SDMS DocID 277532

INDUSTRI-PLEX SITE

REMEDIAL TRUST

P.O. BOX 2580
WOBURN, MA 01888-1080

April 27, 1998

Mr. Joseph F. LeMay
Remedial Project Manager
USEPA-1
J.F.K. Federal Building, HBO
Boston, MA 02202-2211

Re: Final RTC Certification Report
Industri-plex Site
Woburn, MA

Dear Joe:

The ISRT is pleased to present you with two copies of the Final RTC Cover Certification Report. The ISRT has made the necessary revisions to the report to address your latest round of comments dated April 13, 1998.

If you have any questions relative to the enclosed report, please do not hesitate to contact me at (781) 933-2492. We appreciate your assistance in expediting the approval of the report.

Sincerely,

John Fiore
Project Manager

cc: Mike Light (w/o attachments)
Anna Mayor (w attachments)

TEL. 781-933-2492
FAX 781-933-4821

Golder Associates Inc.

400 Commercial Street
Manchester, NH USA 03101-1113
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Golder Associates

I 7.5

REPORT ON
RTC COVER CERTIFICATION
INDUSTRI-PLEX SITE
WOBURN, MASSACHUSETTS
(VOLUME 1 of 2)

Prepared for:

Industri-Plex Site Remedial Trust

23 Atlantic Avenue

Woburn, Massachusetts

Prepared by:

Golder Associates Inc.

400 Commercial Street

Manchester, New Hampshire

Distribution:

1 Copy – D. Michael Light
6 Copies - John Fiore
2 Copies - Joe LeMay, U.S. EPA
1 Copies - Anna Mayor, MADEP
2 Copies - Golder Associates

April 1998

Project No.: 933-6143

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Golder Associates

April 27, 1998

Project No.: 933-6143

Mr. D. Michael Light
Trustee Representative
Industri-Plex Site Remedial Trust
PO Box 2580
Woburn, MA 01888-1080

RE: FINAL CERTIFICATION REPORT FOR CONSTRUCTION OF RTC ALTERNATE COVER, INDUSTRI-PLEX SITE, WOBURN, MASSACHUSETTS

Dear Mr. Light:

We are pleased to submit the attached Final Certification Report for the construction of the Regional Transportation Center (RTC) Alternate Cover, at the Industri-Plex Site. This report provides a summary of work, a summary of remediation requirements, and a summary of documentation including decommissioning, material testing, and construction monitoring. A final set of as-built drawings will be submitted in a separate submittal.

This submission is made in fulfillment of the requirements of Appendix I, Section F.3.d of the Consent Decree. Please note that this report covers only a portion of the Industri-Plex Site which is identified as the Regional Transportation Center. This report provides a basis for certifying the completion of a portion of the remedial action for soil, sediments, and air in conformance with the Consent Decree, *Civil Actions 89-0195-MC* and *89-0196-MC*.

Should you have any questions or require additional information, please do not hesitate to call.

Very truly yours,

GOLDER ASSOCIATES INC.

Peter Neumann

Peter C. Neumann, P.E.
Project Manager

Peter Neumann for

Peter C. Conti, P.E.
Principal

PCN/ljl

Attachments

TABLE OF CONTENTS

VOLUME ONE OF TWO

Cover Letter i

Table of Contents ii

SECTION PAGE

1.0 INTRODUCTION 1
1.1 Site Description 1
1.1.1 Site and Design History 2
1.2 Summary of Work 6

2.0 REMEDIATION REQUIREMENTS 13
2.1 Soil Remedy 13
2.1.1 Soil Remedy - Consent Decree Requirements 13
2.2 Sediment Remedy 15
2.2.1 Sediment Remedy - Consent Decree Requirements 15
2.3 RTC Alternate Cover Requirements 15
2.3.1 Plans and Specifications 15
2.3.2 Submittals 16
2.3.3 Design Changes 16
2.3.4 Construction Controls 17
2.3.5 Decontamination 20
2.3.6 Facility Documentation for Off-Site Disposal 21
2.3.7 Survey Control 21

3.0 Evaluating Completion 23
3.1 Decommissioning 23
3.1.1 Utilities, Foundations, and Structure Decommissioning 23
3.1.2 Monitoring Wells, Gas Vents, and Piezometer Decommissioning 25
3.2 Test Borings 26
3.3 Blasting 27
3.4 Clearing, Grubbing and Subgrade Preparation 29
3.5 Fill Soil, Aggregate, Rip-Rap, and Topsoil Materials 30
3.5.1 Fill Soil 30
3.5.1.1 Material Requirements 30
3.5.1.1.1 General Requirements 30
3.5.1.1.2 Compacted Fill Requirements 31
3.5.1.1.3 Cover Soil Fill Requirements 31
3.5.1.1.4 Clean Off-Site Soils 32
3.5.1.1.5 Ordinary Borrow Fill Soils 32
3.5.1.2 Sources 32
3.5.1.3 Testing Requirements 33
3.5.1.4 Test Results 33

3.5.1.5 Conclusions 34
3.5.2 Aggregate 35
3.5.2.1 Material Requirements 35
3.5.2.2 Sources 35
3.5.2.3 Testing Requirements 36
3.5.2.4 Results and Conclusions 36
3.5.3 Rip-rap 36
3.5.3.1 Material Requirements 36
3.5.3.2 Sources 37
3.5.3.3 Testing Requirements and Results 37
3.5.3.4 Testing Results and Conclusions 38
3.5.4 Topsoil 38
3.5.4.1 Material Requirements 38
3.5.4.2 Sources 39
3.5.4.3 Testing Requirements and Results 39
3.5.4.4 Conclusions 40
3.5.5 Summary of Purchased Materials 41
3.6 Bituminous Materials 41
3.6.1 Material Requirements 41
3.6.2 Testing Requirements 42
3.6.3 Results 42
3.6.4 Conclusions 42
3.7 Geosynthetic Materials 42
3.7.1 Geotextile Materials Manufacturer's Quality Control 42
3.7.2 Geomembrane Materials Manufacturer's Quality Control 45
3.7.3 Geosynthetic Materials Conformance Testing 47
3.7.4 Geosynthetic Materials Quality Assurance 48
3.8 Monitoring and Testing 48
3.8.1 Subgrade and Geotextile Seaming Monitoring 48
3.8.2 Field Soil Moisture/Density Tests 49
3.8.3 Field Testing of Asphalt Concrete 51
3.8.4 Field Testing of Concrete 52
3.8.5 Testing of Reinforcing Bar 54
3.8.6 Testing of Manhole and Catch Basin Concrete 54
3.9 Flexible Membrane Field Monitoring 55
3.10 Record Drawings 60
3.11 Drainway Plantings 62

4.0 CERTIFICATION 64

5.0 REFERENCES 65

IN ORDER
FOLLOWING
PAGE 65

TABLES

Table 1 - Testing Methods for Soils and Geosynthetics
Table 2 - Abbreviations

FIGURES

Figure 1 - Site Location Map
Figure 2 – RTC Alternate Cover Types
Figure 3 – RTC Institutional Controls Land Classes
Figure 4 - 1996-1997 Organization Chart
Figure 5 - Contractor's Project Management Organization Chart (1996 - 1997)
Figure 6 - Project Change Management Flow Chart (1996-1997)
Figure 7 - Project Change Management Flow Chart (1992-1995)
Figure 8 - Structures Demolished, Spring 1996
Figure 9 - Destructive Sample Test Codes Extrusion Weld With Leister Heat Seam
Figure 10 - Destructive Sample Test Codes Hot Wedge Fusion Weld

APPENDICES

Appendix A - Schedule
A.1 -Project Milestone Record

Appendix B - Submittals
B.1. - RTC Alternate Cover Submittal Register (1996 - 1997)
B.2 - Submittal Log for Submittals applicable to work performed within the limits of Presidential and Commerce Way Extensions (1992 - 1995)

Appendix C – Modifications
C.1 – Summary of Variances
C.1.1 Approved Variance Request Forms
C.2 - Summary of Clarifications
C.3 - Modifications applicable to work performed within the limits of Presidential and Commerce Way Extensions (1992 - 1995)
C.3.1 – Approved Variance Request Forms (1992-1995)

Appendix D - Contractor Controls
D.1 - Air Monitoring
D.2 - Surface Water Monitoring
D.2.1 – Surface Water Monitoring Exceedances 1993-1995
D.3 - Decontamination
D.4 - Off-site Facility Documentation
D.4.1 – Manifests and Bills of Lading, 1996-1997

Appendix E. - Summary of Decommissioned Utilities and Structures
E.1 - Summary of Decommissioned Utilities and Structures
E 1.1 – 1992-1995 Utilities and Structure Decommissioning
E 1.2 – 1996-1997 Utilities and Structure Decommissioning
E.2 - Summary of Monitoring Wells, Gas Vents and Piezometer Decommissioning

E.2.1 – Decommissioning Records

Appendix F - Soil Borings
F.1 - Test Borings
F.2 - Compressibility Borings

Appendix G - Blasting
G.1 - Blast Surveys
G.1.1 - Pre-Blast Survey
G.1.2 - Post-Blast Survey
G.2 - Blast Monitoring Report Summary

VOLUME TWO OF TWO

Appendix H - Soil and Rock Materials
H.1 - Soil Laboratory Test Results
H.2 - Angular Stone Laboratory Test Results
H.3 - Rip-Rap Laboratory Test Results
H.4 - Topsoil Laboratory Test Results
H.5 - Soil and Rock Material Quantities
H.5.1 – Soil Material Quantities Purchased by the Trust
H.6 - Soil Analytical Tests

Appendix I - Bituminous Materials
I.1 - Bituminous Plant and Field Test Summary

Appendix J - Geosynthetic Materials
J.1 - Geotextile
J.1.1 - Geotextile Inventory Summary
J.1.2 - Geotextile Quality Control Certificates
J.1.3 - Geotextile Conformance Tests
J.2 - Geomembrane
J.2.1 - Geomembrane Inventory Summary
J.2.2 - Resin Manufacturers Quality Control Certificates
J.2.3 - Geomembrane Conformance Tests

Appendix K - Field Monitoring
K.1 - Subgrade and Geotextile Monitoring Summary
K.1.1 – Subgrade and Geotextile Inspection Forms
K.2 - Field Moisture Density Tests
K.3 - Concrete Testing Summary
K.4. - Reinforcing Bar Testing
K.5 - Pre-Cast Structure Testing

Appendix L - Flexible Membrane Monitoring
L.1 - Quality Control and Quality Assurance Personnel
L.2 - Atlantic Avenue Drainway Monitoring
L.2.1 - Subgrade Acceptance
L.2.2 - Deployment Summary
L.2.3 - Fusion Trial Seam Summary

L.2.4 - Extrusion Trial Seam Summary
L.2.5 - Fusion Seam Summary
L.2.6 - Extrusion Seam Summary
L.2.7 - Pressure Test Summary
L.2.8 - Vacuum Test Summary
L.2.9 - Repair Summary
L.2.10 - Destructives
L.3 - Detention Basin Liner
L.3.1 - Subgrade Acceptance
L.3.2 - Deployment Summary
L.3.3 - Fusion Trial Seam Summary
L.3.4 - Extrusion Trial Seam Summary
L.3.5 - Fusion Seam Summary
L.3.6 - Pressure Test Summary
L.3.7 - Vacuum Test Summary
L.3.8 - Repair Summary
L.3.9 - Destructives

Appendix M - Record Drawings (Provided in Separate Submittal)
M.1 - Title
M.2 - Index
M.3 -
M.3.1 – Site Boundary and Geotextile Limit
M.3.2 – Site Control Monuments
M.4 - Drainage Structures
M.4.1 - North View and Points Chart
M.4.2 - South View and Points Chart
M.4.3 - Presidential Way Ext. Commerce Way Ext. and Points Chart (Drainage Plan)
M.5 - Site Subgrade Surface (Geotextile)
M.5.1 - North View with Subgrade Contours
M.5.2 - South View with Subgrade Contours
M.5.3 - Points Chart
M.6 - Site Cover Thickness-50' Grid
M.6.1 - North View
M.6.2 - South View
M.6.3 - Points Chart
M.7 - Detention Basin and Atlantic Avenue Drainway
M.7.1 - Plan View
M.7.2 - HDPE Liner
M.7.3 - Points Chart
M.8 - MBTA Right-of-Way
M.8.1 - North View-Subgrade and Pullbox Details
M.8.2 - North View-Finish Grade and Typical Cross-Sections
M.8.3 - South View-Subgrade and Pullbox Details and Atlantic Avenue Drainway-South Section, Plan View Subgrade
M.8.4 - South View-Finish Grade and Typical Cross-Sections and Atlantic Avenue Drainway-South Section, Plan View-Finish Grade
M.8.5 - Finish Grade Contours - North and South Views and Atlantic Avenue Drainway–South Section, Finish Grade Contours
M.8.6 - Points Chart and Atlantic Avenue Drainway-South Section, Points Chart

M.9 - Decommissioned Structures
M.9.1 - Northwest Site View
M.9.2 - Southwest Site View
M.9.3 - Northeast Site View
M.9.4 - Southeast Site View
M.10 - Presidential Way and Commerce Way Extension
M.10.1 - Plan View and Points for Future RD, Utility Corridor and Aberjona River
M.10.2 - Cross-Sections for Utility Corridor and Aberjona River
M.11 - Cover Thickness for Misc. Areas
M.11.1 - Plan View Details
M.11.2 - Points Chart

Appendix N - Final Vegetation Establishment/Soil Stabilization As-Built-Plan

Appendix O - Reports
O.1 - Haverhill Soil Test Fill Report and Letter
O.2 - Site Soil Mixing Evaluation
O.3 - Subsurface Investigation - Surcharge
O.4 - UST Backfill Observations
O.4.1 – Concrete Underground Storage Tank Bottom Analysis
O.5 - Documentation Report- Contaminated Soil Stabilization by United Retek Corporation
O.6 – Building and Stack Demolition Closure Reports
O.6.1 – Janpet Property Building closeout
O.6.2 – Environmental Monitoring

Appendix P – EPA Comments
P.1 – Response to EPA Comments – November 1997
P.2 – Response to EPA Comments – March 1998
P.3 – Response to EPA Comments – April 1998

1.0 INTRODUCTION

In accordance with the Consent Decree (Civil Actions 89-0195-MC and 89-0196-MC), the Contract Documents for the Remedial Action, and the Regional Transportation Center (RTC) Alternate Cover plans and specifications, construction work was completed for a portion of the Remedial Action of soil, sediments, and air at the Industri-Plex Site (Site), Woburn, Massachusetts. The remedial action associated with the RTC Alternate Cover included:

- debris removal, grubbing, and subgrade preparation;
- covering an approximately 34.7 acre site and two access roads through the Industri-Plex Site (Figure 1); and
- dredging and covering sediments in existing and relocated drainways with a geotextile, and rip-rap cover. The relocated drainway received a geomembrane, geotextile and rip-rap cover.

This certification report provides a summary of the testing and monitoring that was completed to meet the requirements of the plans and specifications for the remedy of soil and sediments on the future RTC facility.

1.1 Site Description

The Industri-Plex Site is a 245 (+/-) acre area, located about 10 miles northwest of Boston, Massachusetts in the north part of Woburn, within the Aberjona River Valley (Figures 1 and 2). The site is bounded on the east side by Interstate 93, and Interstate 95/State Route 128 is located about one half mile south of the Site. The Boston Edison Power Company right-of-way No. 9 is the southwest boundary of the site. The Massachusetts Bay Transportation Authority (MBTA) railway transects roughly the western third of the Site in a northwest-southeast direction. The Industri-Plex Site was surveyed by SAIC Engineering, Inc. and Liu Aerial Surveys in 1990 and 1991.

The area designated for the Regional Transportation Center (RTC) Alternate Remedial Cover includes four properties within the Industri-Plex Site—a portion of Janpet Property, a portion of the Woburn Industrial Associates Property, a portion of the MBTA Property, and a portion of Atlantic Avenue. Improvements for two roadways, Presidential Way and Commerce Way Extension, on property owned by the Industri-Plex Custodial Trust are included with the RTC

Site work (Figure 2). Drainage improvements performed in the Atlantic Avenue Drainway and Aberjona River are certified by this report. The breakdown of approximate areas included in RTC Alternate Cover Certification are as follows:

LOCATION	AREA (in acres)
1. **Janpet Property**	**20.3**
• **Less portion of northern section not containing contaminated soils**	-2.2
• **Portion of Janpet property covered as part of RTC**	**18.1**
2. **Woburn Industrial Associates, Inc.**	**10.6**
• **Less portion of eastern area previously covered (South hide pile)**	-2.6
• **Portion of WIA property covered as part of RTC**	**8**
3. **Portion of MBTA**	**1.7**
4. **Portion of Atlantic Avenue covered**	**0.5**
5. **Portion of Boston Edison Right of Way No. 9 (including Atlantic Avenue Drainway)**	1.6
6. **Presidential Way Extension**	**3.2**
7. **Commerce Way Extension (Including Aberjona River)**	1.6
TOTAL ACREAGE COVERED	**34.7 Acres (approximately)**

1.1.1 Site and Design History

Since the mid-1800s, the Industri-Plex Site has been used primarily by companies producing chemicals for textile, leather, and paper. By 1929, the Merrimac Chemical Company, which occupied the Industri-Plex Site, had become one of the leading producers of insecticides and other chemicals in the U.S. The Merrimac Chemical plant included 90 buildings on 417 acres, many of which were within the current Industri-Plex Site. Early operations included disposal of wastes in pits or low-lying wetlands. Liquid wastes were discharged into streams and later sewers. As a result, heavy metal wastes from the chemical operations contaminated site soils and wetland sediments.

From 1934 to 1969, the property was used by several companies to manufacture glues and gelatins from animal hides. Animal hide waste products from the rendering process were disposed of in mounds or hide piles on-site. A developer purchased the plant property in the early 1970's intending to build a complex of industrial buildings (hence Industri-Plex) and began grading operations. During hide pile excavation of one of the hide piles, noxious gases and odors attributable to the decomposing hide wastes were released. The distinctive odor became known as the "Woburn odor." Complaints from local residents and encroachment on wetland areas stopped further development of the site.

In 1982, following investigation of the Site, the EPA added the Industri-Plex Site to the Superfund list. The EPA completed a Remedial Investigation and Feasibility Study to identify contaminants of concern and develop a scope of work for cleanup of the Site. The Remedial Investigation identified arsenic, lead, and chromium in Site soils and wetland sediments as well as impacts to groundwater and odors due to hydrogen sulfide and methyl mercaptans emitted from the hide piles. Abandoned buildings and waste lagoons were also present on the Site. Along with Massachusetts Department of Environmental Protection (MDEP), the EPA issued a Record of Decision (ROD) in 1986 outlining the remedial alternatives and their preferred remedy for the Site.

In a 1989 Consent Decree between the EPA, MDEP and the current and former property owners, two Trusts were established which set in motion the remediation and reuse of the Industri-Plex Site. The Industri-Plex Remedial Trust was formed to prepare and implement the remedy according to the ROD. The Industri-Plex Custodial Trust was formed to hold, manage, and sell a portion of the Site.

Golder Associates Inc. (Golder) was selected in 1989 by the Remedial Trust to design the remediation for the Industri-Plex Site. The remedial design included pre-design investigations of the soils, wetlands, air, and groundwater.

The pre-design investigations included sampling analysis and studies to determine the extent of contamination and, in accordance with the Consent Decree, to evaluate cover types. Designs were needed to prepare the ground surface for cover. The remedial design included:

1. Plans for the demolition or decommissioning of abandoned buildings, railroad tracks, underground utilities, a personnel tunnel, and over 120 existing observation wells and piezometers used during the preliminary investigation.

2. Plans for controlling odors, fugitive dusts, and surface water runoff during construction to prevent off-site impacts.

3. Evaluation of, and considerations for the future stability of, the hide pile slopes.

4. Plans for collecting and treating waste gases in a Thermal Oxidation Unit.

5. Plans for dredging, remediating, and revitalizing streams and wetlands.

The remedial design for contaminated soils and air included both permeable (soil and geotextile) and impermeable (soil and geomembrane) covers. A permeable cover system was designed for 60 acres of up-land soils and hide piles contaminated with high concentrations of heavy metals and decomposing organic wastes. The permeable cap included a geotextile base to maintain separation between contaminated soils and clean cover material, a clean grading fill, and topsoil with vegetation. An impermeable cover was designed for a four-acre hide pile (East Hide Pile) which was an active odor source. The impermeable cover included a high permeability gas collection layer, geomembrane, cover grading fill, topsoil, and vegetation. An active gas collection system was designed to collect gases trapped by the impermeable cover and convey the gases to a thermal oxidation unit for treatment.

Site remediation required capping approximately five acres of contaminated streams and wetland sediment. Approximately seven acres of wetland enhancement, restoration, and creation were designed to compensate for wetland losses. Normandeau Associates, Inc. of Bedford, New Hampshire, was a key designer of the wetland mitigation plans.

A revised final (100%) Design Report was issued on May 8, 1992. Approval for the 100% Design Report was issued by the EPA in consultation with the MDEP on May 18, 1992. Subsequent addenda were issued for the 100% Design including:

Addendum 1 issued May, 1992	EPA/MDEP Approval March 11, 1993
Addendum 2 issued June, 1992	EPA/MDEP Approval March 11, 1993
Addendum 3 issued May 14, 1993	EPA/MDEP Approval May 27, 1993

Addendum 3 revision 1 August 27, 1993	EPA/MDEP Approval May 27, 1993
Addendum 3 revision 2 October 18, 1993	EPA/MDEP Approval May 27, 1993

While remediating the property was the first priority for the Industri-Plex Site Remedial Trust, a plan was started for reusing portions of the site which included the RTC. The Custodial Trust and Remedial Trust began discussions with planners from the Massachusetts Bay Transportation Authority (MBTA), Massachusetts Department of Environmental Protection (MDEP), Massachusetts Port Authority (Massport), and Massachusetts Highway Department. Because a conventional design would not accommodate future development on the Site, an alternate cover was needed to allow future development.

