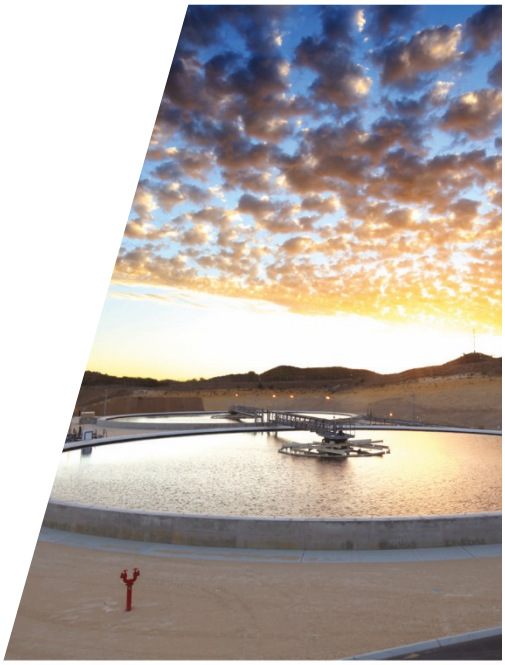

Site Management Plan

102nd Street Landfill
Niagara Falls, New York

Glenn Springs Holdings, Inc.

Executive Summary

The following provides a brief summary of the controls implemented for the Site, as well as the inspections, monitoring, maintenance and reporting activities required by the Site Management Plan.

Site Identification NYSDEC Site No. 932022 – 102nd Street Landfill

Institutional Controls:	1. The Site is not available for use or development, other than operation of remedial systems.	
	2. The use of groundwater underlying the Site is prohibited without necessary water quality treatment as determined by the NYSDOH or the Niagara County Department of Health.	
	3. Groundwater monitoring must be performed as defined in this SMP.	
	4. Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP.	
	5. All ECs must be inspected at a frequency and in a manner defined in the SMP.	
Engineering Controls:	1. Cover System	
	2. APL Collection and Discharge System	
	3. NAPL Recovery System	
	4. Fencing and Access Control	
Inspections:		**Frequency**
1. APL Collection System Manhole/Wet Wells Inspection		Annually
2. NAPL Recovery Well Inspection		Annually
3. Landfill Cap, Site Cover, Fence Inspection		Annually
4. Shallow Water Environment Inspection		Annually
5. NYSDEC Annual Inspection		Annually
Monitoring:		
1. Hydraulic Monitoring		Quarterly
2. Groundwater Quality Monitoring		Annually
3. NAPL Presence Monitoring		Quarterly
Maintenance:		
1. Per Operation and Maintenance Manual		As needed
Reporting:		
1. Periodic Review Report		Annually

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Table 1.1 Notifications

Table 4.1 Remedial System Monitoring Requirements and Schedule

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Appendix A Deed Restriction

Appendix B List of Site Contacts

Appendix C Operation, Maintenance & Monitoring Manual

Appendix D Institutional and Engineering Control Certification Form

Appendix E Remedial Site Optimization Outline

Acronyms

ANRP	Accelerated NAPL Recovery Program
AO	Administrative Order
APL	Aqueous Phase Liquid
ARARS	Applicable or Relevant and Appropriate Requirements
EC	Engineering Control
FER	Final Engineering Report
GSH	Glenn Springs Holdings, Inc.
HASP	Health and Safety Plan
IC	Institutional Control
LCSCT	Love Canal South Collector Tank
LCTF	Love Canal Treatment Facility
NAPL	Non-aqueous Phase Liquid
NFWB	Niagara Falls Water Board
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OCC	Occidental Chemical Corporation
OM&M	Operation, Maintenance & Monitoring
OU	Operable Unit
PCB	Polychlorinated Biphenyl
PFA	Predesign Field Activities
PFAR	Predesign Field Activity Report
PRR	Periodic Review Report
RAO	Remedial Action Objectives
RD	Remedial Design
RDWP	Remedial Design Work Plan
ROD	Record of Decision
RSO	Remedial Site Optimization
SIU	Significant Industrial User
SMP	Site Management Plan
USEPA	United States Environmental Protection Agency

1. Introduction

1.1 General

This Site Management Plan (SMP) has been prepared at the request of the New York State department of Environmental Conservation (NYSDEC) for the remedial program associated with the 102nd Street Landfill located in Niagara Falls, New York (hereinafter referred to as the "Site"). The location of the Site is presented on Figure 1.1. The Site is currently listed as site No. 932022 in the Inactive Hazardous Waste Disposal Site Remedial Program, which is administered by the NYSDEC.

Occidental Chemical Corporation (OCC) entered into a Record of Decision with the State of New York in 1990 to assume responsibility for operation, maintenance, and monitoring of the remedial systems at the Site. Site responsibility has been assigned by OCC to Glenn Springs Holdings, Inc. (GSH), an affiliate of OCC. A figure showing the boundaries of this Site is provided in Figure 1.2. The boundaries of the site are more fully described in the metes and bounds site description that is part of the Deed Restriction provided in Appendix A.

After completion of the remedial work, some contamination was left at this Site, which is hereafter referred to as "remaining contamination". Institutional and Engineering Controls (ICs and ECs) have been incorporated into the Site remedy to control exposure to remaining contamination to ensure protection of public health and the environment. A Deed Restriction granted to the NYSDEC, and recorded with the Niagara County Clerk, along with the Record of Decision, require compliance with this SMP and all ECs and ICs placed on the site.

This SMP was prepared to manage remaining contamination at the Site, as requested by the NYSDEC, in accordance with the NYSDEC approved Operation, Maintenance, & Monitoring (OM&M) Manual for the Site. This plan has been approved by the NYSDEC, and compliance with this plan is required by the grantor of the Record of Decision and Deed Restriction. This SMP may only be revised with the approval of the NYSDEC.

All reports associated with the Site can be viewed by contacting the NYSDEC or its successor agency managing environmental issues in New York State. A list of contacts for persons involved with the Site is provided in Appendix B of this SMP.

This SMP was prepared by GHD, on behalf of Glenn Springs Holdings, Inc., in general accordance with the requirements of the NYSDEC's DER-10 ("Technical Guidance for Site Investigation and Remediation"), dated November 2017, and the guidelines provided by the NYSDEC, as applicable. This SMP addresses the means for implementing the ICs and ECs that are required by the Deed Restriction for the Site.

1.2 Revisions

Revisions to this plan will be submitted in writing to the NYSDEC's project manager. Revisions will be necessary upon, but not limited to, the following occurring: a change in media monitoring requirements, upgrades to or shut-down of a remedial system, post-remedial removal of contaminated soil, or other significant change to the site conditions. In accordance with the Deed Restriction for the site, the NYSDEC will provide a notice of any approved changes to the SMP, and append these notices to the SMP that is retained in its files.

1.3 Notifications

Notifications will be submitted to the NYSDEC, as needed, in accordance with NYSDEC's DER – 10 for the following reasons:

- 60-day advance notice of any proposed changes in Site use that are required under the terms of the Consent Decree, 6NYCRR Part 375 and/or Environmental Conservation Law.
- 15-day advance notice of any proposed ground-intrusive activity.
- Notice within 48-hours of any damage or defect to the foundation, structures or EC that reduces or has the potential to reduce the effectiveness of an EC, and likewise, any action to be taken to mitigate the damage or defect.
- Verbal notice by noon of the following day of any emergency, such as a fire; flood; or earthquake that reduces or has the potential to reduce the effectiveness of ECs in place at the site, with written confirmation within 7 days that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.
- Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action submitted to the NYSDEC within 45 days describing and documenting actions taken to restore the effectiveness of the ECs.

Table 1.1 includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information. A full listing of Site-related contact information is provided in Appendix B.

Table 1.1 Notifications

Name	Contact Information
Brian Sadowski	716-851-7220 brian.sadowski@dec.ny.gov
Glenn May	716-851-7220 glenn.may@dec.ny.gov
Stan Radon	716-851-7220 Stanley.radon@dec.ny.gov

2. Summary of Previous Investigations and Remedial Actions

2.1 Site Location and Description

The Site is located in Niagara Falls, Niagara County, New York and is identified consists of six parcels. The Site is an approximately 22.1 acre area and is bounded by Buffalo Avenue to the north, the Niagara River to the south, Griffon Park to the west, and privately owned land (the Belden Site) to the east (see Figure 1.2 – Site Layout Map). The boundaries of the site are more fully described in Appendix A – Deed Restriction. The owners of the site parcels at the time of issuance of this SMP are OCC and Olin Corporation.

2.2 Physical Setting

2.2.1 Land Use

The Site consists of a 22.1 acre fenced area. The Site is zoned as OS - Open Space and is currently vacant.

The properties adjoining the Site and in the neighborhood surrounding the Site primarily include commercial, residential, and open space properties. The properties immediately north of the Site include open space; the properties immediately east of the Site include open space; and the properties to the west of the Site include open space (Park) and beyond by residential properties.

2.2.2 Geology

The geology of the Site, with increasing depth below ground surface, is as follows:

- Fill (0 to 18 feet [ft] thick), overlying
- Alluvium (up to 32 ft thick), overlying
- Clay (approximately 28 ft thick on the northern side of the Site and varying at the southern side of the Site), overlying
- Till (4 to 20 ft thick), overlying
- Lockport Formation Bedrock

A geologic cross section is shown on Figure 2.1.

2.2.3 Hydrogeology

The overburden materials, due to their high clay content, are relatively impermeable. On a regional scale, the overburden would be considered an aquitard, and the limited groundwater flow within this unit will generally be in a downward direction. However, near the Niagara River, a thin layer of more permeable silty sand and areas of fill overlie the aquitard and provide a pathway for lateral migration.

The major aquifer in the Niagara Falls area is the Lockport Group. Groundwater occurs in the Lockport Group in three types of openings:

- Bedding plane joints and fractures,
- Vertical joints
- Small cavities due to gypsum dissolution

Of these, bedding plane joints are the most important and transmit the largest volume of water moving through the formation. The joints within the Lockport Group that transmit the most of the water are the fractures along the prominent bedding planes which have been widened by mineral dissolution. In the Niagara Falls area, these planar openings have been found to be really extensive over several miles, A water bearing unit in the Lockport Group may consist of a single open bedding joint, or an interval of rock up to one foot thick, containing several open bedding joints.

In general, open vertical joints are less important water bearing zones in the Lockport Group, except in the upper few feet of the unit. The cavities formed by mineral dissolution are also most prevalent in the upper 15 ft of the Lockport Group.

2.3 Investigation and Remedial History

The following narrative provides a remedial history timeline. A brief summary of the available project records which document key investigative and remedial milestones for the Site is not included in this report due to the size and nature of the project, but a list of reports relevant to the Site's history can be found in the most recent United States Environmental Protection Agency (USEPA) Five-Year Review.

The Site was operated as a disposal Site for industrial wastes by both OCC, Olin, and their predecessors. OCC and its predecessors operated their 15.6 acre portion of the Site as a landfill from approximately 1943 until 1970. Olin operated their 6.5 acre portion (which occupies the eastern section of the overall Site) as a landfill from 1948 to 1970.

The Site was divided into three Operable Units (OU) for investigative and remedial alternative feasibility studies. The three OUs are:

- OU-1: landfill residuals, perimeter soils, shallow groundwater, and non-aqueous phase liquids.
- OU-2: sediments in the Niagara River within 300 ft of the shore.
- OU-3: the portion of the 100th Street Storm Sewer that crosses the Site.

This report describes the remedial action of OU-1 and OU-2 only.

The selected remedial action for the Site was presented in the Record of Decision (ROD) issued on September 26, 1990. The Remedial Design Work Plan (RDWP) for the Site, which describes the overall approach to the design of remedial measures, was approved by the USEPA on May 6, 1992. The selected remedial alternative for OU-1 and OU-2 included the following components:

- OU-1
  - Capping the Site with a compound liner consisting of a compacted soil layer and a synthetic flexible membrane liner.
  - Consolidation of perimeter and off-Site soils under the cap.
  - Construction of a slurry wall encompassing the Site.
  - Recovery and treatment of aqueous phase liquids (APL).
  - Recovery and treatment of non-aqueous phase liquids (NAPL).
  - Monitoring of post-remedial action.
  - Restriction of access.
  - Institutional controls.
- OU-2
  - Removal and off-Site incineration of highly impacted Embayment sediments, and removal of the remaining impacted sediments with subsequent placement on the Site.

Predesign Field Activities (PFA) were conducted at the Site from September 22 to October 27, 1992. The PFA obtained information on the soil conditions along the perimeter of the Site for the engineering design. The Predesign Field Activity Report (PFAR), which documented the PFA, was submitted to the USEPA on November 20, 1992.

A NAPL Recovery Well Testing Program was conducted as part of the remedial design (RD) for the Site. The purpose of the testing program was to obtain data that could be used to evaluate the potential yield of NAPL, to evaluate the necessity of a NAPL well recovery system, and to obtain data to finalize design of NAPL recovery system, if a system was deemed practical. A NAPL Recovery Well Testing Work Plan was approved by the USEPA on May 17, 1994. A NAPL Recovery Well Testing Program report which presents the results of the program was issued in June 1995.

The Final Engineering, which incorporated and accommodated comments from the City of Niagara Falls, NYSDEC, and USEPA was documented in the FER issued September 9, 1995 and revised February 5, 1996. The FER, including drawings and technical specifications, constitutes the RD Report as defined in the Site's Administrative Order (AO) for Remedial Design and Remedial Action, September 30, 1991. The Remedial Design is consistent with the selected remedy described in the Amended ROD and has taken into account and accommodated applicable or relevant and appropriate requirements (ARARS).

2.4 Remedial Action Objectives

The Record of Decision Document does not list Remedial Action Objectives (RAOs) for the Site but instead states "the selected remedy of consolidation, capping, and containment will effectively eliminate each of these pathways leading to human exposure. The 'ingestion of fish' pathway will be eliminated since no contaminants can leach from the landfill area due to the existence of the slurry wall keyed into the confining clay/till layer, the capping of the Site, and the maintenance of an inward gradient across the slurry wall. In a similar manner, the pathways involving swimming in the River and drinking water from the River, will be eliminated. Exposure to any dust from contaminated off-site soils will be avoided since all off-site soils which have contamination levels above those levels deemed actionable, will be removed from their present location and consolidated beneath the cap. After implementation of the options which comprise the selected remedy the overall risk associated with the Site will be reduced to 10^{-4} for carcinogens, and the hazard indices for non-carcinogens will be less than one."

2.5 Remaining Contamination

Contaminants identified on-Site during initial investigations included chlorobenzene compounds, chlorinated phenols, polychlorinated biphenyls (PCBs), polychlorinated dioxins, dibenzofurans, and heavy metals such as mercury.

2.5.1 Soil

Soil and sediment in areas immediately next to the Site were excavated and placed in the landfill area. Gravel and topsoil were placed on these areas, however there may be low-level residual contamination in the soils that are below cleanup criteria. Some contamination exists outside of the slurry wall, potentially impacting surface water and sediment quality in the area. This placement of the slurry wall was to preserve natural fish and wildlife habitats.

Impacted soil within the landfill remains, but is contained by the cover, slurry wall, and groundwater collection system.

2.5.2 Groundwater

Groundwater contamination exists within the slurry wall and landfill cap. This contamination is contained by the maintenance of inward gradients across the Site border. Some contamination exists immediately outside the slurry wall between the wall and the River.

3. Institutional and Engineering Control Plan

3.1 General

Since remaining contamination exists at the Site, ICs and ECs are required to protect human health and the environment. This IC/EC Plan describes the procedures for the implementation and management of all IC/ECs at the site. The IC/EC Plan is one component of the SMP and is subject to revision by the NYSDEC.

This plan provides:

- A description of all IC/ECs on the site.
- The basic implementation and intended role of each IC/EC.
- A description of the key components of the ICs.
- A description of the controls to be evaluated during each required inspection and periodic review.
- A description of plans and procedures to be followed for implementation of IC/ECs.
- Any other provisions necessary to identify or establish methods for implementing the IC/ECs required by the site remedy, as determined by the NYSDEC.

3.2 Institutional Controls

A series of ICs are required by the Deed Restriction and Record of Decision to: (1) implement, maintain and monitor Engineering Control systems; (2) prevent future exposure to remaining contamination; and, (3) restrict the use and development of the site. Adherence to these ICs on the site is required by the Deed Restriction and will be implemented under this SMP. ICs identified in the Deed Restriction may not be discontinued without an amendment to or extinguishment of the Deed Restriction. The IC boundaries are shown on Figure 1.2. These ICs are:

- The Site is not available for use or development, other than operation of the remedial systems.
- All ECs must be operated and maintained as specified in this SMP.
- All ECs must be inspected at a frequency and in a manner defined in the SMP.
- The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the New York State Department of Health (NYSDOH) or the Niagara County Department of Health to render it safe for use as drinking water or for industrial

purposes, and the user must first notify and obtain written approval to do so from the Department.

- Groundwater monitoring must be performed as defined in this SMP.
- Data and information pertinent to site management must be reported at the frequency and in a manner as defined in this SMP.
- All future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP.
- Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP.
- Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP.
- Access to the Site must be provided to agents, employees or other representatives of the State of New York or the USEPA with reasonable prior notice.

3.3 Engineering Controls

Procedures for the inspection of these engineering controls are provided in the Monitoring and Sampling Plan included in Section 4.0 of this SMP. Any work conducted must be conducted in accordance with the procedures defined in the Health and Safety Plan (HASP) prepared for the Site. Detailed information about the engineering controls, including inspection and operation procedures, can be found in the OM&M Manual provided in Appendix C.

3.3.1 Cover

Exposure to remaining contamination at the site is prevented by a cover system placed over the site. This cover system is comprised of a minimum of the following layers, in descending order:

- Vegetative cover
- 6-inch topsoil layer
- 18-inch select cover fill layer
- 8-ounce, non-woven, needle-punched geotextile
- Drainage net (geonet) that drains into a surface drainage collection system
- Geomembrane layer
- Prefabricated geosynthetic clay liner (maximum permeability of $1x10^{-9}$ cm/s)
- Compacted clayey fill with top 1-inches free of sharp objects and deleterious material

In the event the cover system is breached, penetrated, temporarily removed, or any underlying remaining contamination is disturbed, appropriate action will immediately be taken to prevent, abate, or minimize any release or threat of release, and notify the appropriate parties as outlined in the Consent Decree. Any work conducted regarding the cover must also be conducted in accordance with the procedures defined in the HASP. Procedures for inspection of the Site cover are provided in the OM&M Manual in Appendix C.

3.3.2 APL Collection and Discharge System

Containment of groundwater is achieved with the APL Collection and Discharge System. The system is designed to create an inward gradient in the groundwater table across the slurry wall. This is achieved by pumping groundwater from four wet wells installed in the groundwater collection trench. The system consists of a 2,300 ft of perimeter collection drain, four wet wells, seven inline clean-outs, pumps, forcemain piping, seven forcemain cleanout manholes, electrical conduit, control and electrical wiring, controls, and instrumentation. The collected groundwater is pumped via forcemain to a wet well at the Love Canal from which it is pumped to and treated at the Love Canal Treatment Facility (LCTF) located north of the Site. Treated effluent is discharged into the Niagara Falls Water Board (NFWB) sanitary sewer under the Site's Significant Industrial User (SIU) Permit #44.

3.3.3 NAPL Recovery System

A NAPL recovery system is installed at the Site. The system consists of eight NAPL recovery wells from which NAPL will be pumped if a recoverable amount has accumulated (NR-1 through NR-5, NR-7, NR-8, and NR-10). Each NAPL recovery well consists of a 12-inch diameter, type 304 stainless steel casing, a 10-foot long type 316 stainless steel well screen with No. 20 slots, a sand filter pack, bentonite and grout seals, and a concrete pad at the ground surface. The NAPL is shipped off Site for incineration after it is recovered.

3.3.4 Slurry Wall

A perimeter soil-bentonite slurry wall, designed to reduce groundwater inflow from off-Site areas to the perimeter collection drain, is installed along the perimeter of the Site beyond the groundwater collection trench alignment. The 3-foot wide slurry wall is keyed a minimum of 36-inches into the underlying native clay/till confining unit and is capped with 24-inches of clay and the landfill cap. The low permeability layer of the cap and the slurry wall create a continuous barrier to groundwater migration through the landfilled materials.

3.3.5 Fencing and Access Control

A 6-foot high chain link fence is installed along the Site perimeter as shown in Figure 1.2. The Site can be accessed through a traffic gate from Buffalo Avenue. The fence is topped with three strands of barbed wire.

4. Monitoring and Sampling Plan

4.1 General

This Monitoring and Sampling Plan describes the measures for evaluating the overall performance and effectiveness of the remedy. This Monitoring and Sampling Plan may only be revised with the approval of the NYSDEC. Details regarding the sampling procedures, data quality usability objectives, analytical methods, etc. for all samples collected as part of site management for the Site can be found in Appendix C.

This Monitoring and Sampling Plan describes the methods to be used for:

- Sampling and analysis of groundwater
- Evaluating site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment;

To adequately address these issues, this Monitoring and Sampling Plan provides information on:

- Sampling locations, protocol and frequency
- Information on all designed monitoring systems
- Analytical sampling program requirements
- Inspection and maintenance requirements for monitoring wells
- Monitoring well decommissioning procedures
- Annual inspection and periodic certification

Reporting requirements are provided in Section 7.0 of this SMP.

4.2 Site-Wide Inspection

A Site-wide inspection will be performed annually. Modification to the frequency or duration of the inspections will require approval from the NYSDEC. A Site-wide inspection will also be performed after all severe weather conditions that may affect ECs or monitoring devices. Other components of the Site are inspected at varying frequencies. An inspection schedule for these other components of the Site, as well as inspection forms, are presented in the OM&M Manual in Appendix C.

The Annual comprehensive Site-wide inspection will document the following:

- Compliance with all ICs, including Site usage
- An evaluation of the condition and continued effectiveness of ECs
- Whether ECs continue to perform as designed
- If these controls continue to be protective of human health and the environment
- Compliance with requirements of this SMP and the Deed Restriction
- Achievement of remedial performance criteria
- General Site conditions at the time of the inspection

Inspections of all remedial components installed at the Site will be conducted at the frequency specified in the OM&M Manual in Appendix C.

Reporting requirements are outlined in Section 7.0 of this plan.

Inspections will also be performed in the event of an emergency. If an emergency, such as a natural disaster or an unforeseen failure of any of the ECs occurs that reduces or has the potential to reduce the effectiveness of ECs in place at the site, verbal notice to the NYSDEC must be given by noon of the following day. In addition, an inspection of the site will be conducted within 5 days of the event to verify the effectiveness of the IC/ECs implemented at the site by a qualified environmental

professional, as determined by the NYSDEC. Written confirmation must be provided to the NYSDEC within 7 days of the event that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.

4.3 Remedial System Monitoring and Sampling

Monitoring of the APL Collection and Discharge System and NAPL Recovery System is conducted in accordance with the OM&M Manual presented in Appendix C. Modification to the frequency or sampling requirements will require approval from the NYSDEC. Unscheduled inspections and/or sampling may take place when a suspected failure of the APL Collection and Discharge System or NAPL Recovery System has been reported or an emergency occurs that is deemed likely to affect the operation of the APL Collection and Discharge System or NAPL Recovery System.

A complete list of components to be inspected and inspection forms are presented in the OM&M Manual in Appendix C. If any equipment readings are not within their specified operation range, any equipment is observed to be malfunctioning or the system is not performing within specifications, maintenance and repair, as per the OM&M Manual.

4.4 Post-Remediation Media Monitoring and Sampling

Groundwater and NAPL presence monitoring will be performed on a routine basis. Hydraulic monitoring and NAPL presence monitoring are performed on a quarterly basis and chemical monitoring is performed on an annual basis. Details are provided in the OM&M Manual presented in Appendix C. Modification to the frequency or sampling requirements will require approval from the NYSDEC. A visual inspection of the monitoring well and wet well network will be conducted during the chemical monitoring event. Unscheduled inspections and/or sampling may take place when a suspected failure of the APL collection system has been reported or an emergency occurs that is deemed likely to affect the operation of the system. The APL collection system components to be monitored include are specified in the OM&M Manual provided in Appendix C.

If any equipment readings are not within their specified operation range, any equipment is observed to be malfunctioning or the system is not performing within specifications; maintenance and repair, as per the OM&M Manual, is required.

4.4.1 Groundwater Monitoring

4.4.1.1 Hydraulic Monitoring

Water level monitoring consists of the measurement of water levels in monitoring wells to determine groundwater elevations. Water levels in 20 monitoring wells and piezometers (PZ-01, PZ-02, PZ-03R, PZ-04 through PZ-08, PZ-09R, and PZ-10 inside the slurry wall and PCM-01 through PCM-06, PCM-07R, and PCM-08 through PCM-10 outside the slurry wall) will be measured to ensure the water levels inside the slurry wall are lower than the water levels outside the slurry wall (i.e., an inward gradient exists). Additional water level monitoring locations include PCBM-01 through PCBM-03, NR-01 through NR-05, NR-07, NR-08, NR-10, WW-1 through WW-4, and the river. Table 4.1 summarizes wells used for hydraulic monitoring. Figure 4.1 presents the hydraulic monitoring locations. Water level monitoring is conducted on a quarterly basis. The method for measuring water levels accurately is described in Appendix C.

Water level data will be converted to elevations and listed in tabular form for each round of data collected.

In the event that water level monitoring indicates that the inward hydraulic gradients across the slurry wall and/or vertical upward gradient across the clay/till are not adequate, the APL collection system pumping level controls will be adjusted to achieve the target and minimum head difference. The minimum head difference across the slurry wall is 1 foot, and the minimum upward gradient across the clay/till is 1 1/2 feet. The water level monitoring program may be reassessed annually.

4.4.1.2 Chemical Monitoring

Groundwater monitoring will be performed annually to assess the performance of the remedy. Modification to the frequency or sampling requirements will require approval from the NYSDEC.

The network of monitoring wells has been installed to groundwater conditions at the site. The network of wells has been designed based on the following criteria:

Water samples will be collected from ten overburden monitoring wells (PCM-01 through PCM-10) and three bedrock monitoring wells (PCBM-01 through PCBM-03). These monitoring wells are all located outside of the slurry wall.

Table 4.1 summarizes the wells used for chemical monitoring. The locations of wells to be sampled can be seen on Figure 4.2.

If biofouling or silt accumulation occurs in the on-site and/or off-site monitoring wells, the wells will be physically agitated/surged and redeveloped. Additionally, monitoring wells will be properly decommissioned and replaced, if an event renders the wells unusable.

Repairs and/or replacement of wells in the monitoring well network will be performed based on assessments of structural integrity and overall performance.

The NYSDEC will be notified prior to any repair or decommissioning of any monitoring well for the purpose of replacement, and the repair or decommissioning and replacement process will be documented in the subsequent Periodic Review Report. Well decommissioning without replacement will be done only with the prior approval of the NYSDEC. Well abandonment will be performed in accordance with NYSDEC's guidance entitled "CP-43: Groundwater Monitoring Well Decommissioning Procedures." Monitoring wells that are decommissioned because they have been rendered unusable will be replaced in kind in the nearest available location, unless otherwise approved by the NYSDEC.

The sampling frequency may only be modified with the approval of the NYSDEC. This SMP will be modified to reflect changes in sampling plans approved by the NYSDEC.

Deliverables for the groundwater monitoring program are specified in Section 7.0 – Reporting Requirements.

4.4.2 NAPL Presence Monitoring

The eight NAPL recovery wells (NR 1 through NR 5, NR 7, NR 8, and NR 10) will be checked for NAPL quarterly. If more than 3 gallons of NAP-inches deep in a 12-inch diameter well) are present in a NAPL recovery well during monitoring, the NAPL will be removed (only from April through October)

for off Site disposal in accordance with the procedure detailed in the OM&M Manual in Appendix C and in accordance with all applicable Federal and New York State Regulations. This is the minimum depth of NAPL required to allow removal.

Monitoring for NAPL shall be reassessed annually to determine the suitability of the monitoring or until NAPL monitoring is no longer required. NAPL monitoring will no longer be required when the recharge rate for a well is less than 1-gallon/year.

NAPL presence monitoring results shall be recorded on forms or in a field book. Once complete, the bottom of each form will be signed and dated and a copy will be kept on file.

4.4.3 Monitoring and Sampling Protocol

All sampling activities will be recorded in a field book or associated sampling log. Other observations (e.g., groundwater monitoring well integrity, etc.) will be noted on the sampling log. The sampling log will serve as the inspection form for the monitoring network. Additional detail regarding monitoring and sampling protocols, including field forms and sample Chain of Custody forms, are provided within the OM&M Manual in Appendix C of this document.

5. Operation and Maintenance Plan

5.1 General

This Operation and Maintenance Plan provides a brief description of the measures necessary to operate, monitor and maintain the mechanical components of the remedy selected for the Site. This Operation and Maintenance Plan:

- Includes the procedures necessary to allow individuals unfamiliar with the site to operate and maintain the Site remedial systems.
- Will be updated periodically to reflect changes in site conditions or the manner in which the Site remedial systems are operated and maintained.

Further detail regarding the Operation and Maintenance of the Site is detailed in the OM&M Manual in Appendix C. A copy of this OM&M Manual, along with the complete SMP, is to be maintained at the Site. This Operation and Maintenance Plan is not to be used as a stand-alone document, but as a component document of this SMP.

5.2 Remedial System Performance Criteria

Performance criteria for remedial systems are as follows:

- Prevent off-Site migration of chemicals

5.3 Operation and Maintenance of APL Collection and Discharge System

The APL collection and discharge system consists of an APL collection trench, four wet wells, and a forcemain system. The APL accumulates in the collection trench and is transported via gravity to the

wet wells. Once the APL level in the wet well reaches the set point, the wet well pump activates, and the APL is pumped from the wet well into the forcemain. The forcemain exits the Site in the northwest corner and extends north under Buffalo Avenue and the LaSalle Expressway to the Love Canal. The forcemain discharges APL to the Love Canal South Collector Tank (LCSCT). Once the level in the LCSCT reaches a set level as determined by the facility coordinator, the pumps are manually turned on. The APL is then pumped to the LCTF for treatment and is ultimately discharged under permit to the City of Niagara Falls sanitary sewer system.

The individual APL pumps in the APL collection wet wells operate on level control. Power to individual APL pumps is turned off automatically when the level in the wet well falls to the low-level elevation of the probe. Power to the APL pump is restored automatically when the level in the wet well rises to the high-level elevation of the probe. APL levels within each wet well, the flow rate from each wet well, and the total flow to the LCTF will be monitored at the LCTF. The LCTF can remotely control the wet well operation. All four wet well pumps' set points can be adjusted at the LCTF.

Leak detection for the APL discharge forcemain is provided in the on-Site sample manhole and in each off-Site manhole. If a leak is detected in any of these manholes, all four APL pumps will stop pumping automatically, and a remote message will be sent to the LCTF. Pumps will be restarted manually after the problem has been identified and corrected.

When the pumps shut down due to a high level in the LCSCT, the control system will alarm the operator via the process computer.

Level instrumentation in the LCSCT will also shut down the four 102nd Street Wet Well pumps when the LCSCT capacity is reached. Pumps will restart automatically after the tank level decreases to a set elevation.

A hand/off/auto switch is located in each wet well control panel. Under normal operating conditions, the switch will be in the auto position. This will allow the pump to run under normal operating conditions. For testing operations, the switch will be in the hand position. This will allow the pump to bypass the controls and locally operate. The manual setting on the wet well control panel will/will not override the pump shutdown commands from the process computer or forcemain leak detection system. For maintenance operations, the switch will be in the off position. A light located on each wet well control panel will show when the pumps are on.

A troubleshooting chart is presented within Appendix C.

5.4 Operation and Maintenance of NAPL Recovery System

Each of the NAPL recovery wells will be monitored quarterly for the presence of NAPL, April through October. NAPL found during the monitoring will be removed if a well contains at least 3 gallons of NAPL (approximately 6-inch depth of NAPL in the 12-inch diameter wells). Monitoring will be accomplished by lowering an APL/NAPL interface probe into the well. If the NAPL depth exceeds 6-inches, the NAPL will be manually pumped out. NAPL will be removed with a mechanical well jerking pump via dedicated polyethylene tubing with a foot-valve. NAPL will be discharged into a storage tank and shipped off Site for disposal in accordance with all applicable Federal and New York State Regulations.

To minimize the volume of APL extracted with the NAPL, personnel will watch the NAPL discharge and when APL is observed in the discharge line, the operator will manually turn the pump off.

In addition to the quarterly removal of NAPL from the recovery wells, an accelerated NAPL recovery program has been initiated. The Accelerated NAPL Recovery Program (ANRP), implemented in 2004, is based on the results of the "NAPL Extraction Program Work Plan for Accelerated Recovery" dated December 2003. The purpose of the ANRP is to place dedicated recovery equipment at a high NAPL producing well to continuously remove NAPL. This program involved the continuous removal of NAPL from NR-02 through the use of a low flow, automated pump installed in the NR-02 well with daily measurements, while the remaining NR wells were monitored quarterly and NAPL removed as necessary.

Quarterly NAPL presence and removal data in 2010 indicated that NAPL presence in the vicinity of NR-02 may be diminishing, either due to a decrease in NAPL in the area of NR-02 (indicating a successful implementation of the recovery program), or possibly a result of creating a "deNAPLed" (absence of NAPL) area around NR-02 due to the long term pumping at this location and a decreased recharge rate of the NAPL. Due to the reduction in NAPL removed from NR-02, the frequency of monitoring at NR-02 was reduced from continuous to weekly. Historic amounts of NAPL removed from NR-03, along with quarterly NAPL measurements during 2010, indicated that there may be sufficient NAPL present at NR-03 such that additional NAPL removal would be beneficial. Monitoring and continuous removal of NAPL from NR-03 (in addition to weekly removal from NR 02) began in May 2010. A low NAPL recharge rate at NR-03 resulted in the pumping frequency at this NR well being reduced from continuous to twice weekly (NAPL checks and pumping as necessary), and subsequently from twice weekly to its current weekly frequency as approved by the NYSDEC. Subsequently, the high recharge rate in NR-02 resulted in an increase in NAPL check and pumping frequency from weekly to its current twice weekly frequency as approved by NYSDEC.

The components of the accelerated NAPL recovery procedure include a mechanical well jerking pump, dedicated polyethylene tubing with a foot-valve, and NAPL collection tank. The accelerated NAPL recovery procedure is to place the foot valve well below the NAPL level. The pump is set at a discharge rate to insure that the foot valve remains below the NAPL level to minimize the amount of groundwater collected by the pump. Once the NAPL has been removed (personnel observe APL presence in the discharge line), the pump is turned off and disconnected. The tubing and foot valve are left in the well. The ANRP is only conducted from April to October to prevent freezing of the extraction lines.

6. Periodic Assessments/Evaluations

6.1 Climate Change Variability Assessments

Increases in both the severity and frequency of storms/weather events, an increase in sea level elevations along with accompanying flooding impacts, shifting precipitation patterns and wide temperature fluctuation, resulting from global climactic change and instability, have the potential to impact the performance, effectiveness and protectiveness of a given site and associated remedial systems. Vulnerability assessments provide information so that the site and associated remedial

systems are prepared for the impacts of the increasing frequency and intensity of severe storms/weather events and associated flooding.

Based on more than 30 years of remedial system operation, there have been no significant issues with climate events. As such, no vulnerability assessments have been performed or are currently anticipated to be performed.

6.2 Green Remediation

NYSDEC's DER-31 Green Remediation requires that green remediation concepts and techniques be considered during all stages of the remedial program including site management, with the goal of improving the sustainability of the cleanup and summarizing the net environmental benefit of any implemented green technology. Green remediation principals will be considered for any upgrades associated with the existing remedial system. If implemented, these measures will be reported in the Periodic Review Report (PRR).

6.3 Remedial System Optimization

A Remedial Site Optimization (RSO) study will be conducted any time that the NYSDEC or the remedial party requests in writing that an in-depth evaluation of the remedy is needed. An RSO may be appropriate if any of the following occur:

- The remedial actions have not met or are not expected to meet RAOs in the time frame estimated in the Decision Document.
- The management and operation of the remedial system is exceeding the estimated costs.
- The remedial system is not performing as expected or as designed.
- Previously unidentified source material may be suspected.
- Plume shift has potentially occurred.
- Site conditions change due to development, change of use, change in groundwater use, etc.
- There is an anticipated transfer of the site management to another remedial party or agency.
- A new and applicable remedial technology becomes available.

An RSO will provide a critique of a site's conceptual model, give a summary of past performance, document current cleanup practices, summarize progress made toward the site's cleanup goals, gather additional performance or media specific data and information and provide recommendations for improvements to enhance the ability of the present system to reach RAOs or to provide a basis for changing the remedial strategy.

The RSO study will focuses on overall site cleanup strategy, process optimization and management with the intent of identifying impediments to cleanup and improvements to site operations to increase efficiency, cost effectiveness and remedial time frames. Green remediation technology and principals are to be considered when performing the RSO.

7. Reporting Requirements

7.1 Site Management Reports

All site management inspection, maintenance and monitoring events will be recorded on the appropriate field forms presented in the OM&M Manual in Appendix C. These forms are subject to NYSDEC revision.

All applicable inspection forms and other records, including media sampling data and system maintenance reports, generated for the site during the reporting period will be maintained on file and available for NYSDEC Review. Specific inspection forms will be included in the Periodic Review Report.

Routine maintenance event reporting forms will include, at a minimum:

- Date of event.
- Name of person(s) conducting maintenance activities.
- Any modifications to the system.
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet).

Non-routine maintenance event reporting will include, at a minimum:

- Date of event.
- Name, company, and position of person(s) conducting non-routine maintenance/repair activities.
- Description of non-routine activities performed.
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents (included either on the form or on an attached sheet).
- Other relevant documentation.

7.2 Periodic Review Report

A PRR will be submitted annually to the Department. The report will be prepared in accordance with NYSDEC's DER-10 and submitted by the date established each year by NYSDEC. Media sampling results will also be incorporated into the Periodic Review Report. The report will include:

- Identification, assessment and certification of all ECs/ICs required by the remedy for the site.
- Results of the required annual Site inspections and severe condition inspections, if applicable.
- Applicable site inspection forms during the reporting period.
- Data summary tables and graphical representations of groundwater contaminants of concern, which include a listing of all compounds analyzed. These will include a presentation of past data as part of an evaluation of contaminant concentration trends.
- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables for all samples collected during the reporting period will be submitted in digital

format as determined by the NYSDEC. Currently, data is supplied electronically and submitted to the NYSDEC EQuISTM database in accordance with the requirements found at this link: http://www.dec.ny.gov/chemical/62440.html.

- A site evaluation, which includes the following:
  - The compliance of the remedy with the requirements of the site-specific RAWP, ROD or Decision Document.
  - The operation and the effectiveness of all treatment units, etc., including identification of any needed repairs or modifications.
  - Any new conclusions or observations regarding site contamination based on inspections or data generated by the Monitoring and Sampling Plan for the media being monitored.
  - Recommendations regarding any necessary changes to the remedy and/or Monitoring and Sampling Plan.
  - Trends in contaminant levels in the affected media will be evaluated to determine if the remedy continues to be effective in achieving remedial goals.
  - The overall performance and effectiveness of the remedy.
- A performance summary for all treatment systems at the Site during the calendar year, including information such as:
  - The contaminant mass removed.
  - A description of breakdowns and/or repairs along with an explanation for any significant downtime.
  - A description of the resolution of performance problems.
  - A summary of the performance, effluent and/or effectiveness monitoring.
  - Comments, conclusions, and recommendations based on data evaluation.

7.2.1 Certification of Institutional and Engineering Controls

Following the last inspection of the reporting period, a qualified environmental professional or Professional Engineer licensed to practice in New York State will review the Periodic Review Report and sign the IC/EC form as seen in Appendix D.

The Periodic Review Report will be submitted, in electronic format, to the NYSDEC Regional Office in which the Site is located, USEPA, and the NYSDOH. The Periodic Review Report will only be submitted in hard-copy format if requested.

7.3 Corrective Measures Work Plan

If any component of the remedy is found to have failed, or if the periodic certification cannot be provided due to the failure of an institutional or engineering control, a Corrective Measures Work Plan will be submitted to the NYSDEC for approval. This plan will explain the failure and provide the details and schedule for performing work necessary to correct the failure. Unless an emergency condition exists, no work will be performed pursuant to the Corrective Measures Work Plan until it has been approved by the NYSDEC.

7.4 Remedial Site Optimization Report

In the event that an RSO is to be performed (see Section 6.1, upon completion of an RSO, an RSO report must be submitted to the Department for approval. A general outline for the RSO report is provided in Appendix E. The RSO report will document the research/ investigation and data gathering that was conducted, evaluate the results and facts obtained, present a revised conceptual site model and present recommendations. RSO recommendations are to be implemented upon approval from the NYSDEC. Additional work plans, design documents, HASPs etc., may still be required to implement the recommendations, based upon the actions that need to be taken. A final engineering report and update to the SMP may also be required.

The RSO report will be submitted, in electronic format, to the NYSDEC Regional Office in which the site is located, USEPA, and the NYSDOH.

