915063

FINAL REMEDIAL DESIGN REPORT

SEDIMENT REMOVAL AT CHERRY FARM SITE (NYSDEC SITE NO. 9-15-063) RIVER ROAD SITE (NYSDEC SITE NO. 9-15-031) Tonawanda New York

SUBMITTED TO

NEW YORK STATE DEPARTMENT
OF ENVIRONMENTAL CONSERVATION
DIVISION OF HAZARDOUS
WASTE REMEDIATION

SUBMITTED BY

CHERRY FARM / RIVER ROAD SITE PRP GROUP

PREPARED BY

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PARSONS

May 1998

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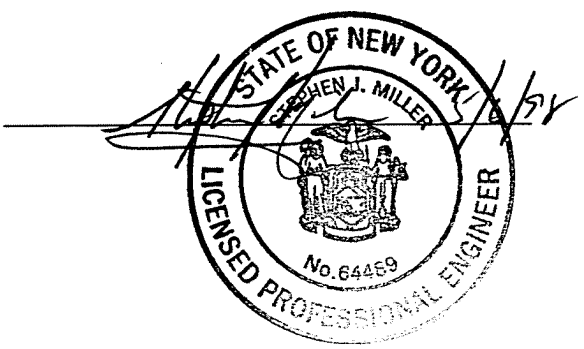
CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who managed the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.



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Final Remedial Design Report For:

SEDIMENT REMOVAL AT CHERRY FARM SITE (NYSDEC SITE NO. 9-15-063) RIVER ROAD SITE (NYSDEC SITE NO. 9-15-031)

Tonawanda, New York

Submitted To:

New York State Department of Environmental Conservation Division of Hazardous Waste Remediation

Submitted By:

Cherry Farm/River Road Site Potentially Responsible Parties

Prepared By:

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MAY 1998

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SECTION 1
INTRODUCTION

1.1 GENERAL

This Final Remedial Design Report (FRDR) presents the basis of design for sediment removal in the Niagara River, adjacent to the Cherry Farm/River Road Site (the Site) in the Town of Tonawanda, New York. A Preliminary Remedial Design Report was issued to the New York State Department of Environmental Conservation (NYSDEC) in May 1997. NYSDEC comments were received on June 12, 1997, and responses were submitted in a letter dated July 1, 1997. In August 1997, the project construction start date was delayed until the 1998 construction season. The primary reason for the delay was to allow time to conduct treatability studies to further evaluate the potential for hydraulic dredging. This FRDR incorporates previous comments by the NYSDEC, as well as the results of the recent treatability studies.

1.2 OBJECTIVES AND SCOPE

This FRDR presents the planned remedial action for Niagara River sediment, and constitutes an addendum to the June 1995 Remedial Design Report for the Cherry Farm/River Road Site (Parsons ES, 1995a). Three phases of sediment sampling have been conducted in the Niagara River adjacent to the Site. The results of the three phases of sampling and analysis indicated that there was a need for remedial action. The primary objectives of the sediment removal remedial action are to:

- Reduce potential human health risks related primarily to direct contact with sediment; and
- Reduce risks to benthic aquatic life and fish.

The selected remedy, based on the conceptual design presented in the Phase II Sediment Investigation and Remedial Alternative Scoping Report, November 1996 (Phase II Report), and the January 1998 Supplemental Alternatives Evaluation Report (Supplemental Report), includes the removal of approximately 42,000 cubic yards of sediment from the river bottom in the vicinity of the Site, and the placement of this material into a previously-constructed sediment disposal area on the River Road property.

The purpose of the FRDR is to develop the remedial design concepts identified as being feasible in the Phase II Report and Supplemental Report. Remedial alternatives were evaluated with respect to cleanup criteria, constructability, the project schedule, and cost (Phase II Report only).

1.3 SITE DESCRIPTION

The River Road Site and Cherry Farm Site adjoin each other, and are located in the Town of Tonawanda, Erie County, New York (Figure 1.1). The River Road Site is approximately 23

acres in size and is located along the Niagara River, south of the Grand Island Bridge. The Cherry Farm Site is approximately 55 acres in size, and is located immediately north of the River Road Site. The Cherry Farm Site is owned by Niagara Mohawk Power Corporation.

These two sites were at one time a part of a larger piece of property owned by the Wickwire-Spencer Steel Company. The Cherry Farm and River Road Sites were used for the disposal of waste from the steel manufacturing process, from approximately 1908 until 1963, and were operated as a landfill for the disposal of industrial wastes from facilities in the area from 1963 until about 1970. Flyash, bottom ash, foundry sand, slag, sludge, liquid boiler cleaning waste, concrete rubble, and miscellaneous fill were disposed of on the two sites. Slag covers a significant portion of the River Road Site and parts of the Cherry Farm Site. Due to the common history, former common ownership, and similar remedial programs, it was considered appropriate to combine the remedial program at the two sites. Along the western boundary of the Site, the Tonawanda Channel of the Niagara River flows to the north. The river in the vicinity of the Site has a width of approximately 1,700 to 2,000 feet. The main navigation channel is on the far side of the river from the Site with a depth of approximately 21 feet (United States Army Corps of Engineers [USACE], 1994).

The eastern bank of the Niagara River, in the vicinity of the Site, is lined with industrial facilities including the former Roblin Steel facility to the south, with a concrete docking facility and a previously dredged channel for industrial shipping. To the south, between Roblin Steel and the River Road portion of the Site, are settling ponds for the Tonawanda Coke Corporation with an outfall to the Niagara River. The shoreline to the north of the Site has native terrain, a bulk fuel unloading platform, and a recreational boating marina.

The river substrate material varies in size and composition throughout the investigation area. The investigation area, adjacent to the Cherry Farm/River Road Site, is generally a low-energy depositional environment characterized by medium to coarse-grained sand and finer-grained sediments. Immediately upstream and downstream of the Site, the river has been deepened by dredging to maintain an adequate depth for the mooring of commercial boat traffic. These areas are higher energy environments characterized by coarser substrates. Farther from shore, the fine-grained material grades to a coarse, washed gravel. In the near shore area between Stations 2000 and 3200 (Figure 1.2), the finer-grained deposits provide a substrate capable of supporting a community of aquatic grasses. Based on samples collected in this area, the aquatic vegetation is comprised mainly of *Vallisneria americana* (wild celery), and to a lesser degree, *Myriophyllum spicata* (Eurasian watermilfoil).

River velocity data was collected along three transects perpendicular to the shoreline (Stations 3200, 4000, and 4600). River velocities in the study area, immediately adjacent to the Site, ranged from 0.3 to 2.6 feet/second (fps), and increased with distance from shore. Typical river velocities, in the portion of the Niagara River near the Site, have been reported to be in the range of 5 to 7 fps (USACE, 1994). Traditionally, water levels in the Niagara River are not prone to large fluctuations. Monthly mean water levels recorded at the Huntley Station (upstream of the Site) range from 564 to 566 feet, International Great Lakes Datum (USACE, 1994).

1.4 PROJECT BACKGROUND

In accordance with the NYSDEC Order-on-Consent for the Cherry Farm Site (Index No. B9-0046-84-10, NYSDEC Site No. 9-15-063), and the River Road Site (Index No. 89-0047-91-02, NYSDEC Site No. 9-15-031), the Potentially Responsible Parties (PRP) Group was required to sample river sediments and report the results to the NYSDEC.

In November 1993, the NYSDEC collected a total of 12 sediment samples from the river bottom in the vicinity of the Site. Sediment samples were analyzed for the presence of semivolatile organic compounds (SVOCs), metals, and polychlorinated biphenols (PCBs). Results indicated elevated levels of polycyclic aromatic hydrocarbons (PAHs) and metals.

The first phase of sediment sampling to be conducted under the ROD was completed in October 1994. The results of the first sampling round were reported to the NYSDEC in the Phase I Sediment Data Assessment Report, April 1995 (Phase I Report). The results reported in the Phase I Report (Parsons ES, 1995b) indicated that concentrations of PAHs and metals were present in the sediments, adjacent to the Site, in excess of background levels.

In response to comments by the NYSDEC, a second phase of sediment sampling was completed in July 1996. The results of the second phase of sampling were reported in the Phase II Sediment Investigation and Remedial Alternative Scoping Report (Parsons ES, 1996a).

The third phase of sampling was completed in May 1997 as part of the pre-design investigation. The results of this work were used to finalize the design specifications and dredging requirements. The results of the final round of sediment sampling and velocity measurements were presented to the NYSDEC in a June 18, 1997 letter report.

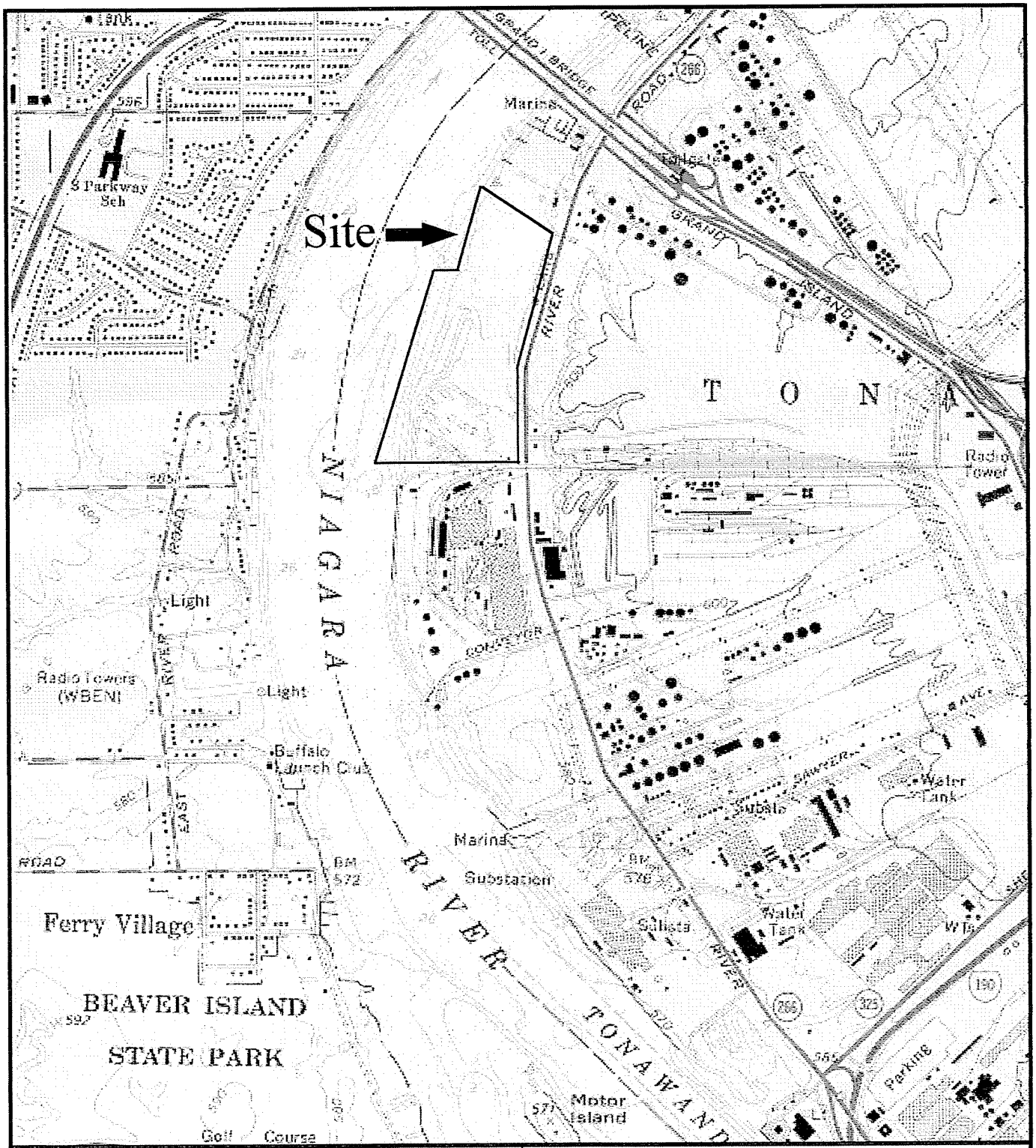
Based on the results of the sampling completed to date, it was determined that sediments adjacent to the Site contained concentrations of PAHs and metals in excess of the 95% upper confidence limit (UCL_{95}) which was used to define background concentrations. The highest concentrations of PAHs (above the UCL_{95}) and metals (above the severe effects level) are located between Stations 3000 and 4600, at distances from the shoreline of up to 150 feet out from shore.

During September 1997 through January 1998, a supplemental alternatives evaluation was conducted, which included sediment settling tests and sediment toxicity testing. The results of the supplemental evaluation were used primarily to determine whether hydraulic dredging was feasible given the onsite space available for sediment disposal and water handling. Results of the supplemental evaluation were presented in detail to the NYSDEC in a letter report dated January 16, 1998. These results were incorporated into the final design. Results of the settling are summarized in Section 2, Pre-design Activities.

1.5 REPORT ORGANIZATION

This FRDR includes the following:

- Section 1 - The project objectives and scope of work, a brief project background, and site description;
- Section 2 - A summary of pertinent pre-design activities conducted from October 1996 through January 1998.
- Section 3 - A presentation of the technical basis for design;
- Section 4 - References;
- Appendix A - Final Design Plans;
- Appendix B - Construction Specifications;
- Appendix C - Design Calculations; and
- Appendix D - Construction Health and Safety Plan Addendum.



QUADRANGLE LOCATION
LONGITUDE: 78° 52' 30"
LATITUDE: 42° 52' 30"

SOURCE: U.S.G.S. 7.5 SERIES BUFFALO NW, New York-Ont (TOPOGRAPHIC), 1965

Figure 1.1

Cherry Farm PRP Group
Cherry Farm/River Road Site

SITE LOCATION MAP

PARSONS ENGINEERING SCIENCE, INC.
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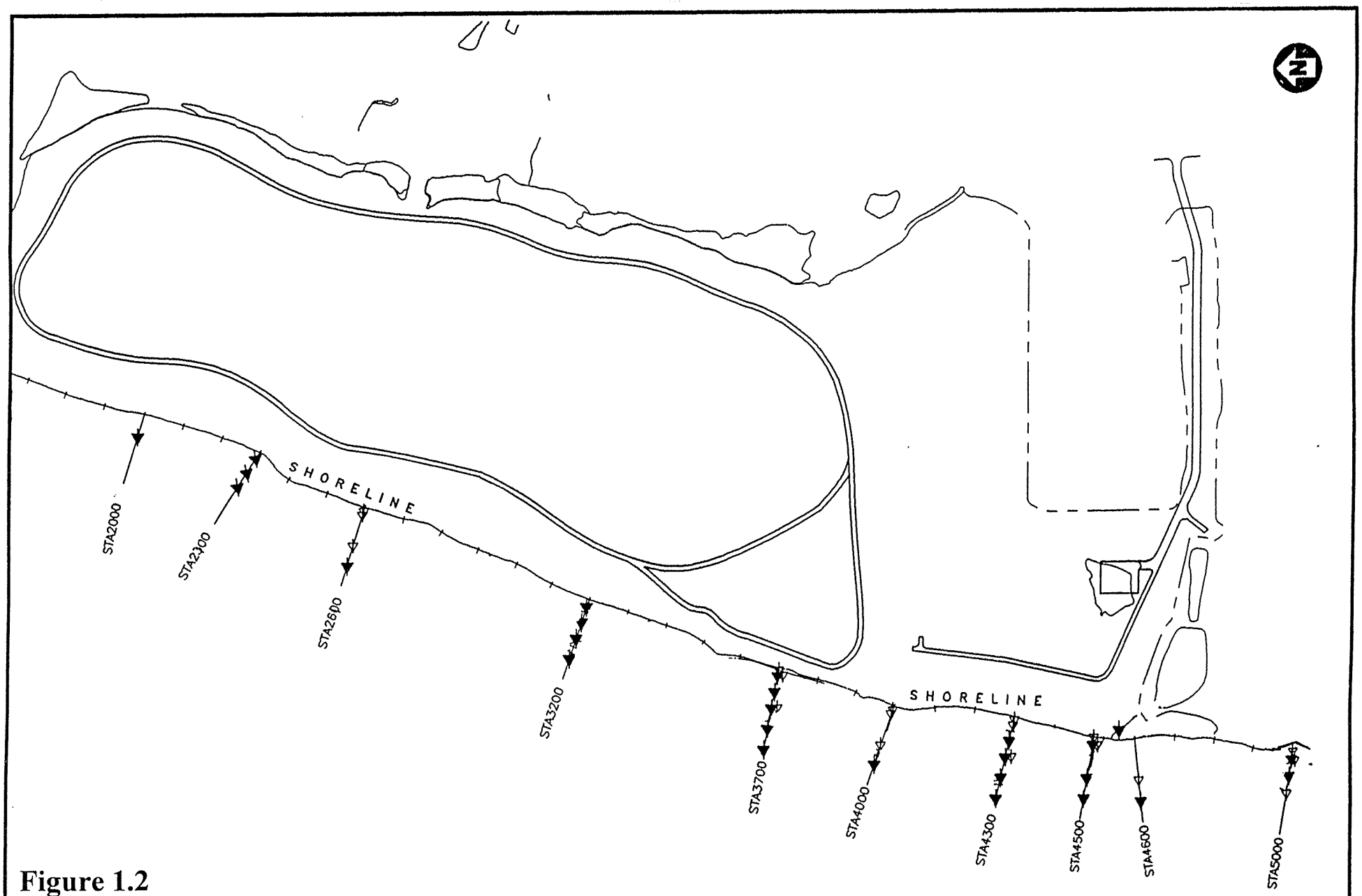


Figure 1.2
Cherry Farm/River Road Site
Niagara River Station Locations Map

SECTION 2
PRE-DESIGN ACTIVITIES

2.1 INTRODUCTION

In order to fill existing data gaps, and to develop final design criteria, the following pre-design activities were completed:

The pre-design activities include the following tasks:

- Underwater Investigation (completed October 1996);
- Bathymetric Survey (completed November 1996);
- Phase III Sediment Sampling (completed May 1997);
- Pre-dredging current velocity measurements (completed May 1997); and
- Sediment settling tests (January 16, 1998 Supplementary Alternatives Evaluation letter report to the NYSDEC).

2.2 UNDERWATER INVESTIGATION

An underwater investigation of the proposed dredging area was conducted by Parsons ES personnel using self-contained underwater breathing apparatus (SCUBA), on October 29, 1996. The investigation was conducted to obtain additional information necessary to evaluate various aspects of the proposed dredging program. The specific objectives of the investigation were to:

- Determine the lateral extent of the weed bed located in the northern portion of the proposed dredging area;
- Conduct a visual examination of the geotechnical and physical characteristics of the river substrate material;
- Investigate the origin, payload, and condition of the barge wreck located in the southern dredging area; and
- Identify potential impediments to dredging operations, to the extent practicable.

The lateral extent of the weed bed was visually confirmed. Due to the time of year, most of the foliage had dropped, leaving only the shoots visible. The primary species observed confirmed previous observations of wild celery and to a lesser extent, watermilfoil. Vegetation became gradually more sparse with increased depth and distance from the shore. Vegetation was, however, observed to a depth of 15 feet.

The investigation did not include sampling or an evaluation of conditions below the sediment/water interface. The substrate was observed to be fine-grained and soft near the shore, and became more gravely with increasing distance from shore. At a distance of 300 feet from shore, the finer sediments were scoured away by the river current, leaving a hard, gravely

substrate. Zebra mussels were observed primarily near Station 4500, in the vicinity of the Tonawanda Coke outfall.

A wooden barge was observed to be located at Station 4200 (Appendix A, Drawing No. C-17). It appeared that the wreck had been flipped upside down and was grounded in the bottom sediments. Based on conversations with the USACE and the U.S. Coast Guard, very little is known about the origin or contents of the wreck. The upstream end is heavily damaged from ice flows, and the downstream end is intact. The top of the wreck (bottom of the vessel) is open. It appears that the planking has been torn off through ice action, exposing the lower hold (ballast area). The lower hold has become infilled with silt. The sides of the vessel are generally exposed with very little silting and appear to be intact. The main structure appeared to be wooden timbers with wooden ribs and decking. Steel "I-beams" were observed and appear to run the length of the wreck. There were no obvious signs of existing or spilled cargo. A population of fish was observed, including small mouth bass and "shiners," as was some aquatic vegetation in areas of lower current velocity adjacent to and downstream of the wreck.

With the exception of the barge wreck and associated debris, no obvious impediments to dredging were observed on the surface of the river bottom.

2.3 BATHYMETRIC SURVEY

In November 1996, a bathymetric survey was conducted using an electronic chart-recording depth finder, and a global positioning system. The survey encompassed an area from approximately Station 1400 through 4900 and to a distance of approximately 250 feet from shore. The river bottom elevation was recorded with an accuracy of 0.1 feet. All survey data was then referenced to the Cherry Farm/River Road Site control network to provide continuity with on-shore elevations. A detailed bathymetric map showing bottom elevation contours and water depths has been prepared for use in the remedial design for sediment removal, and is included as Drawing C-1 in Appendix A.

2.4 PHASE III SEDIMENT SAMPLING

A third phase of sediment sampling was conducted during the week of May 26, 1997, primarily to further evaluate the vertical extent of impacted sediment. Results of this sampling event were submitted to the NYSDEC, in letter dated June 18, 1997. These results were integrated with Phase I and II data, and utilized in determining areas in which cleanup goals were exceeded, and ultimately, in preparing a sediment excavation plan (Drawing C-3).

2.5 VELOCITY MEASUREMENTS

In addition to sediment sampling, river current velocity measurements were also made in the vicinity of the weed bed during the May 1997 pre-design investigation. The results of the May 1997 current velocity measurements are included as Table 2.1.

A previous round of velocity measurements were made in the Niagara River in the vicinity of the Site on June 27, 1996. During that time frame, river stage data from the Huntley Station water level gauge (approximately 1.5 miles upstream of the Site) were obtained from the

USACE. During the time that the current velocities were recorded, the difference between maximum and minimum water levels were observed to be approximately 1.5 feet during the day.

Velocity and water level information will primarily be useful in planning for the sediment removal operations, including turbidity curtain installation, turbidity control, and turbidity monitoring activities.

2.6 SUMMARY OF SEDIMENT SETTLING TESTS

Treatability testing was completed to determine the settling characteristics of the fine fraction of the river sediment. Testing was completed in accordance with the USACE Engineering and Design Manual "Confined Disposal of Dredged Material (EM-1110-2-5027, 1987).

Samples collected at stations 3200, 3500, and 3700 were tested for grain size (sieve analysis), Atterberg Limits, moisture content, specific gravity, and total organic carbon content. Sieve analysis results indicated a range of 61 percent to 66 percent passing the #200 sieve. This is consistent with the intent of the testing, which was to select finer grained material that would be the most difficult to settle from the dredged slurry. Samples were found to be non-cohesive and non-plastic. Water content ranged from 42 percent to 52 percent, specific gravity ranged from 2.7 to 3.2, and the total organic carbon content ranged from 4.4 percent to 5.5 percent.

The material which was used to run the settling tests consisted of a composite from the four sediment samples. In accordance with the method, prior to compositing, samples were screened through a #200 sieve to remove the coarse fraction. After being placed in the test column, the slurry was sampled throughout its entire length to ensure homogeneity. The solids concentration of the sample in the column was calculated to be approximately 14.5 percent.

Following mixing, the material in the column was allowed to settle over a period of 13 days. Measurements of the interface height, turbidity, and total suspended solids (TSS) content of the supernate were monitored periodically. The test suspension was observed to exhibit zone settling kinetics with a settling velocity of approximately 0.18 feet per hour.

Turbidity readings of less than 50 nephelometric turbidity units (NTUs) were achieved from the various sampling ports within three to five hours of the passing of the sediment/water interface below the port.

In addition to the settling test, samples were combined with test polymers (flocculant aids) to determine if a greater rate of settling could be achieved. Conclusions of the polymer testing indicated that anionic polymers were effective in removing suspended solids from the supernatant fluid. Callaway Polymer 4910 was the most effective, reducing the suspended solids by over two orders of magnitude, from 2,000 mg/l to 12 mg/l.

In summary, results of the settling and flocculation tests suggest that sufficient settling may occur without the use of polymers, but that polymers could be effective if considered necessary. The sediment used in the settling test, which is typical of what be expected in the dredged slurry,

has a high specific gravity, and relatively rapid settling rate. Basin size and retention time calculations were conducted based on results of the settling tests, and are presented in Appendix C.

Table 2.1
Cherry Farm/River Road Site
Velocity Measurements in the Niagara River
May 31, 1997

Station	Distance	Depth of Water (feet)	Depth of Reading (feet)	Velocity (fps)
2600	25	2.5	1.5	0.59
2600	50	3	2	0.66
2600	100	4	2	1.21
2600	100	4	3	1.05
2600	150	7	2	1.82
2600	150	7	4	1.78
2600	150	7	6.5	1.54
3450	50	2	1	0.10
3450	100	4	1	1.66
3450	100	4	2	1.45
3450	100	4	3	1.33
3450	150	10	2	2.06
3450	150	10	6	1.80
3450	150	10	8	1.55
3450	200	15	3	2.48
3450	200	15	6	2.06
3450	200	15	9	1.76
3450	200	15	14	1.80
4000	50	8	1	2.06
4000	50	8	3	1.83
4000	50	8	5	1.72
4000	50	8	6.5	1.45
4000	100	12	1	1.70
4000	100	12	3	1.57
4000	100	12	7	1.41
4000	100	12	10	1.17
4000	150	20	4	2.57
4000	150	20	7	2.48
4000	150	20	11	2.09
4000	150	20	15	1.97
4000	150	20	19	1.69
4600	50	17	2	1.43
4600	50	17	8	1.72
4600	50	17	10	1.92
4600	50	17	15	1.62
4600	100	22	2	2.79
4600	100	22	5	2.79
4600	100	22	10	2.87
4600	100	22	15	2.71
4600	100	22	20	2.33
mid river near buoy #26		27	2	3.35

SECTION 3
REMEDIAL DESIGN

3.1 INTRODUCTION

The proposed remedial action for the sediment removal project will involve mechanical and/or hydraulic dredging of approximately 42,000 cubic yards (cy) of sediment, with limited silt curtain containment and capping of nearshore sediment. This section provides the regulatory and technical basis for the tasks presented in the RAWP, and discusses the required permits and approvals, prior to implementation of the remedial action.

3.2 PERMITS, APPROVALS, AND CLEANUP GOALS

The remedial design has been developed to meet Applicable or Relevant and Appropriate Requirements (ARARs). The following requirements have been identified as being ARARs for the remedial design/remedial action, and have been incorporated into the design documents.

3.2.1 U.S. Army Corps of Engineers

As part of the onshore remedial work, a Joint Permit (Section 10 of the Rivers and Harbors Act of 1899/Section 404 of the Clean Waters Act) was obtained from USACE, under the Nationwide Permit program (No. 38). This Joint Permit covers the placement of erosion control material (i.e. synthetic matting and riprap) along the Niagara River shoreline. The permit has undergone a coordinated review with the NYSDEC, and also covers fill/dredge activities within Site wetlands.

To complete the dredging program, the USACE has requested the submittal of a complete Joint Application for Permit. Based upon recent discussions with USACE, the conditions attached to the existing Joint Permit (No. 95-976-173) may be amended to accommodate the proposed sediment removal. This will require a formal submittal to USACE including:

- A detailed description of the work;
- Results of any sediment testing that has been conducted; and
- Mapping of the project, including a plan view showing areas of contamination and proposed dredging areas, as well as a profile sheet and delineation of the federal navigation boundary.

3.2.2 New York State Office of General Services

The New York State Office of General Services (OGS) has jurisdiction over projects that involve construction of permanent structures within State waterways. A permit is not required from OGS for this project, since no permanent structures will remain in the waterway.

3.2.3 Sediment Cleanup Goal

The following cleanup scenario and goals were agreed to by the NYSDEC, following a meeting on April 18, 1997.

- 20 ppm total PAHs will define the horizontal extent of removal in the shallow zone (top one foot) of the sediments.
- 50 ppm total PAHs will be used to define the vertical extent of removal in the deep zone (below one foot) of the sediments. An exception to the above goals is the area of the weed bed between Stations 2600 and 2900. Due to constructability issues in the weed bed (shallow depths), and also to concerns over eliminating a portion of a valuable habitat and aquatic community, only a two-foot deep strip extending to a distance of 20 feet from the original shoreline will be removed between Station 2600 and 2900.
- Removed sediment will be managed onsite, and will be placed beneath the soil cover system being installed at the Site. *Note: this item has been subsequently modified to reflect the recent construction of a sediment disposal area on the River Road property.*
- The sediment removed and placed on the Site must meet the physical criteria described in the approved specification for compaction. *Note: the requirement for compaction no longer applies to the upcoming contract. Sediment will remain in the sediment disposal area until such time as sufficient settling has occurred to allow placement of the cap. The capping of the sediment disposal area will be done under a separate contract from the dredging work.*
- A final grading plan showing onsite contours where sediment will be disposed of will be submitted to the NYSDEC.

The cleanup goals were developed to be protective of human health and the environment. Initial development of the cleanup goals is discussed in detail in the Remedial Design Work Plan for Niagara River Sediments (Parsons ES, 1996b), and in Parsons ES's response to NYSDEC's comments, dated March 21, 1997.

3.2.4 State Environmental Quality Review (SEQR)

It is assumed that the proposed sediment removal remedial action is being conducted under the existing Order-on-Consent. Under this scenario, the SEQR process is eliminated. Therefore, no Environmental Assessment Forms will be filed for this project.

3.3 TECHNICAL BASIS OF DESIGN

The following alternative is recommended based on the treatability testing results, a review of the technologies described in detail in the January 16, 1998 Supplemental Report, an evaluation of their effectiveness relative to the specific site conditions, and implementability. Both mechanical and hydraulic dredging were considered viable technologies. Settling column tests indicated that settling rates are sufficient for hydraulic dredging operations, given the current sediment disposal area size and other site limitations. Therefore, cost will most likely

become the deciding factor in selecting a specific dredging technology. The dredging contractor will be allowed to select the most cost-effective removal method that meets the project performance criteria. The design performance criteria developed for the selected alternative are listed below:

- Removal of approximately 37,000 cubic yards (CY) of material by mechanical or hydraulic dredging, using procedures to minimize resuspension and resulting turbidity. The grading plan for sediment removal (Drawing C-3) was developed to minimize increases in current velocity in the vicinity of the weed bed.
- Dredging will be conducted to the elevations specified on the final grading plan, Drawing C-3. This grading plan (Drawing C-3) will be used as the sole measurement mechanism to demonstrate attainment of the established cleanup criteria. If, however, during the sediment removal remedial action, NYSDEC representatives observe waste material that is beyond the vertical or horizontal dredging limits shown on Drawing C-3, the PRP Group will commit to attempting to develop a mutually-acceptable solution with NYSDEC. This solution will address the issues in the field, prior to the Contractor's demobilization from the site.
- The moratorium on dredging from March 30 to July 15, 1998 requires using a dredging method that will complete removal within the proposed construction schedule.
- Construction of berms and permanent fencing around the currently existing sediment disposal area. Top width and side slopes are specified on Drawing C-2.
- Modification of the drainage swale, adjacent to the sediment disposal area, to create an effluent polishing basin (if needed).
- Final river bottom grade must be equal to or flatter than 3H:1V in order to prevent potential future damage to the improved shoreline.
- Limited nearshore sediment capping in areas where full removal, in accordance with established cleanup goals, is not possible due to slope stability concerns. A maximum 3H:1V slope will be maintained from the shoreline to the point where full removal is occurring. The cap will consist of a combination of geotextile, gravel, and riprap; with a total thickness of approximately 1.5 to 2.0 feet.
- Removal of the barge wreck and associated debris near Station 4000, prior to dredging the area. The barge wreck will be placed in the sediment disposal area in such a manner as to minimize or eliminate void spaces. Also, it will be placed to have a minimum impact on the sediment settling rate.
- Potential mechanical dredging techniques include environmental clamshell bucket, such as Cable Arm™ or hydraulic backhoe. Amphibious excavators, such as the Amphibex™ system or Aquarius Systems™ may be utilized in shallow, low-velocity areas.
- Potential hydraulic dredging techniques include the conventional cutterhead dredge for the majority of the area, and horizontal auger amphibious excavators, such as the Amphibex™ system in hydraulic mode for shallow, low-velocity areas.

- Handling for mechanical dredging will require loading sediment onto a scow or barge, decanting free water from the barge to the sediment disposal area, and placing sediment into the sediment disposal area.
- Handling for hydraulic dredging will require pumping a sediment slurry directly from the removal area to the sediment disposal area, transfer free water from the sediment disposal area to the river, and utilizing an effluent polishing basin, if necessary.
- Settling of suspended solids will occur in the sediment disposal area (and, if necessary, in a sediment polishing basin), followed by discharge to the river pending achievement of prescribed turbidity criteria. A relationship between PAH concentration and turbidity was developed to facilitate the selection of appropriate discharge criteria. Settling column test results indicated that an acceptable turbidity may be achievable without the addition of chemical polymers.
- Turbidity Control Curtain:
  * A curtain must be installed which is capable of use with a river current velocity, approximately 2.5 fps, in conjunction with wave action;
  * The performance must be sufficient to prevent resuspended sediments from entering the weed bed area;
  * The turbidity curtain will be placed, to the extent possible, in areas within and adjacent to the weed bed where velocities are less than 2 feet per second; and
  * Installation must be completed prior to dredging.
- Oil Boom:
  * An oil boom must be deployed around the immediate dredging area to contain accidental releases from dredging equipment; and
  * The boom must be of sufficient size and composition for the containment oil releases and other debris within the immediate working area.
- Construction of temporary docking/unloading facilities, if necessary, will be based on water depths and draft requirements of floating platforms employed by the dredging contractor, including barges, scows, and support vessels.
- Turbidity monitoring will be conducted at upstream, downstream, and work zone locations (see Drawing C-3 and Specification 02081). Turbidity at these points will be measured at time intervals of one minute or less, and will be stored in electronic format and displayed in "real-time" using a dedicated data logging personal computer.
- Turbidity at either downstream monitoring station (Station 2 or 3) must not exceed 150 NTUs above the background turbidity levels at Station 1 for a sustained period of 30 minutes (see Specification 02081).
- The dredging water discharged back to the Niagara River will have a seven-day average turbidity value of 50 NTUs, with no turbidity values exceeding 100 NTUs. The

turbidity shall be measured at the discharge point from the sediment disposal area, the effluent polishing pond, or other convenient location prior to entering the river, and shall be conducted every four hours while discharging is occurring (see Specification 02081).

- Following placement in the sediment disposal basin, sediment will be allowed to consolidate, prior to the placement of a cap. The required settling time is expected to be at least six months following placement. The final cap will be consistent with that specified in the Cherry Farm/River Road Remedial Action Construction Specifications.
- Site restoration following completion of dredging:
    * Restore any areas damaged by the work to pre-existing conditions;
    * If an effluent polishing basin has been constructed, remove effluent polishing basin berm; restore drainage swale to original grade; and install topsoil, seed, and mulch;
    * Seed and mulch berms around sediment disposal area, when berms are constructed;
    * Complete capping (fabric, cover soil, topsoil) and seeding of boat launch area, and any areas disturbed by the sediment remediation;
    * Restore shoreline in dredging work areas;
    * Install roadway in boat launch area (two legs);
    * Repair any damage to site roadways and parking areas; and
    * Install fencing around perimeter of sediment disposal area.

Drawings reflecting the final dredging design and construction areas have been included in Appendix A. Construction specifications are included in Appendix B.

3.4 CONSTRUCTION QUALITY ASSURANCE/QUALITY CONTROL

Additional testing and monitoring activities will be undertaken during the sediment removal process that were not included in the original design or scope of work presented in the 1995 Cherry Farm/River Road Remedial Design Report (Parsons ES, 1995a). These activities include turbidity monitoring in the river and in discharge water from dredging operations. These activities are summarized below and are presented in detail in the project construction specifications, in their respective sections.

3.4.1 River Turbidity Monitoring

Turbidity monitoring will be conducted during sediment dredging to provide "real-time" turbidity data to on-shore personnel (see Specification Section 02081 in Appendix B for details). The YSI Inc. model *YSI6820* nephelometer, or equivalent, will be used for turbidity measurements. Turbidity will be measured in NTUs at three points in the river, as specified in the sediment removal plan. Turbidity at these points will be measured at time intervals of one

minute or less, and will be stored both in electronic format and displayed in "real-time" using a dedicated data logging personal computer accessible to turbidity monitoring personnel.

3.4.2 Discharge Water Monitoring

All water from the transport or dewatering of the sediment will be treated to meet turbidity limits, prior to discharge to the Niagara River (see Specification Section 02081 in Appendix B for details). The Contractor will construct berms within the sediment disposal area and polishing basin, as needed, to promote dewatering and settling of suspended solids. If necessary or advantageous to the Contractor, settling agents may be added to the water, with prior approval from the Engineer. Turbidity monitoring will be conducted by the Contractor on a continuous basis for constant discharge of treated water or on a batch basis for batch discharges of treated water.

3.5 OPERATION AND MAINTENANCE

Additional activities will be undertaken following the sediment removal process that were not included in the original design or scope of work, presented in the 1995 Cherry Farm/River Road Remedial Design Report (Parsons ES, 1995a). These include a post-dredging underwater inspection of the sediment cap system, a post-dredging bathymetric survey (summer 1999), and periodic testing of the sediment in the disposal area for compressive strength.

3.5.1 Sediment Cap Inspections

Two post-dredging, underwater cap inspections will be conducted by Parsons ES. The first will be conducted immediately subsequent to the completion of dredging, or in phases during the dredging operation. The purpose of the initial inspection is to determine whether the cap area and thickness are compliant with the design. The second inspection will be conducted in the spring or summer of 1999 to determine whether the integrity of the cap was maintained over the winter season. Both inspections will be conducted by means of a dive survey (see Specification Section 01055 in Appendix B for details).

3.5.2 Post-Dredging Bathymetric Surveys

A series of post-dredging bathymetric surveys will be conducted. The first survey, to be directed by the Contractor, will be immediately subsequent to the completion of dredging, or in phases during the dredging operation. The purpose of the initial bathymetric survey is to measure for attainment of the design elevations. Subsequent surveys will be conducted once per year for a period of five years beginning in the Spring or Summer of 1999, to determine whether there are any observable impacts to the southern end of the weed bed. These annual surveys will be directed by Parsons ES. All surveys will be conducted by a licensed New York State surveyor, in accordance with the project construction specifications.

The surveys will show the existing sediment surface elevations on a maximum 20-foot by 20-foot grid, and at all grade changes. The surveys will adequately extend beyond the limits of the removal area to properly overlap with areas to remain undisturbed. The grid point locations

shall be located using the global positioning system (GPS). The initial survey may be conducted piecemeal as sediment removal areas are completed.

The NYSDEC has expressed concerns that when the water depth in the area upstream of the weed bed is increased by dredging, there may be an increase in the current velocity through the weed bed. An increase in the current velocity may, in turn, result in an increased potential for scouring or erosion of the substrate. As mentioned previously, the grading plan has been designed to minimize the potential for significant changes in the flow regime. The results of the annual bathymetric surveys referenced above will be used to confirm whether any observable scouring is occurring.

A shoreline inspection from land will also be conducted annually for five years beginning in the Spring or Summer of 1999. The shoreline inspection will supplement information derived from the bathymetric surveys, and will focus on determining whether any substantial changes are occurring to the shoreline over time.

3.5.3 Sediment Disposal Area Inspections

Following completion of the dredging operations, the sediment disposal area will be monitored periodically to determine when settling is sufficient for placement of cap materials. One potential monitoring method is the placement of settling plates following dredging. The plates would be surveyed periodically until a distinct break in the settling curve is observed. The decrease in settling rate, indicated by the flattening of the curve, indicates that the majority of the settling has occurred, and a cap materials can be applied. The cap will be constructed in accordance with existing project construction specifications and drawing details.

Periodic inspections of the sediment disposal area will be conducted after dredging is completed to determine if wind erosion is occurring, and windborne particulates are being produced. If a problem, such as visual dust clouds, is persistent, the affected areas will be seeded to prevent wind erosion until the permanent cap can be placed.

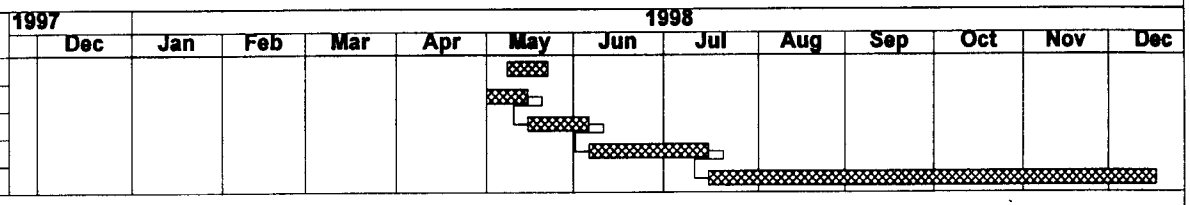
3.6 PRELIMINARY CONSTRUCTION SCHEDULE

A preliminary schedule has been developed for the sediment removal program. The proposed schedule for the sediment removal operations is depicted in Figure 3.1. This schedule is provided for illustrative purposes only, and will be refined in accordance with normal contractor submittals, prior to construction.

The primary constraints on the schedule are the moratorium to dredging imposed by the USACE, and the need to complete the onsite earthwork and site restoration activities during the 1998 construction season. The dredging moratorium restricts operations in the Niagara River between March 30 and July 15. To comply with this restriction, major river work will not begin until July 16, 1998. This reduces the available construction time during the 1998 construction season.

Figure 3.1 - CF/RR Project Schedule

Task #	Task Name	Start	End	Dur.
1	NYSDEC Approval of Design Re	05/08/98	05/21/98	10d
2	Select Contractor	05/01/98	05/14/98	10d
3	Award Contract	05/15/98	06/04/98	15d
4	Mobilize/Site Preparation	06/05/98	07/15/98	29d
5	Remedial Construction	07/16/98	12/16/98	110d



Critical
Critical Milestone
Free Float
Delay
Noncritical
Noncritical Milestone
Total Float (+)
Effort %Complete
Complete
Complete Milestone
Total Float (-)
Summary
Summary Milestone
Baseline
External
External Milestone
Non-Resource

c:\projects\cherry\cfalt\cfrrschd.jbw

SECTION 4
REFERENCES

NYSDEC, 1993. *Technical Guidance for Screening Contaminated Sediments*, New York State Department of Environmental Conservation, Division of Fish and Wildlife. November 1993.

Ontario Hydro, 1993. *Cable Arm Environmental Dredging at Pickering Nuclear Generating Station.* Paper given to the Western Dredging Association, West Coast Chapter in October 1993.

Parsons ES, 1995a. *Remedial Design Report Cherry Farm/River Road Site*, prepared by Parsons Engineering Science, Inc., Buffalo, New York, November 1995

Parsons ES, 1995b. *Phase I Sediment Data Assessment Report*, prepared by Parsons Engineering Science, Inc., Buffalo, New York, April 1995.

Parsons ES, 1996a. *Phase II Sediment Investigation And Remedial Alternative Scoping Report*, prepared by Parsons Engineering Science, Inc., Buffalo, New York, November 1996.

Parsons ES, 1996b. *Remedial Design Work Plan for Niagara River Sediments*, prepared by Parsons Engineering Science, Inc., Buffalo, New York, December 1996.

Parsons ES, 1997a. *Preliminary Remedial Design Report, Sediment Removal At Cherry Farm Site (NYSDEC Site No. 9-15-063), River Road Site (NYSDEC Site No. 9-15-031), Tonawanda, New York*, prepared by Parsons Engineering Science, Inc., Buffalo, New York, May 1997.

Parsons ES, 1997b. *Cherry Farm/River Road Site Sediment Removal Program, Tonawanda, New York - Sediment Data Update*, prepared by Parsons Engineering Science, Inc., Buffalo, New York, June 18, 1997.

Parsons ES, 1998a. *Cherry Farm/River Road Sediment Remediation Supplementary Alternatives Evaluation Report*, prepared by Parsons Engineering Science, Inc., Buffalo, New York, January 16, 1998.

USACE, 1994. *Personal Communication between Tony Eberhardt, United States Army Corps of Engineers, Buffalo District Water Control Section; and Gene Melnyk, Parsons Engineering Science, Inc.*, Buffalo, New York, December 12, 1994.

APPENDIX A

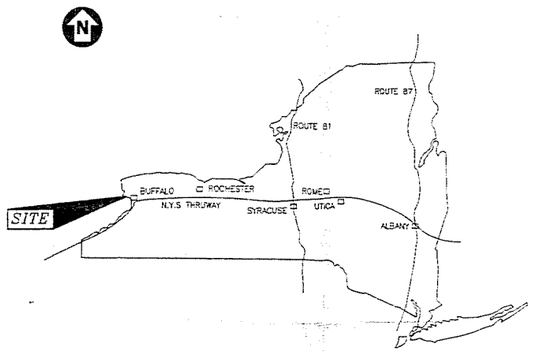
APPENDIX A
PRELIMINARY CONSTRUCTION PLANS

CHERRY FARM / RIVER ROAD PRP GROUP

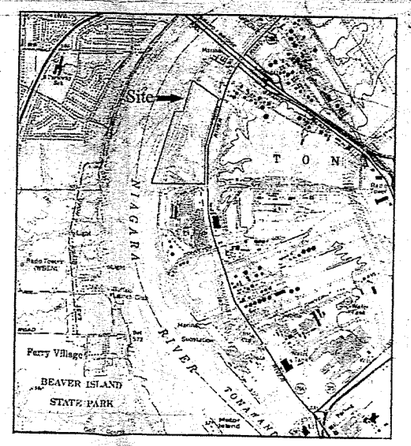
SEDIMENT REMOVAL PLAN
FOR
CHERRY FARM SITE (NYSDEC SITE NO. 9-15-063)
RIVER ROAD SITE (NYSDEC SITE NO. 9-15-031)
TONAWANDA, NEW YORK

DRAWING INDEX

NUMBER	TITLE
G-1	TITLE SHEET AND DRAWING INDEX
C-1	EXISTING SITE PLAN
C-2	SEDIMENT DREDGING OPERATIONS PLAN AND LIMITS OF WORK
C-3	FINAL GRADING PLAN
C-4	ROAD ALIGNMENT PLAN
C-5	SECTIONS AND DETAILS



THE STATE OF NEW YORK
NOT TO SCALE



SITE LOCATION MAP
SCALE 1" = 2000'

Rev	Date	Description
0	1/5/98	ISSUED FOR BIDDING AND CONSTRUCTION

Job No. 735973
Designed WA/GP
Drawn JAR
Checked SJM
Reviewed EBM
Approved SJM
Proj No. 64469
Date 1/5/98

PARSONS ENGINEERING SCIENCE, INC.
BUFFALO, NEW YORK
(716) 633-7074

CHERRY FARM/RIVER ROAD PRP GROUP

CHERRY FARM / RIVER ROAD SEDIMENT REMOVAL

TITLE SHEET AND DRAWING INDEX

DRAWING NO. G-1 | REV 0

DATE: 1/5/98 (1:15)
H:\CAD\735973\SHEETS\G01.DWG (1:1)

NIAGARA MOHAWK INC.
(REPUTED OWNER)

L. MATHEW DUGGAN
(REPUTED OWNER)

CLARENCE MATERIALS
(REPUTED OWNER)

CONRAIL

NIAGARA RIVER WORLD
(REPUTED OWNER)

INSTALL CAP IN AREAS OUTSIDE SEDIMENT DISPOSAL AREA FENCE SEE DETAIL (2 / C-5)

FENCE AND BERM

INSTALL GRAVEL ROAD FOR ADJUSTMENT SEE SHEET C-4 SEE DETAIL (3 / C-5)

SEDIMENT DISPOSAL AREA

EXISTING DECON PAD

SEDIMENTATION POND

SEDIMENTATION POND

GABION WALL (TYPICAL)

LIMITS OF AQUATIC WEED BED

STA3200

STA3450

STA3700

STA3850

STA4000

STA4150

STA4300

STA4500

STA4600

SEE NOTE 2

SEE NOTE 3

NIAGARA RIVER

NIAGARA RIVER

FLOW DIRECTION

LEGEND

EXISTING CONTOURS

PROPOSED CONTOURS

NOTES:

1. REFER TO DRAWING C-1 FOR GENERAL NOTES AND LEGEND.
2. VALUE REPRESENTS DEPTH OF WATER MEASURED DURING A BATHYMETRIC SURVEY PERFORMED BY WENDEL PC ON NOVEMBER 20, 1996. DEPTH MAY VARY TO DIURNAL RIVER LEVEL VARIATIONS.
3. RIVER BOTTOM TO BE DREDGED TO FINAL CONTOURS SHOWN THEN THE SEDIMENT CAP INSTALLED.
4. REMOVE TWO FEET OF SEDIMENT FROM THE NARROW SEDIMENT REMOVAL AREA EAST OF THE AQUATIC WEED BED (WITHIN DREDGING POINTS 7,8,9,10 AS SHOWN ON DRAWING C-2). THE AQUATIC WEED BED SHALL NOT BE DISTURBED IN PERFORMING THIS REMOVAL.

60 30 0 60 120
SCALE: 1"=60'

IT IS A VIOLATION OF NEW YORK STATE LAW FOR ANY PERSON, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED ENGINEER OR LAND SURVEYOR, TO ALTER THIS DRAWING IN ANY WAY. IF THIS DRAWING IS ALTERED, THE ALTERING ENGINEER OR LAND SURVEYOR SHALL AFFIX TO THE DRAWING HIS OR HER SEAL AND THE NOTATION "ALTERED BY" FOLLOWED BY HIS OR HER NAME AND THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

No.	Date	Description	By
0	4/1/98	ISSUED FOR BIDDING AND CONSTRUCTION	KJL / fly

Job No. 726873
Designed SLK/JSP
Drawn JSP
Checked LBM
Reviewed SLK
Proj. No. 64469
Date 3/27/98

PARSONS ENGINEERING SCIENCE, INC.
BUFFALO, NEW YORK
(716) 633-7074

CHERRY FARM/ RIVER ROAD
PRP GROUP

CHERRY FARM/ RIVER ROAD
SEDIMENT REMOVAL

FINAL GRADING PLAN

DRAWING NO. C-3
REV. 0

NOTES:

1. SEE DRAWING C-1 FOR GENERAL NOTES AND LEGEND.
2. CONTRACTOR TO INSTALL A TEMPORARY DOCK AND ASSOCIATED TURBIDITY CONTROL/SILT CURTAIN AS NECESSARY TO OFFLOAD DREDGE SPOILS. FOLLOWING COMPLETION OF DREDGING, THE CONTRACTOR WILL REMOVE TEMPORARY DOCK.
3. THE CONTRACTOR IS RESPONSIBLE TO FURNISH AND MAINTAIN TURBIDITY MONITORING STATIONS, TURBIDITY CONTROL/SILT CURTAINS AND OIL BOOMS AS INDICATED TO MONITOR AND MINIMIZE WATER TURBIDITY AND OIL SHEEN DURING DREDGING OPERATIONS.
4. SEE SHEET C-3 FOR SEDIMENT DREDGING GRADING PLAN.
5. INSTALL BERM AROUND SEDIMENT DISPOSAL AREA. TOP OF BERM TO BE ELEVATION 597. TOP WIDTH OF BERM TO BE 3'. MAXIMUM SIDE SLOPE TO BE 1:1.
6. INSTALL CHAIN LINK FENCE AROUND SEDIMENT DISPOSAL AREA PRIOR TO DISPOSAL OF DREDGED MATERIAL. FENCE TO BE A MINIMUM OF 15' FROM OUTSIDE TOE OF BERM. PROVIDE A MINIMUM OF ONE VEHICLE GATE WHERE NEEDED TO PERFORM WORK.
7. CONTRACTOR TO SET UP AND OPERATE EFFLUENT POLISHING BASIN AS NEEDED TO TREAT DREDGING WATER TO EFFLUENT REQUIREMENTS. CONTRACTOR TO INSTALL ALL STRUCTURES AND EQUIPMENT NEEDED, INCLUDING BERMS, PIPING, SILT CURTAINS, ETC. CONTRACTOR TO SIZE EFFLUENT POLISHING BASIN TO MATCH PROPOSED DREDGING METHOD.
8. CONTRACTOR TO RESTORE EXISTING CAP IN AREAS IMPACTED BY SEDIMENT HANDLING OPERATIONS.

EFFLUENT POLISHING BASIN SEE NOTE 7 AND 8

L. MATHEW DUGGAN (REPUTED OWNER)

CLARENCE MATERIALS (REPUTED OWNER)

NIAGARA MOHAWK INC. (REPUTED OWNER)

NIAGARA MOHAWK POWER CORP. (REPUTED OWNER)

CONRAIL

OVERHEAD SERVICES

FENCE SEE NOTE 6

BERM SEE NOTE 5

SEDIMENT DISPOSAL AREA

12" CULVERT

SEDIMENTATION POND

GABION WALL (TYPICAL)

TEMPORARY DOCK/ UNLOADING PLATFORM SEE NOTE 2

DOWNSTREAM MONITORING STATION SEE NOTE 3

TURBIDITY CONTROL/ SILT CURTAIN SEE NOTE 3

WORK ZONE MONITORING STATION

OIL BOOM SEE NOTE 3

TYPICAL DREDGING OPERATION

TURBIDITY CONTROL/ SILT CURTAIN SEE NOTE 3

TO BE REMOVED AND DISPOSED OF IN SEDIMENT DISPOSAL AREA

1 C-5 TYPICAL FENCE

UPSTREAM MONITORING STATION SEE NOTE 3

STA3200 STA3700 STA4000 STA4500 STA4600

LEGEND

- 8 — SEDIMENT DREDGING AND CAP AREA COORDINATE POINTS
- SEDIMENT DREDGE AREA
- EQUIPMENT STAGING AREA
- TURBIDITY MONITORING STATION
- SEDIMENT CAP AREA
- PROPERTY LINE

SEDIMENT DREDGING LIMITS			SEDIMENT CAP AREA		
POINT	NORTHING	EASTING	POINT	NORTHING	EASTING
1	1087960.95	404197.28	11	1088018.59	404187.83
2	1087960.44	404115.82	12	1088034.06	404128.14
3	1088161.32	404040.63	13	1088149.40	404160.31
4	1088566.78	404133.66	14	1088134.92	404218.24
5A	1088976.40	404255.74	15	1088481.93	404267.24
5B	1089251.88	404284.12	16	1088488.55	404214.82
5C	1089274.87	404374.80	17	1088538.85	404221.82
6	1089437.24	404438.08	18	1088640.38	404265.31
7	1089511.18	404634.54	19	1088625.39	404303.42
8	1089837.07	404758.55	20	1088745.12	404345.08
9	1089833.82	404769.05	21	1088756.27	404306.59
10	1089522.33	404691.13	22	1088918.95	404353.55
			23	1088907.80	404392.04

60' 30' 0 60'
Approximate Scale in Feet

No.	Date	Description	By
0	4/3/98	ISSUED FOR BIDDING AND CONSTRUCTION	WAJ

Designed WAJ/GP
Drawn JAR
Checked JAH
Reviewed CHM
Approved JAH
Proj. No. 64489
Date 4/1/98

PARSONS ENGINEERING SCIENCE, INC.
BUFFALO, NEW YORK (716) 633-7074

CHERRY FARM/ RIVER ROAD
PRP GROUP

CHERRY FARM/ RIVER ROAD
SEDIMENT REMOVAL

SEDIMENT DREDGING OPERATIONS PLAN AND LIMITS OF WORK

DRAWING NO. C-2
REV. 0

DATE: 04/01/98 (JAR)
H:\CAD\7266\73-2\5673SDT.DWG (MODEL: PAPER SPACE & PLOT SCALE)

NOTES:

1. SITE CONTOURS DEPICT DESIGN FINAL GRADE CONTOURS. ACTUAL AS-BUILT CONTOURS MAY VARY. CONTOURS IN THE PROPOSED SEDIMENT DISPOSAL AREA ARE BASED UPON RECORD SURVEY BY WENDEL PC (JANUARY, 1998).
2. BATHYMETRIC CONTOURS WERE DEVELOPED BY WENDEL PC FEBRUARY, 1997 FROM BATHYMETRIC SURVEY DATA OBTAINED NOVEMBER 20, 1996. EXISTING BATHYMETRIC CONTOURS SHOWN WERE MODIFIED BY PARSONS ES, FEBRUARY, 1997, TO ACCOUNT FOR CONDITIONS OBSERVED DURING A DIVE SURVEY OVER THE AREA BY PARSONS ES.
3. WEED BED LIMITS ARE APPROXIMATE AND ARE BASED UPON VISUAL DELINEATION PERFORMED BY PARSONS ES, JUNE, 1996, DURING THE PHASE II SEDIMENT SAMPLING PROGRAM.

LEGEND

- MONITORING WELL
- RECOVERY WELL AND VAULT
- OBSERVATION WELL
- COLLECTION SUMP
- ELECTRICAL PULL BOX
- SEDIMENT SAMPLE LOCATION
- LIMIT OF UNCOMPLETED CAP AREAS
- EXISTING SHORELINE
- PROPERTY LINE
- SHALLOW GROUNDWATER INTERCEPTOR TRENCH
- ELECTRICAL UNDERGROUND SERVICE
- GROUNDWATER CONVEYANCE PIPING
- GABION WALL
- RIP RAP
- AQUATIC WEED BED

SURVEY CONTROL POINTS			
NORTHING	EASTING	ELEVATION	DESC.
1090688.0	405161.0	573.63	GW1
1090255.1	405146.4	584.14	GW2
1090046.5	404955.1	576.25	GW3
1089555.4	404734.7	572.21	GW4
1089122.7	404687.4	584.16	GW5
1088666.5	404462.8	572.12	GW6
1088471.2	404342.6	574.84	GW7
108133.0	404277.2	571.31	GW8
1088246.1	404462.3	588.32	GW9
1089566.7	405695.0	577.68	MW1
1088101.2	405564.3	578.76	MW2
1090855.8	405314.9	571.16	MW3
1090092.8	405094.7	583.63	MW4
1089386.2	404774.3	584.14	MW5
1088294.6	404362.9	585.70	MW6
1087901.2	404701.1	586.40	MW7

SURVEY CONTROL POINTS			
NORTHING	EASTING	ELEVATION	DESC.
1088805.68	404431.61	581.90	#10 MON.*
1090015.47	404928.81	579.26	#9 MON.*
1090468.26	406084.62	574.87	#13 MON.*
1090738.95	405200.70	584.62	#14 I.P.*
1089687.49	405775.20	575.26	#7 I.P.*
1088416.15	405563.36	576.23	#8 I.P.*

*-SURVEY CONTROL MONUMENTS AND IRON PIPES MAY NOT EXIST.

NIAGARA MOHAWK INC. (REPUTED OWNER)
L. MATHEW DUGGAN (REPUTED OWNER)
CLARENCE MATERIALS (REPUTED OWNER)
NIAGARA RIVER WORLD (REPUTED OWNER)
CAPPED AREAS WITHOUT TOPSOIL
UNCAPPED AREA
PROPOSED SEDIMENT DISPOSAL AREA
EXISTING DISPOSAL PAD
EXISTING GRAVEL ROADWAY
AQUATIC WEED BED
TO BE REMOVED AND DISPOSED OF IN SEDIMENT DISPOSAL AREA
STA3+00
STA4+00
STA5+00
STA6+00
STA7+00
STA8+00
100' 50' 0 100'
Approximate Scale in Feet

DATE: 02/05/98 (JAR)
N:\CAD\7256\13\256133GG.DWG (MODEL/PAPER SPACE & PLOT SCALE)

Rev	Date	Description	By
0	04/03/98	ISSUED FOR BIDDING AND CONSTRUCTION	JAR

Designed WA./GP.
Drawn JAR.
Checked SM.
Reviewed LMD.
Approved SM.
Proj. No. 04469
Date 4/3/98

IN THE STATE OF NEW YORK ITEM 7.5 FOR ANY PERSON, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED ARCHITECT, ENGINEER, OR LAND SURVEYOR TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED ARCHITECT, ENGINEER, OR LAND SURVEYOR IS ALTERED, THE ALTERING ENGINEER, ARCHITECT OR LAND SURVEYOR SHALL AFFIX TO THE ITEM HIS OR HER STAMP AND THE NOTATION "ALTERED BY" FOLLOWED BY HIS OR HER SIGNATURE AND THE DATE OF SUCH ALTERATION.

PARSONS ENGINEERING SCIENCE, INC.
BUFFALO, NEW YORK
(716) 633-7074

CHERRY FARM/ RIVER ROAD
PRP GROUP

CHERRY FARM/ RIVER ROAD
SEDIMENT REMOVAL

EXISTING SITE PLAN

DRAWING NO. C-1
REV. 0

LEGEND

SECTIONS OF ROAD TO BE COMPLETED

NOTES:

1. SEE DRAWING C-1 FOR GENERAL NOTES AND LEGEND.
2. CONTRACTOR TO COMPLETE PORTIONS OF ROAD INDICATED.
3. SEE DRAWING C-4 FOR FINAL CONTOURS.

SCALE: 1"=100'-0"

CHERRY FARM/RIVER ROAD
SEDIMENT REMOVAL

ROAD ALIGNMENT PLAN

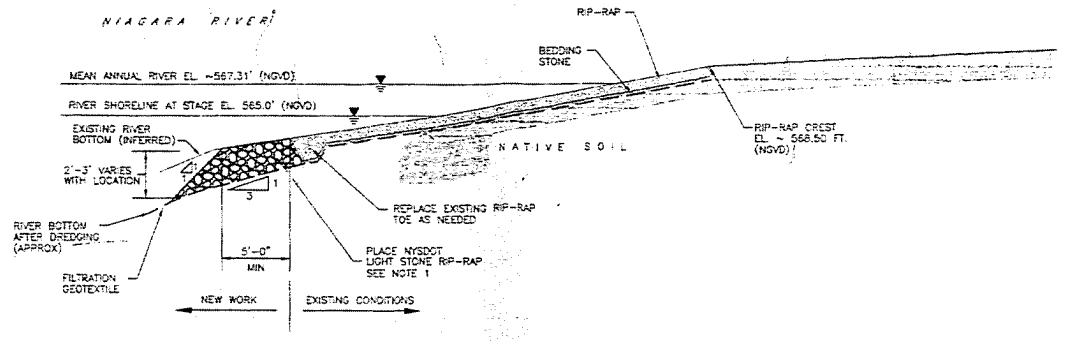
CHERRY FARM/RIVER ROAD
PRP GROUP

PARSONS ENGINEERING SCIENCE, INC.

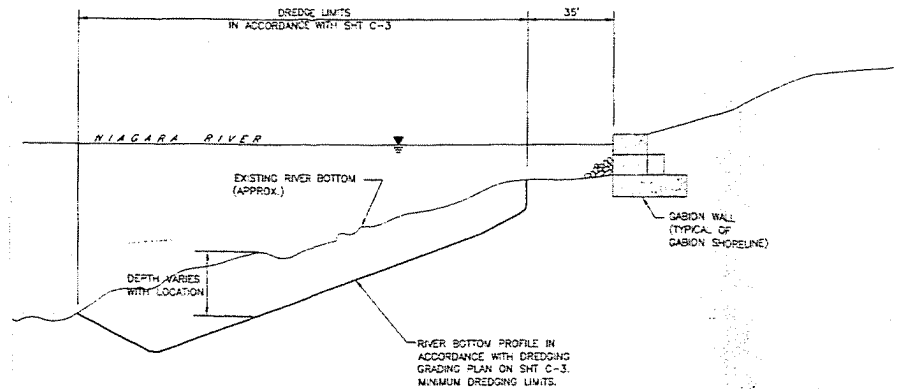
BUFFALO, NEW YORK
(716) 633-7074

Job No. 726071			
Designed WJL/JSP			
Drawn JTS			
Checked SJM			
Reviewed KWM			
Approved SJM			
Reg. No. 64489	0	04/03/98	ISSUED FOR BIDDING AND CONSTRUCTION
Date 4/2/98	Rev	Date	Description

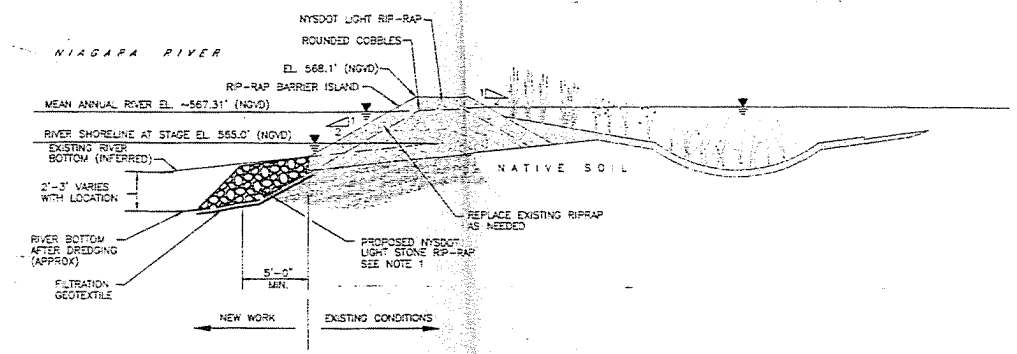
DRAWING NO. C-4
REV. 0



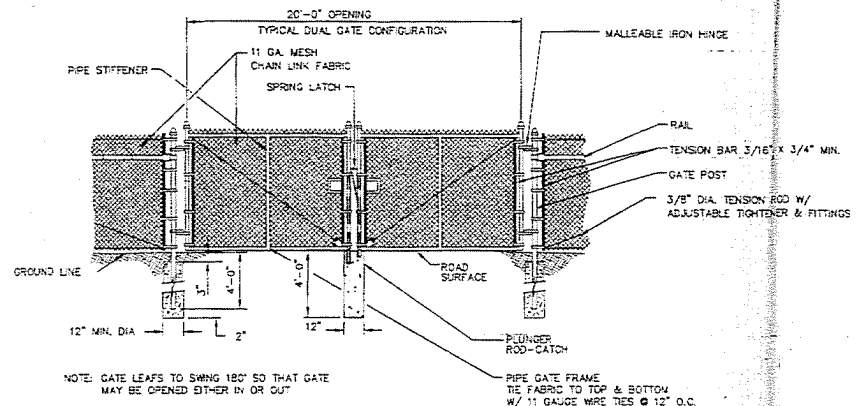
A/C-1 A/C-3 TYPICAL SECTION AT RIP-RAP SHORELINE
SCALE: 1" = 5'-0"



B/C-1 TYPICAL SECTION AT GABION WALL
NOT TO SCALE

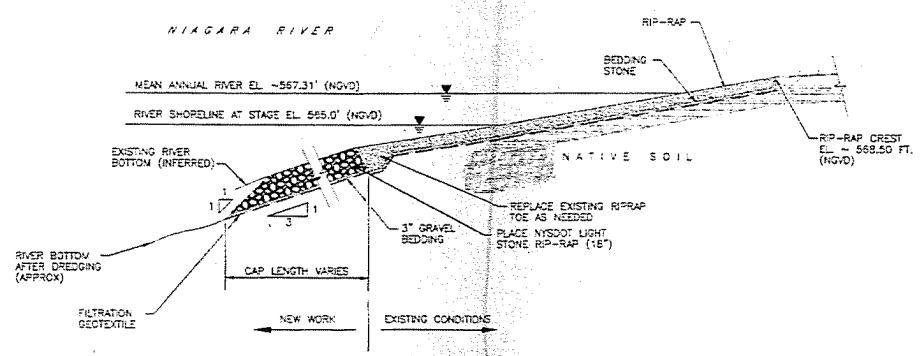


C/C-1 C/C-3 TYPICAL SECTION AT RIPRAP BARRIER ISLAND
SCALE: 1" = 5'-0"

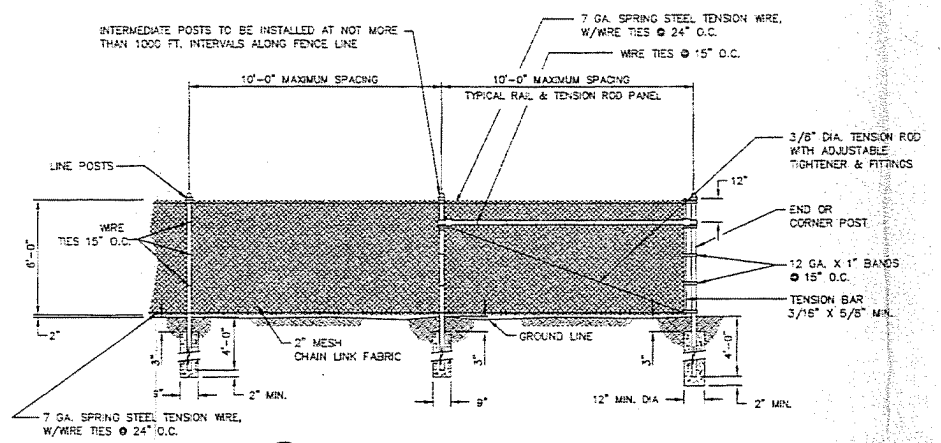


NOTE: GATE LEAFS TO SWING 180° SO THAT GATE MAY BE OPENED EITHER IN OR OUT

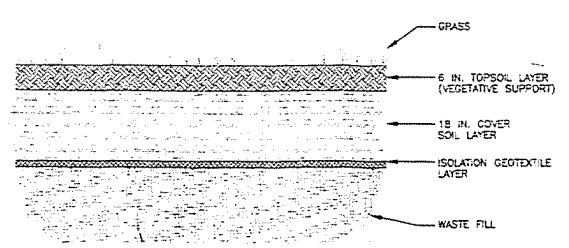
TYPICAL VEHICLE GATE DETAIL
NOT TO SCALE



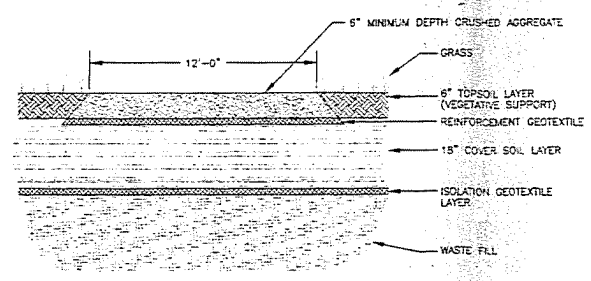
D/C-3 TYPICAL SEDIMENT CAP SECTION
SCALE: 1"=5'-0"



1/C-2 TYPICAL FENCE DETAIL
NOT TO SCALE



2/C-3 TYPICAL PERMEABLE COVER SYSTEM DETAIL
NOT TO SCALE



3/C-3 TYPICAL MAINTENANCE ROAD DETAIL
NOT TO SCALE

NOTES:

1. AFTER DREDGING SEDIMENTS TO PLAN AND GRADE, STABILIZE EXISTING SHORELINE FEATURES ADJACENT TO DREDGE AREAS BY PLACING RIP RAP TO A MINIMUM DEPTH EQUAL TO THE DEPTH OF SEDIMENT REMOVED. CONTRACTOR TO PLACE RIP RAP AS SOON AS PRACTICAL AFTER DREDGING TO PREVENT SLOUGHING.
2. PLACE RIP RAP FROM THE BOTTOM OF SLOPES TOWARD SHORE.

SCALE: 1"=5'

No.	Date	Description	By
0	04/03/98	ISSUED FOR DREDGING AND CONSTRUCTION	

Job No. 726073
Designed MK/JSP
Drawn SM
Checked DM
Reviewed SM
App'vd No. 64489
Date 4/14/98

PARSONS ENGINEERING SCIENCE, INC.
BUFFALO, NEW YORK (716) 631-7074

CHERRY FARM/RIVER ROAD PRP GROUP

CHERRY FARM/RIVER ROAD SEDIMENT REMOVAL

SECTIONS AND DETAILS

DRAWING NO C-5 | REV. 0

DATE: 03/25/98 (JAR)
WHT_W VIEWS AS NOTED
P:\CAD\726073\SHT-C1.DGN
PLOT: HP650-BW (30x42) P/SPACE 1:1 FOR SHT-01.PCP

APPENDIX B
CONSTRUCTION SPECIFICATIONS

CONTRACT DOCUMENTS
REMEDIAL ACTION CONSTRUCTION FOR

SEDIMENT REMOVAL AT
CHERRY FARM SITE (NYSDEC SITE NO. 9-15-063)
RIVER ROAD SITE (NYSDEC SITE NO. 9-15-031)

TONAWANDA, NEW YORK

Submitted By:

CHERRY FARM/RIVER ROAD SITE
POTENTIALLY RESPONSIBLE PARTIES GROUP

Prepared By:

PARSONS ENGINEERING SCIENCE, INC.
180 Lawrence Bell Drive, Suite 100
Williamsville, New York 14221
Phone: (716) 633-7074
Fax: (716) 633-7195

APRIL 1998

PARSONS

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02222	Excavation
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02228	Compaction
02260	Landfill Cover Construction
02269	QA/QC Landfill Cover Soil Materials
02275	Riprap
02421	Geotextiles
02501	Gravel Pavement
02830	Chain Link Fencing & Gates
02990	Finish Grading, Topsoil and Seeding

Attachments:

1. NYSDEC Order-on-Consent
2. USACE Nationwide Permit
3. Sediment Treatability Testing Report
4. Sediment Physical Test Data
5. Sediment Boring Logs
6. Navigation Channel Chart
7. Sediment Analytical Data

PARSONS ENGINEERING SCIENCE, INC.
180 Lawrence Bell Drive, Suite 100 • Williamsville, New York 14221 • (716) 633-7074 • Fax: (716) 633-7195

April 21, 1998

Bidders:

American Marine Constructors, St. Joseph, MI	Ontario Specialty Contracting, Buffalo, NY
Durocher Dock and Dredge, Inc., Cheboygan, MI	Sevenson, Niagara Falls, NY
Luedtke Engineering Co., Frankfort, MI	The King Co., Inc., Holland, MI
OHM Remediation Services Corp., Trenton, NJ	Trident Tech Services, Inc., Chesterton, IN

Telefax Transmittal

RE: Bid Addendum No. 1 to the April 1998 Contract Documents:
Remedial Construction for Sediment Removal at
Cherry Farm/River Road Sites

Bidders:

Your attention is directed to the following modifications, additions, and clarifications to the April 1998 Contract Documents for Sediment Removal at the Cherry Farm/River Road Site. This addendum has been prepared following the Pre-Bid Conference held at the Site on April 17, 1998. Only items discussed at the Pre-Bid Conference that require additional information, clarification, or changes to the Contract Documents are included herein.

1. Pre-Bid Conference Participants: A copy of the sign-in sheet is provided. Representatives of the eight firms requested to provide bids were present at the meeting.
2. Sediment Disposal Area (SDA): The estimated level storage volume of the SDA is 37,800 cubic yards (CY), based on an existing ground elevation of 582 at the north side. The existing ground elevation around the other sides of the SDA is higher, with a maximum elevation of 587, at the southeast corner. The required berm around the SDA will bring the entire perimeter elevation to 587, and provide an additional 16,800 CY of available volume (total volume = 54,600 CY).
3. Specification 02081-2.01B-b: Add the following sentence to the end of the section: "The initial and subsequent locations of this monitor must be mutually acceptable to both the NYSDEC and the Engineer, within the minimum and maximum specified distances from the work zone."
4. Turbidity Due to Upland Erosion: Bidders raised concerns that turbidity in the river, due to upland erosion, could potentially affect dredging operations. Cover work, including additional seeding and erosion control measures, will be completed prior to the start of dredging, except in the uncapped area near the proposed temporary dock as shown on Drawing C-2. No changes to the contract documents are required at this time.
5. Work Hour Restrictions: Per the Town of Tonawanda, there are no work hour restrictions in place for this project.
6. Wages: The project has no requirements for Davis-Bacon wages or union workers.

7. ASTM Certified Surveyor: A New York State licensed surveyor will be required to certify all surveys performed at the site. ASTM certification alone is not sufficient. **(Note: Answer changed from Pre-Bid Conference)**
8. Bonding Requirements: No bid bond is required.
9. Specification 00100-5.1, 3rd sentence: Change to read "Questions received less than "three" days prior to the date for opening of Bids may not be answered."
10. Pre-Bid Investigations by Bidders: Bidders may use divers to inspect the river bottom and obtain samples by hand-coring, a hand-held Ponar[tm] dredge, or other similar hand-held sampling devices. The use of a clamshell bucket to obtain samples is prohibited from now until July 16, 1998, due to fish spawning season. Parsons Engineering Science, Inc. (Parsons) must be notified in advance of any planned sampling events, and data generated from the event must be provided to Parsons as soon as it is available.
11. Specification 00500-Article V, Part 12: Delete in its entirety. Refer to 00500-Article 2 for payment/retainage requirements.
12. Bid Proposals: All bidders are required to complete the base bid, as specified. Any optional, alternate proposals and associated cost items should be clearly indicated as alternates, and submitted separately from the base bid. The requirements for the technical portion of the proposal are specified in 00020, 2nd paragraph. Include the following additional information in proposals, as applicable: a.) percent discounts for early payments by the PRPs; b.) removal method and protective measures for the weed bed, particularly when excavating the narrow strip adjacent to the weed bed; and c.) proposed use of flocculants, if any.
13. River Velocities: A table of the approximate river velocities is provided for use by the bidders. Bidders are reminded that the velocities will vary with flow, storm events, season, etc.

Very truly yours,

PARSONS ENGINEERING SCIENCE, INC.

Mark S. Raybuck, P.G.
Project Manager

cc: PRP Group
W. Long
E. Melnyk
S. Miller
File (726673 #13 z.4)

PARSONS ENGINEERING SCIENCE, INC.

180 Lawrence Bell Drive, Suite 100 • Williamsville, New York 14221 • (716) 633-7074 • Fax: (716) 633-7195

April 24, 1998

Bidders:

American Marine Constructors, St. Joseph, MI	Ontario Specialty Contracting, Buffalo, NY
Durocher Dock and Dredge, Cheboygan, MI	Sevenson, Niagara Falls, NY
Luedtke Engineering Co., Frankfort, MI	The King Co., Inc., Holland, MI
OHM Remediation Services Corp., Trenton, NJ	Trident Tech Services, Inc., Chesterton, IN

Telefax Transmittal

RE: Bid Addendum No. 2 to the April 1998 Contract Documents:
Remedial Construction for Sediment Removal at
Cherry Farm/River Road Sites

Bidders:

The following clarifications to the April 1998 Contract Documents for Sediment Removal at the Cherry Farm/River Road Site are being provided in response to two questions raised by a bidder on April 24, 1998.

1. Question: Section 02421 Geotextiles, 3.04 Performance, Paragraph J states "All seams for geotextile placed under water shall be sewn". Is it the intent to fabricate 170' x 40' pieces of geotextile and place in the river in one large piece or use divers to sew underwater? This will be very difficult due to the river velocities anticipated.

   Answer: Alternate placement methods without sewing the geotextile will be considered. Bidders are to include a brief description of their proposed alternate methods in their preliminary operations plan to be submitted with the bid. There is no need to include a separate price for the alternate method. Bid pricing for sediment capping should include your proposed method of geotextile placement.

2. Question: Section 02142, Construction Water Management, specifies several times that water treatment "if necessary" or "if used" is the responsibility of the Contractor. Is it the intent that all water generated on site can be placed in the SRA and be discharged into the Niagara River along with the water generated during the dredging operation, or is offsite water treatment required or anticipated?

Answer: It is intended that all water generated onsite can be placed in the sediment disposal area (SDA) and discharged into the Niagara River along with water generated from the dredging operation.

Very truly yours,

PARSONS ENGINEERING SCIENCE, INC.

Mark S. Raybuck, P.G.
Project Manager

cc: PRP Group
W. Long
E. Melnyk
S. Miller
File (726673 #24 a.8)

PARSONS ENGINEERING SCIENCE, INC.

180 Lawrence Bell Drive, Suite 100 • Williamsville, New York 14221 • (716) 633-7074 • Fax: (716) 633-7195

April 29, 1998

Bidders:

Durocher Dock and Dredge, Cheboygan, MI
Luedtke Engineering Co., Frankfort, MI
OHM Remediation Services Corp., Trenton, NJ
Ontario Specialty Contracting, Buffalo, NY
Sevenson, Niagara Falls, NY
The King Co., Inc., Holland, MI
Trident Tech Services, Inc., Chesterton, IN

Telefax Transmittal

RE: Bid Addendum No. 3 to the April 1998 Contract Documents:
Remedial Construction for Sediment Removal at
Cherry Farm/River Road Sites

Bidders:

The following clarifications to the April 1998 Contract Documents for Sediment Removal at the Cherry Farm/River Road Site are being provided in response to questions raised by a bidder on April 29, 1998. There are no changes to the contract documents resulting from these clarifications.

1. Question: It is understood that capping the sediment disposal area (SDA) is not part of this project.

   Answer: Correct. The SDA will not be capped as part of the current contract.

2. Question: It is understood that any soil used in the berm construction around the SDA must meet the specifications for the 18" cover soil layer.

   Answer: No, the soil does not need to meet the specifications for the 18" cover soil layer. It should be suitable for construction of berms designed to contain water within the SDA.

3. Question: Drawing C-1 indicates that the area north of the SDA is not to be capped. Drawing C-3 indicates that the same area is to be capped. Which is correct?

   Answer: Drawing C-3 shows the correct areas to be capped. Drawing C-1 represents existing conditions, and should not be used to determine work to be performed.

4. Question: Drawing C-1 and C-3 conflict regarding the need for topsoil in the cap. Which drawing governs?

Answer: Topsoil is needed wherever capping is to be performed. Again, Drawing C-3 should be used to determine work to be done.

Very truly yours,

PARSONS ENGINEERING SCIENCE, INC.

Mark S. Raybuck, P.G.
Project Manager

cc: PRP Group
W. Long
E. Melnyk
S. Miller
File (726673 #24 a.8)

SECTION 01010

SUMMARY OF THE WORK

PART 1 - GENERAL

1.01 Identification

The work shall be performed at the Cherry Farm/River Road Site located on the west side of River Road, Town of Tonawanda, Erie County, New York.

1.02 Contract Documents

Requirements of the work are contained in the Contract Documents, and include cross-references herein to published information, which is not necessarily bound therewith.

A. Included in the general contract are site grading, excavation, soil/sediment removal, landfill cover construction, general construction, electrical, mechanical, and all other operations and work required to complete the remedial construction according to the intent of the Contract Documents.

1.03 Site Background

The River Road Site and the Cherry Farm Site are adjoining Sites. The River Road Site is approximately 23 acres in size and is located along the Niagara River, South of the Grand Island Bridge. The northern half of the Site is owned by Mr. Matthew Duggan of Amherst, New York and the southern portion of the Site is owned by Niagara River World, Inc. and Clarence Materials Corporation (Pineledge Holding Corporation). The Tonawanda Coke Corporation owns and operates two retention ponds located on property adjoining the Site's southwestern boundary. The Cherry Farm is a 55-acre Site located immediately north of the River Road Site. The Cherry Farm Site is owned by Niagara Mohawk Power Corporation.

These two Sites were at one time a part of a larger piece of property owned by Wickwire-Spencer Steel Company. The Cherry Farm and River Road Sites were used for the disposal of waste from the steel manufacturing process from approximately 1908 to 1963, and were operated as a landfill for disposal of industrial wastes from facilities in the area from 1963 to until about 1970. Fly ash, bottom ash, foundry sand, slag, sludge, liquid boiler cleaning waste, concrete rubble, and miscellaneous fill were disposed on the Sites. The slag covers most of the Site. Due to the common history, former common ownership, and similar remedial programs, it was considered appropriate to combine the remedial program at the two Sites (henceforth referred to as Site).

1.04 Summary of Work

A. General

The work consists of furnishing all labor, materials, supervision, equipment, and services necessary to complete the scope of work detailed in the Specifications and Contract Drawings. The remediation work will be performed in compliance with the terms and conditions specified in the terms of the NYSDEC Order on Consent (See Attachment 1) and under the Department of the Army Corps of Engineers' letter of March 25, 1996 which verifies that the proposed work is authorized by the enclosed Nationwide Permit (Attachment 2). Copies of the Order on Consent shall be distributed to all subcontractors. The work includes, but is not limited to, the following:

1. Removal of contaminated sediment from the Niagara River, as indicated on the Drawings;
2. Provide all necessary equipment such as oil booms, silt curtains, surveys, turbidity monitoring devices, docks, etc. to complete dredging, disposal, and capping work;

3. Placement and dewatering of removed sediment in an onsite disposal area;
4. Gravity settling of solids in sediment disposal area; transport of supernatant water to river;
5. Nearshore sediment capping with geotextile, gravel, and riprap cap;
6. Removal of barge wreck from the Niagara River;
7. Construction of berms, access road, drainage system, and fencing for the sediment disposal area;
8. Construction of effluent polishing basin for solids settling (if needed);
9. Installation of a permeable soil cap system inlcuding seeding in selected areas;
10. Installation of gravel access roads;
11. Restoration of disturbed areas;
12. Providing health and safety monitoring during construction; and
13. Temporary facilities and equipment (i.e. field trailers, decontamination equipment, temporary docking facilities, dewatering, etc.).

1.05 Use of Site

The Contractor shall limit his use of the premises to the work indicated.

A. Use of the Site: Confine operations at the site to the areas permitted. Portions of the site beyond areas on which work is indicated are not to be disturbed.

B. Keep existing driveways and entrances serving the premises clear and available at all times. Do not use for parking or storage of materials.

C. Do not encumber the site with materials or equipment. Confine stockpiling of materials and location of storage sheds to the areas indicated or as directed by the Engineer.

D. Lock automotive type vehicles and other mechanized or motorized construction equipment, when parked and unattended. Do not leave vehicles or equipment unattended with the motor running or ignition key in place.

E. Contractor to provide employee parking onsite, not on or adjacent to public roadways.

1.06 Site Security

The Contractor shall install a secure 5-foot, high-strength polyethylene orange plastic fence and/or the temporary fencing to provide site security where a permanent fence has not been installed. Temporary plastic fencing shall be Tenax Alpi or equal with 7-foot minimum length posts set at a maximum of 10-feet apart. Fencing shall be installed prior to beginning construction of other work items and shall be repaired in an expeditious manner as necessary. One main entrance/exit gate shall be established, with optional gate for delivery.

1.07 Access Roads

Access roads shall be maintained for use by the Contractor and the Owner for the duration of the contract. The contractor shall repair ruts and/or weak spots in the roads as necessary. Proper drainage shall be maintained on all access roads. Gravel or crushed stone for use in road construction or repair shall be approved by the Engineer prior to use.

1.08 Signs

The Contractor shall post the work zone with signs reading "Warning, Hazardous Work Area, Do Not Enter Unless Authorized". Warning signs shall be posted at a minimum of every 500 feet along the perimeter fencing.

1.09 Dust Control

An erosion/dust control agent can be used with approval of Engineer. Accomplish dust control by water sprinkling or by other methods approved by the Engineer. The use of petroleum products for dust control shall not be permitted.

1.10 Permits

The Contractor shall obtain and pay for all permits required to perform the work.

1.11 Subcontractors and Employees

A. The Contractor is responsible for the acts and omissions of its employees and subcontractors in connection with the performance of the Work.

B. No visitors are allowed on-site without prior approval of the Owner or Engineer.

C. The Contractor's personnel and its subcontractor's personnel shall sign in and out at the site daily.

1.12 Housekeeping

A. The Contractor shall maintain the premises and working areas in a reasonably clean and orderly condition and perform cleanups when necessary or as ordered by the Engineer, and in no event less frequently than once per week. The Contractor shall keep affected local roadways free of dust and debris at all times.

B. The Contractor shall leave all surfaces free from any contamination resulting from operations. The Contractor shall remove from the work site and from all public and private property, at its own expense, all temporary structures, tools and excess construction materials, waste materials, rubbish, etc., resulting from its operations.

C. The work site shall be prepared for occupancy by a thorough cleanup. If the Contractor does not adequately cleanup within sixteen working hours after ordered by the Owner, the Owner reserves the right to clean the premises and withhold this expense from payments due the Contractor.

D. Should the Owner occupy the work site or any portion thereof prior to its completion by the Owner and Final Acceptance by the Owner, responsibilities for interim and final cleanup of the occupied areas shall be as determined by the Engineer.

-- END OF SECTION 01010 --

SECTION 01050

FIELD ENGINEERING

PART 1 - GENERAL

1.01 Description

A. The Contractor shall establish base lines for the Project. Owner will furnish boundary surveys, if required.

B. Contractor shall:

1. Provide civil, structural , or other professional engineering services specified, or required to execute Contractor's construction methods.
2. Develop and make all detail surveys and measurements needed for construction including slope stakes, batter boards, piling layouts, and all other working lines, elevations, and cut sheets.
3. Keep a transit and leveling instrument on the site at all times and a skilled instrument man employed or obtained whenever necessary for layout of the Work.
4. Provide all material required for bench marks, control points, batter boards, grade stakes, and other items.
5. Be solely responsible for all locations, dimensions, and levels. No data other than written orders of the Engineer shall justify departure from the dimensions and levels required by the Drawings.
6. Safeguard all points, stakes, grade marks, monuments, and bench marks made or established on the Work, re-establish same if disturbed and rectify all Work improperly installed because of not maintaining, not protecting, or removing without authorization such established points, stakes, marks, and monuments.
7. When requested by Engineer, provide such facilities as may be necessary for Engineer to check line and grade points placed by Contractor. Contractor shall do no excavation or embankment work until all cross-sectioning necessary for determining pay quantities has been completed and checked by Engineer.

1.02 Contractor's Field Engineer

A. Contractor shall employ and retain at the site of the Work, a field engineer capable of performing all engineering tasks required of the Contractor. Tasks included are:

1. Daily reports of Project activity to be submitted to the Engineer with all pertinent information pertaining to the Project as follows:
   a. Number of employees;
   b. Subcontractor employees;
   c. Breakdown of employees by trade;
   d. Major equipment and materials installed;
   e. Major construction equipment utilized;
   f. Location of all areas in which construction was done; and

g. Materials and equipment received.

2. Provide all surveying equipment required including transit, level, stakes, and required surveying accessories.

3. Furnish all required lines and grades for construction of operations. Check all formwork, reinforcing, inserts, structural steel, bolts, sleeves, piping, other materials, and equipment.

4. Maintain field office files and drawings, record drawings, and coordinate engineering services with Subcontractors. Prepare layout and coordination drawings for construction operations.

5. Check and coordinate Work for conflicts and interferences and immediately advise Engineer of all discrepancies noted.

6. Cooperate with Engineer in field inspections as required.

1.03 Qualifications of Surveyor or Engineer

A. Qualified engineer or registered land surveyor licensed in the State of New York, acceptable to Owner.

1.04 Records

A. Maintain a complete, accurate log of all control an survey work as its progresses.

B. On completion of foundation walls and major site improvements, prepare a certified survey showing all dimensions, locations, angles, and elevations of construction.

1.05 Submittals

A. Submit a name and address of surveyor or engineer to Engineer.

B. On request of Engineer, submit documentation to verify accuracy of field engineering work.

C. When requested by Engineer, submit certificate signed by registered engineer or surveyor certifying that elevations and locations of Work are in conformance with Contract Documents. Explain all deviations.

-- END OF SECTION 01050 --

SECTION 01051

GRADES, LINES, AND LEVELS

PART 1 - GENERAL

1.01 Description

This section includes specifications for surveying required for execution of this work. The Contractor shall retain the services of a licensed Professional Land Surveyor (Surveyor). The Surveyor shall establish survey control; check and verify as-built thickness and elevations with those shown on the plans and as specified; and prepare record drawings of the construction. The Contractor is responsible for controlling sediment removal depths such that the dredging conforms to the specified limits. The Contractor is responsible for controlling lift thickness and cap component thickness such that the cap conforms to the specified dimension.

(1) Data generated by optical survey measurements shall be used for quality control.

(2) The Surveyor is required, as a minimum to provide the following survey data:

A. Locations of the turbidity control curtains and turbidity monitoring stations;

B. Actual Limits of dredging (horizontal and vertical), prior to and after dredging;

C. Actual Limits of sediment cap (horizontal and vertical);

D. Topography following final sub-grade preparation of the existing landfill surface;

E. Top of cover soil with elevations and thicknesses;

F. Top of topsoil with elevations and thicknesses;

G. Miscellaneous details (e.g. drainage features, riprap); and

H. Locations of roads and fencing.

(3) The data must be reduced and plotted in a form acceptable to the Engineer and provided to the Engineer, prior to proceeding to the next construction phase.

(4) The Contractor shall not proceed with placement of an overlying layer or with subsequent work phases until the Surveyor has completed its survey measurements and the data have been reviewed by the Engineer.

(5) Upon completion of all services, the Surveyor shall provide to the Engineer a Letter of Certification for the surveys for use in the Certification Report.

1.02 Accuracy

(1) Optical Survey, Tape Measurements, and Electronic Measurements: Minimum accuracy of $\pm$0.01 feet in horizontal locations and $\pm$0.01 feet in elevations.

(2) Pressure Transducers Survey/Measurement: Minimum accuracy of $\pm$.20 feet in elevation and $\pm$ .50 feet in horizontal locations.

1.03 Tolerances

(1) The Contractor shall excavate sediment to the lines, grades, and slopes shown on drawings within the tolerances specified below.

Description	Tolerances
Sediment Removal	-0.50 feet (maximum overcut) to + 0.00 feet (no undercut)

(2) The Contractor shall place all layers and systems to the to the lines, grades, slopes, and thickness shown on drawings within the tolerances specified below.

Description	Tolerances
Cover Soil	- 0.00 feet to + 0.20 feet (Thickness)
Topsoil	- 0.00 feet to + 0.20 feet (Thickness)

1.04 Job Conditions

(1) The Contractor shall be responsible for protecting and maintaining all horizontal and vertical control points during construction.

(2) The Contractor shall be responsible for restaking intermediate lifts of required cap system, including low permeability soil protective cover soil, and topsoil.

(3) Areas which fail to meet the thickness requirements of Paragraph 1.03(1) shall be reworked or replaced as directed by Engineer at no cost to the Owner. The Contractor shall pay for the costs of all additional survey on reworked or replaced areas.

PART 2: PRODUCTS

None

PART 3: EXECUTION

3.01 Survey Measurements

(1) Prior to commencement of construction work, the Contractor shall establish all necessary baselines, horizontal control points, and vertical control benchmarks in order to properly complete construction work and make quantity measurements. Survey control points shall be established such that any point within the job site can accurately be re-established and elevations obtained to the required tolerances at any time during the course of construction. The Surveyor shall tie all his baselines, horizontal and vertical control benchmarks into survey information provided by the Owner.

(2) Where appropriate, an orthogonal grid system to reference topographical measurements shall be established on centers approximately 50 feet or less for earthwork, 20 feet or less for sediment removal, and at all breaklines, crests, slope toes etc., as necessary to accurately measure the work. All cross sections shall be performed at intervals of 50 feet or less for earthwork, 20 feet or less for sediment removal. Cross section data shall include baseline station, offset, elevation, and material type.