The objectives of the alternate cover were to provide a cover that would meet the performance requirements of the ROD and would permit the future construction and operations of the Regional Transportation Center (RTC) in clean conditions. The alternative cover design was developed by a team of Golder and Vanasse, Hangen, Brustlin Inc. (VHB) based on a conceptual design of the RTC prepared by VHB. To allow clean construction of the RTC, it was necessary to identify all features of the RTC which would potentially require breaching the cover when installed. Because it was critical that all such facilities be identified prior to finalizing the alternate cover design, VHB's conceptual design was completed in sufficient detail to show locations of parking facilities, buildings, passenger platforms, drainage structures, light standards, guard rails, and other structures which might cause disruption of the cover during future installation. The alternative cover design included installation of storm water management facilities such as drainage culverts and the sedimentation detention basin, which will ultimately be incorporated into the RTC storm water management system. For other structures such a guard rails and light standards, the cover section was thickened to allow installation without contacting contaminated soils. Test borings to support the future design of foundations for the station, rail platform, and parking garage were completed before the alternate cover was installed.

A final RTC Plan prepared by VHB and Golder was submitted to the agencies, the EPA, and the MDEP on July 26, 1996 and received final approval October 1, 1996. Figure 2 shows the approved cover types for the Alternate Remedial Cover.

After the cover has been accepted, there will be legally-established limits or Institutional Controls on the use of the properties. These limits will both:

- Preserve the continued effectiveness of the remedial actions in order to protect human health and the environment and
- Permit the greatest possible use and enjoyment of the Site.

Use of the property will be dependent on the type of land class designation. Figure 3 shows the land classes designated for the areas completed for the RTC Alternate Cover and adjacent properties. Since the Institutional Controls and the land classes have not been finalized, the land classes shown on Figure 3 and other institutional controls should be considered draft.

1.2 Summary of Work

The remediation of the Industri-Plex Site, in accordance with the 100% Design Plans and Specifications, began in August 1992 when the Remedial Trust entered into an agreement with a general remediations contractor, Chemical Waste Management, Inc. Remediation Services Group (CWM) of Princeton, New Jersey. The scope of the 100% Design included the areas now included as the RTC Alternate Remedial Cover. Initial demolition of above-ground structures on the ISRT site began under a preparatory, non-intrusive work scope that preceded formal approval of the Remedial Action Work Plan (RAWP). CWM submitted the RAWP to the EPA on October 5, 1992. The RAWP included plans for implementing the Site Remedial Action. The contractor began remediating the Industri-Plex site on December 2, 1992 after the EPA approved an interim RAWP for areas requiring remediation west of the MBTA railroad tracks. Elements of the remedy included:

- Soil, asphalt and wet area covers west of the MBTA railroad
- Soil covers along the MBTA railroad and east of the railroad
- Stream remediation east of the MBTA railroad
- Utility Corridor for Commerce Way
- Wetland Creation and Enhancement
- Hide Pile Stabilization and cover
- East Hide Pile FML, gas collection and treatment

At the close of 1995, much of the design cover had been installed with the exception of a cover for the properties known as the Janpet Property, a portion of the Woburn Industrial Associates Inc. Property, and a portion of the Boston Edison right of way. The East Central Hide Pile was completed near the end of 1995, but was re-opened in 1996/97 to accommodate the excavation of contaminated waste spoils from the Aberjona River Drainway. The re-opening of the hide pile and excavation were required as part of the remedial action at the Site. The East Central Hide Pile currently remains open to accommodate other Site excavated spoils related to the remedial action. Most of the wetland stream remedy was completed with the exception of the Enhanced Wetland/Created Wetland connection, Aberjona River Drainway adjacent to the East Central Hide Pile and the south end of the Atlantic Avenue Drainway. Plantings of wetland areas were needed along the Created Wetland berm and the Atlantic Avenue Drainway.

The East-Central Hide Pile was completed sometime near the end of 1995, but was re-opened in 1996/97 to accommodate the excavation of contaminated waste spoils from the RTC Alternate Cover and the Aberjona River Drainway. The re-opening of hide pile and excavation were required as part of the remedial action at the Site.

As part of the soil remedy, a geotextile had been placed beneath 16 inches of soil cover. The extent of geotextile on the Site is shown in Sheet M.3.1 The geotextile included as the soil remedy for the RTC Alternate Remedial Cover was attached to the existing soil remedy geotextile for continuous soil remedy of the Industri-Plex Site Cover limits.

Work within the limits of the RTC Alternate cover limits during the construction period 1992-1995 progressed as follows with the following approximate dates:

Initial control survey of the ISRT site including the RTC portion	1992-1995
Initial clearing of trees and surface vegetation	1992-1993
Submittals required by specifications	1992-1994
Well decommissioning within areas included in RTC	2/93-12/93
Design changes impacting aspects of RTC	1992-1995
Geophysical Investigation by Golder Associates, Inc.	5/93
Above ground structure demolition	1992-1993
Demolition of Concrete foundation slabs – Custodial Trust Property	Fall 1993
Construction of Groundwater Treatment Building	2/94-3/94
Construction of temporary dam in Atlantic Avenue Drainway	3/94

Demolition of various structures, pipes, manholes – Woburn Industrial Associates Property	5/94-8/94
Removal of buried metal anomalies - Woburn Industrial Associates Property	7/94-9/94
Placed and compacted on-site soils beneath cover along Presidential Way-east	11/93-8/95
Placed geotextile over existing or on-site soils along Presidential Way-east	11/95
Excavated, placed geotextile and backfilled with clean soil – north end of clean utility corridor Commerce Way Extension	9/94-12/94
Removal of the wood chips and recycling operations from Janpet Property	12/94
Placed geotextile over compacted/proofrolled on-site soils along Presidential Way (east and west)	4/95-10/95
Decommissioned gas tanks – Janpet Property	8/95-9/95
Demolished coal silo – Janpet Property	10/95
Removed cover from coal tunnel	10/95
Excavated, placed geotextile, and backfilled south end of clean utility corridor – Commerce Way Extension	10/95
Removed oil and cleaned out 3 UST's – Janpet Property	11/95
Excavation and treatment of oily soil, under state requirements	7/96-9/96

Existing buildings and foundations on Janpet Property served as equivalent cover in accordance with the Consent Decree. However, these structures were demolished to make the RTC site developable. The following structures were demolished in April/May, 1996:

Boiler House and attached shed
200 foot smoke stack
Remnant Building
Quonset Hut

Asbestos and drummed materials were removed prior to demolition of the structures. The certification of the asbestos disposal, monitoring, and air monitoring are documented in the following reports by Global Waste Management: "Janpet Property Building Closeout," no date; and "Environmental Monitoring", dated June 11, 1996. Copies of both reports are included in Appendix O.

Once the asbestos and drummed materials had been removed, the Boiler House, Quonset Hut, and Remnant Building were demolished. Steel rebar and beams were removed from the Boiler House and recycled as scrap. The brick rubble from the Boiler House was placed and compacted in the basement of the Boiler House and the coal tunnel. The remaining brick was distributed in the

designated demolition debris area. The Quonset hut walls were removed from the Site and recycled as scrap. The reinforced concrete walls of the remnant building were broken and the reinforcing bar steel was separated and removed from the Site as scrap. The approximately 200-foot tall smoke stack was demolished using explosives on May 12, 1996. The stack fell in an easterly direction into a drop zone that was filled with foam and sprayed with water from a hydrant to contain the dust. The stack concrete debris was broken up and the rebar was separated, decontaminated and removed from the Site. The stack brick was loaded onto dump trailer beds double-lined with poly sheet and removed from the Site for disposal as asbestos-contaminated materials. Disposal records are included in the Global Waste Management report "Janpet Property Building Closeout." By the end of May 17, 1996, all brick debris from the stack demolition had been shipped off the Industri-Plex Site. The stack ash was temporarily staged in a stockpile south of the stack location. The ash was eventually placed in the easternmost of the three underground storage tanks (UST's) and mixed with concrete backfill on September 17, 1996. Oily soil left over from work performed in 1992–1995 had been staged on the concrete slab and was treated by United Retek using a portland cement stabilization process. Oily soil tailings were coated with a dry Portland cement mix, disposed in the 3 USTs, and encased in grout.

In March, 1996, the Trust requested that Golder prepare a Commercial Remedial Cover (CRC) design and bid package for a base remedial cover such that the RTC could be constructed as per the existing September, 1995 design entitled "Regional Transportation Center Alternate Cover." The initial scope of work of the CRC was later expanded to include all the elements of the September, 1995 RTC design after the revised RTC Alternate Cover design of July 26, 1996 was issued by Vanasse, Hangen, Brustlin, Inc. and Golder Associate, Inc. for the Industri-Plex Site Remedial Trust.

The work to construct the RTC Alternate Cover during the 1996-1997 construction season included:

- Demolishing the existing buildings, stack, and miscellaneous concrete structures, and removing debris and vegetation;
- Pumping and filling concrete UST's, Coal Tunnel, and Stack foundation;

- Excavating a surface water detention basin, rerouting an existing drainway, and dredging an existing drainway;
- Placing and compacting on-site soils beneath the clean soil cover;
- Placing a geotextile fabric or geomembrane over existing soils;
- Lining an excavated detention basin and the rerouted drainway with geomembrane;
- Constructing clean corridors for drainage features and future service utilities;
- Placing and compacting imported clean cover fill soils;
- Constructing a surface drainage pipe and box culvert system, detention basin, and sedimentation structure;
- Covering the compacted soils with a protective stone surface;
- Placing plantings; and
- Vegetating topsoiled areas.

On May 23, 1996, the CRC contractor and later the RTC contractor, LRS, arrived on Site. This report certifies work which includes implementing the soil remedy for the RTC Alternate Cover. Information from both the 1992-1995 and 1996-1997 construction seasons are included as part of the RTC Alternate Cover. Materials purchased and tested during the 1992-1995 construction season were used during the 1996-1997 RTC Alternate Cover construction season. A project milestone record for activities applicable to the RTC Alternate Cover work certified by this document is presented in Appendix A.1.

Project Participants

1992-1995 Construction Seasons.

Chemical Waste Management Remediation Services Group (CWM-RSG) of Princeton, New Jersey, provided general remediation contracting from 1992-1995. The name of CWM-RSG was changed to Rust Remedial Services, Inc. on January 1, 1993 when CWM-RSG was acquired by Rust, Inc. A final name change occurred in May 1995 when OHM acquired Rust Remedial Services, Inc. The name Chemical Waste Management was retained as the legal name of the contractor throughout the construction of the remedy of ISRT.

Several subcontractors assisted CWM-RSG with specific tasks during the remedial work. Rust Environmental and Infrastructure, Surveying services were performed by Earth Tech Inc., formerly HMM Associates, Inc. of Concord, Massachusetts from 1992-1993 and Meridian Land Services, Inc. of Milford, New Hampshire from 1993-1995. Eastmont Environmental, Inc. of Walpole, Massachusetts conducted perimeter air monitoring. Beatti Enterprises of Lancaster, New Hampshire assisted with initial clearing and grubbing of the Site. Decommissioning of the

wells and piezometers was performed by Maher Environmental Services, formerly D.L. Maher Company, of Reading, Massachusetts. Earth Tech Inc., formerly HMM Associates, Inc. of Concord, Massachusetts and Coastal Environmental, Inc. of Princeton, New Jersey assisted with construction of wetlands and installation of wetland vegetation. Miway Paving of Chelmsford, Massachusetts or their subcontractors performed paving work for the Site during 1992-1995. Barbella Environmental Technology, Inc. of Whitehouse, New Jersey assisted in the Hide Pile remediation and installation of a culvert in a section of the former Wetland 2A. Installation of the 60 mil textured HDPE East Hide Pile cover was performed by National Seal Company of Galesburg, Illinois. Toxikon Laboratories of Woburn, Massachusetts, and 21st Century Environmental, Inc. of Bridgeport, New Jersey assisted the Contractor with water and soil analytical testing. Reliable Fence Company of Woburn, Massachusetts installed chain link fence on the Site.

EPA oversight of the remedial work was provided by Halliburton NUS (HNUS) of Wilmington, Massachusetts. Representatives of the EPA and the MDEP met with the Trust at least monthly (approximately) throughout the 1992-1995 Remedial Action to oversee the performance of the work.

Golder provided resident engineering and quality assurance (QA) monitoring for the Remedial Action for September 1992 until December 1995. Normandeau Associates, Inc. provided review and oversight of wetland plantings for Golder Associates, Inc. Golder Construction Services, Inc. provided on-site construction management services for the Trust from March 1995 through December 1995.

The Trust contracted with Professional Service Industries, Inc. of Canton, Massachusetts to perform soil moisture/density testing of compacted soils, soil laboratory testing, asphalt and concrete testing. PSI also performed on-site QA from August 1993, through December, 1995.

1996-1997 Construction Season

LRS Enviro-Services, Inc. of Hampton, New Hampshire, provided general remediation contracting from 1996-1997. Several subcontractors assisted LRS with specific tasks during the RTC Alternate Cover construction. Surveying services were performed by Meridian Services, Inc. of Milford, New Hampshire. Environmental Health, Inc. of Harris, New Hampshire

performed laboratory analysis of the air monitoring samples. TerreCon of Lunenberg, Massachusetts performed pre- and post-blast monitoring. Maine Drilling and Blasting, Inc. of Gardiner, Maine provided blasting for rock excavation. Installation of the 60 mil textured HDPE in the Atlantic Avenue Drainway was performed by Environmental Network of Weare, New Hampshire. Installation of the 60-mil textured HDPE in the Detention Basin was performed by Chenango Contracting, Inc. of Johnson City, New York. Figure 4 shows the contractors' project organizational structure for the 1996-1997 construction season.

EPA oversight of the remedial work was provided by Halliburton NUS (HNUS) of Wilmington, Massachusetts. Representatives of the EPA and the MDEP met with the Trust at least monthly (approximately) throughout the construction of the RTC Alternate Cover to oversee the performance of the work.

Golder Associates, Inc. provided Resident Engineering and QA monitoring for the RTC Alternate Cover from May 1996 to November 1997. Normandeau Associates, Inc. provided review and oversight of wetland plantings for Golder Associates, Inc. Golder Construction Services provided on-site construction management services for the Trust from April 1996 through January 1997.

The Trust contracted with de maximis to provide on-site project management from 1996-1997. The Trust contracted with Professional Services Industries, Inc. of Canton, Massachusetts to perform soil moisture/density testing of compacted soils, soil laboratory testing, concrete testing, and asphalt testing from 1996-1997. The Trust contracted directly with Global Waste Management, Inc. of Woburn, Massachusetts to perform the demolition of the brick Boiler Houses, Stack, and Quonset Hut. The Trust contracted with soil vendors McDonough, Stockbridge, and Pitcherville to supply clean imported cover soil and topsoil during the construction season of 1996-1997. Toxikon performed the Trust's surface water sample laboratory analysis. The Trust contracted with Demeter of Everett, Massachusetts to perform pavement replacement. Figure 5 shows the organizational structure for 1996-1997.

2.0 REMEDIATION REQUIREMENTS

2.1 Soil Remedy

2.1.1 Soil Remedy - Consent Decree Requirements

Appendix I of the Consent Decree, the Remedial Design Action Plan (RDAP), states the following:

> "The remedial action for soils, sediments, and sludges contaminated with Hazardous Substances, other than those emitting odors (the East Hide Pile), shall include site grading, capping with a permeable soil cover, excavation, dredging, and/or consolidation for all areas containing Hazardous Substances at concentrations above established action levels (arsenic = 300 ppm, lead = 600 ppm, chromium = 1,000 ppm)...."
>
> Furthermore, the RDAP states, "Settlers shall design and implement remedial action for soils contaminated with Hazardous Substances above the action level for metals that shall consist of site grading and capping together with Institutional Controls. Areas already covered adequately by buildings, roadways, parking lots, or other ground covering features, would not receive cover material, instead allowing the structures themselves to act as the protective cap.
>
> "For small areas on-site, such as the landscaped areas between buildings and parking lots, Settlers may propose location-specific alternatives to capping consisting of excavation of contaminated soil and consolidation on-site with similarly contaminated soils, or placement of a protective layer such as asphalt to cap the contaminated soils.
>
> "Settlers shall design and implement the remedial actions for contaminated soils in accordance with the following requirements:
>
> "(1) cap design and construction activities shall be in accordance with regulations and/or guidance on cap design for permeable covers as summarized in [RDAP] Attachment A provided that an alternative permeable cap design including a permeable synthetic fabric and a soil layer less than 30 inches in depth, may be used in all areas of the Site where

Settlers demonstrate to the EPA and the Commonwealth that the alternative cap design will perform as well as or better than the permeable cap design summarized in Attachment A."

Attachment A to the RDAP states that:

"Permeable covers shall be designed and constructed to include at a minimum the following:

"A. A vegetated top layer which shall be:

1. of a minimum thickness of six (6) inches;

2. capable of supporting vegetation that minimizes erosion and minimizes continued maintenance;

3. planted with a persistent species with roots that will not penetrate into the contaminated soils;

4. designed and constructed with a top slope of between 3 percent and 5 percent after settling and subsidence or, if designed and constructed with less than 3 percent, a drainage plan to ensure that the ponding of surface water does not occur or, if designed and constructed with a slope of greater than 5 percent, an expected soil loss of less than 2 tons/acre/year using the USDA universal soil loss equation; and

5. designed and constructed with a surface drainage system capable of conducting effective run-off across the cap.

"B. A base layer that shall be:

1. of a minimum thickness of twenty-four (24) inches of appropriate fill material; and

2. designed and constructed to prevent clogging."

Two alternative permeable covers were designed as part of the remedy under the Consent Decree. The first alternative permeable cover design concept utilizing a 16-inch thick borrow cover overlaying a geotextile was developed in the Alternate Cover Design Report (Golder, 1989). The EPA, in consultation with the MDEP, subsequently approved the first alternative permeable cover design in a letter dated September 11, 1989. The second alternative permeable cover design was the design to accommodate the Regional Transportation Center or RTC Alternative Cover

(VHB/Golder, 1996). The EPA, in consultation with the MDEP, approved the RTC Alternate Cover design in a letter dated October 1996.

2.2 Sediment Remedy

2.2.1 Sediment Remedy - Consent Decree Requirements

The Consent Decree (USEPA, 1989) briefly explains the work to be performed and establishes the requirements for remediation of sediments presented in the RDAP. Sediments within streams and wetlands where there are "no odor-emitting Hazardous Substances (e.g. hide wastes), Settlers shall dredge the Hazardous Substances or remove them by another method shown to be environmentally protective and approved by the EPA in consultation with the Commonwealth."

The RDAP mandates an in-situ cover for areas with sediments containing Arsenic, Lead, and/or Chromium at or above Consent Decree action levels, and hide residues, stipulating that these capping activities will be consistent with other technical requirements of the RDAP.

The RDAP also requires that excavated sediments be "consolidated in other areas of the Site which contain such Hazardous Substances and which will be covered as part of the approved remedial action."

2.3 RTC Alternate Cover Requirements

2.3.1 Plans and Specifications

In partial satisfaction of the Consent Decree, a "100% Design Report, Part I" was prepared in 1991 for the Industri-Plex Site in Woburn, Massachusetts. The design included plans and specifications for conducting Remedial Action of soil, sediments, and air at the Industri-Plex Site. The Alternate Cover Design for the RTC was prepared based on the 100% Design Report Plans and Specifications and was subsequently approved by the EPA on October 1, 1996. The design consisted of two volumes of specifications, entitled "Specifications, Regional Transportation Center Alternate Cover Design, Volume I of II and Volume II of II" and one set of 27 drawings entitled, "Alternate Cover Design, Regional Transportation Center, Woburn, Massachusetts." The objectives of the design were two-fold.

- To meet the performance requirements of the Consent Decree. A minimum cover thickness of 16-inches was required which was consistent with the 100% Design Report requirements.

- To design a cover system that would allow future construction and operation of the Regional Transportation Center in clean conditions.

2.3.2 Submittals

The Contractor performed submittals according to the plans and specifications during the RTC Alternate Cover work. A summary of the submittals for work performed during the 1996-1997 construction season are included in Appendix B.1. A summary of submittals are included in Appendix B.2 for work performed during the 1992-1995 construction season. Submittals by the Contractor included work plans, shop drawings, and samples of materials.

While a number of submittals were made by the Contractor during the construction of the RTC Alternate Cover that were acceptable, several were rejected. In the interest of time and efficiency, the Trust decided to perform some of the items requiring submittals. Such items purchased through the Trust included materials such as concrete grout, cover soil, and topsoil. Also in the interest of time, the Trust accepted the Contractor's adoption of the Industri-Plex Site Remedial Action Work Plan (RAWP), previously prepared by Chemical Waste Management (CWM), with minimal revisions. The submittal record summaries are included to show the record of submittal activity. The Specifications for the RTC Alternate Cover identified specific submittals that were required. The submittal record shows that submittals were performed in accordance with the Design Plans and Specifications and are in compliance with the Consent Decree.

2.3.3 Design Changes

Design changes were discussed with the EPA, in consultation with the MDEP and the principal designers. A summary of the design change review and approval procedure for the RTC Alternate Cover, 1996-1997 is shown in Figure 6. Summaries of RTC Alternate Cover Clarifications and Variances are included in Appendix C. Variances to the RTC Alternate Cover Plans and Specifications were discussed and approved by the EPA.

Applicable design changes to the 100% Remedial Design performed during previous years, 1992-1995 of work that is within the RTC Alternate Cover scope of work are summarized in Appendix C.3. The changes in the 1992-1994 period were documented through design/specification change requests (DSCR). In 1994, a second system was utilized which included Variance Request (VR) forms. In 1995, a third change-management system was introduced and utilized the Speed Form. Each system identifies the change, justification, and approvals. The change-management process during the 1992-1995 time period is summarized in Figure 7. Between 1992 and approximately October 1994, the EPA reviewed and approved significant design variances. From October 1994 to December 1995, the EPA reviewed and issued verbal or written approval for variances. From June 1996 to the present, the EPA reviewed and approved all design variances.