SOURCE: USGS QUADRANGLE MAP;
TONAWANDA WEST, NEW YORK, 1980

figure 1.1

SITE LOCATION
102ND STREET LANDFILL SITE
GLENN SPRINGS HOLDINGS, INC.
Niagara Falls, New York

P:\drawings\01000s\01431\01431-REPORTS\01431-D23101(096)\01431-D23101(096)GN\01431-D23101(096)GN-WA001.DWG Plot Date: DEC 13, 2018

LASALLE EXPRESSWAY

DOUBLE-CONTAINED PIPE
BENEATH LASALLE EXPRESSWAY

CO-MH8

CO-MH9

BUFFALO AVENUE

PCM-09

PZ-10

PCM-10

PZ-09R

PCM-08

PCBM-03

PZ-08

CO-MH1

SAMPLE
MANHOLE

SAMPLE
SHED

PCM-07R

BUFFALO AVENUE

TOWN OF WHEATFIELD
CITY OF NIAGARA FALLS

102ND STREET

MAIN GATE

PZ-07

ASSEMBLY AREA

PCM-06

PZ-06

PCM-01

PZ-01

CO-1

CO-MH2

NR-01

ACCESS ROAD

2,500 GALLON
SKID TANK

NR-02

NR-04

ACCESS ROAD

NR-10

NR-05

NR-07

APL COLLECTION
TRENCH

2,500 GALLON
SKID TANK

NR-03

NR-08

CO-7

APL COLLECTION
TRENCH

2'-2" HDPE FORCE MAINS

APL COLLECTION
TRENCH

PZ-04

CO-5

CO-MH6

WET WELL
WW-3

CO-6

CO-MH7

PZ-05

PCM-05

PCBM-02

PCM-02

PZ-02

CO-2

CO-MH3

CO-4

CO-MH5

PCM-04

LITTLE RIVER

CAYUGA ISLAND

2'-2" HDPE FORCE MAINS

CO-MH4

PZ-03R

WET WELL
WW-2

CO-3

PCBM-01

PCM-03

WET WELL
WW-4

WET WELL
WW-1

APL COLLECTION
TRENCH

NIAGARA RIVER

0 75 150 ft

LEGEND

- PROPERTY LINE
- CITY LINE
- FENCE LINE
- CRIB WALL
- FORCEMAIN AND FLOW DIRECTION
- SLURRY WALL AND CENTERLINE
- APL COLLECTION TRENCH AND FLOW DIRECTION
- PZ-02 PIEZOMETER LOCATION
- PCM-02 MONITORING WELL LOCATION
- CO-2 TRENCH CLEAN OUT
- CO-MH3 FORCEMAIN CLEAN OUT MANHOLE
- NAPL RECOVERY WELL LOCATION
- PCBM-01 BEDROCK MONITORING WELL LOCATION

figure 1.2

SITE PLAN
102ND STREET LANDFILL SITE
GLENN SPRINGS HOLDINGS, INC.
Niagara Falls, New York

P:\drawings\01000s\01431\01431-REPORTS\01431-D23101(096)\01431-D23101(096)GN\01431-D23101(096)GN-WA002.DWG Plot Date: DEC 13, 2018

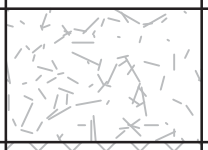
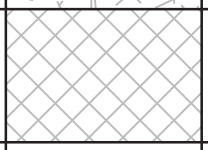
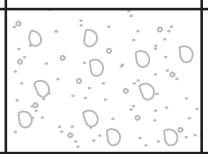
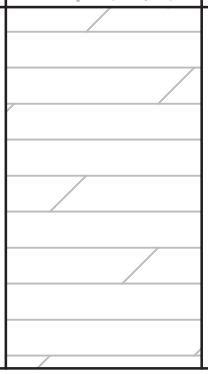
FORMATION	COLUMNAR SECTION	THICKNESS IN FEET	CHARACTER
FILL		0-18	LOCAL SOIL MATERIAL, INDUSTRIAL WASTE, CONSTRUCTION RUBBLE
ALLUVIUM		0-32	GRAY SILTY SAND WITH TRACE CLAY, WITH SOME TEXTURAL VARIATIONS OBSERVED
GLACIOLACUSTRINE CLAY		~28	REDDISH BROWN TO GRAY, SILTY, VARVED, IN UPPER PART GRADING TO VERY PLASTIC, MOIST TO WET, IN LOWER PART
TILL		4-20	REDDISH BROWN SILTY TO SANDY CLAY, GRAVEL AND COBBLES, SANDY ZONES, FIRM, MOIST
BEDROCK		160-180	LOCKPORT DOLOMITE

figure 2.1

GEOLOGIC CROSS SECTION
102ND STREET LANDFILL SITE
GLENN SPRINGS HOLDINGS, INC.
Niagara Falls, New York

Table 4.1

Summary of Monitoring Locations
102nd Street Landfill
Glenn Springs Holdings, Inc.
Niagara Falls, New York

Hydraulic Monitoring Locations	Chemical Monitoring Locations
PCM-01	PCM-01
PCM-02	PCM-02
PCM-03	PCM-03
PCM-04	PCM-04
PCM-05	PCM-05
PCM-06	PCM-06
PCM-07R	PCM-07R
PCM-08	PCM-08
PCM-09	PCM-09
PCM-10	PCM-10
PCBM-01	PCBM-01
PCBM-02	PCBM-02
PCBM-03	PCBM-03
PZ-01	
PZ-02	**NAPL Monitoring Locations**
PZ-03R	
PZ-04	NR-01
PZ-05	NR-02
PZ-06	NR-03
PZ-07	NR-04
PZ-08	NR-05
PZ-09R	NR-07
PZ-10	NR-08
NR-01	NR-10
NR-02	
NR-03	
NR-04	
NR-05	
NR-07	
NR-08	
NR-10	
WW-1	
WW-2	
WW-3	
WW-4	
Niagara River	

Appendices

Appendix A
Deed Restriction

DO NOT DETACH - THIS IS PAGE 1 OF RECORDED DOCUMENT

LIBER 2993 PAGE 150

OFFICE OF THE CLERK COUNTY OF NIAGARA

WAYNE F. JAGOW, COUNTY CLERK

(1505)

County Courthouse, 175 Hawley Street, P.O. Box 461, Lockport, NY 14095
Phone (716) 439-7027 Fax (716)439-7066

NIAGARA COUNTY CLERK RECORDING PAGE

INSTRUMENT # 000541 TYPE Notice and Declaration of Restrictions NUMBER OF PAGES 17

RETURN TO: Nancy Abair
Wiggin & Dana
265 Church Street
New Haven, CT 06510

SPACE BELOW RESERVED FOR COUNTY CLERK'S USE ONLY.

_____
REAL ESTATE TRANSFER TAX
$_____
-/-/-
NIAGARA COUNTY

Parties:
1st part OLIN CORPORATION
2nd Part _____

RECORDED
00 JAN 25 PM 3:42
NIAGARA COUNTY CLERK'S OFFICE LOCKPORT, N.Y.

MORTGAGE AMOUNT
$_____

TAX DISTRICT: _____

[ ] Check if to be apportioned

MORTGAGE # _____

RECORDING TAX RECIEPT

BASIC $_____
ADDITIONAL $_____
SPECIAL $_____
TOTAL $_____

State of New York) ss
County of Niagara)
I do hereby certify that I have Recieved on the within Mortgage, being the amount of the Recording Tax Imposed thereon & paid at recording.

Recording on the 25th day of January 2000 at 3:42 o'clock PM in Liber 2993 of Deeds on page 150 this examined

Niagara County Clerk

Dated this _____ of _____, 199__

Mortgage Tax Clerk of Niagara County

This sheet constitutes the Clerks endorsement required by section 319 of the Real Property Law of the State of New York

DO NOT DETACH

NOTICE AND DECLARATION OF RESTRICTIONS

000541 THIS NOTICE AND DECLARATION OF RESTRICTIONS, made as of January 21, 2000 by OLIN CORPORATION, (successor-in-interest to Olin Chemicals and Chlor Alkali, Inc. as to a portion of the "Olin Piece", defined below) 501 Merritt 7, P. O. Box 4500, Norwalk, Connecticut 06856-4500 ("Olin").

WITNESSETH:

WHEREAS, Olin and Occidental Chemical Corporation, 5005 LBJ Freeway, P. O. Box 809050, Dallas, Texas 75380 ("OCC") are parties to a consent decree ("Decree") with the United States of America and the State of New York in the following entitled case ("Case"):

> United States of America and The State of New York v. Occidental Chemical Corporation, Olin Corporation and City of Niagara Falls, New York (102nd Street Landfill), United States District Court, Western District of New York, Civil Action No. 79-987C;

WHEREAS, the Decree has been filed in the United States District Court of the Western District of New York, and was entered by the Court on October 1, 1999;

WHEREAS, Olin owns a portion of the real property on which the "102nd Street Landfill" is located in the City of Niagara Falls, New York, which 102nd Street Landfill is the "Site" that is the subject of the Decree;

WHEREAS, the "102nd Street Landfill" is described in the Decree and in Schedule A attached hereto and made a part hereof, which Schedule A also depicts the portion of the Site that is owned by Olin (the "Olin Piece");

WHEREAS, the United States Environmental Protection Agency ("EPA"), with the concurrence of the State of New York, selected a remedy for the 102nd Street Landfill embodied in the Record of Decision relating to the Site, as defined in the Decree;

WHEREAS, Olin and OCC have implemented the remedy at the 102nd Street Landfill and have agreed to impose use restrictions on their respective portions of the Site;

WHEREAS, Olin wishes to provide notices to all future successors-in-title to the Olin Piece as required by Section 19 of the Decree.

NOW, THEREFORE, pursuant to and in accordance with the terms of the Decree, Olin hereby provides notice of the matters described in the recitals above, and declares that the use of the Olin Piece, as described in attached Schedule A, shall be restricted as follows (the "Restrictions"):

1. Groundwater beneath such real property shall not be extracted except as required for the implementation, operation and maintenance of the remedy at the 102nd Street Landfill.

2. There shall be no digging, excavation, construction or other activities that could or would interfere with, or adversely affect, the integrity of the landfill cap or any other engineering control implemented as part of the remedial action at the 102nd Street Landfill.

3. At least 30 days prior to the conveyance of any interest in any portion of the Olin Piece, including fee interests, leasehold interests, and mortgage interests, the party conveying the interest shall give the grantee written notice of (i) the Decree, (ii) the use restrictions imposed on such real property, (iii) any instrument by which an interest in such real property has been conveyed that confers a right of access to the 102nd Street Landfill ("access easements") pursuant to Section XII (Access and Institutional Controls) of the Decree, and (iv) any institutional

controls in the form of restrictive easements that have been filed with respect to the 102nd Street Landfill pursuant to said Section XII (Access and Institutional Controls).

4. At least 60 days prior to any such conveyance referred to above, the party conveying the interest shall also give written notice to EPA and the State of New York of the proposed conveyance, including the name and address of the grantee, and the date on which notice of the Decree, use restrictions, access easements, and/or restrictive easements was given to the grantee. If EPA or the State of New York requests, the party seeking to convey the property interest shall execute and record an easement in accordance with Paragraph 45(c) of the Decree, prior to the conveyance of any property interests.

5. The Restrictions shall be binding upon Olin and its successors and assigns, and shall run with the land.

6. This Notice and Declaration of Restrictions shall be recorded in the Niagara County Clerk's Office, and shall be indexed by the Niagara County Clerk against the name Olin Corporation and the name Olin Chemicals and Chlor Alkali, Inc.

IN WITNESS WHEREOF, Olin has duly executed this Notice and Declaration of Restrictions as of the date first above written.

OLIN CORPORATION

By: Roesche

Name: P.C. KOSCHE

Title: SENIOR VICE PRESIDENT

STATE OF CONNECTICUT]
] SS. Norwalk
COUNTY OF Fairfield] [town/city]

On the 21st day of January, in the year 2000 before me, the undersigned, personally appeared Peter C. Kosche, personally known to me or proved to me on the basis of satisfactory evidence to be the individual whose name is subscribed to the within instrument and acknowledged to me that he/she executed the same in his/her capacity, that by his/her signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument; and that such individual made such appearance before the undersigned in the County of Fairfield, City/Town of Norwalk, Connecticut.

Brenda M. Pantelone
Brenda M Pantelone
Notary Public

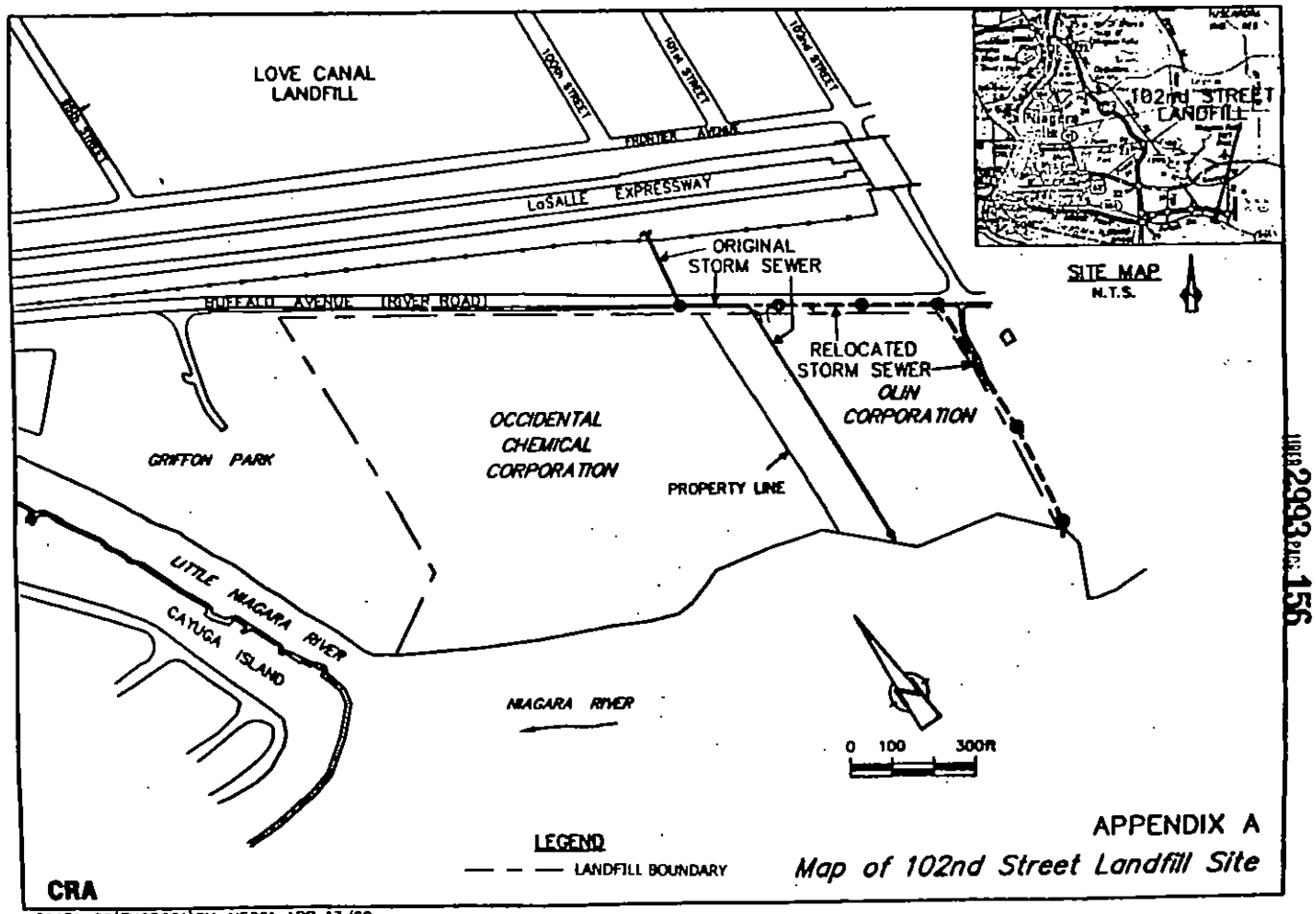
My Commission Exp. Nov. 30, 2002

3pg302:.DOC\9728\97\172947 02

SCHEDULE A

The "102nd Street Landfill" means the area in the City of Niagara Falls, New York, which encompasses the landfill located in the southeast corner of the City of Niagara Falls consisting of a piece of property with a surface area of approximately 27 acres and designated by the "Landfill Boundary" shown on the map attached to this Schedule A as Appendix A and by the following property description: bounded on the north by Buffalo Avenue, on the east by undeveloped land, on the west by Griffon Park, and on the south by the Niagara River.

The Olin Piece is the easterly portion of the 102nd Street Landfill labeled as "Olin Corporation" on said map. The Olin Piece is comprised of two parcels containing the following Niagara County Tax Map Numbers: Section 174.07 – Block 1 – Lot 3 and Section 174.07 – Block 1 – Lot 4.



APPENDIX A

Map of 102nd Street Landfill Site

Appendix B
List of Site Contacts

Appendix B

Site Contact List
Operation, Maintenance, and Monitoring Manual
102nd Street Landfill Site
Niagara Falls, New York

Site Operations:

GHD (for GSH)

John Pentilchuk
- Project Manager

GHD
651 Colby Drive
Waterloo, Ontario, Canada N2V 1C2
Phone: 519-884-0510
Cell: 519-572-5644

Dennis Hoyt
- Project Coordinator

GHD
2055 Niagara Falls Blvd., Suite 3
Niagara Falls, New York 14304
Phone: 716-297-6150
Cell: 716-345-1978

Darrell Crocket
- Site Operator

GHD
805 - 97th Street
Niagara Falls, New York 14304
Phone: 716-297-6150
Cell: 716-998-5804

Project Managers:

Glenn Springs Holdings, Inc. (for OCC)

Joseph Branch
- Western New York Operations Manager

Glenn Springs Holdings, Inc.
7601 Old Channel Trail
Montague, MI 49437
Cell: 231-670-6809
Fax: 231-894-4033

Clinton Babcock
- Western New York Operations Coordinator

Glenn Springs Holdings, Inc.
5005 LBJ Freeway
Suite 1350
Dallas, TX 75244-6119
Phone: 972-687-7506
Cell: 859-421-4233
Fax: 972-687-7524

<u>Olin Corporation</u>

Adam Carringer

Olin Corporation
3855 North Ocoee Street, Suite 200
Cleveland, TN 37312
Phone: 423-336-4057
Fax: 423-508-2768

Appendix B

Site Contact List
Operation, Maintenance, and Monitoring Manual
102nd Street Landfill Site
Niagara Falls, New York

Agency Contacts:

United States Environmental Protection Agency

Jaclyn Kondrk
WNY Remediation Section, Region II
U.S. Environmental Protection Agency
290 Broadway, 20th Floor
New York, New York 10007-1866
Phone: 212-637-4317
Fax: 212-637-4284

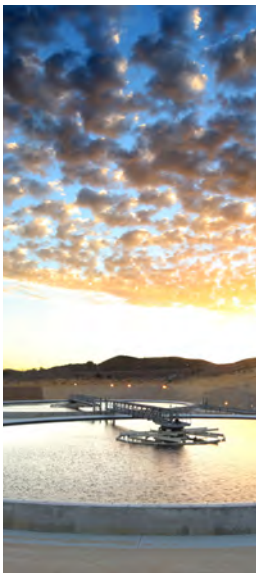
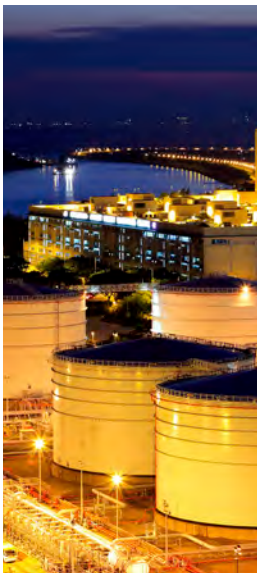
New York State Department of Environmental Conservation

Brian Sadowski
New York State Dept. of Environmental Conservation
Division of Hazardous Waste Remediation
Region 9
270 Michigan Avenue
Buffalo, New York 14203-2999
Phone: 716-851-7220
Fax: 716-851-7226

Glenn May
New York State Dept. of Environmental Conservation
Division of Hazardous Waste Remediation
Region 9
270 Michigan Avenue
Buffalo, New York 14203-2999
Phone: 716-851-7220
Fax: 716-851-7226

Stanley Radon
New York State Dept. of Environmental Conservation
Division of Hazardous Waste Remediation
Region 9
270 Michigan Avenue
Buffalo, New York 14203-2999
Phone: 716-851-7220
Fax: 716-851-7226

Appendix C
Operation, Maintenance & Monitoring Manual


Operation, Maintenance & Monitoring Manual

102nd Street Landfill Site
Niagara Falls, New York

Glenn Springs Holdings, Inc.

2055 Niagara Falls Boulevard Niagara Falls New York 14304
001431 | Report No 79 | October 30 2015

Executive Summary

The following report describes the Operation, Maintenance, and Monitoring (OM&M) requirements for the 102nd Street Landfill Site (Site) located in Niagara Falls, New York. The 22.1-acre Site is jointly owned by Occidental Chemical Corporation (OCC) (15.6 acres) and Olin Corporation (Olin) (6.5 acres). Both OCC's and Olin's responsibilities at the Site are currently handled by Conestoga-Rovers & Associates (CRA), under the direct supervision of Glenn Springs Holdings, Inc. (GSH), an affiliate of OCC.

The Remedial Action (RA) system components that require OM&M are described in this report are as follows:

- A landfill cap
- A perimeter slurry wall
- An aqueous phase liquid (APL) collection and discharge system
- A non-aqueous phase liquid (NAPL) recovery system
- Post RA system performance monitoring
- A perimeter fence
- Shallow water environment monitoring

A post RA system performance monitoring program that includes groundwater quality, groundwater level, and NAPL presence monitoring has been established to monitor the effectiveness of the RA system components. All monitoring activities will be performed in accordance with the Health and Safety Plan (HASP) and the Quality Assurance Project Plan (QAPP) developed for the OM&M activities at the Site. Each component of the monitoring program shall be reassessed annually to determine the need for any modifications. The post closure care and monitoring will be performed for a minimum of 30 years. The formal start of the OM&M activities was April 2002; therefore, the OM&M is anticipated to continue until at least 2032.

Water levels will be measured in ten overburden monitoring wells and ten piezometers to ensure an inward gradient exists across the slurry wall. Additional water levels will be measured at three bedrock wells. Water levels will be measured quarterly. Groundwater samples will be collected and analyzed from ten overburden and three bedrock monitoring wells. Samples will be collected and analyzed semiannually through 2011, and once every year thereafter. A Quality Assurance/Quality Control (QA/QC) evaluation will be performed by GSH/Olin on all analytical results to determine if the data are acceptable for use in the respective program components. The data will be used to determine the effectiveness of the containment system by comparing concentrations of chemicals in the groundwater outside the slurry wall over time.

NAPL presence monitoring will be conducted at eight NAPL recovery wells on a quarterly basis. If, during monitoring, more than 3 gallons of NAPL (6 inches deep in the 12-inch diameter well) are present in a NAPL recovery well, the NAPL will be removed for off Site disposal in accordance with all applicable Federal and New York State Regulations.

The overburden groundwater level inside the slurry wall and along the APL collection trench will be lowered to an elevation of 562.6 feet above mean sea level (AMSL) to create an inward gradient for

the Site. This elevation is approximately 1 foot below the average water level in the Niagara River adjacent to the Site. The APL will be transferred to the Love Canal Treatment Facility (LCTF) via a forcemain and treated at the LCTF. Treated effluent will be discharged to the City of Niagara Falls sanitary sewer system in accordance with the OCC Love Canal discharge permit. After the initial dewatering of the APL collection trench, the gradient established by the APL collection trench will be maintained by level controlled pumping at each wet well. A series of four wet wells (WW-1 through WW-4) are present along the southern perimeter of the Site, inside the slurry wall. The wet wells direct APL to the LCTF. The estimated flow rate to maintain the steady state groundwater level is 2,800 gallons each week. Individual pump flow rates at each wet well, total flow, and APL levels in the Site's wet wells will be monitored through the LCTF control system.

Site requirements include routine inspections, sampling, scheduled preventative maintenance, unscheduled maintenance in response to inspection reports or component failures, and record keeping.

An OM&M Report form will be completed by GSH/Olin and submitted to the New York State Department of Environmental Conservation (NYSDEC) annually. The report will be entitled "Site Management Periodic Review Report" and will contain the completed Operations and Maintenance Report Form, a list of monitoring events, a summary of RA system operation parameters, a description of inspections and maintenance performed during the previous year, and institutional and engineering controls certification.

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594000 30K 06C	As-Built APL Wet Well Details
594000 30K 08	As-Built APL Collection System Section and Details
594000 30K 09	As-Built Slurry Wall Profile
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Glossary

AMSL	Above Mean Sea Level
ANRP	Accelerated NAPL Recovery Program
APL	Aqueous Phase Liquid
CRA	Conestoga-Rovers & Associates
DO	Dissolved Oxygen
DOT	New York State Department of Transportation
EPA	Environmental Protection Agency
GCL	Geosynthetic Clay Liner
GSH	Glenn Springs Holdings, Inc.
HASP	Health and Safety Plan
HDPE	High Density Polyethylene
LCTF	Love Canal Treatment Facility
LLDPE	Linear Low Density Polyethylene
mL/min	milliliters per minute
NAPL	Non Aqueous Phase Liquid
NYSDEC	New York State Department of Environmental Conservation
OM&M	Operation, Maintenance, and Monitoring
Olin	Olin Corporation
OU	Operable Unit
OCC	Occidental Chemical Corporation
ORP	Oxidation Reduction Potential
PPE	Personal Protective Equipment
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RA	Remedial Action
Site	102nd Street Landfill Site
VOC	Volatile Organic Compound

1. Introduction

This plan describes the Operation, Maintenance, and Monitoring (OM&M) Manual for the 102nd Street Landfill Site (Site) located in Niagara Falls, New York. The purpose of the OM&M Manual is to provide the detailed OM&M requirements for the various components of the Remedial Actions (RA) that have been implemented at the Site and to ensure that the components continue to function as intended. The Site covers approximately 22.1 acres and consists of two separate properties owned by Occidental Chemical Corporation (OCC) (15.6 acres) and Olin Corporation (Olin) (6.5 acres). The Site is bordered by the Niagara River to the south, Buffalo Avenue to the north, Griffon Park to the west, and privately owned land to the east. A perimeter fence restricts Site access. Authorized vehicular traffic access is provided from Buffalo Avenue by fence gates. A layout of the Site is presented on Figure 1.

The facility is jointly owned by OCC and Olin, with remedial responsibility assigned to Glenn Springs Holdings, Inc. (GSH). Conestoga-Rovers & Associates (CRA) has been retained by GSH to operate the Site. The contacts primarily responsible for the operation and maintenance activities are presented in Table 1.1.

1.1 Scope of OM&M Manual

This Manual is organized as follows:

Section 1	Introduction - a brief description of the OM&M Manual
Section 2	Site Description - a description of the Site, the RA components, and the equipment and materials used in the construction of the Site RA
Section 3	Monitoring and Testing – instructions for Site monitoring and testing requirements, including groundwater sample collection, water-level measurements, non-aqueous phase liquid (NAPL) measurements, quality control and quality assurance procedures, decontamination procedures for monitoring and testing equipment, and sample packaging and shipping procedures
Section 4	Operation of Site Remedial Systems – instructions for operating the Site remedial system, including start-up operation, NAPL pumping, and system controls and instrumentation
Section 5	Site Maintenance and Inspections – instructions for maintaining the Site systems, including cap maintenance, pump maintenance, wet well and forcemain maintenance, maintenance of erosion controls and swales, maintenance of cap vegetation (mowing), semiannual Site inspections, and shallow water environment area (Embayment Area) inspections
Section 6	Records and Reports – requirements for keeping records and producing annual reports

2. Site Description and Remedial System Components

The 102nd Street Landfill Site is located in the City of Niagara Falls, New York and covers approximately 22 acres of land. The Site is bordered by the Niagara River to the south, Buffalo Avenue to the north, Griffon Park to the west, and privately owned land (the Belden Site) to the east.

Site access is restricted to authorized vehicular traffic from Buffalo Avenue by fence gates.

The RAs performed at the Site consisted of three Operable Units (OU). The components of OU-1 and OU-2 that require operation and maintenance and are described in this document as follows:

- A landfill cap
- A perimeter slurry wall
- An aqueous phase liquid (APL) collection and discharge system
- A NAPL recovery system
- Post-RA system performance monitoring
- A perimeter fence
- Shallow water environment monitoring

OU-3, which consisted of the abandonment and relocation of a 42-inch storm sewer that traversed the Site, has no operation and maintenance or monitoring requirements. Therefore, OU-3 is not covered in this manual.

The installed RA system components are described in the following sections. Replacement components should be the same or equivalent to the RA system components described below. Information and manuals from the vendors of the equipment used at the Site are stored in the Love Canal Treatment Facility (LCTF) control room.

2.1 Landfill Cap

The landfill cap was placed over the Site to reduce the infiltration of precipitation into the landfill, to prevent erosion of landfill materials, and to eliminate direct human contact with the landfilled materials. The landfill cap was extended over the perimeter slurry wall to limit infiltration of precipitation into the groundwater collection system. The landfill cap consists of the following layers, in descending order:

- Vegetative cover
- 6-inch topsoil layer
- 18-inch select cover fill layer
- 8-ounce, non-woven, needle-punched geotextile
- Drainage net (geonet) that drains into a surface drainage collection system
- Geomembrane layer

- Prefabricated geosynthetic clay liner (maximum permeability of $1x10^{-9}$ cm/s)
- Compacted common clayey fill with top 12 inches free of sharp objects and deleterious material

The vegetative cover was established by hydroseeding the topsoil with a mixture of grass seeds, fertilizer, organic mulch (straw), inoculants, and water. The vegetative cover was established in two distinct seeding areas. The area inside the slurry wall was seeded with the following mixture:

- White Clover 5 pounds/acre
- "Lancer" Perennial Pea 20 pounds/acre
- Annual Ryegrass 30 pounds/acre
- "Climax" Timothy Grass 30 pounds/acre
- "Pizza" Orchard Grass 10 pounds/acre
- "Bounty" Smooth Bromegrass 10 pounds/acre
- Redtop 5 pounds/acre

Perimeter areas (Griffon Park and the Anczok easement) were seeded with the following mixture:

- "Triple Crown" Perennial Rye 48 pounds/acre
- Kentucky Bluegrass 25 pounds/acre
- Creeping Red Fescue 24 pounds/acre

The geotextile used in the cap is Evergreen Technologies TG700, which provides a separation between the select fill layer and the geonet. Rolls of the geotextile were overlapped and heat bonded to provide a continuous layer.

The high density polyethylene (HDPE) geonet used in the cap is Polynet 3000, manufactured by National Seal Company. The geonet provides drainage for the cap layers above the geomembrane. Rolls of geonet were overlapped and attached together with plastic ties to provide a continuous drainage layer.

The geomembrane used in the cap is a 40-mil smooth linear low density polyethylene (LLDPE) liner material, manufactured by National Seal Company. The geomembrane provides a low permeability layer to restrict surface water from percolating into the landfill. Rolls of geomembrane were overlapped and fused together with a double hot wedge to provide a continuous barrier layer. An extrusion welder was used in areas where fusion welding could not be used. Seams were tested with positive air pressure or with a vacuum box.

The geosynthetic clay liners (GCL) used in the cap are Claymax 200 and Bentomat ST, both manufactured by Cetco. The GCL consisted of a layer of granular bentonite sandwiched between two layers of woven geotextile. The GCL also provides a low permeability layer to restrict surface water from percolating into the landfill. Rolls of GCL were overlapped 12 inches to provide a continuous barrier layer.

A 12-foot wide light duty gravel access road was constructed to allow access from the center gate from Buffalo Avenue to the wells and wet wells at the Site. The access road alignment is shown on Plan 594000-10U-01 and a cross-section of the access road is shown on Plan 594000-10S-01.

2.2 APL Collection and Discharge System

The APL collection and discharge system is designed to create an inward gradient in the groundwater table across the slurry wall. The inward gradient will be created and maintained by pumping groundwater from four wet wells installed in the groundwater collection trench. The system consists of 2,300 feet of perimeter collection drain, four wet wells, seven inline clean-outs, pumps, forcemain piping, seven forcemain cleanout manholes, electrical conduit, control and electrical wiring, controls, and instrumentation. A plan view of the APL collection and discharge system is presented on Plan 594000-30K-01, APL collection system details are shown on Plan 594000-30K-08, and the APL collection system Piping and Instrumentation Diagram (P&ID) is presented on Plan 59400-25J-02. The collected groundwater is pumped via forcemain to a wet well at the Love Canal from which it is pumped to and treated at the LCTF located north of the Site. Treated effluent is discharged under permit to the City of Niagara Falls sanitary sewer.

2.2.1 Wet Wells and Manholes

Four wet wells are located at low points in the APL collection system. The 6-foot by 6-foot square wet wells were constructed of precast concrete. The wet wells were equipped with hinged manhole covers (Bilco Model No. JD-2 AL) for access. Each wet well has a collection sump that extends 5 feet below the collection pipe invert entering the wet well. Each wet well is equipped with a platform located approximately 8 feet below the top of the wet well for access to the pump casing, flow meter, and water level transmitter. Typical wet well details are shown on Plan 594000-30K-06C.

Seven inline collection drain cleanouts are installed along the collection drain to accommodate cleaning of the pipe, as necessary. Inline cleanout locations are shown on Plan 594000-30K-01. A typical inline collection drain cleanout detail is shown on Plan 594000-30K-08.

Seven forcemain cleanout manholes are installed along the forcemain alignment. Forcemain cleanout manhole locations are shown on Plan 594000-30K-01. The 6-foot by 6-foot square forcemain cleanout manholes were constructed of precast concrete and were equipped with Neenah R-1792 HL frames and covers and Neenah R-1982W aluminum steps for maintenance access. A forcemain cleanout manhole detail is shown on Plan 594000-30K-08.

A sample manhole is installed in the northwest corner of the Site along the forcemain alignment. The 6-foot by 6-foot square sample manhole is constructed of precast concrete and is equipped with a 3.5-foot by 3.5-foot cover and Neenah R-1982W aluminum steps for maintenance access. A sample manhole detail is shown on Plan 594000-30K-08.

2.2.2 Groundwater Collection Trench

The 24-inch wide collection trench consists of 6 inches of washed stone bedding, a 6-inch diameter perforated HDPE collection drain pipe, and washed stone backfill to the preconstruction grade. The entire trench stone backfill is wrapped in woven geotextile fabric. The depth of the collection pipe varies along the trench alignment. The collection pipes are sloped toward the wet wells.

2.2.3 Pumps, Forcemain, and Miscellaneous Plumbing

Each wet well is equipped with a stainless steel electric submersible pump that pumps the collected groundwater by forcemain to a wet well at Love Canal. The wet well pumps are Grundfos Model Redi-Flow4 10E8. The pumps are installed inside a 6-inch diameter steel casing. The pumps discharge to a 1-inch diameter stainless steel pipe that rises out of the pump casing to the top of the wet well. A Flowdata, Inc., EC Series gear-driven flow meter is installed in each pipe. Another flow meter (totalizer) is installed in the meter manhole (Flowdata, Inc., BR-3000 Series).

The forcemain consists of two separate designs; one for within the limits of the slurry wall and the second for outside the slurry wall. Within the slurry wall, there are two 2-inch diameter HDPE pipes installed side-by-side. Only one forcemain pipe is used; the second pipe is for backup in the event that the first pipe becomes inoperable. A quick-connect system to switch from the first to the second pipe is located in each of the wet wells. The forcemain outside of the slurry wall consists of two 2-inch diameter HDPE carrier pipes inside an 8-inch diameter HDPE containment pipe. The transition from the separate 2-inch diameter pipes to the combined 2-inch pipes in the 8-inch containment pipe occurs at the meter manhole where the forcemain crosses the slurry wall. The forcemain alignment is shown on Plan 594000-30K-01.

A typical wet well layout showing the submersible pump and forcemain connections is presented on Plan 594000-30K-06C.

2.2.4 Conduits and Wiring

The wet well pumps are connected to a building called the "Sample Shed" by power, control, and instrumentation cables. The cables are installed through 2-inch diameter HDPE conduits that were buried in a shallow trench with the two forcemains. Cables inside the wet wells are installed in Plastibond conduits. The conduit alignments are shown on Plan 594000-30K-01.

2.2.5 Controls and Instrumentation

The flow meters in the wet wells and meter manhole send flow data to the Sample Shed located near the northwest corner of the Site. High and low water levels used to turn the pumps on and off are measured by Kotron Sentinel II RF level transmitters, manufactured by Magnetrol. The high and low water pumping levels are programmed into the control system, which can be operated manually or automatically. The controls and meters in the Sample Shed can be monitored remotely.

A 36-inch wide by 48-inch high by 12-inch deep locking NEMA 4X enclosure is mounted to the top of each wet well. The enclosures contain the electrical controls for the APL collection and discharge system.

2.3 NAPL Recovery System

A NAPL recovery system is installed at the Site. The system consists of eight NAPL recovery wells from which NAPL will be pumped if a recoverable amount has accumulated (NR-1 through NR-5, NR-7, NR-8, and NR-10). Each NAPL recovery well consists of a 12-inch diameter, type 304 stainless steel casing, a 10-foot long type 316 stainless steel well screen with No. 20 slots, a sand filter pack, bentonite and grout seals, and a concrete pad at the ground surface. The NAPL is shipped off Site for incineration after it is recovered. NAPL recovery well locations are shown on Plan 594000-30K-01 and details are shown on Plan 594000-30K-06.

2.4 Slurry Wall

A perimeter soil-bentonite slurry wall, designed to reduce groundwater inflow from off-Site areas to the perimeter collection drain, is installed along the perimeter of the Site beyond the groundwater collection trench alignment. The 3-foot wide slurry wall is keyed a minimum of 36 inches into the underlying native clay/till confining unit and is capped with 24 inches of clay and the landfill cap. The low permeability layer of the cap and the slurry wall create a continuous barrier to groundwater migration through the landfilled materials. The slurry wall alignment is shown on Plan 594000-30K-01, and slurry wall profiles are shown on Plan 594000-30K-09.

2.5 Monitoring Wells and Piezometers

Three types of monitoring wells are installed at the Site for use in post-RA system performance monitoring. These include ten post-closure overburden monitoring wells (PCM-01 through PCM-06, PCM-07R, and PCM-08 through PCM-10), three post-closure bedrock monitoring wells (PCBM-01 through PCBM-03), and ten overburden piezometers (PZ-01, PZ-02, PZ-03R, PZ-04 through PZ-08, PZ-09R and PZ-10). All three types were installed with 2-inch diameter, schedule 5, type 304 stainless steel riser pipes, 2-inch diameter continuous wrapped wire-wound type 304 stainless steel well screen with No. 6 slots, a sand filter pack, bentonite and grout seals, and a concrete pad at the ground surface. All wells are installed to 2 feet above ground surface with cast iron protective casings, stainless steel inner caps, and locking outer caps. Post-closure overburden monitoring wells and piezometers are installed 6 inches into the clay/till unit. Post-closure bedrock monitoring wells are installed with 10-inch diameter type 304 stainless steel overburden casings installed 18 inches into the clay/till unit and 6-inch diameter, schedule 10, type 304 stainless steel casings installed 2 feet into bedrock. Monitoring well details, locations, and elevations are shown on Plan 594000-30K-06.

2.6 Perimeter Fence

A 6-foot high chain link fence is installed along the Site perimeter as shown on Plan 594000-10U-01. The Site can be accessed through a traffic gate from Buffalo Avenue. The fence is topped with three strands of barbed wire.

3. Monitoring and Testing

Monitoring at the Site, including sample collection, sample analyses, and reporting tasks must be completed to ensure the integrity and evaluate the performance of the RA system components and to meet monitoring requirements. Monitoring will be required for groundwater and NAPL at the Site. The collection of accurate data and representative samples is important for the successful operation of the RA systems at the Site. If the data collected are inaccurate and the samples are not representative, incorrect decisions will be made regarding system operations, and the RA systems will not work properly. The following sections describe methods that, when followed, will ensure the collection of accurate data and representative samples.

3.1 Groundwater Monitoring

A groundwater monitoring program has been established to monitor the effectiveness of the slurry wall, landfill cap, and APL collection system.

The groundwater monitoring program consists of water level monitoring and groundwater quality monitoring. The data collected are used to evaluate the performance of the APL collection and discharge system and the slurry wall and to determine the necessity for implementing contingency measures. The data also are used to determine when operation of the APL collection and discharge system may cease, subject to New York State Department of Environmental Conservation (NYSDEC) approval.

The wells where samples will be collected and measurements will be made are shown on Plan 594000-30K-01. This well network will be evaluated annually to assess whether each location provides useful information and to revise the network, as required.

3.1.1 Water Level Monitoring

Water level monitoring consists of the measurement of water levels in monitoring wells to determine groundwater elevations. Water levels in 20 monitoring wells and piezometers (PZ-01, PZ-02, PZ-03R, PZ-04 through PZ-08, PZ-09R, and PZ-10 inside the slurry wall and PCM-01 through PCM-06, PCM-07R, and PCM-08 through PCM-10 outside the slurry wall) will be measured to ensure the water levels inside the slurry wall are lower than the water levels outside the slurry wall (i.e., an inward gradient exists). Additional water level monitoring locations include PCBM-01 through PCBM-03, NR-01 through NR-05, NR-07, NR-08, NR-10, WW-1 through WW-4, and the river. Hydraulic monitoring locations are shown on Plan 594000-30K-01 and are listed in Appendix C. Water level monitoring is conducted on a quarterly basis. The method for measuring water levels accurately is described in Section 3.3. Since August 2003, the hydraulic monitoring program has been and will continue to be reassessed every 5 years (2003, 2008, 2013, etc.) to determine the suitability of the program and any need for modifications, until water level monitoring is no longer required.

Water level data will be converted to elevations and listed in tabular form for each round of data collected.

In the event that water level monitoring indicates that the inward hydraulic gradients across the slurry wall and/or vertical upward gradient across the clay/till are not adequate, the APL collection system pumping level controls will be adjusted to achieve the target and minimum head difference. The minimum head difference across the slurry wall is 1 foot, and the minimum upward gradient across the clay/till is 1 1/2 feet. The water level monitoring program may be reassessed annually.

3.1.2 Groundwater Quality Monitoring

Groundwater quality monitoring consists of the collection of water samples from ten overburden monitoring wells (PCM-01 through PCM-10) and three bedrock monitoring wells (PCBM-01 through PCBM-03), and the analysis of these samples to determine the concentrations of Site-specific indicators in the groundwater. The samples will be analyzed for the parameters listed in Table 3.1. All of these monitoring wells are located outside of the slurry wall as shown on Plan 594000-30K-01. Groundwater samples will be collected annually.

Upon receipt of validated groundwater quality monitoring data, the data will be evaluated by GSH and Olin to determine if the data are acceptable for use in the monitoring program.

The groundwater quality monitoring will be one of the data sets used to monitor the performance of the groundwater collection system and to determine the effectiveness of the slurry wall with respect to its design criteria and the Record of Decision requirements that an inward gradient be maintained across, and that the NAPL plume be contained by, the slurry wall.

Since August 2003, the program has been and will continue to be reassessed to determine the suitability of the sampling locations, monitoring frequency, and monitoring parameters and to determine the suitability of the program. Recommendations for changes to the program including the installation or abandonment of wells may be made based on the results of monitoring or other pertinent information. The program will be reassessed every 5 years (2003, 2008, 2013, etc.) until groundwater quality monitoring is no longer required.

3.1.3 Groundwater Monitoring Contingency Plan

The groundwater monitoring program will monitor the performance of the groundwater collection system and slurry wall with respect to its design criteria and requirements. If the system is not performing as designed after the time needed to substantially attain steady-state conditions, contingency actions will be required.

3.2 Sampling Plan

The proper collection of water levels, groundwater samples, and NAPL presence information requires that a consistent set of procedures be followed for each well every time water levels and/or groundwater samples are obtained. Following these procedures will result in the collection of good quality data that are representative of conditions at the Site.

The following sections describe the procedures for measuring water levels, sampling groundwater, and checking NAPL presence at the Site. Procedures and protocols outlined below will be performed in conjunction with those presented in the Site-Specific Health and Safety Plan, Glenn Springs Holdings, Inc., Western New York Sites (HASP) and the Quality Assurance Project Plan (QAPP) contained in Appendix A of this OM&M Manual. The HASP and the QAPP must be read by personnel before performing any sampling activities at the Site.

