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Golder Associates

FINAL
ENGINEERING REPORT

WETLANDS TREATMENT SYSTEM DESIGN
ISCHUA LANDFILL
ISCHUA, NEW YORK

Submitted to:

City of Olean
Department of Public Works
Municipal Building
Olean, New York 14760

DISTRIBUTION:

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June 2000

003-9248

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1. INTRODUCTION

1.1 General

Golder Associates Inc. (Golder) has been retained by the City of Olean (City), to provide engineering services to assist the City with regard to leachate seepage conditions at the previously closed Ischua Landfill (Landfill). The City has been working with the New York State Department of Environmental Conservation (NYSDEC) since approximately 1982 with regard to this issue. The City entered into an Order on Consent [Number 89-92] which outlined the concept of a phased approach for remediation of the leachate seeps at the Landfill. Phase I of the remedial program has been completed and evaluated. Based on the results of the Phase I program, a second phase was required to be implemented. The revised Schedule A of the Order on Consent (dated April 2000) requires the City to design and install a wetland treatment system at the Landfill. This treatment system is to sufficiently treat the Landfill leachate to meet a draft State Pollution Discharge Elimination System (SPDES) permit (NY-0258245) issued to the City by the NYSDEC. In partial fulfillment of the requirements of the Order on Consent, this Engineering Report is submitted as the Phase II Final Design Plan for Remedial Action (RA) at the Landfill. This report details the next phase of RA for the collection and treatment of leachate seeps at the Landfill.

1.2 Background

The Landfill is located in the Town of Ischua near the Olean municipal airport (see Figure 1). The Landfill consists of three parallel waste trenches nominally 15 feet deep, 50 feet wide, and ranging from 800 feet to 1,300 feet in length (see Figure 2). The Landfill operated from 1972 to 1975 when it was closed with a minimal (by current standards) final cover.

The City, the owner of the Landfill, has been working with the NYSDEC since approximately 1982 with regard to leachate seeps downgradient of the Landfill. In an effort to control the reported leachate seeps, the Landfill cover was improved in September 1985

with the addition of 18 inches of compacted clay and 6 inches of topsoil, as reported by URS Consultants Inc. (URS) (URS, January 1986).

The improved Landfill cover provides reduction of surface water infiltration, but it did not eliminate the leachate seeps. Thus, this indicated that lateral groundwater flow through the Landfill trenches may be contributing to the observed seepage. In response to renewed concerns, Golder prepared a draft report on the evaluation of remedial alternatives for the Landfill (Golder, February 1991). This draft report served as the initial point of discussion regarding the implementation of further suitable RA at the site. It was agreed between the NYSDEC and the City that the principal concerns at the site are the aesthetic appearance and water quality of the seep areas and the downgradient surface stream. Consequently, it was proposed to the NYSDEC that the RA at the Landfill be implemented in a phased approach. Initially, an upgradient interceptor trench would be installed in an attempt to collect and divert groundwater upgradient of the site to a downgradient location and thereby minimize (or perhaps eliminate) the leachate seeps. If necessary, subsequent phases of remediation would then be incorporated, as appropriate. The proposed phased approach became the technical basis of the final Order on Consent No. 89-92 between the City and the NYSDEC.

In response to Item 2 of the Order on Consent, Golder prepared a report (Golder, June 1992) on the design of the upgradient interceptor trench. The design was approved by the NYSDEC on July 31, 1992. The City initiated the RA activities in September 1992, and retained Golder to perform engineering and construction quality assurance/quality control (CQA/QC) services during the construction of the upgradient interceptor trench. The upgradient interceptor trench was installed in 1992 as described in the as-built report prepared by Golder and was submitted to the NYSDEC in February 1993.

Golder performed quarterly hydraulic monitoring of the upgradient trench from November 1992 through May 1994, in order to evaluate the success of the remedial system. The monitoring events consisted of visual observation of the site leachate seeps (if any), recording the water level from on-site monitoring wells and weirs, and recording the

amount of water intercepted by the trench. As stated in the report "Sixth Quarterly and 18-Month Effectiveness Summary Performance Evaluation of the Upgradient Interceptor Trench" (Golder, July 1994), the performance of the upgradient trench did not achieve the required 95-percent (%) reduction in seepage flow at the Landfill. Consequently, as specified by the Consent Order, a second phase (Phase II) of the remedial program is required. In response to Item 3 of the Consent Order, Golder prepared a report (Golder, September 1991) describing possible conceptual Phase II remedial alternatives that may be adopted, should the Phase I RA (upgradient interceptor trench) not be successful in reducing the leachate seeps at the site. The Phase II conceptual remedial alternatives included a no-action alternative, containment only alternatives, and collection and treatment alternatives.

A final Phase II RA Plan was prepared by the City and submitted to the NYSDEC in August 1994 (Golder, August 1994). This final Phase II RA Plan presented a conceptual design for a proposed constructed wetland collection and treatment system at the Landfill. The NYSDEC conditionally approved the Phase II RA Plan, as stated in their letter dated April 24, 1995, addressed to Golder. A design report, dated August, 23, 1995, for the constructed wetland collection and treatment system was submitted to the NYSDEC. However, subsequent to the submittal, based on the results of five years of monitoring data collected from surface water samples downgradient of the existing wetland and main seep, the City of Olean negotiated with the NYSDEC (June 1996) a revised remedial approach to the project that involves utilizing the existing wetlands at the Landfill to treat the Landfill leachate. The NYSDEC conditionally accepted this revised remedial approach, with the issuance of a draft State Pollutant Discharge Elimination Systems (SPDES) permit (Appendix A).

and from bedding plane outcrops. A review of hydrogeologic data suggests downward flow through the overburden and near-surface fractured rock, with lateral movement along bedding planes underlain by lower hydraulic conductivity layers.