2.3.4 Construction Controls

During the installation of the RTC Alternate Cover work, the Contractor was required by the project specifications to provide controls to maintain a safe work environment and protect the public health and safety. Such controls included air monitoring and surface water monitoring.

The dust control level specifications required the following:

- PM10 particulates were to be limited to an annual average of less than 150 μg per cubic meter of air at the Site monitoring points.

  Dust (Respirable)

  Site 90 $\mu g/M^3$ (respirable)

  Personal 5,000 $\mu g/M^3$ (respirable)

- Data gathered by dust monitoring devices will be used to monitor metals in the particulates to ensure that they are below TLV's outlined in the American Council of Governmental and Industrial Hygienists.

	Arsenic	Chromium	Lead
Site	0.02 $\mu g/M^3$ (of air)	1.36 $\mu g/M^3$ (of air)	1.36 $\mu g/M^3$ (of air)
Personal	5 $\mu g/M^3$ (of air)	250 $\mu g/M^3$ (of air)	50 $\mu g/M^3$ (of air)

The air monitoring data collected from June 1996 to February, 1997 is included in Appendix D.1 and indicates that airborne contaminant concentrations met the Site and personal response levels for all locations except three. The exceptions occurred on June 26, July 15, and August 6, 1996 when particulate concentrations were exceeded. The corresponding arsenic, chromium, and lead concentrations for that Site, during those time frames, were either not detected or well below the site response level. Truck traffic on the access road was believed to be responsible for the higher than normal dust concentrations.

Surface water sampling for RTC construction work was conducted by the Trust from August 21, 1996-March 14, 1997 to meet the project specifications and the CWM RAWP requirements. The surface water controls established by the EPA and included in the Contractor's RAWP required the following procedures:

- Each work day, field measurements were conducted at stations HSW-8 and HSW-9 (whenever there was flow) for turbidity, dissolved oxygen, temperature, specific conductivity, and pH. Samples were collected from each station for analysis of total and dissolved arsenic and lead, total suspended solids (TSS), and hardness. The sample from each station with the highest turbidity during the week was submitted to the laboratory for analysis.

- When samples with a turbidity greater than or equal to 85 NTU were submitted for analysis, the samples with the next highest turbidity during the same week were submitted to the laboratory for analysis.

- Samples that showed a turbidity higher than or equal to 85 NTU were submitted to the laboratory for analysis. These samples were analyzed for total and dissolved metals (arsenic, chromium, and lead), TSS, and hardness. Field measurement for turbidity, dissolved oxygen, temperature, specific conductivity, and pH were conducted at the time of sampling.

- Station HSW-7 was initially monitored daily by field measurements for turbidity, dissolved oxygen, temperature, specific conductivity, and pH. A turbidity of greater than or equal to 35 NTU was investigated to determine the source of the elevated turbidity.

- Station HSW-7 was sampled monthly (August, September, October, December, and January) for laboratory analysis of total and dissolved metals (arsenic, chromium, and lead), TSS, and hardness. This sampling was completed on the same days that Station HSW-11 was sampled.

- Station HSW-11 was sampled and had field measurements taken monthly (August, October, December, and January). Samples were analyzed for total and dissolved metals (arsenic, chromium, and lead), TSS, and hardness.

- Whenever the turbidity at Station HSW-8 was 85 NTU or above and water from upgradient sources may have been a contributing factor, field measurements for turbidity, dissolved oxygen, temperature, specific conductivity, and pH were conducted at Station HSW-7 and/or HSW-11. Samples for laboratory analysis of total and dissolved metals (arsenic, chromium, and lead), TSS, and hardness were collected at Stations HSW-7 and HSW-11 when the turbidity was 85 NTU or greater.

- Additional sampling was to be conducted if a storm and/or a construction event caused the turbidity to rise above 85 NTU at Stations HSW-8 and/or HSW-9. The samples were analyzed for total and dissolved metals (arsenic, chromium, and lead), TSS, and hardness. Field measurements for turbidity, dissolved oxygen, temperature, specific conductivity, and pH were conducted at the time of sampling.

- As the remedy was completed in the sampling locations, the sampling frequencies and locations were modified.

According to the Site surface water monitoring plan, the following Ambient Water Quality Control (AWQC) concentrations were used as the response action levels for the Industri-Plex Site:

AWQC chronic concentration for arsenic = 0.190 mg/l
AWQC chronic concentration for chromium = 0.210 mg/l
AWQC acute concentration for lead = 0.082 mg/l

The above-tabulated AWQC limits correspond to a hardness of 100 ppm. Water hardness values on site indicated moderately hard to very hard conditions (75-300) EPA, 1986. Historical background surface water data collected from surface water drainways periodically contained lead concentrations of 25 ppb. Since these background levels routinely exceeded the threshold value of the AWQC chronic concentration for lead, the AWQC acute concentration was approved as the response action level by the Agencies, June 8, 1994.

The results of the surface water sampling for the work period August 21, 1996 through March 14, 1997, are summarized in Appendix D.2. Surface water sampling was also performed from 1993 to 1995. Test results indicate that the surface water quality remained below the response action thresholds with the exception of exceedances as listed in the summary in Appendix D.2.1. Specific reasons and mitigating actions for each exceedance are described in the quarterly reports of 1993-1995. Generally, the Agencies were notified and the mitigating actions were performed to the satisfaction of the Agencies.

The data from the 1996-1997 construction season indicate that the turbidity was exceeded 15 times during the 1996-1997 sampling period. Analytical sampling for chromium was not always performed since there had rarely been exceedances of this constituent. Analytical sampling conducted on samples taken at the locations where the turbidity exceeded 85 NTU indicated that dissolved metals contaminant concentrations exceeded chronic Ambient Water Quality Criteria AWQC for arsenic on November 23, 1996. Extra measures were taken that day to minimize sediment migration downstream. Subsequent testing the following day indicated that the sediment control measures were successful.

Other exceedances of total metal contaminant concentrations for AWQC (chronic for arsenic and acute for lead) occurred for samples taken at the locations where the turbidity exceeded 85 NTU for total metals. The exceedances for total metals occurred on October 28, 1996 (lead); October 29, 1996 (lead); November 23, 1996 (arsenic); November 26, 1996 (arsenic and lead); December 13, 1996 (arsenic); December 16, 1996 (arsenic and lead); and December 18, 1996 (arsenic). Each exceedance was reported to the EPA and mitigating actions were implemented. Therefore, the records of surface water monitoring show that release pathways were monitored, field notes indicate notifications were made, and mitigation was performed.

2.3.5 Decontamination

Several structures were required to remain exposed above the cover. These structures were decontaminated or cleaned to remove visible soil from the concrete surfaces. The items that have been cleaned or decontaminated include:

- Boulders placed at N. Janpet – 2/96-10/96
- 6 Manholes – along MBTA – 12/96
- Two 60-inch diameter CMP in Atlantic Avenue Drainway – 1/97
- Three 48 – inch RCP in Atlantic Avenue Drainway – 1/97
- All new corrugated polyethylene (CPE) pipe and concrete manholes/catch basins – 10-11/97

The decontamination certification for items left above the cover is included in Appendix D.3.

2.3.6 Facility Documentation for Off-Site Disposal

The EPA reviewed off-site disposal facilities to determine if the facilities were of "acceptable status" to receive materials from the Site. Items removed from the Site included metal, tires, wood (railroad ties), miscellaneous hazardous, special waste (asbestos) and personal protective equipment. The contractor decontaminated the non hazardous materials (metal, tires) prior to removal from the Site. Copies of letters approving disposal facilities for the materials are included in Appendix D.4. The contractor provided manifests and bills of lading documentation for materials removed from site, and copies are included in Appendix D.4.1.

2.3.7 Survey Control

The Contractor utilized Meridian Land Services Inc. (Meridian) to provide record survey documentation of the extent of cover, configuration of grading, and general as-built conditions of the cover and buried or concealed construction. The results of these record surveys are provided in Appendix M. The record drawings are based on the survey control provided in the RTC Alternative Design Report Plans. Survey information of existing conditions for the RTC Design were provided by SAIC Engineering, Liu Aerial Surveys, and Meridian. The existing conditions were tied to the Massachusetts State Plane Coordinate system for horizontal control and to the 1929 NGVD datum for vertical control according to SAIC. SAIC Engineering and Liu Aerial Surveys control points provided in the RTC Design Report for construction purposes included seventeen local control points. At the start of the ISRT Remedial Action, Earth Tech, Inc. ran a closed traverse which included the local survey control points provided from the 100% Design Report Plans. Earth Tech, Inc. also set-up additional control points for construction layout and control. Subsequent to the transition from Earth Tech, Inc. to Meridian, during 1994, Meridian verified and expanded the closed traverse network set up by Earth Tech, Inc.. Closed traverses meet the specification requirements for Third Order Class II Standards for horizontal networks. No boundary level survey work was conducted as part of the Remedial Action. No verification to the Massachusetts Highway Department Geodedic horizontal and vertical control was performed by the Contractor's surveyors. Surveying controls for the remedy were performed in accordance with the Design Plans and Specifications and the Consent Decree.

At the close of the 1995 and 1996 construction seasons, Meridian established permanent elevation monuments near the RTC site. The monuments were not tied to the Massachusetts State Plan

Coordinate system or 1929 NGVD datum. The locations of these points are shown on Appendix M, Sheet M.3.2.

3.0 EVALUATING COMPLETION

Implementation of the remedial action was evaluated for completion against the criteria set forth in the Specifications and Plans for the 100% Design and RTC Alternate Cover Design. The following sections include discussions of the phases of the work and associated quality assurance performed.

3.1 Decommissioning

Decommissioning included demolition of structures and utilities, including existing monitoring wells, gas vents, and piezometers. Documentation of the as-built (decommissioned) condition for features encountered during the remedial action are summarized in Appendix E of this report. The survey plans showing documentation and locations of decommissioned features are included in Appendix M-9.

3.1.1 Utilities, Foundations, and Structure Decommissioning

Demolition of an existing Boiler House, 200 foot Stack, Quonset Hut, and Remnant Building was completed by the Trust in the spring of 1996. The plan locations of the structures demolished in the Spring of 1996 are shown in Figure 8. This work was not required under the 1989 Consent Decree, but was incorporated into the RTC Alternate Cover scope to facilitate the re-development of the site. Two separate reports document the activities of the demolition work and are entitled "Janpet Property Building Demolition Close-out," prepared by Global Waste Management, Inc. (no date) and "Environmental Monitoring," Global Waste Management, Inc., June 11, 1996. Copies of both reports are included in Appendix 0.6.

Appendix E identifies features that were designated by number in the plans, Drawing 11-5 of the 100% Design Report and Drawing C-3 of the RTC Alternate Cover. Features without a number were found during the work. The list of items decommissioned and summarized in Appendix E include features decommissioned during the 1992-1995 construction period as well as work during 1996-1997. Decommissioning of underground concrete tanks, steel tanks, abandoned pipelines, vaults or pits, concrete slabs, above-ground steel tanks, gas pumps, above-ground structures, abandoned railroad lines, and other features listed in the Design Plans and

Specifications was monitored by Golder Associates, Inc. during completion of the work. The decommissioning of features included:

- Compliance with the Design Plans and Specifications, modifications, and Contractor methods;
- Compliance with the approved grout mix and grouting procedures; and
- Reviewing the record survey of the locations of decommissioned structures, tanks, and utilities.

The Woburn Fire Department provided monitoring of decommissioning of underground storage tanks (UST's) in accordance with the Commonwealth of Massachusetts Regulations 527 CMR 9.00. Golder monitored the decommissioning of structures. As-built plans and monitoring records were reviewed by Golder for conformance with the decommissioning procedures. Based on the as-built decommissioning field monitoring forms and field observations by inspectors, the structures, tanks, and utilities were decommissioned in conformance with the Design Plans and Specifications. The following summarizes the methods used for decommissioning the features listed in Appendix E.1:

- Brick, concrete and asphalt demolition debris were placed within designated areas as shown on the as-built drawings in Appendix M.9. Some demolition debris was placed along with crushed rock in the south end of the site.
- Three underground concrete tanks were cleaned and filled with concrete or concrete/ash mix as described in Appendix E, Appendix M.9, and Appendix O.
- Three underground steel tanks were removed according to the current regulations.
- Abandoned pipe lines with oil had their contents removed. Oily soil was also segregated and either removed from the Site or treated on-site and placed as fill beneath the cover. The pipe line was then either removed or crushed in place. Pipelines that were encountered entering vaults or concrete structures were sealed with a one foot plug of concrete.
- Five underground vaults or pits were either removed or backfilled with concrete, including the coal tunnel which was used as a disposal location for asbestos-containing soil found during the demolition of the Boiler House. The asbestos-containing soil was covered with concrete. The remaining coal tunnel was backfilled with boulders and concrete.
- Concrete slabs were either left in place or demolished and placed in designated areas.

- Two above-ground steel tanks were pressure washed inside and outside, removed, and disposed of at a recycling facility.

- One gas pump and associated piping were treated in a similar manner as pipes filled with oil. The equipment was steam cleaned and the contents were tested. Equipment and contents were disposed of off-site at a disposal/recycling facility.

- The 200 foot Stack, Boiler House, Quonset Hut, and Remnant Building were demolished and concrete rubble was either left on-site or removed to a disposal waste recycling facility. See the referenced closure reports, "Janpet Property Building Demolition Close-out," (no date) and "Environmental Monitoring," June 11, 1996, both prepared by Global Waste Management, Inc.

- The smoke stack ash was placed in the easternmost UST and oily soil tailings treated with Portland cement were placed within the three UST's and mixed with the concrete backfill. See the attached report in Appendix O.4.

- Abandoned rail spurs were removed where there was interference with the cover or designed drainage. Some railroad tracks were left in place and buried by fill. The latter were located to the far north of the Janpet Property and to the far south. Railroad ties that were removed were washed and disposed of off-site. See the locations shown in Appendix M.9.

- The temporary construction dam located in the Atlantic Avenue Drainway was removed and the dam, trench boxes, and flexible membrane liner were removed from the Site. Gravel backfill and rip-rap were placed on-site beneath the cover.

- MDEP determined that the MCP S-3 soil cleanup level would be applied as the cleanup standard for oily soils. Therefore, soils with Total Petroleum Hydrocarbons (TPH) greater than 5,000 ppm were excavated. Oily soils around, and associated with, the USTs were excavated and treated by United Retek Inc. via a Portland cement stabilization process. Treated soils were reused as temporary roadways during the Superfund Remedial Action, and were eventually covered by the RTC Alternate Cover. This work was conducted pursuant Massachusetts regulations, and occurred simultaneously with the Remedial Action.

The intent of the Design Plans and Specifications was met in every case of the structure decommissioning.

3.1.2 Monitoring Wells, Gas Vents, and Piezometer Decommissioning

Appendix E.2 lists wells, gas vents, and piezometers, decommissioning dates, and a summary of decommissioning methods used. All wells shown in Appendix E.2 were decommissioned before the construction period of 1996-1997. Decommissioning of monitoring wells, gas vents, and

piezometers was monitored by Golder Associates, Inc.. The well decommissioning monitoring included:

- Verifying the Contractor's submitted method and equipment to seal the well;
- Verifying the well depth and depth drilled;
- Verifying the diameter of overdrill;
- Verifying the grout mix and estimating the volume used; and
- Verifying the final concrete cap.

Any monitoring well, gas vent, or piezometer found in the field without a designation was identified by the prefix UID as "unidentified." Well decommissioning records for each well were prepared by Maher Environmental Services, Inc. formerly D.L. Maher, a licensed Massachusetts well driller. Golder Associates reviewed the reports for conformance with the decommissioning procedures. Based on the well decommissioning records prepared by D.L. Maher and Golder's monitoring during decommissioning, the wells were decommissioned in conformance with the specifications. Copies of the decommissioning records are included in Appendix E.2.1.

3.2 Test Borings

Before covering the RTC Alternate Cover site, soil test borings were performed to investigate subsurface conditions. The first investigation was performed at the request of VHB. The second investigation was performed at the request of the Trust.

- The first test boring investigation evaluated the subsurface conditions for future structural foundations. New Hampshire Boring performed the first subsurface investigation. Copies of their boring logs and plans of their locations are included in Appendix F.1.
- The second test boring program was conducted to investigate the extent and characteristics of soil layers reported from previous investigations. The investigation included nine borings. The borings were performed by Miller Engineering, Inc.. Copies of their boring logs and plans of their locations are included in Appendix F.2. A report summarizing the investigation results is included in Appendix O.3.

The first subsurface investigation is included with this report as a record of the subsurface conditions at the time the cover was placed.

The second subsurface investigation was conducted to clarify the limits of soft soils underlying areas to be covered and measure the compressibility of the soft soils with laboratory testing. The investigation found that at most locations, soft soil layers were not encountered. Where soft soil was encountered, laboratory testing showed that actual compressibility was much lower than had been estimated previously. After performing this subsurface investigation and evaluating the actual subsurface condition of the soft layers, Golder recommended eliminating the one-foot surcharge. Variance 96-34 was issued to document the decision to eliminate the one-foot surcharge.

3.3 Blasting

Blasting operations to excavate rock using drill and blast techniques were monitored by Golder Associates, Inc. as a representative of the Trust. Since some blasting occurred within the MBTA right-of-way, Geosonics, Inc. also monitored the blasting for AMTRAK. The blast monitoring for quality assurance included:

- Review of advance submittals, methods, and permits;
- Review of pre-blast survey;
- Review of blast monitoring data;
- Verifying compliance of the blast operations with the proposed methods or modifications;
- Compliance with the following vibration limits:

D (ft) (Note 1)	Maximum PPV of Ground Vibration (in./sec.)(Note 2)	Airblast Overpressure (psi)
< 300	≤ 1.00	≤ 0.014
> 300 or at the site limits.	≤ 0.75	≤ 0.014

Notes: 1. Distance (D) is from blast round to observation point in feet.

2 Maximum Peak Particle Velocity (PPV) shall be the maximum of three components measured in three mutually perpendicular directions (transverse, vertical, and longitudinal).

3. For all blasts, the Contractor shall monitor vibrations at the nearest structure and other sensitive structures as designated by the Trustee Representative.

Pre- and post-blast survey documentation is included in Appendix G. Photographs were taken to document pre-existing cracks or structural damage in nearby buildings. The surveys were prepared by TerreCon Geophysical Consultants (TerreCon). The pre-blast survey was prepared by TerreCon on August 28, 1996. The post-blast surveys were performed January 31, 1997 and February 4, 1997. The Contractor provided a follow-up post-blast survey which included explanations for the discrepancies and additional photos. TerreCon could not conclude that the blasting operations caused structural damage. TerreCon provided follow-up photos of cracks taken in the pre-blast survey but were not taken in the post-blast survey. TerreCon stated that the cracks noted in the follow-up photos were unchanged from the pre-blast photos.

Blast monitoring included recording vibration responses and air blast at the monitoring stations. Summaries of the blast monitoring reports are included in Appendix G. The blast monitoring reports show that from October 7 to November 7, 1996, the maximum peak particle velocity (MPPV) was less than the maximum of 1 inch per second, and the peak airblast overpressure (AIR O/P) was also not exceeded. Once the blasting operations were located along the MBTA, the MPPV was more difficult to control. Detonations on November 7th, 20th, 21st, 22nd, and 25th registered higher MPPV than the specification requirement of 1.0 inch per second. The maximum MPPV recorded was 3.38 inches per second which is less than the threshold of peak particle velocity of 4.0 inches per second at which damage or opening of old cracks, formation of new cracks, and dislodging of loose objects is likely to occur, according to the U.S. Bureau of Mines, Bulletin 656. The peak airblast overpressure was exceeded less frequently to a maximum of 135 dB or 0.017 psi which is below the maximum safe airblast level of 0.5 psi (164 dB) as recommended by the U.S. Bureau of Mines, Bulletin 656.

Blasting was closely coordinated with AMTRAK and the MBTA since several detonations were performed adjacent to the north-bound rail. AMTRAK and the MBTA completed blast monitoring through a subconsultant, Geosonics, Inc.. Data from Geosonics was not given to the ISRT.

The blasting was performed in a manner that successfully excavated the rock and kept the vibration to a minimum. While the blasting operations were performed with exceedances of the

specified vibration limits, U.S. Bureau of Mines thresholds of significant damage were not exceeded, and photo documentation of old cracks indicated the cracks were unchanged. The Trust has received verbal confirmation from the railroad that they were pleased with the blasting operations. No nearby commercial businesses have come forward with complaints or claims.

3.4 Clearing, Grubbing and Subgrade Preparation

Site clearing and grubbing were performed during the remedial action for the Industri-Plex Site during the construction of the remedy in each of the construction seasons of 1992-1996. Existing wood chip piles from a wood recycling business were removed from the Janpet Property in 1994. Trees and shrubbery located on-site were cut down prior to grubbing the surface soils and chipped and hauled off-site for recycling. Surface vegetation was cleared and grubbed from the areas of work. Organic soils removed during grubbing operations and excavated from the detention basin during the 1996 construction season were originally planned to be disposed of in the East Central Hide Pile consolidation area. Upon direction from EPA and ISRT, these soils were then stockpiled temporarily along the western side of the Site. EPA and MDEP considered organic material (shrubs, weeds, roots, etc.) as not acceptable material for placement on the Site. Only deeper fill areas were approved for organic material placement where settlement was expected to have minimal impact. Vegetation in the organic soils including grasses, shrubs, and weeds were separated and shipped off-site to Waste Management Inc. Turnkey Landfill in Rochester, New Hampshire.

During subgrade preparation, pipes with oil were uncovered east of the former metal warehouse building. The oily soil was stockpiled, then treated by United Retek Corporation in May and July 1996 using an ambient temperature asphalt emulsion pozzolanic stabilization procedure for recycling TPH-impacted soils. A copy of the United Retek Corporation operations and confirmatory sampling reports are included in Appendix O.5. From August 12 to September 20, 1996, United Retek Corporation was remobilized to the Site to utilize their screening operations to separate the vegetation and rock mixed in with the organic soil. Site clearing, grubbing, and subgrade preparations were performed in compliance with the Consent Decree.