3.2.1 General Sampling Procedures

The following activities must not be done while sampling:

- Do not smoke.
- Do not use bug repellents.
- Do not use wasp/hornet spray near a well.
- Do not use aftershaves, cologne, or astringents.
- Be aware of wind direction. Do not run vehicle or small engines (such as generators or air compressors) upwind of a well being sampled.
- Be aware of traffic fumes and nearby activities. Suspend sampling if traffic fumes are noted.
- Do not handle or pour gasoline or other fuels near a well being sampled.

3.2.2 General Health and Safety

Apply the following health and safety rules during collection of groundwater samples:

- Read the HASP before going to the Site.
- Industrial quality work boots, nitrile gloves, and safety glasses are the minimum required personal protective equipment (PPE) for sampling. Respirators may be required also and should be on hand for use at all times.
- Do not eat or drink.
- Be aware of potential slip, trip, and fall hazards and uneven terrain.
- Be aware of hazards of working with portable machinery, electrically operated equipment, gasoline-powered equipment, and high-pressure air.
- Some heavy lifting is required – use proper lifting techniques.
- Some sampling takes place along roads. Be aware of moving vehicles.
- Use caution when opening protective covers on wells – wasps, hornets, or bees may be present.

3.3 Water Level Measurement

Water level measurements are required at all Site wells. In addition to providing information for determining groundwater flow directions, measuring water levels provides the following:

- Accurate data for area groundwater table maps.
- An opportunity for the sampling team to become more familiar with the Site.
- An opportunity to collect data about unusual circumstances such as wells that are damaged, dry, or inaccessible.
- An opportunity to inventory well conditions and to perform minor maintenance such as lubricating locks and hinges, replacing lost or faded well tags, etc.

An electric water level tape will be used for water level measurements in the wells and piezometers at the Site.

Water levels in the wet wells and total flows from the wet well pumps will be recorded when water levels are measured. Wet well water level meter and flow meter readouts are housed in the meter station. Record the wet well water levels and flow data on the form in Appendix C.

3.4 Groundwater Sampling

3.4.1 Well Purging

Prior to sampling each well, the standing water in the well will be purged, utilizing the low-flow purging (LFP) method, so that representative, sediment-free water may be sampled.

Purging will be conducted with a peristaltic pump with dedicated Teflon tubing in each sampling well. During LFP, the pumping rate will be between 100 and 500 milliliters per minute (mL/min). The initial pumping will be conducted at a lower rate to limit drawdown in the well. During purging, groundwater levels are measured to maintain a maximum 0.4 foot (0.1 m) of drawdown. The

pumping rate can be gradually increased during LFP. Pumping rate increases will be dependent on the drawdown and the stabilization of field parameters discussed below. Pumping rate adjustments may occur in the first 15 minutes of purging. After this time, the pumping rate should remain constant and flow rate adjustments should be avoided. During purging, the pumping rate and groundwater level will be measured at least every 10 minutes.

During LFP, stabilization of the purged groundwater is required to ensure the collection of representative groundwater samples from the formation and not from the stagnant water in the well casing. Field parameters including pH, temperature, specific conductance, oxidation-reduction potential (ORP), dissolved oxygen (DO), and turbidity will be monitored during LFP. The measurement of these field parameters is used to evaluate if stabilization of the purged groundwater has occurred prior to the collection of groundwater samples. The field measurements will be measured and recorded at 5-minute intervals. Groundwater stabilization is considered as having been achieved when three consecutive readings for each of the field parameters, taken at 5-minute intervals, are within the following limits:

- pH ±0.1 pH units of the average value of the three readings
- Temperature ±3 percent of the average value of the three readings
- Conductivity ±0.005 milliSiemen per centimeter (mS/cm) of the average value of the three readings for conductivity <1 mS/cm and ±0.01 mS/cm of the average value of the three readings for conductivity >1 mS/cm
- ORP ±10 millivolts (mV) of the average value of the three readings
- DO ±10 percent of the average value of the three readings
- Turbidity ±10 percent of the average value of the three readings, or a final value of less than 5 nephelometric turbidity unit (NTU)

During LFP, field parameters are measured using a flow-through cell apparatus. At the start of LFP, the purge water is visually inspected for clarity prior to being connected to the flow-through cell. If the purge water is turbid, LFP continues until the purge water is visually less turbid prior to being connected to the flow-through cell. Field parameters may be obtained using individual meters or a multiple meter unit; however, the use of a flow-through cell is preferred. All meters must be calibrated daily in accordance with the manufacturer's calibration instructions, and a calibration record must also be maintained.

Stabilization will be considered as being complete when the field parameters have stabilized as indicated in the above table. Purging will continue if stabilization does not occur until a maximum of 20-screen volumes have been removed. LFP causes groundwater to be drawn from a significant distance above or below the pump intake. The screen volume is based on screen length. After the removal of 20-screen volumes, purging will continue if the purged water remains visually turbid and appears to be clearing. Also, purging will continue if the field parameters vary only slightly outside of the stabilization criteria and appear to be approaching stabilization.

If the recharge to the well is insufficient to conduct LFP, the well will be pumped dry and allowed to recharge sufficiently for the collection of the groundwater sample volume. Wells that are purged dry are not required to meet the stabilization criteria detailed above.

3.4.2 Sampling

Groundwater samples will be collected immediately after well purging is completed. Samples are collected directly from the purging pump when possible, or an alternate device (i.e., pump or bailer) may be installed or used. If new sampling equipment is installed, the first few bails or discharge volumes should be discarded to allow acclimation of the sampling equipment with the groundwater.

Samples are typically collected from the pump or bailer with the discharged groundwater collected directly in the appropriate sample containers. The interior of the sample bottle or cap must not be touched or handled in any way. New gloves (i.e., disposable nitrile gloves or equivalent) should be worn for the collection of each sample. Caps from sample bottles must not be placed on the ground or in pockets to eliminate the possibility of cross-contamination.

Analytical requirements and sample containers are discussed in the QAPP (Appendix A).

Where a well will not yield the volume of water necessary to immediately fill all required sample containers, as many of the containers as possible will be filled, with the remainder filled as water begins to enter into the well. Samples for volatile organic compounds (VOCs) will be collected within 2 hours of completion of well purging.

3.4.3 Sampling Documentation

Documentation is a critical part of sampling. The accuracy of samples collected in the field can only be proven through the exhaustive use of field records. Field conditions, collection and handling of samples, and information about each sample collected will be recorded on the standardized forms or in a field book. These forms/records along with chain of custody documentation and shipping manifests provides a permanent record of all significant activities completed during a sample collection event. Complete all forms with a waterproof pen to prevent smudging if the forms get wet in the field. Once complete, sign and date the bottom of each form, and keep a copy at the LCTF.

3.4.4 Sample Containers, Preservation, and Labels

Required sample containers, sample preservation methods, and maximum sample holding times are summarized in Appendix A.

3.4.5 Packaging and Shipping

Groundwater sample containers will be packed in coolers on ice for shipment.

3.4.6 Handling of Materials Generated During OM&M Activities

PPE and sampling refuse (e.g., paper towels, used tin foil, tape, etc.) generated during the sampling activities will be containerized in plastic garbage bags and will be temporarily stored at the LCTF pending final disposal in accordance with all applicable Federal and New York State Regulations.

All groundwater extracted during monitoring activities will be collected and discharged to an on-Site wet well or to the Love Canal Landfill drum barn trench drain for treatment at the LCTF.

3.4.7 Equipment Cleaning Protocols

All equipment used for the collection of samples for chemical analysis including water level measuring devices and meters will be cleaned as follows.

- Wash in phosphate-free detergent
- Potable water rinse
- Deionized water rinse
- Air dry

3.5 NAPL Presence Monitoring

The eight NAPL recovery wells (NR-1 through NR-5, NR-7, NR-8, and NR-10) will be checked for NAPL quarterly. If more than 3 gallons of NAPL (6 inches deep in a 12-inch diameter well) are present in a NAPL recovery well during monitoring, the NAPL will be removed (only from April through October) for off-Site disposal in accordance with the procedure detailed in Section 4.2 and in accordance with all applicable Federal and New York State Regulations. This is the minimum depth of NAPL required to allow removal.

Monitoring for NAPL shall be reassessed annually to determine the suitability of the monitoring or until NAPL monitoring is no longer required. NAPL monitoring will no longer be required when the recharge rate for a well is less than 1 gallon/year.

NAPL presence monitoring results shall be recorded on forms or in a field book. Once complete, the bottom of each form will be signed and dated and a copy will be kept at the CRA Niagara Falls office.

3.6 Evaluation of Monitoring Results

Upon receipt of groundwater data, all analytical results will be evaluated by GSH/Olin to determine if the data are acceptable for use in the respective monitoring programs. All data deemed to be acceptable, including quality assurance/quality control (QA/QC) results, will be entered into a computer database by the field staff. A data report of groundwater monitoring will be sent to NYSDEC following QA validation within 30 days of receipt (upon request). GSH and Olin will designate the data as approved or not approved for evaluating the various RA systems at the Site based on the validation report. Under no circumstances will raw data be sent to NYSDEC/Environmental Protection Agency (EPA).

The computer database will provide the required listing and summary tables of analyses, including a separate listing of QA/QC results. The database will be used to determine the presence of Site-related chemicals in off-Site groundwater. As additional data are generated, graphic representations of concentrations versus time may be prepared to demonstrate changes in groundwater chemical concentrations over time.

Hydraulic data will be converted into groundwater elevations and entered into a computer database. The water level data will be listed in tabular form for each round of data collected.

The evaluation of the hydraulic and water quality data will be used to determine whether corrective contingency measures are required and when the system operations can be terminated.

4. Operation of Site Remedial Systems

The following sections provide instructions for operating the Site remedial systems, including NAPL recovery and system controls and instrumentation.

4.1 APL Collection and Discharge System Operation

The APL collection and discharge system consists of an APL collection trench, four wet wells, and a forcemain system. The APL accumulates in the collection trench and is transported via gravity to the wet wells. Once the APL level in the wet well reaches the setpoint, the wet well pump activates, and the APL is pumped from the wet well into the forcemain. The forcemain exits the Site in the northwest corner and extends north under Buffalo Avenue and the LaSalle Expressway to the Love Canal. The forcemain discharges APL to the Love Canal South Collector Tank (LCSCT). Once the level in the LCSCT reaches a set level as determined by the facility coordinator, the pumps are manually turned on. The APL is then pumped to the LCTF for treatment and is ultimately discharged under permit to the City of Niagara Falls sanitary sewer system.

The individual APL pumps in the APL collection wet wells operate on level control. Power to individual APL pumps is turned off automatically when the level in the wet well falls to the low-level elevation of the probe. Power to the APL pump is restored automatically when the level in the wet well rises to the high-level elevation of the probe. APL levels within each wet well, the flow rate from each wet well, and the total flow to the LCTF will be monitored at the LCTF. The LCTF can remotely control the wet well operation. All four wet well pumps' setpoints can be adjusted at the LCTF.

Leak detection for the APL discharge forcemain is provided in the on-Site sample manhole and in each off-Site manhole. If a leak is detected in any of these manholes, all four APL pumps will stop pumping automatically, and a remote message will be sent to the LCTF. Pumps will be restarted manually after the problem has been identified and corrected.

When the pumps shut down due to a high level in the LCSCT, the control system will alarm the operator via the process computer.

Level instrumentation in the LCSCT will also shut down the four 102nd Street Wet Well pumps when the LCSCT capacity is reached. Pumps will restart automatically after the tank level decreases to a set elevation.

A hand/off/auto switch is located in each wet well control panel. Under normal operating conditions, the switch will be in the auto position. This will allow the pump to run under normal operating conditions. For testing operations, the switch will be in the hand position. This will allow the pump to bypass the controls and locally operate. The manual setting on the wet well control panel will/will not override the pump shutdown commands from the process computer or forcemain leak detection system. For maintenance operations, the switch will be in the off position. A light located on each wet well control panel will show when the pumps are on.

A troubleshooting chart is presented in Appendix B.

4.2 NAPL Recovery System Operation

Each of the NAPL recovery wells will be monitored quarterly for the presence of NAPL, April through October. NAPL found during the monitoring will be removed if a well contains at least

3 gallons of NAPL (approximately 6-inch depth of NAPL in the 12-inch diameter wells). Monitoring will be accomplished by lowering an APL/NAPL interface probe into the well. If the NAPL depth exceeds 6 inches, the NAPL will be manually pumped out. NAPL will be removed with a mechanical well jerking pump via dedicated polyethylene tubing with a foot-valve. NAPL will be discharged into a storage tank and shipped off Site for disposal in accordance with all applicable Federal and New York State Regulations.

To minimize the volume of APL extracted with the NAPL, personnel will watch the NAPL discharge and when APL is observed in the discharge line, the operator will manually turn the pump off.

In addition to the quarterly removal of NAPL from the recovery wells, an accelerated NAPL recovery program has been initiated. The Accelerated NAPL Recovery Program (ANRP), implemented in 2004, is based on the results of the "NAPL Extraction Program Work Plan for Accelerated Recovery" dated December 2003. The purpose of the ANRP is to place dedicated recovery equipment at a high NAPL producing well to continuously remove NAPL. This program involved the continuous removal of NAPL from NR-02 through the use of a low flow, automated pump installed in the NR-02 well with daily measurements, while the remaining NR wells were monitored quarterly and NAPL removed as necessary.

Quarterly NAPL presence and removal data in 2010 indicated that NAPL presence in the vicinity of NR-02 may be diminishing, either due to a decrease in NAPL in the area of NR-02 (indicating a successful implementation of the recovery program), or possibly a result of creating a "deNAPLed" (absence of NAPL) area around NR-02 due to the long term pumping at this location and a decreased recharge rate of the NAPL. Due to the reduction in NAPL removed from NR-02, the frequency of monitoring at NR-02 was reduced from continuous to weekly. Historic amounts of NAPL removed from NR-03, along with quarterly NAPL measurements during 2010, indicated that there may be sufficient NAPL present at NR-03 such that additional NAPL removal would be beneficial. Monitoring and continuous removal of NAPL from NR-03 (in addition to weekly removal from NR 02) began in May 2010. A low NAPL recharge rate at NR-03 resulted in the pumping frequency at this NR well being reduced from continuous to twice weekly (NAPL checks and pumping as necessary), and subsequently from twice weekly to its current weekly frequency as approved by the NYSDEC. Subsequently, the high recharge rate in NR-02 resulted in an increase in NAPL check and pumping frequency from weekly to its current twice weekly frequency as approved by NYSDEC.

The components of the accelerated NAPL recovery procedure include a mechanical well jerking pump, dedicated polyethylene tubing with a foot-valve, and NAPL collection tank. The accelerated NAPL recovery procedure is to place the foot valve well below the NAPL level. The pump is set at a discharge rate to insure that the foot valve remains below the NAPL level to minimize the amount of groundwater collected by the pump. Once the NAPL has been removed (personnel observe APL presence in the discharge line), the pump is turned off and disconnected. The tubing and foot valve are left in the well. The ANRP is only conducted from April to October to prevent freezing of the extraction lines.

Every 5 years, the collected NAPL will be recharacterized to determine if there are any changes in the NAPL. The most recent recharacterization sample was submitted in 2010, and the next recharacterization sample is due in 2015.

5. Site Maintenance and Inspections

Site maintenance requirements will include routine Site inspections, scheduled preventative maintenance, unscheduled maintenance in response to inspection reports or component failures, and record keeping for maintenance activities. All system inspection and maintenance activities are to be performed in accordance with the HASP. Separate work plans will be written, if necessary, for unique or complex unscheduled maintenance tasks.

5.1 Site Inspections

5.1.1 Inspection Schedule

An outline of the inspection and preventative maintenance schedule for the landfill cap, APL collection and discharge system, NAPL recovery system, slurry wall, and surface water flow controls is presented in Table 5.1. This schedule may be revised as more experience with the particular maintenance requirements of the Site systems is acquired.

Any required maintenance shall be performed, as identified by the annual inspections, as soon as it is feasible to do so. Lower priority maintenance activities may be delayed for longer periods of time. High priority items include:

- Pump failures
- Forcemain repairs
- Power failures
- Perimeter fence repairs
- Erosion exposing multiple layers of the cap

5.1.2 Annual Inspections

The Site shall be inspected on an annual basis in the spring of each year, as scheduled by NYSDEC. Annual inspections will ensure that the remedial system components are functioning effectively as designed. Particular attention shall be given to the following system components:

Landfill Cap

- Access roads
- Surface structures
- Vegetated soil cover
- Ditches and culverts
- Perimeter fencing
- General surface conditions

APL Collection and Discharge System

- Manholes
- Wet wells

- Forcemains
- Pumps

NAPL Recovery System

- NAPL wells
- Well chambers
- NAPL pump and generator

Groundwater Monitoring System

- Groundwater monitoring wells
- Pumps, generator, and air compressor

Surface Water Flow Controls

- Swales/ditches
- Erosion controls

Shallow Water Environment

- Vegetation
- Eastern outfall structure
- General condition of the shallow water environment

The inspections will include an overall Site inspection along all access roads and perimeter security fencing. In areas that are inaccessible by vehicle, inspections will be performed on foot.

The annual inspection of the groundwater collection and discharge system will include visual observation of the manholes and wet wells to ensure that they are secure. The surface of the landfill cap must be inspected to ensure that the integrity of the cap is being maintained. The surface of the cap shall be inspected for signs of damage due to loss of vegetation, settlement, and erosion. The shallow water environment along the Niagara River shall also be inspected for signs of damage due to loss of vegetation.

The annual inspection results will be recorded on a log. All original logs will be kept on file at the LCTF.

5.1.3 Daily Inspections

The Site shall be inspected on a daily basis for potential general operational issues. The Site operator will inspect the Site and containment system.

5.2 Maintenance

Maintenance is required when inspections reveal a need to maintain one of the systems or when system components malfunction. If inspections reveal that non-emergency maintenance or response is required, the work shall be completed as soon as it is feasible in order to eliminate further damage and the need for emergency repairs. If a situation requires immediate action, emergency RAs shall be initiated immediately. All replacement equipment must be of equal or

better quality than the original components and, when possible, should be the same make and model as the original (see Section 2). All replacement materials must meet or exceed the RA construction specifications. A summary of potential areas that will require maintenance and the appropriate corrective actions is summarized in Table 5.2.

Unique or complex maintenance activities, including maintenance of the slurry wall, APL collection trench material, soil and landfill materials beneath the geomembrane layer of the cap, well installation or abandonment, electrical or control system repair, and any other maintenance activity not specifically covered by this OM&M Manual, will require an activity specific work plan and a HASP. Activity specific work plans and HASPs will be copies of the RA procedures and RA HASP modified to address the specific activity. Typical maintenance activities not requiring an activity specific work plan include the following:

Landfill Cap

1. Fertilizing and restoring the Site vegetative cover and removing/cutting weeds or bushes
2. Repairing Site access roads
3. Repairing surficial erosion and sloughing along the perimeter slopes unless erosion has occurred below the geomembrane liner
4. Cutting vegetative cover
5. Quarterly trimming around wells for well access
6. Repairing damage caused by burrowing animals, presence of deep-rooted weeds, or other vegetation
7. Repairing or replacing fencing, signs, and locks
8. Cleaning ditches and culverts

APL Collection and Discharge System

1. Cleaning manholes/wet wells and the APL collection drain and discharge forcemain
2. Securing and repairing access covers

Shallow Water Environment

1. Restoring vegetation

5.2.1 Landfill Cap

The purpose of the landfill cap is to reduce infiltration of precipitation into the landfill, prevent erosion of landfill materials, and eliminate direct human contact with the landfill materials. The layers of the cap work together to achieve these goals; therefore, each layer is necessary for the landfill cap system to function effectively. When a situation that may require maintenance is detected with the cap, it must be corrected as soon as it is feasible to do so.

5.2.1.1 Vegetative Cover

Visual indications that the vegetative cover may require maintenance include bare areas, dead or dying vegetation, and growth of weeds or bushes. When inspection reveals bare areas or dead or

dying vegetation, the following actions shall be performed as soon as it is feasible to correct the situation:

1. Check for cracks in the soil from which water or gas may be escaping (if identified, a subsurface investigation of the geomembrane liner is necessary – see Section 5.2.1.3)
2. Till the topsoil
3. Reseed and mulch
4. Cover slopes with temporary erosion control (jute) mat

The entire vegetative cover shall be cut annually after August 15 to remove all bushes and tall weeds to prevent their roots from penetrating the cap and damaging the geonet and geomembrane liner. Other portions of the vegetative cover shall be cut throughout the growing season to maintain access to groundwater monitoring and NAPL collection wells and the perimeter fence.

5.2.1.2 Cover Fill and Topsoil Layers

Visual indications that the cover fill and topsoil layers may require maintenance include washout and erosion, settlement, and standing water.

If the cap has been damaged by erosion or if a washout has occurred, the following actions shall be performed to correct the situation:

1. Recover the washed out soil to the extent practical
2. Backfill with recovered soil and additional soil to the original cover fill layer design thickness
3. Place a 6-inch thick layer of topsoil over the cover fill layer
4. Check the final elevation to ensure adequate drainage
5. Seed/mulch and cover slopes with erosion control (jute) mat

Settlement and standing water can be corrected either by regrading or by placing additional topsoil in the low areas and then reseeding.

Animal holes or burrows shall be corrected by performing the following actions:

1. Capture and remove the animals
2. Carefully excavate the area around the burrow and inspect the geomembrane liner (if the liner requires repair, follow the steps discussed in Section 5.2.1.3)
3. Replace the cover fill and topsoil layers to the original design thickness
4. Seed/mulch and cover slopes with erosion control (jute) mat

5.2.1.3 Geomembrane Liner Layer

If the geomembrane liner is punctured, the following steps shall be taken to repair it:

1. Carefully excavate the soil above the liner (do not use a mechanical excavator or backhoe)
2. Cover the puncture with a 40-mil LLDPE geomembrane patch that extends a minimum of 6 inches beyond the edges of the puncture
3. Seal the patch in place by extrusion welding it to the liner

4. Vacuum test the seam to ensure a complete seal
5. Record the results of the test and location and size of the patch
6. Replace the cover fill and topsoil layers to the original design thickness
7. Seed/mulch and cover slopes with erosion control (jute) mat

5.2.1.4 Groundwater Seeps

Groundwater seeps may occur where the groundwater path to the APL collection trench is blocked or restricted. Seeps may also occur if the APL collection drain is blocked and the collection trench is flooded. A groundwater seep will appear as a groundwater discharge from the landfill slopes. Corrective actions for leachate seeps require excavation below the geomembrane liner and will require an activity specific work plan and HASP.

5.2.1.5 Access Roads

Visual indications that Site access roads may require maintenance include washed out surface soils, potholes, puddles, and obstructions.

If the road surface is washed out, the following actions shall be taken as soon as it is feasible to do so:

1. Recover washed out gravel to the extent practical
2. Use recovered gravel to backfill the eroded areas to the original grade
3. Use new gravel to supplement the recovered material as necessary

When a puddle or pothole is detected, the following actions shall be taken as soon as it is feasible to do so:

1. Backfill with new gravel to original grade

If an object obstructs the access road, the following actions shall be taken as soon as possible:

1. Remove the obstruction
2. Place the obstruction in a secure area pending off-Site disposal in accordance with all applicable Federal and New York State Regulations

5.2.2 APL Collection Drain and Discharge Forcemain

The purpose of the APL collection system is to eliminate groundwater flow from on-Site to off-Site areas, to reduce groundwater flow from the overburden to the bedrock beneath the Site, and to reduce the concentration of chemicals in on-Site groundwater. The purpose of the forcemain system is to provide conveyance of the collected APL to the LCTF. All of the APL collection and discharge system components work together to achieve these goals; therefore, each component is necessary for the system to function effectively. When a situation requiring maintenance is detected with the APL collection and discharge system, it shall be corrected as soon as feasible.

5.2.2.1 Wet Well Pumps

If a wet well pump stops responding to the pump controls, the following actions shall be taken as soon as it is feasible to do so:

1. Attempt to operate the pump in manual mode
2. If it does not respond, shut down the pumping system
3. Disconnect the pump and drain it into the wet well
4. Wrap the pump in plastic sheeting
5. Install spare pump
6. Restart the pumping system
7. Clean and repair the damaged pump according to the manufacturer's instructions and store it for future use

If the pump cannot be repaired, the pump shall be replaced with a new one.

If the pump restarts frequently, the pumping rate shall be reduced or the distance increased between the high and low level probes, if possible.

5.2.2.2 APL Collection Drain

A visual indication of improper functioning of the APL collection drain is an increase in water level in some parts of the APL collection system or a decrease in discharge flow. This indicates that the collection drain or discharge forcemain is blocked or groundwater flow is restricted. The following items must then be checked to determine the cause of the increase in water level or the decrease in discharge flow:

1. Ensure pumps are running (see Section 5.3.2.1)
2. Ensure valves are open
3. Determine if the collection drain or forcemain are blocked (see Section 5.3.2.3 if the forcemain is blocked)

If the collection drain is blocked, the following actions shall be taken as soon as possible:

1. Pressure flush the drain sections that are plugged
2. Vacuum sediments and debris from affected wet wells

Pressures in the range of 500 to 1,000 pounds per square inch (psi) should be used to avoid damaging the collection drain and/or bedding. The material removed from downstream wet wells and manholes will be disposed of at an approved off-Site location in accordance with all applicable regulations.

5.2.2.3 Forcemain

A visible indication of situations that may require maintenance of the forcemain is a decrease in discharge flow. This indicates that the forcemain may be blocked or leaking.

If the discharge forcemain is blocked, the following actions shall be taken as soon as possible:

1. Shut down and lockout/tagout the pumping system
2. Use the quick connects in the manholes immediately upstream and downstream of the blockage to reroute the water flow to the secondary forcemain
3. Ensure new forcemain connections are intact and restart the pumping system
4. Drain the affected forcemain section
5. Pressure flush the blocked section of the primary forcemain as soon as feasible
6. Vacuum sediments and debris from the affected manholes

If the discharge forcemain is leaking, the following actions shall be taken as soon as possible:

1. Shut down and lockout/tagout the pumping system
2. Use the quick connects in the manholes immediately upstream and downstream of the leak to reroute the water flow to the secondary forcemain
3. Ensure new forcemain connections are intact and restart the pumping system
4. Drain the section of forcemain that is leaking
5. If the forcemain leak is on Site, excavate the forcemain at the leak
6. If the forcemain leak is off Site and where possible, pull the damaged forcemain out through the containment pipe from the nearest manhole
7. Reconstruct the primary forcemain to the original construction specifications
8. If leak is on Site, reconstruct the excavated cap to the original lines and grades

5.2.2.4 Manholes and Wet Wells

Visual indications that manholes and wet wells may require maintenance include cracks that allow groundwater to infiltrate, damaged or missing covers, and loose ladder rungs or safety platforms.

If significant groundwater is leaking through cracks on the inside of a manhole or wet well, the cracks shall be patched with cement mortar. While groundwater entry into the manhole or wet well is not an environmental concern, it does pose a health and safety concern if personnel need to enter the manhole/wet well to perform maintenance activities. If a cover is damaged or missing, it shall be replaced. If a ladder rung or safety platform is loose, cement mortar shall be used to reaffix the loose rung or safety platform supports to the inside of the manhole or wet well.

5.2.3 Shallow Water Environment

Visual indications that the shallow water environment vegetation may require maintenance include the presence of dead or dying vegetation and growth of invasive plant species. When inspection reveals dead or dying vegetation or the presence of invasive plant species, the following actions shall be performed as soon as it is feasible to correct the situation:

1. Inspect shallow water environment to determine if cause of dead or dying vegetation is evident
2. Remove all dead or invasive plant species by hand
3. Replant with wild celery

5.2.4 NAPL Recovery System

The purpose of the NAPL recovery system is to reduce the volume of NAPL beneath the Site. When a situation requiring maintenance is detected with the NAPL recovery system, it shall be corrected as soon as it is feasible to do so.

5.2.4.1 Accelerated NAPL Recovery

If the NAPL is not being removed by the mechanical well jerking pump with dedicated polyethylene tubing with a foot-valve, the following actions shall be taken as soon as feasible:

1. Make sure the tubing is correctly connected to the pump
2. Remove and inspect tubing and foot valve and replace as necessary

5.2.5 Groundwater Monitoring System

The purpose of the groundwater monitoring system is to monitor the groundwater quality outside the slurry wall. When a situation requiring maintenance is detected with the groundwater monitoring system, it shall be corrected as soon as it is feasible to do so. The groundwater monitoring is currently conducted using a peristaltic pump. No Site maintenance is required for the peristaltic pump. However, it may be necessary to replace the dedicated tubing periodically.

5.2.6 Other Site RA Systems

Other Site systems include perimeter fences, signage, and drainage ditches. When a situation requiring maintenance is detected with these systems, it shall be corrected as soon as feasible.

5.2.6.1 Perimeter Fence and Signs

Visual indications that the perimeter fence and signs may require maintenance include broken locks or gates, gaps in the fence, and missing or damaged signs.

If locks or gates are missing or damaged, they shall be replaced as soon as possible. If there are gaps in the fence, the damaged sections shall be repaired or replaced. If warning signs are damaged or missing, they shall be replaced.

5.2.6.2 Drainage Ditches and Swale Outlets

Visual indications that the Site drainage ditches may require maintenance include bare areas, dead or dying vegetation, ponding of water, and accumulation of obstructions or debris. When inspections reveal bare areas or dead or dying vegetation, an attempt will be made to determine the cause. If a cause is identified, the situation shall be corrected and the following actions shall be performed:

1. Till the topsoil
2. Reseed and mulch
3. Cover drainage ditch with erosion control (jute) mat

When ponding occurs, the following actions shall be performed to correct the situation:

1. Regrade the ditch or add topsoil
2. Reseed and mulch
3. Cover drainage ditch with erosion control (jute) mat

Any obstructions or debris accumulated in the drainage ditches shall be removed.

5.3 Disposal of Used Material and Waste

Material and waste containing Site-related chemicals shall be containerized and each container clearly labeled. The containers shall be shipped to a licensed off-Site disposal facility in accordance with all applicable Federal and New York State Regulations.

5.4 Maintenance Records

A record of all maintenance performed at the Site will be kept at the LCTF. The records will include a description of the work performed, who it was performed by, and comments that may arise.

The appropriate box on Form 1 (Appendix C) shall be checked when required maintenance activities are complete.

6. Records and Reports

All field notes, field books, and completed standard forms will be stored at the LCTF. A copy of all chains of custody, shipping manifests for analytical samples, and analytical results will also be stored at the LCTF.

In accordance with Section X, Paragraph 35 of the Consent Decree entered October 1, 1999, OCC/Olin are required to submit "…an annual report for the Site, outlining the activities performed at the Site, including Site monitoring. The report shall describe the overall effectiveness of the RA in achieving RA objectives, including the operation of the leachate collection system and the maintenance of gradients." The annual report shall include a list of all monitoring events and the results of all water-level monitoring (including any changes in pumping-level controls to maintain inward ingredients across the slurry wall), all groundwater quality monitoring data, NAPL-presence monitoring data, and the findings from the shallow-water environment monitoring. The annual OM&M Report will be entitled "Site Management Periodic Review Report." The report will contain the completed Operations and Maintenance Report Form (see Appendix C), a list of monitoring events, a summary of RA system operation parameters, a description of inspections and maintenance performed during the previous year, and institutional and engineering controls certification. OCC and Olin shall submit these annual OM&M reports to EPA/NYSDEC by February 28 of every year.

In addition to the annual report, OCC/Olin shall submit copies of the groundwater quality monitoring data following each sampling round to USEPA/NYSDEC within 2 weeks of the completion of the QA/QC Officer's report as set forth in Appendix A hereto.

LASALLE EXPRESSWAY

DOUBLE-CONTAINED PIPE
BENEATH LASALLE EXPRESSWAY

CO-MH8

CO-MH9

BUFFALO AVENUE

PZ-10

PCM-10

PCM-09

PZ-09R

PCM-08

PCBM-03

PZ-08

PCM-07R

PZ-07

MAIN GATE

ASSEMBLY AREA

BUFFALO AVENUE

TOWN OF WHEATFIELD
CITY OF NIAGARA FALLS

102ND STREET

PCM-06

PZ-06

0 75 150ft

N

CO-MH1

SAMPLE
MANHOLE

SAMPLE
SHED

PCM-01

PZ-01

CO-1

CO-MH2

APL COLLECTION
TRENCH

NR-01

ACCESS ROAD

2,500 GALLON
SKID TANK

NR-02

NR-04

ACCESS ROAD

NR-10

NR-05

NR-07

2,500 GALLON
SKID TANK

NR-03

NR-08

APL COLLECTION
TRENCH

PZ-04

CO-5

CO-MH6

WET WELL
WW-3

2'-2" HDPE FORCE MAINS

APL COLLECTION
TRENCH

CO-7

CO-6

CO-MH7

PZ-05

PCM-05

PCBM-02

PCM-02

PZ-02

CO-2

CO-MH3

CO-4

CO-MH5

PCM-04

LITTLE RIVER

CAYUGA ISLAND

2'-2" HDPE FORCE MAINS

CO-MH4

PZ-03R

CO-3

PCBM-01

PCM-03

WET WELL
WW-2

WET WELL
WW-4

WET WELL
WW-1

APL COLLECTION
TRENCH

NIAGARA RIVER

LEGEND

PROPERTY LINE

CITY LINE

FENCE LINE

CRIB WALL

FORCEMAIN AND
FLOW DIRECTION

SLURRY WALL AND CENTERLINE

APL COLLECTION TRENCH
AND FLOW DIRECTION

PZ-02 PIEZOMETER LOCATION

PCM-02 MONITORING WELL LOCATION

CO-2 TRENCH CLEAN OUT

CO-MH3 FORCEMAIN CLEAN OUT MANHOLE

NAPL RECOVERY WELL LOCATION

PCBM-01 BEDROCK MONITORING WELL LOCATION

GHD

figure 1.1

SITE LAYOUT
OPERATION, MAINTENANCE AND MONITORING MANUAL
102ND STREET LANDFILL SITE
GLENN SPRINGS HOLDINGS, INC.
Niagara Falls, New York

Table 1.1

Site Contact List
Operation, Maintenance, and Monitoring Manual
102nd Street Landfill Site
Niagara Falls, New York

Site Operations:

GHD (for GSH)

John Pentilchuk	GHD
- Project Manager	651 Colby Drive
	Waterloo, Ontario, Canada N2V 1C2
	Phone: 519-884-0510
	Cell: 519-572-5644
Dennis Hoyt	GHD
- Project Coordinator	2055 Niagara Falls Blvd., Suite 3
	Niagara Falls, New York 14304
	Phone: 716-297-6150
	Cell: 716-345-1978
Darrell Crocket	GHD
- Site Operator	805 - 97th Street
	Niagara Falls, New York 14304
	Phone: 716-297-6150
	Cell: 716-998-5804

Project Managers:

Glenn Springs Holdings, Inc. (for OCC)

Joseph Branch	Glenn Springs Holdings, Inc.
- Western New York	7601 Old Channel Trail
Operations Manager	Montague, MI 49437
	Cell: 231-670-6809
	Fax: 231-894-4033
Clinton Babcock	Glenn Springs Holdings, Inc.
- Western New York	5005 LBJ Freeway
Operations Coordinator	Suite 1350
	Dallas, TX 75244-6119
	Phone: 972-687-7506
	Cell: 859-421-4233
	Fax: 972-687-7524

<u>Olin Corporation</u>

Dave Share	Olin Corporation
	3855 North Ocoee Street, Suite 200
	Cleveland, TN 37312
	Phone: 423-336-4540
	Fax: 423-336-4166

Table 1.1

Site Contact List
Operation, Maintenance, and Monitoring Manual
102nd Street Landfill Site
Niagara Falls, New York

Agency Contacts:

United States Environmental Protection Agency

Gloria Sosa
WNY Remediation Section, Region II
U.S. Environmental Protection Agency
290 Broadway, 20th Floor
New York, New York 10007-1866
Phone: 212-637-4283
Fax: 212-637-4284

New York State Department of Environmental Conservation

Brian Sadowski
New York State Dept. of Environmental Conservation
Division of Hazardous Waste Remediation
Region 9
270 Michigan Avenue
Buffalo, New York 14203-2999
Phone: 716-851-7220
Fax: 716-851-7226

Gregory Sutton
New York State Dept. of Environmental Conservation
Division of Hazardous Waste Remediation
Region 9
270 Michigan Avenue
Buffalo, New York 14203-2999
Phone: 716-851-7220
Fax: 716-851-7226

Stanley Radon
New York State Dept. of Environmental Conservation
Division of Hazardous Waste Remediation
Region 9
270 Michigan Avenue
Buffalo, New York 14203-2999
Phone: 716-851-7220
Fax: 716-851-7226

Table 3.1

Site-Specific Parameters - Groundwater
Operation, Maintenance and Monitoring Manual
102nd Street Landfill Site
Niagara Falls, New York

Parameter	Laboratory RL	Laboratory MDL	Analytical Method Reference [1]
Benzene	1	0.11	SW-846 8260
Chlorobenzene	1	0.14	SW-846 8260
2-Chlorotoluene	1	0.21	SW-846 8260
1,2-Dichlorobenzene	1	0.15	SW-846 8260
1,4-Dichlorobenzene	1	0.21	SW-846 8260
1,2,3-Trichlorobenzene	1	0.15	SW-846 8260
1,2,4-Trichlorobenzene	1	0.27	SW-846 8260
1,2,4,5-Tetrachlorobenzene	10	0.61	SW-846 8270
Phenol	10	0.55	SW-846 8270
2-Chlorophenol	10	1.6	SW-846 8270
4-Chlorophenol	10	0.22	SW-846 8270
2,4-Dichlorophenol	10	0.32	SW-846 8270
2,5-Dichlorophenol	10	0.38	SW-846 8270
2,4,5-Trichlorophenol	10	1.4	SW-846 8270
alpha-Hexachlorocyclohexane	0.05	0.027	SW-846 8082
beta-Hexachlorocyclohexane	0.05	0.040	SW-846 8082
gamma-Hexachlorocyclohexane	0.05	0.032	SW-846 8082
delta-Hexachlorocyclohexane	0.05	0.017	SW-846 8082
Mercury	0.20	0.038	SW-846 7470
Arsenic	10	3.0	SW-846 6010

Notes:

(1) Referenced from "Test Methods for Evaluating Solid Waste" USEPA Office of Solid Waste (SW-846), 3rd Edition, 1986 and subsequent revisions
USEPA United States Environmental Protection Agency
RL Reporting Limit.
MDL Method Detection Limit (as of November 2014).

Table 5.1

Annual Inspection and Preventative Maintenance
Operation and Maintenance Manual
102nd Street Landfill Site, Niagara Falls, New York

Item	Inspect For
1. APL Collection and Discharge System	
Manholes/Wet Wells	- cover on securely - condition of cover - condition of inside of manhole/wet well - condition of safety platform - flow unrestricted, manhole/wet well free of obstructions
2. Landfill Cap	
Vegetation and Topsoil	- erosion, bare areas, washouts, leachate seeps, dead/dying vegetation
Access Roads	- erosion, obstructions, potholes, puddles, debris
Perimeter Fence	- integrity of fence, gates, locks, placement and condition of signs
Drainage Ditches	- sediment build-up, erosion, condition of erosion protection, obstructions, dead/dying vegetation
3. Shallow Water Environment (Embayment)	
Vegetation	- dead or dying vegetation
City of Niagara Falls Outfall immeditly east of Site	- debris accumulated in front of outfall

Table 5.2

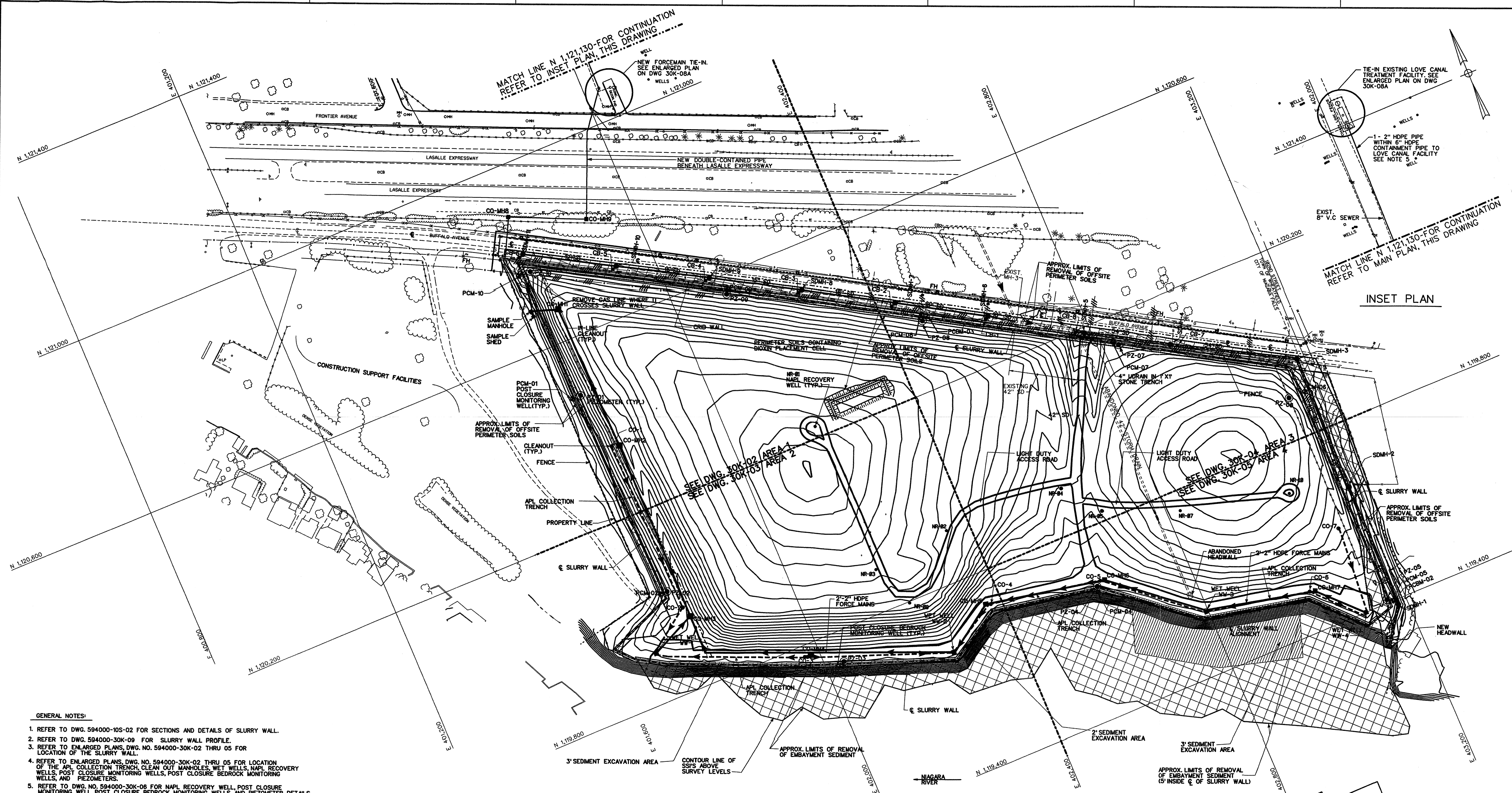
Potential Situations That Require Maintenance and Appropriate Corrective Actions
Operation and Maintenance Manual
102nd Street Landfill Site, Niagara Falls, New York

RA System Components	Situations That Require Maintenance	Appropriate Corrective Actions
APL Collection and Discharge System		
APL Collection Drain/Forcemain	Inward gradient not maintained in some area around perimeter.	Check pump operation. Increase pump rate in nearest wet well. Decrease pump rate in other wet wells if necessary.
	Blockage in pipe restricting groundwater flow. Water level may not be maintained at desired elevations.	Pressure flush pipe sections that are plugged. Vacuum sediments and debris from manholes and wet wells.
	Decrease in discharge rate. Leak detected in off-Site manhole. Leaking forcemain.	Shut down pumping system. Use quick connects to reroute flow to secondary forcemain. Drain leaking pipe. If on Site, excavate forcemain and repair or replace. If off Site and when possible, pull the damaged forcemain out through the containment pipe from the nearest manhole and replace.
Slurry Wall	Leakage through slurry wall. Excessive flow in collection pipe.	Corrective action for slurry wall repair requires an activity specific work plan and health and safety plan.
Landfill Cap		
Cover Soils and Vegetation	Washout and erosion of vegetation, topsoil, or cover fill. Typically on steep slopes.	Take immediate action to prevent further erosion and to protect exposed geomembrane liner. Recover washed out soil. This material may be used to restore the eroded area. Backfill with additional soil to original cap design thickness. Re-seed. If seeding slopes, cover with erosion control (jute) mat.
	Bare areas. Dead/dying vegetation (potential for erosion).	Loosen and till topsoil. Re-seed and mulch as necessary. Cover with erosion control (jute) mat.
	Settlement of original cover. Standing water. Dry bare areas.	Assess size of settlement and potential impact to drainage or low permeability layers. Till topsoil and grade. Add additional topsoil if necessary. Check final elevation to ensure adequate drainage. Re-seed and mulch. Regrading of topsoil should be sufficient to correct minor ponding. Additional soil may be required for significant ponding. If seeding slopes, cover with erosion control (jute) mat.
	Weeds/bushes. Deterioration of desired vegetation. Potential penetration through cover if left unattended.	Remove all bushes and tall weeds. Re-seed as required. Cut vegetation annually (in spring) as a minimum.
	Animal holes/burrows. Safety hazard. Potential for soil cover erosion.	Capture and remove rodents. Excavate area carefully and inspect geomembrane liner. Seal any holes in liner. Replace soil as required. Seed and mulch. If seeding slopes, cover with erosion control (jute) mat.