The occurrence of leachate seeps, which include a component of groundwater flow within the context of the conceptual model described above, would be expected. Seeps would occur where flow along bedding planes underlain by lower hydraulic conductivity layers outcrop at the ground surface. Additionally, seeps may occur downslope of the areas where flow along bedding planes intersects the overburden material. Seeps would also occur even in the absence of the Landfill, and given background groundwater quality, observations of iron staining would be expected.

2.3 Site Ground Water and Surface Water Monitoring

The City currently is following a NYSDEC-approved groundwater and surface water monitoring program for the site. Golder submitted a letter dated November 6, 1995 to the NYSDEC that requested a modification of the sampling frequency at the site from quarterly to semi-annually, based upon a statistical evaluation of the previous five years of groundwater monitoring data. The statistical evaluation of the site data revealed that the total volatile organic compound (VOC) concentrations for all sampling points has remained constant or has decreased with time. In a letter dated January 10, 1996, the NYSDEC concurred with the request to modify the sampling frequency at the site from quarterly to semi-annually. Currently twelve monitoring wells, one surface water sample point (i.e., "stream", unnamed creek), and one leachate seep (as shown on Figure 2) are sampled on a semi-annual basis (i.e., every March and September). These sample points are analyzed for Title 6 New York Codes, Rules and Regulations (6NYCRR) Part 360 Baseline parameters plus VOCs. The results of each of the semi-annual monitoring events are summarized in reports that are submitted by the City to the NYSDEC.

The results of the monitoring program indicate that groundwater samples analyzed from the two furthest downgradient monitoring wells MW-13 and MW-14, southeast of Trench 3

and the primary leachate seep, do not exceed 6NYCRR Class GA groundwater standards for VOCs. In addition, the results indicate that the groundwater from MW-13 and MW-14 do not exceed 6NYCRR Class GA groundwater standards for other parameters analyzed with the exception of iron, manganese, and limited detections of turbidity, color, and total phenol (from MW-13 only).

Furthermore, analytical results of the downgradient stream sample at the site do not exceed 6NYCRR Class A surface water standards for VOCs. Only limited, sporadic exceedances for iron, manganese, color, turbidity and phenol have been observed over the last five years of monitoring. It should be noted that the typical concentrations of naturally occurring iron and manganese in groundwater in the vicinity of the site are known to exceed the Class GA groundwater and Class A surface water standards.

13 cadmium .007 9/98 14 .006 9/98
pH 5.8 3/99 chromium .339 9/97
pH 10.5 9/97
9.1 3/10

3. WETLAND TREATMENT SYSTEM DESIGN

3.1 General Overview

This report presents the final design for a natural wetland treatment system (WTS) at the Landfill site. The WTS has been designed to collect and treat leachate from the seepage areas at the site.

Wetland treatment systems have shown, through a number of demonstrations, that a broad spectrum of inorganic and organic pollutants and bacterial and viral pathogens can be efficiently removed using low energy and manpower requirements. Under certain conditions, wetlands may be an attractive alternative for the treatment of municipal and industrial leachate in comparison to conventional leachate treatment systems and the option of collecting, storing and hauling leachate to an off-site wastewater treatment facility for a number of reasons including:

- Low construction and operation costs;
- Easy to control and maintain;
- Passive system with little operator intervention required;
- No chemical addition required;
- Little to no energy requirements;
- Can effectively function under a wide range of operating criteria;
- Can simultaneously treat a wide range of chemical constituents; and
- Uses of available on-site natural materials.

3.2 Characteristics of the Ischua Landfill Site

An unnamed creek flows northeast from the natural wetlands proposed as the WTS. Approximately two miles further downstream, this creek drains into Ischua Creek. Existing surface channels at the site collect flow from the leachate seeps and direct the flow through the existing natural wetlands. Water quality samples have been collected from the unnamed creek immediately downstream of the wetlands. As discussed in Section 2.3, analytical results of the downgradient stream sample at the site do not exceed 6NYCRR Class A surface water standards for VOCs. Only limited, sporadic exceedances for iron, manganese, color, turbidity and phenol have been observed over the last five years of monitoring.

3.3 Treatment System Objectives

Water quality treatment in a WTS is achieved through a combination of physical, chemical and biological processes. These processes will be employed to meet the WTS treatment objective of achieving the effluent quality specified within the draft SPDES Permit No. NY-0258425 (Appendix A).

The WTS is expected to achieve adequate water quality treatment for a mean annual groundwater seepage rate of 4.5 gallons per minute (gpm) which is an estimate of the long term average leachate seepage rate. The actual seepage rates vary from near zero to about 10 gpm based upon seasonal fluctuations.

To maintain the hydrologic balance that has allowed the site wetlands to thrive, the design does not include measures for diversion of surface water from the WTS. Owing to the sensitivity of wetland ecology, diversion of site runoff away from the wetlands has a strong potential to disrupt the existing conditions at the site. Disturbance of the existing wetlands will be avoided to the extent possible during construction of the various features included in the WTS design.

3.4 Wetland Ecology

On June 5 and 6, 1995, and May 15, 2000, Golder conducted wetland ecology field reconnaissance at the site. The purpose of the 1995 reconnaissance event was to delineate and document the existing wetland conditions at the site. This information was used in subsequent communications with the United States Army Corp of Engineers (USACOE) regarding the project and site. Wetland delineation field data sheets that have been provided to the ACOE in correspondence regarding the project and which document the wetland conditions at the site are provided within Appendix B of this document. During the 1995 event, a boundary was delineated around approximately 1.3 acres of wetland. The 1.3-acre wetland area will be used for the WTS. The boundary was determined utilizing the methodologies outlined in the USACOE Wetlands Delineation Manual (1987 Manual). The delineated wetlands meet the criteria to be classified as headwater

Map shows Area A = 0.5 ac.
B 0.097
C 0.436
1.023 acres total
NOT 1.3

wetlands (stream flow less than five cubic feet/second (cfs)). A copy of the delineated wetland area map, surveyed by Deborah Naybor PLS, PC., is included in Appendix B.