3.5 Fill Soil, Aggregate, Rip-Rap, and Topsoil Materials

The materials used for covering the 34 acres included fill soil, gravel borrow, road structural fill (sub-base), ballast, rip-rap, and topsoil. Each of the materials used from off-site sources was from clean sources. Geotechnical and analytical testing and monitoring of the cover soil, aggregate, rip-rap, and topsoil materials are described below. Testing frequencies are summarized in Table 1. Analytical testing was performed on all soils from off-site except soils from primary or virgin sources.

3.5.1 Fill Soil

On-site soils were placed and compacted beneath the geotextile which separates clean soils and contaminated site soils. Clean off-site soil materials were placed and compacted as compacted fill above and beneath the geotextile separator.

3.5.1.1 Material Requirements

3.5.1.1.1 General Requirements

The general design specifications require that the fill soil shall:

- be approved soil from on-Site excavation or from off-Site borrow areas;
- be free of perishable, and objectionable or deleterious materials such as refuse, rubble, metal, wood etc.;
- not contain frozen earth;
- not contain rocks or lumps over 1/2 the recommended lift thickness;
- be free of objectionable materials which may be compressible such as wood, or trash which can not be properly compacted;
- not contain rock fragments broken concrete, masonry rubble, or other similar materials; and
- be readily spread and compacted to the specified density.

3.5.1.1.2 Compacted Fill Requirements

The compacted fill design specifications require that the fill soil shall:

- be from on- or off-site sources;
- be free of deleterious materials;
- not contain rocks or lumps over 3 inches in the greatest dimension for backfill materials of buried pipe;
- not contain rocks or lumps over 6 inches in the greatest dimension for compacted fill within one foot below the geotextile;
- not contain rocks or lumps over 2 feet in the longest dimension below one foot below the geotextile; and
- have no more than 15 percent of the soil larger than 2-1/2 inches.

Compacted fill placed for grading on slopes steeper than 8 horizontal to 1 vertical shall be sand conforming to the following requirements:

- free of organic matter;
- nonplastic; and
- maximum percentage passing the #200 sieve by weight 12%.

When the compacted fill material contains organic or plastic materials, or contains more than 12% by weight passing the #200 sieve, the soil may only be used for grading in areas with slopes flatter than 8 horizontal to 1 vertical.

3.5.1.1.3 Cover Soil Fill Requirements

Cover soil fill shall conform to the requirements for compacted fill, except that it shall:

- be clean material from an off-site source;
- contain no rocks, stones, or lumps larger than 2-inches in any dimension;
- have physical properties such that it can be readily spread;
- not include snow, ice, and frozen soil.

3.5.1.1.4 Clean Off-Site Soils

The origin of off-site soil shall be approved by the Trustee Representative. Part of the approval includes verifying that the clean soil is free of chemical and organic contamination. The specifications include clean soil thresholds for volatile organics, acid/base neutrals, pesticides/pcbs, and metals. Two cover soils were tested to verify the fill soil was clean.

3.5.1.1.5 Ordinary Borrow Fill Soils

Ordinary borrow, as defined by the Massachusetts Highway Department Standard Specifications for Highways and Bridges (MHD), has the physical characteristics of a soil with a maximum percent passing the #200 sieve of 35 percent (or as defined by soils classified as A-1, A-2-4 or A-3 according to AASHTO M-145). Other requirements for ordinary borrow include being readily spread and compacted for the formation of embankments. The cover soils used on-site beneath the future paved areas were required to meet the ordinary borrow criteria as part of this design modification.

3.5.1.2 Sources

Soils used within the Regional Transportation Center came from on-site and off-site sources. Soils from on-site were excavated from the detention basin and the relocated Atlantic Avenue Drainway. Soils placed on the Site from off-site were soils delivered from Bradford, Revere, Hubbardston/Gardner, Haverhill, and Plymouth, Massachusetts.

Soil Identification	Location	Vendor	Status
Bradford	Groveland/Bradford, MA	McDonough	Native Sand Quarry
Revere	Revere, MA	Stockbridge	Stockpile
Hubbardston/Gardner	Hubbardston and Gardner, MA	Pitcherville	Native Sand Quarry
Haverhill	Haverhill, MA	McDonough	Stockpile
Plymouth	Kingston, MA	Stockbridge	Native Sand Quarry

3.5.1.3 Testing Requirements

Testing of the fill soil material included Grain Size (ASTM D422), Atterberg Limits (ASTM D4318), and Modified Proctor Moisture/Density Curve (ASTM D1557) or Standard Proctor Curve (ASTM D698). The required frequencies of the tests for soils are shown in Table 1. Compacted fill was required to be tested for gradation, plasticity index, and modified compaction at least one test per 5,000 cubic yards in place.

Clean soil analytical testing includes testing for Volatile Organics (USEPA 8240), Acid/Base Neutrals (USEPA 3550/8270/), Pesticides/PCBs (USEPA 3550/8080), Metals (EPA 3050/6010/7060/7420/7470/7740/7840), Cyanide (USEPA 9010), and TPH (USEPA 418.1). Clean soil testing was performed only for off-site soils from Revere and Haverhill. Soils from Bradford, Hubbardston/Gardner, or Plymouth were hauled directly from native quarry sources.

3.5.1.4 Test Results

The results of testing of the on-site soils indicated the following:

- Representative samples of on-site soils indicated the fines content for samples of on-site soils ranged from 5.2 to 24.9 and at times had rocks larger than 6 inches. Boulder-sized rocks were typically segregated.

- Site soils excavated from the southern portion of the future Regional Transportation Center (RTC) were frequently high in organic content and tended to retain moisture. Both the high organic content and high moisture content hindered compaction. Blending the on-site soil with better quality off-site soil material changed the soil material quality by reducing the moisture and organic contents. The material was changed by blending the on-site soil with off-site soil in the field using a road reclaimer CAT RR-250. A letter describing the organic soil compaction method in greater detail is included in Appendix O.2.

The soils used on-site included:

- Bradford sand: 162,336 cubic yards (loose) was delivered to the Site. Representative samples of the Bradford sand indicated the fines content ranged between 4.2 and 30.0 percent, and met the design specifications for compacted cover soil and met the MHD gradation requirements for ordinary borrow.

- Revere sand: 47, 071 cubic yards (loose) was delivered to the Site. Representative samples of the Revere sand indicated the fines content ranged between 6.4 percent and 23.3 percent, which met design specifications for compacted cover soil and met MHD gradation requirements for ordinary borrow.

- Haverhill soil: 14,664 cubic yards (loose) was delivered to the Site. Approximately 5,000 cubic yards of material was left at the end of the job in the stockyard. Representative samples of the Haverhill soil indicated the fines content ranged between 33.4 percent and 46 percent, and did not meet the design specifications for ordinary borrow. The suitability and workability of the Haverhill soil for the fill was evaluated and judged to be acceptable in a test fill program conducted during the spring of 1996. The results of the test fill were presented in a Golder report. A copy of the test fill report is included in Appendix O.1. The report recommended specific placement conditions for the Haverhill soil.

- Hubbardston/Gardner sand: 20,488 cubic yards (loose) was delivered to the Site. Representative samples of Hubbardston/Gardiner sand indicated the fines ranged in content between 5 percent and 14.2, and met the design specifications for compacted cover soil and met the MHD gradation requirements for ordinary borrow.

- Plymouth sand: 1,800 cubic yards (loose) were delivered to the Site. A representative sample of Plymouth sand indicated the fines content was 12 percent, and met the design specifications for compacted cover soil and met the MHD gradation requirements for ordinary borrow.

- Analytical testing of the Haverhill fill soils had some contamination present, but after further testing were permitted for use on the Site. The Haverhill fill soils had some contaminants of common laboratory contaminants of 12 ppb of acetone and 430 ppb of di-n-butyl phalate. The latter constituent was also found in the laboratory method blank and indicated laboratory procedural error. A second round of sampling of the Haverhill fill soil on January 17, 1996 resulted in registering some contaminants of 23 ppb of acetone and 11 ppb of methylene chloride, both common laboratory contaminants. Chromium at 27 ppm was also present. While the chromium result was higher than the Site threshold, it was well below the MCP level for S-1, G-1, G-2, and G-3 of 1000 ppm. The EPA accepted the use of Haverhill fill soil. Copies of analytical results are included in Appendix H.1.

- Analytical testing of the Revere cover fill soils by SCILAB indicated no contaminants exceeded the Site threshold. A copy of the analytical results are included in Appendix H.1.

- Off-site sources from Haverhill met the gradation requirements for compacted cover soil and embankment soil according to the MHD requirements.

- Compacted fill soils tested for clean soil testing criteria met the requirements or were approved by the EPA.

3.5.1.5 Conclusions

Testing results of the soil materials used on-site showed that:

- On-site soils met the design specifications for compacted fill soil;
- Blended on-site material met the MHD gradation requirements for ordinary borrow;
- Off-site sources of Bradford, Revere, Hubbardston/Gardner, and Plymouth met the gradation requirements for compacted cover soil and MHD gradation requirements for ordinary borrow;

3.5.2 Aggregate

Gravel borrow material was used primarily as pipe bedding. Road structural or gravel borrow fill material was used within the detention basin to stabilize the bottom of the basin and ease installation of geomembrane. Road structural fill was placed above the geomembrane according to the design. Crushed stone material, 3/4-inch, was used primarily as cover material for the RTC Alternate Cover. Ballast materials were used along the Massachusetts Bay Transportation Authority (MBTA) Corridor.

3.5.2.1 Material Requirements

The Gravel Borrow material was required to meet the following gradation specifications:

Sieve Designation	1/2 in	No. 4	No. 50	No. 200
Percent Passing	50-85	40-75	8-28	0-10

with a maximum stone size of 2-inches

The Road Structural Fill material was required to meet the following gradation specifications:

Sieve Designation	3 in	3/4 in.	No. 10	No. 50	No. 200
Percent Passing	90-100	50-90	40-80	20-60	5-15

The ¾-inch Crushed Stone material gradation was required to meet the following requirements:

Sieve Designation	1 in	3/4 in.	1/2-in.	3/8-in.	No. 4
Percent Passing	100	90-100	10-50	0-20	0-5

and a maximum percentage of loss due to abrasion as determined by the ASTM C535 not exceeding 40 percent after 500 revolutions.

The ballast was required to conform to the Quality Requirements of AREA Specifications for prepared stone, slag, and gravel ballast gradation: AREA size No. 4.

3.5.2.2 Sources

Aggregate materials were brought in from off-site from nearby quarry operations in Massachusetts.

- The Gravel Borrow material was supplied by Bardon Trimount, Swampscott, MA;
- The Road Structural Fill material was supplied by Bardon Trimount, Swampscott, MA;
- The 3/4-inch Crushed Stone was supplied by Bardon Trimount, Swampscott, MA; and
- The ballast material was supplied by Rowe Contracting Co., Malden, MA and Bardon Trimount, Swampscott, MA.

3.5.2.3 Testing Requirements

Aggregate Testing of the material from the source included Grain Size (ASTM D422), and Abrasion Test (ASTM D535 or C131).

Ballast Testing of the material from the source included Grain Size (ASTM D422) to meet the requirements for AREA Size No. 4.

3.5.2.4 Results and Conclusions

Results of representative samples of Gravel Borrow taken during the construction work and summarized in Appendix H.1 indicate that all samples met the gradation requirements as specified.

Results of a representative sample of Road Structural Fill taken during the construction work and summarized in Appendix H.1 indicate that the sample met the gradation requirement as specified.

Results of representative samples of 3/4-inch Crushed Stone material taken during the construction work and summarized in Appendix H.2 indicates that the samples met the requirements with the exception of the gradation requirements in the 3/4 and No. 10 gradation. These exceptions were reviewed and approved by Variance 96-20.

Results of representative samples of Ballast material taken during the construction work and summarized in Appendix H.3 indicates that the samples met the requirements for AREA size No. 4.

3.5.3 Rip-rap

Rip rap was used to line the relocated Atlantic Avenue Drainway channel, the dredged channel in the Boston Edison Right-of-Way, and the Aberjona River.

3.5.3.1 Material Requirements

Gradation requirements: 50 percent by weight shall be larger than the d_{50} size as determined by the design. The diameter of the maximum stone size in the mixture shall be 1.5 times the d_{50} size.

The design called for three types of rip-rap with the following d_{50} values: 3-inch, 6-inch, and 12-inch.

Other requirements included a test for freeze/thaw, AASHTO Test 103 for ledge rock with no losses greater than 10 percent after 12 cycles, and an abrasion test ASTM C535 with no more than 40 percent losses after 500 revolutions. A minimum specific gravity of 2.50 was required as tested by ASTM C127.

3.5.3.2 *Sources*

Rip-rap materials were brought in from off-site from nearby quarry operations in Massachusetts.

- 3-inch, 6-inch, and 12-inch rip-rap was supplied by Bardon Trimount, Swampscott, MA. A stockpile of 3-inch rip-rap was left in the ISRT stockyard from previous work in 1995 and was used by the Contractor for the work on the RTC Alternate Cover.
- 12-inch rip-rap was supplied by Heffron, Woburn, MA.

3.5.3.3 Testing Requirements and Results

Rip-rap Testing of the material from the source included Gradation Testing (Section 02271), Freeze/Thaw Testing (AASHTO T103), Specific Gravity (ASTM C127), and Abrasion Test (C535).

Rip-rap material was used to line the Atlantic Avenue Drainway channel. The rip-rap was required to meet the following gradation, freeze/thaw, and specific gravity requirements:

- Gradation requirements: 50 percent by weight shall be larger than the d_{50} size as determined by the design. The diameter of the maximum stone size in the mixture shall be 1.5 times the d_{50} size. The design called for three types of rip-rap with the following d_{50} values: 3-inch, 6-inch, and 12-inch.
- Other requirements included a test for freeze/thaw, AASHTO Test 103 for ledge rock with no losses greater than 10 percent after 12 cycles, and an abrasion test ASTM C535 with no more than 40 percent losses after 500 revolutions. A minimum specific gravity of 2.50 was required as tested by ASTM C127.

3.5.3.4 Testing Results and Conclusions

Results of representative samples of rip-rap material taken during the construction work and summarized in Appendix H.3 indicate that the samples met the requirements with the exception of the gradation requirements in the d_{50} gradation of 3-inch, 6-inch, and 12-inch. Instead, the results of the gradation tests indicate that the rip-rap met the criteria for a d_{50} of 2-inch, 5-inch, and less than 12-inch rip-rap material, respectively.

Variance 97-37 allows the reduced rip-rap size based on calculations which show the factor of safety for stability is 1.0 or greater than 1.0. The calculations evaluated a section of the relocated Atlantic Avenue drainway where the d_{50}=5 inch rip-rap was placed. A bend was evaluated in the relocated Atlantic Avenue drainway where the d_{50} rip-rap of approximately 10 inches was placed. The calculations considered the 50 year 24 hour storm peak flow depth of 1.3 feet. Since the relocated Atlantic Avenue drainway and detention basin have been lined with geomembrane and geotextile, channel flows causing scour and undermining the rip-rap is not a factor. Rip-rap placed in the Aberjona River to protect the channel banks is no longer a concern since the open channel has been replaced with a culvert.

3.5.4 Topsoil

Topsoil materials were delivered from Manchester, New Hampshire, Bradford, Massachusetts, or Cape Cod, Massachusetts sources. The sources were tested for soil fertility and analytical constituents. Topsoil material was used as cover material along the planter areas of the Atlantic Avenue Drainway, the Created Wetland Berm, the North Berm, and the Detention Basin

3.5.4.1 Material Requirements

Topsoil specification requirements stated that the topsoil material shall meet the following criteria:

- sandy loam as defined in accordance with the U.S. Department of Agriculture (USDA), Natural Resources Conservation Service Classification;
- no stones, lumps, roots, or similar objects larger than 2-inches;
- pH of between 5.8 and 7.6 percent;

- organic content of a minimum of 2.75 percent;
- meet the following gradation requirements according to the USDA Classification;

Topsoil Constituent	Gradation	Ranges of Percent by weight
Sand	(2.0 mm to 0.050 mm)	40% to 80% (Note 1) 40% to 75% (Note 2)
Silt	(0.050 mm to 0.005 mm)	0% to 30%
Clay	(0.005 mm and smaller)	0% to 30%

Note 1: If more than one-half the sand fraction is smaller than 0.5%.
Note 2: If more than one-half the sand fraction is larger than 0.5%.

- and Baker Soil Test to identify any need for soil amendments.

3.5.4.2 Sources

Topsoil materials were from Manchester, New Hampshire or Bradford, Massachusetts or Cap Cod, Massachusetts.

3.5.4.3 Testing Requirements and Results

The topsoil was required to meet the following testing criteria:

- Topsoil testing of the source includes Gradation Testing (ASTM D422) and Baker Soil Fertility (ASTM D5435); and
- Analytical Testing was performed to ensure that off-site materials were free from chemical and organic contamination. Tests include Volatile Organic (USEPA 8240), Acid/Base Neutrals (USEPA 3550/8270/), Pesticides/PCBs (USEPA 3550/8080), Metals (EPA 3050/6010/7060/7420/7470/7740/7840), Cyanide (USEPA 9010), and TPH (USEPA 418.1).

Results of representative samples of topsoil material taken during the construction work and summarized in Appendix H.4 indicates the following:

Site Sample Number	Source	Gradation %Sand	%Silt	%Clay	%Organic Content	pH	USDA Textural Classification
TS-1	Bradford	74	23	3	4.2	5.3	Sandy Loam
TS-2	Bradford	82	18	0	5.6		Loamy Sand
TS-3	Bradford	61	36	3	6.8		Sandy Loam
TS-4	Bradford	61	36	3	6.8		Sandy Loam
TS-5	Bradford	60	35	5	6.9		Sandy Loam
C-178b	Manchester	85	13	2	7.4	4.8	Loamy Sand
C-452b	Manchester	87	11	1	-		Loamy Sand
C-452C	Manchester	86	11	2	-		Loamy Sand
C-471	Manchester	91	8	1	-		Sand
S970529-112	Cape Cod	65	29.8	5.2	5.8	5.9	Sandy Loam

Analytical testing of both the Manchester and Bradford soils showed some contamination present, but after further testing were permitted for use on-site. The Manchester topsoil had some contaminants of 2.4 ppb of toluene, 390 ppb of phenanthrene, 486 ppb fluoranthene, and 413 ppb of pyrene. The acid/base neutral contaminants found in the Manchester topsoil are considered typical laboratory contaminants, but further testing showed the volatile contaminants were non-detect. Manchester topsoil was approved for use. Analytical testing for the Bradford topsoil found a persistent pesticide contaminant, DDE. Two subsequent sampling rounds showed non-detect for DDE and the Bradford topsoil was approved for use on site. Copies of analytical tests and letters of approval by the EPA for use of both topsoils are included in Appendix H.4.

Some of the topsoil that was used for restoring wetland areas as described in section 3.11 was from Cape Cod, Massachusetts. Analytical and gradation tests indicated that the topsoil meets the design specification requirements. A copy of the analytical test results is included in Appendix H.4.

3.5.4.4 Conclusions

Results of representative samples of topsoil material taken during the construction work and summarized in Appendix H.4 indicates that the samples met the requirements or were approved with stipulated conditions and lime treatments prior to planting.

3.5.5 Summary of Purchased Materials

A summary of the materials purchased by the Contractor is included in Appendix H.5. Cover soils provided by the Trust are summarized and included in Appendix H.5.1. All cover materials, aggregates, and topsoil tested and placed on-site were in conformance with specified requirements or approved modifications and are in compliance with the Consent Decree.

3.6 Bituminous Materials

Bituminous materials were supplied from Bardon Trimount of Saugus, Massachusetts and used for replacing the equivalent cover pavement over the utility corridor along the Atlantic Avenue cul-de-sac in an area of approximately 450 square yards of Atlantic Avenue for the RTC Alternate Cover.

3.6.1 Material Requirements

Two types of asphalt concrete, a binder course and a surface or wearing course, were specified by the design specifications The specifications required that the mix for binder and surface course conform to the requirements of the Massachusetts Department of Public Works Specifications. The following table summarizes the State mix requirements according to the Massachusetts Highway Department Standard Specifications for Highways and Bridges (MHD):

Sieve Size	State Binder (% by weight passing)	State Top (% by weight passing)
1-inch	100	*
3/4-inch	80-100	*
5/8-inch	*	100
1/2-inch	55-75	95-100
3/8-inch	*	80-100
#4	28-50	50-76
#8	20-38	37-54
#16	*	26-40

*No limit/value established for the specific parameter.

3.6.2 Testing Requirements

The specifications require testing of the pavement materials:

- Testing at the plant was performed to obtain a Standard Marshall at the plant. Marshall testing included testing for stability, flow, and density (pounds per cubic foot).
- The asphalt binder and top course materials were required to meet the Massachusetts Department of Public Works Standard Specifications (MHD).

3.6.3 Results

All tests were performed at the asphalt plant on materials being brought to the Site. The wearing course materials met the MHD requirements. The binder course materials met the MHD with the exception of aggregate gradation for the #8 sieve and temperature. The gradation for the binder course #8 sieve was 3% more than the required maximum of 38%. The temperature for the binder extraction was 350 degrees F. According to MHD, the temperature of the mix at discharge should not be more than 325 degrees F. Variance 96-041 allows the acceptance of binder course mix and temperature.

3.6.4 Conclusions

The mix materials met the specification requirements or approved modifications and are in conformance with the specified requirements and are in compliance with the Consent Decree.

3.7 Geosynthetic Materials

Geotextile and geomembrane geosynthetic materials were used as part of the cover materials to separate the contaminated soils from the clean cover soils.