Table 5.2

Potential Situations That Require Maintenance and Appropriate Corrective Actions
Operation and Maintenance Manual
102nd Street Landfill Site, Niagara Falls, New York

RA System Components	Situations That Require Maintenance	Appropriate Corrective Actions
Landfill Cap (continued)		
Sideslopes	Leachate seeps.	Corrective action for leachate seeps requires an activity specific work plan and health and safety plan.
Access Roads	Washouts.	Recover washed out gravel. Use this material to restore the eroded area. Backfill to original grade.
	Potholes or puddles (potential safety hazard).	Backfill to original grade.
	Obstructions (safety hazard).	Remove obstruction. Place in secure area pending off-Site disposal.
NAPL Recovery System		
Pump and Control Box	Electric submersible pump not operating.	Check all electrical and control connections. Replace pump and/or control box with spare. Clean and repair damaged pump and/or control box.
Other Site Systems		
Gates and Locks	Vandalism. Site security.	Replace and secure locks as necessary. Ensure locks are operational.
Perimeter Fence	Forced entry or seasonal damage.	Repair or replace as needed.
Signs	Tampering or theft.	Repair or replace signs.
Other Site Systems (continued)		
Drainage Ditches	Sod drying out. Obstructions or debris.	Irrigate dry areas. Remove obstructions or debris which may affect flow.
	Sediment in ditch or swale. Smothering and killing of sod and interruption of normal surface water flow pattern.	Remove sediment and stockpile as topsoil for future repairs. Replace sod or re-seed and mulch if damaged.
Public Walkway	Potholes or puddles (potential safety hazard).	Backfill to original grade with asphalt patch.
	Obstructions (safety hazard).	Remove obstruction. Place in secure area pending off-Site disposal.
Other Unforeseen Problems		Record problem on Inspection Log. Notify GSH Project Manager for appropriate action.

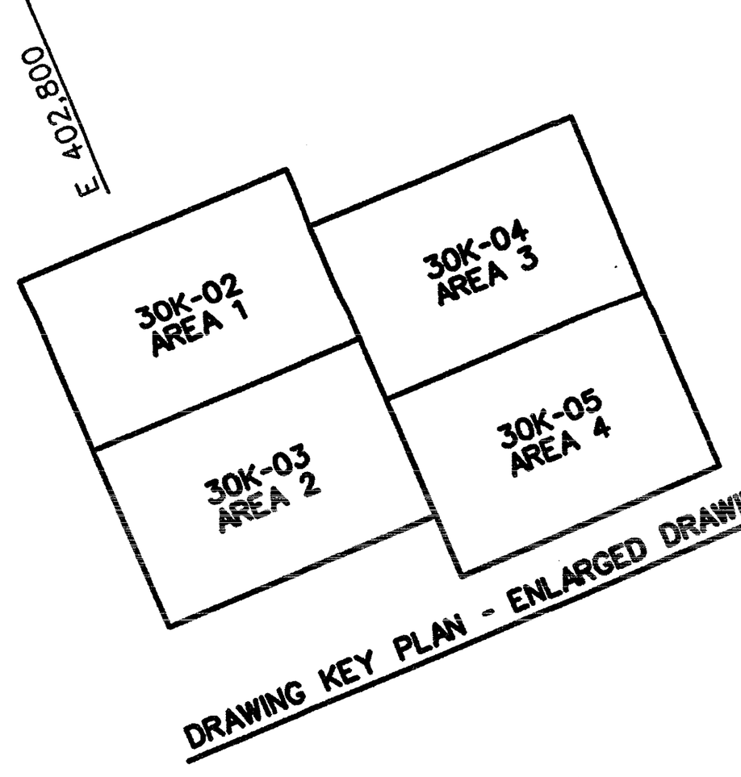

MATCH LINE N 1,121,130-FOR CONTINUATION REFER TO INSET PLAN, THIS DRAWING
NEW FORCEMAIN TIE-IN. SEE ENLARGED PLAN ON DWG 30K-08A
FRONTIER AVENUE
LASALLE EXPRESSWAY
NEW DOUBLE-CONTAINED PIPE BENEATH LASALLE EXPRESSWAY
BUFFALO AVENUE
CONSTRUCTION SUPPORT FACILITIES
SAMPLE MANHOLE
SAMPLE SHED
PCM-10
PCM-01 POST CLOSURE MONITORING WELL(TYP.)
APPROX. LIMITS OF REMOVAL OF OFFSITE PERIMETER SOILS
CLEANOUT (TYP.)
FENCE
APL COLLECTION TRENCH
PROPERTY LINE
℄ SLURRY WALL
CRIB WALL
PERIMETER SOILS CONTAINING SIGAN PLACEMENT CELL
NAPL RECOVERY WELL (TYP.)
SEE DWG. 30K-02 AREA 1
SEE DWG. 30K-03 AREA 2
SEE DWG. 30K-04 AREA 3
SEE DWG. 30K-05 AREA 4
LIGHT DUTY ACCESS ROAD
EXISTING 42" SD
4" UDRAIN IN 1'X1' STONE TRENCH
ABANDONED HEADWALL
2-2" HDPE FORCE MAINS
POST CLOSURE BEDROCK MONITORING WELL (TYP.)
SLURRY WALL ALIGNMENT
NEW HEADWALL
3' SEDIMENT EXCAVATION AREA
2' SEDIMENT EXCAVATION AREA
CONTOUR LINE OF SSI'S ABOVE SURVEY LEVELS
APPROX. LIMITS OF REMOVAL OF EMBAYMENT SEDIMENT
APPROX. LIMITS OF REMOVAL OF EMBAYMENT SEDIMENT (5' INSIDE ℄ OF SLURRY WALL)
NIAGARA RIVER
TIE-IN EXISTING LOVE CANAL TREATMENT FACILITY. SEE ENLARGED PLAN ON DWG 30K-08A
1 - 2" HDPE PIPE WITHIN 6" HDPE CONTAINMENT PIPE TO LOVE CANAL FACILITY SEE NOTE 5
EXIST. 8" V.C SEWER
MATCH LINE N 1,121,130-FOR CONTINUATION REFER TO MAIN PLAN, THIS DRAWING
INSET PLAN

GENERAL NOTES:

1. REFER TO DWG. 594000-10S-02 FOR SECTIONS AND DETAILS OF SLURRY WALL.
2. REFER TO DWG. 594000-30K-09 FOR SLURRY WALL PROFILE.
3. REFER TO ENLARGED PLANS, DWG. NO. 594000-30K-02 THRU 05 FOR LOCATION OF THE SLURRY WALL.
4. REFER TO ENLARGED PLANS, DWG. NO. 594000-30K-02 THRU 05 FOR LOCATION OF THE APL COLLECTION TRENCH, CLEAN OUT MANHOLES, WET WELLS, NAPL RECOVERY WELLS, POST CLOSURE MONITORING WELLS, POST CLOSURE BEDROCK MONITORING WELLS, AND PIEZOMETERS.
5. REFER TO DWG. NO. 594000-30K-06 FOR NAPL RECOVERY WELL, POST CLOSURE MONITORING WELL, POST CLOSURE BEDROCK MONITORING WELLS, AND PIEZOMETER DETAILS.
6. REFER TO DWG. NO. 594000-10U-01 FOR MASTER SITE GRADING PLAN.
7. REFER TO DWG. 594000-30K-06C FOR WET WELL DETAILS
8. REFER TO SITE REMEDIATION PLAN DWGS. 594000-30K-02 THRU 05 FOR CHAIN LINK FENCE LOCATION.
9. REFER TO DWG. 594000-30K-06B FOR PLANS SHOWING REMOVAL/CONSOLIDATION OF PERIMETER SOILS FOR AREAS 1 THRU 4 RESPECTIVELY.
10. REFER TO DWGS. 594000-30K-03 AND 05 FOR DELINEATION OF THE LIMITS OF REMOVAL OF OFFSHORE SEDIMENT.
11. REFER TO DWG. 594000-10Z-02 FOR LEGEND & ABBREVIATIONS.

LIST OF EXISTING UTILITIES

UTILITY	OWNING UTILITY/AGENCY
1. CITY WATER	CITY OF NIAGARA FALLS, NEW YORK
2. GAS	NATIONAL FUEL GAS CORPORATION
3. TELEPHONE	NEW YORK TELEPHONE
4. POWER	NIAGARA MOHAWK POWER CORPORATION
5. CABLE TV	NIAGARA FRONTIER CABLE TELEVISION
6. STORM SEWER	CITY OF NIAGARA FALLS AND TOWN OF WHEATFIELD, NY



0 80 160 FT.

STATE OF NEW YORK CHARLES TAYLOR, JR 073024 LICENSED PROFESSIONAL ENGINEER 8-13-99

REV.	DATE	REVISION DESCRIPTION	DES. CHK.	APPROVED
A	01/29/93	ENGINEERING REPORT SUBMITTAL (PRELIMINARY/INTERMEDIATE)	JTG	DRK
B	6/3/94	DELETED CURTAIN WALL, ADDED OPTIONAL SLURRY WALL ALIGNMENT, ADDED NOTES 15 & 16 : ISSUED FOR REVIEW AND COMMENT-RELOCATION OF UNDERGROUND UTILITIES AND REMOVAL/CONSOLIDATION OF PERIMETER SOILS		
C	09/08/95	FINAL ENGINEERING REPORT (DRAFT SUBMITTAL)		
0	12/21/95	ISSUE FOR BID		
1	02/05/96	ISSUED FOR CONSTRUCTION		
2	6/7/96	REVISED SLURRY WALL LOCATION IN SE CORNER		
3	3/12/97	STORM SEWER AS-BUILTS		
4	8/13/97	ADDED STORM SEWER CB-8 W/TIE IN TO SDMH-5 AND 4" UDRAIN W/TIE IN TO CB-8		
5	1/28/98	AS-BUILT		

DWG.NO.	REFERENCE DRAWINGS
594000-10S-01	SITE DETAILS
594000-10S-02	CAPPING SYSTEM & BULKHEAD - SECTIONS AND DETAILS
594000-10U-01	MASTER SITE GRADING PLAN
594000-30K-02	SITE REMEDIATION PLAN - AREA 1
594000-30K-03	SITE REMEDIATION PLAN - AREA 2
594000-30K-04	SITE REMEDIATION PLAN - AREA 3
594000-30K-05	SITE REMEDIATION PLAN - AREA 4
594000-30K-06	APL, NAPL AND MONITORING WELLS AND MISC. DETAILS
594000-30K-06B	MASTER SITE REMEDIATION PLAN - EXCAVATION DEPTH OF PERIMETER SOILS
594000-30K-06C	APL WET WELL DETAILS
594000-30K-09	SLURRY WALL PROFILE

FLUOR DANIEL

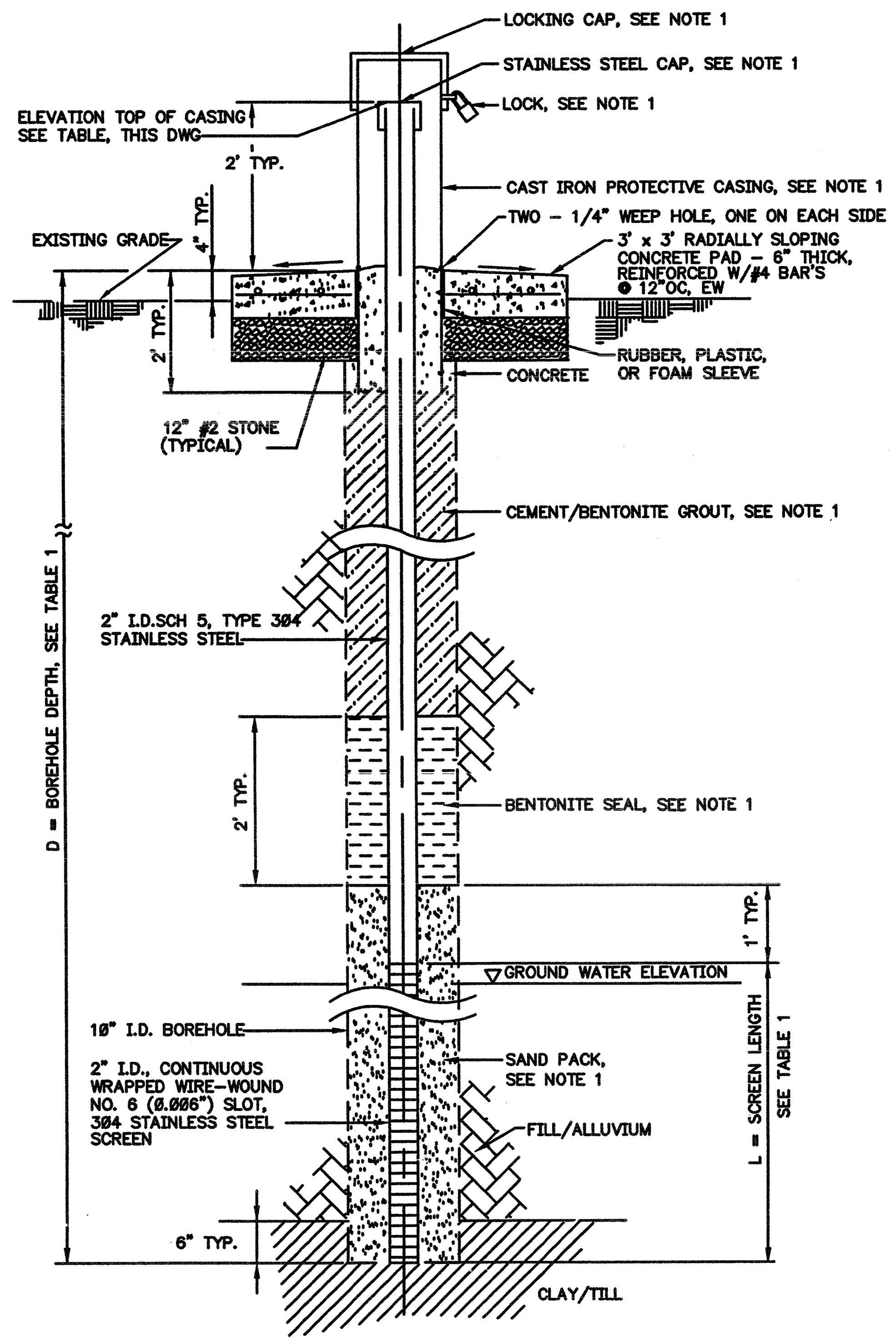
DESIGNED BY: U. KUMTHEKAR/A. BUMB
CHECKED BY: S. LAWRENCE
SUPERVISOR: C. MARS
LEAD ENGR./SPEC.: C. TAYLOR
PROJECT: C. MARS
CLIENT: OXYCHEM/OLIN

OXYCHEM/OLIN
REMEDIAL DESIGN
102nd STREET LANDFILL SITE
NIAGARA FALLS, NEW YORK

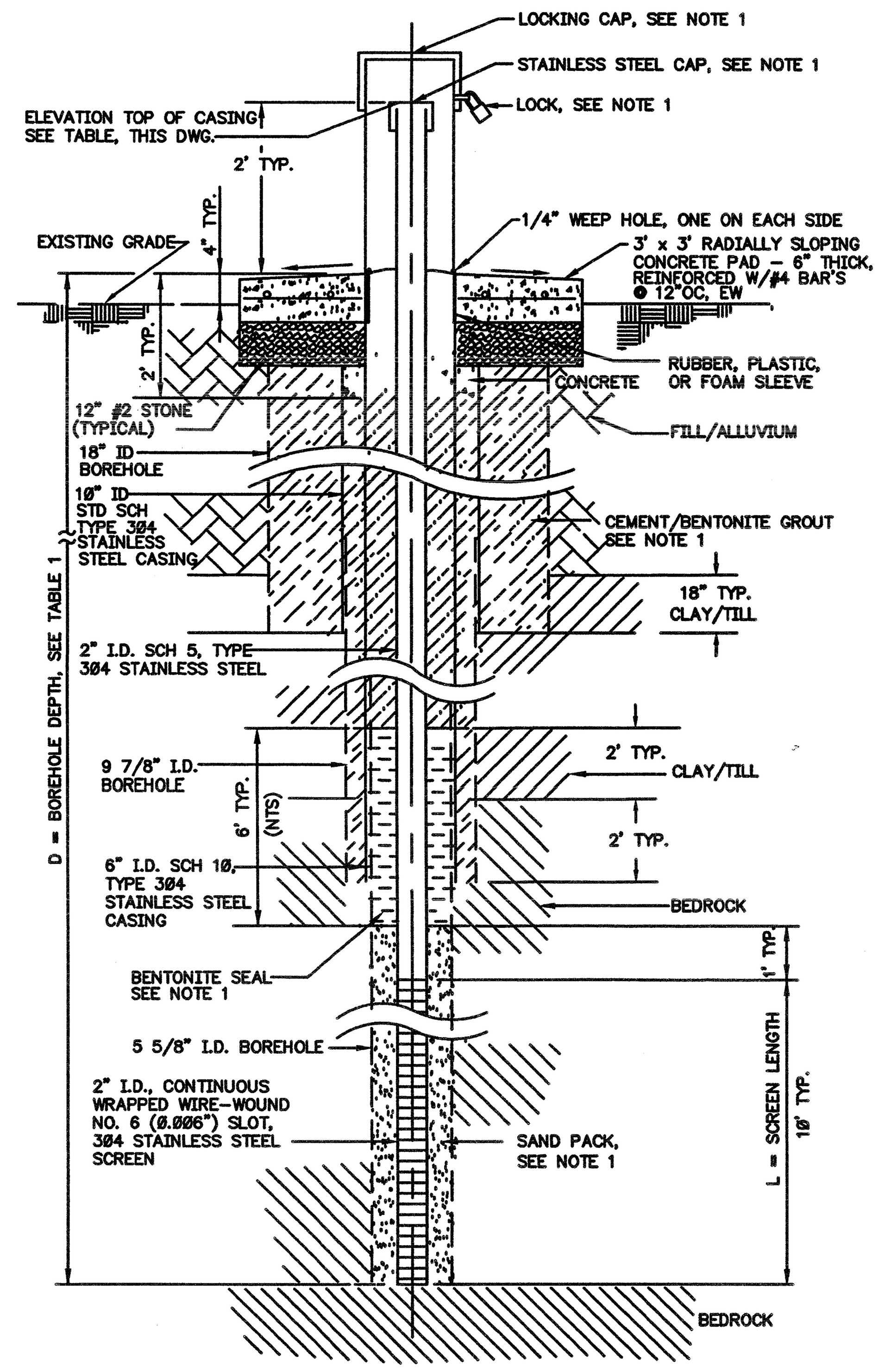
AS-BUILT
MASTER SITE REMEDIATION PLAN

SCALE: 1"=80' | DRAWING NUMBER: 594000-30K-01 | REV.: 5

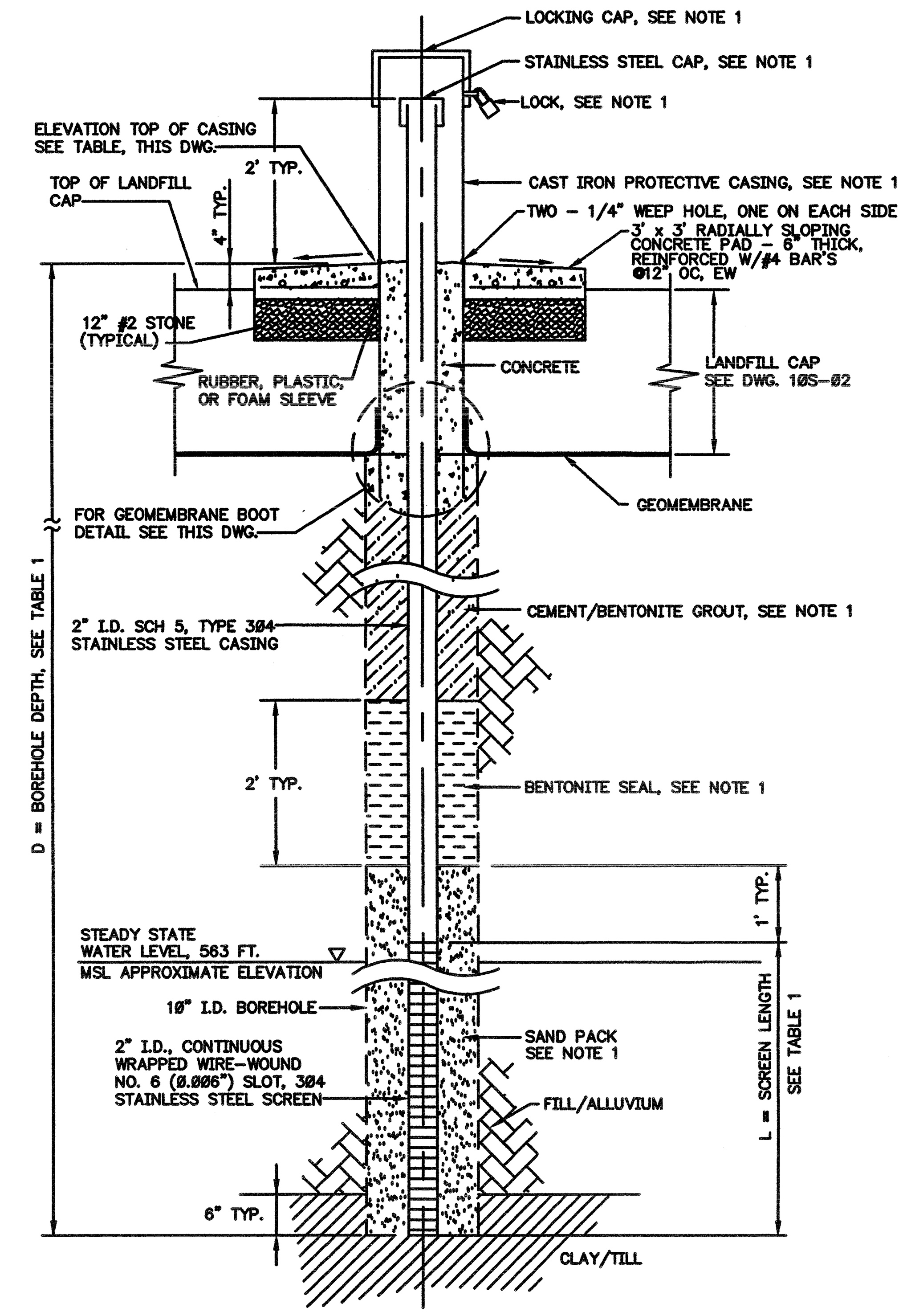
MANUAL CHANGES MADE - YES ☐ NO ☐ DWG. FILE UPDATED - YES ☐ NO ☐ MODEL UPDATED - YES ☐ NO ☐ CADD DRAWING No. 30K01.DGN



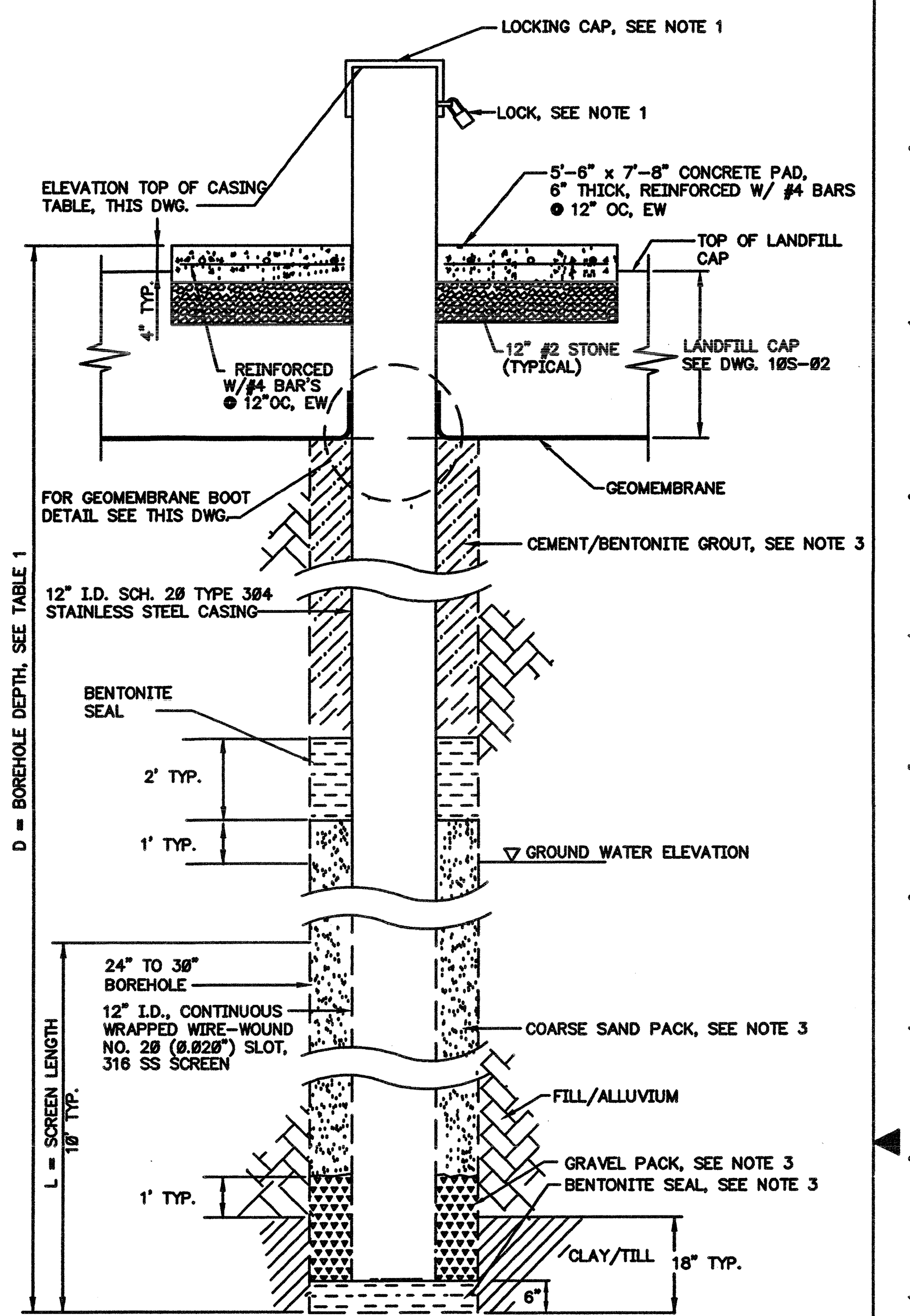
POST CLOSURE MONITORING WELL (PCM) DETAIL
PCM-01 THROUGH PCM-08
N.T.S.



POST CLOSURE BEDROCK
MONITORING WELL (PCBM) DETAIL
PCBM-01 THROUGH PCBM-03
N.T.S.



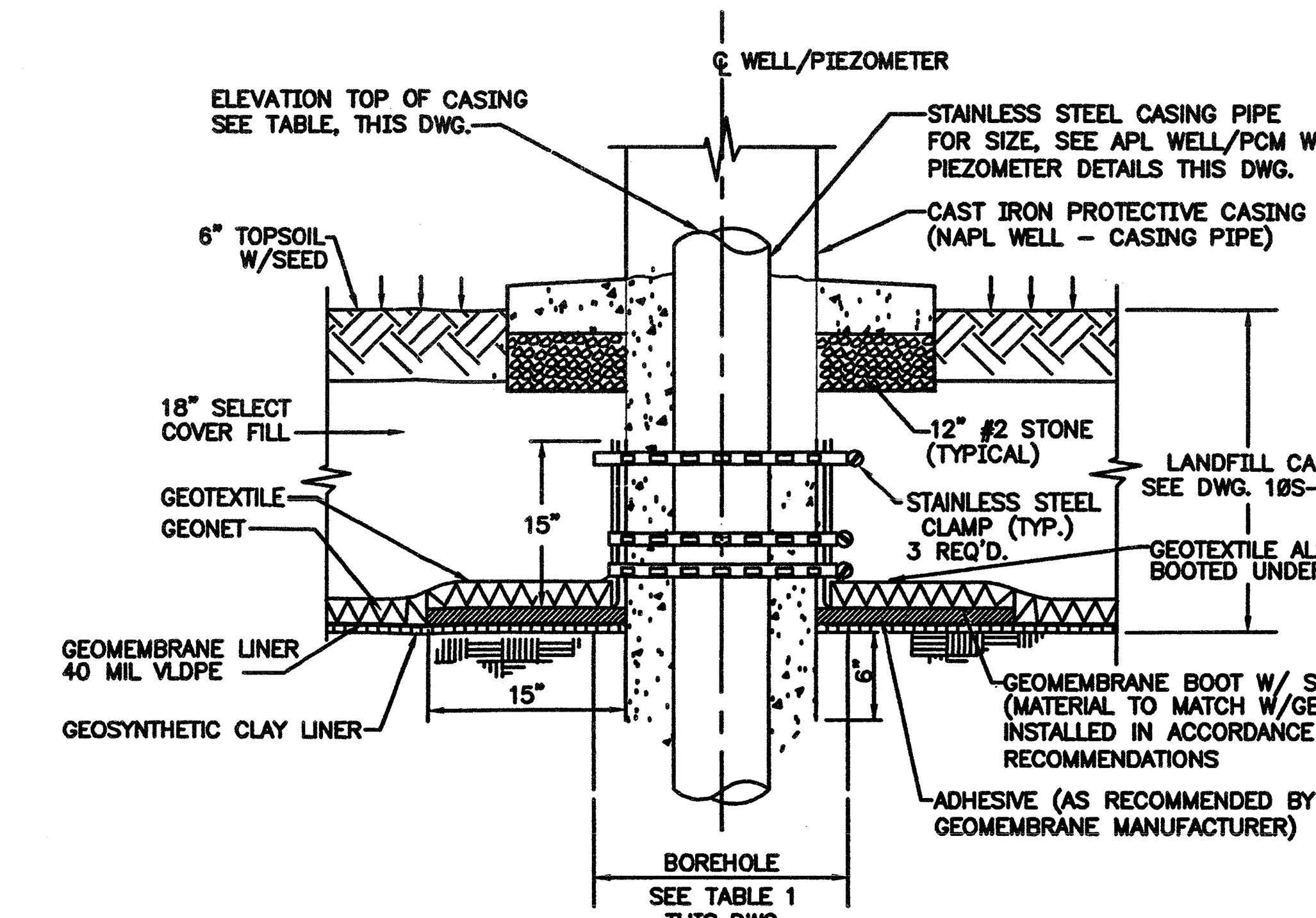
PIEZOMETER (PZ) DETAIL
PZ-01 THROUGH PZ-08
N.T.S.



TYPICAL NAPL RECOVERY WELL (NR) DETAIL
N.T.S.

TABLE-1 AS-BUILT LOCATIONS AND ELEVATIONS OF WELLS						
WELL NO.	NORTHING	EASTING	TOP OF CASING (FT)	BOTTOM OF WELL (FT)	DEPTH OF WELL (FT)	SCREEN LENGTH (FT)
PZ-1	1120480.04	401744.70	582.21	549.64	32.57	5
PZ-2	1120019.49	401749.66	577.92	548.43	23.49	15
PZ-3	1119734.85	402039.66	576.68	545.63	31.05	18
PZ-4	1119675.07	402599.63	576.96	545.63	31.33	25
PZ-5	1119408.08	403159.94	576.87	550.50	26.37	10
PZ-6	1119889.99	403136.05	584.66	564.05	20.61	5
PZ-7	1120136.09	402843.12	579.10	564.80	14.30	5
PZ-8	1120346.01	402477.59	580.99	565.38	15.61	5
PZ-9	1120560.13	402114.84	580.67	566.28	14.39	4
PZ-10	1120765.29	401746.09	581.65	561.56	20.09	10
PCM-1	1120479.99	401725.13	578.24	549.05	29.19	10
PCM-2	1120020.44	401735.99	577.24	547.90	29.34	18
PCM-3	1119726.56	402034.23	576.81	545.15	31.66	18
PCM-4	1119663.44	402595.79	575.73	545.74	29.99	25
PCM-5	1119403.24	403170.10	575.93	550.00	25.93	13
PCM-6	1119888.87	403172.47	580.25	566.50	13.75	5
PCM-7	1120148.17	402835.70	578.80	557.63	21.17	8
PCM-8	1120359.15	402481.45	579.32	564.43	14.89	5
PCM-9	1120570.20	402119.41	578.99	567.87	11.12	4
PCM-10	1120765.54	401719.85	579.40	556.39	23.01	15
PCBM-1	1119728.99	402023.91	576.75	519.72	57.03	10
PCBM-2	1119397.40	403171.17	576.03	519.20	56.83	10
PCBM-3	1120351.74	402490.71	580.24	517.01	63.23	10
NR-1	1120225.50	402179.30	597.30	547.02	50.28	10
NR-2	1119909.60	402350.20	589.73	539.25	50.48	10
NR-3	1119890.80	402179.40	591.70	543.47	48.23	10
NR-4	1119900.20	402610.40	582.39	543.93	38.46	10
NR-5	1119821.10	402672.30	581.55	538.70	42.85	10
NR-7	1119756.60	402828.40	587.21	546.18	41.03	10
NR-8	1119797.00	402217.80	592.31	538.73	53.58	10
NR-10	1119700.20	403057.10	587.87	550.73	37.14	10

NOTE: NR-6 AND NR-9 WERE NOT INSTALLED SINCE NAPL WAS NOT FOUND IN THE AREA AFTER THREE DRILLINGS



TYPICAL GEOMEMBRANE BOOT DETAIL
N.T.S.

GENERAL NOTES:

1. FOR SITE REMEDIATION PLANS SEE DWGS. 30K-02 THRU -05.
2. FOR SITE GRADING PLANS SEE DWGS. 10U-02 THRU -05.
3. ALL CONCRETE SURFACES TO BE BROOM FINISHED.

NOTES - WELL INSTALLATION

1. MATERIALS AND INSTALLATION FOR POST CLOSURE MONITORING WELLS AND PIEZOMETERS SHALL BE AS SPECIFIED IN SECTION 02011.
2. FOR LOCATION OF POST CLOSURE MONITORING WELLS, WET WELLS, NAPL RECOVERY WELLS AND PIEZOMETERS SEE SITE REMEDIATION PLAN DWGS. 30K-02 THRU 30K-05.
3. MATERIALS AND INSTALLATION FOR NAPL RECOVERY WELLS SHALL BE AS SPECIFIED IN SECTION 02012.

