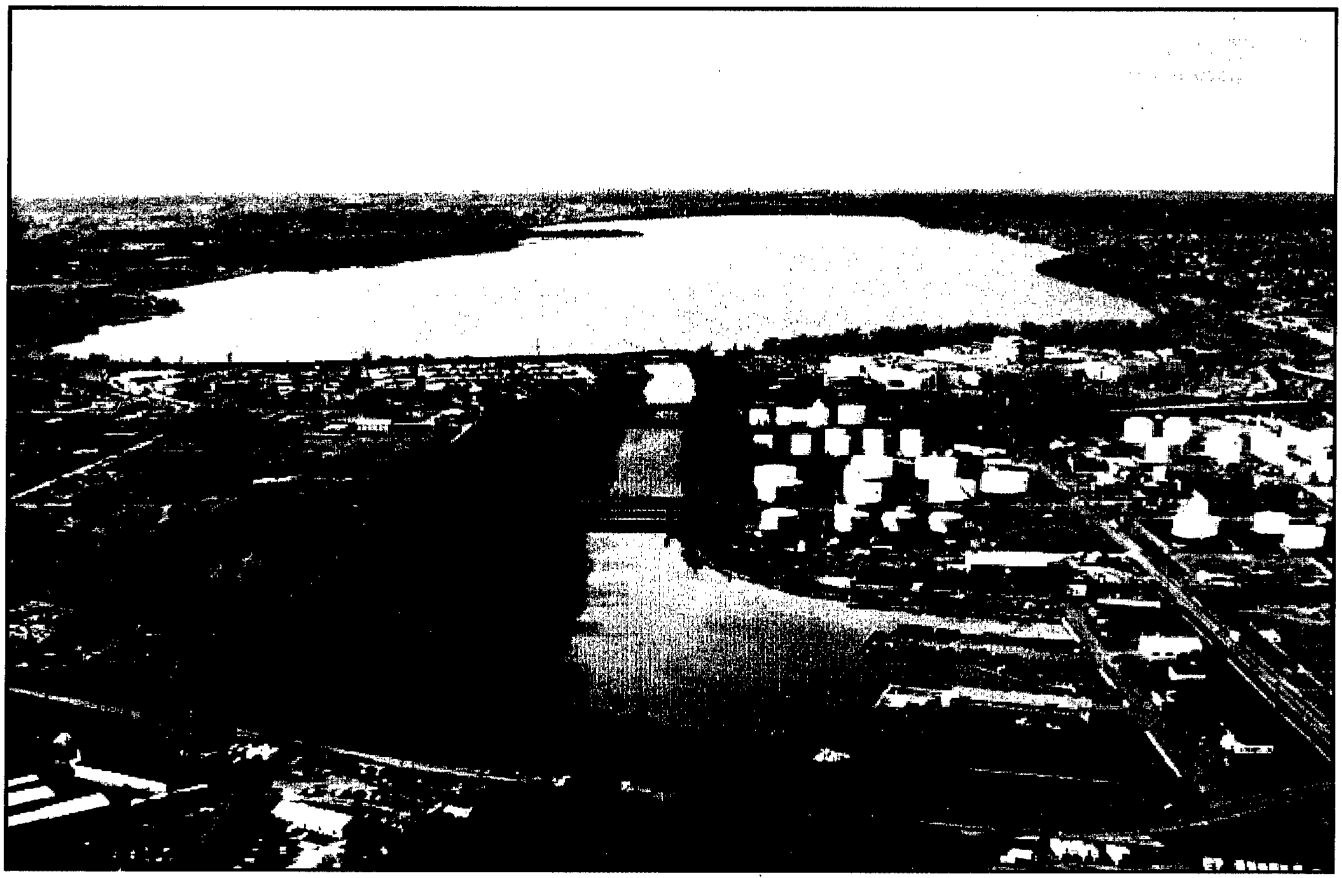
FINAL DESIGN MEMORANDUM

Onondaga Lake Inner Harbor Dredging Design Project, Syracuse, New York



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This report presents the efforts of the sediment sampling analysis, existing conditions, planning, design, and environmental analysis for the dredging project at Onondaga Lake - Onondaga Creek Inner Harbor. The sponsor is the New York State Canal Corporation. The design includes deepening the Inner Harbor channel and a portion of the terminal slip area to a depth of 10 feet below Low Water Datum (LWD) and at a bottom width of 60 feet. The design also includes the rehabilitation of Upland Disposal Site UDS 5-19. The Upland Disposal Site will be used to hold dredging from the proposed Onondaga Creek Inner Harbor project. The Inner Harbor area extends from the New York State Canal Corporation Barge Canal Terminal on Onondaga Creek to the deeper water depths of Onondaga Lake.

14. SUBJECT TERMS
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Onondaga Creek

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ONONDAGA LAKE
INNER HARBOR DREDGING DESIGN MEMORANDUM
SYRACUSE, NEW YORK

DESIGN MEMORANDUM
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INNER HARBOR DREDGING DESIGN PROJECT
SYRACUSE,NY

DESIGN MEMORANDUM

1. INTRODUCTION

The U.S. Army Corps of Engineers has been authorized and funded for the planning and design of a dredging project at Onondaga Lake - Onondaga Creek Inner Harbor. The sponsor is the New York State Canal Corporation a subsidiary of the New York State Thruway Authority. The design includes deepening the Inner Harbor channel and a portion of the terminal slip area to a depth of 10 feet below Low Water Datum (LWD) and at a bottom width of 60 feet. The design also includes the rehabilitation of Upland Disposal Site UDS 5-19. The Upland Disposal Site will be used to hold dredging from the proposed Onondaga Creek Inner Harbor project. The Inner Harbor area extends from the New York State Canal Corporation Barge Canal Terminal on Onondaga Creek to the deeper water depths of Onondaga Lake. The location of the project is shown in Figures 1 and 2.

2. PURPOSE AND SCOPE OF THIS DESIGN MEMORANDUM

This Design Memorandum presents the efforts of the sediment sampling analysis, existing conditions, planning, design, and environmental impact statement for the proposed project (Inner Harbor dredging and the Upland Disposal Site rehabilitation). Approval of this report will provide the basis for the preparation of plans and specifications for the rehabilitation of the UDS 5-19 and the dredging of Onondaga Creek. Appendix B - Site and Structural Design provides detail analysis of the repair alternative.

3. PROJECT AUTHORIZATION AND LOCAL COOPERATION

Congress has authorized under Section 401 (Public Law 101-596) the Assistant Secretary of the Army for Civil Works, acting jointly with the Administrator of the Environmental Protection Agency and the Governor of the State of New York, to convene a management conference for the restoration, conservation, and management of Onondaga Lake.

Figure -1 - Onondaga Lake, Syracuse Inner Harbor Vicinity Map

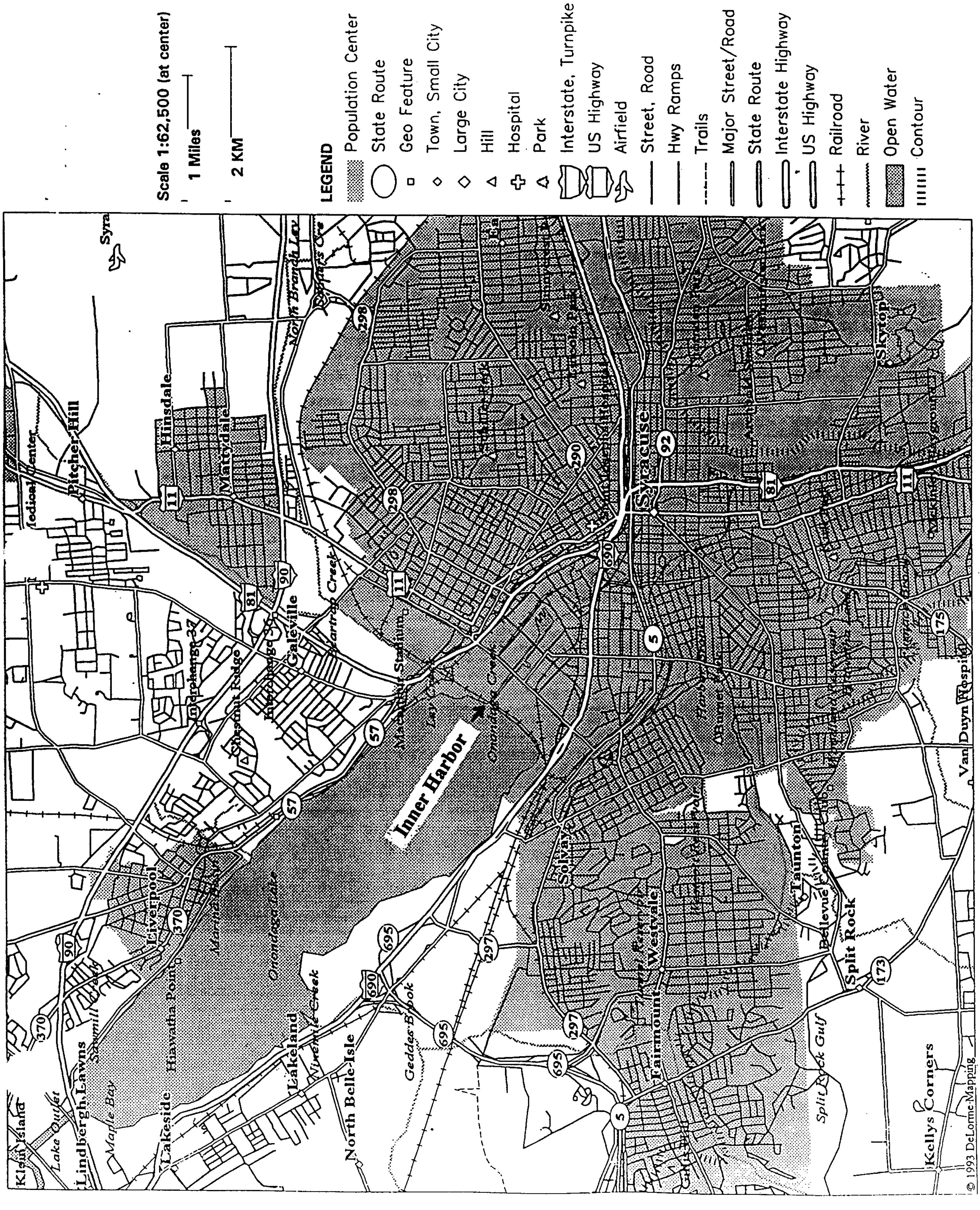
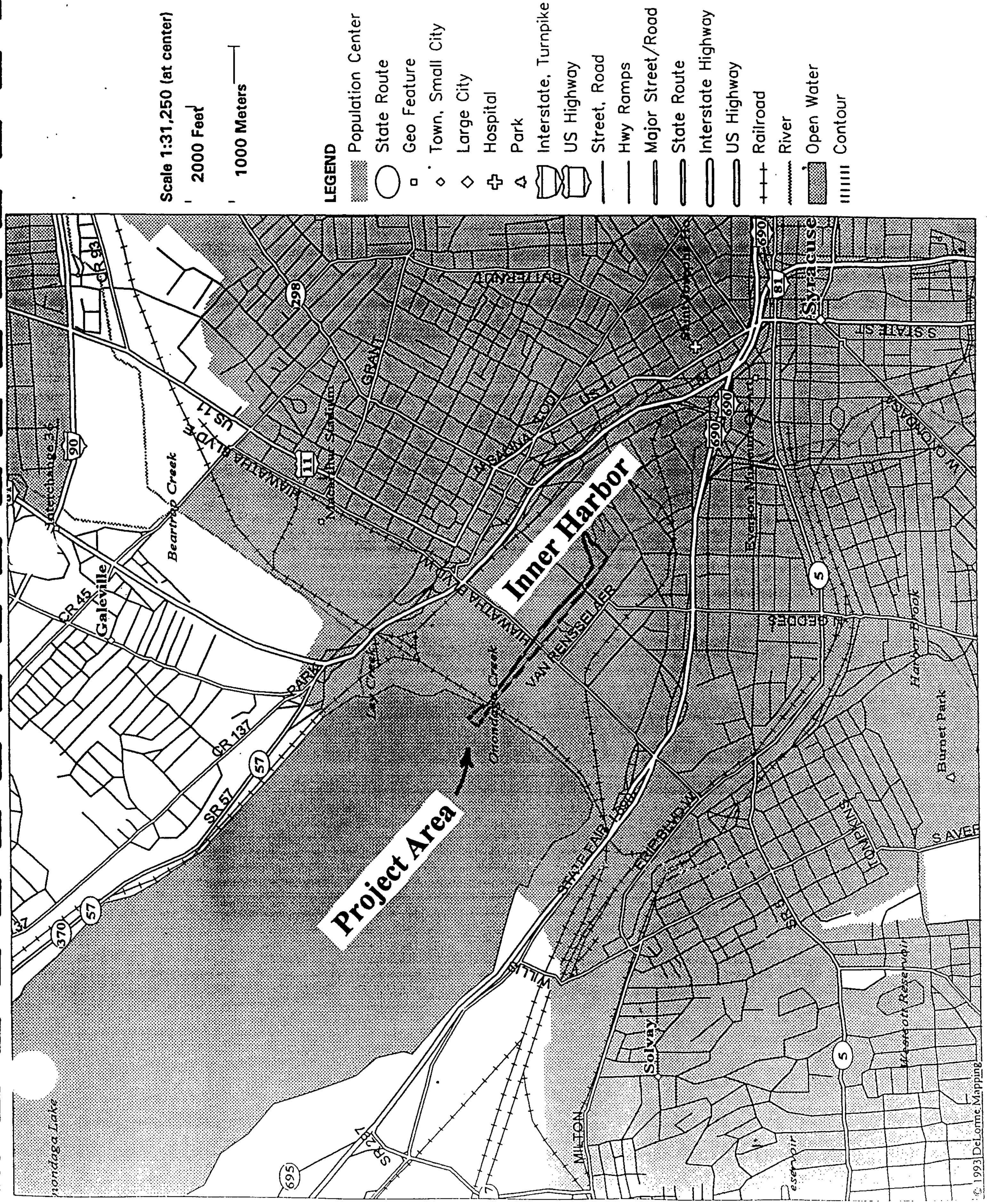


Figure -2 - Onondaga Lake, Syracuse
Inner Harbor
General Project Location Map



The Onondaga Lake Management Conference is composed of representatives of the Assistant Secretary of the Army for Civil Works, the Administrator of the Environmental Protection Agency, the Governor of the State of New York (New York State Department of Environmental Conservation and Attorney General of New York State), Onondaga County, N.Y., and the City of Syracuse, N.Y. This Management Conference passed a resolution on 10 December 1991 that "resolved that the Onondaga Lake Management Conference authorizes and directs the U.S. Army Corps of Engineers (Buffalo District) to proceed, in conjunction with the New York State Canal Corporation and in consultation with the Lakefront Development Office of the City of Syracuse; to dredge and improve the Inner Harbor at the southern end of Onondaga Lake within the funds made available to the U.S. Army Corps of Engineers. A Project Management Plan was signed by the U.S. Army Corps of Engineers-Buffalo District and the New York State Canal Corporation in August 1992. The Cost Sharing Agreement (5A) was executed in November 1993.

4. FIELD INVESTIGATION

Extensive field investigations were conducted to support the development of the technical design report. Hydrographic and topographic information were obtained from the following: Topographic Survey of the barge canal terminal by C.T. Male Associates, P.C. drawn from aerial photographs taken March 1988. Hydrographic and Topographic Survey of the Onondaga Lake Inner Harbor by Bergman Associates from field work completed in December 1994.

Subsurface Exploration by the Corps of Engineers was done by Parratt Wolff in April 1991 and April 1996. Sediment samples were taken by the Corps of Engineers and Acres International Corp in September 1994. Samples where tested by Contract Drilling and Testing, Novamann (Ontario) Inc, Quanterra Environmental Services, Engineering and Environment, Inc., and Corps of Engineers, Ohio River Division Laboratory in Cincinnati, Ohio.

Kappel,W.M., Sherwood,D.A., and Johnston,W.H., 1996, Hydrogeology of the Tully Valley and characterization of Mudboil Activity, Onondaga County, New York: U.S. Geological Survey Water-Resources Investigations Report 96-4043,71 p. This report was prepared in cooperation with the Onondaga Lake Management Conference and U.S. Environmental Protection Agency, Region 2.

5. PROJECT DESCRIPTION

5.1 Onondaga Creek

Onondaga Creek, located at the southeastern end of Onondaga Lake, drains a watershed area of about 115 square miles. The watershed encompasses much of the City of Syracuse and extends south into the Tully Valley. Additionally, sources of high sediment load carried by the Creek have been identified in southern Tully Valley.

The Tully Valley, which lies about 15 miles south of Syracuse, N.Y, contains an unusual area in which turbid water carrying fine-grained sediment is continuously discharged at land surface from volcano like features known as "mudboils." This discharge flows to, and causes turbidity in Onondaga Creek, a tributary to Onondaga Lake, 15 miles down stream.

The U.S. Geological Survey (USGS), funded by the Onondaga Lake Management Conference, began a project to remediate the problems. Remediation efforts of 1993 have entailed (1) diversion of flow from the tributary that feeds the subsided area, (2) installation of depressurizing wells at several locations, and (3) construction of a dam and settling impoundment to detain mudboil sediment that would normally discharge to Onondaga Creek. These efforts have been partly successful, but further work was needed to slow the mudboil activity. In fall 1996, the USGS constructed additional depressuring wells and raised the dam height.

Mudboil activity is normally greatest during the early spring and late fall, when artesian pressures increase in response to seasonal ground-water recharge. Yearly average suspended-sediment loads to Onondaga Creek from the subsidence area for water year 1992, 1993, 1994, and 1995 were 29.8, 9.75, 1.41, 1.80 tons per day, respectively. The 1996 project is expected to further reduce the sediment load.

The Creek flows into Onondaga Lake at the Syracuse Inner Harbor area, the proposed project location. The NYSDEC water quality classification for Onondaga Creek from its mouth upstream to Temple Street in Syracuse is Class "D"; from Temple Street upstream to Tributary 5B the Creek is designated as being Class "B"; from this tributary upstream to the source of Onondaga Creek the Classification is "C" (best usage is for fishing and any other use except for bathing, as a source of water supply for drinking, culinary, or food processing purposes).

5.2 Sediment Quality

As indicated previously, the U.S. Army Corps of Engineers, Buffalo District has sampled and analyzed sediments from Syracuse Inner Harbor area and the proposed UDS 5-19, 5-20, and 5-20A. The results of the sediment analysis are contained in the Environmental Assessment (Figures EA-1, -2, and -3) furnished under separate cover. This analysis is utilized to help determine appropriate dredging and disposal procedures.

Sediment sampling locations for the Inner Harbor are shown in the Environmental Assessment (Figure EA-11). Sediment sampling locations at the proposed disposal area, UDS 5-19 (Trenches 1- 5), are shown in the Environmental Assessment (Figure EA-12).

Particle size tests on proposed dredge material showed it to be a loose mixture of primarily silt and clay. Both bulk chemical total analyses and Toxic Characteristic Leaching Procedure (TCLP) analyses were conducted on candidate dredge material. Results of bulk chemical analyses are summarized in the Environmental Assessment (Table EA-6). TCLP analytical results are summarized in the Environmental Assessment (Table EA-7). The bulk chemical analyses show that the sediment proposed for dredging from the Inner Harbor has elevated levels of lead, cadmium, copper, ammonia-N, poly aromatic hydrocarbons (PAH's), and methyl ethyl ketone (MEK). There are low levels of PCB's and the chlorinated pesticides DDE, DDT, and DDD. Dieldrin was not detected. Elevated mercury levels from sampling locations 1 and 2 reflect the overall high mercury levels of Onondaga Lake from past chemical manufacturing. Very low levels of dioxins (2,3,7,8 TCDD) were measured.

TCLP tests were conducted to ascertain if any of the sediments exhibited the Resource Conservation Recovery Act (RCRA) toxicity characteristic. The Environmental Assessment (Table EA-7) compares the range of values found in the sediment to regulatory levels under RCRA. The data shows very little leaching of toxic constituents under the stringent acid-leaching conditions of the TCLP leaching procedure and far below the regulatory standard. Disposal of sediments is therefore not subject to RCRA regulation. However, the elevated levels of metal and some organic contaminants as previously discussed makes it necessary to dispose of sediments dredged from Syracuse Inner Harbor area in UDS 5-19.

5.3 Onondaga Creek and Inner Harbor Dredging

Alignment of the channel centerline was established by determining straight paths which most closely follow the deepest natural course of the creek. The creek length considered was from the upstream end of the channel at the harbor (station 0+00) to Onondaga Lake (station 48+78). The channel dimensions used to determine the volume of dredging in the creek were 60 feet wide at the base with a bottom elevation of -10 feet (Syracuse datum). The channel width was widened at the Hiawatha Boulevard bridge and at the railroad bridge. The limit of dredging within the harbor included only the North Dock and the area between it and the start of the channel.

The dredging of Onondaga Creek and the harbor will be done by New York State Canal Corporation. The need for Aid to Navigation will be identified and installed by New York State Canal Corporation at a latter date.

The dredging volumes obtained for the creek and harbor are as follows:

Onondaga Creek	30,450 CY
North Dock	12,018 CY
Harbor area not within North Dock	15,264 CY
Total	57,732 CY use 60,000 CY

These volumes are for an undisturbed, in-place state with no factors.
The minimum disposal volume needed for the dredged material is 20% greater than the volume of dredgings, according to the Environmental Analysis Section of the Buffalo District. (Refer to the environmental appendix for justification) Therefore, the capacity of the disposal area has to be at least 72,000 CY. Hydraulic dredging of the channel will contribute additional water volume of between 100,000-120,000 cubic yards. This excess water will be released through the weir and the site will be allowed to evaporate.

5.4 Upland Disposal Site (UDS).

In November 1994, the New York State Canal Corporation provided the Corps of Engineers, Buffalo District a list of nine potential Upland Disposal Sites (UDS). Site investigations during the following months revealed that many of the sites were not adequate for this project due to the long travel distances (15 to 18 miles), environmental sensitive areas (freshwater wetlands) sites, and two sites would cause serious adverse congestion at the Baldwinsville lock. The sites (UDS 5-19, UDS 5-20, and UDS 5-20A - see Figure 3) adjacent to the Inner Harbor channel and terminal area showed the most potential. The New York State Canal Corporation in a letter dated December 11, 1996 (letter contained in Appendix F) directed the Corps of Engineers - Buffalo District to use UDS 5-19, see Figure 4, as the primary location for placement of dredged material. The alternative site would be UDS-20A, but it was unlikely that it would be used. The New York State Canal Corporation also requested that the design channel dimensions be reduced from a 12-foot depth with a 100-foot wide channel bottom to a 10-foot depth with a 60-foot wide channel bottom. They also requested that only the northern-most terminal slip be dredged to 10-feet below Low Water Datum.

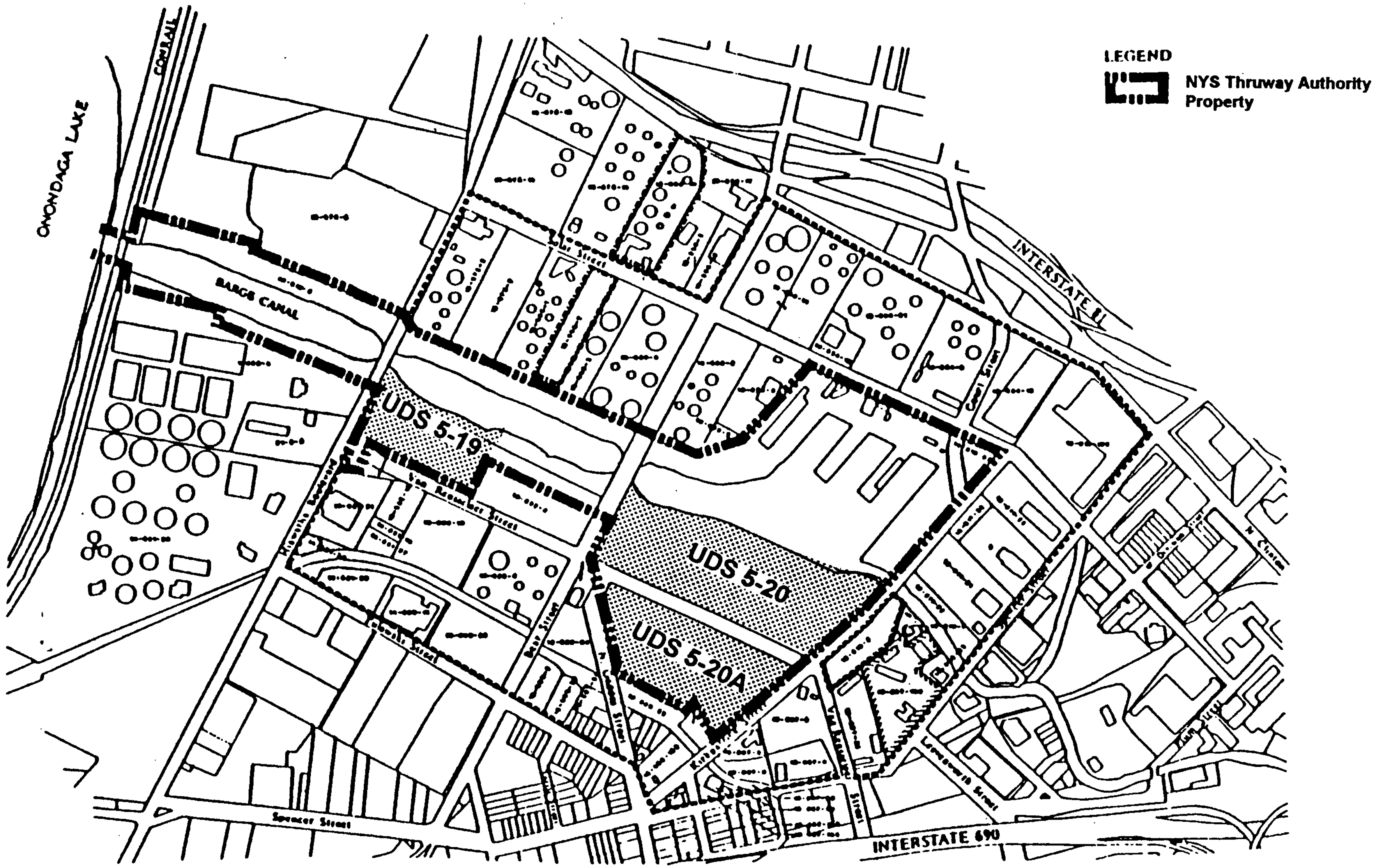
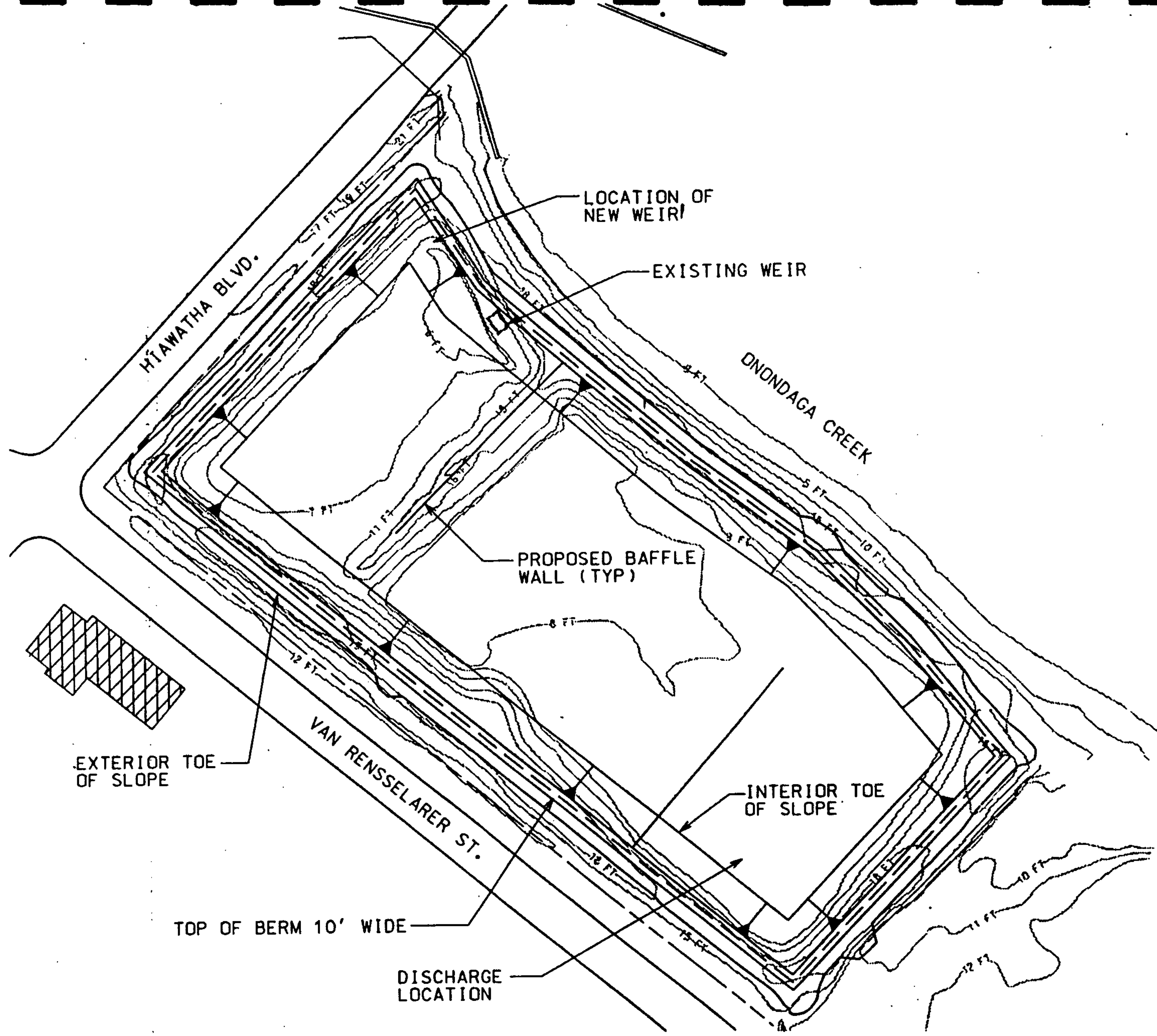


FIGURE 3 **Syracuse Inner Harbor Disposal Area Locations**



NYS CANAL CORP.
SYRACUSE, NY
UDS 5- 19 PLAN
FIGURE 4

5.4.1 Upland Disposal Site UDS 5-19

The Upland Disposal Site UDS 5-19 adjacent to the Syracuse Terminal Channel (Onondaga Creek) in the City of Syracuse, New York. The Disposal Site UDS 5-19 is located in the area at the intersection of Hiawatha Boulevard West and Van Rensselaer Street and along 725 feet of Onondaga Creek. Based on the above explained parameter, a top elevation for the proposed berm was established at elevation +23, which is approximately 5 feet above the existing berm. A bottom elevation of +5.5 was then established by balancing the cut and fill required so that material does not have to removed nor brought to the site. This bottom elevation is approximately 2 feet lower than the grade elevations of the soil borings performed within the interior of the disposal area. Construction will require approximately 15,000 CY to be relocated on site.

The existing site UDS 5-19 contains a finger berm that was used to improve the distance for particle settling. In order to maximize the capacity of the facility it was requested by the NYS Canal Corporation that baffle walls, consisting of plastic membrane, be designed for in lieu of the finger berm. The existing finger berm would therefore be removed and a baffle wall installed in its place while another baffle wall would be located on the opposite side near the opposite corner. The baffle wall would maximize the duration of the water traveling through the UDS, to allow particlulates to settle out.

Based on a site inspection, it was determined that the existing weir is in very poor condition. Therefore, a new weir had to be designed for the facility. In order to minimize effluent solids concentration, the NYS Canal Corporation intends to maximize ponding in the disposal area during dredging operations, with draining of the standing water occurring only at the end of each dredging season.

The New York State Canal Corporation will be responsible for all future operation and maintenance of UDS 5-19. They intend to use the site for future maintenance disposal. This will require that the NYS Canal Corporation periodically remove some of the dried dredge sediments from UDS 5-19 to increase capacity. It is proposed that the sediments will be trucked to a confined landfill area.

5.4.2 Physical and Chemical Testing

Site UDS 5-19 Environmental Assessment (Figure EA-12) is proposed for disposal of sediments to be dredged from the Inner Harbor. Samples were taken at five locations as shown in (Figure EA-12) for physical and chemical testing. Table EA-8 gives the particle size distribution of samples from site UDS 5-19. Trenches 1 and 2 were essentially mixtures of sand and silt while trenches 4 and 5 from lower lying areas were mixtures of silt and clay with no sand. Recompacted permeability of the silt and clay material was tested as only 18 cm/yr indicating that the dikes constructed of this material would be highly impermeable to passage of water or chemical constituents.

Environmental Assessment (Tables EA-9 through EA-13) summarize chemical test data for the five test locations at UDS 5-19. As might be expected, the finer grained sediments from trenches 4 and 5 which are most representative of the overall site, contain somewhat higher levels of inorganic and organic contaminants. This includes elevated levels of the metals cadmium, chromium, copper, lead, zinc, xylene, tri-methyl benzene, phthalates, and an array of PAH's. Low levels of PCB's (~0.5 to 5 mg/kg) were found at trenches 1, 2, 4, and 5. The chlorinated pesticides endosulfan, methoxychlor, DDE, DDD, toxaphene, and endrin ketone were found at various trench locations.

The existing dike is comprised of silty soil which appears to be reasonably well compacted, as it has existed in its current state for many years. The floor of the existing dike contains about 8 feet of previously deposited dredged spoil, which is fine grained, predominantly silt. However, beneath this silt layer lies a relatively flat layer of sandy material containing marl. This serves as a marker layer for design, since this layer is very pervious relative to the sediment above it. Therefore, the rehabilitated Upland Disposal Site should not be excavated down to the sandy/marl layer. The permeability of the 8 feet of dredged material above the marl varies from 1 X 10E-7 to 1.7 X E-7 cm/sec, based on the test results. About 5 feet of silt will be left above the sandy/marl layer to maintain an impermeable bottom layer. Raising the existing dike will be accomplished by excavating dredged material or other appropriate fill from within the existing dike. This material may prove to be too wet to handle or place. Borrow material may be required to complete this raising. Hopefully, the amount of off-site borrow can be minimized

5.5 Private Inner Harbor Projects

The Lakefront Development Corporation (LDC), a non for profit organization, is charged with facilitating the overall redevelopment of the 800 acre parcel in the Inner Harbor area and bordering Onondaga Lake. One of the projects under development is the Syracuse Aquarium and Entertainment Center to be located south of UDS 5-19. Other projects in the area could include a recreational marina with charter boats to offer cruises on the area water ways, residential and light commercial development including a restaurant, and hotel.

6. PROJECT DESIGN

6.1. GEOTECHNICAL ENGINEERING

Geotechnical engineering for the design of proposed rehabilitation plan for the UDS 5-19 is found in Appendix A of this report. The appendix includes discussion of the site geology, previous and recent subsurface explorations, laboratory testing of soil samples, geotechnical design parameters, and construction materials sources. Based on this information, this project is feasible and the required construction materials are available.

6.2 STRUCTURAL DESIGN

The details of the final structural design of the proposed major rehabilitation plan for the UDS 5-19 are found in Appendix C- Site and Structural Design of this report. All structural design was performed in accordance with all applicable current Corps of Engineers design criteria. Construction will require approximately 15,000 CY to be relocated on the site. This includes removal of a finger dike and building up of the existing berm. The finger dike will be replaced with baffle walls, utilizing wood utility poles and wire rope to support a flexible plastic membrane, in order to maximize the capacity of the facility. In order to improve the distance for particle settling, the existing finger berm will be replaced with a baffle wall while two other baffle wall would be located on the opposite side near the south-west corner.

6.3 WIER DESIGN

The details for the final weir design of the proposed rehabilitation for the UDS 5-19 are found in Appendix B, Site and Structural Design, and Appendix C, Weir Design, of this report.

7. WATER QUALITY DESIGN CONSIDERATIONS.

The purpose of the Upland Disposal Site (UDS) is to remove polluted sedimates from the aquatic environment. With the passaged of the Clean Water Act an associated legislation, polluted sediments have been restricted from open-lake discharge. Once the dredged sediments are placed in the UDS, a number of processes occur. Adsorption of pollutants to the sediments and the settling of the sediments and associated pollutants out from the water column is generally recognized as the primary pollutant removal/containment process within a UDS. Pollutants associated with the dredged materials are strongly attached (adsorbed) to the organic and clay fractions. As the particulates settle out, the pollutants adsorbed to the particulates are their by removed from the water column and contained in the sediments. The UDS is therefore designed to contain sediments while allowing water to either evaporate or flow out of the disposal facility through the dike itself or through the overflow weir.

The overflow weir is used to discharge excess effluent during the UDS use. The overflow weir is designed with removable boards to provide for adjustable weir top elevation. The weir is designed to limit suspended solids concentrations in the effluent discharge to less than 100 milligrams per liter. Testing has shown that this limit achieves State water quality standards for the river receiving the waters. The results of the testing is contained in Appendix D, Water and Sediment Technical Appendix.

8. ALTERNATE SITE

The Upland Disposal Site UDS 5-20A, the alternate site, is west of the UDS 5-20 site which is adjacent to the Syracuse Terminal Channel (Onondaga Creek) in the City of Syracuse, New York. The Disposal Site UDS 5-20A is in the area bounded by Van Rensselaer Street, Bear Street, West Kirpatick Street and north east of the Conrail tracks.

The UDS 5-20A has an area of 10.4 acres. The site would be filled by a 14 inch pipe line from the Inner Harbor parallel to Bear Street discharging into the site. A discharge line will run, from the over flow weir, parallel to West Kirpatrick Street back into the Inner Harbor. The intake and discharge lines will run under Van Rensseler Street and across UDS 5-20.

The NYS Canal Corporation requested that an alternative site be investigated in case extra capacity was needed to place the dredged sediments from the Inner Harbor. A preliminary design has been completed as part of this report, that determined the potential capacity of the UDS 5-20A site and the required intake and discharge lines. It has been determined that UDS 5-19 will have sufficient capacity to contain the dredged sediments over a two year dredging season. Therefore, UDS 5-20A will not be constructed as part of this project.

9. CONSTRUCTION MATERIAL

The primary construction material will be the fine-grained fill required to raise the dike. This will be excavated from the floor of the dike and/or borrowed from off site. The weir will be constructed of wood, steel and concrete. Dredging and construction of the dikes, baffle walls, and weir will be the responsibility of the New York State Canal Corporation. See Appendix B figures 4 , 5 and 6 for details.

10. CONSTRUCTION COST ESTIMATE

A construction cost estimate has been prepared for the Syracuse Inner Harbor UDS 5-19 at October 1996 price levels. The estimate contains a 25% contingency which is in accordance with EM 1110-2-1301. The quantities and extent of work were estimated from information contained in Appendix B, Site and Structural Design. An itemized breakdown of the estimate is shown in Table 1. The supporting documentation is shown in Appendix E and retained in the Cost Engineering Branch.

The construction cost estimate, including filling of disposal site, and including reasonable contingencies, of the Upland Disposal Site 5-19 is:

$842,156

The estimated cost for Engineering During Construction (4%) and Supervision and Inspection (8%) is $101,059.

Estimated total cost for the selected alternative is $943,215

TABLE 1. Preliminary Cost Estimate for the Inner Harbor UDS 5-19
(October 1996 Price Levels)

Item No.	Description	Estimated Quantity	Unit	Unit Price	Estimated Amount
01	Construct Upland Disposal Site				
01.01	Construct Upland Disposal Site		L.S.		269,086
01.02	Construct Weir		L.S.		26,830
01.03	Construct Baffle Wall		L.S.		34,595
	Total Construct Upland Disposal Site				330,511
02	Dredge Creek				
02.01	Assemble Dredge Pipe		L.S.		49,023
02.02	Dredge Creek	60,000	C.Y.	7.17	429,939
02.03	Disassemble Dredge Pipe		L.S.		32,682
	Total Dredge Creek	60,000	C.Y.	8.53	511,645
	Total Syracuse UDS 5-19 Budget Est.				$ 842,156

11. ENVIRONMENTAL CONSIDERATIONS

An environmental assessment (EA) of this project was conducted in accordance with the Council on Environmental Quality's "Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act," 40 CFR 1500-1506; and Corps of

Engineers Regulations ER 200-2-2, "Environmental Quality: Policy and Procedures for Implementing NEPA," is contained under separate cover. The proposed project is not a major Federal action which would significantly affect the human environment. Public and agency coordination of the proposed project plans has uncovered no significant adverse environmental concerns. The EA indicates that an environmental impact statement (EIS) is not necessary for the project as proposed. The EA and 404(b) (1) Evaluation, along with an unsigned Finding of No Significant Impact (FONSI) were circulated for a public review period of 30 days, which ended December 1996. No significant comments were received during that time. The District Commander has signed the FONSI and the proposed project is in full compliance with NEPA and other applicable environmental laws and regulations.

12. PROJECT DESIGN AND CONSTRUCTION SCHEDULE

The schedule outlined below lists the key milestone dates for the remainder of the design and the construction of the UDS 5-19.

BCOE #1	Nov 1996
First Design Memorandum	Dec 1996
BCOE #2	Jan 1997
Draft Plans and Specifications	Apr 1997
BCOE #3	Apr 1997
Completion of plans and Specifications	May 1997
Advertise Construction Contract	July 1997
Award Construction Contract	Aug 1997
Begin Construction	Aug 1997
Construction Complete	Aug 1999

The New York State Canal Corporation will be responsible for construction of the project and will be responsible for all future operation and maintenance of the project.

13. RECOMMENDATION

It is recommended that this Design Analysis be approved and serve as the basis for preparation of Plans and Specifications for the confined diked disposal facility, UDS 5-19 located adjacent to Ononadaga Creek and Hiawatha Boulevard West at the Inner Harbor City of Syracuse, New York.

INNER HARBOR DREDGING DESIGN PROJECT

SYRACUSE,NY

APPENDIX A

GEOTECHNICAL DESIGN
FOR
REHABILITATION OF THE UPLAND DISPOSAL SITE
USD 5-19

ONONDAGA LAKE
SYRACUSE, NY
ONONDAGA LAKE CDF

ONONDAGA LAKE CDF

APENDIX A - GEOTECHNICAL DESIGN

U.S. Army Engineer District, Buffalo
1776 Niagara Street
Buffalo, New York 14207

ONONDAGA CDF
SYRACUSE, NEW YORK
ONONDAGA LAKE CDF

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A3	Laboratory Test Results (1996)

A.1 General

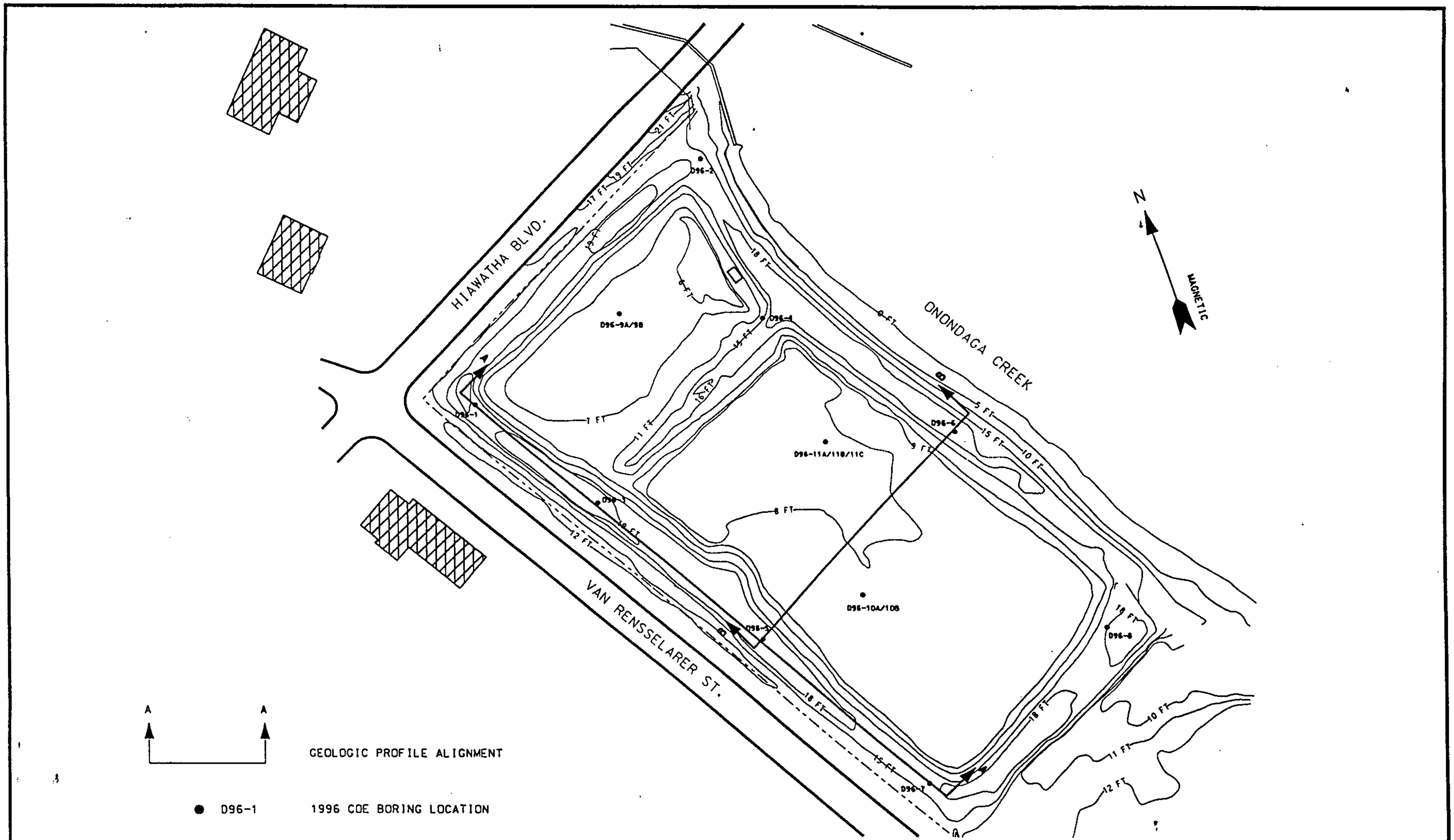
This appendix presents pertinent geotechnical design information concerning the Onondaga Lake CDF project. This project involves construction of a new CDF on the site of an existing facility (see Figure A1) to contain material dredged to deepen the adjacent inlet channel from Onondaga Lake. The current project calls for a raised dike with the same footprint as the existing facility. Some of the dredged material within the existing dike will be excavated to provide borrow material for raising the perimeter dike as well as to increase available capacity.

A.2 Regional Geology

The project site is located within the Erie-Ontario Lowland physiographic province that borders Lakes Erie and Ontario to the north and the Onondaga limestone scarp to the south. This province is typified by low, level land surface without dominant trends. Drumlins (long, thin sand and gravel deposits) are common in this province. Onondaga Lake is a remnant of glacial Lake Iroquois. Much of the sediment in the vicinity of Onondaga Lake settled out of the glacial melt water, creating thick deposits of clays in the deeper waters. At the project site, varved silts and clays were most likely deposited by glacial meltwater streams with seasonally varying flows. These silts and clays are underlain by thick layers of glacial till which were directly deposited by the glaciers as unsorted clays, silts, sands, gravels, and boulders. Between the glacial till and lacustrine silts and clays is a thin layer of sand which was probably deposited by the retreating glacier. The soil strata are underlain by bedrock, which are Silurian Vernon shales of the Salina group. These dolomitic shales are soft, easily weathered, red and green in color, and contain gypsum and salt beds. The Vernon shales in this vicinity have little deformation, dip slightly to the south-southwest, and have no major faults or folds.

A.3 Site Geology

The nature of this project requires only shallow concern for localized site geology. The existing CDF is composed of fine grained soils, including dredged sediments that were placed many years ago within the CDF. Beneath these deposits and the dike perimeter walls, man-made deposits that resulted as waste products of nearby industrial processes lie above the natural soil strata. Refer to the attached boring logs and Sections A.4.2 and A.7 of this report. This man-made deposit, termed marl in the boring logs, is considered to be a dependable marker unit



ONONDAGA CDF
SYRACUSE, NEW YORK
LOCATION OF BORINGS

FIGURE A1

which underlies the desired bottom of the new CDF. Refer to discussion in Section A.7.2. Since the marl layer underlies the CDF and its fill, the CDF itself must be non-natural (i.e., borrow material was used to construct this CDF) in placement. The groundwater table is closely aligned to the elevation of water in the adjacent Onondaga Lake access channel, although an elevated water table exists within the dike itself due to ponding of precipitation.

A.4 Subsurface Explorations

A.4.1 Previous Subsurface Explorations by Others

Three borings were advanced along the existing dike perimeter in January, 1991. This drilling and sampling was done as part of the April 1991 "Dredge Spoils and Terminal Area Sampling and Analysis" study by Parratt Wolff for the project A/E, Stearns and Wheeler. While these borings are site-specific and generally useful, they did not penetrate deep enough (17 to 20 feet below the dike crest, close to the groundwater surface) to fully disclose the foundation conditions beneath this dike. Refer to the boring logs and plan in Attachment A1. The primary value of these three borings, besides being site specific, is that they penetrate just below the apparent bottom of the dike fill into a sandy, silty layer (also termed marl) which is a control on design since it is much more pervious than the overlying silt which comprises the dike walls and dredged material within the dike. Since these three borings were not deep or numerous enough to adequately define the geotechnical site conditions, an additional subsurface investigation program was warranted.

A.4.2 1996 Subsurface Explorations by COE

In April, 1996, Parratt Wolff, Inc. completed a subsurface exploration program for the Buffalo District, Corps of Engineers, to further delineate subsurface conditions at the project site, both in terms of depth and horizontal extent. Eight standard drive sample borings were completed around the perimeter of the dike, penetrating the full dike height (about 15-20 feet) down to a depth of 40 feet below the dike crest. These were distributed fairly evenly around the perimeter. The borings were advanced well below the bottom of the dike floor to provide subsurface information well into the dike foundation. Each of the eight borings penetrated the relatively high permeability sandy (marl) layer beneath the dike section, clearly defining the depth at which the controlling, pervious stratum is encountered. Also, three shallow (8 feet deep) undisturbed sample borings were completed within the interior of the dike, sampling the full extent of dredged material within the dike, just encountering the top of the marl layer below. Two test pits were excavated by backhoe to provide bulk samples for moisture-density relationships tests. The boring locations are shown in plan on Figure A1. The boring logs are included as Attachment A2. The boring information is also plotted on Geologic Profiles A-A and B-B (see Figures A2 and A3, respectively).

A.5 Laboratory Testing

The soil samples recovered by the April 1996 boring program were tested at Ohio River Division Laboratory in Cincinnati. Index testing included visual classifications, gradation tests, and Atterberg limits tests. Of particular importance are the gradation tests and visual classifications of the soils within the existing dike walls and floor, with regard to permeability considerations (see Section A.7.2). The undisturbed samples were tested for strength (two R-bar triaxial tests) and permeability (eight falling head permeability tests). Also, two standard Proctor compaction tests were completed on the bulk samples from the test pits. Refer to the test results (Attachment A3).

A.6 Geotechnical Design Parameters

Geotechnical design parameters were developed based on the laboratory test results and standard penetration test values which were correlated to published values. Appropriate parameters were developed to cover design aspects involving the confined dredged material, including strength, permeability, and compactibility. These are summarized by Table A1.

A.7 Geotechnical Design Considerations

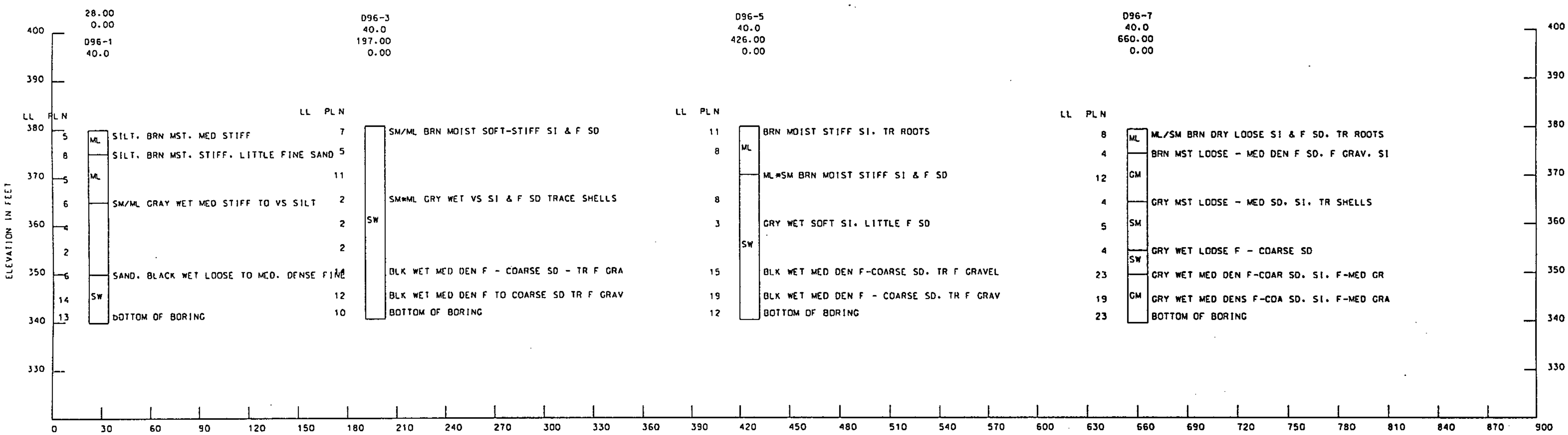
A.7.1 General

Two project features have primary geotechnical significance. The dike must be impervious enough to meet pertinent seepage criteria. Also, the raised dike must be stable and compatible with site constraints. These and other concerns are addressed in the following sections.

A.7.2 Permeability

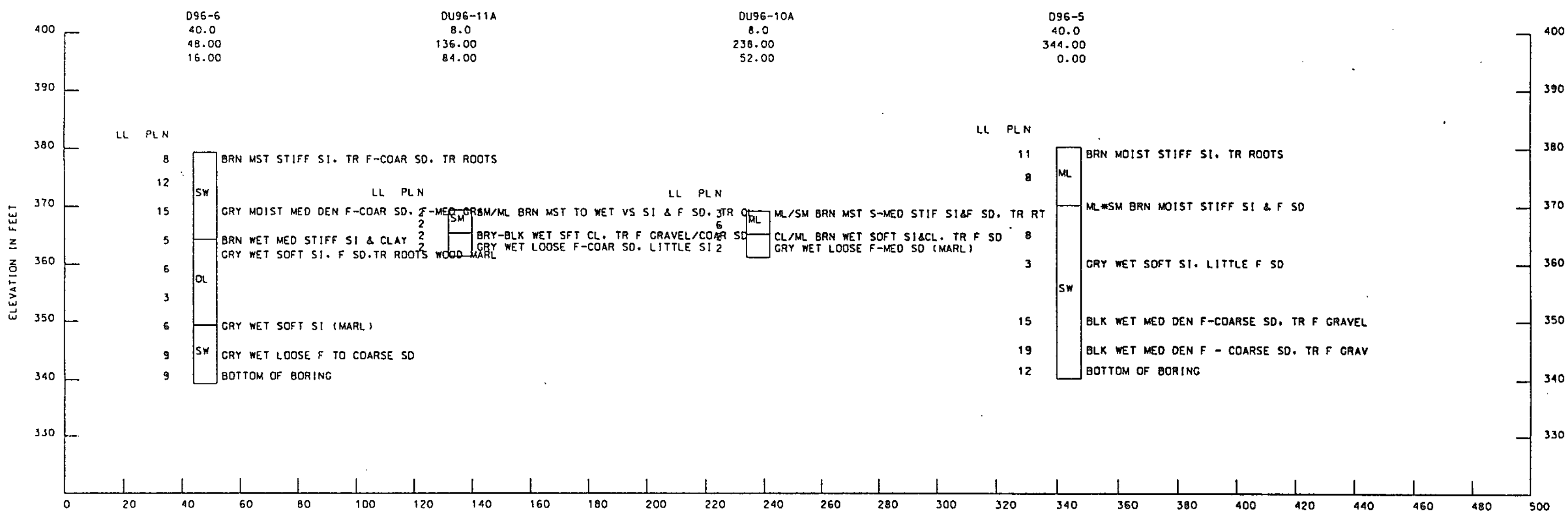
A.7.2.1 Permeability of Dike Floor (Vertical)

As disclosed by borings and test trenches, the floor of the existing dike contains about 8 feet of previously deposited dredged spoil, which is classified as sandy clay soil (CL/CH/OH) per the Unified classification system, essentially saturated (see



GEOLOGIC PROFILE A-A

FIGURE A2



GEOLOGIC PROFILE B-B

Table A1 - Geotechnical Design Parameters

(Existing dredged material in dike)

Cohesion (c) = 250 psf

Angle of Internal Friction (phi) = 0 degrees

Unit Weight, Saturated (gamma sat) = 110 pcf

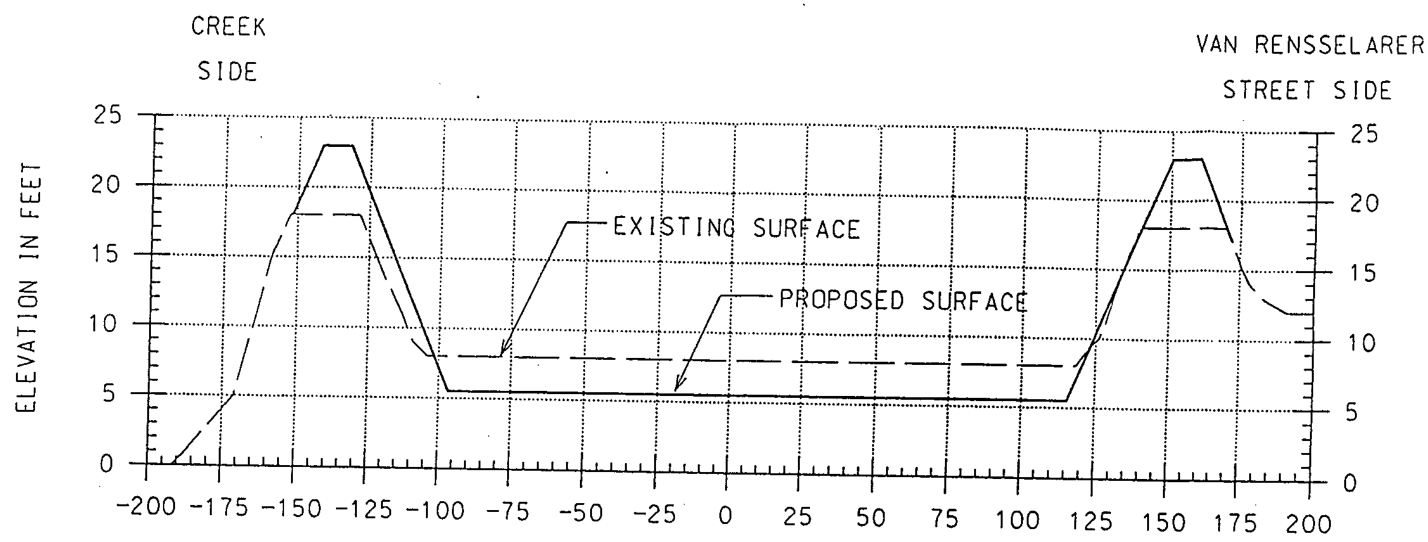
Young's Modulus (Es) = 250 psi

Coefficient of Permeability (k) (Average) = 2.94 10E-7 cm/sec

Groundwater Surface Elevation (in dike) = 367 to 369 NGVD or +5 to +7 Syracuse City Datum attached logs of borings and gardation/classification test results). Results of four falling head permeability tests conducted on undisturbed samples of the dike floor soils confirm that this is a relatively impervious zone, with a range in k values from 8.8E-8 cm/sec to 4.4E-7 cm/sec (average value = 2.94E-8 cm/sec). This satisfies the project design criteria, which do not call out any specific limiting value for permability but rather require that the dike be sufficiently impermeable so the receiving waters (the inlet channel and Onondaga Lake) will not be adversely affected by the impounded dredged material. Calculations indicate it would take over 26 years for water to seep out through the existing (8 foot thick) dike floor, based on the lab test results and other available information. This clearly meets the above stated adverse impact criteria, so long as the floor remains predominantly intact prior to filling. However, beneath this tight sandy clay layer (about 15 feet below the top of the current floor) is a thick (10+ feet) layer of clean sand/gravelly sand (SP) which is an apparent remnant of a previous manufacturing operation in the project vicinity. This is a high permeability layer which would readily drain water from above if it were hydraulically connected to the incoming dredged spoil. Therefore, under no circumstances should the existing material in the floor of the dike be removed to expose the incoming dredged material to the underlying sand layer. The sand layer is essentially flat across the project site and serves as a marker layer and a design constraint. For design purposes, a dike floor bottom elevation of +5.5 has been established to leave a sufficient thickness of existing material in the dike surface to serve as a natural, low-permeability liner while allowing some excavation for borrow to raise the dike walls (to help balance cut and fill quantities as well as to increase dike capacity to a small degree).

A.7.2.2 Permeability of Dike Walls (Horizontal)

The existing dike walls, which extend about 10 feet above the current dike floor, consist of predominantly fine-grained soils (silts, sandy clays, silty sands) of variable content. Refer to the attached laboratory testing results (visual classifications and grain size analyses). The existing dike walls range in thickness from about 25 feet at the top to about 65 feet at the dike floor elevation. No permeability tests were performed on soil samples recovered from the dike walls, so other information (visual descriptions and classifications, as well as grain size analyses) was used to assess horizontal permeability through the dike walls. In general, the dike walls above the existing dike bottom are comprised of predominantly fine grained soils (50% or more of dry weight finer than the No. 200 sieve), per the



NOTE: VERTICAL EXAGGERATION IS 5

NYS CANAL CORP.
SYRACUSE, NY
UDS 5 -19
TYPICAL X-SECTION
FIGURE A4

attached grain size analyses and visual classifications. In only two samples of dike wall soil above the dike bottom surface was the fines content (finer than No. 200 sieve) less than 20% (D96-4, sample 3, 18% finer than No. 200; D96-6, sample 3, 9% finer than No. 200). The former sample is considered to be relatively impervious since the fines content exceeds 13%, which defines relatively impervious soils (Ref. 1). The latter sample falls betwen free draining soils (less than 5% fines) and relatively impervious soils (fines content greater than 13%). Both samples were taken at 10-11.5 foot depth, which is at or slightly below the current dike floor (and where the dike walls are around 60-75 feet thick). These are considered to be atypical of the dike wall soils in general and not considered to constitute seepage paths through the dike walls. At depths well below the current dike floor, the same sandy, free-draining deposits exist beneath the dike walls, but have no bearing on horizontal seepage through the dike walls.

Seepage through the dike walls is not expected to be a problem for the following reasons: (1) As discussed above, the dike walls consist of, almost exclusively, fine-grained soils which are relatively impervious; (2) The dike walls are well-compacted which limits through seepage; (3) The dike walls are thick, providing a long seepage path; (4) Dredged material placed in the dike will tend to clog the existing pores in the dike wall soils, further reducing permeability; (5) The duration of dredge spoil placement is short; (6) The dike not be very high (about 18 feet maximum), so heads in the dike will be small; and (7) Any small amount of seepage that might exit the dike would not adversely affect the receiving waters since any suspended particles would be filtered out by the dike walls. In summary, horizontal seepage out of the raised dike is not expected to be a concern or problem.

A.7.3 Stability

This design requires a modest raising of the existing dike (5 feet), as shown by Figure A4. The raising will not steepen the existing side slopes (about 2H:1V), but rather only extend them upwards, matching the existing slopes, to allow a nominal 5 foot increase in crest height. The existing dike slopes visually appear to be stable, and site constraints (rights of way on three sides and the inlet from Onondaga Lake on the fourth) preclude slope flattening. Stability analysis using the infinite slope method has been done, indicating a stable dike in the raised condition. Using an effective phi angle of 30 degrees for the dike wall material and a 2 horizontal on 1 vertical side slope, the factor of safety against slope failure is calculated as about 1.15 (unity or greater is acceptable). Refer to the attached calculations. Therefore, the stability of the raised dike is adequate.

A.7.4 Compressibility

The raised dike will not significantly increase foundation stresses. Also, the current dike has been in place for many years, and the settlement process for the existing facility is essentially complete. Therefore, only very minimal settlement of the dike is anticipated, which should be inconsequential. Any small settlement will be easily accommodated by the flexible nature of the dike.

A.7.5 Earthwork

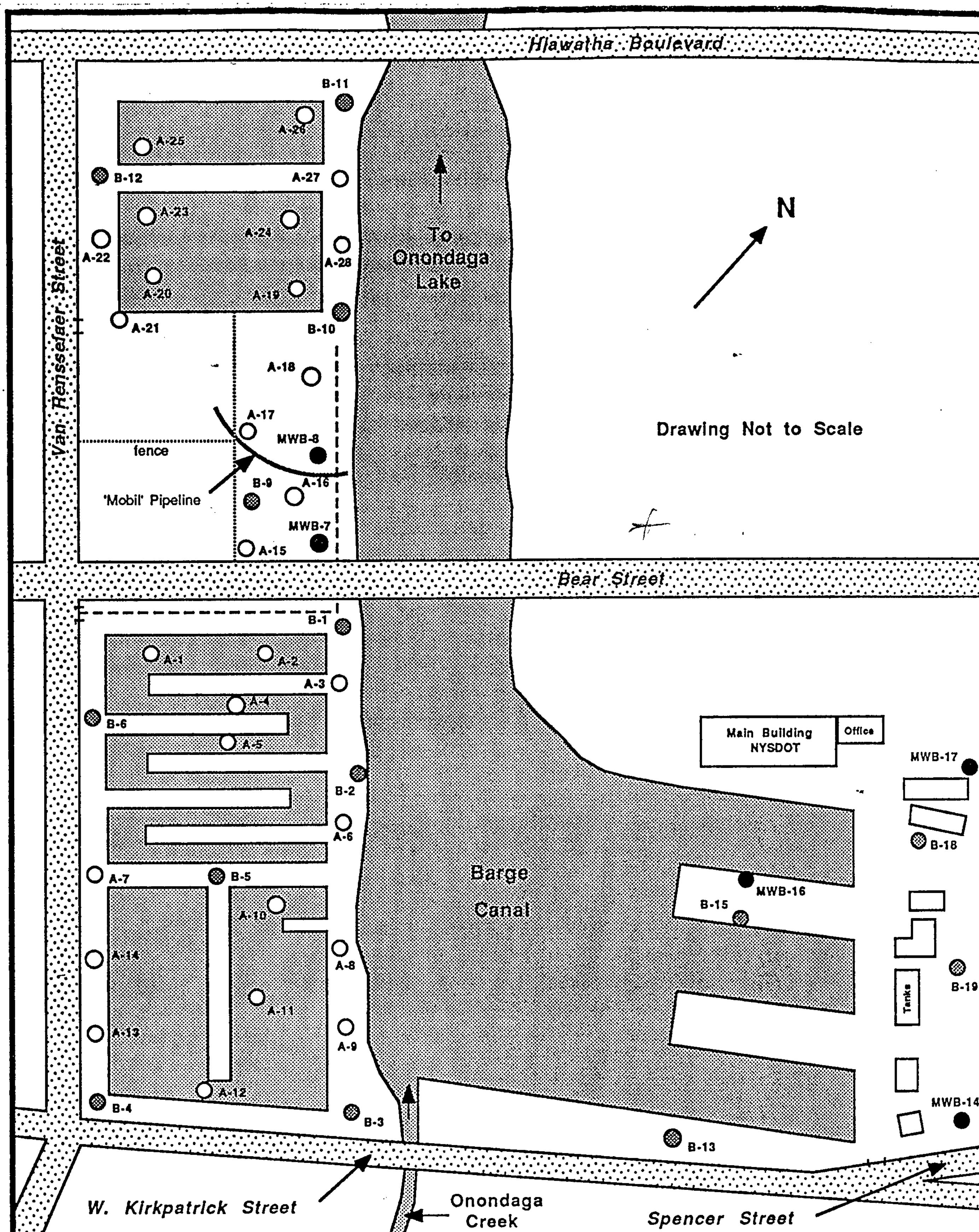
Borrow material for raising the existing dike will be obtained by excavating dredged material or other appropriate fill from within the existing dike, especially the existing finger dike. This should provide the bulk of the borrow required to raise this dike. The remaining borrow (a small amount at most) should be available from the existing dike floor. The laboratory test results (Attachment A-3) indicate some of these soils are high compressibility organic clays and silts (OH) with natural moisture contents not much below their liquid limits. If the material on the dike floor proves to be too wet for practical use, a minimal quantity of borrow material may be required from off-site to complete this raising. This may be obtained from the nearby site UDS 5-20. The dike will be raised by spreading the borrow soil in lifts (about 12 inches) and compacting it by running the construction equipment over each lift at least 3 times. Moderate compaction (90% of standard Proctor maximum dry density) may be accomplished in this manner, which will be sufficient. This can be accomplished using conventional construction equipment. The two compaction tests done on the dredged material in the existing dike indicate this is marginal borrow soil, due to its high optimum moisture content (31%) and low maximum dry density (84 pcf), but most of it may be satisfactory for the minor raising required. Refer to the attached laboratory test results (Attachment A3) for complete details.

A.8 Construction Materials

The primary construction material will be the fine-grained fill required to raise the dike. This will be excavated from the existing finger dike, the floor floor of the dike, and/or borrowed from off site. If this material (existing dredged spoil in the dike) proves to be too wet to handle or place, a minimal quantity of off-site borrow may be required to complete this dike raising.

ATTACHMENTS

ATTACHMENT A1
1991 Boring Log
By Others



KEY TO SYMBOLS

- Deep Soil Boring (No Well Installed)
- Deep Soil Boring (Well Installed)
- Shallow Hand-Augered Boring (No Well Installed)

Stearns & Whele

ENVIRONMENTAL ENGINEERS AND SCIENTIST

FIGURE 1

CITY OF SYRACUSE
DREDGE SPOILS SAMPLING
SITE PLAN

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT: Dredge Spoil Sampling

LOCATION: Barge Canal
Syracuse, New York

DATE STARTED: 1/18/91 DATE COMPLETED: 1/18/91

HOLE NO. B-10

SURF. EL.

JOB NO. 9118

GROUND WATER DEPTH

WHILE DRILLING 18.0'

BEFORE CASING REMOVED 14.0'

AFTER CASING REMOVED Hole at 17.

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER
DRILLER'S FIELD LOG

SHEET 1 OF 1

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-	1		4/6		Brown moist stiff to medium stiff SILT, some medium to fine sand	
	2.0'			6/5	12		
	2.0'-	2		5/7			
	4.0'			6/5	13		
5.0	4.0'-	3		1/2			
	6.0'			3/6	5		
	6.0'-	4		5/7			
	8.0'			7/10	14		
	8.0'-	5		8/7			
10.0	10.0'			7/6	14		
	10.0'-	6		2/2			
	12.0'			3/4	5		
	12.0'-	7		4/4			
	14.0'			4/4	8		
15.0	14.0'-	8		2/3			
	16.0'			3/4	6		
	16.0'-	9		5/6			
WL ▼	18.0'			6/6	12		18.0'
	18.0'-	10		6/5		Brown wet stiff SILT, some fine sand, little marl	
20.0	20.0'			7/6	12		
						Bottom of Boring	20.0'

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 130

PROJECT Dredge Spoil Sampling

LOCATION Barge Canal
Syracuse, New York

DATE STARTED 1/18/91 DATE COMPLETED 1/18/91

HOLE NO. B-11

SURF. EL.

JOB NO. 9118

GROUND WATER DEPTH
WHILE DRILLING 14.5'

BEFORE CASING REMOVED Dry

AFTER CASING REMOVED Dry

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE -- HOLLOW STEM AUGER
DRILLER'S FIELD LOG

SHEET 1 OF 1

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRA[T] CHAN[GE] DEPT[H]
	0.0'-	1		3/3		Brown moist medium stiff to stiff SILT, some medium to fine sand	
	2.0'			2/3	5		
	2.0'-	2		3/4			
	4.0'			5/4	9		
5.0	4.0'-	3		2/2			
	6.0'			2/3	4		
	6.0'-	4		3/3			
	8.0'			3/5	6		
	8.0'-	5		8/7			
10.0	10.0'			8/8	15		
	10.0'-	6		4/5			
	12.0'			4/4	9		
	12.0'-	7		5/4			
	14.0'			4/5	8		
15.0 ▼	14.0'-	8		5/6			14.
WL	16.0'			6/7	12	Brown wet stiff SILT and medium to fine SAND	
						Bottom of Boring	16.
20.0							

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 130

PROJECT Dredge Spoil Sampling

LOCATION Barge Canal
Syracuse, New York

DATE STARTED 1/18/91 DATE COMPLETED 1/18/91

HOLE NO. B-12

SURF. EL.