3.7.1 Geotextile Materials Manufacturer's Quality Control

Geotextile materials were supplied by five manufacturers; Nicolon/Mirafi, Polyfelt Americas, Inc., Synthetic Industries, Amoco, and American Engineered Fabrics. Nicolon/Mirafi provided 6 oz and 16 oz geotextile; Polyfelt Americas, Inc. provided 6 oz and 16 oz geotextile; Synthetic Industries provided 16 oz geotextile; Amoco provided both 6 oz. and 16 oz. geotextile; and American Engineered Fabrics provided 16 oz geotextile. All fabrics are permeable, non-woven,

needle-punched, monofilament and allow percolation. Inventories of the rolls of materials used on the Site are included in Appendix J.1.1.

Geotextile manufacturer's Quality Control Certificates were submitted by each manufacturer and tested by each roll sent to the Site or representative rolls sent to the Site. Copies of the certificates are included in Appendix J.1.2.

The following is a summary of the applicable modifications made to the design specifications for geotextile materials:

- DSCR 003 Increased the AOS requirement from 100 to 70 for 6 ounce geotextile;
- DSCR 057 Accepted Geotextile testing methods D5261 in place of D3776 and D5199 in place of D1777;
- Variance 67 Acceptance of reduced minimum values for Grab Strength (340 lbs), Puncture Resistance (160 lbs), Mullen Burst (550 lbs), and Thickness (150 mil) for Polyfelt product TS1000;
- Variance 77 Acceptance of a minimum of 70 AOS for 16 ounce geotextile with conditions;
- VR-96-002 Acceptance of a minimum thickness of 175 mil for Amoco 16 oz. product; and
- VR-96-038 Acceptance of reduced minimum values for Grab Strength (337 lbs) and minimum Burst Strength (500 lbs) for geotextile used to line the Aberjona River.

A summary of approved modifications applicable to the RTC Alternate Cover is included in Appendix C.

The Certificates state that the rolls met the following specified requirements:

- For six ounce geotextile, the Certificate shall demonstrate the following minimum average roll values:

Property	Requirements	Test Method
Mass per Unit Area	6 oz/sy	ASTM D5261
Grab Strength	150 lbs	ASTM D4632
Trapezoidal Tear Strength	65 lbs	ASTM D4533
Burst Strength	85 lbs	ASTM D4833

Property	Requirements	Test Method
Puncture Strength	85 lbs	ASTM D4833
Thickness	75 mils	ASTM D5199
Apparent Opening Size	US Sieve No. 70	ASTM D4715

- For sixteen ounce non-woven polypropylene or polyester geotextile, the Certificate shall demonstrate the following minimum average roll values:

Property	Requirements	Test Method
Mass per Unit Area	16 oz/sy	ASTM D5261
Grab Strength	340 lbs	ASTM D4632
Trapezoidal Tear Strength	110 lbs	ASTM D4533
Burst Strength	550 lbs	ASTM D4833
Puncture Strength	160 lbs	ASTM D4833
Thickness	150 mils	ASTM D5199
Apparent Opening Size	US Sieve No. 70	ASTM D4715

Nicolon Corporation provided the following manufacturer's testing documentation:

- Quality Control Certificate for Nicolon, Style S600, Order 70006 for 36,000 square yards, September 15, 1992.
- Quality Control Certificate for Nicolon, Style S600, Order 70006 for 40,500 square yards, September 15, 1992.
- Quality Control Certificate for Nicolon, Style S600, Order 70006 for 10,500 square yards, September 15, 1992.
- Quality Control Certificate for Nicolon, Style S600, Order 70006E for 7,500 square yards, September 15, 1992.
- Quality Control Certificate for Nicolon, Style S600, Order 70006 for 18,000 square yards, November 17, 1992.
- Quality Control Certificate for Nicolon, Style S600, Order 3864 for 18,000 square yards, December 17, 1993.

Polyfelt Americas provided the following manufacturer's testing documentation:

- Polyfelt X0046 (TS650) Geotextile Certificate of Compliance, Lot 40058, Style X0046 (TS0065), March 14, 1994.
- Polyfelt X0046 (TS650) Geotextile Certificate of Compliance, Lot 40058, Style X0046 (TS0065), April 26, 1994.
- Polyfelt X0046 (TS650) Geotextile Certificate of Compliance, Lot 40010, Style X0046 (TS0065), May 3, 1994.
- Polyfelt TS1000 Geotextile Certificate of Compliance, Lot 50032, Style TS1000, March 31, 1995.
- Polyfelt TS1000 Geotextile Certification of Compliance, Lot 55032, Style TS1000, April 11, 1995.
- Polyfelt TS1000 Geotextile Certification of Compliance, Lot 55032, Style TS1000, May 4, 1995.
- Polyfelt TS1000 Geotextile Certificate of Compliance, Lot 55032, Style TS1000, July 31, 1995.

Synthetic Industries provided the following manufacturer's testing documentation:

- Certification of Product 1601, for Bills of Lading 615026 and 615031, September 19, 1995.

Amoco Fabrics and Fibers Company provided the following documentation:

- Certificate of Amoco Style 4516, April 2, 1997.
- Certificate of Amoco Style 4552, April 2, 1997.

American Engineering Fabrics, Inc. provided the following manufacturer's testing documentation:

- Certificate of AEF Style 1680, February 17, 1997.

All testing results on the manufacturer quality control documentation indicate conformance with the property values in the specifications or approved modifications.

3.7.2 Geomembrane Materials Manufacturer's Quality Control

Geomembrane materials were provided by two manufacturers, Agru-America and GSE. Both manufacturers provided geomembrane materials that were 60 mil, textured HDPE. Inventories of geomembrane materials used on site are summarized in Appendix J.2.1.

Geomembrane manufacturer's Quality Control Certificates were submitted by each manufacturer for the rolls sent to the Site. Copies of the certificates are included in Appendix J.2.2. The Certificates state that the rolls met the following specified requirements:

Property	Test Method	Value	Units
Thickness	ASTM D751 (modified)	60 + 10%	Mils
Density	ASTM D150	.94	g/cm3
Minimum Tensile Properties (each direction	ASTM D638		
Tensile Strength, (Yield)	ASTM D638	126	lb/in Width
Tensile Strength (Break)	ASTM D638	35	lb/in Width
Elongation at Yield	ASTM D638	12	%
Elongation at Break	ASTM D638	100	%
Tear Resistance (min)	ASTM D1004 Die C	39	lbs
Low Temperature Brittleness	ASTM D746 Procedure B	-60	°C
Dimensional Stability (each direction, maximum)	ASTM D1204	±2 212 °F 15 min	% change
Environmental Stress Crack	ASTM D1693	1,000	hours
Puncture Resistance	FTMS 101C Method 2065	72	lbs
Carbon Black Content Allowable Range	ASTM D1603	2.0 - 3.0	%
Carbon Black Dispersion Acceptable Levels	ASTM D3015	A1,A2 or B1	No Units

*See "procedure modifications", National Sanitation Foundation Standard 54 for Flexible Membrane Liners, National Sanitation Foundation, Appendix A, November 1985, or updates.

The manufacturer Agru/America, Inc. provided the following manufacturer's testing documentation:

- Chevron Chemical Company, Resin Certificate of Analysis, Lot E061717, October 9, 1995.
- Agru/America, Certificate of Conformity, for DTEX 60 mil geomembrane rolls 546323, 546222, 546220, 546219, 546218, 546217, 546216, July 30, 1996.
- Chevron Chemical Company, Resin Certificate of Analysis, Lot E61549, July 18, 1996.
- Agru/America, Certificate of Conformity, for smooth 60 mil geomembrane roll 638686.

GSE provided the following manufacturer's testing documentation:

- GSE Quality Control Certificates for the following roll numbers and Resin Certificates:

GSE Roll Number	Date of Conformance Certificate	Railcar/Package Number	Date of Phillips Chemical Co. Certificate
03040138	9/3/96	PSPX2105	6/14/96
04026558	9/3/96	ACFX96797	2/12/96
04026576	9/3/96	ACFX96797	2/12/96
04026586	9/3/96	ACFX96797	2/12/96
04026801	9/3/96	PSPX2082	2/15/96
04028146	9/3/96	ACFX96964	5/17/96
04028213	9/3/96	PSPX2510	6/14/96
04028219	9/3/96	PSPX2510	6/14/96

- GSE Welding rod Test Results for railcar /package PSPX2389, September 3, 1996.

Polyflex provided the following manufacturer's testing documentation:

- Welding Rod Resin Certification, Quantum Resin lot number C6CP10. (For the welding rod used to weld the GSE geomembrane.)

All testing results on the geomembrane manufacturer quality control documentation indicate conformance with the property values in the specifications.

3.7.3 Geosynthetic Materials Conformance Testing

Copies of the conformance tests for geotextiles and geomembranes are presented in Appendix J.1.3 and J.2.3, respectively. Representative rolls of geosynthetic materials were tested at the frequency rate of 1 per 100,000 square feet for conformance to the RTC Alternate Cover specifications or 100% Design Report specifications. When conformance tests indicated that the sample of the roll failed to meet the required specification, additional conformance tests were performed for the failing material property to bracket the portion of the lot not meeting specification. By this procedure, the failing rolls were isolated and were not used for the cover remedy. There are two exceptions to the conformance testing procedures:

- 16-ounce Geotextile, Amoco Style 4516 from the shipment received to cover the detention basin was not tested for conformance to the specifications. A conformance sample was not needed since the geotextile was used as a cushion layer over the geomembrane in accordance with Variance 96-036; and

- 16-ounce Geotextile from American Engineering Fabrics, Inc. was used to separate the rip-rap from existing soil in the dredged Aberjona River. Due to the tight construction schedule it was not possible to perform conformance testing prior to installation. The manufacturer's certification indicated the geotextile met the geotextile conformance values. Subsequent conformance testing indicated low values for grab strength and burst strength. The performance of the geotextile was evaluated and found to provide the applicable protection for the application. Variance 96-038 documents the evaluation of the geotextile.

3.7.4 Geosynthetic Materials Quality Assurance

The manufacturer's quality control documentation, laboratory conformance testing, and associated modifications to the specifications indicate a conformance to the specifications and compliance with the Consent Decree.

3.8 Monitoring and Testing

Golder performed on-site quality assurance (QA) monitoring and testing of the RTC Cover installation from July, 1996 to May, 1997, and intermittently in October, 1997 to follow-up with punch list items. The Contractor performed their own quality control (QC) of their work. Golder reviewed submittals, design plans and specifications. PSI performed quality assurance monitoring focusing on field density and concrete testing. At key phases of the work, specific monitoring tasks were performed to verify compliance with the design specifications and plans. As deficiencies were noted, the various parties involved were notified to make corrections. The key monitoring tasks are described in Sections 3.8.1 through 3.8.6.

3.8.1 Subgrade and Geotextile Seaming Monitoring

The Contractor prepared the subgrade and placed the geotextile over the contaminated Site soils. Golder conducted the following monitoring during subgrade preparation and placement:

- Visual observation that the subgrade surface was cleared of sharp objects, boulders, stumps, or any materials that may have contributed to fabric punctures, shearing, rupturing, or tearing;

- Visual observation that the subgrade surface was graded smooth and proof rolled, and that any unstable areas were reworked;
- Visual monitoring during geotextile placement that the geotextile was lain smooth and free of tension, stress, folds, wrinkles, or creases;
- Visual monitoring of the continuously sewn seams; and
- Visual monitoring of repair of damaged areas.

Monitoring of the subgrade and geotextile installation was performed from July 30, 1996 through March 5, 1996. Based on seam lengths measured during construction monitoring, a total of approximately 34 acres of geotextile was placed for the RTC Alternate Cover during the construction year 1996-1997. During the construction period of 1994-1995 approximately 9 acres of geotextile was placed within the limits of Commerce Way and Presidential Way extensions. A total of approximately 43 acres of geotextile was placed as covering materials within the limits of the work for the RTC Alternate cover. Placement field monitoring were documented on forms which were signed by both the inspector and contractor. A summary of the monitoring for subgrade and seaming of geotextile is included in Appendix K.1. As noted on the summary forms, some geotextile was removed when the allowable UV exposure limit was exceeded. Tears in the geotextile were repaired by sewing. Some geotextile was double-layered for better cushioning adjacent to foundations and over large rocks in the subgrade. All seams were sewn with the following exceptions:

- For geotextile placed over the detention basin in accordance with Variance 96-034 seams were lapped, not sewn; and
- For geotextile used as a separator between cover soil and the Atlantic Avenue Drainway rip-rap lining according to the design, seams were lapped, not sewn.

The monitoring results indicate a conformance to the specifications or approved modifications and compliance with the Consent Decree.

3.8.2 Field Soil Moisture/Density Tests

The placement of Site soil, off-site compacted fill, road structural fill, and gravel borrow material was monitored to assess conformance with the specified degree of compaction. Testing and monitoring included the following:

- Visual monitoring of the fill subgrade to observe that the subgrade was not soft or unsuitable;

- Visual monitoring of the on-site and off-site soils for the following:

  - presence of wood, trash, and other objectionable materials which may be compressible or which can not be properly compacted;
  - presence of rock fragments, broken concrete, masonry rubble, or other similarly large boulders, organic matter, or vegetation;
  - presence of snow, ice, and frozen soil; and
  - lift thickness.

- Compaction testing for the compacted fill material including testing for density and moisture content of soil in place by nuclear methods (ASTM D-2922 and D3017).

Field density testing was performed on Site soils, off-site soil, and aggregate materials. Testing was performed at the frequency of approximately 9 tests per lift per acre and one test per 100 linear feet of a pipe trench. The minimum density of 95 percent Modified Proctor (ASTM D1557) was selected for areas beneath the future RTC parking lot. A total of 2,756 tests were performed during the RTC Alternate Cover during the construction period of 1996-1997. An additional 161 tests were performed during previous work within the limits of the Presidential Way and Commerce Way Extensions. Results of the tests are presented in Appendix K.2.

Compacted fill that did not meet the minimum density requirement was reworked by providing additional compactive effort, reducing the compacted lift thickness and recompacting, or adjusting the fill moisture content. A total of 216 of the 2756 tests performed in 1996-1997 failed to meet the minimum density requirement. A total of 5 of the 161 tests performed in the Commerce Way and Presidential Way Extensions failed to meet the minimum compaction requirements. All areas that failed density were successfully re-tested with the exception of the following:

- Ten tests failed that were located along the MBTA right-of-way within the constructed clean corridor for the final (uppermost) lift of compacted fill;

- Seven failing tests were performed in areas where the soil was subsequently removed and replaced;

- Three tests were performed on soils that were approved by Variances 96-017 and 96-033. Lower densities were permitted in areas of remedial cover outside the influence limit of the planned pavement;

- One test was performed during the backfilling of fill along a section of the MBTA clean corridor which was compacted to 93% of the maximum modified Proctor value on October 24, 1996. The test was accepted as passing by a field decision. The compaction was performed in 6-inch lifts using a walk-behind compactor. The fill had to be completed before the close of the shift according to agreements with AMTRAK.

The following Variances document the acceptance of in-place densities that were below 95 percent of maximum and were in locations outside the area of the future pavement:

- Variance 96-017 approved of lower compacted densities for areas where topsoil was placed outside the limit of the future pavement;
- Variance 96-033 documents revised compaction requirements for road structural fill and topsoil placed in the detention basin; and
- Variance 96-039 allowed lower compacted densities for the final (uppermost) compacted lift along the MBTA right-of-way.

The field density testing results indicate conformance to the specification requirements and approved modifications and compliance with the Consent Decree.

3.8.3 Field Testing of Asphalt Concrete

Approximately 450 square yards of the existing street pavement Atlantic Avenue cul-de-sac were removed along the lines of work for the clean utility corridor. After the clean utility corridor in the Atlantic Avenue Drainway was completed, geotextile was deployed over the subgrade, seamed and monitored, and dense graded sub-base was replaced and compacted in areas receiving asphalt cover. A final cut in the pavement was made about 12-inches back from the edge of damaged pavement with a concrete saw. The cut pavement was removed so all the edges of the existing pavement were cut to a straight, vertical edge.

The subgrade surface was shaped and compacted by the paving company, Demeter, of Everett, Massachusetts. The broken asphalt edges were cut and removed and new asphalt was placed at a similar thickness as adjacent equivalent cover. A nominal 1-inch binder course was placed in one lift in order to achieve compaction. Following placement of the binder course, a top course or wearing course was placed in one lift. As the asphalt was placed, PSI monitored the thickness of the lift and the mix temperature, and tested the compacted density of the asphalt. Density values

ranged from 95.5 to 98.3 percent. While this effort of compaction does not meet the design specifications for pavement, the compactive effort exceeds the MHD compaction requirement of 95 percent. Variance 96-042 documents acceptance of in-place densities for areas where the pavement density failed to meet the design specifications of 97% but exceeded the Massachusetts Highway Department compaction requirements of 95%. No core samples were taken in pavement replacement of equivalent cover repairs so as to minimize damage to the repair. The density was compared to tests performed at the asphalt plant and provided to the paving company as a guide for final vibratory drum rolling. Asphalt density test results are included in Appendix I. The results indicate that the pavement replacement was performed in accordance with the design specifications or approved modifications and is in conformance with the Consent Decree.

3.8.4 Field Testing of Concrete

The placement of cast-in-place concrete was monitored to assess conformance with the required specifications. Monitoring and testing included the following:

- Visual monitoring of the concrete mix delivery requirements;
- Visual monitoring of the work before placement;
- Visual monitoring of the concrete mix to ensure that the concrete met the requirements of a well-graded, high-density, plastic and workable mix;
- Visual monitoring of the concrete placement and protection;
- Concrete field testing and preparation of compressive test cylinders according to the following standards for ready-mix concrete as specified in ASTM C94:
    - Sampling Fresh Concrete - (ASTM C172)
    - Slump Test - (ASTM C143)
    - Air Content - (ASTM C138)
    - Temperature - (ASTM C1064)
    - Compression Test Specimens - (ASTM C-39)
- Laboratory testing of strength test cylinders (ASTM C39).

The specification requirements included:

- Slump Test - 3 to 5-inches.
- Air Content - 5 to 7 percent.

- Water/Cement Ratio - 0.45.
- Temperature - 50 to 90°F.
- Compression Test - 4,000 psi at 28-days.

Cast-in-place concrete placement was monitored and tested for the following structures associated with the RTC Alternate Cover:

- Sedimentation Structure;
- Atlantic Avenue Drainway Headwall;
- Bases of Manholes; and
- Manhole and Catch Basin Inverts

The results of the representative samples for field and laboratory testing are summarized in Appendix K-3: The results indicate that the slump ranged from 3.0 to 5.0. The air content ranged from 4.8 to 7.0, and concrete temperature ranged from 61 to 72 degrees Fahrenheit. The concrete compression test results indicated a range of 4200 to 5720 psi. The concrete met the specified test requirements in every case with the exception of the air content.

Air content failed to meet the project specifications in two samples, as described below:

- Concrete for the footing of the sedimentation structure has measured air contents of 4.3, and 4.8 percent. The concrete was accepted verbally by the designer, VHB, in pre-meeting discussion with the Trust on October 24, 1996.

- During a pour of the sedimentation structure walls on November 18, 1996, air content of the concrete was measured at 4.0 percent. The ready-mixed plant QC Technician added 2 oz./cubic yard air entrainment agent, DUREX2, to raise the air content 2 percent. The mix was not re-tested.

Values of percent air content (4 to 4.8 percent) are within the acceptable tolerance range for the specified range of 5 to 7 percent in accordance with Variance 96-043. The cast-in-place concrete testing results indicate a conformance to the specifications or approved modification and is in conformance with the Consent Decree.

3.8.5 Testing of Reinforcing Bar

The design specifications require that mill tests of reinforcing steel be submitted prior to each use for each 15 tons or less shipped to the Site. Copies of the mill certificates were submitted by the Contractor. Mill certificates were from New Jersey Steel Corporation. The mill tests of reinforcing steel were performed by the manufacturer in accordance with the requirements of ASTM A 615, Billet Steel Bars for Concrete Reinforcement, which included the following requirements:

- Tensile Strength, min. psi — 90,000 for Grade 60
- Yield Strength, min. psi — 60,000 for Grade 60
- Elongation, min. for Bar 4,5 — 9%
- Bend, Bars 4, 5 for Grade 60 (d = nominal diameter) — 3.5d

The results indicated that the reinforcing steel met the requirements. PSI performed field monitoring of the rebar during placement. The rebar testing submittal was rejected only based on the timing of the submittal; the Contractor submitted the certificates after the reinforcing was used in the concrete structure. Copies of the mill certificates for reinforcing steel are included in Appendix K.4.

3.8.6 Testing of Manhole and Catch Basin Concrete

The design specifications require that manholes and catch basin materials be tested and the results reported by submittal prior to delivery. Copies of the material test results were submitted by the Contractor. Manhole and catch basin material test reports prepared by the manufacturer's testing laboratory were submitted from two manufacturers; Capital Concrete Products and Scituate Ray Precast. A third manufacturer, Concrete Systems Incorporated, provided laboratory material test reports for replacement manholes and catch basins.

Manhole and catch basin materials were to meet the requirements of the cast-in-place concrete for precast reinforced concrete manhole sections, ASTM C 478, which included the following concrete requirements:

- (ASTM C39) Compression Test - 4,000 psi at 28-days.

The results showed that the concrete test results are summarized below:

- Compression Strength: 4300 to 8041 psi at 28 days.

The material testing was performed in accordance with the requirements of ASTM C478, precast reinforced concrete manhole sections. The submittal was rejected based on the timing of the submittal; the Contractor submitted the reports after the reinforcing was used in the concrete structure. Since several manholes/catch basin structures did not meet the required finish grade evaluation, the above manholes provided by Capital Concrete and Scituate Ray Precast were replaced by manholes and catch basins manufactured by Concrete Systems, Inc. of Hudson, NH.

All but one of the manholes identified as not meeting the required finish grade were removed and replaced. The other manhole was modified in-place. Copies of the manhole catch basin manufacturer test results are included in Appendix K.5.