The May 2000 reconnaissance was conducted to evaluate if wetland conditions have changed subsequent to the 1995 delineation. Based on wetland conditions observed during the May 2000 event, the areal extent, general plant species, hydrologic, and hydrogeomorphic setting (i.e. groundwater discharge to surface water in headwater areas) are currently consistent with those observed in June of 1995.

As indicated on the field data sheets contained in Appendix B, the site wetlands are vegetated predominantly with *Juncus* sp. (rushes), *Carex* spp. (sedges), *Typha* sp. (cattails) and some small (less than three feet tall) *Salix* sp. (willow) trees. Upgradient seepage and storm water flowing through the existing lower weir and the seep weir (see Figure 2) lose their channelized flow within 50 feet downstream of the weirs and continue as sheet flow (with a subsurface component) to an intermittent stream channel southeast of the weirs. At the location where the leachate seepage and storm water currently discharge across the lower and seep weirs, there is a significant accumulation of ferric hydroxide precipitate.

An investigation of another wetland area within one mile of the site located in a separate sub-watershed basin included natural wetlands in similar hydrogeomorphic settings (groundwater discharge to surface water in headwater areas). The wetland area investigated was also observed to have significant accumulations of ferric hydroxide precipitate in the small channel flowing through it. The emergent plant communities generally consisted of six to seven predominant species (i.e., *Typha* spp., *Acorus calamus*, *Juncus* spp., *Scirpus* sp., *Polygonum* spp., *Mentha* spp. etc.) growing in dense patches. The remainder of the emergent species in this wetland area (typically more than eight additional species) were more randomly distributed throughout the wetland area in smaller patches.

3.5 Leachate Collection System

3.5.1 Leachate Collection Channels

Two leachate collection channels are currently in place at the site as shown on Figure 3. This first channel flows in a north-south direction and the second channel flows in a northwest-southeast direction as identified on Figure 3. These channels intercept and collect leachate seepage emanating from the area downgradient of Trench 3. The leachate collection channels convey leachate (and precipitation run-off) to the existing 1.3-acre wetland area. During the May 2000 field reconnaissance program for the project, the channels were inspected to determine their suitability for continued use as leachate collection structures. As a result of this inspection, it is considered that the channel characteristics are suitable in the current state to continue to serve in this capacity. The berms of the channels were observed to be in good condition. The channel depth and cross sectional area are adequate to carry the current and anticipated future leachate and surface water flow as indicated by the calculation provided in Appendix C. Most importantly, the interior of the channels are densely vegetated with long bladed grass over nearly their entire length, which will significantly reduce the flow velocity. The one exception to this vegetative cover is a relatively short length of channel (approximately 125 feet) at the location of the upper weir where some exposed rock and soil conditions exist within the channel. At this location, a channel lining of erosion control stone (riprap) will be provided during construction (see Figure 3). The upper weir will be removed as part of the channel lining upgrade. The lower and seep weirs will remain in place to avoid disruption of the existing wetlands area.

3.5.2 Point Source Connector

During wetland field reconnaissance activities conducted in June 1995 and again in May 2000, the site was inspected to evaluate the extent of point source leachate discharge immediately downgradient of the Landfill trenches. The site inspections were also to confirm the presence of previously observed seepage points at locations other than the primary seep at the lower weir location. During the May 2000 field reconnaissance, no additional seeps were identified than those identified from the previous field

reconnaissance performed in June 1995. A total of four (4) seepage locations were observed to be present during the site walkthroughs and are shown as a "seep" on Figure 3.

Based on the topographic location of the seep located downgradient of Landfill Trench 1 and in the vicinity of the site entrance, flow from this source will be captured and discharged by gravity through a shallow french drain (point source connector) into the leachate collection channel. Details regarding the construction of the point source connector are shown on Figure 4. As shown on Figure 4, the point source connector will consist of a gravel filled (NYSDOT No. 2 stone) and bermed collection point which will be connected to a perforated 6-inch diameter polyvinyl chloride (PVC) pipe encased in gravel. The perforated collection pipe will then discharge at the origin of the leachate collection channel as shown on Figure 4. It should be noted that an ancillary benefit derived from the positioning of this point source connector is that it will function as a subsurface drain intercepting potential subsurface seepage flowing toward the drain from Trench 1 and Trench 2 (see Figure 3).

3.6 Effluent Monitoring Station

To monitor the flow and effluent quality from the WTS, an effluent monitoring station will be constructed within the unnamed stream that receives discharge from the treatment wetlands. The effluent monitoring station will consist of a rectangular weir structure, a battery powered water level data-logger, and provisions for installation of an auto-sampler for obtaining water quality samples. This monitoring station is designated as Outfall 001 and its location is indicated on the plan drawing provided as Figure 3.

Figure 5 provides details of the effluent monitoring station. The rectangular weir has been sized to provide an effluent flow measurement range that spans the mean annual seepage rate from the wetlands of 4.5 gpm, which is considered to be a reasonable estimate of the long term average leachate seepage rate, to the expected flow from the 2-year rainfall event (4,036 gpm). However, the weir has been sized to accommodate a

peak flow of 6,341 gpm. Calculations related to sizing of the rectangular weir and other site structures are provided in Appendix C.

3.7 Ancillary Construction Features

3.7.1 Erosion Control Measures

A program of erosion and sedimentation control during construction will be established by requiring the contractor to provide procedures (see Appendix D) for placement of temporary sedimentation and erosion control features such as hay bales and silt fencing. At a minimum, these temporary structures will be placed at appropriate locations within the perimeter of areas of bare earth. These temporary measures will remain in place until adequate vegetative cover is established within the areas of concern. Additionally, the contractor will be required to utilize established haul roads and confine the work activities to the immediate vicinity of the construction so as to minimize disturbance of existing vegetation. Dewatering/surface water diversion work required within the unnamed intermittent stream at Outfall 001 will include procedures for sedimentation control complying to applicable regulatory requirements.