--END OF SECTION 01051--

SECTION 01055

PROJECT RECORD DRAWINGS

PART 1 - GENERAL

1.01 Scope

A. This section specifies the requirements for recording of field modifications made during construction, to be marked on the design Construction Drawings by the Contractor (Record Drawings) and for preparing Supplemental Record Drawings by the Surveyor to be submitted to the Owner and Engineer for use in preparing a final construction monitoring program.

B. Related work specified elsewhere.

1. Section 01051 - Grades, Lines, and Levels

1.02 Record Drawings

The Contractor shall clearly and neatly mark up in red ink one set of paper prints to show the record conditions. These record marked prints (Record Drawings) shall be kept current and available on the job site at all times. All changes from the contract plans which are made in the work, or additional information which might be uncovered in the course of construction shall be accurately and neatly recorded as they occur by means of details and notes. The Record Drawings shall be jointly inspected for accuracy and completeness by the Engineer and a responsible representative of the Contractor prior to submission of each monthly pay estimate. The drawings shall include but not be limited to the following:

A. Installations of any kind or description known to exist within the construction area. The locations shall include dimensions to permanent features.

B. The location and dimensions of any changes within the design features of any kind or description known to exist within the construction area. The locations shall include dimensions to permanent features.

C. Correct grade or alignment of roads, structures, utilities, or project component if any changes were made from contract.

D. Correct elevations if changes were made in sediment dredging.

E. Changes in details of design or additional information obtained from working drawings specified.

F. The topography and grades of all drainage structures installed or affected as part of the project construction.

G. All changes or modifications which result from authorized field changes.

H. Where contract drawings or specifications allow options, only the option selected for construction shall be shown on the record prints.

I. Additional work ordered by the Engineer or Owner.

1.03 Supplemental Record Drawings

This section covers the preparation and submittal by the Surveyor retained by the Contractor, of the Supplemental Record Drawings of the work completed as shown and described in the technical specifications. The Contractor will facilitate and coordinate with the Surveyor in

obtaining field measurements necessary to prepare the supplemental drawings. The Supplemental Record Drawings shall include but not be limited to the following:

A. A post-dredging bathymetric survey of the sediment removal area shall be conducted. The survey shall show the existing sediment surface elevations on a maximum 20 foot by 20 foot grid, and at all grade changes. The survey shall adequately extend beyond the limits of the removal area to properly overlap with areas to remain undisturbed. The grid point locations shall be located using the global positioning system (GPS). The survey may be conducted piecemeal as sediment removal areas are completed.

B. The actual limits, both horizontally and vertically, of the sediment cap.

C. A topographic survey of the elevations of the top of the subgrade surface. The survey should show locations of physical features such as structures, roadways, utilities, limits of the site, and other features. The survey should, as a minimum, show ground surface elevations on a 50 foot by 50 foot grid and at all grade changes. The survey should adequately extend beyond the limits of work to properly overlap existing conditions (i.e; the existing containment berms, roads, etc.).

D. Elevations of the top of the subgrade surface.

E. Elevations of the top of the cover soil layer at the same locations described in Item C. This drawing shall also indicate the thickness of the barrier protective cover soil layer.

F. Elevations of the top of the topsoil layer (Final Grade) at the same locations described in Item C. This drawing shall indicate the thickness of the topsoil layer.

1.04 Submittals

A. Preliminary Submittal

The Contractor shall prepare two (2) copies of the Record Drawings and the Surveyor shall prepare the two (2) copies of the Supplemental Record Drawings. These drawings shall be submitted to the Engineer following completion of that phase of work (within 7 calendar days) for review and approval. These drawings shall be neat, legible, and accurate. The review by the Engineer shall be expedited to the maximum extent possible (expected to be within 7 calendar days). If upon review, the drawings are found to contain errors and/or omissions, they shall be returned to the Contractor and/or Surveyor for corrections. The Contractor and/or Surveyor shall complete the corrections and return the drawings to the Engineer within 10 calendar days for subsequent review.

B. Final Record Drawing Preparation

1. Upon approval of the Record Drawings and Supplemental Record Drawings submitted, these drawings shall be modified by the Engineer, as necessary, to add any additional information which is pertinent to the project. These drawings shall be part of the permanent records of this project.

2. Each drawing to be submitted by the Contractor shall be lettered or stamped with the words "RECORD DRAWING" followed by the name of the Contractor and the Engineer. All original contract drawings shall be marked by the Engineer either "Record" denoting no revisions on the sheet, or "Revised Record" denoting one or more revisions.

3. The Supplemental Record Drawings to be submitted by the Surveyor shall:

a. be stamped and signed by the Surveyor retained by the Contractor;

b. be prepared on a 24" by 36" reproducible sheet and shall locate all work referenced

to the limits of the project area; and

c. have all locations referenced to the site horizontal coordinate system. The grid coordinate system shall be shown on all record drawings. Elevations shall be referenced to the vertical control established for the project.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

--END OF SECTION 01055—

SECTION 01090

DEFINITIONS AND STANDARDS

PART 1 - GENERAL

1.01 - Description

Except as specifically defined otherwise, the following definitions supplement definitions of the Contract, General Conditions, Supplementary Conditions and other general contract documents, and apply generally to the work.

1.02 Definitions

A. General Requirements: The provisions of DIVISION 1, General Requirements Sections, apply to the entire work of the Contract.

B. Indicated: Shown on drawings by notes, graphics or schedules, or written into other portions of the Contract Documents. Terms such as "shown", "noted", "scheduled" and "specified" have same meaning as "indicated", and are used to assist the reader in locating particular information.

C. Directed, Requested, Approved, Accepted, etc.: These terms imply "by the Engineer", unless otherwise indicated.

D. Approved by Engineer: In no case releases Contractor from responsibility to fulfill requirements of contract documents.

E. Project Site: Space available to Contractor at location of project, either exclusively or to be shared with separate contractors, for performance of the work.

F. Furnish: Supply and deliver to project site, ready for unloading, unpacking, assembly, installation, and similar subsequent requirements.

G. Install: Operations at project site, including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar requirements.

H. Provide: Furnish and install, complete and ready for intended use.

I. Installer: Entity (firm or person) engaged to install work, by Contractor, subcontractor or sub-subcontractor. Installers are required to be skilled experts in work they are engaged to install.

J. Overlapping/Conflicting Requirements: Most stringent (generally) requirement written directly into the contract documents is intended and shall be enforced, unless specifically detailed language written into the contract documents clearly indicates that a less stringent requirement is acceptable. Refer uncertainties to the Engineer for a decision before proceeding.

Where optional requirements are specified in a parallel manner, option is intended to be Contractor's unless otherwise indicated.

K. Minimum Requirements: Indicated requirements are for a specific minimum acceptable level of quality/quantity, as recognized in the industry. Actual work must comply (within specified tolerances), or may exceed minimums within reasonable limits. Refer uncertainties to Engineer before proceeding.

L. Abbreviations, Plural Words: Abbreviations, where not defined in contract documents, shall be interpreted to mean the normal construction industry terminology, determined by recognized grammatical rules, by the Engineer. Plural words shall be interpreted as singular and singular words shall be interpreted as plural where applicable for context of contract documents.

M. Testing Laboratory: An independent entity engaged for the project to provide inspections, tests, interpretations, reports and similar services.

1.03 Standards and Regulations

A. Industry Standards: Applicable standards of the construction industry that have same force and effect on performance of the work as if copied directly into contract documents or bound and published therewith. Standards referenced in contract documents or in governing regulations have precedence over non-referenced standards, insofar as different standards may contain overlapping or conflicting requirements. Comply with the standards in effect as of the date of the contract documents, unless otherwise indicated.

Abbreviations: Where abbreviations or acronyms are used in contract documents, they mean the well recognized name of the entity in the building construction industry; refer uncertainties to Engineer before proceeding, or consult the "Encyclopedia of Associations" by Gale Research Co.

B. Trade Union Jurisdictions: Maintain current information on jurisdictional matters, regulations, actions and pending actions; and administer/supervise performance of work in a manner which shall minimize possibility of disputes, conflicts, delays, claims or losses.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

--END OF SECTION 01090--

SECTION 01105

HEALTH AND SAFETY

PART 1 - GENERAL

1.01 Description

The Contractor shall develop and implement a Health and Safety Plan to protect all site personnel including those of the Owner, Engineer, all site visitors, and the community. Compliance shall be strictly adhered to and enforced by the Contractor.

This section describes the minimum health and safety requirements for this project including the requirements for the development of a written Health and Safety Plan (HASP) for the project site. The Contractor's HASP must comply with all applicable Federal and State regulations protecting human health and the environment from the hazards posed by activities during this site remediation. The Contractor's HASP must be approved by a certified industrial hygienist. The HASP shall be submitted by the apparent low Bidder within 14 days from the date of Notice of Award letter. If the Contractor is awarded the contract, the HASP will be reviewed by the Engineer and the Owner for consistency with the HASP contained in the approved Remedial Design Report. This review does not relieve the Contractor of any responsibility for compliance with all applicable health and safety regulations. The Contractor will resubmit the HASP, addressing all review comments from the Engineer and the Owner, and NYSDOH. The Contractor shall not initiate onsite work in contaminated areas until an approved HASP addressing all comments has been issued. All onsite workers must comply with the requirements of the HASP.

Consistent disregard for the provision of these Health and Safety specifications shall be deemed just and sufficient cause for immediate stoppage of work and/or termination of the Contract or any subcontract without compromise or prejudice to the rights of the Owner.

Any discrepancies between this HASP and the specifications shall be resolved in favor of the more stringent requirements as determined by the Engineer.

1.02 Basis

The Occupational Safety and Health Administration (OSHA) Standards and Regulations contained in Title 29, Code of Federal Regulations, Parts 1910 and 1926 (20 CFR 1910 and 1926) and subsequent additions and/or modifications, the New York State Labor Law Section 876 (Right-to-Know Law), United States Coast Guard Standards and Regulations, and the Standard Operating Safety Guidelines by the United States Environmental Protection Agency (USEPA), Office of Emergency and Remedial Response provides the basis for the safety and health program. Additional specifications within this section are in addition to OSHA regulations and reflect the positions of both the USEPA and the National Institute for Occupational Safety and Health (NIOSH) regarding procedures required to ensure safe operations at abandoned hazardous waste disposal sites.

The safety and health of the public and project personnel and the protection of the environment will take precedence over cost and schedule considerations for all project work. Any additional costs will be considered only after the cause for suspension of operations is addressed and work is resumed. The Engineer and the Contractor's Superintendent will be kept appraised, by the Safety Officer, of conditions which may adversely affect the safety and health of project personnel and the community. The Owner and the Engineer may stop work for health and safety reasons. If work is suspended for health and/or safety reasons, it shall not resume until approval is obtained from the Owner and the Engineer. The cost of work stoppage due to health and/or safety shall be borne entirely by the Contractor.

1.03 Definitions

The following definitions shall apply to the work of this Contract:

A. Project Personnel: Project personnel include the Owner, Engineer, Contractor, Subcontractors, and Federal and State Representatives working or having official business at the Project Site(s).

B. Authorized Visitor: Visitors shall be prepared by the Contractor. Authorized visitors who work for the State of New York shall receive approval to enter the site. The Safety Officer has primary responsibility on determining who is qualified and may enter the site.

C. Health and Safety Coordinator (HSC): The HSC shall be a Certified Industrial Hygienist (CIH) or Certified Safety Professional (CSP) retained by the Contractor. The HSC will be responsible for the development and implementation of the HASP.

D. Safety Officer (SO): The SO will be the Contractor's onsite person who will be responsible for the day-to-day implementation and enforcement of the HASP. The SO cannot also perform as the Contractor's site superintendent.

E. Health and Safety Technicians (HST): The HST(s) will be the Contractors onsite personnel who will assist the SO in the implementation of the HASP, in particular, with air monitoring in active work areas and maintenance of safety equipment. One HST shall be present for each site. The HST cannot also perform as the Contractor's site superintendent.

F. Medical Consultant (MC): The Medical Consultant is a physician retained by the Contractor who will be responsible for conducting physical exams as specified under the Medical Monitoring Programs in this section.

G. Project Site: The area designated on the Drawings which includes the Contractor Work Area. The total project includes two project sites: the Cherry Farm and the River Road Sites.

H. Contractor Work Area: An area of the project site including Support Zone, access road, staging area and Exclusion Zone.

I. Contractor Support Zone: An area of the Contractor Work Area outside the Exclusion Zone, accessible for deliveries and visitors. No persons, vehicles or equipment may enter these areas from the Exclusion Zone without having gone through specified decontamination procedures in the adjacent Contamination Reduction Zone.

J. Staging Areas: Areas within the Exclusion Zone for the temporary staging of contaminated soil and debris.

K. Exclusion Zone: An area within the Contractor Work Area which encloses the area of contamination. Protective clothing and breathing apparatus as specified in the health and safety requirements and in the Contractor's approved Health and Safety Plan must be worn.

L. Contamination Reduction Zone: An area at the Exit Point of the Exclusion Zone through which all personnel, vehicles and equipment must enter and exit. All decontamination of vehicles and equipment and removal of personnel protective clothing and breathing apparatus must take place in the Contamination Reduction Zone.

M. Monitoring: The use of direct reading field instrumentation to provide information regarding the levels of gases and/or vapor, which are present during remedial action. Monitoring shall be conducted to evaluate employee exposures to toxic materials and hazardous conditions.

1.04 Responsibilities:

The Owner and the Engineer will review modifications to the HASP for the acceptability for its personnel and the impact on the site and human health.

Contractor:

The Contractor will perform all work required by the Contract Documents in a safe and environmentally acceptable manner. The Contractor will provide for the safety of all Project Personnel and the community for the duration of the Contract.

The Contractor shall:

A. Employ a Safety Officer for the project who shall be assigned full-time responsibility for all tasks described under the Health and Safety Plan. In the event the Health and Safety Officer cannot meet his responsibilities, the Contractor shall be responsible for obtaining the services of an "alternate" Health and Safety Officer meeting the minimum requirements and qualifications contained within these plans. No work will proceed on this project in the absence of an approved Health and Safety Officer.

B. Employ a Health and Safety Technician (HST) for the project who will assist the SO in implementing the HASP.

C. Ensure that all Project Personnel have obtained the required physical examination prior to and at the termination of work covered by the contract in accordance with OSHA 1910.120 regulations.

D. Responsibility for the pre-job indoctrination of all Project Personnel with regard to the Safety Plan and other safety requirements to be observed during work, including but not limited to: (1) potential hazard, (2) personal hygiene principles, (3) personal protection equipment, (4) respiratory protection equipment usage and fit testing, and (5) emergency procedures dealing with fire and medical situations.

E. Responsibility for the implementation of this Health and Safety Plan, and the Emergency Contingency Plan and Response Plan.

F. Provide and ensure that all Project Personnel are properly clothed and equipped and that all equipment is kept clean and properly maintained in accordance with the manufacturer's recommendations or replaced as necessary.

G. Alert appropriate emergency services before starting any hazardous work and provide a copy of the Emergency Contingency Plan to the respective emergency services.

H. Have sole and complete responsibility of safety conditions for the project including safety of all persons (including employees).

I. Be responsible for protecting the project personnel and the general public from hazards due to the exposure, handling, and transport of contaminated materials. Barricades, lanterns, roped-off areas, and proper signs shall be furnished in sufficient amounts and locations to safeguard the project personnel and public at all times.

J. Ensure all OSHA health and safety requirements are met.

K. Maintain a chronological log of all persons entering the project site. It will include organization, date, and time of entry and exit. Each person must sign in and out.

L. Post the work zone with signs reading "Warning, Hazardous Work Area, Do Not Enter

Unless Authorized," and restrict access by the use of temporary and/or permanent fencing. Warning signs shall be posted on marine equipment (barges).

M. Brief all approved visitors to the site on safety and security, provide with temporary identification and safety equipment, and escort throughout their visit.

N. Post sign and provide notifications as specified by the United States Coast Guard requirements.

PART 2 - HEALTH AND SAFETY PLAN

2.01 Health and Safety Plan

The Health and Safety Plan (HASP) is a deliverable product of this project and shall be submitted within 14 days from the date of Notice of Intent letter. The Contractor shall prepare a HASP, have it approved by a certified industrial hygienist. If awarded the contract, the Engineer and the Owner will review and comment on the Contractor's HASP. Agreed upon responses to all comments will be incorporated into the final copy of the HASP. The HASP shall govern all work performed for this contract. The HASP shall address, at a minimum, 29 CFR 1910.120 (B)(4).

2.02 Personnel Hygiene and Decontamination

The Contractor shall provide a hygiene facility at each site. The hygiene facility shall include the following:

A. Hand washing facilities for project personnel complete with hot water, soap, paper towels, and mirror;

B. Areas for changing into and out of work clothing. Work clothing should be stored separately from street clothing;

C. Clean and "dirty" locker facilities;

D. Disposal of spent clothing material;

E. Portable "boot wash" decontamination equipment. Clean water shall be provided no less than twice per day; and

F. First aid kit including a portable eye wash station.

2.03 Equipment Decontamination

General:

1. All equipment and material used in this project shall be thoroughly washed down in accordance with established Federal and State procedures before it is removed from the project. The cost for this element of work shall be incorporated in the lump sum bid for mobilization/demobilization or as otherwise directed on this project.

2. All vehicles and equipment used in the "Dirty Area" will be decontaminated to the satisfaction of the Safety Officer in the decontamination area on site prior to leaving the project. The Contractor will certify, in writing, that each piece of equipment has been decontaminated prior to removal from the site.

3. Decontamination shall take place within the designated equipment and materials decontamination area. The Contractor shall provide suitable wind barriers. The decontamination shall consist of degreasing (if required), followed by high-pressure, hot water cleaning, supplemented by detergents as appropriate. Wash units shall be portable

high-pressure with a self-contained water storage tank and pressurizing system (as required). Each unit shall be capable of heating wash waters to 180 degrees and providing a nozzle pressure of 150 psi.

4. Personnel engaged in vehicle decontamination will wear Level C Protective clothing and equipment. If the Contractor cannot or does not satisfactorily decontaminate the tools or equipment at the completion of the project, the Contractor will dispose such and will bear the cost of such tools and equipment and its disposal without any liability to the Owner. At the completion of the project the Contractor shall completely decontaminate and clean the decontamination area.

2.04 Air Monitoring Program

A. The Contractor shall develop as part of the HASP, an Air Monitoring Program (AMP). The purpose of the AMP is to determine the proper level of personnel protective equipment to be used, to document that the level of worker protection is adequate and to assess the migration of contaminants to offsite receptors as a result of site work.

B. The Contractor shall supply all personnel, equipment, facilities and supplies to develop and implement the Air Monitoring Program described in this section.

C. The Contractor's AMP shall include real-time air monitoring.

   1. The purpose of real-time monitoring will be to determine if an upgrade (or downgrade) of personnel protective equipment is required while performing onsite work and to implement engineering controls, protocols or emergency procedures if Contractor established action levels are encountered.

D. During the progress of active remedial work, the Contractor will monitor the quality of the air in and around each active hazardous operation with real-time instrumentation prior to personnel entering these areas. Sampling at the hazardous work site will be conducted on a periodic basis. Any departures from general background will be reported prior to personnel entering a confined area to the Safety Officer who will determine when and if operations should be shut down.

E. Air monitoring equipment will be operated by personnel trained in the use of the specific equipment provided and will be under the control of the Safety Officer. A log of the location, time, type and value of each reading and/or sampling will be maintained. Copies of log sheets will be provided, as generated, to the Engineer.

F. Real-Time Air Monitoring:

   1. Real-time air monitoring shall be conducted using the following equipment:

      - Volatile organics shall be measured using a photoionizaton detector, or equal. The instrument shall be calibrated once daily using measures in the users manual.

   2. Real-time monitoring will also be conducted at the work area exclusion zone at a minimum of four locations including one upwind (background) and three downwind locations. A background reading will be established daily during all intrusive activities at the beginning of the work shift. If the wind direction changes during the course of the day, a new background reading will be made. Downwind readings at the exclusion zone perimeter will be made when action levels have been exceeded at the excavation, or a minimum of twice a day.

3. If the level of VOCs at the downwind site perimeter is 5 ppm above background levels measured upwind from the work area, then all work must be suspended and engineering controls must be implemented to bring concentrations back down to acceptable levels.

   If the organic vapor level decreased below 5 ppm above background, work activities can resume. If the organic vapor levels are greater than 5 ppm over background but less than 25 ppm over background at the perimeter of the work area, activities can resume provided:

   - the organic vapor level 200 feet downwind of the work area or half the distance to the nearest residential or commercial structure, whichever is less, is below 5 ppm over background; and

   - more frequent intervals of monitoring, as directed by the Safety Officer, are conducted.

4. Dust emissions are not anticipated due to the nature of dredge spoils (wet/moist sediment). If sediments are allowed to dry during the course of filling the spoils pit, real-time dust monitoring shall be instituted as follows:

   If the level of airborne particulates at the downwind site perimeter exceeds the action level of 150 ug/m^3 that is established in the NYSDEC Technical and Administrative Guidance Memorandum HWR.89-4031 entitled "Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Sites", then all work must be suspended and engineering controls such as water spray or dust suppressants must be implemented to bring concentrations back down to acceptable levels. No visible dust from exposed waste areas will be permitted.

G. Meteorology:

   The contractor shall maintain hourly records on wind direction and temperature, during work hours.

H. Explosive Gas Monitoring:

   The Contractor shall monitor for explosive gases in all enclosed spaces (i.e. excavations) prior to work in those areas.

2.05 Site Specific Information

For preparation of the HASP required as part of the bid, the following tables are included as attachments:

- Air Monitoring Data Results from E.O. Watts Engineers
- Sediment Analytical Data

2.06 Reporting

A The Contractor shall maintain and submit to the Engineer on a daily basis, a daily health and safety report which summarizes the following:

1. Work performed;
2. Level of protection;
3. Real-time air monitoring results;

4. Safety related problems; and

5. Corrective actions implemented.

B. The Contractor shall prepare a monthly report of all health and safety monitoring analysis and corrective measures. The monthly report will be provided to the Engineer no later than two weeks after the end of each month during work involving exposure to wastes. The report shall include all analytical results and maps depicting sampling and work locations, wind direction, date and time of sampling and monitoring, and action limits. The report shall also include any information regarding the use/implementation of engineering controls to reduce emission and exposure levels.

END OF SECTION 01105

SECTION 01201

PRECONSTRUCTION CONFERENCE

PART 1 - GENERAL

1.01 General

A. Date, Time, and Location: Conference will be held after exectuion of the Contract and before construction is started at the site. Engineer will fix the date, time, and location of the meeting in accordance with requirements of the General Conditions.

B. Engineer shall prepared agenda, preside at meeting, and prepare and distribute a transcript of proceedings to all parties.

C. Contractor(s) shall provide data required, contribute appropriate items for discussion, and be prepared to discuss all items on agenda.

1.02 Required Attendance

A. Contractor(s) and major Subcontractors.

B. Owner's representative.

C. Engineer.

D. Representatives of government agencies having any degree of control or responsibility, if available. NYSDEC shall be informed about the preconstruction conference at least 5 days in advance.

1.03 Agenda

A. Agenda will include but not necessarily be limited to, the following:

1. Designation of responsible personnel.
2. Subcontractors.
3. Coordination with other contractors.
4. Construction schedule.
5. Processing of Shop Drawings.
6. Processing of field decisions and Change Orders.
7. Requirements for copies of Contract Documents.
8. Insurance in force.
9. Schedule of Values.
10. Schedule of Payments.
11. Use of premises.
12. Contractor(s) responsibility for safety and first aid procedures.
13. Security.
14. Housekeeping.
15. Field Offices.
16. Record of Drawings.

--END OF SECTION 01201--

SECTION 01202

PROGRESS MEETINGS

PART 1 - GENERAL

1.01 General

A. Date and Time:

1. Regular Weekly Meetings: As mutually agreed upon by Engineer and Contractor.
2. Other Meetings: On call.
3. The NYSDEC shall be notified 48 hours in advance of any progress meetings.

B. Place: Engineer's office at Project site or other mutually agreed upon location.

C. Engineer shall prepare agenda, preside at meetings, and prepare and distribute a transcript of proceedings to all parties.

D. Contractor shall provide data required and be prepared to discuss all items on agenda.

1.02 Minimum Attendance

A. Contractor(s), Subcontractors, and suppliers. Representatives present for each party shall be authorized to act on their behalf.

B. Engineer.

C. Owner's representative.

D. Others as appropriate.

1.03 Agenda

A. Agenda will include but not necessarily be limited to, the following:

1. Transcript of previous meeting.
2. Progress since last meeting.
3. Planned progress for next period.
4. Problems, conflicts, and observations.
5. Change Orders.
6. Applications for payment.
7. Quality standards and control.
8. Schedules, including off-site fabrication and delivery schedules. Corrective measures required.
9. Coordination between parties.
10. Safety
11. Other business.

--END OF SECTION 01202--

SECTION 01300

SUBMITTALS

PART 1 - GENERAL

1.01 Schedule of Submittals

A. The Contractor shall submit a preliminary schedule of Shop Drawings and submittals.

A. Schedule of Submittals: The Contractor shall prepare a detailed schedule of submittals 14 days after award of contract. The schedule shall show necessary submission dates for all shop drawings, samples, product data, etc.

1.02 Shop Drawings, Product Data and Samples

The Contractor shall coordinate submittals with the progress schedule and actual work progress. Allow two weeks for review by the Engineer. Provide additional copies as required by governing authorities.

A. Shop Drawings:

1. The Contractor shall submit to the Engineer for review, shop drawings, engineering information, product data, and samples, when requested, of all items of material and equipment as specified.

2. Initial Submittal: Submit six opaque blue/black line prints. One will be returned.

3. Final Submittal: After approval, submit six prints; with final submittal, include additional prints as necessary for job use and distribution. Maintain one print as a mark-up copy for the record drawings.

B. Product Data: Mark each copy to indicate the actual product to be provided; show selections from among options in the manufacturer's printed product data. Submit six copies to the Engineer. Where the product data are required for maintenance manuals, submit two additional copies which will be returned. Maintain one additional copy; at the project site for reference purposes.

Do not proceed with the installation of manufactured products until final review by the Engineer and until a copy of related product data is in the installer's possession at the project site.

C. Samples: Submit three sets of samples when requested; one set will be returned. Provide three or more samples in each set where variations in color, pattern or texture are observable; show average condition and extreme range of variations. Submit full documentation with each set. Sample submittals are for Engineer's observation of color, texture, pattern and "kind". Maintain returned set at project site for purposes of quality control comparisons.

D. Miscellaneous Submittals: Provide copies of miscellaneous submittals as follows:

1. Warranties: Submit two executed copies, plus additional copies as required for maintenance manual.

2. Operation and Maintenance Manuals: Submit two bound copies. Include information for all equipment and materials installed.

3. Record Drawings: Submit original maintained marked-up prints.

E. Engineer's Action:

Stamp: The Engineer will stamp each submittal to be returned with a uniform, self explanatory action stamp, appropriately marked and executed to indicate the status of the submittal.

The purpose of having schedules and shop drawings reviewed by the Engineer is to assist the Contractor in interpreting the Contract Drawings. The review given by the Engineer shall be considered as accomplishing this and shall not relieve the Contractor of any liability or responsibility for proper construction or compliance with the Contract Drawings and Detailed Specifications. Such schedules and shop drawings shall become part of the Contract Documents.

Do not combine items from different sections of the specification under common submittal; submit items of unlike disciplines separately.

A. Substitutions: See Specification 01630, Substitutions.

B. List of Submittals: Contractor's submittals shall include, but not be limited to the following:

Division 1

Section 01026 Schedule of Values

Section 01050 Field Engineering

01050-1 Daily Project Reports

01050-2 Surveyor and Engineer

Section 01055 Project Record Drawings

01055-1 Record Drawings

01055-2 Supplemental Record Drawings

Section 01105 Health and Safety Plan (HASP)

01105-1 HASP

01105-2 Health and Safety Reports

Section 01300 Submittals

01300-1 Progress Schedule

01300-2 Schedule of Submittals

Section 01310 Progress Schedule

01310-1 Progress Schedule

01310-2 Progress Report

01310-3 Method Statements

Section 01400 Quality Assurance and Quality Control Services

01400-1 Independent Testing Agency

01400-2 Inspection Reports

Section 01500 Temporary Facilities and Field Office

01500-1 Temporary Facilities Layout Drawings

Section 01564 Erosion Control

01564-1 Schedule

01564-2 Products Data

01564-3 Methods

Section 01700 Project Closeout

01700-1 Warranties, Maintenance Agreements, and Inspection Certificates

01700-2 Record Drawings

01700-3 Maintenance Manuals

Division 2

Section 02081 Underwater Waste Fill and Sediment Removal

02081-1 Dredging Plan

02081-2 Material Handling Plan

02081-3 Barge Wreck Removal Plan

02081-4 Turbidity Curtain Deployment Plan

02081-5 Turbidity Monitoring Plan

02081-6 Dock/Unloading Platform

Section 02131 Decontamination Pads and Equipment

02131-1 Product Data

02131-2 Fabrication, Assembly, and Installation Diagrams

02131-3 Operation Description

Section 02142 Construction Water Management

02142-1 Construction Water Management Plan

Section 02223 Backfilling

02223-1 Materials

02223-2 Test Reports

Section 02228 Compaction

02228-1 Description of Equipment and Methods

02228-2 Sample Materials to Laboratory

02228-3 Test Reports

Section 02260 Landfill Cover Construction

02260-1 Certified Quality Control Tests for Each Cover Soil Material

02260-2 Compaction Equipment

02260-3 List of Completed Projects

Section 02269 Quality Assurance/Quality Control Landfill Cover Soil Materials

02269-1 Quality Control Tests for Each Soil Material

Section 02275 Rip Rap

02275-1 Source of Stone

02275-2	Test Reports
Section 02421	Geotextiles
02421-1	Product Data
02421-2	Certificates
Section 02501	Gravel Paving
02501-1	Test Reports/Material Certificates
Section 02830	Chain Link Fencing and Gates
02830-1	Shop Drawings
02830-2	Product Data
Section 02990	Finish Grading, Topsoil, and Seeding
02990-1	Materials and Products
02990-2	Installer
02990-3	Certificates

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

-- END OF SECTION 01300 --

SECTION 01310

PROGRESS SCHEDULE

1. GENERAL

1.01 Scope

A. This section covers requirements for submission, approval, and updating of progress schedules and related documents.

1.02 Progress Schedule

A. The Contractor shall submit a preliminary Progress Schedule with the bid.

B. Fifteen (15) days before the date established for "commencement of the work", submit five (5) copies of a comprehensive progress schedule indicating a time bar for each significant category of work to be performed. Arrange schedule to indicate required sequencing and to show time allowances for submittals, inspections, weather allowances, and similar time margins. The schedule shall indicate the estimated dates for the start and completion of the various stages of the work and shall include information regarding man-loading and equipment-loading required to progress the work as shown. Following the initial revision of the schedule after the Engineer's review, print and distribute the schedule to concerned parties, including three (3) copies to the Engineer. The schedule shall be revised and redistributed as determined with each monthly pay requisition, subject to the Owner's approval, at intervals matching application for payment requests.

C. The Contractor shall revise and update his Plan of Operations and Progress Schedule whenever one of the following conditions apply:

(1) When delays in completion of any work item or sequence of work items results in an indicated extension of the Project completion by 10 working days or more.

(2) When delays in submittals or deliveries, or work stoppages are encountered which make replanning or rescheduling of the work necessary.

(3) When the schedule does not represent the actual production and progress of the Project.

D. The Contractor shall submit five (5) copies of the Progress Schedule and each revision to the Company for review.

1.03 Progress Report

A. The Contractor shall submit a progress report to the Company with each payment application. Each report shall include a description of the amount of progress during the past period in terms of completed activities in the Plan of Operation and Progress Schedule currently in effect, a description of problem areas, current and anticipated delay factors and their estimated impact on performance of other activities and completion dates, and an explanation of corrective actions taken or proposed. The progress report shall also include plans for the next period.

B. Five (5) copies of each progress report shall be submitted for review and record purposes.

C. If at any time it appears to the Engineer that the rate of progress of the work being made is insufficient to insure completion of the Work by the scheduled completion date, the Authorized Representative may require the Contractor to take such steps as are necessary to insure completion as scheduled. Any additional costs incurred shall be the sole obligation of the Contractor.

1.04 Method Statements

A. The Contractor shall submit to the Company for review by the Company and Engineer, method statements indicating the Contractor's intended procedure for accomplishing each feature of the work. Method statements shall address:

(1) Key personnel

(2) Plans and equipment

(3) Work sequences

(4) Estimated rates of progress

(5) Levels of protection

B. Method statements shall be submitted to the Company at least fifteen (15) days prior to commencement of each feature of the work. Work shall not commence on any feature until approval of the corresponding method statement has been received in writing. Approval of the Contractor's method statement shall not relieve the Contractor of his obligations to perform the work in accordance with the Contract provisions.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

--END OF SECTION 01310—

SECTION 01341

SHOP DRAWINGS PROCEDURES

PART 1 - GENERAL

1.01 Description

A. Shop Drawing procedures shall conform to requirements of General Conditions and as described in this Section.

1.02 Procedure

A. Submit Shop Drawings to: Parsons Engineering Science, Inc., 180 Lawrence Bell Drive, Suite 100, Williamsville, New York 14221. Submit additional copy to the Resident Project Representative at address provided by Engineer.

B. A letter of transmittal shall accompany each submittal. If data for more than one Section of the Specifications is submitted, a separate transmittal letter shall accompany the data submitted for each Section.

C. A the beginning of each letter of transmittal, provide a reference heading indicating the following:

1. Owners Name _____
2. Project Name _____
3. Contract No. _____
4. Transmittal No. _____
5. Section No. _____

D. If a Shop Drawing deviates from the requirements of the Contract Documents, Contractor shall specifically note each variation in the letter of transmittal. The letter will also include reasons for the variation and associated credits.

E. All Shop Drawings submitted for review shall have a title block with complete identifying information satifactory to Engineer.

F. All Shop Drawings submitted shall bear the stamp of approval and signature of Contractor as evidence that they have been reviewed by Contractor. Submittals without this stamp of approval will not be reviewed by Engineer and will be returned to Contractor. The stamp shall contain the following minimum information:

Project Name: _____

Contractor's Name: _____

Date: _____

Item: _____

Specifications: _____

Section: _____

Page No.: _____

Para. No.: _____

Drawing No.: _____

Location: _____

Submittal No.: _____

Approved By: _____

G. A number shall be assigned to each submittal by Contractor starting with No. 1 and thence numbered consecutively. Resubmittals shall be identified by the original submittal number followed by the suffix "A" for the first resubmittal, the suffix "B" for the second resubmittal, etc.

H. Contractor shall initially submit to Engineer a minimum of five copies of all submittals that are on 8 1/2-inch by 11-inch or smaller sheets, and one unfolded sepia and two prints made from that sepia for all submittals on sheets larger than 8 1/2-inch by 11-icnh. The Resident Project Representative shall receive one copy only of each submittal which will be stamped "Preliminary - Not for Construction."

I. After Engineer completes his review, Shop Drawings will be marked with one of the following notations:

1. Reviewed - No Objection
2. Reviewed as Corrected
3. Revise and Resubmit
4. Rejected

J. If a submittal is acceptable, it will be marked "Reviewed - No Objection" or "Reviewed as Corrected". Two prints or copies of the submittal will be returned to Contractor.

K. Upon receipt of a submittal marked "Reviewed - No Objection" or "Reviewed as Corrected", Contractor may order, ship, or fabricate the materials included on the submittal, provided it is in accordance with the corrections indicated.

L. If a Shop Drawing marked "Reviewed as Corrected" has extensive corrections or corrections affecting other drawings or Work, Engineer may require that Contractor make the corrections indicated thereon and resubmit the Shop Drawings for record purposes. Such drawings will have the notation, "Reviewed as Corrected - Resubmit".

M. If a submittal is unacceptable, 2 copies will be returned to Contractor with one of the following notations:

a. "Revise and Resubmit"
b. "Rejected"

N. Upon return of a submittal marked "Revise and Resubmit", Contractor shall make the corrections indicated and repeat the initial approval procedure. The "Rejected" notation is used to indicate material or equipment that is not acceptable. Upon return of a submittal so marked, Contractor shall repeat the initial approval procedure utilizing acceptable material or equipment.

O. Any related Work performed or equipment instaled without an "Reviewed - No Objection" or "Reviewed as Corrected" Shop Drawing will be at the sole responsibility of the Contractor.

P. Shop Drawings shall be submitted well in advance of the need for the material or equipment for construction and with ample allowance for the time required to make delivery of material or equipment after data covering such is approved. Contractor shall assume the risk for all materials or equipment which are fabricated or delivered prior to the review of Shop Drawings. Materials or equipment will not be included in

periodic progress payments until review thereof has been obtained in the specified manner.

Q. Engineer will review and process all submittals promptly, but a reasonable time should be allowed for this, for the Shop Drawings being revised and resubmitted, and for time required to return the reviewed Shop Drawings to Contractor.

R. It is Contractor's responsibility to review submittals made by his suppliers and Subcontractors before transmitting them to the Engineer to assure proper coordination of the Work and to determine that each submittal is in accordance with his desires and that there is sufficient information about materials and equipment for the Engineer to determine compliance with the Contract Documents. Incomplete or inadequate submittals will be returned for revision without review.

S. Contractor shall furnish required submittals with complete information and accuracy in order to achieve required review of an item within three submittals. All costs to the Engineer involved with subsequent submittals of Shop Drawings, samples, or other items requiring review, will be backcharged to the Contractor, at the rate of 3.0 times direct technical labor cost, by deducting such costs from payments due the Contractor for Work completed. In the event that the Contractor requests a substitution for a previously approved item, all of the Engineer's costs in the reviewing and review of the substitution will be backcharged to the Contractor unless the need for such substitution is beyond the control of the Contractor.

--END OF SECTION 01341--

SECTION 01342

SAMPLES

PART 1 - GENERAL

1.01 Description

A. The submittal of Samples shall conform to the requirements of the General Conditions and to procedures described in this Section.

B. Samples and Shop Drawings which are related to the same unit of Work or Specification Section shall be submitted at the same time. If related Shop Drawings and Samples are submitted at different times, they cannot be reviewed until both are furnished to the Engineer.

1.02 Procedure

A. Contractor shall review, approve, and submit all Samples promptly. Samples shall be identified with correct reference to Specification Section, page, article and paragraph number, and Drawing Number when applicable. Samples shall clearly illustrate functional characteristics of the product and all related parts and attachments, and full range of color, texture, pattern, and material. Samples shall be furnished so as not to delay fabrication, allowing the Engineer reasonable time for the consideration of the Samples submitted.

B. Contractor shall submit at least three Samples of each item required for the Engineer's approval. Submission of Samples shall conform to all applicable provision under Shop Drawing Submittal and Correspondence Procedure. Two of the Sample shall be delivered to the Engineer's home office unless otherwise authorized by the Engineer. One Sample shall be delivered to the Engineer's field office. If the Contractor requires a Sample for his use, he shall notify the Engineer in writing.

C. The Contractor shall make all corrections required and shall resubmit the required number of new Samples until approved.

1.03 Job Mock-Ups

A. Job mock-ups (sample panels) shall be constructed on site by the Contractor and only one of each type will be required. Mock-ups shall be constructed only after the individual Samples and components used in the mock-up have been approved by the Engineer. If a mock-up is not approved, Contractor shall construct additional ones until approval is received.

B. Contractor shall store and protect large Samples and mock-ups until the Project is complete or until a time approved by the Engineer.

1.04 Samples for Tests

A. Contractor shall furnish such samples of materials as may be required for examination and test. All Samples of materials for tests shall be taken according to standard methods and as required by the Contract Documents.

--END OF SECTION 01342--

SECTION 01400

QUALITY ASSURANCE AND QUALITY CONTROL SERVICES

PART 1 - GENERAL

1.01 Description

A. The Engineer will execute a quality assurance and quality control (QA/QC) program as required by the Owner and these specifications. All excavation and earthwork related construction must be performed in the presence of the Engineer. The Contractor shall cooperate with the Engineer with sampling and testing as requested by the Engineer. The Contractor shall conform to all applicable requirements in the Construction Quality Assurance/Quality Control Plan prepared by Parsons Engineering Science, Inc., June 1995, revised November 1995. The data generated as part of the quality assurance and quality control program shall govern over data generated from the Contractor's required quality control program and any other test data.

B. Related work specified in other sections:

1. Section 01300 - Submittals
2. Section 02219 - Waste Excavation, Consolidation and Disposal
3. Section 02228 - Compaction
4. Section 02260 - Landfill Cover Construction
5. Section 02405 - Polyethylene Geomembrane

1.02 Testing

A. Engineer's Responsibilities: The Engineer shall provide and pay for QA/QC services for the following work items:

1. Sediment cap inspections using dive surveys to confirm limits and design of sediment cap areas.

B. Contractor's Responsibilities: The Contractor shall provide and pay for QC services for the following work items:

1. Tests required for the initial submittal and approval of all materials at the site.
2. Compaction testing for fill placement.
3. Other geotechnical testing for Landfill cover soil materials, as per Section 02269.
4. Turbidity testing of both the dredging area and the dredge water effluent.

C. The Contractor shall pay for repeat tests performed by the Engineer required because of the Contractor's negligence or failure to meet specification requirements.

1.03 Submittals

A. The Contractor shall submit the name and qualifications of independent test agencies to be used for this project.

B. The Contractor shall submit a certified written report of each inspection, test or similar service, in duplicate to the Engineer.

Report Data: Written inspection or test reports shall include:

1. Names of testing agency or test laboratory.

2. Dates and locations of samples, tests, or inspections.
3. Names of individuals present.
4. Complete inspection or test data.
5. Test results.
6. Interpretations.
7. Recommendations.

1.04 Coordination

A. The Contractor shall coordinate required tests with the Engineer and shall notify the Engineer a minimum of 24 hours in advance.

B. The Contractor shall allow a reasonable amount of time from the time samples are taken to obtain results from the Engineer.

C. The Engineer shall provide copies of all test results to the Contractor.

D. The Contractor shall cooperate with the Engineer and the testing laboratory to provide access to the work and to assist in obtaining samples.

E. The Contractor shall schedule his work to allow the required testing and shall not cover up work for which acceptable test results have not been received.

F. Inspection, sampling, and testing shall be as specified in other sections.

1.05 Measurement and Payment

No separate measurement or payment shall be made for work required under this section. All costs in connection therewith shall be considered incidental to the work under this Contract.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.01 Execution

Upon completion of inspection or testing, repair damaged work and restore substrates and finishes to original form.

-- END OF SECTION 01400 --

SECTION 01500

TEMPORARY FACILITIES AND FIELD OFFICE

PART 1 - GENERAL

1.01 Description of Requirements

A. Provide the necessary field offices, ancillary structures, sheds, utility services, and facilities for the workers to carry out the project work as specified. Install the temporary facilities to be ready for use when first needed to avoid delays in the work. Do not remove the facilities until no longer needed and removal is authorized by the Engineer. Usage charges for temporary facilities are to be paid by the Contractor. Temporary services shall be provided at each site.

1.02 Quality Assurance

A. Regulation: Comply with requirements of local laws and regulations governing construction and local industry standards, in the installation and maintenance of temporary services and facilities.

B. Standards: Comply with the requirements of NFPA Code 241, "Building Construction and Demolition Operations", the ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition", and the NECA National Joint Guideline NJG-6 "Temporary Job Utilities and Services".

PART 2 - PRODUCTS

2.01 Submittals

The Contractor shall submit drawings within ten days following Notice of Award and prior to commencing work to the Engineer for approval, showing the layout, furnishings, and facilities of the field office trailer and information concerning how the Contractor proposes to furnish the required utilities.

PART 3 - EXECUTION

3.01 Utility Installation

Engage the local utility company to install temporary service or make connections to existing service, if available. Arrange with the Owner for an acceptable time when service can be interrupted to make connections. The Contractor shall obtain and pay for permits and construction required to bring temporary utilities to each site.

A. Electric Power Service: Comply with applicable requirements of NEMA, NECA and UL standards and governing regulations.

B. Temporary Telephones: Install telephones for the Engineer's field offices. Separate telephone service shall be provided for Engineer and Contractor. Post a list of operational and emergency telephone numbers.

3.02 Temporary Construction and Support Facilities Installation

A. Engineer's Field Offices: Provide standard prefabricated or mobile units, or the equivalent job-built field offices, of at least 500 square feet for the Engineer at the site.

1. The office shall be adequately heated, well lighted, suitably ventilated, and cooled with a refrigerated-type air conditioning unit, complete with all piping and electrical connections. An adequate supply of cold drinking water shall be furnished and maintained. Steps and landings shall be provided.

2. The office shall be provided with following items:

1 - fire extinguisher
1 - locking file cabinet (4-drawer)
1 - first aid kit
1 - conference table
(3 ft. x 5 ft. minimum)
1 - full size desk and chair (for Engineer)
1 - full size desk and chair (for NYSDEC)
2 - shelves (3' x 1' minimum)
2 - waste baskets
1 - paper towel dispenser with towels (to be replenished by Contractor)
8 - chairs (folding or stackable)
1 - telephone answering machine with integral phone
1 - plain paper facsimile machine
1 - plans table
1 - copier capable of copies up to 11"x17" in size (with all needed supplies)
1 - water dispenser with hot and cold water outlets, integral refrigerator, and paper cup dispenser to be replenished by Contractor (separate refrigerator acceptable)
1 - vertical plan rack (22" x 36" minimum)

B. Sanitary Facilities: Sanitary facilities must be provided at each site and shall include temporary toilets, wash facilities and drinking water fixtures. Comply with governing regulations including safety and health codes for the type, number, location, operation and maintenance of fixtures and facilities. Contractor to empty waste baskets and perform general cleaning in and around the Engineer's Field Office weekly.

C. Temporary Enclosure: Provide temporary enclosure of materials, equipment, to provide protection from exposure, foul weather, other construction operations, and similar activities.

D. The Contractor shall pay for all utilities, including the Engineer's phone charges.

3.03 Collection and Disposal of Wastes

Establish a system for daily collection and disposal of waste materials. Dispose of waste material in a lawful matter. Burying or burning of waste materials on the site or washing waste material down sewers shall not be permitted.

3.04 Security and Protection Facilities Installation

Provide a neat, uniform appearance in security and protection facilities acceptable to the Owner and the Engineer. Maintain site in a safe, lawful and publicly acceptable manner.

A. Temporary Fire Protection: Comply with recommendations of NFPA Standard 10.

B. Barricades, Warning Signs and Lights: Comply with recognized standards and code requirements for erection of substantial barricades where needed to prevent accidents.

C. Security Enclosure and Lockup: Install substantial temporary or permanent enclosures of partially completed areas of construction. Provide locking entrances adequate to prevent unauthorized entrance, vandalism, theft and similar violations of project security.

D. Anchor temporary facilities, as required, to prevent possible roll over or tipping by winds.

3.05 Termination and Removal

Remove each temporary service and facility when need has ended and approval has been given by the Engineer.

At substantial completion, clean and renovate permanent services and facilities that have been used to provide temporary services and facilities during the construction period.

-- END OF SECTION 01500 --

SECTION 01540

SECURITY

PART 1 - GENERAL

1.01 Description

A. Contractor shall safely guard all Work, materials, equipment, and properly from loss, theft, damage, and vandalism. Contractor's duty to safely guard property shall include the Owner's property and other private property from injury or lost in connection with the performance of the Contract.

B. He shall employ watchmen as needed to provide the required security and prevent unauthorized entry.

C. Contractor may make no claim against the Owner for damage resulting from trespass.

D. Contractor shall make good all damage to property of Owner and others arising from failure to provide adequate security.

E. If existing fencing or barriers are breached or removed for purposes of construction, Contractor shall provide and maintain temporary security fencing equal to the existing in a manner satisfactory to the Engineer and Owner.

F. Maintain security program throughout construction until Owner's acceptance and occupancy precludes need for Contractor's security program.

--END OF SECTION 01540--

SECTION 01545

PROTECTION OF THE WORK AND PROPERTY

PART 1 - GENERAL

1.01 Description

The Work specified in this Section consists of the labor, equipment, tools, materials, and services needed to provide complete protection of all existing facilities during construction operations.

A. Work included in this Section:

1. Location of Facilities.
2. Notification of Owners and Authorities.
3. Coordination and Preparation.
4. Protection of Facilities.
5. Relocation of Facilities.
6. Protection of Sewers and Existing Storm Water Conveyance Structures.
7. Restoration of Property Markers.
8. Protection of Historic Structures

B. Related work specified in other Sections:

1. Section 01500 - Temporary Facilities and Field Office
2. Section 02222 - Excavation
2. Section 02990 - Finish Grading, Topsoil, and Seeding

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.01 Location of Facilities

A. Prior to construction, verify location of existing underground facilities near or adjacent to project.

1. Consult with owners of facilities and arrange for field stake-out or other markings to show locations.
2. Perform exploratory excavation at key junctures and other critical points to aid in ascertaining locations.

B. Report field stake-out findings and results of exploratory excavations to the Engineer if possible changes in project location or design are indicated because of suspected interferences with existing facilities. Allow the Engineer sufficient time to determine magnitude of changes and to formulate instructions in that regard.

C. If the location of existing underground facilities is uncertain, apply careful excavation and probing techniques during construction to locate and avoid damage to same.

3.02 Notifications of Owners and Authorities

A. Prior to construction, notify owners of existing facilities, including local Police and Fire Departments, of general scope, nature and planned progress schedule of the Work. Owners include Conrail, Clarence Materials, and Tonawanda Coke.

B. When existing utilities, such as sewer, water, gas, telephone or electric power are damaged or disturbed during construction, immediately notify affected owner, Project Owner, and the Engineer.

C. Notify Police and Fire Departments, including affected owners, immediately if hazardous conditions are created or have the potential for occurring, as a result of damage to an existing facilities or as a result of other activities at project site. Hazardous conditions could be created from: fire, explosion, escape of gas, escape of fuel oil, gasoline or industrial fluids, downed electrical wires, and disrupted underground electrical cables.

3.03 Coordination and Preparation

A. Make preparations beforehand to repair and restore damaged utilities, including arrangements for standby materials and equipment to be promptly assembled at site and utilized immediately.

3.04 Protection of Facilities

A. Plan and conduct construction operations so that operation of existing facilities near or adjacent to the Work, including electric, telephone, sewer, water, gas or dramage utilities, are sustained insofar as the requirements of the project will permit.

B. Protect existing facilities from damage or movement through installation of adequate support systems and use of proper equipment, including application of careful excavation and backfilling techniques in sensitive areas. The Tonawanda Coke pond area shall be protected during shoreline stabilization and grading work to prevent damage to pond structures.

C. In locations where blasting is to take place, provide special protection and support of underground facilities which may be vulnerable to damage by virtue of their physical location or condition, and which could create hazardous conditions if damaged.

D. Existing utilities and other facilities which are damaged by the Contractor's construction operations shall be promptly repaired by Contractor to the satisfaction of the utility owner or, if he so elects, the utility owner will perform the repairs with his own forces. Under either arrangement, such repair work shall be done at Contractor's expense.

E. When aboveground visible facilities such as poles, wires, cables, fences, signs or structures constitute an unavoidable interference, notify the Engineer and utility owner regarding temporary removal and later restoration of the interfering item. Arrange with the Engineer and utility owner to remove and later restore the interfering item to the satisfaction of the utility owner, subject to approval of the utility owner; or, allow the utility owner to perform such work with his own forces. Under either arrangement, such work shall be done at Contractor's expense.

F. Take all necessary precautions to prevent fires at or adjacent to the work, buildings, and other facilities. No burning of trash or debris is permitted. Fire extinguishers are to be easily accessible in case of equipment fires, etc. and are to be maintained as required by OSHA, they shall be recharged and in "new" condition when turned over to the Owner.

3.05 Relocation of Facilities

A. If the location or position of an existing gas pipe, water pipe, sewer, drain, conduit, or structure requires its removal, realignment or change, such alteration shall be without cost to the Contractor for the work of removal, provided the work was not included in the contract documents.

B. Uncovering, supporting and sustaining such facilities before its removal or before and after its realignment or change, shall be the Contractor's responsibility as part of the Work of this Contract.

C. Contractor shall be entitled to an extension of time for completion of entire Work if the Engineer determines that the entire Work was delayed by the removal, realignment or change of such obstruction.

3.06 Protection of Sewers and Stormwater Conveyance Structures

A. Maintain existing sumps, diversion, and other utility structures in their pre-work condition. Any material or debris entering same due to the Contractor's operation shall be promptly removed.

3.07 Restoration of Property Markers

A. Property corner markers, boundary monuments, etc., disturbed or moved by the Contractor's operation shall be restored, in conformance with the property deed description, by a licensed land surveyor. Restoration of the property corner markers or boundary monuments shall be certified by said surveyor on a map prepared by him which shows the work accomplished. One copy of the map shall be given to the property owner and one copy given to the Engineer.

3.08 Protection of Historic Structures

If a site is found to contain historic structures, they are not to be disturbed, damaged, or removed by the Contractor's operations. The Contractor shall limit his work operations to only the areas detailed on the Contract Drawings. Any subsurface structures or artifacts unearthed during the work shall be brought to the immediate attention of the Engineer.

-- END OF SECTION 01545 --

SECTION 01564

EROSION CONTROL

GENERAL

1.01 Description

The work specified in this section consists of the labor, equipment, tools, materials, and services needed to accomplish erosion control measures during and following construction as described herein or shown on the Contract Drawings.

A. Work included in this section:

1. Installation of sedimentation and erosion control barriers.
2. Anchoring all topsoil stockpiles with straw mulch and ringing with hay bales.
3. Inspection of all erosion control measures weekly, after each rainfall and at least daily during prolonged rainfall.
4. Repairing immediately any failed sedimentation and erosion control barrier.
5. Removing and disposing of sediment deposits in a manner that does not result in additional erosion or pollution.
6. Removal of hay bales or silt fences after completion of construction and permanent stabilization is complete.

B. Related work specified in other sections:

1. Section 02081 - Sediment Removal
2. Section 02222 - Excavation
3. Section 02223 - Backfilling
4. Section 02228 - Compaction
5. Section 02275 - Rip-Rap
6. Section 02421 - Geotextiles
7. Section 02990 - Finish Grading, Topsoil and Seeding

1.02 Performance Requirements

A. Observe government policy established by United States Environmental Protection Agency (USEPA) Memorandum 78-1.

B. Conform to all erosion and sedimentation control measures of the State of New York as specified in the Storm Water Management and Erosion Control Plan prepared by Parsons Engineering Science, June 1995.

C. Temporary erosion and sediment control measures shall be installed as the first step in construction, shall be continuously maintained, and shall not be removed until permanent cover is completely established and stabilized, with Engineer's approval.

1.03 Schedule

A. Taking into account specific constraints or other criteria outlined herein, the Contractor shall prepare a detailed schedule which sets forth his program of operations to effectively control

erosion and sediment-runoff at all times during construction and during the one-year guarantee period following completion of the work.

1. Two copies of the schedule shall be filed with the Engineer.
2. At least one copy shall be kept at the project site at all times, and shall be made available for examination by the Engineer.
3. The schedule shall be arranged so as to include:
   a. Chronological completion dates for each temporary (and permanent) measure for controlling erosion and sediment.
   b. Location, type and purpose for each temporary measure to be undertaken.
   c. Dates when those temporary measures will be removed.

1.04 Submittals

A. Product Data. Provide product data for each component to be used in erosion and sediment control.

B. Methods. Provide a description of and a plan showing implementation measures.

PART 2 PRODUCTS

2.01 Soil Erosion and Sediment Control Plan

The Contractor shall comply with the provisions of the Storm Water Management and Erosion Control Plan prepared by Parsons ES, June 1995.

2.02 Materials

A. Hay/Straw Bales
   1. Shall be securely tied and measure, at a minimum, 14 inches by 18 inches by 30 inches long (14" x 18" x 30") or greater.

B. Geotextile
   1. Reinforcement geotextile as specified in Section 02421.
   2. Silt fence shall be constructed using prefabricated 24-inch height units with 4-foot spacing stakes.

C. Stakes and Fasteners
   1. Shall be two #3 rebar or two 2-inch by 2-inch hardwood stakes for each hay/straw bale.
   2. Shall be a 2-inch by 2-inch by 36-inch hardwood post or Standard T or U section steel posts weighing not less than 1.33 pounds per linear foot for silt fences.

D. Erosion Control Fabric
   1. North American Green Type 575 or equal shall be used.

E. Oil Sorbents
   1. Booms - New Pig Spaghetti Boom or equal shall be used.
   2. Socks - New Pig Skimmer Socks or equal shall be used.

2.03 Methods

A. Sediment Barriers - Sediment barriers shall be hay or straw bales, stone, silt fences or other approved materials that will prevent migration of silts and sediment to receiving waters.

B. Diversion Terraces - Diversion terraces shall be installed on the uphill side of the disturbed areas to divert surface runoff away from unstabilized slopes.

C. Interceptor Channels - Interceptor channels shall be installed across disturbed areas where the slope is running parallel to the direction of trenches.

D. Oil Sorbent Booms/Socks. Oil sorbent booms/socks shall be installed to contain oil sheens emanating from waste materials.

PART 3 EXECUTION

3.01 General Requirements

A. It is the Contractor's responsibility to implement and maintain erosion and sedimentation control measures which effectively prevent accelerated erosion and sedimentation.

B. Earthmoving activities shall be conducted in such a manner as to prevent accelerated erosion and sedimentation.

C. All erosion and sedimentation control measures shall be inspected by the Contractor immediately after each rainfall and at least daily during prolonged rainfall.

1. Repair and/or maintenance of sedimentation and erosion control measures will be made as soon as needed.

2. The Contractor shall be held responsible for the implementation and maintenance of all erosion control measures on this site.

D. Land disturbance shall be kept to a minimum.

1. Restabilization shall be scheduled immediately after any disturbance.

E. Silt fences or hay bales shall be installed at the toe of all critical cut and fill slopes.

F. Catch basins (sumps) shall be protected with silt fences or hay bales throughout the construction sequence and until all disturbed areas are stabilized.

G. Erosion and sedimentation control measures shall be installed prior to all construction activities.

H. Sediment removal from temporary control structures and from permanent drainage facilities shall be the responsibility of the Contractor.

1. Sediment shall be disposed of in a manner which is consistent with overall intent of the plan and which does not result in additional erosion.

I. The erosion and sedimentation control measures described herein are intended as a general guide for the Contractor.

1. It is the Contractor's responsibility to provide any and all work necessary to prevent erosion of soil from the construction site and to provide silt fences, hay bales or other control measures as the need arises during construction at no additional cost to the Owner.

J. Remove all sedimentation and erosion control barriers after completion of construction and permanent stabilization of erosion.

K. Prior to installation of erosion control fabric, the underlying layer is to be graded as shown on the Contract Drawings and as specified in other sections.

3.02 Diversion Terraces

A. Diversion terraces shall be used as a temporary measure installed on the uphill side of the disturbed areas to divert surface runoff away from unstabilized slopes, and the project area.

3.03 Interceptor Channels

A. Interceptor channels shall be used across disturbed areas where the slope is running parallel to the direction of trenches.

B. Interceptor channels reduce erosion by intercepting storm runoff and diverting it to outlets on the lower side of the disturbed area where it can be disposed of having minimum erosion impact.

3.04 Trench Barriers

A. Trench barriers shall be used where the disturbed area is sloped in the direction of required piping, when the slope exceeds 15 percent.

B. Trench barriers shall be earth-filled sacks or piled stone, stacked to the top of the trench after installation of piping and prior to backfill, if backfill is delayed.

C. Trench barriers shall act as an erosion check by preventing the washout of the trench.

3.05 Sediment Barriers

A. Sediment barriers shall be used at storm drain sumps; across minor swales and ditches; and at other applications where the structure is of a temporary nature and structural strength is not required.

1. Sediment barriers are temporary berms, diversions, or other barriers that are constructed to retain sediment onsite by retarding and filtering storm runoff.

B. Recommended Materials and Dimensions shall be as specified in Section 2.02 of this specification.

3.06 Oil Sorbent Booms/Socks

A. Oil sorbent booms/socks shall be utilized to contain oil sheens emanating from waste materials.

3.07 Special Conditions

Prohibited Construction Practices - Prohibited construction practices include but shall not be limited to the following:

1. Dumping of spoil material into any stream corridor, any wetlands, any surface waters or at unspecified locations.
2. Indiscriminate, arbitrary or capricious operation of equipment in any stream corridors, any wetlands or any surface waters.
3. Pumping of silt-laden water from trenches or other excavations into any surface waters, any stream corridors or any wetlands.
4. Disposal of trees, brush and other debris in any stream corridors, any wetlands, any surface water or at unspecified locations.
5. Permanent or unspecified alteration of the flow line of any stream.
6. Open burning of construction project debris.

3.08 Adjustment of Practices

1. If the planned measures do not result in effective control of erosion and sediment runoff to the satisfaction of the regulatory agencies having jurisdiction over the project, the Contractor shall immediately adjust his program and/or institute additional measures so as to eliminate excessive erosion and sediment-runoff.
2. If the Contractor fails or refuses to comply promptly, the Engineer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of

the time lost due to any such stop orders shall be made the subject of a claim for extension of time or for excess costs or damages by the Contractor.

-- END OF SECTION 01564 --

SECTION 01600

MATERIAL AND EQUIPMENT

PART 1 GENERAL

1.01 Section Includes:

A. Products

B. Preparation for Shipment

C. Packaging and delivery of spare parts and special tools

D. Shipment and handling

E. Inspection

F. Storage and protection

G. Inventory control

H. Products options

I. Products list

J. Substitutions

K. Systems demonstration

1.02 Related Sections

A. Section 01400 - Quality Control/Quality Assurance Services.

1.03 Products

A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components required for reuse.

B. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.

C. Materials and equipment to be provided under this contract shall be standard catalogue products of manufacturers regularly engaged in the manufacture of the products and shall duplicate material and equipment in satisfactory service for a 5 year minimum.

D. Material and equipment shall meet the requirements of the contract and shall be suitable for the installation. Where two or more units of the same equipment class are furnished, the equipment shall be from the same manufacturer and shall be interchangeable. Materials and equipment shall be new and free from defects.

E. Material and equipment shall be installed in accordance with the requirements of the contract drawings and approved recommendations of the manufacturers.

1.04 Preparation for Shipment

A. When practical, equipment shall be factory assembled. The equipment parts and assemblies that are shipped unassembled shall be furnished with an assembly plan and instructions. The separate parts and assemblies shall be match-marked or tagged in a manner to facilitate field assembly.

B. Generally, machined and unpainted parts subject to damage by the elements shall be projected with an application of a strippable protective coating.

C. Equipment shall be packaged or crated in a manner that will provide protection from damage during shipping, handling, and storage.

D. The outside of the package or crate shall be adequately marked or tagged to indicate its contents by name and Equipment number, if applicable; approximate weight; any special precautions for handling; and the recommended requirements for storage prior to installation.

1.05 Packaging and Delivery of Spare Parts and Special Tools

A. Spare parts and special tools shall be properly marked to identify the associated equipment by name, equipment, and part number. Parts shall be packaged in a manner for protection against damage from the elements during shipping, handling, and storage. Spare parts and special tools shall be shipped in boxes that shall be marked to indicate the contents. Delivery of spare parts and special tools shall be made prior to the time the associated equipment is scheduled for the initial test run.

1.06 Shipment and Handling

A. Shipments shall be addressed to the Contractor who shall be responsible for their receipt, unloading, handling, and storage at the site. The Owner will not accept deliveries on behalf of the Contractor or his subcontractors or assume responsibility for security of materials, equipment, or supplies delivered to the site.

B. Transport and handle products in accordance with manufacturer's instructions.

C. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

D. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.07 Inspection

A. Immediately upon receipt of equipment and materials at the job site, the Contractors shall inspect for completeness and any evidence of damage during shipment. Should there appear to be any damage, the Engineer shall be immediately notified, and the Contractor shall be responsible for informing the manufacturers and the transportation company of the extent of damage. If the items or items require replacing, the Contractors shall take the necessary measures to expedite the replacement.

1.08 Storage and Protection

A. Store products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight enclosures; maintain within temperature and humidity ranges required by manufacturer's instructions.

B. For exterior storage of fabricated products, place on sloped supports above ground. Cover products subject to deterioration with impervious sheet covering; provide ventilation to avoid condensation.

C. Store loose granular materials on solid surfaces in a well-drained area; prevent mixing with foreign matter.

D. Arrange storage to provide access for inspection. Periodically inspect to assure products are undamaged, and are maintained under required conditions.

1.09 Inventory Control

A. Equipment and materials shall be stored in manner to provide easy access for inspection and inventory control. The Contractor shall keep a running account of all materials in storage to facilitate inspection and to estimate progress payments for materials delivered but not installed in the work.

1.10 Product Options

1.11 Products List

A. Within 30 days after date established in Notice to Proceed, submit a complete list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.

1.12 Substitutions

1.13 Systems Demonstration

A. Prior to final inspection, demonstrate operation of each system to Engineer and Owner.

B. Instruct Owner's personnel in operation, adjustment, and maintenance of equipment and systems, using the operation and maintenance data as the basis of instruction.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

--END OF SECTION 01600--

SECTION 01610

TRANSPORTATION AND HANDLING OF MATERIALS AND EQUIPMENT

PART 1 - GENERAL

1.01 Description

A. Contractor shall make all arrangements for transportation, delivery, and handling of equipment and materials required for prosecution and completion of the Work.

B. Shipments of materials to Contractor or Subcontractors shall be delivered to the site only during regular working hours. Shipments shall be addressed and consigned to the proper party giving name of Project, street number, and city. Shipments shall not be delivered to Owner except where otherwise directed.

C. If necessary to move stored materials and equipment during construction, Contractor shall move or cause to be moved materials and equipment without nay additional compensation.

1.02 Delivery

A. Arrange deliveries of products in accord with construction schedules and in ample time to facilitate inspection prior to installation.

B. Coordinate deliveries to avoid conflict with Work and conditions at site and to accommodate the following:

1. Work of other Contractors, or Owner.
2. Limitations of storage space.
3. Availability of equipment and personnel for handling products.
4. Onwer's use of premises.

C. Do not have products delivered to project site until related Shop Drawings have been approved by the Engineer.

D. Do not have products delivered to site until required storage facilities have been provided.

E. Have products delivered to site in manufacturer's original, unopened, labeled containers. Keep Engineer informed of delivery of all materials to be incorporated in the Work.

F. Partial deliveries of component parts of equipment shall be clearly marked to identify the equipment, to permit easy accumulation of parts, and to facilitate assembly.

G. Immediately on delivery, inspect shipment to assure:

1. Product complies with requirements of Contract Documents and reviewed submittal.
2. Quantities are correct.
3. Containers and packages are intact, labels are legible.
4. Products are properly protected and undamaged.

1.03 Product Handling

A. Provide equipment and personnel necessary to handle products, including those provided by Owner, by methods to prevent soiling or damage to products or packaging.

B. Provide additional protection during handling as necessary to prevent scraping, marring, or otherwise damaging products or surrounding surfaces.

C. Handle products by methods to prevent bending or overstressing.

D. Lift heavy components only at designated lifting points.

E. Materials and equipment shall at all times be handled in a safe manner and as recommended by manufacturer or supplier so that no damage will occur to them. Do not drop, roll, or skid products off delivery vehicles. Hand carry or use suitable materials handling equipment.

--END OF SECTION 01610--

SECTION 01615

STORAGE OF MATERIAL

PART 1 - GENERAL

1.01 Description

A. Store and protect materials in accordance with manufacturer's recommendations and requirements of Specifications.

B. Contractor shall make all arrangements and provisions necessary for the storage of materials and equipment. All excavated materials, construction equipment, and materials and equipment to be incorporated into the Work shall be placed so as not to injure any part of the Work or existing facilities and so that free access can be had at all times to all parts of the Work and to all public utility service company installations in the vicinity of Work. Materials and equipment shall be kept neatly and compactly stored in locations that will cause a minimum of inconvenience to other contractors, public travel, adjoining owners, tenants, and occupants. Arrange storage in a manner to provide easy access for inspection.

C. Areas available on the construction site for storage of material and equipment shall be as shown or approved by the Engineer.

D. Materials and equipment which ar to become the property of the Owner shall be stored to facilitate their inspection and insure preservation of the quality and fitness of the Work, including proper protection against damage by freezing and moisture. They shall be placed in inside storage areas unless otherwise acceptable to Owner.

E. Field, grass plots, or other private property shall not be used for storage purposes without written permission of the Owner, or other person in possession or control of such premises.

F. Contractor shall be fully responsible for loss or damage to stored materials and equipment.

G. Do not open manufacturers containers until time of installation unless recommended by the manufacturer or otherwise specified.

1.02 Uncovered Storage

A. The following types of materials may be stored out-of-doors without cover:

1. Masonry units.
2. Piping.
3. Precast concrete items.

B. Store the above materials on wood blocking so there is no contact with the ground.

1.03 Covered Storage

A. Rough lumber may be stored out-of-doors if covered with tarps or covers which are impervious to water. If stored on wood blocking, tie down covers with rope and slope to prevent accumulation of water on top of covers.

B. Store geotextile, HDPE geomembrane, geonets, and similar materials according to the manufacturer's recommendations.

1.04 Fully Protected Storage

A. Store all products not named above in buildings or trailers which have a concrete or wooden floor, a roof, and fully closed walls on all sides.

B. Provide heated storage space for materials which would be damaged by freezing.

C. Protect synthetic liner from being contaminated by dust, dirt, and moisture.

1.05 Maintenance of Storage

A. Maintain periodic system of inspection of stored products on scheduled basis to assure that:

1. State of storage facilities is adequate to provide required conditions.
2. Required environmental conditions are maintained on continuing basis.
3. Products exposed to elements are not adversely affected.

--END OF SECTION 01615--

SECTION 01630

SUBSTITUTIONS

PART 1 - GENERAL

1.01 Description

A. Requests for review of a substitution shall conform to the requirements of Article 6.7 of the General Conditions (EJCDC) and shall contain complete data substantiating compliance of proposed substitutions with Contract Documents.

1.02 Contractor's Options

A. For materials or equipment (hereinafter products) specified only by reference standard, select product meeting the standard, by any manufacturer, fabricator, supplier or distributor (hereinafter manufacturer). To the maximum extent possible, provide products of the same generic kind from a single source.

B. For products specified by naming several products or manufacturers, select any one of the products or manufacturers named which complies with Specifications.

C. For products specified by naming several products or manufacturers and stating "or equal", submit a request for a substitution for any product or manufacturer which is not specifically named.

D. For products specified by naming only one product or manufacturer and followed by words indicating that no substitution is permitted, there is no option and no substitution allowed.

E. Where more than one choice is available as a Contractor's option, select product which is compatible with other products already selected or specified.

1.03 Substitutions

A. No item listed on the Contract Drawings, Contractor's shop drawings, or the Detailed Specifications by trade name or by name of manufacturer may be substituted for without the prior approval of the Engineer. Any such substitution or refusal of substitution shall not cause delay or increased costs. In the event the Contractor claims the inability to obtain a specified or indicated item at the proper time, the Owner or Engineer may make inquiries at the Contractor's expense to establish such a claim.

B. During a period of 30 days after date of commencement of Contract Time, Engineer will consider written requests from Contractor for substitution of products or manufacturers, and construction methods (if specified).

1. After end of specified period, requests will be considered only in case of unavailability of product or other conditions beyond control of Contractor.

C. Submit 5 copies of request for substitution. Submit separate request for each substitution. In addition to requirements set forth in Article 6.7 of General Conditions (EJCDC), include in request the following:

1. For product or manufacturers:

a. Product identification, including manufacturer's name and address.

b. Manufacturer's literature with product description, performance and test data, and reference standards.

c. Samples, if appropriate.

d. Name and address of similar projects on which product was used, and date of installation.

2. For construction methods (if specified):

a. Detailed description of proposed method.

b. Drawings illustrating method.

3. Such other data as the Engineer may required to establish that the proposed substitution is equal to the product, manufacturer, or method specified.

4. All applications for substitutions shall be accompanied by statement of credit or extra cost attributed to the substitution.

D. In making request for substitution, Contractor represent that:

1. Contractor has investigated proposed substitution, and determined that it is equal to or superior in all respects to the product, manufacturer, or method specified.

2. Contractor will provide the same or better warranties or bonds for proposed substitution as for product, manufacturer or method specified.

3. Contractor waives all claims for additional costs or extension of time related to proposed substitution that subsequently may become apparent.

E. Proposed substitutions will not be accepted if:

1. Acceptance will require substantial revision of Contract Documents.

2. They will delay completion of the Work, or the work of other contractors.

3. They are indicated or implied on a Shop Drawing and ar not accompanied by a formal request for substitution from Contractor.

F. If the Engineer determines that a proposed substitute is not equal to that specified, Contractor shall furnish the product, manufacturer, or method specified at no additional cost to the Owner.

G. Approval of a substitution will not relieve Contractor from the requirement for submission of Shop Drawings as set forth in the Contract Documents.

H. Contractor shall carefully verify and shall be fully responsible for determining that the equipment it proposes to provide and install shall fit into the confines indicated on the Contract Drawings, Contractor's shop drawings or Detailed Specifications.

--END OF SECTION 01630--

SECTION 01700

PROJECT CLOSEOUT

PART 1 - GENERAL

1.01 Description of Requirements

Provisions of this section apply to the procedural requirements for the actual closeout of the Work, not to administrative matters such as final payment. Closeout requirements relate to both substantial and final completion of the Work; they also apply to individual portions of completed work as well as the total Work. Specific requirements contained in other sections have precedence over the general requirements contained in this section.

1.02 Procedures at Substantial Completion

A. Prerequisites: Comply with the General Conditions and complete the following before requesting inspection of the Work, or a designated portion of the Work, for certification of substantial completion. A representative of the Owner and the Engineer will perform the substantial completion inspection.

1. Submit executed warranties, maintenance agreements, inspection certificates and similar required documentation for specific units of work, enabling the Owner's unrestricted occupancy and use.
2. Submit record documentation, maintenance manuals, tools, spare parts, keys and similar operational items.
3. Complete final cleaning, and remove temporary facilities and tools.

B. Inspection Procedures: Upon receipt of Contractor's request, the Engineer, and the Owner's project manager will either proceed with inspection or advise the Contractor of prerequisites not fulfilled. Following initial inspection, the Engineer will either prepare the certificate of substantial completion, or advise the Contractor of work which must be performed prior to issuance of the certificate of completion. The Engineer and the Owner project manager will repeat the inspection when requested and assure that the Work has been substantially completed. Results of the completed inspection will form the initial "punch-list" for final acceptance.

1.03 Procedures at Final Acceptance

A. Reinspection Procedure: The Engineer and the Owner's project manager will reinspect the Work upon receipt of the Contractor's notice that the Work has been completed, including punch-list items from earlier inspections. Upon completion of reinspection, the Engineer will either recommend final acceptance and final payment, or will advise the Contractor of work not completed or obligations not fulfilled as required for final acceptance. If necessary, this procedure will be repeated.

1.04 Record Documentation

A. Record Drawings: Maintain a complete set of either blue- or black- line prints of the contract drawings and shop drawings for record mark-up purposes throughout the Contract Time. Mark-up these drawings during the course of the work to show both changes and the actual installation, in sufficient detail to form a complete record. Give particular attention to work which will be concealed and difficult to measure and record at a later date, and work which may require servicing or replacement during the life of the project. Require the entities marking prints to sign and date each mark-up. Bind prints into manageable sets, with durable paper covers, appropriately labeled.

These marked prints (Record Drawings) shall be kept current and available on the job site at all times. All changes from the contract plans which are made in the work, or additional information which might be uncovered in the course of construction shall be accurately and neatly recorded as they occur by means of

details and notes. The Record Drawings shall be jointly inspected for accuracy and completeness by the Engineer prior to submission of each monthly pay estimate. The drawings shall include but not be limited to the following:

1. Installations of any kind or description known to exist within the construction area. The locations shall include dimensions to permanent features.
2. The location and dimensions of any changes within the design features of any kind or description known to exist within the construction area. The locations shall include dimensions to permanent features.
3. Correct grade or alignment of roads, structures, utilities, or project components if any changes were made from contract drawings.
4. Correct elevations if changes were made in site grading.
5. Changes in details of design or additional information obtained from working drawings specified.
6. The topography and grades of all drainage structures installed or affected as part of the project construction.
7. All changes or modifications which result from authorized field changes.
8. Where contract drawings or specifications allow options, only the option selected for construction shall be shown on the record prints.
9. Additional work ordered by the Engineer or the Owner.

B. Maintenance Manuals: Provide 3-ring vinyl-covered binders containing required maintenance manuals, properly identified and indexed. Include operating and maintenance instructions extended to cover emergencies, spare parts, warranties, inspection procedures, diagrams, safety, security, and similar appropriate data for each system or equipment item.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.01 Operator Instructions

Require each installer of systems requiring continued operation and maintenance by the Owner's operating personnel, to provide on-location instruction to the Owner's personnel, sufficient to ensure safe, secure, efficient, non-failing utilization and operation of systems.

3.02 Final Cleaning

At the time of project close out, clean and return the Work area to its original condition. Complete the following operations before requesting the Engineer's inspection for certification of substantial completion:

A. Remove non-permanent protection and labels.

B. Clean exposed finishes.

C. Touch-up minor finish damage.

D. Remove debris.

E. Sweep and wash paved areas.

F. Police yards and grounds.

-- END OF SECTION 01700 --

SECTION 02081
UNDERWATER WASTE FILL, DEBRIS, AND SEDIMENT REMOVAL

PART 1 - GENERAL

1.01 Description

The work specified in this section consists of the labor, equipment, tools, materials, and services needed to perform the removal of underwater waste fill, debris and sediments as shown on the Contract Drawings, specified herein and in compliance with the terms and conditions specified by the U.S. Army Corps of Engineers Nationwide Permit Program.

A. Work included in this section:

1. Removal of underwater waste fill, debris, and sediment.

B. Related work specified in other sections:

1. Section 01051 - Grades, Lines, and Levels;
2. Section 01105 - Health and Safety;
3. Section 02222 - Excavation; and
4. Section 02275 - Riprap.

1.02 Reference Information

In order to plan and complete the work, the Contractor may rely on the following information:

1. Sediment Treatability Testing Report (Attachment 3);
2. Sediment Physical Test Data (Attachment 4);
3. Sediment Boring logs (Attachment 5); and
4. Navigation Channel Chart (Attachment 6).

1.03 Submittals

A. Waste Fill, Debris, and Sediment Dredging Plan

The Contractor shall prepare and submit for approval by the Engineer, prior to beginning work, a Sediment Dredging Plan. The Sediment Dredging Plan shall present in detail the equipment, materials, instrumentation, sequencing, and procedures (including surveying and equipment control procedures) to be used for waste fill, debris, and sediment removal within the river channel. The Plan shall also address in detail the equipment, materials, and procedure from unloading sediment from the barge(s) to final disposition at the sediment disposal area. The Plan shall also present in detail the equipment, materials, and removal procedures to be used to remove the barge wreck and include a shop drawing.

The Sediment Dredging Plan shall include a design for the effluent polishing pond (if an effluent polishing pond is proposed) including berms, piping arrangements, pumps, discharge control structures, and calculations of anticipated settling times and water volumes. The effluent polishing pond design shall be signed and stamped by a licensed New York State Professional Engineer. If an effluent polishing pond is not proposed, then the means of conveying water from the sediment disposal area to the final discharge point shall be presented, and shall include, as applicable, berms, piping arrangements, pumps, discharge control structures, and calculations of anticipated settling times and water volumes.

The Sediment Dredging Plan shall include a contingency plan describing actions to be taken in cases of contravention of the dredge water discharge or in-river turbidity requirements. The Contractor

shall propose a system of emergency response to mitigate potential releases of sediments or floating contaminants into the river, should release from the work zone occur. This system shall include, at a minimum, a turbidity curtain with sorbent booms, and a means for rapidly deploying sorbent booms.

B. Dock/Unloading Plan

A Dock/Unloading Platform Design Plan shall be submitted to the Engineer for approval before the construction of the dock/unloading platform (if the Contractor chooses to construct such a dock/unloading platform). The Design Plan shall present in detail the materials and installation procedures to be used and include New York State Professional Engineer signed and stamped drawing(s).

C. Water Quality Monitoring Plan

A Water Quality Monitoring Plan shall be submitted to the Engineer for approval before dredging operations commence. The Plan shall present in detail the equipment, materials, installation, and recording procedures to be used and include a shop drawing. Monitoring requirements include providing a minimum of three turbidity monitors.

D. Turbidity Curtain Deployment Plan

A Turbidity Curtain Deployment Plan shall be submitted to the Engineer for approval before the turbidity curtain is installed. The Plan shall present in detail the materials and installation procedures to be used and include a shop drawing. The Plan shall explain all precautions to be taken to protect the weed bed and previously completed riverbank restoration work (i.e. plantings).

E. Material Performance Data

Product data, performance criteria, and other pertinent information will be submitted to the Engineer for approval prior to the use of any materials specified in Subsection 2.01.

F. Records

1. Notice of Intent to Dredge: Prior to commencement of work on this contract, the Contractor shall notify the Shore Maintenance Detachment, Ninth Coast Guard District, 1240 E. Ninth Street, Cleveland, OH 44199-2060, (216) 522-7601, of his intended operations to dredge and request that it be published in the Local Notice to Mariners. This notification must be given in sufficient time so that it appears in the Notice to Mariners at least two weeks prior to commencement of this dredging operation. A copy of the notification shall be provided to the Engineer.

2. Relocation of Navigation Aids: The Contractor shall not remove, change the location of, obstruct, willfully damage, make fast to, or interfere with any aid to navigation. The Contractor shall notify the Shore Maintenance Detachment, Ninth Coast Guard district in writing, with a copy to the Engineer, 30 days in advance of the time he plans to dredge adjacent to any aids which require relocation to facilitate dredging. The Contractor shall contact the U.S. Coast Guard for information concerning the position to which the aids will be relocated. A copy of the notification shall be provided to the Engineer.

3. Daily/Monthly Report of Operations: The Contractor shall prepare and submit one copy of the Daily Report of Operations. This report shall be submitted on a daily basis. In addition to the daily report, the Contractor shall prepare a Monthly Report of Operations for each month. Upon completion of the job, the Contractor shall submit to the Engineer, a consolidated job report, combining monthly reports.

4. Notice of Misplaced Material: The Contractor shall notify the U.S. Coast Guard Marine Safety Office of any misplaced material.

PART 2 - PRODUCTS

2.01 Materials

A. Turbidity Curtain

American Marine, Inc. *RUFFWATERSCREEN* or equivalent shall be used. The curtain shall have sufficient buoyancy to remain floating at all times while deployed in the Niagara River and shall be weighted at the bottom (i.e., at the river bottom). The Contractor shall incorporate sections of filter screen or flap gates into the design of the curtain as necessary to accommodate flow in the affected zone of the Niagara River or to equalize hydrostatic pressure between the containment area and the open river.

B. Turbidity Monitoring

Turbidity monitoring shall be conducted during sediment dredging to provide "real-time" turbidity readings. Turbidity readings shall be transmitted via radio telemetry from the turbidity monitors to the receiving stations. At a minimum, two receiving stations are required: one on the dredging equipment for use by the dredge operator and one in the Engineer's trailer. Each receiving station shall be equipped with an alarm, either audible or visual, that can be set for varying turbidity readings. The Contractor shall provide continuous monitoring of turbidity during operation of the dredge.

The YSI Inc. model *YSI6820* nephelometer or equivalent shall be used for turbidity measurements. The power source for the radio transmitter at each turbidity monitoring point buoy must be reliable and capable of supporting the continuous transmission of turbidity data to the receiving stations. Considering the climate, excessive dependence upon solar power should be avoided.

Turbidity in units of Nephelometric Turbidity Units (NTUs) will be measured at three points in the river as specified in the sediment removal plan:

a) Station 1 - a fixed location upstream of the project work area, near Station 4600;

b) Station 2 - a movable location, which is a minimum of 500 feet downstream from the work zone, and a maximum distance downstream equal to the northing grid line, 1090000. The intent is to monitor outside the contract dredging limits, near the center line of any expected or visible plume, within the minimum and maximum downstream distances mentioned above. The location of turbidity monitoring station 2 will be evaluated daily and the station relocated as necessary to most effectively monitor the potential sediment plume; and

c) Station 3 - a fixed location downstream of the turbidity control curtain, within the weed bed area.

Turbidity at these points will be measured at time intervals of one minute or less and will be both stored in electronic format and displayed in "real-time" using a dedicated data logging personal computer.

The depth in the water column to which the sensors should be deployed will be based on the maximum repeatable turbidity reading within the water column. The sensor will be adjusted until a maximum value is obtained. If turbidity readings are equal throughout the water column, the sensor will be placed at 60% of the water column as measured from the from the water surface. Each turbidity sensor shall be securely fastened between an appropriate river bottom anchor and floating surface buoy. Alternatively, each may be mounted to a piece of construction equipment such as a barge if the construction equipment is located at a turbidity monitoring point and the construction equipment will not hamper the function of the turbidity sensor.

Turbidity at either downstream monitoring station (Station 2 or 3) must not exceed 150 NTUs above the background turbidity levels at Station 1 for a sustained period of 30 minutes. Should the turbidity

readings exceed 150 NTUs above background for more than 30 minutes, the Contractor shall take such actions as necessary to reduce the turbidity to below 150 NTUs above background within one hour. If compliance is not achieved within one hour after the sustained readings occur, the Contractor shall cease dredging and determine appropriate further actions.

C. Oil Sorbent Booms

New Pig Spaghetti Boom™ (8-inch diameter)or equal shall be used.

PART 3 - EXECUTION

3.01 General

A. Layout of the Work: The work performed under this Specification shall be constructed to the lines, grades, elevation, slopes and cross sections indicated on the Drawings, specified herein, and/or directed by the Engineer. The Contractor shall lay out his work and be responsible for all measurements in connection therewith. The Contractor shall furnish, at his own expense, all stakes, templates, platform equipment, range markers, and labor that may be required in laying out any part of the work. The Contractor will be held responsible for the execution of the work to such lines and grades as may be established or indicated by the Engineer. It shall be the responsibility of the Contractor to maintain and preserve all stakes and other markers established.

B. Protection: Existing items not designated to be demolished or removed shall be protected from damage. Damaged items shall be repaired at the expense of the Contractor.

C. Subaqueous Cable Crossings: The Contractor shall be responsible for verifying the locations and depths of all utility crossings and take precautions against damages which might result from his operations, including without limitation, the sinking of dredge spuds and/or anchors into the channel bottom, in the vicinity of utility crossings. If any damage occurs as a result of his operations, the Contractor will be required to suspend dredging until the damage is repaired and approved by the Engineer. Costs of such repairs and downtime of the dredge and attendant plant shall be at the Contractor's expense.

D. Surveys: The Contractor shall be responsible for performing all surveys necessary to layout and ensure the work is constructed as depicted in the Drawings and specified in the Contract Documents. The Contractor shall perform a post-dredging survey which, in combination with the existing grades shown on the Drawings, shall serve as the basis of payment for the work.

3.02 Underwater Waste Fill, Debris, and Sediment Removal

A. Methods: The Contractor is not restricted from using any specific plant or equipment to perform the dredging. The plant or equipment employed by the Contractor must be capable of performing the dredging within the allowable contract duration and must meet environmental (i.e., turbidity) requirements.

B. Removal operations shall be conducted in accordance with the approved Underwater Waste Fill, Debris, and Sediment Dredging Plan, including the use of oil booms and turbidity curtains.

C. Turbidity at either downstream monitoring station (Station 2 or 3) must not exceed 150 nephelometric turbidity units (NTUs) above the background turbidity levels at Station 1 for a sustained period of 30 minutes. Should the turbidity readings exceed 150 NTUs above background for more than 30 minutes, the Contractor shall take such actions as necessary to reduce the turbidity to below 150 NTUs above background within one hour. If compliance is not achieved within one hour after the sustained readings occur, the Contractor shall cease dredging and determine appropriate further actions.

D. Plant: Maintain the plant, barges, pipelines, and associated equipment to meet the requirements of the work. Promptly repair leaks or breaks along pipelines. Remove dredged material placed due to leaks and breaks.

E. Noise Control: All equipment, dredge/barges, boats, and tugs used on this work shall be equipped with satisfactory mufflers or other noise abatement devices. The Contractor shall conduct his operations so as to comply with all Federal, State, and local laws pertaining to noise. The use of horns and whistle signals shall be held to the minimum necessary in order to ensure as quiet an operation as possible.

F. Pumping of Bilges: The Contractor is warned that pumping oil or bilge water containing oil into navigable waters, or into areas which would permit the oil to flow into such waters, is prohibited by Section 13 of the River and Harbor Act of 1899, approved 3 March 1899 (30 Stat. 1152; 33 U.S.C. 407).

G. Fuel Oil Transfer Operations: In accordance with U.S. Coast Guard regulations (33 CFR 156.120), couplings used in fuel oil transfer operations on any vessel with a capacity of 250 or more barrels of oil shall be either a bolted or full-threaded connection; or a quick-connect coupling approved by the Commandant; or an automatic back-pressure shutoff nozzle used to fuel the vessel. An executed fuel oil transfer (Declaration) form signed by the tanker shall be submitted to the Engineer for each refueling operation. The U.S. Coast Guard shall also be notified prior to any refueling.

H. Lights: Each night, between sunset and sunrise, and during periods of restricted visibility, provide lights for floating plants, pipelines, ranges, and markers. Also provide lights for buoys that could endanger or obstruct navigation. For night work, maintain lights from the beginning of sunset to sunrise during the progress dredging operations. Lighting shall conform to United States Coast Guard requirements for visibility and color.

I. Navigation Warnings: Furnish and maintain navigation warning signs along pipelines and other equipment as needed or required.

J. Notice to Mariners: Should the Contractor, during dredging operations, encounter any objects which could be a hazard to navigation, the Contractor shall notify the Engineer and U.S. Coast Guard immediately as to the location of said object and any other pertinent information necessary for the U.S. Coast Guard to put out a Notice to Mariners.

K. Aids to Navigation:

1. Installation. In general, the Contractor shall provide and install aids to navigation as may be required to fulfill these specifications and meet U.S. Coast Guard requirements. Lighted aids to navigation shall be installed to mark hard bottoms and the pipeline corridor across the hard bottoms. The lighted aids to navigation shall be installed prior to any dredging equipment entering a dredging area or along any pipeline from a dredging area. The aids to navigation shall be lighted for 24-hour operation. The Contractor shall use a standard aids to navigation scheme. Light characteristics for the aids shall be flashing yellow. If buoys are used they shall be yellow with reflective international orange square patches or stripes. The aids must be lettered. The Contractor shall notify the U.S. Coast Guard and obtain U.S. Coast Guard approval for all aids to navigation including buoys and dredging markers.

2. Operation and Maintenance: The Contractor shall operate and maintain the lighted aids to navigation. Should lighted aids to navigation leave positioned locations, the Contractor shall reposition within 24 hours.

3. Removal: The Contractor shall remove all lighted aids to navigation, piles, chains, anchors, etc., from the project area that were installed as part of this contract.

4. Payment: Lighted aids to navigation are a subsidiary obligation of this contract and therefore, no separate payment will be made for the aids to navigation.

5. U.S. Coast Guard Approval: Should the U.S. Coast Guard not approve any aids to navigation because of the closeness of a navigation channel, then those aids to navigation shall be deleted from this contract requirement.

6. Locations: The locations for the aids to navigation will be identified by the Contractor at the pre-construction conference.

7. Existing Navigation Aids: Navigation aids located within or near the areas required to be dredged will be removed, if deemed necessary by the U.S. Coast Guard in advance of dredging operations. The Contractor shall not remove, change the location of, obstruct, willfully damage, make fast to, or interfere with any aid to navigation.

L. Obstruction of Navigable Waterways:

1. The Contractor shall minimize interference with the use of navigable channels and passages.

2. The Contractor shall:

a) Promptly recover and remove any material, plant, machinery, or appliance which the Contractor loses, dumps, throws overboard, sinks, or misplaces, and which, in the opinion of the Engineer, may be dangerous to or obstruct navigation;

b) Give immediate notice, with description and locations of any such obstructions, to the Engineer; and

c) When required by the Engineer, mark or buoy such obstruction until the same are removed.

M. The Contractor shall utilize a Global Positioning System during sediment removal operations to document sediment dredging depth and elevation. A computer plot of the anticipated and actual sediment dredging plan shall also be submitted to the Engineer. Furnish, set and maintain ranges, buoys, and markers needed to define the work and to facilitate inspection. Establish and maintain gauges in locations observable from each part of the work so that the depth may be determined. Suspend dredging when the gauges or ranges cannot be seen or followed. The Engineer will furnish, upon request by the Contractor, survey lines, points, and elevations necessary for the setting of ranges, gages, and buoys.

N. Allowances and Tolerances.

1. Overdepth

The maximum allowable overdepth in this contract is six inches (6") below the required pay prism as shown on the contract drawing and stated herein. Dredged material actually removed to maximum pay prism, as computed by the Engineer, will be paid for at the contract unit price.

2. Excessive Dredging

Any material removed below the overdepth allowance will be considered excessive dredging and will not be paid for. Any existing channel crossing that is damaged due to dredging operations shall be repaired by the Contractor at his expense.

O. Inspection

1. The Contractor shall inspect the work, keep records of work performed, and ensure that gauges, targets, ranges, and other markers are in place and usable for the intended purpose. Furnish, at the request of the Engineer, boats, boatmen, laborers, and material necessary for inspecting, supervising, and surveying the work. When required, provide transportation for the Engineer and inspectors to and from the disposal area and between the dredging plant

and adjacent on shore.

2. The Contractor shall provide a system of communication between the dredge crew and the crew at the disposal area. A portable two-way radio is acceptable.

3. The Contractor shall furnish to the Engineer on board the dredge or other craft upon which they are employed, a suitable separate desk for office purposes. The desk shall be in a room fully equipped and maintained to the satisfaction of the Engineer. The room shall be properly heated, ventilated, and lighted. The desk shall be furnished with a lock and chair. Washing and toilet facilities shall be made available for the inspectors. The entire cost to the Contractor for furnishing, equipping, and maintaining the foregoing accommodations shall be included in the contract price.

P. Plant and Equipment Removal:

Upon completion of the work, promptly remove plant, including ranges, buoys, piles, and other markers or obstructions.

3.03 Turbidity Curtain/Oil Boom

A. The Contractor shall install a turbidity curtain(s) downstream of the sediment dredge area to minimize migration of sediment or other contaminants into the weed bed such that no visible evidence of floating contaminants or disturbed sediment may be seen discharging from the dredge area to the weed bed during dredging operations. Contractor shall install the curtain such that:

1. The curtain shall extend from the water surface (i.e., from the flotation device) to the river bottom, the depth of which will vary from 0 to 20 feet, depending on distance from water's edge, as shown on the Drawings.