REV.	DATE	REVISION DESCRIPTION	DES. / CHK.	APPROVED
A	01/29/93	ENGINEERING REPORT SUBMITTAL (PRELIMINARY/INTERMEDIATE)	ACB / JG	DRK
B	09/08/95	FINAL ENGINEERING REPORT (DRAFT SUBMITTAL)		JG
0	12/21/95	ISSUED FOR BID		
1	2/5/96	ISSUED FOR CONSTRUCTION		
2	3/21/97	REVISED WET WELL DTL., WW-1 DATA (TABLE 1) & WELL INSTL. NOTES		
3	1/21/98	AS-BUILT		

DWG.NO.	REFERENCE DRAWINGS
594000-30K-02	SITE REMEDIATION PLAN - AREA 1
594000-30K-03	SITE REMEDIATION PLAN - AREA 2
594000-30K-04	SITE REMEDIATION PLAN - AREA 3
594000-30K-05	SITE REMEDIATION PLAN - AREA 4

FLUOR DANIEL

DESIGNED BY: A. BUMB/U. KUMTHEKAR
CHECKED BY: S. LAWRENCE
SUPERVISOR: C. MARS | RELEASE DATE:
LEAD ENGR./SPEC.: C. TAYLOR | INITIALS:
PROJECT: C. MARS | APP.DATE:
CLIENT: OXYCHEM / OLIN | APP.DATE:

OXYCHEM / OLIN
REMEDIAL DESIGN
102nd STREET LANDFILL SITE
NIAGARA FALLS, NEW YORK

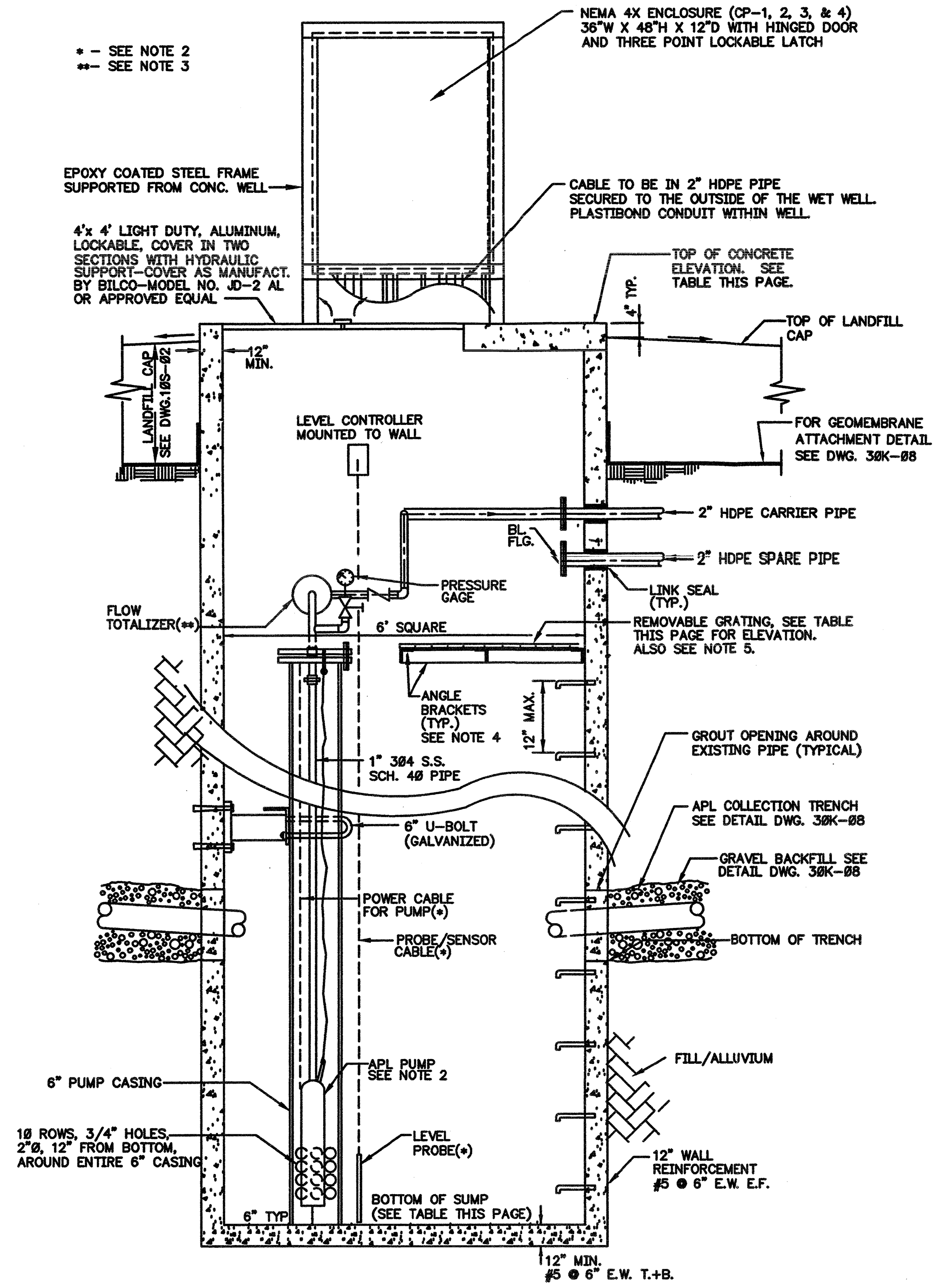
AS-BUILT
APL, NAPL AND MONITORING WELLS
AND MISC. DETAILS

SCALE: AS NOTED | DRAWING NUMBER: 594000-30K-06 | REV. 3

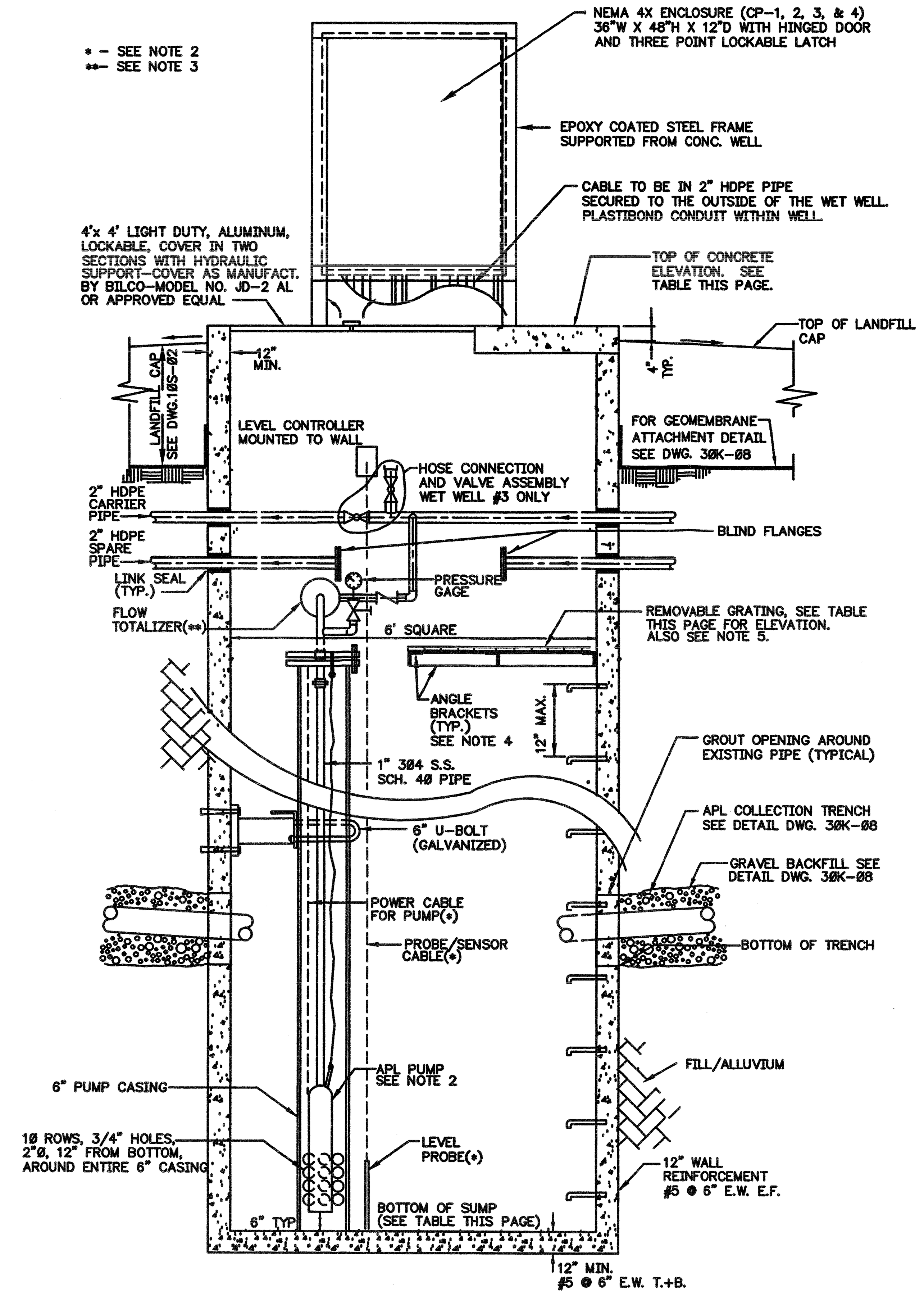
MANUAL CHANGES MADE - YES ☐ NO ☐ DWG. FILE UPDATED - YES ☐ NO ☐ MODEL UPDATED - YES ☐ NO ☐ CADD DRAWING No. 30K06.DWG 1/21/98

STATE OF NEW YORK CHARLES TAYLOR, JR LICENSED PROFESSIONAL ENGINEER 073024
8-13-99

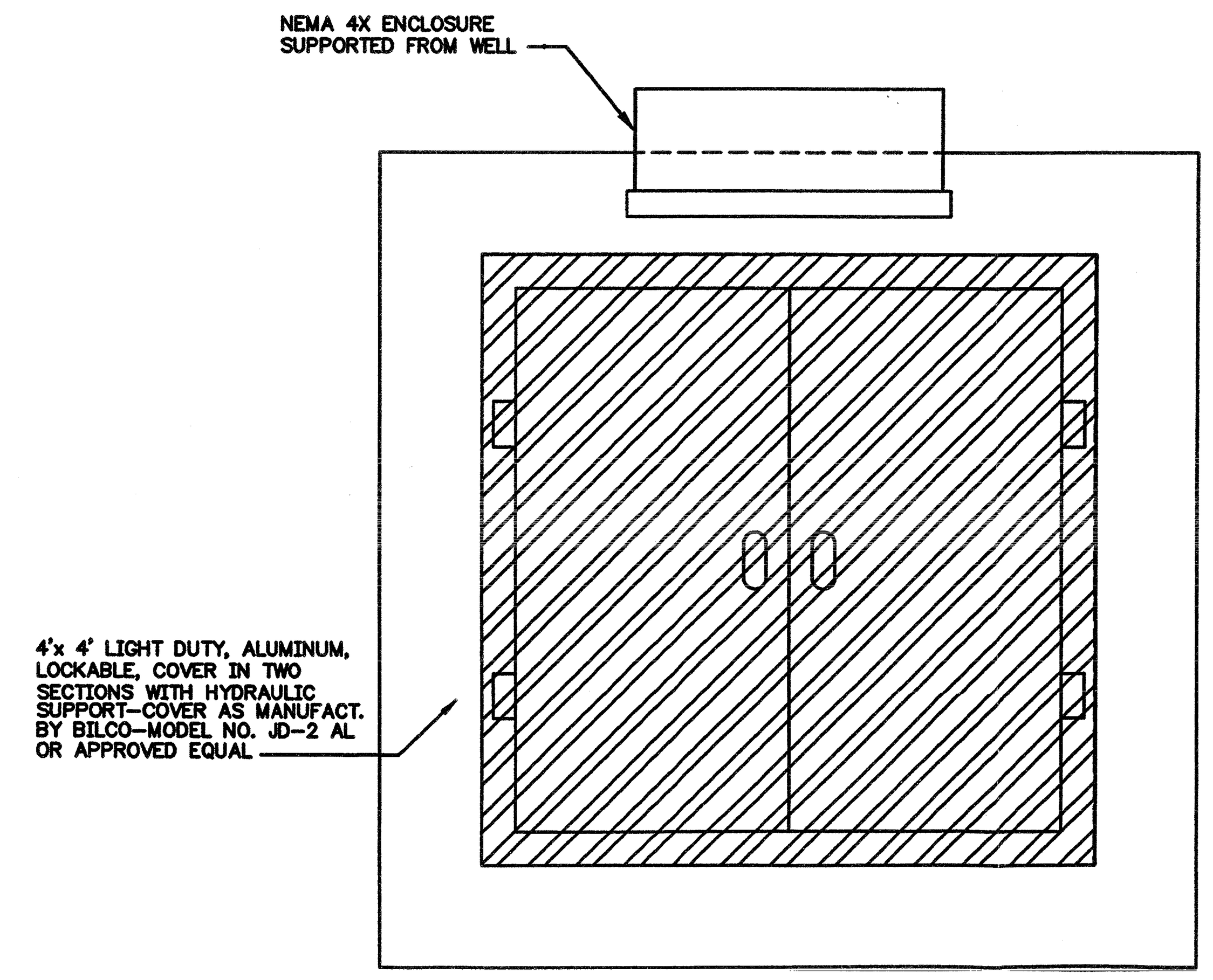
WRK. PKG. DIST. CODE



TYPICAL WET WELL DETAIL
WET WELL WW-1 AND WW-4
N.T.S.



TYPICAL WET WELL DETAIL
WET WELL WW-2 AND WW-3
N.T.S.



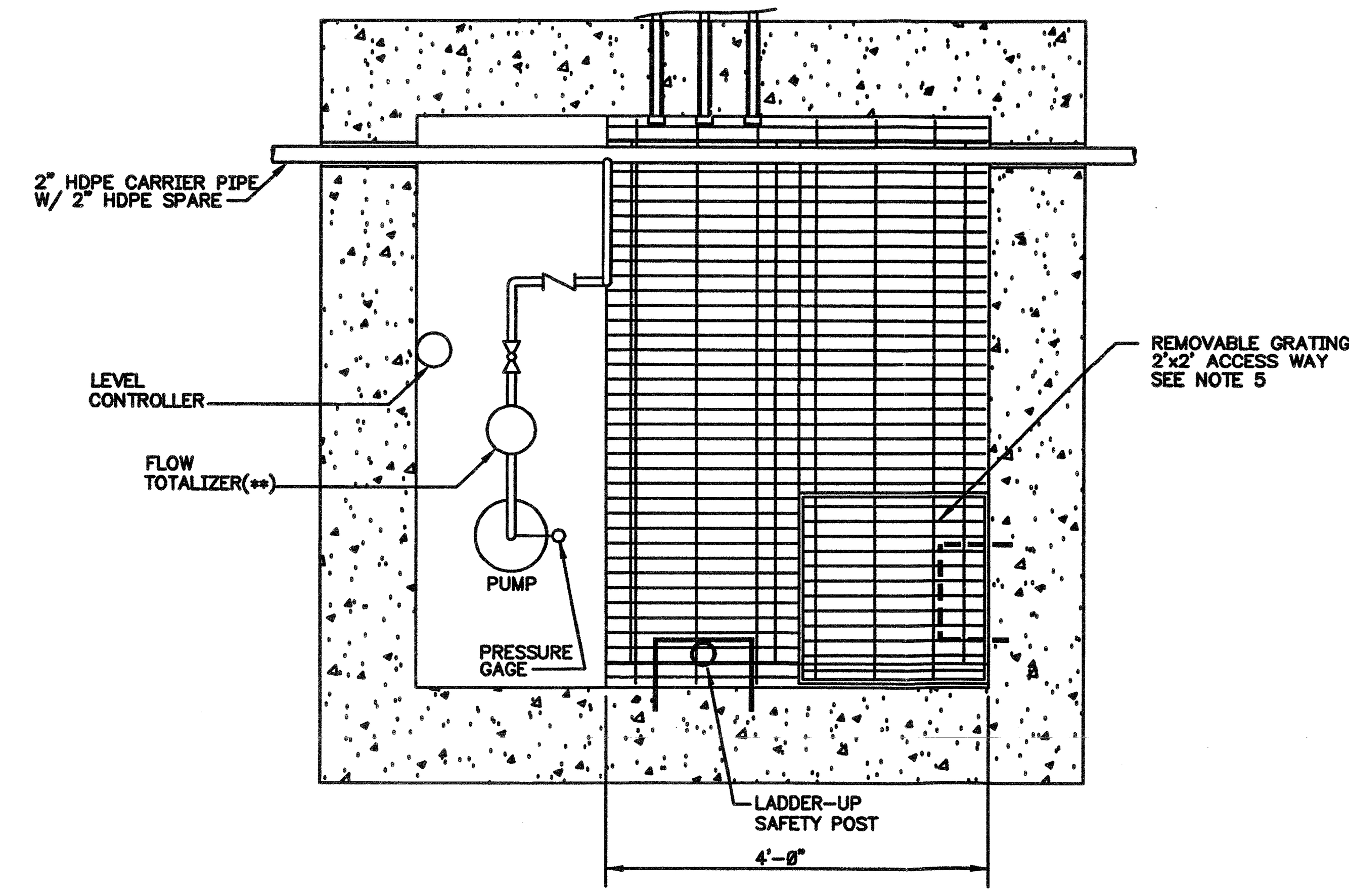
TYPICAL WET WELL PLAN
EXTERIOR
N.T.S.

GENERAL NOTES:

1. FOR SITE REMEDIATION PLANS SEE DWGS. 30K-02 THRU -05.
2. ALL CONCRETE SURFACES TO BE BROOM FINISHED.

NOTES – WET WELL INSTALLATION

1. FOR LOCATION OF WET WELLS SEE SITE REMEDIATION PLAN DWGS. 30K-02 THRU 30K-05.
2. FOR APL PUMP AND ACCESSORIES AND CONTROLS, SEE EQUIPMENT DATA SHEETS.
3. FOR VALVES AND FLOW TOTALIZER SEE INSTRUMENT SPECIFICATIONS. VALVES WILL HAVE 18 INCH STEM EXTENSIONS.
4. 3" x 2" x 1/2" LLV GALVANIZED BRACKET. ATTACH BRACKETS TO WALL WITH 3/4" DIAMETER HILTI KWIK BOLTS AT 12" ON CENTER.
5. PROVIDE 1 1/2" GALVANIZED GRATING. PROVIDE 1/2" CLEARANCE BETWEEN EDGE OF GRATING AND WALLS.



TYPICAL WET WELL PLAN
INTERIOR
(WW-2 & 3 SHOWN, WW-1 & 4 SIMILAR)
N.T.S.

	TOP OF CONCRETE	GRATING	BOTTOM OF WELL
WW-1	575.80	567.80	553.90
WW-2	575.48	567.43	553.68
WW-3	575.62	567.62	553.72
WW-4	575.97	567.97	554.17

REV.	DATE	REVISION DESCRIPTION	DES. CHK.	APPROVED
A	2/27/97	ISSUED FOR REVIEW	GK	
B	3/11/97	ISSUED FOR REVIEW	GK	
0	3/21/97	ISSUED FOR APPROVAL	GK	
1	1/20/98	AS-BUILT		

DWG.NO.	REFERENCE DRAWINGS
594010-10S-02	CAPPING SYSTEM & BULKHEAD – SECTIONS AND DETAILS
594010-30K-02	SITE REMEDIATION PLAN – AREA 1
594010-30K-03	SITE REMEDIATION PLAN – AREA 2
594010-30K-04	SITE REMEDIATION PLAN – AREA 3
594010-30K-05	SITE REMEDIATION PLAN – AREA 4
594010-30K-08	APL COLLECTION SYSTEM – SECTIONS AND DETAILS

FLUOR DANIEL

DESIGNED BY G. KURYLEC
CHECKED BY S. LAWRENCE
SUPERVISOR C. MARS
LEAD ENGR./SPEC. C. TAYLOR
PROJECT C. MARS
CLIENT OXYCHEM / OLIN

OXYCHEM / OLIN
REMEDIAL DESIGN
102nd STREET LANDFILL SITE
NIAGARA FALLS, NEW YORK

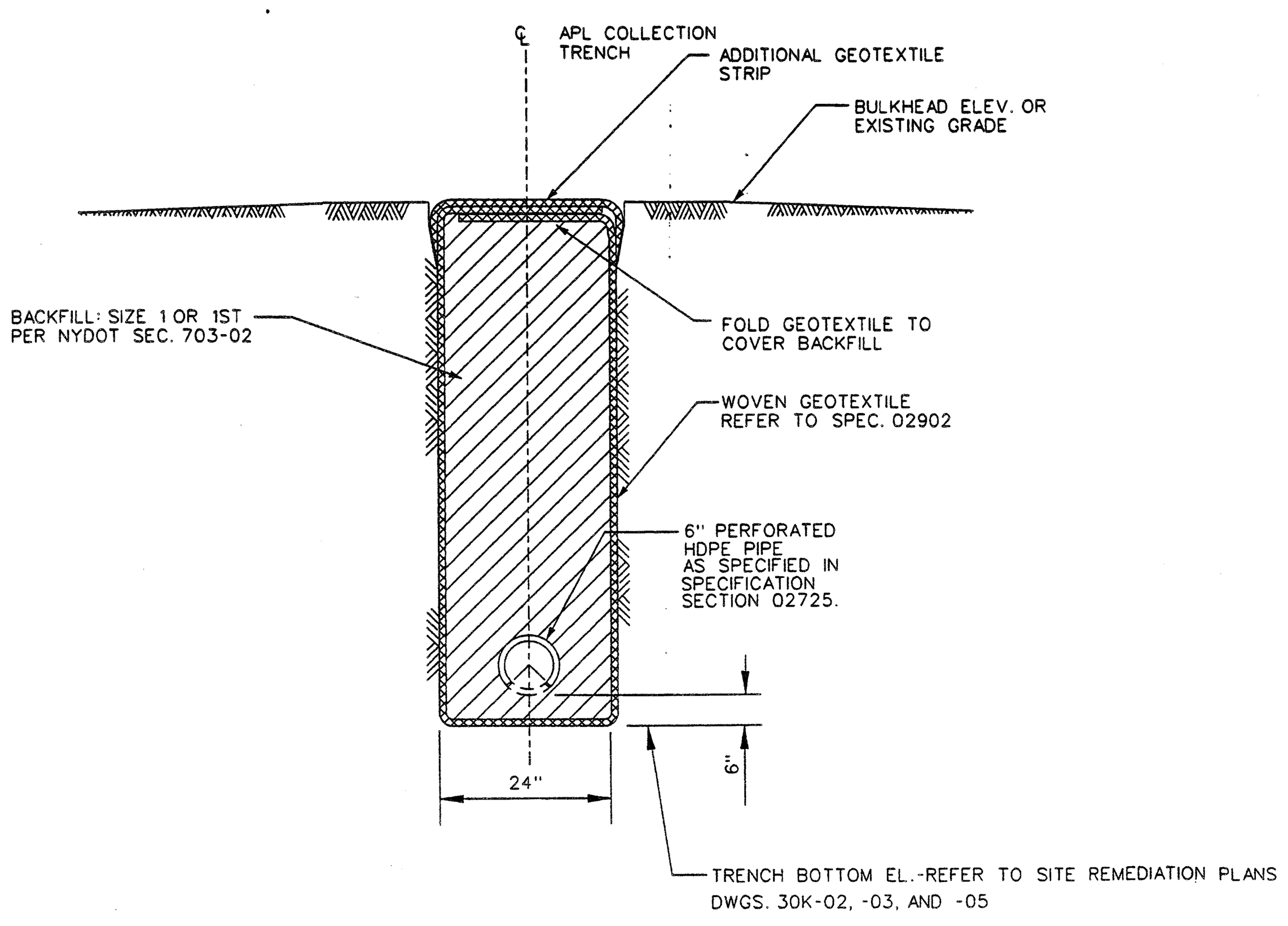
AS-BUILT APL WET WELL DETAILS

SCALE AS NOTED — DRAWING NUMBER 594000-30K-06C — REV. 1

MANUAL CHANGES MADE – YES ☐ NO ☐ DWG. FILE UPDATED – YES ☐ NO ☐ MODEL UPDATED – YES ☐ NO ☐ CADD DRAWING No. 30K06C.DWG 1/20/98

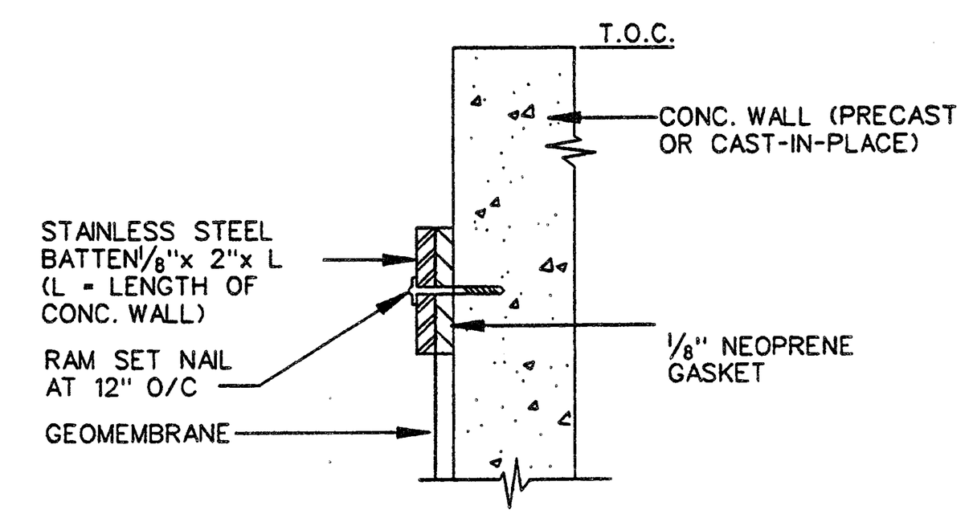
STATE OF NEW YORK — CHARLES TAYLOR — LICENSED PROFESSIONAL ENGINEER

DIST. CODE VRK. PKG. SUB-CONTRACT PKG.



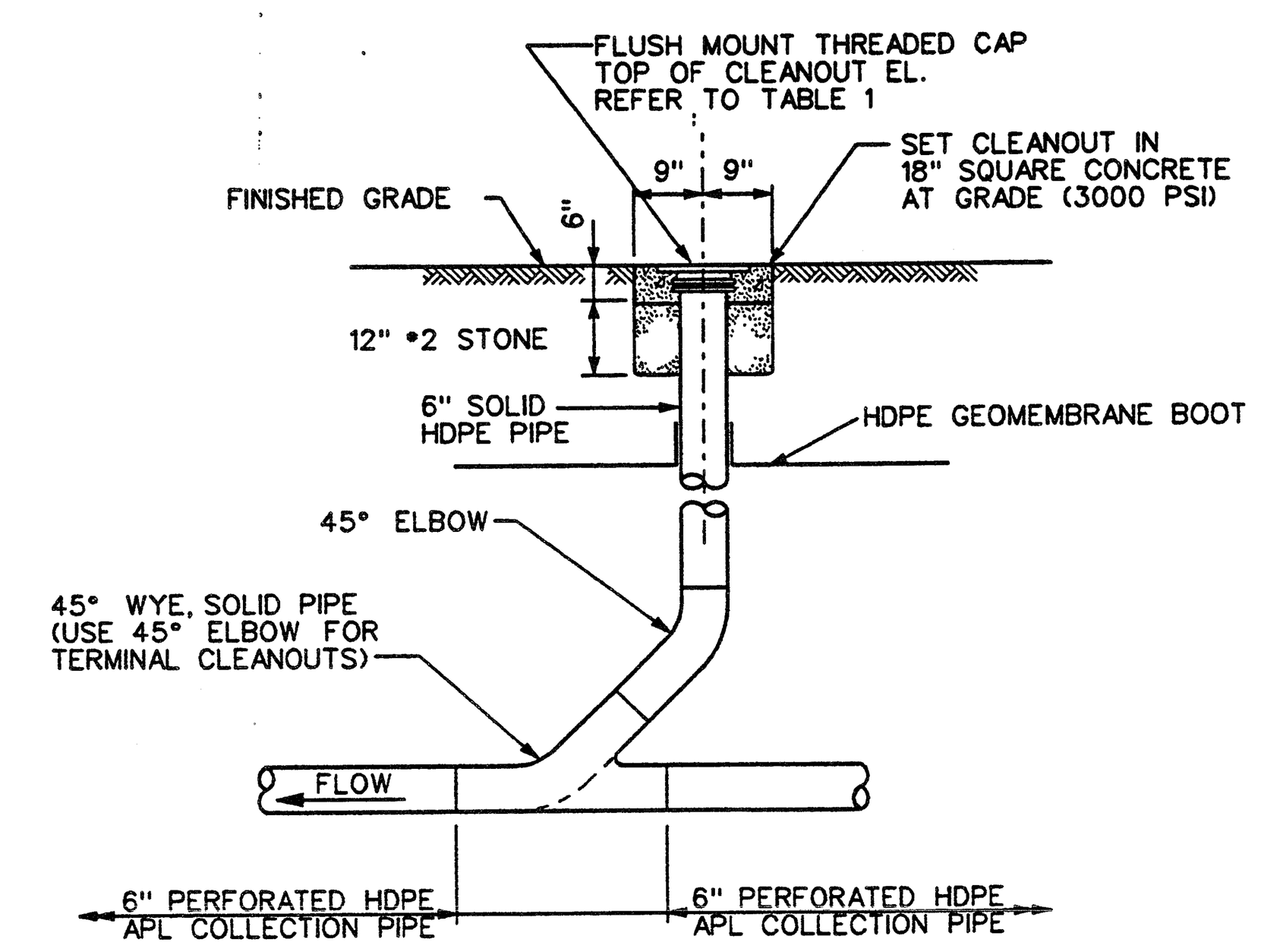
APL COLLECTION TRENCH - TYPICAL SECTION

CONSTRUCTION USING BIO-POLYMER TECHNIQUE (WITHIN LANDFILL) NTS.



GEOMEMBRANE ATTACHMENT DETAIL

N.T.S.



(REF. DWG. 30K-02, 30K-03 AND 30K-05)

TYPICAL CLEANOUT DETAIL
APL COLLECTION TRENCH

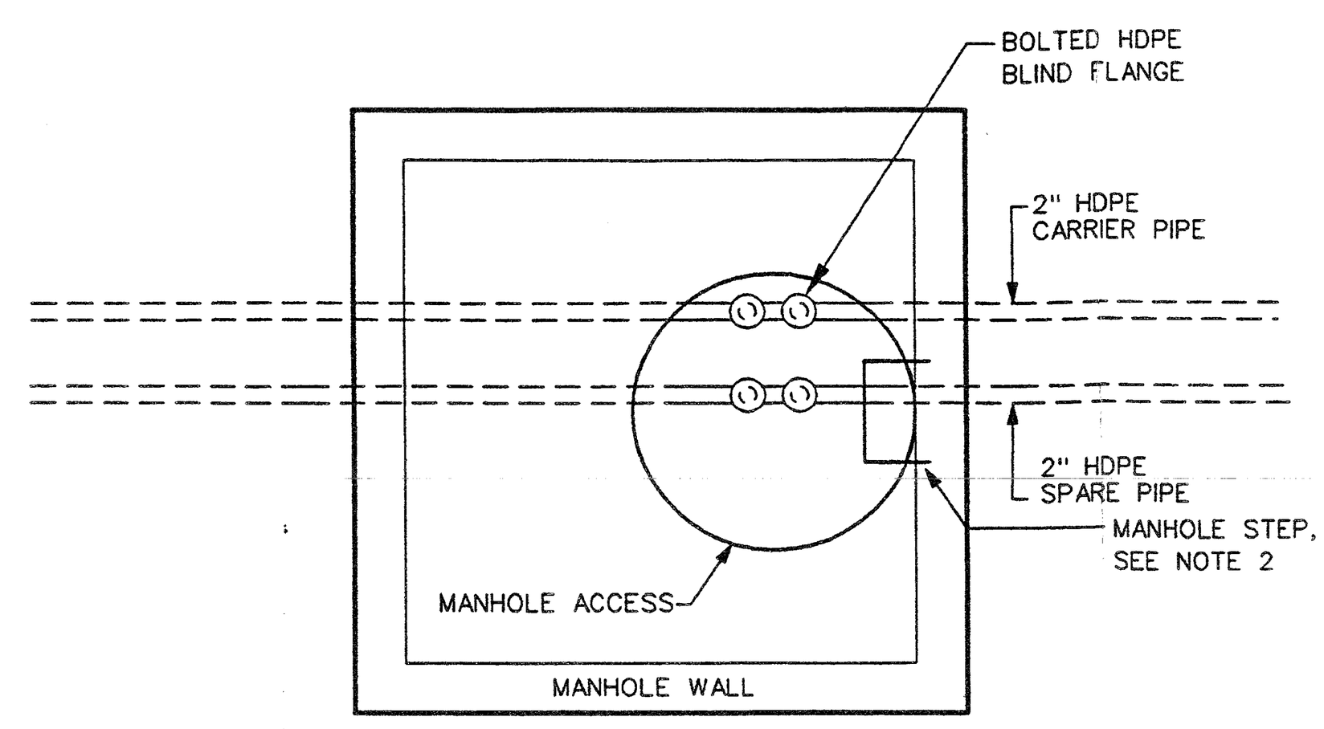
(WITHIN LANDFILL) N.T.S.

TABLE -1
TOP OF CLEANOUT ELEVATION

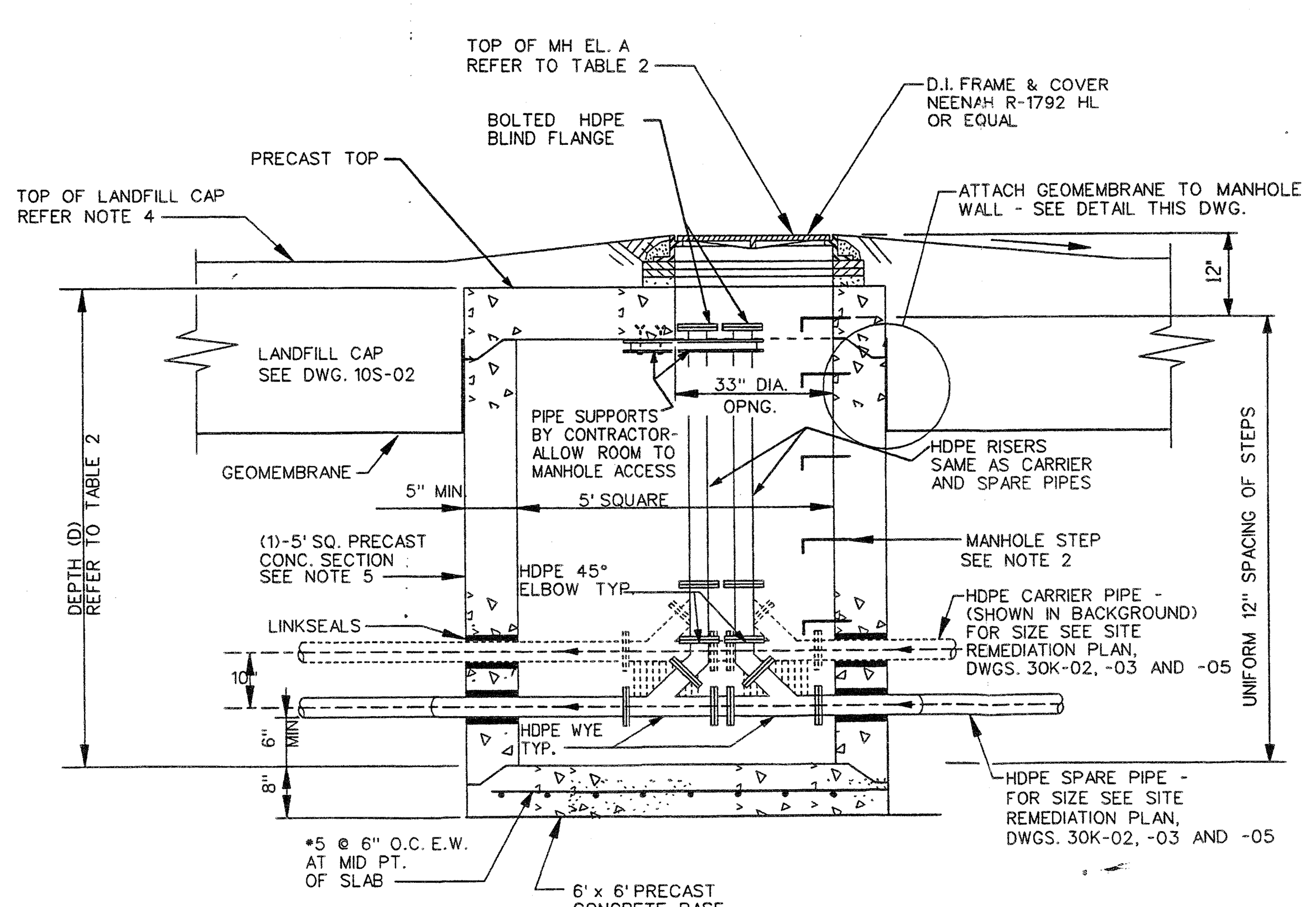
CO #	NORTHING	EASTING	TOP OF CLEANOUT EL.
CO 1	1119976.07	401764.73	577.93
CO 2	1120350.80	401762.54	581.42
CO 3	1119776.23	401967.46	575.51
CO 3	1119774.09	401972.45	575.45
CO 4	1119727.87	402375.94	575.39
CO 5	1119683.30	402610.16	575.44
CO 5	1119683.36	402611.60	575.50
CO 6	1119487.11	403014.81	575.31
CO 6	1119486.06	403017.76	575.51
CO 7	1119590.03	403124.18	579.54

TABLE -2
IN LINE CLEANOUT MANHOLES

CO-MH #		COORDINATES EAST	NORTH	TOP OF MH EL. (A)	DEPTH (D)
CO-MH 1	———	401770.55	112068.47	585.07	6'-3"
CO-MH 2	———	401777.89	1120348.75	583.97	6'-3"
CO-MH 3	———	401775.31	1119951.61	577.33	6'-4"
CO-MH 4	———	401981.06	1119774.87	575.81	6'-2"
CO-MH 5	———	402366.46	1119731.53	575.66	6'-3"
CO-MH 6	———	402619.63	1119681.68	575.82	6'-2"
CO-MH 7	———	403026.11	1119484.11	576.12	6'-3"



PLAN VIEW



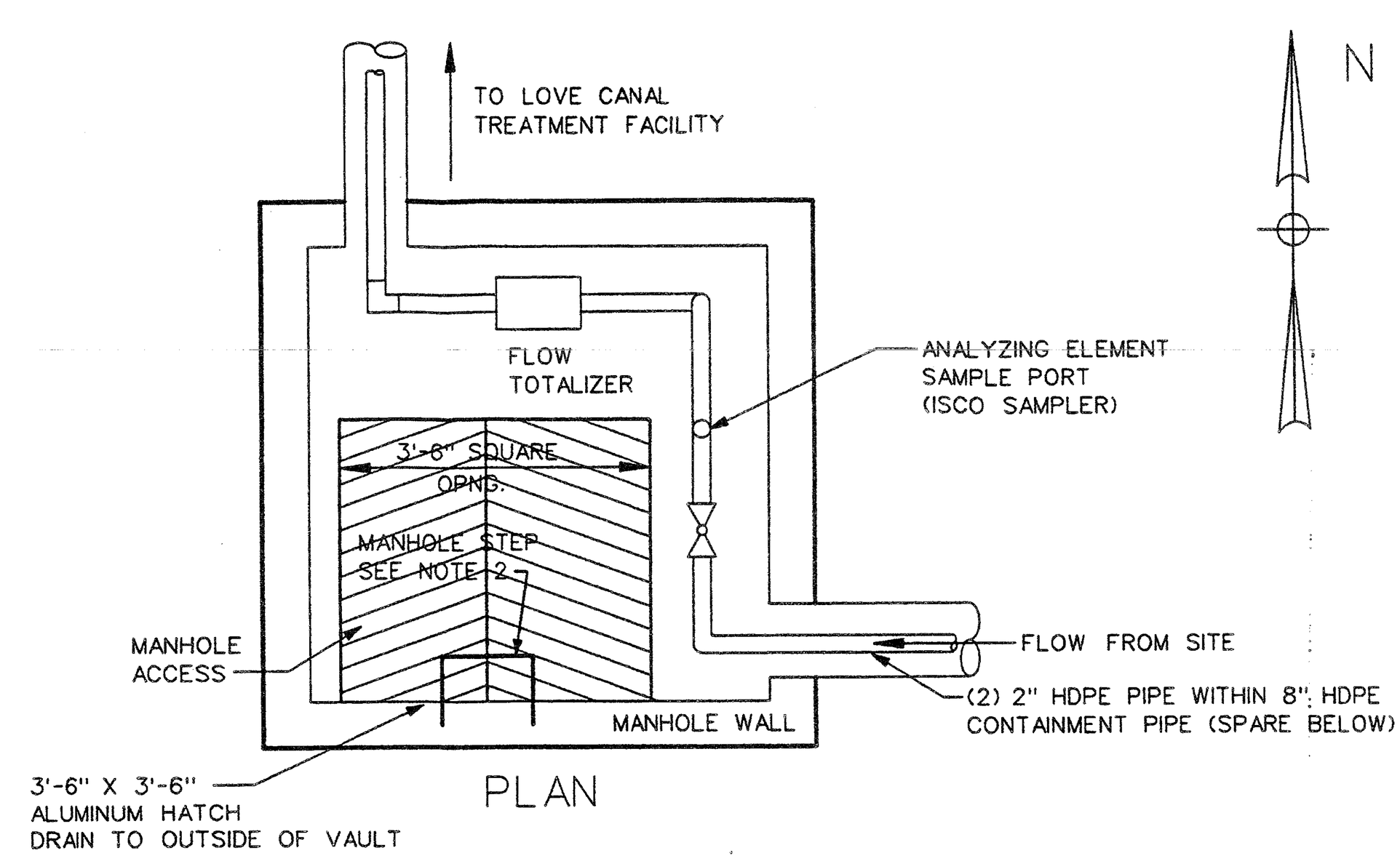
SECTION

INLINE CLEANOUT MANHOLE DETAIL
(WITHIN LANDFILL)

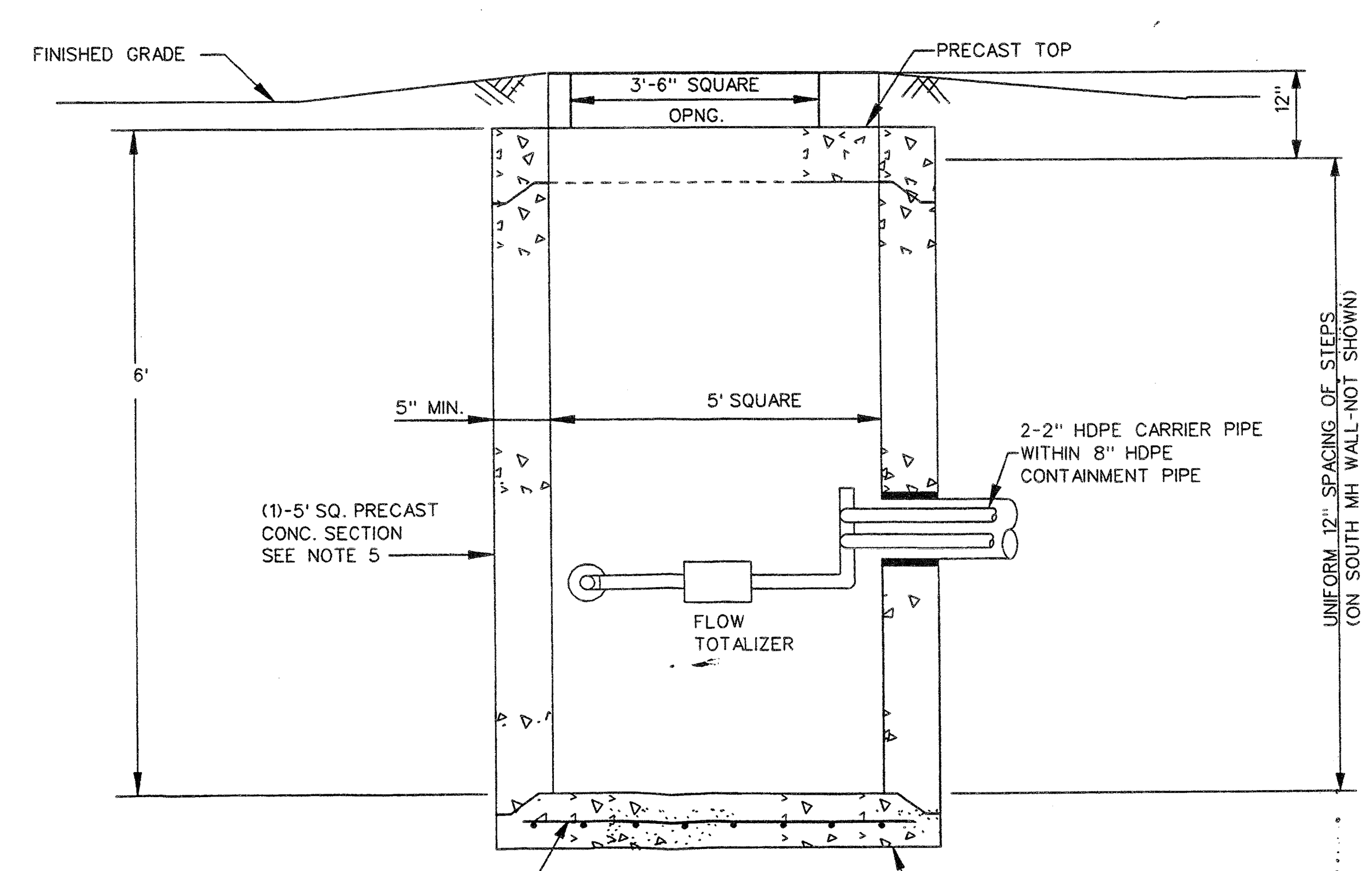
N.T.S.

GENERAL NOTES: INLINE CLEANOUT MANHOLE DETAIL

1. OPENINGS FOR PIPE IN PRECAST BASE AND RISER UNITS SHALL BE PREFORMED. THE CONTRACTOR SHALL FURNISH THE FABRICATOR WITH ANGLES BETWEEN CENTER LINES, THE INVERT ELEVATIONS AND THE SIZE OF ALL PIPES. HOLES SHALL BE SIZED TO ACCOMODATE LINK SEAL.
2. MANHOLE STEPS SHALL BE NEENAH R-1982W, ALUMINUM OR APPROVED EQUAL.
3. REFER TO SITE REMEDIATION PLANS (DWGS. 30K-02, 03, AND 05) FOR LOCATIONS, INVERT ELEVATIONS AND PIPE SIZES.
4. FOR TOP OF LANDFILL CAP ELEVATIONS AT INLINE CLEANOUT MANHOLES, SEE TABLE 2 THIS DWG.
5. PRECAST REINFORCED CONCRETE CHAMBER SHALL CONFORM TO ASTM C478.
6. CAST STEEL SLEEVES INTO MANHOLES.