3.7.2 Access Road

To facilitate wetlands operation and maintenance activities, an access road will be constructed along the alignment shown on Figure 3. A typical roadway cross-section is shown on Figure 5.

3.7.3 Security Fence

To provide protection of the wetland system and effluent monitoring station, a six foot high security fence with an additional one foot of barbed wire has been specified for construction around the perimeter of each of these features. As a further measure to restrict public access to the site, a section of security fence will be constructed across the site's entrance at Yankee Road. The security fence layout is presented on Figure 3, and the details for the fence are shown on Figure 6.

4. MONITORING

The City will monitor the effluent quality from the WTS in accordance with the draft SPDES Permit No. NY-0258425 (Appendix A). The effluent will be monitored at Outfall 001 (location shown on Figure 3) for flow, water quality parameters and VOCs. A 24-hour composite water quality sample will be collected using a portable battery operated Isco Series 6700 Sampler. The intake tubing will be clamped to the weir structure (Figure 5, Detail B) and the sample will be obtained directly upstream of the weir. Appropriate action will be taken to prevent sediment accumulation around the intake tubing during sampling. Effluent samples will also be analyzed for alpha-terpineol, benzoic acid, and p-cresol. Monitoring for these compounds are required by the draft SPDES permit due to the recently promulgated United States Environmental Protection Agency (USEPA) "Effluent Limitations, Pretreatment Standards and New Source Performance Standards for the Landfills Point Source Category, Final Rule", 40 CFR Parts 136 and 455, effective February 18, 2000.

Effluent flow rate will be recorded using a method which allows calculation of continuous flow as detailed in Section 3.3 of this report. The draft SPDES permit currently requires monthly monitoring of the effluent from Outfall 001. However, the City requests the NYSDEC to amend the proposed monitoring frequency from monthly to quarterly after May 1, 2002, subsequent to completion of construction activities (scheduled for September 1, 2001) and performance of nine monthly monitoring events.

Semi-annual groundwater monitoring for the Landfill will also continue to be performed in accordance with the current NYSDEC approved program. Upon initiation of the SPDES permit effluent monitoring program, sampling and analysis of the "Stream" sample under the current semi-annual groundwater monitoring program will be discontinued. This existing sample point will be replaced by monitoring of the WTS effluent at Outfall 001.

A "Permitted Discharge Point" sign will also be fabricated and installed in accordance with the specifications in the draft SPDES permit for Outfall 001.

5. OPERATION AND MAINTENANCE PLAN

An Operation and Maintenance (O&M) Plan has been developed for the WTS and ancillary features which specifies the O&M procedures to be followed by the City so that the system functions as designed. The O&M Plan includes the following:

- Schedules for periodic O&M site assessments;
- Checklists for site inspections/assessments;
- Inspection/replacement of water level datalogger batteries;
- Inspection for identifying condition of wetland vegetation;
- Specifications for identifying the presence of undesirable invasive species;
- Procedures for routine wetland maintenance;
- Corrective actions to be followed should problems be identified; and
- Action criteria to be utilized in evaluation of the necessity of soil and vegetation replacement.

The O&M Plan is provided as Appendix E. At the completion of the first year of system operation, the O&M Plan will be modified as necessary, to address any significant changes in procedures that may be required.

7. SUMMARY

This document represents the engineering report for the final remedy at the Ischua Landfill site as required by Order on Consent No. 89-92, Revised Schedule A (April 2000). The report presents details of a leachate collection system and natural wetland treatment system to be implemented to control and treat leachate seepage from the Landfill. The design of the remedy includes ancillary measures to provide access as well as protection to the WTS. The design of a structure for flow monitoring and water quality monitoring of the effluent from the treatment wetlands is also provided within this report. Treated effluent will be discharged to the unnamed stream on-site. Performance monitoring for the system will be conducted in accordance with the requirements of a final NYSDEC SPDES Permit (NY-0258425) issued for the site. An operation and maintenance plan is specified for the leachate collection system, natural wetland treatment system, and ancillary features of the remedy. This report, including appendices and drawing package, is presented for review and approval by the NYSDEC.

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Anthony L. Grasso, P.G.
Project Director/Associate