2. The curtain shall be securely anchored to remain in position at all times.

3. The top (water level) of the curtain shall include an oil sorbent boom which shall prevent migration of floating contaminants into the weed bed. Any such contaminants shall be collected and properly disposed of by the Contractor. An additional moveable oil boom shall be installed around the work zone during dredging operations to prevent migration of floating contaminants to the river. Both booms (the boom associated with the silt curtain, and the additional boom surrounding the work zone) shall comply with all requirements of Subsection 2.01.

4. The Contractor shall provide for onsite supervision of the installation and inspection of the curtain and oil booms by a qualified field representative.

5. The turbidity curtain(s) shall be in place during all dredging operations. Damage or displacement of the turbidity curtain(s) which allows turbid water to enter the weedbed shall be immediately repaired or dredging operations ceased until repairs are made.

3.04 Disposal of Dredged Material

A. General: The dredged material shall be transported to and placed in the sediment disposal area (SDA) shown on the Contract Drawings. Proper erosion and sedimentation control such as earth berm and silt fencing shall be installed around the sediment disposal area. Contractor shall follow the requirements described in the Stormwater Management and Erosion Control Plan (Parsons ES, 1995).

B. Conveyance Method: The dredged material shall be conveyed into the SDA by an approved method; however, the method of conveying the dredged material to the SDA shall be such as to prevent the loss of any water or material into the area outside the facility. Conveyance of dredged material to the SDA shall be conducted entirely within the work area unless prior written

approval has been obtained from the Owner to use offsite facilities. The Contractor will not be permitted to deposit any dredged material in the river for the purpose of rehandling into the SDA. If the dredged material is transferred from scows to the SDA by bucket-type equipment, provisions shall be made underneath the transfer equipment to catch drippings of water and dredged material, and to prevent such water and material from escaping into the area outside of the confined disposal facility. If the material is conveyed from scows to hoppers to the disposal facility by pumping, water from outside the disposal facility may be used.

C. Dredged Material Placement: The methods, equipment, and layout of the Contractor's operations, and sequence of placement shall be submitted to and approved by the Engineer prior to placement of any dredged material in the sediment disposal area. The Contractor shall monitor the placement to prevent development of isolated ponding areas.

D. Other Removal Materials: All tree trunks, dock timbers, old piles, boulders, and similar materials removed in connection with dredging operations shall be disposed of in the sediment disposal area, provided that all such material is completely covered by dredged material.

E. Spillage: Water and dredged materials shall not be permitted to overflow or spill out of barges while transporting to the disposal site(s). If a leak occurs in the discharge pipelines, immediately discontinue using the line until leaks are repaired. Remove material placed due to leaks or breaks. Failure to repair leaks or change the method of operation which is resulting in overflow or spillage will result in suspension of dredging operations and require prompt repair or change of operation to prevent overflow or spillage as a prerequisite to the resumption of dredging.

F. Misplaced Material: Any material that is deposited elsewhere than in places designated or approved by the Engineer will not be paid for and the Contractor may be required to remove such misplaced material and deposit it where directed at his expense.

G. Sediment Settling Plates: The Contractor shall install a minimum of two sediment settling plates in the center of the SDA at the completion of dredging. The plates shall be placed on the surface of the dredge material and have a survey target visible from outside the SDA. The plates shall be constructed of material that will not deteriorate over a one year period and will not be displaced by wind, erosion or other normal weather conditions.

3.05 Treatment of Dredge Water

A. All water from the transport or dewatering of the sediment shall be treated to meet turbidity limits prior to discharge to the Niagara River. The Contractor shall construct berms within the sediment disposal area and effluent polishing pond as needed to promote dewatering and settling of suspended solids. If necessary or advantageous to the Contractor, settling agents may be added to the water with prior approval from the Engineer.

B. The dredging water discharged back to the Niagara River shall have a seven-day average turbidity value of 50 NTUs with no turbidity values exceeding 100 NTUs. The turbidity shall be measured at the discharge point from the sediment disposal area, the effluent polishing pond, or other convenient location prior to entering the river, and shall be conducted every four hours while discharging is occurring.

C. Samples of the discharge water shall be collected weekly and analyzed for polycyclic aromatic hydrocarbons (PAHs) using USEPA SW846 Method 8270. The first sample shall be collected 24 hours after discharge has begun with a 24-hour turnaround for the sample results. A seven-day turnaround is required for all other samples. The individual PAH compounds shall not exceed 20 micrograms per liter (ug/l) for acenaphthene, 10 ug/l for naphthalene, and non-detect for benzo(a)pyrene. The total PAH concentration shall not exceed 100 ug/l. If the turbidity and PAH concentration values are exceeded, discharge of the dredging water shall stop until additional steps are taken to ensure compliance.

D. No visible oil sheen will be permitted to pass beyond the discharge point. The Contractor will make provisions, such as an oil boom in the sediment disposal area or the effluent polishing pond (if one is constructed) to prevent such releases.

E. Should the above conditions for PAH concentrations, turbidity values, or oil sheen control not be met, immediate actions will be taken by the Contractor to return the discharge water to values within the established limits.

3.06 Barge Wreck Removal

A. The Contractor shall remove a barge wreck, approximately 40 by 80 feet in dimension, and adjacent debris. The wreck and debris shall be placed in the sediment disposal area.

B. A description of the barge wreck is provided herein. The information was obtained from a dive survey conducted in October 1996. A wooden barge was observed to be located at Station 4200. It appeared that the wreck had been flipped upside down and was grounded in the bottom sediments. Based on conversations with the USACE and the U.S. Coast Guard, very little is known about the origin or contents of the wreck. The upstream end is heavily damaged from ice flows, and the downstream end is intact. The top of the wreck (bottom of the vessel) is open. It appears that the planking has been torn off through ice action, exposing the lower hold (ballast area). The lower hold has become infilled with silt. The sides of the vessel are generally exposed with very little silting and appear to be intact. The main structure appeared to be wooden timbers with wooden ribs and decking. Steel "I-beams" were observed and appear to run the length of the wreck. There were no obvious signs of existing or spilled cargo.

--END OF SECTION 02081--

SECTION 02131

DECONTAMINATION PAD AND EQUIPMENT

PART 1 - GENERAL

1.01 Summary

The work specified in this section consists of the labor, equipment, tools, materials, and services needed to perform all work described herein or shown on the Contract Drawings.

A. Work included in this section: Provide the following equipment for use of the existing decontamination pad:

1. Holding tanks (2)
2. Flexible hose
3. Submersible pump
4. Pressure washer

B. Related work specified in other sections:

1. 02100 - Health and Safety
2. 01500 - Temporary Facilities and Field Office

1.02 System Description

A. Contractor shall furnish and install all materials, equipment, controls, and incidentals required to provide, at a minimum, one operational decontamination pad.

B. Performance Requirements

1. All equipment furnished under this Section shall be suitable for the installation as shown and specified. The size, capacity and type of construction materials specified shall be understood to establish minimum requirements only.

C. Description: Decontamination Pad (Existing)

1. The equipment to be provided includes two (2) 1,000-gallon storage tanks, one (1) pressure washer, a submersible sump pump, and all associated valves and fittings.
2. The pads are to include all necessary piping, nozzles, valves, etc. to provide a fully functioning system.

1.03 Submittals

A. Shop Drawings: Furnish complete Shop Drawings showing the following minimum data:

1. Manufacturer's literature, illustrations, specifications and engineering data including dimensions, materials, size, and weight for tanks, pressure washer, and submersible pump.
2. Fabrication, assembly and installation diagrams.
3. Detailed description of operation.

1.04 Quality Assurance

A. Manufacturer's Qualifications: The manufacturer shall have experience in the production of similar equipment, and shall show evidence of satisfactory operation in at least five installations.

1.05 Delivery, Storage, and Handling

A. Store materials to permit easy access for inspection and identification. Keep all materials off the ground, using pallets, platforms, or other supports. Protect packaged materials from corrosion and deterioration.

PART 2 - PRODUCTS

2.01 Holding Tanks

Provide and install one (1) tank to store wastewater from the decontamination process and one (1) tank to store clean water for the pressure washer at each decontamination pad.

A. The process tanks will be designed and manufactured by Nalgene of Nalge Co. of Rochester, New York or approved equal.

B. Each tank will have openings to accommodate venting ports, sample ports, and piping connections at several locations on the tank as specified.

C. The tanks shall be as specified below:

Capacity	1000 gal (each tank)
Description	Vertical, cylindrical, closed top with manway, flat bottom
Material	HDPE
Size	72 inch high x 66 inch diameter
Fittings	Flanged
Process	Bulk Storage

2.02 Flexible Hose

A. Hose shall be flexible, braided, 2-inch diameter to pump waste from the submersible sump to the waste tank.

2.03 Submersible Pump

Furnish and install one (1) submersible non-clogging wastewater pump at each decontamination pad, in accordance with the following requirements or a pump capable of conveying decontamination water from the sump to the storage tank or to the sediment disposal area.. The pump shall be equipped with a 1.5 HP, submersible electric motor connected for operation on 230 volts, 1 phase, 60 hertz, 3-wire service, with 7 feet of submersible cable suitable for submersible pump applications. The power cable shall be sized according to NEC and ICEA standards. The pump shall be supplied with a mating 2-inch discharge connection and be capable of delivering 30 GPM at 11 feet total dynamic head (TDH). The pump shall be fitted with 13 feet of lifting chain or steel cable. The working load of the lifting system shall be 50 percent greater than the pump unit weight. The liquid to be pumped consists of process decontamination wastewater.

2.04 Pressure Washer

A. Manufacturer - Furnish and install one (1) pressure washer unit at decontamination pad. Pressure washer units shall be Model 5830 as manufactured by the Hotsy Corporation, or equal.

B. The pressure washers shall be specifically designed, constructed and installed in conformance with the following conditions.

Operating Flow Rate:	6 gpm
Operating Pressure:	1800 psi
Operating Temperature:	180°F
Electrical Supply Required:	240V, Single Phase
Pump Sizing:	7.5 Hp, Direct Drive
Mobility:	Temporary, Non-Rollable
Hose Length:	100 ft. (min.)
Shell Material of Construction:	Heavy Gauge Steel, Angle Iron Frame
Dimensions	64-inch L x 35-inch W x 55-inch H

PART 3 - EXECUTION

3.01 Decontamination Pads

A. Inspection

Contractor and his installer shall examine the substrate and the conditions under which work is to be performed and notify Engineer of unsatisfactory conditions. Do not proceed with the work until satisfactory conditions have been corrected in a manner acceptable to Engineer.

END OF SECTION 02131

SECTION 02142

CONSTRUCTION WATER MANAGEMENT

PART 1 - GENERAL

1.01 Description

A. Development of an acceptable Construction Water Management Plan detailing the handling, storage, treatment (if necessary), and disposal of all construction water and associated sludge generated during construction in accordance with all applicable local, state, and federal regulations.

B. The Contractor is to obtain (if necessary) and operate within all required local, state, and federal permits and requirements required to implement the proposed Construction Water Management Plan.

C. Provide all labor, materials, and equipment required for handling, testing, storage, treatment, and disposal of construction water in accordance with the approved Construction Water Management Plan.

D. Perform all specified and necessary sampling and analyses to insure compliance with required permits and applicable laws and regulations or as directed by the Group's Representative.

E. Related Work Specified Elsewhere:

1. Section 01564 - Erosion Control
2. Section 02081 - Sediment Removal
3. Section 02131 - Decontamination Pads and Equipment

1.02 Applicable Codes, Standards, and Specifications

A. The Contractor shall comply with applicable federal, state, and local applicable codes, ordinances, regulations, statutes, and standards, including, but not limited to, the following:

1. 6 NYCRR Part 750-757 - State Pollutant Discharge Elimination System
2. 6 NYCRR Part 364 - Waste Transporter Permits
3. 6 NYCRR Part 371 - Identification and Listing of Hazardous Wastes
4. 6 NYCRR Part 372 Hazardous Waste Manifest System and Related Standards for Generators, Transporters, and Facilities
5. 6 NYCRR Part 373 - Hazardous Waste Treatment, Storage, and Disposal Facility Requirements.
6. 6 NYCRR Parts 700-705 - Water Quality Regulations.

1.03 Submittals

A. Construction Water Management Plan.

B. Shop drawings and test results used in design of the method of handling construction water.

PART 2 - PRODUCTS

2.01 General

A. Construction Water Management Plan

1. The Contractor shall submit his plan for handling construction water. The plan shall include, but not be limited to, the Contractor's proposed method of handling, sampling and analyses (if required), methods for minimizing the volume of construction water and associated sludges, storage (if necessary), treatment (if necessary), and disposal of construction water generated during construction.

2. Acceptable methods of handling construction water include, but are not limited to, the following:

   a. Collection, onsite treatment, and discharge in accordance with applicable regulations and requirements including, but not limited to, a State Pollutant Discharge Elimination System permit obtained by the Contractor.

   b. Collection, transport, offsite treatment, and disposal.

3. Acceptable methods of handling sludge generated by the Contractor's management of construction water include, but are not limited to:

   a. Collection and onsite disposal within the limits of the proposed capping system. Onsite disposal shall be conducted in accordance with all applicable local, state, and federal regulations and in accordance with the requirements of Section 02081 "Sediment Removal".

   b. Collection, transport, offsite treatment, and disposal in accordance with all applicable local, state, and federal regulations.

PART 3 - EXECUTION

3.01 General

A. It shall be the responsibility of the Contractor to investigate and comply with all applicable federal, state, and local laws and regulations governing the handling, storage, and disposal of construction water. All construction water shall be disposed of in a manner which meets applicable permit requirements, laws, and regulations.

B. Except for those obtained by the Owner as indicated in the Special Provisions, the Contractor shall obtain all required permits, manifests, and required for the handling, storage, transport, treatment, and disposal of construction water.

C. No construction water shall be discharged to the Town of Tonawanda Sewer District.

D. Any sampling and analyses necessary to protect the health and welfare of the Contractor's employees and/or agents and/or characterize collected water or treated water shall remain the sole responsibility of the Contractor.

F. Contractor shall characterize construction water and any settled solids as necessary for disposal.

G. No Contractor proposed facility for offsite disposal shall be utilized without prior acceptance by the Owner. For all wastes disposed of offsite, Contractor is responsible for characterization of such material and arranging for proper temporary storage, transportation, and disposal in accordance with all applicable federal, state, and local regulations at no additional costs to the Owner.

H. Contractor shall dispose of water designated for offsite disposal within 30 days of collection.

I. Contractor shall mark, label, placard, package, and manifest wastes in accordance with applicable codes, regulations, and statutes.

J. The Contractor shall make every effort to minimize the generation of construction water and associated sludges. Appropriate methods to minimize generation of construction and

contaminated water include, but are not limited to, erection of temporary berms use of low permeability tarpaulin or suitable means to cover exposed contaminated areas, limiting the amount of exposed contaminated areas, grading to control run-on and run-off, engineering controls on construction activities to minimize contact of personnel and equipment with contaminated areas thus minimizing the amount of decontamination required, and other appropriate methods.

K. Construction water shall be handled using equipment compatible with anticipated contaminants which may be present.

L. The Contractor shall be solely responsible for onsite Construction water treatment system (if used) set up, debugging, operation, testing, shut-down, decontamination, dismantling and removal subsequent to completion of work, including removal of all materials incidental to treatment system operations.

END OF SECTION 02142

SECTION 02222

EXCAVATION

PART 1 - GENERAL

1.01 Description

The work specified in this section consists of the labor, equipment, tools, materials, and services needed to perform all excavation as described herein or shown on the Contract Drawings.

A. Work included in this section:

1. Excavation of soils whether contaminated or not.
2. Excavation for drainage ditches, swales, culverts, piping, etc.
3. Excavation for site structures.

B. Related work specified in other sections:

1. Section 01545 - Protection of the Work and Property
2. Section 01500 - Temporary Facilities and Field Office
3. Section 01564 - Erosion Control
4. Section 02081 -Underwater Waste Fill, Debris, and Sediment Removal
5. Section 02223 - Backfilling
6. Section 02228 - Compaction
7. Section 02260 - Landfill Cover Construction
8. Section 02501 - Gravel Pavement
9. Section 02990 - Finish Grading, Topsoil, and Seeding

1.02 Quality Assurance

A. Field Measurements

Verify that survey benchmark, monuments and intended elevations for the work are as shown on the Drawings or as provided by the Engineer.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.01 Preparation

A. Identify required lines, levels, contours, and datum. Review subsurface investigation reports and other available site information.

B. Protect plants, lawns, wetlands, and other features which have been designated on the Contract Drawings to remain as a portion of final landscaping.

C. Protect control points, bench marks, existing structures, fences, sidewalks, paving, and curbs from excavation equipment and vehicular traffic. Damaged items shall be promptly repaired at the Contractor's expense.

D. Prior to start of construction, notify the appropriate organizations, and have staked or marked all underground utilities. Utilities include water, gas, electrical, telephone, cable, storm sewer, sanitary sewers, laterals, and services. In the event such locations indicate a possible interference, or when needed to locate points of connection to existing facilities, perform exploratory excavations to determine the utilities' location and elevation. Provide the utility owner with the results of the exploratory excavations for his review. Allow the Engineer sufficient time to determine any changes required as a result of such exploratory excavations prior to start of construction.

E. Maintain existing manholes, catch basins, and other utility structures above and below grade which are to remain in their pre-work condition. Any material or debris entering same due to the operation shall be promptly removed.

F. Areas to receive compacted fill shall be graded to prevent surface runoff and ponding.

3.02 Classification of Excavated Material

A. Classifications of excavated materials are as follows:

1. Common Excavation - "Common excavation" shall include all excavation except "rock excavation." All unconsolidated and non-indurated material, rippable rock, loose rock, soft mineral matter, weathered rock or saprolite, and soft or friable shale which is removable with normal earth excavation equipment shall be considered "common excavation." All boulders and detached pieces of solid rock, concrete, or masonry less than 1 cubic yard in volume shall be classified as "common excavation."

2. Rock Excavation - "Rock excavation" shall include all sound solid masses, layers and ledges of consolidated and indurated rock or mineral matter of such hardness, durability and/or texture that it is not rippable or cannot be excavated with normal earth excavation equipment.

   a. In situations where interbedded strata of "common excavation" material and "rock excavation" material are encountered in the same excavation, the individual classification of those materials shall be made on an average percentage basis of the occurrence of those materials as measured in stratigraphic sections and as approved by the Engineer.

3.03 Excavation

A. Underpin adjacent structures which may be damaged by excavation work, including utilities and pipe chases.

B. Excavate subsoil required to accommodate access roads, construction operations, and culverts.

C. Excavate as required to accommodate access roads, ditching, site structures, construction operations, and piping.

D. Banks are to be shored or machine-sloped to an angle which is safe for the specific material in which the excavation is made.

E. Excavations shall not interfere with the normal 45 degree bearing splay of foundations. Undercutting of excavation faces will not be permitted.

F. Grade the top perimeter of excavations to prevent surface water from draining into the excavation.

G. Hand trim excavations to the required undisturbed subgrade. Remove loose matter.

H. Remove lumped subsoil, boulders, and rock under 1 cubic yard. Refill voids with concrete or compacted gravel/crushed stone.

I. Notify the Engineer of unexpected subsurface conditions, or of questionable soils encountered at required subgrade elevations, and discontinue work in the area until notified to resume work.

J. Should the Contractor, through negligence or otherwise, carry his excavation below the designated subgrade, Type A material or such other materials as may be approved by the Engineer, shall be furnished and placed as backfill in sufficient quantities to reestablish the designated subgrade surface. Granular material used for backfilling shall be spread and compacted in conformance with the requirements of Section 02223, and to the percentage compaction outlined therein. The cost of this over-excavation and refilling operation, including any tests associated therewith, shall be borne by the Contractor.

K. Stockpile excavated material in areas designated by the Engineer.

3.04 Trench Excavation

A. Trenches for underground drainage, utilities, piping shall be excavated and maintained as shown on the Drawings and specified in this Section. As specified in this section, trench widths shall be held within the minimum and maximum limits shown on the Drawings. If a prefabricated, mobile shield is utilized in lieu of conventional sheeting and bracing in pipe trenches, the bottom of the shield shall be maintained as high as possible (preferably above the spring line of the pipe) so as to prevent disturbance of the pipe foundation material and to avoid forces which would tend to pull pipe joints apart when the shield is dragged forward. Gouged openings or troughs left by the shield shall be filled with additional pipe foundation material and thoroughly compacted. Installation of sheeting and bracing and use of mobile shields shall be in complete accordance with all details of applicable codes, rules and regulations including all applicable local, State and Federal regulations including the Occupational Safety and Health Act (OSHA).

B. Excavation shall be such that a flat bottom trench of allowable width is established at the required subgrade elevation for subsequent installation of pipe foundation material.

C. If indicated on the Drawings or when required as a result of unsuitable soil conditions, trench excavation shall be carried below the required subgrade and a special pipe foundation installed in conformance with the Contract Documents. In any event, operations shall result in stable trench walls and a stable base free from standing water, consistent with trench width requirements.

D. Bedrock, boulders and cobbles greater than 6 inches shall be trimmed back or removed on each side of the trench so that no rock protrudes within 6 inches of the installed pipe. Rock shall also be trimmed back across the bottom of the trench so that no rock, boulder or cobble protrudes within 4 inches of the installed pipe.

E. In general, trenches shall not be opened for more than 50 feet in advance of installed pipe. Excavation of the trench shall be fully completed at least 5 feet in advance of pipe laying operations. No more than 40 feet of trench shall be left open overnight.

3.05 Disposal of Material

A. All excavated material except reusable topsoil or reusable fill shall be classified as surplus material and disposed in an onsite location approved by the Engineer.

B. Reuse of excavated material as onsite fill shall conform with Section 02223.

3.06 Field Quality Control

A. Field inspection will be performed under provisions of Section 01400.

B. Provide for visual inspection of bearing surfaces.

3.07 Protection of Excavations

A. Protect excavations by methods required to prevent cave-ins or loose soil from falling into excavation.

B. All excavations shall be properly and legally maintained while they are open and exposed. Sufficient and suitable barricades, warning lights, flood lights, signs, etc., to protect life and property shall be installed and maintained at all times until the excavation has been backfilled and graded to a safe and satisfactory condition.

C. Protect the bottom of excavations and soil adjacent to, and beneath, foundations from freezing.

D. Exposed subgrade surfaces shall remain undisturbed, drained, and maintained as uniform areas shaped to receive the foundation components of the structure.

– END OF SECTION 02222 –

SECTION 02223

BACKFILLING

PART 1 - GENERAL

1.01 Description

The work specified in this section consists of the labor, equipment, tools, materials, and services needed to perform all backfilling as described herein or shown on the Contract Drawings.

A. Work included in this section:

1. Site filling and backfilling.
2. Fill under culverts and access road.
3. Classification of materials.

B. Related work specified in other sections:

1. Section 01500 - Temporary Facilities and Field Office
2. Section 02081 - Underwater Waste Fill, Debris, and Sediment Removal
3. Section 02222 - Excavation
4. Section 02228 - Compaction

1.02 Quality Assurance

A. Referenced standards: Comply with the applicable provisions and recommendations of the following, except as otherwise shown or specified.

1. ANSI/ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.

B. No granular materials shall be used on this project for fill, backfill, subbase, or other purpose until approval is obtained from the Engineer. Only material from approved sources shall be used.

1.03 Submittals

A. Materials

1. Granular materials required for filling, backfilling, subbase and other purposes shall be as shown on the Drawings. Prior to bidding, prospective contractors shall familiarize themselves with the available quantities of approved onsite and offsite materials.
2. For each material proposed, notify the Engineer of the source of material and furnish for approval a certified gradation analysis at least 10 days prior to date of anticipated use of such material. Except as specified herein, only offsite approved materials shall be utilized.
3. The Owner and the Engineer reserve the right to inspect proposed sources of offsite granular material and to order such tests of the materials deemed necessary to ascertain its quality and graduation of particle size. The Contractor shall, at his own expense, engage an approved testing laboratory to perform such tests, and submit certified test results to the Engineer. If similar tests of the material from a particular source were performed previously, submit results of these tests to the Engineer for consideration.

PART 2 - PRODUCTS

2.01 Onsite Materials

A. Excavated wastefill shall only be used as necessary to grade the project to the lines and grades specified. Backfilling of trenches or utility corridors with onsite wastefill will not be allowed.

B. Virgin soils excavated from utility trenches that do no contain wastefill may be utilized (with the Engineer's approval) for backfilling utility trenches above the pipe bedding and over material. any wastefill encountered or virgin soils deemed unsuitable by the Engineer will be placed as general wastefill for grading purposes.

2.02 Offsite Materials

A. Offsite material required for fill or backfill shall be natural, offsite material, free from topsoil, trash, debris, boulders, snow, ice and other frozen or mechanically deleterious material.

B. Approved must be obtained from the Engineer prior to the placement of any borrow material.

2.03 Pipe Bedding

A. Pipe bedding and cover shall be sand or run of bank gravel free of organic matter. The material shall conform to the following requirements:

Sieve Size	Percent Passing by Weight
1 1/4-inch	100 percent
1-inch	95 - 100 percent
1/4-inch	30-65 percent
#200	$\leq$10

2.04 Sediment Cap

A. The gravel material for the sediment cap shall conform to the requirements of the New York State Department of Transportation (NYSDOT) for Item 304, Type I, Subbase course. The gradation shall be as follows::

Sieve Size Designation	Percent Passing by Weight
3-inch	100
2-inch	90 - 100
1/4-inch	30-65
No. 40	5 - 40
No. 200	0 - 10

PART 3 - EXECUTION

3.01 General Backfilling Requirements

A. Verify that fill materials to be used are acceptable to that specified. Any crushed stone stockpiles which have undergone excessive particle segregation shall be removed prior to backfilling.

B. Verify that all subsurface installations for the project have been inspected and are ready for backfilling.

C. Generally, compact subgrade to density requirements for subsequent backfill materials. Cut out soft areas of subgrade not capable of in-situ compaction. Backfill with a material as specified in Part 2 (above) and compact to density equal to or greater than requirements for subsequent backfill material.

D. Backfill spaces shall be inspected prior to backfilling operations and all unsuitable materials, including sheeting, bracing forms and debris, shall be removed. Remove all water, snow, and ice and debris from surfaces to accept backfill material. No backfill shall be placed against foundation walls of structural members unless they are properly shored and braced or of sufficient strength to withstand lateral soil pressures.

E. Onsite backfill material shall be inspected prior to placement and all roots, vegetation, organic matter, or other foreign debris shall be removed. Stones larger than 12 inches in any dimension shall be removed or broken. Stones shall not be allowed to form clusters with voids. If the contractor fails to stockpile and protect onsite excavated material acceptable for backfill, then the Contractor shall provide an equal quantity of acceptable offsite material at his own expense.

F. Backfilling shall be started as soon as practicable and after structures or pipe installations have been completed and inspected, concrete has acquired 70 percent of design strength, and subgrade waterproofing materials have been in place for at least 48 hours. Backfilling shall be carried on expeditiously thereafter. Backfill shall be started at the lowest section of the area to be backfilled. Natural drainage shall not be obstructed at any time.

G. No backfill material shall be placed on frozen ground nor shall the material itself be frozen or contain frozen soil fragments when placed. No calcium chloride or other chemicals shall be added to prevent freezing. Material incorporated in the backfilling operation which is not in satisfactory condition shall be subject to rejection and removal at the Contractor's expense.

H. Backfill material shall not be placed when moisture content is more than two percent above optimum or is otherwise too high to allow proper compaction. When material is too dry for adequate compaction, water shall be added to the extent necessary. Maintain optimum moisture content of backfill materials to attain required compaction density. Rough grade all backfilled and filled areas to meet subsequent topsoiling or paving requirements. Make grade changes gradual. Blend slopes into level areas.

I. Backfill areas to required contours, grades, and elevations.

J. Hydraulic compaction by ponding or jetting will not be permitted except in very unusual conditions and then only upon written request and demonstration of its effectiveness by the Contractor and the written acceptance by the Engineer.

K. Place and compact fill materials in continuous layers to meet appropriate requirements of Table 1 of Section 02228, Compaction.

L. Employ a placement and compaction method consistent with Section 02228 that does not disturb or damage adjacent walls, drainage systems, damp-proofing, waterproofing, protective coverings, utilities in trenches, underground conduits or tanks.

M. Remove surplus backfill materials from site and/or place in an area acceptable to the Engineer.

3.02 Tolerances

A. Top Surface of General Backfilling - plus or minus one inch from required elevations.

3.03 Field Quality Control

A. Field inspection and testing will be performed under provisions of Section 01400.

B. Tests and analysis of fill material will be performed in accordance with Section 02228.

C. Compaction testing will be performed in accordance with Sections 01400 and 02228.

D. If tests indicate the Work does not meet the specified requirements, the Contractor shall remove, replace and retest the work at his own expense.

E. Proof roll compacted fill surfaces under gravel access road.

3.04 Protection of Finished Work

A. Protect Finished Work.

B. Regrade and recompact fills subjected to vehicular traffic.

– END OF SECTION 02223 –

SECTION 02228

COMPACTION

PART 1 - GENERAL

1.01 Description

The work specified in this section consists of the labor, equipment, tools, materials, and services needed to perform all compaction as described herein or shown on the Contract Drawings.

A. Work included in this section:

1. Compaction requirements.
2. Compact all subgrades, foundations, replaced, filled and backfilled material as specified.

B. Related work specified in other sections:

1. Section 02222 - Excavation
2. Section 02223 - Backfilling
3. Section 02260 - Landfill Cover Construction
4. Section 02269 - QA/QC for Landfill Cover Soil Material
5. Section 02501 - Gravel Pavement
6. Section 02990 - Finish Grading, Topsoil, and Seeding

1.02 Quality Assurance

A. The Engineer shall provide in place moisture-density testing to verify the Contractor's work quality.

B. The Contractor shall adopt compaction methods which will produce the degree of compaction specified herein, prevent subsequent settlement, and provide adequate support for the structures and piping to be placed thereon, or therein, without damage to the new or existing facilities.

C. The natural subgrade for all footing, mats, slabs-on-grade for structures, or pipes shall consist of firm undisturbed natural soil, at the grades shown on the drawings.

D. After excavation to subgrade is completed, the subgrade shall be compacted if it consists of loose granular soil or if its surface is disturbed by the teeth of excavating equipment.

1. This compaction shall be limited to that required to compact loose surface material and shall be terminated in the event that it causes disturbance to underlying fine-grained soils, as revealed by weaving or deflection of the subgrade under the compaction equipment.
2. If the subgrade soils consist of saturated fine or silty sands, silts, or clay or varved clays, no compaction shall be applied.

1.03 Submittals

A. Submit in writing a description of the equipment and methods proposed to be used for compaction.

B. Submit samples of materials to be compacted on the project to the testing laboratory for analysis prior to beginning compaction.

C. Submit copies of all compaction test reports. The test reports shall include the test methods used, results, a narrative of tests conducted, locations, elevations, material tested, equipment used, the name of the technician conducting the tests, and a signed certification from the laboratory.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.01 Preparation

A. Brace walls and slabs of structures to support surcharge loads and construction loads imposed by compaction operations.

B. Proof-roll all subgrade surfaces to accept fill or backfill material.

C. Each layer of fill or backfill shall be compacted to the specified density the same day it is placed.

1. The moisture content of backfill or fill material shall be adjusted, if necessary, to achieve the required degree of compaction.

D. Compact each lift in accordance with Table 02228-1 (attached at end of section).

E. Match compaction equipment and methods to the material and location being compacted in order to obtain the specified compaction, with consideration of the following guidelines:

1. Vibratory compaction is preferred for dry, granular materials.

2. Hand compaction equipment such as impact rammers, plate or small drum vibrators, or pneumatic buttonhead compactors should be used in confined areas.

3. Hydraulic compaction by pounding or jetting will not be permitted except in unusual conditions, and then only upon written approval by the Engineer and after a demonstration of effectiveness.

4. Backhoe mounted hydraulic or vibratory tampers are preferred for compaction of backfill in trenches over 4 feet in depth. The upper 4 feet shall be compacted as detailed above or with hand-guided or self propelled vibratory compactors or static rollers.

5. For plastic pipelines (PVC, PE or PB) do not compact directly over the center of the pipe until the backfill has reached 2 feet above the top of the pipe.

6. Compaction of relocated waste material shall be performed by making a minimum of three passes with a vibratory sheepsfoot roller. The roller shall be suitable for use on municipal waste and weigh a minimum of 23,000 pounds.

F. Compaction must be performed by properly controlling the moisture content, lift thickness, and other necessary details to obtain satisfactory results.

G. The 18-inch soil cover should be laid in two lifts with compacted thickness of each lift of nine inches.

3.02 Field Quality Control

A. Material Testing

1. The Engineer reserves the right to order testing of materials at any time during the work.

2. Testing will be done by a qualified, independent testing laboratory in accordance with this Section and Section 01400, Quality Assurance and Quality Control Services. The Contractor shall pay for all compaction testing performed by the testing laboratory.

3. The Contractor shall aid the Engineer in obtaining representative material samples to be used in testing.

4. For each material which does not meet specifications, the Contractor shall reimburse the Owner for the cost of the test and shall supply an equal quantity of acceptable material, at no additional compensation.

5. The Contractor shall anticipate these tests and incorporate the time and effort into his procedures.

B. Compaction Testing

1. The Engineer reserves the right to direct the qualified independent testing laboratory to conduct in-place density tests of compacted lifts.

2. Testing may be conducted for every 200 cubic yards of fill or backfill, or every 75 linear feet of trench backfill placed.

3. The Contractor shall dig test holes and provide access to all backfill areas at no additional compensation when requested by the Engineer if an area has been covered without approval or is suspected of not meeting the specifications.

4. For each test which does not meet the specifications, the Contractor shall pay for the cost of the test and shall replace all material included in that lift or sector with acceptable material and compact to specification, at no additional compensation.

5. The Contractor shall anticipate these tests and incorporate the time and effort into his procedures.

6. Nuclear moisture density testing by "probe" methods will be provided.

a. Only certified personnel will conduct nuclear testing.

b. The nuclear moisture density test specified for each lift should be performed using appropriate instruments capable of testing moisture density for the full depth of the test.

C. Alternate Methods of Compaction - The Contractor may employ alternate methods of compaction if the desired degree of compaction can be successfully demonstrated to the Engineer's satisfaction.

3.03 Protection

A. Prior to terminating work for the day, the final layer of compacted fill shall be rolled with a smooth-drum roller if necessary to eliminate ridges of soil and depressions left by tractors or equipment used for compaction or installing the material.

B. As backfill progresses, the surface shall be graded so as to drain during incidence of rain such that no ponding of water shall occur on the surface of the fill.

C. The Contractor shall not place a layer of fill on snow, ice or frozen soil. Unsatisfactory materials shall be removed prior to fill placement.

– END OF SECTION 02228 –

TABLE 02228-1

MINIMUM COMPACTION REQUIREMENTS

Construction Element	Maximum Compaction Layer Thickness (Inches)	ASTM	Minimum Compaction
I. Structures			
a. Fill under slabs-on-grade, and backfill around structures and above footings	8	D698	95%
II. Trenches			
a. Fill under pipelines and pipe bedding	8	D698	95%
b. Pipe sidefills and first 1 foot of pipe backfill under pavements*	12	D698	95%
c. Backfill from 1 foot above pipe to top of trench under pavement*	18	D698	95%
d. Backfill under lawns, gardens and cultivated fields	18	D698	85%
e. All other trenches	18	D698	85%
III. Embankments and Fills			
a. Fill under streets, parking lots and other paved areas	12	D698	95%
b. Rough site grading	18	D698	95%
IV. Access Gravel Roadway			
a. Crushed stone paving	12	D698	92%
V. Landfill cover layers			
Subgrade	18	D698	95%
Relocated Wastefill	18	--	3 passes
Low Permeability Layer**	8	D698	95%
Drainage Layer***	6	D698	90% (95% maximum)
Cover Soil Layer	12	D698	90%
Topsoil Layer	6	--	See Section 02990

* For plastic or polyethylene pipe, use 2 feet over top of pipe.

** A permeability of 1 x 10^{-7} cm/sec must also be achieved.

*** Do not overcompact drainage layer as the permeability may be adversely affected.

Refer to Section 02264 - Quality Assurance/Quality Control/Landfill Cover Soils for testing frequencies and requirements.

SECTION 02260

LANDFILL COVER CONSTRUCTION

PART 1 - GENERAL

1.01 Description

The work specified in this section consists of the labor, equipment, tools, materials, and services needed to perform the construction of the landfill cover layers described herein or as shown on the Contract Drawings.

A. Work included in this section:

1. Barrier Protection layer.
2. Topsoil Layer

B. Related work specified in other sections:

1. Section 01564 - Erosion Control
2. Section 02081 -Underwater Waste Fill, Debris, and Sediment Removal
3. Section 02222 - Excavation
4. Section 02223 - Backfilling
5. Section 02228 - Compaction
6. Section 02269 - QA/QC for Landfill Cover Soil Material
7. Section 02990 - Finish Grading, Topsoil, and Seeding

1.02 Quality Assurance

The Contractor shall have successfully completed at least two landfills of equal or larger size, one of which involved the placement of a low permeability soil layer or barrier protection layer.

1.03 Submittals

A. Submit one series of certified quality control tests for each cover soil material for the Engineer's approval. Include a 50-pound sample and identify the source of each material. Resubmit as needed to obtain approval.

B. Submit a list of compaction equipment to be used including the manufacturer, model name and/or number, type, gross weight, and areal loading.

C. Submit a list of at least two successfully completed projects of equal or larger size and or similar construction.

1.04 Delivery, Storage, and Handling

Material stockpiles shall be segregated by type of material and shall be stored and handled to prevent inclusion of objectionable material such as trash, debris, organic matter, unapproved materials, stones, ice, snow, or other materials.

PART 2 - PRODUCTS

2.01 Cover Soil Layer

The cover soil material shall conform to the following requirements:

Gradation

Sieve Size	Percent Passing
3inch	100 percent
#4	85
#200	40-60
.002	0-10

Requirements specified in Section 02223 - Backfilling shall also be adhered to.

2.02 Topsoil Layer

Refer to Section 02990 for specifications relating to finish grading, topsoil, and seeding.

PART 3 - EXECUTION

3.01 Subgrade Preparation

A. Prior to construction of the cover layers, the subgrade shall be proof-rolled using a roller of not less than 23,000 pounds. The Engineer shall observe the proof-rolling and also make determinations of unsuitable subgrades. Unsuitable subgrades shall be excavated in one-foot increments up to a maximum of three feet. The subgrade shall be proof-rolled and re-inspected by the Engineer after each increment until accepted. The excavation shall be backfilled and compacted with barrier protection material, or stable waste material.

3.02 Sequencing and Scheduling

A. The Contractor shall be responsible for the installation, sequencing, and testing of all cover components.

B. The Contractor shall verify that the subgrade and each cover component has been properly installed, graded, tested, and had the test results accepted as required prior to the installation of subsequent cover components. The Engineer must approve the prior lift surface prior to the installation of subsequent lifts.

C. The Contractor shall notify the Engineer a minimum of 24 hours in advance of required QA/QC testing.

3.03 Installation (General)

A. Each lift shall be placed and compacted in uniform lifts in accordance with Section 02228. Employ compaction equipment and methods which will achieve the specified permeabilities and compaction.

B. Employ placement and compaction methods which will not damage previously installed cover layers or geosynthetics and are acceptable to the Engineer.

C. Maintain proper grading and compaction of each cover layer to maintain drainage and prevent ponding. Areas compacted with a sheepfoot roller shall be proof-rolled or back-bladed to a smooth surface each night to prevent infiltration and ponding and to maintain drainage.

D. Do not place materials on spongy, porous, wet or frozen ground or while in a frozen condition.

E. Calcium chloride or other chemicals shall not be used to prevent freezing.

F. QA/QC testing shall be conducted in accordance with Section 02269.

-- END OF SECTION 02260 --

SECTION 02269

QUALITY ASSURANCE/QUALITY CONTROL LANDFILL COVER SOIL MATERIALS

PART 1 - GENERAL

1.01 Description

A. Work included in this section:

The work specified in this section consists of the labor, equipment, tools, materials, and services needed to perform all QA/QC requirements for the landfill cover only as described herein or shown on the Contract Drawings. The quality assurance/quality control requirements, including sampling frequency and test type; the documentation requirements for the sampling and testing; and the requirements for failed quality control tests.

B. Related work specified in other sections:

1. Section 02222 - Excavation
2. Section 02223 - Backfilling
3. Section 02228 - Compaction
4. Section 02260 - Landfill Cover Construction
5. Section 02990 - Finish Grading, Topsoil, and Seeding

1.02 Submittals

A. The Contractor shall submit one series of quality control tests for each soil material for the Engineer's approval prior to use of that material.

The test reports shall include, at a minimum, the sample number, the location of the sample, the quantity of material represented by the sample, the location of the overall quantity represented by the sample, the test methods used, the name of the technician conducting the tests, and a signed certification from the laboratory. Each certificate shall be signed by an authorized representative of the testing firm, such as the laboratory manager, who will certify that sampling and test methods were performed in accordance with those described for this work. Each certificate shall reference the test sample number.

B. A description of the bentonite plug to be used to repair penetrations in the low permeability soil layer.

1.03 Referred Standards

A. ASTM D-75, "Standard Practice for Sampling Aggregates".

B. ASTM D-422, "Standard Test Method for Particle-Size Analysis of Soils".

C. ASTM D-1556, "Standard Test Method for Density of Soil in Place by the Sand-Cone Method."

D. ASTM D-698, "Standard Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5 pound Rammer and 12-inch Drop."

E. ASTM D-2922, "Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

F. ASTM D-2974, "Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils."

G. ASTM D-3017, "Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)."

H. ASTM D-3740, "Standard Practice for Evaluation of Agencies Engaged in the Testing and/or Inspection of Soil and Rock as used in Engineering Design and Construction."

I. ASTM D-4220, "Standard Practices for Preserving and Transporting Soil Samples."

J. ASTM D-4253, "Standard Test Methods for Maximum Index Density of Soils Using a Vibrating Table."

K. ASTM D-4254, "Standard Test Methods for Minimum Index Density of Soils and Calculation of Relative Density."

L. NYSDEC 6NYCRR Part 360 Regulations - Solidwaste Management Facilities.

1.04 Responsibilities

A. Contractor Responsibilities: The Contractor shall be responsible for and pay for one series of quality control tests for each cover soil material for the Engineer's approval. Resubmissions to obtain approval shall also be at the Contractor's expense.

The Contractor shall notify the Engineer on a daily basis and no less than 24 hours in advance of testing required. The contractor shall make available personnel or equipment as needed to assist with the testing.

B. Engineer's Responsibilities: The Engineer shall be responsible for and pay for all quality control and quality assurance testing with the exception of the initial quality control tests for material approval. The Engineer shall provide copies of all test reports to the Contractor.

PART 2 - PRODUCTS

PART 3 - EXECUTION

3.01 Inspection

A. Maintain on the site for inspection, the information outlined in ASTM Designation D-3740.

B. Prior to beginning work, verify that the Engineer has reviewed the testing facilities.

3.02 Preparation

A. Verify that the areas to be tested are ready to be tested.

B. Review testing parameters, requirements, and anticipated schedules to ensure that adequate personnel and proper equipment will be available. Notify the Engineer at least 24 hours in advance of the required testing.

C. Perform audits, as needed, to evaluate construction test results and discuss with the Engineer any changes which may simplify and expedite the work.

D. Coordinate sampling and testing operations so as to have the necessary data available on a timely basis.

1. Quality control samples shall be scheduled such that test results are available at the time the sampled material is being placed and compacted.

2. Quality assurance tests should be scheduled immediately after material placement so evaluations and determinations concerning installed material can be made.

3.03 Protection

A. Minimize disturbance of previous completed work during the performance of the work in this Section.

3.04 Quality Control Sampling and Testing

A. The Contractor shall schedule quality control sampling and testing of source materials prior to the use of a specified quantity of materials to determine if mechanical characteristics and laboratory performance criteria are consistent with those required for the work, and to provide information for use in handling, preparation and compaction activities. Quality control testing shall be performed by the Engineer.

B. Inform the Engineer of anticipated quantities and locations of excavated soil on a daily basis and no less than 24 hours in advance to enable the Engineer and the testing firm to prepare for quality control sampling and testing.

C. Based on quantity estimates, notify the Engineer when and where quality control sampling is required.

D. Quality control sampling shall be performed as follows:

1. For material which is taken directly from its natural state to the landfill, the testing firm shall obtain a representative sample from the next proposed section of the material source, as identified by the Contractor.

2. For material which is excavated, spread and/or worked to prepare the material, and then used for construction, the testing firm shall obtain a representative sample from the next proposed section of the material source, as identified by the Contractor.

3. For material which is excavated and stockpiled for later use or excavated, spread and then stockpiled, the testing firm shall obtain a representative sample from the stockpile in accordance with ASTM Designation D-75.

4. In all cases, the testing firm should visually inspect the proposed borrow material for noticeable variations in material and sample different materials separately.

5. Mass samples shall be of sufficient quantity for the required testing. Subsamples for individual test procedures shall be extracted as required by specific test methods.

6. All samples shall be individually labeled for identification purposes.

7. Subsample labels shall denote the sample from which they were derived.

E. Quality control testing shall be performed as follows:

1. The minimum frequency of testing and test methods used shall be in accordance with Table 02269-1 at the end of this section.

2. Samples which must be tested offsite shall be handled in accordance with ASTM Designation D-4220.

3.05 Quality Assurance Sampling and Testing

A. Quality assurance sampling and testing of compacted soil materials shall be performed by the Engineer after a specified quantity of material has been prepared, placed, and compacted to verify that compaction requirements have been met and that the resulting field performance criteria are consistent with those obtained from quality control testing and those required for the work.

B. Inform the Engineer of anticipated quantities and locations of placed and compacted material on a daily basis and no less than 24 hours in advance to enable the testing firm to prepare for quality assurance sampling and testing.

C. Quality assurance testing and sampling shall be performed as follows:

1. The minimum frequency of testing and the test methods to be used are listed in Table 02269-1 at the end of this section.
2. Depending on the nature of the drainage material, field compaction verification testing may be waived and visual observation of compaction may be substituted. A written request with supporting documentation shall be submitted to, and written approval received from the Engineer, prior to a change in the Quality Assurance Program.
3. Penetrations in the barrier protection layers shall be filled with the same material and compacted.

3.06 Special Conditions

A. Failed Tests

1. Acceptable soil shall be defined as soil which lies between consecutive sample locations which produced test results meeting all applicable specifications.
2. In the event that a quality control test result does not meet specifications, the material from which the sample was taken, and which the sample represents, shall be considered unacceptable and shall not be used for construction.
    a. The Engineer may take and test additional samples about the failed sample to limit the area represented by the failed sample at the expense of the Contractor.
    b. The Contractor may amend the soil as he deems necessary and retest the soil. The amendment shall be documented by a certified soil testing laboratory at the expense of the Contractor.
3. In the event that a quality assurance test does not meet specifications, the area represented by the failed sample shall be considered unacceptable and shall be removed and replaced with an equivalent amount of acceptable material at no additional compensation.
    a. The Engineer may take and test additional samples about the failed sample to limit the area represented by the failed sample, at the expense of the Contractor.

TABLE 02269-1

QUALITY CONTROL

FREQUENCY OF TESTING

Test (1)	Method	Cover Soil Layer	Topsoil Layer
Particle Size Analysis	ASTM D-422	1/2,500 cy	1/10,000 cy
Standard Proctor Analysis(2)	ASTM D-698	1/2,500 cy	N/A
Organic Content	ASTM D-2974	N/A	1/10,000 cy
Soil pH	ASTM D-4972		1/10,000 cy

(1) Testing shall also be performed at noticeable changes in material.

(2) Perform minimum/maximum density testing (ASTM D-4253 and ASTM D-4254) for material not meeting the oversize correction requirements of the Standard Proctor Analysis (ASTM D-698).

(3) Testing frequencies shall meet or exceed NYSDEC 6 NYCRR Part 360 requirements.

TABLE 02269-2

QUALITY ASSURANCE EVALUATIONS

Test	Topsoil Method Layer	Cover Soil Layer	Topsoil Layer
In Place Density (Nuclear)	ASTM D-2922	1/50 ft grid/lift	N/A
Moisture Content (Nuclear)	ASTM D-3017	1/50 ft grid/lift	N/A
Thickness Evaluation	Before and After Survey of Component Layer	1/50 foot grid	1/50 foot grid

-- END OF SECTION 02269 --

SECTION 02275

RIPRAP

PART 1 - GENERAL

1.01 Description

The work specified in this section consists of the labor, equipment, tools, materials, and services needed to provide and place riprap as described herein or shown on the Contract Drawings.

A. Items included in this section:

1. Riprap requirements for shoreline protection, ditches, and outfall structures

B. Related work specified in other sections:

1. Section 01564 - Erosion Control
2. Section 02222 - Excavation
3. Section 02223 - Backfilling
4. Section 02228 - Compaction
5. Section 02421 - Geotextiles

1.02 Submittals

A. Submit the name and location of the source of stone used.

B. Submit test reports on the materials including sieve analysis.

PART 2 - PRODUCTS

2.01 General

A. Bedding stone and riprap shall be clean, hard, durable, crushed, angular stone as delivered from an offsite source.

B. Bedding stone and riprap shall be free from organic matter, trash, debris, shale, show, ice, and other frozen or mechanically deleterious materials.

C. Bedding stone and riprap shall be hard enough to withstand exposure to air, water, freezing, and thawing.

2.02 Riprap

A. Light stone riprap shall meet the gradation requirements for NYSDOT light stone fill, item #620-2.02. Gradation shall be as follows:

Size	Percent of Total by Weight
Smaller than 12 inches	100%
Larger than 4 inches	50-100%
Smaller than 1/2 inch	0-10%

B. Surge stone riprap shall meet the following gradation:

Size	Percent of Total by Weight
Smaller than 6 inches	100%
Larger than 3 inches	50-100%
Smaller than 1/2 inch	0-10%

2.03 Bedding Stone

A. Bedding stone shall be well graded, crushed stone conforming to NYSDOT Item 304 Item 304 Type 2 conforming to the following gradation:

Seive Size	Percent of Total by Weight
2-inch	100%
1/4 inch	25-60%
No. 40	5-40%
No. 200	0-10%

PART 3 - EXECUTION

3.01 Placement

A. The Contractor shall place the stone fill in accordance with NYSDOT Specification 620-3.02 in the locations shown on the Drawings.

B. The stone fill shall be placed in a manner that will produce a reasonable well-graded mass of stone with smaller stone fragments filling the space between the larger ones, so as to result in the minimum practicable percentage of voids.

C. The final section of stone filing shall be in conformance with the lines, grades, and thicknesses shown on the plans. Stone filling used for bank or channel protection shall be placed to its fill course thickness in one operation, unless otherwise directed by the Engineer or specified in the special provisions, and in such a manner that the underlying material will not be displaced or worked into the layer of stone filling.

D. Placement of stone upon finished bedding material, when used, shall be carefully controlled to avoid disruption and damage to the layer of bedding material. The stone shall be so placed and distributed that there will be no pockets of uniform size material.

E. The desired distribution of the various sizes of stone throughout the mass shall be obtained by selective loading of the material at the quarry of other source; by controlled dumping of successive loads during final placing or by other methods of placement which will produce the specified results. Rearranging of individual stones by mechanical equipment or by hand will be required to the extent necessary to secure the specified results.

F. The stone fill shall be placed starting at the bottom of the placement areas and proceed to the top, or in such a manner that stones will not slide or roll down during their placement. On slopes, the largest stones shall be placed at the bottom of the slope.

G. The ground surface on which channel protection is to be placed shall be free of brush, trees, stumps, and other objectionable material and shall be dressed to a smooth surface. Do not place riprap over frozen or spongy subgrade surfaces.

H. Riprap shall be placed to allow the weight of the stone to be carried by the underlying material and not by the adjacent stones.

– END OF SECTION 02275 –

SECTION 02421

GEOTEXTILES

PART 1 - GENERAL

1.01 Section Includes

A. Isolation Geotextile (Non-Woven).

B. Separation Geotextile (Non-Woven).

C. Reinforcement Geotextile (Woven).

D. Filtration Geotextile (Non-Woven).

1.02 Related Sections

A. Section 02081 - Underwater Waste Fill and Sediment Removal

B. Section 02222 - Backfilling

C. Section 02260 - Landfill Cover Construction

D. Section 02275 - Rip-Rap

E. Section 02501 - Gravel Paving

1.03 References

A. Documents

1. Task Force #25, AASHTO-ABC-ARTBA Joint Committee, "Specifications for Geotextiles." July 1986.

B. Quality Control Testing Standards

1. ASTM D3776 - Mass Per Unit Area of Woven Fabric.
2. ASTM D3786 - Hydraulic Bursting Strength of Knitted Goods and Non-Woven Fabrics.
3. ASTM D4354 - Sampling of Geosynthetics for Testing.
4. ASTM D4491 - Water Permeability of Geotextiles by Permittivity.
5. ASTM D4594 - Effects of Temperature on Stability of Geotextiles.
6. ASTM D4595 - Tensile Properties of Geotextiles by the Wide Width Strip Method.
7. ASTM D4632 - Breaking Load and Elongation of Geotextiles (Grab Method).
8. ASTM D4751 - Determining Apparent Opening Size of a Geotextile.
9. ASTM D4833 - Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.
10. ASTM D4873 - Identification, Storage and Handling of Geotextiles.
11. ASTM D5188 - Nominal Thickness of Geotextiles and Geomembranes.

1.04 Submittals

A. Materials: Submit product data and a 1-foot square sample of each geotextile proposed for use on this project.

B. Certification that each geotextile meets the criteria listed in Table 02421-1 at the end of this section.

1.05 Delivery, Storage, and Handling

A. Store geotextiles out of the elements and protect from abrasion or tearing.

B. Clearly mark rolls showing the type of fabric and manufacturer.

C. Handling of the geotextile rolls shall be based on the manufacturer's recommendations.

D. The requirements for identification, storage and handling of geotextiles in ASTM D4873 shall be followed as a minimum.

PART 2 - MATERIALS AND PRODUCTS

2.01 Materials

A. Separation Geotextile (Filters and Riprap Base)

1. Shall be heat-bonded (non-woven) geotextile specifically designed for drainage and separation applications.
2. Shall be composed of polyester and/or polypropylene polymers.
3. Shall meet the criteria listed in Table 02421-1.

B. Reinforcement Geotextile (Road Reinforcement) and Isolation Geotextile

1. Shall be a woven geotextile specifically designed for reinforcement applications.
2. Shall be composed of polyester and/or polypropylene polymers.
3. Shall meet the criteria listed in Table 02421-1.

C. Filtration Geotextile (Sediment Capping)

1. Shall be a needle-punched, non-woven geotextile, specifically designed for filtration applications.
2. Shall be composed of polyester and/or polypropylene polymers,
3. Shall meet the criteria listed in Table 02421-1.

PART 3 - EXECUTION

3.01 Inspection

A. The Contractor shall inspect all geotextiles upon delivery and verify that the proper materials and quantities have been supplied.

B. The Contractor shall inspect the subgrade for protrusions or other unacceptable conditions prior to installation of geotextiles.

C. The Contractor shall continuously inspect needle-punched geotextiles during deployment for broken needles remaining from needle-punching operations.

3.02 Preparation

A. The subgrade shall be prepared as indicated in the specifications.

3.03 Protection

A. Protect all geotextile materials from damage due to exposure to sunlight, dirt, dust and other hazards.

B. Maintain the protective wrapping on geotextile rolls at all times.

C. The geotextiles shall be covered within 10 days after installation.

D. During spreading operations of backfill, a minimum depth of 12 inches of aggregate shall be maintained over the geotextiles when possible. Construction equipment shall not operate directly on the geotextile.

3.04 Performance

A. Geotextile rolls shall be positioned as required and unrolled.

B. When placed on prepared subgrades, geotextiles shall be overlapped a minimum of 1.0 feet on all edges.

C. When geotextile is placed on unstable subgrades or slopes steeper than 1V:5H, horizontal overlaps shall be sewn.

D. When geotextile is placed on slopes steeper than 1V:5H, longitudinal seams shall be sewn or overlapped a minimum of 2 feet.

E. Sewing requirement:

1. The thread color shall contrast with that of the geotextile.
2. Sewing operations shall employ a thread tension which secures the geotextile rolls without cutting the material.
3. Sewing operation shall use a "J" seam secured with a minimum of one row of four-stitch per inch two thread main stitch.

F. When geotextile is placed in trenches, the material shall be overlapped a minimum of 1 foot over the top of the trench. Longitudinal seams between adjacent rolls of material shall be overlapped a minimum of 2 feet.

G. Geotextile rolls shall be cut and laid flat such that buckling of the roll does not occur.

H. If geotextiles are damaged during any phase of construction or installation, a new piece of the same type shall be cut and placed over the damaged area with a 2-foot minimum overlap and sewn.

I. Aggregate shall be spread in the direction of overlap wherever possible.

J. All seams for geotextile placed under water shall be sewn.

TABLE 02421-1

MINIMUM ACCEPTANCE CRITERIA GEOTEXTILE

Test Description	Test Method	Criteria
Separation		
Mass per unit area	ASTM D-3776	≥6 oz/SY
Apparent opening size (AOS)	ASTM D-4751	<No. 70 sieve
Puncture resistance	ASTM D-4833	≥60 lb.*
Grab strength	ASTM D-4632	≥150 lb.*
Tensile strength	ASTM D-4595	≥75 lb.*
Permittivity	ASTM D-4491	≥2.0 sec^{-1}*
Burst strength	ASTM D-3786	≥200 psi*
Reinforcement and Isolation		
Mass per unit area	ASTM D-3776	>8 oz/SY
Puncture resistance	ASTM D-4833	>150 lb.
Grab strength	ASTM D-4632	>400 lb.
Tensile strength	ASTM D-4595	>200 lb./in.
Burst strength	ASTM D-3786	>800 psi
Filtration		
Mass per unit area	ASTM D-3776	≥6 oz/SY
Apparent opening size (AOS)	ASTM D-4751	<No. 50 sieve
Puncture resistance	ASTM D-4833	≥75 lb.*
Tensile strength	ASTM D-4632	>120 lb.*
Tensile strength	ASTM D-4595	>50 lb./in*
Permittivity	ASTM D-4491	≥1. 0 $sec.^{-1}$
Burst strength	ASTM D-3786	>200 psi

Minimum strength criteria shall apply to both the machine direction (MD) and the cross machine direction (XMD).

* Minimum Average Roll Values (MARV)

– END OF SECTION 02421 –

SECTION 02501

GRAVEL PAVEMENT

PART 1 - GENERAL

1.01 Description

A. The work herein consists of the furnishment and placement of the following materials at the site.

B. Section Includes:

1. Subgrade preparation.
2. Furnishing natural soils.
3. Furnishing select borrow material.
4. Furnishing granular access road material.
5. Temporary drainage.
6. Compaction.
7. Proof rolling.
8. Removal and replacement of unacceptable materials.
9. Grading.
10. Installation of geotextile fabric.

1.02 Related Sections

A. Section 01040 - Project Coordination

B. Section 01500 - Temporary Facilities and Controls

C. Section 01564 - Erosion Control

D. Section 02223 - Backfilling

E. Section 02228 - Compaction

F. Section 02421 - Geotextiles

1.03 References

A. ASTM D698 - "Moisture-Density Relations of Soil and Soil Aggregate Mixtures Using 5.5 pound Rammer and 12-inch Drop".

1.04 Definitions

A. "Subgrade" shall be defined as the foundation layer of natural soils or select borrow material that supports the gravel pavement layer.

1.05 Performance Requirements

A. Compaction of subgrade shall meet the requirements for compaction as stated in Section 02228, Table 1.

1. Compaction curves shall be developed for each type of subgrade material when "In-Place Density" tests are required by the Engineer.

2. The cost of failed compaction tests will be reimbursed by the Contractor.

B. Proof rolling with 8 to 10-ton pneumatic tire compactors to locate areas of inadequate compaction or soft or rutting areas or other defects in the subgrade surface.

1.06 Submittals

A. Geotextile Fabric - Refer to Section 02421.

B. Granular Materials - Submit test reports on the materials including sieve analysis ad certifications where required.

1.07 Environmental Requirements

A. Provide erosion and sediment controls (refer to Section 01564) to prevent debris, stones and silt from entering drainage systems.

1.08 Field Measurements

A. Prior to start of construction, verify by field measurements that existing conditions are as shown on Drawings. Notify the Engineer of specific differences.

1.09 Coordination

A. Coordinate field work under provisions of Section 01040, including maintenance of traffic and emergency vehicle access.

B. Coordinate work with local utility companies (private and municipal) for location of existing utilities and protection thereof.

1.10 Test Requirements

A. Refer to Article 1.05 above.

PART 2 - PRODUCTS

2.01 Materials

A. Granular access road material shall be NYSDOT Type 2, Item No. 304.202. Run of crusher stone or recycled concrete aggregate with similar gradation.

B. Subgrade shaping materials shall be as described in Section 02223.

C. The type, size and quantity of granular material shall be that required to prepare a compacted subgrade approved by the Engineer.

D. Geotextile fabric shall be as specified for a separation geotextile in Section 02421.

PART 3 - EXECUTION

3.01 Examination

A. See Section 02223.

B. All underground utility installations, including culverts, shall be completed, backfilled and compacted prior to completion of subgrade.

C. Verify that traffic controls and erosion and sediment controls are in place.

3.02 Preparation

A. See Section 02223.

B. Temporary erosion and sediment controls shall be installed prior to construction of subgrade. See Section 01564.

C. Temporary drains and ditches shall be constructed as necessary to remove water from the subgrade area.

1. Temporary drainage openings in existing catch basins may be made in a manner acceptable to the Engineer. Such openings to be repaired to the satisfaction of the Engineer.

2. Contractor shall prevent debris, stones and silt from entering drainage systems, including the use of hay bales, screens and other desilting methods.

D. Backfilled areas shall be retested at the discretion of the Engineer.

3.03 Installation

A. Construct the subgrade by cutting existing grades or by filling with clean offsite fill.

1. The final subgrade surface shall be fine graded, rolled and compacted to form a smooth, even surface.

B. The subgrade in fill sections shall be placed in maximum 12-inch layers before compaction, and compacted before the next layer is spread.

C. The subgrade surface shall drain to the road edges, be free from holes, bumps, wheel ruts and of standing water, snow, frozen material and organic materials prior to the placement of the next course.

1. Soft or otherwise unacceptable subgrade materials shall be removed and replaced with select onsite material acceptable to the Engineer.

2. Where no suitable onsite fill is available, granular materials shall be installed and compacted.

3.04 Field Quality Control

A. For compaction requirements, refer to Section 02228, Table 1.

B. Tolerances - Refer to Section 02223.

C. Proof Rolled - Prior to the placement of the next granular layer or geotextile fabric, the subgrade surface shall be proof rolled to locate areas of inadequate compaction, deflection, or soft or rutting areas requiring undercutting, with 8 to 10-ton pneumatic tire compactors.

1. Areas of inadequate compaction will be recompacted.

2. If additional rolling does not correct an area of unstable conditions, the unstable area shall be removed and replaced with select onsite material and compacted.

3. Where no suitable onsite material is available, granular materials shall be installed and compacted.

4. Areas inaccessible to rollers are to be compacted by other mechanical methods.

3.05 Protection

A. No vehicular traffic will be allowed on the newly-placed fabric until covered with the granular layer.

3.06 Dust Control

A. Dust Control shall be accomplished by using water, brooming and cleaning methods.

1. Dust control shall be carried out on a daily basis including weekends and holidays.

– END OF SECTION 02501 –

SECTION 02830

CHAIN LINK FENCING AND GATES

PART 1 - GENERAL

1.01 Description

A. Provide new six-foot high chain link fencing and gates as complete units including necessary erection accessories, fittings, and fastenings as indicated on drawings.

B. Related work specified in other sections:

1. Section 01500 - Temporary Facilities and Field Office
2. Section 01545 - Protection of the Work and Property
3. Section 02222 - Excavation

1.02 Submittals

Submit manufacturer's technical product data, shop drawings, and installation instructions for metal fencing, fabric, gates and accessories.

A. Dimensions indicated for pipe are outside dimensions, exclusive of coatings.

B. Manufacture: Subject to compliance with requirements, provide products of equal value to the following:

Galvanized Steel Fencing and Fabric
Allied Tube and Conduit Corp.
American Fence Corp.
Anchor Fence, Inc.

PART 2 - PRODUCTS

2.01 Fabric

Zinc-coated fabric shall be galvanized after weaving with a minimum 1.2 ounces of zinc per square foot of surface area and conform to ASTM A-392, Class I. Fabric to be 9 gauge wire woven in a 2-inch diamond mesh. Top selvage to be twisted and barbed. Bottom selvage to be knuckled.

2.02 Framing

Pipe manufactured from steel conforming to ASTM A 569, cold-formed, high frequency or induction welded and having a minimum yield strength of 50,000 PSI. External surface triple coating per ASTM F-1234, Type B & Type D with 1.0 ounce +/- 0.1 ounce of zinc per square foot, 30 +/- 15 micrograms of chromate per square inch and high performance polymer and shall demonstrate the ability to resist 1,000 hours of exposure to salt spray with a maximum of 5 percent red rust in a test conducted in accordance with ASTM B-117. Internal surface coated, after welding, with a zinc-rich based organic coating having a 91 percent zinc powder loading capable of providing the ability to withstand 650 hours of exposure to salt fog with a maximum of 5 percent red rust, when conducted in accordance with ASTM B-117. All coatings are to be applied inside and out after weldings.

Pipe shall be straight, true to section and conform to the following weights:

Pipe Size Outside Diameter	Weight Lbs./Ft.

1-5/8 inches	1.84
2 inches	2.28
2-1/2 inches	3.12
3 inches	4.64
3-1/2 inches	5.71
4 inches	6.56
6-5/8 inches	--

1. End, Corner and Pull Posts: Minimum sizes and weights as follows: 2.5-inches OD, 3.12 lbs. per linear foot.

   Pull post to be installed at a maximum of 100 feet on straight runs. Corner parts to be installed at all horizontal changes in direction and all vertical changes in direction 5 percent or greater.

2. Line Posts: Space 10 feet o.c. maximum, unless otherwise indicated, of following minimum sizes and weights. 2-inch OD, 2.28 pounds per linear foot.

3. Gate Posts: Furnish posts for supporting for single gate leaf, or one leaf of a double gate installation, for nominal gate widths as follows: 4-inches OD, 6.56 pounds per linear foot.

4. Post Brace Assembly: Manufacturer's standard adjustable brace at end and gate posts and at both sides of corner and pull posts with horizontal brace located at mid-height of fabric. Use same material as line posts for brace, and truss to line posts with 3/8-inch diameter rod and adjustable tightener.

2.03 Gates

Gates: Fabricate perimeter frames of gates from metal and finish to match fence framework. Assemble gate frames by welding or with special fittings and rivets for rigid connections, providing security against removal of breakage connections. Provide horizontal and vertical members to ensure proper gate operation and attachment of fabric, hardware and accessories. Space frame members maximum of 8 feet apart unless otherwise indicated.

1. Provide same fabric as for fence, unless otherwise indicated. Install fabric with stretcher bars at a vertical edges and at top and bottom edges. Attach stretcher bars to gate frame at not more than 15 inches o.c.

2. Install diagonal cross-bracing consisting of 3/8-inch diameter adjustable length truss rods on gates to ensure frame rigidity without sag or twist.

2.04 Gate Hardware

Provide hardware and accessories for each gate, galvanized per ASTM A 153, and in accordance with the following:

1. Hinges: Size and material to suit gate size, non-life type, offset to permit 180° gate opening, (90° both in and out). Provide 1 pair of hinges for each leaf.

2. Latch: Forked type or plunger-bar type to permit operation from either side of gate, with padlock eye as integral part of latch.

3. Double Gates: Provide gate stops for double gates, consisting of mushroom type flush plate with anchors, set in concrete, and designed to engage center drop rod or plunger bar. Include locking device and padlock eyes as integral part of latch, permitting both gate leaves to be locked with single padlock.

2.05 Fittings and Accessories

Galvanized, ASTM A 153, with a minimum of 0.80 ounces of zinc per square foot of wire surface.

1. Wire Ties: For tying fabric to line posts, use wire ties spaced 12 inches o.c. For tying fabric to rails and braces, use wire ties spaced 24 inches o.c. For tying fabric to tension wire, use hog rings spaced 24 inches o.c.

   Manufacturer's standard procedure will be accepted if of equal strength and durability.

2. Tension Wire: 7-gage, coated coil spring wire, metal and finish to match fabric. Locate at bottom of fabric.

2.06 Concrete

Provide concrete consisting of Portland cement, ASTM C 150, aggregates ASTM C 33, and clean water. Mix materials to obtain concrete with a minimum 28-day compressive strength of 2500 psi using at least 4 sacks of cement per cubic yard, 1 inch maximum size aggregate, maximum 3 inch slump, and 2 percent to 4 percent entrained air.

PART 3 EXECUTION

3.01 Excavation

Auger post holes to the minimum depth and diameter as shown on the drawings. Provide forms as needed to prevent mushrooming of the top of the post holes.

3.02 Installation

Install in accordance with ASTM F 567 and written installation instructions of fencing manufacturer to provide secure, aligned installation.

3.03 Site Security

The permanent fence may be used in lieu of, or in addition to, the temporary fence to provide site security as required in Section 01010. Any damage to the permanent fence during construction shall be repaired prior to final acceptance.

– END OF SECTION 02830 –

SECTION 02990

FINISH GRADING, TOPSOIL AND SEEDING

PART 1 - GENERAL

1.01 Work Specified

A. The work specified herein includes the material, equipment, and labor necessary to provide finish grading and to place topsoil, fertilizer, seed, mulch, and erosion control fabric. The mulch and erosion control fabric shall be placed as follows:

1. Mulch - shall be utilized on all slopes.
2. Natural erosion control fabric - shall be utilized as indicated on the Drawings.

B. Related work specified in other sections:

1. Section 01500 - Temporary Facilities and Field Office
2. Section 01564 - Erosion Control
3. Section 02222 - Excavation
4. Section 02260 - Landfill Cover Construction
5. Section 02269 - QA/QC for Landfill Cover Soil Material

1.02 Submittals

A. Materials and Products: Submit for approval data.

1. Topsoil Source: The Contractor shall submit for approval by the Engineer, a written statement giving location of topsoil source. If soil amendments are proposed, submit amendment types, quantities, mixes and test results.
2. Grass Seed Vendors Certificate: The Contractor shall submit the seed vendor's certified statement for the grass seed mixture required, stating common name, percentage by weight, and percentages of purity, and germination.
3. Fertilizer: Submit manufacturer's product data showing contents and test results.
4. Hydroseeders: The Contractor shall submit for approval by the Engineer, all data concerning hydroseeding equipment (if used) including all material application rates.
5. Erosion Control Fabrics: The Contractor shall submit for approval by the Engineer, the erosion control fabric manufacturer's literature, samples and specifications.

B. Installer - Submit the name of subcontractors (if used) and Qualification Statements.

C. Manufacturer's Certification - Certify that products meet or exceed specified requirements.

1.03 Quality Assurance

A. All plants shall conform to or surpass minimum quality standards as defined by the American Association of Nurserymen. All plant materials must be clearly labeled with genus, species, and common name. These plants may be inspected for conditions of root ball, disease, insects, or injury. All rejected plant materials must be removed immediately from the job site and must be replaced by

the Contractor at no cost to the Owner within 5 working days. The Engineer has the right to inspect and reject plant materials up to the final acceptance.

B. Certificates. In addition to any other certificates specified, the Contractor shall furnish a certificate with each delivery of material, in containers or bulk, the analysis of the material, together with the date of delivery. All certificates shall be delivered to the Engineer, who will inspect the materials prior to its use.

C. Seeding. Seed shall be labeled in accordance with USDA Rules and Regulations under the Federal Seed Act and applicable State seed laws. Seed shall be furnished in sealed bags or containers bearing the date of the last germination which shall be within a period of six (6) months prior to commencement of planting operations. Seeding material shall be inspected upon arrival at the job site, and unacceptable material shall be removed from the job site. Seed shall be from same or previous year's crop; each variety of seed shall have a purity of not less than 85%, a percentage of germination not less than 90%, shall have a weed content of not more than 1% and contain no noxious weeds.

PART 2 - PRODUCTS

2.01 Topsoil

A. Topsoil shall be natural, friable, fertile soil of loamy character, capable of sustaining healthy plant life, and reasonably free from subsoil, roots, heavy or stiff clay, stones larger than 2 inches in greatest dimension, noxious weeds, sticks, brush, litter, and other deleterious matter. Topsoil as delivered to the site or stockpiled shall meet the following requirements:

a. shall be well graded with a maximum particle size of 2 inches, 85 to 100 percent passing 1 inch, 65 to 95 percent passing 1/4 inch, and 20 to 80 percent passing a Number 200 sieve. Clay content of material passing the Number 200 sieve shall not be greater than 30 percent, as determined by hydrometer analysis;

b. pH between 6.0 and 7.5;

c. shall contain not less than 3 percent organic matter nor more than 20 percent as determined by loss of ignition of moisture-free samples dried at 100° to 110° Celsius;

d. free of pest larvae; and

e. soluble salt content not greater than 500 ppm.

B. Quality Control

1. The Company shall provide the services of an Engineer and an independent soils testing laboratory to conduct quality assurance testing.

2. The following material property test methods and frequency shall be conducted for soil:

Material Property	Test Method	Frequency
Grain-size Analysis with Fines	ASTM D-422	10,000 cubic yards
Soil pH	ASTM D-4972	10,000 cubic yards
Organic Content	ASTM D-2974	10,000 cubic yards

3. Additional testing will required if alternate sources are proposed or utilized.

C. Fertilizer

All soil placed for riverbank restoration and wetland creation shall be amended with fertilizer. Fertilizer shall be a starter fertilizer of commercial stock, of neutral character, with elements derived from organic sources. It shall be a complete, prepared and packaged material and shall contain a minimum of 8% nitrogen, 20% phosphoric acid and 10% potash. Each bag of fertilizer shall bear the manufacturer's guaranteed statement of analysis.

2.03 Grass Seed

The seed mixture will consist of the following proportions or approved equal.

Common Name	% By Weight
Red, Chewing, and Tall Fescue	40
Perennial Ryegrass	25
Annual Ryegrass	15
Cliomax Timothy	15
White Clover	05

2.04 Fertilizer

A. Fertilizer shall be a starter fertilizer of commercial stock, of neutral character, with elements derived from organic sources. It shall be a complete, prepared and packaged material and shall contain a minimum of 18 percent nitrogen, 24 percent phosphoric acid, and 6 percent potash. Other fertilizer mixes may be acceptable provided the application rate is adjusted to provide equal quantities. Each bag of fertilizer shall bear the manufacturer's guaranteed statement of analysis.

1. Product and Manufacturers:
    a. Scotts Starter Fertilizer by Scott and Son
    b. or equal

2.05 Mulch

A. Straw Mulch

Mulch shall be comprised of clean, threshed straw of oats, wheat, barley, or rye that is free from noxious weeds, mold or other objectionable material. The straw mulch shall contain at least 50 percent by weight of material to be 10 inches or longer. Straw shall be in an air-dry condition and suitable for placement with blower equipment.

B. Hydromulch

Hydromulch - Wood Cellulose Fiber Pulp.

a. Provide a specially prepared wood cellulose fiber, processed to contain no growth or germination inhibitor factors, and dyed an appropriate color to facilitate visual metering of application of the materials.

b. Hydromulch manufactured from recycled paper products will be acceptable.

c. Product and Manufacturer:
    1. Conwed Virgin Wood Fiber Mulch by Conwed, Inc.
    2. Silva Fiber by Weyerhaeuser Co.
    3. or equal

2.06 Natural Erosion Control Fabric

A. The natural erosion control fabric shall be a machine-produced mat of 100 percent biodegradable material.

1. Straw matting

a. The material shall contain straw at 0.5 pounds per square yard with netting on one side only.

b. Product and Manufacturer:

1. Erosion Mat S75 by North American Green

2. or equal

2. Wood Excelsior Blanket

a. Provide a specially prepared machine produced mat of curled and barbed wood excelsior. 80 percent of the fibers shall be 6-inches or longer. Fibers shall be evenly distributed through the blanket and secured by a photodegradable plastic mesh. The fibers shall not contain growth or germination inhibitors.

b. Product and Manufacturer:

1. Curlex Blanket by American Excelsior Co.

2. or equal

3. Jute Mesh

a. Provide a mesh blanket of coired coconut fiber twine.

b. Product and Manufacturer:

1. Bio D-Mat 90 by Rolanka International, Inc.

2. or equal.

B. The wire staples for securing erosion control fabrics shall be U-shaped and formed of 11-gauge plain iron wire with dimensions of 6-inch minimum length and 2-inch minimum width.

PART 3 - EXECUTION

A. All final grade surfaces shall receive six (6) inches minimum of compacted topsoil, seeding, mulch/or erosion control fabric, and fertilizer in accordance with this section.

B. All final grade surfaces outside the cover limits that have been disturbed or damaged during completion of the work shall be reseeded using a mixture of seed which shall produce similar vegetative growth as existed prior to commencement of the work.

C. The Contractor shall place mulch or erosion control fabric as follows:

1. Mulch on all slopes less or equal to 15 percent.

2. Natural erosion control fabric on all disturbed or constructed slopes greater than 15 percent or as indicated on the Drawings, whichever is more stringent.

3.01 Application Procedures

A. Topsoil

1. The Contractor shall place a minimum of six (6) inches of compacted topsoil over excavated areas, the landfill cover area, and the disturbed areas as directed by the Engineer.

2. The underlying soil shall be tilled to a depth of 2 inches by disking or harrowing before topsoil placement. Tillage shall be parallel to contours, and shall not be performed when the cover is frozen or excessively wet.

3. Topsoil shall be placed to a depth sufficiently greater than required so that after compaction, the complete work will conform to the lines, grades, and elevations indicated on the Drawings and the six (6) inch minimum requirement. No topsoil shall be spread in water or while frozen or muddy.

4. The topsoil shall then be rolled or compacted with a cultipacker weighing not more than 100 pounds per foot of width. During the rolling, all depressions caused by settlement of rolling shall be filled with additional topsoil, and the surface shall be regraded and rolled until a smooth and even finished grade is created.

B. Fertilizer

1. The fertilizer shall be applied with a mechanical spreader at a minimum rate of 200 lbs/acre or in accordance with the manufacturer's suggested rate.

2. After topsoil has been spread and the fertilizer applied, it shall be carefully prepared by scarifying or harrowing to a depth of 2 inches and left in a roughened condition for seeding. All stiff clods, lumps, roots, litter and other foreign material shall be removed from the area and disposed of by the Contractor.

C. Seeding

1. The seed mixture shall be applied uniformly upon the prepared surface with a hand or mechanical spreader at a minimum rate of 100 lbs/acre. The seed shall be raked lightly into the surface and rolled. Seeding shall be conducted from April 1 to May 30 or from August 15 to October 1.

D. Mulch and Erosion Control Fabrics

1. Mulch or erosion control fabric shall be placed immediately after the application of fertilizer and seed.

2. Areas that have been seeded and have a slope less than or equal to 15 percent shall be protected from erosion by the placement of straw mulch or hydromulch. Straw mulch shall be applied with a mulch blower at a uniform rate of 1500 lbs/acre and anchored by use of a tackifier.

3. Natural erosion control fabrics shall be installed in lieu of the mulch in areas that have a slope greater than 15 percent or as indicated on the Drawings.

E. Watering

1. Following applications of the mulch or erosion control fabric, the seed bed shall be moistened. A muddy soil condition will not be acceptable. Seeded areas shall be watered as often as required to obtain germination and to obtain and maintain a satisfactory growth. Watering shall be done in such a manner to prevent washing out of seed.

2. The stand of grass resulting from the seeding shall not be considered satisfactory until accepted by the Owner. If areas are determined to be unacceptable, the remaining mulch or erosion control fabric will be removed and all areas shall be reseeded, refertilized and remulched and erosion control fabric replaced as per the above application procedures at the Contractor's expense.

3.02 Maintenance

A. The Contractor shall begin a maintenance period immediately after planting of grass and landscape materials.

B. The Contractor shall maintain grass areas, for the periods required to establish an acceptable growth, but not less than 60 days, after seeding. If seeded in the fall and not given a full 60 days of maintenance, or if not considered acceptable by the Owner and the Engineer at that time, continue maintenance during following spring until acceptable grass stand is established.

C. Seeded areas shall be watered as often as required to obtain germination and to obtain and maintain a satisfactory sod growth. Watering shall be in such a manner as to prevent washing out of seed.

3.03 Warranty

A. The warranty period shall be one year from the date of substantial completion or correction period. Areas of erosion shall be immediately repaired, re-seeded, re-mulched and maintained until an acceptable grass stand is established. Areas to be repaired shall also include areas failing to produce a full, uniform strand of grass.

-- END OF SECTION 02990 --

ATTACHMENT 1
NYSDEC ORDER-ON-CONSENT

STATE OF NEW YORK: DEPARTMENT OF ENVIRONMENTAL CONSERVATION

In the Matter of the
Development and Implementation
of a Joint Remedial Program for
Inactive Hazardous Waste Disposal
Sites, Under Article 27, Title 13,
and Article 71, Title 27 of the
Environmental Conservation Law
of the State of New York
by

THE PARTIES SET FORTH IN
APPENDIX "C"

Respondents.

ORDER
ON
CONSENT
INDEX # B9-0046-84-10
B9-0047-91-02

Site Codes #915063
and #915031

WHEREAS,

1. The New York State Department of Environmental Conservation (the "Department") is responsible for enforcement of Article 27, Title 13 of the Environmental Conservation Law of the State of New York ("ECL"), entitled "Inactive Hazardous Waste Disposal Sites." This Order is entered into pursuant to the Department's authority under ECL Article 27, Title 13 and ECL 3-0301.

2. Certain of the Respondents ("Cherry Farm Respondents") are among the corporations or individuals which the Department alleges to be potentially responsible parties with respect to certain contamination which exists at a Site near 4000 River Road in the Town of Tonawanda, Erie County, New York, known as the Niagara Mohawk-Cherry Farm Site (the "Cherry Farm Site"). The Cherry Farm Site is further defined in the Site plan attached hereto as Appendix "A". A list of the Respondents to

this Order is attached hereto as Appendix "C".

3. Certain of the Respondents ("River Road Respondents") are among the corporations or individuals which the Department alleges to be potentially responsible parties with respect to certain contamination which exists at a Site on River Road in the Town of Tonawanda, Erie County, New York known as the River Road Site (the "River Road Site"). The River Road Site is further defined in the Site Plan attached hereto as Appendix "B". A list of the Respondents to this Order is attached hereto as Appendix "C".

4. The Department alleges that each Site is an "inactive hazardous waste disposal Site," as that term is defined at ECL 27-1301.2, and presents a significant threat to the public health or environment. The Cherry Farm Site has been listed by the Department in the Registry of Inactive Hazardous Waste Disposal Sites in New York State as Site Number 915063. The River Road Site has been listed by the Department in the Registry of Inactive Hazardous Waste Disposal Sites in New York State as Site Number 915031. The Department has classified each Site as a Classification "2" pursuant to ECL 27-1305.4.b.

5. A. Pursuant to ECL 27-1313.3.a, whenever the Commissioner of Environmental Conservation (the "Commissioner") "finds that hazardous wastes at an inactive hazardous waste disposal site constitute a significant threat to the environment, he may order the owner of such site and/or any person responsible for the disposal of hazardous wastes at such

site (i) to develop an inactive hazardous waste disposal site remedial program, subject to the approval of the Department, at such site, and (ii) to implement such program within reasonable time limits specified in the order."

B. Any person under order pursuant to ECL 27-1313.3.a has a duty imposed by ECL Article 27, Title 13 to carry out the remedial program committed to under order. ECL 71-2705 provides that any person who fails to perform any duty imposed by ECL Article 27, Title 13 shall be liable for civil, administrative and/or criminal sanctions.

C. The Department also has the power, inter alia, to provide for the prevention and abatement of all water, land, and air pollution. See ECL 3-0301.1.i.

6. Cherry Farm Respondent Niagara Mohawk Power Corporation developed and implemented a Remedial Investigation and Feasibility Study for this Site pursuant to an Order on Consent executed by the Commissioner on April 27, 1988.

7. The Department selected a final remedial alternative for the Cherry Farm Site in a Record of Decision dated February 15, 1991. Following a period of public comment an Amended Record of Decision was signed by the Commissioner on October 7, 1993. The Amended Record of Decision which incorporates the February 15, 1991 Record of Decision is attached to and incorporated into this Order as Appendix "D" and shall be referred to in this Order as the " Cherry Farm ROD".

8. The Department selected a final remedial alternative

for the River Road Site in a Record of Decision dated March 24, 1994. This Record of Decision is attached to and incorporated into this Order as Appendix "E" and shall be referred to in this Order as the "River Road ROD."

9. The Respondents have prepared, and the Department has approved, the Scope of Work ("SOW") for the joint remedial program for both the Cherry Farm and River Road Sites which is attached to and incorporated into this Order as Appendix "F".

10. The Department, the Cherry Farm Respondents and the River Road Respondents agree that the goals of this Order are for Respondents to (i) develop and implement, in accordance with the RODs and the SOW, a joint inactive hazardous waste disposal site remedial program ("Remedial Program") for the Sites that shall include design and implementation, and operation, maintenance and monitoring of the remedial alternative specified in the RODs and SOW; and (ii) reimburse the Department's past and future administrative costs as limited by Paragraph VIII of this Order.

11. Respondents, without the admission of any liability or of the veracity of any of the facts alleged herein, having waived Respondents' right to a hearing herein as provided by law, and having consented to the issuance and entry of this Order, agree to be bound by its terms. Respondents consent to and agree not to contest the authority or jurisdiction of the Department to issue or enforce this Order, and agree not to contest the validity of this Order or its terms.

NOW, having considered this matter and being duly advised, IT IS ORDERED THAT:

I. Within 60 days after the effective date of this Order, Respondents shall submit to the Department all data within their possession or control regarding environmental conditions on-Site and off-Site (to the extent off-Site conditions may be causally related to the on-Site disposal of hazardous waste at the Cherry Farm or River Road Site) to the extent that such data has not previously been provided to, or is not otherwise in the possession or control of, the Department.

Pursuant to applicable State laws and regulations, any Respondent may assert a confidentiality claim with respect to data required to be submitted pursuant to this Paragraph. In documents that are protected by attorney client privilege, are considered to be attorney work-product, or are otherwise protected by privilege, Respondents are hereby required to provide only technical information related to the Site. Where such information is contained in a document containing other material, provision of such information shall not be construed to waive any applicable disclosure exemption privilege that may exist with respect to such other material.

II. Remedial Design Contents

A. Within 45 days or less, after the effective date of this Order Respondents shall submit a work plan which addresses both Sites (the "Workplan") to the Department to implement the Remedial Program as identified in the RODs and the

SOW. The Workplan shall include a schedule for all future deliverables under this Order.

B. In accordance with the schedule set forth in the Work plan and the SOW, Respondents shall submit to the Department a joint remedial design to implement the Remedial Program for the Sites as set forth in the RODs and the SOW (the "Remedial Design"). The Remedial Design shall be prepared by and have the signature and seal of a professional engineer who shall certify that the Remedial Design was prepared in accordance with this Order.

C. The Remedial Design shall include the following:

1. A detailed description of the remedial objectives and goals and the means by which each essential element of the Remedial Program will be implemented to achieve those objectives and goals consistent with the RODs and the SOW, including, but not limited to:

a. the construction and operation of any structures;

b. the collection, destruction, treatment, and/or disposal of hazardous wastes and substances and their constituents and degradation products, and of any soil, sediments in drainage channels at the site or other materials contaminated thereby;

c. the collection, destruction, treatment, and/or disposal of contaminated groundwater, leachate, and air;

d. physical security and posting of the

Site;

e. health and safety of persons living and/or working at or in the vicinity of the Sites;

f. quality control and quality assurance procedures and protocols to be applied during implementation of the Remedial Design; and

g. monitoring requirements during implementation of the Remedial Program.

2. "Biddable Quality" documents for the Remedial Design including, but not limited to, documents and specifications prepared, signed, and sealed by a professional engineer. These plans shall satisfy all applicable local, state and federal laws, rules and regulations;

3. A time schedule to implement the Remedial Design;

4. The parameters, conditions, procedures, and protocols to determine the effectiveness of the Remedial Design, including a schedule for periodic sampling of groundwater monitoring wells as may be required on-Site and off-Site;

5. A description of operation, maintenance, and monitoring activities to be undertaken after the Department has approved construction of the Remedial Design, including the number of years during which such activities will be performed;

6. A joint contingency plan describing organized, planned, and technically coordinated courses of action to be followed in case of emergency or other special

conditions, including but not limited to equipment breakdowns, fire, odor, explosion, spills, receipt or release of hazardous or toxic materials or substances, and other incidents that could threaten human health or safety or the environment;

7. A joint health and safety plan for the protection of persons at and in the vicinity of the Sites during construction and after completion of construction. This plan shall be prepared in accordance with 29 CFR 1910 by a certified health and safety professional; and

8. A joint citizen participation plan which incorporates appropriate activities outlined in the Department's publication, "New York State Inactive Hazardous Waste Citizen Participation Plan," dated August 30, 1988, any subsequent revisions thereto, and 6 NYCRR Part 375.

III. Remedial Design Construction and Reporting

A. Within 30 days of the Department's approval of the Remedial Design, Respondents shall solicit bids for the implementation of the Remedial Design for the Sites.

B. Within 90 days of the Department's approval of the Remedial Design, Respondents shall award the construction contract. Respondents shall commence construction of the Remedial Design in accordance with the schedule in the Workplan and the Remedial Design.

C. Respondents shall implement the Remedial Design in accordance with the Department-approved Remedial Design.

D. During field activities associated with the

implementation of all construction activities identified in the Remedial Design, Respondents shall have on the Sites a full-time representative who is qualified to supervise the work done. Such representative may be an employee of a consultant or a contractor.

E. In the event during field activities at a Site a condition is discovered which poses a threat to human health or the environment, the Department may seek to require that Respondents for that Site modify the Scope of the Remedial Design and Remedial Construction to address the condition.

F. Within 60 days after completion of the construction activities identified in the Remedial Design, Respondents shall submit to the Department a detailed joint post-remedial operation and maintenance plan ("O & M Plan"); "as-built" drawings and a final engineering report (each including all changes made to the Remedial Design during construction); and a certification by a professional engineer that the Remedial Design was implemented and all construction activities were completed in accordance with the Department-approved Remedial Design. The O & M Plan, "as built" drawings, final engineering report, and certification must be prepared, signed, and sealed by a professional engineer.

G. Upon the Department's approval of the O & M Plan, Respondents shall implement the O & M Plan in accordance with the requirements of the Department-approved O & M Plan.

H. After receipt of the "as-built" drawings, final

engineering report, and certification, the Department shall notify Respondents in writing whether the Department is satisfied that all construction activities have been completed in accordance with the approved Remedial Design.

I. If the Department determines that all construction activities at a Site have not been completed in accordance with the approved Remedial Design, Respondents for that Site shall be in violation of this Order and the ECL.

J. If the Department concludes (1) that any element of the Remedial Program at a Site fails to achieve the remedial objectives or goals set forth in the ROD for the site or otherwise fails to protect human health or the environment; or (2) that further actions are necessary to address Niagara River sediments which have been studied pursuant to this Order, the Department may seek to require Respondents for either or both sites, depending on the applicability of the Department's conclusions, to take whatever action the Department determines necessary to achieve those objectives or goals, to ensure that the Remedial Program otherwise protects human health and the environment, or to address sediments in the Niagara River which have been studied pursuant to this Order.

IV. Progress Reports

During the pendency of construction activities Respondents shall submit to the parties set forth in paragraph XII copies of joint written monthly progress reports that: (i) describe the actions which have been taken toward achieving

compliance with this Order during the previous month; (ii) include all results of sampling and tests and all other data received or generated by Respondents or Respondents' contractors or agents in the previous month, as may be required by the Department, including quality assurance/quality control information; (iii) identify all work plans, reports, and other deliverables required by this Order that were completed and submitted during the previous month; (iv) describe all actions, including, but not limited to, data collection and implementation of work plans, that are scheduled for the next month and provide other information relating to the progress at the Sites; (v) include information regarding percentage of completion, unresolved delays encountered or anticipated that may affect the future schedule for implementation of the Respondents' obligations under the Order, and efforts made to mitigate those delays or anticipated delays; (vi) include any modifications to any work plans that Respondents have proposed to the Department or that the Department has approved; and (vii) describe all activities undertaken in support of the Citizen Participation Plan during the previous month and those to be undertaken in the next month. Respondents shall submit these progress reports to the Department by the fifteenth day of every month following the commencement of on-Site activities.

V. Review of Submittals

A. (1) The Department shall review each of the submittals Respondents make pursuant to this Order to determine

whether it was prepared, and whether the work done to generate the data and other information in the submittal was done, in accordance with this Order and generally accepted technical and scientific principles. The Department shall notify Respondents in writing of its approval or disapproval of the submittal, except for the submittals discussed in Paragraphs II.C.(7) and IV. All Department-approved submittals shall be incorporated into and become an enforceable part of this Order.

(2) (a) If the Department disapproves a submittal, it shall so notify Respondents in writing and shall specify the reasons for its disapproval. Within 30 days after receiving written notice that Respondents' submittal has been disapproved, or within such further time as the Department may provide, Respondents shall make a revised submittal to the Department that addresses all of the Department's stated reasons for disapproving the first submittal.

(b) After receipt of the revised submittal, the Department shall notify Respondents in writing of its approval or disapproval. If the Department disapproves the revised submittal, Respondents shall be in violation of this Order and the Department may take any action or pursue whatever rights it has pursuant to any provision of statutory or common law. If any disapproval of a revised submittal is based upon conditions existing at one of the two Sites, or is based upon any action or inaction on the part of the Respondents in connection with one of the Sites, then Respondents for the other

Site shall not be in violation of this Order. Such disapproval by the Department shall be considered final agency action for purposes of Article 78 of the CPLR. If the Department approves the revised submittal, it shall be incorporated into and become an enforceable part of this Order.

B. The Department may seek to require Respondents for a Site to modify and/or amplify and expand a submittal if the Department determines, as a result of reviewing data generated by an activity required under this Order or as a result of reviewing any other data or facts, that further work at a Site is necessary.

VI. Penalties

A. Respondents' failure to comply with any term of this Order constitutes a violation of this Order and the ECL. A Respondent shall only be liable for any failure to comply which relates to the Site for which the Department alleges that Respondent to be a potentially responsible party.

B. Respondents shall not suffer any penalty under this Order or be subject to any proceeding or action if Respondents cannot comply with any requirement hereof because of war, riot, or other causes which are beyond the reasonable control of Respondents and which the exercise of ordinary human prudence could not have prevented. Respondents shall, within five business days of when they obtain knowledge of any such condition, notify the Department in writing. Respondents shall include in such notice the measures taken and to be taken by

Respondents to prevent or minimize any delays and shall request an appropriate extension or modification of this Order. Failure to give such notice within such five-day period constitutes a waiver of any claim that a delay is not subject to penalties. Respondents shall have the burden of proving that an event is a defense to compliance with this Order.