3.9 Flexible Membrane Field Monitoring

Flexible membrane materials were placed in the Atlantic Avenue Drainway and Detention Basin. Two contractors were used to install the liner for the project. Environmental Network initially installed the liner in the Atlantic Avenue Drainway. Environmental Network is located in Weare, New Hampshire. Chenango Contracting, Inc. from Johnson City, New York installed the liner in the Detention Basin.

Field monitoring of the installation of the geomembrane was performed during the installation. Monitoring was performed to evaluate the subgrade preparation, the quality of the material during deployment, seam monitoring, and repair of defects. Seams were tested both destructively and non-destructively.

The subgrade preparation for both the Atlantic Avenue Drainway and the Detention Basin were inspected and accepted prior to deployment of liner material. The liner installed in the Atlantic Avenue Drainway was deployed over a cushion layer consisting of two 6-ounce geotextile layers placed in the bottom of the excavated drainway. The liner installed in the detention basin was

deployed over compacted road structural fill or gravel borrow material above the excavated base. Laborers pulled the geomembrane down the slope, across the floor and up the opposite slope. During deployment of the geomembrane liner panels, the following services were provided by Golder personnel:

- Measurement of the panel thickness;
- Confirmation of panel overlap;
- Visual observation of overall sheet quality; and
- Assignment of a unique identification number to each panel deployed.

A nominal overlap of 6-inches was maintained between adjoining panels. The average panel thickness was determined by averaging five measurements made along each of the leading edge and trailing edge. A summary of Golder's deployment observations is presented in Appendix L.2.2 and L.3.2

Trial seams were made with each welding apparatus at the start of each day, and at least once every five hours while seaming. Sample coupons were cut from each end of the trial seam and tested in the peel and shear test modes using a calibrated tensiometer supplied by the Installer.

If a trial seam failed the field testing, the welder and welding apparatus associated with the failing trial seam were not allowed to weld on the geomembrane liner until a passing trial seam had been made in accordance with the RTC project specifications. A summary of the trial seam results is presented in Appendix L.2.3, L.2.4, L.3.3, and L.3.4.

The geomembrane liner panel seaming process proceeded concurrently with the panel deployment. The majority of the seams were made using a dual, hot-wedge fusion welding apparatus. Repairs and some of the butt-seams between panels were made using an extrusion welding apparatus. The seaming operations were observed and documented by Golder personnel. The entire length of all seams, patches, or other repairs were observed and documented either during or shortly after completion. A summary of seaming operations, fusion, and extrusion welds, is presented in Appendix L.2.5, L.2.6, and L.3.5. The locations of the geomembrane liner seams are presented on Sheet M-7.2 of Appendix M.

All of the seaming and repair work was performed between August, 1996 and January 1997, under cold weather conditions. The ability of the welders to operate satisfactorily below 40°F was demonstrated by trial seams that were completed regularly. Generally, at temperatures ranging from 35 to 40°F, satisfactory welds were achieved without any special precautions.

Samples for destructive testing were obtained from the seams of the 60-mil geomembrane liner at an average frequency of at least one destructive test sample for each 500 feet of welding for each seaming apparatus. The test locations were selected by Golder personnel based on either completion of approximately 500 feet of welding or by observations of the welded seams. Destructive samples were tested off-site by Golder Construction Service's geosynthetic testing laboratory, in Atlanta, Georgia.

Ten test coupons were cut from each destructive test sample. Five coupons were tested for adhesion (peel test mode) and five coupons were tested for bonded seam strength (shear test mode). Destructive test codes are shown in Figures 9 and 10.

In the event that a destructive test sample failed, the path of the welder was traced in both directions from the location of the failed test sample and the seam was re-sampled and retested at intervals that generally ranged from 10 to 20 feet until the failed destructive test was bounded in both directions by passing test samples. The section of seam between the passing test samples was then reconstructed between the test samples.

A total of 12 destructive samples were collected and tested for the liner in the Atlantic Avenue Drainway. Four of the twelve failed. The installer traced the welding path in each direction from the failed location and obtained an additional set of samples that were tested as destructive samples in the laboratory. The additional samples passed the destructive tests. The installer opted to cap the failed seam between the two passing test locations. The passing destructive tests were reported in Appendix L.2.10. Testing of the repaired/cap seams between the passing destructive tests is documented in Appendix L.2.9.

A total of 6 destructive samples were collected and tested for the liner in the Detention Basin. There were no re-tests needed for the liner installed in the Detention Basin. The locations are

shown on Sheet M-7.1 in Appendix M. A summary of destructive test results is presented in Appendix L.2.10 and L.3.9.

All nondestructive seam continuity testing was performed by the installer personnel and observed by Golder personnel. Two types of non-destructive testing were used for this project.

- Vacuum box testing on extrusion welds; and
- Air pressure testing on dual hot wedge fusion welds.

A vacuum box is a rigid-wall box with a clear Plexiglas top and a neoprene gasket around the bottom of the box that acts as a seal between the box and the HDPE liner. Vacuum box testing consists of:

- Applying a soapy water solution to the seam;
- Placing the vacuum box over the seam;
- Applying a vacuum of two to four psi to the inside of the box for 10 seconds; and
- Observing the seam for bubbles, indicating a discontinuity in the seam.

Air pressure testing consists of:

- Sealing off of the air channel between the inside and outside tracks of the fusion weld;
- Inserting a needle with a pressure gauge attached into the air channel;
- Using an air compressor, inflating the air channel to between 25 to 30 psi; and
- Observing the air pressure gauge over a period of 5 minutes to see if it maintains the inflation pressure.

Defects in the geomembrane liner were assigned unique identification numbers and were located and marked in the field by Golder personnel for repair. The defects were repaired and non-destructively tested by the Installer in accordance with the specifications. A summary of the defects and repairs is presented in Appendix L.2.9, and L.3.8. Defect repair locations are shown on Sheet M-7.1 of Appendix M.

Covering the relocated Atlantic Avenue Drainway channel with geomembrane was not required in the original 100% Design or RTC Alternate Cover Design. The decision to line the relocated Atlantic Avenue Drainway with geomembrane was made after the contractor encountered murky water and black and white substances exposed in the soil. Results of soil and water analytical testing indicated site contaminants of concern and benzene. To minimize potential mixing of the benzene contaminated groundwater with the surface water, the Trust decided to line the relocated portion of the Atlantic Avenue Drainway with geomembrane prior to placing rip-rap on the Drainway slopes (see Variance 96.004, Appendix C.1).

Design considerations for the installation of the geomembrane liner in the Atlantic Avenue Drainway included:

- Anchoring the geomembrane to the Drainway banks;
- Anchoring the geomembrane to the upstream bed and downstream head wall structure;
- Providing cushioning beneath the geomembrane liner on the Drainway bed, while reducing voids beneath the geomembrane; and
- Testing seams to a minimum high water elevation (approximately 3 feet up the Drainway slope).

Problems encountered during installation included dewatering and seam testing. Moisture in the weld would result in failing seams. The Drainway was dewatered by pumping the water out of a diked-off section and pumping downstream.

Routine testing of the geomembrane seams indicated several failures of the seams. The installer was able to cap failed seams with smooth geomembrane welded onto the smooth surface of the existing geomembrane.

During the course of constructing the flexible membrane liners for the Atlantic Avenue Drainway and Detention Basin, modifications were made to the specifications. The following list summarizes the changes to the monitoring and laboratory testing for the liner installation:

- Variance 96-004 Placement of Geomembrane liner in relocated Atlantic Avenue Drainway.

- Variance 96-008 — Revised Variance 96-004 to include placement of a geocomposite cushion over the geomembrane liner.
- Variance 96-010 — Revised the destructive pass/fail criteria to meet with industry standards.
- Variance 96-011 — Repaired seams by cap stripping with smooth geomembrane material.
- Variance 96-032 — Placed geotextile over geomembrane instead of beneath the liner.
- Variance 96-044 — Allowed variances in testing seams in the Atlantic Avenue Drainway and wet basin liner.

The results of the field monitoring and laboratory testing are summarized in Appendix L.2 for the flexible membrane liner installation in the Atlantic Avenue Drainway, and in Appendix L.3 for the flexible membrane liner installation in the Detention Basin. The results indicate conformance with the plans and specifications, with approved modifications, and are in compliance with the Consent Decree.

3.10 Record Drawings

Record drawings of the as-built conditions of the RTC Alternate Cover, certified by a Massachusetts Land Surveyor (Meridian Land Services, Inc.), are included in Appendix M. Meridian Land Services, Inc. is a private corporation founded January 1, 1992 and located in Amherst, New Hampshire. Meridian Land Services, Inc. began work at the Industri-Plex Site in the fall of 1993 as a subcontractor to HMM/Earthtech Environmental Services at which time they provided field personnel to assist HMM in performing construction surveying services.

Beginning with the new construction season in March of 1994, Meridian Land Services, Inc. accepted an expanded role at the Industri-Plex Site. A construction office was set up and maintained on a daily basis and a Resident Surveyor was assigned to oversee the increased construction activity. Work was performed at the home office to supplement the existing staff, as needed.

Meridian Land Services, Inc. maintained the construction office on the Industri-Plex Site continuously from July of 1994 through February of 1997, breaking only temporarily in spring of 1996 while general contractors were changed. During that period, a tremendous volume of data was collected to monitor and record the remediation efforts. Stringent construction specifications and the requirement that a comprehensive record drawing package be produced necessitated the creation of an electronic data collection and storage system sufficient to track and record all the construction activities over the entire Site during all phases and levels. The end result was an organized group of discrete point values in excess of 50,000, each point having a unique position and purpose. By recording the elevation of each point throughout the varying levels of construction, it was possible to determine separate cover layer thickness. This became the basis of the record drawings represented in both tabular form and topographic plan form. In addition to this data, the record drawings included such information as new and existing structure locations, demolition activity, and decommissioned wells and utilities, as recorded throughout the construction cycle.

As well as forming the basis for the record drawing, the same collected data served as a tool to determine quantities of excavation, fill placement, and blasted soil and rock. Because they were based on accurate measurements and computer calculations, these quantities were very important in establishing pay item amounts, tracking volumes of materials on-site, and determining reorder schedules and amounts.

Throughout the years on-site, Meridian Land Services, Inc. set up an extensive construction survey control network. A permanent set of control monuments was established and published with the record drawings and is known as the "institutional control monuments." These monuments will provide the means to monitor and manage the Site in the future. The site's construction control system is based on information provided by SAIC Engineering, Inc., as shown in the Golder 100% Design Report, Part I, Sheet 11-1A. The horizontal control system is based on the Massachusetts State Plane Coordinate System and the vertical control system is based on the National Geodetic Vertical Datum of 1929.

Each drawing set in Appendix M has a plan view and points chart. The plan view shows grid points and intermediate point locations. The points chart shows elevation data collected at each

point shown on the plan view. Each plan view includes contour lines for subgrade and finish grade. A summary of the separate sections of the record drawings is as follows:

- Drainage Structures;
- Presidential Way and Commerce Way Extensions;
- Site Subgrade;
- Site Cover Thickness;
- Detention Basin and Atlantic Avenue Drainway;
- MBTA and BECO right of way;
- Decommissioned Features; and
- Sections and Details.

The record drawings indicate compliance with the design soil cover remedy of 16 inch thickness as measured in accordance with the design specification grid at 50 feet with the exception of the following:

1.	Location:	552500N 696450E and 552350N 696500E Detention Basin
2.	Location:	Grid Points 1564-1601 southern half of the MBTA Corridor Western Bank.

Variance 96-040 allows for the two exceptions identified above. The work has been performed in compliance with the specifications, variances or approvals.

3.11 Drainway Plantings

The final vegetation establishment/soil stabilization as-built report prepared by Normandeau Associates, Inc. is included in Appendix N. The report states that most wetland- and upland-related remediation and restoration activities were completed in 1995 in accordance with the design standards for vegetation establishment as presented in RTC specifications section 02936 and 02938. Attached to the report in Appendix N is a document describing the wetland activities performed during the 100% Design remedial activities for the years 1993-1995. Construction activities completed in 1997 include:

- Reseeding vegetation and repair of upland cover areas on the East Hide Pile, East Central Hide Pile, and upland buffer area around the Created Wetland.

- Wetland seed mix was added and emergent plantings were replaced into the Created Wetland. Goose control fencing was installed and sand deposits were removed/replaced with topsoil.

- Thirty shrubs were added to the Wetland 1C and Wetland Enhancement areas.

- Plantings along Atlantic Avenue for the RTC were completed according to the Design Plans and Specifications with the exception of a very narrow planter on the eastern side of the drainway along a chain link fence. This area is extremely narrow, steeply sloping, and reportedly receives snow from an adjacent parking lot. The Trust will find an alternate plant that will fit in this smaller area that will serve the same as originally designed. Shrub plantings along the Created Wetland were not planted. This area will be monitored and maintained. Documentation in the attached as-built report indicates that corrective actions have brought the project back to design standards in compliance with the Consent Decree.

4.0 CERTIFICATION

The Regional Transportation Center (RTC) Alternate Cover at the Industri-Plex Site was constructed during the period October 1992 through May 15, 1997 and intermittently in October, 1997 to monitor punch list item work by CWM-RSG, Global Waste Management, and LRS and their subcontractors. Golder Associates was employed by the Industri-Plex Site Remedial Trust to provide construction quality assurance on-site and certifying engineering services. Quality Control testing of materials was performed by testing laboratory/services employed by the Industri-Plex Site Remedial Trust.

Golder Associates, as the designated certifying engineer, provides this certification* on behalf of the ISRT. It is based upon observation of construction activities; review of quality assurance/testing activities; reliance upon preparation of record plans prepared by Meridian Land Services Inc. and reliance upon representations made and information provided by the remediation contractor and or its subcontractors, the ISRT and their representatives and other contractors. In Golder Associates Inc. professional opinion, based upon the above, the RTC Alternate Cover was constructed and completed in accordance with the approved specifications and drawings, work plans, and approved design changes in compliance with the Consent Decree.

GOLDER ASSOCIATES INC.

Peter C. Neumann

Peter C. Neumann
Certifying Engineer for Golder Associates Inc.
MA License No. 38521

4/17/98

*A professional engineer's certification comprises a declaration of his professional judgement. It does not constitute a warranty or guarantee, expressed or implied, nor does it release any other party of their responsibility to abide by contract documents or applicable codes, standards, regulations, and ordinances.

5.0 REFERENCES

Environmental Protection Agency, 1986. Quality Criteria for Water, EPA 440/5-86-001.

Global Waste Management, Inc. 1996, Environmental Monitoring, Industri-Plex Site, Woburn, Massachusetts, June.

Global Waste Management, Inc., 1996, Janpet Property Demolition Close-out, Industri-Plex Site, Woburn, Massachusetts.

Golder Associates Inc., 1989. Alternate Cover Design, Industri-Plex Site, Woburn, Massachusetts, May.

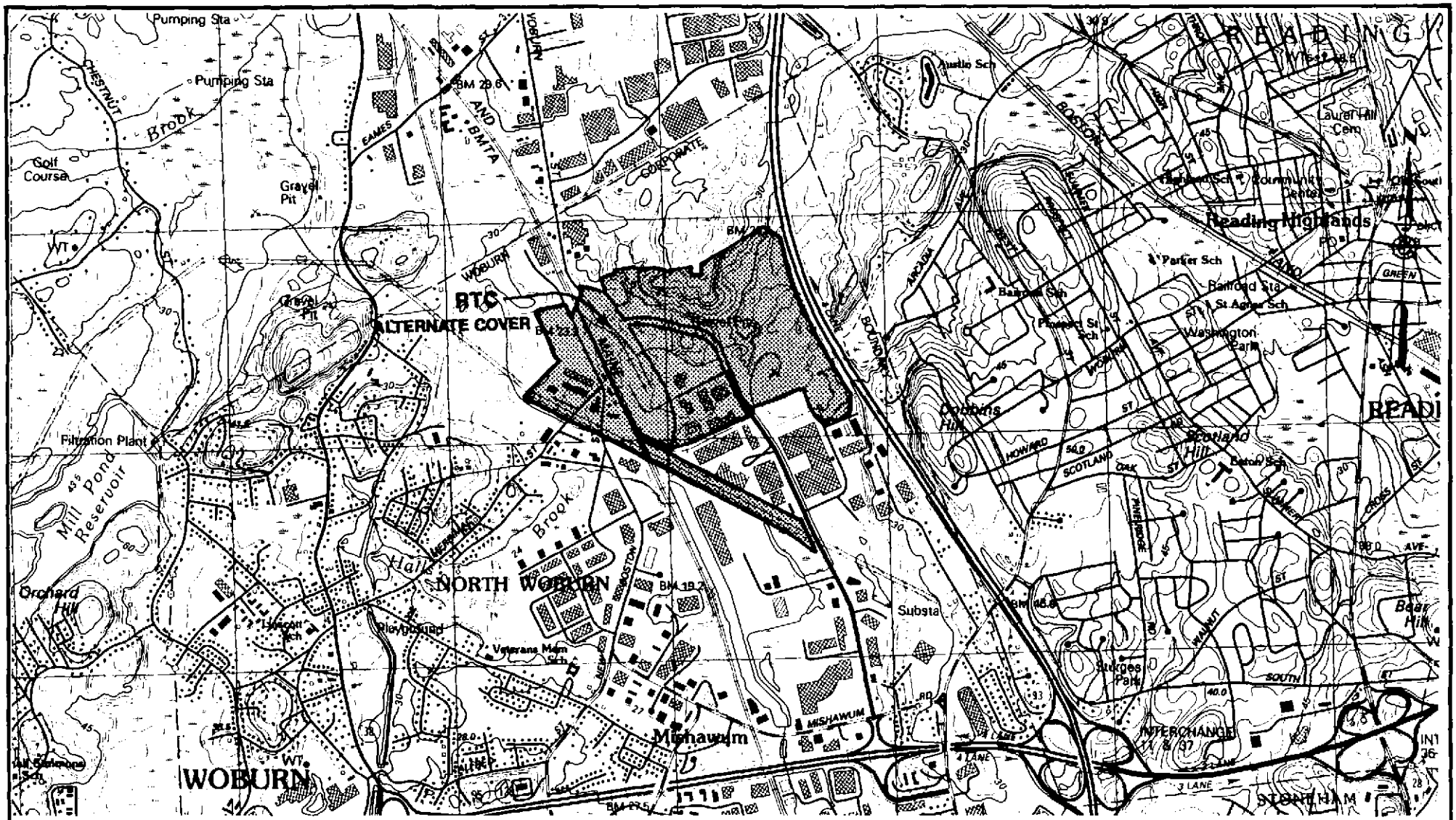
Golder Associates Inc., 1992. 100% Design Report, Industri-Plex Site, Woburn, Massachusetts, 8 Volumes, Revised October, 1993.

U.S. Bureau of Mines, "Blasting Vibrations and Their Effects on Structures," Bulletin No. 656, Washington, D.C., 1971.

U.S. Environmental Protection Agency, 1986. Record of Decision, Industri-Plex Site, Woburn, Massachusetts, September.

U.S. Environmental Protection Agency, 1989. Industri-Plex Site Consent Decree, Civil Action Nos. 89-0195-MC and 89-0196-MC, April.

Vanasse Hangen Brustlin, Inc. and Golder Associates, Inc. "Regional Transportation Center Alternate Cover Design," July 26, 1996.