MLB/DJM/ALG/FTA:dml

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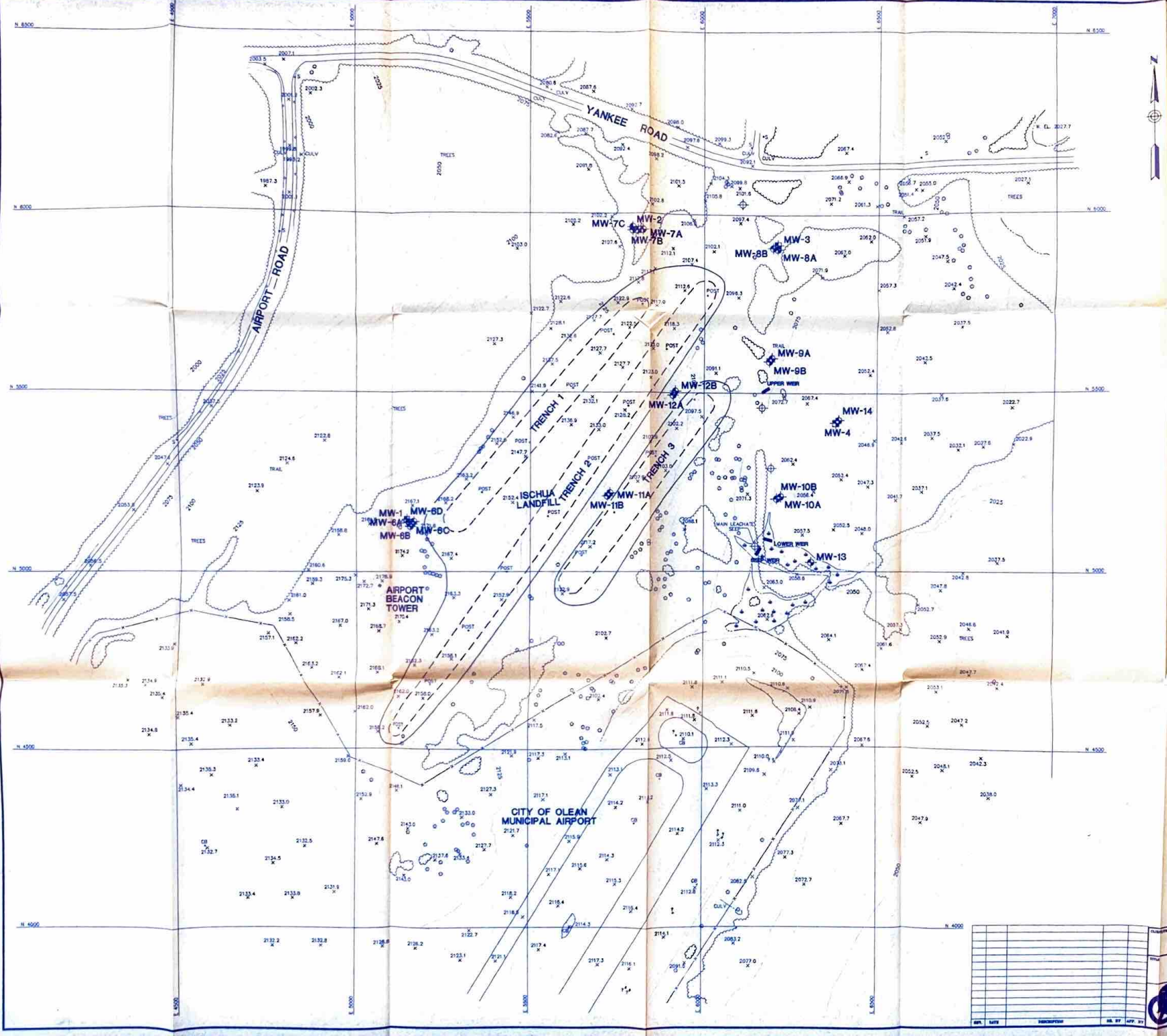

LEGEND

- 2050 — EXISTING GROUND CONTOUR (SEE NOTE 2)
- MW-4 — MONITORING WELL (INSTALLED BY URS CONSULTANTS INC.)
- MW-14 — MONITORING WELL (INSTALLED BY EARTH INVESTIGATIONS LIMITED)
- SEEP
- WEIR
- × 2042.4 — SPOT ELEVATION
- LIMITS OF CONSTRUCTED CLAY CAP (APPROXIMATE) SEE NOTE 3
- LIMITS OF LANDFILL TRENCH (APPROXIMATE)
- WETLAND AREA (SEE NOTE 5)
- TREE LINE
- EXISTING FENCE

NOTES

1. CONTOUR INTERVAL: 5 ft.
2. MAPPING COMPILED BY STEREOPHOTOGRAMMETRIC METHODS FROM 1"=500' SCALE AERIAL PHOTOGRAPHY FLOWN 04/19/90. MAPPING COMPILED WITHOUT BENEFIT OF A FIELD EDIT. AREAS NOTED (?) INDICATE AREAS OF DOUBTFUL ACCURACY.
   SURVEY ELEVATIONS MAY DIFFER SLIGHTLY FROM MORE RECENT SURVEY PERFORMED BY DEBRA A. NAYBOR PLS, P.C. (DATED 5/25/95) AND UTILIZED FOR FIGURES 4 THROUGH 9, CONTAINED HEREIN.
3. CLAY CAPS LOCATED FROM URS DRAWING No. D-1107-1 (7-25-80).
4. SEEP LOCATIONS CONFIRMED BASED ON SITE RECONNAISSANCE VISITS BY GOLDER ASSOCIATES ON 6/24/95, 8/30/95, 8/5/95, AND 5/15/00.
5. WETLAND AREA LOCATED FROM TOPOGRAPHIC MAP PROVIDED BY DEBORAH A. NAYBOR PLS, P.C. (5/25/95).