VII. Entry upon Site

A. Respondent Niagara Mohawk Power Corporation hereby consents to the entry upon the Cherry Farm Site or areas in the vicinity of the Site which may be under the control of Niagara Mohawk Power Corporation by any duly designated employee, consultant, contractor, or agent of the Department or any State agency for purposes of inspection, sampling, and testing and to ensure Respondents' compliance with this Order.

B. River Road Respondents, to the extent they are a party to this Order, hereby consent to the entry upon the River Road Site or areas in the vicinity of the River Road Site which may be under their control by any duly designated employee, consultant, contractor or agent of the Department or any State agency for purposes of inspection, sampling and testing and to ensure Respondents' compliance with this Order.

C. Respondents shall provide the Department, during the time on-Site offices are maintained by Respondents, with suitable office space at the Site, including access to a telephone, and shall permit the Department full access to all records relating to implementation of the Remedial Program.

Respondents also shall allow the Department to attend, and shall provide the Department at least seven days advance notice of, any of the following: prebid meetings, formal and/or regularly scheduled job progress meetings, substantial completion meeting and inspection, and final inspection and meeting.

VIII. Payment of State Costs

A. Within 60 days of the effective date of this Order, Respondents shall make payment to the Department in the amount of $649,074.00 which represents the past response costs incurred by the State of New York up to December 15, 1993, for the Sites. These costs are itemized as set forth in subparagraph VIII.B. Payment shall be made in the manner as set forth below.

B. Thereafter, the Department will periodically submit itemized invoices to Respondents and within 60 days after receipt of an itemized invoice from the Department, Respondents shall pay to the Department a sum of money which shall represent reimbursement for the State's expenses incurred negotiating this Order, reviewing and revising submittals made pursuant to this Order, overseeing activities conducted pursuant to this Order, collecting and analyzing samples, and administrative costs associated with this Order. Such reimbursements pursuant to subparagraph VIII.B., in total, shall not exceed $300,000. Such payment shall be made by certified check payable to the Department of Environmental Conservation. Payment shall be sent to the Bureau of Program Management, Division of Hazardous Waste

Remediation, N.Y.S.D.E.C., 50 Wolf Road, Albany, NY 12233-7010. Itemization of the costs shall include an accounting of personal services indicating the employee name, title, biweekly salary, and time spent (in hours) on the project during the billing period, as identified by an assigned time and activity code. This information shall be documented by quarterly reports of Direct Personal Service. Approved agency fringe benefit and indirect cost rates shall be applied. Non-personal service costs shall be summarized by category of expense (e.g., supplies, materials, travel, contractual) and shall be documented by the New York State Office of the State Comptroller's quarterly expenditure reports.

C. If the Department concludes that the total sum of money paid pursuant to this Paragraph VIII is insufficient to reimburse the State's costs, the Department may, at its option, in a separate proceeding, seek to recover additional reimbursement.

IX. Department Reservation of Rights

A. Except as provided in this Order, nothing contained in this Order shall be construed as barring, diminishing, adjudicating, or in any way affecting any of the Department's rights including, but not limited to nor exemplified by, the following:

1. the Department's right to bring any action or proceeding against anyone other than Respondents and/or any of Respondents' successors and assigns;

2. the Department's right to enforce this Order against Respondents and/or any of Respondents' successors and assigns if Respondents fail to satisfy any of the terms of this Order; or

3. the Department's right to bring any action or proceeding against Respondents and/or any of Respondents' successors and assigns with respect to claims for natural resources damages as a result of the release or threatened release of hazardous substances or constituents at or from the Sites;

4. the Department's right to gather information and enter and inspect property and premises.

B. If, after review, the Department accepts and approves the engineer's certification that construction of the Remedial Program was completed in accordance with the approved Remedial Design, then, unless a supplementary remedial program is determined to be necessary by the Department pursuant to Paragraph II.C.6, or determined to be necessary by the Department pursuant to Paragraph III.E, III. J and/or V.B, and except for the provisions of subparagraphs A and C of Paragraph IX, and the provisions of paragraph X; and except for the future Operation and Maintenance of the Sites, reimbursement of Department expenditures in accordance with Paragraph VIII, and any Natural Resource Damage claims that may arise, such acceptance shall constitute a release for each and every claim, demand, remedy or action whatsoever against Respondents, their

successors and assigns, which the Department has or may have pursuant to Article 27, Title 13 of the ECL, CERCLA, or otherwise, relative to or arising from the disposal of hazardous wastes at the Sites; provided, however, that the Department specifically reserves all of its rights concerning, and any such release and satisfaction shall not extend to, any investigation or remediation the Department deems necessary due to:

(1) environmental conditions on-site or off-site which are related to the disposal of hazardous wastes at the Sites and were unknown to the Department at the time of its approval of the Remedial Design; or

(2) information received, in whole or in part, after the Department's approval of the Remedial Design,

and such unknown environmental conditions or information indicates that the Remedial Program is not protective of human health or the environment. The Department shall notify the Respondent of such environmental conditions or information and its basis for determining that the Remedial Program is not protective of human health and the environment.

This release shall inure only to the benefit of Respondents, their successors and assigns.

Nothing herein shall be construed as barring, diminishing, adjudicating or in any way affecting any legal or equitable rights or claims, actions, suits, causes of action or demands whatsoever that the Department may have against anyone

other than Respondents, their successors and assigns.

C. Nothing contained in this Order shall be construed to prohibit the Commissioner or his duly authorized representative from exercising any summary abatement powers.

X. Indemnification

Respondents shall indemnify and hold the Department, the State of New York, and their representatives and employees harmless for all claims, suits, actions, damages, and costs of every name and description arising out of or resulting from the fulfillment or attempted fulfillment of this Order by Respondents, and/or Respondents' directors, officers, employees, servants, agents, successors, and assigns, and Respondent L. Matthew Duggan, Jr.'s estate, heirs, executors and/or administrators. Respondents shall not indemnify the Department or the State of New York for unlawful, grossly negligent, willful or malicious acts or omissions on the part of the State, State agencies, or their officers, employees or agents.

XI. Public Notice

A. Within 30 days after the effective date of this Order, every Respondent who owns any portion of the Sites shall file a Declaration of Covenants and Restrictions with the Clerk of Erie County to give all parties who may acquire any interest in the Sites notice of this Order.

B. If any Respondent who owns any portion of the Sites proposes to convey the whole or any part of that Respondent's ownership interest in either of the Sites, that

Respondent shall, not fewer than 60 days before the date of conveyance, notify the Department in writing of the identity of the transferee and of the nature and proposed date of the conveyance and shall notify the transferee in writing, with a copy to the Department, of the applicability of this Order.

C. Within 30 days after Department approval of the "as-built" drawings every Respondent who owns any portion of the Sites shall file with the Clerk of Erie County a Notice of Restrictions of Use which shall refer to the Record of Decision and shall describe the remedy which is in place at the Sites, and to which shall be attached as an appendix the "as-built" drawings.

D. If any Respondent transfers the whole or any portion of its ownership interest in the either Site, that Respondent shall include restrictions in the property deed to specify that any future use of the property must be limited to activities and purposes which shall not interfere with remedial structures or equipment located upon or beneath that Site, or with activities required to be conducted in conjunction with the remedial action. Any such deed shall further specify that the restriction stated in 6 NYCRR § 375-1.2(e)(2) is applicable to the transferred property, by virtue of the property having been listed in the Registry of Inactive Hazardous Waste Sites, and shall specify that these restrictions are covenants which run with the land.

XII. Communications

A. All written communications required by this Order shall be transmitted by United States Postal Service, by private courier service, or hand delivered as follows:

Communication from Respondents shall be sent to:

1. Director, Division of Hazardous Waste Remediation
New York State Department of Environmental Conservation
50 Wolf Road
Albany, New York 12233-7010

2. Director, Bureau of Environmental Exposure Investigation
New York State Department of Health
2 University Place
Albany, New York 12203

3. Regional Engineer, Region 9, Division of Hazardous Waste Remediation
New York State Department of Environmental Conservation
270 Michigan Avenue
Buffalo, New York 14203-2999

4. Division of Environmental Enforcement
New York State Department of Environmental Conservation
270 Michigan Avenue
Buffalo, New York 14203-2999

B. Copies of work plans and reports shall be submitted as follows:

1. Four copies (one unbound) to Division of Hazardous Waste Remediation.

2. Two copies to the Director, Bureau of Environmental Exposure Investigation.

3. One copy to Region 9

4. One copy to Buffalo Field Unit

C. Within 30 days of the Department's approval of

any report submitted pursuant to this Order, Respondents shall submit to the project manager a computer readable magnetic media copy of the approved report in American Standard Code for Information Interchange (ASCII) format.

D. Communication to be made from the Department to the Respondents shall be sent to the parties set forth in Appendix "C".

E. The Department and Respondents reserve the right to designate in writing additional or different addressees for communication or written notice to the other.

XIII. Miscellaneous

A. All activities and submittals required by this Order shall, consistent with the RODs and the SOW, address both on-Site contamination and off-Site contamination (to the extent off-Site conditions may be causally related to the on-Site disposal of hazardous waste) at either of the Sites resulting from the alleged disposal of hazardous waste at the Sites.

B. Respondents shall retain professional consultants, contractors, laboratories, quality assurance/quality control personnel, and data validators reasonably acceptable to the Department to perform the technical, engineering, and analytical obligations required by this Order. A summary of the experience, capabilities, and qualifications of the firms or individuals selected by Respondents shall be submitted to the Department within 60 days after the effective date of this Order. The Department's

approval of these firms or individuals shall be obtained before the start of any activities for which the Respondents and such firms or individuals will be responsible. The responsibility for the performance of the professionals retained by Respondents shall rest solely with Respondents.

C. The Department shall have the right to obtain split samples, duplicate samples, or both, of all substances and materials sampled by Respondents. The Department also shall have the right to take its own samples and Respondents may obtain split samples of any such samples and the results of any Department sampling/analysis. Respondents shall make available to the Department the results of all sampling and/or tests or other data generated by Respondents with respect to implementation of this Order and shall submit these results in the progress reports required by this Order.

D. Respondents shall notify the Department at least 10 working days in advance of the commencement of any field activities to be conducted pursuant to this Order.

E. 1. Respondents shall obtain all permits, easements, rights-of-way, rights-of-entry, approvals, or authorizations necessary to perform Respondents' obligations under this Order.

2. Respondents shall not be required to obtain permits for certain work conducted under this Order consistent with the criteria set forth in 6 NYCRR 375-1.7. Further, for purposes of implementing the Remedial Program, the Sites shall

constitute a single Site for purposes of 6 NYCRR 376.

3. In the event Respondents are unable to obtain the necessary authorizations required to perform the obligations under this Order, the Department shall, consistent with its legal authority, assist in obtaining all such authorizations Respondents were unable to obtain. If Respondents cannot obtain such authorizations on a timely basis, Respondents may request that the time for performance of any obligation dependent upon such authorization be appropriately extended. If Respondents cannot obtain such authorization, Respondents may request that this Order be appropriately modified.

F. This Order shall bind the Respondents, and any successors or assigns. Any change in ownership or corporate status of any Respondent including, but not limited to, any transfer of assets or real or personal property shall in no way alter Respondents' responsibilities under this Order.

G. Respondents shall provide a copy of this Order to each contractor hired to perform work required by this Order and to each person representing Respondents with respect to the Site and shall condition all contracts entered into in order to carry out the obligations identified in this Order upon performance in conformity with the terms of this Order. Respondents or Respondents' contractors shall provide written notice of this Order to all subcontractors hired to perform any portion of the work required by this Order. Respondents shall nonetheless be

responsible for ensuring that Respondents' contractors and subcontractors perform the work in satisfaction of the requirements of this Order.

H. All references to "professional engineer" in this Order are to an individual registered as a professional engineer in accordance with Article 145 of the New York State Education Law.

I. All references to "days" in this Order are to calendar days unless otherwise specified.

J. The section headings set forth in this Order are included for convenience of reference only and shall be disregarded in the construction and interpretation of any of the provisions of this Order.

K. Except as otherwise provided in this Order, the obligations of Respondents under this Order are joint and several. In the event of the insolvency or failure of any or more of Respondents to implement any obligation of this Order at a Site, the remaining Respondents for that Site shall complete all such obligations.

L. (1) The terms of this Order shall constitute the complete and entire Order between Respondents and the Department concerning the Sites. No term, condition, understanding, or agreement purporting to modify or vary any term of this Order shall be binding unless made in writing and subscribed by the party to be bound. No informal advice, guidance, suggestion, or comment by the Department regarding any report, proposal, plan,

CONSENT BY RESPONDENT

Cherry Farm and River Road Respondent hereby consents to the issuing and entering of this Order, waives Respondent's right to a hearing herein as provided by law, and agrees to be bound by this Order.

GENERAL MOTORS CORPORATION

By:_____

_____
(Type Name of Signer)

Title:_____

Date: _____

STATE OF NEW YORK)
) s.s.:
COUNTY OF)

On this _____ day of _____, 19___, before me personally came _____, to me known, who, being by me duly sworn, did depose and say that he resides in _____; that he is the _____ of the _____, the corporation described in and which executed the foregoing instrument; that he knew the seal of said corporation; that the seal affixed to said instrument was such corporate seal; that it was so affixed by the order of the Board of Directors of said corporation, and that he signed his name thereto by like order.

_____
Notary Public

CONSENT BY RESPONDENT

Cherry Farm and River Road Respondent hereby consents to the issuing and entering of this Order, waives Respondent's right to a hearing herein as provided by law, and agrees to be bound by this Order.

ALLIEDSIGNAL INC.

By: _____

_____
(Type Name of Signer)

Title: _____

Date: _____

STATE OF NEW JERSEY)
) s.s.:
COUNTY OF)

On this _____ day of _____, 19___, before me personally came _____, to me known, who, being by me duly sworn, did depose and say that he resides in _____; that he is the _____ of the _____, the corporation described in and which executed the foregoing instrument; that he knew the seal of said corporation; that the seal affixed to said instrument was such corporate seal; that it was so affixed by the order of the Board of Directors of said corporation, and that he signed his name thereto by like order.

_____
Notary Public

CONSENT BY RESPONDENT

Cherry Farm Respondent hereby consents to the issuing and entering of this Order, waives Respondent's right to a hearing herein as provided by law, and agrees to be bound by this Order.

NIAGARA MOHAWK POWER CORPORATION

By: _____

_____
(Type Name of Signer)

Title: _____

Date: _____

STATE OF NEW YORK)
) s.s.:
COUNTY OF)

On this _____ day of _____, 19___, before me personally came _____, to me known, who, being by me duly sworn, did depose and say that he resides in _____; that he is the _____ of the _____, the corporation described in and which executed the foregoing instrument; that he knew the seal of said corporation; that the seal affixed to said instrument was such corporate seal; that it was so affixed by the order of the Board of Directors of said corporation, and that he signed his name thereto by like order.

_____
Notary Public

CONSENT BY RESPONDENT

Cherry Farm and River Road Respondent hereby consents to the issuing and entering of this Order, waives Respondent's right to a hearing herein as provided by law, and agrees to be bound by this Order.

TRW INC.

By: _____

_____
(Type Name of Signer)

Title: _____

Date: _____

STATE OF OHIO)
) s.s.:
COUNTY OF)

On this _____ day of _____, 19___, before me personally came _____, to me known, who, being by me duly sworn, did depose and say that he resides in _____; that he is the _____ of the _____, the corporation described in and which executed the foregoing instrument; that he knew the seal of said corporation; that the seal affixed to said instrument was such corporate seal; that it was so affixed by the order of the Board of Directors of said corporation, and that he signed his name thereto by like order.

_____
Notary Public

CONSENT BY RESPONDENT

River Road Respondent hereby consents to the issuing and entering of this Order, waives Respondent's right to a hearing herein as provided by law, and agrees to be bound by this Order.

PINELEDGE HOLDING CORP.

By: _____

_____
(Type Name of Signer)

Title: _____

Date: _____

STATE OF NEW YORK)
) s.s.:
COUNTY OF)

On this _____ day of _____, 19___, before me personally came _____, to me known, who, being by me duly sworn, did depose and say that he resides in _____; that he is the _____ of the _____, the corporation described in and which executed the foregoing instrument; that he knew the seal of said corporation; that the seal affixed to said instrument was such corporate seal; that it was so affixed by the order of the Board of Directors of said corporation, and that he signed his name thereto by like order.

_____
Notary Public

CONSENT BY RESPONDENT

River Road Respondent hereby consents to the issuing and entering of this Order, waives Respondent's right to a hearing herein as provided by law, and agrees to be bound by this Order.

L. MATTHEW DUGGAN, JR

By: _____

_____
(Type Name of Signer)

Title: _____

Date: _____

STATE OF NEW YORK)
) s.s.:
COUNTY OF)

On this _____ day of _____, 19___, before me personally came _____, to me known, who, being by me duly sworn, did depose and say that he resides in _____; that he is the _____ of the _____, the corporation described in and which executed the foregoing instrument; that he knew the seal of said corporation; that the seal affixed to said instrument was such corporate seal; that it was so affixed by the order of the Board of Directors of said corporation, and that he signed his name thereto by like order.

_____
Notary Public

CONSENT BY RESPONDENT

River Road Respondent hereby consents to the issuing and entering of this Order, waives Respondent's right to a hearing herein as provided by law, and agrees to be bound by this Order.

CONRAIL

By: _____

_____
(Type Name of Signer)

Title: _____

Date: _____

STATE OF NEW YORK)
) s.s.:
COUNTY OF)

On this _____ day of _____, 19___, before me personally came _____, to me known, who, being by me duly sworn, did depose and say that he resides in _____; that he is the _____ of the _____, the corporation described in and which executed the foregoing instrument; that he knew the seal of said corporation; that the seal affixed to said instrument was such corporate seal; that it was so affixed by the order of the Board of Directors of said corporation, and that he signed his name thereto by like order.

_____
Notary Public

ATTACHMENT 2
USACE NATIONWIDE PERMIT

3/27/96
DPF
726673
F1716)

DEPARTMENT OF THE ARMY
BUFFALO DISTRICT, CORPS OF ENGINEERS
1776 NIAGARA STREET
BUFFALO, NEW YORK 14207-3199

REPLY TO ATTENTION OF:

March 25, 1996

Regulatory Branch

SUBJECT: Application No. 95-976-173, Nationwide Permit 33 CFR 330, Appendix A, Section B, No. (38)

Mr. David P. Flynn
Attorney at Law
Phillips, Lytle, Hitchcock, Blaine & Huber
3400 Marine Midland Center
Buffalo, New York 14203

Dear Mr. Flynn:

This pertains to your proposal to remediate and clean up hazardous waste at the Cherry Farm and River Road sites located adjacent to the Niagara River, Town of Tonawanda, Erie County, New York.

I have reviewed your application, and have concluded that the proposed work is authorized by the enclosed Nationwide Permit provided that the attached conditions are satisfied. Please note that our verification of the applicability of this Nationwide Permit is valid for two years from the date of this letter unless the Nationwide is modified, suspended, or revoked. This verification will remain valid if during this two year period the Nationwide Permit is reissued without modification. Please note that if you commence or are under contract to commence this activity in reliance of your Permit prior to the date this Permit expires, is suspended or revoked, or is modified such that your activity no longer complies with the terms and conditions, you have 12 months from the date of Permit modification, expiration, or revocation to complete the activity under the present terms and conditions of the Permit, unless this Permit has been subject to the provisions of discretionary authority.

It is your responsibility to remain informed of changes to the Nationwide Permit program. A public notice announcing any changes will be issued when they occur. Finally, note that if your activity is not undertaken within the two year period or the project specifications have changed, you must immediately notify this office to determine the need for further approval or reverification.

Regulatory Branch
SUBJECT: Application No. 95-976-173, Nationwide Permit 33 CFR 330, Appendix A, Section B, No. (38)

Lastly, I would like to point out that our verification of the Federal wetland boundary, as shown on the attached drawings, is valid for a period of five (5) years from the date of this correspondence. At the end of this period, a new wetland delineation will be required if the above described work is not completed.

In addition to the general conditions attached to the Nationwide Permit, you must comply with the following special conditions:

1. That to mitigate for the loss of riparian habitat you shall at your own expense create the barrier islands, emergent marsh and wooded shoreline habitat as depicted on the attached drawings nos. 5 of 11 through 11 of 11.

2. That you shall monitor the mitigation areas annually for a period of five years. Success of the mitigation shall be measured by 85 % hydrophytic vegetation coverage in the emergent wetland and 30 % hydrophytic vegetation in the wooded riparian wetland for two successive growing seasons. In addition, you shall also seasonally monitor the emergent wetland and wooded shoreline habitat for utilization by fish and wildlife. A written report detailing your findings shall be provided to Mr. Gary E. McDannell of my staff by December 31 of each year.

3. That if the District Commander finds that the success of the mitigation is not achieved during the first five years, that you at your own expense may be required to undertake corrective measures necessary to re-evaluate, and correct the mitigation until success is achieved.

Your initiation of work as authorized by the enclosed Nationwide Permit acknowledges your acceptance of the general and special conditions contained therein.

Regulatory Branch
SUBJECT: Application No. 95-976-173, Nationwide Permit 33 CFR 330, Appendix A, Section B, No. (38)

Questions pertaining to this matter should be directed to Gary E. McDannell, who may be contacted by calling , or by writing to the above address.

Sincerely,

for Walter Neitzke
Colonel, U.S. Army
Commanding

Enclosures

QUANTITIES OF IMPACTS INTO FEDERAL AREAS

TABLE 1 - NIAGARA RIVER SHORELINE STABILIZATION/MITIGATION

Shoreline Section	Sediments to be Excavated*	Riprap Fill to be Placed*	Clean Fill to be Placed*
Riprap	2,695	1,744	951
Wetland Shore	3,120	2,080	231
Wooded Shore	4,583	--	--
Totals	10,398	3,824	1,182

*cubic yards

Total fill in Section 10 jurisdiction = 5,006 cubic yards.

TABLE 2 - WETLANDS REMEDIATION

Wetland Location	Excavation*
Northeast Wetland	454
Southeast Wetland	296
Total	750

*cubic yards

TABLE 3 - WETLANDS LOST THROUGH FILLING

Wetland Location	Fill Area (Sq. ft./Acres)
Northeast Wetland	----
Southeast Wetland	----
South Wetland	22,100 / 0.51
Total	22,100 / 0.51

TABLE 4 - WETLANDS CREATED

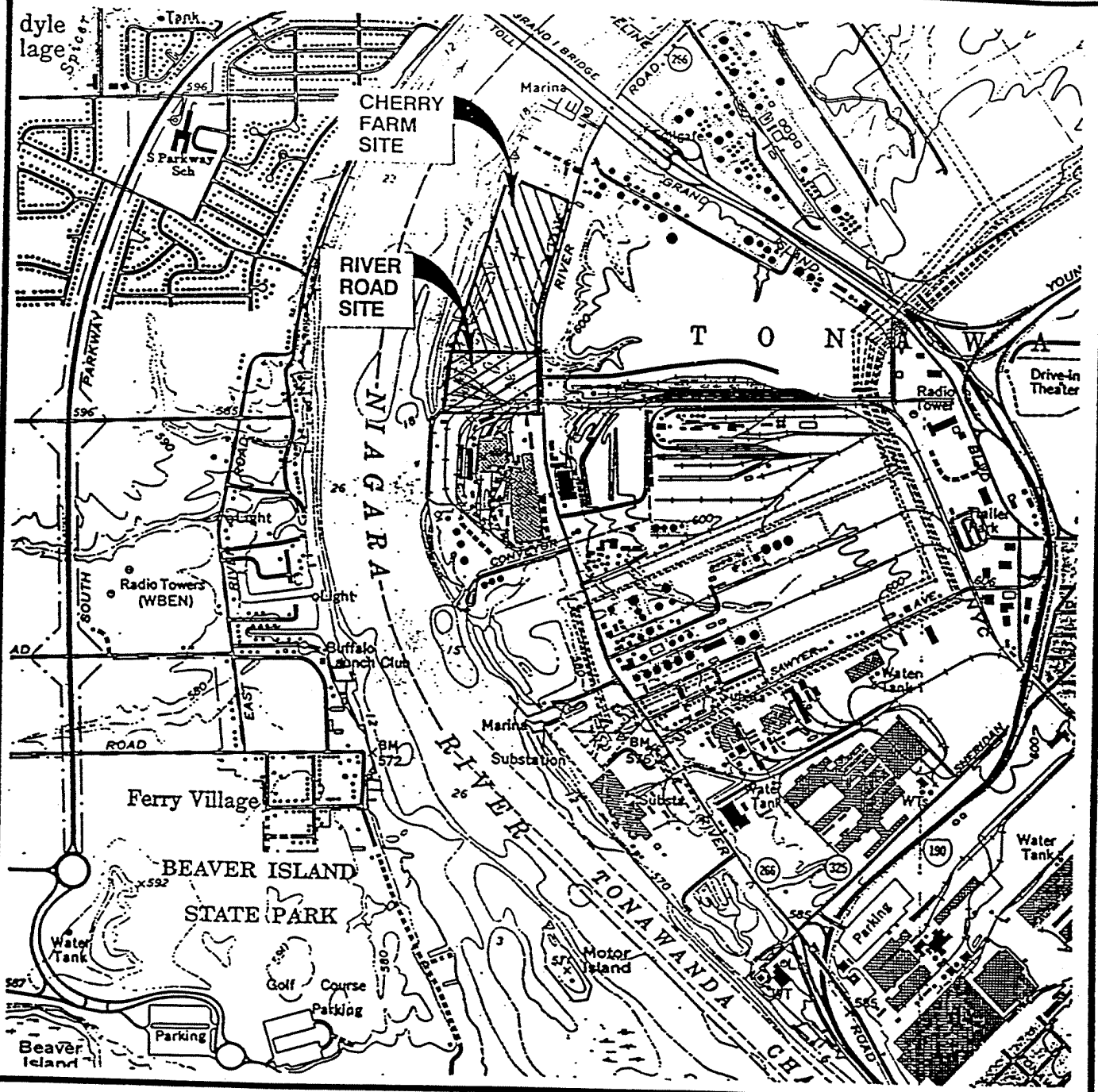
Habitat	Area (Sq. ft. / Acres)
Emergent Wetland	27,040 / 0.6207
Wooded Riparian	26,400 / 0.6060
Total	53,440 / 1.2267

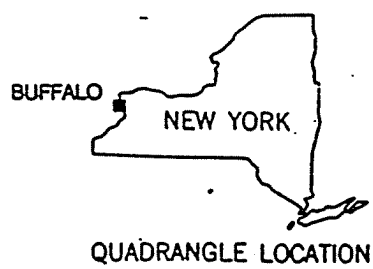
Cherry Farm/River Road PRP Group

DA Proc. No. 95-976-173

Sheet 1 of 11

FIGURE 1





LAT. 42-59'-26"
LONG. 78-56'-14"

SCALE
0 2000 4000 FT.

PARSONS ENGINEERING SCIENCE

REFERENCE:

U.S.G.S. 7.5 MINUTE TOPOGRAPHIC QUADRANGLE, BUFFALO NW, NEW YORK- ONTARIO, CANADA (1965)
SCALE 1:24000

SITE LOCATION MAP

Cherry Farm/River Road
PRP Group

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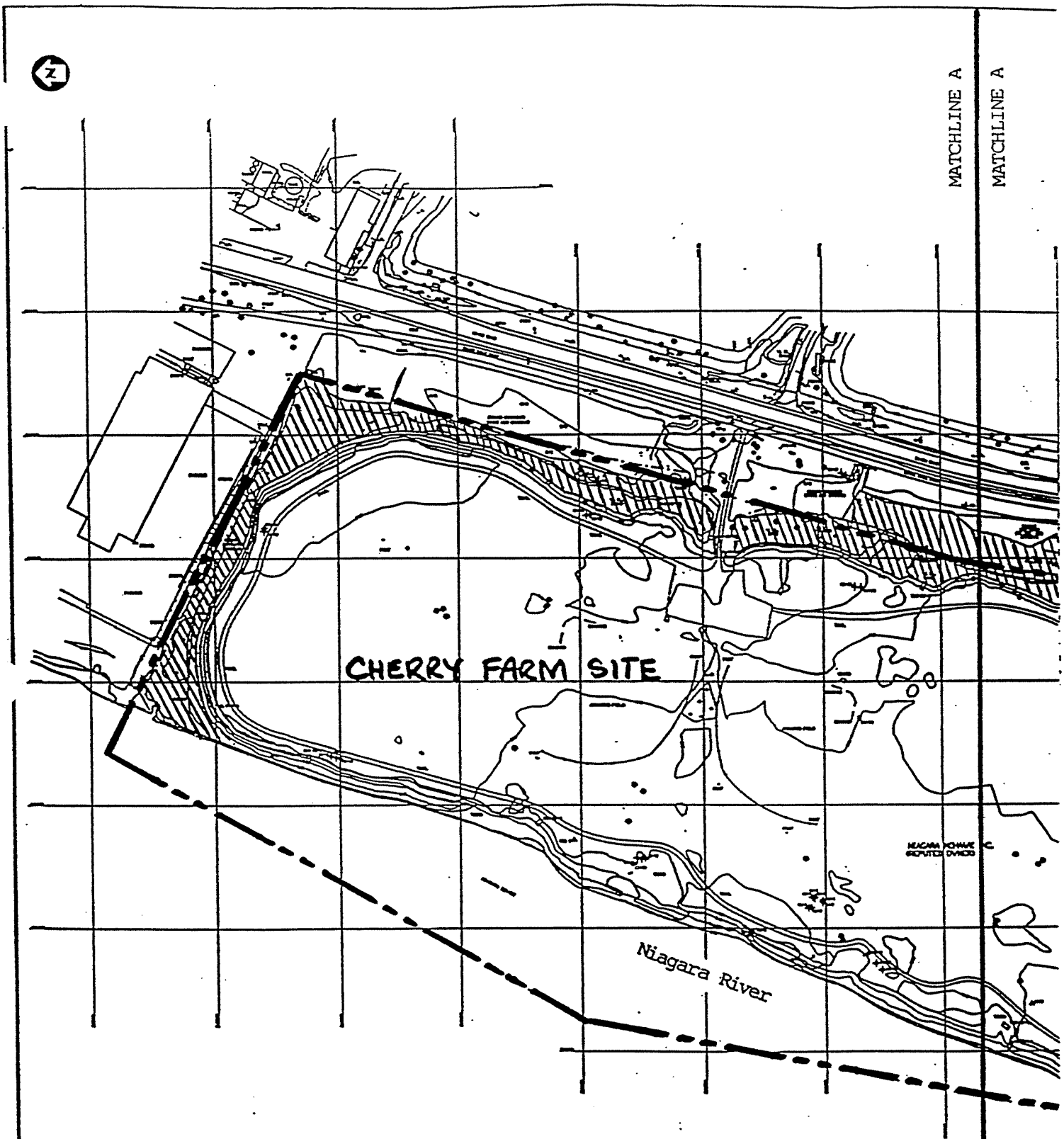

GENERAL NOTES:

1. AERIAL MAPPING BY TVGA ENGINEERS, SURVEYORS P.C., JANUARY 1985
2. MAPPING COMPILED BY STEREOPHOTOGRAMMETRIC METHODS FROM 1"=333' SCALE AERIAL PHOTOGRAPHY FLOWN 12/21/84.
3. MAPPING COMPILED WITHOUT BENEFIT OF FIELD SURVEY.
4. AREAS OUTLINED AND NOTED INDICATE AREAS OF ESSENTIAL ACCURACY.
5. THE CONTOURS IN THE AREA LOCATED BETWEEN THE MAPPING LIMITS AND THE EDGE OF MAPPING ON THE OF QUESTIONABLE ACCURACY DUE TO THE PROCESS OF DTM CONTOUR GENERATION.
6. SITE MAPPING AND SURVEY CONTROL:
   HORIZONTAL DATUM - NAD 1983 (BASED ON EXISTING SITE MONUMENTS # 9 AND #10).
   VERTICAL DATUM - NGVD 1929 (BASED ON EXISTING SITE MONUMENTS #9 AND #10).
7. GROUND SURVEY OF MONITORING WELLS, TEST PITS AND WETLANDS BY TVGA, SURVEYORS P.C. DECEMBER, 1984 / JANUARY 1985.
8. FEDERAL WETLAND DELINEATION CONDUCTED BY WILSON ENVIRONMENTAL TECHNOLOGIES. FIELD DELINEATION COMPLETED DECEMBER, 1984.
9. STATE WETLAND DELINEATION CONDUCTED BY NYSDEC WILDLIFE BIOLOGIST. FIELD DELINEATION CONDUCTED JANUARY, 1985.

AERIAL CONTROL POINTS

NORTHING	EASTING	ELEVATION	DESCRIPTION
[illegible]	[illegible]	[illegible]	[illegible]

Cherry Farm/River Road
PRP Group

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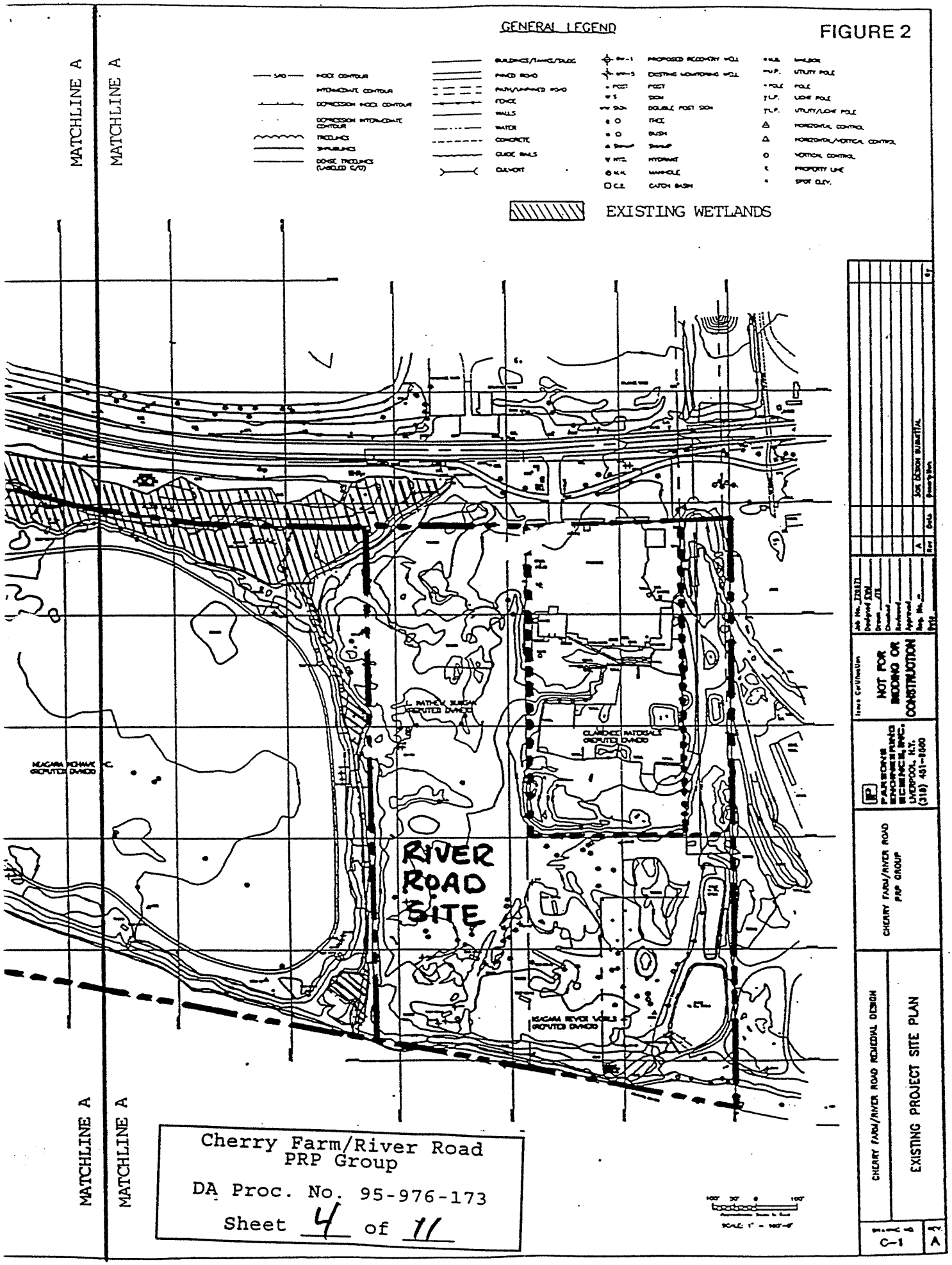
FIGURE 2



Cherry Farm/River Road
PRP Group

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FIGURE 3

LEGEND

EXISTING WETLANDS

PROPOSED WETLANDS

DESTROYED WETLANDS

MATCHLINE B

MATCHLINE B

MATCHLINE B

MATCHLINE B

RIVER ROAD SITE

A

B

A : Riprap Shoreline See Figure 4

B : Wooded Shoreline See Figure 5 & Figure 7

C : Wetland Shoreline See Figure 6 & Figure 8

Cherry Farm/River Road
PRP Group

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CHERRY FARM/RIVER ROAD REMEDIAL DESIGN

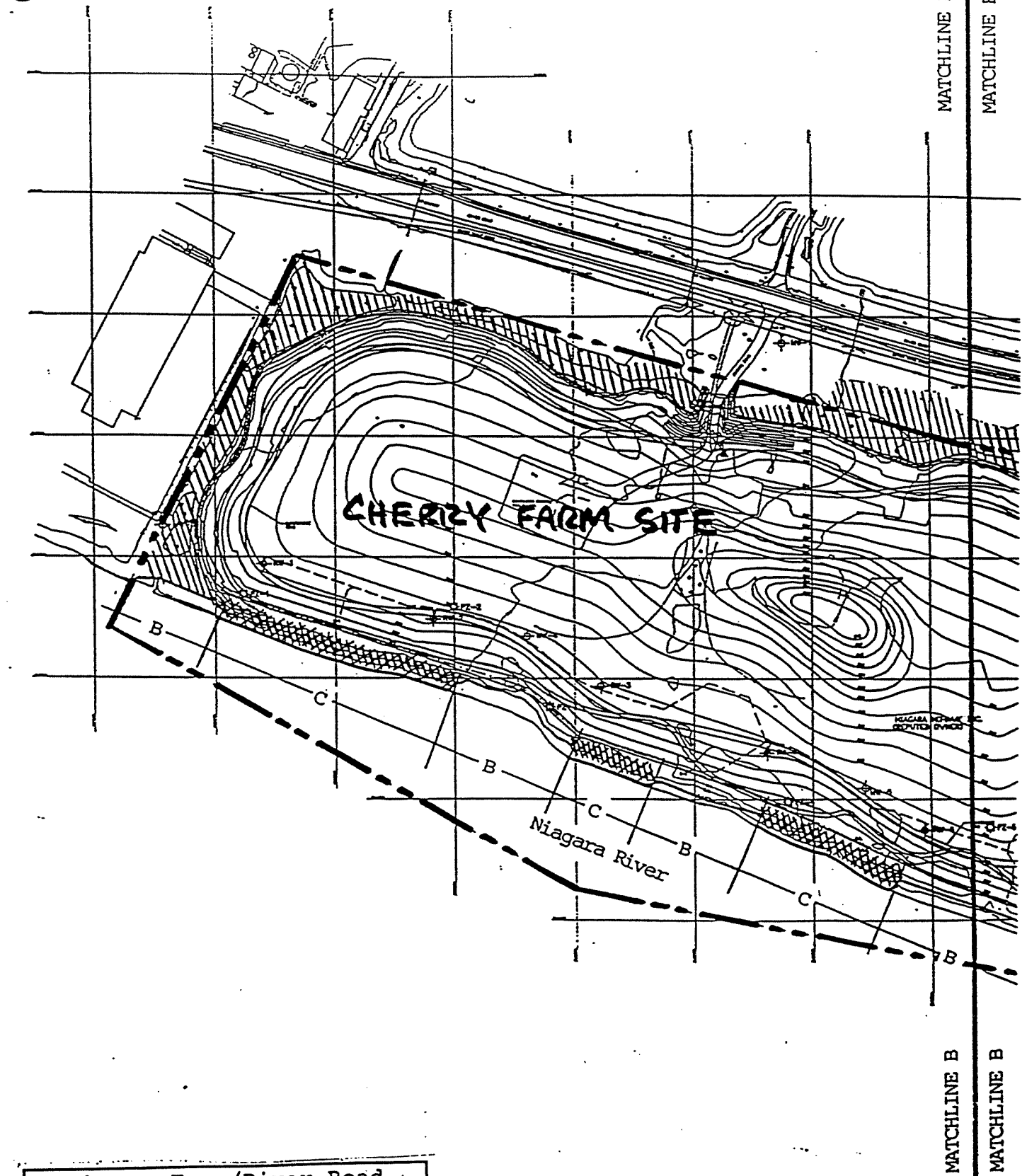
Final Site Plan

CHERRY FARM/RIVER ROAD PRP GROUP

PARSONS ENGINEERING SCIENCE, INC. BUFFALO, NEW YORK (716) 633-7074

NOT FOR BIDDING OR CONSTRUCTION

ISSUED FOR



Cherry Farm/River Road
PRP Group

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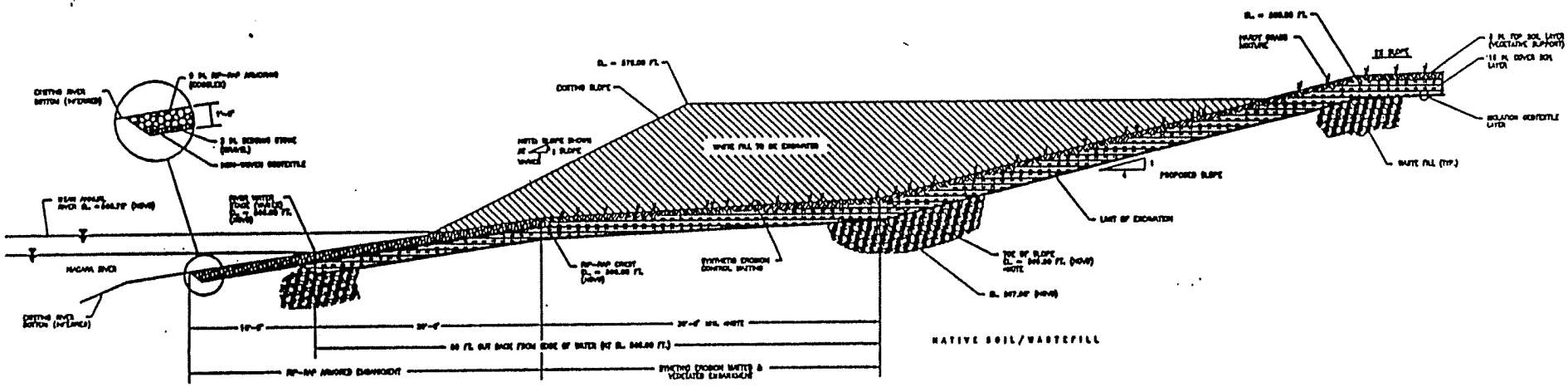
Sheet 6 of 11



RIP-RAP SHORELINE STABILIZATION DETAIL
1/2" = 1'-0"

NOTE:
WITH VARIES ALONG SHORELINE
REFER TO HORIZONTAL COORDINATES ON DWGS. 8-3 AND 8-4 FOR
SITUATING THE TOE OF SLOPE.

FIGURE 4

CHERRY FARMS/RIVER ROAD

RIP-RAP SHORELINE STABILIZATION DETAIL

PARSONS ENGINEERING SCIENCE, INC.
DESIGN • RESEARCH • PLANNING
290 ELWOOD DAVIS ROAD • SUITE 312 • LIVERPOOL, N.Y. 13088 • 315/451-9560
OFFICES IN PRINCIPAL CITIES

Cherry Farm/River Road
PRP Group

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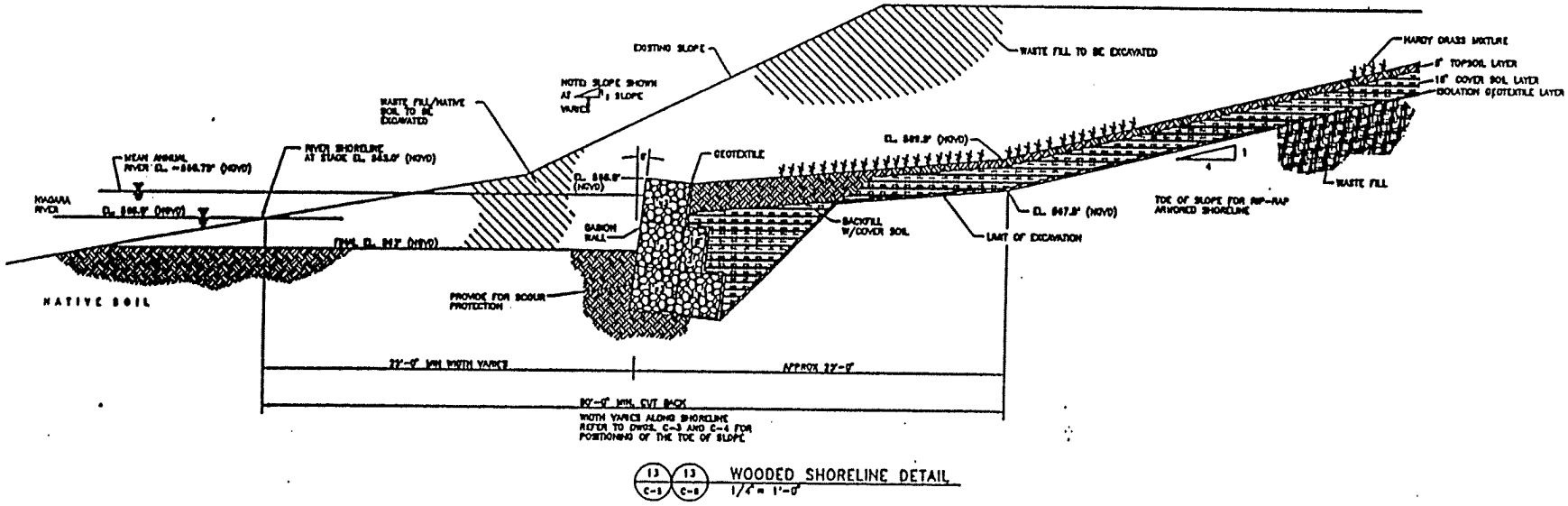
NGVD = IGLD + 1.25'
565.0' NGVD = 563.75' IGLD
566.75' NGVD = 565.50' IGLD



13/C-5 13/C-6 WOODED SHORELINE DETAIL
1/4" = 1'-0"

EXCAVATION = 1100 LF (25'W X 4.5'D) = 4583 CY

FIGURE 5

CHERRY FRAMS/RIVER ROAD

WOODED SHORELINE DETAILS

PARSONS ENGINEERING SCIENCE, INC.
DESIGN • RESEARCH • PLANNING
290 ELWOOD DAVIS ROAD • SUITE 312 • LIVERPOOL, N.Y. 13088 • 315/451-9560
OFFICES IN PRINCIPAL CITIES

Cherry Farm/River Road
PRP Group

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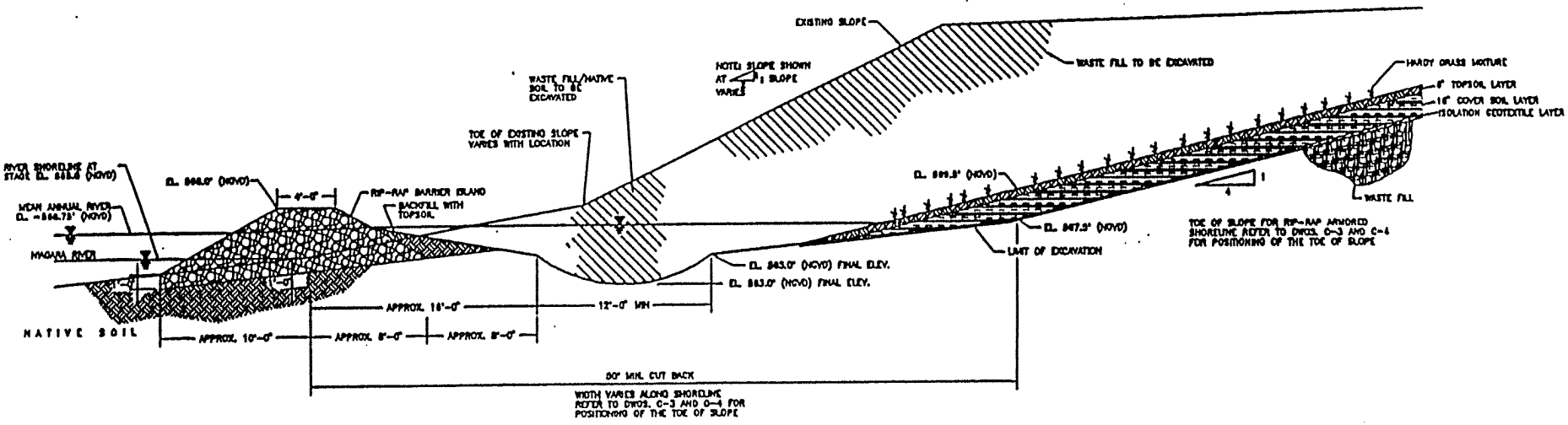
NGVD = IGLD + 1.25'
565.0' NGVD = 563.75' IGLD
566.75' NGVD = 565.50' IGLD



14 / C-5 — 14 / C-6 WETLAND SHORELINE DETAIL
1/4" = 1'-0"

EXCAVATION = 1040 LF [(1'D X 18'W) + (1.5'D X 30'W) + (1.5'D X 12'W)] = 3120 CY
Riprap Area Channel Trough

RIPRAP FOR = 1040LF (4.5'H X 12'W) = 2080 CY }
BARRIER BERM } SUM OF FILL = 2311 CY
}
SOIL BACKFILL = 1040LF[.5 (1.5'D X 8'W)] = 231 CY }

NET CHANGE = 3120 CY EXC. - 2311CY FILL = 809 CY EXC.

FIGURE 6

CHERRY FARM /RIVER ROAD

WETLAND SHORELINE DETAIL

PARSONS ENGINEERING SCIENCE, INC.
DESIGN • RESEARCH • PLANNING
290 ELWOOD DAVIS ROAD • SUITE 312 • LIVERPOOL, N.Y. 13088 • 315/451-9560
OFFICES IN PRINCIPAL CITIES

Cherry Farm/River Road
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Chei Farm/River Road
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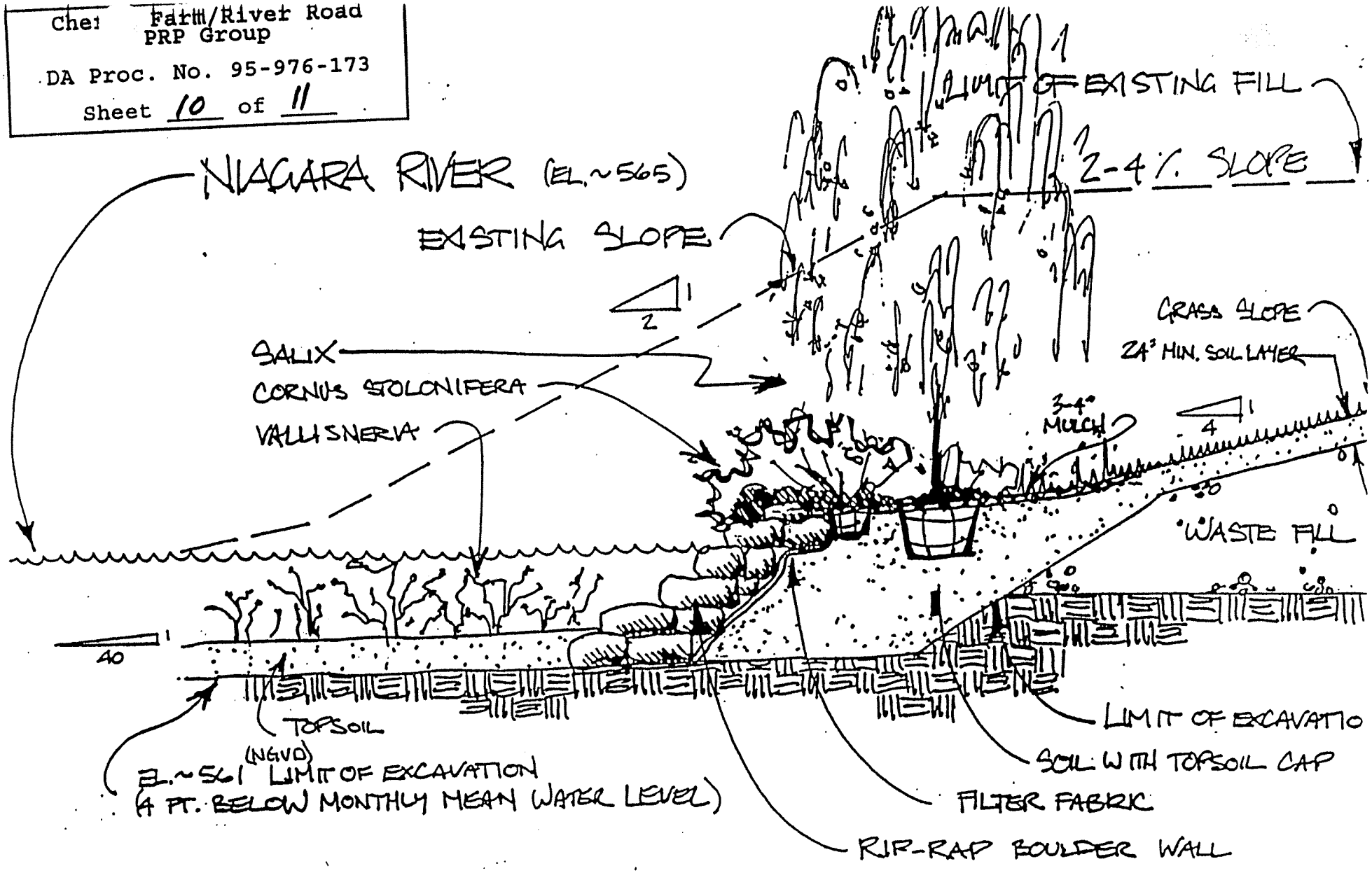

CHERRY FARM

RIVER BANK STABILIZATION AND WOODED SHORELINE REPLACEMENT

0 5 10 20

FIGURE 7

Cherry Farm/River Road
PRP Group
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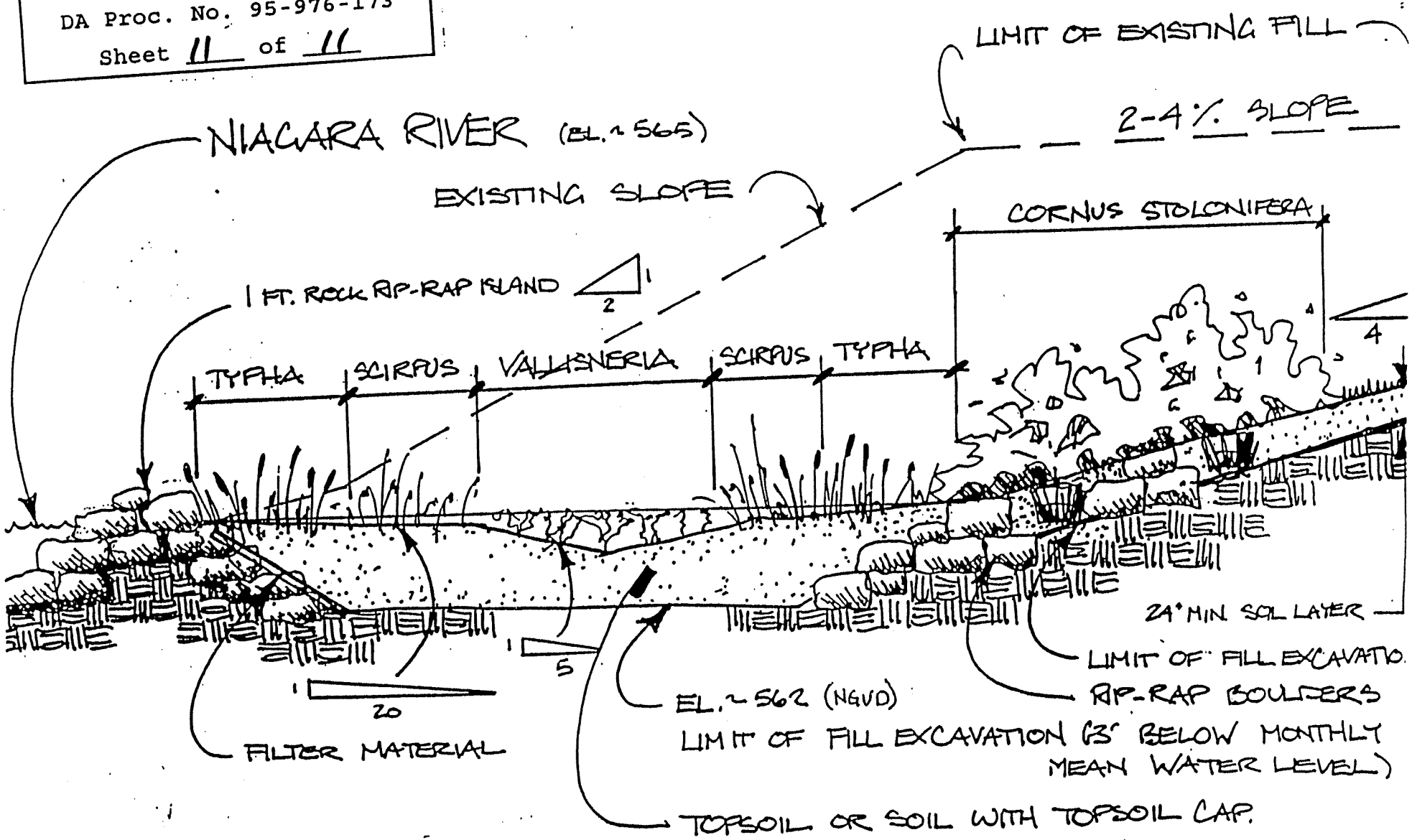


CHERRY FARM
RIVER BANK STABILIZATION AND WETLAND CREATION

0 5 10 20

FIGURE 8

ACTIVITIES AUTHORIZED UNDER 33 CFR 330, APPENDIX A:

(38) Cleanup of Hazardous and Toxic Waste. Specific activities required to effect the containment, stabilization or removal of hazardous or toxic waste materials that are performed, ordered, or sponsored by a government agency with established legal or regulatory authority provided the permittee notifies the district engineer in accordance with the "Notification" general condition. For discharges in special aquatic sites, including wetlands, the notification must also include a delineation of affected special aquatic sites, including wetlands. Court ordered remedial action plans or related settlements are also authorized by this nationwide permit. This nationwide permit does not authorize the establishment of new disposal sites or the expansion of existing sites used for the disposal of hazardous or toxic waste. (Sections 10 and 404)

NATIONWIDE PERMIT GENERAL CONDITIONS

General Conditions: The following general conditions must be followed in order for any authorization by a nationwide permit to be valid:

1. Navigation. No activity may cause more than a minimal adverse effect on navigation.

2. Proper Maintenance. Any structure or fill authorized shall be properly maintained, including maintenance to ensure public safety.

3. Erosion and Siltation Controls. Appropriate erosion and siltation controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills must be permanently stabilized at the earliest practicable date.

4. Aquatic Life Movements. No activity may substantially disrupt the movement of those species of aquatic life indigenous to the waterbody, including those species which normally migrate through the area, unless the activity's primary purpose is to impound water.

5. Equipment. Heavy equipment working in wetlands must be placed on mats or other measures must be taken to minimize soil disturbance.

6. Regional and Case-by-Case Conditions. The activity must comply with any regional conditions which may have been added by the division engineer (see 33 CFR 330.4[e]) and any case specific conditions added by the Corps.

7. Wild and Scenic Rivers. No activity may occur in a component of the National Wild and Scenic River System; or in a river officially designated by Congress as a "study river" for possible inclusion in the system, while the river is in an official study status. Information on Wild and Scenic Rivers may be obtained from the National Park Service and the U.S. Forest Service.

8. Tribal Rights. No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

9. Water Quality Certification. In certain states, an individual state water quality certification must be obtained or waived (see 33 CFR 330.4[c]).

10. Coastal Zone Management. In certain states, an individual state coastal zone management consistency concurrence must be obtained or waived. (See 33 CFR 330.4[d]).

11. Endangered Species. No activity is authorized under any NWP which is likely to jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act, or which is likely to destroy or adversely modify the critical habitat of such species. Non-federal permittees shall notify the district engineer if any listed species or critical habitat might be affected or is in the vicinity of the project and shall not begin work on the activity until notified by the district engineer that the requirements of the Endangered Species Act have been satisfied and that the activity is authorized. Information on the location of threatened and endangered species and their critical habitat can be obtained from the U.S. Fish and Wildlife Service and National Marine Fisheries Service. (See 33 CFR 330.4[f]).

12. Historic Properties. No activity which may affect Historic properties listed, or eligible for listing, in the National Register of Historic Places is authorized, until the DE has complied with the provisions of 33 CFR 325, appendix C. The prospective permittee must notify the district engineer if the authorized activity may affect any historic properties listed, determined to be eligible, or which the prospective permittee has reason to believe may be eligible for listing on the National Register of Historic Places, and shall not begin the activity until notified by the District Engineer that the requirements of the National Historic Preservation Act have been satisfied and that the activity is authorized. Information on the location and existence of historic resources can be obtained from the State Historic Preservation Office and the National Register of Historic Places. (See 33 CFR 330.4[g]).

13.Notification (all except Single Family Housing NWP): (a) Where required by the terms of the NWP, the prospective permittee must notify the District Engineer as early as possible and shall not begin the activity: (1) Until notified by the District Engineer that the activity may proceed under the NWP with any special conditions imposed by the district or division engineer; or

(2) If notified by the District or Division engineer that an individual permit is required; or

(3) Unless 30 days have passed from the District Engineer's receipt of the notification and the prospective permittee has not received notice from the District or Division Engineer. Subsequently, the permittee's right to proceed under the NWP may be modified, suspended, or revoked only in accordance with the procedure set forth in 33 CFR 330.5[d][2].

(b) The notification must be in writing and include the following information and any required fees:

(1) Name, address and telephone number of the prospective permittee;

(2) Location of the proposed project;

(3) Brief description of the proposed project; the project's purpose; direct and indirect adverse environmental effects the project would cause; any other NWP(s), regional general permit(s) or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity;

(4) Where required by the terms of the NWP, a delineation of affected special aquatic sites, including wetlands; and

(5) A statement that the prospective permittee has contacted: (i) The USFWS/NMFS regarding the presence of any Federally listed (or proposed for listing) endangered or threatened species or critical habitat in the permit area that may be affected by the proposed project; and any available information provided by those agencies. (The prospective permittee may contact Corps District Offices for USFWS/NMFS agency contacts and lists of critical habitat).

(ii) The SHPO regarding the presence of any historic properties in the permit area that may be affected by the proposed project; and the available information, if any, provided by that agency.

(c) The standard individual permit application form (Form ENG 4345) may be used as the notification but must clearly indicate that it is a PDN and must include all of the information required in (b)(1)-(5) of General Condition 13.

(d) In reviewing an activity under the notification procedure, the District Engineer will first determine whether the activity will result in more than minimal individual or cumulative adverse environmental effects

or will be contrary to the public interest. The prospective permittee may, at his option, submit a proposed mitigation plan with the predischarge notification to expedite the process and the District Engineer will consider any optional mitigation the applicant has included in the proposal in determining whether the net adverse environmental effects of the proposed work are minimal. The District Engineer will consider any comments from Federal and State agencies concerning the proposed activity's compliance with the terms and conditions of the nationwide permits and the need for mitigation to reduce the project's adverse environmental effects to a minimal level. The district engineer will upon receipt of a notification provide immediately (e.g. facsimile transmission, overnight mail or other expeditious manner) a copy to the appropriate offices of the Fish and Wildlife Service, State natural resource or water quality agency, EPA, and, if appropriate, the National Marine Fisheries Service. With the exception of NWP 37, these agencies will then have 5 calendar days from the date the material is transmitted to telephone the District Engineer if they intend to provide substantive, site-specific comments. If so contacted by an agency, the District Engineer will wait an additional 10 calendar days before making a decision on the notification. The District Engineer will fully consider agency comments received within the specified time frame, but will provide no response to the resource agency. The District Engineer will indicate in the administrative record associated with each notification that the resource agencies' concerns were considered. Applicants are encouraged to provide the Corps multiple copies of notifications to expedite agency notification. If the District Engineer determines that the activity complies with the terms and conditions of the NWP and that the adverse effects are minimal, he will notify the permittee and include any conditions he deems necessary. If the District Engineer determines that the adverse effects of the proposed work are more than minimal, then he will notify the applicant either:

(1) That the project does not qualify for authorization under the NWP and instruct the applicant on the procedures to seek authorization under an individual permit; or

(2) That the project is authorized under the nationwide permit subject to the applicant's submitting a mitigation proposal that would reduce the adverse affects to the minimal level. This mitigation proposal must be approved by the District Engineer prior to commencing work. If the prospective permittee elects to submit a mitigation plan, the DE will expeditiously review the proposed mitigation plan, but will not commence a second 30-day notification procedure. If the net adverse effects of the project (with the mitigation proposal) are determined by the District Engineer to be minimal, the District Engineer will provide a timely written response to the applicant informing him that the project can proceed under the terms and conditions of the nationwide permit.

(e) Wetlands Delineations: Wetland delineations must be prepared in accordance with the current method required by the Corps. The permittee may ask the Corps to delineate the special aquatic site. There may be some delay if the Corps does the delineation. Furthermore, the 30-day period will not start until the wetland delineation has been completed.

(f) Mitigation: Factors that the District Engineer will consider when determining the acceptability of appropriate and practicable mitigation include, but are not limited to:

(1) To be practicable the mitigation must be available and capable of being done considering costs, existing technology, and logistics in light of overall project purposes;

(2) To the extent appropriate, permittees should consider mitigation banking and other forms of mitigation including contributions to wetland trust funds, which contribute to the restoration, creation, replacement, enhancement, or preservation of wetlands.

Furthermore, examples of mitigation that may be appropriate and practicable include but are not limited to: reducing the size of the project; establishing buffer zones to protect aquatic resource values; and replacing the loss of aquatic resource values by creating, restoring, and enhancing similar functions and values. In addition, mitigation must address impacts and cannot be used to offset the acreage of wetland losses that would occur in order to meet the acreage limits of some of the nationwide permits (e.g. 5 acres of wetlands cannot be created to change a 6 acre loss of wetlands to a 1 acre loss; however, the 5 created acres can be used to reduce the impacts of the 6 acre loss).

Section 404 Only Conditions

In addition to the General Conditions, the following conditions apply only to activities that involve the discharge of dredged or fill material and must be followed in order for authorization by the nationwide permits to be valid:

1. **Water Supply Intakes.** No discharge of dredged or fill material may occur in the proximity of a public water supply intake except where the discharge is for repair of the public water supply intake structure and adjacent bank stabilization.

2. **Shellfish Production.** No discharge of dredged or fill material may occur in areas of concentrated shellfish production, unless the discharge is directly related to a shellfish harvesting activity authorized by nationwide permit 4.

3. **Suitable Material.** No discharge of dredged or fill material may consist of unsuitable material (e.g., trash, debris, car bodies, etc.) and material discharged must be free from toxic pollutants in toxic amounts (see section 307 of the Clean Water Act).

4. **Mitigation.** Discharges of dredged or fill material into waters of the United States must be minimized or avoided to the maximum extent practicable at the project site (i.e. on-site), unless the DE has approved a compensation mitigation plan for the specific regulated activity.

5. **Spawning Areas.** Discharges in spawning areas during spawning seasons must be avoided to the maximum extent practicable.

6. **Obstruction of High Flows.** To the maximum extent practicable, discharges must not permanently restrict or impede the passage of normal or expected high flows or cause the relocation of the water (unless the primary purpose of the fill is to impound waters).

7. **Adverse Impacts From Impoundments.** If the discharge creates an impoundment of water, adverse impacts on the aquatic system caused by the accelerated passage of water and/or the restriction of its flow shall be minimized to the maximum extent practicable.

8. **Waterfowl Breeding Areas.** Discharges into breeding areas for migratory waterfowl must be avoided to the maximum extent practicable.

9. **Removal of Temporary Fills.** Any temporary fills must be removed in their entirety and the affected areas returned to their preexisting elevation.

NATIONWIDE PERMIT SPECIAL CONDITIONS

NEW YORK STATE

NATIONWIDE PERMIT PROGRAM - FURTHER INFORMATION

1. District Engineers have the authority to determine if an activity complies with the terms and conditions of a Nationwide Permit.
2. Nationwide Permits do not obviate the need to obtain other Federal, State, or local permits, approvals, or authorizations required by law.
3. Nationwide Permits do not grant any property rights or exclusive privileges.
4. Nationwide Permits do not authorize any injury to the property or rights of others.
5. Nationwide Permits do not authorize interference with any existing or proposed Federal Project.
6. If you have any questions concerning special conditions relating to activities within the New York State Coastal Zone, you may contact the following:

New York State Department of State
Division of Coastal Resources and
Waterfront Revitalization
Coastal Management Program
162 Washington Avenue
Albany, New York 12231
Telephone (518) 474-3642

7. In issuing the Water Quality Certification for Nationwide Permits in the State of New York, the New York State Department of Environmental Conservation included the following conditions:

a. This certification does not apply to any activity that is likely to jeopardize the continued existence of an endangered species or threatened species listed in 6NYCRR Part 182, or which is likely to destroy or adversely modify the critical habitat of such species. Information on New York State endangered or threatened species may be obtained at the following address:

Department of Environmental Conservation
Division of Fish and Wildlife
Information Services
700 Troy-Schenectady Road
Latham, New York 12110
Telephone (518) 783-3932

b. Prior to undertaking any Nationwide Permit activity that will involve or occupy State owned lands now or formerly under the waters of New York State, the party proposing the activity must first obtain all necessary approvals from:

New York State Office of General Services
Division of Land Utilization
Tower Building
Empire State Plaza
Albany, New York 12231
Telephone (518) 473-1288

INFORMATION ON NATIONWIDE PERMIT VERIFICATION

Verification of the applicability of this Nationwide permit is valid for two years from the date of issuance of your standard Department of the Army permit unless the Nationwide permit is modified, suspended or revoked. This verification will remain valid if during this two year period the Nationwide permit is reissued without modification or your activity complies with any subsequent permit modification. Please note that if you commence or are under contract to commence this activity in reliance of your permit prior to the date this Nationwide permit is suspended or revoked, or is modified such that your activity no longer complies with the terms and conditions, you have twelve months from the date of permit modification, expiration, or revocation to complete the activity under the present terms and conditions of this permit, unless this permit has been subject to the provisions of discretionary authority.

It is your responsibility to remain informed of changes to the Nationwide Permit program. A public notice announcing any changes will be issued when they occur. Finally, note that if your activity is not undertaken within the three year period or the project specifications have changed, you must immediately notify this office to determine the need for further approval or reverification.

Possession of this permit does not obviate you of the need to contact all appropriate state and/or local governmental officials to insure that the project complies with their requirements.

ATTACHMENT 3
SEDIMENT TREATABILITY TESTING REPORT

Treatability Study on the

Settling Kinetics of Hydrocarbon-Contaminated Sediment

FINAL REPORT 12/29/97

Cherry Farm/River Road Site

Tonawanda, NY

Prepared For: Parsons Engineering Science, Inc.
180 Lawrence Bell Drive
Suite 100
Williamsville, NY 14221

Prepared By: Waste Stream Technology
302 Grote Street
Buffalo, New York 14207

December 29, 1997

1.0 Scope of Work

The goal of this treatability study is to determine the efficacy of hydraulic dredging on sediment samples obtained from the Cherry Farm/River Road Site. Specifically, geophysical characterization and the settling kinetics was determined on native, untreated sediments, and flocculation testing was performed on the aqueous phase of pre-settled sediment.

2.0 Initial Sediment Characterization

Five buckets of sediment (STA 3500, STA 3200, STA 3850, STA 3700 [1], and STA 3700 [2]) were received at the treatability laboratory located at Waste Stream Technology (WST). Appendix A contains a copy of the chain of custody form shipped with the samples. Three samples were tested for moisture content (ASTM D-22160, grain size + hydrometer (ASTM D-422), specific gravity (SM 2710), Atterberg Limits (ASTM D-4318), and organic content (SW 846 Method 9060). The results are summarized in Appendix B, and indicate the soils to be non-plastic and non-cohesive, with a water content of 42.2% for sample 3200, 61.9% for sample 3500, and 56.4 for sample 3700. The specific gravity was quite high, ranging from 2.71 for sample 3700 to 3.18 for sample 3200. Sieve analysis indicated this soil to be (ML) sandy silts (USDA silty loam, AASHTO A-4), with 61-66% passing through the -200 screen. The organic content was determined to be between 4.42% and 5.53%.

3.0 Settling Test

3.1 Zone Settling

A settling test was performed on sediments according to the method specified by the USACE in EM1110-2-5027 Section 3-3. Briefly, sediment samples were screened in -200 mesh sieve, and soils passing through were diluted with tap water to 15% solids.

Samples were then composited in ratios detailed by Parsons Engineering Science, Inc (Appendix

C): 25% each of samples STA 3200, STA 3500, and STA 3850, and 12.5% of both STA 3700 (1) and STA 3700 (2). The sediment was then poured into an 8' x 8" diameter plexiglass column, and allowed to gravity settle over a 13 day period. In order to ensure solids homogeneity throughout the column at the initiation of the experiment, TSS and % solids samples were immediately taken at depths of 1', 2', 3', 4', and 5'6" below the water surface. Results showed good sediment distribution, with solids ranging from 14.32-14.99%, and TSS ranging from 186,400-206,600 mg/l (Appendix D).

A distinct interface developed after 1 hour of the settling, indicating that the sediment was exhibiting zone settling kinetics. Appendix E contains the raw data as it was recorded during this study. The interface height was defined as the distance from the bottom of the column to the foci of settled solids. The interface depth is defined as the distance from the water surface to this same foci. Reported in Appendix E are the TSS and turbidity values from sampling ports located in 0.5' intervals at depths of 0.375', 0.875', 1.375', 1.875', 2.375', 2.875', 3.375', and 3.875'. The interface depth was recorded at regular intervals throughout the study; in addition, as the interface descended the length of the column below sampling ports, the supernatant was sampled and analyzed for TSS and turbidity.

The depth to the interface versus time was plotted, and clearly show the sedimentation kinetics to be zone settling (Appendix F). The curve flattens after 24 hours, indicating the onset of compression settling after this time point. Examination of the graph indicates that the linear portion of the depth to solids interface versus settling time curve occurs between 0 and 12 hours. The slope of the curve between these time intervals was calculated, indicating the settling velocity of this sediment to be 0.17854 feet per hour (Appendix G). By day 4 the depth to interface was determined to be 4.19 feet.

Flocculation settling, which occurred in the supernatant fluid, was further examined by drawing a supernatant suspended solids concentration profile diagram (Appendix H). The TSS was determined at various column depths and time intervals, and the ratio of measured suspended

solids concentration to initial suspended solids concentration was calculated. These calculations are expressed as percentage of initial concentration. The first supernatant fluid TSS sample was taken above the interface at the onset of zone settling, and was determined to be 368 mg/l. Therefore this value was used as the initial TSS concentration in all calculations. The data shows that, by 12 hours, the TSS concentration was reasonably distributed above the interface and throughout the entire supernatant fluid phase.

3.2 Compression Settling

Compression settling was examined by measuring the depth to interface throughout a 13 day settling period. Results show that the additional settling did occur, as the depth to interface increased ¼ foot between days 5 and 12 (Appendix I). There was no change between days 12 and 13, at which time WST was instructed by Parsons Engineering to terminate the test.

4.0 Chemically-Assisted Flocculation Test

4.1 Initial Screening

Chemically-assisted flocculation testing was performed according to the methods outlined by the USACE in EM 1110-2-5027 Section 3-4 and Appendix E. For the initial screening, 10 Callaway polymers were selected against an initial slurry concentration of 2 g/l. Each polymer was first tested at a concentration of 1 ppm, and was added in 1 ppm increments until flocculation occurred. The polymer was considered ineffective if no flocculation developed at a dosage of 10 ppm. Of those tested, polymers 842 and 4035 are cationic polymers, while 4320, 4910, 4864, 4571, 4805, and 4905L are anionic polymers. Test solutions were stirred for 5 minutes while mixing at 100 rpms, and allowed to settle for 10 minutes. The supernatant fluid was decanted and analyzed for turbidity and TSS.

The results of the screening tests indicate that the suspended solids are best flocculated utilizing an anionic polymer (Appendix I). Each anionic polymer tested generated flocculation, with polymer 4910 yielding the best combination of low dosage (3 ppm) and lowest TSS (12

ppm). Although treatment with 2 ppm of polymer 4864 gave the lowest turbidity result (11.8 NTUs), the resultant TSS (22 ppm) was greater than polymer 4910. Therefore, polymer 4910 was investigated further in the optimization studies. Neither cationic polymer yielded detectable flocculation at the concentrations tested.

4.2 Optimization

The optimum feed solids concentration, dosage, and settling time were examined in flocculation tests utilizing Callaway polymer 4910. Again, the methods employed herein are outlined by the USACE in EM 1110-2-5027 Section 3-4 and Appendix E. Feed solids varied from 0.5 g/ml to 2 g/ml, while polymer was tested at 2 and 3 ppm. Solutions were mixed for 5 minutes at 100 rpm and allowed to settle for 6 minutes. Samples of the supernatant fluid were carefully removed at selected time intervals, and analyzed for turbidity and TSS.

The results of these experiments show that the optimal ratio of feed solids to polymer was 2 g/l and 3 ppm 4910 (Appendix J). After 4 and 6 minutes' settling time, the remaining suspended solids concentration was 12 and 14 ppm, respectively, with a turbidity of approximately 30 NTUs. Flocculation required several minutes of mixing, as no coagulation was apparent immediately after polymer addition. In general, 3 to 4 minutes of stirring was required to enhance the formation of a good particulate flocculent.

5.0 Conclusions

The results of the treatability study demonstrate that hydraulic dredging is a viable option for the removal of sediments at the Cherry Farm/River Road site. Suspended sediments exhibited zone-settling kinetics, and had a calculated settling velocity of 0.17854 feet per hour. Further, polymer testing results indicate that anionic polymer treatments are effective in removing the resultant suspended solids from the supernatant fluid. Specifically, 3 ppm of Callaway polymer 4910 reduced the solids by over 2 orders of magnitude, from 2,000 mg/l to 12 mg/l. Turbidity of the resultant treated water was negligible.

Appendix A

WASTE STREAM TECHNOLOGY
302 GROTE STREET
BUFFALO, NY 14207
(716) 876-5290

CHAIN OF CUSTODY RECORD

PROJECT NO: 9705 SITE NAME: PARSONS ENGINEERING-SCIENCE

SAMPLERS (SIGNATURE): [signature]

SAMPLE NO.	DATE	TIME	COMP.	GRAB	MATRIX	SAMPLE LOCATION	SIZE & NO. OF CONTAINERS	TCLP/TAL/TCL						PRESERVATIVES	REMARKS
	11/13/97			X	RIVER SEDIMENT	STA 3500	1x5gal								
	↓			↓	↓	STA 3200	↓								
						STA 3850									
						3700 (1) 1of2									
						3700 (2) 2of2									

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
[signature]	11/13/97 1550	Amy J. Toth			
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	DATE/TIME	REMARKS	

Distribution Original accompanies shipment. Copy to coordinator field files

LAB USE: REFRIGERATOR # _____ SHELF # _____

Appendix B

LABORATORY TESTING DATA SHEET

Project Name: WASTE STREAM TECHNOLOGY

Project No.: 1300.27 | Assigned By: J. HYZY | Reviewed By:

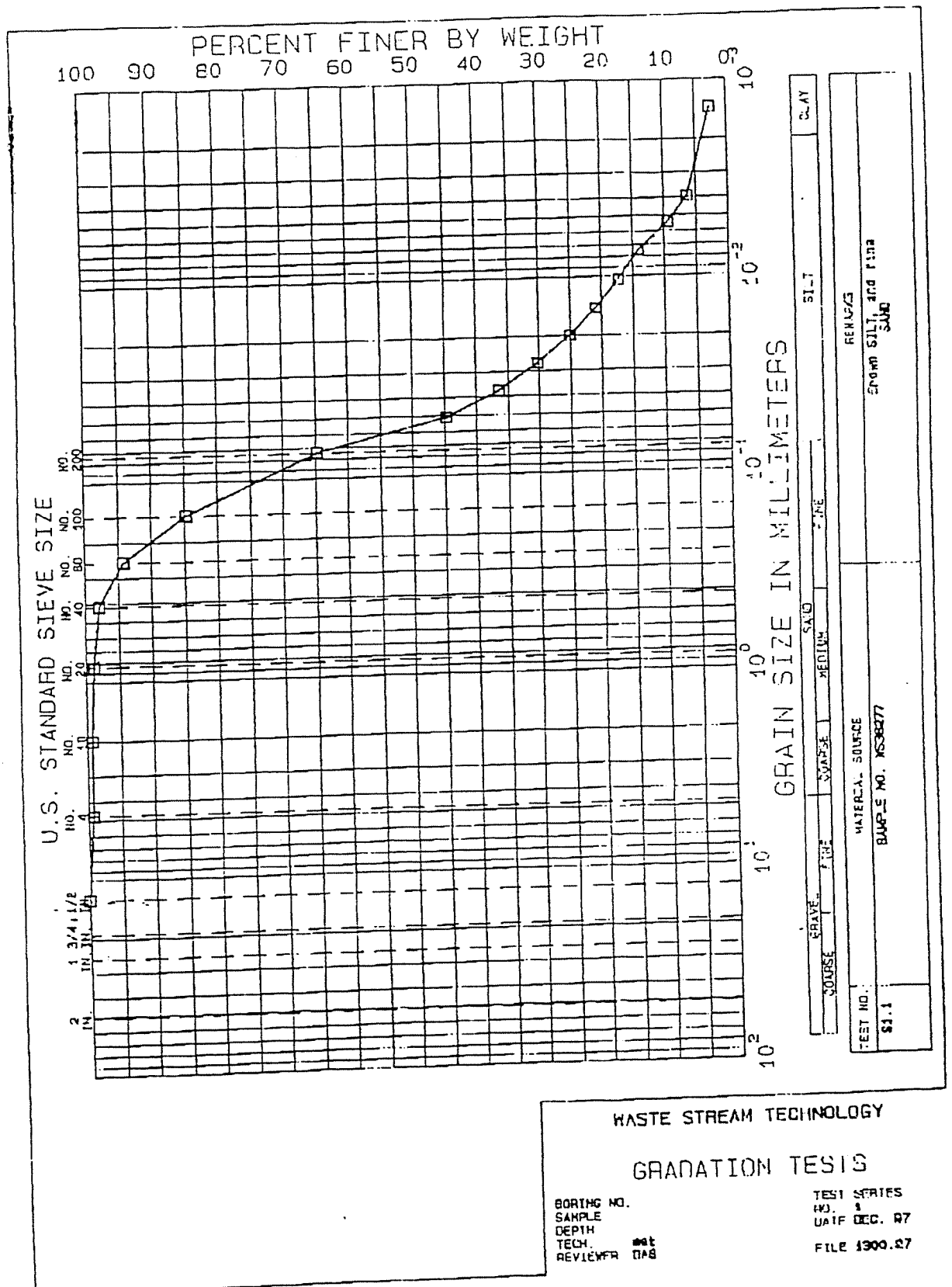
Project Engineer: R. REDENBACH | Date: DEC.97 | Date Reviewed:

				Identification Tests							Density			Strength Tests						Consol.		
Boring/ Test Pit No.	Sample No.	Depth Ft.	Lab No.	Water Content %	LL %	PL %	Sieve #200 %	Hyd. -2μ %	ORG %	G_s	Dry unit wt. pcf	γ_d MAX (pcf) W_{opt} (%)	Permeability cm/sec	Torvane or Type Test	σ_3 psf	Failure Criteria	$\sigma_1 - \sigma_3$ or psf	Strain %	C_c $\frac{\Delta e}{\Delta \log \sigma}$	Laboratory Log and Soil Description
	WS-38277	3200	1	42.2	non-plastic		65			3.18											Brown SILT and fine SAND
	WS-38278	3500	2	61.9	non-plastic		66			3.00											Brown SILT, some (+) fine SAND
	WS-38279	3700	3	56.4	non-plastic		61			2.71											Brown SILT and fine SAND

CZA GeoEnvironmental, Inc.

Q:\NEWTON\LAB\LABFORM1.XLS

labform1.xls



WASTE STREAM TECHNOLOGY

GRADATION TESTS

BORING NO.
SAMPLE
DEPTH
TECH. mat
REVIEWER DAS

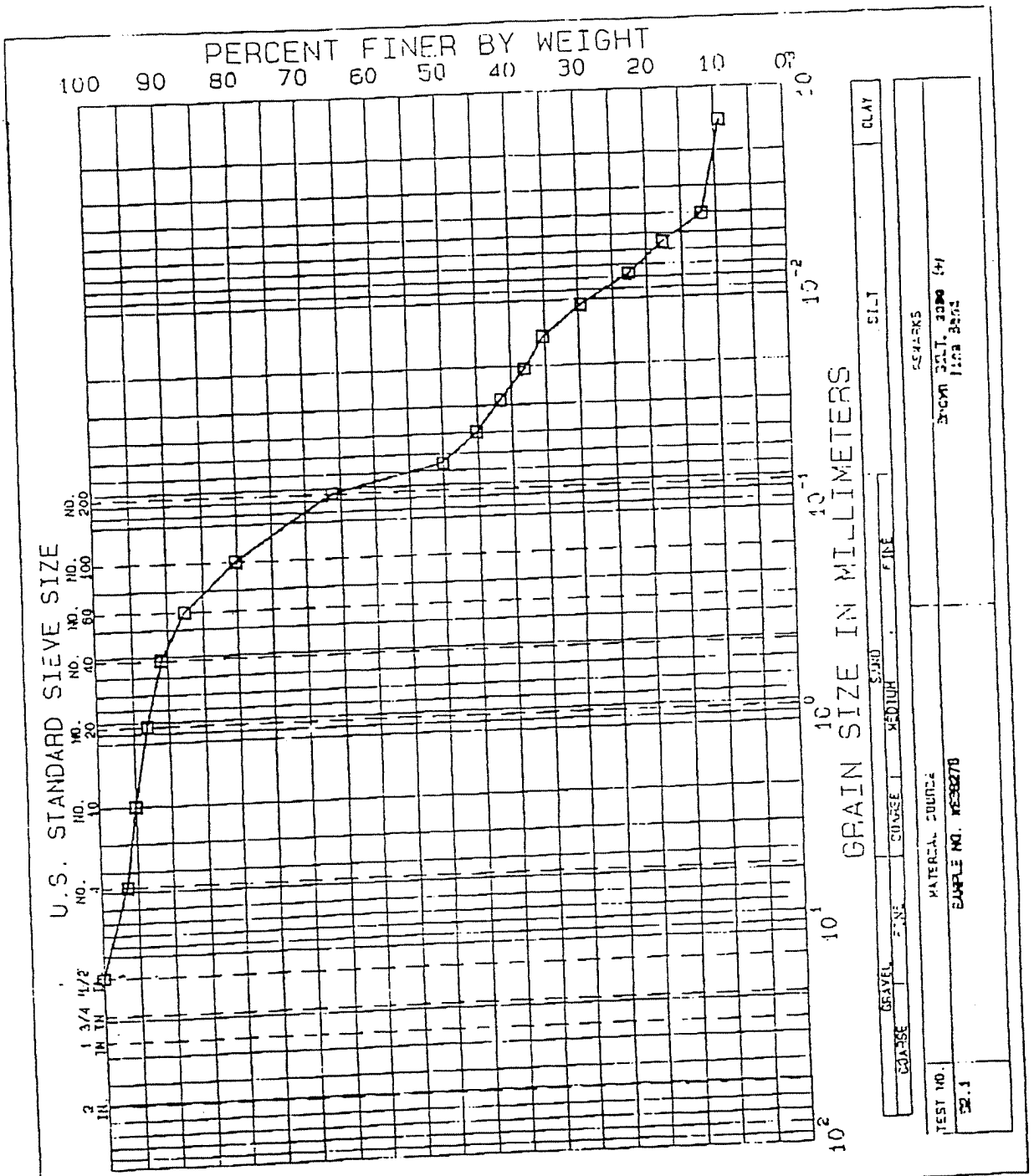
TEST SERIES NO. 1
DATE DEC. 97

FILE 1300.27

GZA GEOENVIRONMENTAL, INC.
ENGINEERS AND SCIENTISTS

APPENDIX C-9

S 3



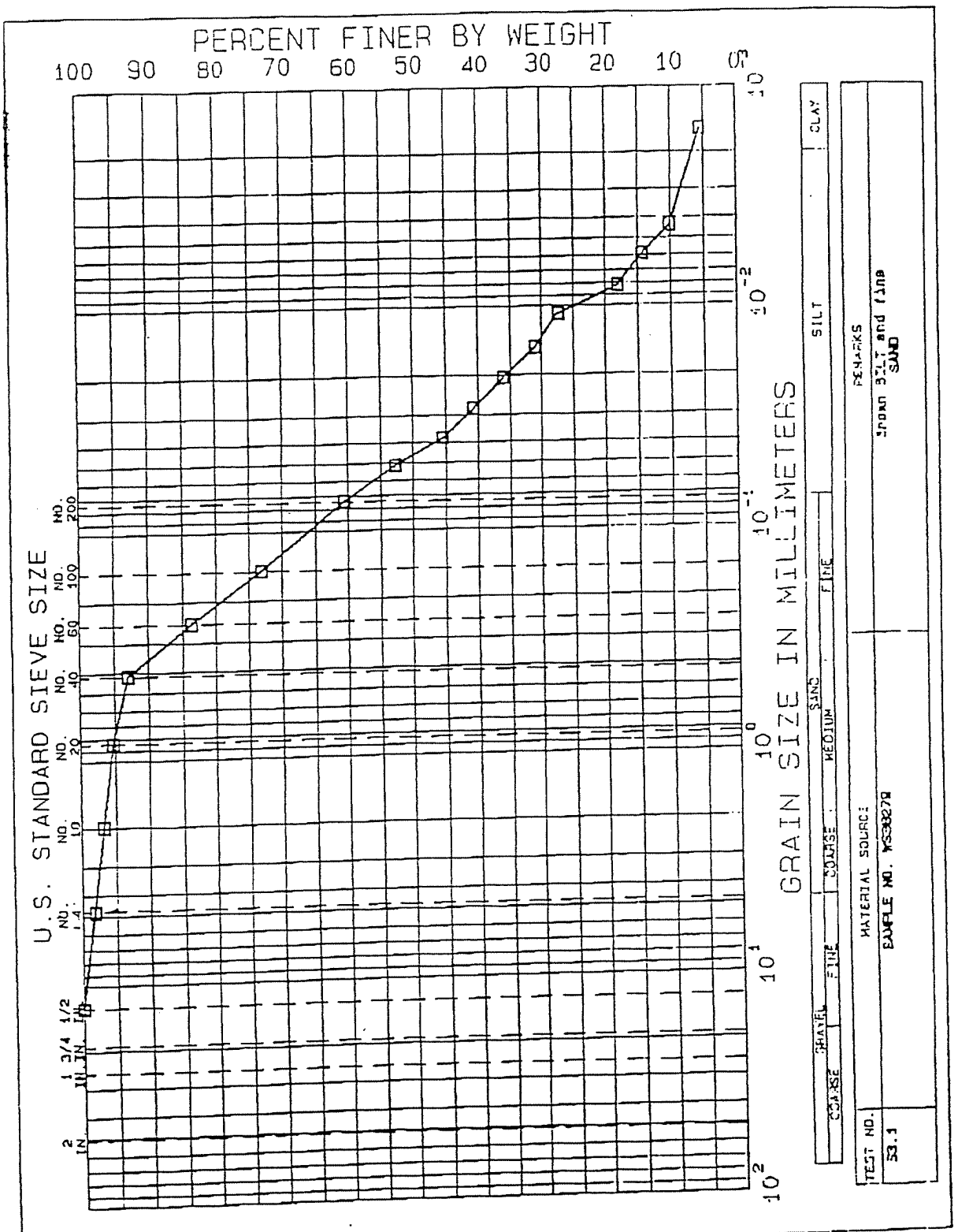
WASTE STREAM TECHNOLOGY

GRADATION TESTS

BORING NO.
SAMPLE
DEPTH
TECH. mat
REVIEWER DAS

TEST SERIES NO. 2
DATE DEC. 97

FILE 1900.27



WASTE STREAM TECHNOLOGY

GRADATION TESTS

BORING NO.
SAMPLE
DEPTH
TECH. eat
REVIEWER DAB

TEST SERIES NO. 3
DATE DEC. 97

FILE 1300.27

WASTE STREAM TECHNOLOGY
302 GROTE STREET
BUFFALO, NY 14207
(716) 876-5290
FAX (716) 876-2412

CHAIN OF CUSTODY RECORD

PROJECT NO: 1705-175 SITE NAME: NYST

SAMPLERS (SIGNATURE):

SAMPLE NO.	DATE	TIME	COMP	GRAB	MATRIX	SAMPLE LOCATION	SIZE & NO. OF CONTAINERS	PHENOLS (4AAP) (SPECIFY)	CYANIDE (SPECIFY) + TOTAL (SPECIFY)						PRESERVATIVES	REMARKS
1	12/4	16:10		X	SOIL	TWS 36-77	2x8oz	X	X							
2	↓	↓		↓	↓	↓ 78	↓	↓	↓							
3	↓	↓		↓	↓	↓ 79	↓	↓	↓							
																P.O. # 10893

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
[signature]	12/5/97 09:00	[signature]			
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)

SPECIAL INSTRUCTIONS: PLEASE FAX RESULTS TO JIM HILEY.

TURNAROUND TIME 5 BD (12-12-97)

LAB USE: REFRIGERATOR # _____ SHELF # _____ GROUP # _____ DUE DATE _____

Parsons Engineering Science

Initials:

	Organic Content %
STA 3200	5.29
STA 3500	5.53
STA 3700-1	4.42
STA 3700-2	4.21
STA 3850	5.51

Appendix C

MEMORANDUM

December 3, 1997

To: Jim Hyzy/Waste Stream Technology

From: Mark Raybuck/Parsons ES MR

Subject: Treatability Testing

For conducting the sediment settling tests, composite the necessary volume of material into a single sample using approximately equal portions from each of the four station locations. Use the following proportions by volume as a guide:

- Sample STA 3200 - 25%
- Sample STA 3500 - 25%
- Sample STA 3850 - 25%
- Sample STA 3700 (1) and (2) combined - 25% (12.5% each)

For example, if you need 20 gallons total to run the test, take 5 gallons each from STA 3200, 3500, 3850, and 2.5 gallons each from STA 3700 (1) and STA 3700 (2).