PLAN

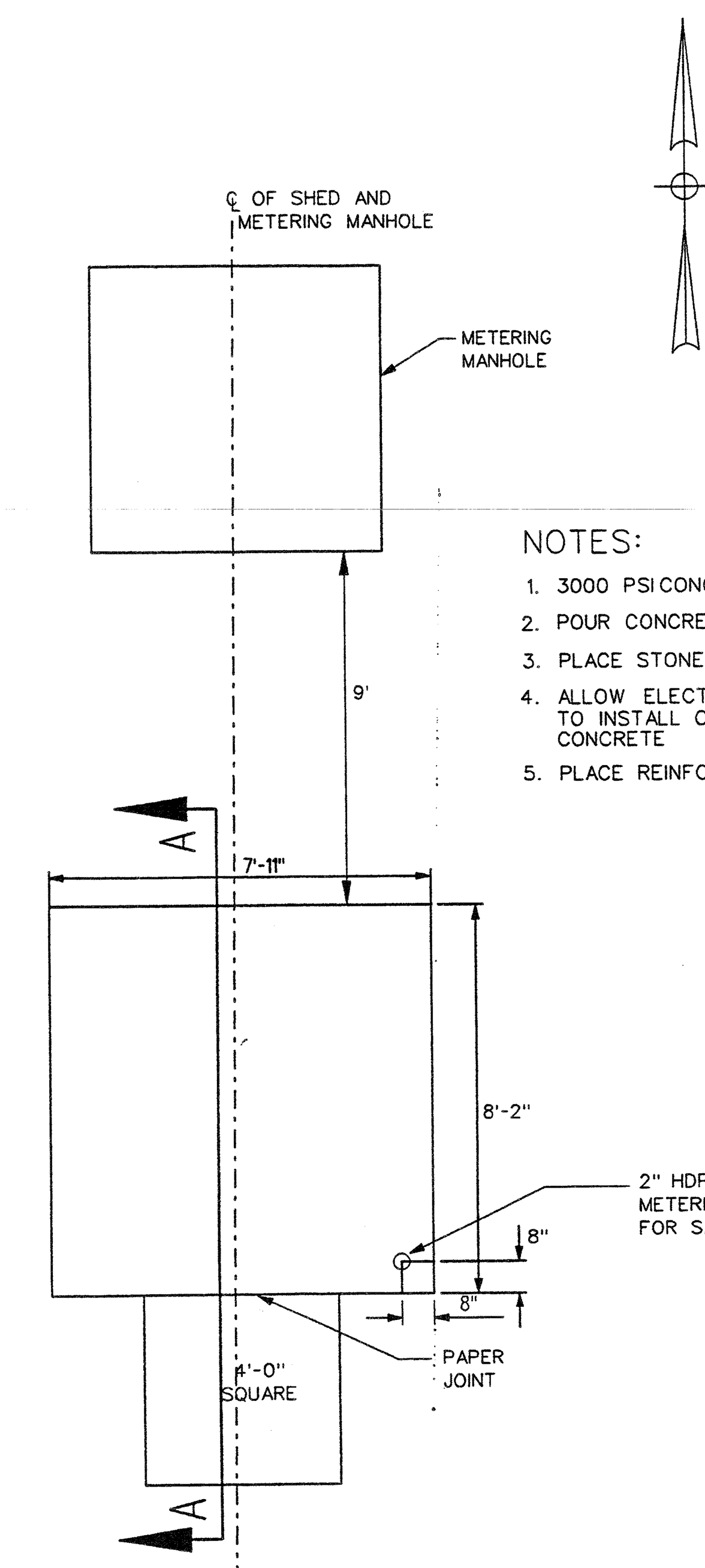


SECTION

SANITARY SEWER METER AND SAMPLING MANHOLE DETAIL

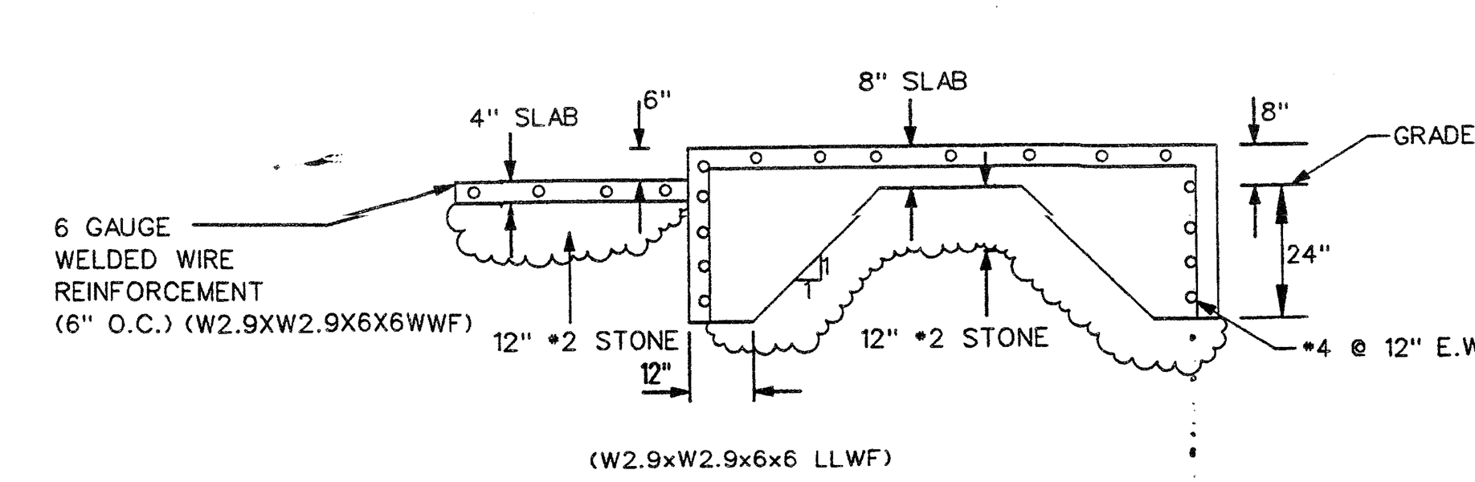
(LKG. NORTHEAST)

N.T.S.



NOTES:

1. 3000 PSI CONCRETE AT 28 DAYS SHALL BE USED
2. POUR CONCRETE ON 12" CRUSHED STONE
3. PLACE STONE ON WELL COMPACTED SUBBASE
4. ALLOW ELECTRICAL AND MECHANICAL CONTRACTORS TO INSTALL CONDUIT AND PIPE PRIOR TO POURING CONCRETE
5. PLACE REINFORCEMENT IN CENTER OF SLABS



SECTION A-A

SAMPLING SHED FOUNDATION PLAN

REV.	DATE	REVISION DESCRIPTION	DES. CHK.	APPROVED
A	1/29/93	ENGINEERING REPORT SUBMITTAL (PRELIMINARY/INTERMEDIATE)	JTG	DRK
B	8/24/95	REVISED TITLE		
C	9/8/95	FINAL ENGINEERING REPORT (DRAFT SUBMITTAL)		
D	12/21/95	ISSUED FOR BID		
1	2/5/95	ISSUED FOR CONSTRUCTION		
2	3/21/97	REVISED IN LINE C.O. DTL., TABLE 2 & ADDED SAN MH DTLS.	GZK	
3	8/20/97	REVISED CLEANOUT SCHEDULES AND SAN. MH DTL. ADDED VARIOUS DETAILS.	MCG	
4	12/12/97	REVISED SANITARY SEWER AND SAMPLING MANHOLE DETAIL. ADDED SAMPLING SHED DETAIL.		
5	1/20/98	AS-BUILT		

DWG.NO.	REFERENCE DRAWINGS
594010-10U-07	FORCE MAIN ROUTING PLAN
594010-30K-08A	FORCE MAIN DETAILS
594010-30K-02	SITE REMEDIATION PLAN - AREA 1
594010-30K-03	SITE REMEDIATION PLAN - AREA 2
594010-30K-04	SITE REMEDIATION PLAN - AREA 3
594010-30K-05	SITE REMEDIATION PLAN - AREA 4

FLUOR DANIEL

DESIGNED BY: A. BUMB/U. KUMTHEKAR
CHECKED BY: S. LAWRENCE
SUPERVISOR: C. MARS
LEAD ENGR./SPEC.: C. TAYLOR
PROJECT: C. MARS
CLIENT: OXYCHEM/OLIN

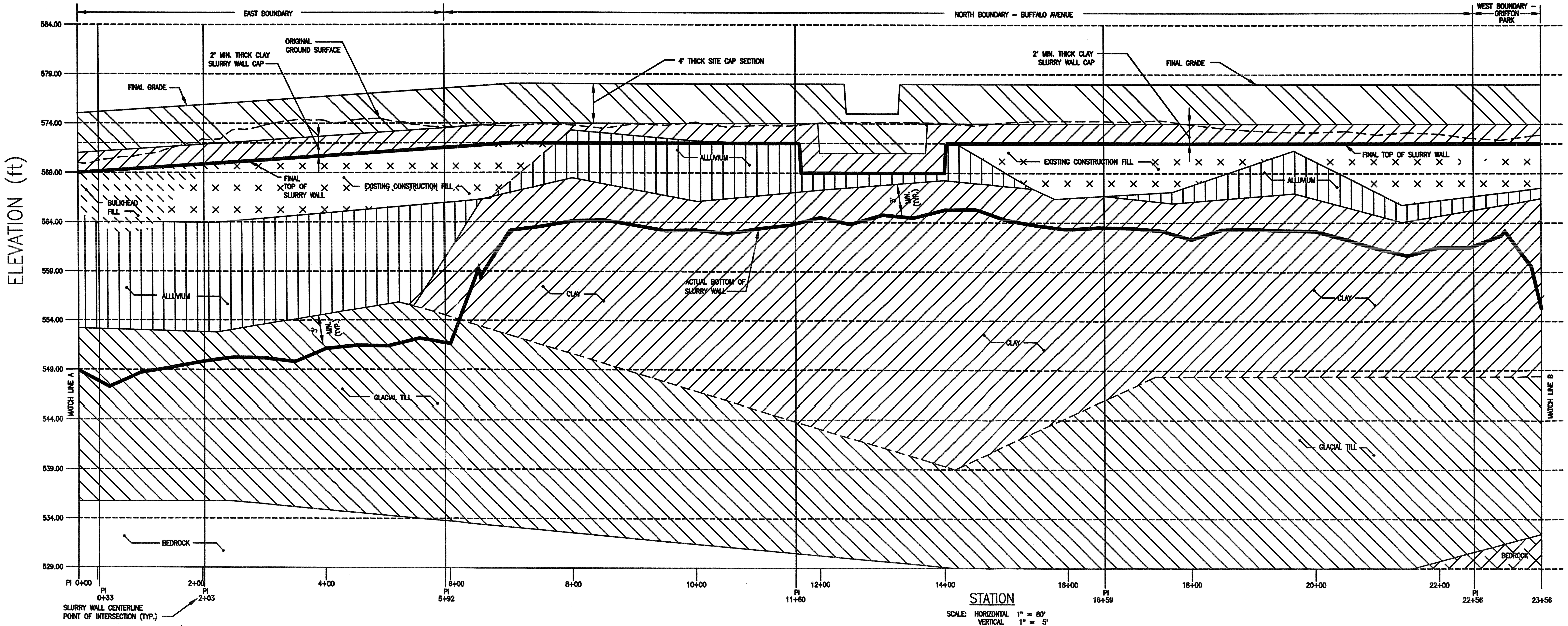
OXYCHEM/OLIN
REMEDIAL DESIGN
102nd STREET LANDFILL SITE
NIAGARA FALLS, NEW YORK

AS-BUILT APL COLLECTION SYSTEM
SECTIONS AND DETAILS

DRAWING NUMBER: 594000-30K-08 REV. 5

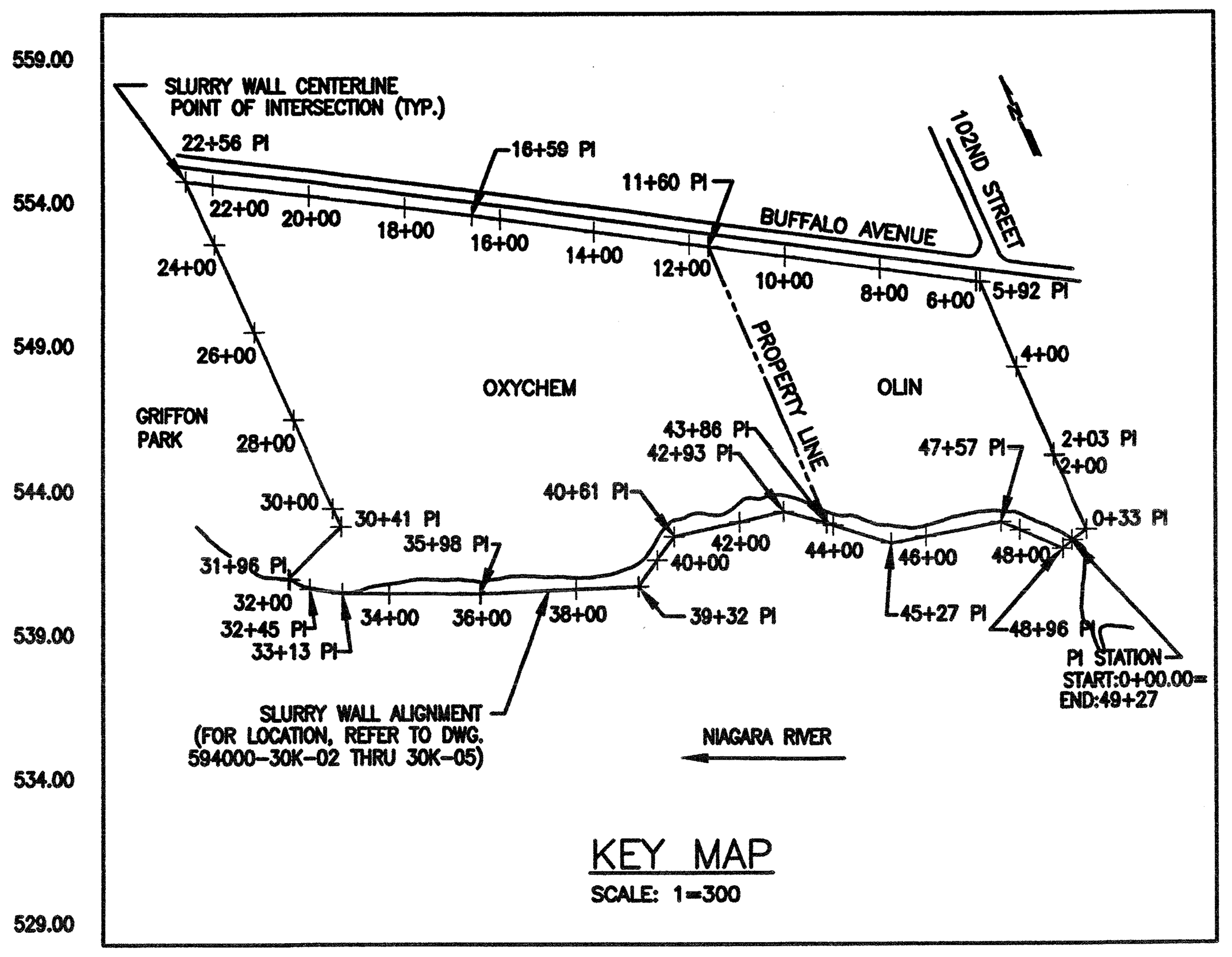
MANUAL CHANGES MADE - YES ☐ NO ☐ DWG. FILE UPDATED - YES ☐ NO ☐ MODEL UPDATED - YES ☐ NO ☐ CADD DRAWING No. 30K08.DGN

STATE OF NEW YORK LICENSED PROFESSIONAL ENGINEER 071024

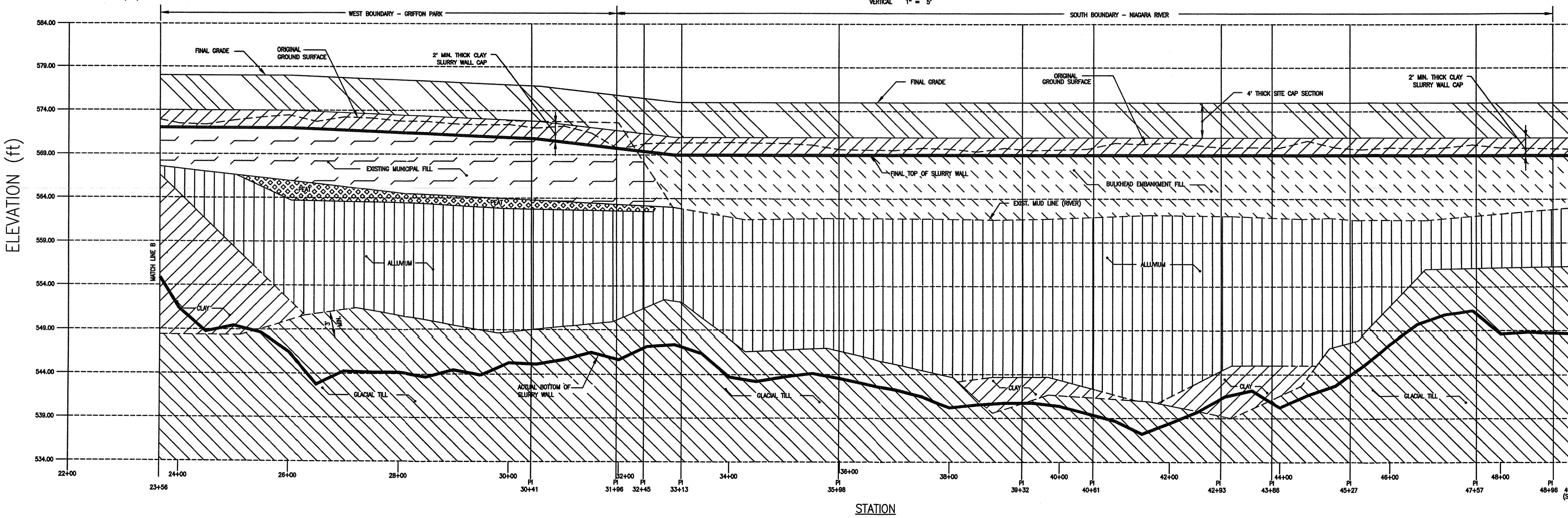


NOTES:

1. DATA CONCERNING SUBSURFACE CONDITIONS HAS BEEN OBTAINED FROM BORINGS PERFORMED DURING THE PREDESIGN FIELD ACTIVITIES. BORING LOGS ARE INCLUDED IN APPENDIX A OF THE PREDESIGN FIELD ACTIVITIES REPORT.
2. A TWO FOOT THICK MIN. CLAY SLURRY WALL CAP IS TO BE INSTALLED ON TOP OF THE SLURRY WALL ALONG ITS ENTIRE LENGTH.
3. SLURRY WALL WILL BE KEYED INTO THE UNDERLYING GLACIAL TILL/CLAY A MINIMUM OF 3 FEET BELOW ANY WEATHERED ZONE.



KEY MAP
SCALE: 1=300



0 40 80 FT.
UNLESS NOTED OTHERWISE

REV.	DATE	REVISION DESCRIPTION	DES. CHK.	APPROVED	REV.	DATE	REVISION DESCRIPTION	DES. CHK.	APPROVED
A	01/29/93	ENGINEERING REPORT SUBMITTAL (PRELIMINARY/INTERMEDIATE)	FGS	DRK					
B	09/06/95	ENGINEERING REPORT SUBMITTAL (FINAL)							
0	12/21/95	ISSUE FOR BIDS							
1	2/5/96	ISSUED FOR CONSTRUCTION							
2	2/19/98	AS-BUILT							

DWG.NO.	REFERENCE DRAWINGS	DWG.NO.	REFERENCE DRAWINGS

FLUOR DANIEL

DESIGNED BY: G. KURYLEC
CHECKED BY: S. LAWRENCE
SUPERVISOR: C. MARS | RELEASE DATE:
LEAD ENGR./SPEC.: C. TAYLOR | INITIALS:
PROJECT: C. MARS | APP.DATE:
CLIENT: OXYCHEM / OLIN | APP.DATE:

STATE OF NEW YORK · CHARLES TAYLOR JR · LICENSED PROFESSIONAL ENGINEER · 071024
8-13-99

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102nd STREET LANDFILL SITE
NIAGARA FALLS, NEW YORK

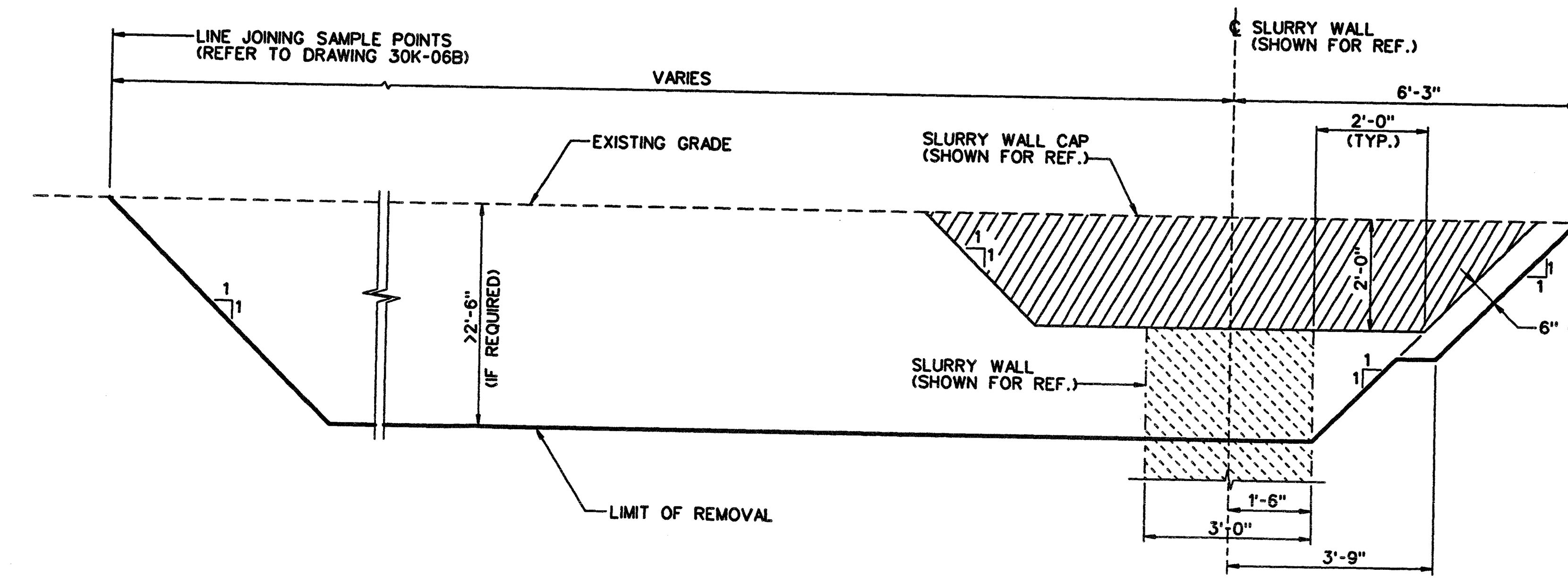
AS-BUILT SLURRY WALL PROFILE

SCALE: AS NOTED | DRAWING NUMBER: 594000-30K-09 | REV. 2

WRK. PKG. | DIST. CODE | SUB-CONTRACT PKG.

MANUAL CHANGES MADE – YES ☐ NO ☐ DWG. FILE UPDATED – YES ☐ NO ☐ MODEL UPDATED – YES ☐ NO ☐ CADD DRAWING No. 30K09B.DWG 2/5/96

07/13/99 11:00



TYPICAL PERIMETER SOILS SECTION

SCALE: 1"=2'

REFER TO DWG. 30K-06B FOR GRID COORDINATES AND DEPTHS

PERMANENT SEEDING MIXTURE AND NOTES

MIXTURE	'INSIDE SLURRY WALL' LB/ACRE	'PERIMETER AREAS'	LB/ACRE
WHITE CLOVER	5	TRIPLE CROWN PERENIAL RYE	48.12
'LANCER' PERENIAL PEA	20	KENTUCKY BLUE GRASS	24.68
ANNUAL RYEGRASS	30	CREEPING RED FESCUE	24.24
TIMOTHY	30		
ORCHARD GRASS	10		
SMOOTH BROMEGRASS	10		
REDTOP	5		
TOTAL	110		

NOTES

1. USE ONE (1) 55 LB BAG OF SEED, THREE (3) 66.3 LB BAGS OF FERTILIZER, THIRTEEN (13) 50 LB BAGS OF MULCH, AND ½ BAG OF INNOCULAR. 1500 GALLONS OF WATER NEEDED.
2. PERIMETER AREAS INCLUDE GRIFFON PARK AND ANCZOK EASEMENT AREA.
3. SITE PREPARATION
   A. INSTALL NEEDED WATER AND EROSION CONTROL MEASURES AND BRING AREA TO BE SEEDED TO DESIRED GRADES.
   B. TOPSOIL TO BE A MINIMUM OF 6" THICK. TOPSOIL MATERIAL AND INSTALLATION TO BE IN ACCORDANCE WITH THE NY GUIDELINES FOR URBAN EROSION AND SEDIMENT CONTROL (UESC).
   C. REMOVE ALL STONES OVER 1 INCH IN DIAMETER, STICKS AND FOREIGN MATTER FROM THE SURFACE.
   D. INCORPORATE LIME AND FERTILIZER IN TOP 2-4 INCHES OF TOPSOIL.
   E. SMOOTH AND FIRM THE SEEDBED.
4. PLANTING

   IF HYDROSEEDED, LIME AND FERTILIZER MAY BE APPLIED THROUGH THE SEEDER THEN ROLLING IS NOT PRACTICAL.
5. MULCHING

   MULCH ALL SEEDED AREAS IN ACCORDANCE WITH STANDARD AND SPECIFICATIONS FOR MULCHING ON PAGE 3.31 OF THE N.Y. GUIDELINES FOR URBAN EROSION AND SEDIMENT CONTROL (UESC).
6. RESTRICT USE

   NEW SEEDINGS SHOULD BE PROTECTED FROM USE FOR ONE FULL YEAR TO ALLOW DEVELOPMENT OF A DENSE SOD WITH GOOD ROOT STRUCTURE.
7. SWALES

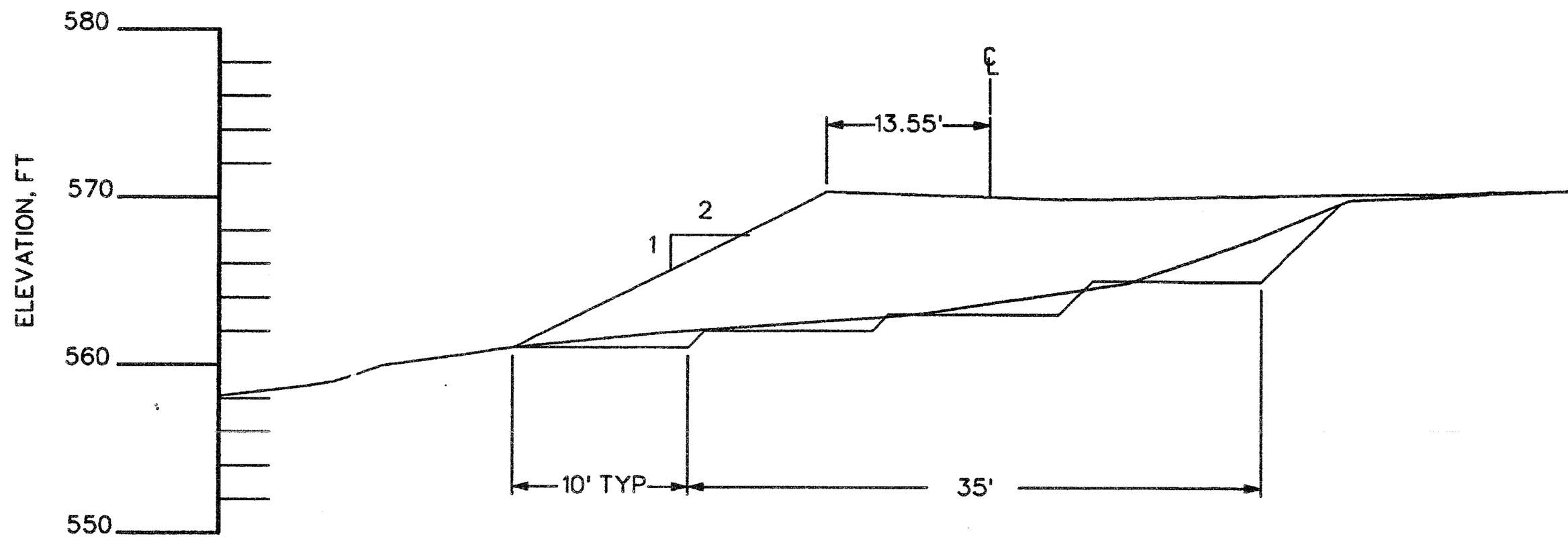
   THE ABOVE SEED MIXTURE IS COMPATIBLE WITH WATERWAYS. SWALES AND OUTLETS SHALL BE PROTECTED AGAINST EROSION BY VEGETATIVE MEANS AS SOON AFTER CONSTRUCTION AS PRACTICAL. VEGETATION MUST BE WELL ESTABLISHED BEFORE DIVERSIONS OR OTHER CHANNELS ARE OUTLETTED INTO THEM. USE EROSION CONTROL MATTING, OR SODDING OF CHANNELS TO PROVIDE EROSION PROTECTION AS SOON AFTER CONSTRUCTION AS POSSIBLE.

   SWALE CENTERS OR CRUCIAL AREAS MAY BE SODDED. REFER TO THE STANDARD AND SPECIFICATION FOR STABILIZATION WITH SOD ON PAGE 3.35 OF THE N.Y. GUIDELINES FOR URBAN EROSION AND SEDIMENT CONTROL. BE SURE SOD IS SECURELY ANCHORED USING STAPLES OR STAKES.
8. MAINTENANCE

   FERTILIZE, LIME AND MOW AS NEEDED TO MAINTAIN DENSE PROTECTIVE VEGETATIVE COVER.

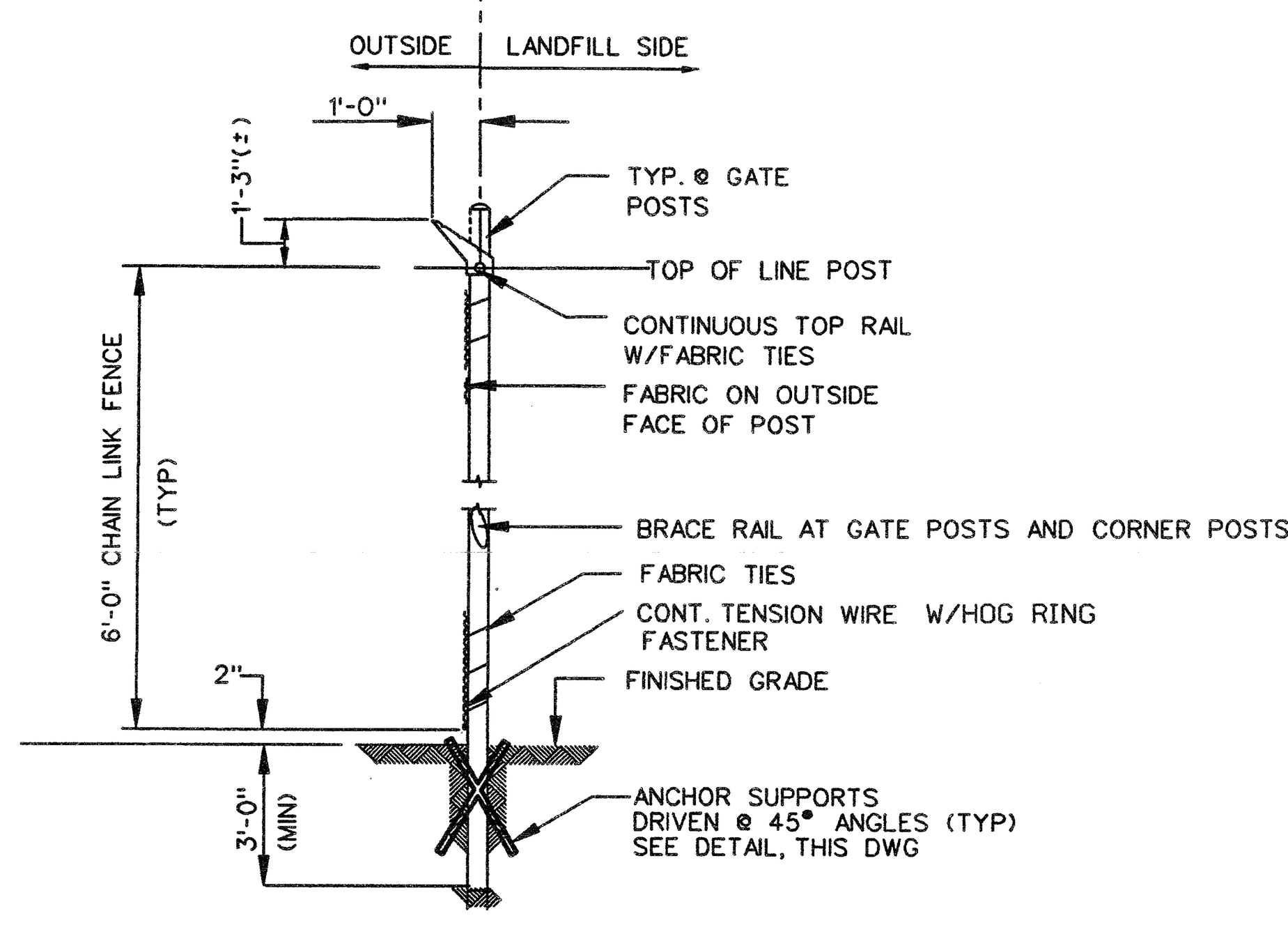
   SWALES SHALL NOT BE USED FOR ROADWAYS.

   IF RILLS DEVELOP IN THE BOTTOM OF A SWALE, PROMPT ATTENTION IS REQUIRED TO AVOID THE FORMATION OF GULLIES. EITHER HAY OR STRAW BALES, RIPRAP, EXCELSIOR OR FILTER FABRIC MAY BE USED DURING THE ESTABLISHMENT PHASE. SEE FIGURE 3.3, RILL MAINTENANCE MEASURES ON PAGE 3.27 OF THE N.Y. GUIDELINES FOR URBAN EROSION AND SEDIMENT CONTROL. SPACING BETWEEN RILL MAINTENANCE BARRIERS SHALL NOT EXCEED 100 FEET.



TYPICAL BULKHEAD CONSTRUCTION BENCH SECTION

NTS

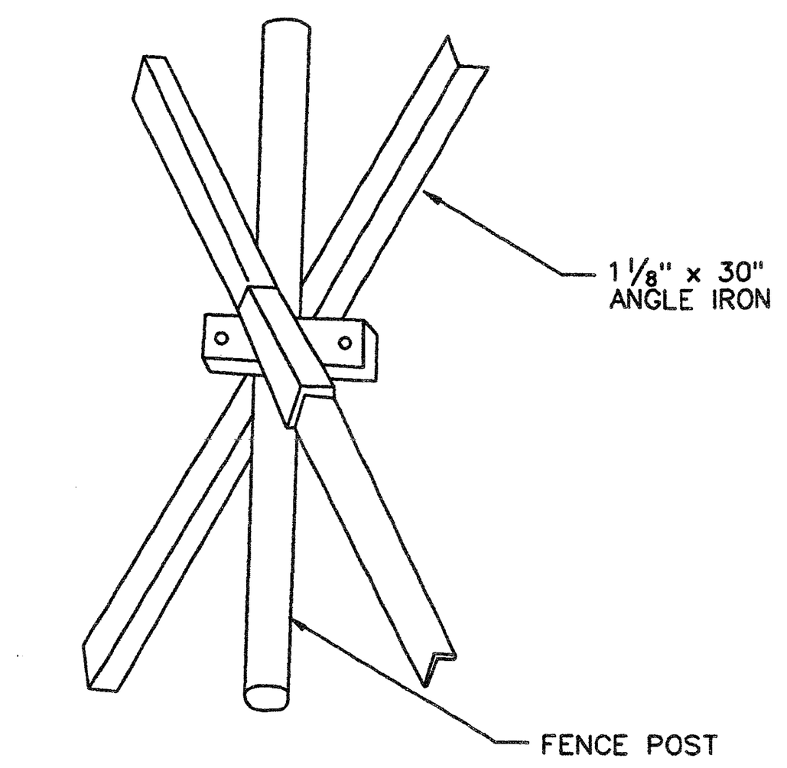


TYPICAL FENCE POST DETAIL

NTS

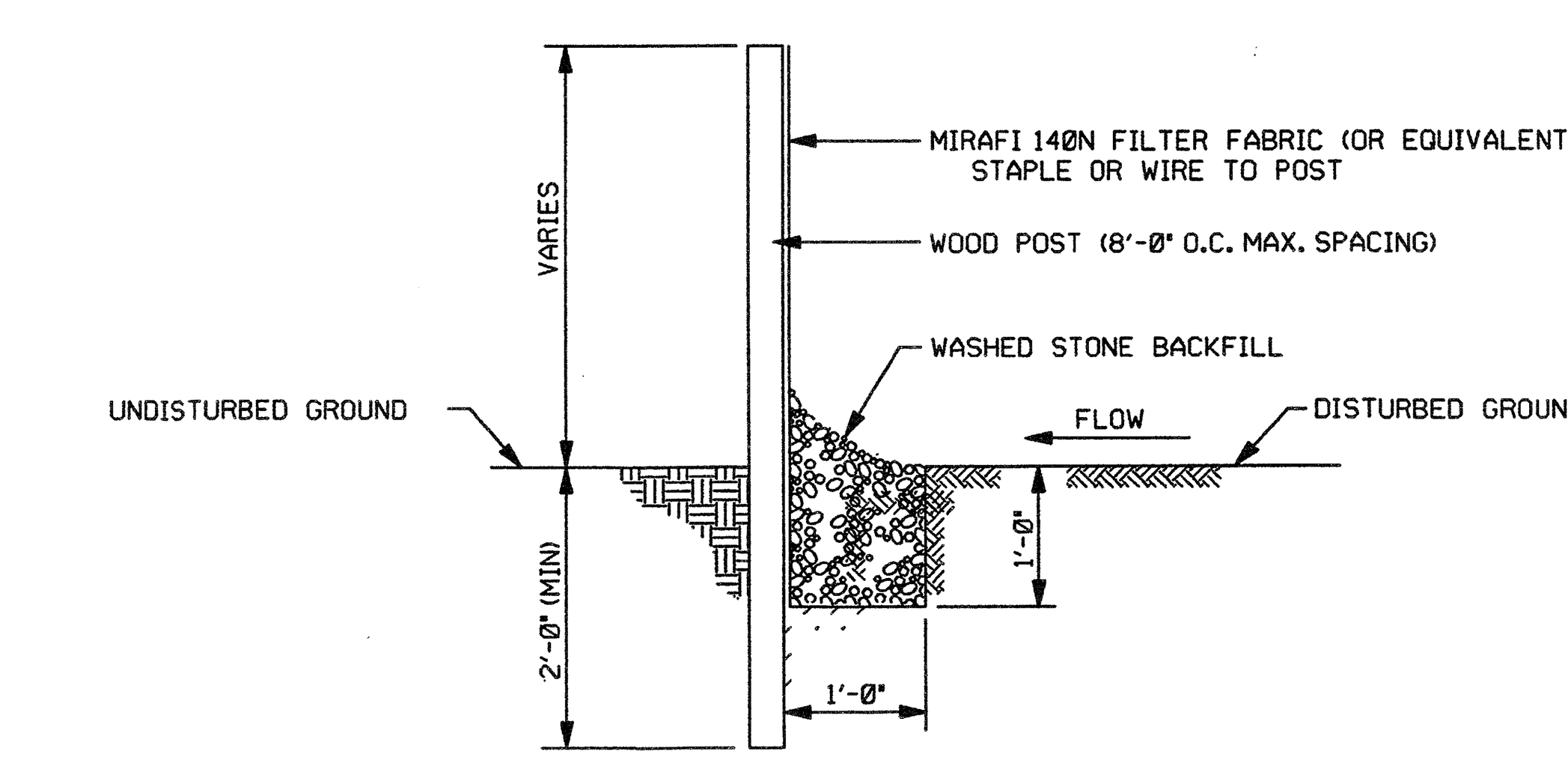
FENCING NOTES:

1. FOR LOCATION OF FENCING, SEE DWGS. 594000-30K-02 THROUGH 30K-05.
2. ALL FENCING MATERIAL SHALL BE AS SPECIFIED IN SPECIFICATION SECTION 02834.
3. DOUBLE SLIDE GATE FRAMES SHALL BE 1-1/2 INCH SCHEDULE 40 HOT DIP GALVANIZED STEEL PIPE WITH 1-1/2 INCH SCHEDULE 40 INTERMEDIATE POSTS AND 5/8 INCH DIA. POST RODS.
4. ALL HARDWARE SHALL BE MANUFACTURER'S STANDARD HARDWARE.
5. ALL CORNER, END AND GATE POSTS SHALL BE SET IN CONCRETE. OTHER POSTS SHALL BE ANCHORED AS PER FENCE ANCHOR DETAIL THIS DWG.
6. REFER TO DWGS. 30K-02 THROUGH -05 FOR FENCE LOCATIONS.