REFERENCE

1. BASE TOPOGRAPHY SUPPLIED BY TVGA ENGINEERING, SURVEYING, P.C. (C. J# 16-1428153) MAPPED 04/19/90.

100 0 100 200
scale feet

NO.	DATE	DESCRIPTION	DR. BY	APP. BY

CLIENT: WETLAND TREATMENT SYSTEM
ISCHUA LANDFILL
CITY OF OLEAN, NEW YORK

TITLE: SITE TOPOGRAPHIC BASE MAP AND EXISTING CONDITIONS

Golder Associates
Buffalo, New York

DESIGN	POD-LAH	DATE	05/16/00
DRAWN	M.B	SCALE	AS SHOWN
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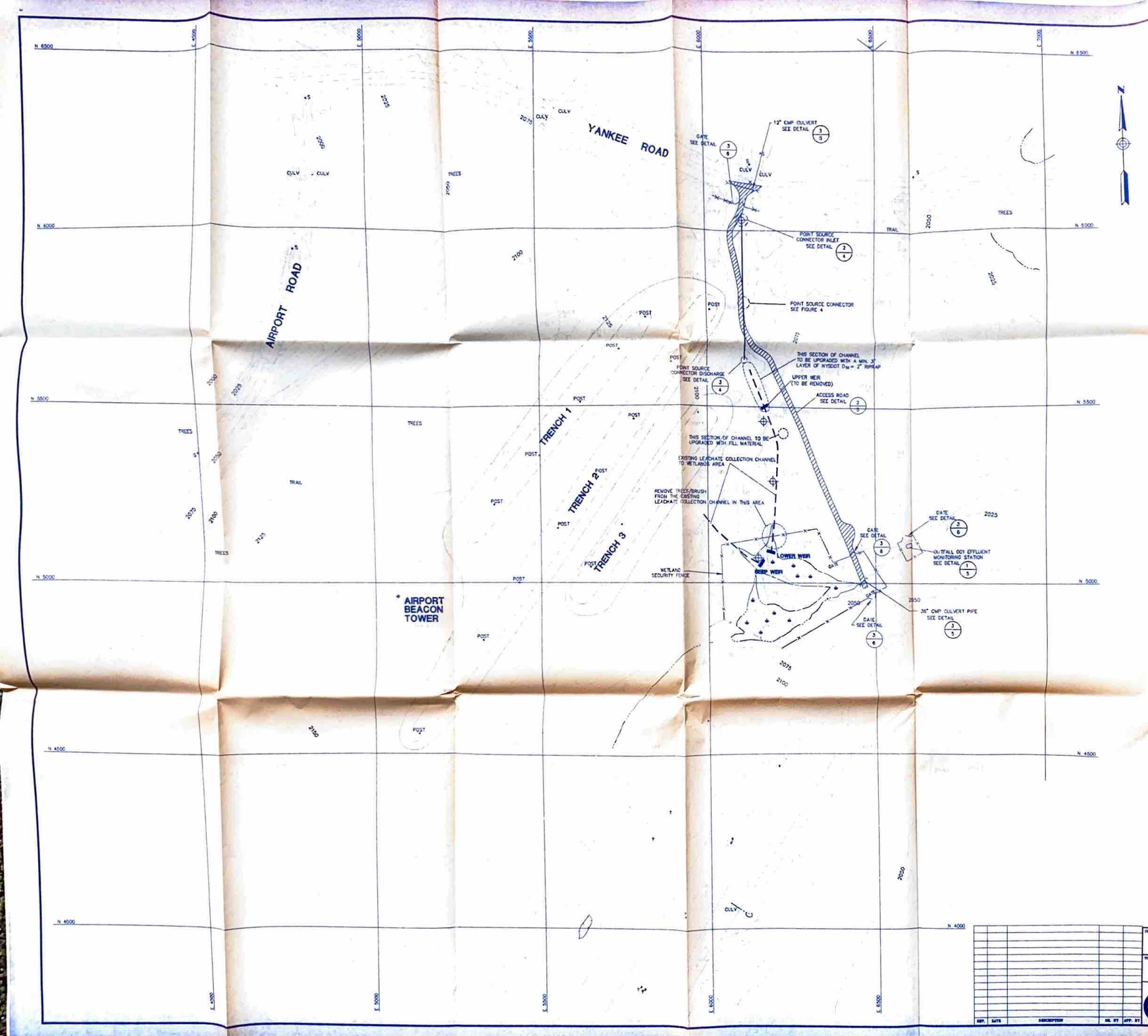
APPROVED	AHG	DWG. NO.	65
FILE NO.	003-9248	REV.	2



LEGEND

- EXISTING GROUND CONTOUR (SEE NOTE 2)
- MW-4 — MONITORING WELL (INSTALLED BY URS CONSULTANTS INC.)
- MW-14 — MONITORING WELL (INSTALLED BY EARTH INVESTIGATIONS LIMITED)
- SEEP
- WEIR
- SPOT ELEVATION
- LIMITS OF CONSTRUCTED CLAY CAP (APPROXIMATE) SEE NOTE 3
- LIMITS OF LANDFILL TRENCH (APPROXIMATE)
- WETLAND AREA (SEE NOTE 3)
- TREE LINE
- EXISTING FENCE
- SITE ACCESS ROAD (SEE FIGURE 5 FOR DETAILS)
- POINT SOURCE CONNECTOR (SEE FIGURE 4 FOR DETAILS)
- SECURITY FENCE AND GATE (SEE FIGURE 6 FOR DETAILS)
- CULVERT CROSSING (SEE FIGURE 5 FOR DETAILS)
- EXISTING WEIR
- EXISTING LEACHATE COLLECTION CHANNEL

NOTES

1. CONTOUR INTERVAL 5 ft.
2. MAPPING COMPILED BY STEREOPHOTOGRAMMETRIC METHODS FROM 1"=500' SCALE AERIAL PHOTOGRAPHY FLOWN 04/19/93. MAPPING COMPILED WITHOUT BENEFIT OF A FIELD EDIT. AREAS NOTED (?) INDICATE AREAS OF DOUBTFUL ACCURACY.
   SURVEY ELEVATIONS MAY DIFFER SLIGHTLY FROM MORE RECENT GROUND SURVEY PERFORMED BY DEBRA A. NAYBOR PLS, P.C. (DATED 5/25/95) AND UTILIZED FOR FIGURES 4 THROUGH 6 CONTAINED HEREIN.
3. WETLAND AREA LOCATED FROM TOPOGRAPHIC MAP PROVIDED BY DEBORAH A. NAYBOR PLS, P.C. (5/25/95)