JOB NO. 9118

GROUND WATER DEPTH
WHILE DRILLING 15.0'

BEFORE CASING REMOVED Dry

AFTER CASING REMOVED Dry

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE – HOLLOW STEM AUGER
DRILLER'S FIELD LOG

SHEET 1 OF 1

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRAT CHAN DEP
	0.0'-	1		3/4		Light brown moist stiff to medium stiff SILT and fine SAND	
	2.0'			5/5	9		
	2.0'-	2		4/5			
	4.0'			4/4	9		
5.0	4.0'-	3		4/4			
	6.0'			5/5	9		
	6.0'-	4		4/4			
	8.0'			5/6	9		
	8.0'-	5		4/5			
10.0	10.0'			4/4	9		
	10.0'-	6		2/2			
	12.0'			3/3	5		
	12.0'-	7		3/4			
	14.0'			4/5	8		
15.0	14.0'-	8		5/2			15.
WL	16.0'			3/2	5	Gray wet medium stiff SILT and fine SAND	
						Bottom of Boring	16.
20.0							

ATTACHMENT A2
1996 Boring Logs
(COE)

Ohio River Division Laboratories - Soils Laboratory

Site: Onondaga Lake CDF VW81296LS015NCB

Date: 06-27-96 Sheet 1 of 1

Hole Number	Top Elevation	Sample Number	Depth ft.	Visual Soil Classification	WC (%)	PL (%)	LL (%)	Estimate			
								max	grav	sand	fine
D96-11A		1	0.0 2.0	Sandy Silty CLAY (CL-ML) brown, medium to fine sand; very low plasticity						20	80
		2	2.0 4.0	Sandy Organic CLAY (OH) brown, medium to fine sand; high plasticity		32.4	61.2			20	80
		3	4.0 6.0	Sandy CLAY (CL) brown, medium to fine sand; medium plasticity						30	70
		4	6.0 8.0	Sandy CLAY (CH) brown, medium to fine sand; high plasticity		26.0	55.5			30	70

Ohio River Division Laboratories - Soils Laboratory

Site: Onondaga Lake CDF   VW81296LS015NCB   Date: 06-27-96   Sheet 1 of 1

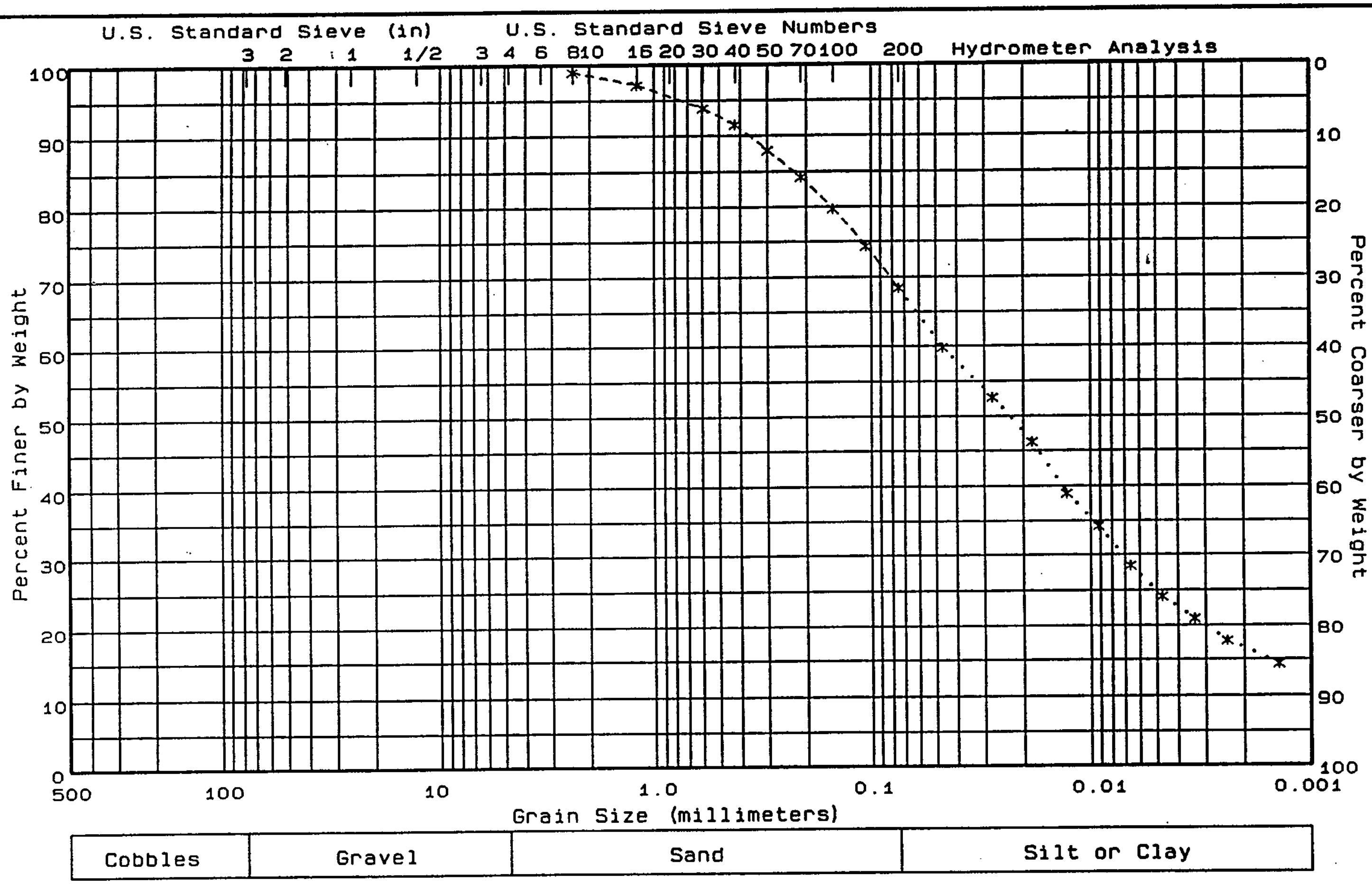
Hole Number	Top Elevation	Sample Number	Depth ft.	Visual Soil Classification	WC (%)	PL (%)	LL (%)	Estimate max	Estimate grav	Estimate sand	Estimate fine
D96-9A		1	0.0 2.0	Sandy CLAY (CL) brown, medium to fine sand; medium plasticity						20	80
		2	2.0 4.0	Sandy CLAY (CH) brown, medium to fine sand; high plasticity		31.5	66.6			20	80
		3	4.0 6.0	Sandy CLAY (CL) brown, medium to fine sand; medium plasticity						20	80
		4	6.0 8.0	Sandy Organic CLAY (OH) gray, medium to fine sand; high plasticity		29.2	53.1			20	80

Ohio River Division Laboratories - Soils Laboratory

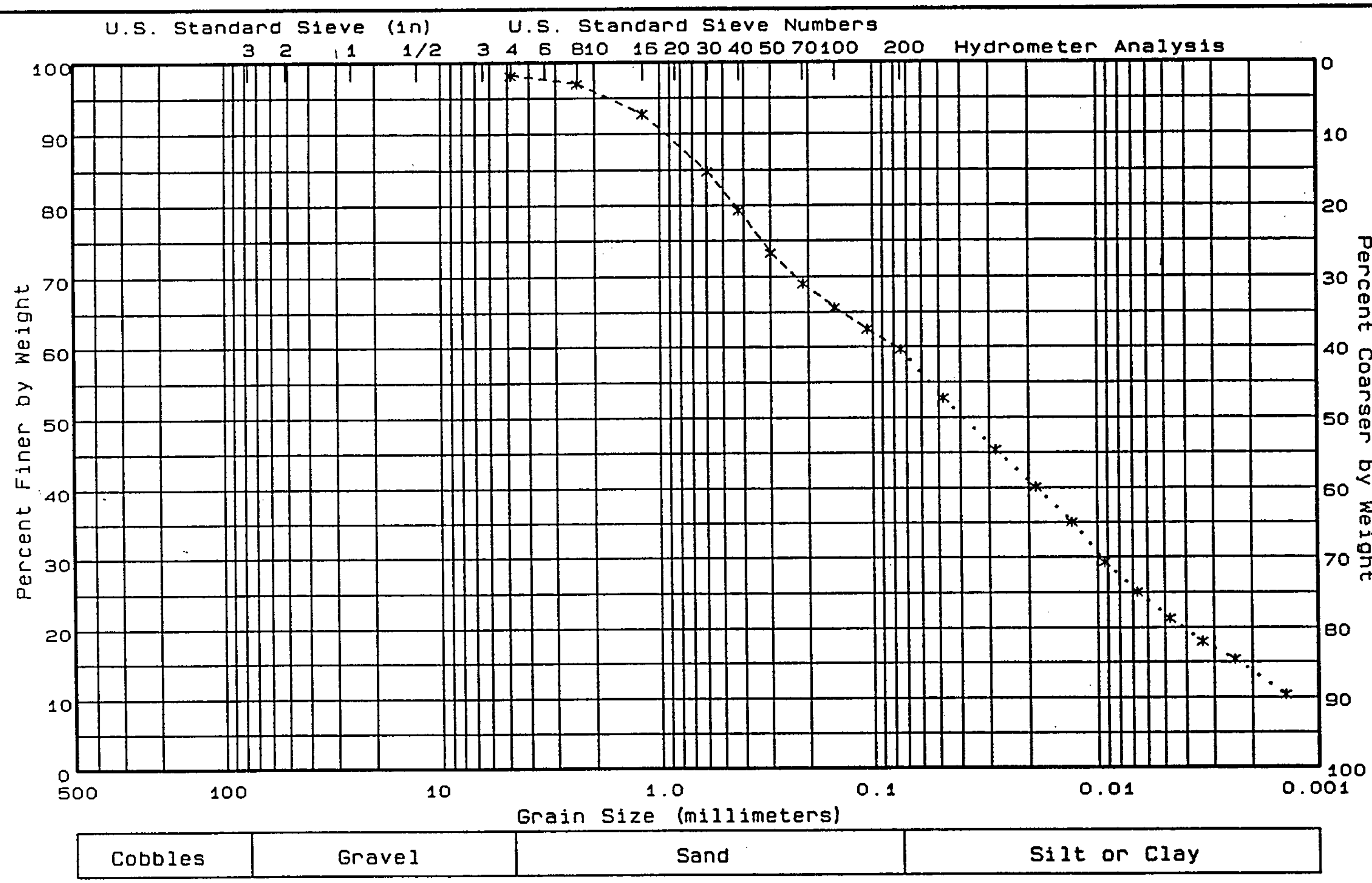
Site: Onondaga Lake CDF VW81296LS015NCB

Date: 06-27-96 Sheet 1 of 1

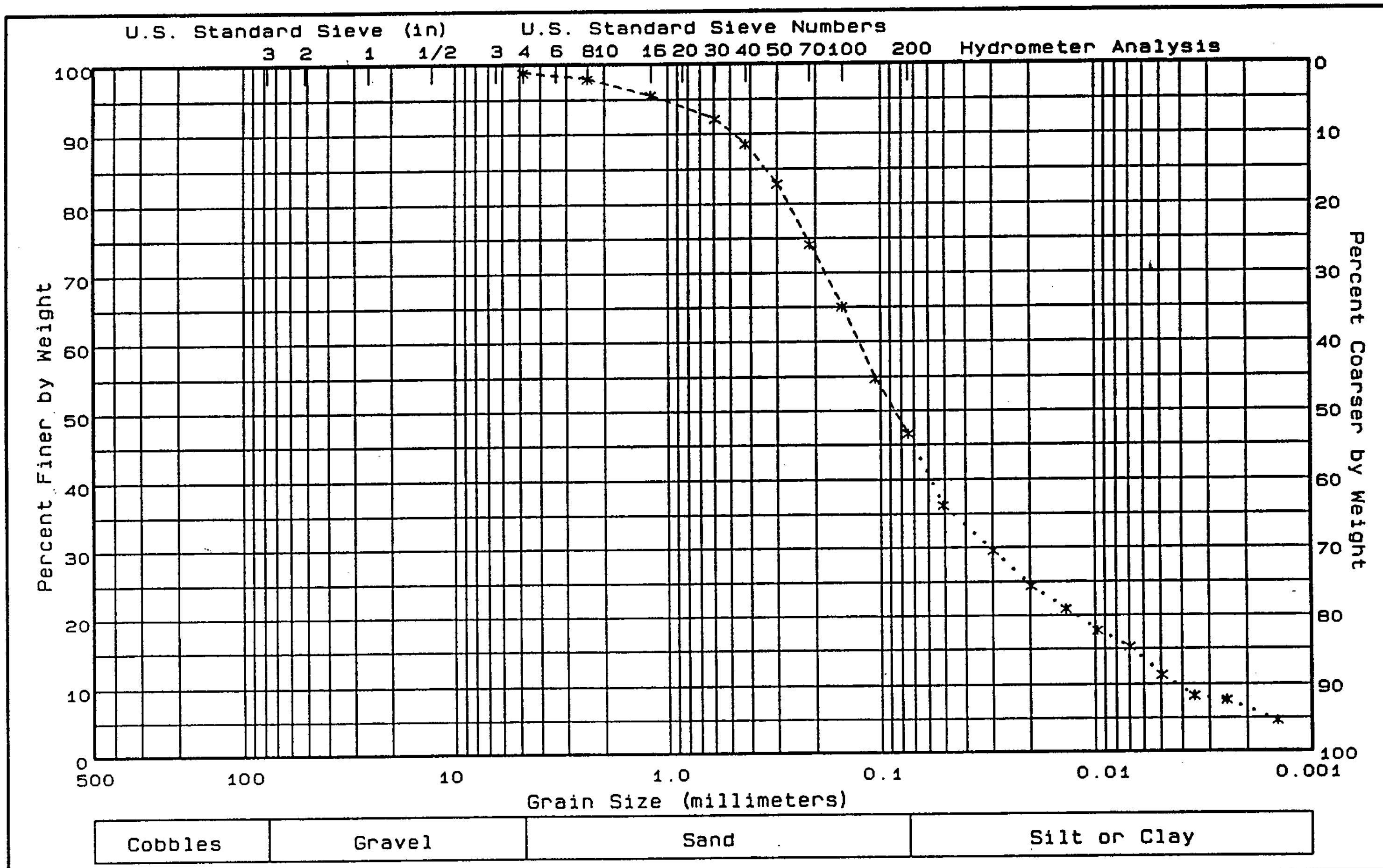
Hole Number	Top Elevation	Sample Number	Depth ft.	Visual Soil Classification	WC (%)	PL (%)	LL (%)	Estimate			
								max	grav	sand	fine
DU96-10A		1	0.0 2.0	Sandy Organic SILT (OH) brown, medium to fine sand; high plasticity, w/roots		36.4	70.4			20	80
		2	2.0 4.0	Sandy CLAY (CL) brown, fine sand; medium plasticity, w/free water						20	80
		3	4.0 6.0	Sandy CLAY (CH) brown, fine sand; high plasticity		29.5	60.4			20	80
		4	6.0 8.0	Sandy CLAY (CL) brown, coarse to fine sand; medium plasticity						30	70



Sam No	Elev	Classification	w%	LL	PL	PI	
3	10.0-11.5	Sandy CLAY (CL)	27.6	39.7	23.8	15.9	Project Onondaga Lake CDF
							Area
							Boring No. D96-8
GRADATION CURVES							Date 08-10-96



Sam No	Elev	Classification	W%	LL	PL	PI	Project Onondaga Lake CDF
6	20.0-21.5	Sandy CLAY (CL)	26.4	44	24.6	19.4	
							Area
							Boring No. 096-8
GRADATION CURVES							Date 08-10-96



Sam No	Elev	Classification	w%	LL	PL	PI
4	15.0-16.5	Clayey SAND (SC)	27.7			

Project Onondaga Lake CDF

Area

Boring No. 096-7

Date 08-10-96

GRADATION CURVES

Ohio River Division Laboratories - Soils Laboratory

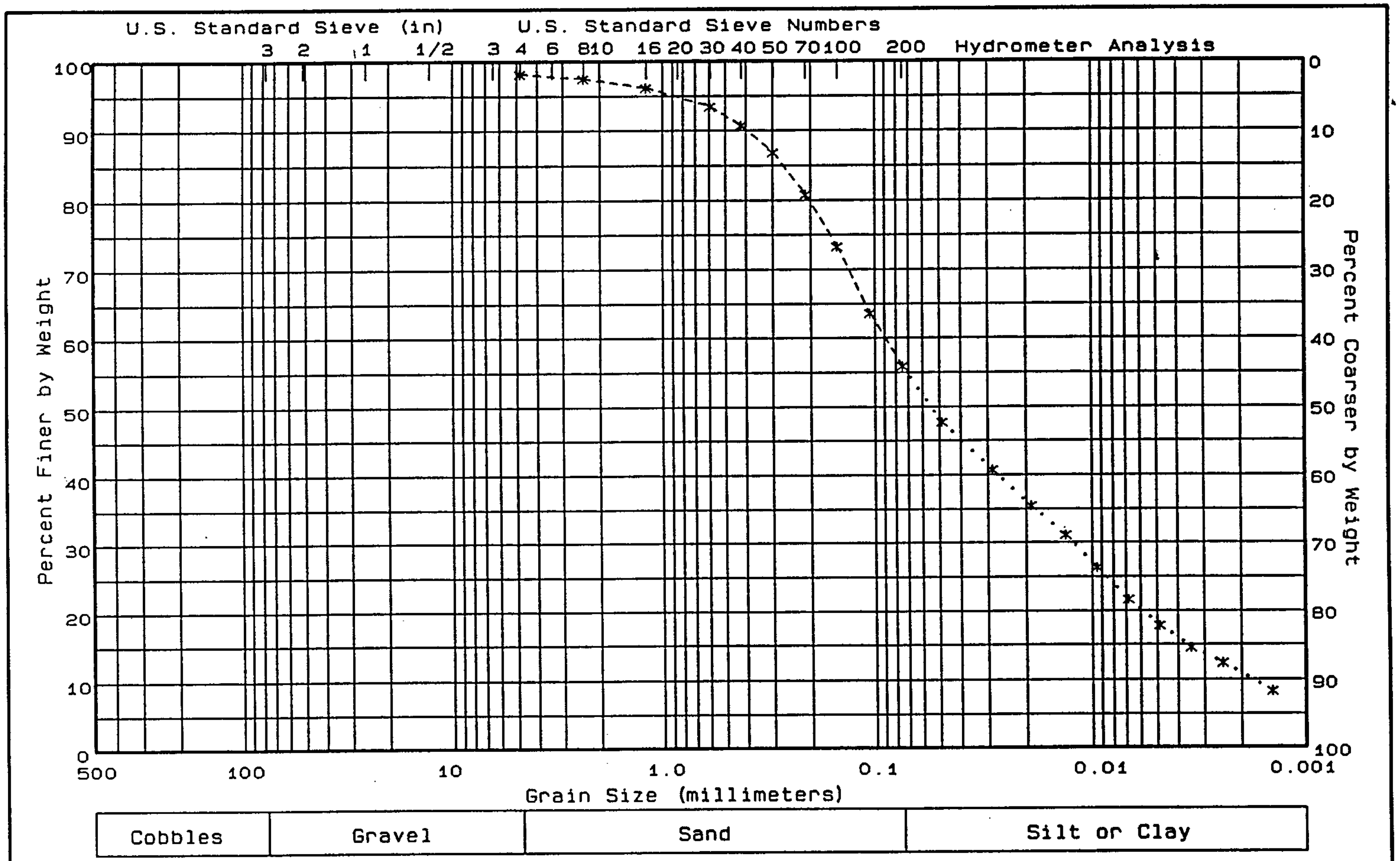
Site: Onondaga Lake CDF VW81296LS015NCB (* actual sieve %) Date: 06-27-96 Sheet 1 of 1

Hole Number	Top Elevation	Sample Number	Depth ft.	Visual Soil Classification	WC (%)	PL (%)	LL (%)	Estimate			
								max	grav	sand	fine
D96-8		1	1.0 2.5	Sandy SILT (ML) brown, medium to fine sand; nonplastic, w/roots						30	70
		2	5.0 6.5	Sandy CLAY (CL) brown, fine subangular gravel, coarse to fine sand; medium plasticity				3/8"	10	25	65
		* 3	10.0 11.5	Sandy CLAY (CL) brown, coarse to fine sand; medium plasticity		23.8	39.7			32	68
		3B	10.0 11.5	CLAY (CL) brown, fine sand; medium plasticity						10	90
		* 6	20.0 21.5	Sandy CLAY (CL) brown, fine subangular gravel, coarse to fine sand; medium plasticity		24.6	44.0	3/8"	2	38	60
		6B	21.0 21.5	Gravelly Sandy CLAY (CL) brown, fine subangular gravel, coarse to fine sand; medium plasticity				1/2"	20	25	55
		7	25.0 26.5	Silty Gravelly SAND (SM) gray, fine subangular gravel, coarse to fine sand; nonplastic, w/free water				3/4"	25	50	25
		8	30.0 31.5	SAND (SP) gray, coarse to fine sand; nonplastic, w/free water						96	4
		9	35.0 36.5	SAND (SP) gray, coarse to fine sand; nonplastic, w/free water						97	3
		10	38.5 40.0	SAND (SP) gray, coarse to fine sand; nonplastic, w/free water						97	3

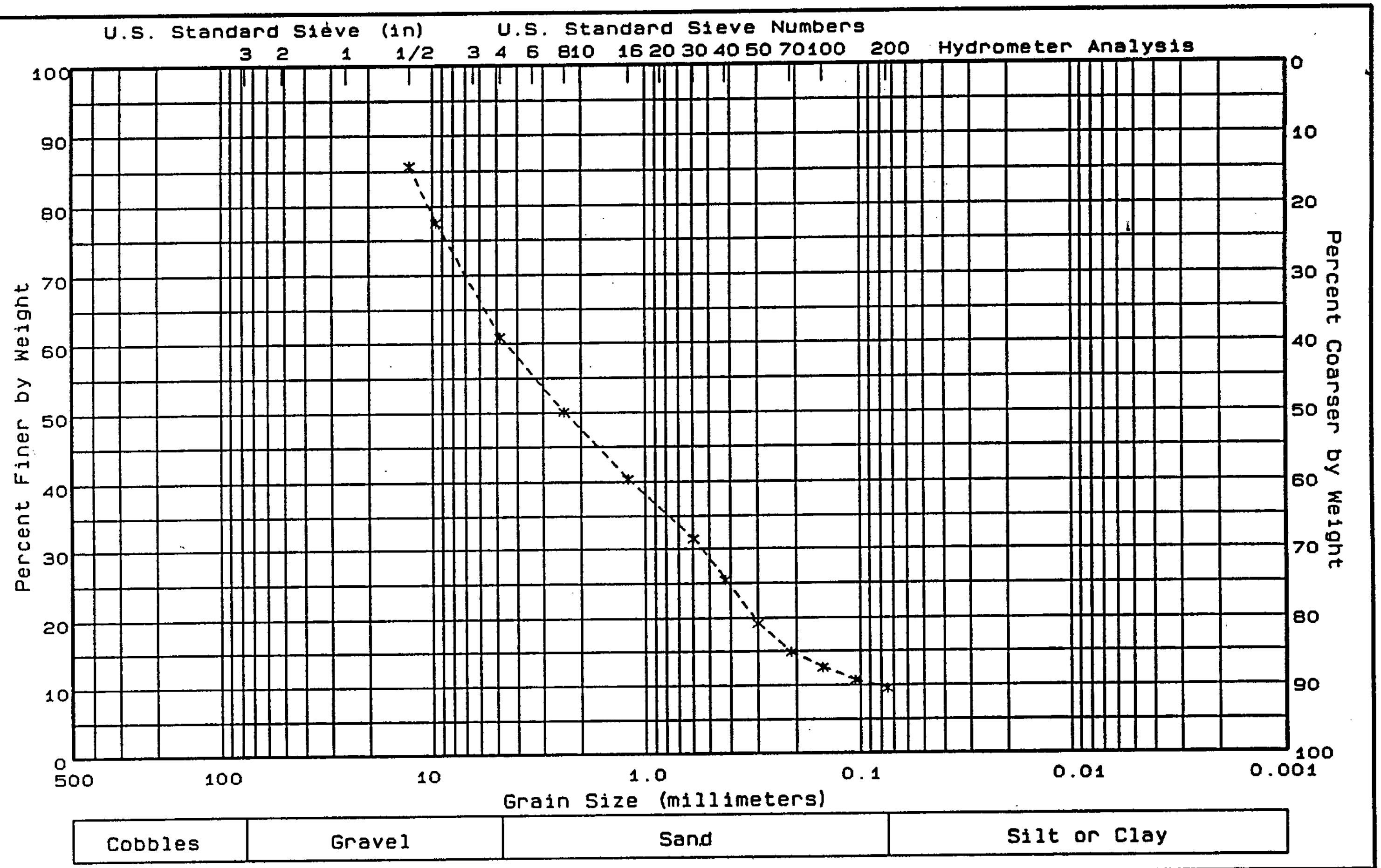
Ohio River Division Laboratories - Soils Laboratory

Site: Onondaga Lake CDF VW81296LS015NCB (* actual sieve %) Date: 06-27-96 Sheet 1 of 1

Hole Number	Top Elevation	Sample Number	Depth ft.	Visual Soil Classification	WC (%)	PL (%)	LL (%)	Estimate			
								max	grav	sand	fine
D96-7		1	1.0 2.5	Sandy CLAY (CL) brown, coarse to fine sand; medium plasticity, w/roots & organics						30	70
		2	5.0 6.5	Gravelly Sandy CLAY (CL) brown, fine subangular gravel, coarse to fine sand; medium plasticity				1/2"	15	25	60
		* 3	10.0 11.5	Sandy CLAY (CL) brown, fine subrounded gravel, coarse to fine sand; medium plasticity				3/8"	2	42	56
		* 4	15.0 16.5	Clayey SAND (SC) brown, fine subangular gravel, coarse to fine sand; low plasticity				3/8"	1	53	46
		5	20.0 21.5	Sandy CLAY (CL) gray, fine subangular gravel, coarse to fine sand; medium plasticity				3/8"	10	25	65
		6	25.0 26.5	Clayey SAND (SC) gray, coarse to fine sand; low plasticity						70	30
		7	30.0 31.5	Silty Gravelly SAND (SM) gray, fine subangular gravel, coarse to fine sand; nonplastic				1/2"	25	50	25
		8	35.0 36.5	Gravelly SAND (SP-SM) gray, fine subangular to subrounded gravel, coarse to fine sand; nonplastic, w/free water				1/2"	25	65	10
		9	38.5 40.0	SAND (SP-SM) gray, fine subangular gravel, coarse to fine sand; nonplastic				3/8"	10	80	10



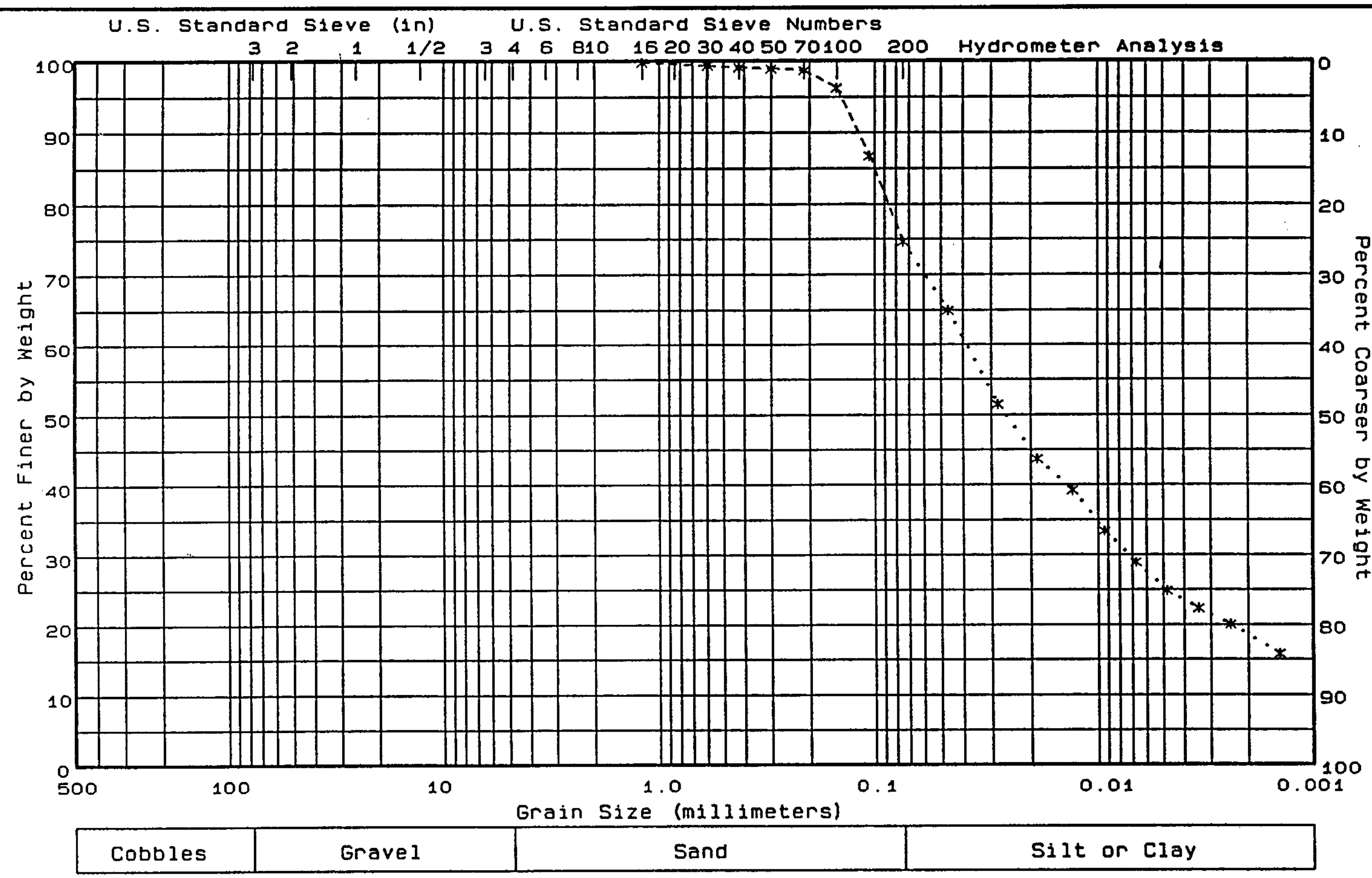
Sam No.	Elev	Classification	w%	LL	PL	PI	
							Project Onondaga Lake COF
3	10.0-11.5	Sandy CLAY (CL)	32.2				
							Area
							Boring No. D96-7
GRADATION CURVES							Date 08-10-96



Sam No	Elev	Classification	w%	LL	PL	PI	Project Onondaga Lake CDF
3	10.0-11.5	Gravelly SAND (SP-SM)	5.5				
							Area
							Boring No. 096-6

GRADATION CURVES

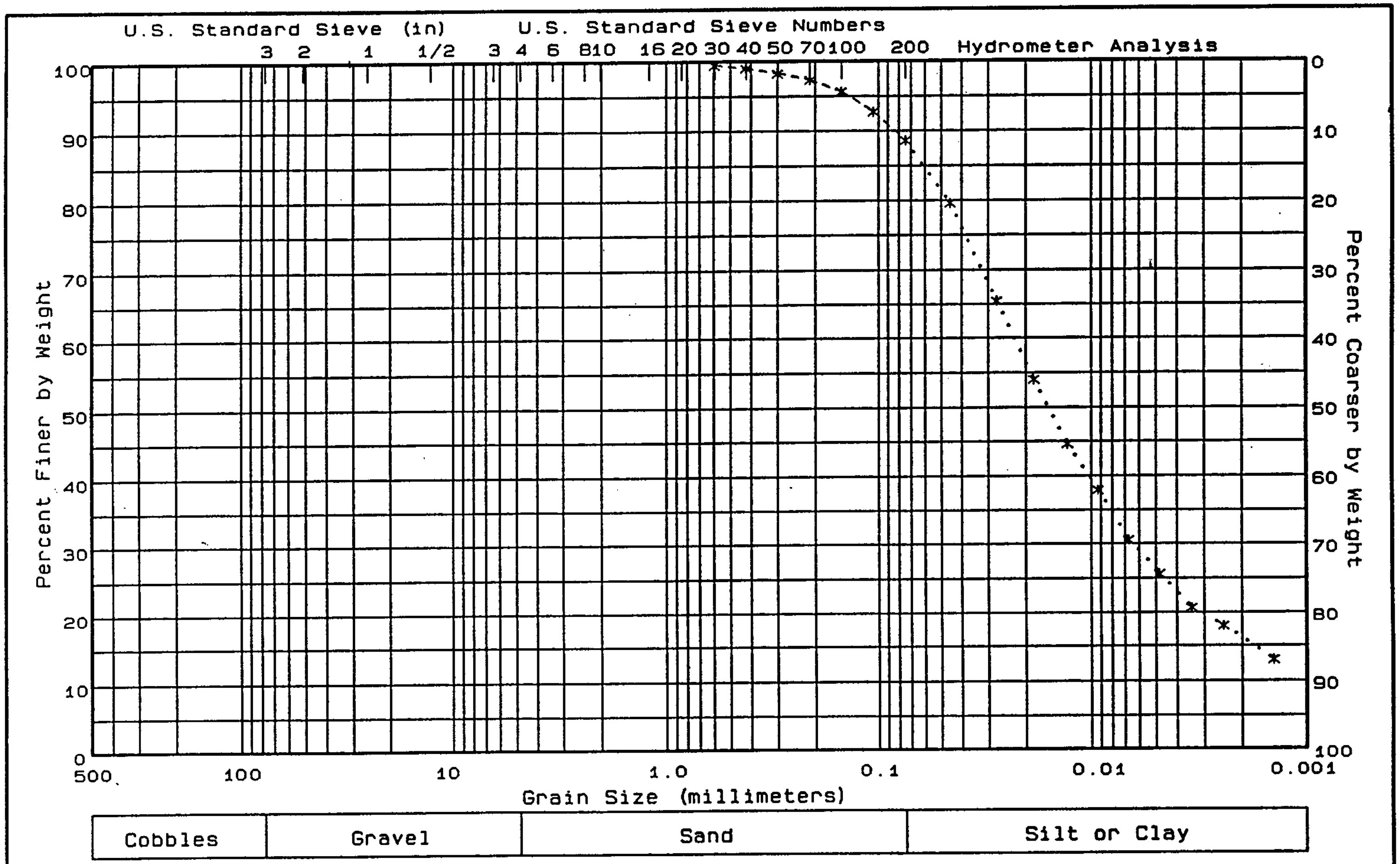
Date 08-10-96



Sam No	Elev	Classification	w%	LL	PL	PI	
4	15.0-16.5	Sandy CLAY (CL)	29.1				Project Onondaga Lake CDF
							Area
							Boring No. D96-6

GRADATION CURVES

Date 08-10-96

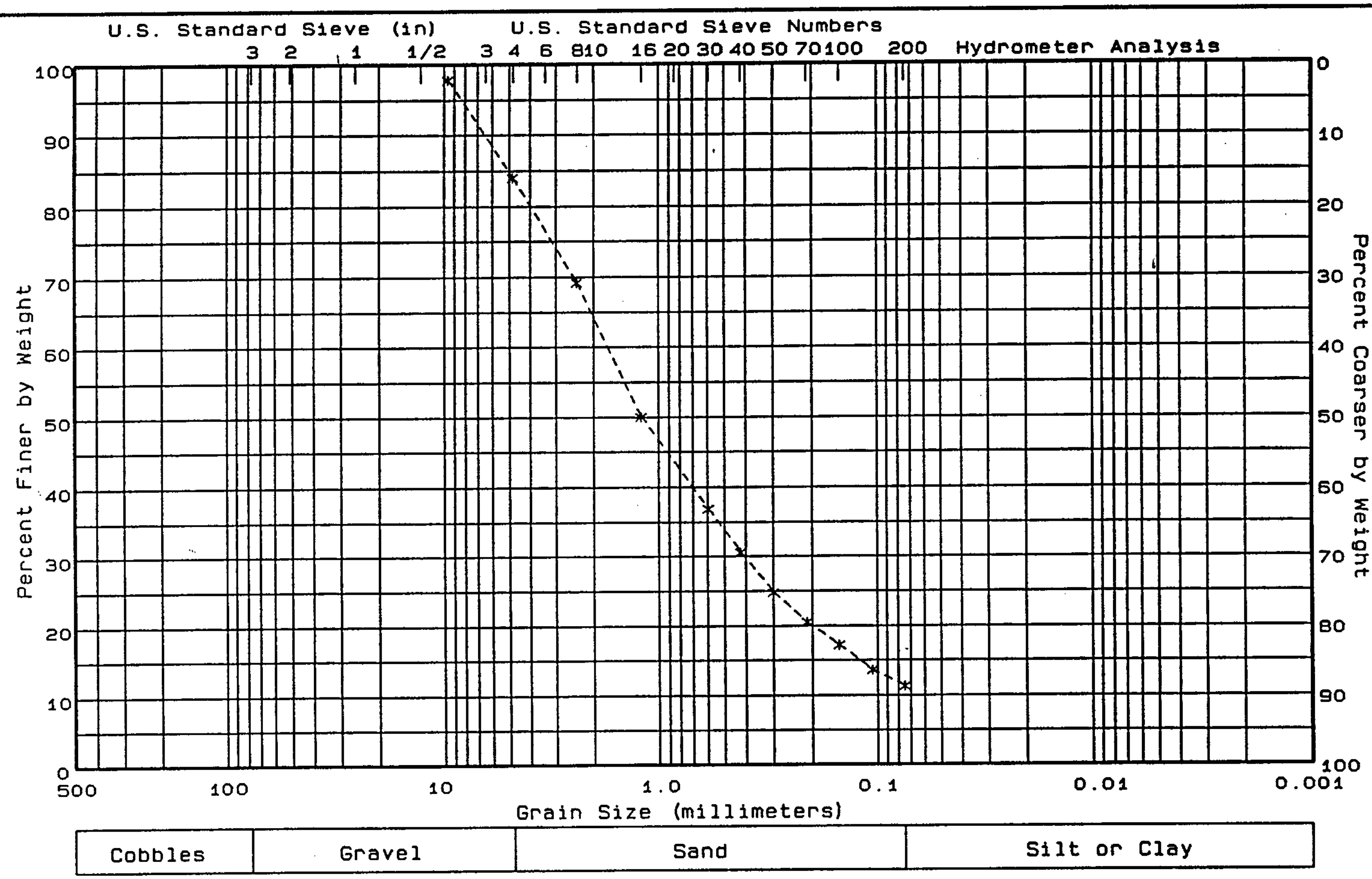


Sam No	Elev	Classification	w%	LL	PL	PI	Project Onondaga Lake CDF
4	15.0-16.5	CLAY (CL)	42.5				
							Area
							Boring No. 096-5
GRADATION CURVES							Date 08-10-96

Ohio River Division Laboratories - Soils Laboratory

Site: Onondaga Lake CDF VW81296LS015NCB (* actual sieve %) Date: 06-25-96

Hole Number	Top Elevation	Sample Number	Depth ft.	Visual Soil Classification	WC (%)	PL (%)	LL (%)	Estimate max	Estimate grav	Estimate sand	Estimate fine
D96-6		1	1.0 1.5	Silty Clayey SAND (SC-SM) brown, coarse to fine sand; very low plasticity						55	45
		2	5.0 6.5	Sandy CLAY (CL) brown, coarse to fine sand; low plasticity, w/roots		22.9	34.1			30	70
		* 3	10.0 11.5	Gravelly SAND (SP-SM) grayish brown, fine subangular to subrounded gravel, coarse to fine sand; nonplastic				3/4"	39	52	9
		* 4	15.0 16.5	Sandy CLAY (CL) grayish brown, coarse to fine sand; medium plasticity						25	75
		4B	16.0 16.5	Sandy CLAY (CL) gray, medium to fine sand; medium plasticity						30	70
		5	20.0 21.5	Sandy Organic CLAY (OL) gray, medium to fine sand; low plasticity		29.9	43.2			35	65
		6	25.0 26.5	Clayey SAND (SC) dark gray, coarse to fine sand; low plasticity						60	40
		7	30.0 31.5	Sandy Silty CLAY (CL-ML) gray, coarse to fine sand; very low plasticity						40	60
		7B	31.0 31.5	SAND (SP-SC) gray, coarse to fine sand; very low plasticity, w/free water						90	10
		8	35.0 36.5	SAND (SP) gray, coarse to fine sand; nonplastic, w/free water						96	4
		9	38.5 40.0	Gravelly SAND (SP) gray, fine subangular to subrouned gravel, coarse to fine sand; nonplastic				1/2"	30	66	4



Sam No	Elev	Classification	W%	LL	PL	PI	Project Ondonga Lake CDF
4	15.0-16.5	Gravelly SAND (SP-SM)	11.1				
							Area
							Boring No. D96-4
GRADATION CURVES							Date 08-10-96

Ohio River Division Laboratories - Soils Laboratory

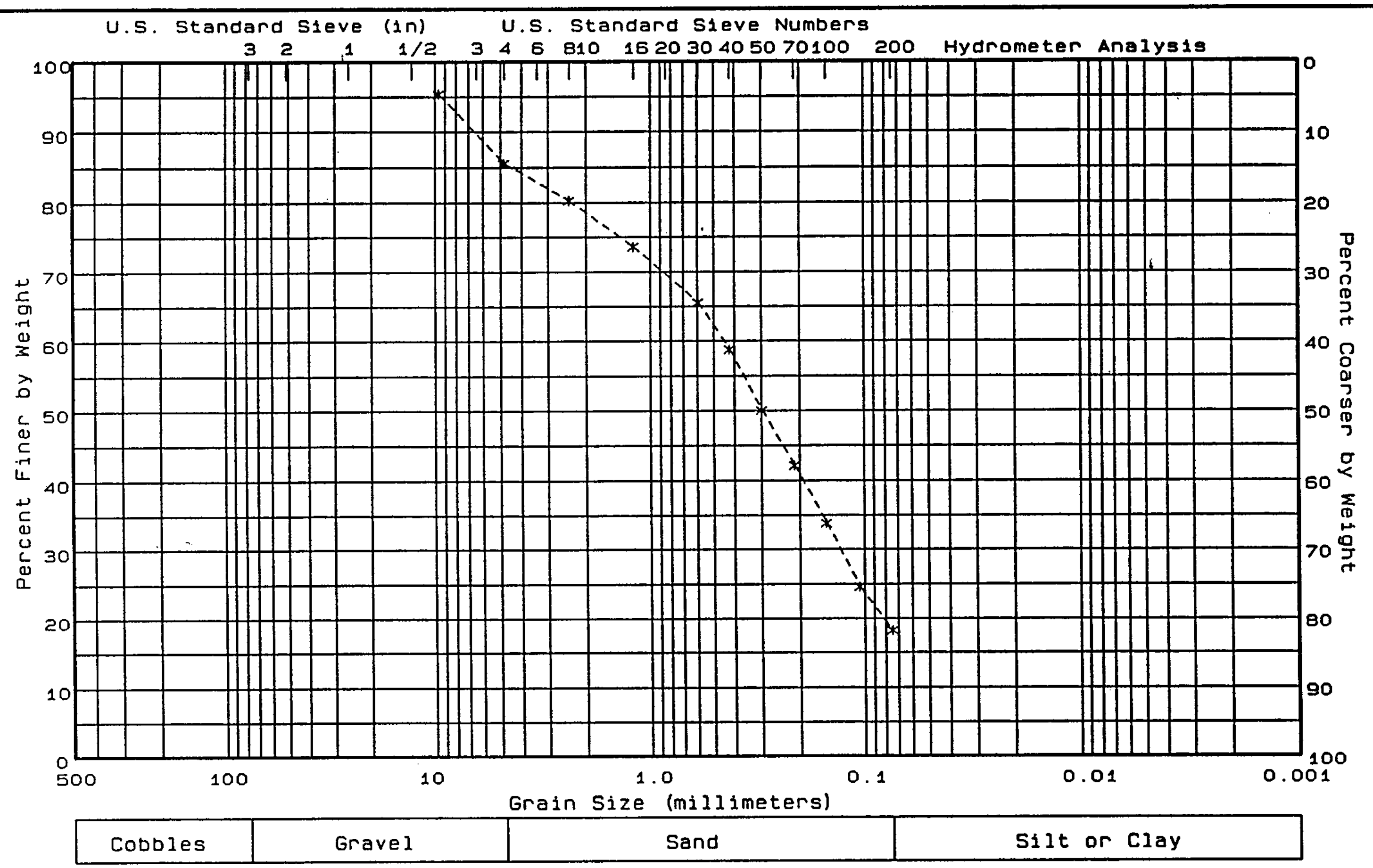
Site: Onondaga Lake CDF VW81296LS015NCB (* actual sieve %) Date: 06-25-96 Sheet 1 of 1

Hole Number	Top Elevation	Sample Number	Depth ft.	Visual Soil Classification	WC (%)	PL (%)	LL (%)	Estimate			
								max	grav	sand	fine
D96-5		1	1.0 2.5	CLAY (CL) brown, fine sand; medium plasticity						10	90
		2	5.0 6.5	CLAY (CL) brown, fine sand; medium high plasticity		26.0	47.5			10	90
		3	10.0 11.5	Sandy Clayey SILT (CL-ML) brown, medium to fine sand; very low plasticity						25	75
		* 4	15.0 16.5	CLAY (CL) brown, medium to fine sand; low plasticity						11	89
		5	20.0 21.5	CLAY (CL) grayish brown, fine sand; medium high plasticity						10	90
		6	25.0 26.5	Silty SAND (SM) gray, coarse to fine sand; nonplastic						70	30
		7	30.0 31.5	Gravelly SAND (SP) gray, fine subangular to subrounded gravel, coarse to fine sand; nonplastic, w/free water				1/2"	35	61	4
		8	35.0 36.5	Gravelly SAND (SP-SM) gray, fine subangular to subrounded gravel, coarse to fine sand; nonplastic, w/free water				1/2"	40	50	10
		9	38.5 40.0	Gravelly SAND (SP) gray, fine subangular to subrounded gravel, coarse to fine sand; nonplastic, w/free water				3/4"	40	56	4

Ohio River Division Laboratories - Soils Laboratory

Site: Onondaga Lake CDF VW81296LS015NCB (* actual sieve %) Date: 06-25-96 Sheet 1 of 1

Hole Number	Top Elevation	Sample Number	Depth ft.	Visual Soil Classification	WC (%)	PL (%)	LL (%)	Estimate max	Estimate grav	Estimate sand	Estimate fine
D96-4		1	1.0 2.5	Sandy CLAY (CL) brown, fine sand; medium plasticity						20	80
		2	5.0 6.5	Sandy SILT (ML) brown, fine sand; low plasticity		29.9	45.6			25	75
		* 3	10.0 11.5	Silty SAND (SM) brown, fine subangular gravel, coarse to fine sand; nonplastic				1/2"	14	68	18
		* 4	15.0 16.5	Gravelly SAND (SP-SM) brown, fine subangular to subrounded gravel, coarse to fine sand; nonplastic, W/free water				1/2"	16	73	11
		5	20.0 21.5	Sandy CLAY (CL) brown black, coarse to fine sand; medium plasticity						30	70
		6	25.0 26.5	Silty SAND (SM) gray, coarse to fine sand; nonplastic						70	30
		7	30.0 31.5	Sandy CLAY (CL) gray, medium to fine sand; medium plasticity, W/free water						30	70
		8	35.0 36.5	Clayey SAND (SC) gray, coarse to fine sand; low plasticity, W/free water						75	25
		9	38.5 40.0	SAND (SP) gray, coarse to fine sand; nonplastic, W/free water						96	4

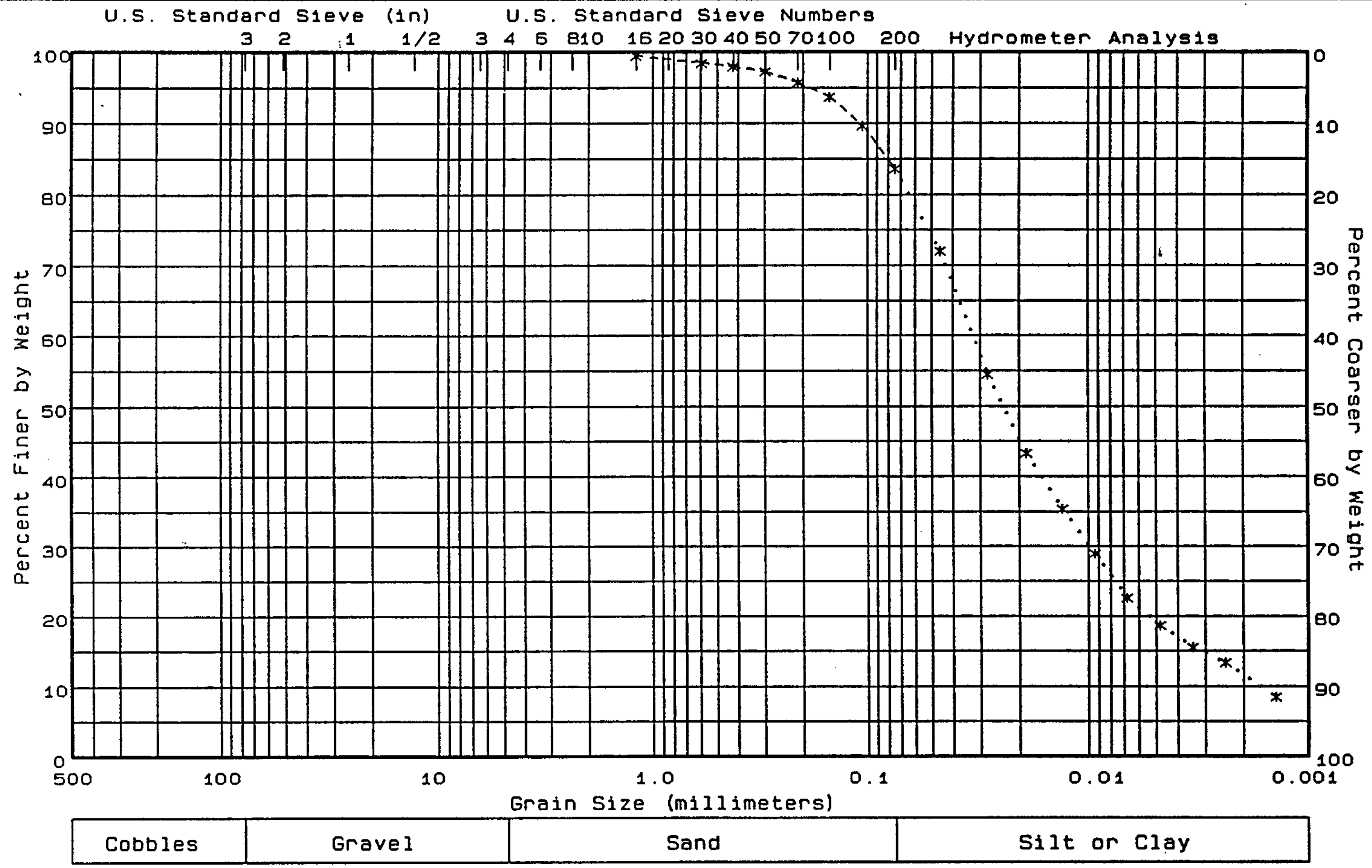


Sam No	Elev	Classification	w%	LL	PL	PI	Project Onondaga Lake CDF
3	10.0-11.5	Silty SAND (SM)	17.4				
							Area
							Boring No. 096-4
GRADATION CURVES							Date 08-10-96

Ohio River Division Laboratories - Soils Laboratory

Site: Onondaga Lake CDF VW81296LS015NCB (* actual sieve %) Date: 06-25-96 Sheet 1 of 1

Hole Number	Top Elevation	Sample Number	Depth ft.	Visual Soil Classification	WC (%)	PL (%)	LL (%)	Estimate max	Estimate grav	Estimate sand	Estimate fine
D-96-3		1	1.0 2.5	Silty Clayey SAND (SC-SM) gray, medium to fine sand; very low plasticity						60	40
		2	5.0 6.5	Sandy CLAY (CL) brown, medium to fine sand; medium plasticity						30	70
		3	10.0 11.5	Sandy Organic CLAY (OL) brownish gray, medium to fine sand; low pasticity		31.4	46.4			30	70
		* 4	15.0 16.5	Sandy Organic CLAY (OL) brown, coarse to fine sand; medium plasticity LOI = 6.85%						16	84
		5	20.0 21.5	Sandy CLAY (CL) gray, medium to fine sand; medium plasticity, W/shells						35	65
		6	25.0 26.5	Silty SAND (SM) gray, coarse to fine sand; nonplastic, W/free water						70	30
		7	30.0 31.5	Clayey Silty SAND (SC-SM) gray, coarse to fine sand; very low plasticity						60	40
		8	35.0 36.5	Gravelly SAND (SP) gray, fine subrounded gravel, coarse to fine sand; nonplastic, W/free water				3/4"	25	71	4
		9	38.5 40.0	Gravelly SAND (SP) gray, fine subangular to subrounded gravel, coarse to fine sand; nonplastic, W/free water				3/4"	35	61	4

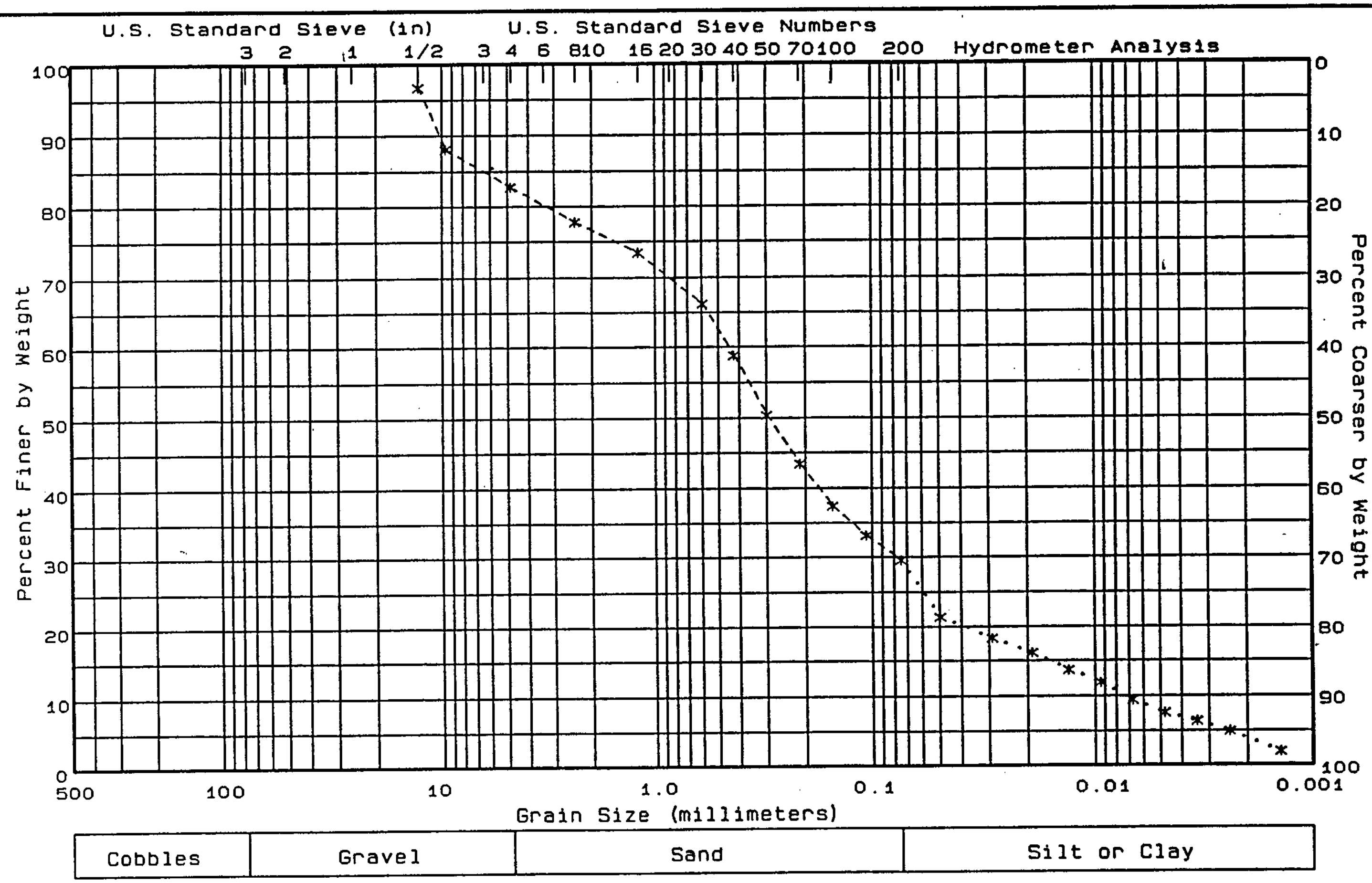


Sam No	Elev	Classification	w%	LL	PL	PI	Project Onondaga Lake CDF
4	15.0-16.5	Sandy Organic CLAY (OL)	50.4				
							Area
							Boring No. D96-3
GRADATION CURVES							Date 08-10-96

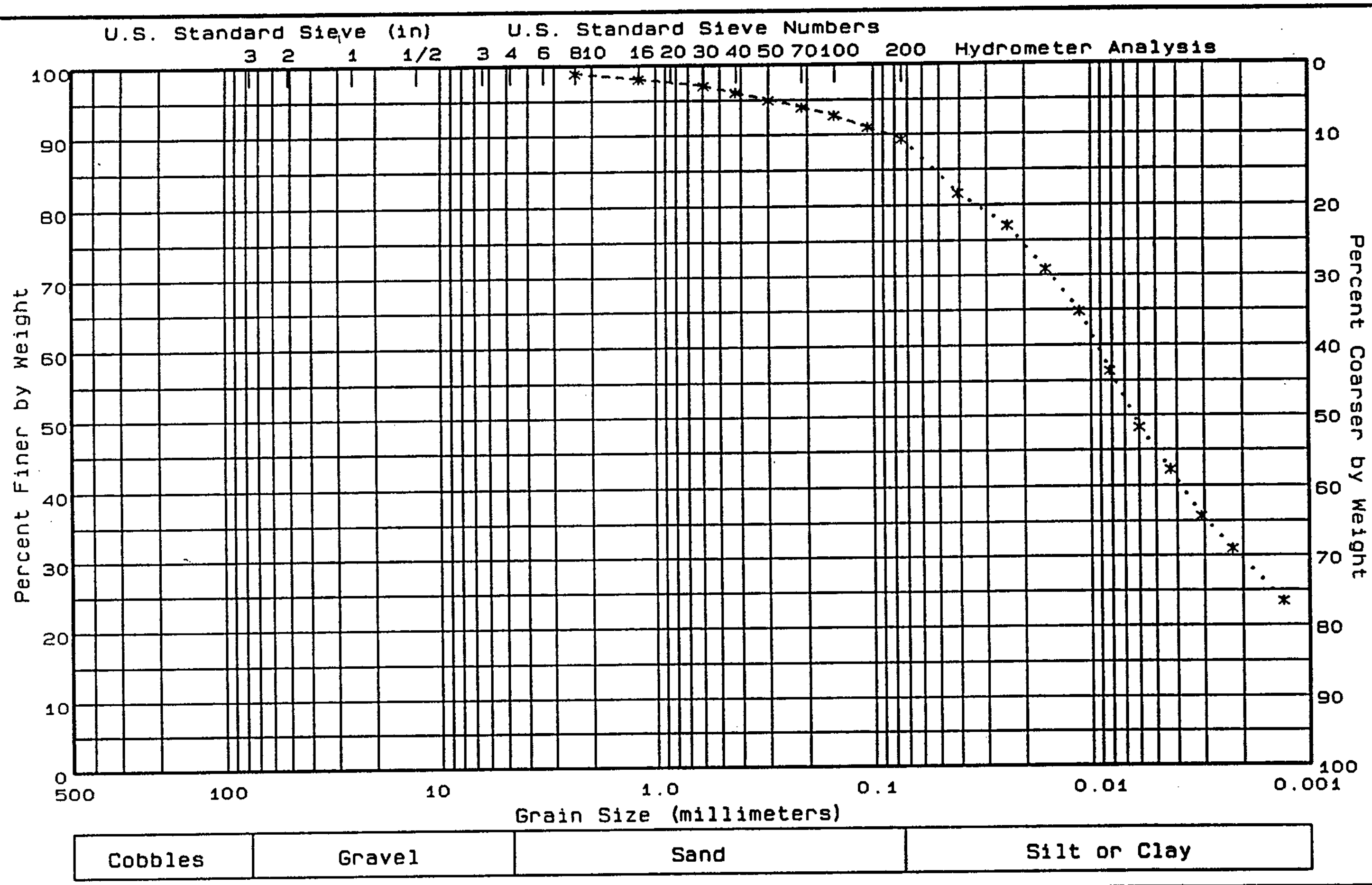
Ohio River Division Laboratories - Soils Laboratory

Site: Onondaga Lake CDF VW81296LS015NCB (* actual sieve %) Date: 06-25-96 Sheet 1 of 1

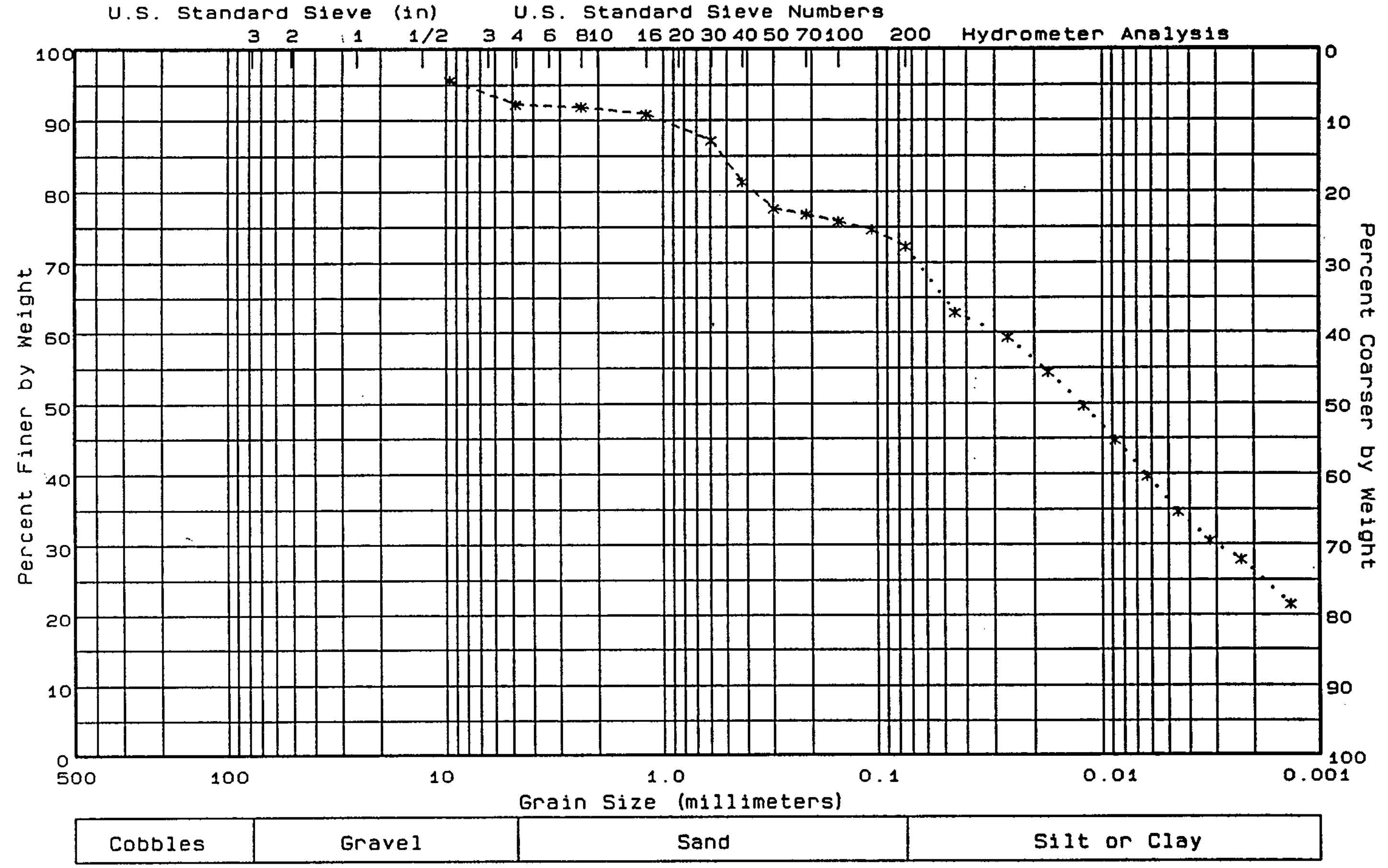
Hole Number	Top Elevation	Sample Number	Depth ft.	Visual Soil Classification	WC (%)	PL (%)	LL (%)	Estimate max	Estimate grav	Estimate sand	Estimate fine
D96-2		1	1.0 2.5	Sandy CLAY (CL) brown, coarse to fine sand; medium plasticity						30	70
		2	5.0 6.5	Sandy SILT (ML) brown, coarse to fine sand; low plasticity		26.6	36.0			30	70
		* 3	10.0 11.5	Gravelly Clayey SAND (SC) brownish gray, fine subangular to subrounded gravel, coarse to fine sand; low plasticity				3/4"	17	53	30
		4	15.0 16.5	Silty SAND (SM) gray, coarse to fine sand; nonplastic, w/free water & decayed wood		N	P			60	40
		5	20.0 21.5	Clayey SAND (SC) gray, coarse to fine sand; low plasticity, w/free water						55	45
		6	25.0 26.5	Clayey SAND (SC) gray, coarse to fine sand; low plasticity, w/free water						55	45
		7	30.0 31.5	Gravelly SAND (SP-SM) dark gray, fine subangular gravel, coarse to fine sand; nonplastic, w/free water				3/8"	30	60	10
		8	35.0 36.5	Gravelly SAND (SP-SM) dark gray, coarse to fine subangular gravel, coarse to fine sand; nonplastic				1"	25	70	5
		9	38.5 40.0	Gravelly SAND (SP-SM) dark gray, fine subangular gravel, coarse to fine sand; nonplastic, w/free water & decayed wood				1/2"	25	70	5



Sam No	Elev	Classification	w%	LL	PL	PI	Project Onondaga Lake CDF
3	10.0-11.5	Gravelly Clayey SAND (SC)	20.2				
							Area
							Boring No. D96-2
GRADATION CURVES							Date 08-10-96



Sam No	Elev	Classification	w%	LL	PL	PI	Project Onondaga Lake COF
3	10.0-11.5	CLAY (CL)	34.9				
							Area
							Boring No. D-96-1
GRADATION CURVES							Date 08-10-96



Sam No	Elev	Classification	W%	LL	PL	PI	
							Project Onondaga Lake CDF
4	15.0-16.5	Sandy CLAY (CL)	30.1				
							Area
							Boring No. D96-1
GRADATION CURVES							Date 08-10-96

ONONDAGA LAKE CDF

Disturbed Soil Test Results

BUFFALO DISTRICT

Ohio River Division Laboratories - Soils Laboratory

Site: Onondaga Lake CDF   VW81296LS015NCB   (* actual sieve %)   Date: 06-25-96   Sheet 1 of 1

Hole Number	Top Elevation	Sample Number	Depth ft.	Visual Soil Classification	WC (%)	PL (%)	LL (%)	Estimate			
								max	grav	sand	fine
D96-1		1	1.0 2.5	Sandy Silty CLAY (CL-ML) brown, medium to fine sand; very low plasticity						20	80
		2	5.0 6.5	SILT (MH) brown, fine sand; high plasticity		34.2	62.5			10	90
		* 3	10.0 11.5	CLAY (CL) brown, coarse to fine sand; medium high plasticity						11	89
		* 4	15.0 16.5	Sandy CLAY (CL) brown, fine subrounded gravel, coarse to fine sand; medium high plasticity				3/4"	8	20	72
		5	20.0 21.5	Silty SAND (SM) gray, coarse to fine sand; nonplastic, w/free water						70	30
		6	25.0 26.5	Silty SAND (SM) gray, coarse to fine sand; nonplastic, w/free water						80	20
		7	30.0 31.5	SAND (SP-SM) gray, coarse to fine sand; nonplastic						90	10
		8	35.0 36.5	Gravelly SAND (SP-SM) gray, coarse to fine angular to subrounded gravel, coarse to fine sand; nonplastic, w/free water				1.5"	30	60	10
		9	38.5 40.0	Gravelly SAND (SP) gray, fine subangular gravel, coarse to fine sand; nonplastic, w/free water				3/4"	35	61	4

ATTACHMENT A3
Laboratory Test
Results (1996)

TEST BORING LOG

parratt wolff inc

PROJECT: **Subsurface Exploration Program**
Onondaga Lake Inner Harbor CDF
LOCATION: **Site UDS 5-19, Syracuse, New York**

HOLE NO. DU96-11C
JOB NUMBER: 96054

GROUNDWATER DEPTH
WHILE DRILLING Dry

DATE STARTED 4/15/96
DATE COMPLETED 4/15/96

BEFORE CASING
REMOVED Dry

N - NO. OF BLOWS TO DRIVE SAMPLER 12" W/ 140# HAMMER
FALLING 30" - ASTM D - 1586 STANDARD PENETRATION TEST

AFTER CASING
REMOVED Dry

TYPE OF DRILL: CME 850
NAME OF DRILLER/INSPECTOR: G. LANSING/W. MORROW

CASING TYPE HOLLOW STEM AUGER
SHEET 1 OF 1
SURFACE ELVATION: 369.4'
Purchase Order #DACW49-95-D-0006
DATUM FOR ELEVATION: NGVD

DEPTH	SAMPLE DEPTH	SAMPLE NO.	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	3.0'-	T-1	2.0	3" Shelby			
5.0	5.0'			Tube			
						Bottom of Boring	5.0'
						Note: Boring DU96-11C is offset 3.0' from DU96-11A.	

[✓] Fisher Road, East Syracuse NY 13057-0056 Telephone 315-437-1429 or 800-782-7260 FAX 315-437-1770
[ ] One Copley Parkway, Suite 309, Raleigh, North Carolina 27623 Telephone 919-469-2953 FAX 919-469-8280

TEST BORING LOG

parratt wolff inc

PROJECT: Subsurface Exploration Program
Onondaga Lake Inner Harbor CDF
LOCATION: Site UDS 5-19, Syracuse, New York

HOLE NO. DU96-11A
JOB NUMBER: 96054

GROUNDWATER DEPTH
WHILE DRILLING Grade

DATE STARTED 4/15/96
DATE COMPLETED 4/15/96

BEFORE CASING
REMOVED 3.0'

N - NO. OF BLOWS TO DRIVE SAMPLER 12" W/ 140# HAMMER FALLING 30" - ASTM D - 1586 STANDARD PENETRATION TEST

AFTER CASING
REMOVED Grade

TYPE OF DRILL: CME 850
NAME OF DRILLER/INSPECTOR: G. LANSING/W. MORROW

CASING TYPE HOLLOW STEM AUGER
SURFACE ELVATION: 369.4'
DATUM FOR ELEVATION: NGVD

SHEET 1 OF 1
Purchase Order #DACW49-95-D-0006

DEPTH	SAMPLE DEPTH	SAMPLE NO.	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
WL	0.0'-	1	1.5	WH-1.0'		Brown moist to wet very soft SILT and fine	
	2.0'			2/1	2	SAND, trace clay (SM/ML)	
	2.0'-	2	0.5	1/1			
	4.0'			1/1	2		4.0'
5.0	4.0'-	3	0.5	WH/WH		Gray-black wet soft CLAY, traces fine gravel,	
	6.0'			2/2	2	trace fine to coarse sand (CL)	
	6.0'-	4	1.0	WH/1			
	8.0'			1/2	2		7.5'
						Gray wet loose fine to coarse SAND, little silt	
10.0						(marl) (SM)	
						Bottom of Boring	8.0'
						Note: WH indicates sampler penetrated under weight of 140# hammer.	

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TEST BORING LOG

parratt wolff inc

PROJECT: Subsurface Exploration Program
Onondaga Lake Inner Harbor CDF

LOCATION: Site UDS 5-19, Syracuse, New York

HOLE NO. DU96-11B

JOB NUMBER: 96054

GROUNDWATER DEPTH
WHILE DRILLING Grade

DATE STARTED 4/15/96
DATE COMPLETED 4/15/96

BEFORE CASING
REMOVED Dry

N - NO. OF BLOWS TO DRIVE SAMPLER 12" W/ 140# HAMMER FALLING 30" - ASTM D - 1586 STANDARD PENETRATION TEST

AFTER CASING
REMOVED Dry

TYPE OF DRILL: CME 850
NAME OF DRILLER/INSPECTOR: G. LANSING/W. MORROW

CASING TYPE HOLLOW STEM AUGER

SHEET 1 OF 1

SURFACE ELVATION: 369.4'

Purchase Order #DACW49-95-D-0006

DATUM FOR ELEVATION: NGVD

▼DEPTH	SAMPLE DEPTH	SAMPLE NO.	REC	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
WL							
	1.0'-	T-1	2.0	3" Shelby			
	3.0'			Tube			
5.0	4.5'-	T-2	0.6	3" Shelby			
	6.5'			Tube			
						Bottom of Boring	6.5'
10.0						Note: Boring DU96-11B is offset 3.0' from DU96-11A.	

