love Canal Treatment Facility (LCTF) for treatment.

2.5 HYDRAULIC CONDUCTIVITY TESTING

Single well response tests will be conducted at the two newly installed bedrock groundwater monitoring wells and the sanitary sewer bedding monitoring well (provided groundwater is present). Two rising head and two falling head tests will be conducted at each location. The four results for each well will be averaged to give an average hydraulic conductivity for that well. The slug tests will be conducted following standard CRA protocols. A summary of the protocol is presented below:

- Measurement of the water level in the monitoring well to be tested.
- Installation of a pressure transducer, set at a 1-second recording interval in the monitoring well.
- The water level will be allowed to equilibrate from the addition of the pressure transducer.
- A slug of a known volume will be inserted into the water column of the well.
- Manual water level measurements will be collected at a 30-second interval for the first 5 minutes and then at 1 minute interval for the next 10 minutes. If after 15 minutes the water level has not recovered to within 10 percent of the original water level, manual water levels will be recorded at a 5-minute interval for 1 hour or until the water level has recovered to within 10 percent of the initial water level.
- After the well has recovered to within 10 percent of the initial water level, or 1 hour and 15 minutes has elapsed, the slug will be removed from the water column.
- Manual water levels will be recorded at the interval described above.
- After water level recovery to within 10 percent of the initial water level or 1 hour and 15 minutes has elapsed, the test will be completed.
- The pressure transducer will be downloaded.

After the hydraulic conductivity fieldwork has been completed, the data will be analyzed using Aqtesolv™ software to calculate the hydraulic conductivity for each bedrock well.

2.6 COLLECTION OF GROUNDWATER SAMPLES

Two groundwater samples will be collected from each of the two new bedrock monitoring wells. The groundwater samples will be collected at least 2 weeks after well

development to allow for stabilization of the aquifer. The two groundwater samples will be collected at least 1 month apart.

Groundwater samples will be collected following GSH Field Procedure FP-04b, APL Sampling-3 Well Volume Method, included as Appendix B. This sampling procedure is the approved method utilized at the nearby Love Canal Facility. The continuity of the sampling procedures will allow for direct comparison of the analytical data from the newly installed bedrock monitoring wells to the existing Love Canal Site data. A summary of the GSHI Field Procedure FP-04b, APL Sampling-3 Well Volume Method is as follows:

i) Measure water level and record on the field log. Determine the volume of water to be purged according to formulas on the sample collection forms.

ii) Install pump/bailer into well for purging. Lower pump deep enough that the well does not go dry during the purging; the vertical location of the pump is not critical for a 3-well volume purge.

- A decontaminated pump will be used for each well purging.
- Pumps will not be field decontaminated. Pumps will be decontaminated as needed at the Love Canal Drum Barn.

iii) Start pump and purge as follows:

- Start pump and adjust flow rate to a rate sustainable by the well. The goal of the sampling is to purge and sample without drying up the well.
- Monitor field parameters (pH, specific conductance, and temperature), water level, and pumping rate, and record in the field log including the time of the measurements. One set of readings will be taken at the start of purging and an additional set will be taken after removal of each standing well volume.
- If the well goes dry, a sustainable pumping rate should be determined for potential future sampling events.

iv) Samples shall be collected directly from the pump discharge.

The groundwater samples will be submitted to TestAmerica-Knoxville and analyzed for VOCs plus TICs, SVOCs, and pesticides. All collected purge water will be transferred to the LCTF for treatment.

2.7 NAPL PRESENCE MONITORING

The sanitary sewer bedding monitoring well will be monitored for NAPL presence. The monitoring will consist of using an oil/water interface probe to measure any accumulated fluids in the well. The fluid level will be measured 1 week, 1 month, and 2 months after development. After this initial monitoring, the data will be evaluated and a determination will be made regarding the long-term monitoring for this well.

2.8 SITE SURVEY

The three new monitoring wells and the installed soil borings will be surveyed for location relative to North American Datum (NAD) 27. Additionally at the new monitoring wells, the top of each well casing will be surveyed to the nearest 0.01 foot relative to the National Geodetic Vertical Datum (NGVD) 29 and survey point will be marked on the well casing. The survey will include the ground elevation at each well to the nearest 0.10 foot relative to the NGVD 29. The well location will be surveyed to the nearest 1.0 foot.

2.9 SCHEDULE

The drilling program will begin after NYSDEC approval of this Work Plan and after completion of the permanent repair to Colvin Boulevard's surface, pending driller availability. The drilling is anticipated to take 2 weeks to complete. Groundwater monitoring well development will be conducted a week after well installation to allow for the grout to fully set up. Groundwater sampling will be conducted 2 weeks after completion of bedrock groundwater monitoring well development. Hydraulic conductivity will be completed in conjunction with the collection of the groundwater samples.