Sample bottles containing sediment for the characterization tests will be delivered on December 4, 1997.

Thanks. If you have any questions, please call me at 633-7074.

cc: File - 726673

Post-it® Fax Note 7671	Date 12/3/97	# of pages ▶
To Jim Hyzy	From Mark Raybuck	
Co./Dept. Waste Stream	Co.	
Phone #	Phone #	
Fax # 876-2412	Fax #	

726673.160000

Appendix D

Parsons Engineering Science

Settling Data

Initial Data:
Time Started: 12/11/97 10:10 AM
Initial Volume: 16.04 gallons

Depth	% Solids	TSS (ppm)
1'	14.47	199,700
2'	14.99	206,600
3'	14.86	186,400
4'	14.32	190,400
5'6"	14.59	197,500

Appendix E

Parsons Engineering Science

Settling Data

Time Interval	Time	Interface Height	Depth to Interface	TSS >0.375'	Turbidity >0.375'	TSS 0.375'	Turbidity 0.375'	TSS 0.875'	Turbitity 0.875'	TSS 1.375'	Turbidity 1.375'	TSS 1.875'	Tubidity 1.875'
Initial	10:10 AM	5'10 1/2"	0										
1 Hr	11:10 AM	5'6 1/4"	0.35	368	269								
2 Hr	12:10 AM	5'4 1/2"	0.5	88	126	276	218						
3 Hr	1:10 PM	5'2 1/2"	0.67	56	97	88	121						
4 Hr	2:10 PM	5' 1/2"	0.83	52	74	76	91.9						
5 Hr	3:10 PM	4'10 1/4"	1.02			40	71.8	76	90.9				
6Hr	4:10 PM	4'8"	1.21			40	60.9	32	64.7				
7 Hr	5:10 PM	4'6"	1.38			24	46.8	148	112.0				
8 Hr	6:10 PM	4'3 3/4"	1.56			20	47.7	32	66.2	92	99.0		
12 Hr	10:10 PM	3'8"	2.21			24	44.3	40	49.6	40	46.4	32	70.4
24 Hr	10:10 AM	2'4 1/4"	3.52			52	54.8	36	55.9	52	69.2	64	73.3
48 Hr	10:10 AM	2'	3.88			36	13.9	44	14.7	32	21.3	40	17.2
72 Hr	10:10 AM	1'9 1/2"	4.08			20	11.3	16	11.7	20	13.7	16	13.1
96 Hr	10:10 AM	1'8 1/4"	4.19				N/A	32	12.8	24	13.4	24	15.1

(continued)

Time Interval	Time	Interface Height	Depth to Interface	TSS 2.375'	Tubidity 2.375'	TSS 2.875'	Tubidity 2.875'	TSS 3.375'	Tubidity 3.375'	TSS 3.875'	Tubidity 3.875'
Initial	10:10 AM	5'10 1/2"	0								
1 Hr	11:10 AM	5'6 1/4"	0.35								
2 Hr	12:10 AM	5'4 1/2"	0.5								
3 Hr	1:10 PM	5'2 1/2"	0.67								
4 Hr	2:10 PM	5' 1/2"	0.83								
5 Hr	3:10 PM	4'10 1/4"	1.02								
6Hr	4:10 PM	4'8"	1.21								
7 Hr	5:10 PM	4'6"	1.38								
8 Hr	6:10 PM	4'3 3/4"	1.56								
12 Hr	10:10 PM	3'8"	2.21								
24 Hr	10:10 AM	2'4 1/4"	3.52	176	150.0	84	77.5	408	182.0		
48 Hr	10:10 AM	2'	3.88	108	113.0	12	12.8	28	20.2		
72 Hr	10:10 AM	1'9 1/2"	4.08	248	135.0	24	14.9	28	15.2	224	109.0
96 Hr	10:10 AM	1'8 1/4"	4.19	16	15.9	20	14.1	28	14.3	16	14.8

* TSS units ppm
* tubidity units NTU's

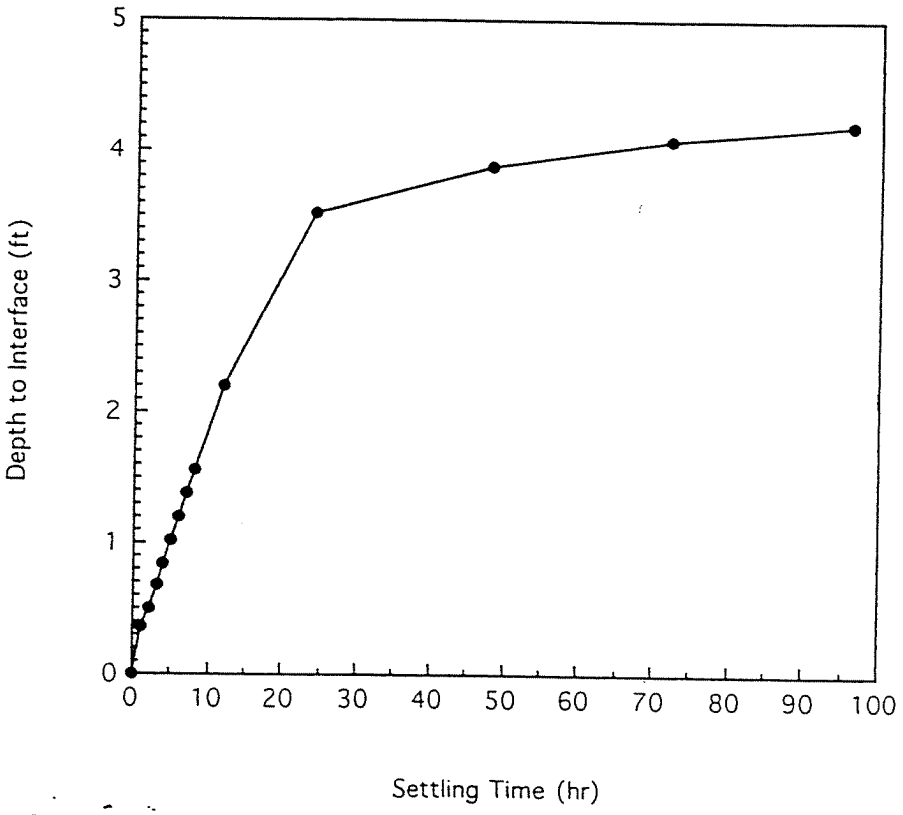
Appendix F

Parsons data

Wed, Dec 17, 1997 3:24 PM

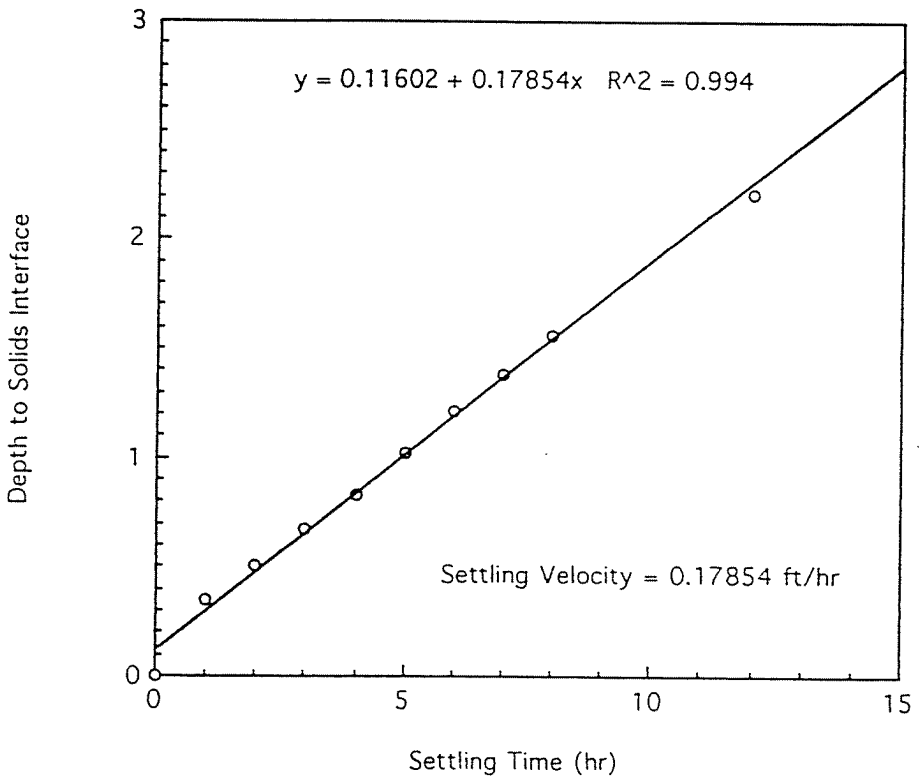
	Time (hr)	Depth (ft)	Height (ft)	Time (hr)	Depth (ft)
1	0.000	0.000	5.880	0.000	0.000
2	1.000	0.350	5.520	1.000	0.350
3	2.000	0.500	5.380	2.000	0.500
4	3.000	0.670	5.210	3.000	0.670
5	4.000	0.830	5.040	4.000	0.830
6	5.000	1.020	4.850	5.000	1.020
7	6.000	1.210	4.670	6.000	1.210
8	7.000	1.380	4.500	7.000	1.380
9	8.000	1.560	4.310	8.000	1.560
10	12.000	2.210	3.670	12.000	2.210
11	24.000	3.520	2.350		
12	48.000	3.880	2.000		
13	72.000	4.080	1.790		
14	96.000	4.190	1.690		

Depth to Solids Interface as a Function of Time



Appendix G

Calculation of Settling Velocity in Cherry Farm/River Road Study



Appendix H

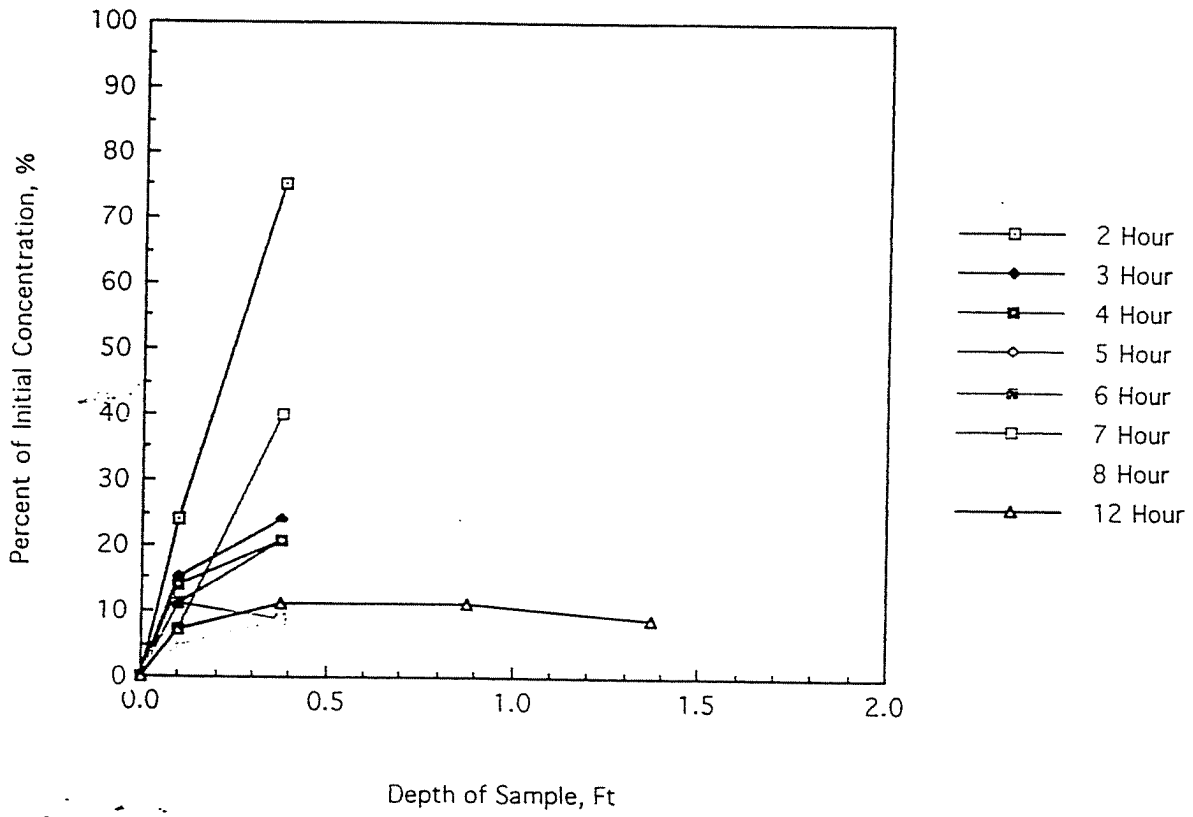
Parsons Data 2

Wed, Dec 17, 1997 3:26 PM

	Depth	2 Hour	3 Hour	4 Hour	5 Hour	6 Hour	7 Hour
1	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	0.100	24.000	15.000	14.000	11.000	11.000	7.000
3	0.375	75.000	24.000	21.000	21.000	9.000	40.000
4	0.875						
5	1.375						
6	1.875						
7	2.375						
8	2.875						
9	3.375						
10	3.875						

	8 Hour	12 Hour
1	0.000	0.000
2	5.000	7.000
3	9.000	11.000
4	25.000	11.000
5		9.000
6		
7		
8		
9		
10		

Supernatant Suspended Solids Concentration Profile Diagram



Appendix I

Parsons Engineering Science

Settling Data

	Time	Interface Height	Depth to Interface
5 day	120 Hr	1'7 1/2"	4.25
6 Day	144 Hr	1'7"	4.29
7 Day	168 Hr	1'6 1/2"	4.33
8 Day	192 Hr	1'6"	4.38
9 Day	216 Hr	1'5 3/4"	4.4
10 Day	240 Hr		
11 Day	264 Hr		
12 Day	288 Hr	1'5 1/4"	4.44
13 Day	312 Hr	1'5 1/4"	4.44
14 Day	336 Hr		
15 Day	360 Hr		

Appendix J

Parsons Engineering Science

Chemical Clarification

Test #	Slurry conc.	Polymer conc.	settling time	Turbidity NTU's	T.S.S. ppm
1	2 gm/ L	3 ppm 4320	10 min.	44	52
2	2 gm/ L	10 ppm 842	10 min.		
3	2 gm/ L	3 ppm 4910	10 min.	20.3	12
4	2 gm/ L	2 ppm 4864	10 min.	11.8	22
5	2 gm/ L	4 ppm 4571	10 min.	41.4	60
6	2 gm/ L	10 ppm 4035	10 min.		
7	2 gm/ L	10 ppm 4805	10 min.	27.6	18
8	2 gm/ L	5 ppm 4905 L	10 min.	13.9	18

Test #	Slurry conc.	Polymer 4910 conc.	Settling Time (min)	Turbidity NTU's	T.S.S. ppm
1	2 gm/ L	3 ppm 4910	2	31.3	26
2	2 gm/ L	3 ppm 4910	4	30.4	12
3	2 gm/ L	3 ppm 4910	6	29.8	14
4	1.5 gm/L	3 ppm 4910	1	40.4	34
5	1.5 gm/L	3 ppm 4910	2	39.9	30
6	1.5 gm/L	3 ppm 4910	4	39.3	28
7	1.5 gm/L	3 ppm 4910	6	40.5	28
8	1.5 gm/L	2 ppm 4910	1	35.7	30
9	1.5 gm/L	2 ppm 4910	2	35.6	20
10	1.5 gm/L	2 ppm 4910	4	35.3	22
11	1.5 gm/L	2 ppm 4910	6	35.9	22
12	1.0 gm/L	2 ppm 4910	1	37.8	30
13	1.0 gm/L	2 ppm 4910	2	35.3	30
14	1.0 gm/L	2 ppm 4910	4	35.7	34
15	1.0 gm/L	2 ppm 4910	6	36.8	26
16	0.5 gm/L	2 ppm 4910	1	43.3	36
17	0.5 gm/L	2 ppm 4910	2	41.1	28
18	0.5 gm/L	2 ppm 4910	4	41.6	32
19	0.5 gm/L	2 ppm 4910	6	40.2	14

Note: All above treatments were mixed at 100 revolutions/minute for five minutes. A significant floc did not appear for approximately one minute after mixing was initiated. A good floc formed by three minutes.

ATTACHMENT 4
SEDIMENT PHYSICAL TEST DATA

ATTACHMENT 4
SEDIMENT PHYSICAL TEST DATA

TABLE
GRAIN-SIZE ANALYSES FOR SEDIMENTS
Cherry Farm/River Road Site

Boring	Depth (feet)	Sieve Size (mm) Percent Passing																
		1-1/2	1	3/4	1/2	#4	#10	#20	#40	#100	#200							
		38.1	25.4	19.05	12.7	4.75	2	0.85	0.425	0.15	0.075	0.03	0.02	0.015	0.0085	0.006	0.0045	0.003
345050	2.0 - 3.0	100.0%	100.0%	96.4%	96.4%	94.2%	92.7%	92.2%	91.7%	87.4%	62.6%	32.0%	27.0%	20.0%	13.0%	10.0%	8.0%	6.0%
345050	8.0 10.0	100.0%	100.0%	100.0%	100.0%	99.6%	99.3%	99.2%	99.2%	81.1%	18.8%	8.0%	5.0%	4.0%	3.0%	2.0%	1.0%	0.5%
345100	12.0 14.0	100.0%	100.0%	100.0%	99.1%	97.5%	97.5%	97.5%	97.4%	31.0%	6.1%	2.0%	2.5%	1.0%	0.5%	0.3%	0.2%	0.1%
345150	4.0 - 6.0	100.0%	100.0%	95.5%	94.8%	93.6%	92.9%	92.6%	91.8%	72.4%	30.6%	12.0%	9.5%	8.0%	6.0%	4.0%	3.0%	2.0%
345150	6.0 8.0	100.0%	100.0%	95.7%	94.9%	91.5%	89.8%	88.5%	85.2%	40.4%	10.2%	5.0%	4.0%	4.0%	3.0%	2.0%	1.0%	0.5%
345150	12.0 - 14.0	100.0%	100.0%	100.0%	93.5%	72.2%	57.4%	54.8%	53.8%	26.4%	7.7%	3.0%	2.0%	1.0%	0.5%	0.4%	0.3%	0.2%
370020	4.0 - 6.0	100.0%	100.0%	100.0%	100.0%	99.2%	98.6%	98.6%	94.9%	85.7%	55.6%							
370020	6.0 - 8.0	100.0%	100.0%	100.0%	100.0%	99.8%	98.9%	97.3%	96.0%	88.2%	60.4%							
370020	10.0 - 12.0	100.0%	100.0%	88.7%	75.4%	52.6%	42.3%	37.8%	25.7%	13.3%	3.7%							
370020	12.0 - 14.0	92.4%	86.4%	81.7%	75.1%	60.9%	54.8%	51.7%	49.0%	36.6%	13.7%							
400040	2.0 - 4.0	100.0%	100.0%	100.0%	99.0%	93.6%	90.5%	89.0%	87.3%	70.3%	34.8%	15.0%	13.0%	10.0%	8.0%	5.0%	4.0%	3.0%
400040	12.0 - 14.0	100.0%	100.0%	100.0%	95.6%	87.3%	84.1%	83.1%	82.6%	16.3%	5.8%	2.0%	1.0%	0.5%	0.0%	0.0%	0.0%	0.0%
400075	0.0 - 2.0	100.0%	100.0%	100.0%	100.0%	96.7%	96.0%	95.4%	94.1%	35.7%	7.0%	5.0%	4.0%	3.0%	2.0%	1.0%	0.0%	0.0%
400075	6.0 - 8.0	100.0%	89.6%	78.4%	72.0%	53.3%	44.6%	40.5%	37.4%	13.8%	4.2%	2.0%	2.0%	2.0%	1.0%	0.0%	0.0%	0.0%
400100	0.0 - 2.0	100.0%	100.0%	96.6%	93.8%	87.6%	83.0%	81.6%	78.7%	49.8%	28.1%	15.0%	12.0%	11.0%	7.0%	5.0%	4.0%	1.0%
400100	8.0 - 10.0	100.0%	100.0%	96.6%	87.7%	71.9%	58.8%	53.5%	49.8%	20.3%	7.9%	4.0%	2.5%	2.0%	1.0%	0.8%	0.5%	0.5%
450060	4.0 6.0	100.0%	100.0%	100.0%	98.6%	87.8%	75.7%	67.3%	59.2%	18.3%	6.7%	5.0%	4.0%	3.0%	2.0%	1.0%	0.5%	0.3%
		99.6%	98.6%	95.9%	92.7%	84.7%	79.8%	77.7%	74.9%	46.3%	21.4%	8.5%	6.8%	5.3%	3.6%	2.4%	1.7%	1.1%
			MEDIUM	FINE		COARSE	MEDIUM		FINE									
							SAND											

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Fax: (610) 746-2669

TOLL FREE: 1-800-821-5911

Laboratory Test Report

PROJECT : *MATERIAL TESTING : PARSONS ENGINEERING SCIENCE*

CLIENT : *PARSONS ENGINEERING SCIENCE*

DATE : *JUNE 16, 1997*

PROJECT NO.: SJB-T768
REPORT NO.: LTR-1

SJB SAMPLE NUMBER : 97-274
CLIENT IDENTIFICATION : 400040 : 2'-4'

ASTM D-422 : Particle Size Analysis of Soils

Sieve Size	Percent Passing
3/4"	100.0
1/2"	99.0
3/8"	98.3
1/4"	95.4
#4	93.6
#10	90.5
#20	89.0
#40	87.3
#100	70.3
#200	34.8

PERCENT COMPONENTS			
GRAVEL	SAND	SILT	CLAY
6.4%	58.8%	34.4%	0.4%

SJB SAMPLE NUMBER : 97-275
CLIENT IDENTIFICATION : 400040 : 12'-14'

ASTM D-422 : Particle Size Analysis of Soils

Sieve Size	Percent Passing
3/4"	100.0
1/2"	95.6
3/8"	94.0
1/4"	89.4
#4	87.3
#10	84.1
#20	83.1
#40	82.6
#100	16.3
#200	5.8

PERCENT COMPONENTS			
GRAVEL	SAND	SILT	CLAY
12.7%	81.4%	5.9%	0.0%

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Laboratory Test Report

PROJECT : MATERIAL TESTING : PARSONS ENGINEERING SCIENCE

CLIENT : PARSONS ENGINEERING SCIENCE

DATE : JUNE 16, 1997

PROJECT NO.: SJB-T768
REPORT NO.: LTR-1

SJB SAMPLE NUMBER : 97-276
CLIENT IDENTIFICATION : 400075 : 0'-2'

ASTM D-422 : Particle Size Analysis of Soils

Sieve Size	Percent Passing
1/2"	100.0
3/8"	98.7
1/4"	97.3
#4	96.7
#10	96.0
#20	95.4
#40	94.1
#100	35.7
#200	7.0

PERCENT COMPONENTS			
GRAVEL	SAND	SILT	CLAY
3.3%	89.8%	6.9%	0.0%

SJB SAMPLE NUMBER : 97-277
CLIENT IDENTIFICATION : 400075 : 6'-8'

ASTM D-422 : Particle Size Analysis of Soils

Sieve Size	Percent Passing
1 1/2"	100.0
1"	89.6
3/4"	78.4
1/2"	72.0
3/8"	64.7
1/4"	57.0
#4	53.3
#10	44.6
#20	40.5
#40	37.4
#100	13.8
#200	4.2

PERCENT COMPONENTS			
GRAVEL	SAND	SILT	CLAY
46.7%	49.0%	4.3%	0.0%

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Laboratory Test Report

PROJECT : MATERIAL TESTING : PARSONS ENGINEERING SCIENCE

CLIENT : PARSONS ENGINEERING SCIENCE

DATE : JUNE 16, 1997

PROJECT NO.: SJB-T768
REPORT NO.: LTR-1

SJB SAMPLE NUMBER : 97-278
CLIENT IDENTIFICATION : 400100 : 0'-2'

ASTM D-422 : Particle Size Analysis of Soils

Sieve Size	Percent Passing
1"	100.0
3/4"	96.6
1/2"	93.8
3/8"	92.0
1/4"	89.3
#4	87.6
#10	83.0
#20	81.6
#40	78.7
#100	49.8
#200	28.1

PERCENT COMPONENTS

GRAVEL	SAND	SILT	CLAY
12.4%	59.5%	27.6%	0.5%

SJB SAMPLE NUMBER : 97-279
CLIENT IDENTIFICATION : 400100 : 8'-10'

ASTM D-422 : Particle Size Analysis of Soils

Sieve Size	Percent Passing
1"	100.0
3/4"	96.9
1/2"	87.7
3/8"	83.3
1/4"	75.8
#4	71.9
#10	58.8
#20	53.5
#40	49.8
#100	20.3
#200	7.9

PERCENT COMPONENTS

GRAVEL	SAND	SILT	CLAY
28.1%	63.9%	7.1%	0.9%

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Laboratory Test Report

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CLIENT : PARSONS ENGINEERING SCIENCE

DATE : JUNE 16, 1997

PROJECT NO.: SJB-T768
REPORT NO.: LTR-1

SJB SAMPLE NUMBER : 97-280
CLIENT IDENTIFICATION : 370020 : 4'-6'

ASTM C-136 : Sieve Analysis of Fine and Coarse Aggregates

Sieve Size	Percent Passing
1/2"	100.0
3/8"	99.5
1/4"	99.3
#4	99.2
#10	98.6
#20	98.6
#40	94.9
#100	85.7
#200	55.6

GRAVEL 0.8% SAND 43.6% SILT/CLAY 55.6

SJB SAMPLE NUMBER : 97-281
CLIENT IDENTIFICATION : 370020 : 6'-8'

ASTM C-136 : Sieve Analysis of Fine and Coarse Aggregates

Sieve Size	Percent Passing
3/8"	100.0
1/4"	99.9
#4	99.8
#10	98.9
#20	97.3
#40	96.0
#100	88.2
#200	60.4

0.2% 39.4% 60.4

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Laboratory Test Report

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CLIENT : PARSONS ENGINEERING SCIENCE

DATE : JUNE 16, 1997

PROJECT NO.: SJB-T768
REPORT NO.: LTR-1

SJB SAMPLE NUMBER : 97-282
CLIENT IDENTIFICATION : 370020 : 10'-12'
ASTM C-136 : Sieve Analysis of Fine and Coarse Aggregates

Sieve Size	Percent Passing
1"	100.0
3/4"	88.7
1/2"	75.4
3/8"	67.3
1/4"	58.4
#4	52.6
#10	42.3
#20	37.8
#40	35.7
#100	13.3
#200	3.7

GRAVEL	SAND	SILT/CLAY
47.4%	49%	3.6%

SJB SAMPLE NUMBER : 97-283
CLIENT IDENTIFICATION : 370020 : 12'-14'
ASTM C-136 : Sieve Analysis of Fine and Coarse Aggregates

Sieve Size	Percent Passing
2"	100.0
1 1/2"	92.4
1"	86.4
3/4"	81.7
1/2"	75.1
3/8"	70.6
1/4"	63.9
#4	60.9
#10	54.8
#20	51.7
#40	49.6
#100	26.6
#200	13.7

39.1%	47.2%	13.7%

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Laboratory Test Report

PROJECT : *MATERIAL TESTING : PARSONS ENGINEERING SCIENCE*

CLIENT : *PARSONS ENGINEERING SCIENCE*

DATE : *JUNE 16, 1997*

PROJECT NO.: SJB-T768
REPORT NO.: LTR-1

SJB SAMPLE NUMBER : 97-284
CLIENT IDENTIFICATION : 345050 : 2'-3'

ASTM D-422 : Particle Size Analysis of Soils

Sieve Size	Percent Passing
1"	100.0
3/4"	96.4
1/2"	96.4
3/8"	96.1
1/4"	94.9
#4	94.2
#10	92.7
#20	92.2
#40	91.7
#100	87.4
#200	62.6

PERCENT COMPONENTS

GRAVEL	SAND	SILT	CLAY
5.8%	31.6%	60.0%	2.6%

SJB SAMPLE NUMBER : 97-285
CLIENT IDENTIFICATION : 345150 : 4'-6'

ASTM D-422 : Particle Size Analysis of Soils

Sieve Size	Percent Passing
1"	100.0
3/4"	95.5
1/2"	94.8
3/8"	94.3
1/4"	93.8
#4	93.6
#10	92.9
#20	92.6
#40	91.8
#100	72.4
#200	30.6

PERCENT COMPONENTS

GRAVEL	SAND	SILT	CLAY
6.4%	63.0%	29.6%	1.0%

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Laboratory Test Report

PROJECT : MATERIAL TESTING : PARSONS ENGINEERING SCIENCE

CLIENT : PARSONS ENGINEERING SCIENCE

DATE : JUNE 16, 1997

PROJECT NO.: SJB-T768
REPORT NO.: LTR-1

SJB SAMPLE NUMBER : 97-286
CLIENT IDENTIFICATION : 345150 : 12'-14'

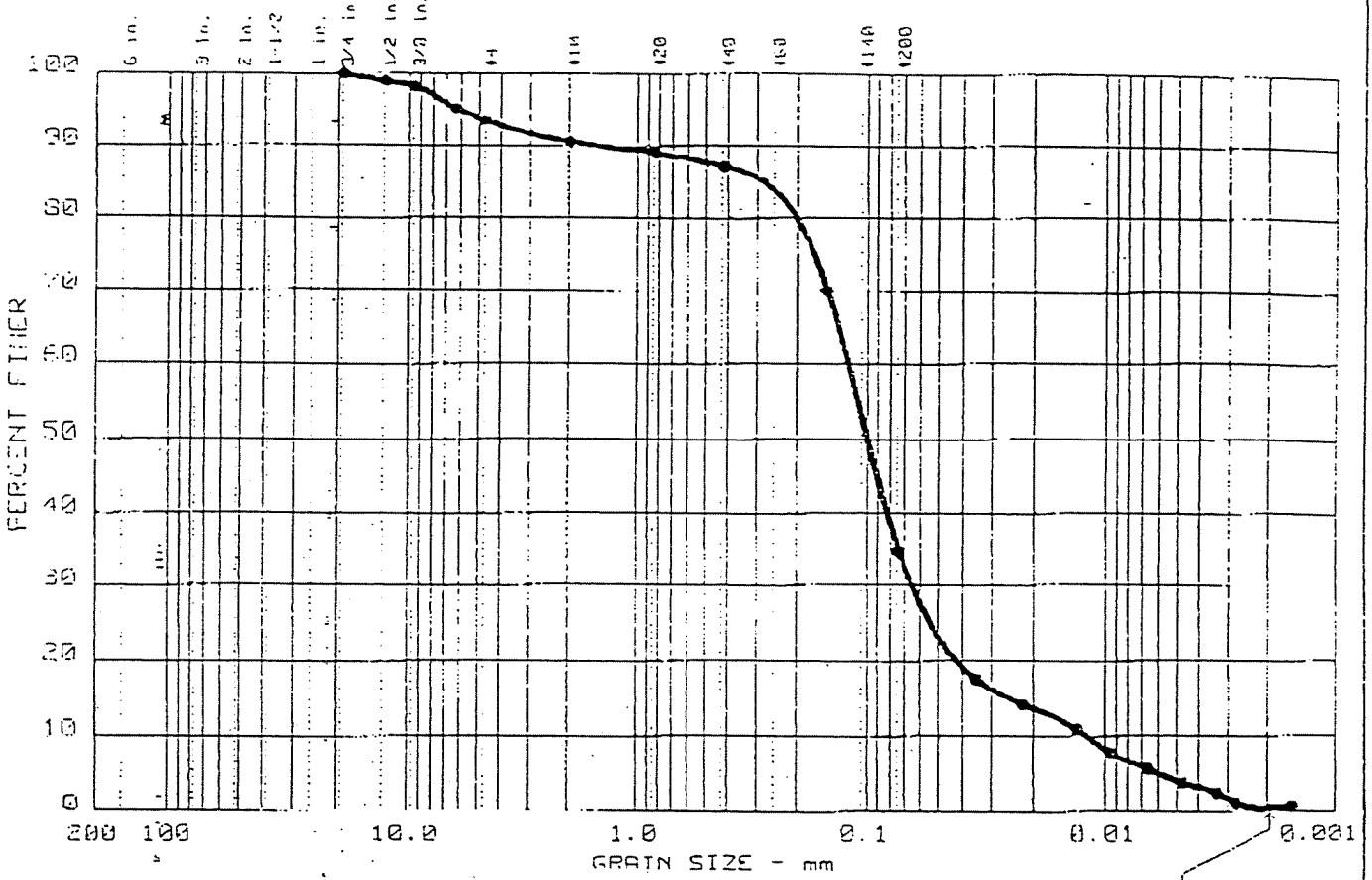
ASTM D-422 : Particle Size Analysis of Soils

Sieve Size	Percent Passing
3/4"	100.0
1/2"	93.5
3/8"	91.0
1/4"	80.4
#4	72.2
#10	57.4
#20	54.8
#40	53.8
#100	26.4
#200	7.7

PERCENT COMPONENTS

GRAVEL	SAND	SILT	CLAY
27.8%	64.5%	7.7%	0.0%

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	15	0.0	6.4	58.8	34.4	0.4

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.28	0.12	0.10	0.065	0.0245	0.0119	2.98	10.1

MATERIAL DESCRIPTION	USCS	AASHTO
● CLIENT ID# 400040 : 2'-4'	SM	A-2-4(0.0)

Project No.: SJB-T768 : LTR-1

Project: MATL TESTING: PARSONS ENGINEERING SCIENCE

● Location: CHERRY FARMS PROJECT

Date: JUNE 16, 1997

GRAIN SIZE DISTRIBUTION TEST REPORT

SJB Services, Inc.

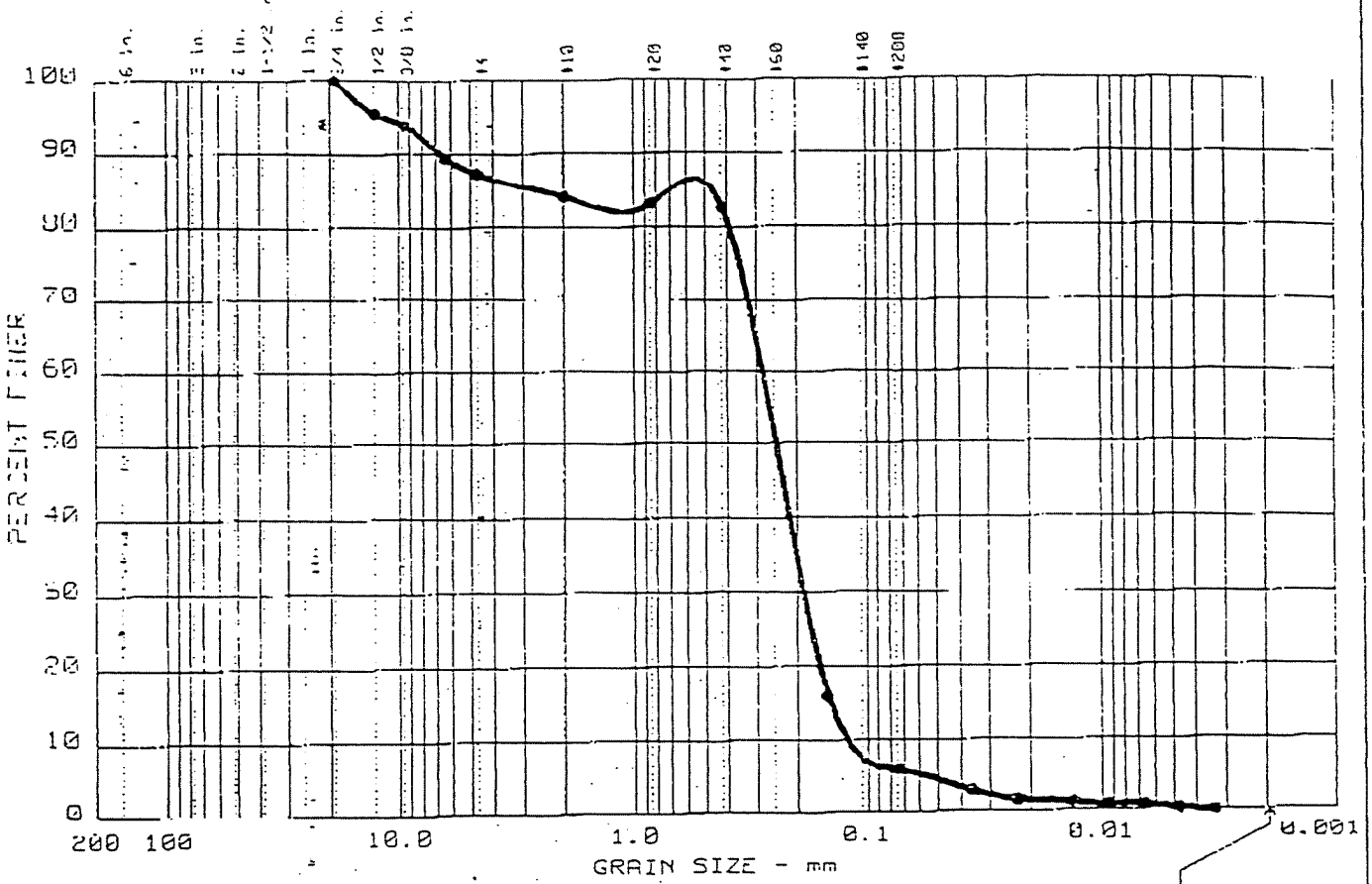
Remarks:

Collected by the client and received at SJB on June 7, 1997.

SJB Sample ID# is 97-274

Figure No. ____

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	16	0.0	12.7	81.4	5.9	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			2.54	0.28	0.25	0.189	0.1445	0.1230	1.03	2.3

MATERIAL DESCRIPTION	USCS	AASHTO
● CLIENT ID# 400040 : 12'-14'	SP-SM	A-3

Project No.: SJB-T768 : LTR-1
Project: MATL TESTING:PARSONS ENGINEERING SCIENCE
● Location: CHERRY FARMS PROJECT

Date: JUNE 16, 1997

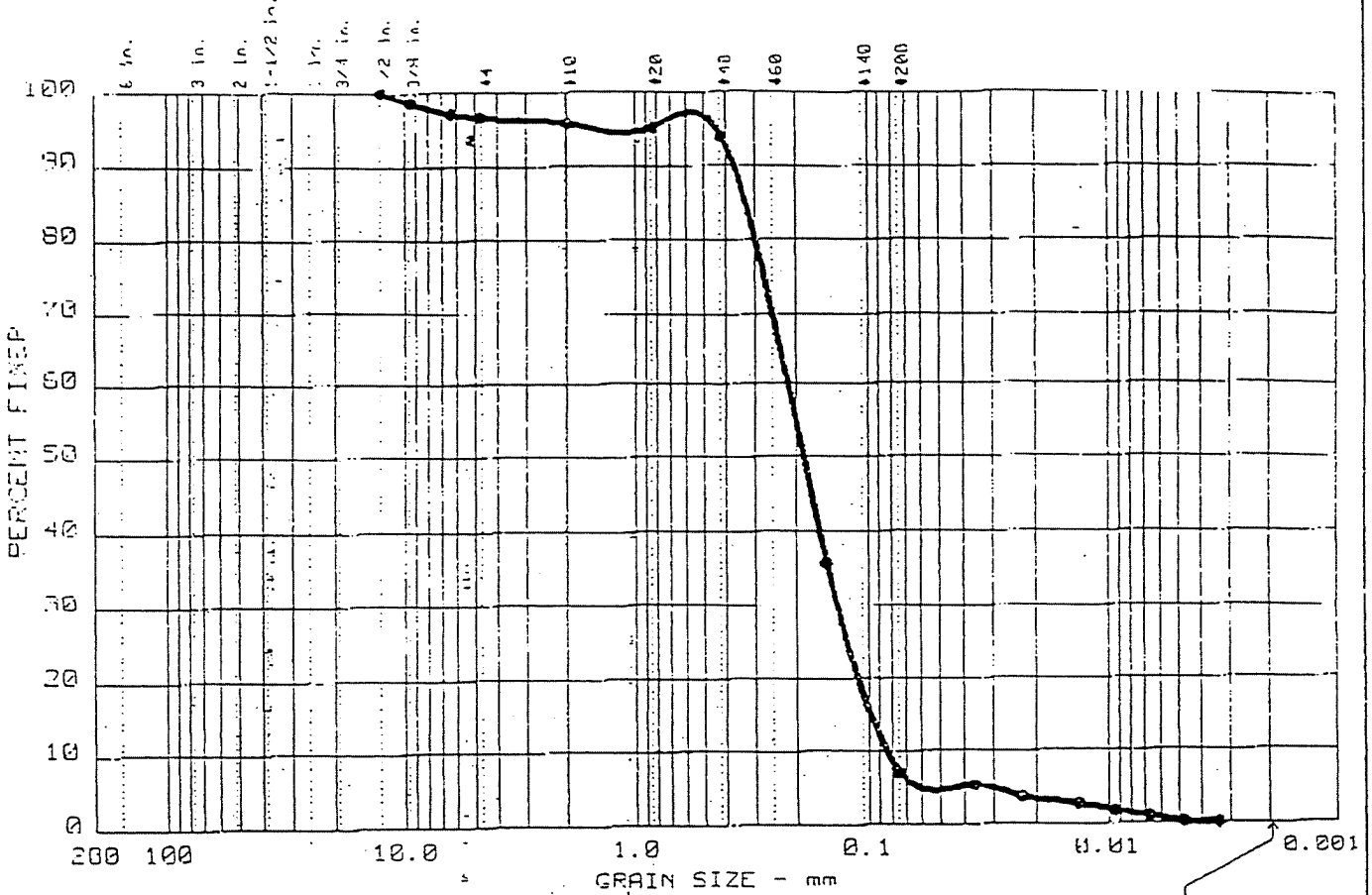
GRAIN SIZE DISTRIBUTION TEST REPORT

SJB Services, Inc.

Remarks:
Collected by the client and received at SJB on June 2, 1997.
SJB Sample ID# is 97-275

Figure No. ____

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	17	0.0	3.3	89.8	6.9	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.33	0.22	0.19	0.135	0.0984	0.0845	0.99	2.6

MATERIAL DESCRIPTION	USCS	AASHTO
● CLIENT ID# 400075 : 0'-2'	SP-SM	A-3

Project No.: SJB-T768 : LTR-1

Project: MHTL TESTING:PARSONS ENGINEERING SCIENCE

● Location: CHERRY FARMS PROJECT

Date: JUNE 16, 1997

GRAIN SIZE DISTRIBUTION TEST REPORT

SJB Services, Inc.

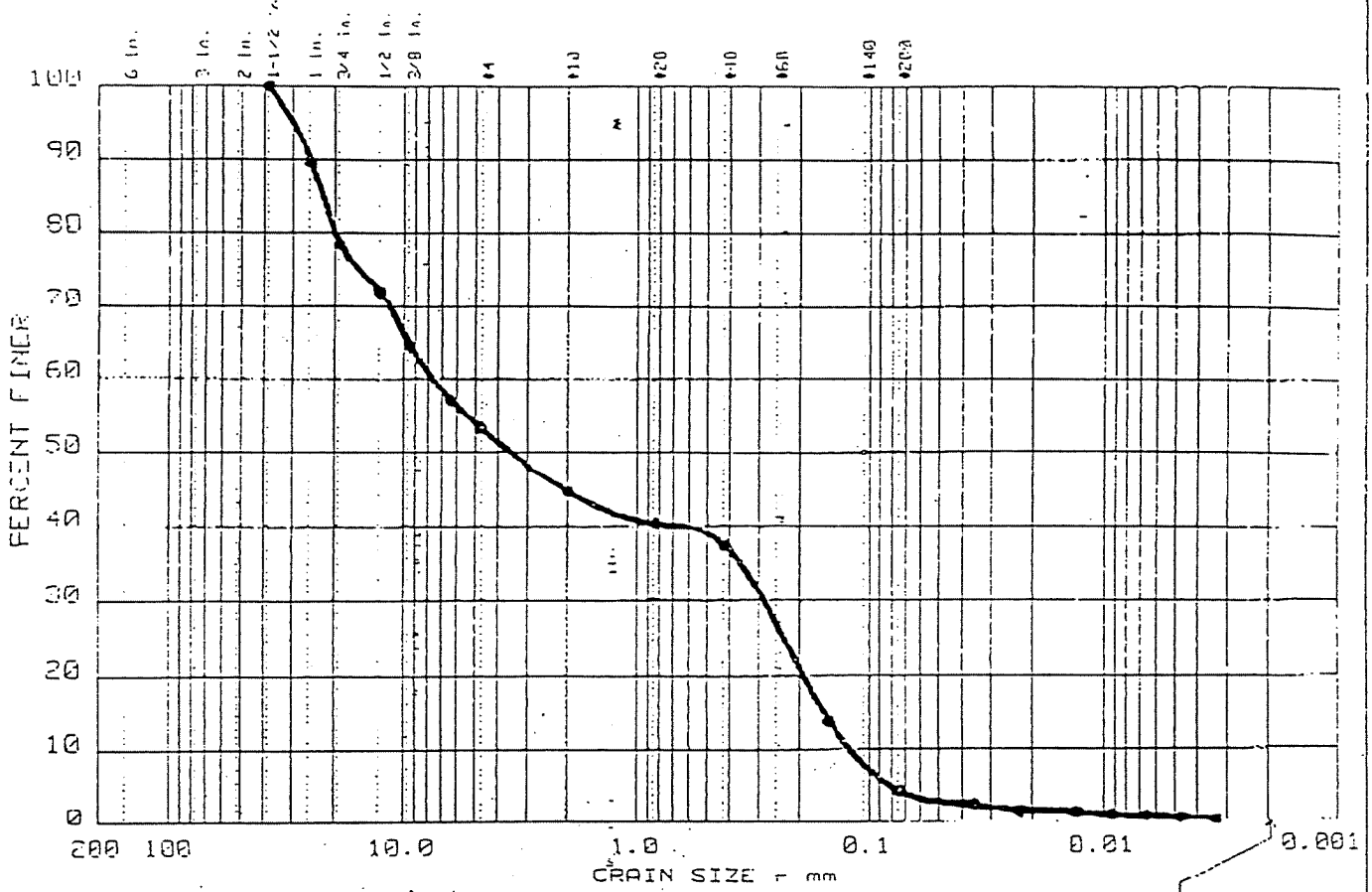
Remarks:

Collected by the client and received at SJB on June 2, 1997.

SJB Sample ID# is 97-276

Figure No. ____

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	18	0.0	46.7	49.0	4.3	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			22.65	7.67	3.55	0.285	0.1565	0.1215	0.09	63.2

MATERIAL DESCRIPTION	USCS	AASHTO
● CLIENT ID# 400075 : 6'-8'	SP	A-1-b

Project No.: SJB-T768 : LTR-1
Project: MATL TESTING:PARSONS ENGINEERING SCIENCE
● Location: CHERRY FARMS PROJECT

Date: JUNE 16, 1997

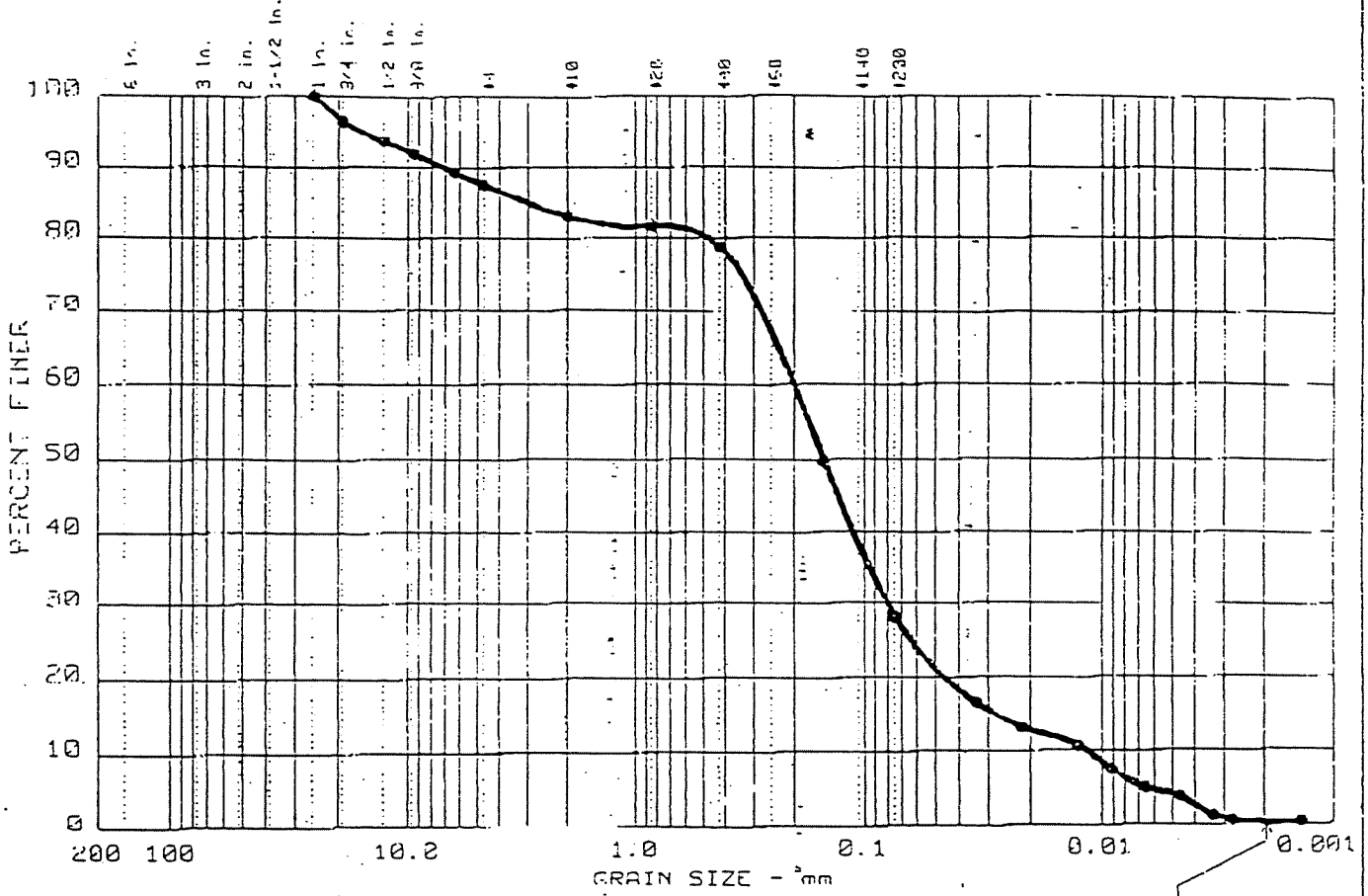
GRAIN SIZE DISTRIBUTION TEST REPORT

SJB Services, Inc.

Remarks:
Collected by the client and received at SJB on June 2, 1997.
SJB Sample ID# is 97-277

Figure No. ____

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	19	0.0	12.4	59.5	27.6	0.5

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			2.99	0.20	0.15	0.079	0.0279	0.0115	2.75	17.4

MATERIAL DESCRIPTION	USCS	AASHTO
● CLIENT ID# 400100 : 0'-2'	SM	A-2-4(0.0)

Project No.: SJB-T768 : LTR-1
Project: MATL TESTING:PARSONS ENGINEERING SCIENCE
● Location: CHERRY FARMS PROJECT

Date: JUNE 16, 1997

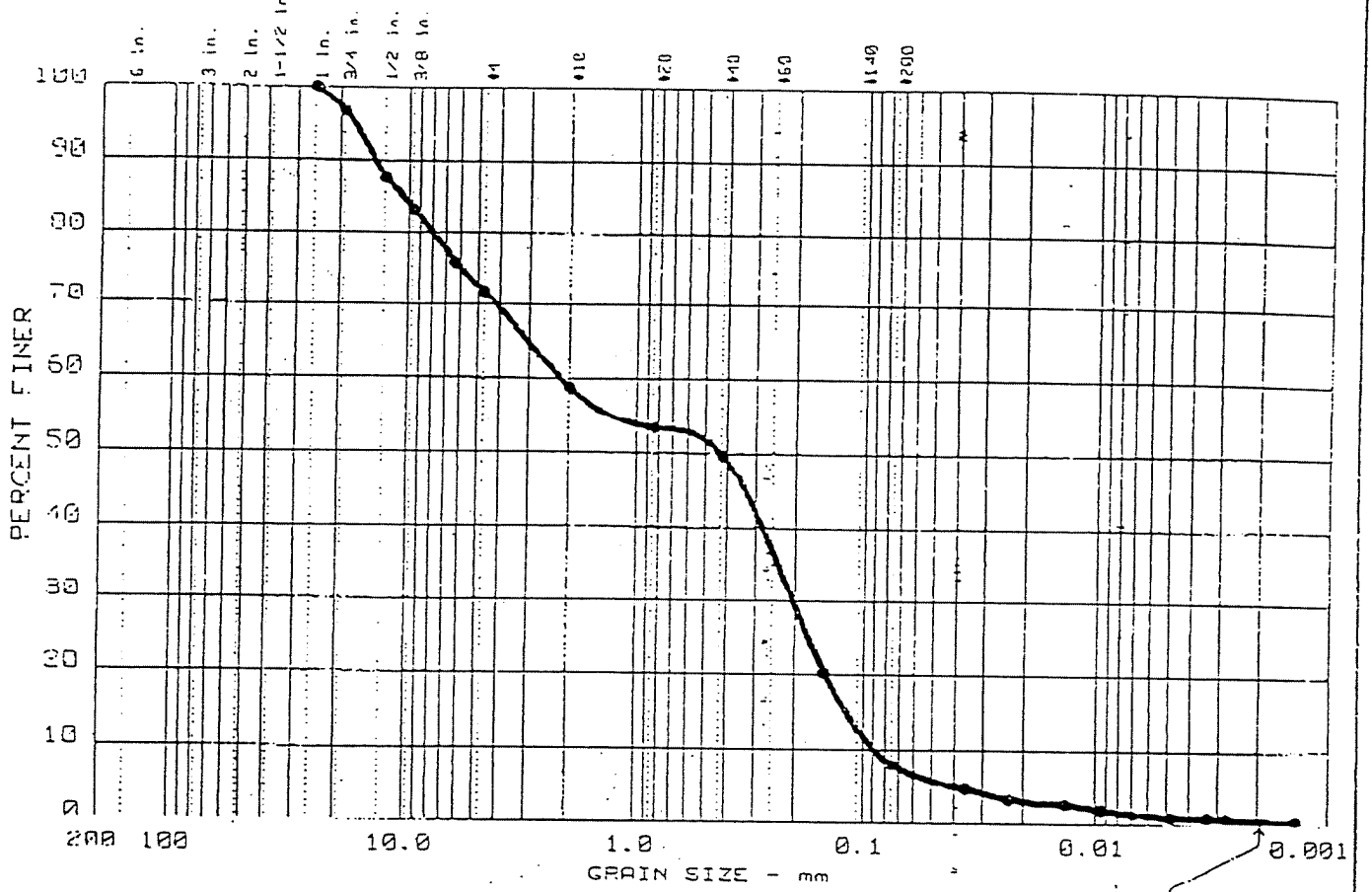
GRAIN SIZE DISTRIBUTION TEST REPORT

SJB Services, Inc.

Remarks:
Collected by the client and received at SJB on June 2, 1997.
SJB Sample ID# is 97-278

Figure No. ———

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	20	0.0	29.1	63.9	7.1	0.9

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			10.72	2.19	0.42	0.204	0.1189	0.0881	0.22	24.8

MATERIAL DESCRIPTION	USCS	AASHTO
● CLIENT ID# 400100 : 8'-10'	SP-SM	A-1-b

Project No.: SJB-T768 : LTR-1
Project: MATL TESTING:PARSONS ENGINEERING SCIENCE
● Location: CHERRY FARMS PROJECT

Date: JUNE 16, 1997

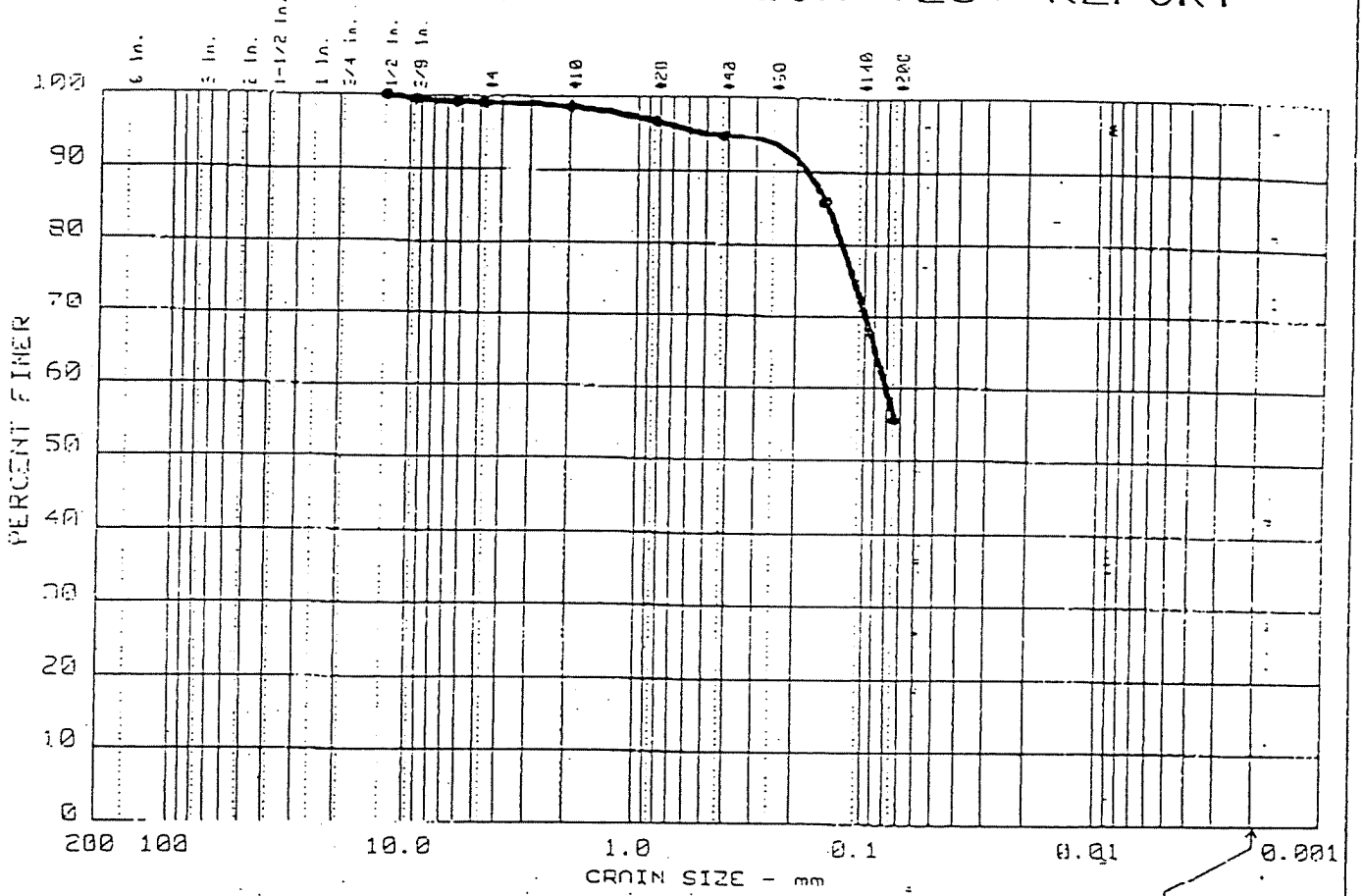
GRAIN SIZE DISTRIBUTION TEST REPORT

SJB Services, Inc.

Remarks:
Collected by the client and received at SJB on June 2, 1997.
SJB Sample ID# is 97-279

Figure No. _____

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	1	0.0	0.8	43.6	55.6	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.14	0.08						

MATERIAL DESCRIPTION	USCS	AASHTO
● CLIENT ID# 370020 : 4'-6'	ML	A-4(0.0)

Project No.: SJB-T768 : LTR-1
Project: MAIL TESTING:PARSONS ENGINEERING SCIENCE
● Location: CHERRY FARMS PROJECT

Date: JUNE 16, 1997

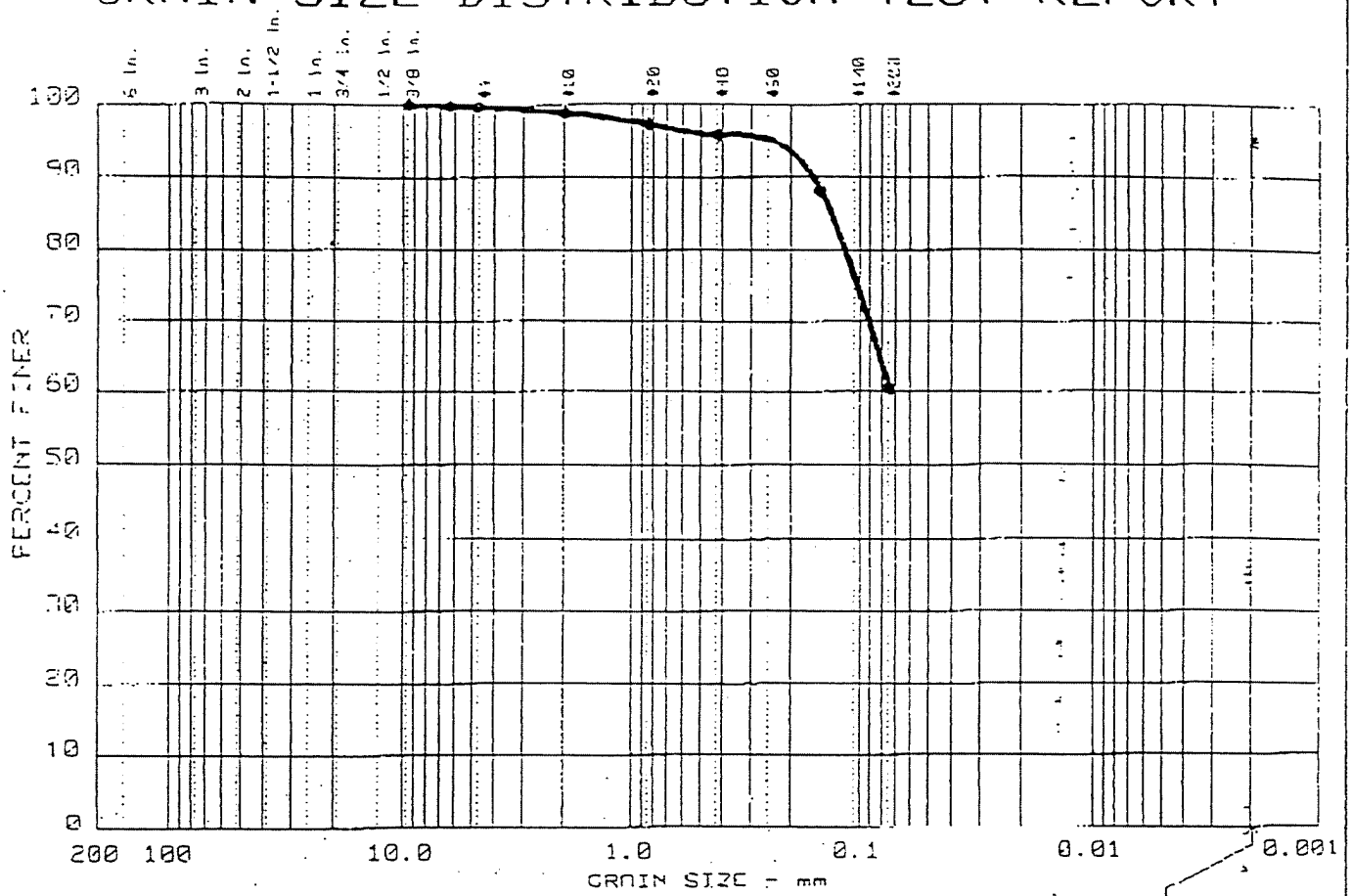
GRAIN SIZE DISTRIBUTION TEST REPORT

SJB Services, Inc.

Remarks:
Collected by the client and received at SJB on June 2, 1997.
SJB Sample ID# is 97-280

Figure No. _____

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	2	0.0	0.2	33.4	60.4	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.13							

MATERIAL DESCRIPTION	USCS	AASHTO
● CLIENT ID# 370020 : 6'-8'	ML	A-4(0.0)

Project No.: SJB-T768 : LTR-1
Project: MATL TESTING:PARSONS ENGINEERING SCIENCE
● Location: CHERRY FARMS PROJECT

Date: JUNE 16, 1997

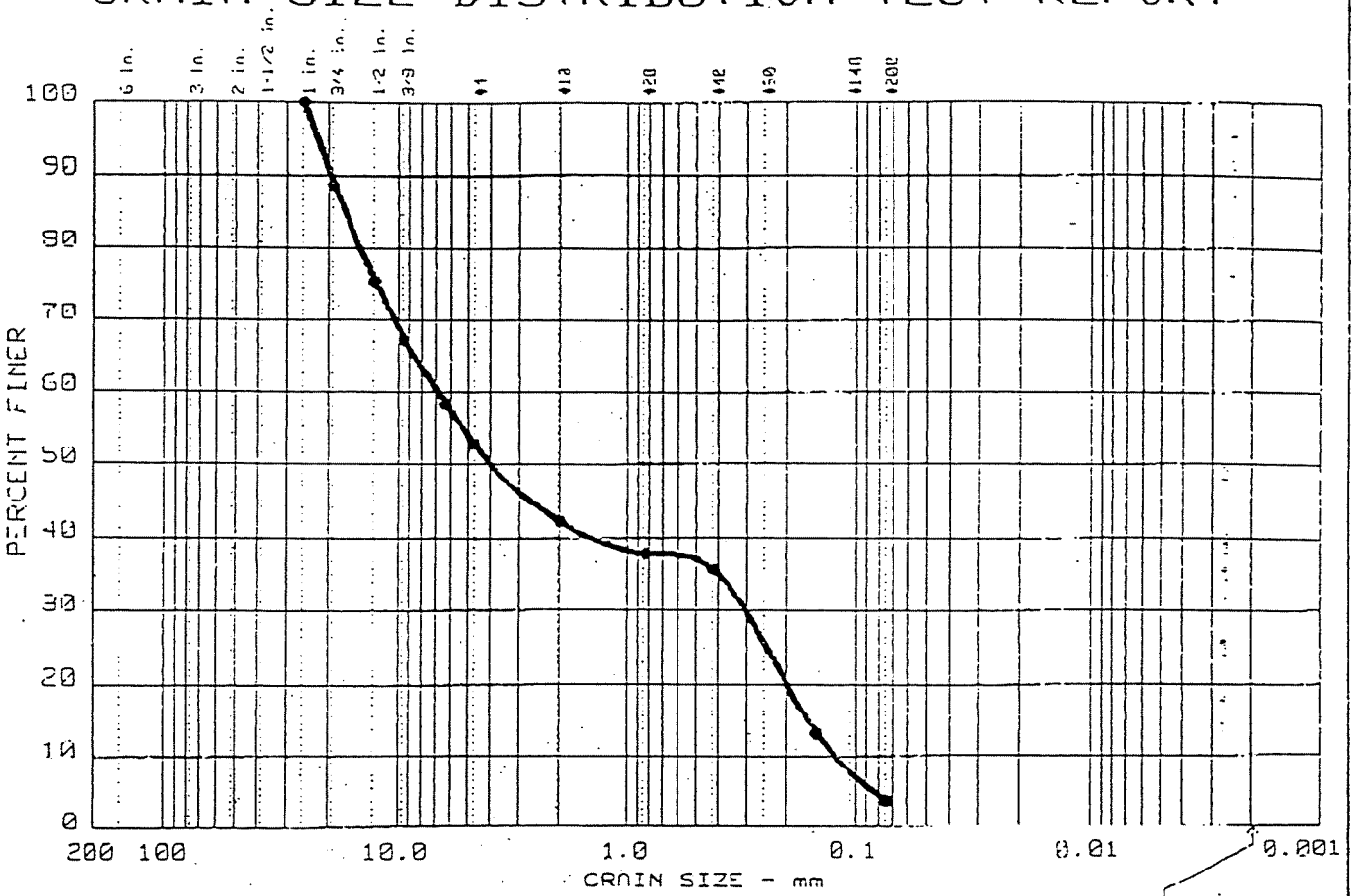
GRAIN SIZE DISTRIBUTION TEST REPORT

SJB Services, Inc.

Remarks:
Collected by the client and received at SJB on June 2, 1997.
SJB Sample ID# is 97-281

Figure No. ____

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	3	0.0	47.4	49.0	3.6	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			17.16	6.83	4.02	0.302	0.1620	0.1229	0.11	55.6

MATERIAL DESCRIPTION	USCS	AASHTO
● CLIENT ID# 370020 : 10'-12'	SP	A-1-b

Project No.: SJB-T768 : LTR-1
Project: MATL TESTING:PARSONS ENGINEERING SCIENCE
● Location: CHERRY FARMS PROJECT

Date: JUNE 16, 1997

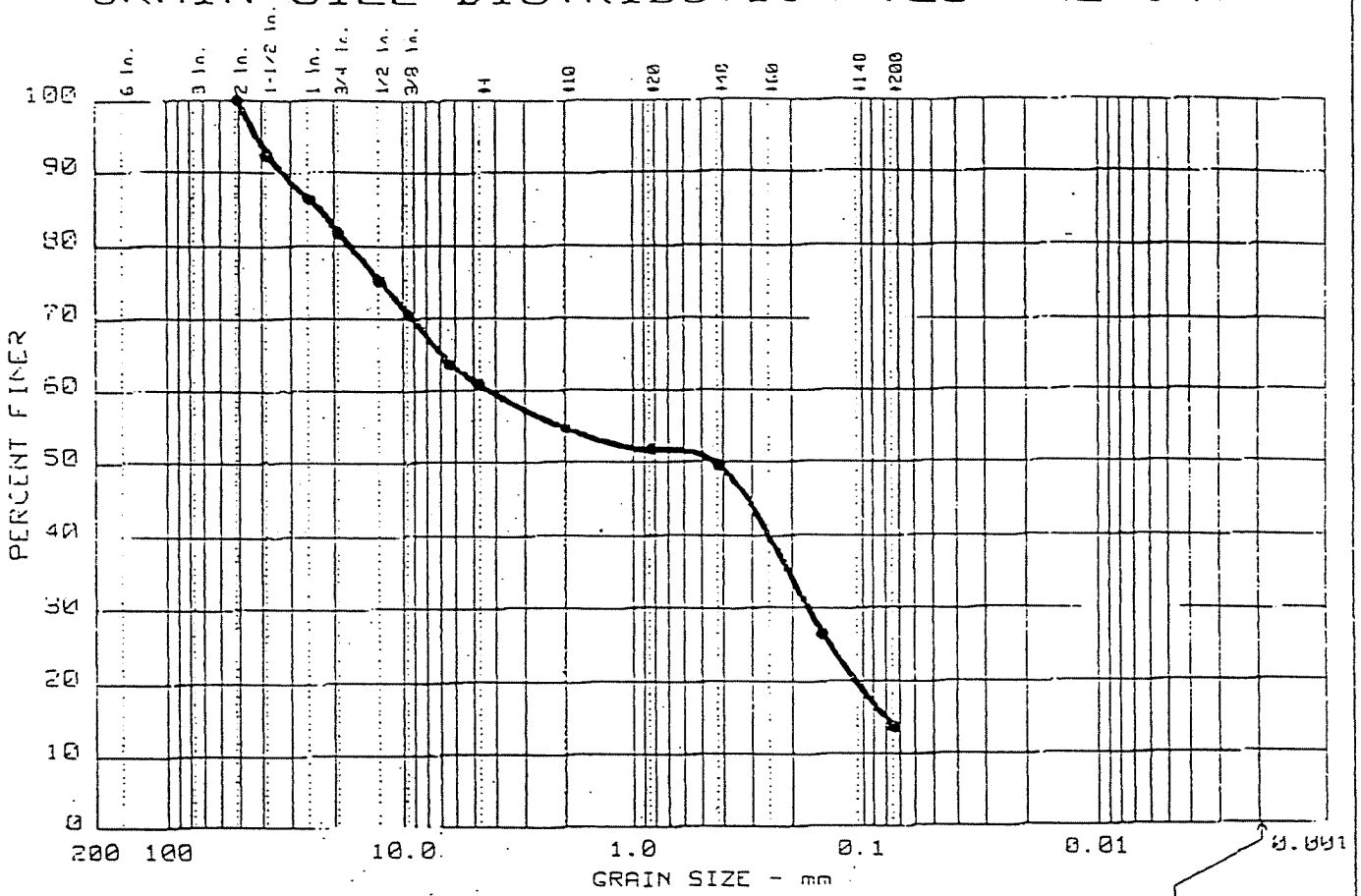
GRAIN SIZE DISTRIBUTION TEST REPORT

SJB Services, Inc.

Remarks:
Collected by the client and received at SJB on June 2, 1997.
SJB Sample ID# is 97-282

Figure No. ____

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	4	0.0	39.1	47.2	13.7	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			22.91	4.22	0.43	0.171	0.0793			

MATERIAL DESCRIPTION	USCS	AASHTO
● CLIENT ID# 370020 : 12'-14'	SM	A-1-b

Project No.: SJB-T768 : LTR-1
Project: MATL TESTING:PARSONS ENGINEERING SCIENCE
● Location: CHERRY FARMS PROJECT

Date: JUNE 16, 1997

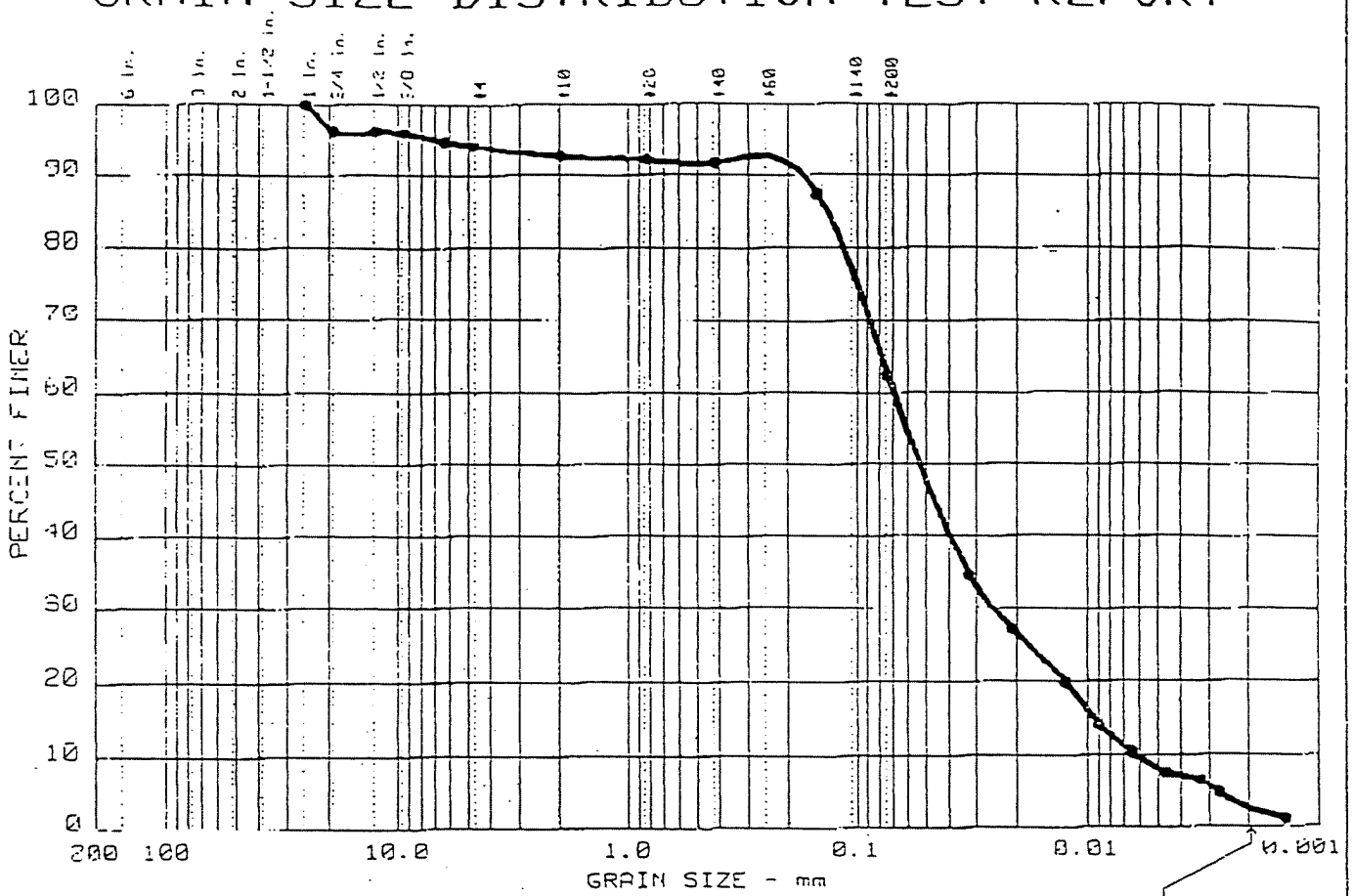
Remarks:
Collected by the client and received at STR on June 2, 1997.
SJB Sample ID# is 97-283

GRAIN SIZE DISTRIBUTION TEST REPORT

SJB Services, Inc.

Figure No. ———

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	5	0.0	5.8	31.6	60.0	2.6

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.13		0.05	0.025	0.0094	0.0062	1.51	11.2

	MATERIAL DESCRIPTION	USCS	AASHTO
●	CLIENT ID# 345050 : 2'-3'	ML	A-4(0.0)

Project No.: SJB-T768 : LTR-1

Project: MATL TESTING: PARSONS ENGINEERING SCIENCE

● Location: CHERRY FARMS PROJECT

Date: JUNE 16, 1997

GRAIN SIZE DISTRIBUTION TEST REPORT

SJB Services, Inc.

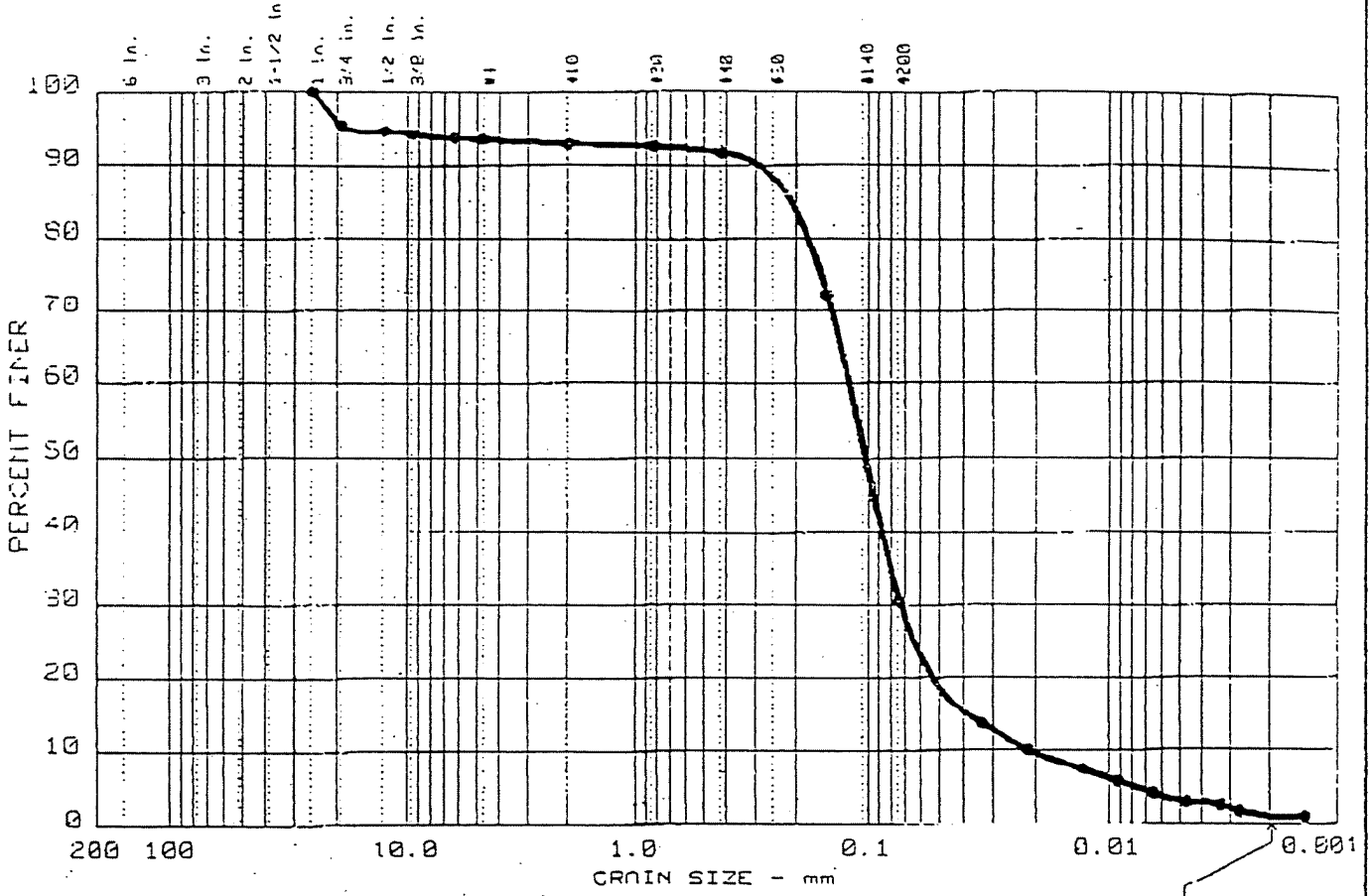
Remarks:

Collected by the client and received at SJB on June 2, 1997.

SJB Sample ID# is 97-284

Figure No. ——

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	6	0.0	6.4	63.0	29.6	1.0

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.21	0.12	0.10	0.073	0.0383	0.0210	2.11	5.7

MATERIAL DESCRIPTION	USCS	AASHTO
● CLIENT ID# 345150 : 4'-6'	SM	A-2-4(0.0)

Project No.: SJB-T768 : LTR-1
Project: MATL TESTING:PARSONS ENGINEERING SCIENCE
● Location: CHERRY FARMS PROJECT

Date: JUNE 16, 1997

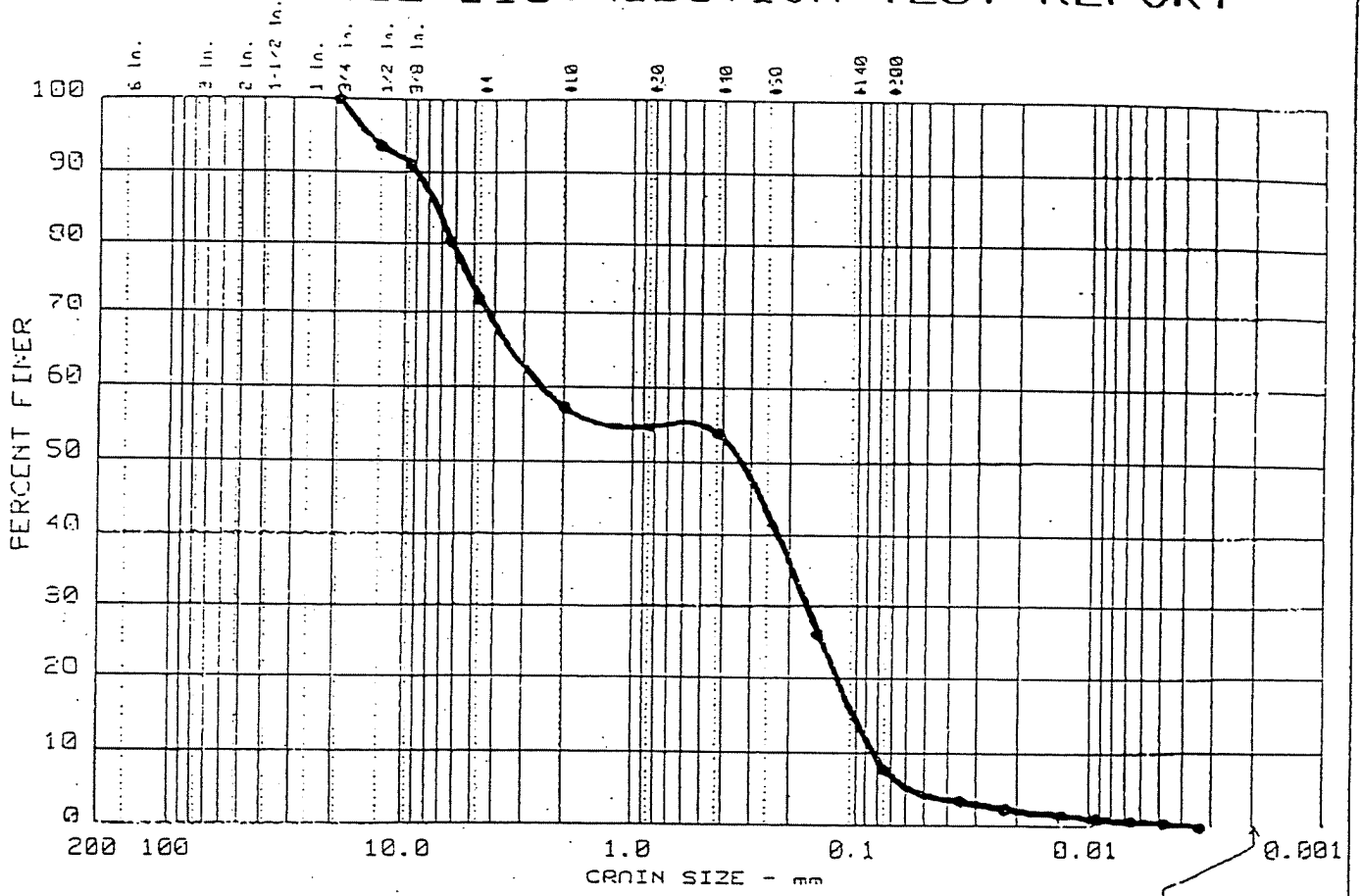
GRAIN SIZE DISTRIBUTION TEST REPORT

SJB Services, Inc.

Remarks:
Collected by the client and received at SJB on June 2, 1997.
SJB Sample ID# is 97-285

Figure No. ____

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	7	0.0	27.8	64.5	7.7	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			7.39	2.50	0.33	0.165	0.1029	0.0837	0.13	29.9

MATERIAL DESCRIPTION	USCS	AASHTO
● CLIENT ID# 345150 : 12'-14'	SP-SM	A-3

Project No.: SJB-T768 : LTR-1
Project: MATL TESTING:PARSONS ENGINEERING SCIENCE
● Location: CHERRY FARMS PROJECT

Date: JUNE 16, 1997

GRAIN SIZE DISTRIBUTION TEST REPORT

SJB Services, Inc.

Remarks:
Collected by the client and received at SJB on June 2, 1997.
SJB Sample ID# is 97-286

Figure No. _____

ATTACHMENT 5
SEDIMENT BORING LOGS

Contractor: Northstar Drilling
Driller: Jeff Thew
Inspector: Jeffrey Poulsen
Rig Type: Barge-mounted Minuteman
Method: 3-inch Split Spoon Sampler

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

PROJECT NAME: Cherry Farms Sediment Sampling
PROJECT NUMBER: 726673

BORING NO. 413060

Sheet 1 of 1

Location: Station 4130, 60 feet from shore

Weather: Overcast, 60 deg. F

Date/Time Start: May 30, 1997. / 1240

Date/Time Finish: May 30, 1997. / 1405

SURFACE WATER OBSERVATIONS

Date	05/30/97			
Time	1240			
Depth	8 feet			

Photovac Reading	Sample I.D.	Sample Depth	Percent Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL	COMMENTS
		0			*0 feet*	
			100	3	GRAVEL and SHELLS, hard. *0.5 feet*	
		1		5	FILL, silt and fine sand, dark brown-black, odor, sheen.	
				5		
		2		6		
			80	3		
		3		4		
				4		
		4		4		
			50	4	FILL, silt, little fine sand and shells, trace fine gravel, dark brown-black.	
		5		8	Odor and sheen present.	
				4		
		6		14		
			100	4		
		7		6		
				10		
		8		12		
			50	2	*8.5 feet*	
		9		2	SAND, medium, trace-little gravel, medium-dark gray, odor, sheeen.	
				3		
		10		4		
			50	8	SAND, fine-medium, some gravel, light-medium gray, odor.	
		11		12		
				16	*11.5 feet*	
		12		20	GRAVEL layer.	
		13			Boring terminated at 12 feet below sediment surface.	
		14				
		15				
		16				
		17				

SUMMARY:

Contractor: Northstar Drilling
Driller: Jeff Thew
Inspector: Jeffrey Poulsen
Rig Type: Barge-mounted Minuteman
Method: 3-inch Split Spoon Sampler

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

PROJECT NAME: Cherry Farms Sediment Sampling
PROJECT NUMBER: 726673

BORING NO. 320050

Sheet 1 of 1
Location: Station 3200, 50 feet from shore

Weather: Clear, windy, 70 deg. F
Date/Time Start: May 27, 1997. / 1455
Date/Time Finish: May 27, 1997. / 1510

SURFACE WATER OBSERVATIONS

Date	05/27/97			
Time	1455			
Depth	3.5 feet			

Photovac Reading	Sample I.D.	Sample Depth	Percent Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL	COMMENTS
		0			*0 feet*	
					FILL, silt, trace fine rounded gravel, light gray, contains zebra mussels.	
0.0		1	75		FILL, silt, trace fine sand, dark brown-black, trace sheen.	
		2			FILL, silt, trace clay, medium gray, trace dark brown organics.	
0.0			100		Dark gray-black sheen from 2 to 3 feet.	
		3			3 ft	
0.0			100		SILT, little clay, light-medium gray, varved, dark brown organics in horizontal layers.	
		4				
					Boring terminated at 4 feet below sediment surface.	
		5				
		6				
		7				
		8				
		9				
		10				
		11				
		12				
		13				
		14				
		15				
		16				
		17				

SUMMARY:

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

BORING NO. 345050

Sheet 1 of 1

Contractor: Northstar Drilling
Driller: Jeff Thew
Inspector: Jeffrey Poulsen
Rig Type: Barge-mounted Minuteman
Method: 3-inch Split Spoon Sampler

PROJECT NAME: Cherry Farms Sediment Sampling
PROJECT NUMBER: 726673

Location: Station 3450, 50 feet from Gabion Wall.

Weather: Clear, calm, 60 deg. F

Date/Time Start: May 29, 1997. / 1840

Date/Time Finish: May 29, 1997. / 1930

SURFACE WATER OBSERVATIONS

Date	05/29/97			
Time	1840			
Depth	2.5 feet			

Photovac Reading	Sample I.D.	Sample Depth	Percent Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL	COMMENTS
		0			*0 feet*	
			30	1	SILT, some debris, trace gravel, dark brown-black, odor, sheen.	
		1		2		
				2		
		2		3	SILT, light gray, odor, sheen.	
			100	2	SILT and fine SAND, some organics (rootlets), medium-dark gray.	
		3		3		
				3		
		4		5	*4 feet*	
			100	2	SILT and fine-very fine SAND, trace organics light-medium gray, firm.	
		5		3	No odor or sheen.	
				3		
		6		4		
			50	2		
		7		3		
				4		
		8		5		
			100	7		
		9		12		
				14		
		10		18		
		11			Boring terminated at 10 feet below sediment surface.	
		12				
		13				
		14				
		15				
		16				
		17				

SUMMARY:

Contractor: Northstar Drilling
Driller: Jeff Thew
Inspector: Jeffrey Poulsen
Rig Type: Barge-mounted Minuteman
Method: 3-inch Split Spoon Sampler

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

PROJECT NAME: Cherry Farms Sediment Sampling
PROJECT NUMBER: 726673

BORING NO. ____

Sheet 1 of 1
Location: Station 3450, 100 feet from Gabion Wall.

Weather: Clear, calm, 60 deg. F
Date/Time Start: May 29, 1997. / 1600
Date/Time Finish: May 29, 1997. / 1750

SURFACE WATER OBSERVATIONS

Date	05/29/97			
Time	1600			
Depth	4.50			

Photovac Reading	Sample I.D.	Sample Depth	Percent Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL	COMMENTS
		0			*0 feet*	
			100	1		
		1		2	medium/dark brown silt FILL	
				1	odor/sheen/shells	
		2		0		
			100	1		
		3		1		
				1		
		4		1		
			50	WOH		
		5		0		
				0		
		6		1		
			75	1		
		7		0		
				0		
		8		0	FILL medium-dark brown silt trace -little sand	
			100	1	trace gravel, sheen/odor	
		9		1		
				1		
		10		0		
			100	1		
		11		5	*11 feet*	
				6		
		12		10	light-medium grey fine-medium SAND	
			100	4	little silt and 1/4-inch gravel	
		13		6		
				8		
		14		12		
					Boring terminated at 14 feet below sediment surface.	
		15				
		16				
		17				

SUMMARY: ____

Contractor: Northstar Drilling
Driller: Jeff Thew
Inspector: Jeffrey Poulsen
Rig Type: Barge-mounted Minuteman
Method: 3-inch Split Spoon Sampler

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

PROJECT NAME: Cherry Farms Sediment Sampling
PROJECT NUMBER: 726673

BORING NO. 345150

Sheet 1 of 1

Location: Station 3450, 150 feet from Gabion Wall.

Weather: Overcast, 60 deg. F

Date/Time Start: May 30, 1997. / 0900

Date/Time Finish: May 30, 1997. / 1015

SURFACE WATER OBSERVATIONS

Date	05/30/97			
Time	0900			
Depth	8.5 feet			

Photovac Reading	Sample I.D.	Sample Depth	Percent Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL	COMMENTS
		0			*0 feet*	
			10	1	FILL	
		1		1	silt and fine sand, dark brown-black, odor, sheen.	
				1		
		2		1		
			100	1		
		3		1		
				1		
		4		1		
			100	1		
		5		1		
				1		
		6		1		
			100	1		
		7		3	*7 feet*	
				3	SAND, fine-medium, little silt, gray.	
		8		3		
			100	3	SAND, fine-medium, some rounded gravel (1/2"), little silt, gray, sheen.	
		9		2		
				1		
		10		3		
			50	2		
		11		4	*11 feet*	
				6	SILT and fine SAND, little gravel, light-medium gray, no sheen or odor.	
		12		7	*12 feet*	
			100	7	SAND, fine-medium, little fine-medium gravel, trace silt, light-med. gray.	
		13		17	No sheen or odor.	
				22		
		14		30		
					Boring terminated at 14 feet below sediment surface.	
		15				
		16				
		17				

SUMMARY:

Contractor: Northstar Drilling
Driller: Jeff Thew
Inspector: Jeffrey Poulsen
Rig Type: Barge-mounted Minuteman
Method: 3-inch Split Spoon Sampler

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

PROJECT NAME: Cherry Farms Sediment Sampling
PROJECT NUMBER: 726673

BORING NO. 345200

Sheet 1 of 1

Location: Station 3450, 200 feet from Gabion Wall.