TEST BORING LOG

parratt wolff inc

PROJECT: Subsurface Exploration Program
Onondaga Lake Inner Harbor CDF

LOCATION: Site UDS 5-19, Syracuse, New York

HOLE NO. DU96-10A

JOB NUMBER: 96054

GROUNDWATER DEPTH
WHILE DRILLING 2.0'

DATE STARTED 4/15/96
DATE COMPLETED 4/15/96

BEFORE CASING
REMOVED Dry

N - NO. OF BLOWS TO DRIVE SAMPLER 12" W/ 140# HAMMER FALLING 30" - ASTM D - 1586 STANDARD PENETRATION TEST

AFTER CASING
REMOVED 2.0'

TYPE OF DRILL: CME 850

NAME OF DRILLER/INSPECTOR: G. LANSING/W. MORROW

CASING TYPE HOLLOW STEM AUGER

SHEET 1 OF 1

SURFACE ELVATION: 369.2'

Purchase Order #DACW49-95-D-0006

DATUM FOR ELEVATION: NGVD

DEPTH	SAMPLE DEPTH	SAMPLE NO.	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-	1	1.2	2/1		Brown moist soft to medium stiff SILT and fine	
WL ▼	2.0'			2/1	3	SAND, trace roots (ML/SM)	
	2.0'-	2	1.5	2/3			
	4.0'			3/3	6		4.0'
5.0	4.0'-	3	2.0	WH/1		Brown wet soft SILT and CLAY, trace fine sand	
	6.0'			1/1	2	(CL/ML)	
	6.0'-	4	2.0	WH/WH			
	8.0'			2/3	2		7.5'
						Gray wet loose fine to medium SAND (marl)	
10.0						(SW)	
						Bottom of Boring	8.0'
						Note: WH indicates sampler penetrated under weight of 140# hammer.	

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One Copley Parkway, Suite 309, Raleigh, North Carolina 27623 Telephone 919-469-2953 FAX 919-469-8280

TEST BORING LOG

parratt wolff inc

PROJECT: Subsurface Exploration Program
Onondaga Lake Inner Harbor CDF
LOCATION: Site UDS 5-19, Syracuse, New York

HOLE NO. DU96-10B
JOB NUMBER: 96054

GROUNDWATER DEPTH
WHILE DRILLING 2.0'

DATE STARTED 4/15/96
DATE COMPLETED 4/15/96

BEFORE CASING
REMOVED Dry

N - NO. OF BLOWS TO DRIVE SAMPLER 12" W/ 140# HAMMER FALLING 30" - ASTM D - 1586 STANDARD PENETRATION TEST

AFTER CASING
REMOVED Dry

TYPE OF DRILL: CME 850
NAME OF DRILLER/INSPECTOR: G. LANSING/W. MORROW

CASING TYPE HOLLOW STEM AUGER
SHEET 1 OF 1
SURFACE ELVATION: 369.2'
Purchase Order #DACW49-95-D-0006
DATUM FOR ELEVATION: NGVD

DEPTH	SAMPLE DEPTH	SAMPLE NO.	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.5'-	T-1	1.6	3" Shelby			
WL ▼	2.5'			Tube			
	2.5'-	T-2	2.0	3" Shelby			
	4.5'			Tube			
5.0							
						Bottom of Boring	4.5'
						Note: Boring DU96-10B is offset 3.0' from DU96-10A.	

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TEST BORING LOG

parratt wolff inc

PROJECT: Subsurface Exploration Program
Onondaga Lake Inner Harbor CDF
LOCATION: Site UDS 5-19, Syracuse, New York

HOLE NO. DU96-9A
JOB NUMBER: 96054

GROUNDWATER DEPTH
WHILE DRILLING Grade

DATE STARTED 4/15/96
DATE COMPLETED 4/15/96

BEFORE CASING
REMOVED 4.0'

N - NO. OF BLOWS TO DRIVE SAMPLER 12" W/ 140# HAMMER FALLING 30" - ASTM D - 1586 STANDARD PENETRATION TEST

AFTER CASING
REMOVED Grade

TYPE OF DRILL: CME 850
NAME OF DRILLER/INSPECTOR: G. LANSING/W. MORROW

CASING TYPE HOLLOW STEM AUGER
SHEET 1 OF 1
SURFACE ELVATION: 369.3'
Purchase Order #DACW49-95-D-0006
DATUM FOR ELEVATION: NGVD

DEPTH	SAMPLE DEPTH	SAMPLE NO.	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
WL	0.0'-	1	1.5	WH-1.0'		Brown-black wet very soft SILT, little fine	
	2.0'			1/1	1	sand, trace roots, trace clay (ML)	
	2.0'-	2	2.0	1/1			
	4.0'			1/1	2		
5.0	4.0'-	3	2.0	WH-1.0'			
	6.0'			1/1	1		
	6.0'-	4	2.0	1/2			6.5'
	8.0'			2/2	4	Black wet very soft SILT and CLAY (CL)	7.0'
						Gray wet loose fine to medium SAND (marl)	
10.0						(SP/SW)	
						Bottom of Boring	8.0'
						Note: WH indicates sampler penetrated under weight of 140# hammer.	

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TEST BORING LOG

parratt wolff inc

PROJECT: Subsurface Exploration Program
Onondaga Lake Inner Harbor CDF
LOCATION: Site UDS 5-19, Syracuse, New York

HOLE NO. DU96-9B
JOB NUMBER: 96054

GROUNDWATER DEPTH
WHILE DRILLING Grade

DATE STARTED 4/15/96
DATE COMPLETED 4/15/96

BEFORE CASING
REMOVED Dry

N - NO. OF BLOWS TO DRIVE SAMPLER 12" W/ 140# HAMMER FALLING 30" - ASTM D - 1586 STANDARD PENETRATION TEST

AFTER CASING
REMOVED Dry

TYPE OF DRILL: CME 850
NAME OF DRILLER/INSPECTOR: G. LANSING/W. MORROW

CASING TYPE HOLLOW STEM AUGER
SHEET 1 OF 1

SURFACE ELVATION: 369.3'

Purchase Order #DACW49-95-D-0006

DATUM FOR ELEVATION: NGVD

DEPTH	SAMPLE DEPTH	SAMPLE NO.	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
WL	0.5'-	T-1	1.9	3" Shelby			
	2.5'			Tube			
	2.5'-	T-2	2.0	3" Shelby			
	4.5'			Tube			
5.0							
						Bottom of Boring	4.5'
						Note: Boring DU96-9B is offset 3.0' from DU96-9A.	

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TEST BORING LOG

parratt wolff inc

PROJECT: Subsurface Exploration Program
Onondaga Lake Inner Harbor CDF
LOCATION: Site UDS 5-19, Syracuse, New York

HOLE NO. D96-8
JOB NUMBER: 96054

GROUNDWATER DEPTH
WHILE DRILLING 15.0'

DATE STARTED 4/4/96
DATE COMPLETED 4/4/96

BEFORE CASING
REMOVED 23.0'

N - NO. OF BLOWS TO DRIVE SAMPLER 12" W/ 140# HAMMER FALLING 30" - ASTM D - 1586 STANDARD PENETRATION TEST

AFTER CASING REMOVED Hole Caved At 11.4'

TYPE OF DRILL: MOBILE B41
NAME OF DRILLER/INSPECTOR: D. RICHMOND/W. MORROW

CASING TYPE HOLLOW STEM AUGER

SHEET 1 OF 2
Purchase Order #DACW49-95-D-0006

SURFACE ELEVATION: 379.3'
DATUM FOR ELEVATION: NGVD

DEPTH	SAMPLE DEPTH	SAMPLE NO.	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	1.0'-	1	0.2	3/3		Brown moist medium stiff SILT (ML)	
	2.5'			2	5		
5.0							5.0'
	5.0'-	2	0.7	2/4		Brown moist stiff SILT, trace fine to coarse sand, trace medium gravel (ML)	
	6.5'			5	9		
10.0							10.0'
	10.0'-	3	0.8	2/4		Interbedded gray moist stiff SILT and fine SAND (marl) (ML) and gray-brown moist stiff SILT and CLAY (CL)	
	11.5'			5	9		
▼ 15.0							
WL	15.0'-	4	No	4/3			
	16.5'		Rec	3	6		
	17.0'-	5	No	2/3			
	18.5'		Rec	3	6		
20.0							20.0'
	20.0'-	6	1.5	3/3		Gray moist medium stiff SILT and fine SAND, trace wood (marl) (ML/SM)	
	21.5'			3	6		21.0'
						Black-gray moist medium stiff SILT and fine SAND (marl) (ML/SM)	
25.0							
	25.0'-	7	0.6	2/3			25.5'
	26.5'			3	6	Gray wet loose fine SAND, little silt (marl) (SM)	
30.0							
	30.0'-	8	0.7	5/8			30.5'
	31.5'			7	15	Red-brown wet medium dense fine SAND, little silt (SM)	
35.0							

Start →

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TEST BORING LOG

parratt wolff inc

PROJECT: Subsurface Exploration Program
Onondaga Lake Inner Harbor CDF
LOCATION: Site UDS 5-19, Syracuse, New York

HOLE NO. D96-8
JOB NUMBER: 96054

GROUNDWATER DEPTH
WHILE DRILLING 15.0'

DATE STARTED 4/4/96
DATE COMPLETED 4/4/96

BEFORE CASING
REMOVED 23.0'

N - NO. OF BLOWS TO DRIVE SAMPLER 12" W/ 140# HAMMER FALLING 30" - ASTM D - 1586 STANDARD PENETRATION TEST

AFTER CASING REMOVED Hole Caved At 11.4'

TYPE OF DRILL: MOBILE B41
NAME OF DRILLER/INSPECTOR: M. EAVES/W. MORROW

CASING TYPE HOLLOW STEM AUGER
SURFACE ELVATION: 379.3'
DATUM FOR ELEVATION: NGVD

Purchase Order #DACW49-95-D-0006

DEPTH	SAMPLE DEPTH	SAMPLE NO.	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	35.0'-	9	0.6	4/4		Red-brown wet medium dense fine SAND,	
	36.5'			5	9	little silt (SM)	35.5'
						Brown wet loose to medium dense fine to	
	38.5'-	10		4		medium SAND (SW)	
40.0	40.0'			6/6	12		
						Bottom of Boring	40.0'

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TEST BORING LOG

parratt wolff inc

PROJECT: Subsurface Exploration Program
Onondaga Lake Inner Harbor CDF

HOLE NO. D96-7

LOCATION: Site UDS 5-19, Syracuse, New York

JOB NUMBER: 96054

GROUNDWATER DEPTH
WHILE DRILLING 25.0'

DATE STARTED 4/15/96
DATE COMPLETED 4/15/96

BEFORE CASING
REMOVED 22.5'

N - NO. OF BLOWS TO DRIVE SAMPLER 12" W/ 140# HAMMER FALLING 30" - ASTM D - 1586 STANDARD PENETRATION TEST

AFTER CASING Added Water
REMOVED 8.7'

TYPE OF DRILL: CME 850
NAME OF DRILLER/INSPECTOR: G. LANSING/W. MORROW

CASING TYPE HOLLOW STEM AUGER

SURFACE ELEVATION: 379.6'

Purchase Order #DACW49-95-D-0006

DATUM FOR ELEVATION: NGVD

DEPTH	SAMPLE DEPTH	SAMPLE NO.	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	1.0'-	1		1/3		Brown dry loose SILT and fine SAND, trace roots (ML/SM)	
	2.5'			5	8		
5.0							5.0'
	5.0'-	2		2/2		Brown moist loose to medium dense fine SAND, some fine gravel, little silt, (GM)	
	6.5'			2	4		
10.0							
	10.0'-	3		6/6			
	11.5'			6	12		
15.0							15.0'
	15.0'-	4		2/2		Gray moist loose fine to medium SAND, some silt, trace shells (marl) (SM)	
	16.5'			2	4		
20.0							
	20.0'-	5		1/2			
	21.5'			3	5		
▼ 25.0							25.0'
WL	25.0'-	6		1/2		Gray wet loose fine to coarse SAND (SW)	
	26.5'			2	4		
30.0							30.0'
	30.0'-	7		8/10		Gray wet medium dense fine to coarse SAND, little silt, little fine to medium gravel (GM)	
	31.5'			13	23		
35.0							

Start →

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TEST BORING LOG

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PROJECT: Subsurface Exploration Program
Onondaga Lake Inner Harbor CDF
LOCATION: Site UDS 5-19, Syracuse, New York

HOLE NO. D96-7
JOB NUMBER: 96054

GROUNDWATER DEPTH
WHILE DRILLING 25.0'

DATE STARTED 4/15/96
DATE COMPLETED 4/15/96

BEFORE CASING
REMOVED 22.5'

N - NO. OF BLOWS TO DRIVE SAMPLER 12" W/ 140# HAMMER FALLING 30" - ASTM D - 1586 STANDARD PENETRATION TEST

AFTER CASING Added Water
REMOVED 8.7'

TYPE OF DRILL: CME 850
NAME OF DRILLER/INSPECTOR: G. LANSING/W. MORROW

CASING TYPE HOLLOW STEM AUGER
SURFACE ELVATION: 379.6'
DATUM FOR ELEVATION: NGVD

SHEET 2 OF 2
Purchase Order #DACW49-95-D-0006

DEPTH	SAMPLE DEPTH	SAMPLE NO.	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	35.0'-	8		12/9		Gray wet medium dense fine to coarse SAND, little silt, little fine to medium gravel (GM)	
	36.5'			10	19		
	38.5'-	9		13/12			
40.0	40.0'			11	23		
						Bottom of Boring	40.0'

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TEST BORING LOG

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PROJECT: Subsurface Exploration Program
Onondaga Lake Inner Harbor CDF
LOCATION: Site UDS 5-19, Syracuse, New York

HOLE NO. D96-6
JOB NUMBER: 96054

GROUNDWATER DEPTH
WHILE DRILLING 15.0'

DATE STARTED 4/4/96
DATE COMPLETED 4/4/96

BEFORE CASING
REMOVED 19.6'

N - NO. OF BLOWS TO DRIVE SAMPLER 12" W/ 140# HAMMER FALLING 30" - ASTM D - 1586 STANDARD PENETRATION TEST

AFTER CASING
REMOVED Dry

TYPE OF DRILL: MOBILE B41
NAME OF DRILLER/INSPECTOR: D. RICHMOND/W. MORROW

CASING TYPE HOLLOW STEM AUGER
SURFACE ELVATION: 379.3'
DATUM FOR ELEVATION: NGVD

SHEET 1 OF 2
Purchase Order #DACW49-95-D-0006

DEPTH	SAMPLE DEPTH	SAMPLE NO.	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	1.0'-	1	0.4	3/4		Brown moist stiff SILT, trace fine to coarse	
	2.5'			4	8	sand, trace roots (ML)	
5.0							
	5.0'-	2	1.2	4/5			
	6.5'			7	12		
10.0							
	10.0'-	3	0.6	4/7			10.5'
	11.5'			8	15	Gray moist medium dense fine to coarse	
						SAND, some fine to medium gravel (SW)	
15.0							15.0'
WL	15.0'-	4	1.1	4/3		Brown wet medium stiff SILT and CLAY (CL)	16.0'
	16.5'			2	5	Gray wet soft SILT, little fine sand, little wood,	
						trace roots, trace marl (OL)	
20.0							
	20.0'-	5	0.5	2/2			
	21.5'			4	6		
25.0							
	25.0'-	6	0.6	1/2			
	26.5'			1	3		
30.0							30.0'
	30.0'-	7	0.9	1/2		Gray wet soft SILT (marl) (ML)	31.0'
	31.5'			4	6	Gray wet loose fine to coarse SAND (SW)	
35.0							

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TEST BORING LOG

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PROJECT: Subsurface Exploration Program
Onondaga Lake Inner Harbor CDF
LOCATION: Site UDS 5-19, Syracuse, New York

HOLE NO. D96-6
JOB NUMBER: 96054

GROUNDWATER DEPTH
WHILE DRILLING 15.0'

DATE STARTED 4/4/96
DATE COMPLETED 4/4/96

BEFORE CASING
REMOVED 19.6'

N - NO. OF BLOWS TO DRIVE SAMPLER 12" W/ 140# HAMMER FALLING 30" - ASTM D - 1586 STANDARD PENETRATION TEST

AFTER CASING
REMOVED - Dry

TYPE OF DRILL: MOBILE B41
NAME OF DRILLER/INSPECTOR: D. RICHMOND/W. MORROW

CASING TYPE HOLLOW STEM AUGER

SHEET 2 OF 2

SURFACE ELVATION: 379.3'

Purchase Order #DACW49-95-D-0006

DATUM FOR ELEVATION: NGVD

DEPTH	SAMPLE DEPTH	SAMPLE NO.	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	35.0'-	8	0.5	3/4		Gray wet loose fine to coarse SAND (SW)	
	36.5'			5	9		
	38.5'-	9	0.3	4			
40.0	40.0'			5/4	9		
						Bottom of Boring	40.0'

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TEST BORING LOG

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PROJECT: **Subsurface Exploration Program**
Onondaga Lake Inner Harbor CDF
LOCATION: **Site UDS 5-19, Syracuse, New York**

HOLE NO. D96-5
JOB NUMBER: 96054

GROUNDWATER DEPTH
WHILE DRILLING 21.0'

DATE STARTED 4/5/96
DATE COMPLETED 4/5/96

BEFORE CASING
REMOVED 20.7'

N - NO. OF BLOWS TO DRIVE SAMPLER 12" W/ 140# HAMMER FALLING 30" - ASTM D - 1586 STANDARD PENETRATION TEST

AFTER CASING
REMOVED Dry

TYPE OF DRILL: MOBILE B41
NAME OF DRILLER/INSPECTOR: G. LANSING/W. MORROW

CASING TYPE HOLLOW STEM AUGER
SHEET 1 OF 2
SURFACE ELVATION: 380.3'
Purchase Order #DACW49-95-D-0006
DATUM FOR ELEVATION: NGVD

DEPTH	SAMPLE DEPTH	SAMPLE NO.	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	1.0'-	1	0.8	5/5		Brown moist stiff SILT, trace roots (ML)	
	2.5'			6	11		
5.0							
	5.0'-	2	0.6	3/4			
	6.5'			4	8		
10.0							10.0'
	10.0'-	3	1.5	3/4		Brown moist stiff SILT and fine SAND	
	11.5'			4	8	(ML/SM)	
15.0							
	15.0'-	4	1.0	5/4			
	16.5'			6	10		
20.0							
WL	20.0'-	5		1/1			21.0'
	21.5'			2	3	Gray wet soft SILT, little fine sand (marl) (ML)	
25.0							
	25.0'-	6		1/1			
	26.5'			2	3		
30.0							30.0'
	30.0'-	7		4/8		Black wet medium dense fine to coarse SAND	
	31.5'			7	15	trace fine gravel (SW)	
35.0							

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TEST BORING LOG

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PROJECT: Subsurface Exploration Program
Onondaga Lake Inner Harbor CDF
LOCATION: Site UDS 5-19, Syracuse, New York

HOLE NO. D96-
JOB NUMBER: 96054

GROUNDWATER DEPTH WHILE DRILLING 21.0'

DATE STARTED 4/5/96
DATE COMPLETED 4/5/96

BEFORE CASING REMOVED 20.7'

N - NO. OF BLOWS TO DRIVE SAMPLER 12" W/ 140# HAMMER FALLING 30" - ASTM D - 1586 STANDARD PENETRATION TEST

AFTER CASING REMOVED Dry

TYPE OF DRILL: MOBILE B41
NAME OF DRILLER/INSPECTOR: G. LANSING/W. MORROW

CASING TYPE HOLLOW STEM AUGER

SHEET 2 OF 2

SURFACE ELVATION: 380.3'

Purchase Order #DACW49-95-D-0006

DATUM FOR ELEVATION: NGVD

DEPTH	SAMPLE DEPTH	SAMPLE NO.	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	35.0'-	8		7/8		Black wet medium dense fine to coarse SAND	
	36.5'			11	19	trace fine gravel (SW)	
	38.5'-	9		4			
40.0	40.0'			6/6	12		
						Bottom of Boring	40.0'

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TEST BORING LOG

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PROJECT: Subsurface Exploration Program
Onondaga Lake Inner Harbor CDF
LOCATION: Site UDS 5-19, Syracuse, New York

HOLE NO. D96-4
JOB NUMBER: 96054

GROUNDWATER DEPTH
WHILE DRILLING 10.0'

DATE STARTED 4/4/96
DATE COMPLETED 4/4/96

BEFORE CASING
REMOVED 14.0'

N - NO. OF BLOWS TO DRIVE SAMPLER 12" W/ 140# HAMMER FALLING 30" - ASTM D - 1586 STANDARD PENETRATION TEST

AFTER CASING REMOVED Hole Caved At 15.3'

TYPE OF DRILL: MOBILE B41
NAME OF DRILLER/INSPECTOR: D. RICHMOND/W. MORROW

CASING TYPE HOLLOW STEM AUGER

SHEET 1 OF 2

SURFACE ELEVATION: 378.7'

Purchase Order #DACW49-95-D-0006

DATUM FOR ELEVATION: NGVD

DEPTH	SAMPLE DEPTH	SAMPLE NO.	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	1.0'-	1		3/3		Brown moist medium stiff SILT and fine SAND,	
	2.5'			3	6	little roots (SM/ML)	
5.0							
	5.0'-	2		3/4			
	6.5'			4	8		
10.0							10.0'
WL	10.0'-	3		3/4		Brown wet loose fine SAND, little silt (SM)	
	11.5'			5	9		
15.0							15.0'
	15.0'-	4		3/2		Brown wet loose fine to coarse SAND, trace	
	16.5'			1	3	silt (SW)	
20.0							20.0'
	20.0'-	5		2/3		Brown wet soft SILT, little fine to medium	
	21.5'			2	5	sand, trace shells (marl) (ML)	
25.0							25.0'
	25.0'-	6		3/4		Gray wet loose fine to medium SAND, little	
	26.5'			3	7	silt, trace shells (marl) (SM)	
30.0							30.0'
	30.0'-	7		4/5		Gray wet stiff SILT, little fine to medium sand,	
	31.5'			9	14	trace shells (marl) (ML)	31.5'
						Black wet medium dense fine to coarse SAND,	
						some silt (SM)	
35.0							

TEST BORING LOG

parratt wolff inc

PROJECT: Subsurface Exploration Program
Onondaga Lake Inner Harbor CDF
LOCATION: Site UDS 5-19, Syracuse, New York

HOLE NO. D96-4
JOB NUMBER: 96054

GROUNDWATER DEPTH
WHILE DRILLING 10.0'

DATE STARTED 4/4/96
DATE COMPLETED 4/4/96

BEFORE CASING
REMOVED 14.0'

N - NO. OF BLOWS TO DRIVE SAMPLER 12" W/ 140# HAMMER FALLING 30" - ASTM D - 1586 STANDARD PENETRATION TEST

AFTER CASING REMOVED Hole Caved At 15.3'

TYPE OF DRILL: MOBILE B41
NAME OF DRILLER/INSPECTOR: D. RICHMOND/W. MORROW

CASING TYPE HOLLOW STEM AUGER
SHEET 2 OF 2

SURFACE ELVATION: 378.7
Purchase Order #DACW49-95-D-0006
DATURM FOR ELEVATION: NGVD

DEPTH	SAMPLE DEPTH	SAMPLE NO.	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	35.0'-	8		6/10		Black wet medium dense fine to coarse SAND, some silt (SM)	
	36.5'			11	21		
	38.5'-	9		7			
40.0	40.0'			8/10	18		
						Bottom of Boring	40.0'

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TEST BORING LOG

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PROJECT: Subsurface Exploration Program
Onondaga Lake Inner Harbor CDF

LOCATION: Site UDS 5-19, Syracuse, New York

HOLE NO. D96-3
JOB NUMBER: 96054

GROUNDWATER DEPTH
WHILE DRILLING 15.0'

DATE STARTED 4/5/96
DATE COMPLETED 4/5/96

BEFORE CASING
REMOVED 20.3'

N - NO. OF BLOWS TO DRIVE SAMPLER 12" W/ 140# HAMMER FALLING 30" - ASTM D - 1586 STANDARD PENETRATION TEST

AFTER CASING
REMOVED 17.8'

TYPE OF DRILL: MOBILE B41
NAME OF DRILLER/INSPECTOR: G. LANSING/W. MORROW

CASING TYPE HOLLOW STEM AUGER

SURFACE ELVATION: 380.6'
Purchase Order #DACW49-95-D-0006

DATUM FOR ELEVATION: NGVD

DEPTH	SAMPLE DEPTH	SAMPLE NO.	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	1.0'-	1	1.1	3/3		Brown moist soft to stiff SILT and fine SAND	
	2.5'			4	7	(SM/ML)	
5.0							
	5.0'-	2	0.5	2/2			
	6.5'			3	5		
10.0							
	10.0'-	3	0.6	4/5			
	11.5'			6	11		
15.0							
WL	15.0'-	4	0.8	1/1			16.4'
	16.5'			1	2	Gray wet very soft SILT and fine SAND, trace shells (marl) (SM/ML)	
20.0							
	20.0'-	5	1.2	2/1			
	21.5'			1	2		
25.0							
	25.0'-	6	1.1	1/1			
	26.5'			1	2		
30.0							
	30.0'-	7	0.8	4/7			31.0'
	31.5'			7	14	Black wet medium dense fine to coarse SAND, trace fine gravel (SW)	
35.0							

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TEST BORING LOG

parratt wolff inc

PROJECT: Subsurface Exploration Program
Onondaga Lake Inner Harbor CDF
LOCATION: Site UDS 5-19, Syracuse, New York

HOLE NO. D96-
JOB NUMBER: 96054

GROUNDWATER DEPTH
WHILE DRILLING 15.0'

DATE STARTED 4/5/96
DATE COMPLETED 4/5/96

BEFORE CASING
REMOVED 20.3'

N - NO. OF BLOWS TO DRIVE SAMPLER 12" W/ 140# HAMMER FALLING 30" - ASTM D - 1586 STANDARD PENETRATION TEST

AFTER CASING
REMOVED 17.8'

TYPE OF DRILL: MOBILE B41
NAME OF DRILLER/INSPECTOR: G. LANSING/W. MORROW

CASING TYPE HOLLOW STEM AUGER

SHEET 2 OF 2

SURFACE ELVATION: 380.6'

Purchase Order #DACW49-95-D-0006

DATUM FOR ELEVATION: NGVD

DEPTH	SAMPLE DEPTH	SAMPLE NO.	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	35.0'-	8	0.5	5/6		Black wet medium dense fine to coarse SAND, trace fine gravel (SW)	
	36.5'			6	12		
	38.5'-	9	0.5	4			
40.0	40.0'			5/5	10		
						Bottom of Boring	40.0'

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TEST BORING LOG

parratt wolff inc

PROJECT: Subsurface Exploration Program
Onondaga Lake Inner Harbor CDF

LOCATION: Site UDS 5-19, Syracuse, New York

HOLE NO. D96-2
JOB NUMBER: 96054

GROUNDWATER DEPTH
WHILE DRILLING 15.0'

DATE STARTED 4/5/96
DATE COMPLETED 4/5/96

BEFORE CASING
REMOVED 19.0'

N - NO. OF BLOWS TO DRIVE SAMPLER 12" W/ 140# HAMMER FALLING 30" - ASTM D - 1586 STANDARD PENETRATION TEST

AFTER CASING
REMOVED 9.0'

TYPE OF DRILL: MOBILE B41
NAME OF DRILLER/INSPECTOR: G. LANSING/W. MORROW

CASING TYPE HOLLOW STEM AUGER

SHEET 1 OF 2

SURFACE ELVATION: 376.3'

Purchase Order #DACW49-95-D-0006

DATUM FOR ELEVATION: NGVD

DEPTH	SAMPLE DEPTH	SAMPLE NO.	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	1.0'-	1	0.4	4/3		Brown moist medium stiff SILT, little clay (ML)	
	2.5'			3	6		
5.0							
	5.0'-	2	1.0	3/4			5.5'
	6.5'			5	9	Brown moist stiff SILT, little fine sand (ML)	
10.0							10.0'
	10.0'-	3	0.7	4/7		Gray-brown moist stiff SILT and fine SAND,	
	11.5'			5	12	trace fine to medium gravel (SM/ML)	
15.0							15.0'
WL	15.0'-	4	1.0	2/1		Gray wet soft SILT and fine SAND, trace shells	
	16.5'			1	2	(marl) (SM/ML)	
20.0							
	20.0'-	5	1.0	1/1			
	21.5'			1	2		
25.0							
	25.0'-	6	1.5	WH/1			
	26.5'			2	3		
30.0							30.0'
	30.0'-	7		5/6		Black wet medium dense fine to coarse SAND	
	31.5'			6	12	(SW)	
35.0							

TEST BORING LOG

parratt wolff inc

PROJECT: Subsurface Exploration Program
Onondaga Lake Inner Harbor CDF

LOCATION: Site UDS 5-19, Syracuse, New York

HOLE NO. D96-

JOB NUMBER: 96054

GROUNDWATER DEPTH
WHILE DRILLING 15.0'

DATE STARTED 4/5/96
DATE COMPLETED 4/5/96

BEFORE CASING
REMOVED 19.0'

N - NO. OF BLOWS TO DRIVE SAMPLER 12" W/ 140# HAMMER
FALLING 30" - ASTM D - 1586 STANDARD PENETRATION TEST

AFTER CASING
REMOVED 9.0'

TYPE OF DRILL: MOBILE B41
NAME OF DRILLER/INSPECTOR: G. LANSING/W. MORROW

CASING TYPE HOLLOW STEM AUGER

SHEET 2 OF 2

SURFACE ELVATION: 376.3'

Purchase Order #DACW49-95-D-0006

DATUM FOR ELEVATION: NGVD

DEPTH	SAMPLE DEPTH	SAMPLE NO.	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	35.0'-	8		12/11		Black wet medium dense fine to coarse SAND	
	36.5'			10	21	(SW)	
	38.5'-	9		6			38.5'
40.0	40.0'			6/8	14	Gray-brown wet medium dense fine SAND,	
						trace wood (SP)	
						Bottom of Boring	40.0'
						Note: WH indicates sampler penetrated	
						under weight of 140# hammer.	

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OU

TEST BORING LOG

parratt wolff inc

PROJECT: Subsurface Exploration Program
Onondaga Lake Inner Harbor CDF
LOCATION: Site UDS 5-19, Syracuse, New York

HOLE NO. D96-1
JOB NUMBER: 96054

GROUNDWATER DEPTH
WHILE DRILLING 15.0'

DATE STARTED 4/5/96
DATE COMPLETED 4/5/96

BEFORE CASING
REMOVED 20.1'

N - NO. OF BLOWS TO DRIVE SAMPLER 12" W/ 140# HAMMER FALLING 30" - ASTM D - 1586 STANDARD PENETRATION TEST

AFTER CASING
REMOVED 13.0'

TYPE OF DRILL: MOBILE B41
NAME OF DRILLER/INSPECTOR: G. LANSING/W. MORROW

CASING TYPE HOLLOW STEM AUGER
SHEET 1 OF 2

SURFACE ELVATION: 379.9'
Purchase Order #DACW49-95-D-0006

DATUM FOR ELEVATION: NGVD

DEPTH	SAMPLE DEPTH	SAMPLE NO.	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	1.0'-	1		1/3		Brown moist medium stiff SILT, little clay	
	2.5'			2	5	(ML)	
5.0							5.0'
	5.0'-	2		3/3		Brown moist stiff SILT, little fine sand (ML)	
	6.5'			5	8		
10.0							
	10.0'-	3	No	3/3			
	11.5'		Rec	2	5		
15.0							15.0'
WL	15.0'-	4		3/4		Gray wet medium stiff to very soft SILT and	
	16.5'			2	6	fine SAND, trace shells (SM/ML)	
20.0							
	20.0'-	5		2/2			
	21.5'			2	4		
25.0							
	25.0'-	6		1/1			
	26.5'			1	2		
30.0							30.0'
	30.0'-	7		2/3		Black wet loose to medium dense fine to	
	31.5'			3	6	coarse SAND (SW)	
35.0							

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ok

TEST BORING LOG

parratt wolff inc

PROJECT: Subsurface Exploration Program
Onondaga Lake Inner Harbor CDF
LOCATION: Site UDS 5-19, Syracuse, New York

HOLE NO. D96-
JOB NUMBER: 96054

GROUNDWATER DEPTH
WHILE DRILLING 15.0'

DATE STARTED 4/5/96
DATE COMPLETED 4/5/96

BEFORE CASING
REMOVED 20.1'

N - NO. OF BLOWS TO DRIVE SAMPLER 12" W/ 140# HAMMER FALLING 30" - ASTM D - 1586 STANDARD PENETRATION TEST

AFTER CASING
REMOVED 13.0'

TYPE OF DRILL: MOBILE B41
NAME OF DRILLER/INSPECTOR: G. LANSING/W. MORROW

CASING TYPE HOLLOW STEM AUGER
SHEET 2 OF 2

SURFACE ELVATION: 379.9'
Purchase Order #DACW49-95-D-0006
DATUM FOR ELEVATION: NGVD

DEPTH	SAMPLE DEPTH	SAMPLE NO.	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	35.0'-	8		7/7		Black wet loose to medium dense fine to coarse SAND (SW)	
	36.5'			7	14		
	38.5'-	9		4			
40.0	40.0'			5/8	13		
						Bottom of Boring	40.0'

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ONONDAGA LAKE CDF

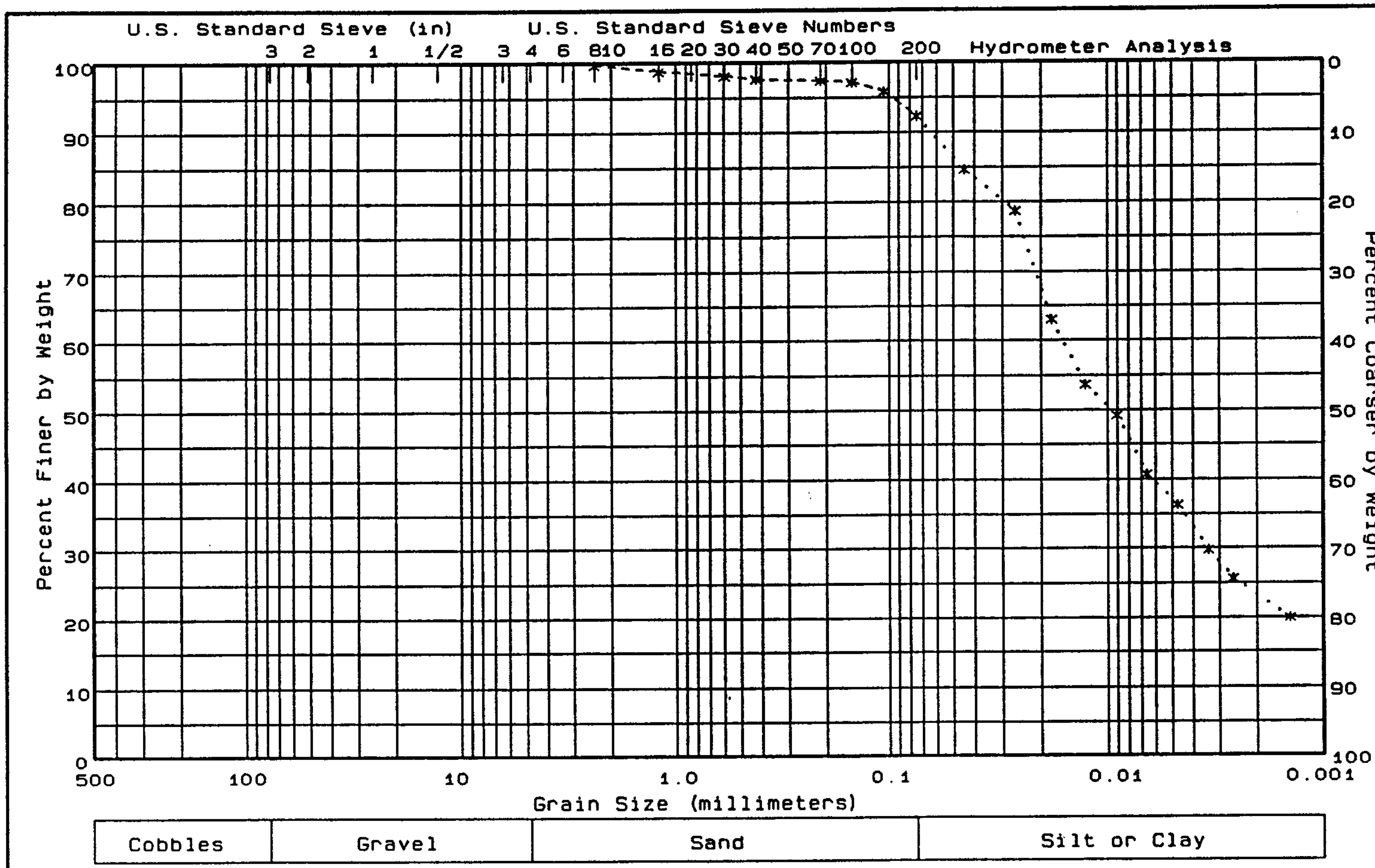
Undisturbed Soil Test Results

BUFFALO DISTRICT

VISUAL CLASSIFICATION: UNDISTURBED SAMPLES
Ohio River Division Laboratories - Soils Laboratory

PROJECT: Onondaga | Date: 8 August 1996 | (* Actual Sieve %) | LAB NO: VW81296LS015NCB | HOLE NO: DU96-9B

SAMPLE	DEPTH	MAX.	GRAV	SAND	FINES	M.C.	CLASSIFICATION AND DESCRIPTION
1	0.5-2.5			25	75		Sandy CLAY (CH) brown, fine sand; high plasticity (LL-52, PL-28, PI-24) soft consistency w/organics & wax
.25	<-----------1.52----------->						K20 = 1.7E-07 cm/sec
2	2.5-4.5			* 8	92	45.5	CLAY (CH) brown, coarse to fine sand; high plasticity (LL-51, PL-26, PI-25) soft consistency, w/organic odor
.25	<----------1.45'----------->						K20 = 1.72E-07 cm/sec

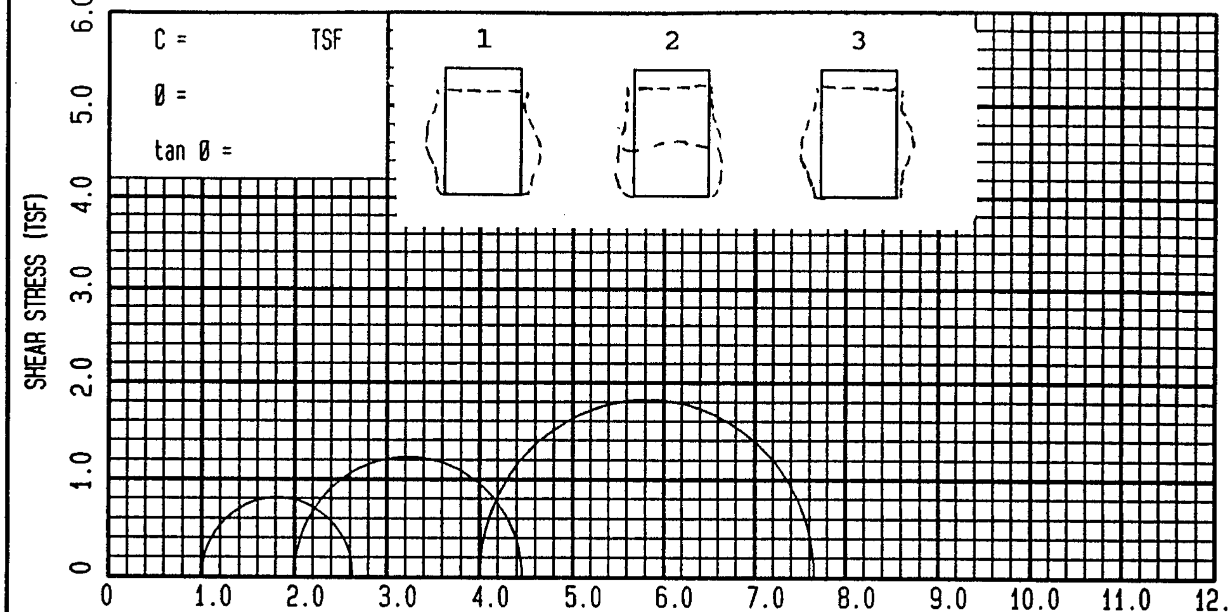


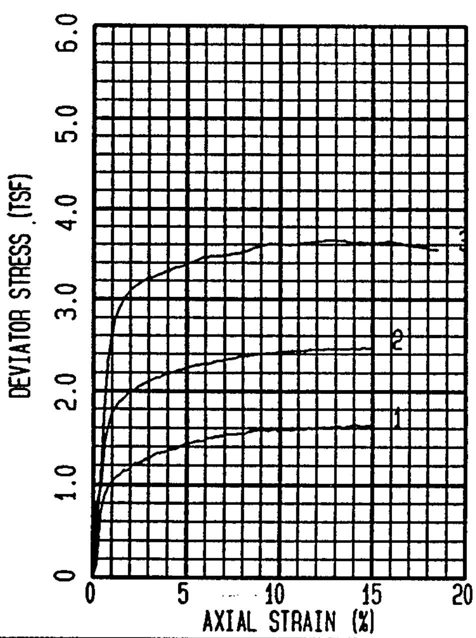
Sam No	Elev	Classification	w%	LL	PL	PI	Project Onondaga
T-2	2.5-4.5	CLAY (CH)	45.5	51	26	25	
							Area
							Boring No. DU96-98
GRADATION CURVES							Date 08-08-96

C = TSF

Ø =

tan Ø =





SPECIMEN NUMBER		1	2	3	4
BEFORE SHEAR	WATER CONTENT (%)	40.9	43.4	47.4	
	DRY DENSITY (PCF)	76	76	71.7	
	SATURATION (%)	100	100	100	
	VOID RATIO	1.143	1.142	1.272	
AFTER SHEAR	WATER CONTENT (%)	36.6	34.7	34.4	
	DRY DENSITY (PCF)	82.5	85.4	87.7	
	SATURATION (%)	100	100	100	
	VOID RATIO	.973	.905	.857	
	FINAL BACK PRESSURE (TSF)	5	5	5	
MINOR PRINICIPAL STRESS (TSF)		1	2	4	
MAX DEVIATOR STRESS (TSF)		1.63	2.46	3.65	
TIME TO FAILURE (MIN)		1035	1080	1005	
ULTIMATE DEVIATOR STRESS (TSF)		1.62	2.46	3.48	
INITIAL DIAMETER (IN)		1.405	1.4	1.389	
INITIAL HEIGHT (IN)		2.941	2.939	2.992	

CONTROLLED STRAIN TEST

DESCRIPTION OF SPECIMENS: CLAY (CH) brown, coarse to fine sand; high plasticity, soft consistency, w/organics

LL 51	PL 26	PI 25	Gs 2.609	TYPE OF SPECIMEN: Undisturbed	TYPE OF TEST: R-Bar

REMARKS: Each specimen was trimmed at a different depth due to 3 " diameter of sample. Some patching required.

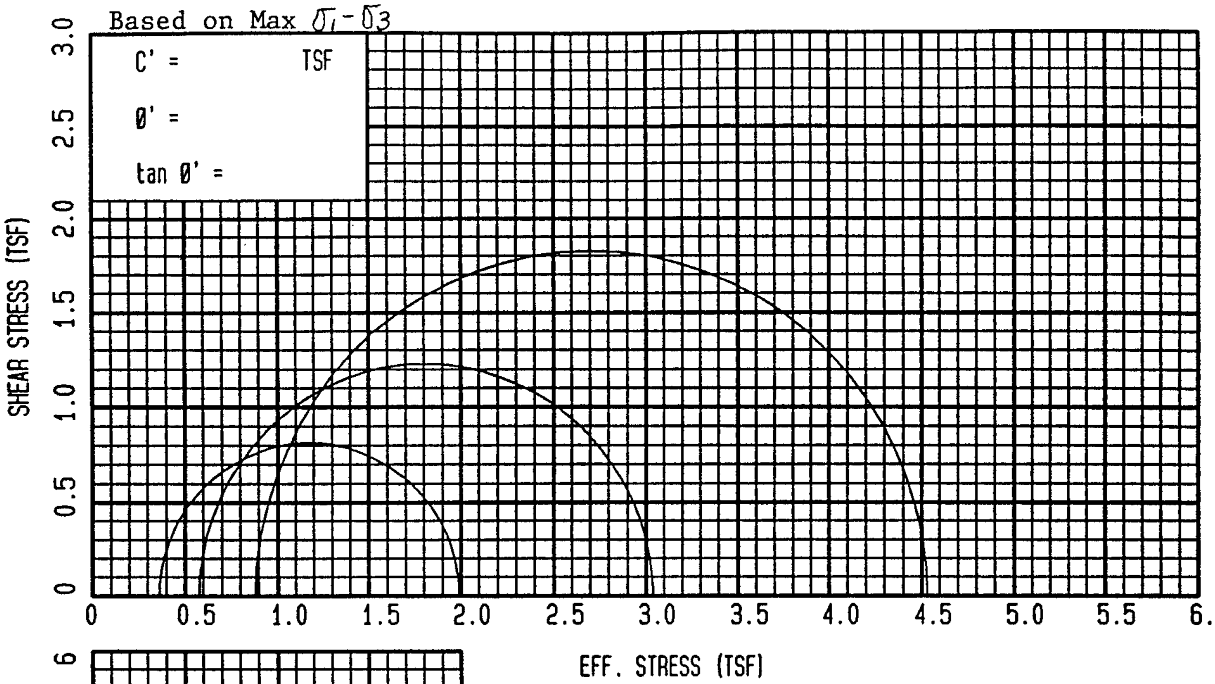
PROJECT: Onondaga

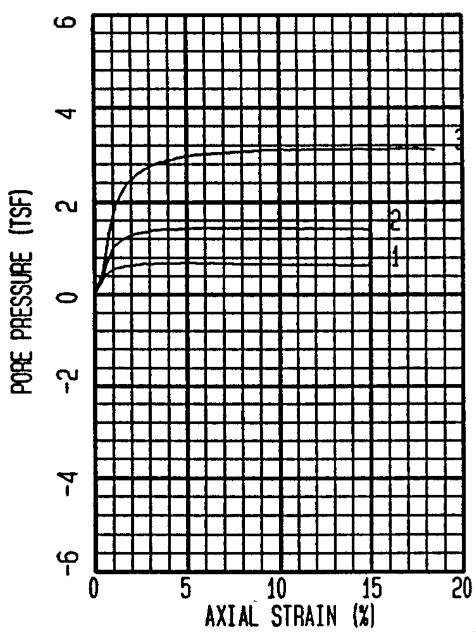
BORING NO DU96-9B | SAMPLE NO 2

DEPTH/ELEV. 2.5-4.5

LABORATORY: CEORD | DATE 08/08/96

TRIAXIAL COMPRESSION TEST REPORT





SPECIMEN NUMBER		1	2	3	4
BEFORE SHEAR	WATER CONTENT (%)	40.9	43.4	47.4	
	DRY DENSITY (PCF)	76	76	71.7	
	SATURATION (%)	100	100	100	
	VOID RATIO	1.143	1.142	1.272	
AFTER SHEAR	WATER CONTENT (%)	36.6	34.7	34.4	
	DRY DENSITY (PCF)	82.5	85.4	87.7	
	SATURATION (%)	100	100	100	
	VOID RATIO	.973	.905	.857	
	FINAL BACK PRESSURE (TSF)	5	5	5	
MINOR PRINICIPAL STRESS (TSF) σ_{3f}		.361	.576	.88	
MAX DEVIATOR STRESS (TSF)		1.63	2.46	3.65	
TIME TO FAILURE (MIN)		1035	1080	1005	
ULTIMATE DEVIATOR STRESS (TSF)		1.62	2.46	3.48	
INITIAL DIAMETER (IN)		1.405	1.4	1.389	
INITIAL HEIGHT (IN)		2.941	2.939	2.992	

CONTROLLED STRAIN TEST

DESCRIPTION OF SPECIMENS: CLAY (CH) brown, coarse to fine sand; high plasticity, soft consistency, w/organics

LL 51	PL 26	PI 25	Gs 2.609	TYPE OF SPECIMEN: Undisturbed	TYPE OF TEST: R-Bar

REMARKS: Each specimen was trimmed at a different depth due to 3" diameter of sample. Some patching required.

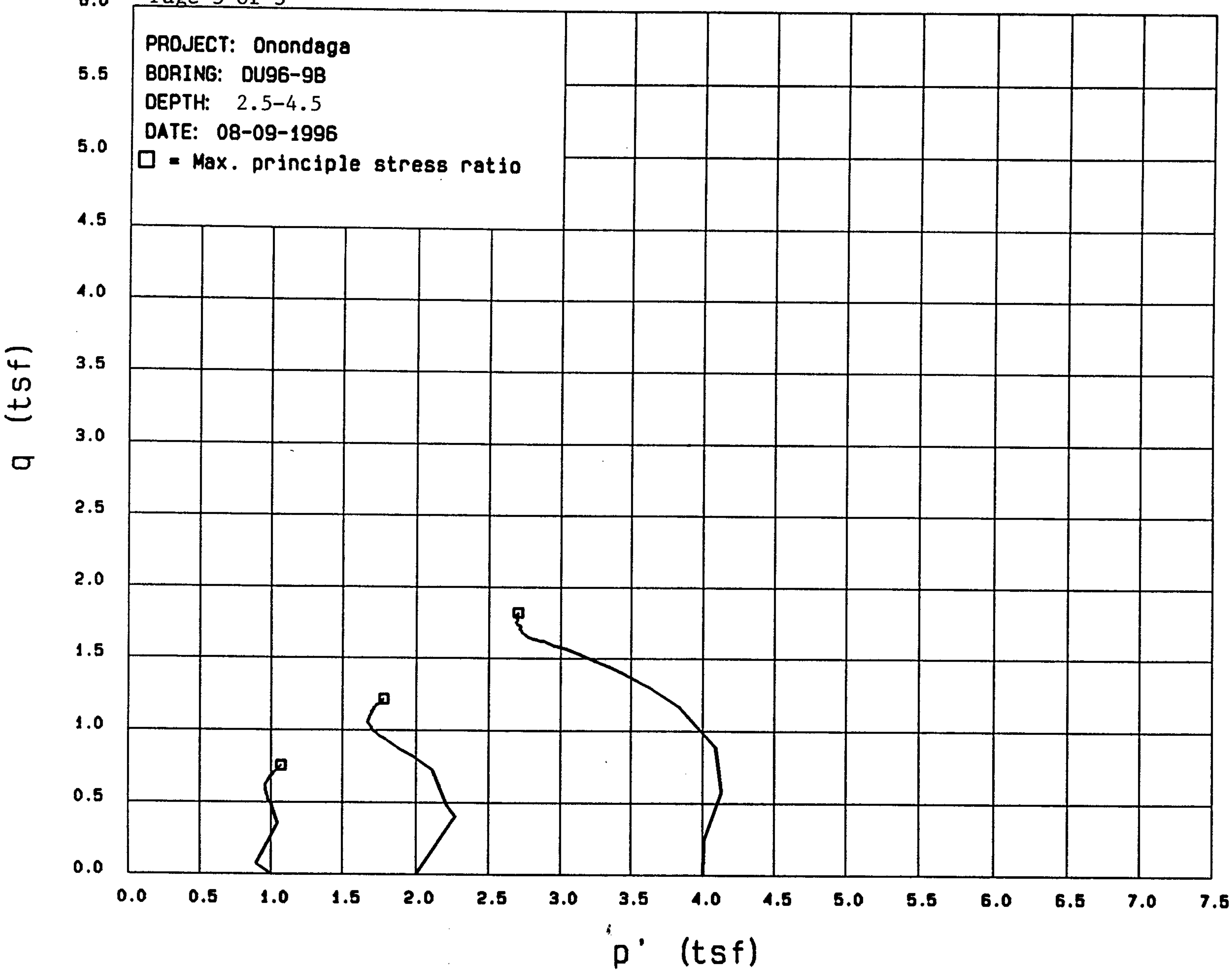
PROJECT: Onondaga

BORING NO DU96-9B | SAMPLE NO 2

DEPTH/ELEV. 2.5-4.5

LABORATORY: CEORD | DATE 08/08/96

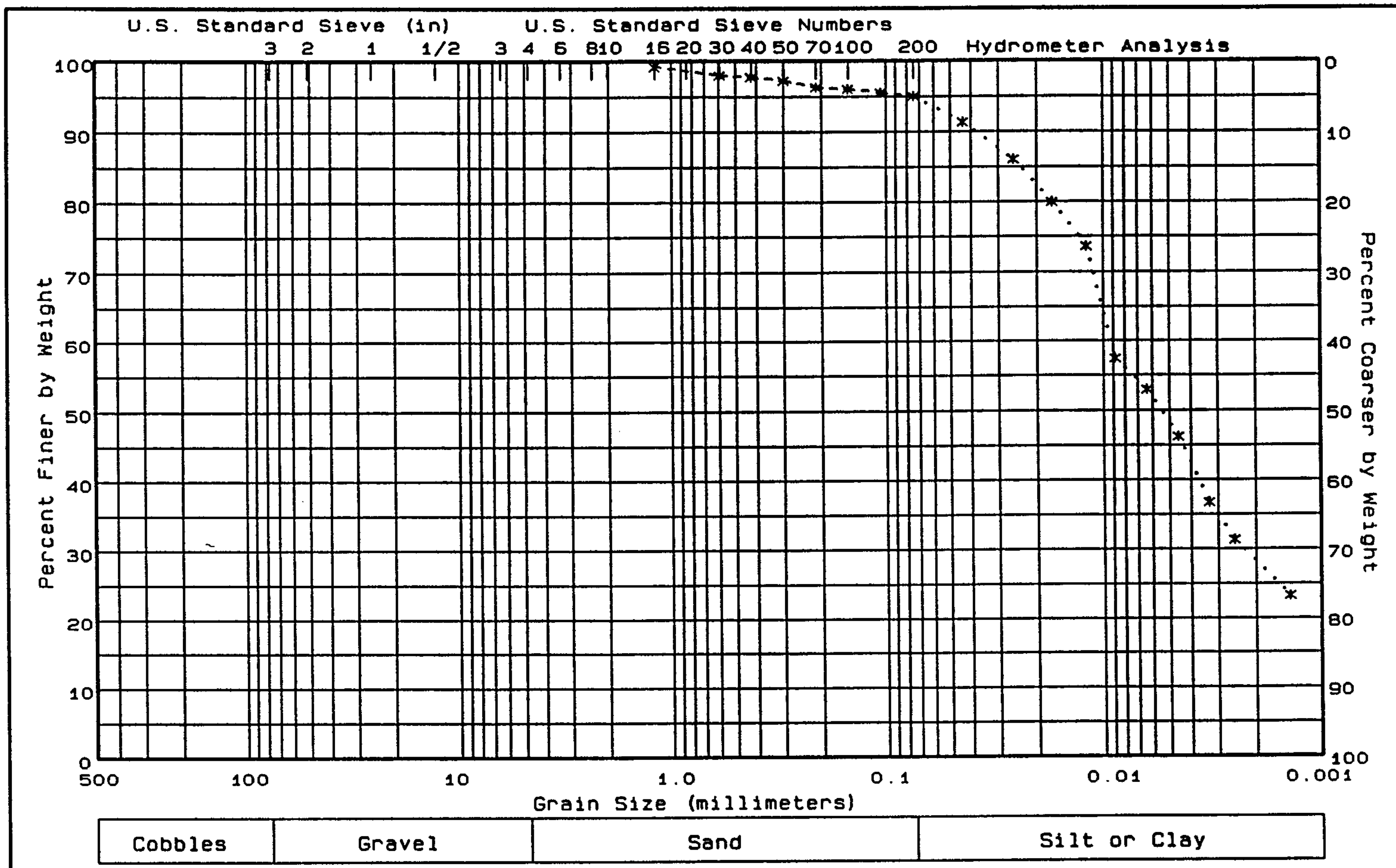
TRIAXIAL COMPRESSION TEST REPORT


PROJECT: Onondaga
BORING: DU96-9B
DEPTH: 2.5-4.5
DATE: 08-09-1996
□ = Max. principle stress ratio
q (tsf)
p' (tsf)
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5

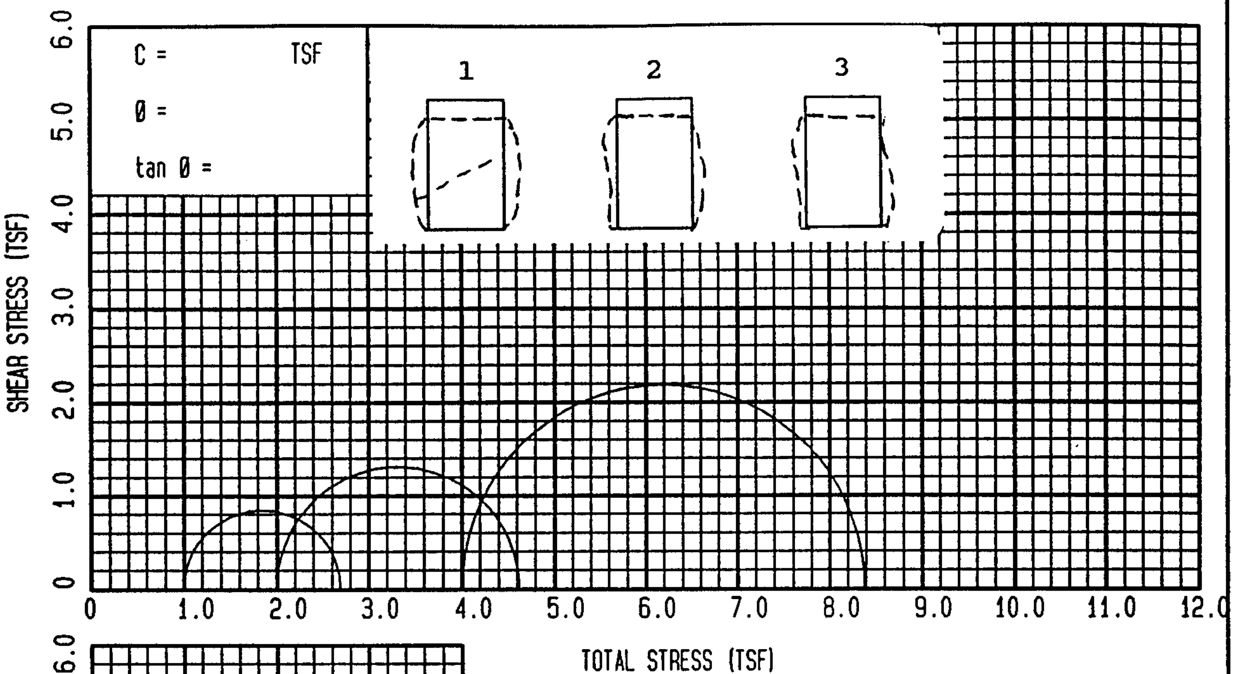
VISUAL CLASSIFICATION: UNDISTURBED SAMPLES
Ohio River Division Laboratories - Soils Laboratory

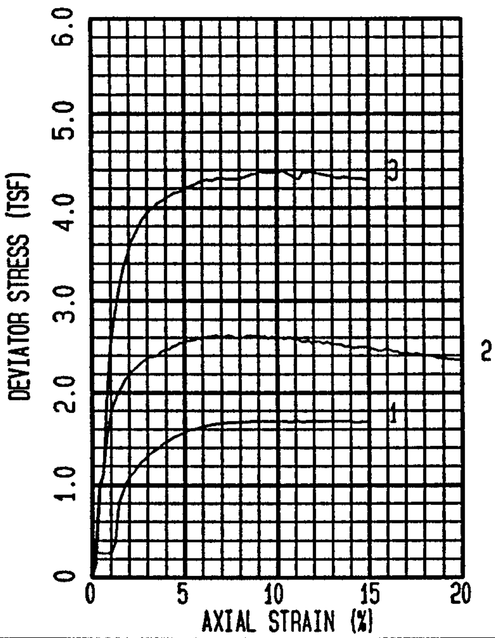
PROJECT: Onondaga | Date: 8 August 1996 | (* Actual Sieve %) | LAB NO: VW81296LS015NCB | HOLE NO: DU96-10B

SAMPLE	DEPTH	MAX.	GRAV	SAND	FINES	M.C.	CLASSIFICATION AND DESCRIPTION
1	0.5-2.5			10	90		Sandy Organic CLAY (OH) brown, fine sand; high plasticity (LL-55, PL-31, PI-34) medium consistency
.25 <----------1.13'----------->							K20 = 4.4E-07 cm/sec
2	2.5-4.5			* 5	95	55.9	Organic CLAY (OH) brown, medium to fine sand; high plasticity (LL-75, PL-37, PI-38) soft consistency
.25 <----------1.87'----------->							K20 = 8.87E-08 cm/sec



Sam No	Elev	Classification	w%	LL	PL	PI	Project Onondaga
2	2.5-4.5	Organic CLAY (OH)	55.9	75	37	38	
							Area
							Boring No. OU96-10B
GRADATION CURVES							Date 08-09-96





SPECIMEN NUMBER		1	2	3	4
BEFORE SHEAR	WATER CONTENT (%)	55	55.6	54.6	
	DRY DENSITY (PCF)	65.9	66	66.4	
	SATURATION (%)	100	100	100	
	VOID RATIO	1.418	1.412	1.401	
AFTER SHEAR	WATER CONTENT (%)	53.3	48	40.9	
	DRY DENSITY (PCF)	71.2	76.1	88.5	
	SATURATION (%)	100	100	100	
	VOID RATIO	1.238	1.093	.799	
	FINAL BACK PRESSURE (TSF)	5	5	5	
MINOR PRINICIPAL STRESS (TSF)		1	2	4	
MAX DEVIATOR STRESS (TSF)		1.69	2.62	4.38	
TIME TO FAILURE (MIN)		690	510	810	
ULTIMATE DEVIATOR STRESS (TSF)		1.67	2.35	4.29	
INITIAL DIAMETER (IN)		1.405	1.41	1.406	
INITIAL HEIGHT (IN)		2.971	2.879	2.884	

CONTROLLED STRAIN TEST

DESCRIPTION OF SPECIMENS: Organic CLAY (OH) brown, medium to fine sand; high plasticity, soft consistency

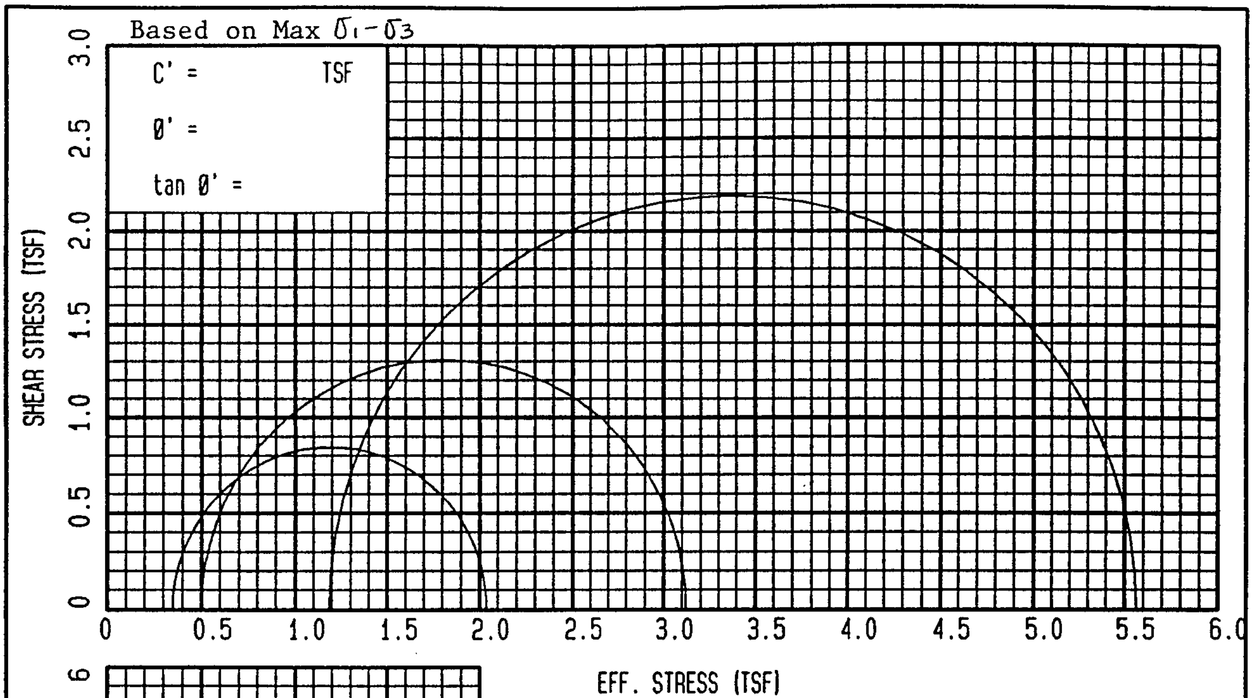
LL 75	PL 37	PI 38	Gs 2.553	TYPE OF SPECIMEN: Undisturbed	TYPE OF TEST: R-Bar

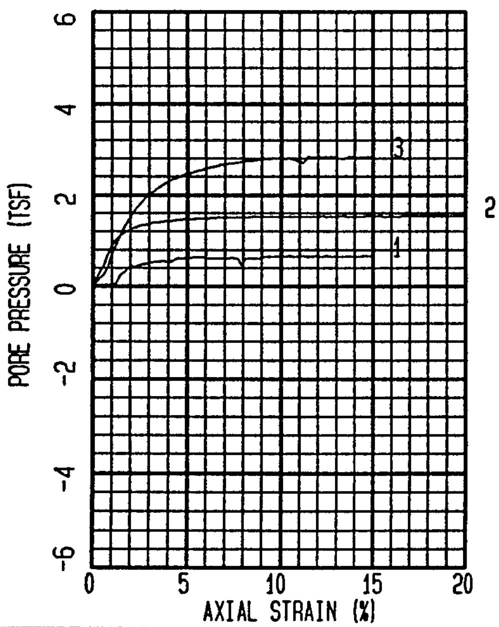
REMARKS: Each specimen was trimmed at a different depth due to 3" diameter of sample.

PROJECT: Onondaga

BORING NO DU96-10B	SAMPLE NO 2
DEPTH/ELEV. 2.5-4.5	
LABORATORY: CEORD	DATE 08/08/96

TRIAXIAL COMPRESSION TEST REPORT





	SPECIMEN NUMBER	1	2	3	4
BEFORE SHEAR	WATER CONTENT (%)	55	55.6	54.6	
	DRY DENSITY (PCF)	65.9	66	66.4	
	SATURATION (%)	100	100	100	
	VOID RATIO	1.418	1.412	1.401	
AFTER SHEAR	WATER CONTENT (%)	53.3	48	40.9	
	DRY DENSITY (PCF)	71.2	76.1	88.5	
	SATURATION (%)	100	100	100	
	VOID RATIO	1.238	1.093	.799	
	FINAL BACK PRESSURE (TSF)	5	5	5	
MINOR PRINICIPAL STRESS (TSF) σ_{3f}		.348	.499	1.183	
MAX DEVIATOR STRESS (TSF)		1.69	2.62	4.38	
TIME TO FAILURE (MIN)		690	510	810	
ULTIMATE DEVIATOR STRESS (TSF)		1.67	2.35	4.29	
INITIAL DIAMETER (IN)		1.405	1.41	1.406	
INITIAL HEIGHT (IN)		2.971	2.879	2.884	

CONTROLLED STRAIN TEST

DESCRIPTION OF SPECIMENS: Organic CLAY (OH) brown, medium to fine sand; high plasticity, soft consistency

LL 75	PL 37	PI 38	Gs 2.553	TYPE OF SPECIMEN: Undisturbed	TYPE OF TEST: R-Bar

REMARKS: Each specimen was trimmed at a different depth due to 3" diameter of sample.