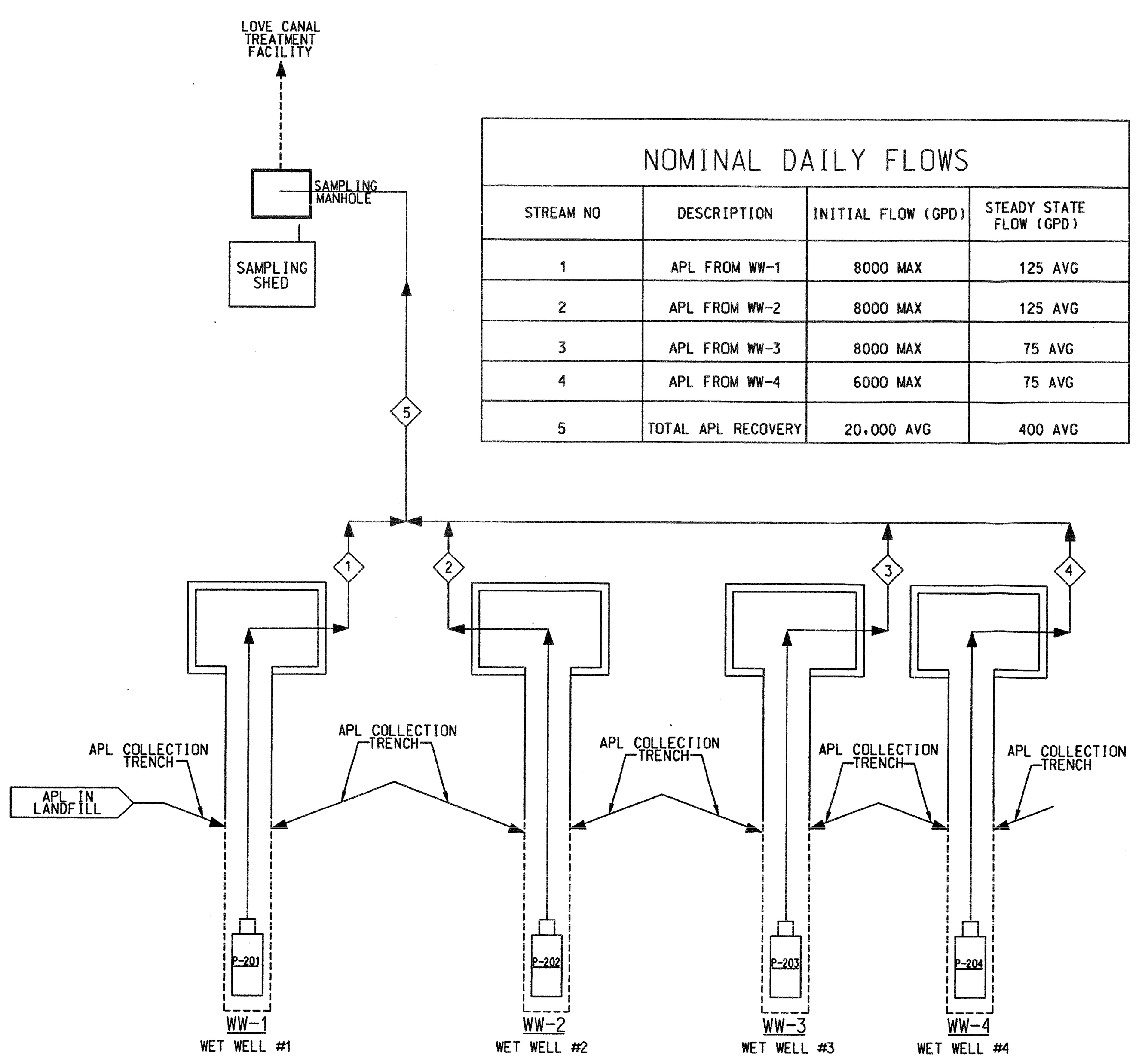
FENCE ANCHOR DETAIL

NTS



TYPICAL SILT FENCE DETAIL

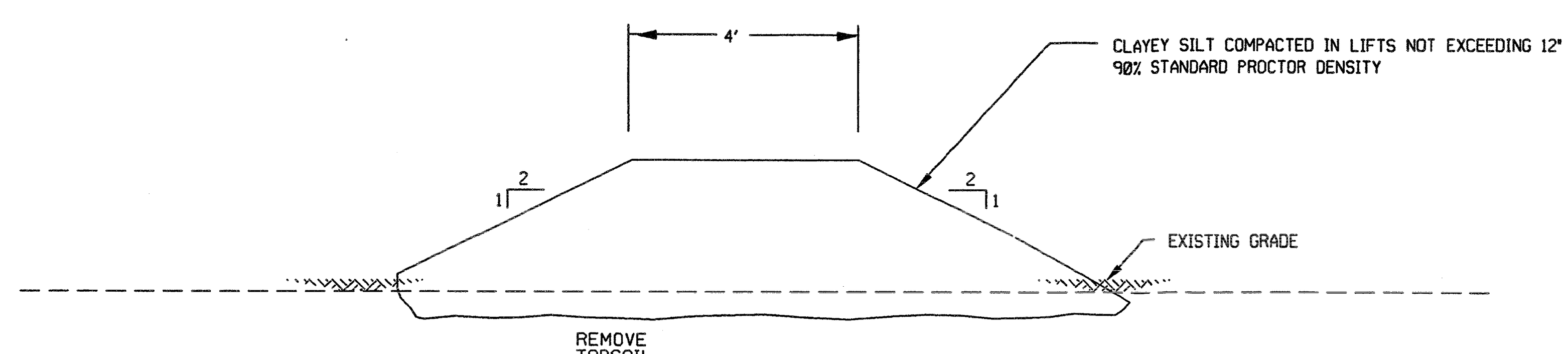
N.T.S.



NOMINAL DAILY FLOWS

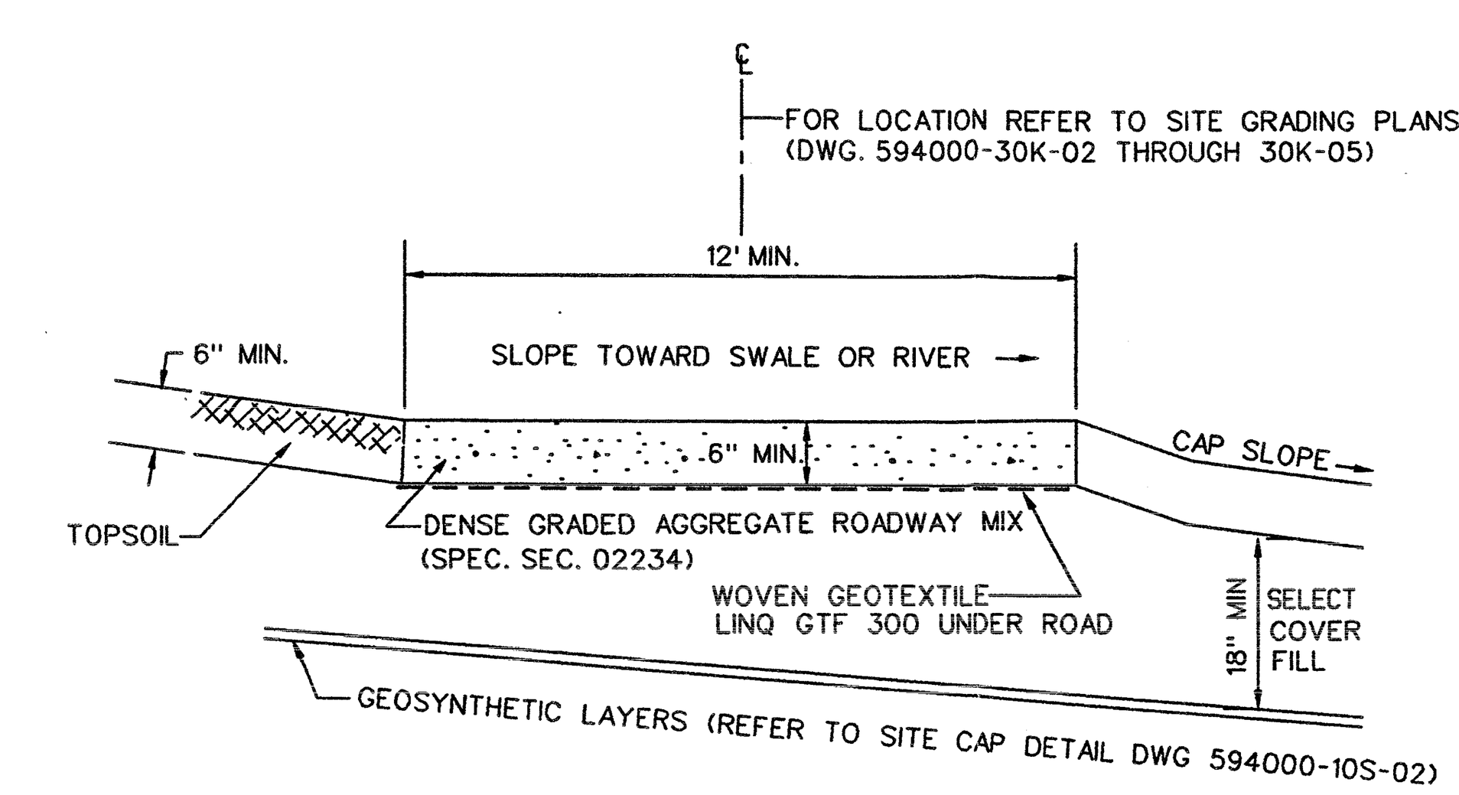
STREAM NO	DESCRIPTION	INITIAL FLOW (GPD)	STEADY STATE FLOW (GPD)
1	APL FROM WW-1	8000 MAX	125 AVG
2	APL FROM WW-2	8000 MAX	125 AVG
3	APL FROM WW-3	8000 MAX	75 AVG
4	APL FROM WW-4	6000 MAX	75 AVG
5	TOTAL APL RECOVERY	20,000 AVG	400 AVG

AQUEOUS PHASE LIQUID (APL) SYSTEM



TYPICAL DIVERSION BERM/DIKE DETAIL

N.T.S.



LIGHT DUTY ACCESS ROAD DETAIL

NTS

REV.	DATE	REVISION DESCRIPTION	DES. CHK.	APPROVED
A	01/29/93	ENGINEERING REPORT SUBMITTAL (PRELIMINARY/INTERMEDIATE)		
B	9/8/95	FINAL ENGINEERING REPORT (DRAFT SUBMITTAL)		
0	12/21/95	ISSUE FOR BIDS		
1	2/5/96	ISSUE FOR CONSTRUCTION		
2	1/19/98	AS-BUILT		
3	7/13/99	AS-BUILT, DELETED DETAILS		

DWG.NO.	REFERENCE DRAWINGS
594000-30K-02	SITE REMEDIATION PLAN - AREA 1
594000-30K-03	SITE REMEDIATION PLAN - AREA 2
594000-30K-04	SITE REMEDIATION PLAN - AREA 3
594000-30K-05	SITE REMEDIATION PLAN - AREA 4
594000-10S-02	CAPPING SYSTEM & BULKHEAD - SECTIONS AND DETAILS

FLUOR DANIEL

DESIGNED BY T. SZYMONIAK
CHECKED BY S. LAWRENCE
SUPERVISOR C. MARS
LEAD ENGR./SPEC. C. TAYLOR
PROJECT C. MARS
CLIENT OXYCHEM/OLIN

RELEASE DATE / INITIALS / APP.DATE / APP.DATE

STATE OF NEW YORK — CHARLES TAYLOR, JR — 073024 — LICENSED PROFESSIONAL ENGINEER

8-13-99

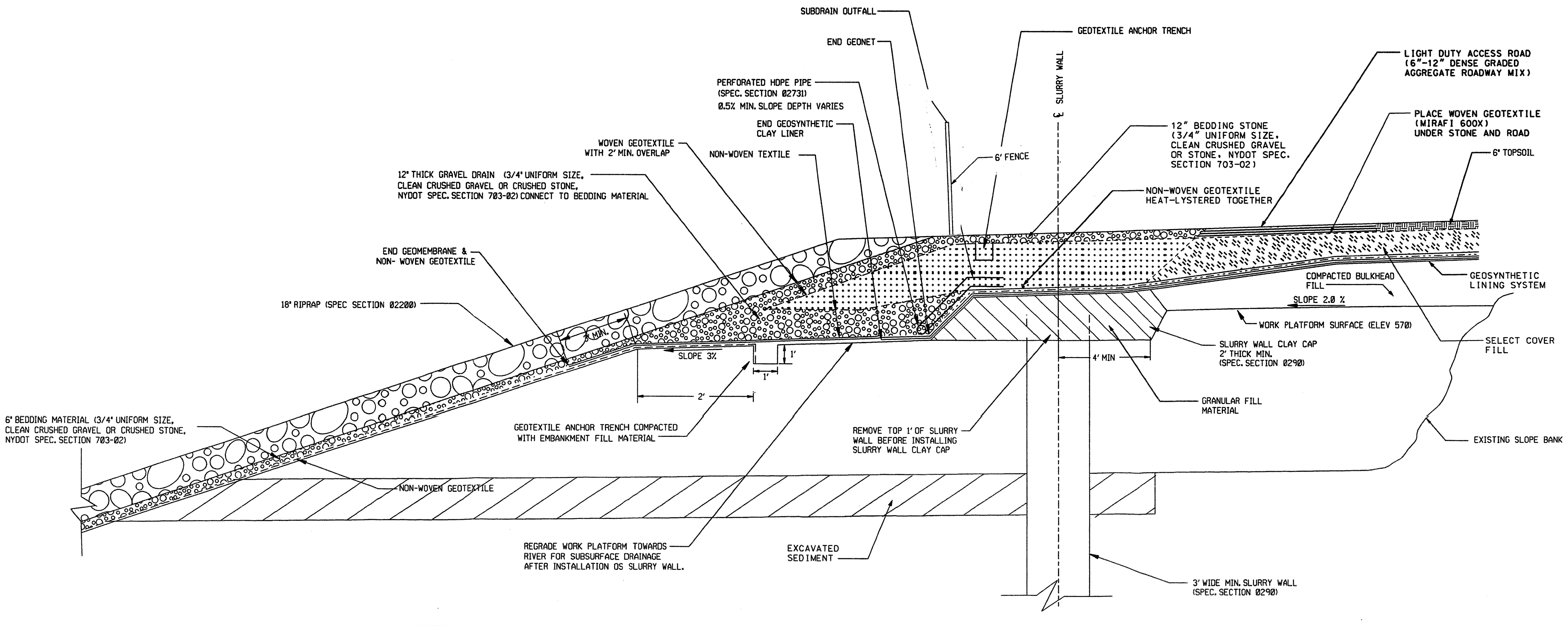
OXYCHEM/OLIN REMEDIAL DESIGN 102nd STREET LANDFILL SITE NIAGARA FALLS, NEW YORK

AS-BUILT SITE DETAILS

SCALE | DRAWING NUMBER 594000-10S-01 | REV. 3

SUB-CONTRACT PKG. | WRK. PKG. | DIST. CODE

REDUCED PRINT SCALES | METRIC SCALES



TYPICAL BULKHEAD DETAIL
N.T.S.

GENERAL NOTES

1. FIELD INSTALLATION AND TESTING OF GEOSYNTHETIC LAYERS SHALL BE AS RECOMMENDED BY THEIR RESPECTIVE MANUFACTURER(S) AND APPROVED BY THE CONSTRUCTION MANAGER. THE GEOSYNTHETIC LAYERS SHALL BE INSTALLED BY AN EXPERIENCED INSTALLER. ALL SUBMITTALS AND RESULTS OF TESTING DATA SHALL BE APPROVED BY THE CONSTRUCTION MANAGER PRIOR TO ANY MATERIALS ARRIVING ON THE SITE.

2. THE CONTRACTOR SHALL SUBMIT A QUALITY CONTROL AND FIELD TESING PLAN INCLUDING APPROPRIATE ASTM STANDARD METHODS AS RECOMMENDED BY THE GEOSYNTHETIC MANUFACTURER(S) FOR THE CONSTRUCTION MANAGERS APPROVAL.

3. THE WOVEN GEOTEXTILE ON BULKHEAD SHALL BE MIRAFI 700X.

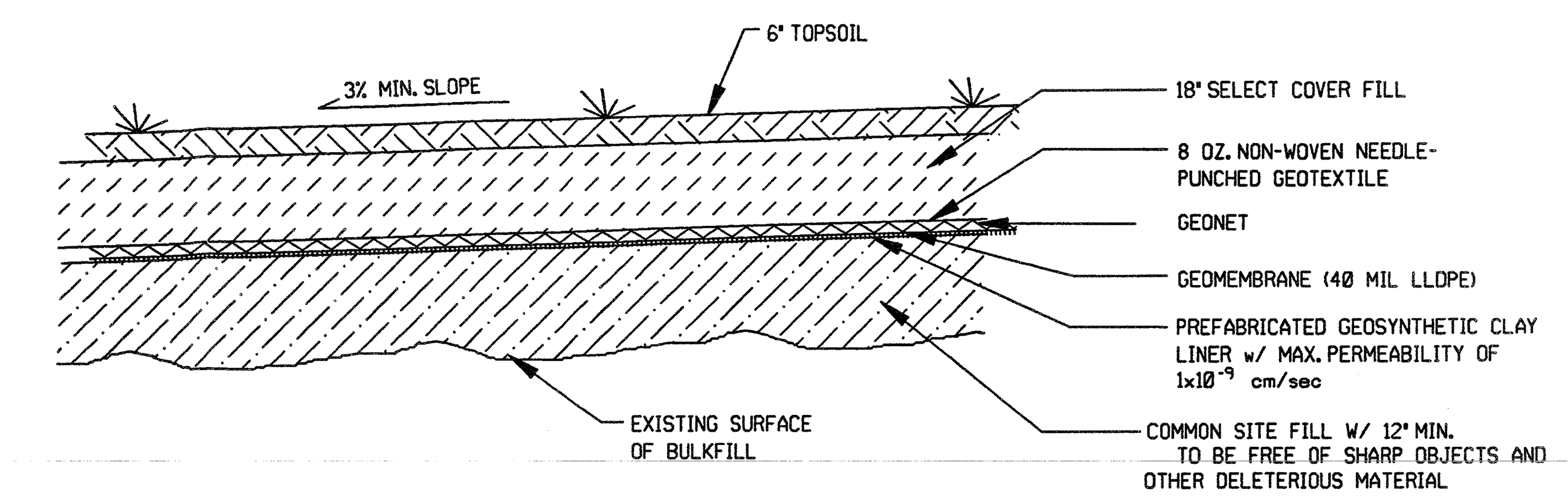
4. THE NON-WOVEN GEOTEXTILE SHALL BE EVERGREEN TECHNOLOGIES TG 700.

5. THE GEONET SHALL BE NATIONAL SEAL COMPANY POLY-NET 2000 OR EQUIVALENT HAVING A MINIMUM TRANSMISSIVITY OF 0.21×10^{-3} SQUARE METERS PER SECOND FOR EACH FOOT OF WIDTH FOR ALL SLOPES.

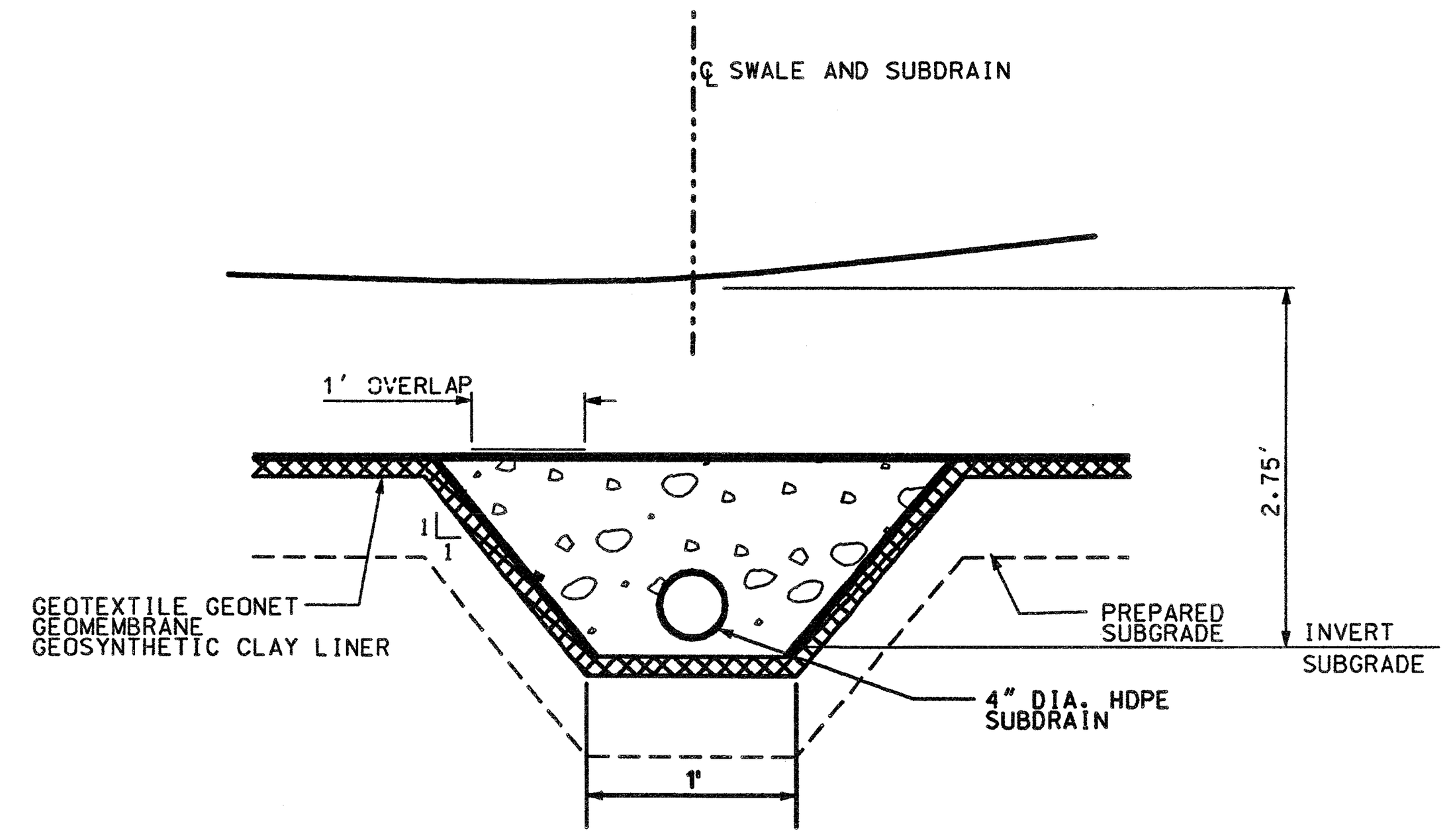
6. THE GEOMEMBRANE SHALL BE A MINIMUM 40 MIL THICK LLDPE. THE GEOMEMBRANE SHALL BE NATIONAL SEAL COMPANY LLDPE.

7. THE GEOSYNTHETIC CLAY LINER SHALL BE CLAYMAX 200R.

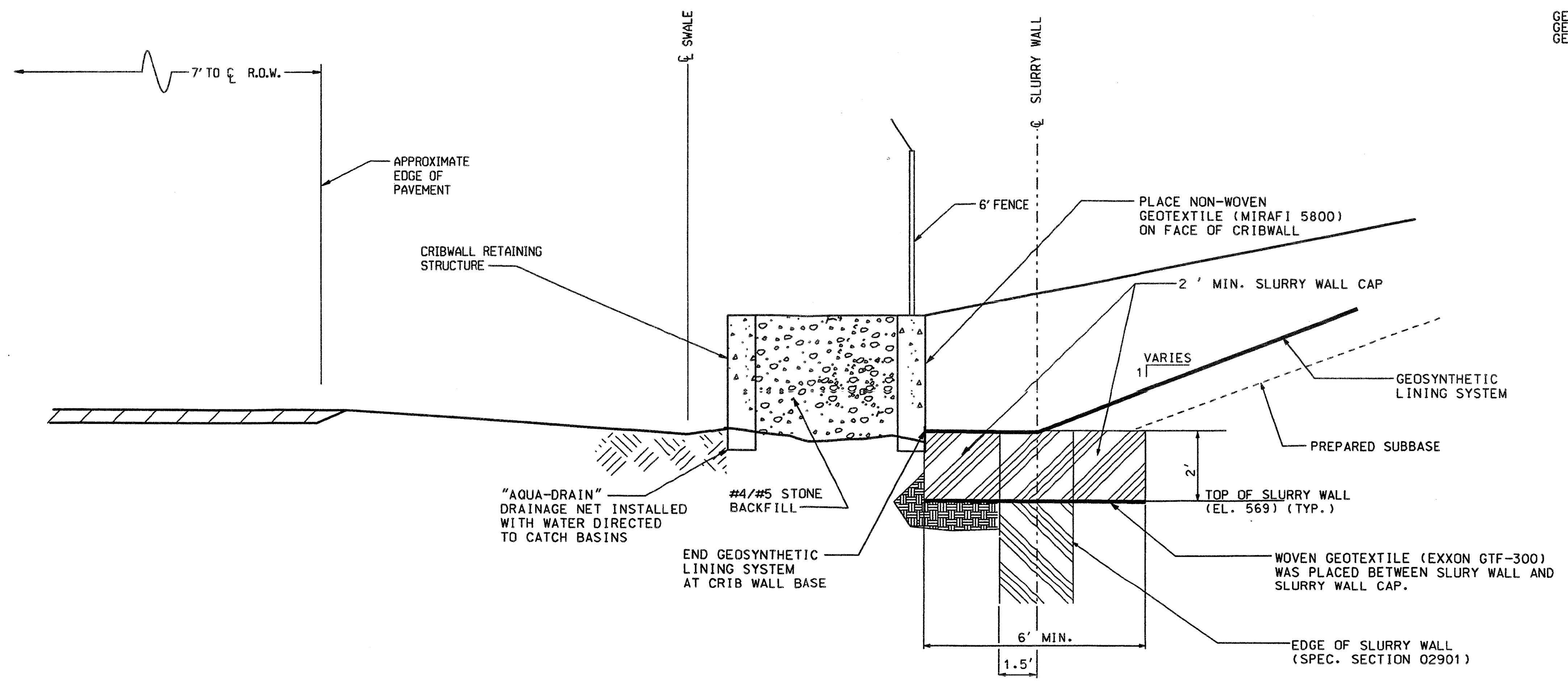
8. THE GEOSYNTHETIC CLAY LINER ON SLOPES GREATER THEN 10% SHALL BE BENTOMAT ST.



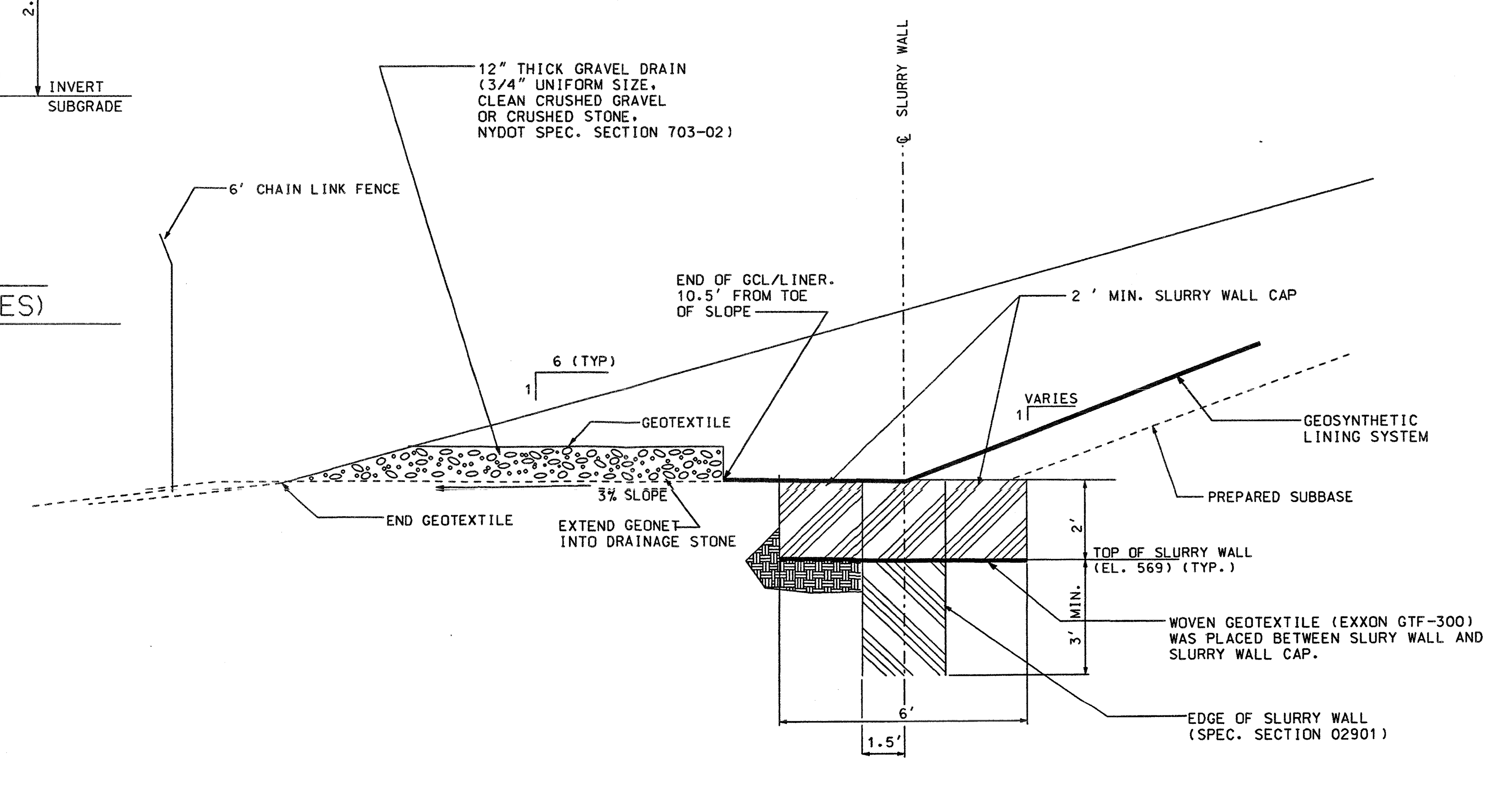
TYPICAL CAP DETAIL
NTS



DRAINAGE TRENCH DETAIL
(TYPICAL BELOW ALL SURFACE SWALES)
NTS



TYPICAL LANDFILL/SLURRY WALL DETAIL
TOE AT BUFFALO AVENUE
NTS



TYPICAL LANDFILL/SLURRY WALL DETAIL
NTS

REV.	DATE	REVISION DESCRIPTION	DES. CHK.	APPROVED
A	9/26/92	PRELIMINARY ISSUE FOR 30% DESIGN		
B	8/24/95	REVISED TITLE		
C	9/8/95	FINAL ENGINEERING REPORT (DRAFT SUBMITTAL)		
1	2/18/98	AS-BUILT		

REFERENCE DRAWINGS

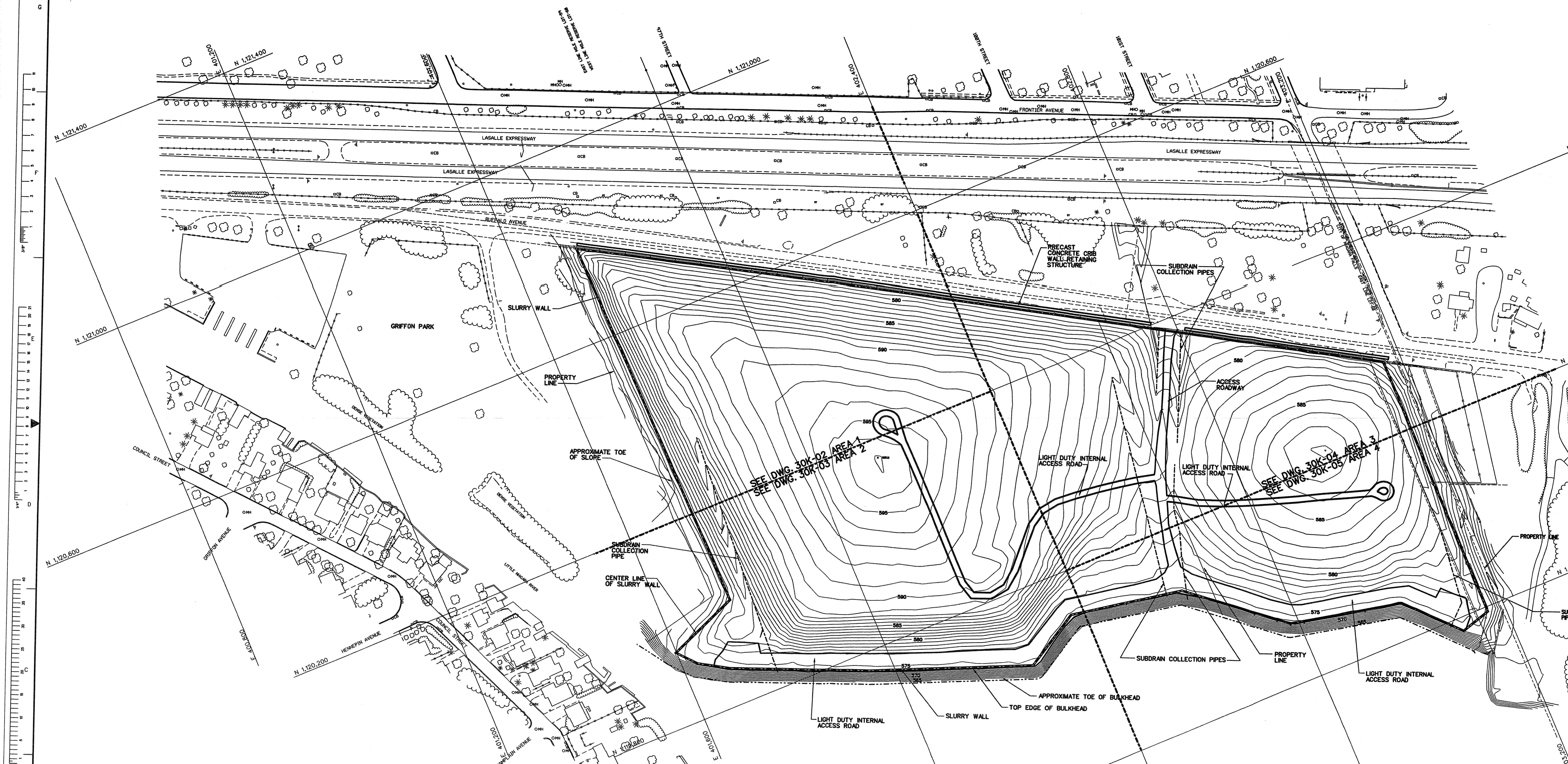
FLUOR DANIEL

DESIGNED BY: L. ATTCITY
CHECKED BY: S. LAWRENCE
SUPERVISOR: C. MARS
LEAD ENGR./SPEC.: C. TAYLOR
PROJECT: C. MARS
CLIENT: OXYCHEM/OLIN

OXYCHEM / OLIN
REMEDIAL DESIGN
102nd STREET LANDFILL SITE
NIAGARA FALLS, NEW YORK
AS-BUILT
CAPPING SYSTEM AND BULKHEAD
SECTION AND DETAILS

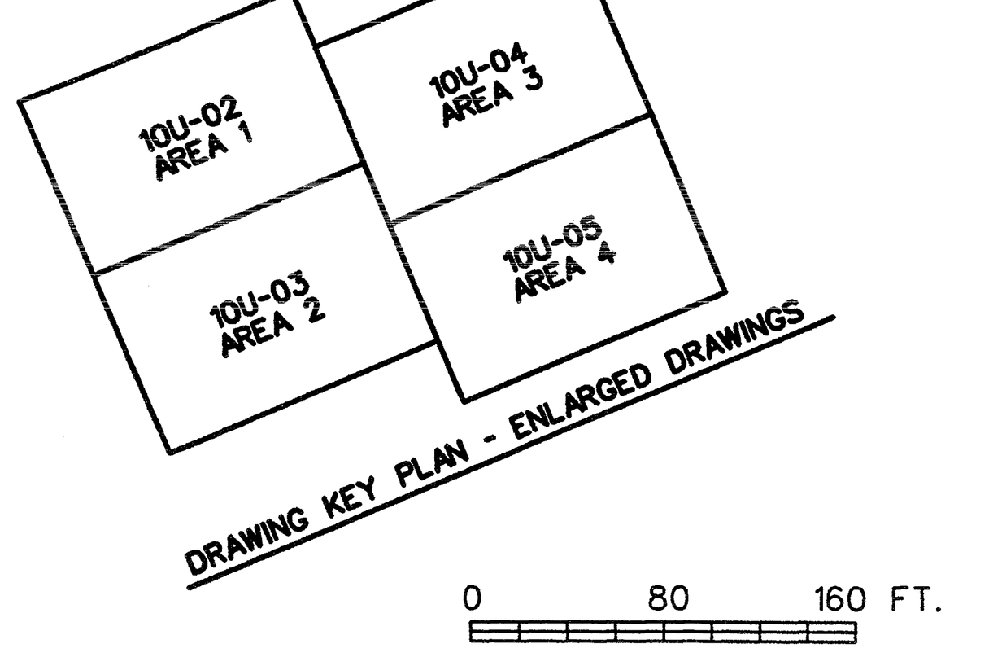
SCALE: AS NOTED
DRAWING NUMBER: 594000-10S-02
REV.: 1

STATE OF NEW YORK — CHARLES TAYLOR, JR. — LICENSED PROFESSIONAL ENGINEER



GENERAL NOTES:

1. REFER TO COVER SHEET (DWG. 59400-10Z-01) FOR GENERAL NOTES. REFER TO LEGEND AND ABBREVIATIONS (DWG. 594000-10Z-02).
2. THE SUBDRAIN COLLECTION PIPE IS LOCATED DIRECTLY BELOW DIVERSION SWALES AND EXTENDED TO BULKHEAD AS SHOWN ON DRAWING 594000-30K-02 THRU100U-05 AND DETAILS ON DRAWING 594000-10S-02.
3. THE LIMIT OF THE TEMPORARY CONSTRUCTION EASEMENT ALONG BUFFALO AVENUE SHALL BE THE SOUTHERN EDGE OF PAVEMENT OF BUFFALO AVENUE.
4. THIS DRAWING REPRESENTS FINAL GRADING AND FENCE LINE AFTER THE REMEDIATION OF 102nd STREET LANDFILL SITE.
5. REFERENCE BENCH MARK USED: N22 (U.S.L.S), ON THE NORTH SIDE OF BUFFALO AVENUE IN THE WEST WALL OF HOUSE NO. 9818, 9 FEET SOUTH OF THE NORTHWEST CORNER OF THE HOUSE, IN THE CONRETE WATER TABLE, ABOUT 2-1/2 FEET HIGHER THAN GROUND. THE HORIZONTAL LINE OF A CROSS ON THE UNITED STATES LAKE SURVEY STANDARD DISK SET VERTICALLY. (176.038 METERS OR 5.77.551 FEET NGVD)



0 80 160 FT.

REV.	DATE	REVISION DESCRIPTION	DES. CHK.	APPROVED
A	1/29/93	ENGINEERING REPORT SUBMITTAL (PRELIMINARY/INTERMEDIATE)	JTG	DRK
B	9/8/95	FINAL ENGINEERING REPORT (DRAFT SUBMITTAL)		
0	12/21/95	ISSUED FOR BIDS		
1	2/5/96	ISSUED FOR CONSTRUCTION		
2	6/7/96	REVISED SLURRY WALL LOCATION & CONTOURS IN S.E. CORNER		
3	8/27/96	REVISED CONTOURS IN WESTERN PORTION OF LANDFILL		
4	4/4/97	REVISED LANDFILL CONTOURS & ACCESS RD. LOCATION, REMOVED LOADOUT FACILITY		
5	4/23/97	REVISED OLIN LANDFILL CONTOURS	MCG	
6	4/24/97	REVISED OLIN LANDFILL CONTOURS- HIGH POINT @ EL. 587		
7	5/7/97	REVISED LANDFILL CONTOURS		
8	1/26/98	AS-BUILT		

DWG.NO.	REFERENCE DRAWINGS
594000-10S-02	CAPPING SYSTEM & BULKHEAD - SECTIONS AND DETAILS
594000-30K-02	SITE REMEDIATION PLAN - AREA 1
594000-30K-03	SITE REMEDIATION PLAN - AREA 2
594000-30K-04	SITE REMEDIATION PLAN - AREA 3
594000-30K-05	SITE REMEDIATION PLAN - AREA 4

FLUOR DANIEL

DESIGNED BY: T. SZYMONIAK
CHECKED BY: S. LAWRENCE
SUPERVISOR: C.MARS — RELEASE DATE:
LEAD ENGR./SPEC.: C. TAYLOR — INITIALS:
PROJECT: C. MARS — APP.DATE:
CLIENT: OXYCHEM/OLIN — APP.DATE:

OXYCHEM/OLIN
REMEDIALDESIGN
102nd STREET LANDFILL SITE
NIAGARA FALLS, NEW YORK

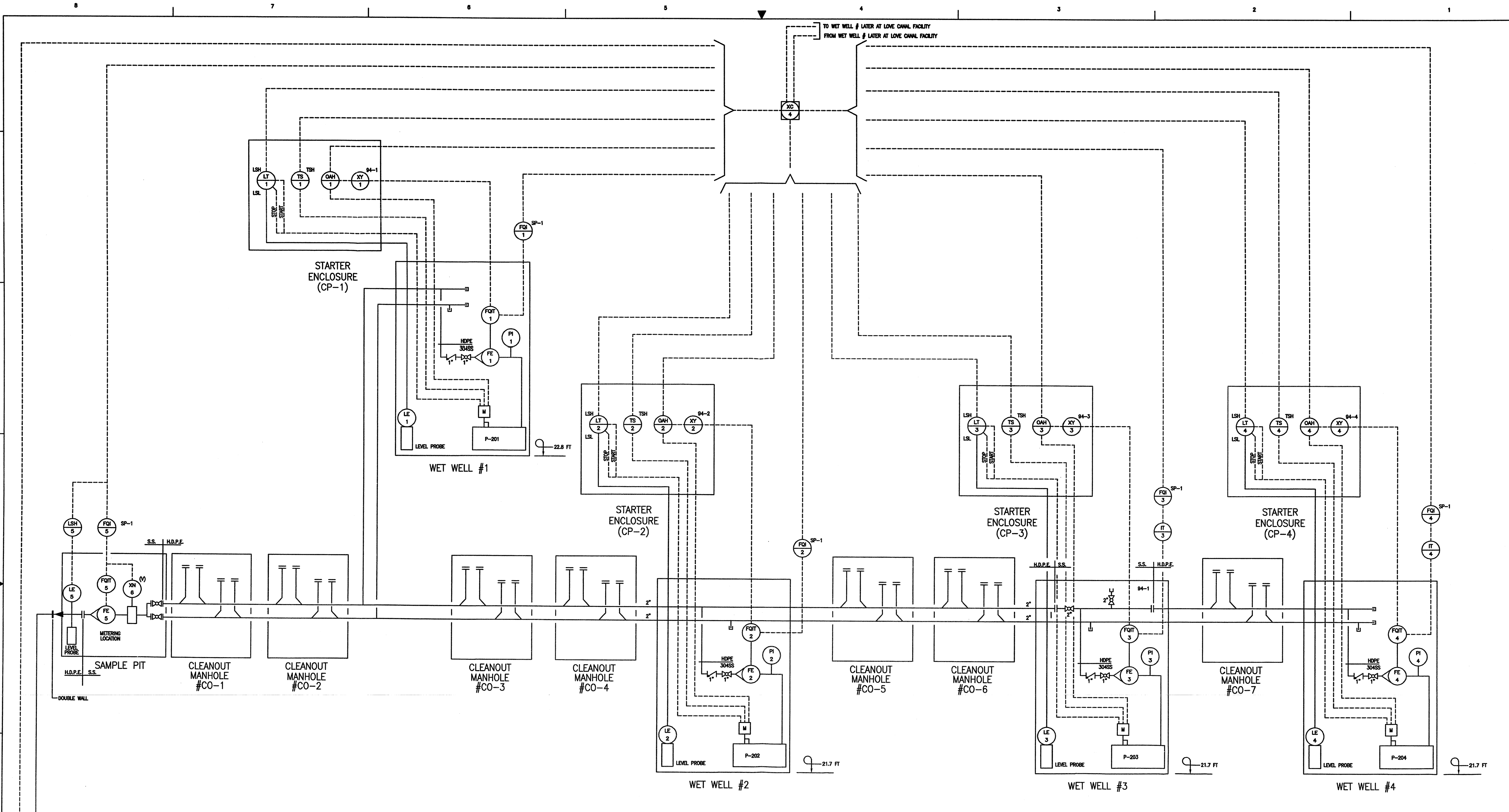
AS-BUILT MASTER SITE GRADING PLAN

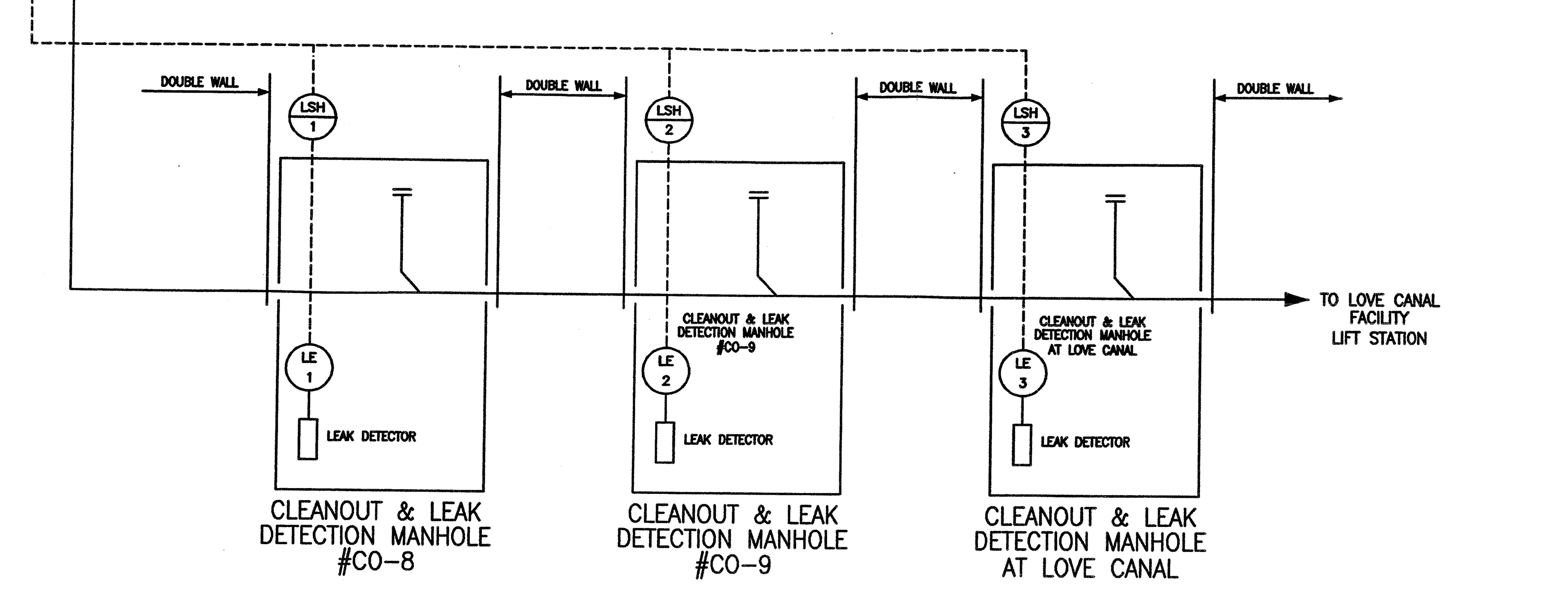
SCALE: 1"=80' — DRAWING NUMBER: 594000-10U-01 — REV. 8

WRK. PKG. — DIST. CODE — SUB-CONTRACT PKG.