2.10 REPORTING

The field activities outlined in this Work Plan will be reported to the NYSDEC in a Letter Report. The Letter Report will be submitted 2 months after the collection of second round of groundwater sampling from the two bedrock monitoring wells. In addition to providing the documentation and summary of the field work completed that is outlined in this Work Plan, the Letter Report will include the recommended long-term monitoring for the wells installed under this Work Plan.

FIGURES

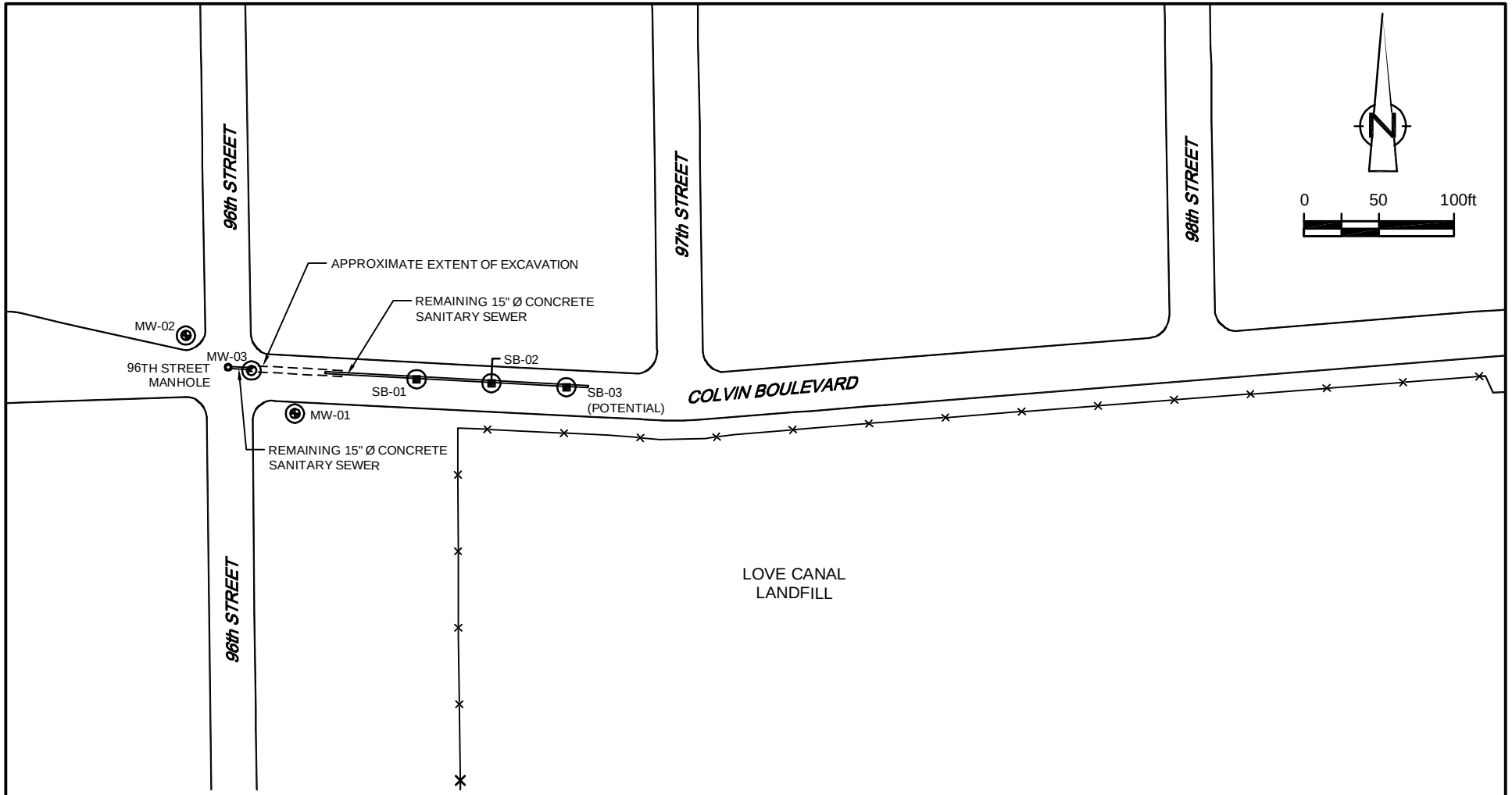


figure 1

SITE VICINITY PLAN
COLVIN BOULEVARD SANITARY SEWER REPAIR
GLENN SPRINGS HOLDINGS, INC.
Niagara Falls, New York

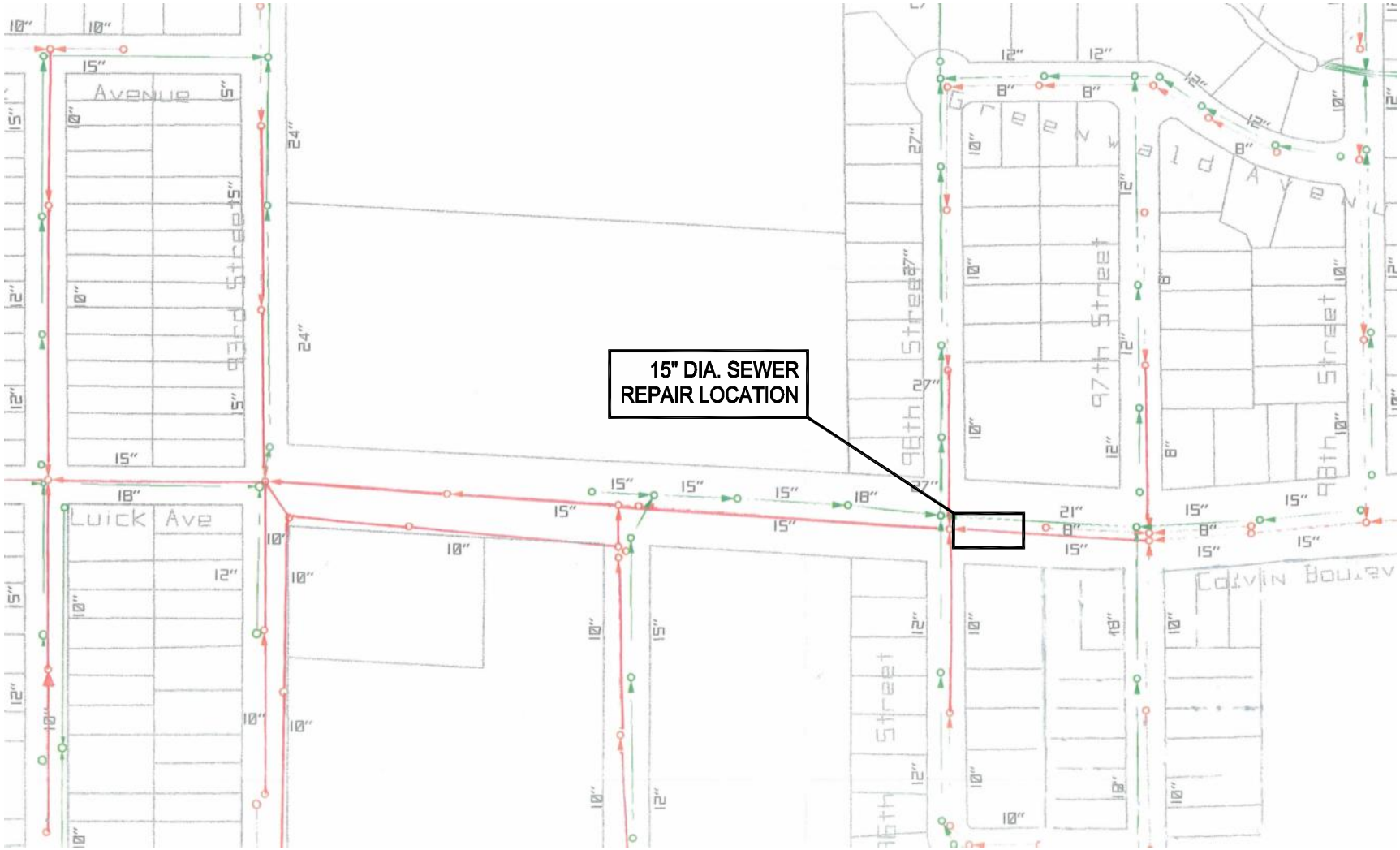
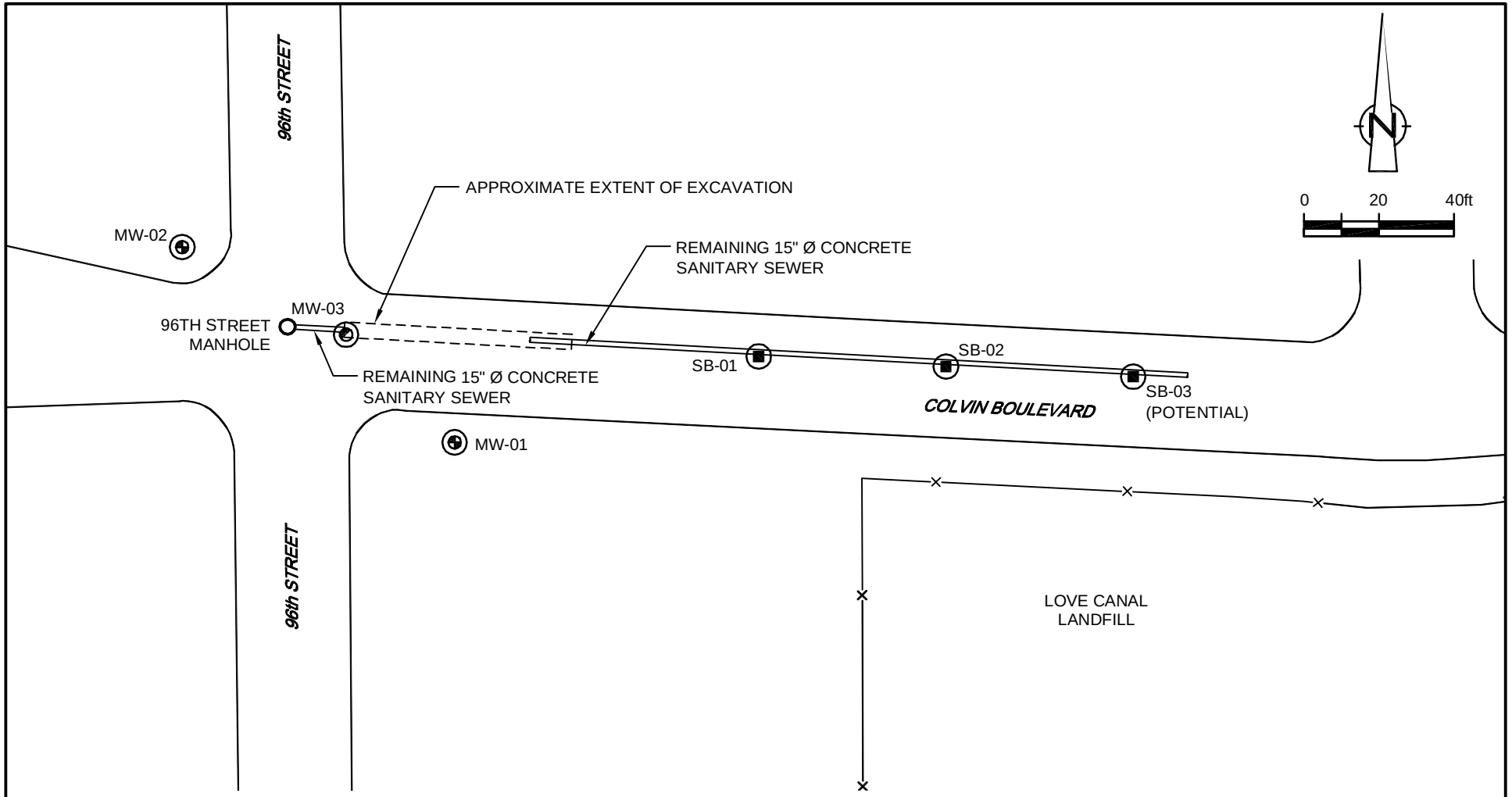