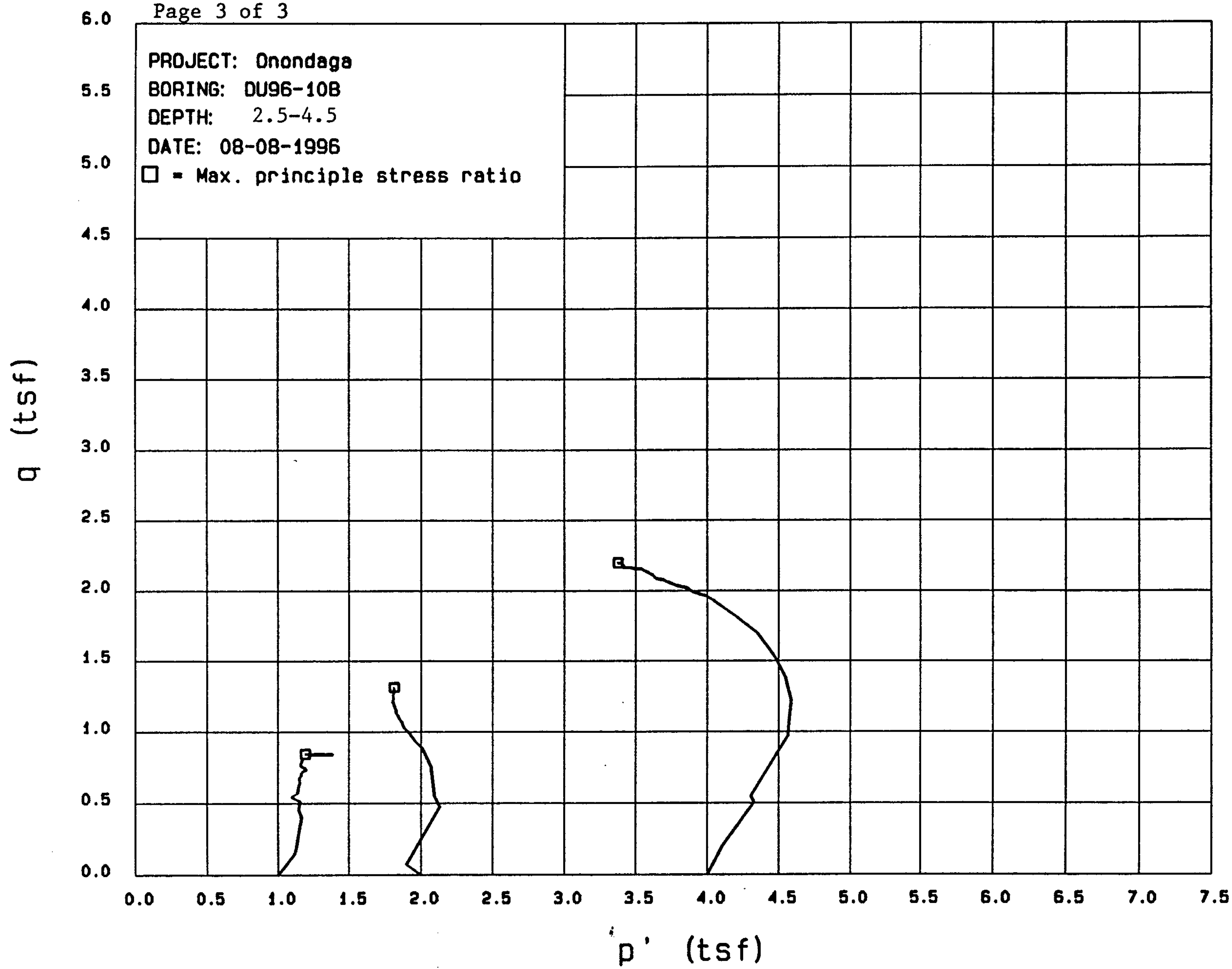
PROJECT: Onondaga

BORING NO DU96-10B | SAMPLE NO 2

DEPTH/ELEV. 2.5-4.5

LABORATORY: CEORD | DATE 08/08/96

TRIAXIAL COMPRESSION TEST REPORT


PROJECT: Onondaga
BORING: DU96-10B
DEPTH: 2.5-4.5
DATE: 08-08-1996
□ = Max. principle stress ratio
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
q (tsf)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
6.5
7.0
7.5
p' (tsf)

VISUAL CLASSIFICATION: UNDISTURBED SAMPLES
Ohio River Division Laboratories - Soils Laboratory

PROJECT: Onondaga | Date: 8 August 1996 | (* Actual Sieve %) | LAB NO: VW81296LS015NCB | HOLE NO: DU96-11B

SAMPLE	DEPTH	ESTIMATED PERCENT					
1	1.0-3.0	MAX.	GRAV	SAND	FINES	M.C.	CLASSIFICATION AND DESCRIPTION
.25				15	85		Sandy Organic CLAY (OH) brown, fine sand; high plasticity (LL-67, PL-37, PI-30) soft consistency
							K20 = 8.02E-07 cm/sec
<----------1.97'----------->							

VISUAL CLASSIFICATION: UNDISTURBED SAMPLES
Ohio River Division Laboratories - Soils Laboratory

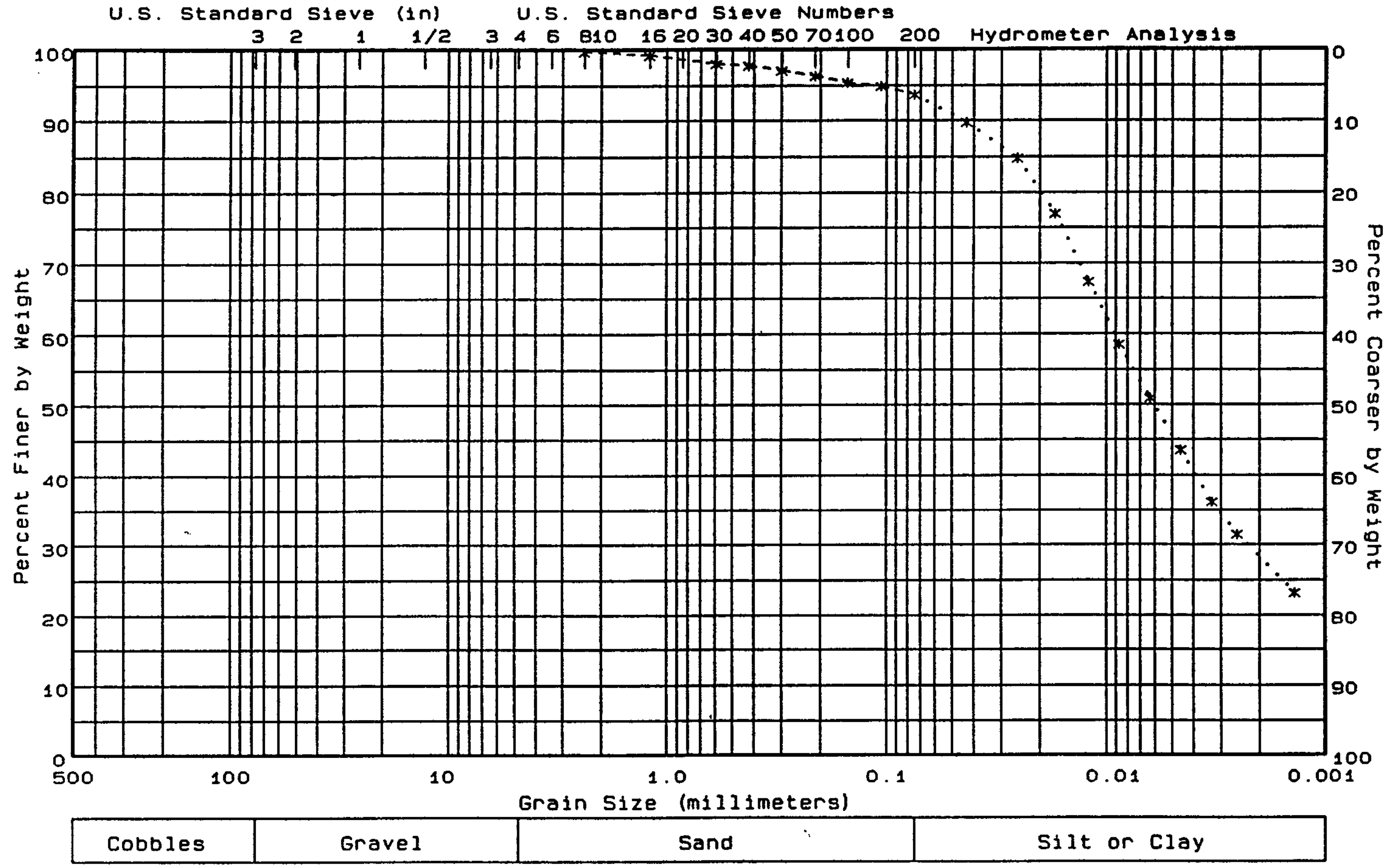
PROJECT: Onondaga | Date: 8 August 1996 | (* Actual Sieve %) | LAB NO: VW81296LS015NCB | HOLE NO: DU96-11C

SAMPLE	DEPTH	ESTIMATED PERCENT					
1	3.0-5.0	MAX.	GRAV	SAND	FINES	M.C.	CLASSIFICATION AND DESCRIPTION
.25				15	85		Sandy Organic CLAY (OH) brown, fine sand; high plasticity (LL-70, PL-35, PI-35) medium consistency
							K20 = 9.3E-08 cm/sec
<----------1.96'----------->							

Ohio River Division Laboratories - Soils Laboratory

Site: Onondaga   VW81296LS015NCB   (* actual sieve %)   Date: 08-09-96   Sheet 1 of 1

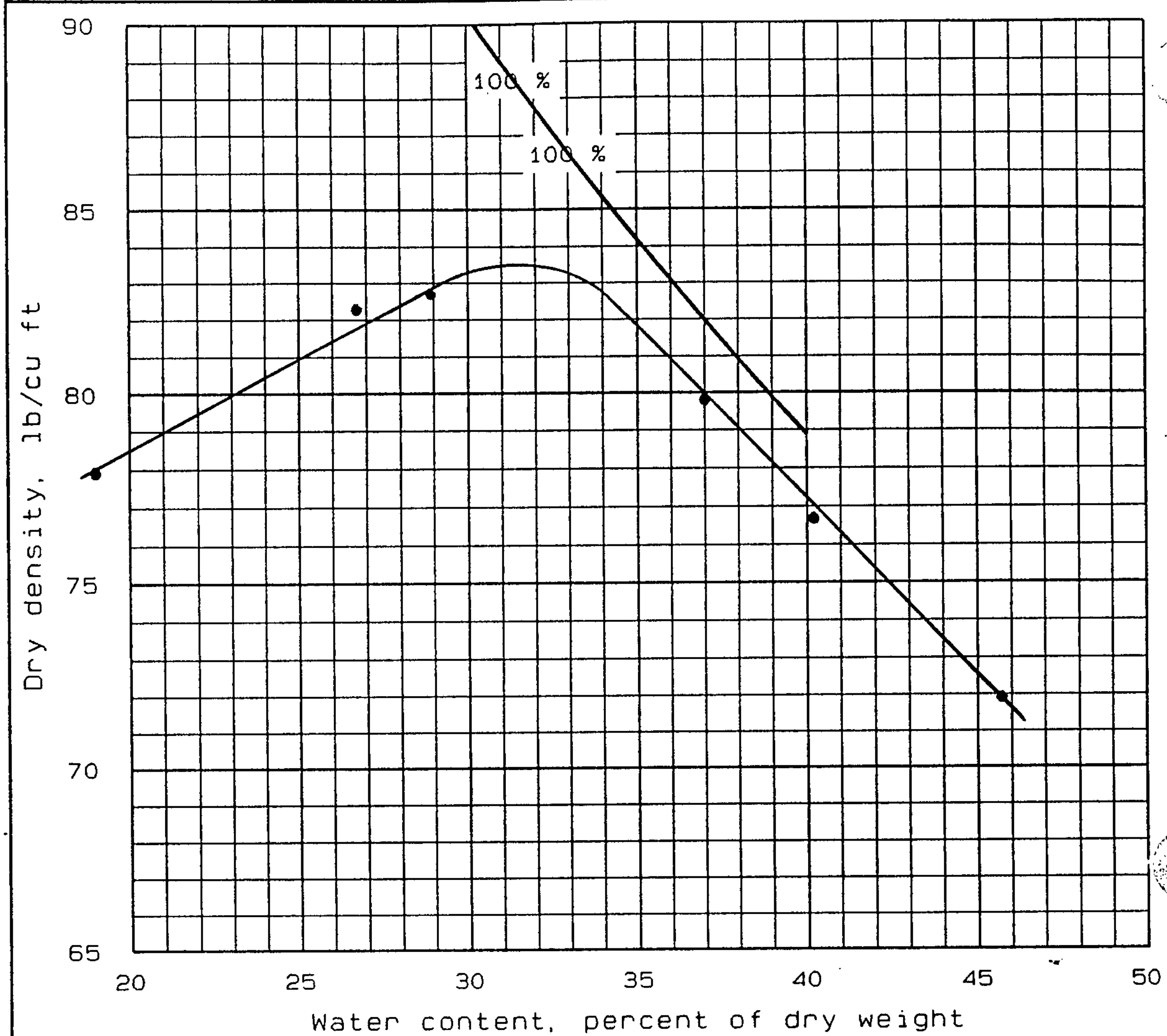
Hole Number	Top Elevation	Sample Number	Depth ft.	Visual Soil Classification	WC (%)	PL (%)	LL (%)	Estimate			
								max	grav	sand	fine
C-96-2		bag		Organic CLAY (OH) dark gray, medium to fine sand; high plasticity	45.4	34	62			6	94



Sam No	Elev	Classification	w%	LL	PL	PI	Project Onondaga
bag		Organic CLAY (OH)	46.4	62	34	28	
							Area
							Boring No. C-96-2
GRADATION CURVES							Date 08-10-96

DEPARTMENT OF THE ARMY, OHIO RIVER DIVISION LABORATORY
CORPS OF ENGINEERS, 11275 SEBRING DRIVE, CINCINNATI, OH 45240

WORK ORDER NO. VW81296LS015NCB
Req. No.
Contract No.



Standard compaction test EM-1110-2-1906
25 blows per each of 3 layers, with 5.50 lb. sl. weight rammer
and 12.0 inch drop. 4.0 inch diameter mold

Sample No.	Elev/ Depth	Classification	G	LL	PL	% > No.4	% > 3/4 in.
1		Organic CLAY (OH)	2.556	62	34		

Sample No.	1			
Water content, percent		Natural		
Optimum water content, percent	31.5			
Max dry density, lb/cu ft	83.5			

Remarks: K20=2.76E-06

Project: Onondaga

Lab No.:

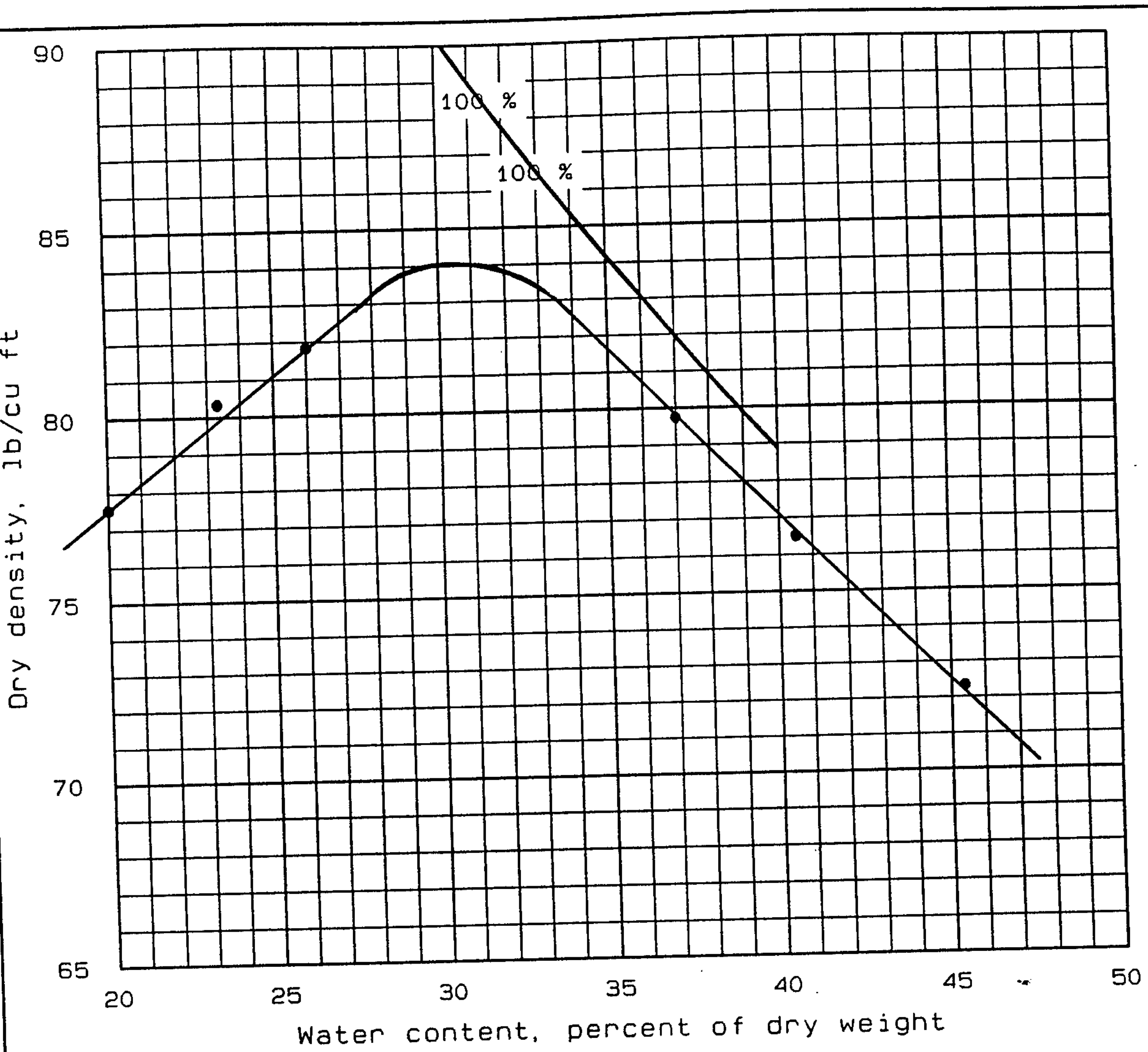
Area:

Boring No.: C-96-2 | Date: 08-15-96

COMPACTION TEST REPORT

WORK ORDER NO. VW81296LS015NCB
Req. No.
Contract No.

DEPARTMENT OF THE ARMY, OHIO RIVER DIVISION LABORATORY
CORPS OF ENGINEERS, 11275 SEBRING DRIVE, CINCINNATI, OH 45240



Standard compaction test EM-1110-2-1906
25 blows per each of 3 layers, with 5.50 lb. sl. weight rammer
and 12.0 inch drop. 4.0 inch diameter mold

Sample No.	Elev/ Depth	Classification	G	LL	PL	% > No.4	% > 3/4 in.
2		Organic CLAY (OH)	2.556	62	34		

Sample No.	2			
Water content, percent		Natural		
Optimum water content, percent	31.0			
Max dry density, lb/cu ft	84.0			

Remarks: K20= 2.44E-06

Project: Onondaga

Lab No.:

Area:

Boring No.: C-96-2

Date: 08-15-96

COMPACTION TEST REPORT

INNER HARBOR DREDGING DESIGN PROJECT
SYRACUSE,NY

APPENDIX B

SITE AND STRUCTURAL DESIGN
FOR
REHABILITATION OF THE UPLAND DISPOSAL SITE
USD 5-19

APPENDIX B - SITE AND STRUCTURAL DESIGN

GENERAL

This appendix presents the findings of an investigation into the use of site UDS 5-19 for disposal of dredgings from Onondaga Creek and the Syracuse Inner Harbor. Although other disposal alternatives are potentially available, disposal at site UDS 5-19 is most desirable due to a combination of factors including cost, environmental concerns, and potential conflicts with local land development. The investigation included determination of the volume of material to be dredged, evaluation of the potential capacity of site UDS 5-19, and preliminary design of a weir and baffle wall system for the proposed facility.

The goal of the dredge disposal program is to establish a new channel depth and channel limits in Onondaga Creek for improved navigation. The length of service for the facility is expected to be 2-3 years, according to John Dergosits of the NYS Canal Corporation. They do not anticipate use of the facility for future maintenance dredgings.

The anticipated life span was a factor in the design of the facility and its components. Another factor considered in the design is that the NYS Canal Corporation intends on performing the dredging and construction with their own plant. Therefore, their input and recommendations steered the direction of the design, unlike if the work was being perfomed under a publicly bid contract.

All elevations mentioned in this report, unless otherwise indicated, are based on City of Syracuse datum, with 0 feet City datum equal to 362 feet NGVD of 1929. Survey information, including hydrographic, for the creek and harbor, used for determination of dredging volume and channel layout, was performed by Bergmann Associates in the winter of 1995-1996. Survey information used for site UDS 5-19 was performed by C.T. Male Associates, P.C. for the Pyramid Companies in 1989. The boring location survey was performed by E.W. Donegan, L.S. in April of 1996.

ONONDAGA CREEK AND SYRACUSE INNER HARBOR DREDGING

Alignment of the channel centerline was established by determining straight paths which most closely follow the deepest natural course of the creek. The creek length considered was from the downstream end of the harbor (station 0+00) to Onondaga Lake (station 48+78). The channel dimensions used to determine the volume of dredging in the creek were 60 feet wide at the base with a bottom elevation of -10. The channel width was widened at the Hiawatha Boulevard bridge and at the railroad bridge. A side slope of 1 vertical to 3 horizontal from the edge of the channel limit was used. The limit of dredging within the harbor included only the North Dock and the area between it and the start of the channel. A vertical side slope was used in the Dock area where a sea wall exists and a side slope of 1 vertical to 3 horizontal was used for the harbor area between the dock and the start of the channel. Refer to Figure 1 for a plan of the proposed dredging.

Volumes were computed using Intergraph's Inroads civil design program, which directly utilizes survey information input from data files or located in Microstation design files. The dredging volumes obtained for the creek and harbor are as follows:

Onondaga Creek		30,450 CY
North Dock		12,018 CY
Harbor area n/i North Dock		15,264 CY
Total		57,732 CY
	Use	60,000 CY

These volumes are for an undisturbed, in-place state with no factors.

UDS 5-19

The minimum disposal volume needed for the dredged material is 20% greater than the volume of dredgings, according to the Environmental Analysis Section of the Buffalo District. (Refer to the environmental appendix for justification) Therefore, the capacity of the disposal area has to be at least 72,000 CY. The proposed layout and elevations of site UDS 5-19 were designed to maximize its capacity while conforming to several parameters which limited the dimensions. The maximum perimeter of the disposal area is limited by the creek on one side, the existing fence on two sides, and the property line on one side. A maximum side slope of 1 vertical on 2 horizontal was established by the Geotechnical Section of the Buffalo District. (Refer to the geotechnical appendix for justification) Because the existing exterior side slope of the berms is steeper than 1 on 2 in a number of locations, especially on the creek side, the perimeter of the new berm is further limited.

The bottom elevation of the disposal area was limited by two factors. One is that a minimum depth of material is required to prevent downward permeation. The Geotechnical Section of the Buffalo District provided a minimum bottom elevation of +1 based on permeability. (Refer to the geotechnical appendix for justification) The factor that controlled the minimum bottom elevation is that the ability of the existing material to support construction equipment decreases with increasing moisture content. Based on the soil borings performed, moisture was found to be present within the first few feet.

Based on the above explained parameters, a top elevation for the proposed berm was established at elevation +23, which is approximately 5 feet above the existing berm. A bottom elevation of +5.5 was then established by balancing the cut and fill required so that material does not have to removed nor brought to the site. This bottom elevation is approximately 2 feet lower than the grade elevations of the soil borings performed within the interior of the disposal area. Construction will require approximately 15,000 CY to be relocated on site.

With the top of berm at +23, the maximum top of dredge fill material would be +19 due to the minimum freeboard of 2 feet and the minimum ponding depth of 2 feet recommended by

EM 1110-2-5027, "Confined Disposal of Dredged Material". Based on this fill elevation, the capacity of the revamped disposal site UDS 5-19 was computed to be 76,000 CY. The additional capacity of the disposal site above the 72,000 CY required would improve detention time near the end of the dredging period and also could be used for disposal of future maintentance dredgings. The civil design program Inroads was used for volume computations. Refer to Figures 2 and 3 for a plan and typical cross section of site UDS 5-19.

It is anticipated that the earth moving operations would be performed with track type, low ground pressure construction equipment. However, it is possible, especially during the later stages of construction, that the interior of the disposal area could become too unstable for equipment access therefore requiring the use of a dragline for excavation.

BAFFLE WALL SYSTEM

The existing site UDS 5-19 includes a finger berm to improve the distance for particle settling. In order to maximize the capacity of the facility it was requested by John Dergosits of the NYS Canal Corporation that baffle walls, consisting of plastic membrane, be designed for in lieu of finger berms. The existing finger berm would therefore be removed and a baffle wall installed in its place while the other baffle wall would be located on the opposite side near the opposite corner. Two different baffle wall systems were investigated for use at the facility. One is a manufactured system with floats at the top of the flexible plastic membrane and concrete anchors at the bottom. The other system involves supporting the flexible plastic membrane with a wire rope strung between wood utility poles.

The manufactured system has advantages in that installation would be relatively simple and wind forces would not affect the system. However, with the large range between the initial and final fill level, it is questionable as to whether or not the burying of the slack material would prevent suspension of the floats. Vegetation and debris also could hinder operation of the system. The system is equipped with lines for freeing it, however, with the difficulty of access to the interior of the facility during the two year dredging period, use of the lines may not always be possible. Because of the uncertainties associated with maintenance of the manufactured floating baffle wall system, the other system, involving the use of wood utility poles and wire rope to support the flexible plastic membrane, appears to be more feasible.

Design calculations for the pole supported system are included at the end of this appendix. Wind force governed the size and spacing of components. The results of the calculations are as follows:

min. pole diameter at the ground	10 in.
min. pole circumference at the ground	31.4 in.
pole spacing	20 ft.
wire rope diameter	0.25 in.
guy wire diameter for end poles	0.25 in.

embedment depth	10 ft.

It was assumed that the type of pole used would be commercially available, utility poles of Southern Pine. The type of wire rope that was assumed would be used is 6x19 IWRC of galvanized improved plow steel.

The type of plastic membrane recommended is 45 mil, reinforced polypropylene. Although PVC membrane is less expensive, it is not rated for extended exposure to ultraviolet light like polypropylene is. The material is weldable for seaming which would be necessary at the top and the sides for connection to the wire rope and the poles.

The poor soil conditions and the high water table present difficulties in terms of a foundation system for the utility poles. The proposed system involves setting the poles to a depth of 10 feet. The casing pipe would prevent the hole from collapsing as well as limit water seepage into the hole during concrete placement. It is recommended that the poles be installed prior to the earth moving operations. As stated earlier, conditions at the later stages of construction could be wet, and access of the augering equipment at that time may not be possible. A short berm, approximately 2.5 feet high by 15 feet wide with 1 on 2 side slopes, would be left in place. The top of the berm would be set at +8, the approximate average existing grade and therefore the level that augering would begin at. The berm would allow the augering depth to be minimized and the lateral load on the poles to be reduced. Casing pipe may be necessary to prevent the hole from collapsing during augering. If the casing pipe can't be removed then concrete with a small aggregate size would be necessary to fill between the casing pipe and the pole. Refer to figures 6 and 7 for an elevation and cross section, respectively, of the proposed baffle system.

The proposed baffle wall system should be considered an experimental system due to combined factors of lack of design guidance, lack of construction history, and poor soil conditions. The likelihood of a problem arising with the construction or performance of the system is greater than for something that is more typical in the engineering and construction industry.

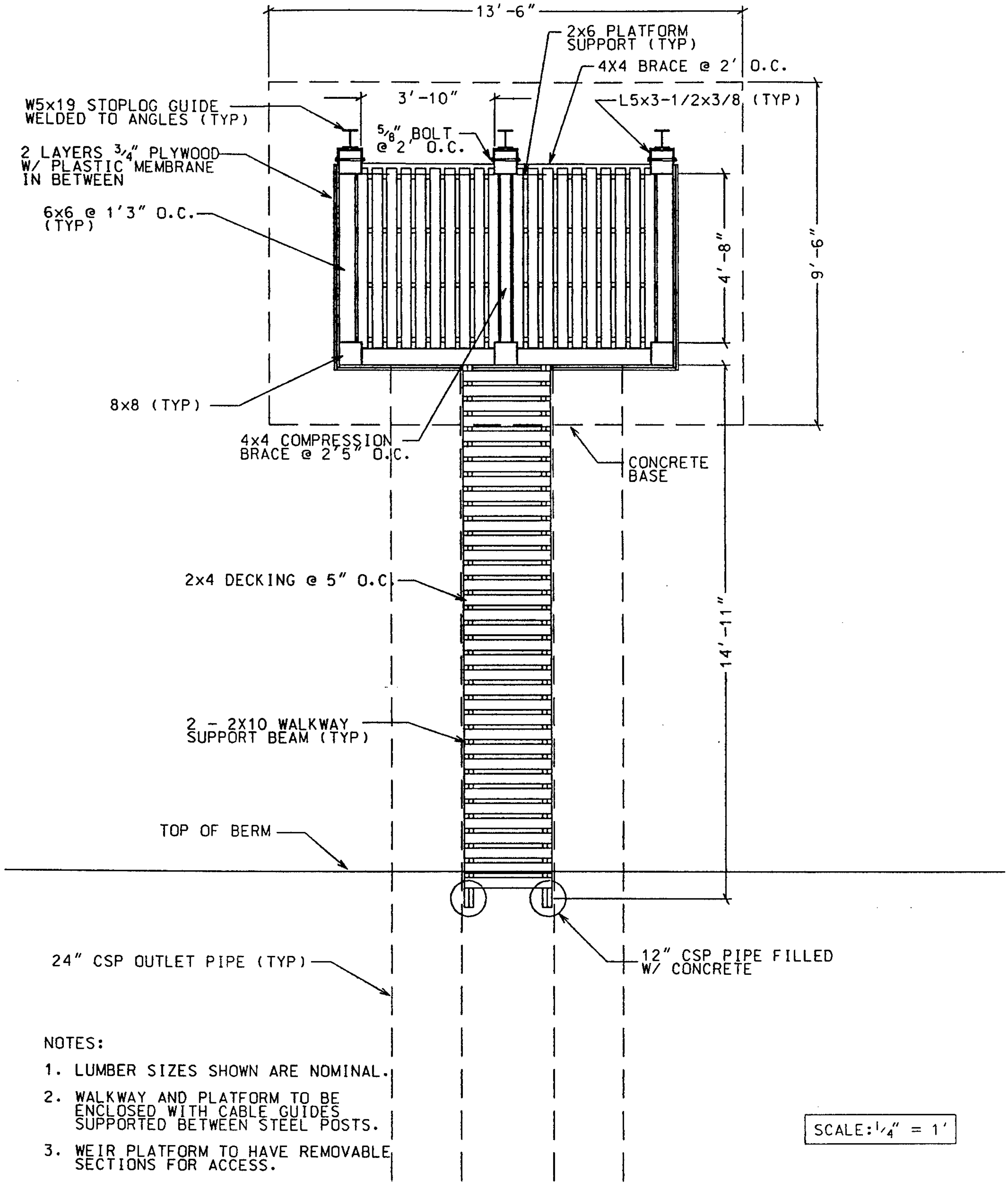
WEIR

Based on a site inspection, it was determined that the existing weir is in very poor condition. Therefore, a new weir had to be designed for the facility. In order to minimize effluent solids concentration, the NYS Canal Corporation intends to maximize ponding in the disposal area during dredging operations, with draining of the standing water occurring only at the end of each dredging season. Therefore, the bottom elevation of the weir was set at +12, which corresponds to the level of fill at which approximately 50% of the dredging is complete. The position of the weir was set away from the new berm so that an unbalanced lateral soil pressure does not affect the structure and so that the berm fill does not conflict with the face of the weir. A walkway was designed to provide access from the berm to the weir.

Wood is the construction material upon which design of the weir is based. In discussions with John Dergosits, he indicated that they preferred the weir be constructed of wood because the NYS Canal Corporation has their own lumber mill and their personnel are experienced in wood construction. They also wanted the weir to be capable of incorporating an internal filtering system using either hay bales or filter fabric. The CSP half pipe weir designed for recent Buffalo District projects would not conveniently accomodate such a system. Figures 3 and 4 show a plan and elevation, respectively, of the proposed weir.

Timber members were assumed to be spruce-pine-fir no. 1 grade while dimensional lumber was assumed to be spruce-pine-fir standard grade. Poplar is the most common type of wood obtained by the NYS Canal Corporation through their clearing operations. A hardwood not typically used for building construction, poplar possesses similar mechanical properties to the spruce-pine-fir group, which are softwoods.

The walls of the weir would consist of two layers of 3/4" marine plywood between which plastic membrane would seal the joints of the structure. The plywood would be backed with 6"x6" nominal size timbers at varied spacings averaging about 15" on center. Vertical timbers, 8"x8" nominal size, would be located at the corners and at the mid-point of the long sides. Interior cross bracing at the mid-point of the long side would be required to reduce the span length. Horizontal timbers would be connected to the vertical timbers with screw bolts along with 1/4" thick steel angles. The concrete base was sized to prevent uplift of the structure. Double 6x6 nominal size horizontal timbers would be connected to the concrete with expansion head anchors. Calculations for the design of the weir are included at the end of the appendix.

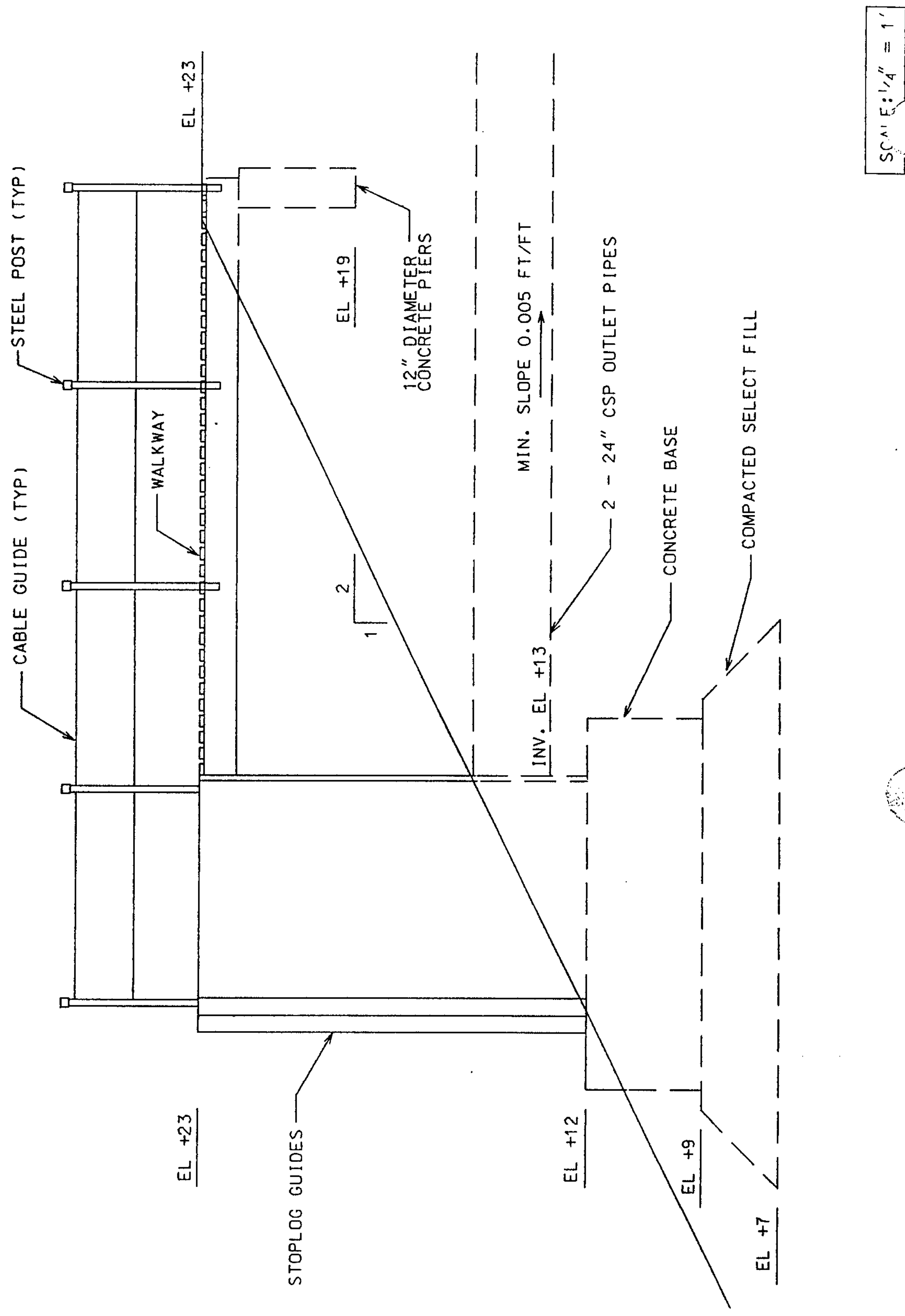


NOTES:

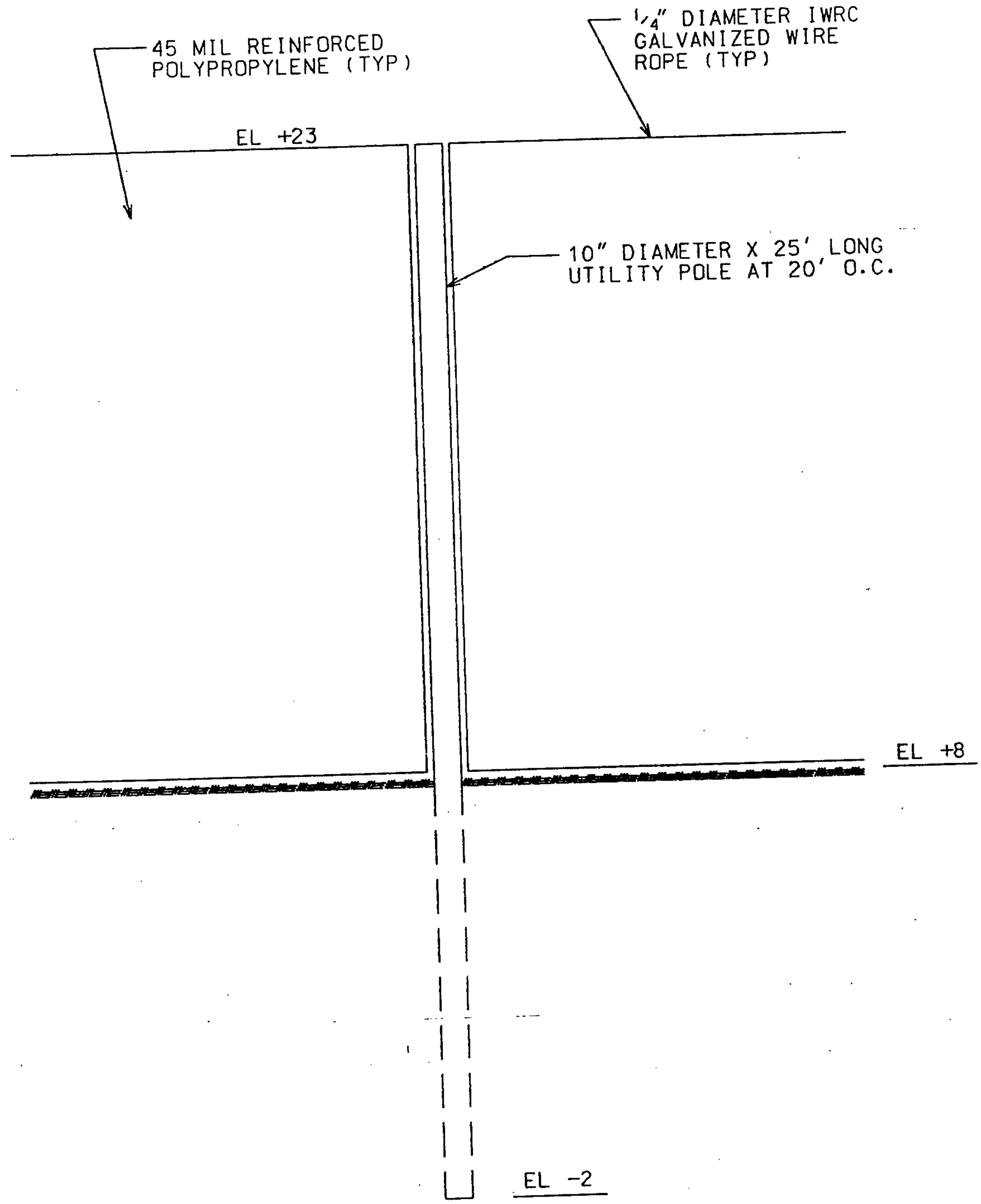
1. LUMBER SIZES SHOWN ARE NOMINAL.
2. WALKWAY AND PLATFORM TO BE ENCLOSED WITH CABLE GUIDES SUPPORTED BETWEEN STEEL POSTS.
3. WEIR PLATFORM TO HAVE REMOVABLE SECTIONS FOR ACCESS.

SCALE: 1/4" = 1'

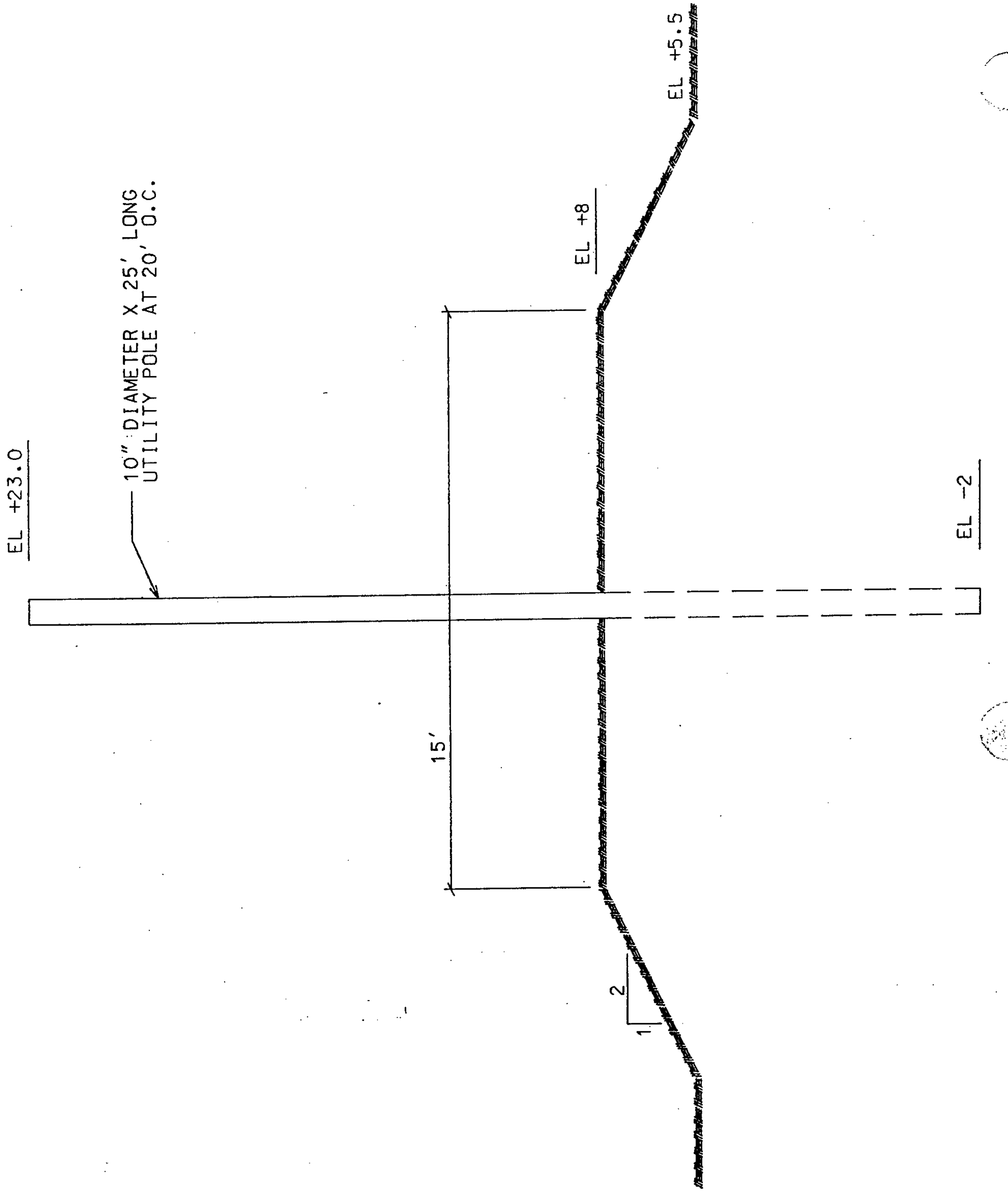
NYS CANAL CORP.
SYRACUSE, NY
UDS 5-19 MODIFICATIONS
WEIR PLAN
FIGURE 4



NYS CANAL CORP.
SYRACUSE, NY
UDS 5-19 MODIFICATIONS
WEIR ELEVATION
FIGURE 5



NYS CANAL CORP.
SYRACUSE, NY
UDS 5-19 MODIFICATIONS
BAFFLE SYSTEM ELEVATION
FIGURE 6



NYS CANAL CORP.
SYRACUSE, NY
UDS 5-19 MODIFICATIONS
BAFFLE SYSTEM X-SECTION
FIGURE 7

PROJECT: NYS CANAL CORPORATION - DREDGE DISPOSAL
LOCATION: SYRACUSE, NY
COMPUTATION: WEIR DESIGN FOR SITE 5-19
DATE: 8/20/96
BY: JOHN HUBERT

Reference: "Wood Engineering and Construction Handbook" by Faherty and Williamson

Assumed properties for timber:

Wood type: Spruce-Pine-Fir No. 1

Properties from table A.9

$F_b := 850 \cdot \frac{lb}{in^2}$ (Allowable bending stress w/o adjustment)

$F_v := 65 \cdot \frac{lb}{in^2}$ (Allowable shear stress w/o adjustment)

$F_c := 700 \cdot \frac{lb}{in^2}$ (Allowable compression parallel to grain w/o adjustment)

$F_{cL} := 425 \cdot \frac{lb}{in^2}$ (Allowable compression perpendicular to grain w/o adjustment)

$E := 1300000 \cdot \frac{lb}{in^2}$ (Modulus of elasticity)

Adjustment factors:

$C_F := 1.0$ (Size factor - no timbers with depth greater than 12 in., therefore it is 1)

$C_{Mb} := 1.0$ (Wet service factor for bending)

$C_{Mv} := 1.0$ (Wet service factor for shear)

$C_{Mc} := 0.91$ (Wet service factor for compression parallel)

$C_{McL} := 0.67$ (Wet service factor for compression perpendicular)

$C_D := 1.25$ (Duration of load - From figure 2.6, for a 2 week period of loading)

Adjusted properties:

$F'_b := F_b \cdot C_F \cdot C_{Mb} \cdot C_D$ $\quad F'_b = 1.063 \cdot 10^3 \cdot \frac{lb}{in^2}$ (Adjusted allowable bending stress)

$F'_v := F_v \cdot C_F \cdot C_{Mv} \cdot C_D$ $\quad F'_v = 81.25 \cdot \frac{lb}{in^2}$ (Adjusted allowable shear stress)

$F'_c := F_c \cdot C_F \cdot C_{Mc} \cdot C_D$ $\quad F'_c = 796.25 \cdot \frac{lb}{in^2}$ (Adjusted allow. comp. paral stress)

$F'_{cL} := F_{cL} \cdot C_F \cdot C_{McL} \cdot C_D$ $\quad F'_{cL} = 355.938 \cdot \frac{lb}{in^2}$ (Adjusted allow. comp. perp. stress)

Design Parameters:

$h_f := 22 \cdot ft$ (Maximum elevation of fluid level)

$h_s := 19 \cdot ft$ (Maximum elevation of sediments)

$h_b := 12 \cdot ft$ (Elevation at the bottom of the weir)

$u_{sat} := 110 \cdot \frac{lb}{ft^3}$ (Saturated unit weight of dredged fill material)

$k_a := 0.4$ (Active pressure coefficient of dredged fill material)

$u_{wat} := 62.5 \cdot \frac{lb}{ft^3}$ (Unit weight of water)

Determine the size and spacing of side support beams for the worst case:

Bracing will be provided by the sheathing.

$l_s := 5 \cdot ft$ (Maximum span on the short side of the weir)

$l_l := 4 \cdot ft$ (Maximum span on the long side of the weir)

$h' := 13.73 \cdot ft$ (Elev. at center of the bottom most member not connected to concrete)

$$w := \left[\left(h_f - h' \right) \cdot u_{wat} \right] + \left[\left(h_s - h' \right) \cdot \left(u_{sat} - u_{wat} \right) \cdot k_a \right]$$

$w = 617.005 \cdot lb \cdot ft^{-2}$ (Uniform unit loading per ft of height)

Try a 6"x6" nominal size timber

$d := 5.5 \cdot in$ (Actual depth of member)

$b := 5.5 \cdot in$ (Actual width of member)

Check bending:

$s := 12.5 \cdot in$ (Tributary width for lowest member not connected to concrete)

$M := \frac{w \cdot s \cdot l_s^2}{8}$ $M = 2.008 \cdot 10^3 \cdot lb \cdot ft$ (Maximum moment)

$S := \frac{b \cdot d^2}{6}$ $S = 27.729 \cdot in^3$ (Section modulus of timber member)

$f_b := \frac{M}{S}$ $f_b = 869.184 \cdot \frac{lb}{in^2}$ (Bending stress)

Check shear:

$R := \frac{w \cdot s \cdot l_s}{2}$ $R = 1.607 \cdot 10^3 \cdot lb$ (End reaction)

$V := R$ $V = 1.607 \cdot 10^3 \cdot lb$ (Design shear)

$A := b \cdot d$ $A = 30.25 \cdot in^2$ (Cross-sectional area)

$f_v := \frac{1.5 \cdot V}{A}$ $f_v = 79.675 \cdot \frac{lb}{in^2}$ (Shear stress)

Check compression:

$P := w \cdot s \cdot \frac{l_1}{2}$ $P = 1.285 \cdot 10^3 \cdot lb$ (Maximum compressive force)

$f_c := \frac{P}{A}$ $f_c = 42.493 \cdot \frac{lb}{in^2}$ (Compressive stress)

$K_{cE} := 0.3$ (Factor for visually graded lumber)

$L_e := 5.0 \cdot ft$ (Effective column length in plane of lateral support)

$E' := E$ (Effective modulus of elasticity)

$F_{cE} := \frac{K_{cE} \cdot E'}{\left(\frac{L_e}{d}\right)^2}$ $F_{cE} = 3.277 \cdot 10^3 \cdot \frac{lb}{in^2}$ (Critical buckling design value)

$c := 0.8$ (Factor for sawn lumber)

$$F''_c := F'_c \cdot \left[\frac{1 + \left(\frac{F_{cE}}{F'_c}\right)}{2 \cdot c} - \sqrt{\left[\frac{1 + \left(\frac{F_{cE}}{F'_c}\right)}{2 \cdot c} \right]^2 - \frac{\frac{F_{cE}}{F'_c}}{c}} \right]$$

$F''_c = 751.524 \cdot \frac{lb}{in^2}$ (Allowable design compressive stress parallel to grain)

Check combined bending and compression:

$$\left(\frac{f_c}{F''_c}\right)^2 + \frac{f_b}{F'_b \cdot \left[1 - \left(\frac{f_c}{F_{cE}}\right)\right]} = 0.832$$

Summary: The first member not connected to the concrete is slightly overstressed in bending, combined bending and compression, and shear. However, beam members immediately above will be well within the allowable stress limits.

Determine size and spacing of crosswall members:

Center stoplog support:

From the attached CFRAME program results:

$M := 4311 \cdot ft \cdot lb$ (Maximum moment)

$R := 5125 \cdot lb$ (Maximum shear)

Try an 8"x8" nominal size timber.

Check bending:

$b := 7.5 \cdot in$ (Actual width of member)

$d := 7.5 \cdot in$ (Actual depth of member)

$S := \frac{b \cdot d^2}{6}$ $S = 70.313 \cdot in^3$ (Section modulus)

$f_b := \frac{M}{S}$ $f_b = 735.744 \cdot \frac{lb}{in^2}$ (Bending stress)

Check shear:

$$w_b := (h_f - h_b) \cdot u_{wat} + (h_s - h_b) \cdot (u_{sat} - u_{wat}) \cdot k_a$$

$w_b = 758 \cdot lb \cdot ft^{-2}$ (Pressure at the base where maximum shear occurs)

$d_b := 5.5 \cdot in$ (Depth of the bottom perpendicular member)

$tw := 4.67 \cdot ft$ (Tributary width for the center support)

$V := R - w_b \cdot d_b \cdot tw$ $V = 3.503 \cdot 10^3 \cdot lb$ (Design shear)

$A := b \cdot d$ $A = 56.25 \cdot in^2$ (Cross-sectional area)

$f_v := 1.5 \cdot \frac{V}{A}$ $f_v = 93.402 \cdot \frac{lb}{in^2}$ (Shear stress)

Summary: Although the member is slightly overstressed in shear, the steel beam used for the stoplog guides will provide additional support.

Compression braces between stoplog wall and back wall:

From CFRAME program results:

$P := 5125 \cdot lb$ (Compressive force)

Try a 4"x4" nominal size timber.

$b := 3.5 \cdot in$ (Actual width of member)

$d := 3.5 \cdot in$ (Actual depth of member)

$A := b \cdot d$ $A = 12.25 \cdot in^2$ (Cross-sectional area)

$f_c := \frac{P}{A}$ $f_c = 169.421 \cdot \frac{lb}{in^2}$

Summary: Based on review of the above calculation for allowable compressive stress, the actual stress is significantly lower than the allowable.

Determine the size of the stoplog members:

Try 4"x4" nominal size timbers:

Check bending:

$b := 1 \cdot ft$ (Effective width of continuously stacked members)

$d := 3.5 \cdot in$ (Actual depth of member)

$S := \frac{b \cdot d^2}{6}$ $S = 24.5 \cdot in^3$ (Section modulus)

$$w := (h_f - h_b - 0.5 \cdot ft) \cdot u_{wat} + (h_s - h_b - 0.5 \cdot ft) \cdot (u_{sat} - u_{wat})$$

$w = 902.5 \cdot lb \cdot ft^{-2}$ (Average pressure on the bottom 1 foot)

$l := 4 \cdot ft$ (Span between stoplog guides)

$M := \frac{w \cdot l^2}{8} \cdot 1 \cdot ft$ $M = 1.805 \cdot 10^3 \cdot lb \cdot ft$ (Maximum moment)

$f_b := \frac{M}{S}$ $f_b = 781.127 \cdot \frac{lb}{in^2}$ (Bending stress)

Check shear:

$V := w \cdot \frac{l}{2} \cdot 1 \cdot ft$ $V = 1.805 \cdot 10^3 \cdot lb$

$A := b \cdot d$ $A = 30.25 \cdot in^2$

$f_v := \frac{1.5 \cdot V}{A}$ $f_v = 89.504 \cdot \frac{lb}{in^2}$

Determine the minimum bearing length required for stop logs:

$l_b := \frac{V}{F'_{cL} \cdot 1 \cdot ft}$ $l_b = 0.423 \cdot in$ (Minimum bearing length required)

Summary: The bottom stoplog members are slightly overstressed in shear. However, members above will be well within the allowable limits.

Determine the maximum span for 2 layers of 3/4" marine plywood:

Assume S-2 grade stress level, species group 1.
Properties for marine plywood based on table 7.7 & 7.8 of ref.:

$F_b := 1190$ (Allowable bending stress for wet condition - lb/in^2)

$F_s := 63$ (Allowable rolling shear stress for wet condition - lb/in^2)

Dimensional properties for 3/4" sanded panel from table 7.6 of ref.:

$KS := 0.464$ (Effective section modulus - in^3/ft)

$I_{bQ} := 6.189$ (Rolling shear constant - in^2/ft)

Check span based on bending for a 3 span condition (ref. section 7.7.2) with span direction parallel with the grain:

$$w := \left(h_f - h' - \frac{s}{2}\right)\cdot u_{wat} + \left(h_s - h' - \frac{s}{2}\right)\cdot\left(u_{sat} - u_{wat}\right)\cdot k_a$$

$w = 574.557 \cdot lb \cdot ft^{-2}$ (Average uniform load over 3 spans)

$$l_1 := \sqrt{\frac{120 \cdot F_b \cdot KS}{\frac{w}{2}\cdot 1 \cdot \frac{ft^2}{lb}}} \cdot 1 \cdot in \qquad l_1 = 15.187 \cdot in \qquad \text{(Max. c-to-c spacing)}$$

Check span based on rolling shear for a 3 span condition (ref. section 7.7.2) with span direction parallel with the grain:

$$l_2 := \frac{20 \cdot F_s \cdot I_{bQ}}{\frac{w}{2}\cdot 1 \cdot \frac{ft^2}{lb}} \cdot 1 \cdot in \qquad l_2 = 27.145 \cdot in \qquad \text{(Max. clear spacing)}$$

Summary: The span of the plywood is within the allowable limits.

Determine the spacing of 2"x6" nominal size members for the platform over the weir:

Assume spruce-pine-fir, standard grade.

Properties:

$F_b := 550 \cdot \frac{lb}{in^2}$ (Allowable bending stress w/o adjustment)

$F_v := 70 \cdot \frac{lb}{in^2}$ (Allowable shear stress w/o adjustment)

Adjustment factors:

$C_F := 1.0$ (Size factor)

$C_r := 1.0$ (Repetitive member factor)

$C_{fu} := 1.0$ (Flat-use factor)

$C_M := 1.0$ (Wet service factor)

$C_H := 1.0$ (Shear stress factor)

Adjusted properties:

$F'_b := F_b \cdot C_F \cdot C_r \cdot C_{fu} \cdot C_M$ $\quad F'_b = 550 \cdot \frac{lb}{in^2}$ (Adjusted allow. bend. stress)

$F'_v := F_v \cdot C_M \cdot C_H$ $\quad F'_v = 70 \cdot \frac{lb}{in^2}$ (Adjusted allow. shear stress)

Try 20" spacing. Bracing will be provided by the flooring.

Check bending:

$u := 50 \cdot \frac{lb}{ft^2}$ (Platform loading pressure)

$s := 20 \cdot in$ (Spacing between members)

$l := 5 \cdot ft$ (Span)

$M := \frac{u \cdot s \cdot l^2}{8}$ $M = 260.417 \cdot lb \cdot ft$ (Moment)

$b := 1.5 \cdot in$ (Actual width of member)

$d := 5.5 \cdot in$ (Actual depth of member)

$S := \frac{b \cdot d^2}{6}$ $S = 7.563 \cdot in^3$ (Section modulus)

$f_b := \frac{M}{S}$ $f_b = 413.223 \cdot \frac{lb}{in^2}$ (Bending stress)

Check shear:

$V := u \cdot s \cdot \frac{l}{2}$ $V = 208.333 \cdot lb$ (Shear)

$A := b \cdot d$ $A = 8.25 \cdot in^2$ (Actual cross-sectional area)

$f_v := \frac{1.5 \cdot V}{A}$ $f_v = 37.879 \cdot \frac{lb}{in^2}$ (Bending stress)

Summary: The bending and shear stress are within the allowable limits.

Determine the size and spacing of the flooring:

Try 2"x4" nominal size members placed in the weak direction at 5" o.c. for flooring.

Check bending:

$l := 20 \cdot in$ (Span)

$s := 5 \cdot in$ (Spacing)

$M := \frac{s \cdot u \cdot l^2}{10}$ $M = 5.787 \cdot lb \cdot ft$ (Moment for a continuous member)

$b := 3.5 \cdot in$ (Actual width of member)

$d := 1.5 \cdot in$ (Actual depth of member)

$S := \frac{b \cdot d^2}{6}$ $S = 1.312 \cdot in^3$ (Section modulus)

$f_b := \frac{M}{S}$ $f_b = 52.91 \cdot \frac{lb}{in^2}$

Check shear:

$V := u \cdot s \cdot \frac{l}{2}$ $V = 17.361 \cdot lb$ (Shear)

$A := b \cdot d$ $A = 5.25 \cdot in^2$ (Cross sectional area)

$f_v := \frac{1.5 \cdot V}{A}$ $f_v = 4.96 \cdot \frac{lb}{in^2}$ (Shear stress)

Summary: The bending and shear stress are within the allowable limits.

Determine size of walkway beams:

Bracing will be provided by the flooring.

Try 2 - 2"x10" nominal size members of the same species and grade as for the platform.

$l := 15 \cdot ft$ (Span of walkway)

$wd := 30 \cdot in$ (Width of walkway)

$u := 50 \cdot \frac{lb}{ft^2}$ (Design loading pressure)

$M := \frac{u \cdot \frac{wd}{2} \cdot l^2}{8}$ $M = 1.758 \cdot 10^3 \cdot lb \cdot ft$ (Moment)

$b := 1.5 \cdot in$ (Actual width of member)

$d := 9.25 \cdot in$ (Actual depth of member)

$S := \frac{b \cdot d^2}{6} \cdot 2$ $S = 42.781 \cdot in^3$ (Section modulus)

$f_b := \frac{M}{S}$ $f_b = 493.061 \cdot \frac{lb}{in^2}$ (Bending stress)

Check shear:

$V := u \cdot \frac{wd}{2} \cdot \frac{l}{2}$ $V = 468.75 \cdot lb$ (Shear)

$A := b \cdot d \cdot 2$ $\quad A = 27.75 \cdot in^2$ (Cross sectional area)

$f_v := 1.5 \cdot \frac{V}{A}$ $\quad f_v = 25.338 \cdot \frac{lb}{in^2}$ (Shear stress)

Summary: The bending and shear stress are within the allowable limits.

Use same flooring system as for platform. By inspection, the size and spacing of members is adequate even though the span is greater.

Determine the size of the concrete slab needed to resist uplift.

$L := 9.67 \cdot ft$ (Base length of weir box)

$W := 6 \cdot ft$ (Base width of weir box)

$D := h_f - h_b$ $\quad D = 10 \cdot ft$ (Submerged depth of weir box)

$V := L \cdot W \cdot D$ $\quad V = 580.2 \cdot ft^3$ (Volume of water displaced by weir box)

$Wt_{req} := V \cdot u_{wat}$ $\quad Wt_{req} = 3.626 \cdot 10^4 \cdot lb$ (Resistance force required)

$L_1 := 13.5 \cdot ft$ (Length of the concrete slab)

$W_1 := 9.5 \cdot ft$ (Width of the concrete slab)

$D_1 := 3 \cdot ft$ (Depth of the concrete slab)

$u_c := 150 \cdot \frac{lb}{ft^3}$ (Unit weight of concrete)

$F_c := L_1 \cdot W_1 \cdot D_1 \cdot (u_c - u_{wat})$ $\quad F_c = 3.367 \cdot 10^4 \cdot lb$ (Resisting force by concrete)

$h_{fill} := 4.5 \cdot ft$ (Height of dredge fill above concrete)

$$F_{so} := \left[\left[(L_1 - L) \cdot W_1 \right] + \left[(L_1 - 2 \cdot W_1) \cdot \frac{W_1 - W}{2} \right] \right] \cdot h_{fill} \cdot (u_{sat} - u_{wat})$$

$F_{so} = 5.72 \cdot 10^3 \cdot lb$ (Resisting force by overburden soil)

Shearing earth pressure resistance

$\theta := 30 \cdot deg$ (shearing angle)

$$A := \left[(2 \cdot h_{fill} \cdot \tan(\theta) + L_1) \cdot (2 \cdot h_{fill} \cdot \tan(\theta) + W_1) \right] - (L_1 \cdot W_1)$$

$A = 146.512 \cdot ft^2$ (plan area of shearing resistance)

$V := \frac{A}{2} \cdot h_{fill}$ $V = 329.651 \cdot ft^3$ (soil volume of shearing resistance)

$F_{ss} := (u_{sat} - u_{wat}) \cdot V$ $F_{ss} = 1.566 \cdot 10^4 \cdot lb$

$F_t := F_c + F_{so} + F_{ss}$ $F_t = 5.504 \cdot 10^4 \cdot lb$ (total resisting force)

$FS_b := \frac{F_t}{Wt_{req}}$ $FS_b = 1.518$ (factor of safety for buoyancy)

Summary: The factor of safety meets the requirements of ETL 1110-2-307.

Determine the size and number of fasteners for the side member connections:

Try 4 - 5/8" diameter lag screws for connection into the vertical members.

$Z_L := 610 \cdot lb$ (From tbl. 5.15,allow. lateral load perp. to grain w/o adjustment)

$C_M := 0.67$ (Adjustment for wet service)

$C_D := 1.15$ (Adjustment for load duration)

$C_t := 1.0$ (Adjustment for temperature)

$Z'_L := Z_L \cdot C_M \cdot C_D \cdot C_t$ $Z'_L = 470.005 \cdot lb$ (Allow. lat. load with adjustments)

$n := 4$ (Number of fasteners)

$F_L := Z'_L \cdot n$ $F_L = 1.88 \cdot 10^3 \cdot lb$ (Connection capacity)

Try 4 - 5/8" diameter through-bolts, countersunk on the exterior side for connection into the horizontal side members.

$Z_L := 580 \cdot lb$ (From tbl. 5.20, allow. lateral load perp. to grain w/o adjust.)

$Z'_L := Z_L \cdot C_M \cdot C_D \cdot C_t$ $Z'_L = 446.89 \cdot lb$ (Allow. lat. load with adjustments)

$n := 4$ (Number of fasteners)

$F_L := Z'_L \cdot n$ $F_L = 1.788 \cdot 10^3 \cdot lb$ (Connection capacity)

Summary: The support reaction is 1607 lb. for the bottom most member not connected to the concrete. The bolt capacity is therefore sufficient.

Determine the size and number of concrete anchor bolts needed to resist uplift of weir box:

The total length of timber to be bolted down is approximately 23 ft. With 2 ft on center spacing, the number of anchor bolts would be 12.

Try 3/4" diameter expansion head anchors with 4.75" embedment in 3000 psi concrete.

From the Hilti Product Technical Guide, 3/4" Kwik Bolt II expansion anchors have an allowable tensile load of 4130 lb. which provides a total capacity of 49,560 lb.

Summary: The total allowable anchor bolt capacity is greater than the uplift force of 36,260 lb.

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1*-*-*-*-*-*-*-*-*-*-*-*-*-*-*
 PROGRAM CFRAME V02.05 24JUL84
 *-*-*-*-*-*-*-*-*-*-*-*-*-*-*


 RUN DATE = 96/ 8/22
 RUN TIME = 11.32.58


  CROSWAL


1 *** JOINT DATA ***

                                -----------------FIXITY------------------
 JOINT      X         Y      X  Y  R      KX          KY          KR
           --- FT ---                     ---LB   / IN---     IN-LB /RAD

    1       .00       .00   *  *
    2       .00      5.00
    3      2.38       .00      *
    4      2.38      5.00
    5      4.75       .00      *
    6      4.75      5.00
    7      7.13       .00      *
    8      7.13      5.00
    9      9.50       .00      *
   10      9.50      5.00