Weather: Overcast, 60 deg. F

Date/Time Start: May 30, 1997. / 1045

Date/Time Finish: May 30, 1997. / 1200

SURFACE WATER OBSERVATIONS

Date	05/30/97			
Time	1045			
Depth	17.5 feet			

Photovac Reading	Sample I.D.	Sample Depth	Percent Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL	COMMENTS
		0			*0 feet*	
			75	3	FILL	
		1		4	silt, little sand and shells, trace gravel, dark brown, sheen.	
				5		
		2		3	*2 feet*	
			10	5	GRAVEL, rounded, 1/2"-1" diameter, hard.	
		3		10		
				12		
		4		11		
					Unable to continue through gravel.	
		5			Boring terminated at 4 feet below sediment surface.	
		6				
		7				
		8				
		9				
		10				
		11				
		12				
		13				
		14				
		15				
		16				
		17				

SUMMARY:

Contractor: Northstar Drilling
Driller: Jeff Thew
Inspector: Jeffrey Poulsen
Rig Type: Barge-mounted Minuteman
Method: 3-inch Split Spoon Sampler

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

PROJECT NAME: Cherry Farms Sediment Sampling
PROJECT NUMBER: 726673

BORING NO. 370020

Sheet 1 of 1
Location: Station 3700, 20 feet from shore

Weather: Clear, windy, 70 deg. F
Date/Time Start: May 27, 1997. / 1630
Date/Time Finish: May 27, 1997. / 1805

SURFACE WATER OBSERVATIONS

Date	05/27/97			
Time	1630			
Depth	4 feet			

Photovac Reading	Sample I.D.	Sample Depth	Percent Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL	COMMENTS
		0			*0 feet*	
					Low recovery - gravel and zebra mussels.	
		1				
		2				
		3				
		4			FILL	
0.0			100		silt, trace fine gravel and organics, dark gray-brown, very soft.	
		5			trace sheen and odor from 4 to 9.5 feet.	
		6				
0.0			100		coarsening downward	
		7				
		8				
0.0			100			
		9				
					9.5 feet	
		10			SAND, fine-medium, little fine-coarse gravel, medium gray, no odor.	
0.0			100		Gravel is rounded, up to 1" diameter.	
		11				
		12				
0.0			100		*2.5 feet*	
		13			SILT, some organics, medium-dark brown, soft.	
					3.5 feet	
		14			SAND, medium and GRAVEL, coarse (1"-3"), trace silt.	
		15			Boring terminated at 14 feet below sediment surface.	
		16				
		17				

SUMMARY:

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

BORING NO. 385040

Sheet 1 of 1

Contractor: Northstar Drilling
Driller: Jeff Thew
Inspector: Jeffrey Poulsen
Rig Type: Barge-mounted Minuteman
Method: 3-inch Split Spoon Sampler

PROJECT NAME: Cherry Farms Sediment Sampling
PROJECT NUMBER: 726673

Location: Station 3850, 40 feet from shore

Weather: Clear, calm, 60 deg. F

Date/Time Start: May 28, 1997. / 1100

Date/Time Finish: May 28, 1997. / 1500

SURFACE WATER OBSERVATIONS

Date	05/28/97			
Time	1100			
Depth	5.5 feet			

Photovac Reading	Sample I.D.	Sample Depth	Percent Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL	COMMENTS
		0			*0 feet*	
-			0		Top surface consists of shells, gravel, fine sand, and silt, very soft.	
		1				
		2				
0.0			30		FILL, silt and fine sand	
		3			trace grave, medium brown very soft, trace sheen	
		4				
0.0			100		SAND, medium, little silt, medium-dark gray, firm, odor, sheen.	
		5				
		6				
0.0			70			
		7				
		8				
0.0			70			
		9				
		10				
0.0			70			
		11				
		12				
0.0			50			
		13			*13 feet*	
					GRAVEL, medium-coarse (3"), little medium sand and organics.	
		14				
		15			Boring terminated at 14 feet below sediment surface.	
		16				
		17				

SUMMARY:

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

BORING NO. 385100

Sheet 1 of 1

Contractor: Northstar Drilling
Driller: Jeff Thew
Inspector: Jeffrey Poulsen
Rig Type: Barge-mounted Minuteman
Method: 3-inch Split Spoon Sampler

PROJECT NAME: Cherry Farms Sediment Sampling
PROJECT NUMBER: 726673

Location: Station 3850, 100 feet from shore

Weather: Clear, calm, 60 deg. F

Date/Time Start: May 28, 1997. / 0900

Date/Time Finish: May 28, 1997. / 1015

SURFACE WATER OBSERVATIONS

Date	05/28/97			
Time	0900			
Depth	8 feet			

Photovac Reading	Sample I.D.	Sample Depth	Percent Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL	COMMENTS
		0			*0 feet*	
0.0			20		FILL, sand, fine, little silt, medium-dark brown, oily odor, trace sheen.	
		1				
		2				
0.0			20		FILL, silt, some organics, mediuim brown-reddish, odor, slight sheen.	
		3				
		4				
-			50		FILL, sand, fine-medium, little silt, medium gray, trace sheen.	
		5				
		6				
0.0			50			
		7				
					5 feet	
		8			GRAVEL, medium-coarse, trace-little fine-medium sand.	
0.0			20		No odor or sheen.	
		9				
		10				
		11			Boring terminated at 10 feet below sediment surface.	
		12				
		13				
		14				
		15				
		16				
		17				

SUMMARY:

Contractor: Northstar Drilling
Driller: Jeff Thew
Inspector: Jeffrey Poulsen
Rig Type: Barge-mounted Minuteman
Method: 3-inch Split Spoon Sampler

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

PROJECT NAME: Cherry Farms Sediment Sampling
PROJECT NUMBER: 726673

BORING NO. 400040

Sheet 1 of 1

Location: Station 4000, 40 feet from shore

Weather: Clear, calm, 60 deg. F

Date/Time Start: May 28, 1997. / 1800

Date/Time Finish: May 28, 1997. / 2030

SURFACE WATER OBSERVATIONS

Date	05/28/97			
Time	1800			
Depth	7 feet			

Photovac Reading	Sample I.D.	Sample Depth	Percent Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL	COMMENTS
		0			*0 feet*	
-			0	2	No recovery - very soft material.	
		1		1		
				1		
		2		1		
0.0			100	2	FILL, silt, some organic debris, dark brown-black, soft.	
		3		3		
				4		
		4		7	FILL, sand, black, firm.	
0.0			100	4	*4.5 feet*	
		5		4	SAND, fine-medium, trace silt and fine gravel, medium-dark gray, no odor.	
				3		
		6		2	*6 feet*	
0.0			30	4	SILT, little fine sand, trace gravel (1/4"), dark brown-red, sheen.	
		7		4		
				4		
		8		4	*8 feet*	
0.0			80	4	SAND, little silt, medium-dark gray, odor, spots of sheen.	
		9		3		
				4		
		10		5		
0.0			100	5		
		11		7		
				4		
		12		4		
0.0			50	8		
		13		10	*13 feet*	
				14	SILT and fine SAND, trace rounded gravel (2"), light gray.	
		14		24	No odor or sheen.	
		15			Boring terminated at 14 feet below sediment surface.	
		16				
		17				

SUMMARY:

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

BORING NO. 400075

Sheet 1 of 1

Contractor: Northstar Drilling
Driller: Jeff Thew
Inspector: Jeffrey Poulsen
Rig Type: Barge-mounted Minuteman
Method: 3-inch Split Spoon Sampler

PROJECT NAME: Cherry Farms Sediment Sampling
PROJECT NUMBER: 726673

Location: Station 4000, 75 feet from shore

Weather: Clear, calm, 60 deg. F

Date/Time Start: May 28, 1997. / 1720

Date/Time Finish: May 28, 1997. / 1750

SURFACE WATER OBSERVATIONS

Date	05/28/97			
Time	1720			
Depth	10 feet			

Photovac Reading	Sample I.D.	Sample Depth	Percent Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL	COMMENTS
		0			*0 feet*	
0.0			50	3	FILL, silt , little fine sand, trace gravel, dark brown-black.	
		1		4		
				4		
		2		3		
0.0			100	4	sheen 2-4 feet	
		3		3		
				3		
		4		5		
0.0			100	6	slight sheen 4-5.5 feet	
		5		3		
				6	*5.5 feet*	
		6		7	GRAVEL, fine-coarse (2"), little fine sand, trace silt, no sheen.	
0.0			70	15	*6.5 feet*	
		7		7	SAND, medium, trace-little silt, medium gray, no sheen.	
				8		
		8		7		
		9			Boring terminated at 8 feet below sediment surface.	
		10				
		11				
		12				
		13				
		14				
		15				
		16				
		17				

SUMMARY:

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

BORING NO. 400100

Sheet 1 of 1

Contractor: Northstar Drilling
Driller: Jeff Thew
Inspector: Jeffrey Poulsen
Rig Type: Barge-mounted Minuteman
Method: 3-inch Split Spoon Sampler

PROJECT NAME: Cherry Farms Sediment Sampling
PROJECT NUMBER: 726673

Location: Station 4000, 100 feet from shore

Weather: Clear, calm, 60 deg. F

Date/Time Start: May 28, 1997. / 1515

Date/Time Finish: May 28, 1997. / 1700

SURFACE WATER OBSERVATIONS

Date	05/28/97			
Time	1515			
Depth	10.5 feet			

Photovac Reading	Sample I.D.	Sample Depth	Percent Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL	COMMENTS
		0			*0 feet*	
0.0			10	WOH	FILL, silt and fine sand, black, odor.	
		1		WOH		
				2		
		2		2		
0.0			20	2	FILL, silt and fine-medium sand, trace gravel (1"), brown-black.	
		3		1		
				1		
		4		1		
0.0			50	2	FILL, sand, fine, little-some silt, dark brown-black, odor, sheen.	
		5		3		
				4		
		6		5		
-			100	6		
		7		6	*7 feet*	
				4	SILT, gray, firm. *7.5 feet*	
		8		3	SAND, fine-medium, little coarse gravel, firm, no odor. *8 feet*	
0.0			80	6	SAND, some silt, little-some fine-coarse gravel (rounded), trace clay,	
		9		6	light-medium gray.	
				6		
		10		6		
		11			Boring terminated at 10 feet below sediment surface.	
		12				
		13				
		14				
		15				
		16				
		17				

SUMMARY:

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

BORING NO. 413060

Sheet 1 of 1

Contractor: Northstar Drilling
Driller: Jeff Thew
Inspector: Jeffrey Poulsen
Rig Type: Barge-mounted Minuteman
Method: 3-inch Split Spoon Sampler

PROJECT NAME: Cherry Farms Sediment Sampling
PROJECT NUMBER: 726673

Location: Station 4130, 60 feet from shore

Weather: Overcast, 60 deg. F

Date/Time Start: May 30, 1997. / 1240

Date/Time Finish: May 30, 1997. / 1405

SURFACE WATER OBSERVATIONS

Date	05/30/97			
Time	1240			
Depth	8 feet			

Photovac Reading	Sample I.D.	Sample Depth	Percent Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL	COMMENTS
		0			*0 feet*	
			100	3	GRAVEL and SHELLS, hard. *0.5 feet*	
		1		5	FILL, silt and fine sand, dark brown-black, odor, sheen.	
				5		
		2		6		
			80	3		
		3		4		
				4		
		4		4		
			50	4	FILL, silt, little fine sand and shells, trace fine gravel, dark brown-black.	
		5		8	Odor and sheen present.	
				4		
		6		14		
			100	4		
		7		6		
				10		
		8		12		
			50	2	*8.5 feet*	
		9		2	SAND, medium, trace-little gravel, medium-dark gray, odor, sheeen.	
				3		
		10		4		
			50	8	SAND, fine-medium, some gravel, light-medium gray, odor.	
		11		12		
				16	*1.5 feet*	
		12		20	GRAVEL layer.	
		13			Boring terminated at 12 feet below sediment surface.	
		14				
		15				
		16				
		17				

SUMMARY:

Contractor: Northstar Drilling
Driller: Jeff Thew
Inspector: Jeffrey Poulsen
Rig Type: Barge-mounted Minuteman
Method: 3-inch Split Spoon Sampler

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

PROJECT NAME: Cherry Farms Sediment Sampling
PROJECT NUMBER: 726673

BORING NO. 413150

Sheet 1 of 1

Location: Station 4130, 150 feet from shore

Weather: Overcast, 60 deg. F

Date/Time Start: May 30, 1997. / 1715

Date/Time Finish: May 30, 1997. / 1745

SURFACE WATER OBSERVATIONS

Date	05/30/97			
Time	1715			
Depth	17 feet			

Photovac Reading	Sample I.D.	Sample Depth	Percent Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL	COMMENTS
		0			*0 feet*	
				14	GRAVEL, coarse surficial layer.	
		1		5	SAND, fine-medium, little silt, trace gravel.	
				3		
		2		2		
		3			Boring terminated at 2 feet below sediment surface.	
		4				
		5				
		6				
		7				
		8				
		9				
		10				
		11				
		12				
		13				
		14				
		15				
		16				
		17				

SUMMARY:

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

BORING NO. 430100

Sheet 1 of 1

Contractor: Northstar Drilling
Driller: Jeff Thew
Inspector: Jeffrey Poulsen
Rig Type: Barge-mounted Minuteman
Method: 3-inch Split Spoon Sampler

PROJECT NAME: Cherry Farms Sediment Sampling
PROJECT NUMBER: 726673

Location: Station 4300, 100 feet from shore

Weather: Clear, calm. 60 deg. F

Date/Time Start: May 29, 1997. / 1030

Date/Time Finish: May 29, 1997. / 1200

SURFACE WATER OBSERVATIONS

Date	05/29/97			
Time	1030			
Depth	9.5 feet			

Photovac Reading	Sample I.D.	Sample Depth	Percent Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL	COMMENTS
		0			*0 feet*	
					WOOD DEBRIS	
		1			*1 foot*	
0.0			20	2	FILL, silt, some shells, black, odor, trace sheen.	
		2		3		
				2		
		3		2	*3 feet*	
0.0			100	4	SAND, fine-medium, little silt, dark brown-black, odor, trace sheen.	
		4		3		
				2		
		5		3	*5 feet*	
0.0			50	6	SAND, medium, little silt, trace gravel-cobbles (3"), light-medium gray,	
		6		12	firm.	
				21		
		7		10		
0.0			100	8	SAND, fine-medium, trace-little gravel (1/4-1/2"), trace silt,	
		8		9	light-medium gray.	
				12		
		9		32		
		10			Boring terminated at 9 feet below sediment surface.	
		11				
		12				
		13				
		14				
		15				
		16				
		17				

SUMMARY:

Contractor: Northstar Drilling
Driller: Jeff Thew
Inspector: Jeffrey Poulsen
Rig Type: Barge-mounted Minuteman
Method: 3-inch Split Spoon Sampler

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

PROJECT NAME: Cherry Farms Sediment Sampling
PROJECT NUMBER: 726673

BORING NO. 430150

Sheet 1 of 1
Location: Station 4300, 150 feet from shore

Weather: Clear, calm, 60 deg. F
Date/Time Start: May 29, 1997. / 0800
Date/Time Finish: May 29, 1997. / 1000

SURFACE WATER OBSERVATIONS

Date	05/29/97			
Time	0800			
Depth	17 feet			

Photovac Reading	Sample I.D.	Sample Depth	Percent Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL	COMMENTS
		0			*0 feet*	
0.0			5	6	GRAVEL, medium-coarse (2"), some fine-medium sand.	
		1		7	*1 foot*	
				12	SAND, medium, some coarse gravel, medium brown.	
		2		13		
		3			Boring terminated at 2 feet below sediment surface.	
		4				
		5				
		6				
		7				
		8				
		9				
		10				
		11				
		12				
		13				
		14				
		15				
		16				
		17				

SUMMARY:

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

BORING NO. 450060

Sheet 1 of 1

Contractor: Northstar Drilling
Driller: Jeff Thew
Inspector: Jeffrey Poulsen
Rig Type: Barge-mounted Minuteman
Method: 3-inch Split Spoon Sampler

PROJECT NAME: Cherry Farms Sediment Sampling
PROJECT NUMBER: 726673

Location: Station 4500, 60 feet from shore

Weather: Clear, calm, 60 deg. F

Date/Time Start: May 29, 1997. / 1420

Date/Time Finish: May 29, 1997. / 1515

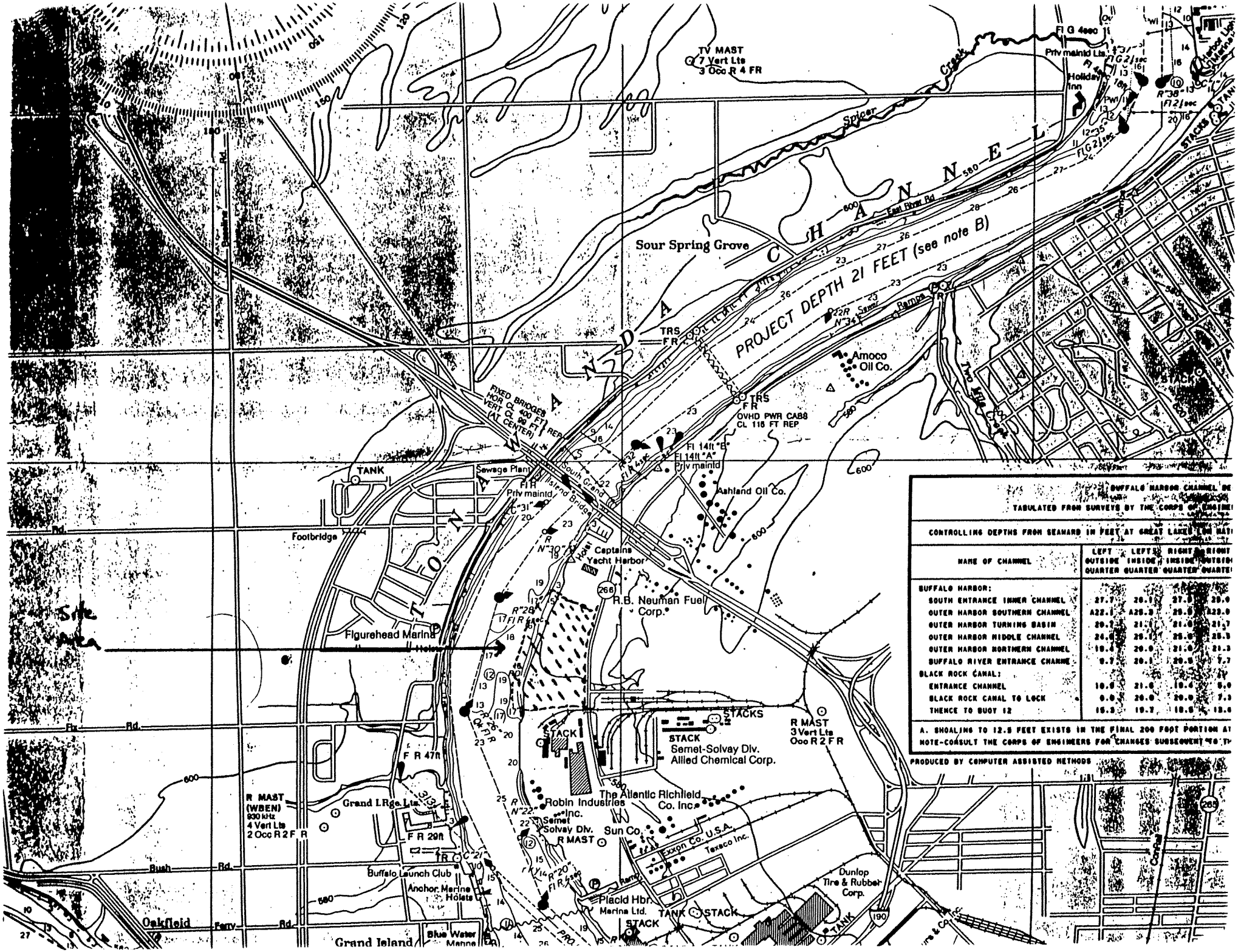
SURFACE WATER OBSERVATIONS

Date	05/29/97			
Time	1420			
Depth	10.5 feet			

Photovac Reading	Sample I.D.	Sample Depth	Percent Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL	COMMENTS
		0			*0 feet*	
0.0			50	4	FILL, silt and fine sand, some shells and organics, dark brown-black,	
		1		3	odor, sheen.	
				2		
		2		2		
0.0			50	6	FILL, silt and fine sand, trace-little rounded gravel (1/2"), dark brown-black,	
		3		6	odor, sheen.	
				6		
		4		6		
0.0			50	4	FILL, silt and fine sand, some cinders, layered, medium-dark brown-black,	
		5		5	odor, sheen.	
				6		
		6		17		
0.0			100	6		
		7		10	*7 feet*	
				12	SAND, fine-medium, trace-little silt, light-medium gray, no odor or sheen.	
		8		20		
		9			Boring terminated at 8 feet below sediment surface.	
		10				
		11				
		12				
		13				
		14				
		15				
		16				
		17				

SUMMARY:

ATTACHMENT 6
NAVIGATION CHANNEL CHART



BUFFALO HARBOR CHANNEL DE

TABULATED FROM SURVEYS BY THE CORPS OF ENGINE

CONTROLLING DEPTHS FROM SEAWARD IN FEET AT GREAT LAKES LOW WATE

NAME OF CHANNEL	LEFT OUTSIDE QUARTER	LEFT INSIDE QUARTER	RIGHT INSIDE QUARTER	RIGHT OUTSIDE QUARTE
BUFFALO HARBOR:				
SOUTH ENTRANCE INNER CHANNEL	27.7	28.1	27.8	28.0
OUTER HARBOR SOUTHERN CHANNEL	A22.1	A25.2	28.8	A23.0
OUTER HARBOR TURNING BASIN	20.1	21.1	21.0	21.7
OUTER HARBOR MIDDLE CHANNEL	24.8	25.1	25.0	25.5
OUTER HARBOR NORTHERN CHANNEL	18.4	20.0	21.0	21.3
BUFFALO RIVER ENTRANCE CHANNE	9.7	20.1	20.8	7.7
BLACK ROCK CANAL:				
ENTRANCE CHANNEL	18.0	21.0	18.4	9.0
BLACK ROCK CANAL TO LOCK	9.0	20.0	20.0	7.3
THENCE TO BUOY 12	16.3	19.7	18.8	18.6

A. SHOALING TO 12.5 FEET EXISTS IN THE FINAL 200 FOOT PORTION AT

NOTE-CONSULT THE CORPS OF ENGINEERS FOR CHANGES SUBSEQUENT TO TH

PRODUCED BY COMPUTER ASSISTED METHODS

ATTACHMENT 7
SEDIMENT ANALYTICAL DATA

Table 3.2 continued
Cherry Farm / River Road Site
Phase II Validated Sediment Analytical Data

Cherry Farm/River Road Site Tonawanda, NY Validated Sediment Analytical Data Detected Compound Summary - Phase II			SAMPLE ID: DEPTH: LAB ID: SOURCE: SDG: MATRIX: SAMPLED: VALIDATED: UNITS:	20060S 0-0.75' 070040-22 NYTEST CFSED2 SEDIMENT 6/28/96 9/26/96	23020S 0-0.75' 070032-01 NYTEST CFSED1 SEDIMENT 6/25/96 9/25/96	23060S 0-0.75' 070032-02 NYTEST CFSED1 SEDIMENT 6/25/96 9/25/96	26150S 0-0.75' 070032-04 NYTEST CFSED1 SEDIMENT 6/25/96 9/25/96
CAS NO.	COMPOUND	95 % UCL-S					
	SEMIVOLATILES						
84-74-2	Di-n-butylphthalate	140	UG/KG	ND	ND	ND	ND
132-64-9	Dibenzofuran	1300	UG/KG	ND	ND	ND	ND
106-46-7	1,4-Dichlorobenzene	-	UG/KG	ND	ND	ND	ND
84-66-2	Diethylphthalate	-	UG/KG	ND	ND	ND	ND
105-67-9	2,4-Dimethylphenol	-	UG/KG	ND	ND	ND	ND
106-44-5	4-Methylphenol	560	UG/KG	270 J	ND	ND	ND
100-02-7	4-Nitrophenol	-	UG/KG	ND	ND	ND	ND
108-95-2	Phenol	-	UG/KG	ND	ND	ND	ND
117-81-7	bis(2-Ethylhexyl)phthalate	1647	UG/KG	120 J	ND	ND	ND
	PAHs						
83-32-9	Acenaphthene	900	UG/KG	ND	ND	ND	ND
208-96-8	Acenaphthylene	1051	UG/KG	ND	ND	ND	ND
120-12-7	Anthracene	1594	UG/KG	ND	ND	ND	60 J
56-55-3	Benzo(a)anthracene	2949	UG/KG	150 J	66 J	ND	260 J
50-32-8	Benzo(a)pyrene	2394	UG/KG	170 J	60 J	ND	210 J
205-99-2	Benzo(b)fluoranthene	2522	UG/KG	210 J	84 J	ND	220 J
191-24-2	Benzo(g,h,i)perylene	1320	UG/KG	110 J	ND	ND	140 J
207-08-9	Benzo(k)fluoranthene	1904	UG/KG	ND	ND	ND	ND
219-01-9	Chrysene	3157	UG/KG	190 J	88 J	ND	350 J
53-70-3	Dibenz(a,h)anthracene	160	UG/KG	ND	ND	ND	51 J
206-44-0	Fluoranthene	9002	UG/KG	200 J	95 J	ND	340 J
86-73-7	Fluorene	1267	UG/KG	ND	ND	ND	ND
193-39-5	Indeno(1,2,3-cd)pyrene	1234	UG/KG	100 J	ND	ND	100 J
91-57-6	2-Methylnaphthalene	230	UG/KG	ND	ND	ND	ND
91-20-3	Naphthalene	770	UG/KG	120 J	60 J	ND	ND
85-01-8	Phenanthrene	7336	UG/KG	82 J	ND	ND	180 J
129-00-0	Pyrene	6170	UG/KG	180 J	87 J	ND	330 J
	Total PAHs	43960		1512	540	ND	2241
	INORGANICS						
7429-90-5	Aluminum	7534	MG/KG	4750	5440	5980	12700
7440-36-0	Antimony	7.11	MG/KG	ND	ND	ND	ND
7440-38-2	Arsenic	7.6	MG/KG	9.1	5.3	3.3	5.5
7440-39-3	Barium	70.8	MG/KG	39	43.2	23 J	62.6
7440-41-7	Beryllium	0.517	MG/KG	0.35 J	0.32 J	0.25 J	0.58 J
7440-43-9	Cadmium	1.287	MG/KG	1.1 J	0.61 J	0.31 J	0.78 J
7440-70-2	Calcium	28651	MG/KG	11300	18800	10800	16700
7440-47-3	Chromium	50.9	MG/KG	21.5	36.3 J	9.5 J	21.3 J
7440-48-4	Cobalt	9	MG/KG	5.9 J	6.1 J	6.5 J	9
7440-50-8	Copper	57.2	MG/KG	25.5	15.9	12.3	34.6
7439-89-6	Iron	26702	MG/KG	41100	18100	12000	27300
7439-92-1	Lead	49.8	MG/KG	41.5	19.8	8	57.1
7439-95-4	Magnesium	6431	MG/KG	4100	5480 J	8540 J	9100 J
7439-96-5	Manganese	6574	MG/KG	556	561	148	328
7439-97-6	Mercury	0.202	MG/KG	0.13 J	ND	ND	0.18
7440-02-0	Nickel	23	MG/KG	20.8	18.2	17.2	27.8
7440-09-7	Potassium	839	MG/KG	878	809	1190	2550
7782-49-2	Selenium	-	MG/KG	0.25 J	ND	ND	ND
7440-22-4	Silver	1.5	MG/KG	ND	ND	ND	ND
7440-23-5	Sodium	-	MG/KG	97.5 J	126 J	104 J	138 J
7440-28-0	Thallium	-	MG/KG	ND	ND	ND	ND
7440-62-2	Vanadium	23.3	MG/KG	15.4	14.1 J	14.1 J	26.2 J
7440-66-6	Zinc	129.3	MG/KG	191	109 J	48.4 J	139 J
57-12-5	Cyanide	-	MG/KG	0.81 J	2.1	ND	0.72 J

Bold Face - Indicates the maximum concentration detected for the sampling round.

- Indicates a concentration above the 95% UCL-S.

Table 3.2 continued
Cherry Farm / River Road Site
Phase II Validated Sediment Analytical Data

Cherry Farm/River Road Site Tonawanda, NY Validated Sediment Analytical Data Detected Compound Summary - Phase II			SAMPLE ID:	26150D	32020S	32020D	32060S	32060D
			DEPTH:	0.75-1.5'	0-0.75'	0.75-1.5'	0-0.75'	0.75-1.5'
			LAB ID:	070032-05	070032-06	070032-07	070032-08	070032-09
			SOURCE:	NYTEST	NYTEST	NYTEST	NYTEST	NYTEST
			SDG:	CFSED1	CFSED1	CFSED1	CFSED1	CFSED1
			MATRIX:	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT
			SAMPLED:	6/25/96	6/25/96	6/25/96	6/25/96	6/25/96
CAS NO.	COMPOUND	95 % UCL-S	VALIDATED: UNITS:	9/25/96	9/25/96	9/25/96	9/25/96	9/25/96
	SEMIVOLATILES							
84-74-2	Di-n-butylphthalate	140	UG/KG	ND	ND	ND	ND	ND
132-64-9	Dibenzofuran	1300	UG/KG	ND	700 J	500 J	1500 J	740 J
106-46-7	1,4-Dichlorobenzene	-	UG/KG	ND	ND	ND	ND	ND
84-66-2	Diethylphthalate	-	UG/KG	ND	ND	ND	ND	ND
105-67-9	2,4-Dimethylphenol	-	UG/KG	ND	ND	ND	ND	ND
106-44-5	4-Methylphenol	560	UG/KG	ND	ND	ND	ND	ND
100-02-7	4-Nitrophenol	-	UG/KG	ND	ND	ND	ND	ND
108-95-2	Phenol	-	UG/KG	ND	ND	ND	ND	ND
117-81-7	bis(2-Ethylhexyl)phthalate	1647	UG/KG	ND	ND	ND	ND	290 J
	PAHs							
83-32-9	Acenaphthene	900	UG/KG	ND	530 J	430 J	1100 J	680 J
208-96-8	Acenaphthylene	1051	UG/KG	ND	650 J	720 J	2000 J	1300 J
120-12-7	Anthracene	1594	UG/KG	59 J	2100 J	1800 J	3800 J	2500 J
56-55-3	Benzo(a)anthracene	2949	UG/KG	210 J	4900 J	5400 J	11000 J	6300 J
50-32-8	Benzo(a)pyrene	2394	UG/KG	150 J	3700 J	4200 J	9200 J	4800 J
205-99-2	Benzo(b)fluoranthene	2522	UG/KG	170 J	4700 J	5200 J	10000 J	5800 J
191-24-2	Benzo(g,h,i)perylene	1320	UG/KG	79 J	1500 J	1600 J	5000 J	1500 J
207-08-9	Benzo(k)fluoranthene	1904	UG/KG	ND	1600 J	1800 J	4200 J	1900 J
219-01-9	Chrysene	3157	UG/KG	210 J	4900 J	5400 J	13000 J	7100 J
53-70-3	Dibenz(a,h)anthracene	160	UG/KG	ND	510 J	410 J	ND	365 J
206-44-0	Fluoranthene	9002	UG/KG	320 J	8900 J	8600 J	23000 J	10000 J
86-73-7	Fluorene	1267	UG/KG	ND	1800 J	1600 J	3800 J	2400 J
193-39-5	Indeno(1,2,3-cd)pyrene	1234	UG/KG	81 J	1700 J	1800 J	5000 J	1800 J
91-57-6	2-Methylnaphthalene	230	UG/KG	ND	1300 J	1200 J	4300 J	2500 J
91-20-3	Naphthalene	770	UG/KG	ND	8100 J	8600 J	35000 J	16000 J
85-01-8	Phenanthrene	7336	UG/KG	210 J	7100 J	5800 J	14000 J	9100 J
129-00-0	Pyrene	6170	UG/KG	250 J	7100 J	7900 J	20000 J	10000 J
	Total PAHs	43960		1739	61090	63460	164500	84060
	INORGANICS							
7429-90-5	Aluminum	7534	MG/KG	11100	1970	2020	3030 J	2450
7440-36-0	Antimony	7.11	MG/KG	ND	2.4 J	3.8 J	ND	6.3 J
7440-38-2	Arsenic	7.6	MG/KG	4.4	1.6	23.2	37.4 J	30.4
7440-39-3	Barium	70.8	MG/KG	51.9	33.7	27.9 J	32.3 J	25.8 J
7440-41-7	Beryllium	0.517	MG/KG	0.47 J	0.29 J	0.27 J	0.36 J	0.27 J
7440-43-9	Cadmium	1.287	MG/KG	0.31 J	0.7	0.57 J	1.4 J	1.5
7440-70-2	Calcium	28651	MG/KG	11400	6710	5940	7960 J	6700
7440-47-3	Chromium	50.9	MG/KG	16.7 J	22.1 J	19.1 J	25.3 J	21.4 J
7440-48-4	Cobalt	9	MG/KG	8.3	3.3 J	3 J	4 J	3.9 J
7440-50-8	Copper	57.2	MG/KG	28.6	26.7	25.5	35.4 J	35.4
7439-89-6	Iron	26702	MG/KG	19000	55200	49300	54400 J	49200
7439-92-1	Lead	49.8	MG/KG	42.3	57.1	51.4	199 J	145
7439-95-4	Magnesium	6431	MG/KG	7180 J	1010 J	963 J	1500 J	1150 J
7439-96-5	Manganese	6574	MG/KG	255	682	642	867 J	726
7439-97-6	Mercury	0.202	MG/KG	0.13	0.32	0.3	0.78 J	0.54
7440-02-0	Nickel	23	MG/KG	24.2	14.4	12.5	15 J	14
7440-09-7	Potassium	839	MG/KG	2020	182 J	195 J	434 J	237 J
7782-49-2	Selenium	-	MG/KG	0.38 J	ND	0.4 J	0.81 J	0.92
7440-22-4	Silver	1.5	MG/KG	ND	ND	ND	0.67 J	0.9 J
7440-23-5	Sodium	-	MG/KG	125 J	35.6 J	37.4 J	68.7 J	84.5 J
7440-28-0	Thallium	-	MG/KG	ND	1.3 J	ND	1.8 J	ND
7440-62-2	Vanadium	23.3	MG/KG	21.4 J	13.7 J	11.8 J	12.8 J	11.1 J
7440-66-6	Zinc	129.3	MG/KG	93.3 J	247 J	205 J	599 J	702 J
57-12-5	Cyanide	-	MG/KG	0.34 J	38.5	35.3	39.8 J	53.5

Bold Face - Indicates the maximum concentration detected for the sampling roun

- Indicates a concentration above the 95% UCL-S.

Table 3.2 continued
Cherry Farm / River Road Site
Phase II Validated Sediment Analytical Data

Cherry Farm/River Road Site Tonawanda, NY Validated Sediment Analytical Data Detected Compound Summary - Phase II			SAMPLE ID: DEPTH: LAB ID: SOURCE: SDG: MATRIX: SAMPLED: VALIDATED:	32100S 0-0.75' 070032-10 NYTEST CFSED1 SEDIMENT 6/25/96 9/25/96	32100D[new] 4-6' 070071-01 NYTEST CFSED3 SEDIMENT 7/02/96 9/26/96	32150S 0-0.75' 070040-21 NYTEST CFSED2 SEDIMENT 6/28/96 9/26/96	37020S 0-0.75' 070040-04 NYTEST CFSED2 SEDIMENT 6/26/96 9/26/96	37020D 0.75-1.5' 070040-05 NYTEST CFSED2 SEDIMENT 6/26/96 9/26/96
CAS NO.	COMPOUND	95 % UCL-S	UNITS:					
	SEMIVOLATILES							
84-74-2	Di-n-butylphthalate	140	UG/KG	320 J	ND	90 J	ND	ND
132-64-9	Dibenzofuran	1300	UG/KG	1000 J	ND	ND	1400 J	3400 J
106-46-7	1,4-Dichlorobenzene	-	UG/KG	150 J	ND	ND	ND	ND
84-66-2	Diethylphthalate	-	UG/KG	ND	48 J	ND	ND	ND
105-67-9	2,4-Dimethylphenol	-	UG/KG	98 J	ND	ND	ND	ND
106-44-5	4-Methylphenol	560	UG/KG	290 J	ND	ND	300 J	ND
100-02-7	4-Nitrophenol	-	UG/KG	ND	175 J	ND	ND	ND
108-95-2	Phenol	-	UG/KG	180 J	ND	ND	77 J	ND
117-81-7	bis(2-Ethylhexyl)phthalate	1647	UG/KG	1400 J	ND	94 J	ND	ND
	PAHs							
83-32-9	Acenaphthene	900	UG/KG	530 J	ND	ND	1800 J	5400 J
208-96-8	Acenaphthylene	1051	UG/KG	1200 J	ND	ND	1300 J	2800 J
120-12-7	Anthracene	1594	UG/KG	2400 J	56 J	53 J	3400 J	11000 J
56-55-3	Benzo(a)anthracene	2949	UG/KG	9400 J	280 J	140 J	8000 J	19000 J
50-32-8	Benzo(a)pyrene	2394	UG/KG	7400 J	270 J	140 J	5700 J	15000 J
205-99-2	Benzo(b)fluoranthene	2522	UG/KG	9100 J	265 J	150 J	9400 JD	20000 J
191-24-2	Benzo(g,h,i)perylene	1320	UG/KG	1300 J	120 J	75 J	790 J	2900 J
207-08-9	Benzo(k)fluoranthene	1904	UG/KG	3700 J	107 J	ND	4000 J	7400 J
218-01-9	Chrysene	3157	UG/KG	8900 J	285 J	160 J	7200 J	18000 J
53-70-3	Dibenz(a,h)anthracene	160	UG/KG	890 J	ND	ND	370 J	1600 J
206-44-0	Fluoranthene	9002	UG/KG	14000 JD	525 J	240 J	17000 JD	39000 J
86-73-7	Fluorene	1267	UG/KG	2000 J	ND	ND	2700 J	7200 J
193-39-5	Indeno(1,2,3-cd)pyrene	1234	UG/KG	1700 J	120 J	83 J	1100 J	5300 J
91-57-6	2-Methylnaphthalene	230	UG/KG	2700 J	ND	ND	3000 J	6600 J
91-20-3	Naphthalene	770	UG/KG	33000 JD	325 J	82 J	55000 JD	48000 J
85-01-8	Phenanthrene	7336	UG/KG	8300 J	145 J	160 J	15000 JD	28000 J
129-00-0	Pyrene	6170	UG/KG	12000 JD	430 J	220 J	13000 JD	27000 J
	Total PAHs	43960		118020	2928	1503	144860	265200
	INORGANICS							
7429-90-5	Aluminum	7534	MG/KG	2230	4750	4090	1920	1550
7440-36-0	Antimony	7.11	MG/KG	ND	3.2 J	4.1 J	2.7 J	3.4 J
7440-38-2	Arsenic	7.6	MG/KG	19.5	4.6	11.1	17.1	20.1
7440-39-3	Barium	70.8	MG/KG	28.7 J	35.1	33.7	39.1	16.8 J
7440-41-7	Beryllium	0.517	MG/KG	0.3 J	0.35 J	0.37 J	0.18 J	0.13 J
7440-43-9	Cadmium	1.287	MG/KG	0.52 J	0.47 J	ND	0.85	0.5 J
7440-70-2	Calcium	28651	MG/KG	7220	16500	118000	7000	8600
7440-47-3	Chromium	50.9	MG/KG	12.9 J	17.2	17.5	18.7	14
7440-48-4	Cobalt	9	MG/KG	3.1 J	5.5 J	5.1 J	2.4 J	2.1 J
7440-50-8	Copper	57.2	MG/KG	19.5	21.3	18.8	23.9	56.7
7439-89-6	Iron	26702	MG/KG	51300	38550	47500	35600	20100
7439-92-1	Lead	49.8	MG/KG	32.8	28.1	24.4	41.9	55.9
7439-95-4	Magnesium	6431	MG/KG	1310 J	5045	13300	1320	1720
7439-96-5	Manganese	6574	MG/KG	969	641	1860	860	233
7439-97-6	Mercury	0.202	MG/KG	0.28	0.09 J	ND	1.4	2.3
7440-02-0	Nickel	23	MG/KG	6.8 J	14.2	16.7	7.8	7.9
7440-09-7	Potassium	839	MG/KG	201 J	942	370 J	257 J	320 J
7782-49-2	Selenium	-	MG/KG	ND	0.19 J	0.3 J	ND	0.47 J
7440-22-4	Silver	1.5	MG/KG	0.64 J	ND	ND	0.44 J	ND
7440-23-5	Sodium	-	MG/KG	39.1 J	146 J	128 J	24.9 J	36.2 J
7440-28-0	Thallium	-	MG/KG	1.7 J	ND	ND	1.1 J	0.42 J
7440-62-2	Vanadium	23.3	MG/KG	10.1 J	14.7	12.2	7.5 J	5.3 J
7440-66-6	Zinc	129.3	MG/KG	129 J	116 J	133	139	129
57-12-5	Cyanide	-	MG/KG	28.5	2.9	5.3 J	18.8 J	28.9 J

Bold Face - Indicates the maximum concentration detected for the sampling roun

- Indicates a concentration above the 95% UCL-S.

Table 3.2 continued
Cherry Farm / River Road Site
Phase II Validated Sediment Analytical Data

Cherry Farm/River Road Site Tonawanda, NY Validated Sediment Analytical Data Detected Compound Summary - Phase II				SAMPLE ID:	37060D	37060D	37060DD	37060S[MS]	37100S
				DEPTH:	0.75-1.5'	4.5-7.5'	10.5-14'	0-0.75'	0-0.75'
				LAB ID:	070040-03	070071-04	070071-14	070040-02	070040-06
				SOURCE:	NYTEST	NYTEST	NYTEST	NYTEST	NYTEST
				SDG:	CFSED2	CFSED3	CFSED3	CFSED2	CFSED2
				MATRIX:	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT
				SAMPLED:	6/25/96	7/02/96	7/02/96	6/26/96	6/26/96
CAS NO.	COMPOUND	95 % UCL-S		VALIDATED:	9/26/96	9/26/96	9/26/96	9/26/96	9/26/96
				UNITS:					
	SEMIVOLATILES								
84-74-2	Di-n-butylphthalate	140	UG/KG		ND	ND	ND	ND	ND
132-64-9	Dibenzofuran	1300	UG/KG		600 J	1900 J	500 J	780 J	560 J
106-46-7	1,4-Dichlorobenzene	-	UG/KG		ND	ND	ND	ND	ND
84-66-2	Diethylphthalate	-	UG/KG		ND	66 J	ND	ND	ND
105-67-9	2,4-Dimethylphenol	-	UG/KG		ND	ND	ND	ND	ND
106-44-5	4-Methylphenol	560	UG/KG		1200 J	93 J	ND	570 J	65 J
100-02-7	4-Nitrophenol	-	UG/KG		ND	ND	ND	ND	ND
108-95-2	Phenol	-	UG/KG		630 J	ND	ND	350 J	150 J
117-81-7	bis(2-Ethylhexyl)phthalate	1647	UG/KG		91 J	ND	ND	ND	130 J
	PAHs								
83-32-9	Acenaphthene	900	UG/KG		380 J	2800 J	710 J	370 J	600 J
208-96-8	Acenaphthylene	1051	UG/KG		1100 J	1300 J	370 J	455 J	1800 J
120-12-7	Anthracene	1594	UG/KG		1800 J	5100 J	1000 J	2600 J	2400 J
56-55-3	Benzo(a)anthracene	2949	UG/KG		5000 J	7000 J	1300 J	5450 J	3200 J
50-32-8	Benzo(a)pyrene	2394	UG/KG		4000 J	5400 J	1100 J	4045 J	1600 J
205-99-2	Benzo(b)fluoranthene	2522	UG/KG		6200 J	7300 JD	1400 J	6150 J	3700 J
191-24-2	Benzo(g,h,i)perylene	1320	UG/KG		690 J	820 J	570 J	2110 J	460 J
207-08-9	Benzo(k)fluoranthene	1904	UG/KG		2200 J	3000 J	510 J	3400 J	1200 J
219-01-9	Chrysene	3157	UG/KG		4800 J	6200 J	1300 J	6400 J	3800 J
53-70-3	Dibenz(a,h)anthracene	160	UG/KG		280 J	330 J	150 J	600 J	130 J
206-44-0	Fluoranthene	9002	UG/KG		9000 J	17000 JD	3500 J	12600 J	7300 J
86-73-7	Fluorene	1267	UG/KG		1400 J	3600 J	1000 J	1700 J	1600 J
193-39-5	Indeno(1,2,3-cd)pyrene	1234	UG/KG		910 J	1100 J	610 J	2495 J	550 J
91-57-6	2-Methylnaphthalene	230	UG/KG		1500 J	3000 J	250 J	1700 J	5000 J
91-20-3	Naphthalene	770	UG/KG		43000 JD	21000 JD	1900 J	32500 J	59000 JD
85-01-8	Phenanthrene	7336	UG/KG		5200 J	15000 JD	3100 J	7100 J	7700 J
129-00-0	Pyrene	6170	UG/KG		6600 J	12000 JD	2400 J	9000 J	6400 J
	Total PAHs	43960			94040	111950	20270	99475	106740
	INORGANICS								
7429-90-5	Aluminum	7534	MG/KG		1860	7160	4640	5210	1910
7440-36-0	Antimony	7.11	MG/KG		ND	ND	3.4 J	2.5 J	4.4 J
7440-38-2	Arsenic	7.6	MG/KG		19.3	15.3	9.2	14.8	26.2
7440-39-3	Barium	70.8	MG/KG		56.8	90.9 J	51.8	224	26.5 J
7440-41-7	Beryllium	0.517	MG/KG		0.2 J	0.71 J	0.47 J	0.7 J	0.26 J
7440-43-9	Cadmium	1.287	MG/KG		0.71 J	2.4 J	0.52 J	1 J	0.37 J
7440-70-2	Calcium	28651	MG/KG		6730	38900	19100	20420	5500
7440-47-3	Chromium	50.9	MG/KG		13.3	56.4	14.1	36	19.5
7440-48-4	Cobalt	9	MG/KG		2 J	8.9 J	5.6 J	7.4 J	3.6 J
7440-50-8	Copper	57.2	MG/KG		17.8	213	47.4	37.5	31.9
7439-89-6	Iron	26702	MG/KG		35300	103000	58700	126050	59800
7439-92-1	Lead	49.8	MG/KG		37.8	214	48.7	113.1	46.1
7439-95-4	Magnesium	6431	MG/KG		1190	8940	4830	2950	1100
7439-96-5	Manganese	6574	MG/KG		1210	1430	1410	2965	982
7439-97-6	Mercury	0.202	MG/KG		0.85	1.3 J	0.48 J	1.2	0.73
7440-02-0	Nickel	23	MG/KG		6.8	35.5	12.9	14.4 J	14.4
7440-09-7	Potassium	839	MG/KG		214 J	1470 J	885	480 J	115 J
7782-49-2	Selenium	-	MG/KG		0.35 J	0.28 J	0.27 J	0.43 J	0.35 J
7440-22-4	Silver	1.5	MG/KG		0.54 J	2.4 J	ND	ND	ND
7440-23-5	Sodium	-	MG/KG		33.3 J	162 J	138 J	78.8 J	26.9 J
7440-28-0	Thallium	-	MG/KG		1.3 J	ND	ND	0.88 J	0.74 J
7440-62-2	Vanadium	23.3	MG/KG		7.6 J	25.2 J	23.8	27	9.4
7440-66-6	Zinc	129.3	MG/KG		114	520 J	275 J	304	113
57-12-5	Cyanide	-	MG/KG		12.3 J	21.8	30.3	36.2 J	28.7 J

Bold Face - Indicates the maximum concentration detected for the sampling roun

- Indicates a concentration above the 95% UCL-S.

Table 3.2 continued
Cherry Farm / River Road Site
Phase II Validated Sediment Analytical Data

Cherry Farm/River Road Site Tonawanda, NY Validated Sediment Analytical Data Detected Compound Summary - Phase II		95 %	SAMPLE ID: DEPTH: LAB ID: SOURCE: SDG: MATRIX: SAMPLED: VALIDATED:	37100D 0.75-1.5' 070040-07 NYTEST CFSED2 SEDIMENT 6/26/96 9/26/96	37100D 4-6' 070071-05 NYTEST CFSED3 SEDIMENT 7/02/96 9/26/96	37150S 0-0.75' 070040-08 NYTEST CFSED2 SEDIMENT 6/26/96 9/26/96	37200S 0-0.75' 070071-03 NYTEST CFSED3 SEDIMENT 7/02/96 9/26/96	40150S 0-0.75' 070032-11 NYTEST CFSED1 SEDIMENT 6/25/96 9/25/96
CAS NO.	COMPOUND	UCL-S	UNITS:					
	SEMIVOLATILES							
84-74-2	Di-n-butylphthalate	140	UG/KG	ND	ND	ND	ND	ND
132-64-9	Dibenzofuran	1300	UG/KG	5700 J	190 J	130 J	ND	ND
106-46-7	1,4-Dichlorobenzene	-	UG/KG	ND	ND	ND	ND	ND
84-66-2	Diethylphthalate	-	UG/KG	ND	130 J	ND	ND	ND
105-67-9	2,4-Dimethylphenol	-	UG/KG	ND	ND	ND	ND	ND
106-44-5	4-Methylphenol	560	UG/KG	ND	ND	2600 J	ND	3300 J
100-02-7	4-Nitrophenol	-	UG/KG	ND	ND	ND	ND	ND
108-95-2	Phenol	-	UG/KG	ND	ND	140 J	ND	120 J
117-81-7	bis(2-Ethylhexyl)phthalate	1647	UG/KG	ND	ND	170 J	ND	460 J
	PAHs							
83-32-9	Acenaphthene	900	UG/KG	ND	1100 J	130 J	ND	ND
208-96-8	Acenaphthylene	1051	UG/KG	26000 J	76 J	340 J	ND	ND
120-12-7	Anthracene	1594	UG/KG	3800 J	88 J	610 J	ND	ND
56-55-3	Benzo(a)anthracene	2949	UG/KG	3700 J	120 J	1000 J	ND	270 J
50-32-8	Benzo(a)pyrene	2394	UG/KG	ND	86 J	980 J	ND	280 J
205-99-2	Benzo(b)fluoranthene	2522	UG/KG	3000 J	100 J	1100 J	ND	370 J
191-24-2	Benzo(g,h,i)perylene	1320	UG/KG	ND	45 J	420 J	ND	180 J
207-08-9	Benzo(k)fluoranthene	1904	UG/KG	ND	49 J	430 J	ND	ND
219-01-9	Chrysene	3157	UG/KG	4000 J	120 J	1100 J	ND	330 J
53-70-3	Dibenz(a,h)anthracene	160	UG/KG	ND	ND	150 J	ND	ND
206-44-0	Fluoranthene	9002	UG/KG	11000 J	340 J	2200 J	ND	680 J
86-73-7	Fluorene	1267	UG/KG	7900 J	970 J	350 J	ND	ND
193-39-5	Indeno(1,2,3-cd)pyrene	1234	UG/KG	ND	42 J	440 J	ND	190 J
91-57-6	2-Methylnaphthalene	230	UG/KG	36000 J	76 J	150 J	ND	ND
91-20-3	Naphthalene	770	UG/KG	320000 J	140 J	450 J	ND	500 J
85-01-8	Phenanthrene	7336	UG/KG	17000 J	260 J	2100 J	ND	560 J
129-00-0	Pyrene	6170	UG/KG	9000 J	270 J	1900 J	ND	560 J
	Total PAHs	43960		441400	3882	13850	ND	3920
	INORGANICS							
7429-90-5	Aluminum	7534	MG/KG	1160	2240	2140	1530	5430
7440-36-0	Antimony	7.11	MG/KG	ND	ND	ND	ND	3.8 J
7440-38-2	Arsenic	7.6	MG/KG	16.2	0.43 J	5.1	2.4	3.5
7440-39-3	Barium	70.8	MG/KG	20.3 J	14.8 J	22 J	5.8 J	59.9
7440-41-7	Beryllium	0.517	MG/KG	0.18 J	0.18 J	0.17 J	0.11 J	0.41 J
7440-43-9	Cadmium	1.287	MG/KG	0.38 J	0.2 J	0.6 J	0.2 J	0.75 J
7440-70-2	Calcium	28651	MG/KG	3280	9320	48900	7810	48900
7440-47-3	Chromium	50.9	MG/KG	13.9	6.2	5.7	2.9	12 J
7440-48-4	Cobalt	9	MG/KG	2.3 J	2.4 J	1.9 J	2 J	6.3 J
7440-50-8	Copper	57.2	MG/KG	31	6.5	10.6	2.3 J	33
7439-89-6	Iron	26702	MG/KG	45200	17600	8940	4350	41000
7439-92-1	Lead	49.8	MG/KG	55.4	9.3	9	3.8	20.2
7439-95-4	Magnesium	6431	MG/KG	567 J	2870	1760	2640	3390 J
7439-96-5	Manganese	6574	MG/KG	765	318	161	72.7	402
7439-97-6	Mercury	0.202	MG/KG	1	0.1 J	0.03 J	0.07 J	ND
7440-02-0	Nickel	23	MG/KG	11.1	5.8	9.2	4.4 J	20.3
7440-09-7	Potassium	839	MG/KG	105 J	443 J	367 J	314 J	900
7782-49-2	Selenium	-	MG/KG	0.27 J	ND	0.23 J	ND	0.47 J
7440-22-4	Silver	1.5	MG/KG	ND	ND	ND	ND	ND
7440-23-5	Sodium	-	MG/KG	19.3 J	99 J	238 J	75.3 J	439 J
7440-28-0	Thallium	-	MG/KG	0.51 J	ND	ND	ND	0.32 J
7440-62-2	Vanadium	23.3	MG/KG	7.7	12.6	5.1 J	4.1 J	13.8 J
7440-66-6	Zinc	129.3	MG/KG	315	55.9 J	41.5	22.4 J	123 J
57-12-5	Cyanide	-	MG/KG	20.5 J	1.8	2.3 J	ND	1.6

Bold Face - Indicates the maximum concentration detected for the sampling roun

- Indicates a concentration above the 95% UCL-S.

Table 3.2 continued
Cherry Farm / River Road Site
Phase II Validated Sediment Analytical Data

Cherry Farm/River Road Site Tonawanda, NY Validated Sediment Analytical Data Detected Compound Summary - Phase II			SAMPLE ID: DEPTH: LAB ID: SOURCE: SDG: MATRIX: SAMPLED: VALIDATED:	40150D 2.5-3.5' 070071-12 NYTEST CFSED3 SEDIMENT 7/02/96 9/26/96	43060S 0-0.5' 070032-12 NYTEST CFSED1 SEDIMENT 6/25/96 9/25/96	43060D 1-2' 070071-06 NYTEST CFSED3 SEDIMENT 7/02/96 9/26/96	43100S 0-0.5' 070032-13 NYTEST CFSED1 SEDIMENT 6/25/96 9/25/96	43100D 1-2' 070071-07 NYTEST CFSED3 SEDIMENT 7/02/96 9/26/96
CAS NO.	COMPOUND	95 % UCL-S	UNITS:					
	SEMIVOLATILES							
84-74-2	Di-n-butylphthalate	140	UG/KG	ND	ND	ND	ND	ND
132-64-9	Dibenzofuran	1300	UG/KG	770 J	2100 J	390 J	200 J	1700 J
106-46-7	1,4-Dichlorobenzene	-	UG/KG	ND	ND	ND	ND	ND
84-66-2	Diethylphthalate	-	UG/KG	ND	ND	ND	ND	69 J
105-67-9	2,4-Dimethylphenol	-	UG/KG	ND	ND	ND	ND	ND
106-44-5	4-Methylphenol	560	UG/KG	ND	ND	ND	150 J	ND
100-02-7	4-Nitrophenol	-	UG/KG	ND	ND	ND	ND	ND
108-95-2	Phenol	-	UG/KG	ND	ND	ND	ND	ND
117-81-7	bis(2-Ethylhexyl)phthalate	1647	UG/KG	ND	ND	ND	ND	ND
	PAHs							
83-32-9	Acenaphthene	900	UG/KG	2800 J	1600 J	480 J	120 J	1400 J
208-96-8	Acenaphthylene	1051	UG/KG	1500 J	4700 J	1600 J	320 J	2700 J
120-12-7	Anthracene	1594	UG/KG	2900 J	12000 J	47 J	520 J	7700 JD
56-55-3	Benzo(a)anthracene	2949	UG/KG	4400 J	17000 J	1200 J	880 J	12000 JD
50-32-8	Benzo(a)pyrene	2394	UG/KG	3600 J	14000 J	910 J	860 J	10000 JD
205-99-2	Benzo(b)fluoranthene	2522	UG/KG	4500 J	15000 J	810 J	880 J	12000 JD
191-24-2	Benzo(g,h,i)perylene	1320	UG/KG	850 J	6200 J	360 J	500 J	1300 J
207-08-9	Benzo(k)fluoranthene	1904	UG/KG	1500 J	4800 J	290 J	ND	5000 J
219-01-9	Chrysene	3157	UG/KG	4200 J	20000 J	50 J	920 J	12000 JD
53-70-3	Dibenz(a,h)anthracene	160	UG/KG	290 J	2000 J	110 J	ND	500 J
206-44-0	Fluoranthene	9002	UG/KG	12000 JD	29000 J	2100 J	1500 J	30000 JD
86-73-7	Fluorene	1267	UG/KG	3400 J	7400 J	2000 J	480 J	5300 J
193-39-5	Indeno(1,2,3-cd)pyrene	1234	UG/KG	1100 J	8500 J	310 J	450 J	1800 J
91-57-6	2-Methylnaphthalene	230	UG/KG	120 J	8300 J	4100 J	300 J	320 J
91-20-3	Naphthalene	770	UG/KG	740 J	3300 J	1800 J	360 J	2100 J
85-01-8	Phenanthrene	7336	UG/KG	8300 JD	40000 J	6400 J	2200 J	27000 JD
129-00-0	Pyrene	6170	UG/KG	9600 JD	32000 J	2700 J	1600 J	24000 JD
	Total PAHs	43960		62000	221900	25267	11890	156220
	INORGANICS							
7429-90-5	Aluminum	7534	MG/KG	4700	3330	6240	990	5430
7440-36-0	Antimony	7.11	MG/KG	ND	4.4 J	17.3 J	ND	12.5 J
7440-38-2	Arsenic	7.6	MG/KG	15.2	16.7	19.4	14.5	15
7440-39-3	Barium	70.8	MG/KG	54.4 J	94.1	118 J	22 J	154
7440-41-7	Beryllium	0.517	MG/KG	0.88 J	0.38 J	1.4 J	0.14 J	1.3 J
7440-43-9	Cadmium	1.287	MG/KG	0.98 J	ND	1.3 J	0.44 J	1.9 J
7440-70-2	Calcium	28651	MG/KG	25900	91500	13800	8700	16000
7440-47-3	Chromium	50.9	MG/KG	41.8	58.7 J	58.3	62.1 J	52.6
7440-48-4	Cobalt	9	MG/KG	8.2 J	4.9 J	13.3 J	2.3 J	9.9 J
7440-50-8	Copper	57.2	MG/KG	50.1	34.1	84.4	12.5	54.5
7439-89-6	Iron	26702	MG/KG	151000	64500	300000	37900	257000
7439-92-1	Lead	49.8	MG/KG	54.2	35.4	85.2	13.1	62.8
7439-95-4	Magnesium	6431	MG/KG	5220	4650 J	2210 J	2460 J	2340 J
7439-96-5	Manganese	6574	MG/KG	2510	3140	5470	1410	7730
7439-97-6	Mercury	0.202	MG/KG	0.24 J	0.18	0.38 J	0.05 J	0.96 J
7440-02-0	Nickel	23	MG/KG	30.5	19	39.4	10	11.9 J
7440-09-7	Potassium	839	MG/KG	497 J	341 J	ND	108 J	379 J
7782-49-2	Selenium	-	MG/KG	0.36 J	ND	0.43 J	0.38 J	ND
7440-22-4	Silver	1.5	MG/KG	ND	ND	ND	ND	2.4 J
7440-23-5	Sodium	-	MG/KG	126 J	338 J	28.1 J	31.8 J	47.8 J
7440-28-0	Thallium	-	MG/KG	ND	ND	ND	ND	ND
7440-62-2	Vanadium	23.3	MG/KG	28.8 J	40.5 J	43.2	10 J	43.8
7440-66-6	Zinc	129.3	MG/KG	250 J	198 J	463 J	86.4 J	279 J
57-12-5	Cyanide	-	MG/KG	22	15.8	25.9	20.1	23.4

Bold Face - Indicates the maximum concentration detected for the sampling roun

- Indicates a concentration above the 95% UCL-S.

Table 3.2 continued
Cherry Farm / River Road Site
Phase II Validated Sediment Analytical Data

Cherry Farm/River Road Site Tonawanda, NY Validated Sediment Analytical Data Detected Compound Summary - Phase II				SAMPLE ID: DEPTH: LAB ID: SOURCE: SDG: MATRIX: SAMPLED: VALIDATED:	43150S 0-0.5' 070032-14 NYTEST CFSED1 SEDIMENT 6/25/96 9/25/96	45020S 0-0.75' 070032-17 NYTEST CFSED1 SEDIMENT 6/25/96 9/25/96	45020D 1-2' 070071-08 NYTEST CFSED3 SEDIMENT 7/01/96 9/26/96	45100S 0-0.75' 070032-18 NYTEST CFSED1 SEDIMENT 6/25/96 9/25/96	45100D 1-2' 070071-09 NYTEST CFSED3 SEDIMENT 7/01/96 9/26/96
CAS NO.	COMPOUND	95 % UCL-S	UNITS:						
	SEMIVOLATILES								
84-74-2	Di-n-butylphthalate	140	UG/KG	ND	ND	59 J	ND	ND
132-64-9	Dibenzofuran	1300	UG/KG	3700 J	1500 J	4200 J	480 J	3900 J
106-46-7	1,4-Dichlorobenzene	-	UG/KG	ND	ND	ND	ND	ND
84-66-2	Diethylphthalate	-	UG/KG	ND	ND	ND	ND	ND
105-67-9	2,4-Dimethylphenol	-	UG/KG	ND	ND	ND	ND	ND
106-44-5	4-Methylphenol	560	UG/KG	920 J	ND	ND	450 J	ND
100-02-7	4-Nitrophenol	-	UG/KG	ND	ND	ND	ND	ND
108-95-2	Phenol	-	UG/KG	ND	ND	65 J	ND	ND
117-81-7	bis(2-Ethylhexyl)phthalate	1647	UG/KG	ND	ND	ND	ND	ND
	PAHs							
83-32-9	Acenaphthene	900	UG/KG	6900 J	570 J	960 J	580 J	2900 J
208-96-8	Acenaphthylene	1051	UG/KG	1600 J	2800 J	12000 JD	ND	2300 J
120-12-7	Anthracene	1594	UG/KG	9900 J	6400 J	11000 JD	1100 J	6700 J
56-55-3	Benzo(a)anthracene	2949	UG/KG	7500 J	7900 J	11000 JD	1800 J	8100 JD
50-32-8	Benzo(a)pyrene	2394	UG/KG	7200 J	7400 J	9000 J	1500 J	6700 J
205-99-2	Benzo(b)fluoranthene	2522	UG/KG	7300 J	8200 J	9100 JD	1800 J	7200 JD
191-24-2	Benzo(g,h,i)perylene	1320	UG/KG	4200 J	3800 J	1200 J	760 J	1000 J
207-08-9	Benzo(k)fluoranthene	1904	UG/KG	3500 J	2900 J	4000 J	690 J	2800 JD
219-01-9	Chrysene	3157	UG/KG	7900 J	7500 J	11000 JD	1800 J	7600 JD
53-70-3	Dibenz(a,h)anthracene	160	UG/KG	810 J	900 J	460 J	210 J	400 J
206-44-0	Fluoranthene	9002	UG/KG	24000 J	25000 JD	25000 JD	4400 J	20000 JD
86-73-7	Fluorene	1267	UG/KG	6100 J	3400 J	10000 JD	710 J	6500 J
193-39-5	Indeno(1,2,3-cd)pyrene	1234	UG/KG	4000 J	4000 J	1600 J	830 J	1400 J
91-57-6	2-Methylnaphthalene	230	UG/KG	790 J	530 J	9500 JD	190 J	240 J
91-20-3	Naphthalene	770	UG/KG	1700 J	1300 J	30000 JD	220 J	700 J
85-01-8	Phenanthrene	7336	UG/KG	32000 J	22000 JD	39000 JD	4800 J	26000 JD
129-00-0	Pyrene	6170	UG/KG	20000 J	18000 JD	24000 JD	3500 J	17000 JD
	Total PAHs	43960		145400	122700	204840	24890	117640
	INORGANICS							
7429-90-5	Aluminum	7534	MG/KG	3360	3090	6040	2500	2750
7440-36-0	Antimony	7.11	MG/KG	ND	3.9 J	ND	2.8 J	2.3 J
7440-38-2	Arsenic	7.6	MG/KG	5.7	0.24 J	19	5.9	10.2
7440-39-3	Barium	70.8	MG/KG	49.6	41.8	126 J	33.8	19.1 J
7440-41-7	Beryllium	0.517	MG/KG	0.25 J	0.14 J	0.94 J	0.17 J	0.31 J
7440-43-9	Cadmium	1.287	MG/KG	0.36 J	0.44 J	2.5 J	0.68 J	0.64
7440-70-2	Calcium	28651	MG/KG	87100	43500	83500	79800	18500
7440-47-3	Chromium	50.9	MG/KG	16 J	204 J	165	33.8 J	17.9
7440-48-4	Cobalt	9	MG/KG	3.6 J	0.68 J	8.6 J	3.8 J	3.3 J
7440-50-8	Copper	57.2	MG/KG	21.6	7	77.9	27.2	18.2
7439-89-6	Iron	26702	MG/KG	35300	18000	162000	32100	36800
7439-92-1	Lead	49.8	MG/KG	15.7	9	114	20	26.6
7439-95-4	Magnesium	6431	MG/KG	3810 J	5640 J	8470	31200 J	4120
7439-96-5	Manganese	6574	MG/KG	843	5760	6070	745	986
7439-97-6	Mercury	0.202	MG/KG	0.03 J	0.05 J	0.67 J	0.04 J	0.15 J
7440-02-0	Nickel	23	MG/KG	11.4	2.9 J	40.8	30	11.9
7440-09-7	Potassium	839	MG/KG	663 J	63.5 J	ND	497 J	414 J
7782-49-2	Selenium	-	MG/KG	ND	ND	0.98 J	ND	0.67
7440-22-4	Silver	1.5	MG/KG	ND	ND	ND	ND	ND
7440-23-5	Sodium	-	MG/KG	471 J	47.5 J	130 J	197 J	98.7 J
7440-28-0	Thallium	-	MG/KG	ND	0.21 J	ND	ND	ND
7440-62-2	Vanadium	23.3	MG/KG	13.9 J	49.3 J	54.8	12.3 J	10.8
7440-66-6	Zinc	129.3	MG/KG	82.6 J	37.5 J	564 J	67.2 J	110 J
57-12-5	Cyanide	-	MG/KG	5	15.2	18	3	10

Bold Face - Indicates the maximum concentration detected for the sampling roun

- Indicates a concentration above the 95% UCL-S.

Table 3.2 continued
Cherry Farm / River Road Site
Phase II Validated Sediment Analytical Data

Cherry Farm/River Road Site Tonawanda, NY Validated Sediment Analytical Data Detected Compound Summary - Phase II			SAMPLE ID: DEPTH: LAB ID: SOURCE: SDG: MATRIX: SAMPLED:	46150S 0-0.75' 070032-19 NYTEST CFSED1 SEDIMENT 6/24/96	46150S 0-0.75' 070040-14 NYTEST CFSED2 SEDIMENT 6/24/96	50060S 0-0.75' 070040-09 NYTEST CFSED2 SEDIMENT 6/26/96	50060D 0.75-1.5' 070071-10 NYTEST CFSED3 SEDIMENT 7/02/96	78100S 0-2' 070071-11 NYTEST CFSED3 SEDIMENT 7/02/96
CAS NO.	COMPOUND	95 % UCL-S	VALIDATED: UNITS:	9/25/96	9/26/96	9/26/96	9/26/96	9/26/96
	SEMIVOLATILES							
84-74-2	Di-n-butylphthalate	140	UG/KG	ND	ND	ND	ND	ND
132-64-9	Dibenzofuran	1300	UG/KG	ND	71 J	ND	1000 J	ND
106-46-7	1,4-Dichlorobenzene	-	UG/KG	ND	ND	ND	ND	ND
84-66-2	Diethylphthalate	-	UG/KG	ND	ND	ND	ND	ND
105-67-9	2,4-Dimethylphenol	-	UG/KG	ND	ND	NA	ND	ND
106-44-5	4-Methylphenol	560	UG/KG	ND	1200 J	NA	75 J	ND
100-02-7	4-Nitrophenol	-	UG/KG	ND	ND	NA	ND	ND
108-95-2	Phenol	-	UG/KG	ND	63 J	NA	ND	ND
117-81-7	bis(2-Ethylhexyl)phthalate	1647	UG/KG	ND	240 J	120 J	ND	ND
	PAHs							
83-32-9	Acenaphthene	900	UG/KG	ND	48 J	ND	610 J	ND
208-96-8	Acenaphthylene	1051	UG/KG	ND	100 J	ND	1400 J	ND
120-12-7	Anthracene	1594	UG/KG	ND	190 J	ND	3800 J	ND
56-55-3	Benzo(a)anthracene	2949	UG/KG	ND	390 J	120 J	5300 J	ND
50-32-8	Benzo(a)pyrene	2394	UG/KG	ND	340 J	130 J	4600 J	ND
205-99-2	Benzo(b)fluoranthene	2522	UG/KG	ND	440 J	180 J	5400 J	ND
191-24-2	Benzo(g,h,i)perylene	1320	UG/KG	ND	110 J	47 J	1600 J	ND
207-08-9	Benzo(k)fluoranthene	1904	UG/KG	ND	190 J	72 J	2200 J	ND
219-01-9	Chrysene	3157	UG/KG	ND	430 J	160 J	180 J	ND
53-70-3	Dibenz(a,h)anthracene	160	UG/KG	ND	ND	ND	490 J	ND
206-44-0	Fluoranthene	9002	UG/KG	ND	990 J	270 J	14000 JD	ND
86-73-7	Fluorene	1267	UG/KG	ND	130 J	ND	2500 J	ND
193-39-5	Indeno(1,2,3-cd)pyrene	1234	UG/KG	ND	130 J	59 J	1800 J	ND
91-57-6	2-Methylnaphthalene	230	UG/KG	ND	ND	ND	340 J	ND
91-20-3	Naphthalene	770	UG/KG	ND	150 J	ND	500 J	ND
85-01-8	Phenanthrene	7336	UG/KG	ND	740 J	150 J	14000 JD	ND
129-00-0	Pyrene	6170	UG/KG	ND	680 J	220 J	11000 JD	ND
	Total PAHs	43960		ND	5058	1406	69820	ND
	INORGANICS							
7429-90-5	Aluminum	7534	MG/KG	2590	2210	2880	5490	5800
7440-36-0	Antimony	7.11	MG/KG	ND	ND	ND	2.6 J	ND
7440-38-2	Arsenic	7.6	MG/KG	ND	4.7	3.1	4.6	3.5
7440-39-3	Barium	70.8	MG/KG	13.4 J	36.6	25.6	41.3	14.1 J
7440-41-7	Beryllium	0.517	MG/KG	0.1 J	0.11 J	0.17 J	0.81 J	0.28 J
7440-43-9	Cadmium	1.287	MG/KG	0.52 J	0.34 J	0.29 J	0.42 J	0.24 J
7440-70-2	Calcium	28651	MG/KG	21500	129000	61000	21200	37700
7440-47-3	Chromium	50.9	MG/KG	4.9 J	6.3	6.5	14.9	10.2
7440-48-4	Cobalt	9	MG/KG	3.1 J	1.9 J	2.4 J	3.6 J	5.2 J
7440-50-8	Copper	57.2	MG/KG	8.1	9.8	7.6	26.3	14.2
7439-89-6	Iron	26702	MG/KG	8940	5570	6980	13700	11800
7439-92-1	Lead	49.8	MG/KG	7.4	5.4	22.2	15.4	10.7
7439-95-4	Magnesium	6431	MG/KG	7550 J	3890	4130	4290	15300
7439-96-5	Manganese	6574	MG/KG	203	158	201	180	216
7439-97-6	Mercury	0.202	MG/KG	ND	ND	ND	0.09 J	0.1 J
7440-02-0	Nickel	23	MG/KG	10.2	7	9	12.6	16.4
7440-09-7	Potassium	839	MG/KG	449 J	457 J	546 J	847	1410
7782-49-2	Selenium	-	MG/KG	ND	0.48 J	ND	0.27 J	0.19 J
7440-22-4	Silver	1.5	MG/KG	ND	ND	ND	0.36 J	ND
7440-23-5	Sodium	-	MG/KG	80.5 J	571 J	278 J	159 J	122 J
7440-28-0	Thallium	-	MG/KG	ND	ND	ND	ND	ND
7440-62-2	Vanadium	23.3	MG/KG	9 J	5.4 J	7.4	11.9	12.6
7440-66-6	Zinc	129.3	MG/KG	46.5 J	37.2	40.8	65.7 J	36.9 J
57-12-5	Cyanide	-	MG/KG	ND	ND	0.31 J	ND	ND

Bold Face - Indicates the maximum concentration detected for the sampling roun

- Indicates a concentration above the 95% UCL-S.

Table 3.2 continued
Cherry Farm / River Road Site
Phase II Validated Sediment Analytical Data

Cherry Farm/River Road Site Tonawanda, NY Validated Sediment Analytical Data Detected Compound Summary - Phase II			SAMPLE ID: DEPTH: LAB ID: SOURCE: SDG: MATRIX: SAMPLED: VALIDATED:	80060S 0-0.75' 070040-10 NYTEST CFSED2 SEDIMENT 6/26/96 9/26/96	82020S 0-0.75' 070040-11 NYTEST CFSED2 SEDIMENT 6/26/96 9/26/96	82100S 0-0.75' 070040-12 NYTEST CFSED2 SEDIMENT 6/26/96 9/26/96	SWALE[dup] 0-0.75' 070032-15 NYTEST CFSED1 SEDIMENT 6/25/96 9/25/96
CAS NO.	COMPOUND	95 % UCL-S	UNITS:				
	SEMIVOLATILES						
84-74-2	Di-n-butylphthalate	140	UG/KG	ND	ND	ND	ND
132-64-9	Dibenzofuran	1300	UG/KG	4000 J	ND	ND	470 J
106-46-7	1,4-Dichlorobenzene	-	UG/KG	ND	ND	ND	ND
84-66-2	Diethylphthalate	-	UG/KG	ND	ND	ND	ND
105-67-9	2,4-Dimethylphenol	-	UG/KG	ND	ND	ND	ND
106-44-5	4-Methylphenol	560	UG/KG	ND	ND	ND	ND
100-02-7	4-Nitrophenol	-	UG/KG	ND	ND	ND	ND
108-95-2	Phenol	-	UG/KG	ND	ND	ND	ND
117-81-7	bis(2-Ethylhexyl)phthalate	1647	UG/KG	ND	ND	ND	130 J
	PAHs						
83-32-9	Acenaphthene	900	UG/KG	1100 J	ND	ND	350 J
208-96-8	Acenaphthylene	1051	UG/KG	3600 J	ND	ND	505 J
120-12-7	Anthracene	1594	UG/KG	9000 J	ND	ND	880 J
56-55-3	Benzo(a)anthracene	2949	UG/KG	12000 J	ND	ND	2600 J
50-32-8	Benzo(a)pyrene	2394	UG/KG	8900 J	80 J	ND	2450 J
205-99-2	Benzo(b)fluoranthene	2522	UG/KG	12000 J	ND	ND	3550 J
191-24-2	Benzo(g,h,i)perylene	1320	UG/KG	4700 J	ND	ND	1950 J
207-08-9	Benzo(k)fluoranthene	1904	UG/KG	4200 J	ND	ND	1400 J
219-01-9	Chrysene	3157	UG/KG	10000 J	ND	ND	2900 J
53-70-3	Dibenz(a,h)anthracene	160	UG/KG	1100 J	ND	ND	505 J
206-44-0	Fluoranthene	9002	UG/KG	33000 J	ND	53 J	4300 J
86-73-7	Fluorene	1267	UG/KG	7900 J	ND	ND	565 J
193-39-5	Indeno(1,2,3-cd)pyrene	1234	UG/KG	4900 J	ND	ND	2000 J
91-57-6	2-Methylnaphthalene	230	UG/KG	520 J	ND	ND	195 J
91-20-3	Naphthalene	770	UG/KG	730 J	ND	51 J	3800 J
85-01-8	Phenanthrene	7336	UG/KG	37000 J	ND	ND	2300 J
129-00-0	Pyrene	6170	UG/KG	24000 J	ND	ND	3800 J
	Total PAHs	43960		178650	80	104	34050
	INORGANICS						
7429-90-5	Aluminum	7534	MG/KG	3900	3520	3610	6900
7440-36-0	Antimony	7.11	MG/KG	ND	ND	ND	ND
7440-38-2	Arsenic	7.6	MG/KG	3.9	3.4	2.3	31.8
7440-39-3	Barium	70.8	MG/KG	24.4 J	12.4 J	17.7 J	128.1
7440-41-7	Beryllium	0.517	MG/KG	0.23 J	0.16 J	0.18 J	0.8 J
7440-43-9	Cadmium	1.287	MG/KG	0.49 J	ND	0.49 J	0.62 J
7440-70-2	Calcium	28651	MG/KG	13100	5600	5760	49250
7440-47-3	Chromium	50.9	MG/KG	12	6.7	6.6	522 J
7440-48-4	Cobalt	9	MG/KG	4 J	4.2 J	4.2 J	4.8 J
7440-50-8	Copper	57.2	MG/KG	10.9	4.8	9.6	54.5
7439-89-6	Iron	26702	MG/KG	8590	9320	7960	17650
7439-92-1	Lead	49.8	MG/KG	15.2	6.3	7.2	28.2
7439-95-4	Magnesium	6431	MG/KG	2600	3510	3360	10410 J
7439-96-5	Manganese	6574	MG/KG	119	85.7	87.4	10145
7439-97-6	Mercury	0.202	MG/KG	0.04 J	0.06 J	ND	0.17
7440-02-0	Nickel	23	MG/KG	13.5	9.3	11.4	18.3
7440-09-7	Potassium	839	MG/KG	653	671	742	264 J
7782-49-2	Selenium	-	MG/KG	ND	ND	ND	1.03
7440-22-4	Silver	1.5	MG/KG	6.5	ND	ND	ND
7440-23-5	Sodium	-	MG/KG	118 J	87.7 J	135 J	113 J
7440-28-0	Thallium	-	MG/KG	ND	ND	ND	ND
7440-62-2	Vanadium	23.3	MG/KG	14.2	13.3	8.8	84.8 J
7440-66-6	Zinc	129.3	MG/KG	78.6	32	44.8	128 J
57-12-5	Cyanide	-	MG/KG	ND	ND	ND	19.1

Bold Face - Indicates the maximum concentration detected for the sampling roun

- Indicates a concentration above the 95% UCL-S.

CHERRY FARM\RIVER ROAD SITE Tonawanda, NY Sediment Analytical Data Phase III		SAMPLE ID: DEPTH: LAB ID: SOURCE: SDG: MATRIX: SAMPLED:	32050 3-4' 150101 COLUMBIA 10145 SOIL 5/27/97	345050 4-6' 150814 COLUMBIA 10145 SOIL 5/29/97	345100 10-12' 150820 COLUMBIA 10145 SOIL 5/29/97	345150 11-12' 150818 COLUMBIA 10145 SOIL 5/30/97	345200 0-2' 150815 COLUMBIA 10145 SOIL 5/30/97
CAS NO.	COMPOUND	UNITS:					
	PAHs						
83-32-9	Acenaphthene	UG/KG	480 U	470 U	400 U	120 UJ	53000
208-96-8	Acenaphthylene	UG/KG	480 U	470 U	400 U	220 UJ	19000
120-12-7	Anthracene	UG/KG	480 U	470 U	400 U	760	41000
56-55-3	Benzo(a)anthracene	UG/KG	480 U	470 U	400 U	1700	48000
50-32-8	Benzo(a)pyrene	UG/KG	480 U	440 UJ	400 U	1300	40000
205-99-2	Benzo(b)fluoranthene	UG/KG	480 U	470 U	400 U	1400	35000
191-24-2	Benzo(g,h,i)perylene	UG/KG	480 U	470 U	400 U	530 U	12000
207-08-9	Benzo(k)fluoranthene	UG/KG	480 U	470 U	400 U	1000	18000
219-01-9	Chrysene	UG/KG	110 UJ	470 U	400 U	1300	46000
53-70-3	Dibenz(a,h)anthracene	UG/KG	480 U	470 U	400 U	430 U	5900
206-44-0	Fluoranthene	UG/KG	190 UJ	470 U	400 U	3500	73000
86-73-7	Fluorene	UG/KG	480 U	470 U	400 U	230 UJ	59000
193-39-5	Indeno(1,2,3-cd)pyrene	UG/KG	480 U	470 U	400 U	610	11000
91-20-3	Naphthalene	UG/KG	180 UJ	470 U	400 U	140 UJ	17000
85-01-8	Phenanthrene	UG/KG	120 UJ	470 U	400 U	1700	130000
129-00-0	Pyrene	UG/KG	180 UJ	470 U	400 U	2600	100000
	OTHER						
SOLIDS	Percent Solids	%	68.5	70.6	83	77.2	77.7

CHERRY FARM\RIVER ROAD SITE Tonawanda, NY Sediment Analytical Data Phase III		SAMPLE ID: DEPTH: LAB ID: SOURCE: SDG: MATRIX: SAMPLED:	370020 8-10' 150821 COLUMBIA 10145 SOIL 5/29/97	37020 10-12' 150102 COLUMBIA 10145 SOIL 5/27/97	385040 10-12' 150292 COLUMBIA 10145 SOIL 5/28/97	385040 12-14' 150823 COLUMBIA 10145 SOIL 5/28/97	385100 4-6' 150822 COLUMBIA 10145 SOIL 5/28/97
CAS NO.	COMPOUND	UNITS:					
	PAHs						
83-32-9	Acenaphthene	UG/KG	5300 U	150 UJ	4400 U	410 U	6800
208-96-8	Acenaphthylene	UG/KG	5800 U	370 U	8500	150 UJ	12000
120-12-7	Anthracene	UG/KG	11000	110 UJ	13000	280 UJ	15000
56-55-3	Benzo(a)anthracene	UG/KG	13000	130 UJ	12000	370 UJ	15000
50-32-8	Benzo(a)pyrene	UG/KG	10000	97 UJ	9700	280 UJ	12000
205-99-2	Benzo(b)fluoranthene	UG/KG	13000	110 UJ	9800	300 UJ	11000
191-24-2	Benzo(g,h,i)perylene	UG/KG	5300 U	370 U	4400 U	120 UJ	4500 U
207-08-9	Benzo(k)fluoranthene	UG/KG	6800 U	370 U	6500	180 UJ	7400
219-01-9	Chrysene	UG/KG	11000	100 UJ	10000	300 UJ	13000
53-70-3	Dibenz(a,h)anthracene	UG/KG	5300 U	370 U	4400 U	410 U	4400 U
206-44-0	Fluoranthene	UG/KG	32000	400 U	29000	830	29000
86-73-7	Fluorene	UG/KG	11000	370 U	13000	260 UJ	16000
193-39-5	Indeno(1,2,3-cd)pyrene	UG/KG	5300 U	370 U	4400 U	120 UJ	4400 U
91-20-3	Naphthalene	UG/KG	26000	210 UJ	15000	250 UJ	39000
85-01-8	Phenanthrene	UG/KG	35000	310 UJ	37000	890	50000
129-00-0	Pyrene	UG/KG	23000	280 UJ	21000	600	31000
	OTHER						
SOLIDS	Percent Solids	%	62	89.3	75.5	81.2	75.3

CHERRY FARM\RIVER ROAD SITE Tonawanda, NY Sediment Analytical Data Phase III		SAMPLE ID: DEPTH: LAB ID: SOURCE: SDG: MATRIX: SAMPLED:	385100 7.5-10' 150293 COLUMBIA 10145 SOIL 5/28/97	400075 6-8' 150594 COLUMBIA 10145 SOIL 5/28/97	40040 12-14' 150294 COLUMBIA 10145 SOIL 5/28/97	40100 8-10' 150295 COLUMBIA 10145 SOIL 5/28/97	413060 10-12' 150817 COLUMBIA 10145 SOIL 5/30/97
CAS NO.	COMPOUND	UNITS:					
	PAHs						
83-32-9	Acenaphthene	UG/KG	640	810	180 UJ	960	290 UJ
208-96-8	Acenaphthylene	UG/KG	2100	690	1200	1100	2500
120-12-7	Anthracene	UG/KG	2000	520	1800	1400	3000
56-55-3	Benzo(a)anthracene	UG/KG	2000	1500	1800	3100	2800
50-32-8	Benzo(a)pyrene	UG/KG	1900	1300	1500	2600	2000
205-99-2	Benzo(b)fluoranthene	UG/KG	1600	1500	1500	2700	2400
191-24-2	Benzo(g,h,i)perylene	UG/KG	670	620	610	1000	750 J
207-08-9	Benzo(k)fluoranthene	UG/KG	880	690	840	1500	1300
219-01-9	Chrysene	UG/KG	2000	1400	1500	2800	2500
53-70-3	Dibenz(a,h)anthracene	UG/KG	230 UJ	390 U	240 UJ	370 UJ	380 UJ
206-44-0	Fluoranthene	UG/KG	3400	3600	4100	6300	6300
86-73-7	Fluorene	UG/KG	2100	820	1700	3100	3100
193-39-5	Indeno(1,2,3-cd)pyrene	UG/KG	610	620	660	1100	830
91-20-3	Naphthalene	UG/KG	5200	390 U	1700	470	2300
85-01-8	Phenanthrene	UG/KG	6200	1200	5000	3400	8400
129-00-0	Pyrene	UG/KG	4400	2300	3200	5500	4500
	OTHER						
SOLIDS	Percent Solids	%	88.7	84.4	82	84.8	79.9

CHERRY FARM\RIVER ROAD SITE Tonawanda, NY Sediment Analytical Data Phase III		SAMPLE ID: DEPTH: LAB ID: SOURCE: SDG: MATRIX: SAMPLED:	413150 0-2' 150812 COLUMBIA 10145 SOIL 5/30/97	430100 5-7' 150597 COLUMBIA 10145 SOIL 5/29/97	430150 1-2' 150598 COLUMBIA 10145 SOIL 5/29/97	450060 7-8' 150819 COLUMBIA 10145 SOIL 5/29/97
CAS NO.	COMPOUND	UNITS:				
	PAHs					
83-32-9	Acenaphthene	UG/KG	420 U	410 U	430 U	230 UJ
208-96-8	Acenaphthylene	UG/KG	440 U	410 U	400 U	220 UJ
120-12-7	Anthracene	UG/KG	1100	410 U	400 U	540 U
56-55-3	Benzo(a)anthracene	UG/KG	1800	410 U	400 U	660
50-32-8	Benzo(a)pyrene	UG/KG	1500	410 U	400 U	540 U
205-99-2	Benzo(b)fluoranthene	UG/KG	1700	410 U	400 U	600
191-24-2	Benzo(g,h,i)perylene	UG/KG	800	410 U	400 U	220 UJ
207-08-9	Benzo(k)fluoranthene	UG/KG	1000	410 U	400 U	360 UJ
219-01-9	Chrysene	UG/KG	1700	420 U	400 U	560
53-70-3	Dibenz(a,h)anthracene	UG/KG	280 UJ	410 U	400 U	420 U
206-44-0	Fluoranthene	UG/KG	4200	820	400 U	1800
86-73-7	Fluorene	UG/KG	260 UJ	540	1000	550
193-39-5	Indeno(1,2,3-cd)pyrene	UG/KG	840	410 U	400 U	240 UJ
91-20-3	Naphthalene	UG/KG	420 U	1400	400 U	280 UJ
85-01-8	Phenanthrene	UG/KG	2100	1500	1600	1700
129-00-0	Pyrene	UG/KG	3200	870	400 U	1300
	OTHER					
SOLIDS	Percent Solids	%	77.8	80.1	82.3	78.3

APPENDIX C
DESIGN CALCULATIONS

APPENDIX C
DESIGN CALCULATIONS

Project Calculations for:

SEDIMENT REMOVAL AT CHERRY FARM SITE (NYSDEC SITE NO. 9-15-063) RIVER ROAD SITE (NYSDEC SITE NO. 9-15-031)

Tonawanda, New York

Prepared For:

Cherry Farm/River Road Site Project Staff

Parsons ES Syracuse
Parsons ES Buffalo

Prepared By:

PARSONS ENGINEERING SCIENCE, INC.

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Williamsville, New York 14221
Phone: (716) 633-7074
Fax: (716) 633-7195

FEBRUARY 1998

PARSONS

CALCULATION INDEX
JOB NO.: 726673.47000
CLIENT: CHERRY FARM/RIVER ROAD PRP GROUP
PROJECT TITLE: REMEDIAL DESIGN REPORT FOR SEDIMENT REMOVAL AT CHERRY FARM SITE (NYSDEC SITE NO. 9-15-063) RIVER ROAD SITE (NYSDEC SITE NO. 9-15-031)

GROUP 15: CIVIL

15-01 Design of Sediment Disposal Area

A. Calculation Summary and Basis

B. Spreadsheet Model Calculations

1. 10 percent solids by weight slurry
2. 15 percent solids by weight slurry

15-01
ENGINEERING CALCULATION TITLE AND SUMMARY SHEET

Calculation No. 15-01 Revision No. 1 Date 2/25/98 Sheet ___ of ___
Proj. No. 726673 Project Title CF/RR Sediment Removal
Calculation Subject: Determine sizing for Sediment Disposal Area and water volumes
Date Verified/Checked ___
STATUS: PRELIM. ___ FINAL X SUPERSEDED ___ VOIDED ___

STATEMENT OF PROBLEM		
Determine the volume requirement for the sediment disposal area after removal of the in-place sediment. Also predict the amount of water generated during hydraulic dredging based on a 10 and 15 percent solids by weight dredge slurry.		
SUMMARY OF CONCLUSIONS	**Preparer's Signature/Date**	
See attached hand calculations		
VERIFICATION METHOD	**Checker's Signature/Date**	
1. Review X	**Reviewer's Signature/Date**	
2. Alternate Calculation ___		
Alternate calculation description:		
Approver's Signature/Date		

REVISIONS

Rev. No.	Sheet No.	Description of Revision	Reviser's Signature/Date	Reviewer's Signature/Date	Approver's Signature/Date
1	na	*Following technical review by Trident Technical Services*	*Jeffrey Poulsen*	*Tim Harrington*	

15-01 A
HAND CALCULATIONS

MEMORANDUM

February 25, 1998

To: File 726673 (Z-10)

From: Jeffrey Poulsen

Subject: Cherry Farm/River Road Site
Sediment Disposal Area Design

The Cherry Farm/River Road site is located along the Niagara River in the Tonawanda, New York. Along the length of the shoreline is an accumulation of sediment which needs to be excavated due to PAH contamination. Phase I and Phase II investigation have uncovered an estimated volume of 42,000 in place cubic yards of material. In October, 1997, a disposal area was constructed on the River Road portion of the site. The current below grade volume of this disposal area is roughly 37,000 cubic yards.

The purpose of these calculations is to determine if hydraulic dredging is a viable option based on the disposal area constraints. Treatability testing was completed in December 1997 including a settling test following the procedure outlined by the USACE in EM-1110-2-5027. The results of this settling test are included as an attachment to these calculations.

The hand calculations used to determine the sediment bulking characteristics and the amount of material to be produced are included in this package. However, due to the continuing changes being made to the grading plan and the possible variations in the removal rates and slurry densities, an Excel spreadsheet model has been created to assist in the calculations. The hand calculations should only be used to review the method of the calculations. The spreadsheet is used to perform the actual calculations pertaining to the site.

Results

In order to contain the initial volume of sediment removed from the river, the disposal area will need to be capable of containing approximately 52,000 cubic yards of material. This accounts for the bulking of the sediment during material removal. The bulking ratios developed were 1.1 for sand and 2.1 for the fine grained material.

In order to accommodate the volume of sediment material to be removed, the size of the existing disposal area will need to be expanded by building berms. In addition to the volume of material to be contained in the disposal facility, the berms will need to be large enough to accommodate, a water ponding depth of approximately 2 feet and 2 feet of freeboard.

The amount of water generated per day during the dredging process will vary depending upon the dredging rate and the solids content of the resultant slurry. It has bee estimated that the

slurry will contain between 10 and 15 percent solids by weight. This would result in the production of between 240,000 and 135,000 CF of water being produced during an 8 hour day with approximately 800 CY of in-place sediment being removed.

Attachments

1. Excel Speadsheet Model Calculations
2. Site Volume Table : Unadjusted (7/1/97)
3. Grain-Size Analysis for Sediments
4. Log of concentration vs Log of Time Plot
5. Sediment Disposal Area Survey (11/3/97)

References

- Phase I Sediment Data Assessment Report, Parsons ES, April 1995.
- Phase II Sediment Investigation and Remedial Alternative Scoping Report, Parsons ES, November 1996.
- Letter Report to NYSDEC, Cherry Farm/River Road Site Sediment Remedial Program-Sediment Data Update, Parsons ES, June 18, 1997.
- Sediment Treatability Study Final Report, Sevenson Environmental Services, Inc. December 29, 1997.
- Dwg. No. C-3 Rev A Final Grading Plan (2/18/98)

cc: Mark Raybuck, Parsons ES-Buffalo

1.a) In-situ volume estimate

Sources - Bathymetric Survey; Wendel, 11/20/97 - .dwg file
- Sediment Dredging Grading Plan, DWGC-3, PARSONS ES (2/18/98)
- Site CAD Volume calculation (1-1-97) (Attachment #2)

Volume (V_c) = 48,000 CY

from: Sediment Treatability Study by WASTESTREAM TECHNOLOGIES, 1997 (ATTACHMENT #3)

Specific Gravity (G_s)

STA 3200	3.18
STA 3500	3.00
STA 3700	2.71
	2.96 = $G_{Saverage}$

WATER CONTENT

from: Waste Stream Technologies, 1997

STA 3200	42.2
STA 3500	61.9
STA 3700	56.4

W_{AVG} = 53.5 % => 54 %

Degree of Saturation

- Assume 100% saturation for sediments (Sd = 100)
- neglect decomposition gases

16) In situ void Ratio

assumptions

- water content of samples represents in-situ water content.

$$e_i = \frac{w \times G_s}{Sd} = \frac{54\% \times 2.96}{100} = 1.6 \qquad \text{[Eqn 4-1]}$$

GRAIN SIZE DATA

- grain size analysis was completed during the Phase II investigations and compiled in Attachment #4.