LEGEND

BASE MAP TAKE FROM 7.5 x 15 MINUTE USGS TOPOGRAPHIC QUADRANGLE TITLED "READING MA" DATED 1978, SCALE 1:25000

2000 0 2000

scale approximate feet

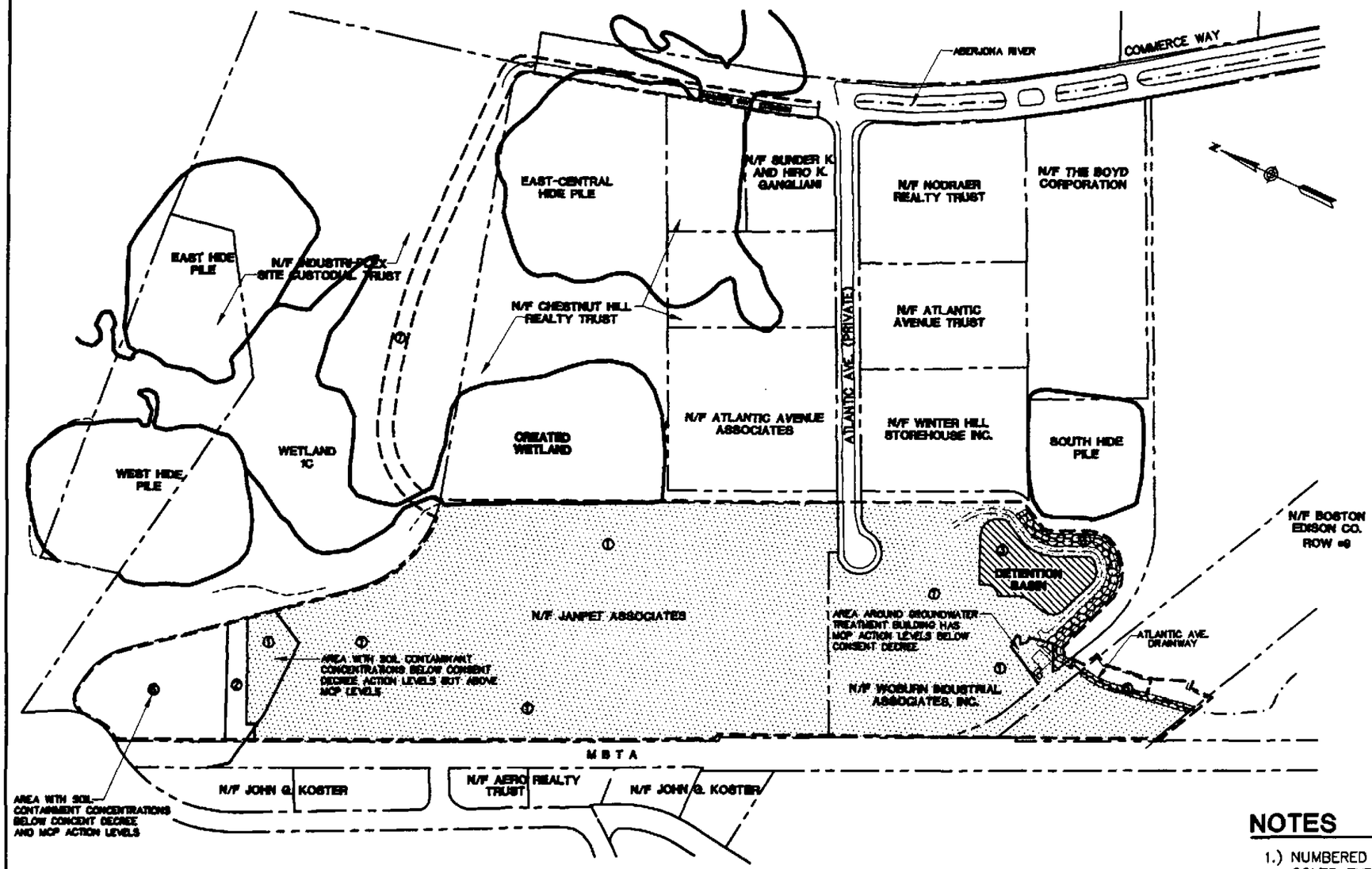
JOB No.:	933-6143	SCALE:	AS SHOWN
DR BY:	CDS	DATE:	3/20/96
CHK BY:		FILE No.:	SITE
REV BY:		DR SUBTITLE:	00

Golder Associates
Manchester, New Hampshire

RTC ALTERNATE COVER SITE LOCATION PLAN

INDUSTRI-PLEX SITE

FIGURE 1



LEGEND

- CRUSHED STONE SURFACE PERMEABLE COVER
- DETENTION BASIN
- RIPRAP LINED CHANNEL
- PROPERTY LINES
- SURFACE WATER FEATURE
- PROPOSED DETENTION BERM ROADWAY
- LIMIT OF FEATURE
- RTC ALTERNATE COVER BOUNDARY

NOTES

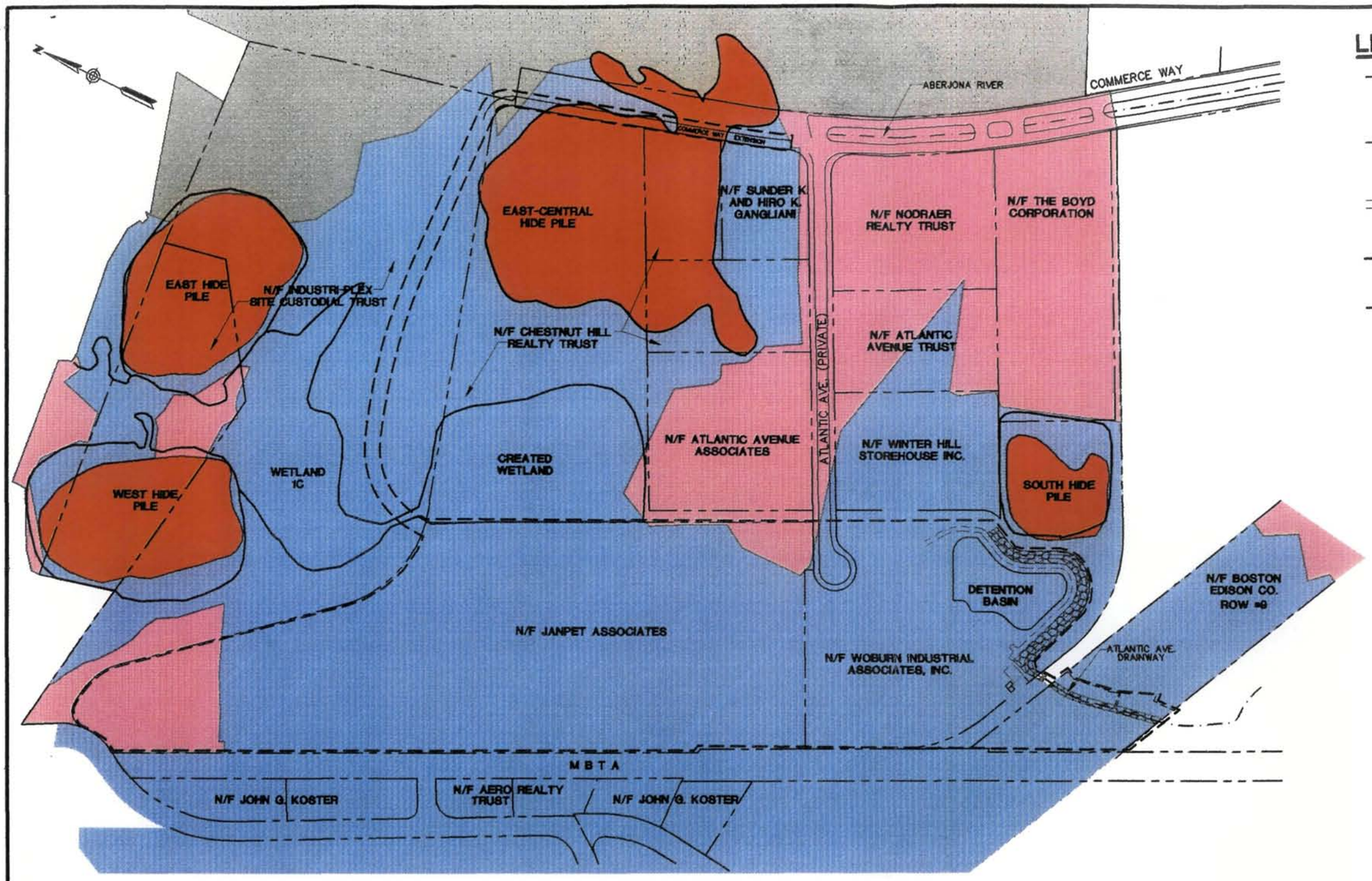
1.) NUMBERED AREAS REFER TO PREVIOUS GROUND CONDITIONS AND CURRENT COVER TYPES AS DESCRIBED IN THE TABLE.

TABLE – COVER TYPES (ALTERNATE COVER)

AREA	PREVIOUS CONDITION	CURRENT COVER TYPE
1	VARIES	PERMEABLE COVER – STONE SURFACE
2	BEDROCK / SOIL WITH VEGETATION	PERMEABLE COVER – TOPSOIL SURFACE
3	VARIES	DETENTION BASIN
4	VARIES	RIPRAP LINED CHANNEL
5	DRAINAGE CHANNEL	RIPRAP OVER GEOTEXTILE LINING
6	SOIL WITH VEGETATION	NO COVER
7	REMEDIAL COVER	DENSE GRADED AGGREGATE COVER

300 0 300
scale feet

JOB No.: 933-6143	SCALE: AS SHOWN	RTC ALTERNATE COVER TYPES	
DR BY: CDS	DATE: 12/16/97		
CHK BY:	FILE No.: RTC-2		
REV BY:	DR SUBTITLE: 00		
Golder Associates		ISRT / RTC / MA	FIGURE 2



LEGEND

- PROPERTY LINES
- SURFACE WATER FEATURE
- PROPOSED DETENTION BERM ROADWAY
- LIMIT OF FEATURE
- RTC BOUNDARY

INSTITUTIONAL CONTROLS LAND CLASSIFICATIONS

AREA	CLASS	DESCRIPTION
	A	UNCONTAMINATED SOILS
	B	SOILS MAY CONTAIN CONTAMINANTS LESS THAN CONSENT DECREE ACTION LEVELS (NO COVER REQUIRED)
	C	SOILS CONTAIN CONTAMINANTS GREATER THAN CONSENT DECREE ACTION LEVELS (COVER REQUIRED)
	D	"HIDE PILES"

300 0 300
scale feet

JOB No.: 933-6143	SCALE: AS SHOWN	RTC INSTITUTIONAL CONTROLS LAND CLASSES	
DR BY: CDS	DATE: 01/10/98		
CHK BY:	FILE No.: CLASS		
REV BY:	DR SUBTITLE: 00		
Golder Associates		ISRT / RTC / MA	FIGURE 3

ISRT RTC Alternate Cover
1996 - 1997 Project Organization

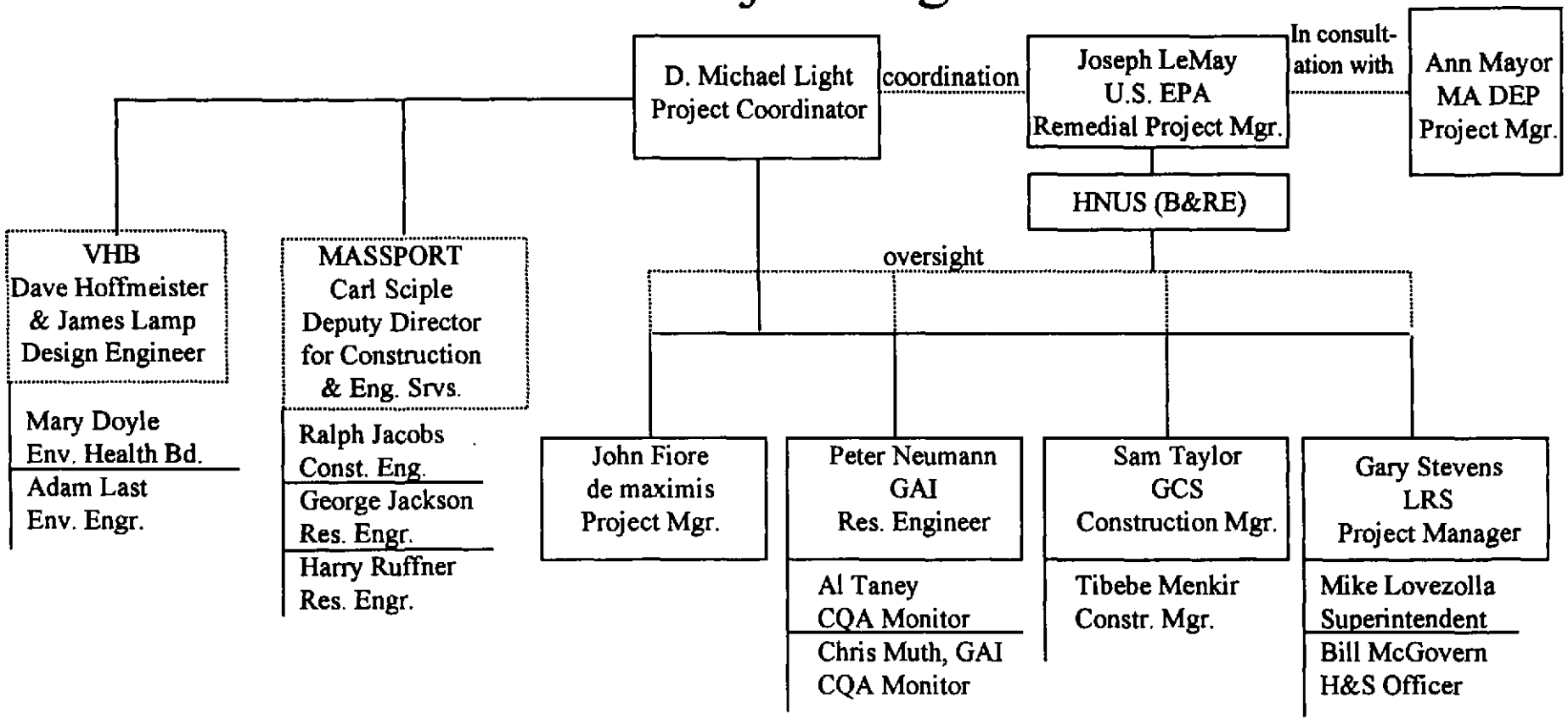
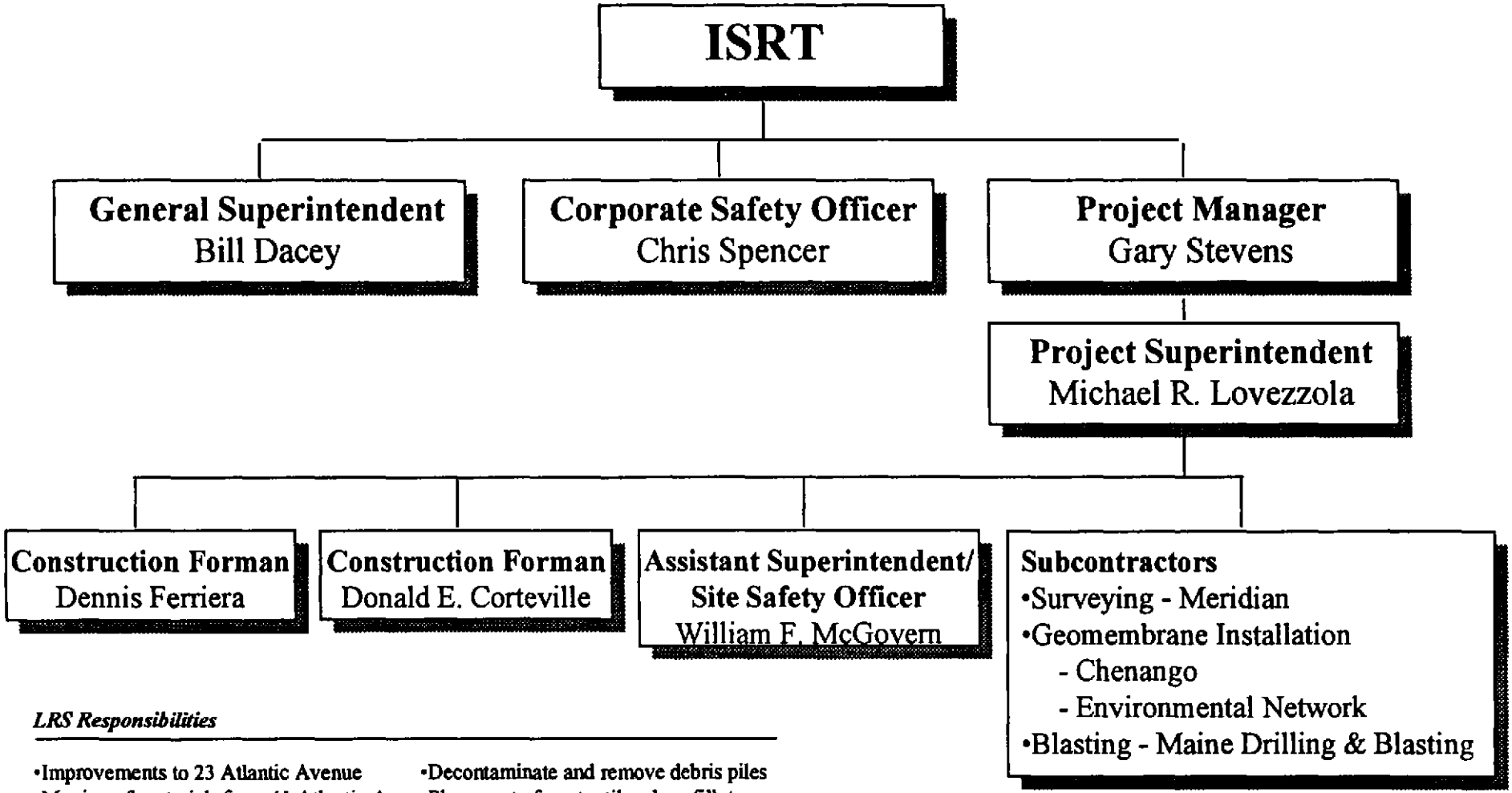


Figure 4

LL\project933-6143\task17\fig2and3.ppt

INDUSTRI-PLEX - FINAL PHASE
PROJECT MANAGEMENT ORGANIZATION



LRS Responsibilities

- Improvements to 23 Atlantic Avenue
- Moving of materials from 41 Atlantic Ave. to 23 Atlantic Ave.
- Excavation/Extension of utility corridors
- Modifications to Atlantic Avenue drainway
- Construction of detention basin
- Demolition of above grade structures
- Abandonment/filling of underground Structure/utilities
- Decontaminate and remove debris piles
- Placement of geotextile, clean fill, top soil, rip-rap and gravel
- Health & Safety monitoring
- Decontamination procedures
- Fence Installation
- Planting vegetation

Subcontractor Responsibilities

- Layout, quantity survey, cover depth verification
- Installation of geomembrane
- Ledge blasting

Figure 5

FIGURE 6

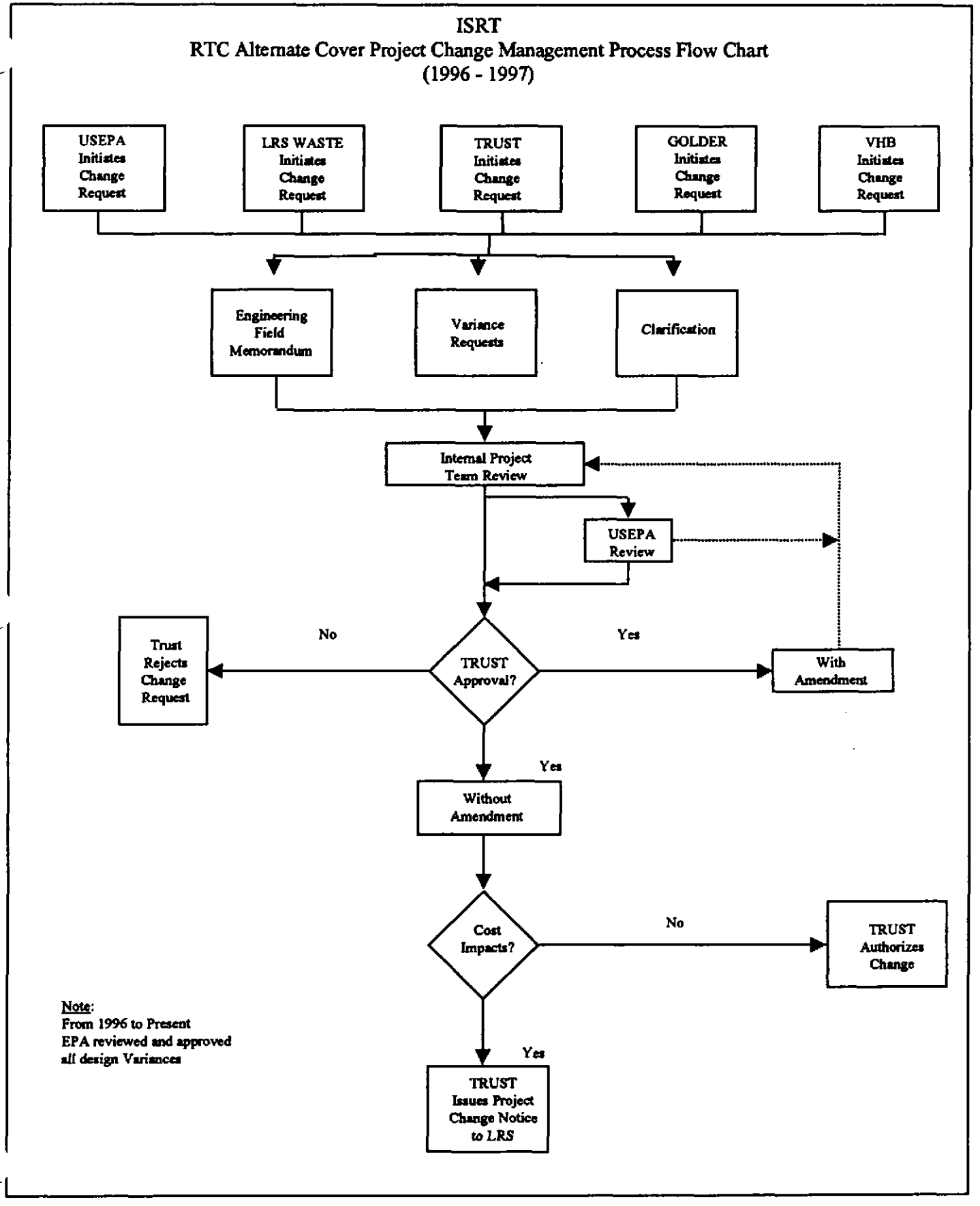
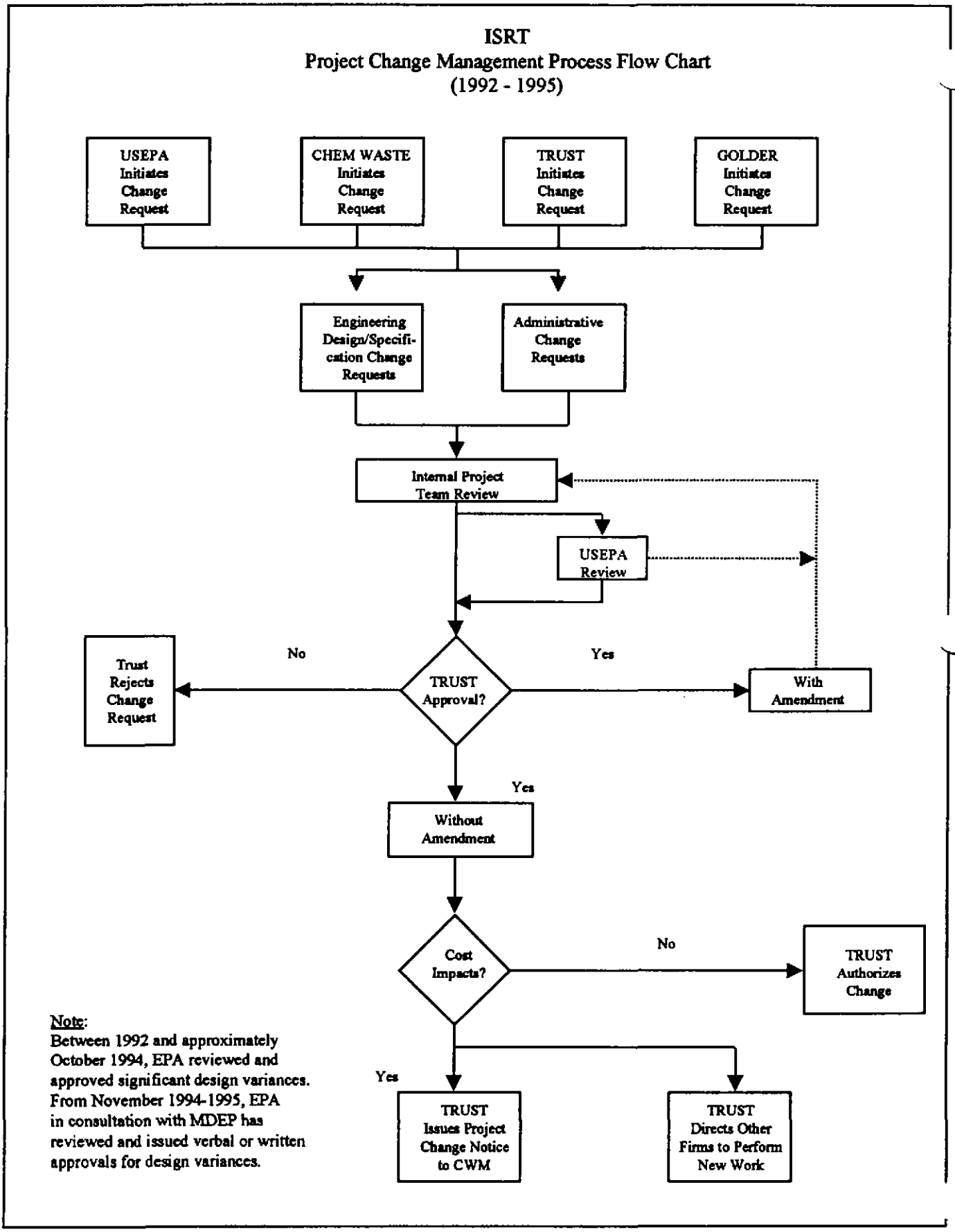
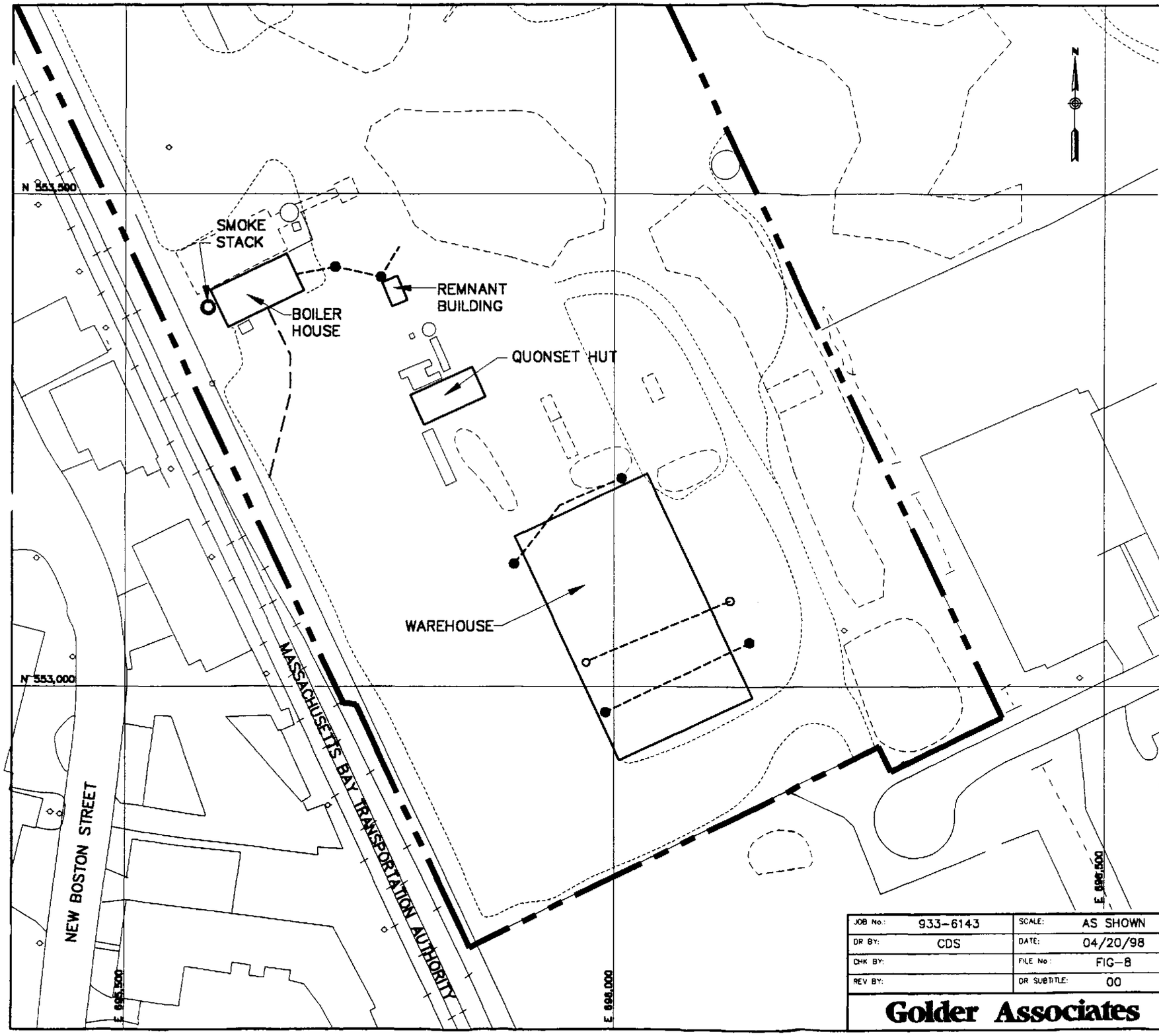