1 *** MEMBER DATA ***

        END END
 MEMBER  A   B    LENGTH      I          A         AS         E          G
```

			FT	FT**4	FT**2	FT**2	PSI	PSI
1	1	2	5.00	.1251E+02	.1225E+02	.1225E+02	.1300E+07	.5000E+06
2	3	-4	5.00	.1251E+02	.1225E+02	.1225E+02	.1300E+07	.5000E+06
3	5	-6	5.00	.1251E+02	.1225E+02	.1225E+02	.1300E+07	.5000E+06
4	7	-8	5.00	.1251E+02	.1225E+02	.1225E+02	.1300E+07	.5000E+06
5	9	10	5.00	.1251E+02	.1225E+02	.1225E+02	.1300E+07	.5000E+06
6	-2	4	2.38	.2637E+03	.5625E+02	.5625E+02	.1300E+07	.5000E+06
7	4	6	2.38	.2637E+03	.5625E+02	.5625E+02	.1300E+07	.5000E+06
8	6	8	2.38	.2637E+03	.5625E+02	.5625E+02	.1300E+07	.5000E+06
9	8	-10	2.38	.2637E+03	.5625E+02	.5625E+02	.1300E+07	.5000E+06
10	-1	-4	5.54	.2080E+02	.8250E+01	.8250E+01	.1300E+07	.5000E+06
11	-9	-8	5.54	.2080E+02	.8250E+01	.8250E+01	.1300E+07	.5000E+06

1 *** LOAD CASE 1

MEMBER	LA FT	PA LB / FT	LB FT	PB LB / FT	ANGLE DEG
6	.00	.3540E+04	2.38	.2588E+04	.00
7	.00	.2588E+04	2.38	.1637E+04	.00
8	.00	.1637E+04	2.38	.7290E+03	.00
9	.00	.7290E+03	2.38	.0000E+00	.00

1 LOAD CASE 1

STRUCTURE REACTIONS

JOINT	FORCE X LB	FORCE Y LB	MOMENT FT-LB
1	.0000E+00	.5125E+04	.0000E+00
3	.0000E+00	.4607E+04	.0000E+00
5	.0000E+00	.3481E+04	.0000E+00
7	.0000E+00	.2078E+04	.0000E+00
9	.0000E+00	.6785E+03	.0000E+00
TOTAL	.0000E+00	.1597E+05	

1

MEMBER END FORCES

MEMBER	LOAD CASE	JOINT	AXIAL LB	SHEAR LB	MOMENT FT-LB	MOMENT EXTREMA FT-LB	LOCATION FT
1	1	1	-.5125E+04	.0000E+00	.0000E+00	.0000E+00	.00
		2	-.5125E+04	.0000E+00	.0000E+00	.0000E+00	.00
2	1	3	-.4607E+04	.0000E+00	.0000E+00	.0000E+00	.00
		4	-.4607E+04	.0000E+00	.0000E+00	.0000E+00	.00
3	1	5	-.3481E+04	.0000E+00	.0000E+00	.0000E+00	.00
		6	-.3481E+04	.0000E+00	.0000E+00	.0000E+00	.00
4	1	7	-.2078E+04	.0000E+00	.0000E+00	.0000E+00	.00
		8	-.2078E+04	.0000E+00	.0000E+00	.0000E+00	.00
5	1	9	-.6785E+03	.0000E+00	.0000E+00	.0000E+00	.00
		10	-.6785E+03	.0000E+00	.0000E+00	.0000E+00	.00
6	1	2	.0000E+00	.5125E+04	.0000E+00	.3942E+04	1.57

		4	.0000E+00	.2152E+04	.3083E+04	.0000E+00	.00
7	1	4	.0000E+00	.2455E+04	.3083E+04	.4311E+04	1.04
		6	.0000E+00	.2562E+04	.2508E+04	.2508E+04	2.37
8	1	6	.0000E+00	.9185E+03	.2508E+04	.2778E+04	.62
		8	.0000E+00	.1891E+04	.9262E+03	.9262E+03	2.37
9	1	8	.0000E+00	.1871E+03	.9262E+03	.9511E+03	.28
		10	.0000E+00	.6785E+03	.0000E+00	.0000E+00	2.37
10	1	1	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.00
		4	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.00
11	1	9	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.00
		8	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.00

PROJECT: NYS CANAL CORPORATION DREDGINGS DISPOSAL
LOCATION: SYRACUSE, NY
COMPUTATIONS FOR: BAFFLE WALL DESIGN
COMPUTED BY: JOHN HUBERT
DATE: 10/29/96

Determine the design wind pressure:

Reference: ANSI minimum design loads for buildings and other structures

Basic wind speed for Syracuse = 70 mph

$k_z := 0.37$ (from table 6 for exposure B)

$I := 0.95$ (from table 5 for category I)

$V := 70$ (wind speed in mph)

$q_z := 0.00256 \cdot k_z \cdot (I \cdot V)^2 \cdot 1 \cdot \frac{lb}{ft^2}$ $q_z = 4.189 \cdot lb \cdot ft^{-2}$ (velocity pressure)

$G_h := 1.35$ (assumed gust response factor for a flexible structure under exposure B)

$C_f := 1.2$ (from table 13 for solid signs)

$f := q_z \cdot G_h \cdot C_f$ $f = 6.786 \cdot lb \cdot ft^{-2}$ (design wind pressure)

Determine the unit loading due to wind:

$h_1 := 23 \cdot ft$ (top of baffle sheet elevation)

$h_2 := 8.0 \cdot ft$ (bottom of baffle sheet elevation)

For sizing of the wire rope, assume that it transfers half of the wind load on the baffle material

$l_w := \frac{(h_1 - h_2) \cdot f}{2}$ $l_w = 50.893 \cdot lb \cdot ft^{-1}$ (wind loading resisted by the wire rope)

Determine the vertical unit load due to the weight of the baffle material:

$w_b := 43 \cdot \frac{oz}{yd^2}$ (unit weight of the baffle material)

$l_b := \frac{(h_1 - h_2) \cdot 1 \cdot ft \cdot w_b}{1 \cdot ft}$ $l_b = 4.479 \cdot lb \cdot ft^{-1}$ (unit load of baffle material)

Wire rope data:

Wire rope type: 6x19 IWRC of galvanized improved plow steel

$D := 0.25 \cdot in$ (nominal diameter of wire rope)

$T_{max} := 5300 \cdot lb$ (breaking strength of the wire rope)

$$l_r := 0.116 \cdot \frac{lb}{ft}$$ (weight per foot of wire rope)

$$F := 0.0000136 \cdot \frac{in^2}{lb}$$ (factor for determining elastic stretch)

Determine the unit vector load due to dead load and wind load:

$$l_{max} := \sqrt{l_w^{\,2} + \left(l_b + l_r\right)^2} \qquad l_{max} = 51.1 \cdot lb \cdot ft^{-1}$$

Determine the sag and change in length under maximum allowed tension at zero degrees Fahrenheit:

Reference: TM 5-811-1 Electric Power Supply and Distribution

$$T_1 := 0.6 \cdot T_{max} \qquad T_1 = 3.18 \cdot 10^3 \cdot lb$$ (allowable tensile force)

$$L := 20 \cdot ft$$ (span between poles)

$$d_1 := \frac{l_{max} \cdot L^2}{8 \cdot T_1} \qquad d_1 = 0.803 \cdot ft$$ (sag for stage 1)

$$\Delta L_1 := \frac{8 \cdot d_1^{\,2}}{3 \cdot L} \qquad \Delta L_1 = 0.086 \cdot ft$$ (change in length for stage 1)

Determine wire rope tension and change in L after removal of the wind load at 0 degrees Fahrenheit:

$$d_2 := 0.17 \cdot ft$$ (assumed stage 2 sag after unloading)

$$T_2 := \frac{\left(l_b + l_r\right) \cdot L^2}{8 \cdot d_2} \qquad T_2 = 1.352 \cdot 10^3 \cdot lb$$ (tension for stage 2)

$$\Delta L_2 := \frac{8 \cdot d_2^{\,2}}{3 \cdot L} \qquad \Delta L_2 = 0.004 \cdot ft$$ (change in length for stage 2)

Reference: Macwhyte Wirerope Catalog of Tables, Data, and Helpful Information

$$\Delta e := \frac{\left(T_1 - T_2\right)}{D^2} \cdot F \qquad \Delta e = 0.398$$ (change in elastic stretch, % of length)

$$\Delta L_{1\_2} := \frac{\Delta e}{100} \cdot L \qquad \Delta L_{1\_2} = 0.08 \cdot ft$$ (change in length due to unloading)

$$\Delta L_1 - \Delta L_2 = 0.082 \cdot ft$$ (This matches the above value, therefore assumed sag is correct)

Determine wire rope tension and change in length without wind load at 60 degrees Fahrenheit:

Reference: TM 5-811-1 Electric Power Supply and Distribution

$$\Delta T := 60 \cdot deg$$ (change in temperature)

$X := 0.0000065 \cdot deg^{-1}$ (thermal expansion coefficient)

$\Delta L_T := X \cdot \Delta T \cdot L$ $\Delta L_T = 0.008 \cdot ft$ (change in length due to temperature)

$\Delta L_3 := \Delta L_2 + \Delta L_T$ $\Delta L_3 = 0.012 \cdot ft$ (change in length for stage 3)

$d_3 := \sqrt{\frac{3 \cdot L \cdot \Delta L_3}{8}}$ $d_3 = 0.296 \cdot ft$ (sag for stage 3)

$T_3 := \frac{(l_b + l_r) \cdot L^2}{8 \cdot d_3}$ $T_3 = 777.169 \cdot lb$ (tension for stage 3)

Determine the required pole size:

$M := \frac{f \cdot L \cdot (h_1 - h_2)^2}{2}$ $M = 1.527 \cdot 10^4 \cdot lb \cdot ft$ (moment at ground due to wind)

Assume that the wood type for the poles is Southern pine.

$f_a := 1850 \cdot \frac{lb}{in^2}$ (allowable bending stress from table 11.8)

$S_m := \frac{M}{f_a}$ $S_m = 99.036 \cdot in^3$ (min. required section modulus at ground)

$C_g := \left(\frac{4 \cdot S_m}{\pi}\right)^{\frac{1}{3}} \cdot 2 \cdot \pi$ $C_g = 31.507 \cdot in$ (min. required circumference at ground)

$\phi := \frac{C_g}{\pi}$ $\phi = 10.029 \cdot in$ (min. required diameter at ground)

Determine minimum embedment depth for a maximum deflection of 6" at the top of the pole:

Reference: "Principles of Foundation Engineering" by Braja Das

Check as a laterally loaded pile embedded in soft-very soft clay.

$M_g := M$ (moment at ground level)

$Q_g := f \cdot L \cdot (h_1 - h_2)$ $Q_g = 2.036 \cdot 10^3 \cdot lb$ (lateral force on pile)

$E_p := 1500000 \cdot \frac{lb}{in^2}$ (wood modulus of elasticity)

$D := 10 \cdot in$ (diameter of pole)

$I_p := \frac{\pi \cdot D^4}{64}$ $I_p = 490.874 \cdot in^4$ (moment of inertia of pole)

$E_s := 250 \cdot \frac{lb}{in^2}$ (Young's modulus for soft-very soft clay)

$\mu_s := 0.35$ (Poisson's ratio of the soil)

$k := 0.65 \cdot \left(\frac{E_s \cdot D^4}{E_p \cdot I_p} \right)^{\frac{1}{12}} \cdot \frac{E_s}{1 - \mu_s^2}$ $k = 115.304 \cdot \frac{lb}{in^2}$ (constant for subgrade reaction)

$R := \left(\frac{E_p \cdot I_p}{k} \right)^{\frac{1}{4}}$ $R = 4.189 \cdot ft$ (characteristic length)

Determine pile deflection at ground level and at the bottom of the pole

Try $L := 10 \cdot ft$ (depth of embedment)

$Z_{max} := \frac{L}{R}$ $Z_{max} = 2.387$ (maximum ratio of length to characteristic length)

From figure 8.31, the following constants are obtained at 0' depth

$A_x := 1.6$ $B_x := 1.1$

$x_1 := \frac{A_x \cdot Q_g \cdot R^3}{E_p \cdot I_p} + \frac{B_x \cdot M_g \cdot R^2}{E_p \cdot I_p}$ $x_1 = 1.254 \cdot in$ (deflection at ground level)

From figure 8.31, the following constants are obtained at 10' depth

$A_x := -0.5$ $B_x := -0.9$

$x_2 := \frac{A_x \cdot Q_g \cdot R^3}{E_p \cdot I_p} + \frac{B_x \cdot M_g \cdot R^2}{E_p \cdot I_p}$ $x_2 = -0.742 \cdot in$

Determine the deflection at the top of the pole due to soil displacement:

$x := x_1 + (h_1 - h_2) \cdot \frac{x_1 - x_2}{L}$ $x = 4.246 \cdot in$

Check overall deflection due to pole bending and soil displacement:

$b := 7.5 \cdot ft$ (center of wind force distance above the ground)

$\Delta_{max} := \frac{Q_g \cdot b^2}{6 \cdot E_p \cdot I_p} \cdot \left[3 \cdot \left(h_1 - h_2\right) - b\right]$ $\Delta_{max} = 1.68 \cdot in$ (pole bending defl.)

$x_{tot} := x + \Delta_{max}$ $x_{tot} = 5.926 \cdot in$ (total deflection at pole top)

Use 10" diameter poles with 10' embedment depth.

Determine guy wire size and arrangement for the end poles:

Assume that 2 guy wires are used to brace each end pole.

$f := \frac{T_1}{2}$ $f = 1.59 \cdot 10^3 \cdot lb$ (horizontal longitudinal force per each guy wire)

$\alpha := 30 \cdot deg$ (angle between guy wire and longitudinal baffle wall alignment)

$\theta := 45 \cdot deg$ (angle between guy wire and the ground)

$F := \frac{\frac{f}{\cos(\alpha)}}{\cos(\theta)}$ $F = 2.596 \cdot 10^3 \cdot lb$ (max. tension in each guy wire)

$F_{br} := \frac{F}{0.6}$ $F_{br} = 4.327 \cdot 10^3 \cdot lb$ (min. required breaking strength of guy wire)

Use 1/4" diameter, galvanized 6x19 IWRC of improved plow steel which has a nominal breaking strength of 5,300 lbs.

$E_p := 57000 \cdot \sqrt{f_c} \cdot 1 \cdot \sqrt{\frac{lb}{in^2}}$ $E_p = 4.496 \cdot 10^8 \cdot lb \cdot ft^{-2}$ (concrete modulus of elasticity)

$d := 2 \cdot ft$ (diameter of concrete)

$I_p := \frac{\pi \cdot d^4}{64}$ $I_p = 0.785 \cdot ft^4$ (moment of inertia of concrete)

$n_h := 4000 \cdot \frac{lb}{ft^3}$ (From Terzaghi - constant of modulus of horizontal subgrade reaction)

$T := \left(\frac{E_p \cdot I_p}{n_h}\right)^{0.2}$ $T = 9.754 \cdot ft$ (characteristic length of soil-pile system)

Determine pile deflection and soil pressure at the location of mamimum movement (1' depth)

From table 8.12, the following constants are obtained at 1' depth

$A_x := 2.435$ $B_x := 1.623$ $A_p := -0.227$ $B_p := -0.145$

$x_1 := \frac{A_x \cdot Q_g \cdot T^3}{E_p \cdot I_p} + \frac{B_x \cdot M_g \cdot T^2}{E_p \cdot I_p}$ $x_1 = 0.02 \cdot ft$ (deflection)

$p_1 := \frac{A_p \cdot Q_g}{T} + \frac{B_p \cdot M_g}{T^2}$ $p_1 = -70.65 \cdot lb \cdot ft^{-1}$ (soil reaction)

Assuming a conservative coefficient of 1, determine the available passive pressure

$D := 1.0 \cdot ft$

$\gamma_{sat} := 100 \cdot \frac{lb}{ft^3}$ (saturated unit weight of soil)

$\gamma_w := 62.5 \cdot \frac{lb}{ft^3}$ (unit weight of water)

$k_p := 1.0$ (passive pressure coefficient)

$P_p := D \cdot (\gamma_{sat} - \gamma_w) \cdot k_p \cdot d$ $P_p = 75 \cdot lb \cdot ft^{-1}$ (passive force)

Available passive force is greater than the soil reaction, therefore ok

Determine soil pressure at the bottom of the concrete

From table 8.12, the following constants are obtained at 5' depth

$A_p := -0.822 \qquad B_p := -0.436$

$$p_5 := \frac{A_p \cdot Q_g}{T} + \frac{B_p \cdot M_g}{T^2} \qquad p_5 = -241.539 \cdot lb \cdot ft^{-1}$$ (soil reaction)

Assuming a conservative coefficient of 1, determine the available passive pressure

$D := 5 \cdot ft$ (depth below ground at mid-point of bottom 1')

$\gamma_{sat} := 100 \cdot \frac{lb}{ft^3}$ (saturated unit weight of soil)

$\gamma_w := 62.5 \cdot \frac{lb}{ft^3}$ (unit weight of water)

$k_p := 1.0$ (passive pressure coefficient)

$$P_p := D \cdot (\gamma_{sat} - \gamma_w) \cdot k_p \cdot d \qquad P_p = 375 \cdot lb \cdot ft^{-1}$$ (passive force)

Available passive force is greater than the soil reaction, therefore ok

Determine guy wire size and arrangement for the end poles:

Assume that 2 guy wires are used to brace each end pole.

$f := \frac{T_1}{2} \qquad f = 1.59 \cdot 10^3 \cdot lb$ (horizontal longitudinal force per each guy wire)

$\alpha := 30 \cdot deg$ (angle between guy wire and longitudinal baffle wall alignment)

$\theta := 45 \cdot deg$ (angle between guy wire and the ground)

$$F := \frac{\frac{f}{\cos(\alpha)}}{\cos(\theta)} \qquad F = 2.596 \cdot 10^3 \cdot lb$$ (max. tension in each guy wire)

$$F_{br} := \frac{F}{0.6} \qquad F_{br} = 4.327 \cdot 10^3 \cdot lb$$ (min. required breaking strength of guy wire)

Use 1/4" diameter, galvanized 6x19 IWRC of improved plow steel which has a nominal breaking strength of 5,300 lbs.

INNER HARBOR DREDGING DESIGN PROJECT
SYRACUSE,NY

APPENDIX C

WIER DESIGN
FOR
REHABILITATION OF THE UPLAND DISPOSAL SITE
UDS 5-19

ONONDAGA UDS
SYRACUSE, NEW YORK
ONONDAGA LAKE UDS

APPENDIX C - WEIR DESIGN

1. Guidelines presented in EM 1110-2-5027 "Confined Disposal of Dredged Material" was utilized for the attached analysis.

2. The following data has been used:
   a. The ponding area available is 3.52 acres.
   b. At least two feet of height will be available at the weir for ponding depth.
   c. The resuspension factor (RF) for ponding depth of 2 feet and area less than 100 acres is 1.5.
   d. The settling curve used for this analysis was derived from data contained in the results of a column settling test conducted by "Engineering and Environment, Inc", October 1995.
   e. From information obtained directly from the NYS Thruway Authority, the dredging plant to be used has a 15 inch outlet pipe and the work schedule will probably be a one 8 hour shift per day.

3. It is recommended that the baffle presently depicted on the plan remain in place with the opening on the end so that the length to width ratio can be maximized.

4. Results:
   Ponding depth =2 ft. Effluent=240 mg/l weir length=8ft.
   Ponding depth =3 ft. Effluent=195 mg/l weir length=8ft.
   Note: A weir length of 8 feet is a minimum length. If the existing 4ft. x 4ft. box could be rebuilt, this would also be satisfactory.

5. The existing outlet works consist of 4-15 inch CMP's. These pipes remain intact and are large enough to pass the necessary discharge.

15 inch pump outlet use 18.5 CFS (EM 1110-2-5027)

Operation will be based on one 8 hr. shift

Average discharge per day = $\frac{8}{24}(18.5) = 6.2$ CFS

H_{fb} = free board = 2.0 ft
Q_i = average daily discharge = 6.2 CFS
H_{pd} = allowable ponding depth = 2.0 ft + 3.0 ft
A = acres = 3.52
RF = resuspension factor = 1.5
Length of travel = 500 + 280 = 780 ft
Width = 100 ft

$$T = \frac{(A)(H_{pd})(12.1)}{Q} = \frac{(3.52)(2)(12.1)}{6.2} = 13.7 \text{ hours}$$

$$\frac{1}{HFCF} = 0.9\left[1-\exp\left(-.3\ L/w\right)\right] = .9\left[1-\exp\left(-.3\ 780/100\right)\right]$$

$= .81$

HFCF = 1.23

$$T_d = \frac{T}{HFCF} = \frac{13.7}{1.23} = 11.1 \text{ hours}$$

$T_d = 11.1$ from Fig 2 $C_{col} = 160$ mg/l

$C_{eff} = C_{col}\,(RF) = (160)(1.5) = 240$ mg/l

Weir Length:

$Q_i = 6.2$ CFS
Zone Settling occurs
$H_{pd} = 2.0$ ft

From Fig 3 ⇒ weir length ≈ 8 ft

For $H_{pd} = 3$ ft

$$T = \frac{(A)(H_{pd})(12.1)}{Q} = \frac{(3.52)(3)(12.1)}{6.2} = 20.6 \text{ hours}$$

$$T_d = \frac{T}{HECF} = \frac{20.6}{1.23} = 16.7 \text{ hours}$$

From Fig 2: $C_{col} = 130$ mg/l

$$C_{eff} = (C_{col})(RF) = (130)(1.5) = 195 \text{ mg/l}$$

Weir length would decrease only slightly

12+00
13+00
14+00
15+00
16+00
17+00
18+00
19+00
20+00
21+00
Pump Station
outfall
280'
TRENCH #5
TRENCH #4
UDS 5-19
TRENCH #3
TRENCH #2
TRENCH #1
VAN RENSSELAER ST.

Fig 1

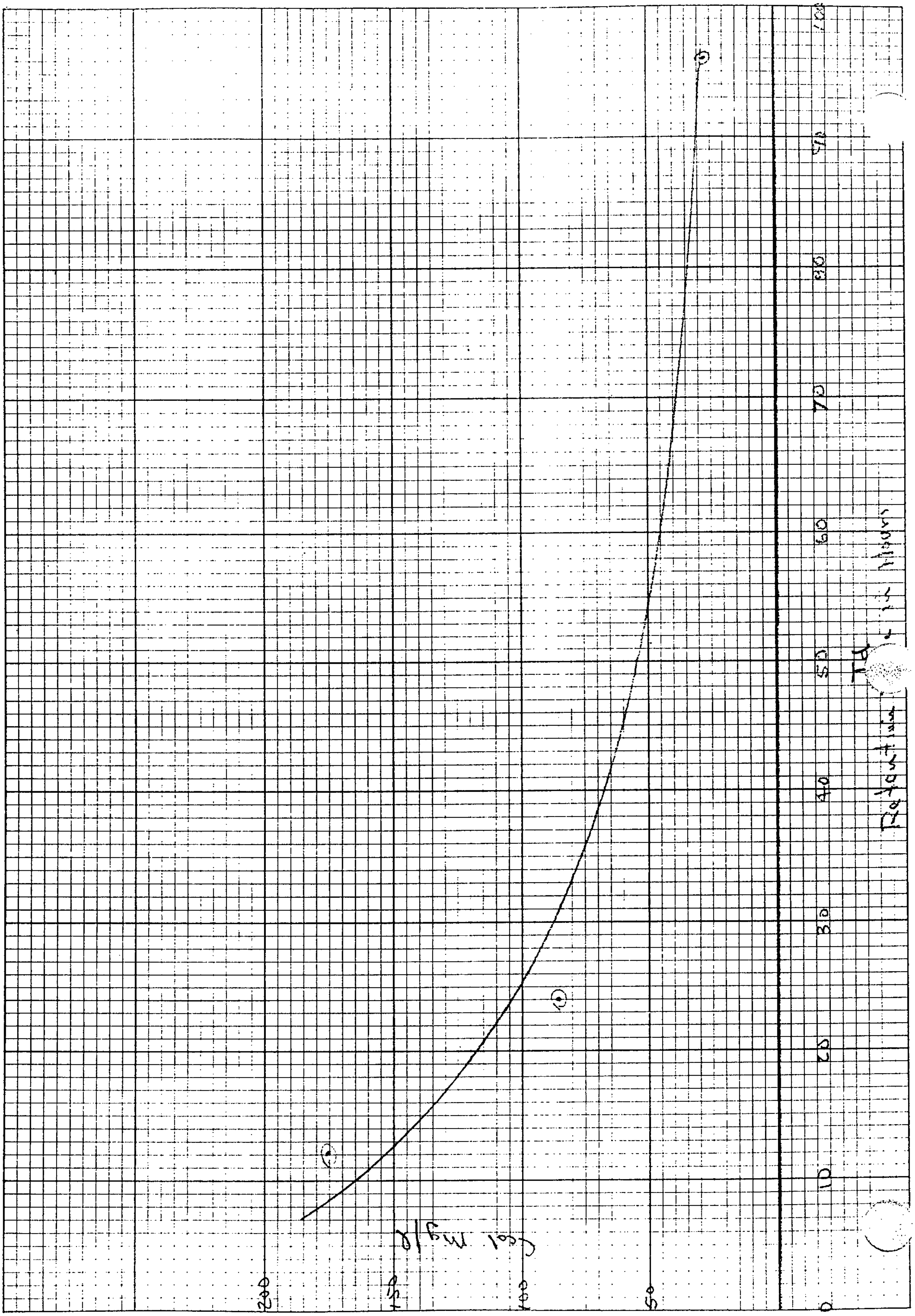
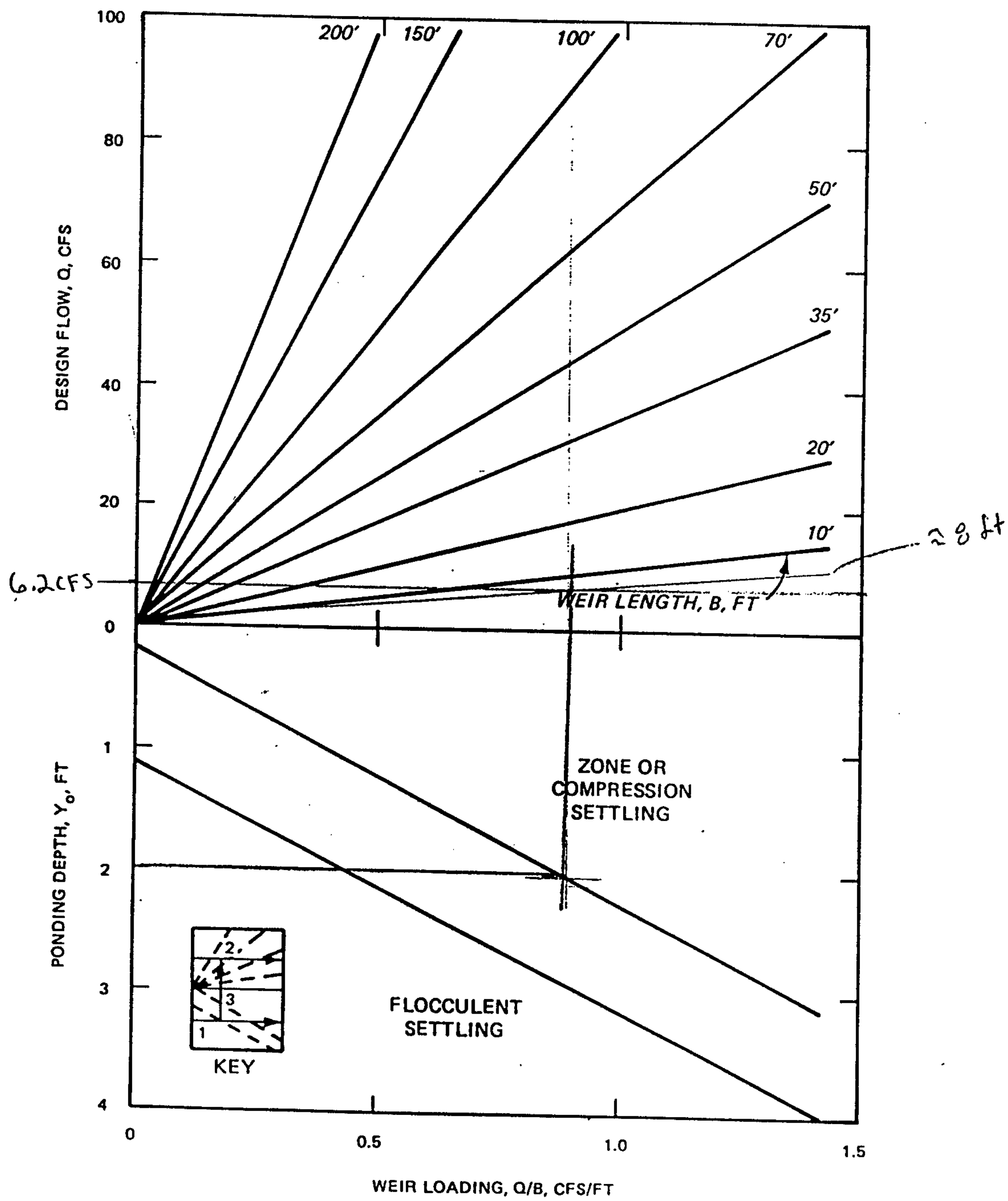

Cod mg/l
200
150
100
50
0
Retention Time in hours
0
10
20
30
40
50
60
70
80
90
100

Fig 2



Weir design nomograph

Fig 3

Onondaga Confined Disposal Area

Operational Manual

The disposal area analysis was performed per *Confined Disposal of Dredged Material*, Engineering Manual 1110-2-5027, US Army corps of Engineers, September 1987, using a minimum ponding depth of 2 feet (recommended by manual). This depth is the water column depth in which water discharge over the weir would be withdrawn from. This would represent the conditions at the very end of the use of the disposal area. The weir is designed to have a full 3-foot ponding depth at full capacity. To standardize the ponding depth, it will be taken as the water depth to the top of the weir boards. This is the minimum depth to be maintained. A larger depth could be maintained if desirable.

The table below presents the design water retention rate (settling times) for various ponding depths and dredging production rates (length of dredging per day).

Settling Times

	Production Rate				
Ponding Depth	8 hours	7 hours	6 hours	5 hours	4 hours
2 feet	11 hours	13 hours	15 hours	18 hours	22 hours
3 feet	17 hours	19 hours	23 hours	27 hours	33.5 hours
4 feet	22 hours	26 hours	30 hours	36 hours	48 hours

Settling tests show a settling time of approximately 24 hours is needed to meet state water quality standards. For the operating life of the disposal area, the ponding depth should be maintained to produce the 24 hours of settling. For example, at a production rate of 6 hours a day, a ponding depth of approximately at a level of 3.25 feet as a minimum should be maintained during the disposal operation. The table below gives the minimum weir board depth to produce the desired settling with various production rates.

	Production Rate - Hours								
	8	7.5	7	6.5	6	5.5	5	4.5	4
Weir Board Depth- Feet	4.25	4	3.75	3.5	3.25	3	2.75	2.5	2.25

If sufficient settling is achieved at a lower ponding depth and/or a higher production, then these parameters could be used. If there is insufficient settling, the production rate can be limited to give greater settling rates.

INNER HARBOR DREDGING DESIGN PROJECT
SYRACUSE,NY

APPENDIX D

WATER & SEDIMENT TECHNICAL APPENDIX

APPENDIX D

Water and Sediment Technical Appendix

Part 1
Onondaga Inlet Sediment Chemistry

Part 2
Settling Sediment Water Chemistry

Part 3
Disposal Area Soil Chemistry

The following data reporting qualifiers are used in the tables.

U - indicates compound was analyzed for but not detected. The sample quantitation limit is corrected for dilution and for percent moisture.

J - indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed, or when the mass spectral data indicate the presence of a compound that meets the identification criteria but the result is less than the sample quantitation limit but greater than zero.

N - indicates presumptive evidence of a compound. This flag is only used for tentatively identified compounds, where the identification is based on a mass spectral library search. It is applied to all TIC results. For generic characterization of a TIC, such as chlorinated hydrocarbon, the N code is not used.

P - This flag is used for a pesticide/Aroclor target analyte when there is greater than 25 % difference for detected concentrations between the two GC columns. The lower of the two values is reported, flagged with a "P".

C - This flag applies to pesticide results where the identification has been confirmed by GC/MS.

B - This flag is used when the analyte is found in the associated blank as well as the sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action. This flag must be used for a TIC as well as for a positively identified target compound.

E - This flag identifies compounds whose concentrations exceed the calibration range of the GC/MS instrument for that specific analysis. If one or more compounds have a response greater than full scale, the sample or extract must be diluted and re-analyzed according to the specifications in scale should have the concentration flagged with an "E" on the form for the original analysis with exceptions noted. If the dilution of the extract causes any compounds identified in the first analysis to be below the calibration range in the second analysis, then the results of both analyses shall be reported on separate forms. The form for the diluted sample have the "DL" suffix appended to the sample number.

D - This flag identifies all compounds identified in an analysis at a secondary dilution factor. If a sample or extract is reanalyzed at a higher dilution factor, as in the "E" flag above, the "DL" suffix is appended to the sample number for the diluted sample, and all concentration values reported are flagged with the "D" flag.

A - This flag indicates that a TIC is a suspected aldol-condensation product.

X - Estimated value only. This flag is used when surrogate and associated spike recoveries are outside control limits.

Y - This flag indicates that the surrogate % recoveries can not be calculated due to dilution.

Part 1

Onondaga Inlet Sediment Chemistry

ONONDAGA INLET SEDIMENT CHEMISTRY

Ten sediment sampling locations as shown in Figure D-1-1 were sampled by coring to represent the sediment in the Barge Canal Terminal area, Onondaga Lake Inlet, Syracuse, NY. Originally, the sediment cores were to be divided into two parts representing the upper portion of the sediment to be dredged and the lower sediment to be left in place. Because of core recovery problems and because many sampling sites yielded consistently similar material throughout the core and failed to yield a distinctive underlying lower sediment unit, only those cores showing a distinct lower layer were sampled for lower unit chemistry. Due to the homogenous nature of the upper unit sediments, it was decided that TCLP and elutriate testing would be conducted only at every other location (Stations #1, 3, 5, 7, & 9). In order to obtain a sufficient volume of sediment for chemical and physical testing, several adjacent cores were collected from each location. The sediment cores were vibrated to refusal. Because of sediment loss, sediment compaction, and sediment recovery problems, refusal was taken as a known location. Sample locations are given in Figure D-1-1. The core depths are illustrated in Figure D-1-2.

A visual description of the sediments is given in Table D-1-2. Sediment particle size distribution is presented in Table D-1-3. Other sediment physical parameters are given in Table D-1-4. Volatile organic compound analyses are presented in Table D-1-5. Semi-volatile organic compound analyses are given in Table D-1-6. Pesticide and PCB analyses are exhibited in Table D-1-7, while metals and inorganic parameter testing is displayed in Table D-1-8, and dioxin analysis is shown in Table D-1-9. Table D-1-10 shows petroleum hydrocarbon analyses.

Onondaga Inlet Inner Harbor sediments are highly polluted and only suitable for disposal in a secured confined disposal facility or a licensed landfill. The sediments have elevated levels of heavy metals and PAHs and low levels of PCBs and the chlorinated pesticides DDD, DDE, and DDT. Very low levels of para-dioxin (2, 3, 7, 8 TCDD) wer measured.

The TCLP results are shown in Tables D-1-11 to D-1-14. TCLP tests were conducted to ascertain if any of the sediments exhibited the Resource Conservation Recovery Act (RCRA) toxicity characteristics. The data show very little leaching of toxic constituents under the stringent acid-leaching conditions of the TCLP leaching procedure and are far below the regulatory standards. Disposal of sediments is therefore not subject to RCRA regulation.

Elutriate analysis results are presented in Tables D-1-15 and D-1-16. Elutriate analytical analyses indicate the degree the tested parameters would become desorbed from the sediment and dissolved into the water. Very low concentrations (ppb) of heavy metals were found in the water. This shows most of the contaminants are associated with the sediments in the water.

New York State Department of Environment Conservation's testing results for polychlorinated dioxin/furan isomers for Stations 5 & 7 are shown on pages D-1-28 through D-1-35. Low levels of dioxin and furans were detected.

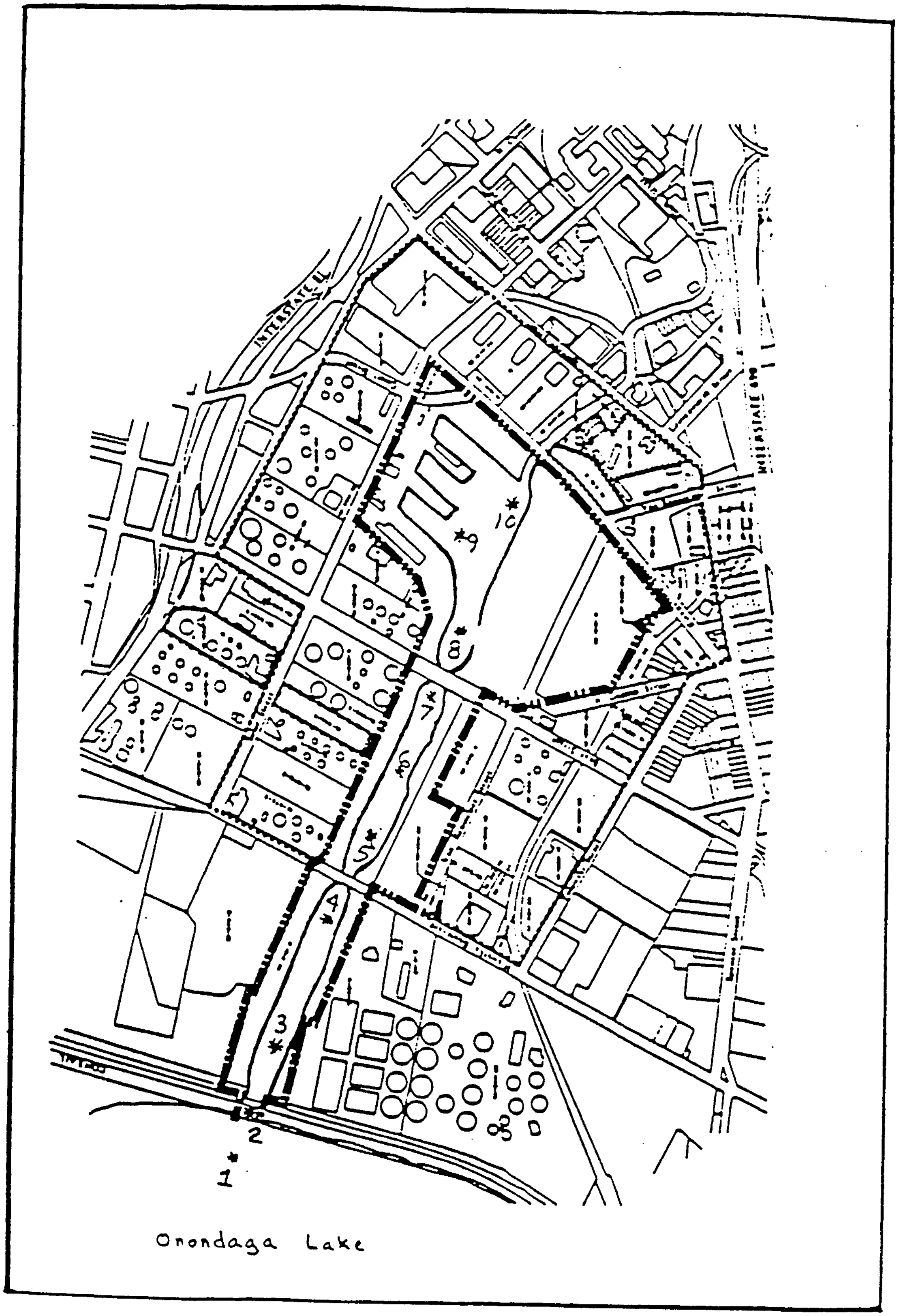


Figure D-1-1 ONONDAGA LAKE - BARGE CANAL TERMINAL SEDIMENT SAMPLING SITES

Table D-1-1

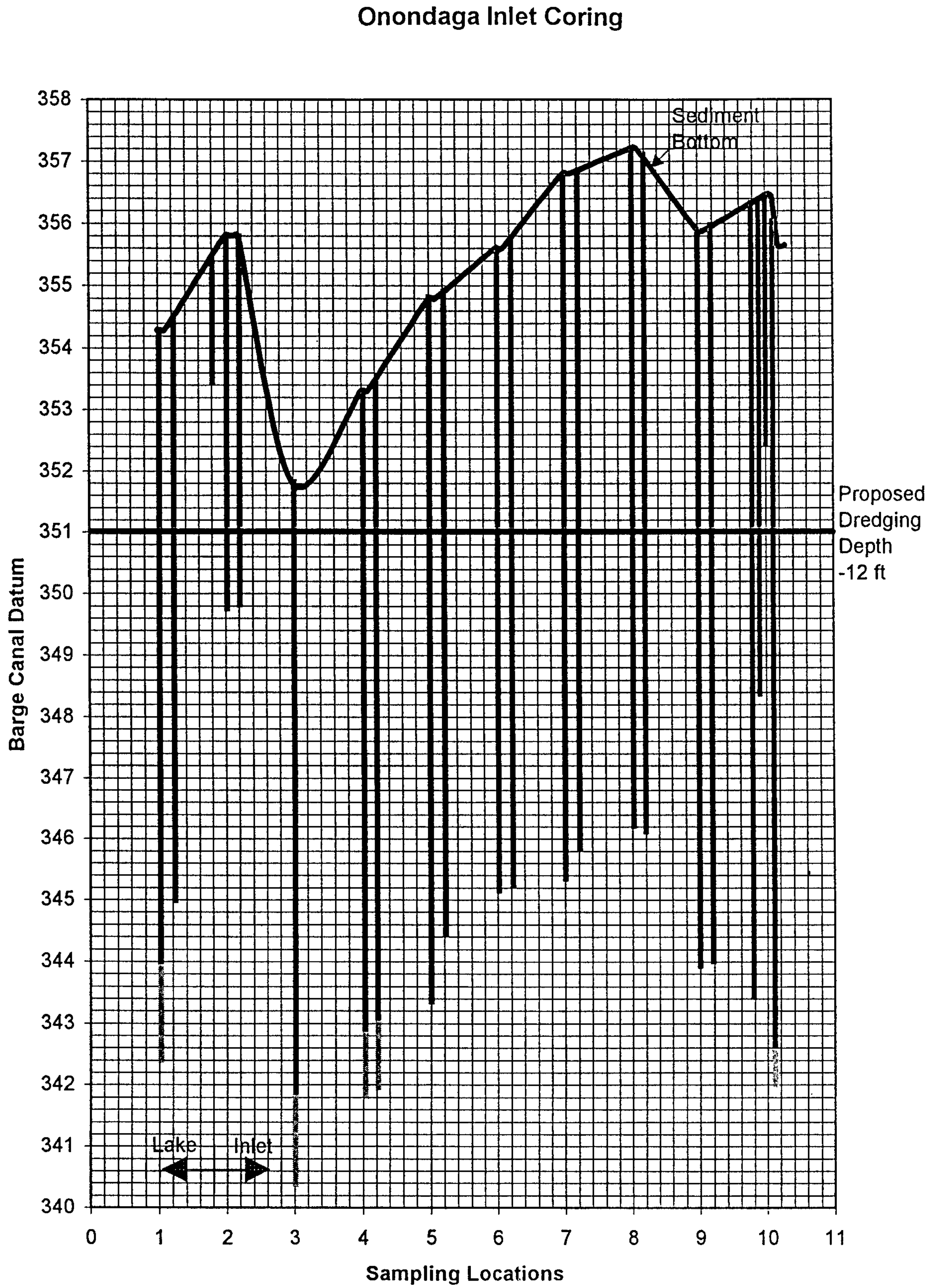
US ARMY COE - ONONDAGA LAKE
SEDIMENT SAMPLING

Location	Core Run ID	Length (ft)	Core Returned (ft)	Length of Section		Elevation Sediment (ft) top/break/bottom	Water Depth (ft)	GPS Coordinates	Calculated Core Thickness (WL-363) + (12-WD)+3 (ft)
				Upper (ft)	Lower (ft)				
1	1a 1b	12' 9.5'	5'1" 3'11"	3'8" 3'11"	1'5" –	354.3/343.8/342.3 354.3/–/344.8	10.0'	N 43°04'5.5 W 76°10'45.3	6.3'
2	2a 2b 2c	2' 6' 6'	2.0' 2.0' 2.0'	2.0' 2.0' 2.0'	– – –	355.8/–/353.8 355.8/–/349.8 355.8/–/349.8	8.0'	N 43°04'6.7 W 76°10'42.2	7.8'
3	3	11.5'	5.0'	3.5'	1.5'	351.8/341.8/340.3	12.0'	N 43°04'2.1 W 76°10'32.6	3.8'
4	4a 4b	11.5' 11.5'	4.5' 5.0'	4.0' 4.0'	0.5' 1.0'	353.3/342.8/341.8 353.3/342.8/341.8	10.5'	N 43°03'57.7 W 76°10'26.2	5.3'
5	5a 5b	11.5' 10.5'	4.0' 4.0'	4.0' 4.0'	– –	354.8/–/343.3 354.8/–/344.3	9.0'	N 43°03'52.2 W 76°10'22.2	6.8'
6	6a 6b	10.5' 10.5'	4.5' 4.0'	4.5' 4.0'	– –	355.6/–/345.1 355.6/–/345.1	8.2'	N 43°03'49.2 W 76°10'14.4	7.6'
7	7a 7b	11.5' 11.0'	5.5' 5.0'	5.5' 5.0'	– –	356.8/–/345.3 356.8/–/345.8	7.0'	N 43°03'46.1 W 76°10'6.8	8.8'
8	8a 8b	11.0' 11.0'	5.0' 5.0'	5.0' 5.0'	– –	357.2/–/346.2 357.2/–/346.2	6.6'	N 43°03'43.5 W 76°10'4.8	9.2'
9	9a 9b	12.0' 12.0'	4.0' 2.0'	2.0' 2.0'	2.0' –	355.9/345.9/343.9 355.9/–/343.9	7.9'	N 43°03'42.5 W 76°09'53.5	7.9'
10	10a 10b	8.0' 8.0'	1.0' 5.0'	1.0' 5.0'	– –	356.45/–/343.45 356.45/–/348.45	7.1'	N 43°03'36.4 W 76°09'54.5	8.45'
	10c 10d	4.0' 14.0'	2.0' 4.5'	2.0' 4.0'	– 0.5'	355.65/–/351.65 355.65/342.15/341.65	7.9'	N 43°03'36.9 W 76°09'49.4	7.65'
TOTAL		215.5'	85.0'						79.6'

NOTES:
1. Lower unit core samples were collected from sample locations #1, 3, 4, 9. Locations 1 and 3 showed an abrupt transition to a tight, moist to dry, finely laminated light brown silty soil. The lower units at locations 4 and 9 showed a gradual transition to coarse sandy sediments with no apparent color change.

A duplicate sample was collected from sediment sampling location 8.
An MS/MSD sample was collected from sediment sampling location 1.

Figure D-1-2



Onondaga Inlet Coring
Sediment Bottom
Proposed Dredging Depth -12 ft
Barge Canal Datum
358
357
356
355
354
353
352
351
350
349
348
347
346
345
344
343
342
341
340
Lake
Inlet
0
1
2
3
4
5
6
7
8
9
10
11
Sampling Locations

Sediment Description

SJB SERVICES, INC.
Contract Drilling and Testing
1951-1 Hamburg Turnpike
Buffalo, NY 14218
Phone: (716) 821-5911
Fax: (716) 821-0163
P.O. BOX 515
New Holland, PA 17557
Phone: (717) 354-7389
Fax: (717) 354-7619

Table D-1-2

Laboratory Test Report

PROJECT : ONONDAGA LAKE - BRIDGE CANAL

CLIENT : ACRES INTERNATIONAL CORP.

DATE : SEPTEMBER 30, 1994

PROJECT NO.: SJB-D394
REPORT NO.: LTR-1

SAMPLE INFORMATION :
Sample Nos. 94-687 through 94-696 were received from the client at the SJB Services, Inc. Laboratory during the month of September 1994. Samples are described as sediment samples from Lake Onondaga in Syracuse, New York.

Visual Classification of Soil Samples

Laboratory Number	Acres Sample Location	Visual Description
94-687	#1	Br.-gr., sand & silt, trace of clay & gravel.
94-688	#2	Br.-gr., sand, little gravel, trace of silt & clay.
94-689	#3	Br.-gr., silt & clay.
94-690	#4	Br.-gr., silt, some clay, trace sand.
94-691	#5	Br.-gr., silt, some clay, trace sand.
94-692	#6	Br.-gr., silt, some clay, trace sand.
94-693	#7	Br.-gr., silt, little clay, trace sand.
94-694	#8	Br.-gr., silt, some clay, trace sand.
94-695	#9	Br.-gr., silt, some clay, trace sand.
94-696	#10	Br.-gr., silt, some sand & gravel, trace clay.

Sediment Particle Size Distribution

SJB SERVICES, INC.
Contract Drilling and Testing
1951-1 Hamburg Turnpike
Buffalo, NY 14218
Phone: (716) 821-5911
Fax: (716) 821-0163
P.O. BOX 515
New Holland, PA 17557
Phone: (717) 354-7389
Fax: (717) 354-7619

Table D-1-3

Laboratory Test Report

PROJECT : ONONDAGA LAKE - BRIDGE CANAL

CLIENT : ACRES INTERNATIONAL CORP.

DATE : SEPTEMBER 30, 1994

PROJECT NO.: SJB-D394
REPORT NO.: LTR-1

SAMPLE INFORMATION :
Sample Nos. 94-687 through 94-696 were received from the client at the SJB Services, Inc. Laboratory during the month of September 1994. Samples are described as sediment samples from Lake Onondaga in Syracuse, New York.

ASTM D-422 : Test Method for Particle Size Analysis of Soils

Laboratory Number	Acres Sample Location	PERCENT OF SAMPLE GRAVEL	SAND	SILT	CLAY
94-687	#1	0.8	46.2	43.3	9.7
94-688	#2	12.6	76.8	6.6	4.0
94-689	#3	0.0	0.8	55.9	43.3
94-690	#4	0.0	1.2	63.9	34.9
94-691	#5	0.0	6.9	66.3	26.8
94-692	#6	0.0	1.9	66.3	31.8
94-693	#7	0.0	5.6	76.2	18.2
94-694	#8	0.0	6.8	61.9	31.3
94-695	#9	0.0	2.2	77.3	20.5
94-696	#10	17.5	22.6	56.3	3.6

Other Physical Parameters

SJB SERVICES, INC.
Contract Drilling and Testing

1951-1 Hamburg Turnpike
Buffalo, NY 14218
Phone: (716) 821-5911
Fax: (716) 821-0163

P.O. BOX 515
New Holland, PA 17557
Phone: (717) 354-7389
Fax: (717) 354-7619

Table D-1-4

Laboratory Test Report

PROJECT : ONONDAGA LAKE - BRIDGE CANAL

CLIENT : ACRES INTERNATIONAL CORP.

DATE : SEPTEMBER 30, 1994

***PROJECT NO.:** SJB-D394*
***REPORT NO.:** LTR-1*

ASTM D4318 : Test method for liquid Limit, Plastic Limit, and Plasticity Index of Soils

Laboratory Number	Acres Sample Location	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
94-687	#1	NOT PLASTIC		
94-688	#2	NOT PLASTIC		
94-689	#3	35	28	7
94-690	#4	49	31	18
94-691	#5	47	32	15
94-692	#6	46	28	18
94-693	#7	47	31	16
94-694	#8	45	28	17
94-695	#9	47	31	16
94-696	#10	NOT PLASTIC		

SJB SERVICES, INC.

Contract Drilling and Testing

1951-1 Hamburg Turnpike
Buffalo, NY 14218

Phone: (716) 821-5911
Fax: (716) 821-0163

P.O. BOX 515
New Holland, PA 17557

Phone: (717) 354-7
Fax: (717) 354-

Table D-1-4

Laboratory Test Report

PROJECT : ONONDAGA LAKE - BRIDGE CANAL

CLIENT : ACRES INTERNATIONAL CORP.

DATE : SEPTEMBER 30, 1994

PROJECT NO.: SJB-D394
REPORT NO.: LTR-1

ASTM D854 : Test Method for Specific Gravity of Soils

Laboratory Number	Acres Sample Location	SPECIFIC GRAVITY AT 20°C
94-687	#1	2.62
94-688	#2	2.60
94-689	#3	2.75
94-690	#4	2.67
94-691	#5	2.70
94-692	#6	2.70
94-693	#7	2.73
94-694	#8	2.62
94-695	#9	2.59
94-696	#10	2.75

SJB Services, Inc.

Paul C. Gregorczyk
Laboratory Manager

Ray J. Kron
Testing Services Manager

Sediment Core Chemistry

Table D-1-5

ONONDAGA LAKE INLET (BARGE CANAL TERMINAL AREA)
SOIL ANALYTICAL DATA
Volatile Organics - Method SW-846, 8260

Customer Number	SS-1 UPPER		SS-2 UPPER		SS-3 UPPER		SS-4 UPPER		SS-5 UPPER		SS-6 UPPER		SS-7 UPPER		SS-8 UPPER		SS-9 UPPER		SS-10 UPPER		SS-1 LOWER		SS-3 LOWER		SS-9 LOWER	
NOVAMANN Number	10973		10988		10989		10990		10991		10992		10993		10994		10995		10996		10997		10998		11000	
Compound Names	Conc (ug/K	Q	Conc (ug/K	Q	Conc (ug/K	Q	Conc (ug/K	Q	Conc (ug/K	Q	Conc (ug/K	Q	Conc (ug/K	Q	Conc (ug/K	Q	Conc (ug/K	Q	Conc (ug/K	Q	Conc (ug/K	Q	Conc (ug/K	Q	Conc (ug/K	Q
1,1,1-Trichloroethane	1800	U	1700	U	1400	U	1900	U	1800	U	1800	U	1900	U	1900	U	1600	U	2000	U	1	U	1	U	1	U
1,1,2,2-Tetrachloroethane	3600	U	3400	U	2800	U	3800	U	3600	U	3600	U	3800	U	3800	U	3200	U	4000	U	2	U	2	U	2	U
1,1,2-Trichloroethane	3600	U	3400	U	2800	U	3800	U	3600	U	3600	U	3800	U	3800	U	3200	U	4000	U	2	U	2	U	2	U
1,1-Dichloroethane	1800	U	1700	U	1400	U	1900	U	1800	U	1800	U	1900	U	1900	U	1600	U	2000	U	1	U	1	U	1	U
1,1-Dichloroethene	1800	U	1700	U	1400	U	1900	U	1800	U	1800	U	1900	U	1900	U	1600	U	2000	U	1	U	1	U	1	U
1,2-Dichloroethane	1800	U	1700	U	1400	U	1900	U	1800	U	1800	U	1900	U	1900	U	1600	U	2000	U	1	U	1	U	1	U
1,2-Dichloroethene (Total)	1800	U	1700	U	1400	U	2200		1800	U	1800	U	1900	U	1900	U	1600	U	2000	U	1	U	1	U	1	U
1,2-Dichloropropane	1800	U	1700	U	1400	U	1900	U	1800	U	1800	U	1900	U	1900	U	1600	U	2000	U	1	U	1	U	1	U
1,3-Dichloropropene(E)	1800	U	1700	U	1400	U	1900	U	1800	U	1800	U	1900	U	1900	U	1600	U	2000	U	1	U	1	U	1	U
1,3-Dichloropropene(Z)	1800	U	1700	U	1400	U	1900	U	1800	U	1800	U	1900	U	1900	U	1600	U	2000	U	1	U	1	U	1	U
2-Butanone	29000		20000	J	11000	J	16000	J	16000	J	20000	J	10000	J	14000	J	14000	J	11000	J	24		47		15	U
2-Hexanone	18000	U	17000	U	14000	U	19000	U	18000	U	18000	U	19000	U	19000	U	16000	U	20000	U	10	U	10	U	10	U
4-Methyl-2-Pentanone	18000	U	17000	U	14000	U	19000	U	18000	U	18000	U	19000	U	19000	U	16000	U	20000	U	10	U	10	U	10	U
Acetone	27000	U	25500	U	21000	U	28500	U	27000	U	27000	U	28500	U	28500	U	24000	U	30000	U	280		270		15	U
Benzene	900	U	390	J	320	J	410	J	900	U	900	U	950	U	950	U	800	U	1000	U	1.4		2.8		0.5	U
Bromodichloromethane	3600	U	3400	U	2800	U	3800	U	3600	U	3600	U	3800	U	3800	U	3200	U	4000	U	2	U	2	U	2	U
Bromoform	3600	U	3400	U	2800	U	3800	U	3600	U	3600	U	3800	U	3800	U	3200	U	4000	U	2	U	2	U	2	U
Bromomethane	3600	U	3400	U	2800	U	3800	U	3600	U	3600	U	3800	U	3800	U	3200	U	4000	U	2	U	2	U	2	U
Carbon Disulfide	18000	U	17000	U	14000	U	19000	U	18000	U	18000	U	19000	U	19000	U	16000	U	20000	U	10	U	10	U	10	U
Carbon Tetrachloride	1800	U	1700	U	1400	U	1900	U	1800	U	1800	U	1900	U	1900	U	1600	U	2000	U	1	U	1	U	1	U
Chlorobenzene	2600		850	U	700	U	950	U	900	U	900	U	950	U	950	U	800	U	1000	U	0.5	U	0.5	U	0.5	U
Chloroethane	3600	U	3400	U	2800	U	3800	U	3600	U	3600	U	3800	U	3800	U	3200	U	4000	U	2	U	2	U	2	U
Chloroform	1800	U	1700	U	1400	U	1900	U	1800	U	1800	U	1900	U	1900	U	1600	U	2000	U	1	U	1	U	1	U
Chloromethane	3600	U	3400	U	2800	U	3800	U	3600	U	3600	U	3800	U	3800	U	3200	U	4000	U	2	U	2	U	2	U
Dibromochloromethane	1800	U	1700	U	1400	U	1900	U	1800	U	1800	U	1900	U	1900	U	1600	U	2000	U	1	U	1	U	1	U
Dichloromethane (Methylene	1800	U	1700	U	1400	U	1900	U	1800	U	1800	U	1900	U	1900	U	1600	U	2000	U	1	U	1	U	1	U
Ethyl Benzene	910		310	J	2900		470	J	900	U	900	U	950	U	950	U	800	U	1000	U	18		6.3		1.1	
Styrene	18000	U	17000	U	14000	U	19000	U	18000	U	18000	U	19000	U	19000	U	16000	U	20000	U	10	U	10	U	10	U
Tetrachloroethene	1800	U	1700	U	1400	U	1900	U	1800	U	1800	U	1900	U	1900	U	1600	U	2000	U	1	U	1	U	1	U
Toluene	1600		2200		680	J	1400		270	J	440	J	360	J	420	J	940		340	J	1.5		19		0.5	U
Total Xylenes	2700		900	J	3000		780	J	400	J	260	J	1900	U	680	J	1600	U	2000	U	34		10		5.3	
Trichloroethene	1800	U	1700	U	1400	U	460	J	1800	U	1800	U	1900	U	1900	U	1600	U	2000	U	1	U	1	U	1	U
Vinyl Acetate	3600	U	3400	U	2800	U	3800	U	3600	U	3600	U	3800	U	3800	U	3200	U	4000	U	2	U	2	U	2	U
Vinyl Chloride	3600	U	3400	U	2800	U	3800	U	3600	U	3600	U	3800	U	3800	U	3200	U	4000	U	2	U	2	U	2	U

Table

ONONDAGA LAKE INLET (BARG... TERMINAL AREA)
SOIL ANALYTICAL DATA
Semi-Volatile Organics - Method SW-846, 8270

Customer Number	SS-1 UPPER		SS-2 UPPER		SS-3 UPPER		SS-4 UPPER		SS-5 UPPER		SS-6 UPPER	
NOVAMANN Number	10973		10988		10989		10990		10991		10992	
Compound Names	Conc (ug/Kg	Q	Conc (ug/Kg	Q	Conc (ug/Kg	Q	Conc (ug/Kg	Q	Conc (ug/Kg	Q	Conc (ug/Kg	Q
1,2,4-Trichlorobenzene	6900	U	6900	U	8000	U	8000	U	8000	U	8000	U
1,2-Dichlorobenzene	6900	U	6900	U	8000	U	8000	U	8000	U	8000	U
1,3-Dichlorobenzene	6900	U	6900	U	8000	U	8000	U	8000	U	8000	U
1,4-Dichlorobenzene	6900	U	6900	U	8000	U	8000	U	8000	U	8000	U
2,4,5-Trichlorophenol	6900	U	6900	U	8000	U	8000	U	8000	U	8000	U
2,4,6-Trichlorophenol	6900	U	6900	U	8000	U	8000	U	8000	U	8000	U
2,4-Dichlorophenol	6900	U	6900	U	8000	U	8000	U	8000	U	8000	U
2,4-Dimethylphenol	6900	U	6900	U	8000	U	8000	U	8000	U	8000	U
2,4-Dinitrophenol	6900	U	6900	U	8000	U	8000	U	8000	U	8000	U
2,4-Dinitrotoluene	6900	U	6900	U	8000	U	8000	U	8000	U	8000	U
2,6-Dinitrotoluene	6900	U	6900	U	8000	U	8000	U	8000	U	8000	U
2-Chloronaphthalene	6900	U	6900	U	8000	U	8000	U	8000	U	8000	U
2-Chlorophenol	6900	U	6900	U	8000	U	8000	U	8000	U	8000	U
2-Methylnaphthalene	16000		1500	J	59000		1400	J	2200	J	1100	J
2-Methylphenol	6900	U	6900	U	8000	U	8000	U	8000	U	8000	U
2-Nitroaniline	34000	U	34000	U	40000	U	40000	U	40000	U	40000	U
2-Nitrophenol	6900	U	6900	U	8000	U	8000	U	8000	U	8000	U
3,3-Dichlorobenzidene	34000	U	34000	U	40000	U	40000	U	40000	U	40000	U
3-Nitroaniline	34000	U	34000	U	40000	U	40000	U	40000	U	40000	U
4,6-Dinitro-o-Cresol	34000	U	34000	U	40000	U	40000	U	40000	U	40000	U
4-Bromo Phenyl Phenyl Ether	6900	U	6900	U	8000	U	8000	U	8000	U	8000	U
4-Chloro Phenyl Phenyl Ether	6900	U	6900	U	8000	U	8000	U	8000	U	8000	U
4-Chloroaniline	34000	U	34000	U	40000	U	40000	U	40000	U	40000	U
4-Methylphenol	6900	U	6900	U	8000	U	8000	U	8000	U	8000	U
4-Nitroaniline	34000	U	34000	U	40000	U	40000	U	40000	U	40000	U
4-Nitrophenol	34000	U	34000	U	40000	U	40000	U	40000	U	40000	U
Acenaphthene	15000		1100	J	23000		6200	J	8000	U	8000	U
Acenaphthylene	6900	U	6900	U	8400		8000	U	8000	U	8000	U
Anthracene	17000		4600	J	20000		9400		1500	J	8000	U
Benzo(a)Anthracene	16000		14000		12000		9400		9000		6400	J
Benzo(a)Pyrene	12000		12000		8800		8200		9700		6600	J
Benzo(b)Fluoranthene	14000		17000		12000		13000		15028		11000	
Benzo(ghi)Perylene	6900	U	6900	U	8000	U	8000	U	8000	U	8000	U
Benzo(k)Fluoranthene	12000		7400		5200	J	5200	J	4600	J	3500	J
Bis(2-Chloroethoxy)Methane	6900	U	6900	U	8000	U	8000	U	8000	U	8000	U
Bis(2-Chloroethyl)Ether	6900	U	6900	U	8000	U	8000	U	8000	U	8000	U
Bis(2-Chloroisopropyl)Ether	6900	U	6900	U	8000	U	8000	U	8000	U	8000	U
Bis(2-Ethylhexyl)Phthalate	6400	JE	4800	JE	6600	JE	7600	JE	20000	B	12000	B
Butylbenzyl Phthalate	6900	U	6900	U	8000	U	8000	U	8000	U	8000	U
Chrysene	12000		11000		9400		6800	J	10200		6700	J
Di-N-Butylphthalate	6900	U	6900	U	8000	U	8000	U	8000	U	8000	U
Di-N-Octylphthalate	6900	U	6900	U	8000	U	8000	U	8000	U	8000	U
Dibenzo(a,h)Anthracene	6900	U	6900	U	8000	U	8000	U	8000	U	8000	U
Dibenzofuran	14000	U	14000	U	16000	U	16000	U	16000	U	16000	U
Diethyl Phthalate	6900	U	6900	U	8000	U	8000	U	8000	U	8000	U
Dimethyl Phthalate	17000	U	17000	U	20000	U	20000	U	20000	U	20000	U
Dimethylaniline	34000	U	34000	U	40000	U	40000	U	100	URE	100	URE
Fluoranthene	6900	U	25000		23000		20000		12000		7800	J
Fluorene	10400		3400	J	20000		7200	J	2000	J	8000	U
Hexachlorobenzene	6900	U	6900	U	8000	U	8000	U	8000	U	8000	U
Hexachlorobutadiene	6900	U	6900	U	8000	U	8000	U	8000	U	8000	U
Hexachlorocyclopentadiene	6900	U	6900	U	8000	U	8000	U	8000	U	8000	U
Hexachloroethane	6900	U	6900	U	8000	U	8000	U	8000	U	8000	U
Indeno(1,2,3-cd)Pyrene	6900	U	6900	U	8000	U	8000	U	8000	U	8000	U
Isophorone	34000	U	34000	U	40000	U	40000	U	40000	U	40000	U
N-Nitroso-di-n-propylamine	6900	U	6900	U	8000	U	8000	U	8000	U	8000	U
Naphthalene	10400		6900	U	4300	J	8600		8000	U	8000	U
Nitrobenzene	6900	U	6900	U	8000	U	8000	U	8000	U	8000	U
Nitrosodiphenylamine/Dipheny	6900	U	6900	U	8000	U	8000	U	8000	U	8000	U
p-Chloro-m-Cresol	6900	U	6900	U	8000	U	8000	U	8000	U	8000	U
Pentachlorophenol	34000	U	34000	U	40000	U	40000	U	40000	U	40000	U
Phenanthrene	54000		20000		65000		35000		9000		5600	J
Phenol	6900	U	6900	U	8000	U	8000	U	8000	U	8000	U
Pyrene	22000		10200		16000		7800	J	11000		7500	J

Customer Number	SS-7 UPPER		SS-8 UPPER		SS-9 UPPER		SS-10 UPPER		SS-1 LOWER		SS-3 LOWER		SS-9 LOWER	
NOVAMANN Number	10993		10994		10995		10996		10997		10998		11000	
Compound Names	Conc (ug/Kg	Q	Conc (ug/Kg	Q	Conc (ug/Kg	Q	Conc (ug/Kg	Q	Conc (ug/Kg	Q	Conc (ug/Kg	Q	Conc (ug/Kg	Q
1,2,4-Trichlorobenzene	8000	U	7000	U	4000	U	8000	U	1000	U	1000	U	800	U
1,2-Dichlorobenzene	8000	U	7000	U	4000	U	8000	U	1000	U	1000	U	800	U
1,3-Dichlorobenzene	8000	U	7000	U	4000	U	8000	U	1000	U	1000	U	800	U
1,4-Dichlorobenzene	8000	U	7000	U	4000	U	8000	U	1000	U	1000	U	800	U
2,4,5-Trichlorophenol	8000	U	7000	U	4000	U	8000	U	1000	U	1000	U	800	U
2,4,6-Trichlorophenol	8000	U	7000	U	4000	U	8000	U	1000	U	1000	U	800	U
2,4-Dichlorophenol	8000	U	7000	U	4000	U	8000	U	1000	U	1000	U	800	U
2,4-Dimethylphenol	8000	U	7000	U	4000	U	8000	U	1000	U	1000	U	800	U
2,4-Dinitrophenol	8000	U	7000	U	4000	U	8000	U	1000	U	1000	U	800	U
2,4-Dinitrotoluene	8000	U	7000	U	4000	U	8000	U	1000	U	1000	U	800	U
2,6-Dinitrotoluene	8000	U	7000	U	4000	U	8000	U	1000	U	1000	U	800	U
2-Chloronaphthalene	8000	U	7000	U	4000	U	8000	U	1000	U	1000	U	800	U
2-Chlorophenol	8000	U	7000	U	4000	U	8000	U	1000	U	1000	U	800	U
2-Methylnaphthalene	72000		7000	U	4000	U	76000		2400		620	J	800	U
2-Methylphenol	8000	U	7000	U	4000	U	8000	U	1000	U	1000	U	800	U
2-Nitroaniline	40000	U	35000	U	20000	U	40000	U	5000	U	5000	U	4000	U
2-Nitrophenol	8000	U	7000	U	4000	U	8000	U	1000	U	1000	U	800	U
3,3-Dichlorobenzidene	40000	U	35000	U	20000	U	40000	U	5000	U	5000	U	4000	U
3-Nitroaniline	40000	U	35000	U	20000	U	40000	U	5000	U	5000	U	4000	U
4,6-Dinitro-o-Cresol	40000	U	35000	U	20000	U	40000	U	5000	U	5000	U	4000	U
4-Bromo Phenyl Phenyl Ether	8000	U	7000	U	4000	U	8000	U	1000	U	1000	U	800	U
4-Chloro Phenyl Phenyl Ether	8000	U	7000	U	4000	U	8000	U	1000	U	1000	U	800	U
4-Chloroaniline	40000	U	35000	U	20000	U	40000	U	5000	U	5000	U	4000	U
4-Methylphenol	8000	U	7000	U	4000	U	8000	U	1000	U	2200		800	U
4-Nitroaniline	40000	U	35000	U	20000	U	40000	U	5000	U	5000	U	4000	U
4-Nitrophenol	40000	U	35000	U	20000	U	40000	U	5000	U	5000	U	4000	U
Acenaphthene	43000		7000	U	4000	U	53000		980	J	1000	U	800	U
Acenaphthylene	8000	U	7000	U	4000	U	4000	J	1000	U	1000	U	800	U
Anthracene	21000		7000	U	860	J	26000		1100		144	J	800	U
Benzo(a)Anthracene	29000		6400	J	5400		30000		3800		200	J	210	J
Benzo(a)Pyrene	20000		6100	J	5200		19000		2900		1000	U	220	J
Benzo(b)Fluoranthene	26000		10400		8600		21000		3700		1000	U	370	J
Benzo(ghi)Perylene	8000	U	7000	U	4000	U	8000	U	1000	U	1000	U	800	U
Benzo(k)Fluoranthene	7700	J	3500	J	3600	J	8200		1400		1000	U	800	U
Bis(2-Chloroethoxy)Methane	8000	U	7000	U	4000	U	8000	U	1000	U	1000	U	800	U
Bis(2-Chloroethyl)Ether	8000	U	7000	U	4000	U	8000	U	1000	U	1000	U	800	U
Bis(2-Chloroisopropyl)Ether	8000	U	7000	U	4000	U	8000	U	1000	U	1000	U	800	U
Bis(2-Ethylhexyl)Phthalate	17000	B	14000	B	12000	B	7100	JB	1000	UB	1000	UB	290	JB
Butylbenzyl Phthalate	8000	U	7000	U	4000	U	8000	U	1000	U	1000	U	800	U
Chrysene	26000		6800	J	6200		30000		3000		170	J	230	J
Di-N-Butylphthalate	8000	U	7000	U	4000	U	8000	U	1000	U	1000	U	800	U
Di-N-Octylphthalate	8000	U	7000	U	4000	U	8000	U	1000	U	1000	U	800	U
Dibenzo(a,h)Anthracene	8000	U	7000	U	4000	U	8000	U	1000	U	1000	U	800	U
Dibenzofuran	16000	U	14000	U	8000	U	2400	J	2000	U	2000	U	1600	U
Diethyl Phthalate	8000	U	7000	U	4000	U	8000	U	1000	U	1000	U	800	U
Dimethyl Phthalate	20000	U	17500	U	10000	U	20000	U	2500	U	2500	U	2000	U
Dimethylaniline	100	URE	35000	U	20000	U	40000	U	5000	U	5000	U	4000	U
Fluoranthene	28000		9000		8200		34000		2800		180	J	300	J
Fluorene	23000		7000	U	4000	U	30000		760	J	220	J	800	U
Hexachlorobenzene	8000	U	7000	U	4000	U	8000	U	1000	U	1000	U	800	U
Hexachlorobutadiene	8000	U	7000	U	4000	U	8000	U	1000	U	1000	U	800	U
Hexachlorocyclopentadiene	8000	U	7000	U	4000	U	8000	U	1000	U	1000	U	800	U
Hexachloroethane	8000	U	7000	U	4000	U	8000	U	1000	U	1000	U	800	U
Indeno(1,2,3-cd)Pyrene	8000	U	7000	U	4000	U	8000	U	1000	U	1000	U	800	U
Isophorone	40000	U	35000	U	20000	U	40000	U	5000	U	5000	U	4000	U
N-Nitroso-di-n-propylamine	8000	U	7000	U	4000	U	8000	U	1000	U	1000	U	800	U
Naphthalene	51000		7000	U	4000	U	52000		3600		500	J	800	U
Nitrobenzene	8000	U	7000	U	4000	U	8000	U	1000	U	1000	U	800	U
Nitrosodiphenylamine/Dipheny	8000	U	7000	U	4000	U	8000	U	1000	U	1000	U	800	U
p-Chloro-m-Cresol	8000	U	7000	U	4000	U	8000	U	1000	U	1000	U	800	U
Pentachlorophenol	40000	U	35000	U	20000	U	40000	U	5000	U	5000	U	4000	U
Phenanthrene	64000		3200	J	5200		73000		3000		580	J	152	J
Phenol	8000	U	7000	U	4000	U	8000	U	1000	U	1000	U	800	U
Pyrene	36000		7100		7000		46000		2900		250	J	280	J

NOVAMANN INTERNATIONAL

Table D-1-7

ONONDAGA LAKE INLET (BARGE CANAL TERMINAL AREA)
SOIL ANALYTICAL DATA
Pesticides - Method SW-846, 8081

Customer Number	SS-1 UPPER	SS-2 UPPER	SS-3 UPPER	SS-4 UPPER	SS-5 UPPER	SS-6 UPPER	SS-7 UPPER	SS-8 UPPER	SS-9 UPPER	SS-10 UPPER	SS-1 LOWER	SS-3 LOWER	SS-9 LOWER
NOVAMANN Number	10973	10988	10989	10990	10991	10992	10993	10994	10995	10996	10997	10998	11000
Compound Names	Conc (ug/Kg) Q	Conc (ug/Kg) Q	Conc (ug/Kg) Q	Conc (ug/Kg) Q	Conc (ug/Kg) Q	Conc (ug/Kg) Q	Conc (ug/Kg) Q	Conc (ug/Kg) Q	Conc (ug/Kg) Q	Conc (ug/Kg) Q	Conc (ug/Kg) Q	Conc (ug/Kg) Q	Conc (ug/Kg) Q
Aldrin	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2 U	10 U	10 U	2 U	2 U	2 U
Alpha-BHC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2 U	10 U	10 U	2 U	2 U	2 U
Alpha-Chlordane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2 U	10 U	10 U	2 U	2 U	2 U
Beta-BHC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2 U	10 U	10 U	2 U	2 U	2 U
Delta-BHC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2 U	10 U	10 U	2 U	2 U	2 U
Dieldrin	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2 U	10 U	10 U	2 U	2 U	2 U
Endosulfan I	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2 U	10 U	10 U	2 U	2 U	2 U
Endosulfan II	10 U	11	10 U	10 U	12	12	11	11	18	11	2 U	2 U	2 U
Endosulfan Sulfate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9	10 U	21	2 U	2 U	2 U
Endrin	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2 U	10 U	10 U	2 U	2 U	2 U
Endrin Aldehyde	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2 U	10 U	10 U	2 U	2 U	2 U
Endrin Ketone	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2 U	10 U	10 U	2 U	2 U	2 U
Gamma-BHC (Lindane)	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2 U	10 U	10 U	2 U	2 U	2 U
Gamma-Chlordane	10 U	10 U	11	10 U	10 U	10 U	16	20	10 U	15	2 U	2 U	2 U
Heptachlor	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2 U	10 U	10 U	2 U	2 U	2 U
Heptachlor Epoxide	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2 U	10 U	10 U	2 U	2 U	2 U
Methoxychlor	50 U	50 U	50 U	50 U	50 U	64	50 U	10 U	92	50 U	10 U	10 U	10 U
Polychlorinated Biphenyl - 1016	150 U	150 U	150 U	150 U	150 U	150 U	150 U	30 U	150 U	150 U	30 U	30 U	30 U
Polychlorinated Biphenyl - 1221	300 U	300 U	300 U	300 U	300 U	300 U	300 U	60 U	300 U	300 U	60 U	60 U	60 U
Polychlorinated Biphenyl - 1232	150 U	150 U	150 U	150 U	150 U	150 U	150 U	30 U	150 U	150 U	30 U	30 U	30 U
Polychlorinated Biphenyl - 1242	150 U	150 U	150 U	150 U	150 U	150 U	150 U	30 U	150 U	150 U	30 U	30 U	30 U
Polychlorinated Biphenyl - 1248	1250	150 U	150 U	150 U	150 U	150 U	150 U	30 U	150 U	150 U	30 U	30 U	30 U
Polychlorinated Biphenyl - 1254	150 U	150 U	150 U	150 U	150 U	150 U	150 U	30 U	150 U	150 U	30 U	30 U	30 U
Polychlorinated Biphenyl - 1260	150 U	150 U	150 U	150 U	150 U	150 U	150 U	30 U	150 U	150 U	30 U	30 U	30 U
PP'-DDD	10 U	10 U	10 U	20	10 U	12	26	37	26	10 U	2 U	2 U	2 U
PP'-DDE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2 U	10 U	10 U	2 U	2 U	2 U
PP'-DDT	10 U	10 U	16	20	10 U	10 U	19	2 U	10 U	24	2 U	2 U	2 U
Toxaphene	500 U	500 U	500 U	500 U	500 U	500 U	500 U	100 U	500 U	500 U	100 U	100 U	100 U

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Table D-1-8

ONONDAGA LAKE INLET (BARGE CANAL TERMINAL AREA)
SOIL ANALYTICAL DATA
Inorganic Parameters

Customer Number	SS-1 UPPER		SS2 UPPER		SS3 UPPER		SS4 UPPER		SS5 UPPER		SS6 UPPER		SS7 UPPER	
NOVAMANN Number	6860		6861		6862		6863		6864		6865		6866	
Compound Names	Conc (mg/Kg	Q	Conc (mg/Kg	Q	Conc (mg/Kg	Q	Conc (mg/Kg	Q	Conc (mg/Kg	Q	Conc (mg/Kg	Q	Conc (mg/Kg	Q
Zinc	384		391		168		199		186		208		179	
Phosphorus	1180		1210		735		856		66		82		717	
Lead	176		197		68.2		138		150		172		132	
Cadmium	13.0		10.3		1.28		5.40		3.77		4.87		1.92	
Nickel	35.0		25.1		29.3		34.3		38.4		42.1		34.6	
Barium	157		203		132		122		136		138		131	
Iron	10400		6700		22500		18600		19500		21200		18200	
Manganese	241		221		557		430		403		469		491	
Chromium	133		113		22.6		53.7		42.7		50.4		31.0	
Copper	123		118		71.1		88.5		73.1		74.0		75.0	
Silver	3.94		1.64		.665	U	2.07		2.76		2.93		2.01	
Sodium	2710		2320		1730		10000		648		2380		1000	
Sulphate	1330		754		509		463		1440		799		437	
Ammonia as N	580		101		194		226		266		198		387	
pH (pH units)	7.74		7.33		7.00		7.53		7.41		7.43		7.36	
TOC (WPCF/EPA 410.4)	71500		82400		33700		50600		44200		44900		41200	
Mercury	2.04		1.73		0.24		0.46		0.52		0.47		0.44	
Selenium	1	U	1		1	U	1	U	1		1	U	1	U
Arsenic	6		4		7		6		8		8		7	
COD	191000		220000		89900		135000		118000		120000		110000	
Oil and grease	266		642		50	U	194		406		217		218	
TKN	2460		1660		2790		2860		2800		2740		3200	
Sulphide	0.4	U	0.4	U	0.4	U	0.8		0.4	U	0.4	U	0.5	
Moisture	41.0		36.5		46.8		47.0		45.6		41.0		43.7	
Total Cyanide	0.129		0.794		0.051		0.372		0.103		0.118		0.317	
Volatile Solids	209000		188000		140000		197000		120000		157000		133000	
TOC (Leach-Combustion	51900		116000		19600		28500		35500		26500		29700	

Customer Number	SS8 UPPER		SS9 UPPER		SS10 UPPER		SS1 LOWER		SS3 LOWER		SS9 LOWER	
NOVAMANN Number	6867		6868		6869		6870		6871		6872	