figure 2

LOCATION OF SEWER REPLACEMENT AREA
COLVIN BOULEVARD SANITARY SEWER REPAIR
GLENN SPRINGS HOLDINGS, INC.
Niagara Falls, New York

SOURCE: NIAGARA FALLS WATER BOARD



LEGEND

FENCE LINE

APPROXIMATE LOCATION OF PROPOSED BEDROCK MONITORING WELL

APPROXIMATE LOCATION OF PROPOSED BEDDING BOREHOLE

APPROXIMATE LOCATION OF PROPOSED OVERBURDEN NAPL MONITORING WELL

figure 3

PROPOSED MONITORING LOCATIONS
COLVIN BOULEVARD SANITARY SEWER REPAIR
GLENN SPRINGS HOLDINGS, INC.
Niagara Falls, New York

09954-D23101(022)GN-WA007 JUN 08/2011

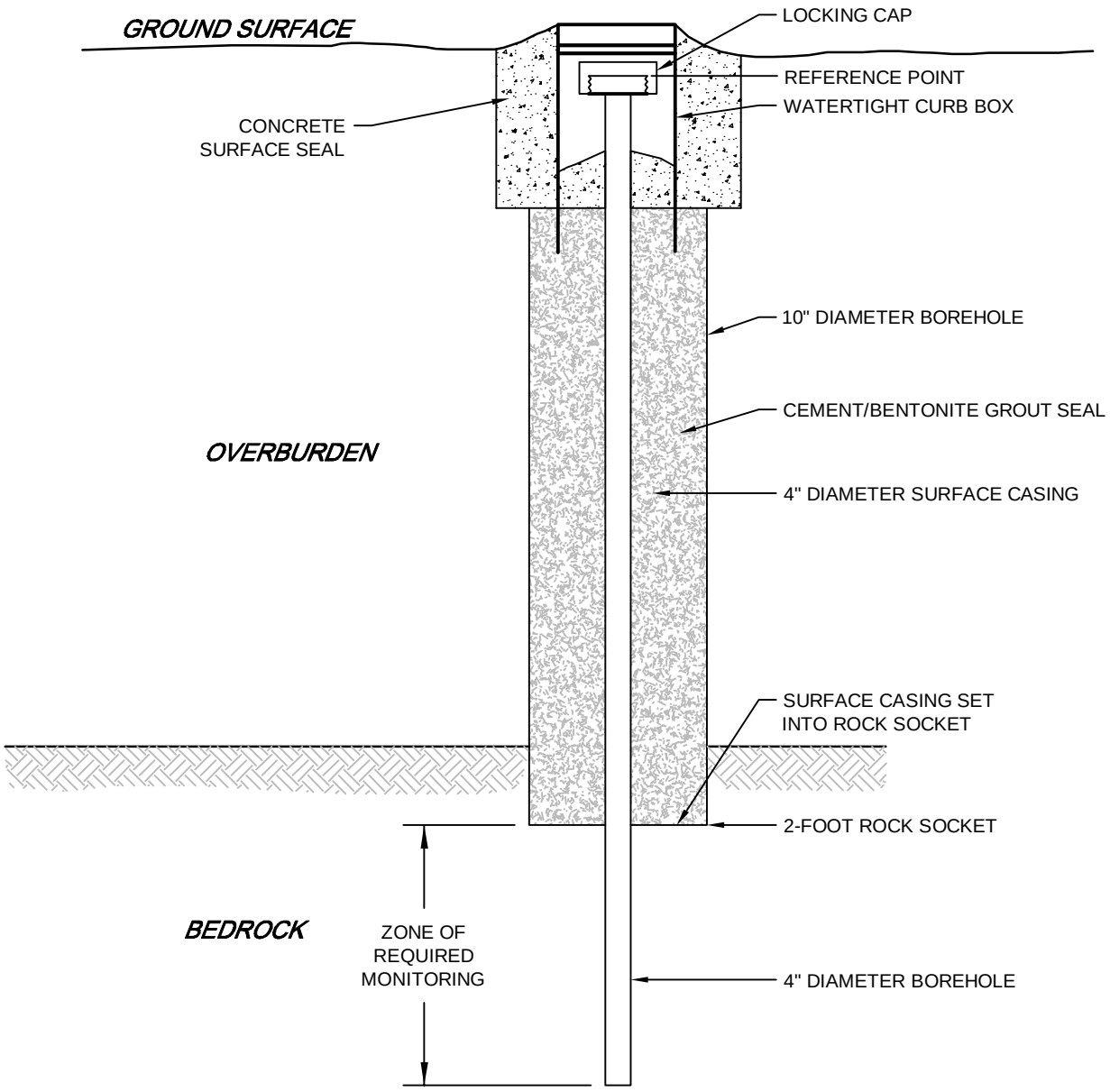


figure 4

TYPICAL BEDROCK WELL INSTALLATION
COLVIN BOULEVARD SANITARY SEWER REPAIR
GLENN SPRINGS HOLDINGS, INC.
Niagara Falls, New York