- assumes that the Phase II samples reflect actual site conditions

%Passing #200 sieve = 21.4% (fine fraction)
≈ 22 %

V_c = 48,000 cy

Volume of Sand (V_{sd}) = 48,000 x (100-22%) /100 = 37440 cy

Volume of fines (V_f) = $V_c - V_{sd}$
= 48,000 - 37440 cy
= 10,560 cy

PARSONS ENGINEERING SCIENCE, INC.

Client CF IND GROUP | Job No. 726573 | Sheet 3 of 11

Subject SEDIMENT DISPOSAL AREA DESIGN | By J.S. POULSEN | Date 1/13/97

Checked | Rev. 1

Calculation of Initial storage Volume Requirements

Assume

- Dredging period - 8 hrs/day
- Dredging rate - 100 cy insitu volume/hr.
- Dredging time

$$48{,}000 \text{ cy} / \left(100 \frac{\text{cy}}{\text{hr}} \times 8 \text{ hrs/day}\right) = 60 \text{ days}$$

half time of concentration
= Dredging time / 2
= 30 days

$$30 \text{ days} \times \frac{24 \text{ hrs}}{\text{day}} = 720 \text{ hrs} = T_{\frac{1}{2}}$$

Compression Settling Test Results - Attachment #3

Initial interface height	H_0	5.88	feet
Initial slurry concentration	C_0	~~190~~ 150	g/l

Time (hours)	[C] slurry concentration (g/l)	[H_t] interface height (ft)
0	190	5.88
1.0	202.39	5.52
2.0	207.56	5.38
3.0	214.43	5.21
4.0	221.67	5.04
5.0	230.36	4.85
6.0	239.25	4.67
7.0	248.27	4.50
8.0	259.21	4.31
12.0	304.41	3.67
24.0	475.40	2.35
48.0	656.60	2.00
72.0	624.38	1.79
96.0	661.07	1.69
120.00	685.40	1.63
144.00	702.34	1.59
168.00	720.67	1.55
192.00	741.80	1.50
216.00	761.86	1.48
288.00	795.85	1.44
312.00	798	1.43

[eqn 3-11]

$$C = \frac{C_0 H_i}{H_t}$$

Plot C vs t as Attachment #5

if $t_{\frac{1}{2}}$ = 720 hrs

Cd = 1185 - full curve

Cd = 890 - compression curve

Revised 2/13/98 JSP

PARSONS ENGINEERING SCIENCE, INC.

Client CF/RR PRP GROUP | Job No. 726673 | Sheet 4 of 11

Subject SEDIMENT DISPOSAL AREA DESIGN | By J S Poulsen | Date 1/13/97

Checked | Rev. 1

Volume Estimation at Placement in Disposal Area

average void ratio of dredged fine grained materials

$$e_o = \frac{G_s \gamma_w}{\gamma_d} - 1 \qquad \gamma_w = 1000 \frac{g}{L}$$

Revised 2/13/98 JSP

$\gamma_d = 890 \frac{g}{L}$ $\qquad$ $\gamma_d = 1125 \frac{g}{L}$

$$e_o = \frac{2.96 \times 1000 \frac{g}{L}}{700\ \cancel{890}\ g/L} - 1 \qquad e_o = \frac{2.96 \times 1000\ g/L}{\cancel{1125}\ \cancel{820}\ \frac{g}{L}} - 1$$

$e_o = \cancel{2.33}\ 3.23$ $\qquad$ $e_o = \cancel{1.63}\ 2.61$

an e_o value of $\cancel{2.33}\ 3.23$ is more realistic as is representative of the compression settling portion of the settling curve. To be conservative use $e_o = \cancel{2.4}\ 3.3$

Calculate volume of sand following removal.

Per CoE guidance use a 1.0 bulking ratio for sand, however, this is based on the assumption that the sand will be loose in-place.

	Bulking ratio	V_{SD} (CY)	$V_{SDfinal}$ (CY)	
0%	1.0	37440	37440	
5%	1.05	37440	39312	
10%	1.10	37440	41184	← assume 10% bulking to be Conservative

PARSONS ENGINEERING SCIENCE, INC.

Client CF/RR PRP Group | Job No. 726673 | Sheet 5 of 11

Subject Sediment Disposal Basin Design | By JS Powsen | Date 1/13/97

Checked | Rev. 1

Calculate Volume of fine grained material after removal

$$V_f = V_i \left(\left[\frac{e_o - e_i}{1 + e_i} \right] + 1 \right) \qquad \text{[eqn 4-3]}$$

$$= 10{,}560 \text{ cy} \left(\left(\frac{2.4 - 1.6}{1 + 1.6} \right) + 1 \right)$$

$$= 13{,}809 \text{ cy}$$
$$17{,}465$$

Total Volume Required for Sediment Disposal

$$V_T = V_f + V_{SD} \qquad \text{[eqn 4-4a]}$$

$$= 17465 \text{ cy} + 41184 \text{ cy}$$
$$58648 \text{ cy}$$
$$= 54{,}993 \text{ cy}$$
$$\approx 55{,}000 \text{ cy}$$

Revised 2-13-98 JSP

DETERMINE BERM HEIGHT REQUIREMENTS

EXISTING DISPOSAL AREA ON THE RIVER ROAD SITE

V_d = 47,015 CY — Based on Wendel Survey, (10/31/97) Attachment # 6

A_d = 75,000 SF

$$H_{DK} = \frac{V_T - V_d}{A_d} + H_{pd} + H_{fb}$$

H_{DK} = Berm height
V_T = Volume of Sediment
V_d = Volume of existing basin
A_d = Surface area of existing basin
H_{pd} = ponding depth
H_{fb} = freeboard depth

$$H_{DK} = \frac{(58{,}648\ CY - 47015\ CY) \times 27\ SF/CY}{91{,}000\ SF} + H_{pd} + H_{fb}$$

$= 3.5\ ft + 2ft + 2\ ft$

$= 7.5\ ft$

Assume $H_{pd} = 2\ ft$
$H_{fb} = 2.0\ ft$

Revised
2/13/98
JSP

Water Handling Requirements

ASSUMPTIONS

- H_d = 2 ft
- Quiescent Conditions
- Removal Rate = 800 cy per 8 hour day
- between 10% and 15% solids in slurry mix
- [illegible] wt @ 90 pcf

Volume of Water produced

10% slurry by wt

$$Q_w = \left(V_{solids} \times \frac{100}{\%solids}\right) - V_{solids}$$

$$= \left(800 CY \times \frac{100}{10}\right) - 800 CY$$

$$= 7200 CY \times 27 \frac{CF}{CY}$$

$$= 194400 CF / 8 hr day$$

Q_{w10} = 24,300 cf/hr

15% slurry by wt

$$Q_w = \left(V_{solids} \times \frac{100}{\%solids}\right) - V_{solids}$$

$$= \left(800 CY \times \frac{100}{14}\right) - 800 CY$$

$$= 4914 CY \times 27 \frac{CF}{CY}$$

$$= 132,678 \ CF / 8 hr day$$

Q_{w14} = 16,585 cf/hr

OMIT
2-13-98

PARSONS ENGINEERING SCIENCE, INC.

nt PRP Group | Job No. 726673 | Sheet 7 of 11

Subject Sediment Disposal Area. | By J Poulsen | Date 2/13/98

Checked | Rev. 0

Geotechnical Data from Waste Stream Technologies

	%water
3200	42.2
3500	61.9
3700	56.4

$G_s = 2.96$

Average 53.5% by wt

$$\% = \frac{W_{water}}{W_{solids}}$$

for 1 CF of sediments $W_w + W_{solids} = W_{Total}$

$W_{solid} = 2.96 (62.4 pcf) = 184.7 pcf$

$W_{water} = 62.4 pcf$

0.54 lb water / lb solid

$$0.54 lb_{water} \times \frac{1 CF}{62.4 lb} = 33$$

% 0.33 lb water / lb seds

0.67 lb solid / lb seds

PARSONS ENGINEERING SCIENCE, INC.

Client PRPGROUP | Job No. 726673 | Sheet 8 of 11

Subject Sed Disposal Area | By J. Poulsen | Date 2/11/98

Checked | Rev. 2

In place Sediment

per Waste stream analysis of Water Content

≈ 33 % water by weight
67 % solids

$G_s = 2.96$ $\rho_s = 2.96 (62.4 \text{ pcf}) = 184.7 \text{ pcf solid}$

$$\left(\frac{0.67 \text{ lb solid}}{\text{lb sed}}\right)\left(\frac{1 \text{ cf solid}}{184.7 \text{ pcf}}\right) + \left(\frac{0.33 \text{ lb water}}{\text{lb sediment}}\right)\left(\frac{1 \text{ CF water}}{62.4 \text{ pcf}}\right)$$

$$0.0036 \frac{\text{CF solid}}{\text{lb sed}} + \frac{0.005 \text{ CF water}}{\text{lb sed}} = 0.0086 \frac{\text{CF}}{\text{lb sed.}}$$

$\rho_{sed} = 116 \text{ pcf}$

$G_s = 1.86$ in place sed.

$$0.0036 \frac{\text{CF solid}}{\text{lb sed}} \times 116 \frac{\text{lb sed}}{\text{CF}} = 0.42 \frac{\text{CF solid}}{\text{CF sed.}} = 42 \text{ solid by Volume in place}$$

Slurry 15 % solids by wt

$$\left(\frac{0.15 \text{ lb solid}}{\text{lb slurry}}\right)\left(\frac{1 \text{ cf solid}}{184.7 \text{ lb solid}}\right) + \left(\frac{0.85 \text{ lb water}}{\text{lb slurry}}\right)\left(\frac{1 \text{ CF water}}{62.4 \text{ lb water}}\right)$$

$$0.00081 \frac{\text{CF solid}}{\text{lb slurry}} + 0.014 \frac{\text{CF water}}{\text{lb slurry}} = 0.015 \frac{\text{CF water}}{\text{lb slurry}}$$

$\rho_{SL} = 67.5 \frac{\text{lb slurry}}{\text{CF slurry}}$

$$\left(0.00081 \frac{\text{CF solid}}{\text{lb slurry}}\right)\left(67.5 \frac{\text{lb}}{\text{CF}}\right) = 0.055 \frac{\text{CF solid}}{\text{CF slurry}} = 5.5\% \text{ solid by volume in slurry}$$

Assume removal of 100 cy/y in place sediment per hour

∴ 58 cy water
42 cy solids

$$(100 \text{ cy sed}_s)\left(27 \frac{\text{cf}}{\text{cy}}\right)\left(0.42 \frac{\text{cf solid}}{\text{cf sed}_s}\right) = 1134 \text{ cf solid}$$

if slurry is 5.5% solid by volume ⇒ $0.055 \frac{\text{cf solid}}{\text{cf slurry}}$

$$(675 \text{ cf solid})\left(\frac{1 \text{ cf slurry}}{0.055 \text{ cf solid}}\right) = 20{,}618 \text{ cf slurry/hr}$$

Assume that solids settle out to original density (50% by wt)
They will the occupy 100 cy or 2,700 cf

20618 cf − 2700 cf = 17,918 cf water is left

Water Produced
assume 8 hrs per day @ 17,918 cf per hour

8 x 17918 cf = 143,345 cf water extra per day.

= 1,072,324 gal/day

Water Handling (cont)

OPERATE Disposal Area as Batch

Premise: during an 8-hour day fill the disposal area with slurry, let settle and drain off before next cycle begins

10% solids in slurry

$Q_{w,10}$ = ~~194,400~~ CF/8hrs 240,000 CF/xhrs

Water Space available (V_{pd})

determine

$Hpd_{req} = Q_w / A_d$ 240,000 cf / 91,000 sf

$= 194,400$ cf / 75,000 sf

$Hpd_{req} = 2.6$ ft 2.64 encroaches into freeboard

15% solids, 153,553

$Q_{w,4} = 132,678$ CF/8hr day

$Hpd = Q_w / A_d$ 153,553 cf / 91,000 sf

$= 132,678$ cf / 75,000 sf

$Hpd_{req} = 1.76$ ft 1.69 within design ponding depth

Assume θ_H = 10 hrs for settling before discharge to polishing pond

$D_s = V_s \times \theta_H = 0.18 \frac{ft}{hr} \times 10 hr = 1.8 ft$

Water Handling (Cont)

OPERATE AS FLOW THROUGH

10% Slurry

$Q_{W,10}$ = ~~194,000~~ 240,000 CF / 18hrs

$V_{pd} = A_d \times H_{pd}$
$= 25{,}000$ ~~sf~~ $\times$ 2 ft
$= 150{,}000$ ~~CF~~ 182000 CF

minimum hydraulic retention time

$\Theta_H = \frac{V_{pd}}{Q_{W,10}} = \frac{150{,}000}{240000} = 0.75$ day $= 18$ hrs

based on a zone settling rate of 0.18 ft/hr, (V_s) (Attachment #3)
fines will settle (D_s)

$D_s = V_s \times \Theta_H$

$= 0.18 \frac{ft}{hr} \times 18$ hrs ✓

$= 3.24$ ft. — default to 2 ft maximum (= H_{pd})

15
14% slurry

$\Theta_H = \frac{V_{pd}}{Q_{W,14}} = \frac{182000 \text{ CF}}{153553 \frac{CF}{day}} = 1.1$ day $= 27$ hrs ✓

$D_s = V_s \times \Theta_H$
$= 0.18 \frac{ft}{Hr} \times 27$ hrs
$= 4.86$ ft. default to 2 ft max (= H_{pd})

Attachment #2

Site Volume Table: Unadjusted

Cut yards	Fill yards	Net yards	Method
te: vol2			
Stratum: fg-1- eg-1- junk			
45747.3004	2.6570	45744.6434	(C) Grid
48660.4709	9.4387	48651.0322	(C) Tin Sub
47718.4473	20.0548	47698.3925	(C) End area
47706.1638	19.3240	47686.8398	(C) Prismoidal

Round up to 48,000 CY

Here is a new Volume

Calculation based on the new Dredging

Contour -

Jill

CHERRY FARMS

Project: 726673 Fri Feb 6 19:14:57 1998

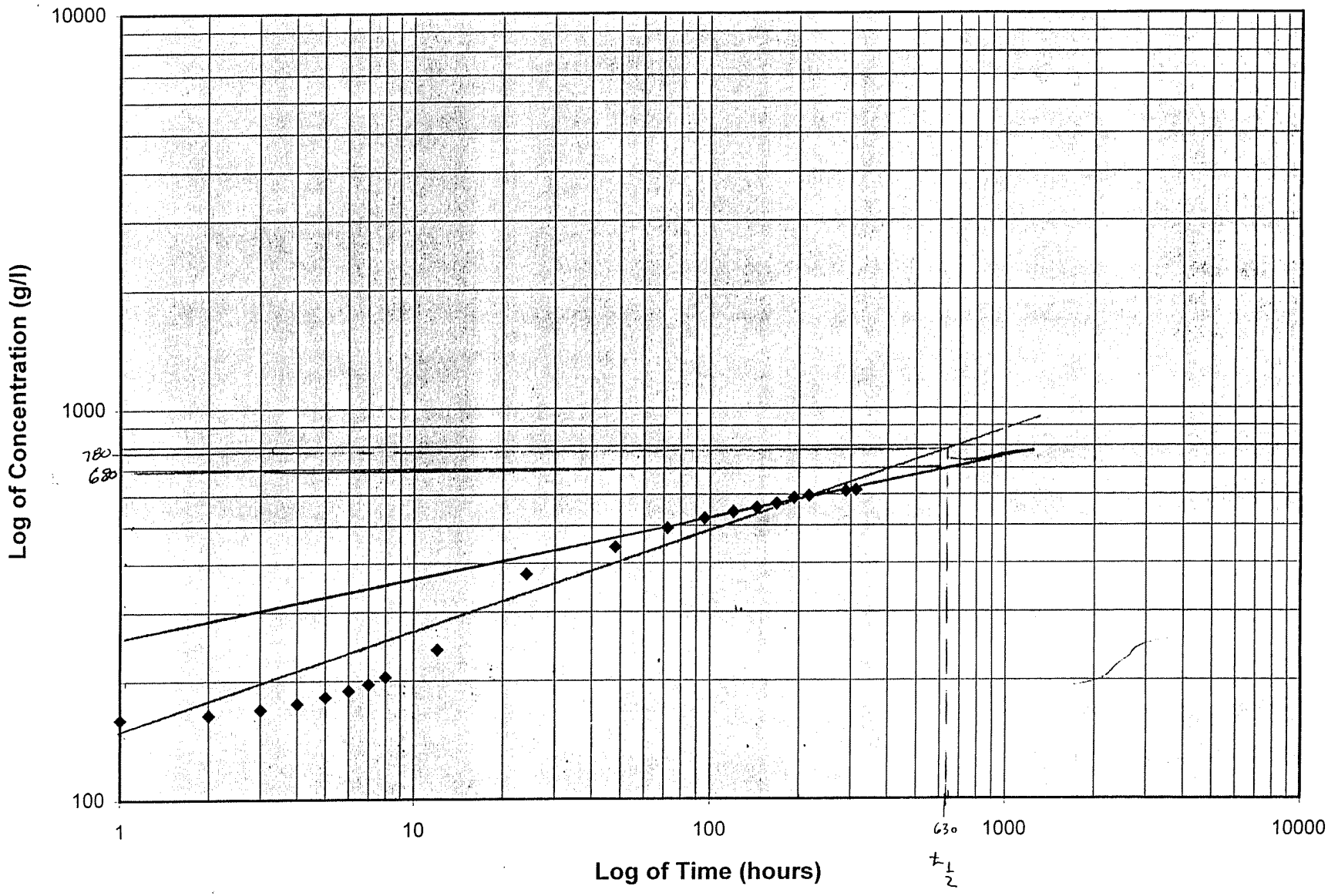
Site Volume Table: Unadjusted

Cut yards	Fill yards	Net yards		Method
Site: vol2				
Stratum: fg-1- eg-1- junk				
45747.3004	2.6570	45744.6434	(C)	Grid
48660.4709	9.4387	48651.0322	(C)	Tin Sub
47718.4473	20.0548	47698.3925	(C)	End area
47706.1638	19.3240	47686.8398	(C)	Prismoidal
Stratum: fg2 eg-1- fg-2-				
40128.1901	124.7582	40003.4319	(C)	Grid
42043.2944	179.0078	41864.2865	(C)	End area
42034.2099	176.7516	41857.4583	(C)	Prismoidal

TABLE
GRAIN-SIZE ANALYSES FOR SEDIMENTS
Cherry Farm/River Road Site

Boring	Depth (feet)	Sieve Size (mm) Percent Passing																
		1-1/2	1	3/4	1/2	#4	#10	#20	#40	#100	#200							
		38.1	25.4	19.05	12.7	4.75	2	0.85	0.425	0.15	0.075	0.03	0.02	0.015	0.0085	0.006	0.0045	0.003
345050	2.0 - 3.0	100.0%	100.0%	96.4%	96.4%	94.2%	92.7%	92.2%	91.7%	87.4%	62.6%	32.0%	27.0%	20.0%	13.0%	10.0%	8.0%	6.0%
345050	8.0 10.0	100.0%	100.0%	100.0%	100.0%	99.6%	99.3%	99.2%	99.2%	81.1%	18.8%	8.0%	5.0%	4.0%	3.0%	2.0%	1.0%	0.5%
345100	12.0 14.0	100.0%	100.0%	100.0%	99.1%	97.5%	97.5%	97.5%	97.4%	31.0%	6.1%	2.0%	2.5%	1.0%	0.5%	0.3%	0.2%	0.1%
345150	4.0 - 6.0	100.0%	100.0%	95.5%	94.8%	93.6%	92.9%	92.6%	91.8%	72.4%	30.6%	12.0%	9.5%	8.0%	6.0%	4.0%	3.0%	2.0%
345150	6.0 8.0	100.0%	100.0%	95.7%	94.9%	91.5%	89.8%	88.5%	85.2%	40.4%	10.2%	5.0%	4.0%	4.0%	3.0%	2.0%	1.0%	0.5%
345150	12.0 - 14.0	100.0%	100.0%	100.0%	93.5%	72.2%	57.4%	54.8%	53.8%	26.4%	7.7%	3.0%	2.0%	1.0%	0.5%	0.4%	0.3%	0.2%
370020	4.0 - 6.0	100.0%	100.0%	100.0%	100.0%	99.2%	98.6%	98.6%	94.9%	85.7%	55.6%							
370020	6.0 - 8.0	100.0%	100.0%	100.0%	100.0%	99.8%	98.9%	97.3%	96.0%	88.2%	60.4%							
370020	10.0 - 12.0	100.0%	100.0%	88.7%	75.4%	52.6%	42.3%	37.8%	25.7%	13.3%	3.7%							
370020	12.0 - 14.0	92.4%	86.4%	81.7%	75.1%	60.9%	54.8%	51.7%	49.0%	36.6%	13.7%							
400040	2.0 - 4.0	100.0%	100.0%	100.0%	99.0%	93.6%	90.5%	89.0%	87.3%	70.3%	34.8%	15.0%	13.0%	10.0%	8.0%	5.0%	4.0%	3.0%
400040	12.0 - 14.0	100.0%	100.0%	100.0%	95.6%	87.3%	84.1%	83.1%	82.6%	16.3%	5.8%	2.0%	1.0%	0.5%	0.0%	0.0%	0.0%	0.0%
400075	0.0 - 2.0	100.0%	100.0%	100.0%	100.0%	96.7%	96.0%	95.4%	94.1%	35.7%	7.0%	5.0%	4.0%	3.0%	2.0%	1.0%	0.0%	0.0%
400075	6.0 - 8.0	100.0%	89.6%	78.4%	72.0%	53.3%	44.6%	40.5%	37.4%	13.8%	4.2%	2.0%	2.0%	2.0%	1.0%	0.0%	0.0%	0.0%
400100	0.0 - 2.0	100.0%	100.0%	96.6%	93.8%	87.6%	83.0%	81.6%	78.7%	49.8%	28.1%	15.0%	12.0%	11.0%	7.0%	5.0%	4.0%	1.0%
400100	8.0 - 10.0	100.0%	100.0%	96.6%	87.7%	71.9%	58.8%	53.5%	49.8%	20.3%	7.9%	4.0%	2.5%	2.0%	1.0%	0.8%	0.5%	0.5%
450060	4.0 6.0	100.0%	100.0%	100.0%	98.6%	87.8%	75.7%	67.3%	59.2%	18.3%	6.7%	5.0%	4.0%	3.0%	2.0%	1.0%	0.5%	0.3%
		99.6%	98.6%	95.9%	92.7%	84.7%	79.8%	77.7%	74.9%	46.3%	21.4%	8.5%	6.8%	5.3%	3.6%	2.4%	1.7%	1.1%
			MEDIUM	FINE		COARSE	MEDIUM		FINE									
						SAND												

Attachment


10000
1000
100
780
680
Log of Concentration (g/l)
1
10
100
630
1000
10000
Log of Time (hours)
t 1/2

Attachment #6

JSP

72.6673.24
C4-50

WENDEL

7405 CANAL ROAD
P.O. BOX 501
LOCKPORT, NEW YORK 14095
716/433-5963 or 625-8228
FAX 716/433-7534
e-mail: wendel@wendel-design.com

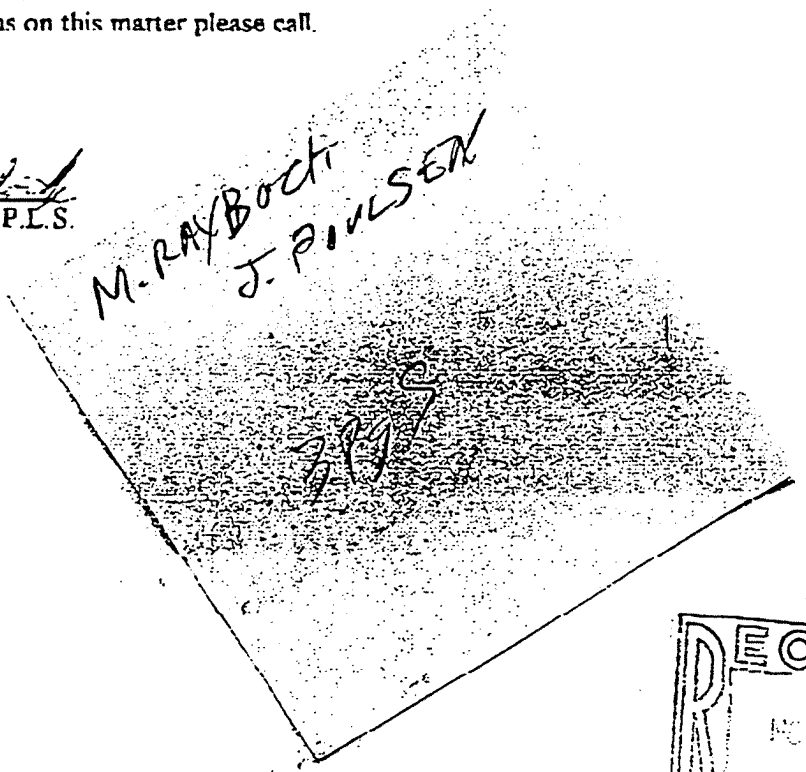
November 3, 1997

Mr. Todd Doty
The Haseley Companies
P.O. Box 212
10315 Lockport Road
Niagara Falls, N.Y 14304

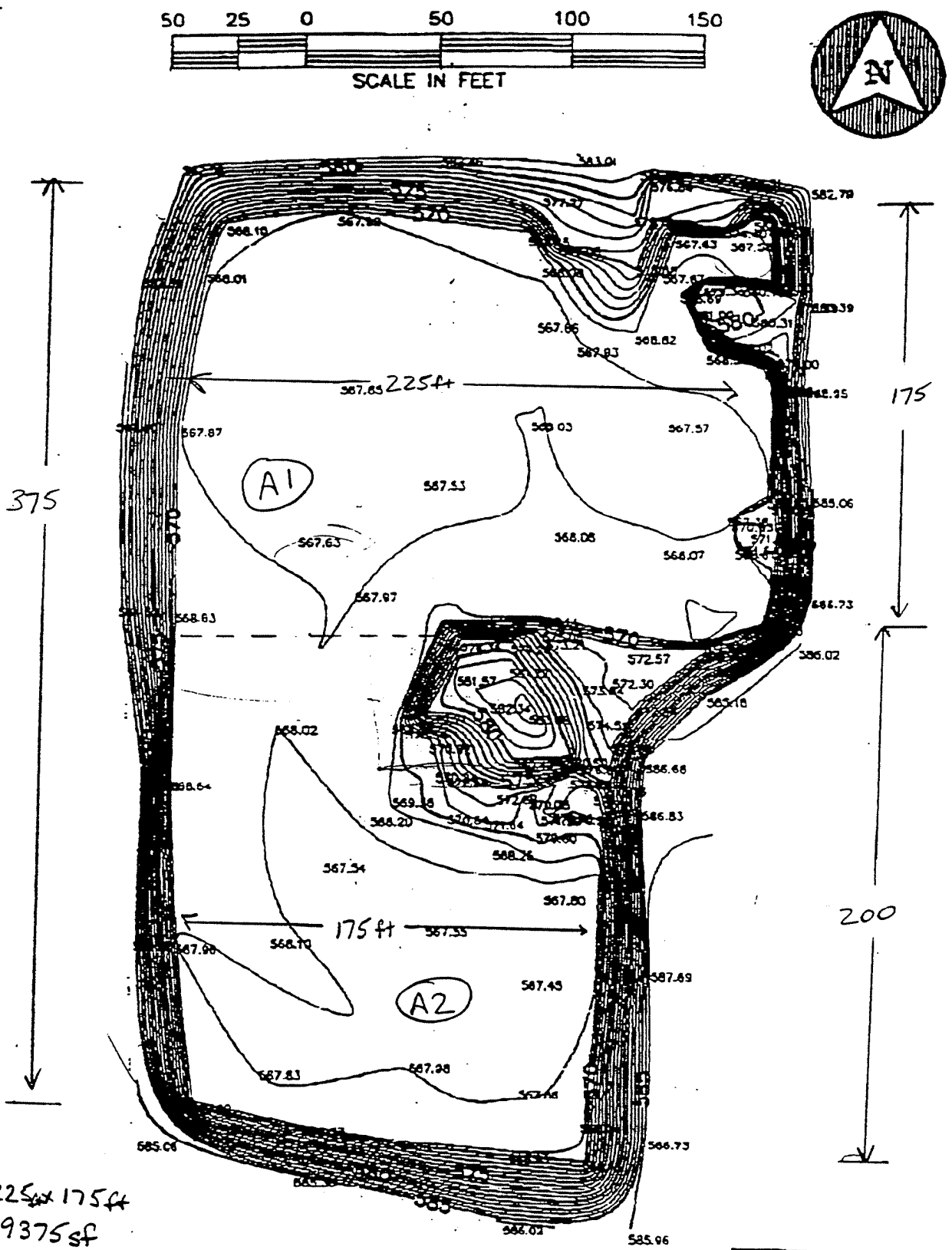
Top of subgrade at the River Road site was surveyed by Wendel on September 24,1997. Haseley Construction then excavated material and Wendel performed an asbuilt survey on October 31, 1997. Volumes were computed by Wendel on November 3, 1997 using 3D terrain models and comparing the original surface to the final surface. The volume of excavation was computed to be 47,015 cubic yards. Contour maps of these two surfaces are provided with this letter.
If you have any questions on this matter please call.

Sincerely,

Charles F. Bigelow, Jr., P.L.S.
Project Manager



RECEIVED
NOV 12 1997

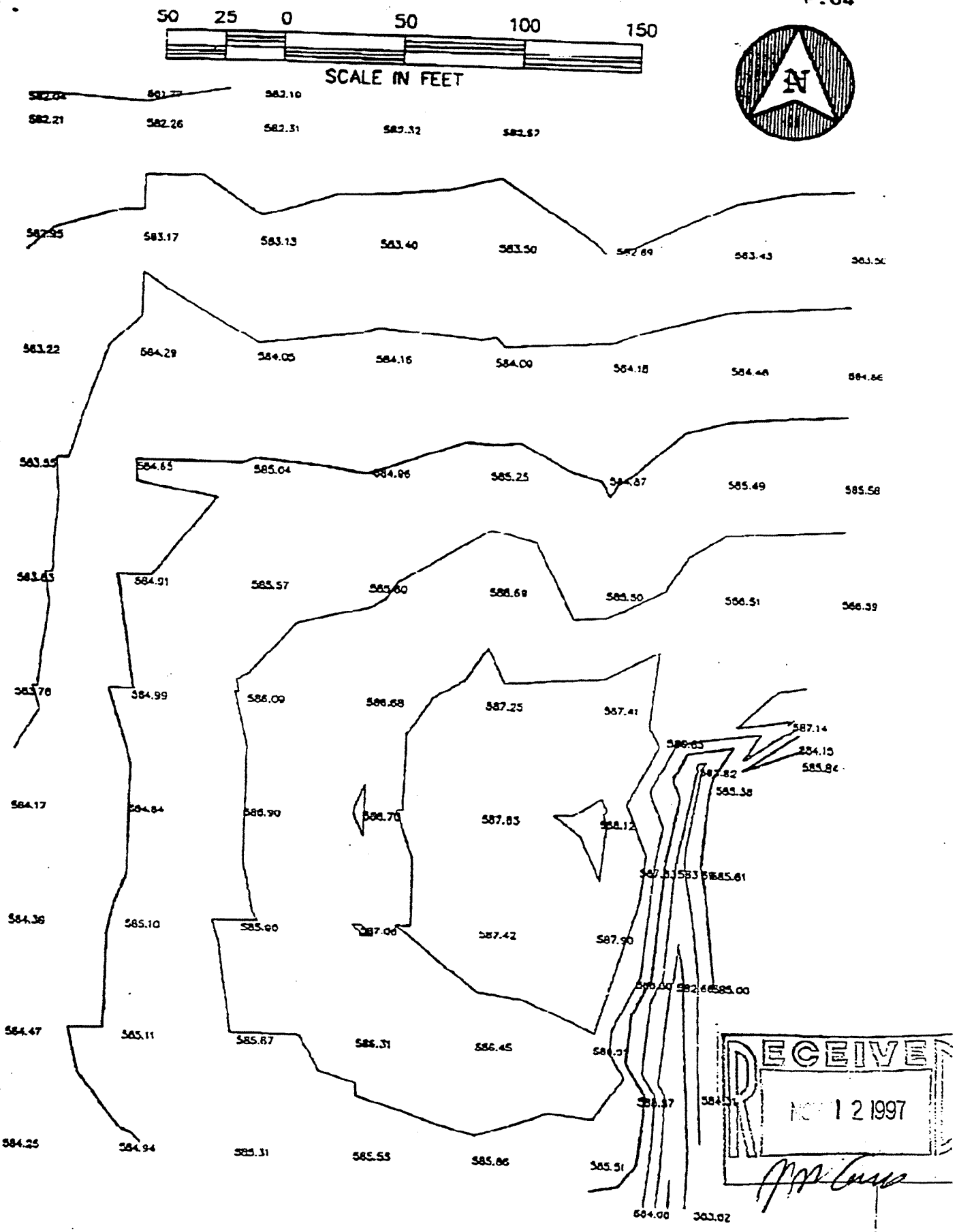


A1 = 225ft x 175ft
A1 = 39375sf

A2 = 175ft x 200ft
= 35,000

47,015 CUBIC YARDS

Ad = A1 + A2
= 39375ft + 35,000ft = 74375cf 275,000 SF



TRIDENT TECH SERVICES, INC.

1050 Broadway
Suite 7
Chesterton, IN 46304
Phone: (219) 929-9366
Fax: (219) 926-8446

To: MARK RAYBUCK

Fax No.: 716-633-7195
Phone No.: 716-633-7074

From: TIM H.

Project No.:

Date: 2/5/98

Number of pages (including cover): 2

Message:

* MY COMMENTS ON JANUARY 1998 CALCULATIONS.

* CALL IF YOU WISH TO DISCUSS. I WILL BE IN THIS AFTERNOON AND MONDAY/TUESDAY NEXT WEEK

HEC
Harrington Engineering & Construction, Inc.

Memorandum

TO: Mark Raybuck

February 6, 1998

FROM: Tim Harrington

97-033

SUBJECT: Sediment Disposal Area Design

I have reviewed the January 13, 1998 calculations by Jeff Poulsen. I have the following comments.

1. On page 3 of _, I believe from my understanding of the Sevenson test results that the initial concentration of solids in the settling test is represented by the % solids column in Appendix D of the Sevenson report. The average of the % solids column indicates 146g/l is the initial concentration. This would seem to match with their statement in the report which indicates that the slurry was mixed at 15% solids. Previous discussions with Sevenson indicate that this was by dry weight of the solids added. Have they changed their procedure? The final report really does not say that it is by weight. The impact of this change is to cause a slightly higher 720 hour void ratio probably around 3.0 (I did not check exactly) making the bulking ratio for the fines around 1.5.
2. On page 7 of _, the calculation for volume of water should be on 10 - 15% by weight solids not by volume. This would be consistent with the column tests and is usually the meaning when 10-15% is quoted as the sediment load in the hydraulic dredge pipe. To calculate the volume for a given dry weight of solids we must assume the in-situ dry weight of the sediment. A reasonable assumption for the type of sediment we have is 85-90 pounds per ft^3 (about 1.4tons/yd^3). Using the assumed dry weight and the sediment specific gravity of 2.96, the total volume for 10% by weight is 42,000 ft^3/hr and for 15% by weight is 27,000 ft^3/hr.
3. On page 8 of _, the change from number 2 above produces 4.5 ft at 10% and 2.9 ft at 15% both greater than the freeboard. Conclusion is that the water will have to withdrawn as dredging is occurring or that the dredging may have to be less than 8-hours per day near the end of filling the pond.
4. When we get all through the calculation the conclusion will still indicate that the pond as it reaches capacity may not be adequate to allow 8-hr per day of dredging without substantial solids overflow into the polishing pond.

15-01 B
SPREADSHEET MODEL CALCULATIONS

1. CALCULATIONS FOR 10 PERCENT SOLIDS BY WEIGHT SLURRY
2. CALCULATIONS FOR 15 PERCENT SOLIDS BY WEIGHT SLURRY

DEVELOPMENT MODEL OF A CONFINED DISPOSAL FACILITY OF DREDGED MATERIAL

by: J.S. Poulsen Parsons Engineering Science, Inc.

This model for the design of a confined disposal facility of dredged material is basd on the US Army Corps of Engineers document EM 1110-2-5027.

Last Updated February 23, 1998.

Entered Value

Site Name	Cherry Farm/River Road Site
Project Number	726673
Project Manager	Mark Raybuck

Initial Design Parameters

Estimated In-Situ Volume (CY) 42000 (Vc)

w = water content of sample (%)	w =	54	(w)
Gs = specific gravity of sediment solids	Gs =	2.96	(Gs)
Sd = degree of saturation (100 percent for sediment	Sd =	100	(Sd)
ρ_{solid} = bulk density of in place solids (pcf)	ρ_{solid} =	184.9	(rhosolid)
In place Sediments	% solids =	67.0%	
In place Sediments	%water =	33.0%	

ρ_{sed} = bulk density of in place sediment (pcf)	ρ_{sed}=	(rhosed)
Specific gravity of in place sediments		
In place percent solids by volume		

ei = in-situ void ratio of sediment

$e_i = wG_s/S_d$ = (Ei)

Average Grain Size Data

(this parameter can be estimated using the "sieves.xls" spreadsheet)

Percent Passing Sieve	Percent
1-1/2	99.55%
1	98.59%
3/4	95.86%
1/2	92.70%
#4	84.66%
#10	79.82%
#20	77.68%
#40	74.93%
#100	46.29%
#200	21.41%

% sand = (sandpercent)

% fines = (finespercent)

Volume of sand to be dredged = CY (Vsd)

Volume of fines to be dredged = CY (Vi)

Estimated Dredging Parameters

(CHD)	12	Cutter Head Diameter (12,14,16,18,24 inches)
(DD)	20	Depth of Dredging (enter 20 feet)
(DDIST)	900	Average Distance to Containment Area (100 ft increments)
(Dpipeline)	12	Discharge Pipeline Diameter (8,10,12,14,16,18,20,24,27,28,30,36 inches)
(Ci)	15	% Suspended Solids Concentration in Slurry (by weight) (default to 14% if unknown)
	[illegible]	Bulk dnesity of slurry (pounds/cf pf slurry)
	[illegible]	% Suspended Solids Concentration in Slurry (by volume)

(prodrate)	[illegible]100	Estimated Production Rate (CY sediments per hour)
(Qi)	[illegible]138	Estimated Pipe Discharge Rate (cfs)
(dredgetime)	[illegible]120	Estimated Time of Dredging Based on Production Rate (hours)
(hrpd)	8	Estimated Effective dredging hours per day
(days)	[illegible]53	Estimated dredging days

Indicate Settling Type(X)

Zone	x
Flocculent	

Enter Zone Settling Veolocity

(Vs) 0.17854 (feet/hour) from settling test

Compression Settling Test Results

(Ho) Initial interface height 5.88 feet

(Co) Initial slurry concentration 150 g/l

Time (hours)	slurry concentration (g/l)	interface height (ft)
[illegible]	[illegible]150	[illegible]5.88
1.0	[illegible]159.78	5.52
2.0	[illegible]163.94	5.38
3.0	[illegible]169.29	5.21
4.0	[illegible]176.00	5.04
5.0	[illegible]181.86	4.85
6.0	[illegible]188.87	4.67
7.0	[illegible]196.00	4.50
8.0	[illegible]204.64	4.31
12.0	[illegible]240.33	3.67
24.0	[illegible]375.32	2.35
48.0	[illegible]441.00	2.00
72.0	[illegible]482.74	1.79
96.0	[illegible]521.89	1.69
120.00	[illegible]541.00	1.63
144.00	[illegible]554.72	1.59
168.00	[illegible]569.03	1.55
192.00	[illegible]588.00	1.50
216.00	[illegible]595.95	1.48
288.00	[illegible]612.50	1.44
312.00	[illegible]616.78	1.43

Sediment Basin Design

	[illegible]	calculated half time of concentration (hours)
(halftime)	630	entered half time of concentration (hours)
(Cd)	680	concentration at 1/2Time (g/l) (from graph)
(eo)	[illegible]	Average void ratio of fine grained material at completion
(Vfine)	[illegible]	Volume of fine grained material (CY)
(bulksand)	1.1	Estimated Bulking Ratio for Sand >1(percent)
(Vsand)	[illegible]	Volume of sand (CY)
(Vtotal)	[illegible]	Volume Total (CY)
(Vdesign)	37,000	Volume of Existing Disposal Area (CY)
(Adesign)	91,000	Disposal Area Footprint (sq ft)
(Hpd)	2	required minimum average ponding depth (feet). (if unknown default to 2 feet)
(Hfb)	2	required freeboard depth (feet)
(Hdk)	[illegible]	Required berm height

Analysis of Water Handling Requirements

(Ci)	[illegible]	Assumed Slurry Density (percent by weight)
	[illegible]	Assumed Slurry Density (percent by volume)
	[illegible]	In Place Sediment Removed per day (CY)
(CYslurryperday)	[illegible]	Assumed Production Rate (CY slurry per day)
(solidsCY)	[illegible]	Solids removed per day (CY)
(waterCY)	[illegible]	Water produced per day (CY)
(waterCF)	[illegible]	Water produced per day (CF)
	[illegible]	Water produced per day (gallons)
	[illegible]	Water Space Available (CF)
(thetaH)	[illegible]	Hydraulic Retention Time (hours)
	[illegible]	Distance Settled (feet)

Account for Hydraulic Efficiency Correction Factor (HECF)

HECF = thetaHD/thetaH

ThetaHD - mean residence time (hours)
ThetaH - theoretical residence time (hours)

	375.00	Basin Length (feet)
	200.00	Basin Width (feet)
	[illegible]	Length/Width Ratio
(HECF)	[illegible]	HECF
(thetaHD)	[illegible]	Hydraulic Retention Time Adjusted for HECF (hours)
	[illegible]	Distance Settled (feet) adjusted for HECF

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Initial Design Parameters

Estimated In-Situ Volume (CY) 42000 (Vc)

w = water content of sample (%)	w =	54	(w)
Gs = specific gravity of sediment solids	Gs =	2.96	(Gs)
Sd = degree of saturation (100 percent for sediment	Sd =	100	(Sd)
ρ_{solid} = bulk density of in place solids (pcf)	ρ_{solid} =	184.9	(rhosolid)
In place Sediments	% solids =	67.0%	
In place Sediments	%water =	33.0%	

ρ_{sed} = bulk density of in place sediment (pcf)	ρ_{sed} =	104.20	(rhosed)
Specific gravity of in place sediments		1.80	
In place percent solids by volume		40.66%	

ei = in-situ void ratio of sediment

$e_i = wG_s/S_d$ = 1.60 (Ei)

Average Grain Size Data

(this parameter can be estimated using the "shakes.xls" spreadsheet)

Percent Passing Sieve	Percent
1-1/2	99.55%
1	98.59%
3/4	95.86%
1/2	92.70%
#4	84.66%
#10	79.82%
#20	77.68%
#40	74.93%
#100	46.29%
#200	21.41%

% sand = 78.00% (sandpercent)

% fines = 22.00% (finespercent)

Volume of sand to be dredged = 32760 CY (Vsd)

Volume of fines to be dredged = 9240 CY (Vi)

Estimated Dredging Parameters

(CHD)	12	Cutter Head Diameter (12,14,16,18,24 inches)
(DD)	20	Depth of Dredging (enter 20 feet)
(DDIST)	900	Average Distance to Containment Area (100 ft increments)
(Dpipeline)	12	Discharge Pipeline Diameter (8,10,12,14,16,18,20,24,27,28,30,36 inches)
(Ci)	10	% Suspended Solids Concentration in Slurry (by weight) (default to 14% if unknown)
	66.8	Bulk dnesity of slurry (pounds/cf pf slurry)
	3.8	% Suspended Solids Concentration in Slurry (by volume)

(prodrate)	100	Estimated Production Rate (CY sediments per hour)
(Qi)	3.18	Estimated Pipe Discharge Rate (cfs)
(dredgetime)	420	Estimated Time of Dredging Based on Production Rate (hours)
(hrpd)	8	Estimated Effective dredging hours per day
(days)	53	Estimated dredging days

Indicate Settling Type(X)

Zone	x
Flocculent	

Enter Zone Settling Veolocity

(Vs) 0.17854 (feet/hour) from settling test

Compression Settling Test Results

(Ho) Initial interface height 5.88 feet

(Co) Initial slurry concentration 150 g/l

Time (hours)	slurry concentration (g/l)	interface height (ft)
0	150	5.88
1.0	159.78	5.52
2.0	163.94	5.38
3.0	169.26	5.21
4.0	175.00	5.04
5.0	181.86	4.85
6.0	188.87	4.67
7.0	196.00	4.50
8.0	204.64	4.31
12.0	240.33	3.67
24.0	375.32	2.35
48.0	441.00	2.00
72.0	492.74	1.79
96.0	521.89	1.69
120.00	541.10	1.63
144.00	554.72	1.59
168.00	569.03	1.55
192.00	588.00	1.50
216.00	595.95	1.48
288.00	612.50	1.44
312.00	616.78	1.43

Sediment Basin Design

	[illegible]	calculated half time of concentration (hours)
(halftime)	630	entered half time of concentration (hours)
(Cd)	680	concentration at 1/2Time (g/l) (from graph)
(eo)	[illegible]	Average void ratio of fine grained material at completion
(Vfine)	[illegible]	Volume of fine grained material (CY)
(bulksand)	1.1	Estimated Bulking Ratio for Sand >1(percent)
(Vsand)	[illegible]	Volume of sand (CY)
(Vtotal)	[illegible]	Volume Total (CY)
(Vdesign)	37,000	Volume of Existing Disposal Area (CY)
(Adesign)	91,000	Disposal Area Footprint (sq ft)
(Hpd)	2	required minimum average ponding depth (feet). (if unknown default to 2 feet)
(Hfb)	2	required freeboard depth (feet)
(Hdk)	[illegible]	Required berm height

Analysis of Water Handling Requirements

(Ci)	[illegible]	Assumed Slurry Density (percent by weight)
	[illegible]	Assumed Slurry Density (percent by volume)
	[illegible]	In Place Sediment Removed per day (CY)
(CYslurryperday)	[illegible]	Assumed Production Rate (CY slurry per day)
(solidsCY)	[illegible]	Solids removed per day (CY)
(waterCY)	[illegible]	Water produced per day (CY)
(waterCF)	[illegible]	Water produced per day (CF)
	[illegible]	Water produced per day (gallons)
	[illegible]	Water Space Available (CF)
(thetaH)	[illegible]	Hydraulic Retention Time (hours)
	[illegible]	Distance Settled (feet)

Account for Hydraulic Efficiency Correction Factor (HECF)

HECF = thetaHD/thetaH

ThetaHD - mean residence time (hours)
ThetaH - theoretical residence time (hours)

	375.00	Basin Length (feet)
	200.00	Basin Width (feet)
	[illegible]	Length/Width Ratio
(HECF)	[illegible]	HECF
(thetaHD)	[illegible]	Hydraulic Retention Time Adjusted for HECF (hours)
	[illegible]	Distance Settled (feet) adjusted for HECF

15-01 C
ELECTRONIC FILE INDEX

All electronic files related to this calculation are maintained in the A11042936\Cherry\Sed98\calcs directory.

File Name	Type	Description
cfcalcs.doc	MS Word	Project calculations document
26673t91.doc	MSWord	Sediment Disposal Area Design Results Memo
sedgz.xls	MS Excel	Sediment Grainsize Data analysis spreadsheet
cfdredge.xls	MS Excel	Sediment Disposal Area Calculations

15-02 Slope Stability Calculations

A. Calculation Summary and Basis

B. Calculations

15-02 A
ENGINEERING CALCULATION TITLE AND SUMMARY SHEET

Calculation No. 15-02 Revision No. 0 Date 2/25/98 Sheet 2
Proj. No. 726673 Project Title CF/RR Sediment Removal
Calculation Subject: Slope Stability Date Verified/Checked
STATUS: PRELIM. FINAL X SUPERSEDED VOIDED

STATEMENT OF PROBLEM		
Determine slope stability characteristics and design parameters for on-site berms		
SUMMARY OF CONCLUSIONS	**Preparer's Signature/Date**	
VERIFICATION METHOD	**Checker's Signature/Date**	
1. Review X	**Reviewer's Signature/Date**	
2. Alternate Calculation		
Alternate calculation description:		
Approver's Signature/Date		

REVISIONS

Rev. No.	Sheet No.	Description of Revision	Reviser's Signature/Date	Reviewer's Signature/Date	Approver's Signature/Date

15-02 A
ENGINEERING CALCULATION BASIS SHEET

Calculation No. 15-02 Revision No. 1 Date 2/25/98 Sheet ___ of ___
Proj. No. 726673 Project Title CF/RR Sediment Removal
Calculation Subject: Slope Stability

SUMMARY OF DATA SOURCES - CODES - ASSUMPTIONS

Assumptions:

1.

Data Sources:

1.

15-02 B
CALCULATIONS

PARSONS ENGINEERING SCIENCE, INC.

Client FT - 3011 Job No. 726673 Sheet 1 of 40

Subject Slope Stability Analysis By DED Date 6/27/97

Checked David R. Eck (DRE) Rev.

Objective: Evaluate the stability of the river bank after dredging to a 3:1 slope.

Approach: Utilize the PC STABLE Model and slope stability charts to predict the factor of safety against deep rotational failure.

Assumptions:
- The subsurface character is predominately sand. (Refer to 4-10, 14-19 Sheets)
- Sta. 4000 is the worst slope in that it has the longest slope length of the cross sections representing the dredging area. (Refer to Sheet 13)
- Borings B-400040, B-400075, B-400100, and MW-5I are representative of subsurface conditions (Refer to 14-19)
- Assume an average $N = 8$ for correlation to shear strength. (Sheets 14-19, 26 & 28/40)
- Shear strength of soil is represented by $\phi = 28$ & $C = 0$ (Refer to Sheets 26 & 28/40)
- Minimum FS = 1.3 (Sheet 29)

PESI-COR-8 (12/94)

Calculation:

Slope Stability Charts

r_u = Pore Pressure Parameter = 0
(Refer to Sheet 31/32/40)
Use Figure 4.15

β = Slope Angle $\cong 18°$

$\phi' = 28°$

H = Slope Height $\cong 17'$

$$\cot\beta = \frac{1}{\tan\beta} = \frac{1}{\tan 18°} \cong 3$$

$C'/\gamma' H = 0$ since $C' \cong 0$

so from Figure 4.15

$$\frac{\tan\phi'}{FS} = 0.39$$

$$\frac{\tan 28°}{FS} = 0.39$$

$$FS = 1.36 \cong \underline{\underline{1.3}} \checkmark$$

Calculation:

PC STABLE (Bishop's Method)

$FS_{min} = 1.7$ which represents a shallow failure circle (sheet 33)

Refer to sheets 34-40 for Program Input File

Discussion: $FS_{min} = 1.3$ for stability chart methods which is acceptable. Dredging should begin at the top of slope 1 to maintain toe support.

THIS CALC IS ACCEPTABLE REGARDING GENERAL STABILITY OF THE SLOPE. THE QUESTION OF EROSION PROTECTION HAS NOT BEEN ADDRESSED. CURRENTS AND WAVE ACTION MAY CAUSE PROBLEMS IF THE SAND IS LEFT EXPOSED.

D. Sal.
7/7/97

4/40

SJB SERVICES, INC

Contract Drilling and Testing

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Laboratory Test Report

PROJECT : MATERIAL TESTING : PARSONS ENGINEERING SCIENCE

CLIENT : PARSONS ENGINEERING SCIENCE

DATE : JUNE 16, 1997

PROJECT NO.: SJB-T768
REPORT NO.: LTR-1

SJB SAMPLE NUMBER : 97-274
CLIENT IDENTIFICATION : 400040 : 2'-4'

ASTM D-422 : Particle Size Analysis of Soils

Sieve Size	Percent Passing
3/4"	100.0
1/2"	99.0
3/8"	98.3
1/4"	95.4
#4	93.6
#10	90.5
#20	89.0
#40	87.3
#100	70.3
#200	34.8

PERCENT COMPONENTS

GRAVEL	SAND	SILT	CLAY
6.4%	58.8%	34.4%	0.4%

SJB SAMPLE NUMBER : 97-275
CLIENT IDENTIFICATION : 400040 : 12'-14'

ASTM D-422 : Particle Size Analysis of Soils

Sieve Size	Percent Passing
3/4"	100.0
1/2"	95.6
3/8"	94.0
1/4"	89.4
#4	87.3
#10	84.1
#20	83.1
#40	82.6
#100	16.3
#200	5.8

PERCENT COMPONENTS

GRAVEL	SAND	SILT	CLAY
12.7%	81.4%	5.9%	0.0%

5/40

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CLIENT : PARSONS ENGINEERING SCIENCE

DATE : JUNE 16, 1997

PROJECT NO.: SJB-T768
REPORT NO.: LTR-1

SJB SAMPLE NUMBER : ~~97-276~~
CLIENT IDENTIFICATION : 400075 : 0'-2'

ASTM D-422 : Particle Size Analysis of Soils

Sieve Size	Percent Passing
1/2"	100.0
3/8"	98.7
1/4"	97.3
#4	96.7
#10	96.0
#20	95.4
#40	94.1
#100	35.7
#200	7.0

PERCENT COMPONENTS			
GRAVEL	SAND	SILT	CLAY
3.3%	89.8%	6.9%	0.0%

SJB SAMPLE NUMBER : 97-277
CLIENT IDENTIFICATION : 400075 : 6'-8'

ASTM D-422 : Particle Size Analysis of Soils

Sieve Size	Percent Passing
1 1/2"	100.0
1"	89.6
3/4"	78.4
1/2"	72.0
3/8"	64.7
1/4"	57.0
#4	53.3
#10	44.6
#20	40.5
#40	37.4
#100	13.8
#200	4.2

PERCENT COMPONENTS			
GRAVEL	SAND	SILT	CLAY
46.7%	49.0%	4.3%	0.0%

6/40

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CLIENT : PARSONS ENGINEERING SCIENCE

DATE : JUNE 16, 1997

PROJECT NO.: SJB-T768
REPORT NO.: LTR-1

SJB SAMPLE NUMBER : 97-278
CLIENT IDENTIFICATION : 400100 : 0'-2'

ASTM D-422 : Particle Size Analysis of Soils

Sieve Size	Percent Passing
1"	100.0
3/4"	96.6
1/2"	93.8
3/8"	92.0
1/4"	89.3
#4	87.6
#10	83.0
#20	81.6
#40	78.7
#100	49.8
#200	28.1

PERCENT COMPONENTS			
GRAVEL	SAND	SILT	CLAY
12.4%	59.5%	27.6%	0.5%

SJB SAMPLE NUMBER : 97-279
CLIENT IDENTIFICATION : 400100 : 8'-10'

ASTM D-422 : Particle Size Analysis of Soils

Sieve Size	Percent Passing
1"	100.0
3/4"	96.9
1/2"	87.7
3/8"	83.3
1/4"	75.8
#4	71.9
#10	58.8
#20	53.5
#40	49.8
#100	20.3
#200	7.9

PERCENT COMPONENTS			
GRAVEL	SAND	SILT	CLAY
28.1%	63.9%	7.1%	0.9%

7/40

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Laboratory Test Report

PROJECT : MATERIAL TESTING : PARSONS ENGINEERING SCIENCE

CLIENT : PARSONS ENGINEERING SCIENCE

DATE : JUNE 16, 1997

PROJECT NO.: SJB-T768
REPORT NO.: LTR-1
PAGE 5 OF 8

SJB SAMPLE NUMBER : 97-280
CLIENT IDENTIFICATION : 370020 : 4'-6'

ASTM C-136 : Sieve Analysis of Fine and Coarse Aggregates

Sieve Size	Percent Passing
1/2"	100.0
3/8"	99.5
1/4"	99.3
#4	99.2
#10	98.6
#20	98.6
#40	94.9
#100	85.7
#200	55.6

SJB SAMPLE NUMBER : 97-281
CLIENT IDENTIFICATION : 370020 : 6'-8'

ASTM C-136 : Sieve Analysis of Fine and Coarse Aggregates

Sieve Size	Percent Passing
3/8"	100.0
1/4"	99.9
#4	99.8
#10	98.9
#20	97.3
#40	96.0
#100	88.2
#200	60.4

8/40

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Laboratory Test Report

PROJECT : MATERIAL TESTING : PARSONS ENGINEERING SCIENCE

CLIENT : PARSONS ENGINEERING SCIENCE

DATE : JUNE 16, 1997

PROJECT NO.: SJB-T768
REPORT NO.: LTR-1
PAGE 6 OF 8

SJB SAMPLE NUMBER : 97-282
CLIENT IDENTIFICATION : 370020 : 10'-12'
ASTM C-136 : Sieve Analysis of Fine and Coarse Aggregates

Sieve Size	Percent Passing
1"	100.0
3/4"	88.7
1/2"	75.4
3/8"	67.3
1/4"	58.4
#4	52.6
#10	42.3
#20	37.8
#40	35.7
#100	13.3
#200	3.7

SJB SAMPLE NUMBER : 97-283
CLIENT IDENTIFICATION : 370020 : 12'-14'
ASTM C-136 : Sieve Analysis of Fine and Coarse Aggregates

Sieve Size	Percent Passing
2"	100.0
1 1/2"	92.4
1"	86.4
3/4"	81.7
1/2"	75.1
3/8"	70.6
1/4"	63.9
#4	60.9
#10	54.8
#20	51.7
#40	49.6
#100	26.6
#200	13.7

 9/40

SJB SERVICES, INC.
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Laboratory Test Report

PROJECT : MATERIAL TESTING : PARSONS ENGINEERING SCIENCE

CLIENT : PARSONS ENGINEERING SCIENCE

DATE : JUNE 16, 1997

PROJECT NO.: SJB-T768
REPORT NO.: LTR-1
PAGE 7 OF 8

SJB SAMPLE NUMBER : 97-284
CLIENT IDENTIFICATION : 345050 : 2'-3'

ASTM D-422 : Particle Size Analysis of Soils

Sieve Size	Percent Passing
1"	100.0
3/4"	96.4
1/2"	96.4
3/8"	96.1
1/4"	94.9
#4	94.2
#10	92.7
#20	92.2
#40	91.7
#100	87.4
#200	62.6

PERCENT COMPONENTS			
GRAVEL	SAND	SILT	CLAY
5.8%	31.6%	60.0%	2.6%

SJB SAMPLE NUMBER : 97-285
CLIENT IDENTIFICATION : 345150 : 4'-6'

ASTM D-422 : Particle Size Analysis of Soils

Sieve Size	Percent Passing
1"	100.0
3/4"	95.5
1/2"	94.8
3/8"	94.3
1/4"	93.8
#4	93.6
#10	92.9
#20	92.6
#40	91.8
#100	72.4
#200	30.6

PERCENT COMPONENTS			
GRAVEL	SAND	SILT	CLAY
6.4%	63.0%	29.6%	1.0%

9/40

SJB SERVICES, INC.
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Laboratory Test Report

PROJECT : MATERIAL TESTING : PARSONS ENGINEERING SCIENCE

CLIENT : PARSONS ENGINEERING SCIENCE

DATE : JUNE 16, 1997

PROJECT NO.: SJB-T768
REPORT NO.: LTR-1
PAGE 7 OF 8

SJB SAMPLE NUMBER : 97-284
CLIENT IDENTIFICATION : 345050 : 2'-3'

ASTM D-422 : Particle Size Analysis of Soils

Sieve Size	Percent Passing
1"	100.0
3/4"	96.4
1/2"	96.4
3/8"	96.1
1/4"	94.9
#4	94.2
#10	92.7
#20	92.2
#40	91.7
#100	87.4
#200	62.6

PERCENT COMPONENTS			
GRAVEL	SAND	SILT	CLAY
5.8%	31.6%	60.0%	2.6%

SJB SAMPLE NUMBER : 97-285
CLIENT IDENTIFICATION : 345150 : 4'-6'

ASTM D-422 : Particle Size Analysis of Soils

Sieve Size	Percent Passing
1"	100.0
3/4"	95.5
1/2"	94.8
3/8"	94.3
1/4"	93.8
#4	93.6
#10	92.9
#20	92.6
#40	91.8
#100	72.4
#200	30.6

PERCENT COMPONENTS			
GRAVEL	SAND	SILT	CLAY
6.4%	63.0%	29.6%	1.0%

 9/40

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Laboratory Test Report

PROJECT : MATERIAL TESTING : PARSONS ENGINEERING SCIENCE

CLIENT : PARSONS ENGINEERING SCIENCE

DATE : JUNE 16, 1997

PROJECT NO.: SJB-T768
REPORT NO.: LTR-1
PAGE 7 OF 8

SJB SAMPLE NUMBER : 97-284
CLIENT IDENTIFICATION : 345050 : 2'-3'

ASTM D-422 : Particle Size Analysis of Soils

Sieve Size	Percent Passing
1"	100.0
3/4"	96.4
1/2"	96.4
3/8"	96.1
1/4"	94.9
#4	94.2
#10	92.7
#20	92.2
#40	91.7
#100	87.4
#200	62.6

PERCENT COMPONENTS			
GRAVEL	SAND	SILT	CLAY
5.8%	31.6%	60.0%	2.6%

SJB SAMPLE NUMBER : 97-285
CLIENT IDENTIFICATION : 345150 : 4'-6'

ASTM D-422 : Particle Size Analysis of Soils

Sieve Size	Percent Passing
1"	100.0
3/4"	95.5
1/2"	94.8
3/8"	94.3
1/4"	93.8
#4	93.6
#10	92.9
#20	92.6
#40	91.8
#100	72.4
#200	30.6

PERCENT COMPONENTS			
GRAVEL	SAND	SILT	CLAY
6.4%	63.0%	29.6%	1.0%

10/40

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Laboratory Test Report

PROJECT : MATERIAL TESTING : PARSONS ENGINEERING SCIENCE

CLIENT : PARSONS ENGINEERING SCIENCE

DATE : JUNE 16, 1997

PROJECT NO.: SJB-T768
REPORT NO.: LTR-1
PAGE 8 OF 8

SJB SAMPLE NUMBER : 97-286
CLIENT IDENTIFICATION : 345150 : 12'-14'

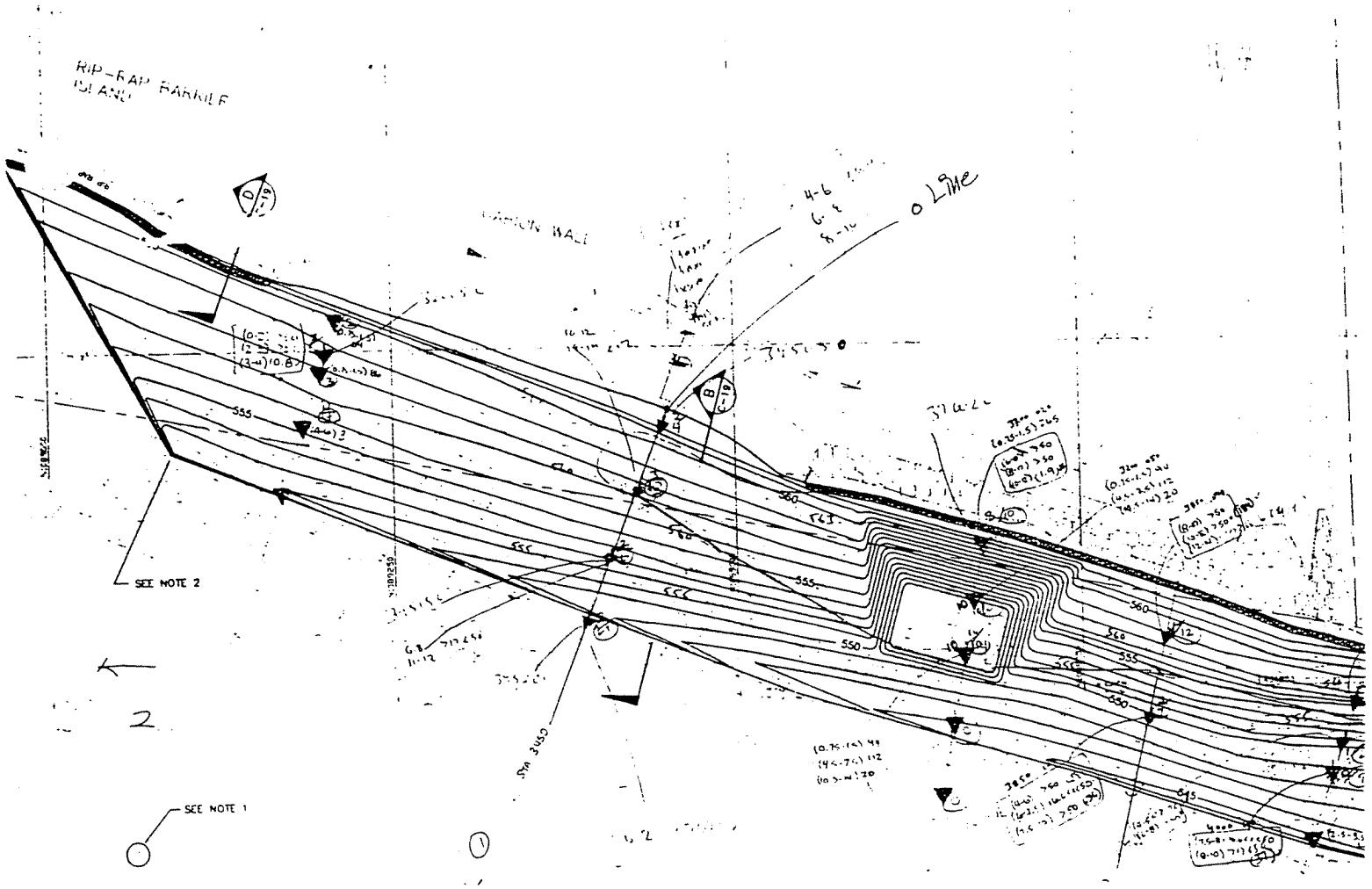
ASTM D-422 : Particle Size Analysis of Soils

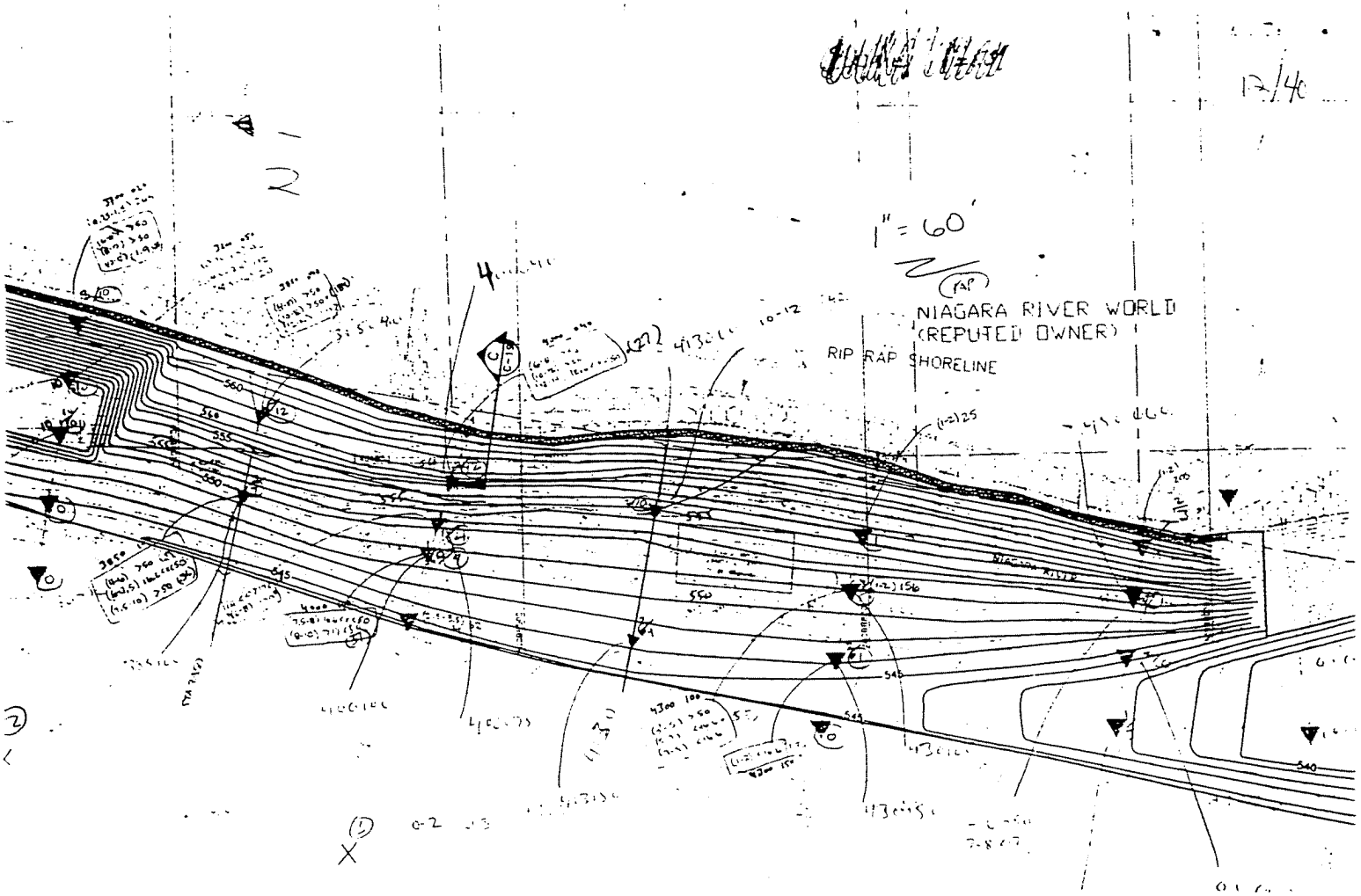
Sieve Size	Percent Passing
3/4"	100.0
1/2"	93.5
3/8"	91.0
1/4"	80.4
#4	72.2
#10	57.4
#20	54.8
#40	53.8
#100	26.4
#200	7.7

PERCENT COMPONENTS

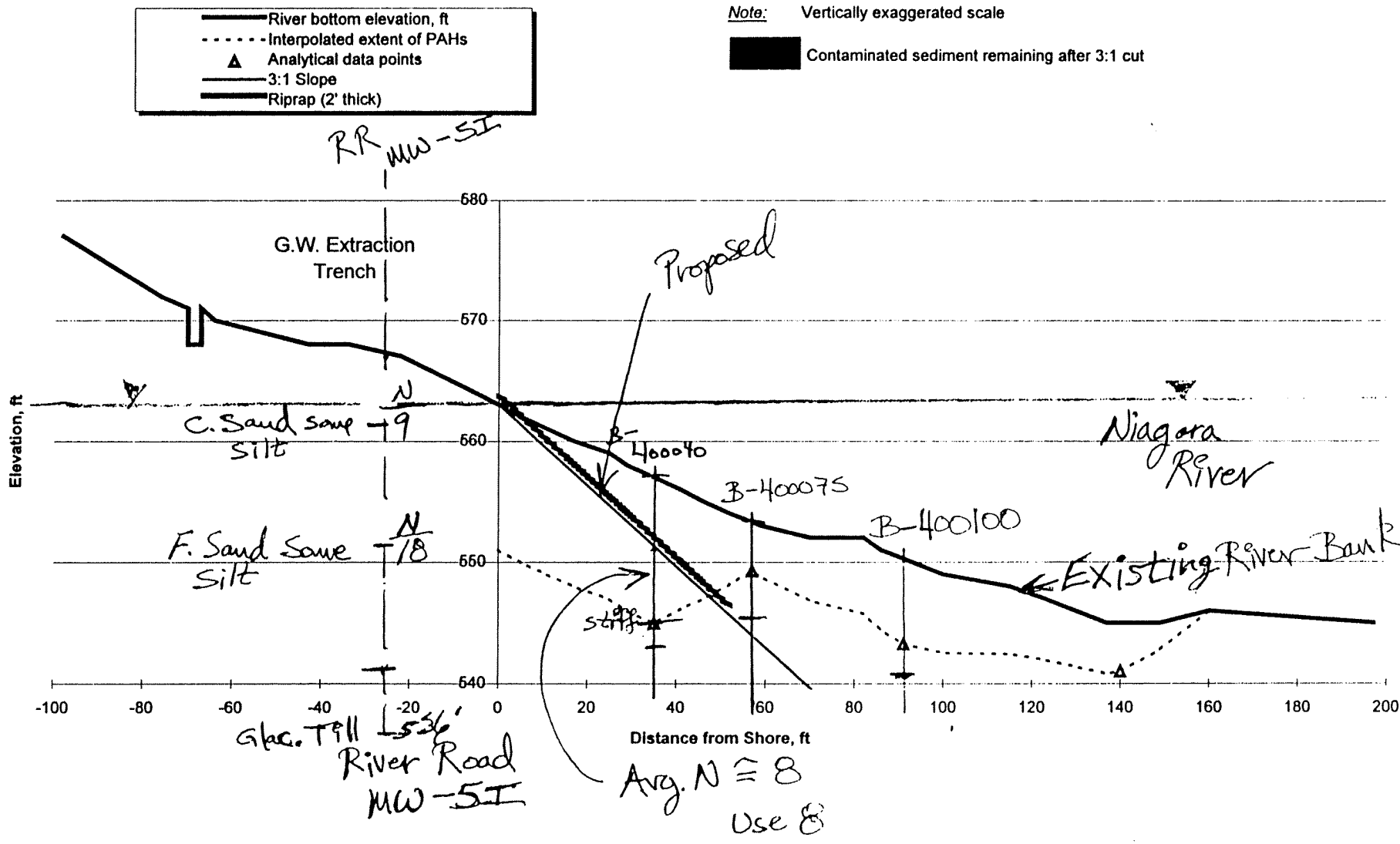
GRAVEL	SAND	SILT	CLAY
27.8%	64.5%	7.7%	0.0%

"QUALITY & SERVICE THE WAY IT USED TO BE"


RIP-RAP BARRIER
ISLAND
SEE NOTE 2
SEE NOTE 1
555
560
550
565
570


1" = 60'
NIAGARA RIVER WORLD
(REPUTED OWNER)
RIP RAP SHORELINE

Cherry Farm Sediment Project - *STA: 4000*



14/40

Contractor: Northstar Drilling
Driller: Jeff Thew
Inspector: Jeffrey Poulsen
Rig Type: Barge-mounted Minuteman
Method: 3-inch Split Spoon Sampler

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

PROJECT NAME: Cherry Farms Sediment Sampling
PROJECT NUMBER: 726673

BORING NO. 400040
Sheet 1 of 1
Location: Station 4000, 40 feet from shore

Weather: Clear, calm, 60 deg. F
Date/Time Start: May 28, 1997. / 1800
Date/Time Finish: May 28, 1997. / 2030

SURFACE WATER OBSERVATIONS

Date	05/28/97			
Time	1800			
Depth	7 feet			

Photovac Reading	Sample I.D.	Sample Depth	Percent Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL	COMMENTS
		0			*0 feet*	
-			0	2	No recovery - very soft material.	
		1		1		
				1		
		2		1		
0.0			100	2	FILL, silt, some organic debris, dark brown-black, soft.	
		3		3		
				4		
		4		7	FILL, sand, black, firm.	
0.0			100	4	*4.5 feet*	
		5		4	SAND, fine-medium, trace silt and fine gravel, medium-dark gray, no odor.	
				3		
		6		2	*6 feet*	
0.0			30	4	SILT, little fine sand, trace gravel (1/4"), dark brown-red, sheen.	
		7		4		
				4		
		8		4	*8 feet*	
0.0			80	4	SAND, little silt, medium-dark gray, odor, spots of sheen.	
		9		3		
				4		
		10		5		
0.0			100	5		
		11		7		
				4		
		12		4		
0.0			50	8	18	
		13		10	*13 feet*	
				14	SILT and fine SAND, trace rounded gravel (2"), light gray.	
		14		24	No odor or sheen.	
		15			Boring terminated at 14 feet below sediment surface.	
		16				
		17				

To Remain

SUMMARY:

15/46

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

BORING NO. 400075

Sheet 1 of 1

Contractor: Northstar Drilling
Driller: Jeff Thew
Inspector: Jeffrey Poulsen
Rig Type: Barge-mounted Minuteman
Method: 3-inch Split Spoon Sampler

PROJECT NAME: Cherry Farms Sediment Sampling
PROJECT NUMBER: 726673

Location: Station 4000, 75 feet from shore

Weather: Clear, calm, 60 deg. F

Date/Time Start: May 28, 1997. / 1720

Date/Time Finish: May 28, 1997. / 1750

SURFACE WATER OBSERVATIONS

Date	05/28/97			
Time	1720			
Depth	10 feet			

Photovac Reading	Sample I.D.	Sample Depth	Percent Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL	COMMENTS
		0			*0 feet*	
0.0			50	3	FILL, silt , little fine sand, trace gravel, dark brown-black.	
		1		4		
				4		
		2		3		
0.0			100	4	sheen 2-4 feet	
		3		3		
				3		
		4		5		
0.0			100	6	slight sheen 4-5.5 feet	
		5		3		
				6	*5.5 feet*	
		6		7	GRAVEL, fine-coarse (2"), little fine sand, trace silt, no sheen.	
0.0			70	15	*6.5 feet*	
		7		7	SAND, medium, trace-little silt, medium gray, no sheen.	
				8		
		8		7		
		9			Boring terminated at 8 feet below sediment surface.	
		10				
		11				
		12				
		13				
		14				
		15				
		16				
		17				

SUMMARY:

16/46

Contractor: Northstar Drilling
Driller: Jeff Thew
Inspector: Jeffrey Poulsen
Rig Type: Barge-mounted Minuteman
Method: 3-inch Split Spoon Sampler

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

PROJECT NAME: Cherry Farms Sediment Sampling
PROJECT NUMBER: 726673

BORING NO. 400100
Sheet 1 of 1
Location: Station 4000, 100 feet from shore

Weather: Clear, calm, 60 deg. F
Date/Time Start: May 28, 1997. / 1515
Date/Time Finish: May 28, 1997. / 1700

SURFACE WATER OBSERVATIONS

Date	05/28/97			
Time	1515			
Depth	10.5 feet		-	

Photovac Reading	Sample I.D.	Sample Depth	Percent Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL	COMMENTS
		0			*0 feet*	
0.0			10	WOH	FILL, silt and fine sand, black, odor.	
		1		WOH		
				2		
		2		2		
0.0			20	2	FILL, silt and fine-medium sand, trace gravel (1"), brown-black.	-
		3		1		
				1		
		4		1		
0.0			50	2	FILL, sand, fine, little-some silt, dark brown-black, odor, sheen.	
		5		3		
				4		
		6		5		
-			100	6		
		7		6	*7 feet*	
				4	SILT, gray, firm. *7.5 feet*	
		8		3	SAND, fine-medium, little coarse gravel, firm, no odor. *8 feet*	
0.0			80	6	SAND, some silt, little-some fine-coarse gravel (rounded), trace clay,	
		9		6	light-medium gray.	
				6		
		10		6		
		11			Boring terminated at 10 feet below sediment surface.	
		12				
		13				
		14				
		15				
		16				
		17				

SUMMARY:

RIVER ROAD 17/40

BORING LOG

Dvirka and Bartilucci

Project No.: 1150 02A
Project Name: River Road RI/FS

Well/Boring No.: MW-5I
Sheet 1 of
By: KL/EA Date: 3/27/97
Chk'd: Date:

Drilling Contractor: KenDrick Drilling Inc
Driller: J. Sims Geologist: Pete Rosso
Drill Rig: Simco 5-50 Drilling Method: 4¼" ID HSA
Sample Spoon I.D.: 2" Drive Hammer Wt.: 140 lbs
Date Started: 3/19/97 Date Completed: 3/28/97

Borehole Completion Depth: 32'
Borehole Diameter: 6¼
Ground Surface El:

SPLIT SPOON INFO.						VOC READ			
SAMPLE NO.	RECOV. (in.)	DEPTH per 6"	DEPTH	STRATA	SOIL DESCRIPTION	BKGD (PPM)	SAMP (PPM)	WELL	GEOLOGIC LOG
S-1	10"	1 3 4 2	1 2		0-3" Black fine sand, grass roots 3"-6" Black silty fine Sand, Trace angular gravel 6"-10" Brown-reddish fine Sand in alt. layers, moist	0	0		Fill Material
			3 4						
			5						
S-2	15"	9 10	6		0-15" Grey-Black fine Sand, some silt, with wood chips and foundry sands throughout, moist	0	0		
		14 10	7						
			8						
			9						
			10	57P					
S-3	17"	14 21 14 12	11 12		0-17" Black-Brown fine Sand, little silt, Trace angular gravel with foundry sands at (6"-9"), moist	0	2		
			13						
			14						≈ 14 ft Alluvial Deposits
S-4	5"	9 15	15 16	56?	0-5" Dark Black silty Sand, with foundry sand, wood chips, and fine-Coarse, angular gravel saturated	0	0		

NOTES AND COMMENTS: Soil sample S-3 collected from depth of (10-12') was selected for Chemical analysis.

RIVER ROAD 18/41

BORING LOG

Dvirka and Bartilucci

Project No.: 1150-2A
Project Name: River Road RI/FS

Well/Boring No.: MW 5I
Sheet 1 of 2
By: RR/EA Date: 3/31/92
Chk'd: Date:

Drilling Contractor: Kendrick Drilling
Driller: Paul Usery
Drill Rig: Diedrich D-50
Sample Spoon I.D.: 2 inch
Date Started: 3/27

Geologist: R. Rubins / Jeff Aldrich
Drilling Method:
Drive Hammer Wt.: 140 lbs
Date Completed: 3/28

Borehole Completion Depth: 57
Borehole Diameter: 6 1/2
Ground Surface El: ~ 565

SPLIT SPOON INFO. SAMPLE NO.	RECOV. (in.)	DEPTH per 6"	DEPTH	STRATA	SOIL DESCRIPTION	VOC READ BKGD (PPM)	VOC READ SAMP (PPM)	VOC READ WELL	GEOLOGIC LOG
S-4	5"	8 3	17		Soil description on previous page	0	0		Alluvial Deposits
			18						
			19		562'				
			20						
S-5	18"	7 4 5 6	21 22		0-3" Black medium-coarse Sand, some silt, trace angular gravel 3"-18" Gray silty, very fine Sand, trace clay, trace angular gravel slightly plastic, cohesive moist-saturated	0	4		
			23						
			24						
			25						
S-6	13"	5 9 7 5	26		0-13" Black-Gray very fine sandy SILT very slightly plastic saturated	0	4-8		
			27						
			28						
			29						
			30						
S-7	9"	6 7 11 13	31 32		0-9" Gray fine Sand, some silt cohesive, saturated	0	4		

NOTES AND COMMENTS:

River Road 19/40

BORING LOG

Dvirka and Bartilucci

Project No.: 1150-02A
Project Name: River Road RI/FS

Well/Boring No.: MW-5I
Sheet 1 of 3
By: KR/EA Date: 3/27/92
Chk'd: _____ Date: _____

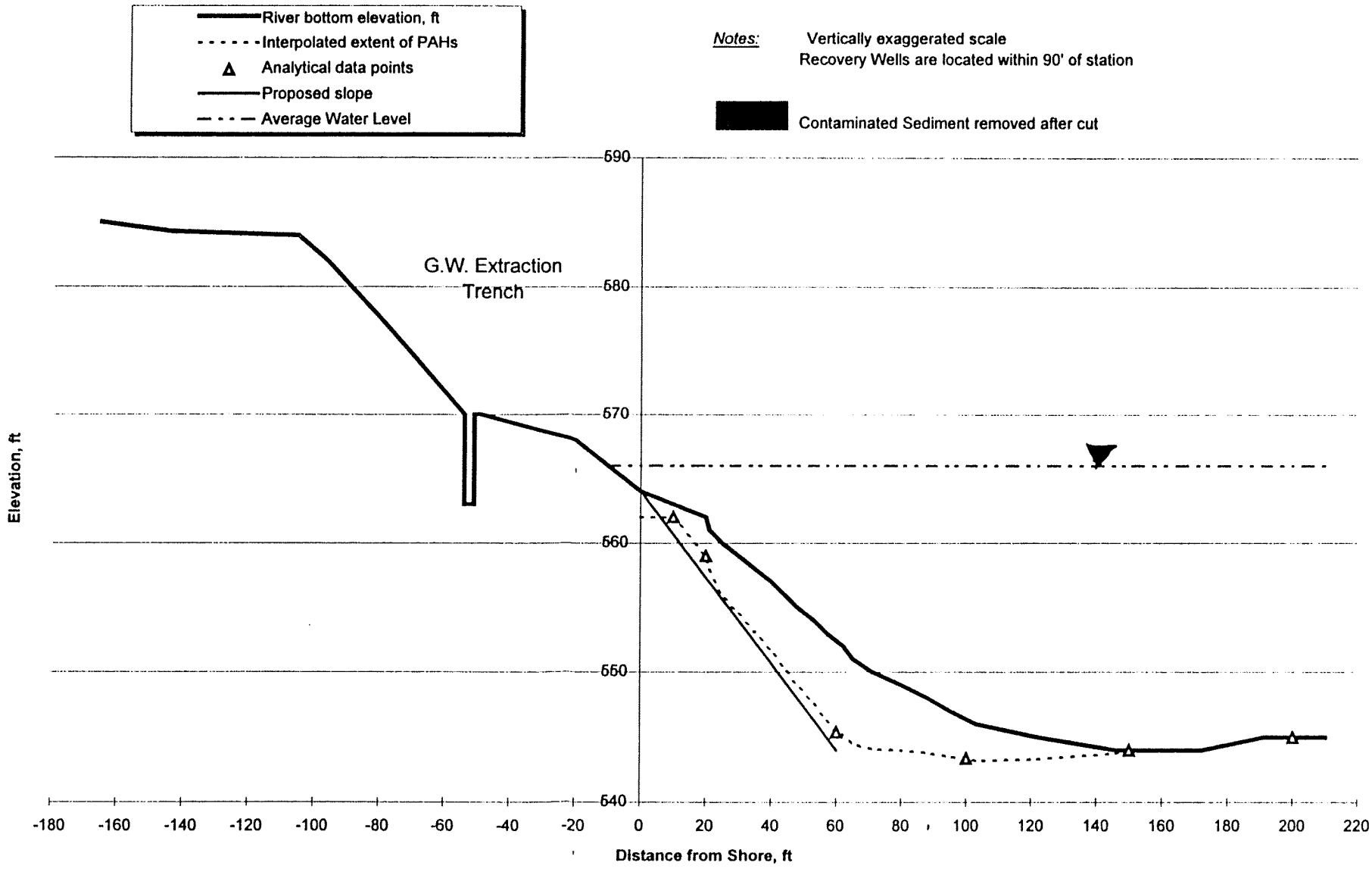
Drilling Contractor: Renderick Drilling
Driller: Paul Doty
Drill Rig: DieDrick 0-5
Sample Spoon I.D.: 4 inch
Date Started: 3/27/92
Geologist: Keith Reiss / Ed Aldrich
Drilling Method: 4¼ HSA
Drive Hammer Wt.: 140 lbs
Date Completed: _____

Borehole Completion Depth: 52'
Borehole Diameter: 6½
Ground Surface El: _____

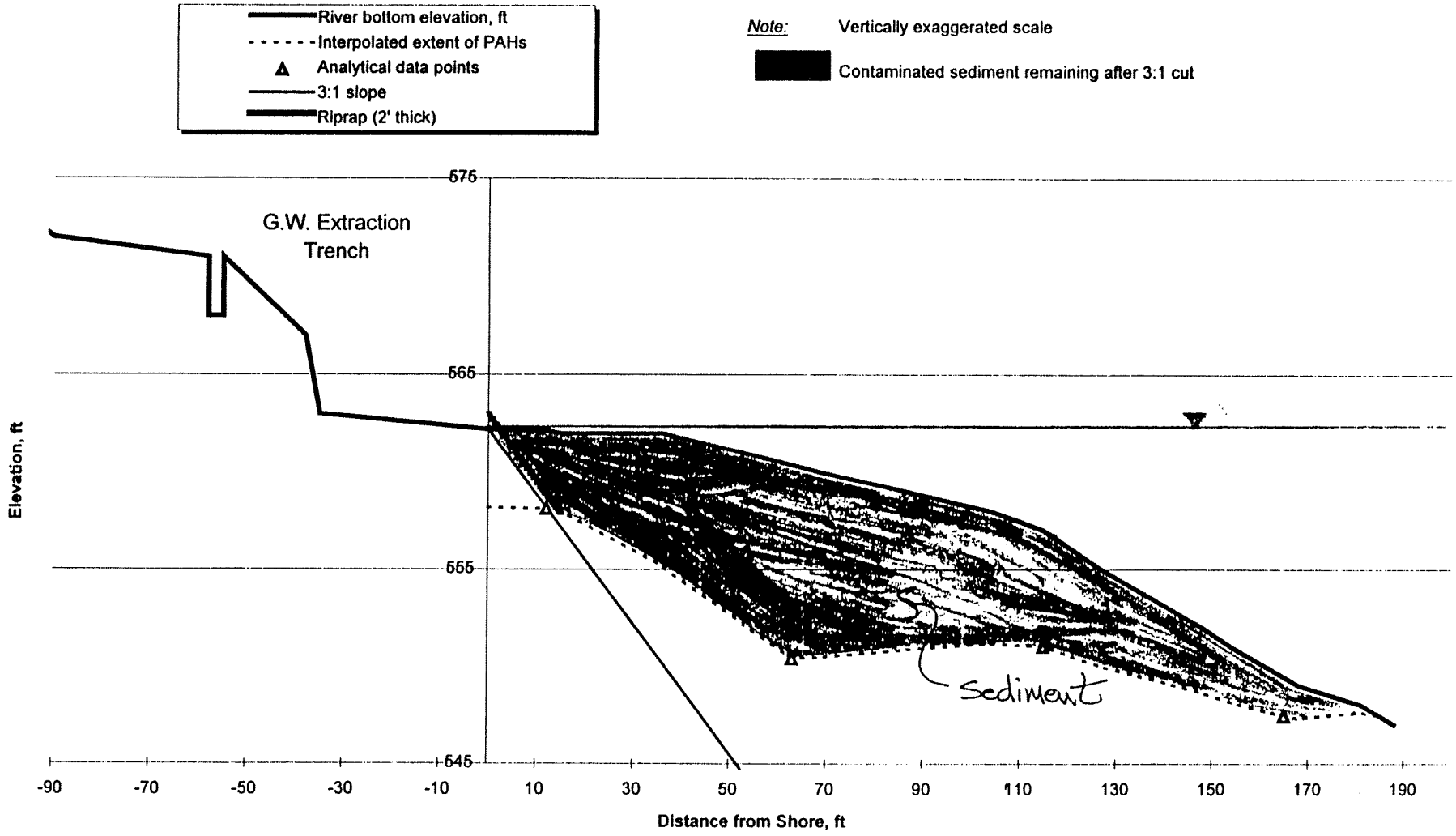
SPLIT SPOON INFO. SAMPLE NO.	RECOV. (ft.)	DEPTH per 6"	DEPTH	STRATA	SOIL DESCRIPTION	VOC READ BKGD (PPM)	VOC READ SAMP (PPM)	WELL	GEOLOGIC LOG
			33						Alluvial deposits
			34		5/6				
S-8	18"	5 8 12 17	35		0-18" Gray-Black fine Sand, some silt, trace fine-coarse angular gravel, saturated	0	0		
			36						
			37						
			38						
			39						
			40		5/12				
S-9	22	22 100/4 100/1	41		(40-42) 0"-21½" Gray fine sand 21½"-22" Gray silt	0	0		
			42						
			43						
			44						
	7"	3 3 3 5	45		(45-47) 0-7" Brown-gray silty clay some fine gravel sand	0	0		
			46						
	10"	100/4 50/1	47						Glacial Till
			48		(60-52) 0-10 Gray medium sand & gravel with some silty clay mixed.	0	1.5		

NOTES AND COMMENTS:

Cherry Farm Sediment Project - *STA: 4500*



Cherry Farm Sediment Project - *STA: 3450*

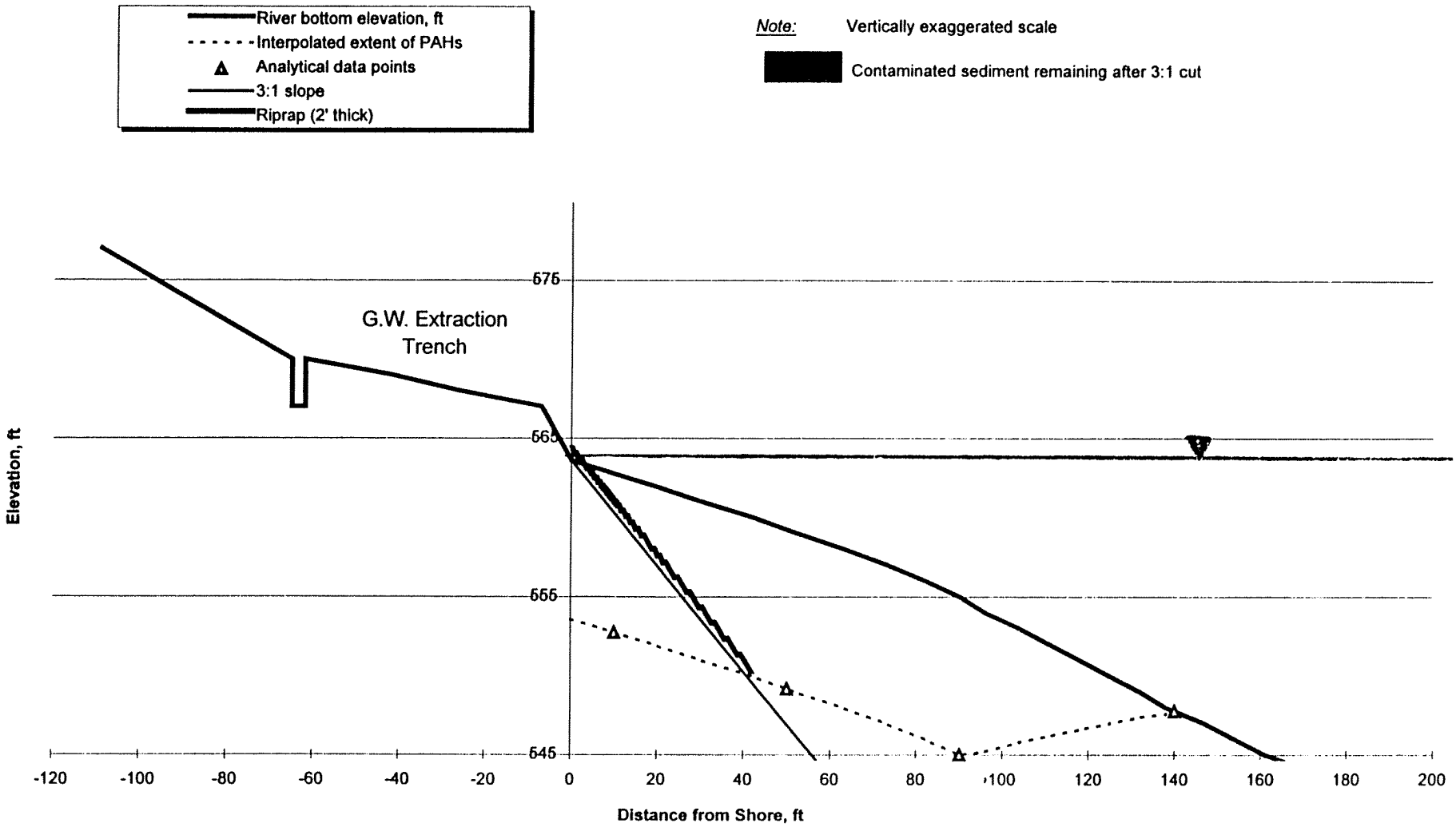


Parsons Engineering Science Inc.