Compound Names	Conc (mg/Kg	Q	Conc (mg/Kg	Q	Conc (mg/Kg	Q	Conc (mg/Kg	Q	Conc (mg/Kg	Q	Conc (mg/Kg	Q
Zinc	225		189		366		47.4		22.4		39.1	
Phosphorus	827		896		813		342		152		216	
Lead	182		124		147		17.5		3		8	
Cadmium	2.74		1.82		5.49		0.414		.285	U	.285	U
Nickel	38.2		36.0		160		11.2		6.90		12.2	
Barium	149		133		202		83.4		83.7		40.8	
Iron	20000		17900		18000		9720		6610		7670	
Manganese	497		449		403		229		184		248	
Chromium	41.8		31.9		49.8		8.23		4.55		6.29	
Copper	89.6		78.2		69.4		17.6		6.01		12.2	
Silver	3.50		2.70		2.80		.665	U	.665	U	.665	U
Sodium	1280		7860		13700		6980		22200		652	
Sulphate	771		1230		896		137		111		372	
Ammonia as N	316		398		191		323		119		8.1	
pH (pH units)	7.40		7.44		7.72		7.87		7.69		8.35	
TOC (WPCF/EPA 410.4)	39000		47600		46800		46100		44600		3780	
Mercury	0.43		0.41		0.53		0.11		0.05	U	0.05	U
Selenium	1	U	1	U	1		1	U	1	U	1	U
Arsenic	8		6		22		2		1		2	
COD	104000		127000		125000		123000		119000		10100	
Oil and grease	147		100		215		50	U	50	U	50	U
TKN	3240		3200		2050		2440		1320		197	
Sulphide	1.4		0.4	U	0.6		0.4	U	0.4	U	0.4	U
Moisture	45.0		48.9		40.4		39.7		37.2		15.0	
Total Cyanide	0.033		0.025	U	0.221		0.025	U	0.025	U	0.025	U
Volatile Solids	140000		185000		160000		135000		103000		42300	
TOC (Leach-Combustion	28200		31200		25400		16600		9800		6600	

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Table D-1-9

ONONDAGA LAKE INLET (BARGE CANAL TERMINAL AREA)
SOIL ANALYTICAL DATA
Dioxins - Method EPA 8290

Customer Number	SS-1 UPPER		SS-2 UPPER		SS-3 UPPER		SS-4 UPPER		SS-5 UPPER		SS-6 UPPER		SS-7 UPPER		SS-8 UPPER		SS-9 UPPER		SS-10 UPPER		SS-1 LOWER		SS-3 LOWER		SS-9 LOWER	
NOVAMANN Number	10973		10988		10989		10990		10991		10992		10993		10994		10995		10996		10997		10998		11000	
Compound Names	Conc (ppt)	Q	Conc (ppt)	Q	Conc (ppt)	Q	Conc (ppt)	Q	Conc (ppt)	Q	Conc (ppt)	Q	Conc (ppt)	Q	Conc (ppt)	Q	Conc (ppt)	Q	Conc (ppt)	Q	Conc (ppt)	Q	Conc (ppt)	Q	Conc (ppt)	Q
2,3,7,8-Tetrachloro Dibenzo-P-Dioxin	1	U	1.4		1	U	1	U	0.5	U	1.1		1.7		1.2		1.2		1	U	0.5	U	0.5	U	0.4	U

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Table D-1-10

ONONDAGA LAKE INLET (BARGE CANAL TERMINAL AREA)
SOIL ANALYTICAL DATA
Petroleum Hydrocarbons - Method EPA 3550/8270

Customer Number	SS-1 UPPER		SS-2 UPPER		SS-3 UPPER		SS-4 UPPER		SS-5 UPPER		SS-6 UPPER		SS-7 UPPER		SS-8 UPPER		SS-9 UPPER		SS-10 UPPER		SS-1 LOWER		SS-3 LOWER		SS-9 LOWER	
NOVAMANN Number	10973		10988		10989		10990		10991		10992		10993		10994		10995		10996		10997		10998		11000	
Compound Names	Conc (ug/Kg	Q	Conc (ug/Kg	Q	Conc (ug/Kg	Q	Conc (ug/Kg	Q	Conc (ug/Kg	Q	Conc (ug/Kg	Q	Conc (ug/Kg	Q	Conc (ug/Kg	Q	Conc (ug/Kg	Q	Conc (ug/Kg	Q	Conc (ug/Kg	Q	Conc (ug/Kg	Q	Conc (ug/Kg	Q
Total Petroleum Hydrocarbons	284000		739000		1690000		549000		487000		1214000		498000		656000		95000	J	2170000		16000	U	16000	U	10700	J
AV Jet-A1 Fuel		U		U		U		U		U		U		U		U		U		U		U		U		U
Crankcase Oil		U		U		U		U		U		U		U		U		U		U		U		U		U
Diesel		U		U		U		U		U		U		U		U		U		U		U		U		U
Furnace Oil		U		U		U		U		U		U		U		U		U		U		U		U		U
Gasoline		U		U		U		U		U		U		U		U		U		U		U		U		U
Hydraulic Oil		U		U		U		U		U		U		U		U		U		U		U		U		U
Kerosene		U		U		U		U		U		U		U		U		U		U		U		U		U
Naphtha		U		U		U		U		U		U		U		U		U		U		U		U		U
Varsol		U		U		U		U		U		U		U		U		U		U		U		U		U

Sediment TCLP Chemistry

NOVAMANN INTERNATIONAL

Table D-1-11

ONONDAGA LAKE INLET (BARGE CANAL TERMINAL AREA)
SOLID-TCLP LEACHATE ANALYTICAL DATA
Volatile Organics - Method EPA 624

Customer Number	SS-1 UPPER		SS-3 UPPER		SS-5 UPPER		SS-7 UPPER		SS-9 UPPER	
NOVAMANN Number	11158		11159		11160		11161		11162	
Compound Names	Conc (ug/L)	Q	Conc (ug/L)	Q	Conc (ug/L)	Q	Conc (ug/L)	Q	Conc (ug/L)	Q
1,1-Dichloroethene	87	U	87	U	87	U	87	U	87	U
1,2-Dichloroethane	87	U	87	U	87	U	87	U	87	U
Benzene	44	U	44	U	44	U	44	U	44	U
Carbon Tetrachloride	87	U	87	U	87	U	87	U	87	U
Chlorobenzene	44	U	44	U	44	U	44	U	44	U
Chloroform	87	U	87	U	87	U	87	U	87	U
Methyl Ethyl Ketone	870	U	870	U	870	U	870	U	870	U
Tetrachloroethene	87	U	87	U	87	U	87	U	87	U
Trichloroethene	87	U	87	U	87	U	87	U	87	U
Vinyl Chloride	174	U	174	U	174	U	174	U	174	U

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Table D-1-12

ONONDAGA LAKE INLET (BARGE CANAL TERMINAL AREA)
SOLID- TCLP LEACHATE ANALYTICAL DATA
Semi-Volatile Organics - Method EPA 625

Customer Number	SS-1 UPPER		SS-3 UPPER		SS-5 UPPER		SS-7 UPPER		SS-9 UPPER	
NOVAMANN Number	11158		11159		11160		11161		11162	
Compound Names	Conc (mg/L)	Q	Conc (mg/L)	Q	Conc (mg/L)	Q	Conc (mg/L)	Q	Conc (mg/L)	Q
1,4-Dichlorobenzene	0.0023	J	0.002	U	0.0005	J	0.0006	J	0.002	U
2,4,5-Trichlorophenol	0.01	U	0.002	U	0.002	U	0.002	U	0.002	U
2,4,6-Trichlorophenol	0.01	U	0.002	U	0.002	U	0.002	U	0.002	U
2,4-Dinitrotoluene	0.01	U	0.002	U	0.002	U	0.002	U	0.002	U
Hexachloro-1,3-Butadiene	0.01	U	0.002	U	0.002	U	0.002	U	0.002	U
Hexachlorobenzene	0.01	U	0.002	U	0.002	U	0.002	U	0.002	U
Hexachloroethane	0.01	U	0.002	U	0.002	U	0.002	U	0.002	U
Nitrobenzene	0.02	U	0.004	U	0.004	U	0.004	U	0.004	U
o-Cresol	0.01	U	0.002	U	0.002	U	0.002	U	0.002	U
p/m-Cresol	0.01	U	0.002	U	0.002	U	0.002	U	0.002	U
Pentachlorophenol	0.02	U	0.004	U	0.004	U	0.004	U	0.004	U
Pyridine	0.05	U	0.01	U	0.01	U	0.01	U	0.01	U

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Table D-1-13

ONONDAGA LAKE INLET (BARGE CANAL TERMINAL AREA)
SOLID-TCLP LEACHATE ANALYTICAL DATA
Pesticides - Method EPA 625

Customer Number	SS-1 UPPER		SS-3 UPPER		SS-5 UPPER		SS-7 UPPER		SS-9 UPPER	
NOVAMANN Number	11158		11159		11160		11161		11162	
Compound Names	Conc (mg/L	Q	Conc (mg/L	Q	Conc (mg/L	Q	Conc (mg/L	Q	Conc (mg/L	Q
2,4,5-TP (Silvex)	0.02	U	0.004	U	0.004	U	0.004	U	0.004	U
2,4-D	0.02	U	0.004	U	0.004	U	0.004	U	0.004	U
Alpha Chlordane	0.03	U	0.006	U	0.006	U	0.006	U	0.006	U
Endrin	0.02	U	0.004	U	0.004	U	0.004	U	0.004	U
Gamma Chlordane	0.03	U	0.006	U	0.006	U	0.006	U	0.006	U
Heptachlor	0.0075	U	0.0015	U	0.0015	U	0.0015	U	0.0015	U
Lindane	0.02	U	0.004	U	0.004	U	0.004	U	0.004	U
Methoxychlor	0.05	U	0.01	U	0.01	U	0.01	U	0.01	U
Toxaphene	0.5	U	0.1	U	0.1	U	0.1	U	0.1	U

NOVAMANN INTERNATIONAL

Table D-1-14

ONONDAGA LAKE INLET (BARGE CANAL TERMINAL AREA)
SOIL - TCLP ANALYTICAL DATA
Inorganic Parameters

Customer Number	SS-1 UPPER		SS3 UPPER		SS5 UPPER		SS7 UPPER		SS9 UPPER	
NOVAMANN Number	6874		6875		6876		6877		6878	
Compound Names	Conc (ug/L)	Q	Conc (ug/L)	Q	Conc (ug/L)	Q	Conc (ug/L)	Q	Conc (ug/L)	Q
Lead	42.1		51.3		33.0		51.3		66.1	
Cadmium	15.3		3	U	3	U	3	U	6.65	
Barium	275		1270		650		759		606	
Chromium	5	U	11.4		6.30		6.13		7.67	
Silver	7	U	7	U	7	U	7	U	7	U
Mercury	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
Selenium	50	U	50	U	50	U	50	U	50	U
Arsenic	60	U	98.7		110		103		105	
Moisture	41.0		46.8		45.6		43.7		48.9	
Initial pH	4.62		4.49		3.85		3.92		4.99	
Final pH	5.82		5.75		5.74		5.76		5.76	

Sediment Elutriate Chemistry

NOVAMANN INTERNATIONAL

Table D-1-15

ONONDAGA LAKE INLET (BARGE CANAL TERMINAL AREA)
ELUTRIATE ANALYTICAL DATA
Pesticides - Method SW-846, 8081

Customer Number	SW-1		SS-1 UPPER		SS-3 UPPER		SS-5 UPPER		SS-7 UPPER		SS-9 UPPER	
NOVAMANN Number	10972		11065		11066		11067		11068		11069	
Compound Names	Conc (ug/L)	Q	Conc (ug/L)	Q	Conc (ug/L)	Q	Conc (ug/L)	Q	Conc (ug/L)	Q	Conc (ug/L)	Q
Aldrin	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
Alpha-BHC	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
Alpha-Chlordane	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
Beta-BHC	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
Delta-BHC	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
Dieldrin	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Endosulfan I	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
Endosulfan II	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Endosulfan Sulfate	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Endrin	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Endrin Aldehyde	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Endrin Ketone	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Gamma-BHC (Lindane)	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
Gamma-Chlordane	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
Heptachlor	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
Heptachlor Epoxide	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
Methoxychlor	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Polychlorinated Biphenyl - 1016	1	U	1	U	1	U	1	U	1	U	1	U
Polychlorinated Biphenyl - 1221	2	U	2	U	2	U	2	U	2	U	2	U
Polychlorinated Biphenyl - 1232	1	U	1	U	1	U	1	U	1	U	1	U
Polychlorinated Biphenyl - 1242	1	U	1	U	1	U	1	U	1	U	1	U
Polychlorinated Biphenyl - 1248	1	U	1	U	1	U	1	U	1	U	1	U
Polychlorinated Biphenyl - 1254	1	U	1	U	1	U	1	U	1	U	1	U
Polychlorinated Biphenyl - 1260	1	U	1	U	1	U	1	U	1	U	1	U
PP'-DDD	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
PP'-DDE	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
PP'-DDT	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Toxaphene	5	U	5	U	5	U	5	U	5	U	5	U

NOVAMANN INTERNATIONAL

Table D-1-16

ONONDAGA LAKE INLET (BARGE CANAL TERMINAL AREA)
ELUTRIATE ANALYTICAL DATA
Inorganic Parameters

Customer Number	SW1		SS-1 UPPER		SS3 UPPER		SS5 UPPER		SS7 UPPER		SS9 UPPER	
NOVAMANN Number	6879		6880		6881		6882		6883		6884	
Compound Names	Conc (ug/L)	Q	Conc (ug/L)	Q	Conc (ug/L)	Q	Conc (ug/L)	Q	Conc (ug/L)	Q	Conc (ug/L)	Q
Zinc	54.6		3	U	3	U	3	U	3	U	3	U
Lead	3		2	U	2	U	2	U	2	U	2	U
Cadmium	3	U	3	U	3	U	3	U	3	U	3	U
Nickel	10	U	10	U	10	U	10	U	10	U	10	U
Barium	120		77.1		167		85.6		86.9		82.7	
Iron	2010		284		8680		2040		1930		2200	
Manganese	123		91.8		466		302		130		295	
Chromium	5	U	5	U	5	U	5	U	33.1		5	U
Copper	5.77		3	U	3	U	3	U	3	U	3	U
Silver	7	U	7	U	7	U	7	U	7	U	7	U
Sodium	300000		509000		607000		328000		354000		945000	
Mercury	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
Selenium	2	U	2	U	2	U	2	U	2	U	4	
Arsenic	2	U	8		13		16		20		17	
Oil and grease	5000	U	5000	U	5000	U	5000	U	5000	U	5000	U

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NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Analysis of Sample Site 5 & 7

for

PCBs
&
Polychlorinated Dioxins/Furans Isomer Specific Analysis

Quanterra Environmental Services

PCBs in Soil

Method 8080

Client Name: New York State DEC
Client ID: SED94 01895 SS5UPR
Lab ID: 079861-0004-SA
Matrix: SOIL
Authorized: 19 JAN 95

Sampled: 18 AUG 94
Prepared: 09 FEB 95

Received: 19 JAN 95
Analyzed: 14 FEB 95

Parameter	Result	Wet wt. Units	Reporting Limit	
Aroclor 1016	ND	ug/kg	330	R
Aroclor 1221	ND	ug/kg	50	
Aroclor 1232	ND	ug/kg	330	R
Aroclor 1242	62	ug/kg	50	
Aroclor 1248	ND	ug/kg	330	R
Aroclor 1254	62	ug/kg	50	
Aroclor 1260	ND	ug/kg	50	
Surrogate	Recovery			
Decachlorobiphenyl	13.1	%		&

Note R : Raised reporting limit(s) due to high analyte level(s).

Note & : Surrogate recovery is outside of control limits.

ND = Not detected
NA = Not applicable

Reported By: Mark Gimpel

Approved By: Eric Bayless

The cover letter is an integral part of this report.
Rev 230787

0013

PCBs in Soil

Method 8080

Client Name: New York State DEC
Client ID: SED94 01895 SS7UPR
Lab ID: 079861-0005-SA
Matrix: SOIL
Authorized: 19 JAN 95

Sampled: 18 AUG 94
Prepared: 09 FEB 95

Received: 19 JAN 95
Analyzed: 14 FEB 95

Parameter	Result	Wet wt. Units	Reporting Limit	
Aroclor 1016	ND	ug/kg	330	R
Aroclor 1221	ND	ug/kg	50	
Aroclor 1232	ND	ug/kg	330	R
Aroclor 1242	85	ug/kg	50	
Aroclor 1248	ND	ug/kg	330	R
Aroclor 1254	91	ug/kg	50	
Aroclor 1260	ND	ug/kg	50	

Surrogate	Recovery		
Decachlorobiphenyl	11.0	%	&

Note R : Raised reporting limit(s) due to high analyte level(s).

Note & : Surrogate recovery is outside of control limits.

ND = Not detected
NA = Not applicable

Reported By: Mark Gimpel

Approved By: Eric Bayless

The cover letter is an integral part of this report.
Rev 230787

0014

Quanterra
Environmental Services

GENERAL INORGANICS

(Soil/Solid)

Client Name: New York State DEC
Client ID: SED94 01895 SS5UPR
Lab ID: 079861-0004-SA
Matrix: SOIL
Authorized: 19 JAN 95

Sampled: 18 AUG 94
Prepared: See Below

Received: 19 JAN 95
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Organic Carbon, Total	22600	mg/kg	100	9060 Modified	01 FEB 95	06 FEB 95
Solids, Total Volatile	82.8	mg/kg	1.0	160.4	NA	07 FEB 95

ND = Not detected
NA = Not applicable

Reported By: Don Fredrickson

Approved By: Jennifer Kimzey

The cover letter is an integral part of this report.
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0022

GENERAL INORGANICS

(Soil/Solid)

Client Name: New York State DEC
Client ID: SED94 01895 SS7UPR
Lab ID: 079861-0005-SA
Matrix: SOIL   Sampled: 18 AUG 94   Received: 19 JAN 95
Authorized: 19 JAN 95   Prepared: See Below   Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Organic Carbon, Total	30600	mg/kg	100	9060 Modified	01 FEB 95	06 FEB 95
Solids, Total Volatile	84.2	mg/kg	1.0	160.4	NA	07 FEB 95

ND = Not detected
NA = Not applicable

Reported By: Don Fredrickson   Approved By: Jennifer Kimzey

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Rev 230787

0023

Quanterra Environmental Services

POLYCHLORINATED DIOXINS/FURANS
ISOMER SPECIFIC ANALYSIS
Method 1613A

Client Name: New York State DEC
Client ID: SED94 01895 SS5UPR
Lab ID: 079861-0004-SA
Matrix: SOIL
Sampled: 18 AUG 94
Received: 19 JAN 95
Authorized: 19 JAN 95
Prepared: 20 JAN 95
Analyzed: 24 JAN 95

Sample Amount 5.0 G
Column Type DB-5

Parameter	Result	Units	Detection Limit	Data Qualifiers
Furans				
TCDFs (total)	31	pg/g	--	g
2,3,7,8-TCDF	3.5	pg/g	--	g
PeCDFs (total)	ND	pg/g	23	
1,2,3,7,8-PeCDF	ND	pg/g	7.6	
2,3,4,7,8-PeCDF	ND	pg/g	2.2	
HxCDFs (total)	ND	pg/g	47	
1,2,3,4,7,8-HxCDF	ND	pg/g	7.7	
1,2,3,6,7,8-HxCDF	ND	pg/g	2.5	
2,3,4,6,7,8-HxCDF	ND	pg/g	6.0	
1,2,3,7,8,9-HxCDF	ND	pg/g	2.3	
HpCDFs (total)	210	pg/g	--	
1,2,3,4,6,7,8-HpCDF	82	pg/g	--	@
1,2,3,4,7,8,9-HpCDF	ND	pg/g	3.8	
OCDF	150	pg/g	--	
Dioxins				
TCDDs (total)	ND	pg/g	5.4	
2,3,7,8-TCDD	ND	pg/g	1.3	
PeCDDs (total)	ND	pg/g	11	
1,2,3,7,8-PeCDD	ND	pg/g	4.1	
HxCDDs (total)	83	pg/g	--	
1,2,3,4,7,8-HxCDD	ND	pg/g	2.0	
1,2,3,6,7,8-HxCDD	ND	pg/g	22	
1,2,3,7,8,9-HxCDD	ND	pg/g	12	
HpCDDs (total)	610	pg/g	--	
1,2,3,4,6,7,8-HpCDD	300	pg/g	--	
OCDD	2800	pg/g	--	

(continued on following page)

ND = Not detected
NA = Not applicable

Reported By: Carol Haines
Approved By: Mark Bechthold

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0035

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POLYCHLORINATED DIOXINS/FURANS
ISOMER SPECIFIC ANALYSIS (CONT.)
Method 1613A

Client Name: New York State DEC
Client ID: SED94 01895 SS5UPR
Lab ID: 079861-0004-SA
Matrix: SOIL
Authorized: 19 JAN 95

Sampled: 18 AUG 94
Prepared: 20 JAN 95

Received: 19 JAN 95
Analyzed: 24 JAN 95

Sample Amount 5.0 G
Column Type DB-5

	% Recovery	
13C-2,3,7,8-TCDF	101	g
13C-1,2,3,7,8-PeCDF	103	
13C-2,3,4,7,8-PeCDF	105	
13C-1,2,3,4,7,8-HxCDF	105	
13C-1,2,3,6,7,8-HxCDF	97	
13C-2,3,4,6,7,8-HxCDF	92	
13C-1,2,3,7,8,9-HxCDF	96	
13C-1,2,3,4,6,7,8-HpCDF	96	
13C-1,2,3,4,7,8,9-HpCDF	96	
13C-2,3,7,8-TCDD	86	
37Cl-2,3,7,8-TCDD	92	
13C-1,2,3,7,8-PeCDD	110	
13C-1,2,3,4,7,8-HxCDD	102	
13C-1,2,3,6,7,8-HxCDD	107	
13C-1,2,3,4,6,7,8-HpCDD	104	
13C-OCDD	104	

Note g : 2,3,7,8-TCDF results have been confirmed on a DB-225 column.

Note @ : Result is an estimated value that is below the lower calibration limit but above the target detection limit.

ND = Not detected
NA = Not applicable

Reported By: Carol Haines

Approved By: Mark Bechthold

The cover letter is an integral part of this report.
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Quanterra Environmental Services

POLYCHLORINATED DIOXINS/FURANS
ISOMER SPECIFIC ANALYSIS
Method 1613A

Client Name: New York State DEC
Client ID: SED94 01895 SS7UPR
Lab ID: 079861-0005-SA
Matrix: SOIL   Sampled: 18 AUG 94   Received: 19 JAN 95
Authorized: 19 JAN 95   Prepared: 20 JAN 95   Analyzed: 24 JAN 95

Sample Amount 5.0 G
Column Type DB-5

Parameter	Result	Units	Detection Limit	Data Qualifiers
Furans				
TCDFs (total)	ND	pg/g	4.5	
2,3,7,8-TCDF	ND	pg/g	2.6	g
PeCDFs (total)	ND	pg/g	17	
1,2,3,7,8-PeCDF	ND	pg/g	2.7	
2,3,4,7,8-PeCDF	ND	pg/g	1.7	
HxCDFs (total)	ND	pg/g	32	
1,2,3,4,7,8-HxCDF	ND	pg/g	6.0	
1,2,3,6,7,8-HxCDF	ND	pg/g	2.9	
2,3,4,6,7,8-HxCDF	ND	pg/g	5.2	
1,2,3,7,8,9-HxCDF	ND	pg/g	0.91	
HpCDFs (total)	170	pg/g	--	
1,2,3,4,6,7,8-HpCDF	60	pg/g	--	@
1,2,3,4,7,8,9-HpCDF	ND	pg/g	4.5	
OCDF	180	pg/g	--	@
Dioxins				
TCDDs (total)	ND	pg/g	3.0	
2,3,7,8-TCDD	ND	pg/g	1.3	
PeCDDs (total)	ND	pg/g	5.0	
1,2,3,7,8-PeCDD	ND	pg/g	3.4	
HxCDDs (total)	72	pg/g	--	
1,2,3,4,7,8-HxCDD	ND	pg/g	2.5	
1,2,3,6,7,8-HxCDD	ND	pg/g	22	
1,2,3,7,8,9-HxCDD	ND	pg/g	13	
HpCDDs (total)	520	pg/g	--	
1,2,3,4,6,7,8-HpCDD	280	pg/g	--	
OCDD	2500	pg/g	--	

(continued on following page)

ND = Not detected
NA = Not applicable

Reported By: Andre Algazi   Approved By: Mark Bechthold

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0037

POLYCHLORINATED DIOXINS/FURANS
ISOMER SPECIFIC ANALYSIS (CONT.)
Method 1613A

Client Name: New York State DEC
Client ID: SED94 01895 SS7UPR
Lab ID: 079861-0005-SA
Matrix: SOIL   Sampled: 18 AUG 94   Received: 19 JAN 95
Authorized: 19 JAN 95   Prepared: 20 JAN 95   Analyzed: 24 JAN 95

Sample Amount 5.0 G
Column Type DB-5

	% Recovery
13C-2,3,7,8-TCDF	99
13C-1,2,3,7,8-PeCDF	91
13C-2,3,4,7,8-PeCDF	92
13C-1,2,3,4,7,8-HxCDF	91
13C-1,2,3,6,7,8-HxCDF	87
13C-2,3,4,6,7,8-HxCDF	82
13C-1,2,3,7,8,9-HxCDF	88
13C-1,2,3,4,6,7,8-HpCDF	85
13C-1,2,3,4,7,8,9-HpCDF	88
13C-2,3,7,8-TCDD	80
37Cl-2,3,7,8-TCDD	87
13C-1,2,3,7,8-PeCDD	97
13C-1,2,3,4,7,8-HxCDD	89
13C-1,2,3,6,7,8-HxCDD	94
13C-1,2,3,4,6,7,8-HpCDD	93
13C-OCDD	90

Note g : 2,3,7,8-TCDF results have been confirmed on a DB-225 column.

Note @ : Result is an estimated value that is below the lower calibration limit but above the target detection limit.

ND = Not detected
NA = Not applicable

Reported By: Andre Algazi   Approved By: Mark Bechthold

0038

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Part 2

Settling Sediment Water Chemistry

SETTLING SEDIMENT WATER CHEMISTRY

Onondaga Lake Inlet sediment was obtained from the locations shown in Figure D-2-1 for physical parameter measurements and column settling tests. The overlying supernatant was analyzed for suspended solids, PAHs, ammonia, and metals concentrations. A schematic of the settling column is shown in Figure D-2-2. Table D-2-1 presents the sampling times and parameters. The analytical methods for analyses are indicated in Table D-2-2. An in-situ core was obtained for testing and labeled in two parts Core #1 & Core #2. A ponar dredge sample was obtained and labeled Sample #1.

The physical testing on the core and ponar dredge sample are provided in Table D-2-3.

The settling interface times and supernatant suspended solids concentrations are exhibited in Table D-2-4. The corresponding chemistry is given in Table D-2-5.

For most of the operating life of the disposal area, a ponding depth of at least 3-feet and a water retention time of at least 24 hours is expected. At the very end of the disposal area use at full capacity, a 12 to 15-hour retention rate can be expected for a 2-foot ponding depth and approximately 22-hour retention for a 3-foot depth. Suspended solids discharge varied from 200 to 160 mg/l for the two scenarios. Expected total suspended solids concentrations were comparable with those calculated with the retention rates. Arsenic, cadimum, chromium, and mercury values were well below New York water quality standards for Class C water aquatic life. Analyses of the data for lead and DDT indicate expected levels to be below or close to the standards (Class C - aquatic) for the water that is withdrawn from the disposal area ponding water and discharged over the weir. At the end of the disposal area use, the production rate can be decreased to give a longer settling time, if deemed necessary.

Figure D-2-1 SEDIMENT TESTING LOCATION

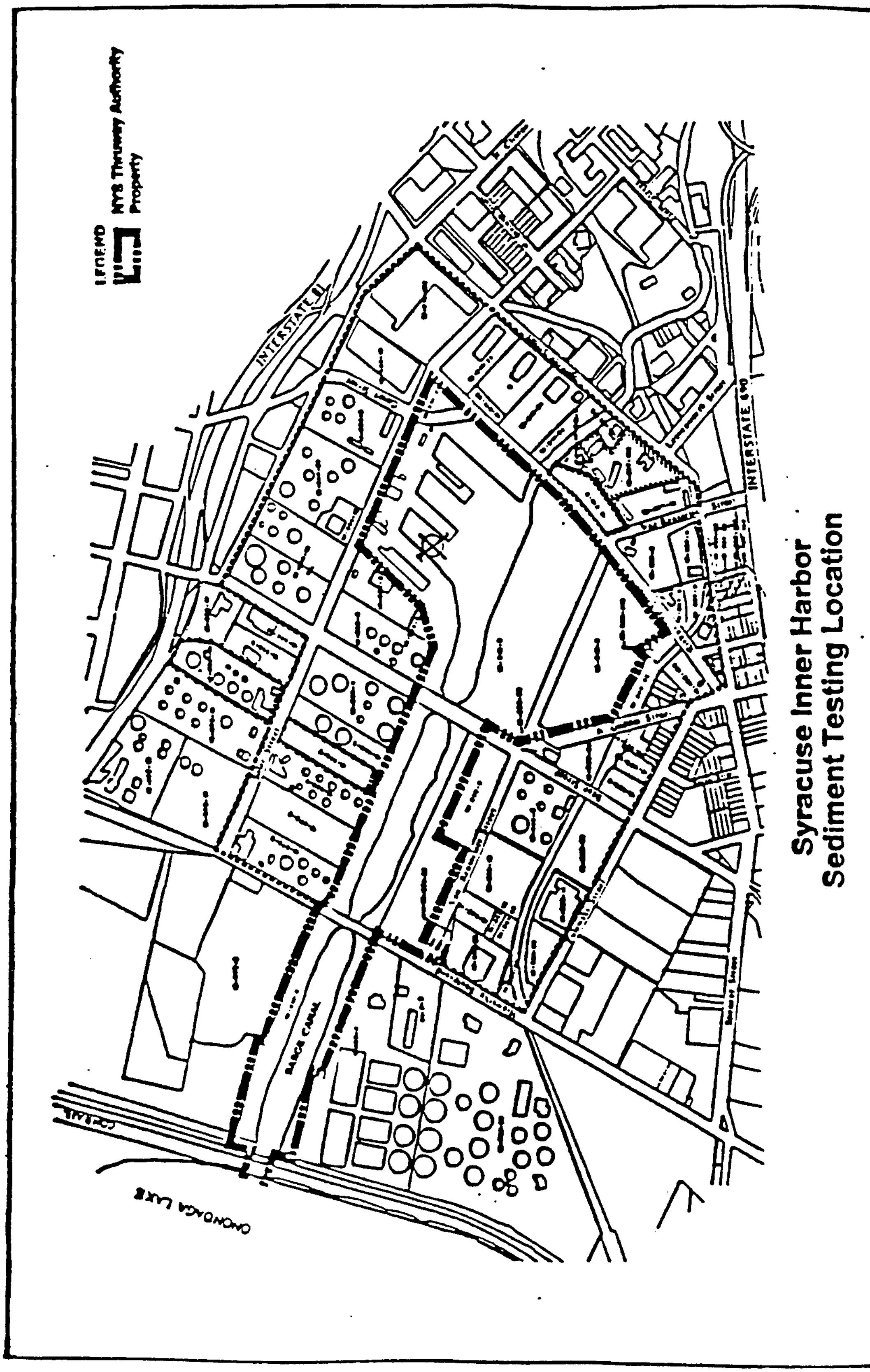


Figure D-2-2 SETTLING COLUMN DIAGRAM

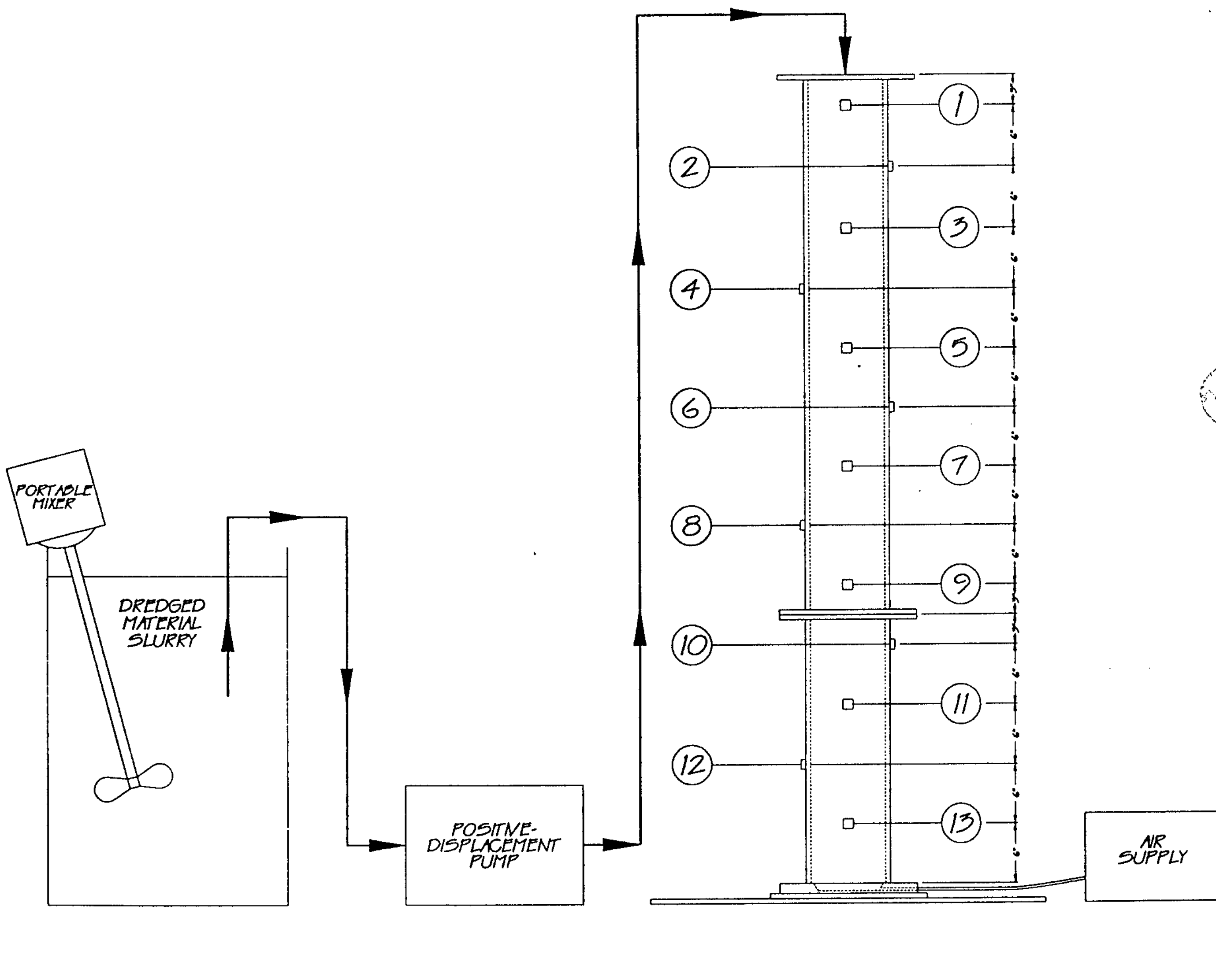


Table D-2-1

COLUMN SETTLING TEST - ONONDAGA INLET

MEASURING TIMES

Time	Surface Water Height	Settling Interface	SS/Turb Sampling[1]	Group 1 Chemistry Sampling[3]	Group 2 Chemistry Sampling[4]
0 hr	x	x	x[2]		
0.5 hr	x	x			
1 hr	x	x	x		
1.5 hr	x	x			
2 hr	x	x	x		
3	x	x			
4	x	x	x		
6	x	x	x		
8	x	x			
10	x	x			
12	x	x	x	x	x
18	x	x			
1 day	x	x	x	x	x
2	x	x		x	x
4	x	x	x	x	
6	x	x	x	x	
8	x	x	x		
10	x	x	x		
12	x	x	x		
14	x	x	x		
20	x	x			

1 Sample only the top 4 even foot ports below the initial water surface.
Sample only the even foot ports above the settling interface.
Parameters include total solids and turbidity.

2 Before time zero, measure only total solids concentration at all even foot ports.

3 Sample only above the settling interface.
Sample the 2 ports closest to the 2-foot level below the water surface.
Parameters include Hg, Pb, and ammonia.
If the settling interface is not below the 2-foot level, sample at the next time indicated and shift sampling time down by one time increment.

4 Sample the closest port to the 2-foot level below the water surface but above the settling interface.
Parameters include volatile organics and PAHs.
If the settling interface is not below the 2-foot level, sample at the next time indicated and shift sampling time down by one time increment.

Table D-2-2

ANALYTICAL METHODS

Analysis	Method Reference
Settling Column Test	USAEC EM 1110-2-5027
Permeability	ASTM D-2434-68
Moisture Content	ASTM D-2216-80
Bulk Specific Gravity	ASTM D-1188-88
Bulk Density	Dry sediment weight was divided by the volume of sediment and water.
Trace Metals	EPA 600/4-79-020
Cd	Method 213.2
Pb	Method 239.2
Hg	Method 245.1
Volatile Organic Compounds	40CFR, Part 136
Polynuclear Aromatic Hydrocarbons	40CFR, Part 136, Method 625
General Chemistry	EPA 600/4-79-020
Ammonia-NH3	Method 350.1

Table D-2-3 PHYSICAL TEST RESULTS

Sample	Coefficient of Permeability (cm/s)	Moisture Content (%H2O)	Bulk Specific Gravity	Total Solids (g/L)
Core #1	45.3	70.9	1.09	--
Core #1	--	--	1.18	--
Jar #2	--	63.8	--	372

-- = Not applicable

Table D-2-4 COLUMN SETTLING TEST

Sample = Onondaga Inner Harbor

Column Dimensions: total height = 79.8 in. (203.7 cm)
diameter = 8 in. (20.3 cm)
port #1 = 78 in. (198.12 cm) above base
port #13 = 6 in. (15.24 cm) above base

Time (hr)	Port #	Surface Height (in.)	Interface Below Surface (in.)	Dry Weight SS (g)	Concentration (g/L)	Turbidity (NTU)
0	2	72.6	0	21.04	99.25	--
0	4	72.6	0	21.47	100.04	--
0	6	72.6	0	23.05	102.32	--
0	8	72.6	0	21.68	101.37	--
0	10	72.6	0	26.95	108.77	--
0	12	72.6	0	21.00	101.80	--

Average Concentration (time = 0) = 102.3 g/L +- 3.4 g/L

Time (hr)	Port	Surface Height (in.)	Interface Below Surface (in.)	Dry Weight SS (g)	Concentration (g/L)	Turbidity (NTU)
0.5	2	72.6	2.5	0.53	2.49	--
1	2	72.3	5.2	0.04	0.18	145
1.5	--	72.1	7.6	--	--	--
2	2	72.1	9.7	0.03	0.14	78
3	--	71.7	14.1	--	--	--
4	4	71.7	17.8	0.39	1.55	79
6	4	71.4	25.0	0.01	0.04	43
	6	71.4	25.0	0.57	2.40	1344
8	--	70.7	31.1	--	--	--
10	--	70.7	37.6	--	--	--
12	4	70.7	40.8	0.04	0.19	101
	6	70.7	40.8	0.04	0.19	92
	8	70.7	40.8	0.58	2.74	1068
24	4	69	43.2	0.02	0.09	34
	6	69	43.2	0.03	0.12	35
	8	69	43.2	0.01	0.04	30
48	6	67	43.3	--	--	--
	7	67	43.3	--	--	--
96	4	66	44.1	0.01	0.04	20
	6	66	44.1	0.01	0.04	21
	8	66	44.1	0.01	0.04	20
	10	66	44.1	0.01	0.04	21
144	4	64.1	46.0	0.08	0.02	14
	6	64.1	46.0	0.06	0.24	16
	8	64.1	46.0	0.04	0.15	17
	10	64.1	46.0	0.03	0.12	18
192	4	61.4	44.8	0.01	0.05	13
	6	61.4	44.8	0.01	0.01	12
	8	61.4	44.8	0.01	0.01	13
	10	61.4	44.8	0.02	0.07	15
240	4	60.8	44.6	0.01	0.01	9
	6	60.8	44.6	0.03	0.12	10
	8	60.8	44.6	0.01	0.01	10
	10	60.8	44.6	0.01	0.01	10
288	6	60.3	44.7	0.01	0.04	8
	8	60.3	44.7	0.01	0.04	8
	10	60.3	44.7	0.06	0.22	8
336	6	58.3	43.2	0.04	0.15	7
	8	58.3	43.2	0.04	0.16	7
	10	58.3	43.2	0.04	0.15	7
480	--	57.6	42.9	--	--	--

-- = Not applicable

Table D-2-5 SETTLING WATER CHEMISTRY

	Time (hr)	12		24		48		96		144	
	Port #	5	6	5	6	6	7	6	7	6	7
Group 1 Parameters	Cadmium (ug/L)	0.50(U)	0.50(U)	0.50(U)	0.50(U)	0.50(U)	0.50(U)	0.50(U)	0.50(U)	0.50(U)	0.50(U)
	Lead (ug/L)	3.0(U)	**3.1**	3.0(U)	**7.2**	3.0(U)	3.0(U)	3.0(U)	3.0(U)	3.0(U)	3.0(U)
	Mercury (ug/L)	1.0(U)	1.0(U)	0.50(U)	1.0(U)	1.0(U)	1.0(U)	0.50(U)	0.50(U)	0.50(U)	0.50(U)
	Ammonia, as N (mg/L)	**14**	**15**	**15**	**17**	**22**	**14**	**24**	**27**	**25**	**27**
Group 2 Parameters	Chloromethane	–	10(U)	–	10(U)	–	10(U)	–	–	–	–
	Vinyl Chloride	–	10(U)	–	10(U)	–	10(U)	–	–	–	–
	Bromomethane	–	10(U)	–	10(U)	–	10(U)	–	–	–	–
	Chloroethane	–	10(U)	–	10(U)	–	10(U)	–	–	–	–
	1, 1-Dichloroethene	–	5(U)	–	5(U)	–	5(U)	–	–	–	–
	Carbon Disulfide	–	5(U)	–	**2.8(J)**	–	**2.3(U)**	–	–	–	–
	Acetone	–	**48**	–	**73**	–	**66**	–	–	–	–
	Methylene Chloride	–	**7.9(B)**	–	**13(B)**	–	**29(B)**	–	–	–	–
	trans-1, 2-Dichloroethene	–	5(U)	–	5(U)	–	5(U)	–	–	–	–
	1, 1Dichloroethane	–	5(U)	–	5(U)	–	5(U)	–	–	–	–
	cis-1, 2-Dichloroethene	–	5(U)	–	5(U)	–	5(U)	–	–	–	–
	Chloroform	–	**3.1(J)**	–	**3.6(J)**	–	**3.3(J)**	–	–	–	–
	1, 2-Dichloroethane	–	5(U)	–	5(U)	–	5(U)	–	–	–	–
	2-Butanone	–	**6.1(J)**	–	**220**	–	**200**	–	–	–	–
	1, 1, 1-Trichloroethane	–	5(U)	–	5(U)	–	5(U)	–	–	–	–
	Carbon Tetrachloride	–	5(U)	–	5(U)	–	5(U)	–	–	–	–
	Benzene	–	5(U)	–	5(U)	–	5(U)	–	–	–	–
	Trichloroethene	–	5(U)	–	5(U)	–	5(U)	–	–	–	–
	1, 2-Dichloropropane	–	5(U)	–	5(U)	–	5(U)	–	–	–	–
	Bromodichloromethane	–	5(U)	–	5(U)	–	5(U)	–	–	–	–
	trans-1, 3-Dichloropropene	–	5(U)	–	5(U)	–	5(U)	–	–	–	–
	cis-1, 3-Dichloropropene	–	5(U)	–	5(U)	–	5(U)	–	–	–	–
	1, 1, 2-Trichloroethane	–	5(U)	–	5(U)	–	5(U)	–	–	–	–
	Dibromochloromethane	–	5(U)	–	5(U)	–	5(U)	–	–	–	–
	Bromoform	–	5(U)	–	5(U)	–	5(U)	–	–	–	–
	4-Methyl-2-Pentanone	–	10(U)	–	10(U)	–	10(U)	–	–	–	–
	Toluene	–	5(U)	–	5(U)	–	5(U)	–	–	–	–
	Tetrachloroethene	–	5(U)	–	5(U)	–	5(U)	–	–	–	–
	2-Hexanone	–	10(U)	–	10(U)	–	10(U)	–	–	–	–
	Chlorobenzene	–	5(U)	–	5(U)	–	5(U)	–	–	–	–
	Ethylbenzene	–	5(U)	–	5(U)	–	5(U)	–	–	–	–
	meta+para-xylenes	–	5(U)	–	5(U)	–	5(U)	–	–	–	–
	ortho-xylene	–	5(U)	–	5(U)	–	5(U)	–	–	–	–
	Styrene	–	5(U)	–	5(U)	–	5(U)	–	–	–	–
	1, 1, 2, 2-Tetrachloroethane	–	5(U)	–	5(U)	–	5(U)	–	–	–	–
	Naphthalene	–	5.3(U)	–	5.3(U)	–	5.3(U)	–	–	–	–
	Acenaphthylene	–	12(U)	–	12(U)	–	12(U)	–	–	–	–
	Acenaphthene	–	6.3(U)	–	6.3(U)	–	6.3(U)	–	–	–	–
	Fluorene	–	6.3(U)	–	6.3(U)	–	6.3(U)	–	–	–	–
	Phenanthrene	–	18(U)	–	18(U)	–	18(U)	–	–	–	–
	Anthracene	–	6.3(U)	–	6.3(U)	–	6.3(U)	–	–	–	–
	Fluoranthene	–	7.3(U)	–	7.3(U)	–	7.3(U)	–	–	–	–
	Pyrene	–	6.3(U)	–	6.3(U)	–	6.3(U)	–	–	–	–
	Benzo[a]anthracene	–	26(U)	–	26(U)	–	26(U)	–	–	–	–
	Chrysene	–	8.3(U)	–	8.3(U)	–	8.3(U)	–	–	–	–
	Benzo[b]fluoranthene	–	16(U)	–	16(U)	–	16(U)	–	–	–	–
	Benzo[k]fluoranthene	–	8.3(U)	–	8.3(U)	–	8.3(U)	–	–	–	–
	Benzo[a]pyrene	–	8.3(U)	–	8.3(U)	–	8.3(U)	–	–	–	–
	Indeno[1, 2, 3-cd]pyrene	–	12(U)	–	12(U)	–	12(U)	–	–	–	–
	Dibenz[a, h]anthracene	–	8.3(U)	–	8.3(U)	–	8.3(U)	–	–	–	–
	Benzo[g, h, i]perylene	–	14(U)	–	14(U)	–	14(U)	–	–	–	–

U = Undetected
J = Below method detection limit
B = Compound also detected in method blank
-- = Not applicable

SETTLING SEDIMENT WATER CHEMISTRY

A second column settling test was performed in March 1997. Sediment was obtained from the location shown in Figure D-2-1. The overlying supernatant was analyzed for suspended solids, disolved solids, turbidity, pesticides, and the metals As, Cd, Cr, Hg, and PB. A schematic of the settling column is shown in Figure D-2-2. Table D-2-6 presents the sampling times and parameters. The analytical methods for analyses are indicated in Table D-2-7.

The settling interface times and supernatant suspended solids concentrations are exhibited in Tables D-2-8 and D-2-9. The corresponding chemistry is given in Tables D-2-10 and D-2-11.

Part 3

Disposal Area Soil Chemistry

Disposal Area Chemistry

The three areas picked as possible disposal sites for the Onondaga Inlet dredged sediments are shown in Figure D-3-1. Trenches approximately 5 to 7 feet deep were dug at each site for obtaining soil samples. Five trenches were dug at each of the sites UDS 5-19 and UDS 5-20 (Figures D-3-2 and D-3-3) and three trenches at site UDS 5-20A (Figure D-3-4). Samples for particle size analyses and permeability testing were taken from material removed from the trenches. Samples for chemistry testing were removed from the side of each trench at the bottom. Analyses consisted of testing for particle size, permeability, metals, volatile organics, semi-volatile organics, PAHs, pesticides, PCBs, cyanide, sulfur, sulfate, total organic carbon, ammonia, volatile solids, and chemical oxygen demand, Composited trench samples were used for some of the dioxin/furan testing. The testing methods are presented in Table D-3-1.

Table D-3-2 exhibits the particle size and permeability.

Table D-3-3 shows the soil furan and dioxin chemistry.

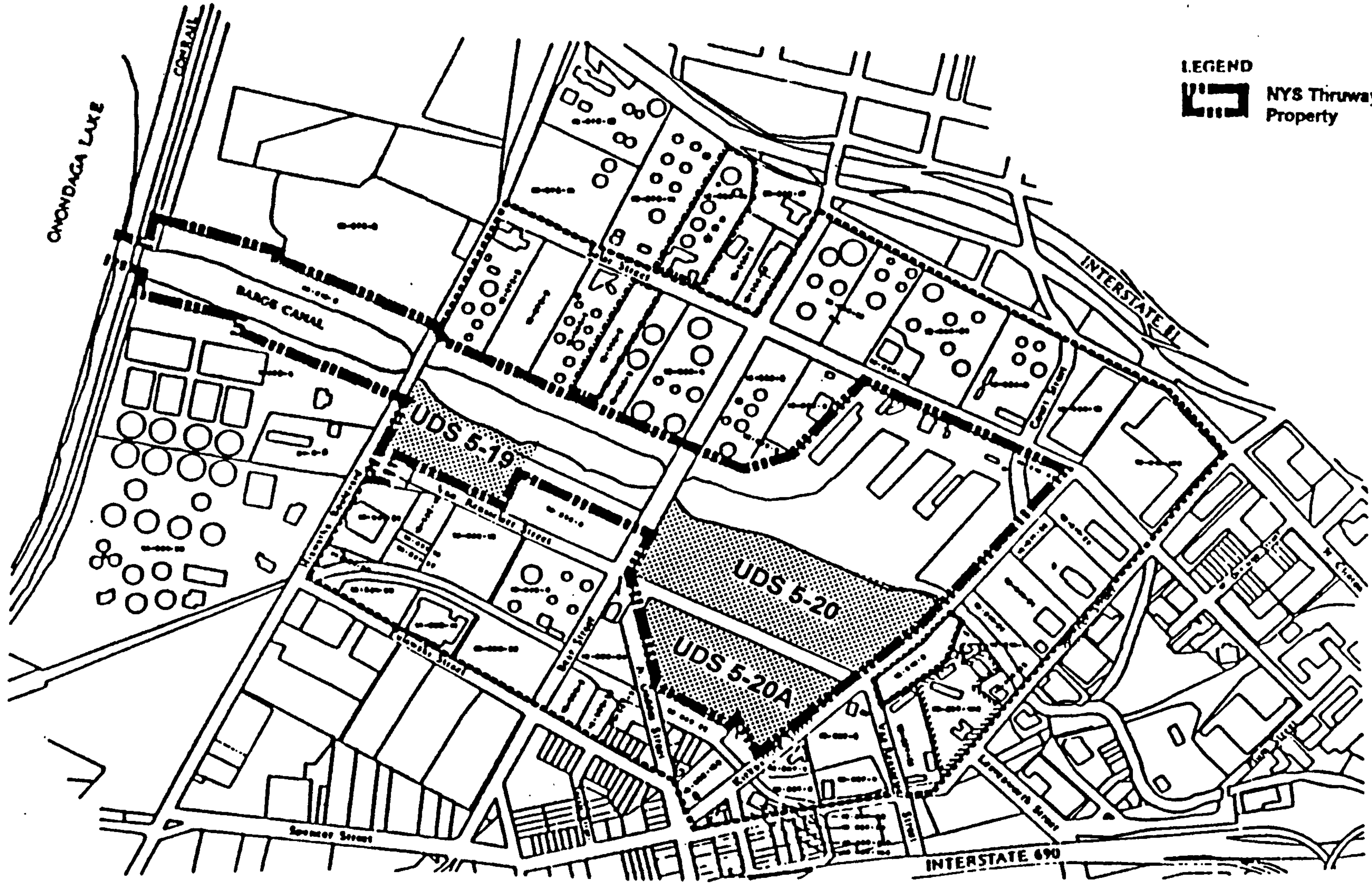
The volatile organic parameters at the three sites are shown in Tables D-3-4 through D-3-6 while Tables D-3-7 and D-3-8 provide indications of the tentatively identified organics not on the list given in the previous tables.

Tables D-3-9 through D-3-15 present the semi-volatile organics measured and the tentatively identified semi-volatiles on Tables D-3-9 and D-3-10.

Pesticide and PCB concentrations are provided in Tables D-3-15 through D-3-17.

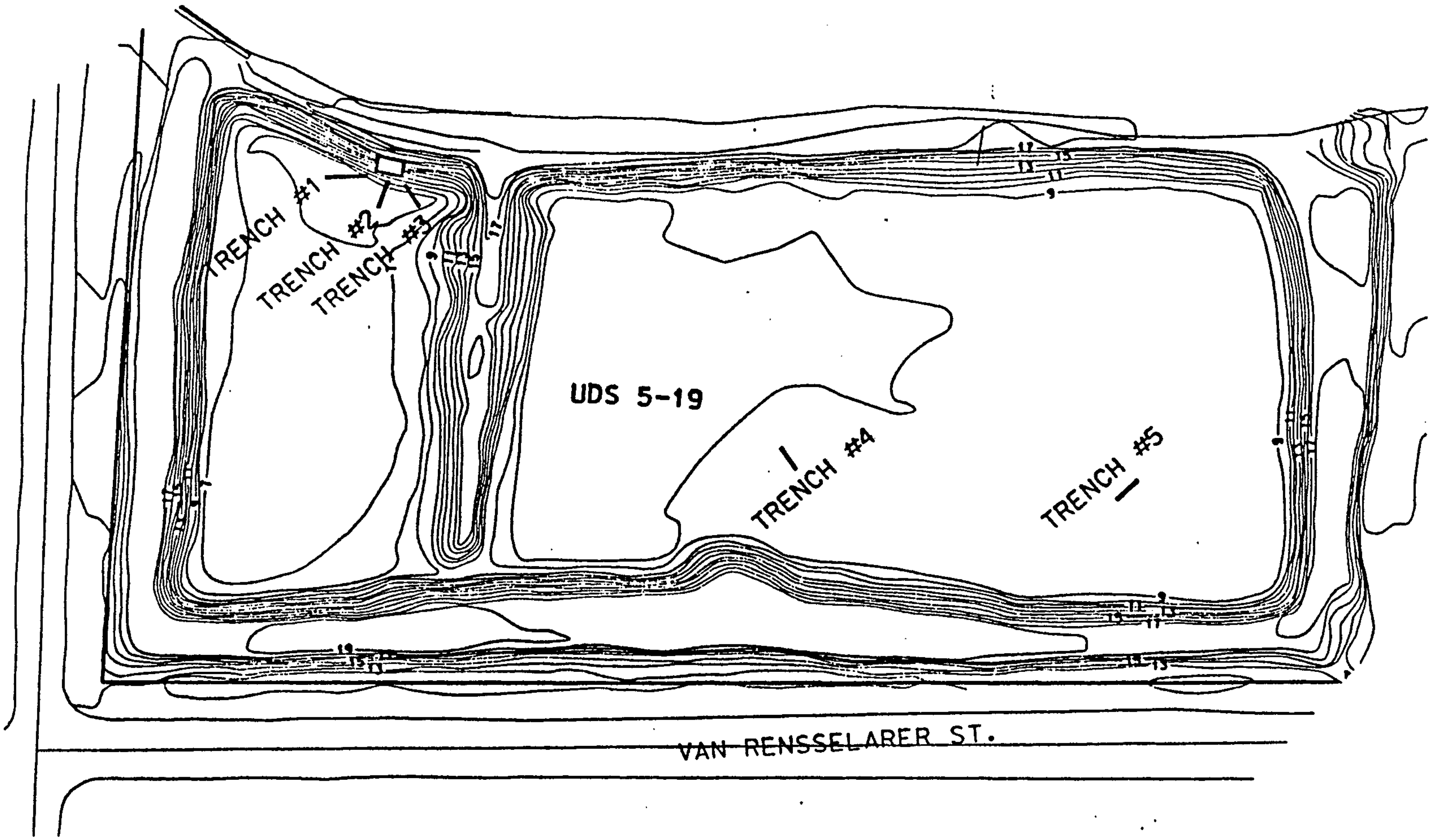
Metals are shown in Tables D-3-18 and D-3-19 while other measured inorganic parameters are indicated in Table D-3-20.

Site UDS 5-19 (Figure D-3-1) is proposed for disposal of sediments to be dredged from the Inner Harbor area. The site contains elevated levels of cadmium, chromium, copper, lead, zinc, xylene, tri-methyl benzene, phthalates, and an array of PAHs. Low levels of PCBs (~0.5 to 5 ppm) were found at tenches 1, 2, 4, and 5. The chlorinated pesticides endosulfan, methoxychlor, DDE, DDD, toxaphene, and endrin ketone were found at various tenches. The data show that the dredge material proposed for disposal has similar concentrations as the dredge material already at the site. It is concluded that the material proposed for disposal at UDS 5-19 is compatible both physically and chemically with dredge material already in place.



Syracuse Inner Harbor
Disposal Area Locations

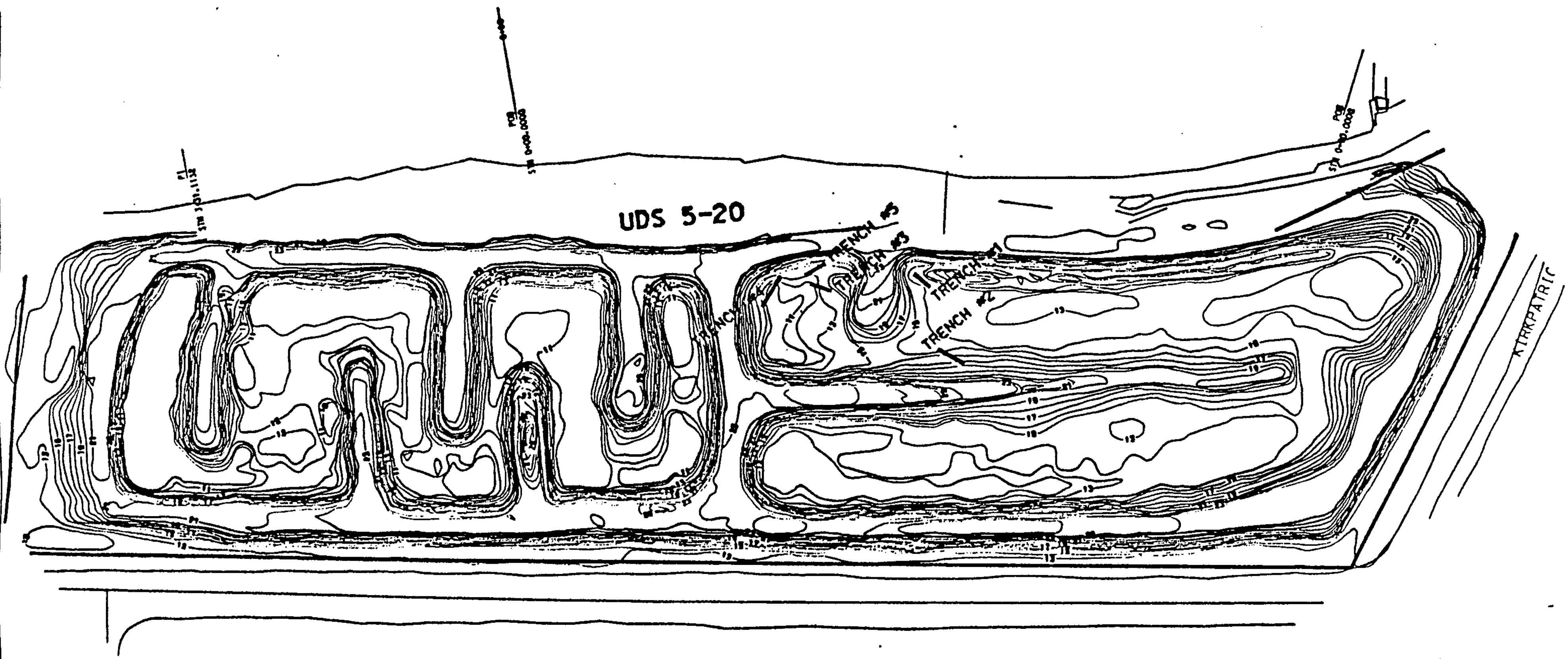
Figure D-3-1



Scale : 1" = 100'
Trench Length Distorted

Figure D-3-2

UDS 5-19 Soil Sampling Locations



Scale : 1" = 150'

Trench Length Distorted

Figure D-3-3

UDS 5-20 Soil Sampling Locations

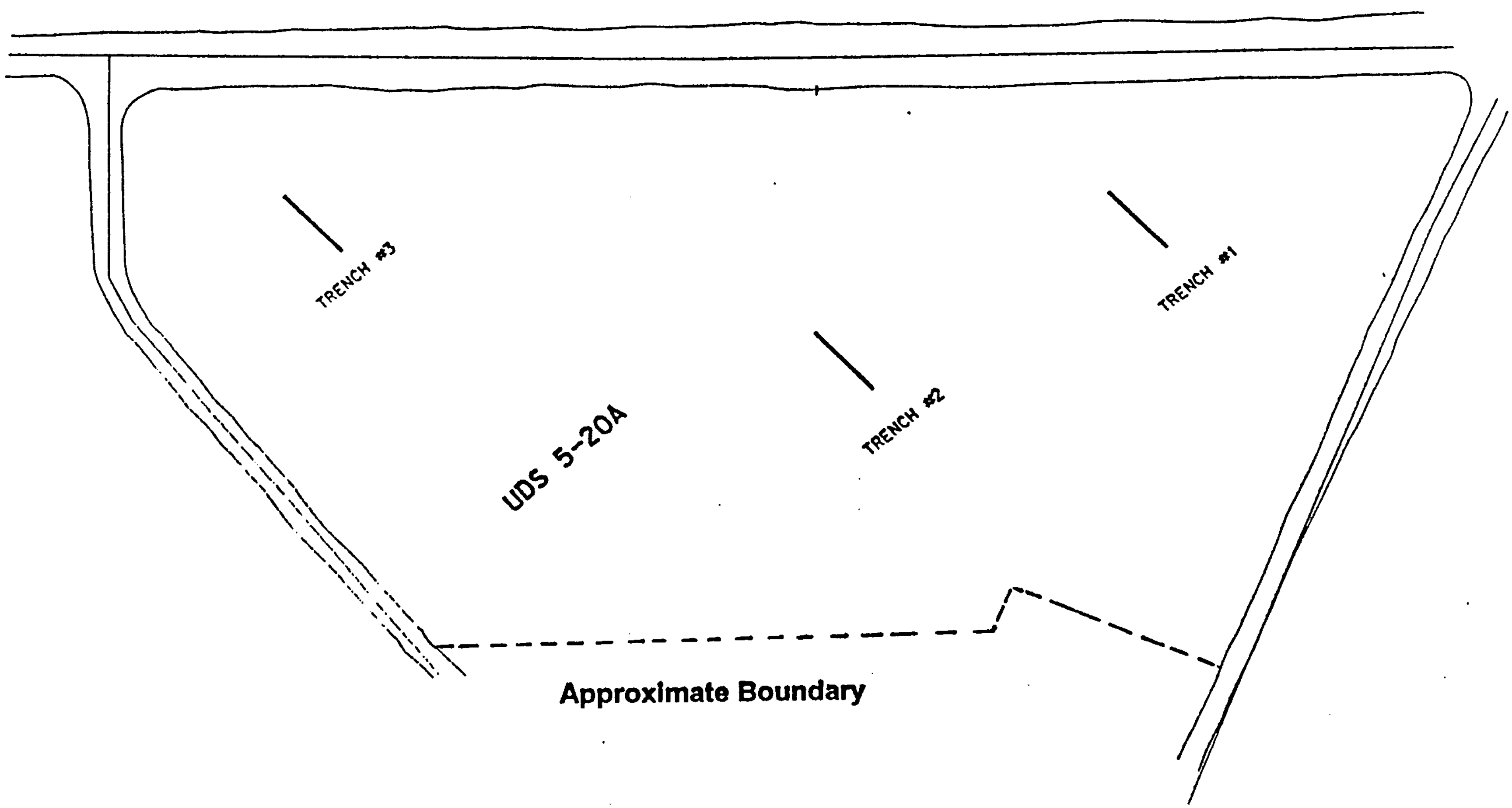


Figure D-3-4

UDS 5-20A Soil Sampling Locations

Table D-3-1 ANALYTICAL METHODS

Analysis	Method Reference
Particle Size	ASTM D-422-63
Permeability	ASTM D-2434-68
TAL Metals	EPA SW846
Volatile Organic Compounds	40CFR, Part 136
Semivolatile Organic Compounds	40CFR, Part 136
General Chemistry	EPA 600/4-79-020
Pesticides/PCBs	EPA SW846
Polychlorinated Dioxins/Furans	Method 1613A (modified New York State Department of Health Method June 1992)

Table D-3-2 Particle Size and Permeability

Particle Size**

Sample	% Sand	% Silt	% Clay
UDS5-19, TRENCH 1	51.13	44.63	4.24
UDS5-19, TRENCH 2	58.49	36.38	5.14
UDS5-19, TRENCH 3*	--	--	--
UDS5-19, TRENCH 4	0.00	80.41	19.59
UDS5-19, TRENCH 5	0.00	65.67	34.33
UDS5-20, TRENCH 1	0.00	67.66	32.34
UDS5-20, TRENCH 2	0.00	78.23	21.77
UDS5-20, TRENCH 3	0.00	45.78	54.22
UDS5-20, TRENCH 4	0.00	68.87	31.13
UDS5-20, TRENCH 5	0.98	59.56	39.46
UDS5-20A, TRENCH 1	87.10	10.22	2.68
UDS5-20A, TRENCH 2	8.38	58.18	33.44
UDS5-20A, TRENCH 3	0.84	59.51	39.65

* Sample lost due to breakage of graduated cylinder

** Please note: Some of the samples for particle size determinations were inadvertently mislabled in the laboratory as described below.
The samples are presented correctly in the summary table above, however, the samples remain mislabelled in the laboratory reports.

Field Label	Laboratory Label
UDS5-19, TRENCH 1	UDS5-20B, TRENCH 1
UDS5-19, TRENCH 2	UDS5-20C, TRENCH 2
UDS5-20, TRENCH 1	UDS5-20C, TRENCH 1
UDS5-20, TRENCH 2	UDS5-20B, TRENCH 2

Permeability

Sample	L thickness (cm)	h head (cm)	T time (min)	Q discharge (ml)	k coeff. perm. (cm/yr)
UDS5-19, TRENCH 4	3.0	41.0	1165	4.1	18.4
UDS5-20, TRENCH 1	2.5	39.7	520	3.3	24.5
UDS5-20A, TRENCH 3	2.3	42.2	1305	15.1	38.7

A (cross sectional area) = 8.55 sq. cm
$k = QL/ATh$

Table D-3-3 Furans and Dioxins

Analyte	UDS5-19A Trench 1&2 pg/g	UDS5-20 Trench 3, 4, 5 pg/g	UDS5-20A Trench 2 pg/g	Method Blank pg/g
Furans				
TCDFs (total)	ND	**140**	ND	ND
2, 3, 7, 8-TCDF	ND	**12**	ND	ND
PeCDFs (total)	ND	**180**	ND	ND
1, 2, 3, 7, 8-PeCDF	ND	ND	ND	ND
2, 3, 4, 7, 8-PeCDF	ND	ND	ND	ND
HxCDFs (total)	ND	**290**	ND	ND
1, 2, 3, 4, 7, 8-HxCDF	ND	ND	ND	ND
1, 2, 3, 6, 7, 8-HxCDF	ND	ND	ND	ND
2, 3, 4, 6, 7, 8-HxCDF	ND	ND	ND	ND
1, 2, 3, 7, 8, 9-HxCDF	ND	ND	ND	ND
HpCDFs (total)	ND	**690**	ND	ND
1, 2, 3, 4, 6, 7, 8-HpCDF	ND	**260**	ND	ND
1, 2, 3, 4, 7, 8, 9-HpCDF	ND	ND	ND	ND
OCDF	ND	**310**	ND	ND
Dioxins				
TCDDs (total)	ND	**29**	ND	ND
2, 3, 7, 8-TCDD	ND	**5.6**	ND	ND
PeCDDs (total)	ND	**61**	ND	ND
1, 2, 3, 7, 8-PeCDD	ND	ND	ND	ND
HxCDDs (total)	ND	**1000**	ND	ND
1, 2, 3, 4, 7, 8-HxCDD	ND	ND	ND	ND
1, 2, 3, 6, 7, 8-HxCDD	ND	**130**	ND	ND
1, 2, 3, 7, 8, 9-HxCDD	ND	**78**	ND	ND
HpCDDs (total)	ND	**2600**	ND	ND
1, 2, 3, 4, 6, 7, 8-HpCDD	ND	**1200**	ND	ND
OCDD	**20**	**12000**	**6.0**	ND

ND = Not Detected

Table D-3-4 USD 5-19 Volatile Organics

COMPOUND	UDS5-19 TRENCH 1 (ug/Kg)	UDS5-19 TRENCH 2 (ug/Kg)	UDS5-19 TRENCH 3 (ug/Kg)	UDS5-19 TRENCH 4 (ug/Kg)	UDS5-19 TRENCH 5 (ug/Kg)
Dichlorodifluoromethane	14 (U)	13 (U)	14 (U)	76 (U)	31 (U)
Chloromethane	14 (U)	13 (U)	14 (U)	76 (U)	31 (U)
Bromomethane	14 (U)	13 (U)	14 (U)	76 (U)	31 (U)
Vinyl Chloride	14 (U)	13 (U)	14 (U)	76 (U)	31 (U)
Chloroethane	14 (U)	13 (U)	14 (U)	76 (U)	31 (U)
Trichlorofluoromethane	7 (U)	6 (U)	14 (U)	38 (U)	15 (U)
Methylene Chloride	10 (B)	16 (B)	7 (B)	35 (JB)	25 (B)
1, 1-Dichloroethene	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
1, 1-Dichloroethane	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
2,2-Dichloropropane	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
trans-1,2-Dichloroethene	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
cis-1,2-Dichlorethene	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
Chloroform	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
1,2-Dichloroethane	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
1,1-Dichloropropene	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
Dibromomethane	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
Bromochloromethane	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
1, 1, 1-Trichloroethane	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
Carbon Tetrachloride	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
1,2-Dibromoethane	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
Bromodichloromethane	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
1, 2-Dichloropropane	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
1,3 -Dichloropropane	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
Trichloroethene	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
Dibromochloromethane	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
1, 1, 2-Trichloroethane	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
Benzene	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
Bromoform	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
Tetrachloroethene	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
1,1,2,2-Tetrachloroethane	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
1,1,1,2-Tetrachloroethane	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
Toluene	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
Chlorobenzene	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
Ethylbenzene	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
Styrene	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
meta+para-xylenes	7 (U)	6 (U)	7 (U)	12(J)	15 (U)
ortho-xylene	7 (U)	6 (U)	7 (U)	44	5 (J)
Isopropylbenzene	7 (U)	6 (U)	7 (U)	29 (J)	15 (U)
Bromobenzene	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
1,2,3-Trichloropropane	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
n-Propylbenzene	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
2-Chlorotoluene	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
4-Chlorotoluene	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
1,3,5-Trimethylbenzene	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
tert-Butylbenzene	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
1,2,4-Trimethylbenzene	7 (U)	6 (U)	7 (U)	190	26
sec-Butylbenzene	7 (U)	6 (U)	7 (U)	10 (J)	5 (J)
1,3-Dichlorobenzene	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
1,4-Dichlorobenzene	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
1,2-Dichlorobenzene	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
p-Isopropyltoluene	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
n-Butylbenzene	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
1,2-Dibromo-3-chloropropane	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
1,2,4-Trichlorobenzene	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
Naphthalene	7 (U)	6 (U)	7 (U)	23 (J)	15 (U)
Hexachlorobutadiene	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)
1,2,3-Trichlorobenzene	7 (U)	6 (U)	7 (U)	38 (U)	15 (U)

U = Undetected
D = Dilution performed
J = Below method detection limit
B = Compound also detected in method blank
RE = Reanalysis performed (see non-conformance summaries)

Table D-3-5 USD 5-20 Volatile Organics

COMPOUND	USD5-20 [illegible] (ug/kg)	USD5-20 [illegible] (ug/kg)	USD5-20 [illegible] (ug/kg)	USD5-20 RE [illegible] (ug/kg)	USD5-20 [illegible] (ug/kg)
Dichlorodifluoromethane	77 (U)	31 (U)	83 (U)	81 (U)	81 (U)
Chloromethane	77 (U)	31 (U)	83 (U)	81 (U)	81 (U)
Bromomethane	77 (U)	31 (U)	83 (U)	81 (U)	81 (U)
Vinyl Chloride	77 (U)	31 (U)	83 (U)	81 (U)	81 (U)
Chloroethane	77 (U)	31 (U)	83 (U)	81 (U)	81 (U)
Trichlorofluoromethane	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
Methylene Chloride	100 (B)	27 (B)	59 (B)	58 (B)	110 (B)
1, 1-Dichloroethene	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
1, 1-Dichloroethane	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
2,2-Dichloropropane	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
trans-1,2-Dichloroethene	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
cis-1,2-Dichlorethene	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
Chloroform	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
1,2-Dichloroethane	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
1,1-Dichloropropene	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
Dibromomethane	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
Bromochloromethane	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
1, 1, 1-Trichloroethane	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
Carbon Tetrachloride	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
1,2-Dibromoethane	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
Bromodichloromethane	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
1, 2-Dichloropropane	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
1,3 -Dichloropropane	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
Trichloroethene	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
Dibromochloromethane	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
1, 1, 2-Trichloroethane	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
Benzene	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
Bromoform	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
Tetrachloroethene	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
1,1,2,2-Tetrachloroethane	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
1,1,1,2-Tetrachloroethane	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
Toluene	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
Chlorobenzene	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
Ethylbenzene	12 (J)	16 (U)	42 (U)	40 (U)	18 (J)
Styrene	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
meta+para-xylenes	16 (J)	22	42 (U)	40 (U)	40 (U)
ortho-xylene	79	19	42 (U)	40 (U)	20 (J)
Isopropylbenzene	52	10 (J)	42 (U)	40 (U)	15 (J)
Bromobenzene	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
1,2,3-Trichloropropane	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
n-Propylbenzene	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
2-Chlorotoluene	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
4-Chlorotoluene	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
1,3,5-Trimethylbenzene	71	37	42 (U)	40 (U)	100
tert-Butylbenzene	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
1,2,4-Trimethylbenzene	230	87	9 (J)	40 (U)	120
sec-Butylbenzene	39 (U)	7 (J)	42 (U)	40 (U)	40 (U)
1,3-Dichlorobenzene	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
1,4-Dichlorobenzene	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
1,2-Dichlorobenzene	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
p-Isopropyltoluene	39 (U)	27	21 (J)	11 (J)	40 (U)
n-Butylbenzene	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
1,2-Dibromo-3-chloropropane	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
1,2,4-Trichlorobenzene	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
Naphthalene	33 (J)	5 (J)	42 (U)	40 (U)	25 (J)
Hexachlorobutadiene	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)
1,2,3-Trichlorobenzene	39 (U)	16 (U)	42 (U)	40 (U)	40 (U)

U = Undetected
D = Dilution performed
J = Below method detection limit
B = Compound also detected in method blank
RE = Reanalysis performed (see non-conformance summaries)

Table D-3-6 USD 5-20A Volatile Organics

COMPOUND	[illegible] (µg/kg)	UDSS-20A [illegible] (µg/kg)	UDSS-20A [illegible] (µg/kg)
Dichlorodifluoromethane	12 (U)	13 (U)	13 (U)
Chloromethane	12 (U)	13 (U)	13 (U)
Bromomethane	12 (U)	13 (U)	13 (U)
Vinyl Chloride	12 (U)	13 (U)	13 (U)
Chloroethane	12 (U)	13 (U)	13 (U)
Trichlorofluoromethane	6 (U)	7 (U)	7 (U)
Methylene Chloride	13 (B)	19 (B)	18 (B)
1, 1-Dichloroethene	6 (U)	7 (U)	7 (U)
1, 1-Dichloroethane	6 (U)	7 (U)	7 (U)
2,2-Dichloropropane	6 (U)	7 (U)	7 (U)
trans-1,2-Dichloroethene	6 (U)	7 (U)	7 (U)
cis-1,2-Dichlorethene	6 (U)	7 (U)	7 (U)
Chloroform	6 (U)	7 (U)	7 (U)
1,2-Dichloroethane	6 (U)	7 (U)	7 (U)
1,1-Dichloropropene	6 (U)	7 (U)	7 (U)
Dibromomethane	6 (U)	7 (U)	7 (U)
Bromochloromethane	6 (U)	7 (U)	7 (U)
1, 1, 1-Trichloroethane	6 (U)	7 (U)	7 (U)
Carbon Tetrachloride	6 (U)	7 (U)	7 (U)
1,2-Dibromoethane	6 (U)	7 (U)	7 (U)
Bromodichloromethane	6 (U)	7 (U)	7 (U)
1, 2-Dichloropropane	6 (U)	7 (U)	7 (U)
1,3 -Dichloropropane	6 (U)	7 (U)	7 (U)
Trichloroethene	6 (U)	7 (U)	7 (U)
Dibromochloromethane	6 (U)	7 (U)	7 (U)
1, 1, 2-Trichloroethane	6 (U)	7 (U)	7 (U)
Benzene	6 (U)	7 (U)	7 (U)
Bromoform	6 (U)	7 (U)	7 (U)
Tetrachloroethene	6 (U)	7 (U)	7 (U)
1,1,2,2-Tetrachloroethane	6 (U)	7 (U)	7 (U)
1,1,1,2-Tetrachloroethane	6 (U)	7 (U)	7 (U)
Toluene	6 (U)	7 (U)	7 (U)
Chlorobenzene	6 (U)	7 (U)	7 (U)
Ethylbenzene	6 (U)	7 (U)	7 (U)
Styrene	6 (U)	7 (U)	7 (U)
meta+para-xylenes	6 (U)	7 (U)	7 (U)
ortho-xylene	6 (U)	7 (U)	7 (U)
Isopropylbenzene	6 (U)	7 (U)	7 (U)
Bromobenzene	6 (U)	7 (U)	7 (U)
1,2,3-Trichloropropane	6 (U)	7 (U)	7 (U)
n-Propylbenzene	6 (U)	7 (U)	7 (U)
2-Chlorotoluene	6 (U)	7 (U)	7 (U)
4-Chlorotoluene	6 (U)	7 (U)	7 (U)
1,3,5-Trimethylbenzene	6 (U)	7 (U)	7 (U)
tert-Butylbenzene	6 (U)	7 (U)	7 (U)
1,2,4-Trimethylbenzene	6 (U)	7 (U)	7 (U)
sec-Butylbenzene	6 (U)	7 (U)	7 (U)
1,3-Dichlorobenzene	6 (U)	7 (U)	7 (U)
1,4-Dichlorobenzene	6 (U)	7 (U)	7 (U)
1,2-Dichlorobenzene	6 (U)	7 (U)	7 (U)
p-Isopropyltoluene	6 (U)	7 (U)	7 (U)
n-Butylbenzene	6 (U)	7 (U)	7 (U)
1,2-Dibromo-3-chloropropane	6 (U)	7 (U)	7 (U)
1,2,4-Trichlorobenzene	6 (U)	7 (U)	7 (U)
Naphthalene	6 (U)	7 (U)	7 (U)
Hexachlorobutadiene	6 (U)	7 (U)	7 (U)
1,2,3-Trichlorobenzene	6 (U)	7 (U)	7 (U)

U = Undetected
D = Dilution performed
J = Below method detection limit
B = Compound also detected in method blank
RE = Reanalysis performed (see non-conformance summaries)

Table D-3-7 USD 5-20 Tentatively Identified Volatile Organics

TENTATIVELY IDENTIFIED COMPOUND	RETENTION TIME	USD 5-20 TRENCH 1 (µg/kg)	USD 5-20 TRENCH 2 (µg/kg)	USD 5-20 TRENCH 3 (µg/kg)	USD 5-20 TRENCH 4 (µg/kg)	USD 5-20 TRENCH 5 (µg/kg)
Unknown	20.75-20.77	120	--	390	150	220
Unknown	18.36	--	--	--	--	40
Unknown	20.48-20.50	--	--	180	56	48
Unknown	19.44	--	--	--	--	48
Ethyl Methyl Benzene	22.79	110	--	--	--	--
Aromatic Hydrocarbon	24.54-24.55	--	38	420	--	--
Dimethyl Ethyl Benzene isomer	24.86	140	--	--	--	--
Dimethyl Ethyl Benzene isomer	25.48-25.49	120	34	--	--	--
Dimethyl Ethyl Benzene isomer	25.69	85	--	--	--	--
Unknown	26.49-26.53	77	56	1000	--	100
Aromatic Hydrocarbon	27.18	220	--	--	--	--
Unknown	27.61	180	--	--	--	--
Aromatic Hydrocarbon	26.06	--	--	430	--	--
Aromatic Hydrocarbon	28.29-28.30	92	--	--	--	190
Aromatic Hydrocarbon	31.65	--	63	--	--	--
Aromatic Hydrocarbon	32.20-32.22	580	--	--	--	290
Unknown	29.08	--	--	--	--	81
Unknown	17.71	--	47	--	--	--
Unknown Cycloalkane	19.42	--	--	--	48	--
Unknown Cycloalkane	20.76	--	160	--	--	--
Unknown Cycloalkane	20.07-20.08	--	--	--	73	73
Unknown	21.70	--	--	--	--	48
Unknown	21.66	--	--	--	48	--
Unknown	22.73	--	--	350	--	--
Unknown	22.09	--	--	--	48	--
Unknown	22.37	--	--	--	97	--
Unknown	21.62	--	--	--	--	--
Unknown	22.11-22.13	--	75	780	--	--
Unknown Alkane	23.27	--	--	--	350	--
Unknown Alkane	29.62-29.65	--	53	1300	--	--
Unknown Cycloalkane	22.38	--	--	830	--	--
Unknown Ketone	7.01	--	44	--	--	--
Unknown Cycloalkane	21.65	--	--	490	--	--

Table D-3-8 USD 5-19 & USD 5-20A Tentatively Identified Volatile Organics

TENTATIVELY IDENTIFIED COMPOUND	RETENTION TIME	UDS-5-19 TRENCH 1 (ug/kg)	UDS-5-19 TRENCH 2 (ug/kg)	UDS-5-19 TRENCH 3 (ug/kg)	UDS-5-19 TRENCH 4 (ug/kg)	UDS-5-19 TRENCH 5 (ug/kg)
Unknown cycloalkane	19.48	--	--	--	--	180
Unknown cycloalkane	20.09	--	--	--	--	110
Unknown	20.50	--	--	--	--	110
Unknown	20.76-20.78	--	--	--	280	290
Unknown cycloalkane	21.66	--	--	--	--	46
Unknown	22.09-22.11	--	--	--	190	59
Unknown cycloalkane	22.41	--	--	--	--	89
Ethyl Methyl Benzene	22.78	--	--	--	130	--
Unknown	25.14	--	--	--	--	31
Dimethyl Ethyl Benzene isomer	25.49	--	--	--	170	--
Unknown	26.06	--	--	--	110	--
Unknown	26.52	--	--	--	--	62
Unknown cycloalkane	26.52	--	--	--	150	--
Aromatic Hydrocarbon	27.17	--	--	--	140	--
Aromatic Hydrocarbon	27.23	--	8	--	--	--
Dimethyl Ethyl Benzene isomer	27.58	--	--	--	200	--
Aromatic Hydrocarbon	28.31	--	--	--	140	--
Aromatic Hydrocarbon	28.39	--	8	--	--	--
Unknown Alkane	29.67	--	--	--	--	49
Aromatic Hydrocarbon	32.21	--	--	--	560	--

TENTATIVELY IDENTIFIED COMPOUND	RETENTION TIME	UDS-5-20A TRENCH 1 (ug/kg)	UDS-5-20A TRENCH 2 (ug/kg)	UDS-5-20A TRENCH 3 (ug/kg)
Ethane, 1,1,2-trichloro-1,2,2-trifluoro	6.68-6.71	35	--	38
Unknown	7.02	--	17	--
Unknown	26.66	8	--	--
Aromatic Hydrocarbon	28.31	8	--	--
Unknown	32.29	8	--	--

* All concentrations given are estimates

Table D-3-9 USD 5-19 Semi-Volatile Organics

COMPOUND	UDS5-19 TRENCH 1 (ug/Kg)	UDS5-19 TRENCH 2 (ug/Kg)	UDS5-19 TRENCH 3 (ug/Kg)	UDS5-19 TRENCH 4 (ug/Kg)	UDS5-19 TRENCH 5 (ug/Kg)
bis(2-Chloroethyl)ether	480 (U)	430 (U)	450 (U)	1000 (U)	2600 (U)
Phenol	480 (U)	430 (U)	450 (U)	1000 (U)	2600 (U)
2-Chlorophenol	480 (U)	430 (U)	450 (U)	1000 (U)	2600 (U)
1, 3-Dichlorobenzene	480 (U)	430 (U)	450 (U)	1000 (U)	2600 (U)
1, 4-Dichlorobenzene	480 (U)	430 (U)	450 (U)	1000 (U)	2600 (U)
1, 2-Dichlorobenzene	480 (U)	430 (U)	450 (U)	1000 (U)	2600 (U)
2, 2'-oxybis(1-Chloropropane)	480 (U)	430 (U)	450 (U)	1000 (U)	2600 (U)
2-Methylphenol	480 (U)	430 (U)	450 (U)	1000 (U)	2600 (U)
Hexachloroethane	480 (U)	430 (U)	450 (U)	1000 (U)	2600 (U)
N-Nitroso-di-n-propylamine	480 (U)	430 (U)	450 (U)	1000 (U)	2600 (U)
3&4-Methylphenol	480 (U)	430 (U)	450 (U)	1000 (U)	2600 (U)
Nitrobenzene	480 (U)	430 (U)	450 (U)	1000 (U)	2600 (U)
Isophorone	480 (U)	430 (U)	450 (U)	1000 (U)	2600 (U)
2-Nitrophenol	480 (U)	430 (U)	450 (U)	1000 (U)	2600 (U)
2, 4-Dimethylphenol	480 (U)	430 (U)	450 (U)	1000 (U)	2600 (U)
bis(2-Chloroethoxy)methane	480 (U)	430 (U)	450 (U)	1000 (U)	2600 (U)
2, 4-Dichlorophenol	480 (U)	430 (U)	450 (U)	1000 (U)	2600 (U)
1, 2, 4-Trichlorobenzene	480 (U)	430 (U)	450 (U)	1000 (U)	2600 (U)
Naphthalene	480 (U)	430 (U)	450 (U)	360 (JD)	510 (JD)
4-Chloroaniline	480 (U)	430 (U)	450 (U)	1000 (U)	2600 (U)
Hexachlorobutadiene	480 (U)	430 (U)	450 (U)	1000 (U)	2600 (U)
4-Chloro-3-methylphenol	480 (U)	430 (U)	450 (U)	1000 (U)	2600 (U)
2-Methylnaphthalene	480 (U)	430 (U)	450 (U)	650 (JD)	6300 (D)
Hexachlorocyclopentadiene	480 (U)	430 (U)	450 (U)	1000 (U)	2600 (U)
2, 4, 6-Trichlorophenol	480 (U)	430 (U)	450 (U)	1000 (U)	2600 (U)
2, 4, 5-Trichlorophenol	1200 (U)	1100 (U)	1100 (U)	2500 (U)	6400 (U)
2-Chloronaphthalene	480 (U)	430 (U)	450 (U)	1000 (U)	2600 (U)
2-Nitroaniline	1200 (U)	1100 (U)	1100 (U)	2500 (U)	6400 (U)
Acenaphthylene	480 (U)	430 (U)	450 (U)	740 (JD)	1000 (JD)