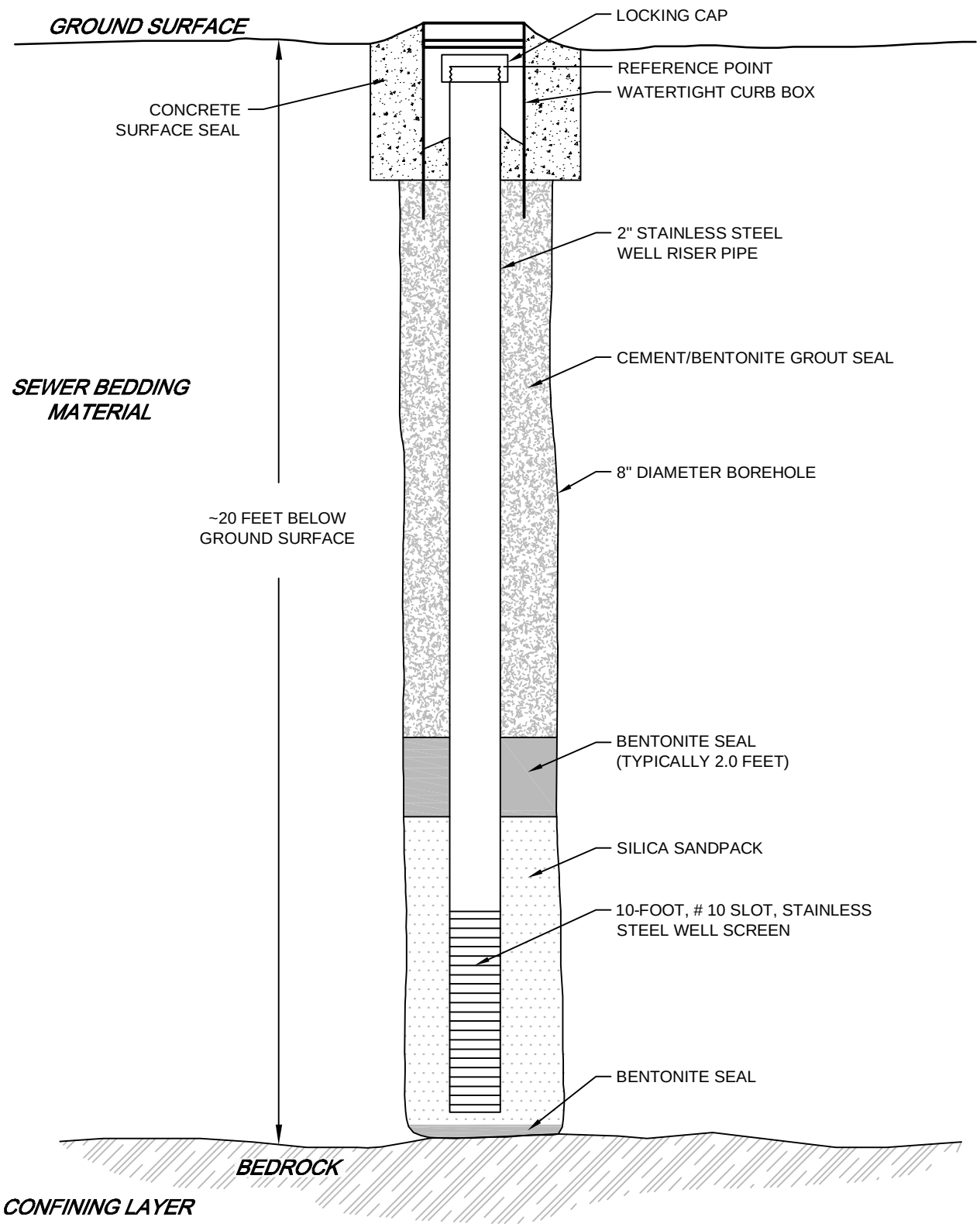


figure 5

TYPICAL OVERBURDEN WELL INSTALLATION
COLVIN BOULEVARD SANITARY SEWER REPAIR
GLENN SPRINGS HOLDINGS, INC.
Niagara Falls, New York

APPENDIX A

CRA MONITORING WELL DESIGN AND CONSTRUCTION
STANDARD OPERATION PROCEDURE – SECTION 6.14 WELL DEVELOPMENT

6.14 WELL DEVELOPMENT

Monitoring well development is the process of obtaining hydraulic stabilization of a monitoring well. To ensure hydraulic stabilization of a well, it is recommended to remove five to ten well volumes. The removal of well volumes will aid in achieving a sand-free condition with the lowest possible turbidity.

The most suitable methods of well development are:

1. Waterra™ (surge block)
2. Surge block
3. Pumping/overpumping/backwashing
4. Bailing
5. Airlifting
6. A combination of the above five methods

Note: Ensure the development method chosen conforms to local, State/Provincial, and Federal regulations.

6.14.1 WATERRA™ (SURGE BLOCK)

Waterra™ is an inertial foot valve attached to flexible or rigid tubing. For well depths greater than 50 feet (15 m) rigid tubing is used. The inertia pump may be pumped by hand or with a power pump. As the inertia pump is moved up and down in the well, water is lifted to the surface. Surge blocks can be attached to the inertia pump so that surging and purging is performed simultaneously.

This development method is cost effective and works well for shallow and small diameter wells. However, this method can be labor intensive.

6.14.2 SURGE BLOCK

When used effectively, surge blocks can destroy the bridging of fine-grained particles from the formation. Surging creates the agitation necessary in the proper development of a well. A surge block is generally used alternately with either bailing or pumping so that purging removes all agitated and loosened particulate in the well. The surge block assembly must be of sufficient weight to freefall through the water column and create a vigorous outward surge. Surging begins at the top of the screen so that sand or silt loosened by the initial surging action will not cascade down on the surge block and "lock" or "bind" the surge block in the well. Surging is initially gentle, and the energy of the action is increased throughout the development process. Surging and pumping continue until the water is free of suspended particulate in the purge water.