8-13-99

MANUAL CHANGES MADE - YES ☐ NO ☐ — DWG. FILE UPDATED - YES ☐ NO ☐ — MODEL UPDATED - YES ☐ NO ☐ — CADD DRAWING No. 10U01.DGN





WET WELL #1	P-201 10 GPM @ 100 FT. 1/2HP,460,3ø	LEVEL PROBE LP-1
WET WELL #2	P-202 10 GPM @ 100 FT. 1/2HP,460,3ø	LEVEL PROBE LP-2
WET WELL #3	P-203 10 GPM @ 100 FT. 1/2HP,460,3ø	LEVEL PROBE LP-3
WET WELL #4	P-204 10 GPM @ 100 FT. 1/2HP,460,3ø	LEVEL PROBE LP-4
COMPOSITE SAMPLER	XN-5	

MANHOLE #8	LEAK DETECTOR LD-1
MANHOLE #9	LEAK DETECTOR LD-2
MANHOLE AT LOVE CANAL	LEAK DETECTOR LD-3
SAMPLE PIT	LEAK DETECTOR LD-4

NOTES:

1. LOW LEVEL IN WET WELLS CUTS POWER OFF TO THE APL PUMP IN THE WET WELL. HIGH LEVEL IN WET WELLS TURNS POWER ON TO THE APL PUMP IN THE WET WELL. HAND SWITCH IS ALSO PROVIDED TO OVERRIDE AUTOMATIC OPERATION OF APL PUMPS.

2. OFF AUTO HAND SELECTOR SWITCH ALLOWS MAINTENANCE BY-PASS OF LEVEL CONTROLS, MUST BE MANUALLY RETURNED TO THE AUTO POSITION.

3. IF ANY PUMP IS OPERATING AND THE PUMPS' ASSOCIATED FLOW METER REGISTERS LOW-LOW/NO FLOW OR IF ANY OF THE PUMP MOTORS HAVE AN OVERLOAD CONDITION A SIGNAL WILL BE SENT TO THE RTU CONTROLLER.

4. WHEN LIQUID IS DETECTED IN EITHER MANHOLE NO. 8, 9 OR MANHOLE AT LOVE CANAL OR THE SAMPLE PIT A SIGNAL WILL BE SENT TO THE RTU CONTROLLER.

5. ACTIVE LEVEL AND FLOW SIGNALS WILL BE SENT TO THE LOVE CANAL FACILITY VIA THE RTU CONTROLLER.

5. ACTIVE LEVEL AND FLOW SIGNALS WILL BE SENT TO THE LOVE CANAL FACILITY VIA THE RTU CONTROLLER.

KEY:

(V) MECHANICAL EQUIPMENT VENDOR SUPPLY.
O-A-H OFF-AUTO-HAND
CP STARTER ENCLOSURES
SP-1 SHED CONTROL PANEL

STATE OF NEW YORK · CHARLES TAYLOR, JR · LICENSED PROFESSIONAL ENGINEER

REV.	DATE	REVISION DESCRIPTION	DES. CHK.	APPROVED	REV.	DATE	REVISION DESCRIPTION	DES. CHK.	APPROVED
A	1-29-93	ENGINEERING REPORT SUBMITTAL (PRELIMINARY/INTERMEDIATE)	ACB JTG	DRK	4	3-21-97	ISSUED FOR APPROVAL		
B	09/08/95	FINAL ENGINEERING REPORT (DRAFT SUBMITTAL)	AFH	HLF	5	8-27-97	ISSUED FOR APPROVAL		
0	12/21/95	ISSUE FOR BIDS	DEG		6	12-7-97	REDRAWN; ISSUED FOR CONSTRUCTION		
1	2/5/96	ISSUED FOR CONSTRUCTION			7	2-17-99	AS BUILT, ISSUED FOR CLOSEOUT REPORT		
2	2/26/97	ISSUED FOR AGENCY REVIEW							
3	3/11/97	ISSUED FOR REVIEW							

DWG.NO.	REFERENCE DRAWINGS	DWG.NO.	REFERENCE DRAWINGS

FLUOR DANIEL
PROJECT #23594010

DESIGNED BY	A. BUMB/K. MCNELIS
CHECKED BY	S. LAWRENCE
SUPERVISOR	C. MARS
RELEASE DATE	
LEAD ENGR./SPEC.	C. TAYLOR
INITIALS	
PROJECT	C. MARS
APP.DATE	
CLIENT	OXYCHEM/OLIN
APP.DATE	

OXYCHEM/OLIN – REMEDIAL DESIGN
102nd STREET LANDFILL SITE
NIAGARA FALLS, NEW YORK

P & ID APL SYSTEM

SCALE: NONE | DRAWING NUMBER: 594000-25J-02 | REV. 7

*DATE*TIME* MANUAL CHANGES MADE – YES ☐ NO ☐ DWG. FILE UPDATED – YES ☐ NO ☐ MODEL UPDATED – YES ☐ NO ☐ CADD DRAWING No. 25J02 DWG

DIST. CODE WRK. PKG. SUB-CONTRACT PKG.

203\210\CHICAGO\10225J02.DWG

FDANSIE.REF REV. 0

Appendices

Appendix A
Quality Assurance Project Plan for OM&M Activities

Table of Contents

1. Introduction 1
2. Monitoring Parameters 1
3. QA Parameters 1
   - 3.1 Field Blanks 1
   - 3.2 Trip Blanks 1
   - 3.3 Field Duplicates 1
   - 3.4 Matrix Spikes and Matrix Spike Duplicates 1
   - 3.5 Field Splits 2
4. Chain of Custody Records 2

Table Index

Table A.1 Site Specific Parameters - Groundwater

Attachments

Attachment A1 Sample Chain of Custody Form

1. Introduction

This appendix describes the Quality Assurance Project Plan (QAPP) for groundwater sampling and analyses during Operation, Monitoring, and Maintenance (OM&M) activities at the 102nd Street Landfill Site.

2. Monitoring Parameters

The monitoring parameters for groundwater samples are listed in Table A.1. Parameter survey levels, analytical methods, sample preservation requirements, holding times, and sample bottle types are presented in Table A.1.

3. QA Parameters

3.1 Field Blanks

Aqueous field blanks will be prepared in the field by pouring deionized water through the sample collection equipment (i.e., bladder pump) into appropriate sample bottles. The sample analyses performed on the field blank will be the same as the analyses performed on groundwater samples. Field blanks will be shipped to the analytical laboratory with the groundwater samples. They will be labeled as field blanks; they will not be submitted “blind”. Field blanks will be collected at a rate of one blank for every 20 groundwater samples collected, which equates to one per sampling round.

3.2 Trip Blanks

Trip blanks (provided by the analytical laboratory in sealed containers) are shipped to the laboratory with the groundwater samples. One set of trip blanks will be shipped with each sample shipment and will be stored and shipped in the same cooler as the volatile organic compound (VOC) samples.

3.3 Field Duplicates

Field duplicate samples will be collected by filling two sets of sample bottles at a well instead of one. The sample bottles will be filled in the order listed in FP 5 - Appendix B (i.e., all VOC bottles first, including field duplicates, followed by all semi volatile organic compound or pesticide bottles, followed by metals). Field duplicates will be stored and shipped with the other samples. The duplicates will be submitted to the analytical laboratory “blind”. Sample personnel will create a non-existent well name for the sample and will not use the same sampling time as any of the other samples collected. Sampling personnel will record on the sample collection sheet the sample identification of the duplicate and the sample identification of the groundwater sample it duplicates. Field duplicates will be collected at a rate of one duplicate for every 20 groundwater samples collected, which equates to one per sampling round.

3.4 Matrix Spikes and Matrix Spike Duplicates

Matrix spike and matrix spike duplicate (MS/MSD) samples will be collected by filling three sets of sample bottles at a well instead of one. The sample bottles will be filled in the order listed in FP

5 - Appendix B (i.e., all VOC bottles first, including field duplicates, followed by all SVOC bottles, followed by all pesticide bottles, followed by metals). MS/MSD samples will be stored and shipped with the other samples. The MS/MSD samples will be labeled as MS/MSD samples; they will not be submitted “blind”. MS/MSD samples will be collected at a rate of one MS/MSD for every 20 groundwater samples collected, which equates to one per sampling round.

3.5 Field Splits

Any additional duplicate (split) samples requested by the Environmental Protection Agency (EPA) will be collected and submitted to EPA for analysis.

4. Chain of Custody Records

Chain of custody records will be used. The sampler will complete and sign the chain of custody prior to shipping, retain the sampler's copies, place the remaining copies in a sealable plastic bag, place the bag in the cooler on top of the packed samples, and seal the cooler. A sample chain of custody is shown in Attachment A1.

Table A.1

Site Specific Parameters, Groundwater
O&M Manual - QA/QC Requirements
102nd Street Landfill Site, Niagara Falls, New York

Parameter	Laboratory RL	Laboratory MDL	Analytical Method Reference	Sample Preservation	Maximum Holding Time	Container
Benzene	1	0.11	SW-846 8260	Cool, 4°C, HCl to pH<2	14 days	40 ml Glass VOA Vials
Chlorobenzene	1	0.14	SW-846 8260	Cool, 4°C, HCl to pH<2	14 days	40 ml Glass VOA Vials
2-Chlorotoluene	1	0.21	SW-846 8260	Cool, 4°C, HCl to pH<2	14 days	40 ml Glass VOA Vials
1,2-Dichlorobenzene	1	0.15	SW-846 8260	Cool, 4°C, HCl to pH<2	14 days	40 ml Glass VOA Vials
1,4-Dichlorobenzene	1	0.21	SW-846 8260	Cool, 4°C, HCl to pH<2	14 days	40 ml Glass VOA Vials
1,2,3-Trichlorobenzene	1	0.15	SW-846 8260	Cool, 4°C, HCl to pH<2	14 days	40 ml Glass VOA Vials
1,2,4-Trichlorobenzene	1	0.27	SW-846 8260	Cool, 4°C, HCl to pH<2	14 days	40 ml Glass VOA Vials
1,2,4,5-Tetrachlorobenzene	10	0.61	SW-846 8270	Cool, 4°C	*	1 Liter Glass
Phenol	10	0.55	SW-846 8270	Cool, 4°C	*	1 Liter Glass
2-Chlorophenol	10	1.6	SW-846 8270	Cool, 4°C	*	1 Liter Glass
4-Chlorophenol	10	0.22	SW-846 8270	Cool, 4°C	*	1 Liter Glass
2,4-Dichlorophenol	10	0.32	SW-846 8270	Cool, 4°C	*	1 Liter Glass
2,5-Dichlorophenol	10	0.38	SW-846 8270	Cool, 4°C	*	1 Liter Glass
2,4,5-Trichlorophenol	10	1.4	SW-846 8270	Cool, 4°C	*	1 Liter Glass
alpha-Hexachlorocyclohexane	0.05	0.027	SW-846 8082	Cool, 4°C	*	1 Liter Glass
beta-Hexachlorocyclohexane	0.05	0.040	SW-846 8082	Cool, 4°C	*	1 Liter Glass
gamma-Hexachlorocyclohexane	0.05	0.032	SW-846 8082	Cool, 4°C	*	1 Liter Glass
delta-Hexachlorocyclohexane	0.05	0.017	SW-846 8082	Cool, 4°C	*	1 Liter Glass
Mercury	0.20	0.038	SW-846 7470	HNO_3 to pH of 2	28 days	500 ml HDPE
Arsenic	10	3.0	SW-846 6010	HNO_3 to pH of 2	180 days	500 ml HDPE

Notes:

* 7 days from collection to extraction; 40 days from extraction to analysis.
HCl hydrochloric acid
HNO3 nitric acid
VOA volatile organic analyte
RL Reporting Limit.
MDL Method Detection Limit (as of November 2014).
HDPE High Density Polyethylene.

Attachment A1
Sample Chain of Custody Form

CHAIN OF CUSTODY RECORD

Address: _____

Phone: _____ *Fax:* _____

COC NO.: _____

PAGE ___ *OF* ___

(See Reverse Side for Instructions)

Project No/ Phase/Task Code:	***Laboratory Name:***	***Lab Location:***	***SSOW ID:***
Project Name:	***Lab Contact:***		***Cooler No:***
Project Location:	***SAMPLE TYPE***	***ANALYSIS REQUESTED*** (See Back of COC for Definitions)	***Carrier:***
GHD Chemistry Contact:			***Airbill No:***
Sampler(s):			***Total # of Containers:***

Item	SAMPLE IDENTIFICATION (Containers for each sample may be combined on one line)	DATE (mm/dd//yy)	TIME (hh:mm)	Matrix Code (see back of COC)	Grab (G) or Comp (C)	Filtered (Y/N)												Total Containers/sample	MS/MSD Request	COMMENTS/ SPECIAL INSTRUCTIONS:
	PRESERVATION - (SEE BACK OF COC FOR ABBREVIATIONS)																			
1																				
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				

TAT Required in business days (use separate COCs for different TATs):

☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 1 Week ☐ 2 Week ☐ Other:

Notes/ Special Requirements:

RELINQUISHED BY	COMPANY	DATE	TIME	RECEIVED BY	COMPANY	DATE	TIME
1.				1.			
2.				2.			
3.				3.			

THE CHAIN OF CUSTODY IS A LEGAL DOCUMENT – ALL FIELDS MUST BE COMPLETED ACCURATELY

INSTRUCTIONS

1. Complete all project, lab and shipping information on top of the form: Project No., Phase/Task, Name, Location, Chemistry Contact and Samplers; Laboratory Name, Location, Contact, and Quote No. if relevant; SSOW ID, Cooler No., Carrier, Airbill No., and Date Shipped.
2. A separate COC should be filled out for each cooler shipped. Complete separate COCs if separate reports or TAT are desired.
3. Complete Sample Identification as it appears on the sample label using the agreed upon format for the project (use GHD standard if not defined), identify sample collection date and time of sampling, indicate if sample is a Grab (G) or Composite (C), identify Matrix Code (see below for matrix codes), indicate number of containers by preservative used and the total containers per sample.
4. Complete the analysis requested (see SSOW or parameter codes below) and mark which samples require the analysis. Indicate which samples should be processed for matrix spikes in last column. It may be necessary to use the space provided for additional comments.
5. Identify the TAT required (separate COCs if multiple TATs) and any special notes or requirements.
6. Transfer Custody by signing "relinquished by" and identifying company affiliation with date and time of transfer at bottom of page.

Commonly used Matrix Codes*/Preservatives:

LIQUID		SOLID	
WB	Borehole Water	SE	Sediment
WG	Groundwater	CC	Concrete
WM	Stormwater	SL	Sludge
WP	Drinking Water	SLRY	Slurry
WS	Surface Water	SO	Soil
WSW	Sump Water	ST	Solid Waste
WT	Treated Effluent	**AIR**	
WW	Waste Water	GE	Gaseous Effluent (Stack Gas)
FP	Free Phase Liquid	GS	Soil Gas
O	Oil	AA	Ambient Air
OTHER		**PRESERVATIVES**	
SW	Surface Wipe	HC	Hydrochloric Acid (HCl)
TA	Animal Tissue	HN	Nitric Acid (HNO3)
TP	Plant Tissue	H2	Sulfuric Acid (H2SO4)
TF	Fish Tissue	SH	Sodium Hydroxide (NaOH)
TB	Trip Blank	Me	VOC Soil - Methanol/Water
		En	VOC Soil - EnCores

* Quality Control (QC) Sample Identification:
-- Field duplicates and blanks should be assigned the base matrix code (such as WG for groundwater QC).
-- MS/MSDs should ***not*** be assigned separate sample IDs.

Commonly used Parameter Codes:

ACRONYM	DEFINITIION
TCL	Target Compound List
TAL	Target Analyte List
TCLP	Toxic Characteristics Leaching Procedure
VOC	Volatile Organic Compounds
SVOC	Semi-volatile Organic Compounds
PCB	Polychlorinated Biphenyls
PEST	Pesticides
HERB	Herbicides
PCDD/PCDF	Polychlorinated Dibenzodioxins/Polychlorinated Dibenzofurans
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
PNA/PAH	Polynuclear Aromatics/Polynuclear Aromatic Hydrocarbons
TPH	Total Petroleum Hydrocarbons
BOD/CBOD	Biochemical Oxygen Demand or Carbonaceous BOD
TSS	Total Suspended Solids
TDS	Total Dissolved Solids
TOC/DOC	Total or Dissolved Organic Carbon
TKN	Total Kjeldahl Nitrogen
RCRA	Resource Conservation and Recovery Act
Hx Cr (Cr6)	Hexavalent Chromium
NPN	Nitrate plus Nitrite

Appendix B
APL Discharge System Troubleshooting Chart

APL Discharge System

Troubleshooting Chart

Problem:

Leak detection alarm indicates a leak at one of the following chambers:

- LDMH 8
- LDMH 9
- Metering Manhole
- Love Canal Manhole

Automatic Response

Computer system shuts down all four Wet Well pumps and alerts operators at Love Canal of the type and location of the problem.

Operator Response

Check chamber where leak detection occurred. Rectify problem. Manually restart pumps.

Problem

One pump shuts down and will not restart.

Automatic Response

Computer system alerts operators at Love Canal. Remaining pumps will keep operating. Due to the hydraulic connectivity between Wet Wells water levels will be maintained.

Operator Response

Check system electronics including level controls. Determine problem. Replace damaged components.

Appendix C
Annual Report Forms

ANNUAL OPERATION AND MAINTENANCE REPORT

102ND STREET LANDFILL SITE
NIAGARA FALLS, NEW YORK

YEAR: _____

MONITORING - Water Level Measurements

Month	Day	Inspector	PCM-01	PZ-01	PCM-02	PZ-02	PCM-03	PZ-03R
1st Qtr.								
2nd Qtr.								
3rd Qtr.								
4th Qtr.								

Month	Day	Inspector	PCM-04	PZ-04	PCM-05	PZ-05	PCM-06	PZ-06
1st Qtr.								
2nd Qtr.								
3rd Qtr.								
4th Qtr.								

Month	Day	Inspector	PCM-07R	PZ-07	PCM-08	PZ-08	PCM-09	PZ-09R
1st Qtr.								
2nd Qtr.								
3rd Qtr.								
4th Qtr.								

Month	Day	Inspector	PCM-10	PZ-10	WW1	WW2	WW3	WW4	River
1st Qtr.									
2nd Qtr.									
3rd Qtr.									
4th Qtr.									

FORM 1

ANNUAL OPERATION AND MAINTENANCE REPORT

102ND STREET LANDFILL SITE
NIAGARA FALLS, NEW YORK

YEAR: _____

GROUNDWATER - Quality Monitoring

Quarter	Date Sample Taken	Inspector	Comments
1st			
2nd			
3rd			
4th			

Results of analyses are attached.

NAPL PRESENCE - Monitoring

	Date	Inspector	NR-01 Depth of NAPL (ft)	NR-01 Gallons Removed	NR-02 Depth of NAPL (ft)	NR-02 Gallons Removed	NR-03 Depth of NAPL (ft)	NR-03 Gallons Removed
1st Quarter								
2nd Quarter								
3rd Quarter								
4th Quarter								

	Date	Inspector	NR-04 Depth of NAPL (ft)	NR-04 Gallons Removed	NR-05 Depth of NAPL (ft)	NR-05 Gallons Removed	NR-07 Depth of NAPL (ft)	NR-07 Gallons Removed
1st Quarter								
2nd Quarter								
3rd Quarter								
4th Quarter								

	Date	Inspector	NR-08 Depth of NAPL (ft)	NR-08 Gallons Removed	NR-10 Depth of NAPL (ft)	NR-10 Gallons Removed
1st Quarter						
2nd Quarter						
3rd Quarter						
4th Quarter						

FORM 1

ANNUAL OPERATION AND MAINTENANCE REPORT

102ND STREET LANDFILL SITE
NIAGARA FALLS, NEW YORK

YEAR: _____

OPERATION

APL COLLECTION AND DISCHARGE SYSTEM

APL Flow for Previous Year (gallons)	APL Flow for Current Year (gallons)

NAPL REMOVAL SYSTEM

	NAPL Removed for Previous Year (gallons)	NAPL Removed for Current Year (gallons)
NR-01		
NR-02		
NR-03		
NR-04		
NR-05		
NR-07		
NR-08		
NR-10		
Total		

Where was NAPL treated/disposed?

Facility _____ Date _____
Facility _____ Date _____
Facility _____ Date _____
Facility _____ Date _____
Facility _____ Date _____
Facility _____ Date _____

FORM 1

ANNUAL OPERATION AND MAINTENANCE REPORT

102ND STREET LANDFILL SITE
NIAGARA FALLS, NEW YORK

YEAR: _____

INSPECTION AND MAINTENANCE

Scheduled inspections performed:

	Date	**Inspectors**
DEC Inspection		
Well Inspection		

Was maintenance required?

Yes	***No***
☐	☐

What maintenance was required?	Date Performed

Describe any maintenance activity that required an activity specific work plan and health and safety plan.

Form Completed By:

NAME	SIGNATURE	DATE

FORM 1

ANNUAL OPERATION AND MAINTENANCE REPORT

102ND STREET LANDFILL SITE
NIAGARA FALLS, NEW YORK

YEAR: _____

Send completed copies of this form to the following for review:

Mr. Joseph Branch
Glenn Springs Holdings, Inc.
7601 Old Channel Trail
Montague, MI 49437

and

Mr. Dave Share
Olin Corporation
3855 North Ocoee Street, Suite 200
Cleveland, TN 37312

After review is complete, include in Annual Periodic Review Report for distribution to:

Chief-New York Remedial Branch
Emergency and Remedial Response Davison
U.S. Environmental Protection Agency - Region II
290 Broadway, 20th Floor
New York, NY 10007-1866
Attn: 102nd Street Landfill Superfund Site Manager

and

Mr. Brian Sadowski
New York State Department of Environmental Conservation
270 Michigan Avenue
Buffalo, NY 14203-2999

and

Mr. Gregory P. Sutton
Regional Remediation Engineer
New York State Department of Environmental Conservation
270 Michigan Avenue
Buffalo, NY 14203-2999

FORM 1

Appendix D
Institutional and Engineering Control Certification Form

Enclosure 1

Certification Instructions

I. Verification of Site Details (Box 1 and Box 2):

Answer the three questions in the Verification of Site Details Section. The Owner and/or Qualified Environmental Professional (QEP) may include handwritten changes and/or other supporting documentation, as necessary.

II. Certification of Institutional Controls/ Engineering Controls (IC/ECs)(Boxes 3, 4, and 5)

1.1.1. Review the listed IC/ECs, confirming that all existing controls are listed, and that all existing controls are still applicable. If there is a control that is no longer applicable the Owner / Remedial Party should petition the Department separately to request approval to remove the control.

2. In Box 5, complete certifications for all Plan components, as applicable, by checking the corresponding checkbox.

3. If you cannot certify "YES" for each Control listed in Box 3 & Box 4, sign and date the form in Box 5. Attach supporting documentation that explains why the **Certification** cannot be rendered, as well as a plan of proposed corrective measures, and an associated schedule for completing the corrective measures. Note that this **Certification** form must be submitted even if an IC or EC cannot be certified; however, the certification process will not be considered complete until corrective action is completed.

If the Department concurs with the explanation, the proposed corrective measures, and the proposed schedule, a letter authorizing the implementation of those corrective measures will be issued by the Department's Project Manager. Once the corrective measures are complete, a new Periodic Review Report (with IC/EC Certification) must be submitted within 45 days to the Department. If the Department has any questions or concerns regarding the PRR and/or completion of the IC/EC Certification, the Project Manager will contact you.

III. IC/EC Certification by Signature (Box 6 and Box 7**):**

If you certified "YES" for each Control, please complete and sign the IC/EC Certifications page as follows:

- For the Institutional Controls on the use of the property, the certification statement in Box 6 shall be completed and may be made by the property owner or designated representative.

- For the Engineering Controls, the certification statement in Box 7 must be completed by a Professional Engineer or Qualified Environmental Professional, as noted on the form.

Enclosure 2
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Site Management Periodic Review Report Notice
Institutional and Engineering Controls Certification Form

Site Details **Box 1**

Site No. 932022

Site Name Hooker-102nd Street Landfill

Site Address: 102nd Street, South of River Road Zip Code: 14304
City/Town: Niagara Falls
County: Niagara
Site Acreage: 16.500

Reporting Period: December 31, 2017 to December 31, 2018

	YES	NO
1. Is the information above correct?	☐	☐
If NO, include handwritten above or on a separate sheet.		
2. Has some or all of the site property been sold, subdivided, merged, or undergone a tax map amendment during this Reporting Period?	☐	☐
3. Has there been any change of use at the site during this Reporting Period (see 6NYCRR 375-1.11(d))?	☐	☐
4. Have any federal, state, and/or local permits (e.g., building, discharge) been issued for or at the property during this Reporting Period?	☐	☐
If you answered YES to questions 2 thru 4, include documentation or evidence that documentation has been previously submitted with this certification form.		
5. Is the site currently undergoing development?	☐	☐

Box 2

	YES	NO
6. Is the current site use consistent with the use(s) listed below? Closed Landfill	☐	☐
7. Are all ICs/ECs in place and functioning as designed?	☐	☐

IF THE ANSWER TO EITHER QUESTION 6 OR 7 IS NO, sign and date below and DO NOT COMPLETE THE REST OF THIS FORM. Otherwise continue.

A Corrective Measures Work Plan must be submitted along with this form to address these issues.

Signature of Owner, Remedial Party or Designated Representative Date

SITE NO. 932022 **Box 3**

Description of Institutional Controls

Parcel	Owner	Institutional Control
161.18-1-34.2	Occidental Chemical Corporation	Landuse Restriction Ground Water Use Restriction Building Use Restriction Monitoring Plan O&M Plan

1. Record of Decision; September 26, 1990.

2. Deed Restriction; January 25, 2000. Prohibits the use of site groundwater or disturbance of the landfill cover.

161.19-3-1	Occidental Chemical Corporation	Monitoring Plan O&M Plan Building Use Restriction Landuse Restriction Ground Water Use Restriction

1. Record of Decision; September 26, 1990.

2. Deed Restriction; January 25, 2000. Prohibits the use of site groundwater or disturbance of the landfill cover.

161.19-3-2	Occidental Chemical Corporation	Landuse Restriction Ground Water Use Restriction Building Use Restriction Monitoring Plan O&M Plan

1. Record of Decision (ROD) September 26, 1990.

2. Deed Restriction; January 25, 2000. Prohibits the use of site groundwater or disturbance of the landfill cover.

174.07-1-1	Occidental Chemical Corporation	Ground Water Use Restriction Building Use Restriction O&M Plan Monitoring Plan Landuse Restriction

1. Record of Decision; September 26, 1990.

2. Deed Restriction; January 25, 2000. Prohibits the use of site groundwater or disturbance of the landfill cover.

174.07-1-2 Occidental Chemical Corporation

Ground Water Use Restriction
Building Use Restriction

Landuse Restriction

Monitoring Plan
O&M Plan

1. Record of Decision; September 26, 1990.

2. Deed Restriction; January 25, 2000. Prohibits the use of site groundwater or disturbance of the landfill cover.

174.07-1-3 Olin Corporation

Monitoring Plan
O&M Plan
Ground Water Use Restriction
Building Use Restriction
Landuse Restriction

1. Record of Decision; September 26, 1990.

2. Deed Restriction; January 25, 2000. Prohibits the use of site groundwater or disturbance of the landfill cover.

174.07-1-4 Olin Corporation

Landuse Restriction
Monitoring Plan
O&M Plan

Ground Water Use Restriction
Building Use Restriction

1. Record of Decision; September 26, 1990.

2. Deed Restriction; January 25, 2000. Prohibits the use of site groundwater or disturbance of the landfill cover.

Box 4

Description of Engineering Controls

Parcel	Engineering Control
161.18-1-34.2	Groundwater Treatment System Groundwater Containment Subsurface Barriers Cover System Fencing/Access Control Leachate Collection

The engineering controls consist of a containment system for the landfill, including: perimeter fencing, NAPL recovery wells, a groundwater collection system, a perimeter sub-surface slurry wall, and a landfill cap. Groundwater collected from the containment system is pumped north for treatment at the Love Canal Leachate Treatment Facility. NAPL is pumped seasonally (April - Nov.) from NAPL recovery wells into two double walled skid mounted tanks with internal secondary containment and sent off site for proper disposal. OCC/Olin, or their consultant has perfomed the required OM&M activities since 1999.

161.19-3-1	Leachate Collection Cover System Fencing/Access Control Groundwater Treatment System Groundwater Containment Subsurface Barriers

The engineering controls consist of a containment system for the landfill, including: perimeter fencing, NAPL recovery wells, a groundwater collection system, a perimeter sub-surface slurry wall, and a landfill cap. Groundwater collected from the containment system is pumped north for treatment at the Love Canal Leachate Treatment Facility. NAPL is pumped seasonally (April - Nov.) from NAPL recovery wells into two double walled skid mounted tanks with internal secondary containment and sent off site for proper disposal. OCC/Olin, or their consultant has performed the required OM&M activities since 1999.

161.19-3-2	Groundwater Treatment System Groundwater Containment Subsurface Barriers Cover System Fencing/Access Control Leachate Collection

The engineering controls consist of a containment system for the landfill, including: perimeter fencing, NAPL recovery wells, a groundwater collection system, a perimeter sub-surface slurry wall, and a landfill cap. Groundwater collected from the containment system is pumped north for treatment at the Love Canal Leachate Treatment Facility. NAPL is pumped seasonally (April - Nov.) from NAPL recovery wells into two double walled skid mounted tanks with internal secondary containment and sent off site for proper disposal. OCC/Olin, or their consultant has performed the required OM&M activities since 1999.

174.07-1-1	Leachate Collection Cover System Fencing/Access Control Groundwater Treatment System Groundwater Containment Subsurface Barriers

The engineering controls consist of a containment system for the landfill, including: a perimeter sub-surface slurry wall, groundwater collection system, NAPL recovery wells, landfill cap and perimeter fencing. Groundwater collected from the containment system is pumped north for treatment at the Love Canal Leachate Treatment Facility. NAPL is pumped seasonally (April-October) from NAPL recovery wells into two, 2,500 gallon, double walled skid mounted tanks with internal secondary containment. Accumulated NAPL is shipped off site for proper disposal. OCC/Olin, or their consultant has performed the required OM&M activities since 1999.

174.07-1-2	Leachate Collection Cover System Fencing/Access Control Groundwater Treatment System Groundwater Containment Subsurface Barriers

Parcel | Engineering Control

The engineering controls consist of a containment system for the landfill, including: perimeter fencing, NAPL recovery wells, a groundwater collection system, a perimeter sub-surface slurry wall, and a landfill cap. Groundwater collected from the containment system is pumped north for treatment at the Love Canal Leachate Treatment Facility. NAPL is pumped seasonally (April - Nov.) from NAPL recovery wells into two double walled skid mounted tanks with internal secondary containment and sent off site for proper disposal. OCC/Olin, or their consultant has performed the required OM&M activities since 1999.

174.07-1-3

Groundwater Treatment System
Cover System
Groundwater Containment
Leachate Collection
Subsurface Barriers
Fencing/Access Control

The engineering controls consist of a containment system for the landfill, including: perimeter fencing, NAPL recovery wells, a groundwater collection system, a perimeter sub-surface slurry wall, and a landfill cap. Groundwater collected from the containment system is pumped north for treatment at the Love Canal Leachate Treatment Facility. NAPL is pumped seasonally (April - Nov.) from NAPL recovery wells into two double walled skid mounted tanks with internal secondary containment and sent off site for proper disposal. OCC/Olin, or their consultant has perfomed the required OM&M activities since 1999.

174.07-1-4

Groundwater Treatment System
Cover System
Groundwater Containment
Leachate Collection
Subsurface Barriers
Fencing/Access Control

The engineering controls consist of a containment system for the landfill, including: perimeter fencing, NAPL recovery wells, a groundwater collection system, a perimeter sub-surface slurry wall, and a landfill cap. Groundwater collected from the containment system is pumped north for treatment at the Love Canal Leachate Treatment Facility. NAPL is pumped seasonally (April - Nov.) from NAPL recovery wells into two double walled skid mounted tanks with internal secondary containment and sent off site for proper disposal. OCC/Olin, or their consultant has performed the required OM&M activities since 1999.

Box 5

Periodic Review Report (PRR) Certification Statements

1. I certify by checking "YES" below that:

   a) the Periodic Review report and all attachments were prepared under the direction of, and reviewed by, the party making the certification;

   b) to the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program, and generally accepted engineering practices; and the information presented is accurate and compete.

YES	NO
☐	☐

2. If this site has an IC/EC Plan (or equivalent as required in the Decision Document), for each Institutional or Engineering control listed in Boxes 3 and/or 4, I certify by checking "YES" below that all of the following statements are true:

   (a) the Institutional Control and/or Engineering Control(s) employed at this site is unchanged since the date that the Control was put in-place, or was last approved by the Department;

   (b) nothing has occurred that would impair the ability of such Control, to protect public health and the environment;

   (c) access to the site will continue to be provided to the Department, to evaluate the remedy, including access to evaluate the continued maintenance of this Control;

   (d) nothing has occurred that would constitute a violation or failure to comply with the Site Management Plan for this Control; and

   (e) if a financial assurance mechanism is required by the oversight document for the site, the mechanism remains valid and sufficient for its intended purpose established in the document.

YES	NO
☐	☐

IF THE ANSWER TO QUESTION 2 IS NO, sign and date below and DO NOT COMPLETE THE REST OF THIS FORM. Otherwise continue.

A Corrective Measures Work Plan must be submitted along with this form to address these issues.

_____ _____

Signature of Owner, Remedial Party or Designated Representative Date

IC CERTIFICATIONS
SITE NO. 932022

Box 6

SITE OWNER OR DESIGNATED REPRESENTATIVE SIGNATURE

I certify that all information and statements in Boxes 1,2, and 3 are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law.

I _____ at _____,
print name print business address

am certifying as _____(Owner or Remedial Party)

for the Site named in the Site Details Section of this form.

_____ _____
Signature of Owner, Remedial Party, or Designated Representative Date
Rendering Certification

IC/EC CERTIFICATIONS

Box 7

Professional Engineer Signature

I certify that all information in Boxes 4 and 5 are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law.

I _____ at _____,
print name print business address

am certifying as a Professional Engineer for the _____
(Owner or Remedial Party)

_____	_____	_____
Signature of Professional Engineer, for the Owner or Remedial Party, Rendering Certification	Stamp (Required for PE)	Date

Enclosure 3
Periodic Review Report (PRR) General Guidance

I. Executive Summary: (1/2-page or less)
   A. Provide a brief summary of site, nature and extent of contamination, and remedial history.
   B. Effectiveness of the Remedial Program - Provide overall conclusions regarding;
      1. progress made during the reporting period toward meeting the remedial objectives for the site
      2. the ultimate ability of the remedial program to achieve the remedial objectives for the site.
   C. Compliance
      1. Identify any areas of non-compliance regarding the major elements of the Site Management Plan (SMP, i.e., the Institutional/Engineering Control (IC/EC) Plan, the Monitoring Plan, and the Operation & Maintenance (O&M) Plan).
      2. Propose steps to be taken and a schedule to correct any areas of non-compliance.
   D. Recommendations
      1. recommend whether any changes to the SMP are needed
      2. recommend any changes to the frequency for submittal of PRRs (increase, decrease)
      3. recommend whether the requirements for discontinuing site management have been met.

II. Site Overview (one page or less)
   A. Describe the site location, boundaries (figure), significant features, surrounding area, and the nature and extent of contamination prior to site remediation.
   B. Describe the chronology of the main features of the remedial program for the site, the components of the selected remedy, cleanup goals, site closure criteria, and any significant changes to the selected remedy that have been made since remedy selection.

III. Evaluate Remedy Performance, Effectiveness, and Protectiveness
   Using tables, graphs, charts and bulleted text to the extent practicable, describe the effectiveness of the remedy in achieving the remedial goals for the site. Base findings, recommendations, and conclusions on objective data. Evaluations and should be presented simply and concisely.

IV. IC/EC Plan Compliance Report (if applicable)
   A. IC/EC Requirements and Compliance
      1. Describe each control, its objective, and how performance of the control is evaluated.
      2. Summarize the status of each goal (whether it is fully in place and its effectiveness).
      3. Corrective Measures: describe steps proposed to address any deficiencies in ICECs.
      4. Conclusions and recommendations for changes.
   B. IC/EC Certification
      1. The certification must be complete (even if there are IC/EC deficiencies), and certified by the appropriate party as set forth in a Department-approved certification form(s).

V. Monitoring Plan Compliance Report (if applicable)
   A. Components of the Monitoring Plan (tabular presentations preferred) - Describe the requirements of the monitoring plan by media (i.e., soil, groundwater, sediment, etc.) and by any remedial technologies being used at the site.
   B. Summary of Monitoring Completed During Reporting Period - Describe the monitoring tasks actually completed during this PRR reporting period. Tables and/or figures should be used to show all data.
   C. Comparisons with Remedial Objectives - Compare the results of all monitoring with the remedial objectives for the site. Include trend analyses where possible.
   D. Monitoring Deficiencies - Describe any ways in which monitoring did not fully comply with the monitoring plan.
   E. Conclusions and Recommendations for Changes - Provide overall conclusions regarding the monitoring completed and the resulting evaluations regarding remedial effectiveness.

VI. Operation & Maintenance (O&M) Plan Compliance Report (if applicable)
   A. Components of O&M Plan - Describe the requirements of the O&M plan including required activities, frequencies, recordkeeping, etc.
   B. Summary of O&M Completed During Reporting Period - Describe the O&M tasks actually completed during this PRR reporting period.

C. Evaluation of Remedial Systems - Based upon the results of the O&M activities completed, evaluated the ability of each component of the remedy subject to O&M requirements to perform as designed/expected.
D. O&M Deficiencies - Identify any deficiencies in complying with the O&M plan during this PRR reporting period.
E. Conclusions and Recommendations for Improvements - Provide an overall conclusion regarding O&M for the site and identify any suggested improvements requiring changes in the O&M Plan.

VII. Overall PRR Conclusions and Recommendations
A. Compliance with SMP - For each component of the SMP (i.e., IC/EC, monitoring, O&M), summarize;
1. whether all requirements of each plan were met during the reporting period
2. any requirements not met
3. proposed plans and a schedule for coming into full compliance.
B. Performance and Effectiveness of the Remedy - Based upon your evaluation of the components of the SMP, form conclusions about the performance of each component and the ability of the remedy to achieve the remedial objectives for the site.
C. Future PRR Submittals
1. Recommend, with supporting justification, whether the frequency of the submittal of PRRs should be changed (either increased or decreased).
2. If the requirements for site closure have been achieved, contact the Departments Project Manager for the site to determine what, if any, additional documentation is needed to support a decision to discontinue site management.

VIII. Additional Guidance

Additional guidance regarding the preparation and submittal of an acceptable PRR can be obtained from the Departments Project Manager for the site.

Appendix E
Remedial Site Optimization Outline

Table of Contents

1. Introduction
   - 1.1 Site Overview
   - 1.2 Project Objectives and Scope of Work
   - 1.3 Report Overview
2. Remedial Action Description
   - 2.1 Site Location and History
   - 2.2 Regulatory History and Requirements
   - 2.3 Clean-up Goals and Closure Criteria
   - 2.4 Previous Remedial Actions
   - 2.5 Description of Existing Remedy
     - 2.5.1 System Goals and Objectives
     - 2.5.2 System Description
     - 2.5.3 Operation and Maintenance Program
3. Findings and Observations
   - 3.1 Subsurface Performance
   - 3.2 Treatment System Performance
   - 3.3 Regulatory Compliance
   - 3.4 Major Cost Components or Processes
   - 3.5 Safety Record
4. Recommendations
   - 4.1 Recommendations to Achieve or Accelerate Site Closure
     - 4.1.1 Source Reduction/Treatment
     - 4.1.2 Sampling
     - 4.1.3 Conceptual Site Model (Risk Assessment)
   - 4.2 Recommendations to Improve Performance
     - 4.2.1 Maintenance Improvements
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     - 4.2.3 Process Modifications
   - 4.3 Recommendations to Reduce Costs
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     - 4.3.3 Optimize Monitoring Program
     - 4.3.4 Maintenance and Repairs
   - 4.4 Recomendations for Implementation

about GHD

GHD is one of the world's leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation. We provide engineering, environmental, and construction services to private and public sector clients.

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