Dimethylphthalate	480 (U)	430 (U)	450 (U)	1000 (U)	2600 (U)
2, 6-Dinitrotoluene	480 (U)	430 (U)	450 (U)	1000 (U)	2600 (U)
Acenaphthene	480 (U)	430 (U)	450 (U)	3600 (D)	3900 (D)
3-Nitroaniline	1200 (U)	1100 (U)	1100 (U)	2500 (U)	6400 (U)
2, 4-Dinitrophenol	1200 (U)	1100 (U)	1100 (U)	2500 (U)	6400 (U)
Dibenzofuran	480 (U)	430 (U)	450 (U)	550 (JD)	770 (JD)
2, 4-Dinitrotoluene	480 (U)	430 (U)	450 (U)	1000 (U)	2600 (U)
4-Nitrophenol	1200 (U)	1100 (U)	1100 (U)	2500 (U)	6400 (U)
Fluorene	480 (U)	430 (U)	450 (U)	2500 (D)	2700 (D)
4-Chlorophenyl-phenylether	480 (U)	430 (U)	450 (U)	1000 (U)	2600 (U)
Diethylphthalate	480 (U)	430 (U)	450 (U)	1000 (U)	2600 (U)
4-Nitrolaniline	1200 (U)	1100 (U)	1100 (U)	2500 (U)	6400 (U)
4, 6-Dinitro-2-methylphenol	1200 (U)	1100 (U)	1100 (U)	2500 (U)	6400 (U)
n-Nitrosodiphenylamine	480 (U)	430 (U)	450 (U)	1000 (U)	2600 (U)
4-Bromophenyl-phenylether	480 (U)	430 (U)	450 (U)	1000 (U)	2600 (U)
Hexachlorobenzene	480 (U)	430 (U)	450 (U)	1000 (U)	2600 (U)
Pentachlorophenol	1200 (U)	1100 (U)	1100 (U)	2500 (U)	6400 (U)
Phenanthrene	480 (U)	430 (U)	49 (J)	5400 (D)	6000 (D)
Anthracene	480 (U)	430 (U)	450 (U)	2800 (D)	3400 (D)
Carbazol	480 (U)	430 (U)	450 (U)	480 (JD)	890 (JD)
Di-n-butylphthalate	480 (U)	430 (U)	450 (U)	1000 (U)	2600 (U)
Fluoroanthene	96 (J)	430 (U)	61 (J)	7000 (D)	13000 (D)
Pyrene	81 (J)	430 (U)	59 (J)	7700 (D)	12000 (D)
Butylbenzylphthalate	480 (U)	430 (U)	450 (U)	1000 (U)	2600 (U)
3, 3'-dichlorobenzidine	480 (U)	430 (U)	450 (U)	1000 (U)	2600 (U)
Benzo(a)anthracene	50 (J)	430 (U)	55 (J)	3200 (D)	6400 (D)
Chrysene	48 (J)	430 (U)	58 (J)	3800 (D)	6600 (D)
bis(2-Ethylhexyl)phthalate	480 (U)	430 (U)	450 (U)	2600 (D)	5200 (D)
Di-n-octylphthalate	480 (U)	430 (U)	450 (U)	1000 (U)	2600 (U)
Benzo(b)fluoranthene	480 (U)	430 (U)	450 (U)	2500 (D)	5500 (D)
Benzo(k)fluoranthene	480 (U)	430 (U)	50 (J)	2300 (D)	3500 (D)
Benzo(a)pyrene	480 (U)	430 (U)	54 (J)	2500 (D)	4600 (D)
Indeno(1, 2,3-cd)pyrene	480 (U)	430 (U)	450 (U)	1900 (D)	3300 (D)
Dibenz(a, h)anthracene	480 (U)	430 (U)	450 (U)	1000 (U)	2600 (U)
Benzo(g, h, i)perylene	480 (U)	430 (U)	450 (U)	1700 (D)	3000 (D)

U = Undetected
D = Dilution performed
J = Below method detection limit
B = Compund also detected in method blank
RE = Reanalysis performed (see non-conformance summaries)

Table D-3-10 USD 5-20 Semi-Volatile Organics

COMPOUND	USD5-20 [illegible]	USD5-20 [illegible]	USD5-20 [illegible]	USD5-20 [illegible]	USD5-20 [illegible]	USD5-20 [illegible]
bis(2-Chloroethyl)ether	1000 (U)	2600 (U)	1100 (U)	2700 (U)	2700 (U)	5500 (U)
Phenol	1000 (U)	2600 (U)	1100 (U)	2700 (U)	2700 (U)	5500 (U)
2-Chlorophenol	1000 (U)	2600 (U)	1100 (U)	2700 (U)	2700 (U)	5500 (U)
1, 3-Dichlorobenzene	1000 (U)	2600 (U)	1100 (U)	2700 (U)	2700 (U)	5500 (U)
1, 4-Dichlorobenzene	1000 (U)	2600 (U)	1100 (U)	2700 (U)	2700 (U)	5500 (U)
1, 2-Dichlorobenzene	1000 (U)	2600 (U)	1100 (U)	2700 (U)	2700 (U)	5500 (U)
2, 2'-oxybis(1-Chloropropane)	1000 (U)	2600 (U)	1100 (U)	2700 (U)	2700 (U)	5500 (U)
2-Methylphenol	1000 (U)	2600 (U)	1100 (U)	2700 (U)	2700 (U)	5500 (U)
Hexachloroethane	1000 (U)	2600 (U)	1100 (U)	2700 (U)	2700 (U)	5500 (U)
N-Nitroso-di-n-propylamine	1000 (U)	2600 (U)	1100 (U)	2700 (U)	2700 (U)	5500 (U)
3&4-Methylphenol	1000 (U)	2600 (U)	1100 (U)	2700 (U)	2700 (U)	5500 (U)
Nitrobenzene	1000 (U)	2600 (U)	1100 (U)	2700 (U)	2700 (U)	5500 (U)
Isophorone	1000 (U)	2600 (U)	1100 (U)	2700 (U)	2700 (U)	5500 (U)
2-Nitrophenol	1000 (U)	2600 (U)	1100 (U)	2700 (U)	2700 (U)	5500 (U)
2, 4-Dimethylphenol	1000 (U)	2600 (U)	1100 (U)	2700 (U)	2700 (U)	5500 (U)
bis(2-Chloroethoxy)methane	1000 (U)	2600 (U)	1100 (U)	2700 (U)	2700 (U)	5500 (U)
2, 4-Dichlorophenol	1000 (U)	2600 (U)	1100 (U)	2700 (U)	2700 (U)	5500 (U)
1, 2, 4-Trichlorobenzene	1000 (U)	2600 (U)	1100 (U)	2700 (U)	2700 (U)	5500 (U)
Naphthalene	340 (JD)	2600 (U)	270 (JD)	2700 (U)	1900 (JD)	1800 (JD)
4-Chloroaniline	1000 (U)	2600 (U)	1100 (U)	690 (JD)	2700 (U)	5500 (U)
Hexachlorobutadiene	1000 (U)	2600 (U)	1100 (U)	2700 (U)	2700 (U)	5500 (U)
4-Chloro-3-methylphenol	1000 (U)	2600 (U)	1100 (U)	2700 (U)	2700 (U)	5500 (U)
2-Methylnaphthalene	440 (JD)	3400 (D)	510 (JD)	2700 (U)	5300 (D)	5700 (D)
Hexachlorocyclopentadiene	1000 (U)	2600 (U)	1100 (U)	2700 (U)	2700 (U)	5500 (U)
2, 4, 6-Trichlorophenol	1000 (U)	2600 (U)	1100 (U)	2700 (U)	2700 (U)	5500 (U)
2, 4, 5-Trichlorophenol	2600 (U)	6400 (U)	2800 (U)	6700 (U)	6800 (U)	14000 (U)
2-Chloronaphthalene	1000 (U)	2600 (U)	1100 (U)	2700 (U)	2700 (U)	5500 (U)
2-Nitroaniline	2600 (U)	6400 (U)	2800 (U)	6700 (U)	6800 (U)	14000 (U)
Acenaphthylene	580 (JD)	1100 (JD)	1200 (D)	500 (JD)	7200 (D)	8100 (D)
Dimethylphthalate	1000 (U)	2600 (U)	1100 (U)	2700 (U)	2700 (U)	5500 (U)
2, 6-Dinitrotoluene	1000 (U)	2600 (U)	1100 (U)	2700 (U)	2700 (U)	5500 (U)
Acenaphthene	3500 (D)	2400 (JD)	2300 (D)	490 (JD)	28000 (D)	30000 (D)
3-Nitroaniline	2600 (U)	6400 (U)	2800 (U)	6700 (U)	6800 (U)	14000 (U)
2, 4-Dinitrophenol	2600 (U)	6400 (U)	2800 (U)	6700 (U)	6800 (U)	14000 (U)
Dibenzofuran	460 (JD)	540 (JD)	660 (JD)	2700 (U)	2700 (U)	5500 (U)
2, 4-Dinitrotoluene	1000 (U)	2600 (U)	1100 (U)	2700 (U)	2700 (U)	5500 (U)
4-Nitrophenol	2600 (U)	6400 (U)	2800 (U)	6700 (U)	6800 (U)	14000 (U)
Fluorene	1800 (D)	2200 (JD)	2200 (D)	650 (JD)	14000 (D)	14000 (D)
4-Chlorophenyl-phenylether	1000 (U)	2600 (U)	1100 (U)	2700 (U)	2700 (U)	5500 (U)
Diethylphthalate	1000 (U)	2600 (U)	1100 (U)	2700 (U)	2700 (U)	5500 (U)
4-Nitrolaniline	2600 (U)	6400 (U)	2800 (U)	6700 (U)	6800 (U)	14000 (U)
4, 6-Dinitro-2-methylphenol	2600 (U)	6400 (U)	2800 (U)	6700 (U)	6800 (U)	14000 (U)
n-Nitrosodiphenylamine	1000 (U)	2600 (U)	1100 (U)	2700 (U)	2700 (U)	5500 (U)
4-Bromophenyl-phenylether	1000 (U)	2600 (U)	1100 (U)	2700 (U)	2700 (U)	5500 (U)
Hexachlorobenzene	1000 (U)	2600 (U)	1100 (U)	2700 (U)	2700 (U)	5500 (U)
Pentachlorophenol	2600 (U)	6400 (U)	2800 (U)	6700 (U)	6800 (U)	14000 (U)
Phenanthrene	2700 (D)	11000 (D)	2500 (D)	1700 (JD)	54000 (ED)	56000 (D)
Anthracene	1900 (D)	3000 (D)	3000 (D)	1100 (JD)	21000 (D)	24000 (D)
Carbazol	430 (JD)	720 (JD)	560 (JD)	330 (JD)	2700 (U)	5500 (U)
Di-n-butylphthalate	1000 (U)	2600 (U)	1100 (U)	2700 (U)	2700 (U)	5500 (U)
Fluoroanthene	5700 (D)	11000 (D)	7700 (D)	5600 (D)	26000 (D)	30000 (D)
Pyrene	5700 (D)	11000 (D)	8800 (D)	5400 (D)	35000 (D)	41000 (D)
Butylbenzylphthalate	1000 (U)	2600 (U)	1100 (U)	2700 (U)	2700 (U)	5500 (U)
3, 3'-dichlorobenzidine	1000 (U)	2600 (U)	1100 (U)	2700 (U)	2700 (U)	5500 (U)
Benzo[a]anthracene	2400 (D)	4800 (D)	3900 (D)	2400 (JD)	17000 (D)	17000 (D)
Chrysene	2900 (D)	5800 (D)	4600 (D)	2900 (D)	16000 (D)	19000 (D)
bis(2-Ethylhexyl)phthalate	3200 (D)	5500 (D)	3300 (D)	9900 (D)	5500 (D)	6300 (D)
Di-n-octylphthalate	1000 (U)	2600 (U)	1100 (U)	2700 (U)	2700 (U)	5500 (U)
Benzo[b]fluoranthene	2300 (D)	4300 (D)	3100 (D)	2500 (JD)	9300 (D)	8600 (D)
Benzo[k]fluoranthene	1500 (D)	2800 (D)	1900 (D)	1700 (JD)	6500 (D)	8700 (D)
Benzo[a]pyrene	2000 (D)	4000 (D)	3100 (D)	2100 (JD)	11000 (D)	12000 (D)
Indeno[1, 2,3-cd]pyrene	1500 (D)	3000 (D)	2600 (D)	1700 (JD)	6100 (D)	6300 (D)
Dibenz[a, h]anthracene	540 (JD)	2600 (U)	930 (JD)	410 (JD)	2500 (JD)	2600 (JD)
Benzo[g, h, i]perylene	1300 (D)	2600 (D)	2300 (D)	1500 (JD)	5400 (D)	5800 (D)

U = Undetected
D = Dilution performed
J = Below method detection limit
B = Compund also detected in method blank
RE = Reanalysis performed (see non-conformance summaries)

Table D-3-11 USD 5-20A Semi-Volatile Organics

COMPOUND	UDS520A TRENCH 1 (ug/kg)	UDS520A TRENCH 2 (ug/kg)	UDS520A TRENCH 3 (ug/kg)
bis(2-Chloroethyl)ether	390 (U)	450 (U)	440 (U)
Phenol	390 (U)	450 (U)	440 (U)
2-Chlorophenol	390 (U)	450 (U)	440 (U)
1, 3-Dichlorobenzene	390 (U)	450 (U)	440 (U)
1, 4-Dichlorobenzene	390 (U)	450 (U)	440 (U)
1, 2-Dichlorobenzene	390 (U)	450 (U)	440 (U)
2, 2'-oxybis(1-Chloropropane)	390 (U)	450 (U)	440 (U)
2-Methylphenol	390 (U)	450 (U)	440 (U)
Hexachloroethane	390 (U)	450 (U)	440 (U)
N-Nitroso-di-n-propylamine	390 (U)	450 (U)	440 (U)
3&4-Methylphenol	390 (U)	450 (U)	440 (U)
Nitrobenzene	390 (U)	450 (U)	440 (U)
Isophorone	390 (U)	450 (U)	440 (U)
2-Nitrophenol	390 (U)	450 (U)	440 (U)
2, 4-Dimethylphenol	390 (U)	450 (U)	440 (U)
bis(2-Chloroethoxy)methane	390 (U)	450 (U)	440 (U)
2, 4-Dichlorophenol	390 (U)	450 (U)	440 (U)
1, 2, 4-Trichlorobenzene	390 (U)	450 (U)	440 (U)
Naphthalene	390 (U)	450 (U)	440 (U)
4-Chloroaniline	390 (U)	450 (U)	440 (U)
Hexachlorobutadiene	390 (U)	450 (U)	440 (U)
4-Chloro-3-methylphenol	390 (U)	450 (U)	440 (U)
2-Methylnaphthalene	390 (U)	450 (U)	440 (U)
Hexachlorocyclopentadiene	390 (U)	450 (U)	440 (U)
2, 4, 6-Trichlorophenol	390 (U)	450 (U)	440 (U)
2, 4, 5-Trichlorophenol	970 (U)	1100 (U)	1100 (U)
2-Chloronaphthalene	390 (U)	450 (U)	440 (U)
2-Nitroaniline	970 (U)	1100 (U)	1100 (U)
Acenaphthylene	390 (U)	450 (U)	440 (U)
Dimethylphthalate	390 (U)	450 (U)	440 (U)
2, 6-Dinitrotoluene	390 (U)	450 (U)	440 (U)
Acenaphthene	390 (U)	450 (U)	440 (U)
3-Nitroaniline	970 (U)	1100 (U)	1100 (U)
2, 4-Dinitrophenol	970 (U)	1100 (U)	1100 (U)
Dibenzofuran	390 (U)	450 (U)	440 (U)
2, 4-Dinitrotoluene	390 (U)	450 (U)	440 (U)
4-Nitrophenol	970 (U)	1100 (U)	1100 (U)
Fluorene	390 (U)	450 (U)	440 (U)
4-Chlorophenyl-phenylether	390 (U)	450 (U)	440 (U)
Diethylphthalate	390 (U)	450 (U)	440 (U)
4-Nitrolaniline	970 (U)	1100 (U)	1100 (U)
4, 6-Dinitro-2-methylphenol	970 (U)	1100 (U)	1100 (U)
n-Nitrosodiphenylamine	390 (U)	450 (U)	440 (U)
4-Bromophenyl-phenylether	390 (U)	450 (U)	440 (U)
Hexachlorobenzene	390 (U)	450 (U)	440 (U)
Pentachlorophenol	970 (U)	1100 (U)	1100 (U)
Phenanthrene	390 (U)	450 (U)	440 (U)
Anthracene	390 (U)	450 (U)	440 (U)
Carbazol	N/A	N/A	N/A
Di-n-butylphthalate	390 (U)	450 (U)	440 (U)
Fluoroanthene	65 (J)	450 (U)	440 (U)
Pyrene	58 (J)	450 (U)	45 (J)
Butylbenzylphthalate	390 (U)	450 (U)	440 (U)
3, 3'-dichlorobenzidine	390 (U)	450 (U)	440 (U)
Benzo[a]anthracene	40 (J)	450 (U)	440 (U)
Chrysene	44 (J)	450 (U)	440 (U)
bis(2-Ethylhexyl)phthalate	390 (U)	450 (U)	440 (U)
Di-n-octylphthalate	390 (U)	450 (U)	440 (U)
Benzo[b]fluoranthene	390 (U)	450 (U)	440 (U)
Benzo[k]fluoranthene	390 (U)	450 (U)	440 (U)
Benzo[a]pyrene	390 (U)	450 (U)	440 (U)
Indeno[1, 2,3-cd]pyrene	390 (U)	450 (U)	440 (U)
Dibenz[a, h]anthracene	390 (U)	450 (U)	440 (U)
Benzo[g, h, i]perylene	390 (U)	450 (U)	440 (U)

U = Undetected
D = Dilution performed
J = Below method detection limit
B = Compund also detected in method blank
RE = Reanalysis performed (see non-conformance summaries)

Table D-3-12 USD 5-19 Tentatively Identified Semi-Volatile Organics

TENTATIVELY IDENTIFIED COMPOUND	RETENTION TIME	[illegible] TRENCH [illegible]	[illegible] TRENCH [illegible]	[illegible] TRENCH [illegible]	[illegible] TRENCH [illegible]	[illegible] TRENCH [illegible]
Unknown	3.18	–	–	–	–	–
Aldol Condensation	3.31	2700 (JB)	–	2400 (JB)	–	–
Unknown	7.45	360 (J)	–	–	–	–
Unknown	7.60	–	–	–	–	3700 (J)
Benzene-1,2,3,4-d-,5,6-dic	7.59	–	–	–	2600 (JB)	–
Unknown	12.47	–	–	–	3300 (J)	6300 (J)
Naphthalene, Isomer	13.17	–	–	–	5400 (J)	7800 (J)
Unknown	14.28-14.29	–	–	–	2300 (J)	4000 (J)
Naphthalene, Isomer	14.79-14.80	–	–	–	2300 (J)	3400 (J)
Naphthalene, Isomer	15.04-15.05	–	–	–	3200 (J)	4800 (J)
Naphthalene, Isomer	15.09-15.11	–	–	–	1700 (J)	2400 (J)
Unknown	15.69-15.70	–	–	–	2600 (J)	5100 (J)
Naphthalene, Isomer	16.84	–	–	–	1700 (J)	2700 (J)
Naphthalene, Isomer	17.09	–	–	–	2200 (J)	–
Unknown	18.55-18.56	–	–	–	2200 (J)	3600 (J)
Unknown	19.38	–	–	–	4000 (J)	8100 (J)
Unknown	20.80	–	–	–	2600 (J)	4700 (J)
Aromatic Hydrocarbon	22.04	–	–	–	2400 (J)	–
Anthracene, Isomer	22.05	–	–	–	–	2500 (J)
Aromatic Hydrocarbon	22.12	–	–	–	1900 (J)	–
Unknown	22.34	–	–	–	–	2100 (J)
Aromatic Hydrocarbon	23.03	–	–	–	1800 (J)	–
Sulfur, mol. (S8)	23.79	–	–	–	3200 (J)	–
Phenanthrene, Isomer	23.83	–	–	–	–	10000 (J)
Aromatic Hydrocarbon	23.84	–	–	–	3300 (J)	–
Phenanthrene, Isomer	23.90	–	–	–	–	4500 (J)
Unknown	23.92-23.93	–	–	–	2000 (J)	2100 (J)
Sulfur, mol. (S8)	24.00-24.01	680 (J)	–	310 (J)	–	–
Unknown	25.21	–	330 (J)	–	–	–
Octadecanoic acid	25.42-25.43	770 (J)	–	240 (J)	–	–
Unknown Alkane	27.72	–	210 (J)	–	–	–
Dotriacontane	27.91	–	–	320 (J)	–	–
Hexadecane	27.91	440 (J)	–	–	–	–
Unknown Alkane	29.71	–	320 (J)	–	–	–
Docosane	29.91	–	–	440 (J)	–	–
Heneicosane	29.91	570 (J)	–	–	–	–
Unknown Alkane	31.56	–	300 (J)	–	–	–
Hexadecane	31.77	590 (JB)	–	510 (JB)	–	–
Unknown	32.35	–	–	–	–	2700 (J)
Unknown Alkane	33.30	–	320 (J)	–	–	–
Dotriacontane	33.51	–	–	560 (J)	–	–
Octadecane	33.52	580 (J)	–	–	–	–
Unknown Alkane	34.18	–	–	–	–	3400 (J)
Unknown	34.20	–	–	–	1700 (J)	–
Unknown	34.34	–	–	190 (J)	–	–
Unknown Alkane	34.92	–	330 (J)	–	–	–
Nonadecane	35.14	730 (J)	–	–	–	–
Octadecane	35.15	–	–	530 (J)	–	–
Heneicosane	36.12	–	–	200 (J)	–	–
Unknown	36.16	–	240 (J)	–	–	–
Unknown Alkane	36.54	–	300 (J)	–	–	–
Nonadecane	36.82	760 (J)	–	–	–	–
Hexadecane	36.83	–	–	530 (J)	–	–
Unknown	37.03	–	200 (J)	–	–	–

J = Below method detection limit
B = Compound also detected in method blank
* All concentrations given are estimates

Table D-3-13 USD 5-20 Tentatively Identified Semi-Volatile Irganics

Tentatively Identified Compound	Retention Time	USD5-20 Trench 1 (ug/kg)	USD5-20 Trench 2 (ug/kg)	USD5-20 Trench 3 (ug/kg)	USD5-20 Trench 4 (ug/kg)	USD5-20 Trench 5 (ug/kg)
Unknown	7.42	–	–	–	4000 (J)	–
Unknown	7.59-7.60	4000 (JB)	–	–	3600 (JB)	–
Unknown	11.37-11.39	–	–	3500 (J)	2500 (J)	–
Unknown Alkane	12.45	–	3600 (J)	–	4200 (J)	–
Unknown	12.46	2100 (J)	–	–	–	–
Unknown	12.48	–	–	4600 (J)	–	–
Naphthalene, Isomer	13.15-13.17	5400 (J)	5000 (J)	–	–	23000 (J)
Unknown	14.26-14.28	1700 (J)	3000 (J)	–	3000 (J)	–
Unknown	14.31	–	–	4700 (J)	–	–
Naphthalene, Isomer	14.62	–	–	–	–	4800 (J)
Naphthalene, Isomer	14.77-14.78	3200 (J)	2300 (J)	–	–	–
Naphthalene, Isomer	14.81			–	–	14000 (J)
Naphthalene, Isomer	15.03	3400 (J)	4000 (J)	–	–	–
Naphthalene, Isomer	15.07	–	–	–	–	17000 (J)
Naphthalene, Isomer	15.11-15.12	–	–	2100 (J)	–	6300 (J)
Naphthalene, Isomer	15.38	–	–	–	–	6900 (J)
Unknown	15.67-15.69	2400 (J)	4400 (J)	–	4500 (J)	–
Unknown	15.73	–	–	4900 (J)	–	–
Naphthalene, Isomer	16.43	–	–	–	–	7500 (J)
Naphthalene, Isomer	16.82	–	2200 (J)	–	–	–
Naphthalene, Isomer	16.85-16.86	–	–	2900 (J)	–	7300 (J)
Unknown	17.05	–	–	2200 (J)	–	–
Naphthalene, Isomer	17.34	–	–	1700 (J)	–	–
Unknown	17.58	–	–	–	–	7100 (J)
Unknown	17.87	–	–	–	–	4900 (J)
Unknown	18.06	–	–	–	–	6300 (J)
Unknown	18.54	–	–	–	2600 (J)	–
Nonacosane	18.54	–	3100 (J)	–	–	–
Unknown	18.59	–	–	3700 (J)	–	–
Unknown	19.36	–	6900 (J)	–	6000 (J)	–
Unknown Alkane	19.37	3900 (J)	–	–	–	–
Unknown	19.42	–	–	9200 (J)	–	–
Unknown	20.78	–	–	–	3100 (J)	–
Unknown Alkane	20.78-20.80	2000 (J)	3800 (J)	–	–	–
Unknown	20.85	–	–	4900 (J)	–	–
Unknown	22.02	–	3600 (J)	–	–	–
Unknown	22.09	–	–	–	–	5000 (J)
Aromatic Hydrocarbon	22.09-22.10	–	3700 (J)	1800 (J)	–	–
Aromatic Hydrocarbon	22.32	–	1800 (J)	–	–	–
Unknown	22.36	–	2400 (J)	–	–	–
Unknown	23.51	–	–	–	1900 (J)	–
Aromatic Hydrocarbon	23.63	1600 (J)	–	–	–	–
Aromatic Hydrocarbon	23.80	–	4000 (J)	–	–	–
Unknown	23.82	–	–	–	4900 (J)	–
Sulfur, mol. (S8)	23.83	–	–	–	6600 (J)	–
Aromatic Hydrocarbon	23.85	3300 (J)	–	–	–	–
Unknown	23.86	–	–	–	3900 (J)	–
Sulfur	23.87	–	–	4500 (J)	–	–
Sulfur, mol. (S8)	23.87	6200 (J)	–	–	–	–
Unknown	23.89	–	–	–	1800 (J)	–
Unknown	23.93	2700 (J)	–	–	–	–
Aromatic Hydrocarbon	23.95	–	–	4100 (J)	–	–
Aromatic Hydrocarbon	24.01	–	–	3000 (J)	–	–
Unknown	24.03	–	–	2800 (J)	–	–
Aromatic Hydrocarbon	25.96	–	–	–	–	7100 (J)
Unknown	31.96	–	–	–	–	5200 (J)
Aromatic Hydrocarbon	32.32	–	2500 (J)	–	–	–
Unknown	34.15	–	–	1800 (J)	–	–
Unknown	34.17	–	–	–	3900 (J)	–
Unknown	34.18	–	–	–	2400 (J)	–
Unknown	34.21-34.22	4100 (J)	–	–	–	9600 (J)
Unknown Alkane	34.23	–	–	–	2300 (J)	–
Unknown	34.29-34.31	5100 (J)	–	–	–	14000 (J)
Unknown	34.58	–	1800 (J)	–	–	–
Unknown	34.59	–	2200 (J)	–	4400 (J)	–
Unknown	34.62-34.63	1800 (J)	–	–	4600 (J)	–
Unknown	34.65	3600 (J)	–	–	–	8200 (J)
Unknown	34.67-34.68	–	–	2200 (J)	–	13000 (J)
Unknown	34.70	1800 (J)	–	2100 (J)	–	–
Unknown	35.84	–	3300 (J)	–	–	–
Unknown	35.90-35.91	3300 (J)	–	–	–	5000 (J)
Unknown	36.22	–	–	–	3500 (J)	–
Unknown	36.27	2900 (J)	–	–	–	5800 (J)

J = Below method detection limit
B = Compound also detected in method blank
* All concentrations given are estimates

Table D-3-14 USD 5-20A Tentatively Identified Semi-Volatile Organics

TENTATIVELY IDENTIFIED COMPOUND	RETENTION TIME	UDS 5-20A TRENCH [illegible] (ug/Kg)	UDS 5-20A TRENCH [illegible] (ug/Kg)	UDS 5-20A TRENCH [illegible] (ug/Kg)
Unknown	3.22	–	2400 (JB)	–
Aldol Condensation	3.32	–	–	2500 (JB)
Benzeneacetic acid	12.55	–	–	480 (J)
Unknown	22.88	–	190 (J)	–
Unknown	23.01	–	–	260 (J)
Unknown	25.41	–	–	540 (J)
Unknown	27.62	–	–	240 (J)
Unknown	27.91	–	–	520 (J)
Unknown	28.64	–	–	220 (J)
Unknown	29.80	–	240 (J)	–
Unknown	29.92	–	–	690 (J)
Unknown	31.67	–	220 (J)	–
Unknown Alkane	31.78	–	–	690 (JB)
Unknown	32.55	–	180 (J)	–
Unknown	33.40	–	–	270 (J)
Unknown	33.52	–	–	700 (J)
Unknown	34.22	–	400 (J)	–
Unknown	34.34	–	–	330 (J)
Unknown	35.03	–	210 (J)	–
Unknown	35.14	–	–	630 (J)
Unknown	35.64	–	–	200 (J)
Unknown	36.82	–	–	660 (J)
Unknown	37.37	–	–	250 (J)

J = Below method detection limit
B = Compound also detected in method blank
* All concentrations given are estimates

Table D-3-15 USD 5-19 Pesticides & PCBs

COMPOUND	UDS5-19 TRENCH 1 (ug/Kg)	UDS5-19 TRENCH 2 (ug/Kg)	UDS5-19 TRENCH 3 (ug/Kg)	UDS5-19 TRENCH 4 (ug/Kg)	UDS5-19 TRENCH 5 (ug/Kg)
Pesticides					
Lindane	1.9 (U)	1.7 (U)	1.8 (U)	2 (U)	2.1 (U)
Heptachlor	1.4 (U)	1.3 (U)	1.4 (U)	1.5 (U)	1.5 (U)
Aldrin	1.9 (U)	1.7 (U)	1.8 (U)	2 (U)	2.1 (U)
Heptachlor epoxide	4.8 (U)	4.3 (U)	4.5 (U)	5.1 (U)	5.1 (U)
Endosulfan I	2.4 (U)	2.1 (U)	2.3 (U)	**34**	2.6 (U)
Dieldrin	1 (U)	0.9 (U)	0.9 (U)	1 (U)	1 (U)
Endosulfan II	1.9 (U)	1.7 (U)	1.8 (U)	2 (U)	2.1 (U)
4,4'-DDT	0.5 (U)	0.4 (U)	0.5 (U)	0.5 (U)	0.5 (U)
Endrin aldehyde	2.4 (U)	2.1 (U)	2.3 (U)	2.5 (U)	2.6 (U)
Methoxychlor	**200**	17 (U)	**180**	20 (U)	21 (U)
alpha-BHC	1.2 (U)	1.1 (U)	1.1 (U)	1.3 (U)	1.3 (U)
beta-BHC	2.4 (U)	2.1 (U)	2.3 (U)	2.5 (U)	2.6 (U)
delta-BHC	2.4 (U)	2.1 (U)	2.3 (U)	2.5 (U)	2.6 (U)
4,4'-DDE	2.4 (U)	2.1 (U)	2.3 (U)	**23**	2.6 (U)
Endrin	2.4 (U)	2.1 (U)	2.3 (U)	2.5 (U)	2.6 (U)
4,4'-DDD	2.4 (U)	2.1 (U)	2.3 (U)	**72**	2.6 (U)
Endosulfan sulfate	4.8 (U)	4.3 (U)	4.5 (U)	5.1 (U)	5.1 (U)
Endrin ketone	**81**	2.1 (U)	**77**	2.5 (U)	2.6 (U)
Chlordane	2.4 (U)	2.1 (U)	2.3 (U)	2.5 (U)	2.6 (U)
Toxaphene	12 (U)	11 (U)	**11**	13 (U)	13 (U)
Polychlorinated Biphenyls					
Aroclor 1016	24 (U)	21 (U)	23 (U)	25 (U)	26 (U)
Aroclor 1221	24 (U)	21 (U)	23 (U)	25 (U)	26 (U)
Aroclor 1232	24 (U)	21 (U)	23 (U)	25 (U)	26 (U)
Aroclor 1242	24 (U)	21 (U)	23 (U)	25 (U)	26 (U)
Aroclor 1248	**4900**	21 (U)	**1400**	**530**	**515**
Aroclor 1254	24 (U)	21 (U)	23 (U)	25 (U)	26 (U)
Aroclor 1260	24 (U)	21 (U)	23 (U)	**520**	26 (U)

U = Undetected
D = Dilution performed
J = Below method detection limit
RE = Reanalysis performed (see non-conformance summaries)

Table D-3-16 USD 5-20 Pesticides & PCBs

COMPOUND	USD5-20 TRENCH 1 (µg/Kg)	USD5-20 TRENCH 2 (µg/Kg)	USD5-20 TRENCH 3 (µg/Kg)	USD5-20 TRENCH 4 (µg/Kg)	USD5-20 TRENCH 5 (µg/Kg)
Pesticides					
Lindane	2.1 (U)	2.1 (U)	2.2 (U)	2.2 (U)	2.2 (U)
Heptachlor	1.5 (U)	1.6 (U)	1.7 (U)	1.6 (U)	1.6 (U)
Aldrin	2.1 (U)	2.1 (U)	2.2 (U)	2.2 (U)	2.2 (U)
Heptachlor epoxide	5.1 (U)	5.2 (U)	5.6 (U)	5.4 (U)	5.4 (U)
Endosulfan I	**17**	2.6 (U)	2.8 (U)	2.7 (U)	2.7 (U)
Dieldrin	1 (U)	1 (U)	1.1 (U)	1.1 (U)	1.1 (U)
Endosulfan II	2.1 (U)	2.1 (U)	2.2 (U)	2.2 (U)	2.2 (U)
4,4'-DDT	0.5 (U)	0.5 (U)	0.6 (U)	0.5 (U)	0.5 (U)
Endrin aldehyde	2.6 (U)	2.6 (U)	2.8 (U)	2.7 (U)	2.7 (U)
Methoxychlor	21 (U)	21 (U)	22 (U)	22 (U)	22 (U)
alpha-BHC	1.3 (U)	1.3 (U)	1.4 (U)	1.3 (U)	1.3 (U)
beta-BHC	2.6 (U)	2.6 (U)	2.8 (U)	2.7 (U)	2.7 (U)
delta-BHC	2.6 (U)	2.6 (U)	2.8 (U)	2.7 (U)	2.7 (U)
4,4'-DDE	**21**	2.6 (U)	**7.2**	**7**	2.7 (U)
Endrin	2.6 (U)	2.6 (U)	2.8 (U)	2.7 (U)	2.7 (U)
4,4'-DDD	**50**	2.6 (U)	**32**	**19**	2.7 (U)
Endosulfan sulfate	5.1 (U)	5.2 (U)	5.6 (U)	5.4 (U)	5.4 (U)
Endrin ketone	2.6 (U)	2.6 (U)	2.8 (U)	**110**	2.7 (U)
Chlordane	2.6 (U)	2.6 (U)	2.8 (U)	2.7 (U)	2.7 (U)
Toxaphene	13 (U)	13 (U)	14 (U)	13 (U)	13 (U)
Polychlorinated Biphenyls					
Aroclor 1016	26 (U)	26 (U)	28 (U)	27 (U)	27 (U)
Aroclor 1221	26 (U)	26 (U)	28 (U)	27 (U)	27 (U)
Aroclor 1232	26 (U)	26 (U)	28 (U)	27 (U)	27 (U)
Aroclor 1242	26 (U)	26 (U)	28 (U)	27 (U)	27 (U)
Aroclor 1248	**320**	**200**	**140**	**130**	**310**
Aroclor 1254	26 (U)	26 (U)	28 (U)	27 (U)	27 (U)
Aroclor 1260	**380**	26 (U)	**130**	**140**	27 (U)

U = Undetected
D = Dilution performed
J = Below method detection limit
RE = Reanalysis performed (see non-conformance summaries)

Table D-3-17 USD 5-20A Pesticides & PCBs

COMPOUND	USD 5-20A TRENCH 1 (ug/kg)	USD 5-20A TRENCH 2 (ug/kg)	USD 5-20A TRENCH 3 (ug/kg)
Pesticides			
Lindane	1.6 (U)	1.8 (U)	1.8 (U)
Heptachlor	1.2 (U)	1.3 (U)	1.3 (U)
Aldrin	1.6 (U)	1.8 (U)	1.8 (U)
Heptachlor epoxide	3.9 (U)	4.4 (U)	4.4 (U)
Endosulfan I	1.9 (U)	2.2 (U)	2.2 (U)
Dieldrin	0.8 (U)	0.9 (U)	0.9 (U)
Endosulfan II	1.6 (U)	1.8 (U)	1.8 (U)
4,4'-DDT	0.4 (U)	0.4 (U)	0.4 (U)
Endrin aldehyde	1.9 (U)	2.2 (U)	2.2 (U)
Methoxychlor	16 (U)	18 (U)	18 (U)
alpha-BHC	1 (U)	1.1 (U)	1.1 (U)
beta-BHC	1.9 (U)	2.2 (U)	2.2 (U)
delta-BHC	1.9 (U)	2.2 (U)	2.2 (U)
4,4'-DDE	1.9 (U)	2.2 (U)	2.2 (U)
Endrin	1.9 (U)	2.2 (U)	2.2 (U)
4,4'-DDD	1.9 (U)	2.2 (U)	2.2 (U)
Endosulfan sulfate	3.9 (U)	4.4 (U)	4.4 (U)
Endrin ketone	1.9 (U)	2.2 (U)	2.2 (U)
Chlordane	1.9 (U)	2.2 (U)	2.2 (U)
Toxaphene	9.7(U)	11 (U)	11 (U)
Polychlorinated Biphenyls			
Aroclor 1016	19 (U)	22 (U)	22 (U)
Aroclor 1221	19 (U)	22 (U)	22 (U)
Aroclor 1232	19 (U)	22 (U)	22 (U)
Aroclor 1242	19 (U)	22 (U)	22 (U)
Aroclor 1248	19 (U)	22 (U)	22 (U)
Aroclor 1254	19 (U)	22 (U)	22 (U)
Aroclor 1260	19 (U)	22 (U)	22 (U)

U = Undetected
D = Dilution performed
J = Below method detection limit
RE = Reanalysis performed (see non-conformance summaries)

Table D-3-18 USD 5-19 & USD 5-20 Metals

ANALYTE	METHOD	UDS5-19 TRENCH 1 (mg/Kg)	UDS5-19 TRENCH 2 (mg/Kg)	UDS5-19 TRENCH 3 (mg/Kg)	UDS5-19 TRENCH 4 (mg/Kg)	UDS5-19 TRENCH 5 (mg/Kg)
Arsenic	Furnace by 7060	1.10	0.99 (S)	0.81	12 (S)	11 (S)
Mercury	Cold Vapor by 7471	0.36 (U)	0.32 (U)	0.34 (U)	0.91	0.77
Aluminum	ICP by 6010	2000	2100	3100	11000	10000
Antimony	ICP by 6010	29 (U)	13 (U)	27 (U)	3 (U)	3.1 (U)
Barium	ICP by 6010	110	43	130	190	180
Beryllium	ICP by 6010	3.6 (U)	1.6 (U)	3.4 (U)	0.42	0.41
Cadmium	ICP by 6010	3.6 (U)	1.6 (U)	3.4 (U)	8	8
Calcium	ICP by 6010	210000	120000	190000	65000	61000
Chromium	ICP by 6010	7.2 (U)	4	6.8 (U)	71	73
Cobalt	ICP by 6010	7.2 (U)	3.2 (U)	6.8 (U)	9.2	8.8
Copper	ICP by 6010	18 (U)	8 (U)	17 (U)	98	94
Iron	ICP by 6010	4700	4900	5500	21000	20000
Lead	ICP by 6010	21 (U)	9.6 (U)	20 (U)	250	230
Magnesium	ICP by 6010	6100	9400	6500	18000	17000
Manganese	ICP by 6010	420	240	400	470	440
Nickel	ICP by 6010	14 (U)	6.4 (U)	14 (U)	46	43
Potassium	ICP by 6010	1400 (U)	640 (U)	1400 (U)	1100	1000
Silver	ICP by 6010	3.6 (U)	1.6 (U)	3.4 (U)	5.2	4.7
Sodium	ICP by 6010	360	180	430	32	290
Vanadium	ICP by 6010	3.6 (U)	4	4.7	23	21
Zinc	ICP by 6010	16	15	28	260	250
Selenium	Furnace by 7740	3.6 (U)	0.32 (U)	3.4 (U)	0.38 (U)	0.38 (U)
Thallium	Furnace 7841	0.36 (U)	0.32 (U)	0.34 (U)	0.5	0.38 (U)

ANALYTE	METHOD	UDS5-20 TRENCH [illegible] (mg/Kg)	UDS5-20 TRENCH [illegible] (mg/Kg)	UDS5-20 TRENCH [illegible] (mg/Kg)	UDS5-20 TRENCH [illegible] (mg/Kg)	UDS5-20 TRENCH [illegible] (mg/Kg)
Arsenic	Furnace by 7060	9.3 (S)	5.3 (S)	8.2 (S)	9.3 (S)	7.7
Mercury	Cold Vapor by 7471	0.78	0.75	1.1	0.58	0.82
Aluminum	ICP by 6010	11000	8900	11000	10000	8600
Antimony	ICP by 6010	3.1 (U)	3.1 (U)	3.3 (U)	3.2 (U)	3.2 (U)
Barium	ICP by 6010	200	160	180	200	190
Beryllium	ICP by 6010	0.42	0.39 (U)	0.46	0.40 (U)	0.40 (U)
Cadmium	ICP by 6010	8.3	6.4	30	5.2	7.5
Calcium	ICP by 6010	64000	62000	27000	69000	52000
Chromium	ICP by 6010	75	60	210	71	71
Cobalt	ICP by 6010	9.1	8.1	9.1	9.5	8.6
Copper	ICP by 6010	110	84	190	120	130
Iron	ICP by 6010	22000	18000	25000	22000	18000
Lead	ICP by 6010	270	220	200	290	260
Magnesium	ICP by 6010	17000	16000	15000	18000	15000
Manganese	ICP by 6010	460	390	360	470	340
Nickel	ICP by 6010	48	40	57	61	54
Potassium	ICP by 6010	1200	920	1000	1000	930
Silver	ICP by 6010	8.4	4.5	5.2	7.8	7.1
Sodium	ICP by 6010	600	1300	820	880	530
Vanadium	ICP by 6010	22	19	21	22	19
Zinc	ICP by 6010	290	210	310	290	310
Selenium	Furnace by 7740	0.39 (U)	0.39 (U)	0.42 (U)	0.40 (U)	0.42
Thallium	Furnace 7841	0.39 (U)	0.39 (U)	0.48	0.40 (U)	0.40 (U)

U = Undetected
S = Result quantitated by Method of Standard Additions

Table D-3-19 USD 5-20A Metals

ANALYTE	METHOD	UDS5-20A TRENCH 1 (mg/Kg)	UDS5-20A TRENCH 2 (mg/Kg)	UDS5-20A TRENCH 3 (mg/Kg)
Arsenic	Furnace by 7060	0.58 (U)	**4.4 (S)**	**6.4 (S)**
Mercury	Cold Vapor by 7471	0.29 (U)	0.33 (U)	0.33 (U)
Aluminum	ICP by 6010	3300	12000	11000
Antimony	ICP by 6010	12 (U)	2.7 (U)	2.6 (U)
Barium	ICP by 6010	32	150	80
Beryllium	ICP by 6010	1.5 (U)	0.75	0.51
Cadmium	ICP by 6010	1.5 (U)	0.33 (U)	0.33 (U)
Calcium	ICP by 6010	76000	4900	30000
Chromium	ICP by 6010	6.3	17	17
Cobalt	ICP by 6010	3.6	11	9.9
Copper	ICP by 6010	9.7	19	26
Iron	ICP by 6010	7200	24000	23000
Lead	ICP by 6010	8.7 (U)	14	15
Magnesium	ICP by 6010	20000	4500	13000
Manganese	ICP by 6010	190	640	280
Nickel	ICP by 6010	11	29	27
Potassium	ICP by 6010	730	590	1000
Silver	ICP by 6010	1.5 (U)	0.33 (U)	0.33 (U)
Sodium	ICP by 6010	160	190	110
Vanadium	ICP by 6010	7.4	18	19
Zinc	ICP by 6010	19	68	63
Selenium	Furnace by 7740	0.29 (U)	0.33 (U)	0.53
Thallium	Furnace 7841	0.29 (U)	0.33 (U)	0.33 (U)

U = Undetected
S = Result quantitated by Method of Standard Additions

Table D-3-20 USD 5-19, USD 5-20, USD 5-20A Inorganic Parameters

ANALYTE	METHOD	UDS5-19 TRENCH 1	UDS5-19 TRENCH 2	UDS5-19 TRENCH 3	UDS5-19 TRENCH 4	UDS5-19 TRENCH 5
Ammonia Nitrogen, (mg/Kg)	350.3	400	320 (U)	380	1100	430
COD, (mg/Kg)	8000M	4600	2800	5500	6300	7400
Cyanide, (mg/Kg)	9012M	0.72 (U)	0.64 (U)	0.68 (U)	1.2	1.2
Soilds, Total Volatile (TVS) (%)	209F	0.80	0.60	0.79	5.5	5.4
Sulfate, (mg/Kg)	375.4	1100	640 (U)	680 (U)	870	1400
Sulfur, (%)	ASTM D129	0.11	0.094 (U)	0.097 (U)	0.12(U)	0.12 (U)
TOC, (mg/Kg)	9060	46000	18000	33000	47000	44000

ANALYTE	METHOD	UDS5-20 TRENCH 1	UDS5-20 TRENCH 2	UDS5-20 TRENCH 3	UDS5-20 TRENCH 4	UDS5-20 TRENCH 5
Ammonia Nitrogen, (mg/Kg)	350.3	430	870	700	450	400(U)
COD, (mg/Kg)	8000M	7600	15000	5800	8500	9700
Cyanide, (mg/Kg)	9012M	1.7	1.8	0.93	0.96	2.0
Soilds, Total Volatile (TVS) (%)	209F	5.6	4.6	5.4	5.8	6.0
Sulfate, (mg/Kg)	375.4	880	780 (U)	1400	1900	2100
Sulfur, (%)	ASTM D129	0.11(U)	0.11 (U)	0.12 (U)	0.12(U)	0.14
TOC, (mg/Kg)	9060	46000	42000	51000	51000	52000

ANALYTE	METHOD	UDS5-20A TRENCH 1	UDS5-20A TRENCH 2	UDS5-20A TRENCH 3
Ammonia Nitrogen, (mg/Kg)	350.3	290(U)	330 (U)	330(U)
COD, (mg/Kg)	8000M	6200	6500	9300
Cyanide, (mg/Kg)	9012M	0.58(U)	0.66 (U)	0.66(U)
Soilds, Total Volatile (TVS) (%)	209F	4.1	3.5	3.6
Sulfate, (mg/Kg)	375.4	600	660 (U)	660(U)
Sulfur, (%)	ASTM D129	0.087(U)	0.10 (U)	0.10(U)
TOC, (mg/Kg)	9060	22000	8500	21000

U = Undetected

INNER HARBOR DREDGING DESIGN PROJECT
SYRACUSE,NY

APPENDIX E

COST ESTIMATE APPENDIX

SYRACUSE UDS 5-19 BUDGET EST.

Designed By: JOHN HUBERT
Estimated By: BUFFALO DIST, COST ENG. BRANCH

Prepared By: PAUL POLANSKI

Preparation Date: 10/17/96
Effective Date of Pricing: 10/17/96

Sales Tax: 0.00%

Thu 31 Oct 1996
Eff. Date 10/17/96

U.S. Army Corps of Engineers
PROJECT SYRA19: SYRACUSE UDS 5-19 BUDGET EST.
ONONDAGA INNER HARBOR DESIGN MEMORANDUN ESTIMATE
** PROJECT OWNER SUMMARY - Contract **

TIME 08:58:39

	QUANTY	UOM	CONTRACT	UNIT	TOTAL CST
01 CONSTRUCT DIKE DISPOSAL AREA			330,511		330,511
02 DREDGE INLET	60000	CY	511,645	8.53	511,645
TOTAL SYRACUSE UDS 5-19 BUDGET EST.	1.00	EA	842,156	842156	842,156

U.S. Army Corps of Engineers
PROJECT SYRA19: SYRACUSE UDS 5-19 BUDGET EST.
ONONDAGA INNER HARBOR DESIGN MEMORANDUN ESTIMATE
** PROJECT OWNER SUMMARY - Feature **

	QUANTY UOM	CONTRACT	UNIT	TOTAL CST
01 CONSTRUCT DIKE DISPOSAL AREA				
01.01 CONSTRUCT DIKE DISPOSAL AREA		269,086		269,086
01.02 CONSTRUCT WEIR		26,830		26,830
01.03 CONSTRUCT BAFFLE WALL		34,595		34,595
TOTAL CONSTRUCT DIKE DISPOSAL AREA		330,511		330,511
02 DREDGE INLET				
02.01 ASSEMBLE DREDGE PIPE		49,023		49,023
02.02 DREDGE INLET	60000 CY	429,939	7.17	429,939
02.03 DISASSEMBLE DREDGE PIPE		32,682		32,682
TOTAL DREDGE INLET	60000 CY	511,645	8.53	511,645
TOTAL SYRACUSE UDS 5-19 BUDGET EST.	1.00 EA	842,156	842156	842,156

	QUANTY UOM	CONTRACT	UNIT	TOTAL CST
01 CONSTRUCT DIKE DISPOSAL AREA				
01.01 CONSTRUCT DIKE DISPOSAL AREA				
01.01. 1 CLEARING & GRUBBING		60,712		60,712
01.01. 2 EXCAVATION		153,824		153,824
01.01. 3 BERM CONSTRUCTION		46,395		46,395
01.01. 4 FERTILIZE, SEED & MULCH		8,155		8,155
TOTAL CONSTRUCT DIKE DISPOSAL AREA		269,086		269,086
01.02 CONSTRUCT WEIR				
01.02.01 CONSTRUCT WEIR		26,830		26,830
TOTAL CONSTRUCT WEIR		26,830		26,830
01.03 CONSTRUCT BAFFLE WALL				
01.03.01 CONSTRUCT BAFFLE WALL		34,595		34,595
TOTAL CONSTRUCT BAFFLE WALL		34,595		34,595
TOTAL CONSTRUCT DIKE DISPOSAL AREA		330,511		330,511
02 DREDGE INLET				
02.01 ASSEMBLE DREDGE PIPE		49,023		49,023
02.02 DREDGE INLET	60000 CY	429,939	7.17	429,939
02.03 DISASSEMBLE DREDGE PIPE		32,682		32,682
TOTAL DREDGE INLET	60000 CY	511,645	8.53	511,645
TOTAL SYRACUSE UDS 5-19 BUDGET EST.	1.00 EA	842,156	842156	842,156

U.S. Army Corps of Engineers
PROJECT SYRA19: SYRACUSE UDS 5-19 BUDGET EST.
ONONDAGA INNER HARBOR DESIGN MEMORANDUN ESTIMATE
** PROJECT INDIRECT SUMMARY - Contract **

	QUANTY UOM	DIRECT	OVERHEAD	HOME OFC	PROFIT	BOND	CONTINGN	TOTAL CST	UNIT
01 CONSTRUCT DIKE DISPOSAL AREA		170,404	43,832	21,424	23,566	5,184	66,102	330,511	
02 DREDGE INLET	60000 CY	333,160	38,946	37,211	0	0	102,329	511,645	8.53
TOTAL SYRACUSE UDS 5-19 BUDGET EST.	1.00 EA	503,563	82,777	58,634	23,566	5,184	168,431	842,156	842156

	QUANTY UOM	DIRECT	OVERHEAD	HOME OFC	PROFIT	BOND	CONTINGN	TOTAL CST	UNIT
01 CONSTRUCT DIKE DISPOSAL AREA									
01.01 CONSTRUCT DIKE DISPOSAL AREA		138,734	35,686	17,442	19,186	4,221	53,817	269,086	
01.02 CONSTRUCT WEIR		13,833	3,558	1,739	1,913	421	5,366	26,830	
01.03 CONSTRUCT BAFFLE WALL		17,836	4,588	2,242	2,467	543	6,919	34,595	
TOTAL CONSTRUCT DIKE DISPOSAL AREA		170,404	43,832	21,424	23,566	5,184	66,102	330,511	
02 DREDGE INLET									
02.01 ASSEMBLE DREDGE PIPE		31,922	3,732	3,565	0	0	9,805	49,023	
02.02 DREDGE INLET	60000 CY	279,957	32,726	31,268	0	0	85,988	429,939	7.17
02.03 DISASSEMBLE DREDGE PIPE		21,281	2,488	2,377	0	0	6,536	32,682	
TOTAL DREDGE INLET	60000 CY	333,160	38,946	37,211	0	0	102,329	511,645	8.53
TOTAL SYRACUSE UDS 5-19 BUDGET EST.	1.00 EA	503,563	82,777	58,634	23,566	5,184	168,431	842,156	842156

	QUANTY UOM	DIRECT	OVERHEAD	HOME OFC	PROFIT	BOND	CONTINGN	TOTAL CST	UNIT
01 CONSTRUCT DIKE DISPOSAL AREA									
01.01 CONSTRUCT DIKE DISPOSAL AREA									
01.01. 1 CLEARING & GRUBBING		31,302	8,052	3,935	4,329	952	12,142	60,712	
01.01. 2 EXCAVATION		79,308	20,400	9,971	10,968	2,413	30,765	153,824	
01.01. 3 BERM CONSTRUCTION		23,920	6,153	3,007	3,308	728	9,279	46,395	
01.01. 4 FERTILIZE, SEED & MULCH		4,205	1,082	529	581	128	1,631	8,155	
TOTAL CONSTRUCT DIKE DISPOSAL AREA		138,734	35,686	17,442	19,186	4,221	53,817	269,086	
01.02 CONSTRUCT WEIR									
01.02.01 CONSTRUCT WEIR		13,833	3,558	1,739	1,913	421	5,366	26,830	
TOTAL CONSTRUCT WEIR		13,833	3,558	1,739	1,913	421	5,366	26,830	
01.03 CONSTRUCT BAFFLE WALL									
01.03.01 CONSTRUCT BAFFLE WALL		17,836	4,588	2,242	2,467	543	6,919	34,595	
TOTAL CONSTRUCT BAFFLE WALL		17,836	4,588	2,242	2,467	543	6,919	34,595	
TOTAL CONSTRUCT DIKE DISPOSAL AREA		170,404	43,832	21,424	23,566	5,184	66,102	330,511	
02 DREDGE INLET									
02.01 ASSEMBLE DREDGE PIPE		31,922	3,732	3,565	0	0	9,805	49,023	
02.02 DREDGE INLET	60000 CY	279,957	32,726	31,268	0	0	85,988	429,939	7.17
02.03 DISASSEMBLE DREDGE PIPE		21,281	2,488	2,377	0	0	6,536	32,682	
TOTAL DREDGE INLET	60000 CY	333,160	38,946	37,211	0	0	102,329	511,645	8.53
TOTAL SYRACUSE UDS 5-19 BUDGET EST.	1.00 EA	503,563	82,777	58,634	23,566	5,184	168,431	842,156	842156

U.S. Army Corps of Engineers
PROJECT SYRA19: SYRACUSE UDS 5-19 BUDGET EST.
ONONDAGA INNER HARBOR DESIGN MEMORANDUN ESTIMATE
** PROJECT DIRECT SUMMARY - Contract **

	QUANTY UOM	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	MANHRS	TOTAL CST	UNIT
01 CONSTRUCT DIKE DISPOSAL AREA		87,876	63,723	18,805	0	1,001	170,404	
02 DREDGE INLET	60000 CY	191,751	141,409	0	0	416	333,160	5.55
TOTAL SYRACUSE UDS 5-19 BUDGET EST.	1.00 EA	279,627	205,132	18,805	0	1,416	503,563	503563
Overhead							82,777	
SUBTOTAL							586,341	
Home Office Percent							58,634	
SUBTOTAL							644,975	
Profit							23,566	
SUBTOTAL							668,541	
Bond							5,184	
SUBTOTAL							673,725	
Contingency							168,431	
TOTAL INCL INDIRECTS							842,156	

U.S. Army Corps of Engineers
PROJECT SYRA19: SYRACUSE UDS 5-19 BUDGET EST.
ONONDAGA INNER HARBOR DESIGN MEMORANDUN ESTIMATE
** PROJECT DIRECT SUMMARY - Feature **

	QUANTY UOM	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	MANHRS	TOTAL CST	UNIT
01 CONSTRUCT DIKE DISPOSAL AREA								
01.01 CONSTRUCT DIKE DISPOSAL AREA		74,893	62,521	1,320	0	680	138,734	
01.02 CONSTRUCT WEIR		8,025	523	5,285	0	179	13,833	
01.03 CONSTRUCT BAFFLE WALL		4,958	678	12,200	0	142	17,836	
TOTAL CONSTRUCT DIKE DISPOSAL AREA		87,876	63,723	18,805	0	1,001	170,404	
02 DREDGE INLET								
02.01 ASSEMBLE DREDGE PIPE		18,559	13,363	0	0	60	31,922	
02.02 DREDGE INLET	60000 CY	160,819	119,138	0	0	316	279,957	4.67
02.03 DISASSEMBLE DREDGE PIPE		12,373	8,908	0	0	40	21,281	
TOTAL DREDGE INLET	60000 CY	191,751	141,409	0	0	416	333,160	5.55
TOTAL SYRACUSE UDS 5-19 BUDGET EST.	1.00 EA	279,627	205,132	18,805	0	1,416	503,563	503563
Overhead							82,777	
SUBTOTAL							586,341	
Home Office Percent							58,634	
SUBTOTAL							644,975	
Profit							23,566	
SUBTOTAL							668,541	
Bond							5,184	
SUBTOTAL							673,725	
Contingency							168,431	
TOTAL INCL INDIRECTS							842,156	

PRIME CONTRACTOR	QUANTY	UOM	CREW ID	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	MANHRS	TOTAL CST	UNIT
PRIME CONTRACTOR										
Overhead Items - AA										
CDF CONTRACTOR										
Overhead Items - AB										
SURVEY DURING CDF CONSTRUCTION										
Laborer (Semi-Skilled) SAY 40 HRS/WK X 5 WK X 2 MEN = 400 HRS	400.00	HR	B-LABORER	30.62 12,249	0.00 0	0.00 0	0.00 0	1.00 400	30.62 12,249	30.62
TOTAL SURVEY DURING CDF CONSTRUCTION				12,249	0	0	0	400	12,249	
MOB & DEMOB										
BLADE, ANGLE, HYDR, FOR D7 BLADE, ANGLE, HYDRAULIC, FOR D7	12.00	HR	T10CA014	0.00 0	5.59 67	0.00 0	0.00 0	0.00 0	5.59 67	5.59
BLADE, ANGLE, HYDR, FOR D7 BLADE, ANGLE, HYDRAULIC, FOR D7	12.00	HR	T10CA014	0.00 0	5.59 67	0.00 0	0.00 0	0.00 0	5.59 67	5.59
DOZER,CWLR,D-7G,PS,(ADD BLADE) POWERSHIFT, (ADD BLADE)	12.00	HR	T15CA012	0.00 0	53.42 641	0.00 0	0.00 0	0.00 0	53.42 641	53.42
HYD EXCAV,CRWLR,2.35 CY BKT 2.35 CY BUCKET	12.00	HR	H25AK005	0.00 0	79.74 957	0.00 0	0.00 0	0.00 0	79.74 957	79.74
DOZER,CWLR,D-7G,PS,(ADD BLADE) POWERSHIFT, (ADD BLADE)	12.00	HR	T15CA012	0.00 0	53.42 641	0.00 0	0.00 0	0.00 0	53.42 641	53.42
TRK,HWY,48,000/64,000 GVW,3 AXLE 64,000 GVW, 3 AXLE	60.00	HR	T50FO020	0.00 0	43.63 2,618	0.00 0	0.00 0	0.00 0	43.63 2,618	43.63
TRK TRLR,LOWBOY, 70 TON, 3 AXLE 70 TON, 3 AXLE	60.00	HR	T45XX018	0.00 0	9.16 550	0.00 0	0.00 0	0.00 0	9.16 550	9.16
Laborers (Semi-Skilled)	60.00	HR	B-LABORER	30.62 1,837	0.00 0	0.00 0	0.00 0	0.00 0	30.62 1,837	30.62
Truck Drivers, Heavy	60.00	HR	B-TRKDVRHV	28.42 1,705	0.00 0	0.00 0	0.00 0	1.00 60	28.42 1,705	28.42
TOTAL MOB & DEMOB				3,542	5,541	0	0	60	9,083	

CDF CONTRACTOR	QUANTY UOM CREW ID	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	MANHRS	TOTAL CST	UNIT
QUALITY CONTROL								
QUALITY CONTROL SURERVISOR		5300.00	0.00	0.00	0.00	0.00	5300.00	
	1.50 MO	7,950	0	0	0	0	7,950	5300.00
OFFICE MANAGER		3700.00	0.00	0.00	0.00	0.00	3700.00	
	1.50 MO	5,550	0	0	0	0	5,550	3700.00
QUALITY CONTROL ENGINEER		4500.00	0.00	0.00	0.00	0.00	4500.00	
	1.50 MO	6,750	0	0	0	0	6,750	4500.00
TOTAL QUALITY CONTROL		20,250	0	0	0	0	20,250	
FIELD OFFICE								
FIELD OFFICE WITH UTILITIES		0.00	0.00	0.00	1500.00	0.00	1500.00	
	1.50 MO	0	0	0	2,250	0	2,250	1500.00
TOTAL FIELD OFFICE		0	0	0	2,250	0	2,250	
TOTAL Overhead Items - AB		36,041	5,541	0	2,250	460	43,832	

STATE DREDGING CREW	QUANTY UOM CREW ID	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	MANHRS	TOTAL CST	UNIT
STATE DREDGING CREW								
Overhead Items - AC								
SURVEY DURING DREDGING								
2-MARINE HELPERS (SURVEYORS) 1.5 MO X 176HR/MO X 2 MEN = 528 HRS	528.00 HR	46.14 24,362	0.00 0	0.00 0	0.00 0	0.00 0	46.14 24,362	46.14
SKIFF	264.00 HR	0.00 0	8.65 2,284	0.00 0	0.00 0	0.00 0	8.65 2,284	8.65
TOTAL SURVEY DURING DREDGING		24,362	2,284	0	0	0	26,646	
QUALITY CONTROL								
QUALITY CONTROL ENGINEER	1.50 MO	4500.00 6,750	0.00 0	0.00 0	0.00 0	0.00 0	4500.00 6,750	4500.00
OFFICE MANAGER	1.50 MO	3700.00 5,550	0.00 0	0.00 0	0.00 0	0.00 0	3700.00 5,550	3700.00
TOTAL QUALITY CONTROL		12,300	0	0	0	0	12,300	
TOTAL Overhead Items - AC		36,662	2,284	0	0	0	38,946	

CONSTRUCT DIKE DISPOSAL AREA	QUANTY UOM CREW ID	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	MANHRS	TOTAL CST	UNIT
CLEARING & GRUBBING AN AREA 700' BY 350' TO BE CLEARED & GRUBBED 6 ACRE								
CLEARING & GRUBBING								
Clear & Grub Med Stumps to 10" D (25cm) Dia, Include Removal	6.00 ACR COETV	656.77 3,941	870.34 5,222	0.00 0	0.00 0	20.00 120	1527.12 9,163	1527.12
Clear and Grub Med Trees to 10"D (25cm) Dia, Cut and Chip	6.00 ACR COMCA	2597.23 15,583	1092.60 6,556	0.00 0	0.00 0	80.00 480	3689.83 22,139	3689.83
TOTAL CLEARING & GRUBBING	6.00 ACR	19,524	11,778	0	0	600	31,302	5216.95
TOTAL CLEARING & GRUBBING		19,524	11,778	0	0	600	31,302	
EXCAVATION								
EXCAVATION								
2 Laborers (Semi-Skilled)	375.00 HR B-LABORER	30.62 11,483	0.00 0	0.00 0	0.00 0	0.00 0	30.62 11,483	30.62
Outside Equip. Op. Medium	187.50 HR X-EQOPRMED	46.76 8,768	0.00 0	0.00 0	0.00 0	0.00 0	46.76 8,768	46.76
Outside Equip. Op. Heavy	187.50 HR X-EQOPRHVY	37.95 7,115	0.00 0	0.00 0	0.00 0	0.00 0	37.95 7,115	37.95
Outside Truck Dr. Heavy	187.50 HR X-TRKDVRHV	30.12 5,648	0.00 0	0.00 0	0.00 0	0.00 0	30.12 5,648	30.12
Outside Oiler	187.50 HR X-EQOPROIL	37.36 7,005	0.00 0	0.00 0	0.00 0	0.00 0	37.36 7,005	37.36
BLADE, ANGLE, HYDR, FOR D7 BLADE, ANGLE, HYDRAULIC, FOR D7	187.50 HR T10CA014	0.00 0	5.59 1,048	0.00 0	0.00 0	0.00 0	5.59 1,048	5.59
DOZER,CWLR,D-7G,PS,(ADD BLADE) POWERSHIFT, (ADD BLADE)	187.50 HR T15CA012	0.00 0	53.42 10,016	0.00 0	0.00 0	0.00 0	53.42 10,016	53.42
TRK,OFF-HWY,35T 22-30CY, 769C 22-30 CY, 35T,REAR DUMP,POWERSHI	187.50 HR T55CA001	0.00 0	70.79 13,273	0.00 0	0.00 0	0.00 0	70.79 13,273	70.79
HYD EXCAV,CRWLR,2.35 CY BKT 2.35 CY BUCKET	187.50 HR H25AK005	0.00 0	79.74 14,952	0.00 0	0.00 0	0.00 0	79.74 14,952	79.74

CONSTRUCT DIKE DISPOSAL AREA	QUANTY UOM	CREW ID	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	MANHRS	TOTAL CST	UNIT
TOTAL EXCAVATION	15000 CY		40,019	39,289	0	0	0	79,308	5.29
TOTAL EXCAVATION			40,019	39,289	0	0	0	79,308	
BERM CONSTRUCTION									
BERM CONSTRUCTION									
Laborer (Semi-Skilled)	187.50 HR	B-LABORER	30.62 5,741	0.00 0	0.00 0	0.00 0	0.00 0	30.62 5,741	30.62
Outside Equip. Op. Heavy	187.50 HR	X-EQOPRHVY	37.95 7,115	0.00 0	0.00 0	0.00 0	0.00 0	37.95 7,115	37.95
BLADE, ANGLE, HYDR, FOR D7 BLADE, ANGLE, HYDRAULIC, FOR D7	187.50 HR	T10CA014	0.00 0	5.59 1,048	0.00 0	0.00 0	0.00 0	5.59 1,048	5.59
DOZER,CWLR,D-7G,PS,(ADD BLADE) POWERSHIFT, (ADD BLADE)	187.50 HR	T15CA012	0.00 0	53.42 10,016	0.00 0	0.00 0	0.00 0	53.42 10,016	53.42
TOTAL BERM CONSTRUCTION	15000 CY		12,856	11,064	0	0	0	23,920	1.59
TOTAL BERM CONSTRUCTION			12,856	11,064	0	0	0	23,920	
FERTILIZE, SEED & MULCH									
FERTILIZE, SEED & MULCH OUTSIDE SIDE SLOPES 2 SIDE(350'+700')10'/9 = 2400 SY									
FERTILIZE, SEED & MULCH	2400.00 SY	XLABD	1.04 2,494	0.07 174	0.55 1,320	0.00 0	0.03 80	1.66 3,987	1.66
TRACTOR,WH,FARM, JD-2755 INDUSTRIAL 2WD	24.00 HR	T25JD004	0.00 0	9.05 217	0.00 0	0.00 0	0.00 0	9.05 217	9.05
TOTAL FERTILIZE, SEED & MULCH	2400.00 SY		2,494	391	1,320	0	80	4,205	1.75
TOTAL FERTILIZE, SEED & MULCH			2,494	391	1,320	0	80	4,205	

CONSTRUCT WEIR	QUANTY	UOM	CREW ID	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	MANHRS	TOTAL CST	UNIT
CONSTRUCT WEIR										
COMPACTED SELECT FILL	20.00	TON	XLABF	13.67 273	2.00 40	15.00 300	0.00 0	0.38 8	30.67 613	30.67
CONCRETE BASE	16.00	CY	XLABF	36.46 583	5.32 85	80.00 1,280	0.00 0	1.00 16	121.78 1,948	121.78
12" CSP PIPE FILLED W/CONCRETE	2.00	EA	XLABF	72.92 146	10.64 21	100.00 200	0.00 0	2.00 4	183.56 367	183.56
2X4 DECKING	80.00	SF	B-LABORER	30.62 2,450	0.00 0	1.20 96	0.00 0	0.25 20	31.82 2,546	31.82
STEEL POST & GUIDE RAIL	60.00	LF	XCARC	10.11 607	0.69 41	8.00 480	0.00 0	0.30 18	18.79 1,128	18.79
24" CSP OUTLET PIPE	100.00	LF	XLABF	7.29 729	1.06 106	10.00 1,000	0.00 0	0.20 20	18.36 1,836	18.36
W5X19 STOP LOGGUIDE	33.00	LF	XCARC	10.68 353	0.72 24	10.00 330	0.00 0	0.32 10	21.41 706	21.41
2X6 PLATFORM SUPPORT	40.00	LF	XLABF	9.11 365	1.33 53	7.00 280	0.00 0	0.25 10	17.45 698	17.45
L5X3-1/2X3/8	66.00	LF	XCARF	8.21 542	0.28 18	8.00 528	0.00 0	0.22 14	16.49 1,088	16.49
8X8 POSTS	66.00	LF	XCARC	9.71 641	0.66 43	6.00 396	0.00 0	0.29 19	16.37 1,080	16.37
6X6 WOOD MEMBER 44'@ 1'3" OC 4.67' LONG= 60 LF	60.00	LF	XCARC	3.34 200	0.23 14	2.00 120	0.00 0	0.10 6	5.56 334	5.56
2 LAYER 3/4" PLYWOOD W/PLASTIC MEMBRANE IN BETWEEN 11' X 20'= 220 SF	220.00	SF	XCARC	2.36 519	0.16 35	0.90 198	0.00 0	0.07 15	3.42 752	3.42
4X4 COMPRESSION BRACE	50.00	LF	XCARC	5.06 253	0.34 17	0.50 25	0.00 0	0.15 8	5.90 295	5.90
2X10 WALKWAY SUPPORT BEAM	30.00	LF	XCARC	7.12 214	0.48 14	1.00 30	0.00 0	0.21 6	8.60 258	8.60
5/8 BOLTS	18.00	EA	XCARC	8.42 152	0.57 10	1.20 22	0.00 0	0.25 5	10.20 184	10.20

CONSTRUCT WEIR	QUANTY UOM CREW ID	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	MANHRS	TOTAL CST	UNIT
TOTAL CONSTRUCT WEIR		8,025	523	5,285	0	179	13,833	

CONSTRUCT BAFFLE WALL	QUANTY UOM	CREW ID	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	MANHRS	TOTAL CST	UNIT
CONSTRUCT BAFFLE WALL									
10" DIA X 20' LONG UTILITY POLE			72.92	10.64	300.00	0.00	2.00	383.56	
	20.00 EA	XLABF	1,458	213	6,000	0	40	7,671	383.56
DRILLING CREW			54.69	7.98	120.00	0.00	1.50	182.67	
	20.00 EA	XLABF	1,094	160	2,400	0	30	3,653	182.67
DRILL, AUGER, 20" DIA, 40' LONG			0.00	4.76	0.00	0.00	0.00	4.76	
20" DIA. AUGER, 40-FT LONG W/DIR	30.00 HR	D15BI002	0	143	0	0	0	143	4.76
1/4" dia IWRC Galvanized wire			0.67	0.05	0.50	0.00	0.02	1.22	
	400.00 LF	XCARC	270	18	200	0	8	488	1.22
45 MIL REINFORCED POLYPROPYLENE			0.36	0.02	0.60	0.00	0.01	0.98	
400' x 15' = 6000 sf	6000.00 SF	XCARC	2,137	145	3,600	0	64	5,881	0.98
TOTAL CONSTRUCT BAFFLE WALL			4,958	678	12,200	0	142	17,836	

ASSEMBLE DREDGE PIPE	QUANTY UOM	CREW ID	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	MANHRS	TOTAL CST	UNIT
DREDGE CAPTAIN	60.00 HR		33.59 2,015	0.00 0	0.00 0	0.00 0	1.00 60	33.59 2,015	33.59
DREDGE OPERATOR	60.00 HR		44.11 2,647	0.00 0	0.00 0	0.00 0	0.00 0	44.11 2,647	44.11
MARINE ENGINEER	60.00 HR		30.70 1,842	0.00 0	0.00 0	0.00 0	0.00 0	30.70 1,842	30.70
TENDER CAPTAIN	60.00 HR		32.10 1,926	0.00 0	0.00 0	0.00 0	0.00 0	32.10 1,926	32.10
SHORE BOSS	60.00 HR		30.40 1,824	0.00 0	0.00 0	0.00 0	0.00 0	30.40 1,824	30.40
MAINT. ASSISTANT (MARINE)	60.00 HR		46.14 2,768	0.00 0	0.00 0	0.00 0	0.00 0	46.14 2,768	46.14
2-MARINE HELPERS	120.00 HR		46.14 5,537	0.00 0	0.00 0	0.00 0	0.00 0	46.14 5,537	46.14
150ton Floating Crane 290hp W/25 0 boom	60.00 HR	XX0XX001	0.00 0	160.99 9,659	0.00 0	0.00 0	0.00 0	160.99 9,659	160.99
INLAND TUG 250 HP	60.00 HR	XX0XX002	0.00 0	53.07 3,184	0.00 0	0.00 0	0.00 0	53.07 3,184	53.07
SKIFF	60.00 HR		0.00 0	8.65 519	0.00 0	0.00 0	0.00 0	8.65 519	8.65
DREDGE CAPTAIN	315.79 HR		33.59 10,607	0.00 0	0.00 0	0.00 0	1.00 316	33.59 10,607	33.59
DREDGE OPERATOR	315.79 HR		44.11 13,929	0.00 0	0.00 0	0.00 0	0.00 0	44.11 13,929	44.11
MARINE ENGINEER	315.79 HR		30.70 9,695	0.00 0	0.00 0	0.00 0	0.00 0	30.70 9,695	30.70
TENDER CAPTAIN	315.79 HR		32.10 10,137	0.00 0	0.00 0	0.00 0	0.00 0	32.10 10,137	32.10
SHORE BOSS	315.79 HR		30.40 9,600	0.00 0	0.00 0	0.00 0	0.00 0	30.40 9,600	30.40
MAINT. ASSISTANT (MARINE)	315.79 HR		46.14 14,571	0.00 0	0.00 0	0.00 0	0.00 0	46.14 14,571	46.14

DREDGE INLET	QUANTY UOM	CREW ID	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	MANHRS	TOTAL CST	UNIT
6-MARINE HELPERS			46.14	0.00	0.00	0.00	0.00	46.14	
	2000.00 HR		92,280	0	0	0	0	92,280	46.14
Hydralic Dredge #5			0.00	250.55	0.00	0.00	0.00	250.55	
	315.79 HR		0	79,121	0	0	0	79,121	250.55
INLAND TUG 250 HP			0.00	53.07	0.00	0.00	0.00	53.07	
	315.79 HR	XX0XX002	0	16,759	0	0	0	16,759	53.07
DREDGE PIPE			0.00	65.00	0.00	0.00	0.00	65.00	
assume1000' floating 4,700/mo	315.79 HR		0	20,526	0	0	0	20,526	65.00
1000' submerged 2,800/mo									
2000' shoreline 4,000/mo									
total 11,500/mo									
$11,500/176HR/MO = $65/HR									
SKIFF			0.00	8.65	0.00	0.00	0.00	8.65	
	315.79 HR		0	2,732	0	0	0	2,732	8.65
DREDGE CAPTAIN			33.59	0.00	0.00	0.00	1.00	33.59	
	40.00 HR		1,344	0	0	0	40	1,344	33.59
DREDGE OPERATOR			44.11	0.00	0.00	0.00	0.00	44.11	
	40.00 HR		1,764	0	0	0	0	1,764	44.11
MARINE ENGINEER			30.70	0.00	0.00	0.00	0.00	30.70	
	40.00 HR		1,228	0	0	0	0	1,228	30.70
TENDER CAPTAIN			32.10	0.00	0.00	0.00	0.00	32.10	
	40.00 HR		1,284	0	0	0	0	1,284	32.10
SHORE BOSS			30.40	0.00	0.00	0.00	0.00	30.40	
	40.00 HR		1,216	0	0	0	0	1,216	30.40
MAINT. ASSISTANT (MARINE)			46.14	0.00	0.00	0.00	0.00	46.14	
	40.00 HR		1,846	0	0	0	0	1,846	46.14
2-MARINE HELPERS			46.14	0.00	0.00	0.00	0.00	46.14	
	80.00 HR		3,691	0	0	0	0	3,691	46.14
150ton Floating Crane 290hp W/25			0.00	160.99	0.00	0.00	0.00	160.99	
0ft Boom	40.00 HR	XX0XX001	0	6,440	0	0	0	6,440	160.99
INLAND TUG 250 HP			0.00	53.07	0.00	0.00	0.00	53.07	
	40.00 HR	XX0XX002	0	2,123	0	0	0	2,123	53.07
SKIFF			0.00	8.65	0.00	0.00	0.00	8.65	
	40.00 HR		0	346	0	0	0	346	8.65

DISASSEMBLE DREDGE PIPE	QUANTY UOM	CREW ID	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	MANHRS	TOTAL CST	UNIT
TOTAL SYRACUSE UDS 5-19 BUDGET EST.	1.00 EA		279,627	205,132	18,805	0	1,416	503,563	503563

SRC	ITEM ID	DESCRIPTION	NO.	UOM	RATE	**** LABOR **** HOURS	**** LABOR **** COST	**** EQUIP **** HOURS	**** EQUIP **** COST	TOTAL COST
	COETV	2 B-trkdvrhv + 2 12 Cy Dump Truck/Loadr			PROD =	100%			CREW HOURS =	40
MIL	B-EQOPRMEDF	Equip. Operators, Medium	1.00	HR	41.69	1.00	41.69			41.69
MIL	B-TRKDVRHVL	Truck Drivers, Heavy	2.00	HR	28.42	2.00	56.83			56.83
MIL	H25CA016 E	HYD EXCAV, CRWLR, 1.50 CY BKT	1.00	HR	57.94			1.00	57.94	57.94
MIL	T40XX008 E	REAR DUMP BODY, 8 CY,(30,000 GV	2.00	HR	2.73			2.00	5.46	5.46
MIL	T50KE003 E	TRK,HWY, 46,000 GVW, 6X4, 3 AXL	2.00	HR	33.58			2.00	67.15	67.15
	TOTAL					3.00	98.52	5.00	130.55	229.07
	COMCA	5 B-laborer + 1 16" Chipper/1 3-3/4Cy,Cwlr Ldr			PROD =	100%			CREW HOURS =	80
MIL	B-LABORER L	Laborers, (Semi-Skilled)	4.00	HR	30.62	4.00	122.49			122.49
MIL	B-LABORER F	Laborers, (Semi-Skilled)	1.00	HR	31.12	1.00	31.12			31.12
MIL	B-EQOPRMEDL	Equip. Operators, Medium	1.00	HR	41.19	1.00	41.19			41.19
MIL	B20CI006 E	B-CHIPPER, 16" DIA LOG, TRLR-MT	1.00	HR	6.63			1.00	6.63	6.63
MIL	L35CA007 E	LDR,FE, CRWLR, 3.75 CY	1.00	HR	74.29			1.00	74.29	74.29
MIL	XMIXX020 E	Small Tools	0.74	HR	1.39			0.74	1.03	1.03
	TOTAL					6.00	194.79	2.74	81.94	276.74
	XCARC	2 X-laborer + Misc. Power Tools			PROD =	100%			CREW HOURS =	50
MIL	XMIXX010 E	Misc. Power Tools	1.00	HR	5.85			1.00	5.85	5.85
MIL	XMIXX020 E	Small Tools	1.00	HR	1.39			1.00	1.39	1.39
MIL	X-CARPNTERF	Outside Carpenters	0.17	HR	38.65	0.17	6.57			6.57
MIL	X-CARPNTERL	Outside Carpenters	1.00	HR	38.15	1.00	38.15			38.15
MIL	X-LABORER L	Outside Laborers, (Semi-Skilled	2.00	HR	31.06	2.00	62.11			62.11
	TOTAL					3.17	106.83	2.00	7.24	114.07
	XCARF	1 X-carpnter + Small Tools			PROD =	100%			CREW HOURS =	7
MIL	XMIXX020 E	Small Tools	2.00	HR	1.39			2.00	2.78	2.78
MIL	X-CARPNTERL	Outside Carpenters	2.00	HR	38.15	2.00	76.29			76.29
MIL	X-CARPNTERF	Outside Carpenters	0.15	HR	38.65	0.15	5.80			5.80
	TOTAL					2.15	82.09	2.00	2.78	84.87
	XLABD	3 X-laborer + Misc. Power Tools			PROD =	100%			CREW HOURS =	24
MIL	XMIXX010 E	Misc. Power Tools	1.00	HR	5.85			1.00	5.85	5.85
MIL	XMIXX020 E	Small Tools	1.00	HR	1.39			1.00	1.39	1.39
MIL	X-LABORER F	Outside Laborers, (Semi-Skilled	0.34	HR	31.56	0.34	10.73			10.73
MIL	X-LABORER L	Outside Laborers, (Semi-Skilled	3.00	HR	31.06	3.00	93.17			93.17
	TOTAL					3.34	103.90	2.00	7.24	111.14
	XLABF	2 X-laborer + 1 Loader/Backhoe			PROD =	100%			CREW HOURS =	43
MIL	L50CA003 E	LDR,BH,WH, 1.38CY FE BKT, 30"DI	1.00	HR	15.62			1.00	15.62	15.62
MIL	XMIXX020 E	Small Tools	0.25	HR	1.39			0.25	0.35	0.35
MIL	X-LABORER F	Outside Laborers, (Semi-Skilled	1.00	HR	31.56	1.00	31.56			31.56
MIL	X-LABORER L	Outside Laborers, (Semi-Skilled	1.00	HR	31.06	1.00	31.06			31.06
MIL	X-EQOPRMEDL	Outside Equip. Operators, Mediu	1.00	HR	46.76	1.00	46.76			46.76
	TOTAL					3.00	109.37	1.25	15.97	125.34

U.S. Army Corps of Engineers