6.14.3 PUMPING/OVERPUMPING/BACKWASHING

The least expensive and most commonly used well development technique is pumping.

Overpumping causes an increase in the flow velocity of water through the well screen. This creates a rapid and effective migration of particulate toward and through the well screen.

With no backflow prevention valve (check valve) installed on a pump, the pump can be alternately started and stopped. This backwashing creates a surging action in the well and generally loosens the bridging of fine particles in the formation. Backwashing must only be used with dedicated pumps and hoses or pumps that have been thoroughly decontaminated between well locations. Pumps commonly used for well development include BK pumps, submersible pumps, and jet pumps.

Note:	*Particulate wears out submersible pumps. A 2-inch (5.0 cm) Grundfos™ pump should not be used for well development.*

All of the above techniques are designed to remove the drilling effects from the monitored interval and restore the formation to its previous condition. The above techniques avoid the introduction of fluids, including air, into the monitored interval during development. This minimizes adverse effects on the water quality and restricts available development options.

6.14.4 BAILING

In a relatively clean permeable formation, bailing is an effective development technique. The bailer is allowed to freefall down the well until it strikes the water surface. That contact creates a strong outward surge of water through the screen into the formation. This action tends to break bridging that has occurred in the formation from the borehole advancement process. As the bailer fills and is rapidly removed from the water column, particulate matter outside the well intake flows through the well screen. Subsequent bailing will remove all accumulated particulate from inside the well. Bailing is continued until the water is free from suspended particulate matter.

6.14.5 AIRLIFTING

Airlifting is an effective development technique that is generally used in larger diameter wells. Airlifting is commonly performed using the drill rig that advanced the borehole. Air is injected through small diameter drill rods or pipe to the bottom of the well. The air loosens particulate from the formation and is carried with the water into the well. The particulate is then extracted along with water to the ground surface. Airlifting

provides good development for the sand pack and formation. It is an excellent well rehabilitation tool. This development method can produce large volumes of water, which can create some difficulties for containment.

6.15 WELL DEVELOPMENT DOCUMENTATION

A well is developed after installation to ensure hydraulic stabilization.

Details of well development are recorded on a Well Development and Stabilization Form (SP-06) or in a standard Conestoga-Rovers & Associates (CRA) field book, and must include:

1. Well identification number
2. Date of development
3. Development method
4. Well type including diameter and construction
5. Measuring point location and elevation (if known)
6. Measured water level
7. Measured bottom depth
8. Water column length
9. Screened interval
10. Well volume
11. Volumes purged
12. All field measurements

APPENDIX B

GSH FIELD PROCEDURE FP-04B, APL SAMPLING – 3 WELL VOLUME METHOD

APPENDIX B

FP-04b: APL Sampling – 3 Well Volume Method

Equipment

1. Personal Protective Equipment (PPE).
2. Purging equipment: Water level meter, pumps (Grundfos, peristaltic pumps, hand bailers, or bladder pumps), generator, and compressor. Enough decontaminated pumps will be taken to the field to complete the day's sampling schedule. Water storage tank for purge water.
3. Field Parameter Monitoring Instruments: Multi-parameter (pH, specific conductance, and temperature) flow-through cell.
4. Decon Equipment/Supplies: Sheet plastic low phosphate soap (Alconox), distilled water, paper towels, and buckets.
5. Aqueous phase liquid (APL) sampling forms or field notebook and a Site map.

Pre-Field Activities

1. At least 4 weeks prior to the sampling effort, complete appropriate sampling forms and submit to the Conestoga-Rovers & Associates' (CRA's) Laboratory Coordinator.
2. Contact laboratory to acquire sample bottles.
3. Prepare bottle labels (list of wells/piezometers to sample is in the Site Sampling/Monitoring Work Plan.
4. Complete Chain of Custody forms.
5. Print field log/data recording sheets (pre-printed with location IDs).
6. Calibrate pH and specific conductance instruments, and record calibration results.
7. Decontaminate enough pumps to complete at least 1 day's sampling schedule. For peristaltic pumps, decon is replacement of used tubing with new tubing cleaned by the manufacturer. For inertial pumps (WaTerra), decon the check valves and replace the tubing. The following procedure is for any submersible pumps. Wearing appropriate PPE:
   - Remove all visible sediment/soil by hand brush scrubbing or power washing.
   - Remove drain plug from pump and drain trapped water. Replace the drain plug.
   - Submerge pump in a 5-gallon bucket of low-phosphate soap water and recirculate soap solution for 5 minutes.
   - Remove drain plug from pump and drain trapped water. Replace the drain plug.