BUF\726673\STA3450 Chart 1

3/4

Cherry Farm River Sediment Project - *STA: 3700*



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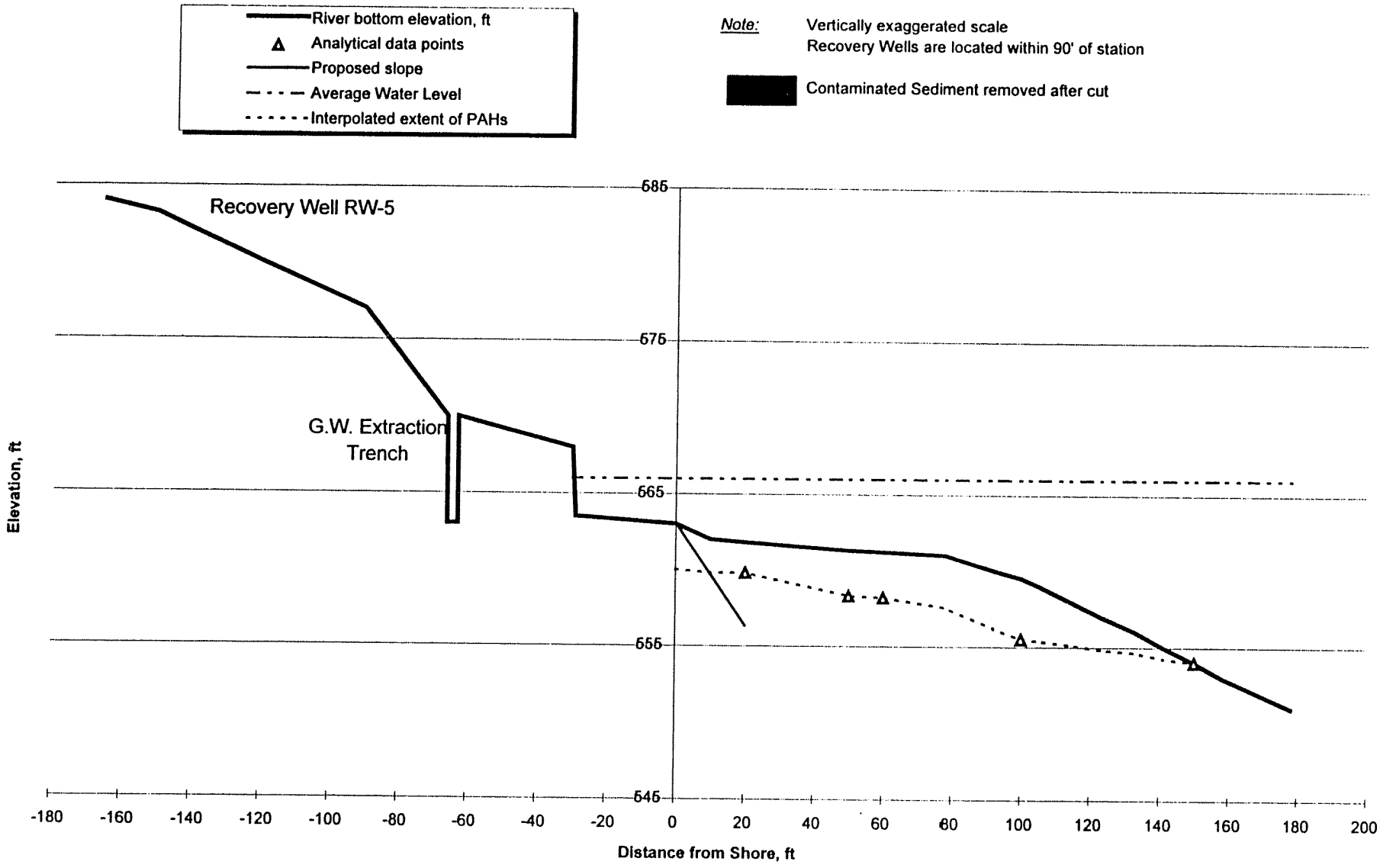

Parsons Engineering Science Inc.

BUF\726673\STA3200 Chart 1

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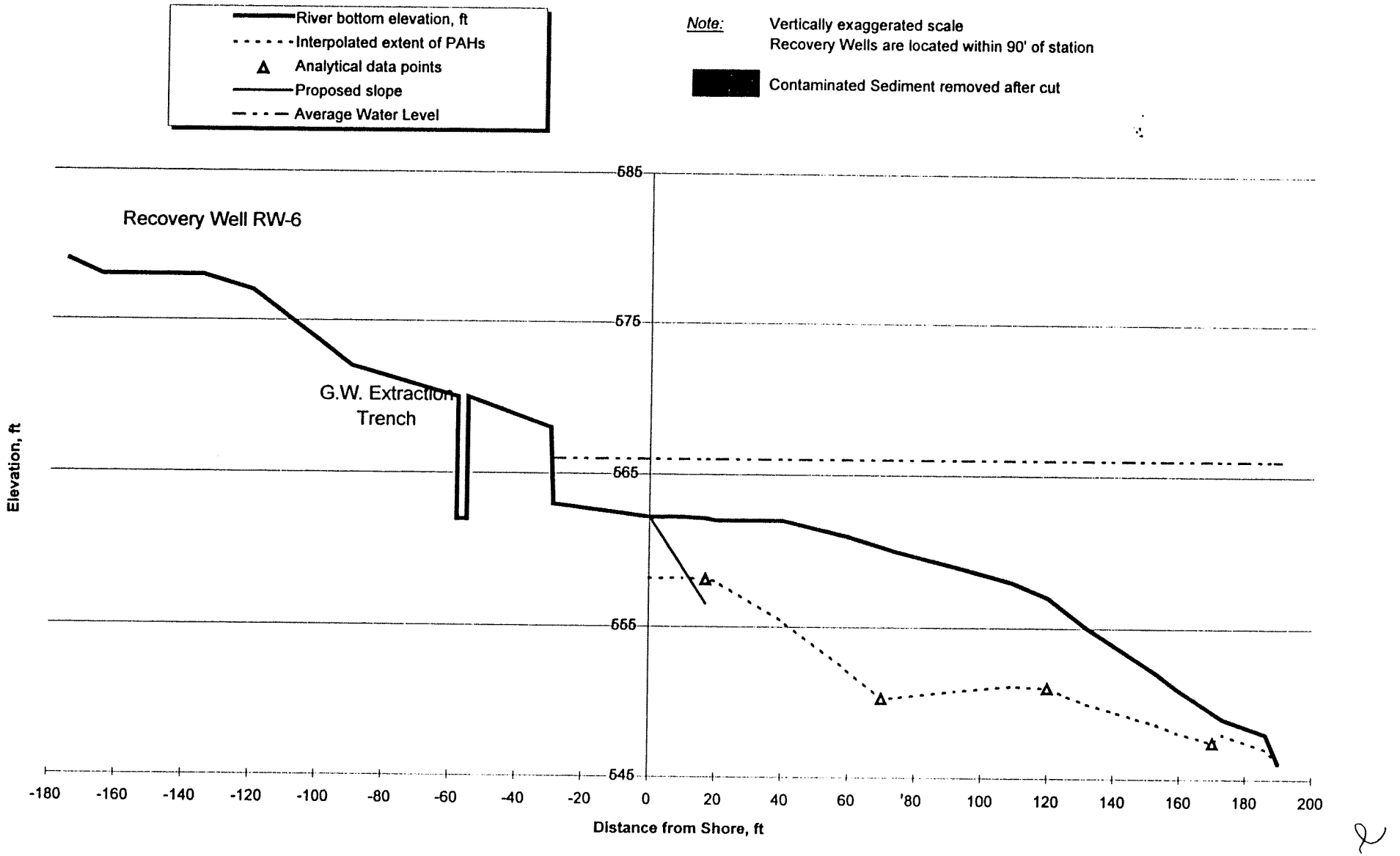
Cherry Farm Sediment Project - *STA: 3450*



Parsons Engineering Science Inc.

BUF\726673\STA3450 Chart 1

25/40

FOUNDATION ENGINEERING HANDBOOK

Edited by

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Professor of Civil Engineering and Geophysics, Emeritus,
Princeton University

HSAI-YANG FANG Ph.D.
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VAN NOSTRAND REINHOLD COMPANY
NEW YORK CINCINNATI ATLANTA DALLAS SAN FRANCISCO
LONDON TORONTO MELBOURNE

= diameter of the vane
M = total resisting moment at failure (resisting moment from the circumference of cylinder plus resisting moment from the end of cylinder)

The assumptions made in the vane test are that the maximum value of torque is used, which means the shear strength is computed from one reading only. The test is assumed to be an undrained test which means that no drainage is allowed to take place during the test. No disturbance of the soil caused by the drilling operations or the installation of the vane is considered. It is assumed that the undrained shear strength is the same in both horizontal and vertical directions, and also that the height of the vane is equal to twice its diameter. The factors affecting the vane test, including the method of installation, vane dimensions, time effect, mode of failure, and inhomogeneities of soil layers are given by Flaate (1966). Other information such as test procedures and interpretation of test results are given in ASTM publications and by Cox (1967).

Pressuremeter

The Menard Type of pressuremeter (1956, 1969) consists of two main portions; a probe and a pressure-volumeter, connected by plastic tubes through which water and gas are applied. The required pressures and volume changes are measured, giving a type of stress-strain test in place.

The probe is a cylindrical metal assembly with rubber membranes attached to three independent cells. The central cell contains water under gas pressure (CO_2), so that crease in volume of this cell is measured by the lowering of the water level in the volumeter at the surface. The lower and upper cells are called guard cells and expand under equal gas pressure from the surface to minimize the effects of end restraint on the measuring cell. The volumeter is so equipped that a monitored gas pressure can be used to force water into the measuring cell. The pressuremeter probe applies a radial pressure to the soil around the probe in the borehole. The pressure gauge and volumeter permit simultaneous measurement of pressure and volume change of the probe. A correlation study of pressuremeter data and conventional shear test results for various types of soil is given by Higgins (1969). Other types of pressuremeters incorporating similar principles were developed independently at the AASHO Road Test in 1956 (Fang, 1969), where the probe has been used to measure the internal deformation characteristics of embankment soil and of base and subbase material.

With regard to cohesionless soils, Table 2.43 shows general relationships between relative density, standard penetration resistance, and angle of internal friction (Peck, 1974; Meyerhof, 1956). These data can be used for preliminary design. For a fundamental theoretical treatment see Winterkorn (1971).

TABLE 2.43 RELATIONSHIP BETWEEN RELATIVE DENSITY, PENETRATION RESISTANCE, AND ANGLE OF INTERNAL FRICTION OF COHESIONLESS SOILS.

Type of Soil	Penetration Resistance N	Relative Density D_r	Angle of Internal Friction ϕ	
			Peck (1974)	Meyerhof (1956)
Very loose sand	<4	<0.2	<29	<30
Loose sand	4–10	0.2–0.4	29–30	30–35
Medium sand	10–30	0.4–0.6	30–36	35–40
Dense sand	30–50	0.6–0.8	36–41	40–45
Very dense sand	>50	>0.8	>41	>45

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DED
27/40

EARTH SUPPORT SYSTEMS & RETAINING STRUCTURES

$\phi = 28^\circ$

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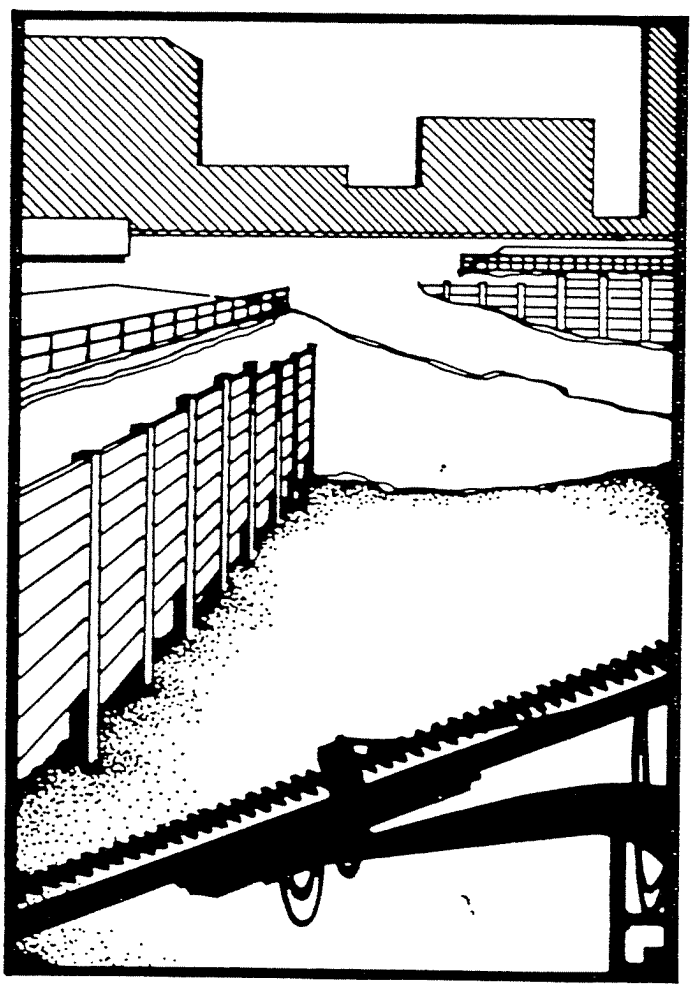

TABLE 3-1
Granular Soil (After Teng., 1962)

Compactness	Very Loose	Loose	Medium	Dense	Very Dense
Relative density, D_d	0	15%	35%	65%	85% 100%
Standard penetration resistance, N = no. of blows per foot.	0	4	10	30	50
ϕ (degrees)*		28	30	36	41
Unit weight, pcf					
moist	<100	95-125	110-130	110-140	<130
submerged	< 60	55-65	60-70	65-85	> 75

*highly dependent on gradation and particle angularity

TABLE 3-2
Cohesive Soil (After Teng., 1962)

Consistency	Very Soft	Soft	Medium	Stiff	Very Stiff	Hard
q_u = unconfined compression strength, tons per square foot.	0	0.25 0.50	1.00	2.00	1.00	
Standard penetration resistance, N = no. of blows per foot.	0	2 4	8	16	32	
Unit weight, pcf (saturated)		100-120	110-130	120-140		130+
Identification charateristics	Exudes from between fingers when squeezed in hand	Molded by light finger pressure	Molded by strong finger pressure	Indented by thumb	Indented by thumb nail	Difficult to indent by thumb nail

TABLE 3-3
Typical Properties of Compacted Materials

Group symbol	Soil Type	Range of maximum dry unit weight, pcf	Range of optimum moisture, percent	Typical value of compression		Typical strength characteristics				Typical coefficient of permeability, K ft/min.
				At 1.4 tsf (20 psi)	At 3.6 tsf (50 psi)	Cohesion (As compacted) psf	Cohesion (saturated) psf	ϕ (Effective stress envelope) degrees	Tanϕ	
				percent of original height						
GW	Well graded clean gravels, gravel-sand mixtures.	125-135	11-8	0.3	0.6	0	0	>38	>0.79	5×10^{-2}
GP	Poorly graded clean gravels, gravel-sand mix.	115-125	14-11	0.4	0.9	0	0	>37	>0.74	10^{-1}
GM	Silty gravels, poorly graded gravel-sand-silt.	120-135	12-8	0.5	1.1	...	...	>34	>0.67	$>10^{-6}$
GC	Clayey gravels, poorly graded gravel-sand-clay.	115-130	14-9	0.7	1.6	...	...	>31	>0.60	$>10^{-7}$
SW	Well graded clean sands, gravelly sands.	110-130	16-9	0.6	1.2	0	0	38	0.79	$>10^{-3}$
SP	Poorly graded clean sands, sand-gravel mix.	100-120	21-12	0.8	1.4	0	0	37	0.74	$>10^{3}$
SM	Silty sands, poorly graded sand-silt mix.	110-125	16-11	0.8	1.6	1050	420	34	0.67	5×10^{-5}
SM-SC	Sand-silt clay mix with slightly plastic fines.	110-130	15-11	0.8	1.4	1050	300	33	0.66	2×10^{-6}
SC	Clayey sands, poorly graded sand-clay mix.	105-125	19-11	1.1	2.2	1550	230	31	0.60	5×10^{-7}
ML	Inorganic silts and clayey silts.	95-120	24-12	0.9	1.7	1400	190	32	0.62	10^{-5}
ML-CL	Mixture of inorganic silt and clay.	100-120	22-12	1.0	2.2	1350	460	32	0.62	5×10^{-7}
CL	Inorganic clays of low to medium plasticity.	95-120	24-12	1.3	2.5	1800	270	28	0.54	10^{-7}
OL	Organic silts and silt-clays, low plasticity.	80-100	33-21	...	...	...	...	...	...	...
MH	Inorganic clayey silts, elastic silts.	70-95	40-24	2.0	3.8	1500	420	25	0.47	5×10^{-7}
CH	Inorganic clays of high plasticity.	75-105	36-19	2.6	3.9	2150	230	19	0.35	10^{-7}
OH	Organic clays and silty clays ...	65-100	45-21	...	...	...	...	...	...	...

Notes:

1. All properties are for condition of "standard Proctor" maximum density, except values of k which are for "modified Proctor" maximum density.
2. Typical strength characteristics are for effective strength envelopes and are obtained from USSR data.
3. Compression values are for vertical loading with complete lateral confinement.
4. (>) indicates that typical property is greater than the value shown. (...) indicates insufficient data available for an estimate.

slope angle is fairly low, slope erosion can be allowed to develop a stable beach in suitable materials.

In many cases of offshore (submarine) prodelta sediments it has been shown that wave action from storm waves can cause large underwater landslides in underconsolidated and normally consolidated sediments (Bea & Audibert 1980, Algamor & Wiseman 1977). The mechanics of wave-induced submarine landsliding has been investigated from a static upper-bound analytical approach by Henkel (1970b), from a finite element approach by Wright and Dunham (1972) and from dynamic similitude modeling techniques by Mitchell *et al.* (1972b) and Mitchell and Hull (1974).

4.5 Recommended design factors of safety and procedures

The growing volumes of literature on statistical analysis in geotechnical engineering, some of which contain the suggestion that probability of failure is more meaningful than factor of safety (Wu & Kraft 1970, Yong *et al.* 1977), reinforce the general feeling that the design (or safe) value which is selected for F should be chosen with due consideration for the confidence established for both the analysis and the strength test results. Where this confidence is established by field performance, low safety factors can be justified. When one considers that the volume of earthwork associated with earth cuttings or embankments is proportional to the cotangent of the slope angle, there is a substantial economic incentive to strive for low safety factors in large earthworks.

A temporary slope is stable by virtue of the pore-water pressure reduction induced by a reduction of the total confining stresses as material is excavated. A saturated fine-grained soil can maintain these pressure reductions for some time due to its low permeability, but it is acknowledged that a slope will eventually fail if constructed on the basis of the temporary slope design. For many soils a temporary slope safety factor of about 2 will yield a long-term factor of safety of about 1 (this can be checked, for a particular soil, if the applicable values of c' and ϕ' are known from drained test results). On this basis, and considering that the long-term condition will be achieved in about three months for silty clays (or varved clays) and in about six months for intact clay soils, the following safety factors are recommended:

$$\left.\begin{aligned} F &= 1.3 + 0.2M \quad \text{for silty clays} \\ F &= 1.3 + 0.1M \quad \text{for intact clays} \end{aligned}\right\} \tag{4.20}$$

where M is the number of months that the excavation will be open.

These recommendations may be modified on the basis of field experience and risk factors to provide either greater safety (higher F) or greater excavation economy (lower F).

Factor of safety recommendations for permanent slope design are listed on Table 4.2. These recommended safety factors should be increased by 0.25 where there is limited material testing and by an additional 0.25 where there is limited construction control (in the case of dikes and dams). Thus, a small impoundment dam in a low-risk situation could be constructed using $F = 1.3$ with good engineering and supervision while $F = 1.8$ is recommended if there is a lack of engineering design and supervision. For a dam 10 m in height, the construction cost difference would be in the order of $500 per meter of dam length and the cost of good engineering design and construction supervision could be recovered in the first 50 to 100 m of dam length.

The steepest natural slopes in actively eroding landscapes exist at a safety factor close to unity and some of these may be stable for decades while failure is triggered in neighboring slopes by climatic, erosional or stratigraphic factors. Erosion and landslide patterns can be observed, as discussed in Chapter 1, using air photos. It is commonly found that slope creep movements develop in many earth slopes where the calculated safety factor is less than about 1.25 (Mitchell & Eden 1972). Safety factors in excess of this value should be used for permanent earth cuttings in materials where creep movements are evident in natural slopes.

The factor of safety recommendations on Table 4.2 are based on the assumption that site investigation and testing procedures have identified the most probable mechanism of failure and the applicable strength envelope. When failure can develop in weak clay layers, samples of this clay should be subjected to multiple shear reversals in a shear box to investigate the

Table 4.2 Typical safety factors.

Slope description and design conditions	*High risk (loss of life or severe damage from failure)*	*Low risk (no loss of life and moderate damage from failure)*
permanent slope in geologically stable material, all conditions	1.3	1.15
permanent slope in geologically metastable materials, all conditions	1.5	1.25
non-impoundment dikes and embankments, all conditions	1.3	1.3
impoundment dams		
(a) end of construction	1.3	1.3
(b) normal operation	1.5	1.3
(c) rapid drawdown	1.3	1.1
(d) earthquake loadings	1.2	1.1
(e) earthquake in combination with (a), (b) or (c)	1.1	1.0

A geologically metastable material is intended to refer to a material susceptible to earthflow or where low safety factors may lead to creep movements and progressive softening.

TITLES OF RELATED INTEREST

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Elements of geographical hydrology
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The boundary integral equation method for porous media flow
J. Liggett and P-L. Liu
Theory of vibration with applications (2nd edn)*
W. T. Thomson

* Co-published with Prentice-Hall Inc. in North America.

Earth Structures Engineering

R. J. Mitchell

Queen's University, Kingston, Ontario

Boston
ALLEN & UNWIN, INC.
London Sydney

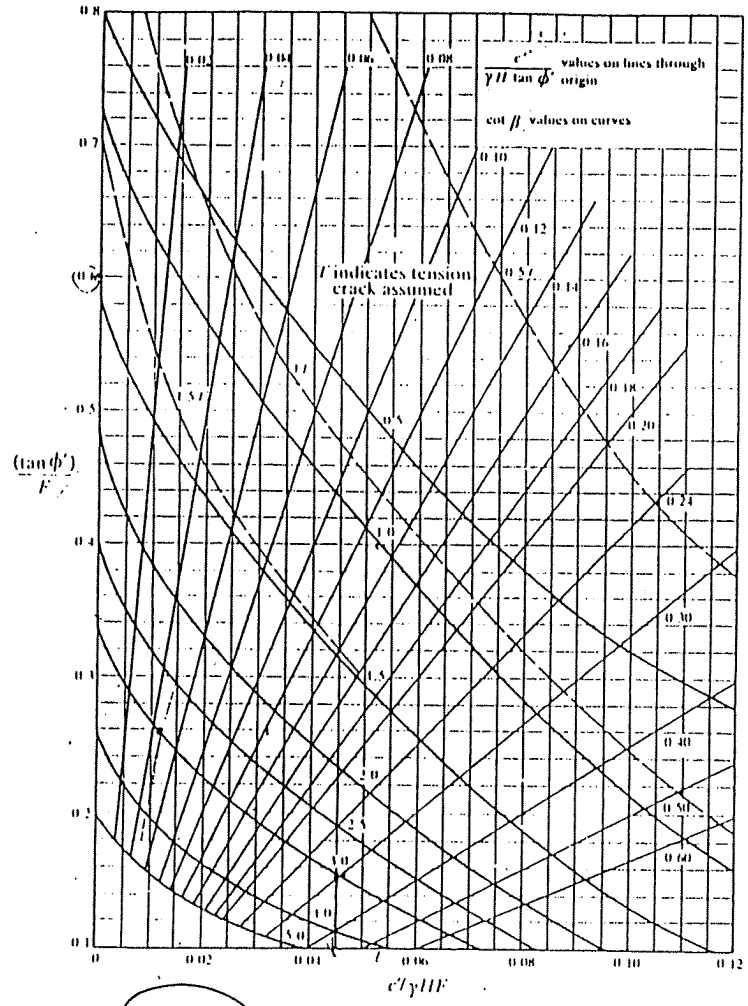


Figure 4.15 Design chart for rotational sliding, $r_u = 0$.

cot $\beta = 3$; find F. Calculate $c'/\gamma H \tan \phi' = 0.045$, (tan $\phi' = 0.727$) and enter charts on this line to find intersection with cot $\beta = 3$. For $r_u = 0$ (Fig. 4.15) obtain tan $\phi'/F = 0.258$ and $c'/\gamma HF = 0.012$, giving $2.73 \leq F \leq 2.28$ (avg = 2.78). For $r_u = 0.3$ (Fig. 4.16) obtain tan $\phi'/F = 0.359$ and $c'/\gamma HF = 0.016$, giving $2.03 \leq F \leq 2.04$ (avg = 2.03). These values are then iterated to give $F = 2.78 - (0.25/0.3)(2.78 - 2.03) = 2.16$.

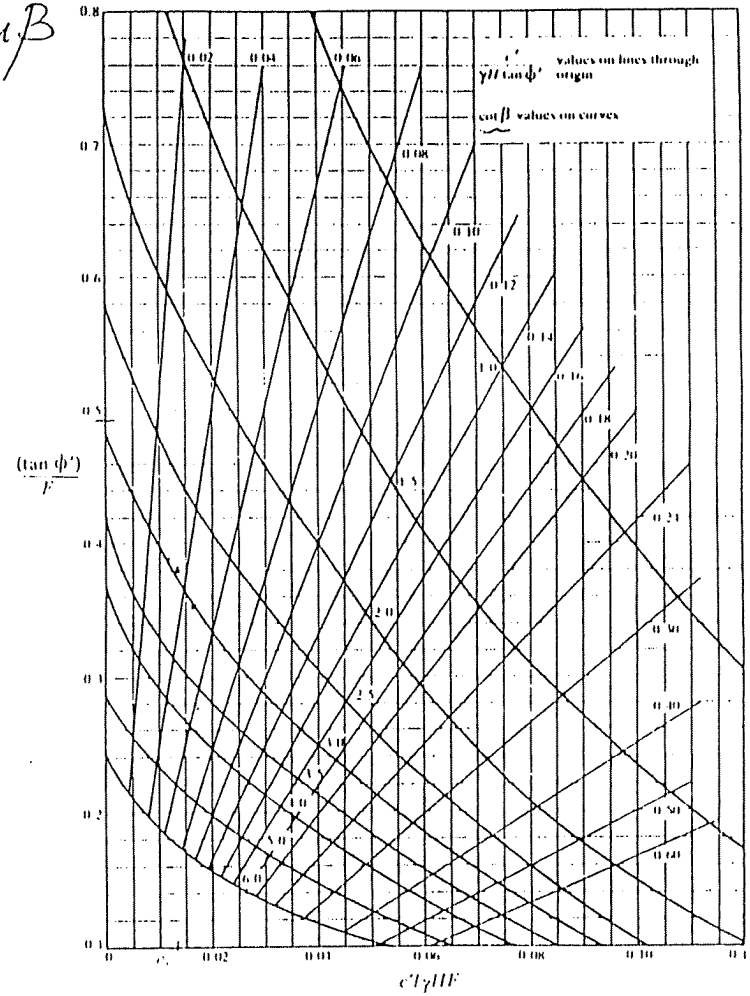


Figure 4.16 Design chart for rotational sliding, $r_u = 0.3$

Example 2 Given $c' = 15$ kPa, $\phi' = 28°$, $r_u = 0.4$, $H = 10$ m, $F = 1.25$, $\gamma = 17$ kN m^{-3}; find β. Calculate $c'/\gamma HF = 0.071$, tan $\phi'/F = 0.426$, $c'/\gamma H \tan \phi' = 0.167$. Figure 4.17 gives cot $\beta = 2.25$ ($r_u = 0.6$) and Figure 4.16 gives cot $\beta = 1.30$ ($r_u = 0.3$). Iterating these values, cot $\beta = 1.30 + (0.1/0.3)(2.25 - 1.30) = 1.62$. Use cot $\beta = 1.6$ ($\beta = 32°$).

twice as much resistance to sliding in air than when submerged since γ_w/γ is approximately equal to 0.5 for a typical soil. The following general rules of thumb can be stated from these considerations:

(a) The stability of a given slope will generally be greater if the slope is submerged than if it exists in air.
(b) The stability of a given slope will decrease during drawdown.

One exception to the first statement is when, during early reservoir filling, the natural groundwater flow may be backed up in the reservoir slope creating higher groundwater pressures in the slope. Flow nets should be constructed for different levels of reservoir filling using regional groundwater flow data and computer solutions to examine this possibility. The only other exception is when submergence causes ground water to wet previously dry materials that expand or lose strength when wetted (partly saturated silts, expansive clays or fine-grained material infilling discontinuities in rocks). Laboratory and field testing should be carried out to examine these possibilities.

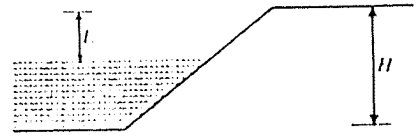
When a slope is fully submerged its safety factor may be obtained from charts or formulae by using $c'/\gamma' H$ in place of $c'/\gamma H$ or $W' = W(1 - \gamma_w/\gamma)$ in place of W and equating r_u (or u) to zero. These substitutions calculate both driving and resisting forces on the basis of submerged unit weight and no groundwater flow, the correct conditions for a fully submerged slope. With the exceptions due to geological factors (as noted above), interpolation between the original conditions and the fully submerged condition can be used to estimate the safety factor of a partially submerged slope.

When a fully submerged slope is subjected to rapid drawdown, the water contained in the slope tends to flow to the slope face, a condition of horizontal flow given by $r_u = \gamma_w/\gamma$. Thus the extreme condition of full rapid drawdown can be analyzed using design charts with $r_u = \gamma_w/\gamma$. An analysis which includes the effects of soil properties on the pore-water pressure parameter has been presented, with design charts, by Morgenstern (1963) for conditions of partial drawdown to various reservoir levels. Drawdown and submergence charts can, however, be prepared by the methods outlined on Figure 4.22. A chart similar to Figure 4.22 is prepared by the following steps:

(1) The safety factor for the fully submerged slope ($L = 0$) is calculated and plotted (point S).
(2) The factor of safety for full rapid drawdown ($L = H$) is calculated and plotted (point R).
(3) Project a horizontal line from R to $L = 0.5H$ and join this point (point a) to point S.
(4) Construct line bc between the quarter point intersections of lines aR and aS.

(5) Construct the drawdown curve from S to R tangent to be as shown.
(6) Construct the submergence lines as shown on Figure 4.22. This construction assumes little to no increase in safety factor during the first 25% of submergence due to groundwater pressure increases.

Submerged and partly submerged slopes are subject to the erosive action of waves, currents and ice forces. Canal slopes are normally lined with impervious membranes (if ground water is relatively low) or protected by rip-rap or dolos blocks on filter media (when ground water is relatively high). Erosion protection is needed above and below the waterline when a steep submerged slope is composed of easily erodible materials. When the



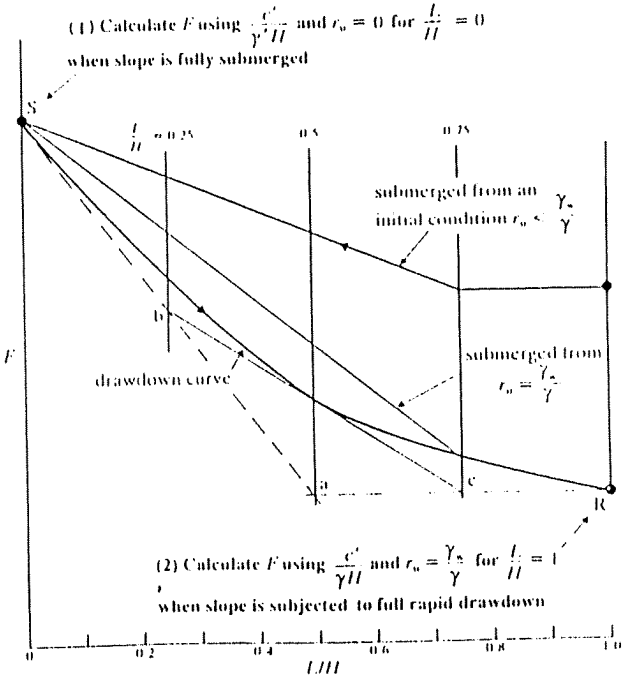
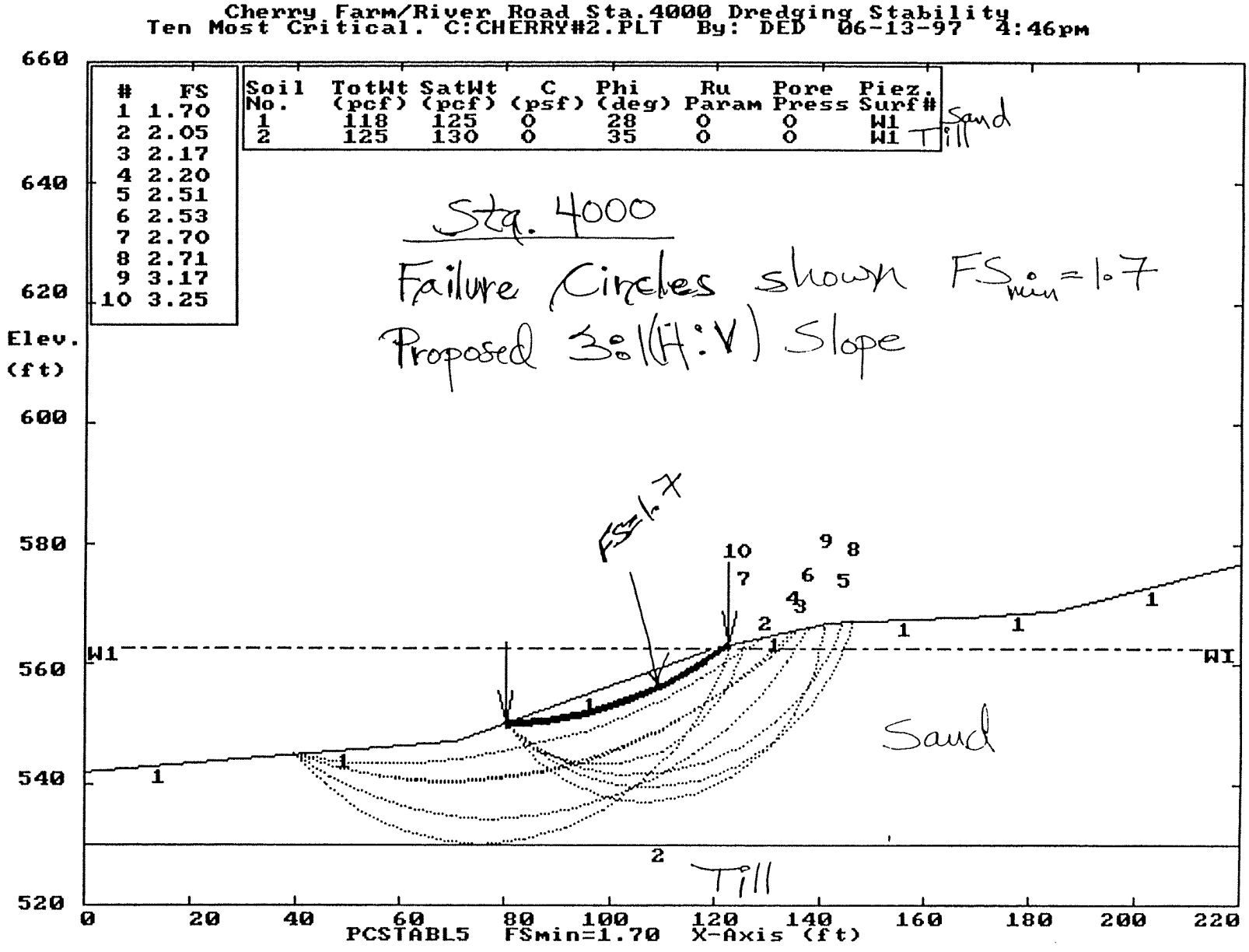


Figure 4.22 Construction of drawdown and submergence charts


Cherry Farm/River Road Sta.4000 Dredging Stability
Ten Most Critical. C:CHERRY#2.PLT By: DED 06-13-97 4:46pm
FS
1 1.70
2 2.05
3 2.17
4 2.20
5 2.51
6 2.53
7 2.70
8 2.71
9 3.17
10 3.25
Soil No. | TotWt (pcf) | SatWt (pcf) | C (psf) | Phi (deg) | Ru Param | Pore Press | Piez. Surf#
1 | 118 | 125 | 0 | 28 | 0 | 0 | W1
2 | 125 | 130 | 0 | 35 | 0 | 0 | W1
Sand
Till
Sta. 4000
Failure Circles shown FSmin=1.7
Proposed 3:1(H:V) Slope
FS=1.7
W1
WI
Sand
Till
Elev. (ft)
660
640
620
600
580
560
540
520
0
20
40
60
80
100
120
140
160
180
200
220
PCSTABL5 FSmin=1.70 X-Axis (ft)

3/40

** PCSTABL5 **

CHERRY#2

by
Purdue University

1

34/46
Input File for PCSTABLE

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 06-13-97
Time of Run: 4:46pm
Run By: DED
Input Data Filename: C:CHERRY#2
Output Filename: C:CHERRY#2.OUT
Plotted Output Filename: C:CHERRY#2.PLT

PROBLEM DESCRIPTION Cherry Farm/River Road Sta.4000
Dredging Stability

BOUNDARY COORDINATES

7 Top Boundaries
8 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	22.00	26.00	24.00	1
2	26.00	24.00	71.00	27.00	1
3	71.00	27.00	120.00	43.00	1
4	120.00	43.00	142.00	47.00	1
5	142.00	47.00	169.00	48.00	1
6	169.00	48.00	185.00	49.00	1
7	185.00	49.00	220.00	57.00	1
8	.00	10.00	220.00	10.00	2

1

ISOTROPIC SOIL PARAMETERS

2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	118.0	125.0	.0	28.0	.00	.0	1
2	125.0	130.0	.0	35.0	.00	.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED CHERRY#2

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	43.00
2	220.00	43.00

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

10 Trial Surfaces Have Been Generated.

5 Surfaces Initiate From Each Of 2 Points Equally Spaced Along The Ground Surface Between X = 40.00 ft.
and X = 80.00 ft.

Each Surface Terminates Between X = 120.00 ft.
and X = 150.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 10.00 ft.

8.00 ft. Line Segments Define Each Trial Failure Surface.

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	80.00	29.94
2	87.98	30.51
3	95.86	31.87

36/40

4	103.57	34.02
5	111.02	36.93
6	118.14	40.57
7	122.65	43.48

Circle Center At X = 78.3 ; Y = 109.6 and Radius, 79.7

*** 1.702 ***

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	40.00	24.93
2	47.95	24.04
3	55.94	23.64
4	63.94	23.73
5	71.92	24.31
6	79.85	25.38
7	87.69	26.94
8	95.43	28.97
9	103.03	31.47
10	110.46	34.44
11	117.69	37.86
12	124.70	41.71
13	129.45	44.72

Circle Center At X = 58.5 ; Y = 153.8 and Radius, 130.2

*** 2.047 ***

1
Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	40.00	24.93
2	47.75	22.94
3	55.63	21.56
4	63.59	20.80
5	71.59	20.68
6	79.58	21.18
7	87.50	22.31
8	95.30	24.06
9	102.95	26.42
10	110.38	29.38
11	117.56	32.91
12	124.44	36.99
13	130.98	41.60
14	136.21	45.95

Circle Center At X = 69.2 ; Y = 122.2 and Radius, 101.6

CHERRY#2

*** 2.168 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	40.00	24.93
2	47.71	22.81
3	55.58	21.33
4	63.53	20.50
5	71.53	20.34
6	79.52	20.83
7	87.43	21.98
8	95.23	23.78
9	102.85	26.22
10	110.24	29.28
11	117.35	32.94
12	124.14	37.17
13	130.56	41.95
14	134.80	45.69

Circle Center At X = 69.5 ; Y = 117.2 and Radius, 96.8

*** 2.196 ***

1

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	80.00	29.94
2	86.81	25.74
3	94.28	22.89
4	102.16	21.50
5	110.16	21.62
6	118.00	23.25
7	125.38	26.32
8	132.06	30.72
9	137.79	36.31
10	142.36	42.87
11	144.24	47.08

Circle Center At X = 105.5 ; Y = 63.7 and Radius, 42.3

*** 2.509 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)

1	40.00	24.93
2	47.01	21.09
3	54.41	18.04
4	62.10	15.84
5	69.99	14.50
6	77.98	14.06
7	85.97	14.50
8	93.86	15.82
9	101.55	18.02
10	108.95	21.05
11	115.97	24.89
12	122.52	29.49
13	128.51	34.79
14	133.88	40.72
15	137.87	46.25

Circle Center At X = 78.0 ; Y = 85.9 and Radius, 71.9

*** 2.526 ***

1
Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	80.00	29.94
2	86.71	25.58
3	94.37	23.29
4	102.37	23.28
5	110.05	25.53
6	116.78	29.86
7	122.00	35.92
8	125.29	43.21
9	125.40	43.98

Circle Center At X = 98.4 ; Y = 50.9 and Radius, 27.9

*** 2.701 ***

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	80.00	29.94
2	86.44	25.19
3	93.68	21.79
4	101.44	19.84
5	109.43	19.44
6	117.35	20.58
7	124.89	23.24
8	131.78	27.30
9	137.76	32.62
10	142.59	39.00
11	146.10	46.19

12 146.35 47.16

Circle Center At X = 107.5 ; Y = 60.6 and Radius, 41.2 CHERRY#2

*** 2.709 ***

1
Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	80.00	29.94
2	85.70	24.32
3	92.53	20.17
4	100.14	17.69
5	108.11	17.03
6	116.02	18.22
7	123.45	21.20
8	129.99	25.80
9	135.30	31.78
10	139.10	38.83
11	141.17	46.55
12	141.18	46.85

Circle Center At X = 107.0 ; Y = 51.6 and Radius, 34.6

*** 3.166 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	40.00	24.93
2	46.06	19.71
3	52.87	15.51
4	60.26	12.45
5	68.05	10.60
6	76.02	10.01
7	83.99	10.68
8	91.76	12.62
9	99.12	15.76
10	105.88	20.02
11	111.89	25.31
12	116.98	31.48
13	121.03	38.38
14	123.04	43.55

Circle Center At X = 75.8 ; Y = 60.3 and Radius, 50.3

*** 3.250 ***

1

Y A X I S F T

CHERRY#2

```
        .00    27.50    55.00    82.50   110.00   137.50

 X      .00 +---*---*-+-----W---+---------+---------+---------+
            -
            -
            -
            -
            -
     27.50 +       *
            -
            -
   -2
  -32
            -
 A   55.00 +    0632
    0
-6432
            -  06   *
 -432
            -  06  32 1                                        -
 X   82.50 +  0
            -   6  3521
 -698
            -      53 21
            -    965 32
            -     0   1
 I  110.00 +    9857 3 1
            -     9 6 7
            -     85  03 21*
            -      8 56 3421
            -      9   6 42
            -       85   3 4
 S  137.50 +          859  3
            -          8 5*
   -8
            -
            -
            -
    165.00 +
            -            *
            -
            -
            -            *
            -
 F  192.50 +
            -
            -
            -
            -
            -
 T  220.00 +  *         W   *
```

APPENDIX D
REMEDIAL ACTION
HEALTH AND SAFETY PLAN ADDENDUM
FOR SEDIMENT REMOVAL OPERATIONS

Addendum to the Remedial Action Health and Safety Plan For:

Cherry Farm Site, River Road, Tonawanda, New York
NYSDEC Site No. 9-15-063
River Road Site, River Road, Tonawanda, New York
NYSDEC Site No. 9-15-031

Submitted to:

The New York State
Department of Environmental Conservation
Division of Hazardous Waste Remediation

Submitted by:

The Cherry Farm and River Road
Potentially Responsible Parties

Prepared By:

PARSONS ENGINEERING SCIENCE, INC.

180 Lawrence Bell Drive, Suite 100
Williamsville, New York 14221

March 5, 1997

Reviewed and Approved By:

	Name	Date
Project Manager:	_____	_____
Parsons ES H&S Officer:	Brian J. Powell, CIH, CSP	3/6/97

PARSONS

SECTION 1

INTRODUCTION

1.1 PURPOSE AND REQUIREMENTS

The purpose of this addendum to the existing health and safety plan is to establish the minimum health and safety standards, practices and procedures that relate to the protection and safety of personnel during the sediment dredging activities at the Cherry Farm/River Road Site. This plan is specific in that it does not assign responsibilities for any land based remedial construction personnel or assign requirements for land based activities. This addendum to the existing HASP focuses primarily on the marine based sediment dredging activities and the remedial construction personnel involved with those activities. The addendum HASP defines the potential hazards and associated risks that may exist for the marine based work. The addendum plan will also identify and describe the action levels for the use and upgrade of personnel protective equipment, and identify the proper use of work zones during hazardous (environmental and otherwise) activities on the water. The provisions of the addendum plan are mandatory for all site personnel performing the marine remedial activities at the site.

The Addendum Health and Safety Plan is structured in the same manner as the existing health and safety plan for the site. In each instance where the existing health and safety plan is applicable, reference has been made to the existing plan. This would include all sections of the health and safety plan as well as the appendices.

1.2 SITE DESCRIPTION

The Cherry Farm and River Road Sites are located between River Road in the Town of Tonawanda and the Tonawanda Channel of the Niagara River. The sediment dredging will take place in an area adjacent to the Cherry Farm/River Road Site within the Tonawanda Channel of the Niagara River.

The river substrate material varies in size and composition throughout the dredge area. The dredging area adjacent to the Cherry Farm/River Road Site is generally a low-energy depositional environment characterized by medium to coarse-grained sand and finer-grained sediments. Immediately upstream and downstream of the Site, the river has been deepened by dredging to maintain an adequate depth for the mooring of commercial boat traffic. These areas are higher energy environments characterized by coarser substrates. Farther from shore, the fine-grained material grades to a coarse washed gravel.

In the nearshore area the finer-grained deposits provide a substrate capable of supporting a community of aquatic grasses. Based on samples collected in this area, the

aquatic vegetation is comprised mainly of *Vallisneria americana* (wild celery; tapegrass), and to a lesser degree, *Myriophyllum spicata* (Eurasian watermilfoil).

River velocities in the study area, immediately adjacent to the Site, ranged from 0.3 to 2.57 feet/second (ft/sec), and increased with distance from shore. Typical river velocities in the portion of the Niagara River near the Site have been reported to be in the range of 5 to 7 ft/sec (USACE, 1995). Traditionally, water levels in the Niagara River are not prone to large fluctuations. Monthly mean water levels recorded at the Huntley Station (upstream of the Site) range from 564 to 566 feet, International Great Lakes Datum (USACE, 1994).

1.3 APPLICABILITY

As described in the Remedial Action Work Plan for Niagara River Sediments (Parsons ES, 1997), the remedial action of the sediments adjacent to the Site include the following elements:

- Installation of the temporary silt curtains (or other containment technology) around the area of concern, as needed, to control the short term impacts of sediment resuspension;
- Hydraulic and mechanical dredging to remove impacted sediments from the proposed sediment dredging areas;
- Gravity or mechanical dewatering to remove excess water from dredged sediments;
- Solidification or equivalent, if necessary, to improve material handling of dewatered sediments;
- Disposal of excavated sediments in an onsite (land based) location;
- Cover excavated sediments with 18 inches of cover soil and 6 inches of top soil; and
- If necessary, granular filtration followed by activated carbon adsorption to treat filtrate from dewatered sediments, prior to discharge to the Town of Tonawanda POTW.

All personnel conducting the above activities are to adhere to the existing Remedial Action Health and Safety Plan (Remedial Action HASP) if the activity is land based. Personnel conducting marine based activity will adhere to the protocols and PPE requirements of the Addendum to the Remedial Action Health and Safety Plan.

1.4 PROJECT TEAM ORGANIZATION

The names of principal onsite personnel will remain the same as in the Remedial Action HASP for all aspects of the sediment dredging work. Additional personnel,

experienced and proficient in the specific type of marine work, may be onsite during the activity.

1.5 SITE SPECIFIC TRAINING

The Site Health and Safety Officer will be responsible for developing and conducting a site specific occupational hazard training program for all personnel that will perform any of the marine based activities. This training will focus on marine based activity and consist of the following topics:

- Names of personnel responsible for implementing the Site safety and health program.
- Safety, health, and other requirements and hazards for the floating plant or marine vessels used to complete the work.
- Proper selection and use of personal protective equipment.
- Work practices by which the employee can minimize risk from hazards.
- Safe use of engineering controls and equipment on the site and for marine based activity.
- Acute effects of compounds in the dredged sediments.
- Decontamination procedures for equipment used during dredging.
- Marine evacuation procedures.
- Daily sign-in procedures.
- Communication methods, including hand signals and radio communication.

SECTION 2

RISK ANALYSIS

2.1 CHEMICAL HAZARDS

Due to disposal practices and the variety of wastes allegedly disposed of at the Cherry Farm/River Road Site, the potential exists that, during land based and marine based marine activities, workers will be exposed to hazardous substances.

Potential contaminants which may be encountered while conducting land based field tasks at the Cherry Farm/River Road Site include phenols, cyanide, polyaromatic hydrocarbons (PAHs), lead, PCBs, naphthalene and the presence of light non-aqueous phase liquids (LNAPL). Contaminants that may be encountered during marine based work include five PAHs and two metals. Table 2.1 details some relevant properties of these compounds.

The decontamination of sampling equipment routinely uses solvents that are potentially hazardous to human health and the environment. Material Safety Data Sheets (MSDS) for these decontamination solvents and other related compounds are included in Appendix 2 of the Remedial Action HASP for the Site. The field team supervisor will maintain a copy of all site specific MSDS.

2.2 LAND BASED HEAVY EQUIPMENT AND VEHICLES

Working with large motor vehicles and heavy equipment could be a major hazard at this site. Injuries can result from equipment hitting or running over personnel, impacts from flying objects, or overturning of vehicles. Vehicle and heavy equipment design and operation will be in accordance with 29 CFR, Subpart O, 1926.600 through 1926.602. In particular, the following precautions will be utilized to help prevent injuries/accidents.

- Brakes, hydraulic lines, light signals, fire extinguishers, fluid levels, steering, tires, horn, and other safety devices will be checked at the beginning of each shift.
- Large construction motor vehicles will not be backed up unless:
    - The vehicle has a reverse signal alarm audible above the surrounding noise level; or
    - The vehicle is backed up only when an observer signals that it is safe to do so.
- Heavy equipment or motor vehicle cable will be kept free of all nonessential items, and all loose items will be secured.

- Large construction motor vehicles and heavy equipment will be provided with necessary safety equipment (seat belts. roll-over protection, emergency shut-off in case of roll-over, backup warning lights and audible alarms.)
- Blades and buckets will be lowered to the ground and parking brakes will be set before shutting off any heavy equipment or vehicles.

2.3 MARINE FLOATING PLANT

Working on a marine floating plant with mechanized and heavy equipment could be a major hazard for this project. Injuries can result from equipment hitting personnel, impacts from flying objects, whipping of broken cables, slips, falls, drowning, or other hazards. Marine based heavy equipment design and operation of the floating plant will be in accordance with the U. S. Army Corps of Engineers Safety and Health Requirements Manual EM 385-1-1, October 1992. The provisions of this manual implement safety and health standards and requirements contained in 29 CFR 1926, 29 CFR 1960, 30 CFR 56, Executive Order 12196, DODI 6055.1, AR 385-10, and AR 385-40. The safety and health requirements and standards provided under 29 CFR 1910 are implemented in the Remedial Action HASP.

In particular, there are specific precautions that will be utilized to help prevent injuries/accidents aboard the floating plant or any of the vessels related to the operations of the floating plant. Specific standards and requirements, as they relate to the floating plant or its operation are discussed in detail in EM 385-1-1 Section 16, Section 19, Section 5, Section 8, Section 14, and Section 15. Relevant sections of the EM 385-1-1 Manual and standard safe work practices for marine work have been added to Attachment 4.

2.4 CONSTRUCTION HAZARDS

Field engineering and surveying will be performed in all areas of the site. These activities will include monitoring the progress of dredging activity and various other dredging related activities. The level of protection for each activity will depend on the likelihood of exposure to contaminants. In general, surveying work will take place aboard ship without appreciable risk of coming in contact with contaminated sediment. This work will, at minimum, require all personnel to wear Level D health and safety protection, using the guidance outlined above for marine safety, the respiratory/personal protective upgrades in the Remedial Action HASP, and safe work practices outlined in Appendix A-2. Most field engineering will also take place on land and will be governed by the Remedial Action HASP.

2.5 PHYSICAL HAZARDS

2.5.1 Heat Stress

A detailed discussion can be found in Section 2.4.1 of the Remedial Action HASP.

2.5.2 Prevention of Heat Stress

A detailed discussion can be found in Section 2.4.2 of the Remedial Action HASP.

2.5.3 Cold-Related Illness

A detailed discussion can be found in Section 2.4.3 of the Remedial Action HASP.

2.5.4 Prevention of Cold-Related Illness

A detailed discussion can be found in Section 2.4.4 of the Remedial Action HASP.

TABLE 2.1 - HEALTH HAZARD QUALITIES OF HAZARDOUS SUBSTANCES OF CONCERN

Compound	PEL [a/] (ppm)	TLV [b/] (ppm)	IDLH [c/] (ppm)	Odor Threshold [d/] (ppm)	Ionization Potential [e/] (eV)	Physical Description/Health Effects/Symptoms
Benzo(a)anthracene	0.2 mg/m^3 [g/]	0.2 mg/m^3 [g/]	80 mg/m^3 [g/]	NA	7.53	Colorless, crystalline solid with greenish-yellow fluorescence. Irritates eyes, respiratory tract, and skin. Causes dermatitis, bronchitis, and lung, kidney, and skin cancer. Carcinogen.
Benzo(b)fluoranthene	0.2 mg/m^3 [g/]	0.2 mg/m^3 [g/]	80 mg/m^3 [g/]	NA	NA	Colorless, needle-like crystals. Irritates eyes, respiratory tract, and skin. Causes dermatitis, bronchitis, and lung, kidney, and skin cancer. Carcinogen.
Benzo(a)pyrene	0.2 mg/m^3 [g/]	0.2 mg/m^3 [g/]	80 mg/m^3 [g/]	NA	NA	Pale-yellow, crystalline solid with a faint aromatic odor. Irritates eyes, respiratory tract, and skin. Causes dermatitis, bronchitis, thickening and discoloration of the skin, and lung, kidney, and skin cancer. Mutagen, experimental teratogen, and carcinogen.
Beryllium	0.002 mg/m^3	0.002 mg/m^3	4 mg/m^3	NA	NA	Hard, brittle, gray-white, metallic solid. Irritates lungs, skin, eyes, and mucous membranes. Causes berylliosis, anorexia, low-weight, weakness, chest pain, coughing, blue skin, clubbed fingers, pulmonary insufficiency, dermatitis, and lung cancer. Mutagen and carcinogen.
Dibenzo(a,h)anthracene	0.2 mg/m^3 [g/]	0.2 mg/m^3 [g/]	80 mg/m3 [g/]	NA	NA	Colorless, plate- or leaf-like crystals. Irritates eyes, respiratory tract, and skin. Causes dermatitis, bronchitis, and lung, kidney, and skin cancer. Mutagen and carcinogen.
Indeno(1,2,3-cd)pyrene	0.2 mg/m^3 [g/]	0.2 mg/m^3 [g/]	80 mg/m^3 [g/]	NA	NA	Yellow, crystalline solid. Solutions show greenish-yellow fluorescence. Irritates eyes, respiratory tract, and skin. Causes dermatitis, bronchitis, and lung, kidney, and skin cancer. Mutagen and carcinogen.
Manganese (compounds and fume, as Mn)	5 mg/m^3 (ceiling) 1 mg/m^3 [v/]	5 mg/m^3 [cc/] 1 mg/m^3 [v/]	500 mg/m^3	NA	NA	Lustrous, brittle, silvery, solid metal. Irritates eyes and skin. Causes Parkinson's disease, loss of strength, insomnia, confusion, dry throat, coughing, rales, shortness of breath, tight chest, flu-like fever, lower back paint, vomiting, vague discomfort, fatigue, and kidney damage. Fumes cause metal fume fever. Mutagen, experimental teratogen, and questionable carcinogen.

a/ PEL = Permissible Exposure Limit. OSHA-enforced average air concentration to which a worker may be exposed for an 8-hour workday without harm. Expressed as parts per million (ppm) unless noted otherwise. PELs are published in the *NIOSH Pocket Guide to Chemical Hazards*, 1994. Some states (such as California) may have more restrictive PELs. Check state regulations.

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b/ TLV = Threshold Limit Value - Time-Weighted Average. Average air concentration (same definition as PEL, above) recommended by the American Conference of Governmental Industrial Hygienists (ACGIH), *1994-1995 Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.*

c/ IDLH = Immediately Dangerous to Life or Health. Air concentration at which an unprotected worker can escape without debilitating injury or health effects. Expressed as ppm unless noted otherwise. IDLH values are published in the *NIOSH Pocket Guide to Chemical Hazards*, 1994.

d/ When a range is given, use the highest concentration.

e/ Ionization Potential, measured in electron volts (eV), used to determine if field air monitoring equipment can detect substance. Values are published in the *NIOSH Pocket Guide to Chemical Hazards*, June 1994.

f/ mg/m^3 = milligrams per cubic meter.

g/ Based on coal tar pitch volatiles.

h/ NA = Not available.

j/ (skin) = Refers to the potential contribution to the overall exposure by the cutaneous route.

v/ Based on fume.

cc/ Based on dust.

SECTION 3

MEDICAL PROGRAM

3.1 INTRODUCTION

Section 3.0 of the Remedial Action HASP outlines the medical program recommended for workers who may potentially be exposed to hazardous materials or situations at the site.

3.2 MEDICAL EXAMINATIONS

Pre-employment screenings and Periodic Medical Examinations are discussed in Section 3.2 of the Remedial Action HASP.

3.3 MEDICAL RECORDS

Proper record keeping is described in the Remedial Action HASP, Section 3.3.

SECTION 4

AIR MONITORING

4.1 INTRODUCTION

Air monitoring requirements for the land based work are identical to those outlined in the Remedial Action HASP. Air monitoring of marine based activities is also identical to that posed in the Remedial Action HASP. However, limitations resulting from the size of the working platform or floating plant and the operation of the floating plant must be considered. Air monitoring must, at a minimum, be conducted on marine platforms where remedial action personnel or crews are transferring dredged material. Material transfer on land and the associated air monitoring will be governed by the Remedial Action HASP.

4.2 MONITORING REQUIREMENTS

4.2.1 General

The general monitoring requirements are discussed in Section 4.2.1 of the Remedial Action HASP.

4.2.2 Air Monitoring Plan

The air monitoring plan for the sediment dredging will be identical to that described in the Remedial Action HASP Section 4.2.3. Limitations to the air monitoring plan resulting from the marine based activity will be added to the Addendum HASP once the floating plant equipment and structure is fully defined.

4.3 VARIABLES OF EXPOSURE FOR MARINE BASED WORK

Complex, multisubstance environments pose significant challenges to accurately and safely assessing airborne contaminants. Several independent and uncontrollable variables, most notably temperature and weather conditions, can affect airborne concentrations. These factors must be considered when developing an air monitoring program and when analyzing data. Some demonstrated variables include:

- **Temperature** - An increase in temperature increases the vapor pressure of most chemicals.
- **Windspeed** - An increase in wind speed can affect vapor concentrations near a free-standing liquid surface. Dusts and particulate-bound contaminants are also affected.

- **Rainfall** - Water from rainfall can essentially cap or plug vapor emission routes from open or closed containers, saturated soil, or lagoons, thereby reducing airborne emissions of certain substances.
- **Moisture** - dusts, including finely divided hazardous solids, are highly sensitive to moisture content. This moisture content can vary significantly with respect to location and time and can also affect the accuracy of many sampling results.
- **Vapor Emissions** - The physical displacement of saturated vapors can produce short-term, relatively high vapor concentrations. Continuing evaporation and/or diffusion may produce long-term low vapor concentrations and may involve large areas.
- **Work Activities** - Work activities often require the mechanical disturbance of contaminated materials, which may change the concentration and composition of airborne contaminants.

SECTION 5

PERSONNEL PROTECTIVE EQUIPMENT AND ACTION LEVELS

5.1 INTRODUCTION

The required personnel protection equipment and the associated action levels are detailed in Section 5 of the Remedial Action HASP. Not only should field personnel use the appropriate equipment, outlined in the Remedial Action HASP, they must also meet or exceed the requirements of the USCG and USACE if the activity is performed on a marine based platform.

5.2 ACTION LEVELS FOR PERSONAL PROTECTIVE EQUIPMENT

The action levels described in Section 5 of the Remedial Action HASP define the level of personnel protection for land based activity. When an activity takes place over water, all personnel are required to don a life jacket. Tyvek suits to eliminate splash hazards are also required when crew or personnel are working on, in, or near the material transfer equipment.

5.2.1 Vapor Emission Action Levels

Action levels are as described in Section 5.2.1 of the Remedial Action HASP.

5.5.2 Conditions for Level D Protection

These conditions are described in Section 5.2.2 of the Remedial Action HASP.

5.5.3 Conditions for Level C Protection.

These conditions are described in Section 5.2.2 of the Remedial Action HASP.

5.3 OSHA REQUIREMENTS FOR PERSONNEL PROTECTIVE EQUIPMENT

The OSHA requirements are described in Section 5.3 of the Remedial Action HASP.

5.4 SELECTION OF EQUIPMENT

As described in Section 5 of the Remedial Action HASP.

SECTION 6

COLLECTION AND SHIPMENT OF SAMPLES

6.1 INTRODUCTION

The collection of samples is fully described in the Remedial Design Work Plan for Niagara River Sediments. Section 6 of the Remedial Action HASP describes the actual shipment of any collected samples.

6.2 ENVIRONMENTAL SAMPLES

Shipment is fully described in Section 6.2 of the Remedial Action HASP.

6.3 HAZARDOUS SAMPLES

Shipment is fully described in Section 6.3 of the Remedial Action HASP.

6.4 SHIPPING PAPERS

Use is fully described in Section 6.4 of the Remedial Action HASP.

SECTION 7

ACCIDENT PREVENTION AND CONTINGENCY PLAN

7.1 INTRODUCTION

Accident Prevention and any contingency plans are described in Section 7 of the Remedial Action HASP.

7.2 ACCIDENT PREVENTION

7.2.1 Personnel Training

Described in Section 7 of the Remedial Action HASP.

7.2.2 Vehicles and Heavy Equipment

Described in Section 7 of the Remedial Action HASP.

7.2.3 Marine Floating Plant

Working on a marine floating plant with mechanized and heavy equipment could be a major hazard for this project. Injuries can result from equipment hitting personnel, impacts from flying objects, whipping of broken cables, slips, falls, drowning, or other hazards. Marine based heavy equipment design and operation for the floating plant will be in accordance with the U. S. Army Corps of Engineers Safety and Health Requirements Manual EM 385-1-1, October 1992. The provisions of this manual implement safety and health standards and requirements contained in 29 CFR 1926, 29 CFR 1960, 30 CFR 56, Executive Order 12196, DODI 6055.1, AR 385-10, and AR 385-40. The safety and health requirements and standards provided under 29 CFR 1910 are implemented in the Remedial Action HASP.

In particular, there are specific precautions that will be utilized to help prevent injuries/accidents aboard the floating plant or any of the vessels related to the operations of the floating plant. Specific standards and requirements, as they relate to the floating plant of its operation are discussed in detail in EM 385-1-1 Section 16, Section 19, Section 5, Section 8, Section 14, and Section 15 (Attachment 4).

7.3 CONTINGENCY PLAN IMPLEMENTATION

7.3.1 Responsible Personnel

Described in detail in Section 7 of the Remedial Action HASP.

7.3.2 Procedures

Described in detail in Section 7 of the Remedial Action HASP.

7.3.3 Arrangements with Emergency Authorities and Contractors

Described in detail in Section 7 of the Remedial Action HASP.

7.4 RESPONSE ACTION

7.4.1 General

The general guidelines to follow in the event of an emergency are explained in Section 7.4.1 of the Remedial action HASP.

7.4.2 Fire and Explosions

Refer to Section 7.4.2 of the Remedial Action HASP.

7.4.3 Release of Hazardous Materials

Refer to Section 7.4.3 of the Remedial Action HASP.

7.4.4 Release of Non-Hazardous Material

Refer to Section 7.4.4 of the Remedial Action HASP.

7.4.5 Unauthorized Dumping and Disposal

Refer to Section 7.4.5 of the Remedial Action HASP.

7.4.6 Medical Emergency

Refer to Section 7.4.6 of the Remedial Action HASP.

7.4.7 Chemical Exposure

Refer to Section 7.4.7 of the Remedial Action HASP.

7.4.8 Major Vapor Emission Response Plan

Refer to Section 7.4.8 of the Remedial Action HASP.

7.4.9 Evacuation Process

See Section 7.4.9 of the Remedial Action HASP.

7.4.10 Vehicle Accident

See Section 7.4.10 of the Remedial Action HASP.

7.4.11 Personal Injury

See Section 7.4.11 of the Remedial Action HASP.

7.4.12. Property Damage or Theft

See Section 7.4.12 of the Remedial Action HASP.

7.5 MAINTENANCE AND REVISIONS TO PLAN

7.5.1 Maintenance

See Section 7.5.1 of the Remedial Action HASP.

7.5.2 Revisions

See Section 7.5.2 of the Remedial Action HASP.

SECTION 8

WORK ZONES AND DECONTAMINATION

8.1 SITE WORK ZONES

To reduce the spread of hazardous materials by workers from contaminated areas of the site or floating plant to clean areas, work zones must be delineated at the site and on the floating plant; and the flow of personnel between the zones must be controlled. The establishment of the work zones will help ensure that: personnel are properly protected against the hazards present where they are working; work activities and contamination are confined to the appropriate areas; personnel can be located and evacuated in an emergency; and site visitors and personnel non-essential to cleanup activities are protected from the hazard present. Communications between zones will be accomplished using portable two-way radios and standard hand signals.

8.1.1 Exclusion Zone

The establishment of exclusion zones on land is fully described in Section 8.1.1 of the Remedial Action HASP. The material transfer barge(s) will be considered an exclusion zone during all phases of the dredging work.

8.1.2 Decontamination Zone

The use of a decontamination zone is fully described in Section 8 of the Remedial Action HASP. If necessary, a land based decontamination zone will be established to decontaminate equipment used in the sediment dredging. Sediment dredging decontamination areas will be adjacent to the river, near the material transfer areas.

8.1.3 Support Zone

For the floating plant and the transfer barges, a land based support zone will be established. The support zone will be similar to that described in the Remedial Action HASP.

8.2 DECONTAMINATION

Decontamination of marine equipment will be similar to that described in Section 8.2 of the Remedial Action HASP.

Decontamination procedures will be identical to those described in Section 8 of the Remedial Action HASP.

ATTACHMENT 1
FORMS FOR HEALTH AND SAFETY RELATED ACTIVITIES

The forms included in Attachment 1 of the Remedial Action HASP should be used.

ATTACHMENT 2
MATERIAL SAFETY DATA SHEETS

The MSDSs included in Attachment 2 of the Remedial Action HASP should be used.

ATTACHMENT 3
AIR MONITORING EQUIPMENT CALIBRATION AND MAINTENANCE

Refer to Attachment 3 of the Remedial Action HASP.

ATTACHMENT 4
STANDARD SAFE WORK PRACTICES

The practices included in Attachment 4 of the Remedial Action HASP should be used for land based work. For marine work, the attached safe work practices for marine work and the excerpts from the EM 385-1-1 manual should be referenced.

SAFETY PRACTICES FOR WORK OVER WATER

1. A minimum of two people will man the barge and an on-shore supervisor will be present at all times. Personnel on the barge will be required to wear a U.S. Coast Guard approved flotation device and shall know how to swim. Prior to each use the floatation device will be inspected for defects or chemical damage.

2. The on-shore supervisor will have the ability to initiate immediate response, in case an accident requiring assistance occurs. The on-shore supervisor shall have immediate access to a circular floatation device, with 90-feet of cord attached. On-shore personnel assisting marine crews or working over water must were approved floatation devices.

3. Appropriate means will be provided to allow access to workers who may fall into the water and access to the platform from the nearby shore.

4. At least one portable or permanent ladder must be capable of assisting an employee that should happen to fall into the water.

5. Provisions shall be made for rewarming and transport of personnel to emergency facilities when working under extreme cold.

6. The project manager and the site health and safety representative must maintain the ships log.

7. A tow line will be attached to the barge and maintained on land at all times, if feasible.

8. Boarding and unloading a barge will be conducted from a dry and stable location without contact with contaminated water.

9. Personnel shall be positioned on the barge so that a stable position is maintained at all times.

10. Work activities conducted aboard a floating plant shall comply with OSHA regulation 1926 "Working Over or Near Water".

16.E.06 Rail clamps, if used, shall have slack between the point of attachment to the rail and the end fastened to the crane: rail clamps shall not be used as a means of restraining tipping of a crane.

16.E.07 Raising (climbing or telescoping) hammerhead tower cranes.

a. The operator of a hammerhead tower crane shall be present during climbing or telescoping operations.

b. Hammerhead cranes shall not be climbed or telescoped when wind speeds at the top of the crane exceed 20 mph or as recommended by the manufacturer.

c. Climbing operations shall not be commenced until all support provisions required at the new support level are in place and as specified by a qualified person.

16.E.08 Tower cranes shall weathervane when left unattended; luffing jib cranes shall have the boom elevated to 15° when left unattended.

16.F FLOATING CRANES AND FLOATING DERRICKS

16.F.01 Construction.

a. Floating cranes and floating derricks shall be constructed to meet all stresses imposed on members and components:

(1) under normal operating conditions when installed, and
(2) when handling loads not exceeding manufacturer's load ratings with recommended reeving.

b. Barges and pontoons shall be constructed to withstand imposed loads.

16.F.02 The load rating of a floating crane or floating derrick shall be the maximum working loads at various radii as determined by the manufacturer or qualified person considering list and trim for each installation.

a. The load rating is dependant upon the structural competence of the crane or derrick, rope strength, hoist capacity, structural attachment to the floating platform, and stability and freeboard of the floating platform.

b. When deck loads are to be carried while lifting, the situation shall be analyzed for modified ratings.

c. When mounted on barges or pontoons, the rated loads and radii of land cranes and derricks shall be modified as recommended by the manufacturer.

16.F.03 Stability - operating list or trim. Unless the crane or derrick manufacturer recommends a lesser value, the following shall be the maximum allowable list or trim:

a. Cranes, designed for barge or pontoon mounting, rated at 25 tons capacity or less shall have a maximum allowable list or trim of 5°.

b. Cranes, designed for barge or pontoon mounting, rated at 25 tons capacity or more shall have a maximum allowable list or trim of 7°, although 5° is recommended.

c. Derricks, designed for barge or pontoon mounting, rated at any capacity shall have a maximum allowable list or trim of 10°.

d. Land cranes and derricks mounted on barges or pontoons shall have a maximum allowable list or trim of 5°.

16.F.04 Stability - design load conditions.

a. Cranes or derricks designed for barge or pontoon mounting shall be stable under the following conditions:

(1) rated load, 60 mph wind, 2 feet minimum freeboard;
(2) rated load plus 25%, 60 mph wind, 1 foot minimum freeboard;
(3) high boom, no load, 60 mph wind, 2 feet minimum freeboard;

(4) for backward stability of the boom - high boom, no load, full back list (least stable condition), 90 mph wind.

b. Land cranes and derricks mounted on barges or pontoons:

(1) Barge- or pontoon-mounted land cranes require modified ratings due to increased loading from list, trim, wave action, and wind: this rating will be different for each size of pontoon or barge used. Therefore, the load rating of barge- or pontoon-mounted land cranes and derricks shall not exceed that recommended by the manufacturer for the particular barge or pontoon under the expected environmental conditions.

(2) All deck surfaces of the pontoon or barge shall be above the water.

(3) The entire bottom area of the barge or pontoon shall be submerged.

(4) Provide tie-downs for derricks to transmit the loading to the barge or pontoon.

(5) Cranes shall be blocked and secured to prevent shifting.

16.F.05 Environmental considerations.

a. The project supervisor shall obtain daily weather forecasts prior to beginning work and as frequently thereafter to monitor any potential weather problems. > *See also Section 19.A*

b. When a local weather storm warning exists, consideration shall be given to the recommendations of the manufacturer for securing the crane.

c. Work shall be halted when significant wave action exists.

16.F.06 Truck and crawler cranes shall be attached to the barge or pontoon by means of a slack tie-down system to tether the machines travel: when stability of the barge or pontoon is not a factor and control barriers are provided, limited travel may be

authorized by the designated authority.

16.F.07 When loads approach the maximum rating of the crane or derrick, the person responsible for the job shall ascertain that the weight of the load has been determined within +/- 10% before it is lifted.

16.F.08 When operating in windy conditions or rough seas, the rated load shall be reduced to allow for the wind and wave effect on the lifted load. > *See also 16.C.18*

16.G OVERHEAD AND GANTRY CRANES

16.G.01 All load bearing foundations, anchorages, runways, and rail tracks shall be constructed or installed in accordance with the crane manufacturer's recommendations and ANSI/ASME B30.2 or B30.17, as applicable.

16.G.02 The rated load of the crane shall be plainly marked on each side of the crane.

a. If the crane has more than one hoisting unit, each hoist shall have its rated load marked on it or its load block.

b. Markings on the bridge, trolley, and load block shall be legible from the ground or floor.

16.G.03 Clearance shall be maintained between the crane, any structure or object, and any parallel running cranes and cranes operating at different elevations.

16.G.04 Contacts with runway stops or other cranes shall be made with extreme caution: the operator shall do so with particular care for the safety of persons on or below the crane, and only after making certain that any persons on the other cranes are aware of what is being done.

16.G.05 Operators of outdoor cranes shall secure them when leaving.

16.G.06 When the wind-indicating alarm of a cab-operated

SECTION 19

FLOATING PLANT AND MARINE ACTIVITIES

19.A GENERAL

19.A.01 Floating plant inspection and certification.

a. All floating plant that are regulated by the US Coast Guard shall have current inspections and certificates issued by the Coast Guard (USCG) before being placed in service. A copy of any USCG Form 835 issued to the vessel in the preceeding year shall be available to the designated authority.

b. Floating plant not subject to USCG inspection and certification shall be inspected anually by a marine surveyor or other qualified person: the inspection shall be documented. The inspection shall be appropriate for the intended use of the plant and shall evaluate structural integrity and compliance with NFPA 302, Fire Protection Standard for Pleasure and Commercial Motor Craft.

c. When any floating plant is brought onto the job site, before it is put into use it shall be inspected and tested by a qualified person and determined to be in safe operating condition.

d. Periodic inspections and tests shall assure safe operating condition.

e. Records of inspections shall be maintained at the site and shall be available to the designated authority.

f. Floating plant found in an unsafe condition shall be taken out of service and its use prohibited until unsafe conditions have been corrected.

19.A.02 Personnel qualifications.

a. Officers and crew shall be possession of a current valid USCG license or correctly endorsed document as required by the USCG.

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a. Officers and crew shall be possession of a current valid USCG license or correctly endorsed document as required by the USCG.

tides, current, and winds anticipated to be expected during severe weather conditions.

f. Contractors working in an exposed marine location shall maintain full-time monitoring of the NOAA marine weather broadcasts and shall use other local commercial weather forecasting services as may be available.

19.A.04 Emergency planning.

a. A station bill, setting forth the special duties and the duty station of each crew member for various emergencies, shall be prepared and posted in conspicuous locations throughout the vessel.

b. Each crew member shall be given a written description of, and shall become familiar with, his emergency duties and shall become familiar with the vessel's emergency signals.

c. Abandon ship/boat and person overboard procedures shall include instructions for mustering personnel.

d. On all floating plant which have a regular crew or on which people are quartered, the following drills shall be held at least monthly (unless the vessel is required, under USCG regulations, to be drilled more frequently): abandon ship/boat drills, fire drills, and person overboard or rescue drills.

(1) The first set of drills shall be conducted within 24 hours of the vessel's occupancy.

(2) Where crews are employed or quartered at night, every fourth set of drills shall be at night; the first set of night drills shall be conducted within the first two weeks of the vessel's occupancy.

e. Person overboard or rescue drills shall be held at least monthly at boat yards, locks, dams, and other locations where marine rescue equipment is required.

f. Emergency lighting and power systems shall be operated

and inspected at least monthly to ensure proper operation.

(1) Internal combustion engine driven emergency generators shall be operated under load for at least 2 hours each month.

(2) Storage batteries for emergency lighting and power systems shall be tested at least once every 2 months.

g. A record of all drills and emergency system checks, including any deficiencies noted in equipment and corrective action taken, shall be made in the station log.

19.A.05 Equipment requirements.

a. Fenders shall be provided to prevent damage and sparking and to provide safe areas for workers exposed to pinching situations caused by floating equipment.

b. Axes or other emergency cutting equipment shall be provided in accessible positions on all towing vessels for use such as freeing lines.

c. A signal device shall be provided on all powered vessels to give signals required by the navigation rules applicable to the waters on which the vessel is operated.

d. Protection from the elements shall be provided all persons being transported by water.

e. All controls requiring operation in cases of emergency - such as boiler stops, safety valves, power switches, fuel valves, alarms, and fire extinguishing systems - shall be located so that they are protected against accidental operation but are readily accessible in an emergency.

f. Electric lights used on or around gasoline and oil barges or other marine locations where a fire or explosion hazard exists shall be explosion-proof.

g. Emergency alarms shall be installed and maintained on all

floating plant where it is possible for either a passenger or crewman to be out of sight or hearing from any other person.

(1) Where electrical alarms are utilized they shall be operated from the primary electrical system with standby batteries on trickle charge that will automatically furnish the required energy during an electrical-system failure.

(2) A sufficient number of signaling devices shall be placed on each deck so that they can be distinctly heard above the normal background noise at any point on the deck.

(3) All signaling devices shall be so interconnected that actuation can occur from at least one strategic point on each deck.

h. Smoke alarms are required for all living quarters of floating plant; smoke alarms, if wired, should utilize the same electrical system as that of the electrical alarms.

i. All doors shall be capable of being opened from either side and provided with positive means to secure them in both the open and closed position.

j. Escape hatches and emergency exits shall be marked on both sides with letters, at least 1 inch high, stating **EMERGENCY EXIT - KEEP CLEAR.**

k. All sources of emergency power shall be either (1) located at or above the level of the main deck and in a manner that is physically separated from all potential fire hazards by distance or (2) protected by walls capable of preventing the passage of fire or smoke for at least one hour.

l. Each prime mover (engine, turbine, motor) driving a generator or dredge pump shall be capable of being stopped by controls remote from the prime mover locations.

19.A.06 Fuel systems and fuel transfers.

a. Gauge glasses or try cocks shall not be installed on fuel

tanks or lines.

b. A shutoff valve shall be installed at the fuel tank connection: arrangement shall be made for operating this valve from outside the compartment in which the tank is located and from outside the engine compartment.

c. A shutoff valve shall be installed at the engine end of the fuel line except when the length of the supply pipe is 6 feet or less.

d. Fuel valves shall be closed at the tank when shutting down for the night or more than 8 hours.

e. All carburetors on gasoline engines shall be equipped with a backfire trap or flame arrestor.

f. All carburetors, except downdraft type, shall be provided with a drip pan, with flame screen, which is continuously emptied by suction from the intake manifold, by a waste tank, or, if permitted, by overboard discharge.

g. Fuel storage tanks shall be diked or curbed to contain the tank contents in the event of leakage in accordance with NAVFAC DM-22, Petroleum Fuel Facilities. In lieu of a dike or curb, other means complying with USCG requirements in 46 CFR Parts 64, Marine Portable Tanks, and 98.30, Handling and Storage of Portable Tanks, may be used.

h. Fuel oil transfers for floating plant shall be in accordance with the provisions of U.S. Coast Guard Regulations, 46 CFR and 33 CFR Parts 155 and/or 156. For uninspected vessels, Coast Guard regulations in 33 CFR 156.120 and 33 CFR 155.320 for fuel coupling devices and fuel oil discharge containment apply. Venting fuel tanks is necessary when using the couplings prescribed by 33 CFR 156.120(1) or (2).

19.A.07 Safe practices.

a. Cables which cross waterways between floating plant or between plant and mooring shall be marked.

b. On all floating plant where people are quartered, one person shall be on watch at all times to guard against fire and provide watchperson service. In lieu of a watchperson, an automatic fire detection and fire and emergency warning system(s) may be used.

c. Provisions shall be made to prevent accumulation of fuel and grease on floors and decks and in bilges.

d. Swimming shall be prohibited for all personnel on floating plant and other marine locations, with the exception of certified divers in the performance of their duties, unless necessary to prevent injury or loss of life.

e. A person in the water shall be considered as a person overboard and appropriate action taken.

f. When barriers are installed in piping systems, positive means - such as protruding handles - shall be used to easily recognize their presence. All barriers shall be marked - including name of installer, name of inspector, and date of installation - and accounted for prior to installation and subsequent to removal.

g. Deck loading will be limited to safe capacity. Loads will be secured and holdbacks or rings will be provided to secure loose equipment during rough weather.

h. Guardrails, bulwarks, or taut cable guardlines shall be provided for deck openings, elevated surfaces, and similar locations where persons may fall or slip from them. Guardrails and taut cable guardlines shall comply with the requirements for standard guardrails. > *See Section 21.B*

i. Projection and tripping hazards shall be removed, identified with warning signs, or distinctly marked with safety yellow.

j. Deck cargo carried on fuel barges shall be placed on dunnage.

k. When two or more pieces of floating plant are being used

as one unit, they shall be securely fastened together to prevent openings between them or the openings shall be covered or guarded.

19.A.08 Confined spaces. > *See Section 06.I*

a. Every floating plant shall be surveyed for the presence of confined spaces. A list of all confined spaces shall be maintained on board the vessel/floating plant.

b. All confined spaces on floating plant shall be indicated with a sign or placard, or similar device

19.A.09 When there is a potential for marine activities to interfere with or damage utilities or other structures, including those underwater, a survey shall be conducted to identify the utilities or structures in the work area, analyze the potential for interference or damage, and recommend steps to be taken to prevent the interference or damage.

19.A.10 Ventilation.

a. All motor vessels or boats powered by internal combustion engines having electric spark ignition systems or having auxiliary engines of this type in cabins, compartments, or confined spaces shall be equipped with an exhaust fan(s) for ventilating engine space and bilges.

b. At least two ventilators fitted with fans capable of ventilating each machinery space and fuel tank compartment - including bilges - shall be provided in order to remove any flammable or explosive gases, except those vessels constructed with the greater portions of the bilges open or exposed to the natural atmosphere at all times.

c. All other spaces within the vessel shall be properly vented. Each compartment not open to the atmosphere shall be provided with a natural ventilation system if:

(1) It contains a permanently installed gasoline or compressed gas fuel engine;

(2) It contains a portable fuel tank that vents into the compartment; or

(3) It contains fuel tank compartments with non-ignition protected components.

d. All living spaces, including the galley, shall be adequately ventilated in a manner suitable to the purpose of the space.

e. For launches and motorboats having diesel power plants not equipped with fans, ventilating shall be by natural draft through permanently open inlet and outlet ducts extending into the bilges. Inlet and exhaust ducts shall be equipped with cowls or exhaust heads.

f. Vent and ventilator requirements.

(1) Fans shall be rated for Class I hazardous locations and located as remotely from potential explosive areas as practical. > *See Section 11.G*

(2) The vent intake shall extend to within 1 foot of within the bottom of the compartment.

(3) Means shall be provided for stopping all fans in ventilation systems serving machinery components and for closing all doorways, ventilators, chases, and annular spaces around tunnels and other openings from outside these spaces in case of fire.

g. Engines shall not be started until the engine space and bilges have been ventilated to remove fuel vapor.

19.A.11 The latest information published by the US Coast Guard regarding aids to navigation shall be maintained aboard the vessel.

19.B ACCESS

19.B.01 General. > *See also 19.A.07h*

a. All means of access shall be properly secured, guarded,

and maintained free of slipping and tripping hazards. > *See Section 21*

b. Nonslip surfaces shall be provided on all working decks, stair treads, ship ladders, platforms, catwalks, and walkways, particularly on the weather side of all doorways opening on deck.

c. Grab bars shall be provided on the sides of superstructure of tugs, tenders, and launches except where railing is present.

d. Double rung or flat tread type Jacob's ladders shall be used only when no safer form of access is practical: when in use, they shall hang without slack and be properly secured.

19.B.02 Access to/from vessels.

a. Safe means for boarding or leaving a floating plant shall be provided and guarded to prevent persons from falling or slipping thereon.

b. A stairway, ladder, ramp, gangway, or personnel hoist shall be provided at all personnel points of access with breaks of 19 inches or more in elevation.

c. Ramps for access of equipment and vehicles to or between vessels shall be of adequate strength, provided with side boards, and be well maintained.

d. Gangways and ramps shall be:

(1) secured at one end by at least one point on each side with lines or chains to prevent overturning,

(2) supported at the other end in such a manner to support them and their normal loads in the event they slid off their supports,

(3) placed at an angle no greater than that recommended by the manufacturer, and

(4) provided with a standard guardrail (toeboards are optional depending on their usefullness and the hazard involved). > *See Section 21.B*

19.B.03 Access on vessels.

a. Vertical access shall be provided between various decks by means of stairs or permanent inclined ladders.

b. Employees shall not be permitted to pass fore and aft, over, or around deck loads unless there is a safe passage.

c. If cargo or materials are stored on deck of barges, scows, floats, etc., the outboard edge shall not be used as a passageway unless at least 2 feet of clearance is maintained.

19.B.04 Emergency access.

a. All vessels, except those easily boarded from the water, shall provide at least one portable or permanent ladder of sufficient length to rescue a person overboard.

b. Two means of escape shall be provided for assembly, sleeping, and messing areas on floating plants.

c. Means of access shall be maintained safe and functional.

19.B.05 Access on floating pipelines.

a. All floating pipelines used as accessways shall be equipped with a walkway and handrail on at least one side.

b. Walkways shall be at least 20 inches wide and anchored to the pipeline. The use of personal floatation devices is also required. > *See Section 05.I*

c. When walkways and handrails are not provided (i.e., the pipeline is not intended for access), the pipeline shall be barricaded at both ends to prevent access by any person.

19.C LAUNCHES, MOTORBOATS, AND SKIFFS

19.C.01 Crew requirements.

a. In the following circumstances a qualified employee shall

be assigned to assist with deck duties:

(1) when extended trips - including overnight trips and trips requiring two or more hours of continuous operation - are made from the work site,
(2) when conditions of navigation make it hazardous for an operator to leave the wheel while underway,
(3) when operations being performed, other than tying-in, require the handling of lines,
(4) when operating at night or during inclement weather, or
(5) when towing.

b. A qualified employee is any individual who has established, to the satisfaction of the operator of the vessel, that he is physically and mentally capable of adequately performing the deck duties to which he may be assigned.

19.C.02 Outboard motorboats and skiffs shall meet the minimum flotation requirement of the Coast Guard. A certification tag affixed to the hull is satisfactory evidence of compliance.

19.C.03 Passenger requirements.

a. The maximum number of passengers and weight that can safely be transported shall be posted on all launches, motorboats, and skiffs. The number of passengers (including crew) shall not exceed the number of PFDs aboard.

b. Launches and motorboats shall have 10 square feet of clear deck space and 18 inches of seat width per passenger.

c. Each boat shall have sufficient room, freeboard, and stability to safely carry the cargo and number of passengers allowed with consideration given to the weather and water conditions in which it will be operated.

19.C.04 Fire protection.

a. The minimum number and rating of fire extinguishers which shall be carried on all launches and motorboats, including

outboards, are as follows:

Length	Extinguisher
26 feet or less	one 1A-10BC
more than 26 feet	two 1A-10BC

b. All launches and motorboats having gasoline or liquid petroleum gas power plants or equipment in cabins, compartments, or confined spaces shall be equipped with a built-in automatic CO_2 or other equally effective type of fire extinguishing system.

19.D DREDGING

19.D.01 Prior to repair or maintenance on the pump, suction or discharge lines below the water line, or within the hull, the ladder shall be raised and positively secured. This provision is in addition to the normal securing of hoisting machinery. Blank or block plates shall also be set in suction or discharge lines as appropriate.

19.D.02 Compressed air raising of submerged pipelines.

a. All short lengths of dredge pipe used as "plugs" shall be securely fastened. If clamps are used, the plug shall have a half-round flat bar or other raised surface to provide a more positive means of securing the plug than just a friction fitting on a smooth plug (pipe) section.

b. All persons shall be prohibited from standing in line with the end of the dredge pipe in which air is being introduced.

c. The end of the pipeline to be raised which does not contain the plug shall be unobstructed. If any doubt exists, it should be checked.

d. Pressure regulating valves, orifices, relief valves or other means which preclude overpressure and provide sufficient pressure to raise the pipeline within a reasonable time frame are recommended for use in compressed air lines.

19.D.03 Dredge pipelines that are floating or supported on trestles shall display the following lights at night and in periods of restricted visibility.

a. One row of yellow lights. The lights must be:

(1) flashing 50 to 70 times per minute,
(2) visible all around the horizon,
(3) visible for at least 2 miles on a clear dark night,
(4) not less than 3 feet nor more than 10 feet above the water,
(5) approximately equally spaced, and
(6) not more than 30 feet apart where the pipeline crosses a navigable channel (where pipeline does not cross a navigable channel, the lights must be sufficient in number to clearly show the pipeline's length and course).

b. Two red lights at each end of the pipeline, including the ends in a channel where the pipeline is separated to allow vessels to pass (whether open or closed). The lights must be:

(1) visible all around the horizon,
(2) visible for at least 2 miles on a clear dark night, and
(3) three feet apart in a vertical line with the lower light at the same height above the water as the flashing yellow light.

19.D.04 Dredge pump wells shall be provided and constructed in such a manner as to insure that in the event of failure or rupture of the dredge pump casing or any suction or discharge piping water will be held in the well until it reaches the level of a drain hole of sufficient size to prevent further accumulation.

19.D.05 Pumps and piping shall be shielded as necessary to prevent spray from ruptures from reaching power sources.

19.D.06 Mobilization, demobilization, and relocation of dredges, support barges, support tenders, tugs, and heavy equipment shall be by qualified persons under the direct supervision of a responsible individual.

19.D.07 Hopper dredges shall discontinue dredging operations

and shall ballast down, if so capable, while loading/unloading personnel.

19.D.08 No dredge will operate in a channel entrance or in open or exposed waterways that experience known frequent and/or rapid changes in sea state conditions that could exceed the dredge's anticipated seaworthy capability.

19.D.09 No dredge will operate in a channel entrance or in open or exposed waterways that experience known slow changes in sea state conditions that could exceed the dredge's anticipated seaworthy capability without a plan to relocate the dredge, support equipment, and personnel to protective waters.

19.E LOCKS AND LOCKING

19.E.01 Smoking, the use of open flame equipment, or other ignition sources shall be prohibited on lock structures within 50 feet of vessels containing flammable or hazardous materials during lockage.

19.E.02 Pleasure craft shall not be locked through a lock chamber with a vessel or tow carrying a dangerous cargo or containing flammable vapors.

19.E.03 Vessels with flammable or highly hazardous cargo will be passed separately from all other vessels. Hazardous materials are described in Part 171, Title 49, Code of Federal Regulations; flammable materials are defined in the National Fore Code of the National Fire Protection Association.

DEFINITIONS

Floating plant: Includes marine vessels use to transport personnel, work boats, floating cranes and derricks, barges, patrol boats, etc.

Jacobs ladder: a ladder consisting of rope or chain sides with rungs made of rigid materials.

SECTION 20

PRESSURIZED EQUIPMENT AND SYSTEMS

20.A GENERAL

20.A.01 Inspections and tests - general.

a. Pressurized equipment and systems shall be inspected and performance tested before being placed in service and after any repair or modification.

b. Unless state or local codes specify more frequent inspection and testing, temporary or portable pressurized equipment and systems shall be inspected and performance tested at intervals of not more than six months and permanent installations shall be inspected and performance tested at least annually.

c. As a minimum performance test the equipment and system shall be subjected to at least the overpressure for actuating a properly adjusted safety relieving device; the operability of gauges and relieving and control devices shall be demonstrated to the Designated Authority.

d. Inspections and tests will be performed by personnel qualified in accordance with American Society of Mechanical Engineers (ASME) Code or the National Board of Boiler and Pressure Vessel Inspectors.

20.A.02 Hydrostatic testing.

a. Unless otherwise specified by state or local codes, hydrostatic testing of unfired pressured vessels shall be performed:

(1) when vessels are installed;
(2) when vessels are placed in service after lay-up;
(3) after any repairs or modifications;
(4) every three years;
(5) if the vessel shows any rust or other deterioration; or
(6) when conditions found during inspections warrant tests.