PROJECT SYRA19: SYRACUSE UDS 5-19 BUDGET EST.
ONONDAGA INNER HARBOR DESIGN MEMORANDUN ESTIMATE
** LABOR BACKUP **

SRC	LABOR ID	DESCRIPTION	BASE	OVERTM	TXS/INS	FRNG	TRVL	RATE	UOM	UPDATE	**** TOTAL **** DEFAULT	HOURS
MIL	B-EQOPRMED	Eq Oper, Medium	21.12	0.0%	30.0%	12.76	0.97	41.19	HR	04/16/96	17.15	120
MIL	B-LABORER	Laborer (Semi-Skilled)	15.64	0.0%	30.0%	9.60	0.69	30.62	HR	04/16/96	12.86	1423
MIL	B-TRKDVRHV	Truck Drivers, Heavy	20.65	0.0%	30.0%	1.57	0.00	28.42	HR	07/26/94	10.49	140
MIL	X-CARPNTER	Outside Carpenter	20.33	0.0%	35.0%	10.70	0.00	38.15	HR	11/07/95	20.70	73
MIL	X-EQOPRHVY	Outside Equip. Op. Heavy	18.32	10.0%	30.0%	10.20	1.55	37.95	HR	05/30/96	19.19	375
MIL	X-EQOPRMED	Outside Equip. Op. Medium	24.75	0.0%	35.0%	13.35	0.00	46.76	HR	11/07/95	17.43	230
MIL	X-EQOPROIL	Outside Oiler	17.93	10.0%	30.0%	10.20	1.52	37.36	HR	05/30/96	13.49	188
MIL	X-LABORER	Outside Laborer (Semi-Skilled)	16.16	10.0%	30.0%	6.68	1.27	31.06	HR	05/30/96	11.84	265
MIL	X-TRKDVRHV	Outside Truck Dr. Heavy	16.87	10.0%	30.0%	4.77	1.23	30.12	HR	05/30/96	19.19	188

U.S. Army Corps of Engineers
PROJECT SYRA19: SYRACUSE UDS 5-19 BUDGET EST.
ONONDAGA INNER HARBOR DESIGN MEMORANDUN ESTIMATE
** EQUIPMENT BACKUP **

SRC	ID.NO.	EQUIPMENT DESCRIPTION	DEPR	FCCM	FUEL	FOG	TR WR	TR REP	EQ REP	TOTAL RATE		** TOTAL ** HOURS
MIL	B20CI006	CHIPPER, 16" CAPACITY, TRLR-MTD	1.37	0.37	2.41	0.67	0.03	0.00	1.77	6.63	HR	80
MIL	D15BI002	DRILL, AUGER, 20" DIA, 40' LONG	1.03	0.33	1.58	0.51			1.32	4.76	HR	30
MIL	H25AK005	HYD EXCAV,CRWLR,2.35 CY BKT	28.28	9.05	7.61	2.89			31.91	79.74	HR	200
MIL	L35CA007	LDR,FE,CRWLR, 3.75 CY, 973	20.04	6.40	7.21	2.74			37.90	74.29	HR	80
MIL	L50CA003	LD/BH,WH,1-3/8CY FE BK/30"BH DIP	4.50	1.67	2.44	0.78	0.63	0.09	5.52	15.62	HR	43
MIL	T10CA014	BLADE, ANGLE, HYDR, FOR D7	2.25	0.72		0.08			2.54	5.59	HR	399
MIL	T15CA012	DOZER,CWLR,D-7G,PS,(ADD BLADE)	13.88	4.93	6.86	2.47			25.27	53.42	HR	399
MIL	T25JD004	TRACTOR,WH,FARM, JD-2755	2.35	0.59	2.76	0.77	0.38	0.06	2.16	9.05	HR	24
MIL	T40XX008	TRUCK OPT,REAR DUMP BODY, 8 CY	1.16	0.31		0.09			1.17	2.73	HR	80
MIL	T45XX018	TRK TRLR,LOWBOY, 70 TON, 3 AXLE	3.23	1.49		0.13	1.30	0.20	2.82	9.16	HR	60
MIL	T50FO020	TRK,HWY,48,000/64,000 GVW,3 AXLE	10.42	2.83	14.90	4.17	1.58	0.24	9.50	43.63	HR	60
MIL	T50KE003	TRK, HWY, 3AXLE, 46,000 GVW	9.34	2.46	10.05	2.82	0.39	0.06	8.46	33.58	HR	80
MIL	T55CA001	TRK,OFF-HWY,35T 22-30CY, 769C	23.40	8.55	8.71	2.96	6.60	0.99	19.58	70.79	HR	188
MIL	XMIXX010	Misc. Power Tools	1.95	0.70	0.55	0.24			2.41	5.85	HR	74
MIL	XMIXX020	Small Tools	0.46	0.17	0.13	0.06			0.57	1.39	HR	157
MIL	XX0XX001	150ton Floating Crane 290hp W/25	53.75	19.17	15.16	6.62			66.29	160.99	HR	100
MIL	XX0XX002	500 To 800hp Tug Boat	17.72	6.32	5.00	2.18			21.85	53.07	HR	416

INNER HARBOR DREDGING DESIGN PROJECT
SYRACUSE,NY

APPENDIX F

CORRESPONDENCE

New York State Thruway Authority

200 Southern Boulevard
Post Office Box 189
Albany, New York 12201-0189

40 Years of Service

Department of Operations

John J. Baniak
Director

Office of Canals

John R. Jermano
Director

Phone (518) 471-5010
TDD/TTY 1-800-253-6244
Fax (518) 471-5023

October 6, 1994

David R. MacPherson, P.E.
Project Manager
U.S. Army Corps of Engineers
1776 Niagara Street
Buffalo, New York 14207-3199

Dear Mr. MacPherson:

Thank you for your letter of September 22, 1994 regarding Confined Disposal Facilities for Onondaga Lake Inner Harbor Dredging. I have assigned John Dergosits of my office to work directly with you on this project. John can be reached at my address or by phone at 518-471-5020.

We look forward to working with you on this project.

Sincerely yours,

David B. Cox

For JOHN R. JERMANO
Director, Office of Canals

JRJ/DBC/jys

cc: J. Baniak
J. Swain
J. Meldrim
J. Zmarthie
F. Parker

New York State Canal Corporation

John Dergosits
FAX (518) 471-5023

NOV - 2 1994

Plan Formulation/Technical Management Section

SUBJECT: Onondaga Lake Inner Harbor Dredging Project

Mr. John Dergosits
Office of Canals
New York State Thruway Authority
200 Southern Boulevard
P.O. Box 189
Albany, New York 12201-0189

Dear Mr. Dergosits:

We have received the preliminary test results for the Inner Harbor sediment sampling contract at Onondaga Lake, New York. However, the report will not be ready for several weeks due to Corps quality assurance comments. The following paragraphs provide a Corps assessment of the preliminary data that should allow us to begin or search for an acceptable disposal site.

The preliminary data indicates that the Inner Harbor sediments have significant levels of Total Petroleum Hydrocarbons (TPH) including Benzene, Toluene, Ethylbenzene, Xylenes (BTEX), and 2-Butanone. Some samples had other chlorinated solvents. Low levels of pesticides (DDT, DDD, Endosulfan, and Chlordane) were found in many samples. Dioxin was encountered at very low levels (1 to 2 parts per trillion). Metal levels were moderate (arsenic, cadmium, mercury, and chromium) except for lead, which was elevated in a number of samples.

The data does not indicate any levels of organics or metals in the Toxic Concentration Leaching Procedure (TCLP) tests that are above regulatory levels for toxic waste under the Resource Conservation Recovery Act (RCRA), 1980, amended 1986, nor were PCB levels above the Toxic Substance Control Act (TSCA), 1976 levels. It appears that the sediments are acceptable for disposal in a confined disposal facility (CDF) that may require an impermeable liner or in an upland lined landfill. A hazardous waste landfill would not be required.

Plan Formulation/Technical Management Section
SUBJECT: Onondaga Lake Inner Harbor Dredging Project

If you have any questions regarding this matter, please contact me by writing to my attention at the above address or by calling (716)879-4294.

Sincerely,

SIGNED

David R. MacPherson, P.E.
Project Manager

CF:
CENCB-PP-PM
CENCB-PE-EA
CENCB-PE-PT
Mr. John R. Jermano
Director, Office of Canals
Albany, New York 12201-0189

MacPherson:mas:103194:4294 DRM 11/1
Leonard KOF 11/1
DeJohn MJD 11/2
Nicaise 11/2/94

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WP 5.1 .CF

New York State Thruway Authority

200 Southern Boulevard
Post Office Box 189
Albany, New York 12201-0189

Department of
Operations

John J. Baniak
Director

Office of Canals

John R. Jermano
Director

Phone (518) 471-5010
TDD/TTY 1-800-253-6244
Fax (518) 471-5023

December 14, 1994

David MacPherson
U.S. Army Corps of Engineers
Buffalo District
1776 Niagara Street
Buffalo, NY 14207

Dear Mr. MacPherson:

This letter is to follow up on four issues discussed at our meeting on November 29, 1994 at our Syracuse Section office.

1. We note that you have utilized the document, INTERIM GUIDANCE, FRESHWATER NAVIGATIONAL DREDGING dated October 1994, to evaluate sediment results from Syracuse Harbor. This document has not been subjected to rule-making or to public comment. We believe that only promulgated state and federal regulation should be used in the formal evaluation contained in your report.

2. At the meeting and subsequent field inspection some nine locations were viewed. Please eliminate from further consideration site number 1, UDS 5-20 and site number 5, UDS 5-8. Based on further discussion and analysis, we do not believe these two sites should be considered.

3. We request that you consider the potential for development of a disposal site along the western shore of Onondaga Lake. Although a specific site has not been identified, please determine the maximum distance that material could be pumped from the Harbor directly to a site. This will aid us in identifying an appropriate location.

4. We are currently evaluating the size (available acreage) of the parcels identified in our meeting. We will forward that information to you as soon as it is available.

Should you have any questions, please contact John Dergosits at (518) 471-5020.

Sincerely,

John R. Jermano
Director, Office of Canals

JRJ/JRD/ms

New York State Thruway Authority

200 Southern Boulevard
Post Office Box 189
Albany, New York 12201-0189

Department of Operations

John J. Baniak
Director

Office of Canals

John R. Jermano
Director

Phone (518) 471-5010
TDD/TTY 1-800-253-6244
Fax (518) 471-5023

January 3, 1995

Mr. David R. MacPherson, P.E.
U. S. Army Corps of Engineers
Buffalo District
1776 Niagara Street
Buffalo, NY 14207

RE: SYRACUSE INNER HARBOR

Dear Mr. MacPherson:

This letter is to transmit the size and available acreage of the parcels identified in your meeting with Mr. Dergosits of my staff. The information follows the numbering of the attached "Syracuse Inner Harbor, Potential Confined Disposal Sites" dated November 28, 1994. Please note that site numbers 1 and 5 have not been included based on my December 12, 1994 letter.

1.	Withdrawn.	
2.	900 feet by 440 feet,	9.09 acres.
3.	1375 feet by 320 feet,	10.10 acres.
4.	2032 feet by 400 feet,	18.66 acres.
5.	Withdrawn.	
6.	3650 feet by 365 feet,	30.58 acres.
7.	4450 feet by 500 feet,	51.08 acres.
8.	2250 feet by 300 feet,	15.50 acres.
9.	575 feet by 520 feet,	6.86 acres.

Please remember to consider the potential for development of a disposal site along the western shore of Onondaga Lake. Although we have not identified a specific site, we will evaluate the area once you determine the maximum distance that material could be pumped from the Harbor directly to a site.

Should you have any questions please contact John Dergosits at (518)471-5020.

Sincerely yours,

JOHN R. JERMANO
Director, Office of Canals

JRJ/JRD/jys
Attachment

New York State Canal Corporation

J. Dergosits
11/28/94

Syracuse Inner Harbor
Potential Confined Disposal Sites

1. Map Number 1, UDS 5-20, Adjacent to proposed Inner Harbor Dredging Project.

2. Map Number 1, UDS 5-20 Annex, Adjacent to proposed Inner Harbor Dredging Project. Need to cross Van Renssellaer Street with dredge lines.

3. Map Number 1, UDS 5-19, Adjacent to proposed Inner Harbor Dredging Project.

4. Map Number 2, Klein Island, Potential development site on northern side of island. Seven (7) miles to proposed Inner Harbor Dredging Project.

5. Map Number 3, UDS 5-8, Existing disposal site, Fourteen and three quarters (14.75) miles to proposed Inner Harbor Dredging Project. Will need to lock through at Lock 24 Baldwinsville.

6. Map Number 4, UDS 5-7, Existing disposal site, Sixteen (16) miles to proposed Inner Harbor Dredging Project.

7. Map Number 4, UDS 5-6, Existing disposal site, Sixteen (16) miles to proposed Inner Harbor Dredging Project.

8. Map Number 5, UDS 5-5, Existing disposal site, Eighteen (18) miles to proposed Inner Harbor Dredging Project.

9. Map Number 5, Schroeppel Island, Potential development site. Eighteen (18) miles to proposed Inner Harbor Dredging Project.

New York State Thruway Authority

200 Southern Boulevard
Post Office Box 189
Albany, New York 12201-0189

Department of Operations

John J. Baniak
Director

Office of Canals

John R. Jermano
Director

Phone (518) 471-5010
TDD/TTY 1-800-253-6244
Fax (518) 471-5023

May 1, 1995

Mr. David R. MacPherson, P.E.
U. S. Army Corps of Engineers
Buffalo District
1776 Niagara Street
Buffalo, NY 14207

RE: SYRACUSE INNER HARBOR

Dear Mr. MacPherson:

This letter is in response to your April 24, 1995 telephone conversation with Mr. Dergosits of my staff regarding the Inner Harbor Project. During that conversation you asked if the number of sites to be evaluated for dredged spoil disposal could be further narrowed to a limited number of potential locations. We believe that based on the information that you have supplied to us that additional technical evaluation can be limited to the sites identified as UDS 5-19, 5-20 and 5-20 Annex.

Should you have any questions you can contact John Dergosits at (518) 471-5020.

Sincerely yours,

JOHN R. JERMANO
Director, Office of Canals

JRJ/JRD/jys

cc: J. Baniak
S. Kupferman
D. Cox
F. Parker
D. Bell
J. Dergosits

New York State Canal Corporation

CENCB-PP-PM 3 May 1995

MEMORANDUM FOR RECORD

SUBJECT: Onondaga Lake - Inner Harbor Project - Coordination Meeting - 2 May 1995

1. The subject meeting was held on 2 May 1995 at 1100 hours at the New York State Thruway Department of Environmental Conservation - Region 7 office, Syracuse, New York. The Office of Canals, NYSDEC- Region 7 and NYSDEC - Central (Albany), and Corps representatives present are listed on enclosure 1.

2. Purpose: To conduct a coordination meeting to discuss the dredging and disposal issues for the Inner Harbor project.

3. Following introductions, Mr. MacPherson, Project Manager (Buffalo District) stated the purpose of the meeting, outlined the status of the project, and outlined the cooperative effort to date for identifying dredging and disposal design criteria.

4. The following is not a verbatim record of the meeting but rather a list of points made during the meeting as recorded by the project manager:

Mr. Dergosits (NYS Thruway Authority - Office of Canals) described the need for two sites; one site will be used on a one time basis while the other site would be used over the long term for future operation and maintenance dredging of the Inner Harbor. After the material dries in the site it could be mined and used for other purposes.

Mr. Estabrooks (NYSDEC- Albany) described a need for a lined site due to the heavily polluted nature of the material to be dredged. It is unknown to what degree a lined site would need to be designed.

Mr. Torba (NYSDEC-Region 7) enquired about the suitability of using the dredged material for use as fill material for construction of the Onondaga Lake bike path and ramps. Mr. Estabrooks questioned the grain size of the material and the polluted nature of the material (we want to be careful about spreading this material around the lake). Mr. Estabrooks suggested mixing the dredged material with kiln dust to stabilize the dredged material. It would then be more suitable for construction material for construction of the bike path ramps and embankments. The PH of the mixed material should be considered.

The size of the potential disposal sites are as follows: UDS 20 - 13.9 Acres; UDS 20 Annex - 10 Acres; UDS 19 - 6.5 Acres

The three potential disposal sites are considered riparian. There is a need for a Section 401 Water Quality Certification. Riparian sites traditionally don't need to be lined. But the polluted nature of the dredged material makes this a special case. There is a need to determine the permeability of the site based on sub-surface explorations. Then the Corps can design (compare to Section 401 standards for no violation) to determine the need for a liner or to design a suitable liner. It is necessary to show that there is no contravention of the Water Quality standards.

Discussed application of the permeability factor of 0.27 inches per hour - It was later decided that this standard was not applicable to this project.

Discussed if the material in the site is more polluted than the new dredged material, then the material can be brought in and used as a cap.

Mr. Flocke (NYSDEC- Region 7) stated that is not necessary to meet standards at the point of (dredge return water) discharge. They will allow for a mixing zone. Water quality information would need to be sent to NYSDEC for examination.

This material is considered by the NYSDEC to be Class C - highly polluted and could be considered as a solid waste according to the interim guidance. Then solid waste would have to be contained in a 360 site. However, this definition is being revisited and may be revised. It was later decided that this material would not be considered solid waste and therefore would not be subject to a 360 site design.

The consensus of the group was that there should be a comparison of permeability at the disposal site to determine the impact on water quality in the Inner Harbor (assuming no Combined Sewer Overflow input - Class C) to meet Section 401 Water Quality Certification.

The sites now have a sandy-loam material. Future subsurface explorations will assist in the Corps analysis to determine permeability of the site.

Future analysis will have to show that standards are not contravened from rainfall collection and future use in a non-covered site. There may be the need for a permanent weir at the sites to control rainfall collection. (Site UDS-19 currently has a permanent weir) Or there may be a need to install a temporary cap to keep out rainwater.

Mr. Flocke questioned whether we have coordinated with the NYS Health Department for future development of the sites? Mr. Dergosits stated that they have not yet been coordinated with at this time. Any requests for proposals for proposed development in the terminal area will require future coordination.

Odor control at the sites may need to be addressed.

NYSDEC representatives stated there may be a need for toxic pollutant testing during construction (dredging) - real time monitoring for heavy metals. It is intended that this would be accomplished during dredging. (However, the Corps does not agree that this is practical. Test results could take 30 to 60 days.)

Representatives from NYSDEC- Albany and the Corps traveled to the three potential disposal sites in the Inner Harbor area to review the issues facing use of these sites.

The Corps will proceed in the following manner based on discussion and guidance received at this meeting:

- Settling tests and analysis on harbor sediments will be completed.
- Chemical tests on material from UDS 19, 20, and 20 Annex will be conducted.
- Subsurface exploration will be conducted.
- Permability tests will be conducted on disposal site material.
- A determination will be made if the Harbor sediments are cleaner than the existing disposal site material.
- The permability of the proposed sites will be analyzed.
- The need for a liner will be based on the permability analysis and whether water quality standards will be contravened if unlined.
- If standards are expected to be contravened, a suitable liner will be designed to restrict exfiltration from the site.
- Methods to control rainfall input to the site will investigated so not to contravene water quality standards.
- The expected magnitude of odor problems will be investigated.

David R. MacPherson

David R. MacPherson, P.E.
Project Manager

CONFERENCE / MEETING

PROJECT Onondaga Lake - Inner Harbor
TYPE OF MEETING Disposal Coordination
DATE/TIME May 2, 1995 11:00
LOCATION NYSDEC - Region 7 - Syracuse

NAME	TITLE	ADDRESS	TELEPHONE
David MacPherson	Project Manager	Corps of Engineers - Buffalo	(716) 879-4294
Bob Torba	Env. Analyst	N.Y.S DEC Region 7	315 426 7439
Steven Eidt	Reg. Water	DEC Region 7	315 426 7500
DAVE WAZENKEWITZ	SOLID WASTE	"	315 426 74[illegible]
Lee Flocke	RE	"	315 426 7551
JON KOLBER	Geotechnical	Corps of Engineers/Buffalo	(716) 879-4165
Dave Melsi	Environmental	"	716-879-4349
John Deposits	CE	NYSTWY - Canals	518/471-5020
FRANK ESTABROOKS	OPS	50 WOLF RD ALBANY	518 4570735
BRUCE GARABEDIAN	ENV. ENG.	"	(518) 457-0729
HAL RADILOFF	ENV. ENG	NYSDEC REG. 7	315-426-7421
Paul Polanski	Construction Estimator	COE	716-879-4236

Project Management Branch

29 JUN 95 13 27

SUBJECT: Onondaga Lake Inner Harbor Dredging Project

MAP ROOM
CENCO-IM-S

Mr. John Dergosits
Office of Canals
New York State Thruway Authority
200 Southern Boulevard
P.O. Box 189
Albany, New York 12201-0189

Dear Mr. Dergosits:

During previous meetings you have expressed the Office of Canal's desire to use their own equipment and labor to dredge the Inner Harbor. In order to prepare a cost estimate for the dredging portion of this project, we require additional information regarding Office of Canals equipment capacities, production rates, equipment costs, and labor rates.

Enclosed is a listing of our information needs.

If you have any questions regarding this request, please contact me by writing to my attention at the address above or by calling me at (716) 879-4294.

Sincerely,

David R. MacPherson P.E.
Project Manager

Enclosure

McPherson_______
Nicaise_________

6/27/95

Information Needs
for
Onondaga Lake Inner Harbor Project

1. State the number of hydraulic dredges that will be used.
2. State the hydraulic dredge size (draft, dimensions, height, etc)
3. State the hydraulic dredges hourly ownership rates.
4. State the expected dredge production rate at the Inner Harbor. (Also state rate of discharge as average rate per day)
5. State the dredge crew size, labor descriptions, and hourly labor cost.
6. State what attending plant (i.e. tug) will be required.
7. State the size and the hourly equipment costs of the attending plant.
8. State the attending crew size, job description titles, and hourly labor rate.
9. State how much dredge pipe is available and at what cost per hour.
10. State if a booster pump would be required, what size, and availability.
11. State what other material and supplies would be consumed.
12. State what would be the field and home office requirements and what would be the costs.
13. State survey requirements.
14. State your construction inspector needs.
15. State how you envision the sequence of dredging to be scheduled. (i.e. Dredge over two years. Location of point of discharge? Pump only into UDS 20 Annex and decant into UDS 19. Weir only in UDS 19)

JAMES T. WALSH
MEMBER OF CONGRESS
25TH DISTRICT, NEW YORK

A... MAJORITY WHIP

COMMITTEE ON APPROPRIATIONS
SUBCOMMITTEES:
DISTRICT OF COLUMBIA
CHAIRMAN
AGRICULTURE, RURAL DEVELOPMENT, FOOD AND DRUG ADMINISTRATION, AND RELATED AGENCIES
VA, HUD, AND INDEPENDENT AGENCIES

Congress of the United States
House of Representatives
Washington, DC 20515-3225

11 JUL 95 13 31
MAIL ROOM
CENCS-TH-S

July 3, 1995

Colonel Walter Neitzke
Commander
Department Of The Army
Buffalo Dist. Corps Of Engineers
1776 Niagara Street
Buffalo, New York 14207

Dear Colonel Neitzke,

RE: Onondaga Lake Inner Harbor Dredging
Onondaga County
New York

Because of the desire of this office to be responsive to all inquires and communications, your consideration of the attached is requested.

Your findings and views, in duplicate form, will be appreciated.

Please respond to the attention of my district director below:

Honorable James T. Walsh
attn: John McGuire
P.O. Box 7306
Syracuse, N.Y. 13261-7306

Thank you for your speedy handling of this inquiry.

Sincerely,

James T. Walsh
Member of Congress

Enclosure

1330 LONGWORTH BUILDING
WASHINGTON, DC 20515-3225
(202) 225-3701 (202) 225-4042 FAX

POST OFFICE BOX 7306
SYRACUSE, NY 13261
(315) 423-5657 (315) 423-5669 FAX

1 LINCOLN STREET
AUBURN, NY 13021
(315) 255-0649 (315) 255-1369 FAX

45 CHURCH STREET
CORTLAND, NY 13045
(607) 758-3918

JUL 2 6 1995

26 JUL 95 15 21

Project Management Branch

SUBJECT: Inner Harbor Dredging Design Project, Onondaga Lake, NY

Honorable James T. Walsh
Representative in Congress
ATTN: John McGwire
P.O. Box 7306
Syracuse, New York 13261-7396

Dear Mr. Walsh:

In response to your letters dated July 3, 1995, and July 20, 1995, I will address the information that you requested regarding your constituent's inquires and communications.

The U.S. Army Corps of Engineers is currently designing the proposed project for dredging the Inner Harbor at Onondaga Lake, NY. This design effort includes the evaluation and selection of disposal areas for the dredged sediments. This design project is being cost-shared with the New York State Thruway Authority - Office of Canals. The Office of Canals ultimately selects the disposal sites. The construction cost of the project will be the responsibility of the non-Federal sponsor.

One of the issues facing the success of this project is the identification of a suitable disposal site for the dredged material from the Inner Harbor channel. In this regard, the Corps can only consider and evaluate proposed sites offered by the Office of Canals. The Office of Canals has identified three potential disposal sites (UDS 5-19, UDS 5-20, and UDS 5-20 Annex) that are adjacent to the harbor and are owned by the Office of Canals. These sites are shown on the attached map (Enclosure 1). Other sites outside of the Syracuse area had been identified, however, they proved to be cost prohibitive due to transportation costs that would place the dredging project in jeopardy. It is necessary that a one-time use site be identified for disposal of about 207,000 cubic yards of dredged material and that a second smaller permanent site be identified for future maintenance dredging of the harbor.

Project Management Branch
SUBJECT: Inner Harbor Dredging Design Project, Onondaga Lake, NY

The Office of Canals is negotiating an agreement with the city of Syracuse and the Aquarium Development Company, Inc., that would allow development of an Aquarium on Office of Canals lands (UDS 5-20) adjacent to harbor. At the same time, the Office of Canals is proposing to use some of these same lands for disposal of dredged material. The Office of Canals is currently conducting meetings with city and developer representatives to address your constituent's concerns. Anyone who has concerns about the selection of sites should broach their concerns with the Office of Canals and/or respond to the public review of the environmental documents the Corps is preparing that assesses the impacts.

I trust this information provides you an understanding of the Corps position regarding this matter. If I can be of further assistance, please do not hesitate to contact me at (716) 879-4200 or contact Mr. David R. MacPherson, P.E., Project Manager at (716) 879-4294.

Sincerely, SIGNED

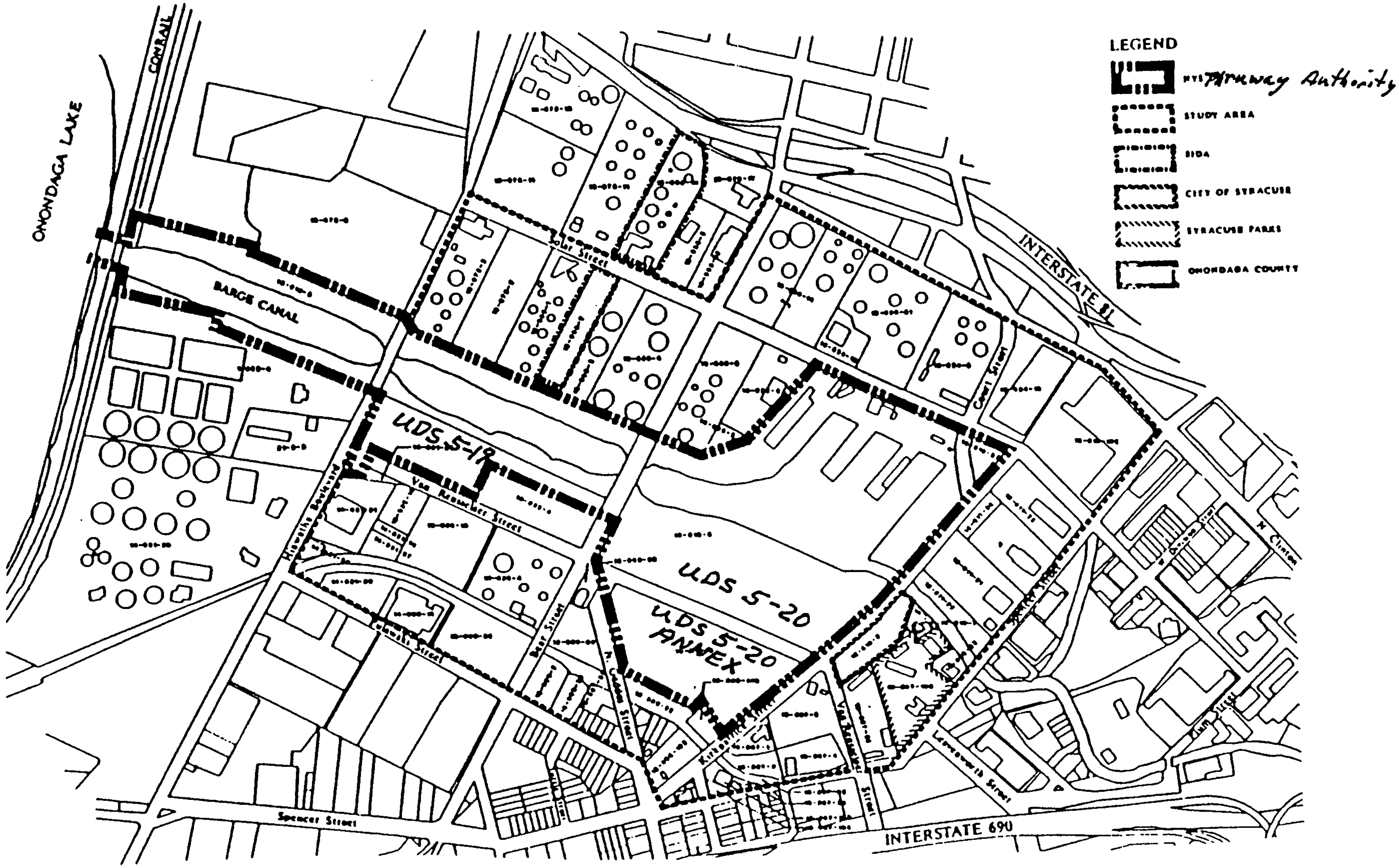
Jan M. Kozlowski
MAJ, EN
Acting District Commander

Enclosure

MacPherson________
Nicaise________
Brooks________
MAJ Kozlowski________

CF:
CENCD-DE
CENCB-DE
CENCB-PA
CENCB-PE
CENCB-PE-PM

Office of Canals
New York State Thruway Authority
ATTN: John Dergosits
200 Southern Boulevard
P.O. Box 189
Albany, NY 12201-0189



SYRACUSE INNER HARBOR
PROPERTY OWNERSHIP

1995

Project Management Branch

SUBJECT: Onondaga Lake Inner Harbor Dredging Project 18 Aug 95 13 35

Mr. John Dergosits
Office of Canals
New York State Thruway Authority
200 Southern Boulevard
P.O. Box 189
Albany, New York 12201-0189

Dear Mr. Dergosits:

In a NYS Thruway Authority - Office of Canals letter dated May 1, 1995, Mr. John Jermano identified three potential disposal sites for additional technical evaluation for the Inner Harbor Project in Syracuse, New York. These three sites were UDS 5-19, 5-20, and 5-20 Annex.

During the past month, several letters of opposition have been received from local government offices, agencies, and developers. The opposition centers on differing plans for future land use of the three sites. I know that the Office of Canals has been conducting meetings with local representatives during the past several weeks in an attempt to settle the issues and select a final disposal site(s).

I request that you provide a date when you expect to have a selected disposal site(s) so we can modify the project schedule accordingly. Delays in selection of the disposal sites will adversely delay the overall project design schedule. Surveys and sub-surface explorations should be scheduled before the winter months to avoid further delays.

Meanwhile, we will provide the results of the column settling tests and the soil sample chemistry tests as they become available to us from the laboratory. These test results may assist you in the selection of a disposal site(s). Preliminary test results have been forwarded to your office. The final test reports will not be available till mid-September 1995.

If you have any questions regarding this request, please contact Mr. David R. MacPherson, P.E., Project Manager of my Project Management Branch at (716) 879-4294.

Sincerely,

SIGNED

Walter C. Neitzke
Colonel, U.S. Army
Commanding

CF:
CENCB-PP-PM
CENCB-PP

MacPherson/jf/8/17/95 DRM 8/17
Nicaise 8/17/95
Brooks 8/17
COL Neitzke 17 Aug

Dave MacPherson

New York State Thruway Authority

200 Southern Boulevard
Post Office Box 189
Albany, New York 12201-0189

August 31, 1995

Department of Operations

John J. Baniak
Director

Office of Canals

John R. Jermano
Director

Phone (518) 471-5010
TDD/TTY 1-800-253-6244
Fax (518) 471-5023

Colonel Walter C. Neitzke, Commander
U.S. Army Corps. of Engineers
Buffalo District
Buffalo, New York 14207-3199

RE: SYRACUSE INNER HARBOR

Dear Colonel Neitzke:

This is in response to your letter to Mr. Dergosits of my staff.

We understand your concern regarding the current delay in the evaluation of potential upland disposal sites for the Syracuse Inner Harbor Project. We have not formed a consensus with the other interested parties involved with the Syracuse project. We are continuing discussions and will communicate the final decisions to you as quickly as possible. We will make every effort to minimize the impact to the projects schedule and hope to be in a position to have surveys and sub-surface explorations underway prior to the winter months.

Should you have questions regarding this matter, please contact either me or John Dergosits at (518) 471-5020.

Sincerely yours,

David B. Cox

DAVID B. COX
Civil Engineer V
Office of Canals

New York State Canal Corporation

200 Southern Boulevard
Post Office Box 189
Albany, New York 12201-0189

Keith E. Giles, P.E. & L.S.
Director and Chief Engineer

Office of Canal
Maintenance and Operations

David B. Cox, P.E.
Director

Phone (518) 471-5010
TDD/TTY 1-800-253-6244
Fax (518) 471-5023

December 11, 1995

Mr. David R. MacPherson, P.E.
U. S. Army Corps of Engineers
Buffalo District
1776 Niagara Street
Buffalo, NY 14207

RE: SYRACUSE INNER HARBOR

Dear Mr. MacPherson:

This letter is to confirm your previous conversations with Mr. Dergosits of this office on the initiation of planning and design for the Inner Harbor project. You should consider the following while performing your work.

1. The primary location for the placement of material to be dredged from the Inner Harbor should be into UDS 5-19. A contingency could be developed that might include the use of UDS 5-20, although that is considered unlikely at this time.

2. You should evaluate the removal of existing sediments from UDS 5-19 in order to increase the capacity at this site. It is likely that the sediments once excavated may need to be transported to a permitted, secure facility.

3. The potential for downsizing of the channel into the Inner Harbor should be considered. According to our Syracuse floating plant staff, a minimum of a 60 foot width channel with 10 foot minimum depth would be required. The harbor channel could also be terminated at the northern most slip. The other two slips in the harbor could be left as they are.

I trust that this addresses your concerns. Should you have any questions you can contact John Dergosits at (518) 471-5020.

Sincerely yours,

David B. Cox

DAVID B. COX
Director,
Canal Maintenance and Operations

New York State Canal Corporation

200 Southern Boulevard
Post Office Box 189
Albany, New York 12201-0189

June 24, 1996

Keith E. Giles, P.E. & L.S.
Director and Chief Engineer

Office of Canal Maintenance
and Operations

David B. Cox, P.E.
Director

Phone (518) 471-5010
TDD/TTY 1-800-253-6244
Fax (518) 471-5023

Mr. David R. MacPherson, P.E.
U. S. Army Corps of Engineers
Buffalo District
1776 Niagara Street
Buffalo, NY 14207

RE: SYRACUSE INNER HARBOR

Dear Mr. MacPherson:

This responds to the attachment to your letter dated June 27, 1995 in which you asked that we provide information regarding our dredging of the Inner Harbor Project. The following responds point by point to your attachment.

1. We anticipate that only one hydraulic dredge (HD#5) would be needed to preform the dredging for this project. One of our derrick boats would be used to set-up the operation and tear it down upon completion, but would not be needed for the dredging.

2. The approximate dimensions of HD#5 are as follows:

Draft	6.0 feet
Length	106.5 feet
Width	28.0 feet
Air Draft	14.0 feet

3. The HD#5 is owned outright by the Canal Corporation. In 1993 the estimated cost per cubic yard dredged was about $5.00. This estimate included repairs, fuel and labor costs. Due to the method used for our accounting, more detailed breakdowns are not possible.

4. It is estimated that the average production rate would be 1500 cubic yards per day for a 8 hour day.

5. The crew and day rates for the hydraulic dredge crew are as follows. These are labor only costs and a fringe/overhead rate of 54% should be added to the following day rates:

1 - Dredge Captain	$ 132.00/day
1 - Dredge Operator	124.00/day
1 - Marine Engineer	118.00/day
1 - Tender Captain	86.00/day
1 - Shore Boss	81.00/day
1 - Maint. Assistant (Marine)	112.00/day
6 - Marine Helpers	411.00/day
TOTAL	$1,064.00/day

6.& 7. A derrick boat crew would be needed for approximately two weeks in each navigation season to place, move and remove the dredge pipeline. A shore based crew would be needed for about 4 weeks the first navigation season to rebuild the UDS 5-19. Four weeks of the shore crew would be needed during the initial dredging season to relocate the north berm wall should the new waterline be found to be in the way of the construction. Additionally, a carpentry crew would be needed for one week per season to rebuild the spillbox at UDS 5-19.

Should the development of UDS 5-20A be required, two weeks of the shore crew would be needed to remove fence and trees the estimates should include a track-hoe and front-end loader. Eight weeks would be needed to haul fill to construct berm walls. We assume that there would be no cost for the fill and it would come from UDS 5-19. This would require two dragline cranes, six dump trucks, two dozers and two front end loaders. Equipment rental rates can be determined by using Means estimating guide. Should VanRensselar Street need to be open for traffic, one week will be needed to excavate, place the dredge lines and backfill. This activity would require a track-hoe and front-end loader. Two weeks of the carpentry crew would be needed to construct the spill box during the first season. In addition the derrick boat crew would be needed for approximately two weeks in each navigation season to place, move and remove the dredge pipeline.

8. The crew and day rates for the derrick boat crew are as follows. These are labor only costs and a fringe/overhead rate of 54% should be added to the following day rates:

1 - Dredge Captain	$ 132.00/day
1 - Crane Operator	124.00/day
1 - Tender Captain	86.00/day
1 - Maint. Assistant (Marine)	112.00/day
2 - Marine Helpers	137.00/day
TOTAL	$ 591.00/day

The crew and day rates for the shore crew are as follows and are identical to the derrick boat crew. These are labor only costs and a fringe/overhead rate of 54% should be added to the following day rates:

1 - Dredge Captain	$ 132.00/day
1 - Crane Operator	124.00/day
1 - Tender Captain	86.00/day
1 - Maint. Assistant (Marine)	112.00/day
2 - Marine Helpers	137.00/day
TOTAL	$ 591.00/day

The crew and day rates for the carpentry crew are as follows. These are labor only costs and a fringe/overhead rate of 54% should be added to the following day rates:

1 - Carpenter	$ 127.00/day
2 - Marine Helpers	137.00/day
TOTAL	$ 264.00/day

9. We currently have sufficient pipeline available and manufacture the pipe for replacement as needed. You will need to consult Means estimating guide for a unit equipment cost for the pipeline.

10. No booster pump is anticipated to be needed. Currently we do not own or use one.

11. Lumber for the spill box and fuel for the shore based equipment is all that is anticipated. In the event that we use UDS 5-20A, two steel carrier pipes will be needed to be placed under VanRensselar Street and the street patched.

12. Office requirements are essentially fixed and would not increase due to this work. Incremental costs are minimal.

13. Survey for stakeout of the dredging operation and UDS construction would be accomplished by in-house staff. You should use your judgement for the time required and use Means Estimating to establish the unit costs.

14. If our staff is accomplishing the UDS construction and dredging minimal inspection time would be needed. You should estimate approximately one day of an engineer at $ 275.00/day plus a fringe/overhead rate of 54% added for each week of field work.

15. If we assume the reduced scale project is undertaken and UDS 5-19 is only used then we envision that this project will take place over two navigational seasons due to the consistency of the material. We depend on the COE's expertise for the methodology for the project and would like to discuss the details with you as they develop.

I trust that the above addresses your concerns. Should you have any questions you can contact John Dergosits at (518) 471-5020.

Sincerely yours,

DAVID B. COX, P.E.
Director,
Canal Maintenance and Operations

LDC

LAKEFRONT DEVELOPMENT CORPORATION

3 SEP 96 12 42

MAILROOM CENWB-IM-S

August 29, 1996

Lt. Col. Michael J. Conrad, Jr.
Commander - Buffalo District
U. S. Army Corp of Engineers
1776 Niagara Street
Buffalo, NY 14207

Dear Lt. Col. Conrad,

The Lakefront Development Corporation (LDC) is charged with facilitating the overall redevelopment of the 800 acre parcel bordering Onondaga Lake. As such we are working closely with the New York State Thruway Authority on the Syracuse Inner Harbor Project.

One component of the project is the proposed dredging of the Syracuse Inner Harbor. The attached memo to the LDC outlines the steps needed to complete the operation.

Unfortunately the projected completion date of Summer 1999 coincides directly with an anticipated opening of the Syracuse Aquarium and Entertainment Center to be located just south of UDS 5-19.

My board has asked me to contact you to see if we could receive an overview of this project and inquire as to the potential of speeding up the process.

I would appreciate your review of this matter and determination if a member of your staff would be available to address the LDC Board.

Should you have any questions please give me a call. Thank you for your interest.

Best regards,

Bart Bush

Bart Bush, Executive Director
Lakefront Development Corporation

WBB/ms
enc.

ROOM 221, 233 EAST WASHINGTON STREET, SYRACUSE, NEW YORK 13202
PHONE (315) 448-8101
FAX (315) 448-8036

New York State Thruway Authority

200 Southern Boulevard
Post Office Box 189
Albany, New York 12201-0189

Phone (518) 471-5327
TDD/TTY 1-800-253-6244
Fax (518) 436-2899

TO: Bart Bush, Executive Director
Lakefront Development Corporation

FROM: Ann Luby, Director
Canal Recreationway Commission

DATE: July 26, 1996

SUBJECT: Syracuse Inner Harbor Dredging

Background

The Army Corps of Engineers is designing the Onondaga Lake Inner Harbor Dredging Project. Work elements of the project include: testing harbor sediments; preparing hydrographic plans of the channel and terminal area; disposal site material tests; designing the disposal site; and preparing the dredging timetable and cost estimates.

In order to minimize the impacts of dredging and limit disposal of sediments to one site to accommodate ADC needs, the dredging project has been scaled back to a 60-foot-wide channel with a minimum depth of 10 feet. Only the northern-most slip will be deepened. Based on preliminary calculations, UDS 5-19 has sufficient capacity to contain the sediments if provisions are made to remove excess water during dredging operations and existing sediments from the disposal site are used to raise the surrounding dike.

Design Project Schedule

Changing the scope to a 60-foot-channel necessitated re-design of the project. The design aspect of the project was originally scheduled for completion by January of 1997. However, it is now anticipated that design will be completed in August of 1997.

Responses to LDC Inquiries

The dredging operation requires two seasons. Sediments dredged in the first season must settle in order to allow the second season's sediments to be deposited in the site.

To: Bart Bush, Executive Director
Lakefront Development Corporation
Re: Syracuse Inner Harbor Dredging
Date: July 26, 1996

The spoils will smell while dredging is ongoing and for a few hours thereafter. The major source of the odor is the organic material contained within the sediments. However, there are certain mitigating actions which will be investigated in order to minimize odor-related impacts. Dredging can be done around the clock; therefore scheduling may help alleviate the associated odor, as dredging is normally done in blocks of four to five hours to allow sediments to settle. In addition, dredging could be done during the cooler spring and fall months so that heat will not exacerbate the odor.

We will also investigate chemical treatment of dredge spoils. However, it is imperative that we avoid any chemical treatment which interferes with the evaporation process. Water must be allowed to evaporate to facilitate settling of sediments.

Regarding the "visual" impact of dredging; the spoils themselves are not visible during the process. Floating plant must stay on-site during the dredging operation.

We also would like to remind LDC Board members that in order to keep the harbor accessible, dredging must occur on a cyclical basis.

I hope this information is helpful. John Meldrim will be available at your meeting to address questions.

Ann E. Luby

Ann E. Luby, Director
Canal Recreationway Commission

cc: S. Kupferman
J. Meldrim
K. Giles

COPY

TO : Ann E. Luby, Director
Canal Recreationway Commission

FROM: Bart Bush, Executive Director
Lakefront Development Corporation

DATE: 7/11/96

RE : Dredging

As discussed at today's LDC meeting, the Board would appreciate your assistance in answering the following two questions:

A: The June 4, 1996 memo attached indicated a dredging schedule anticipated during the navigation seasons of 1998 and 1999. Given this schedule was based on an estimated removal of 207,000 cubic yards of sediment, and most now agree on a downsized 60,000 cubic yards, could the schedule be accelerated to be completed during the 1998 navigation season?

B: What is the cure period for dredge spoils and how is this period effected by other impacts such as weather and additional dredging? Also, what is the visual and odor impact of these spoils and what is the duration of the odor associated with this activity?

Thanks for your assistance in this matter and please give me a call if you have any questions.

cc: Steve Suhowatsky, President
Lakefront Development Corporation

Project Management Branch

24 SEP 96 13 25

SUBJECT: Onondaga Creek - Demonstration [redacted] Design Project
Inner Harbor

Mr. Bart Bush
Executive Director, Lakefront Development Corporation
Room 221
233 E. Washington Street
Syracuse, New York 13202

Dear Mr. Bush:

I have read your letter dated August 29, 1996 requesting that a U.S. Army Corps of Engineers representative provide an overview of the Onondaga Lake Inner Harbor Dredging Design Project. To better address the issues presented in this letter, I request that you direct this inquiry to the New York State Thruway Authority, Office of Canals.

The Corps of Engineers is only participating in the design of this project. The non-Federal sponsor is the New York State Thruway Authority, Office of Canals, who will be responsible for the construction, operation, and maintenance of the project.

The Corps of Engineers anticipates completion of the design memorandum, environmental assessment, and plans and specifications by summer of 1997. Though we know that it will be neccesary to complete the dredging over two dredging seasons due to the limited capacity of the proposed confined disposal facility, the actual dredging schedule will be determined by the Office of Canals.

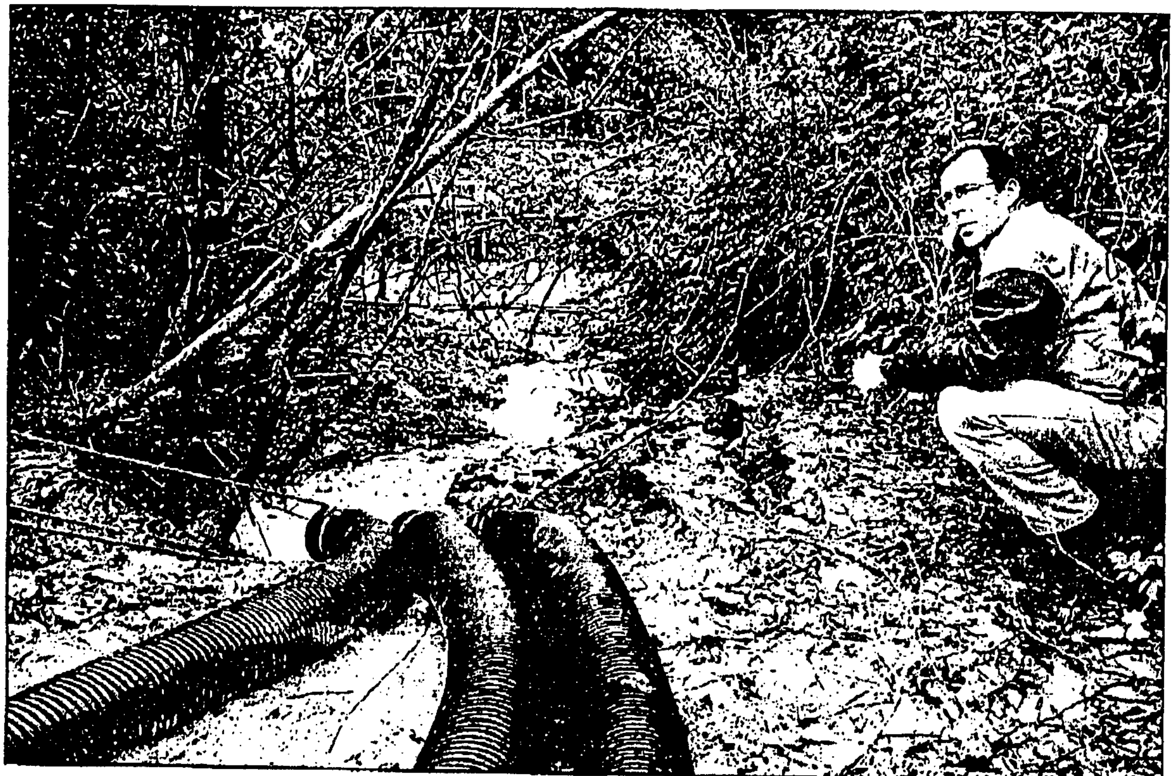
I request that you contact Mr. John Dergosits, Office of Canals at 200 Southern Boulevard, P.O. Box 189, Albany , New York 12201-0189 or by telephone at (518) 471-5020. Mr. Dergosits has been briefed by my staff of your request. If a meeting is arranged between the Lakefront Development Corporation Board and the Office of Canals, I will then consider sending a Corps of Engineers representative.

If you have any questions regarding this matter, please contact Mr. David R. MacPherson, P.E., Project Manager at the above address or by calling (716) 879-4294.

Sincerely,

Michael J. Conrad, Jr.
Lieutenant Colonel, U.S. Army
Commanding

Syracuse Herald-Journal, Tuesday, October 22, 1996 C3



CARL J. SINGLE/Staff photographer

TIM MULVEY, executive director of Onondaga Lake Cleanup Corp., looks over a temporary dam used by workers expanding the dam at the headwaters of Onondaga Creek. They finished the work — designed to reduce the flow of mud — last week.

Dam is containing Tully Valley mud

▶ The new dam makes for a cleaner Onondaga Creek.

By Mark Weiner
Staff Writer

Four years ago, Onondaga Creek looked like bubbling chocolate milk near its headwaters in the Tully Valley.

Today, a pristine stream flows in its place, meandering 17 miles north through Syracuse to Onondaga Lake.

The dramatic change is one of the first tangible environmental improvements attributed to the Onondaga Lake cleanup project.

Last week, workers put the finishing touches on a new earthen dam built to reduce the flow of mud into the creek. The dam is part of a $150,000 creek cleanup project.

The dam is an expansion of one built in 1993, with an elevation 5 feet higher than the old dam. The dam stores up to 7.2 million gallons of water covering a pond of almost 6 acres.

It's easy to see the results.

"People downstream on Onondaga Creek said they could see the bottom of the stream bed for the first time in years," said Don Lake, president of DuLac Engineering in Manlius.

Lake's company was hired by the Onondaga Lake Cleanup Corp., a state-financed organization coordinating the lake's cleanup.

The dam holds back mud, which bubbles from holes in the ground in a rare geological phenomenon. Scientists call the holes "mud boils." Others say they look like miniature volcanoes — most no bigger than a human foot.

CARL J. SINGLE/Staff photographer

HEAVY EQUIPMENT was used to build a dam to help hold back mud, which bubbles from holes in the ground in a rare geological phenomenon. Tim Mulvey, executive director of Onondaga Lake Cleanup Corp., surveyed the project last month.

At its worst in March 1992, about 68 tons of mud washed into Onondaga Creek every day. On average, 30 to 35 tons of mud entered the creek daily.

The dam made an immediate impact.

"When we first put the dam in, the sediment load dropped from 35 tons a day to about 3½ tons per day," Lake said.

Now the creek looks better than it has in years, Lake said. But it might be some time before the results translate into a cleaner Onondaga Lake.

"Tons of mud that were released before the dam was built and improved still line the creek bed and wash into the lake," said Timothy Mulvey, executive director of the Onondaga Lake Cleanup Corp.

"While we are now seeing cleaner water in the Tully Valley, it will probably take a couple of years before the full impact is seen in Syracuse's Inner Harbor and the lake," Mulvey added.

Studies show Onondaga Creek is the source of more than 50 percent of the sediment that fills Onondaga Lake, contributing to the lake's infamous murky appearance.

Residents in the Tully Valley blame salt mining for causing the mud boils.

For decades, Allied-Signal Inc. piped brine from the Tully Valley to its chemical plant in Solvay.

Allied officials deny the company caused the mud boils. Company officials hired at least three consultants over the years who say the mud boils occur naturally.

No matter what the cause, everyone agrees mud boils are destructive. The bubbling mud caused the collapse of the Otisco Road bridge in LaFayette and claimed acres of farm land.

Mulvey said the project is an encouraging step in a much larger cleanup project.

"What this does is show that with some commitment that we can have an impact on the lake," he said. "Hopefully, it will give people confidence to commit to taking on the bigger projects, such as the sewage treatment plant."

The county-operated sewage plant on Hiawatha Boulevard sends up to 80 million gallons of treated sewage into the lake each day.

Improvements to the sewage plant and projects to stop sewage from overflowing into the lake will cost an estimated $300 million to $400 million.

The state will provide $75 million for the lake cleanup if a $1.75 billion Environmental Bond Act is approved by voters on the Nov. 5 ballot.