REFERENCE

1. BASE TOPOGRAPHY SUPPLIED BY TVGA ENGINEERING, SURVEYING, P.C. JOB # 16-142(13A), MAPPED 04/19/93

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scale feet

REV.	DATE	DESCRIPTION	DR. BY	APP. BY

CLIENT/PROJECT: WETLAND TREATMENT SYSTEM
ISCHUA LANDFILL
CITY OF OLEAN, NEW YORK

TITLE: FINAL SITE PLAN AND FEATURES

Golder Associates
Buffalo, New York

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APPROVED	N/A	DWG. NO.	68
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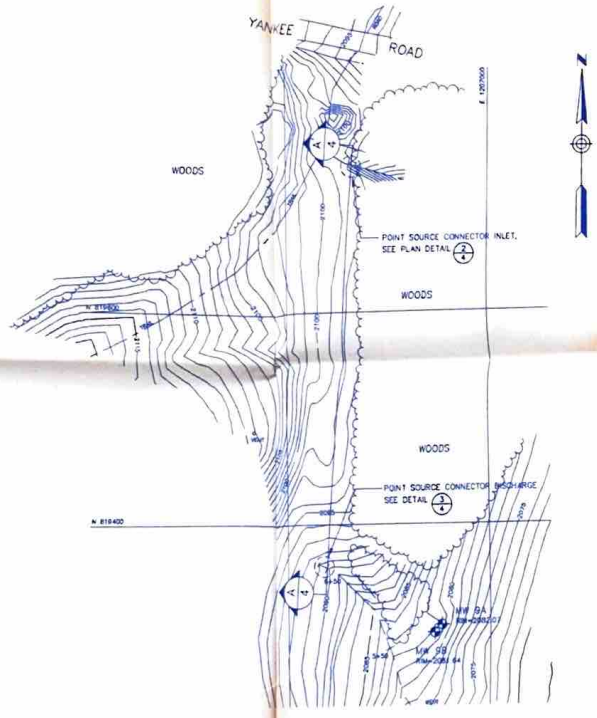
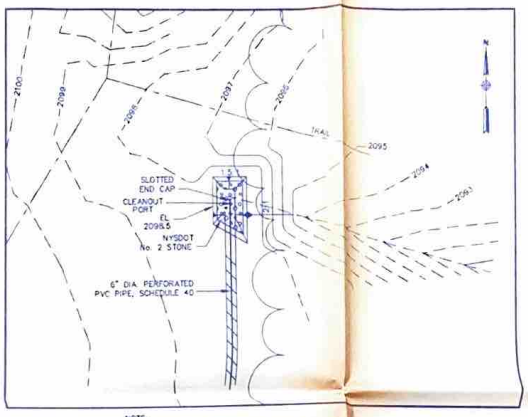


NOTE:
BASE TOPOGRAPHY SUPPLIED BY DEBORAH A. NAYBOR P.L.S. P.C., DATED 05/25/93.

1 POINT SOURCE CONNECTOR PLAN
4

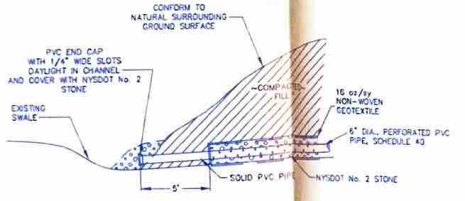
scale: 50 0 50 100 feet



NOTE:
BASE TOPOGRAPHY SUPPLIED BY DEBORAH A. NAYBOR P.L.S. P.C., DATED 05/25/95

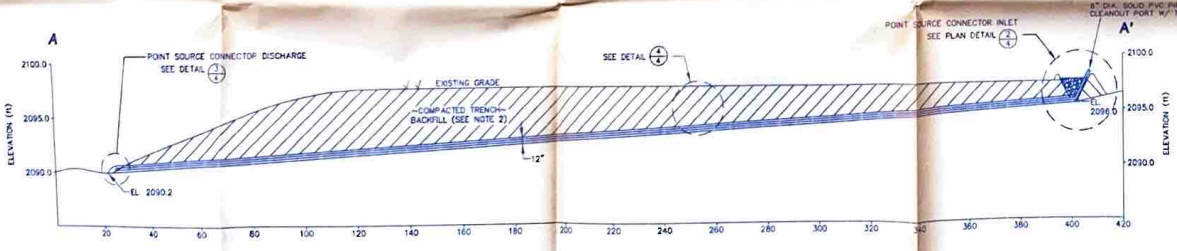
2 POINT SOURCE CONNECTOR INLET
4

scale: 10 0 10 20 feet



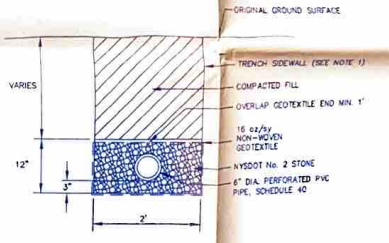
3 POINT SOURCE CONNECTOR DISCHARGE
4

NOT TO SCALE



A POINT SOURCE CONNECTOR CROSS SECTION A-A'
4

horizontal scale: 20 0 20 40 feet
vertical scale: 5 0 5 10 feet



4 TYPICAL CONNECTOR TRENCH DETAIL
4

scale: 1 0 1 2 feet

NOTE:
1) TRENCH SHALL BE EXCAVATED AND MAINTAINED IN A SAFE CONDITION IN ACCORDANCE WITH OSHA TRENCHING AND OPERATION REGULATIONS, 29CFR PART 1926 AND OTHER APPLICABLE LAWS.
2) TRENCH BACKFILL SHALL BE PLACED IN LIFTS NOT EXCEEDING 8 INCHES IN COMPACTED THICKNESS AND COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY (ASTM D698).