- Submerge pump in a 5-gallon bucket of tap water and recirculate water for 5 minutes.
- Rinse equipment with tap water.
- An equipment blank may be required. The equipment blank is collected by pumping 1 gallon of deionized water (DI) through the clean pump. Equipment blanks should be managed consistent with water samples as described below.
- Following decontamination, the pumps shall be wrapped in foil and stored for the next use.

If the pump is contaminated with non-aqueous phase liquid (NAPL), the pump will be cleaned outside with Halso 99 or Citri-Clean, pressure washed outside, the drain plug removed to drain residual water and replaced, run through a 5-minute recirculation with a Citri-Clean solution, and then pressure washed. Following this aggressive cleaning, the procedure defined above will be completed.

Field Procedures

1. Measure water level and record on the field log. Determine the volume of water to be purged according to formulas on the sample collection forms.
2. Install pump into well for purging. Lower pump deep enough that the well/piezometer does not go dry during the purging; the vertical location of the pump is not critical for a 3-well volume purge.
   - Purge tubing is dedicated to each well and remains in the well between sampling events. A decontaminant pump will be used for each well purging. The dedicated tubing is pulled from the well and connected the decontaminated pump.
   - Care must be taken to ensure that the dedicated tubing is not contaminated when it is removed from the well and that no debris is introduced to the well when the pump is lowered.
   - Pumps are not field decontaminated. Pumps are decontaminated nightly at the Love Canal Drum Barn.
3. Start pump and purge as follows:
   - Start pump and adjust flow rate to a rate sustainable by the well. The goal of the sampling is to purge and sample without drying up the well/piezometer.
   - Monitor field parameters (pH, specific conductance, and temperature), water level, and pumping rate, and record in the field log including the time of the measurements. One set of readings will be taken at the start of purging and an additional set will be taken after removal of each standing well volume.

- If the well goes dry, purge 3 consecutive days to dryness and then sample. Full recovery is not necessary. Sampling can commence on day 3 if water is available and can be conducted over the next 4 days if required to fill the sample bottles.
- If the well goes dry, a sustainable pumping rate should be determined for future sampling events. Contact the Glenn Springs Holdings, Inc. (GSH) and CRA project manager regarding adjustment of pumping rates.

4. Samples shall be collected directly from the pump discharge.
   - Note: If possible, sampling in the rain should be avoided to avoid cross-contamination from airborne contaminants picked up by the precipitation.
   - Wells should be sampled beginning with lowest concentration wells, progressing to highest concentrations. This minimizes the potential for cross-contamination.
5. Securely pack samples in ice filled coolers for shipment to the appropriate laboratory. Coolers must:
   - Have chain-of-custody forms in a zip-lock bag in the cooler.
   - Be securely taped closed with security seals across the cooler opening.
6. Remove pump and disconnect from purge tubing. Purge tubing should be returned to the well.
   - Care must be taken to ensure that the dedicated tubing is not contaminated when it is removed from the well and that no debris is introduced to the well when the pump is lowered.
7. Manage purge water and sampling disposables as described below.

Disposal of Wastes

All solid waste materials from monitoring will be placed in a plastic garbage bag. At the end of each day, these wastes will be placed in an approved/labeled 55-gallon waste disposal drum at the Love Canal facility. Purge water and decon liquids will be collected. Solid and liquid wastes will be managed according to field procedure FP-01a.

Reporting

Field data will be entered into the field database management system or an Excel spreadsheet. The GSH Field Manager will specify formats and procedures.

A copy of the chain-of-custody forms must be sent to the Laboratory Coordinator.

FP-01a: Waste Management

Disposables (PPE, towels, tubing, etc…)

All field disposables will be placed in 55-gallon drums at the OCC Love Canal Facility for management as Hazardous Solid Waste.

Purge Water

All purge water from sampling will be disposed of at the OCC Hyde Park water treatment plant. Water will be discharged to the containment area in the Drum Barn or outside loading pads. These locations all connect to the treatment system.

Decon Liquids

Alconox Wash: All decon wash is contained and disposed of in Love Canal or Hyde Park the same as purge water.

Solvents: minimal volumes of solvents are used. Small quantities of solvents (CITRI-CLEAN and Halso 99) that are spilled during decon may be washed into the decon containment area. These areas are connected to the site water treatment system.

NAPL/solvent coated Disposables (PPE, towels, tubing, etc…)

NAPL coated disposables will be managed in the same manner as described above for non-NAPL coated disposables.