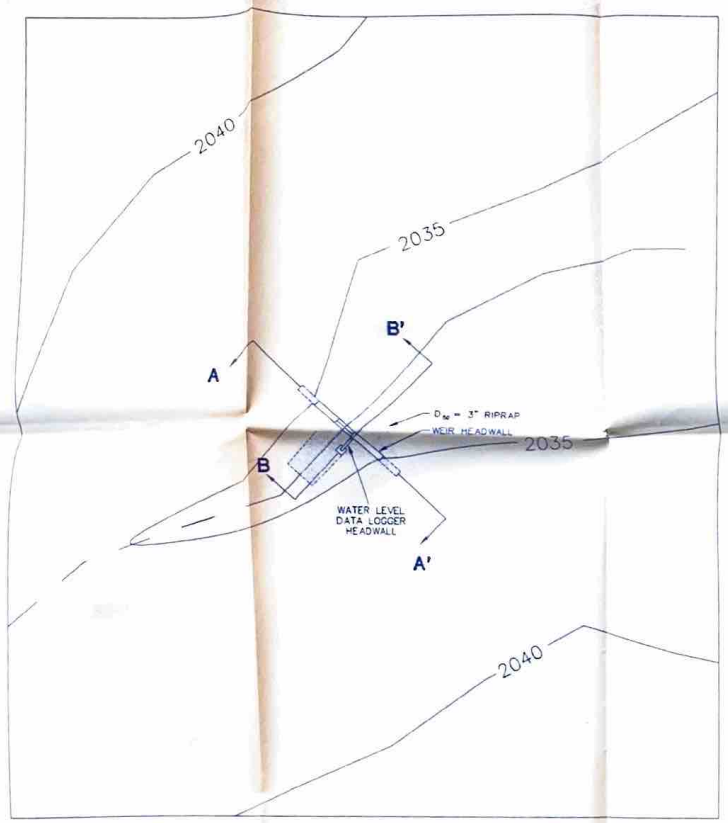
NO.	DATE	DESCRIPTION	DR. BY	APP. BY

WETLAND TREATMENT SYSTEM
ISCHUA LANDFILL
CITY OF OLEAN, NEW YORK

ANCILLARY
CONSTRUCTION DETAILS I

Golder Associates
Buffalo, New York

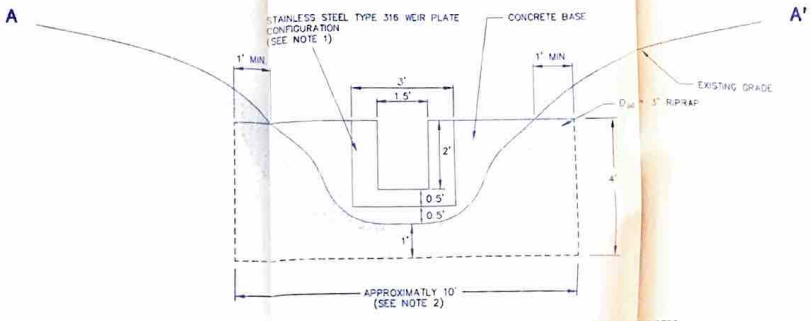
DRAWN	POD-LAH	DATE	05/16/00
DESIGNED	MLB	SCALE	AS SHOWN
REVIEWED	ALG	JOB NO.	003-9248
APPROVED	ALG	DWG. NO.	67
FILE NO.	003-9248	REVISED	4



OUTFALL 001 EFFLUENT MONITORING STATION PLAN VIEW

1/5

NOT TO SCALE



EFFLUENT MONITORING STATION SECTION A-A'

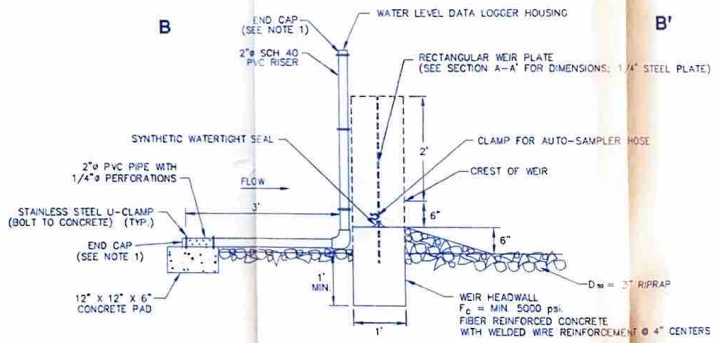
A/5

NOT TO SCALE

NOTES:

(1) THE WEIR PLATE SHOULD EXTEND INTO THE CONCRETE BASE A MINIMUM OF 3" ALONG EACH CONCRETE/WEIR PLATE INTERFACE.

(2) ACTUAL DIMENSION TO BE DETERMINED IN FIELD SUBJECT TO ENGINEER'S APPROVAL.

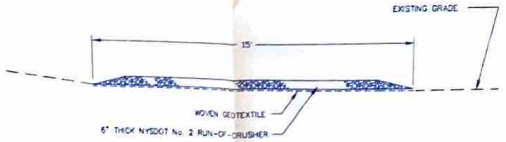


EFFLUENT MONITORING STATION SECTION B-B'

B/5

NOT TO SCALE

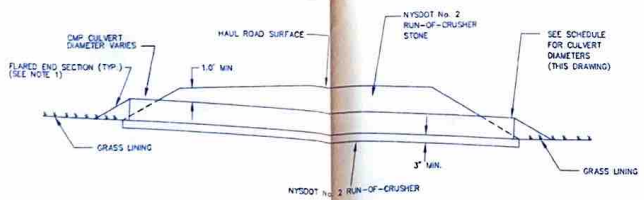
NOTE (1): ALL PVC PIPING SHALL BE THREADED CONNECTIONS.



TYPICAL ROADWAY SECTION

2/5

NOT TO SCALE



TYPICAL CULVERT DETAIL

3/5

NOT TO SCALE

NOTE: (1) 36" CMP CULVERT PIPE ONLY

CULVERT SCHEDULE	
YANKEE ROAD	12" DIA.
WETLAND CHANNEL	36" DIA.

SEE FIGURE 3 FOR LOCATIONS

REV.	DATE	DESCRIPTION	DES. BY	APP. BY

WETLAND TREATMENT SYSTEM
ISCHUA LANDFILL
CITY OF OLEAN, NEW YORK

ANCILLARY CONSTRUCTION DETAILS II

Buffalo, New York

Golder Associates

DRAWN	PCD-LAH	DATE	05/16/00
CHECKED	MLB	SCALE	AS SHOWN
REVIEWED	AJ	JOB NO.	003-9248
APPROVED	AJ	ORIG. NO.	68
FILE NO.	003-9248	REVISION	5