ISRT
RTC Alternate Cover Project Change Management Process Flow Chart
(1996 - 1997)
USEPA Initiates Change Request
LRS WASTE Initiates Change Request
TRUST Initiates Change Request
GOLDER Initiates Change Request
VHB Initiates Change Request
Engineering Field Memorandum
Variance Requests
Clarification
Internal Project Team Review
USEPA Review
TRUST Approval?
No
Yes
Trust Rejects Change Request
With Amendment
Yes
Without Amendment
Cost Impacts?
No
TRUST Authorizes Change
Yes
TRUST Issues Project Change Notice to LRS
Note:
From 1996 to Present
EPA reviewed and approved
all design Variances

FIGURE 7


ISRT
Project Change Management Process Flow Chart
(1992 - 1995)
USEPA Initiates Change Request
CHEM WASTE Initiates Change Request
TRUST Initiates Change Request
GOLDER Initiates Change Request
Engineering Design/Specification Change Requests
Administrative Change Requests
Internal Project Team Review
USEPA Review
Trust Rejects Change Request
No
TRUST Approval?
Yes
With Amendment
Yes
Without Amendment
Cost Impacts?
No
TRUST Authorizes Change
Yes
TRUST Issues Project Change Notice to CWM
TRUST Directs Other Firms to Perform New Work
Note:
Between 1992 and approximately October 1994, EPA reviewed and approved significant design variances. From November 1994-1995, EPA in consultation with MDEP has reviewed and issued verbal or written approvals for design variances.



LEGEND

- SITE BOUNDARY
- N 552,500 — GRID LINE
- SANITARY SEWER LINE
- STORM SEWER LINE

NOTE

1. INFORMATION TAKEN FROM FIGURE TITLE "ABANDONED FACILITIES BELOW GRADE" ISRT WOBURN, MA BY GOLDER ASSOCIATES INC. MT. LAUREL NJ.
2. REFER TO FIGURE 1 FOR SITE LOCATION.

100 0 100
scale feet

JOB No.:	933-6143	SCALE:	AS SHOWN
DR BY:	CDS	DATE:	04/20/98
CHK BY:		FILE No.:	FIG-8
REV BY:		DR SUBTITLE:	00

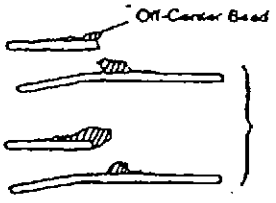
Golder Associates

STRUCTURES DEMOLISHED SPRING, 1996

ISRT / RTC / MA

FIGURE 8

Schematic of Untested Specimen

Types of Breaks	Locus-of-Break Code	Break Description	Classification[a]
	AD1	Failure in adhesion. Specimens may also delaminate under the bead and break through the thin extruded material in the outer area.	Non-FTB
	AD2	Failure in adhesion.	Non-FTB
	AD-WLD	Break through the fillet. Breaks through the fillet range from breaks starting at the edge of the top sheet to breaks through the fillet after some adhesion failure between the fillet and the bottom sheet.	Non-FTB[b]
	SE1	Break at seam edge in the bottom sheet. Specimens may break anywhere from the bead/outer area edge to the outer area/buffed area edge. (Applicable to shear only).	FTB
	SE2	Break at seam edge in the top sheet. Specimens may break anywhere from bead/outer area edge to the outer area/buffed area edge.	FTB
	SE3	Break at seam edge in the bottom sheet. (Applicable to peel only).	FTB
	BRK1	Break in the bottom sheeting. A "B" in parentheses following the code means the specimen broke in the buffed area. (Applicable to shear only).	FTB
	BRK2	Break in the top sheeting. A "B" in parentheses following the code means the specimen broke in the buffed area.	FTB
	AD-BRK	Break in the bottom sheeting after some adhesion failure between the fillet and the bottom sheet. (Applicable to peel only).	FTB
	HT	Break at the edge of the hot tack for specimens which could not be delaminated in the hot tack.	No Test

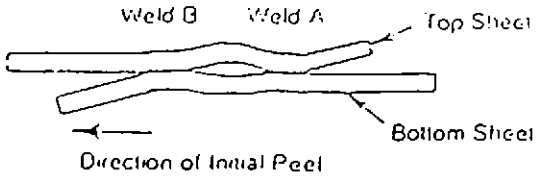
[a] FTB - Film - Tear Bond.

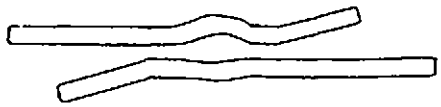
[b] Acceptance of AD-WLD breaks may depend on whether test values meet a minimum specification value and not on classification as a FTB or non-FTB break.

Locus-of-break codes for fillet-extrusion weld seams in semi-crystalline FML's tested for seam strength in shear and peel modes.
Reference - Figure A-4, NSF International Standard 54-1993.

Golder Construction Services, Inc.			TITLE: DESTRUCTIVE SAMPLE TEST CODES EXTRUSION WELD WITH LEISTER HEAT SEAM		
CLIENT/PROJECT: INDUSTRI-PLEX SITE WOBURN, MASSACHUSETTS			DATE	SCALE	JOB NO. 933-6143
DRAWN	CHECKED	REVIEWED	FILE NO.	DWG. NO. / REV. NO.	FIGURE 9

Schematic of Untested Specimen



Types of Break	Locus-of-Break Code	Break Description	Classification[a]
	AD	Adhesion failure.	Non-FTB
	BRK	Break in sheeting. Break can be in either top or bottom sheet.	FTB
	SE1	Break at outer edge of seam. Break can be in either top or bottom sheet.	FTB
	SE2	Break at inner edge of seam through both sheets.	FTB
	AD-BRK	Break in first seam after some adhesion failure. Break can be in either the top or bottom sheet.	FTB

[a] FTB - Film - Tear Bond

NOT TO SCALE

Locus-of-break codes for dual hot-wedge seams in semicrystalline FML's tested for seam strength in shear and peel modes. In cases where the Weld A fails in adhesion in a peel test, it is recommended that the test be stopped, that the specimen be replaced in the testing machine, and that Weld B be tested by peeling in the direction opposite to that used to Weld A..

Reference - Figure A-6, NSF International Standard 54-1993.

Golder Construction Services, Inc.	TITLE: DESTRUCTIVE SAMPLE TEST CODES HOT WEDGE FUSION WELD		
CLIENT/PROJECT: INDUSTRI-PLEX SITE WOBURN, MASSACHUSETTS	DATE	SCALE	JOB NO. 933-6143
DRAWN / CHECKED / REVIEWED	FILE NO.	DWG. NO. / REV. NO.	FIGURE 10

Appendix A

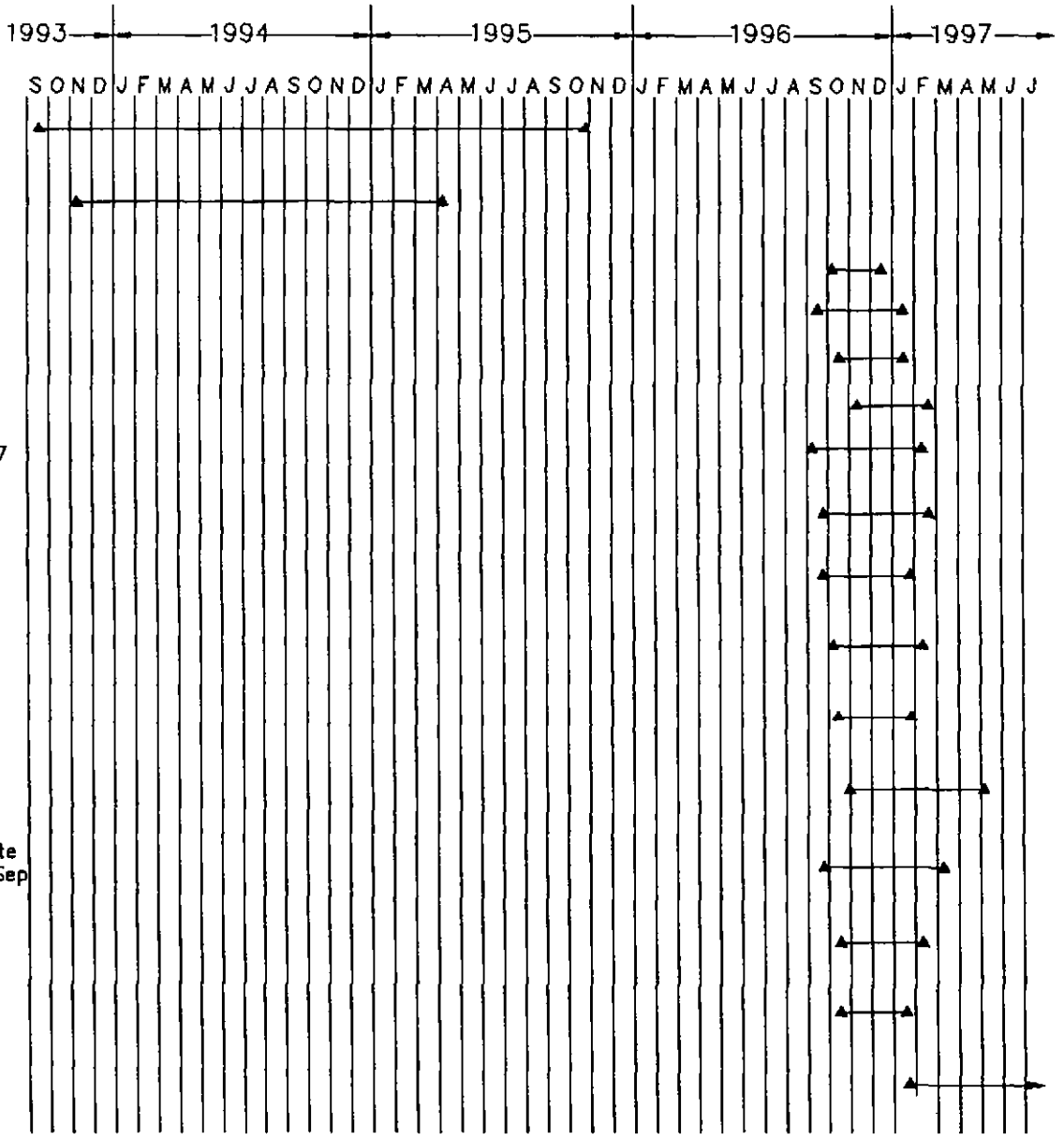
APPENDIX A

SCHEDULE

APPENDIX A.1

PROJECT MILESTONE RECORD

1. Commerce Way Extension (Remedial Cover) 21/Sep 94 – 24/Oct 95
2. Presidential Way Extension (Remedial Cover) 09/Nov 93 – 03/Aug 95
3. Blasting of Existing Rock 06/Oct 96 – 18/Dec 96
4. Eastern RTC (Fill and Cover) 17/Sep 96 – 16/Jan 97
5. Northern RTC (Fill and Cover)16/Oct 96 – 24/Jan 97
6. Underground Storage Tank Closure 06/Nov 96 – 20/Feb 97
7. Utility Corridor (Excavation and Fill) 03/Sep 96 – 06/Feb 97
8. Existing Foundation Slab (Remove Debris, Fill and Cover) 27/Sep 96 – 23/Feb 97
9. MBTA Clean Corridor (Excavate Fill and Cover) 27/Sep 96 – 29/Jan 97
10. Atlantic Avenue Drainway (Relocate, Dredge, Cover) 07/Oct 96 – 11/Feb 97
11. Detention Basin (Excavate, Structures, Cover) 09/Oct 96 – 20/Feb 97
12. Atlantic Avenue Culvert (Excavate, Install Pipe, Restore Drainway and Asphalt. 30/Oct 96 – 01/May 97
13. Drainage System (Procurement, Installation, Reestablishing Site Drainage – Presidential and Commerce Way Extentions) 27/Sep 96 – 03/Mar 97
14. South RTC (Excavate, Fill and Cover) 17/Oct 96 – 05/Feb 97
15. West RTC (Place Demo Debris, Fill and Cover) 14/Oct 96 – 15/Jan 97
16. Punch List 27/Jan 97 – Continuing



JOB No.:	933-6143	SCALE:	AS SHOWN
DR BY:	CDS	DATE:	06/16/97
CHK BY:	PCN	FILE No.:	A1
REV BY:		DR SUBTITLE:	00

Golder Associates
Manchester, New Hampshire

PROJECT MILESTONE RECORD

R.T.C. ALTERNATE COVER CERTIFICATION REPORT

FIGURE A.1

Appendix 3

APPENDIX B

SUBMITTALS

APPENDIX B.1

SUBMITTAL REGISTER (1996 - 1997)

TECHNICAL SUBMITTAL REGISTER 1996-1997
RTC ALTERNATE COVER
INDUSTRI-PLEX SITE

Specification	Section	Description	GCS Item	Submittal No.	Submittal Date	Approval Code	Remarks	Submittal Completed
01300	1.01 B. 1.	Health and Safety Plan (HASP)	49	01564-3	1/21/97		Draft received 5/24/96	5/24/97
01300	1.01 B. 2.	Resume of Site Safety Engineer	49	01564-3	1/21/97		Draft received 5/24/96	5/24/97
01300	1.01 B. 4.	Remedial Action Work Plan	11	01300	6/17/96	REJ	CWM adopted	/
01300	1.01 C. 1.	Preliminary Construction Schedule	6	01300-4	6/13/96	REJ	6/25/96	/
01300	1.01 C. 1.	" " " " "	22	01300	6/27/96	REJ	Trust Prepared	
01300	1.01 C. 2.	Preliminary Schedule of Shop Drawing, sample and Proposed substitutes (or equal)	1	01300	6/13/96	NET		6/25/96
01300	1.08	Demolition Plan	3	01300-3	6/13/96	NET	7/16/96 & 7/19/96	7/18/96
01300	1.09	Contractor's Daily, Weekly and Monthly Reports					On Going through GCS	
01311	1.08 A.	Detailed Project Schedule (Plot)	6	01311-1	6/13/96	REJ	6/25/96	/
01311	1.08 A.	" " " " " "	22	01300	6/27/96	REJ	Trust Prepared	/
01564	2.02 A.	Submittal of Health and Safety Plan		01564-3	5/24/96		Draft received 5/24/96	
			49	01564-3	1/21/97			
01564/65		Ambient Air Monitoring	4	01564	6/13/96		CWM plan adopted	
02060	1.03 A.	Decommissioning Plan	18	02060-1	6/21/96	NET		6/25/96
02060	1.03 B.	Grout Mix					Trust Prepared	
02060	1.03 C.	Procedures for Disposal of Waste					Adopted CWM	
02060	1.03 D.	Results of Chemical Testing for Waste Disposal			2/11/98	NET		2/11/98
02060	1.03 E.	TSD Facility Documentation			2/11/98	NET		2/11/98
02060	1.03 F.	Record Plans of Remaining Subsurface Features			2/9/98	NET		2/11/98
02060	1.03 G.	Bills of Lading, Manifest of Waste Material shipped Off-site			2/11/98	NET		2/11/98
02060	1.03 H.	Emergency Contingency Plan					Adopted CWM	
02069	1.04 B.	List of Equipment for Soil Test Boring Work					N/A	
02069	1.04 C.	Jarred Soil Samples					From NH Boring	
02069	1.04 D.	Driller's Logs					From NH Boring	
02069	1.04 E.	Daily Driller's Report					From NH Boring & LRS Air Monitoring	
02069	1.04 F.	Boring Coordinates and Elevations					From Meridian	
02070	1.03 A.	Well Decommissioning Plan	5	02070	6/13/96	NET		6/25/96
02070	1.03 A.	As-Built Well Abandonment Records					From NH Boring	
02125	1.05 A.	Erosion Control Schedule and Drawing	19	02125-1	6/25/96	NET		6/29/96
02150	1.03 A.	Sheeting, Sheet Piling, Bracing Design	7	01300-2	6/13/96	MCN	6/25/96	
02221	1.01 C.	"Before" Condition Survey (Blastech/Terrecon)	35	02221	8/28/96	NET		8/28/96
02221	1.01 C.	"Before" Condition Survey acceptance (Maine Drilling & Blasting)	57	02221-4	3/10/97	NET	3/19/97	3/19/97
02221	1.01 C.	"After" Condition Survey	63	02221	3/10/97	MCN	4/4/97	
02221	1.01C.	"After" Condition Survey (Terrecon)		02221	2/11/98	NET		2/11/98
02221	1.04 A.	Blasting Operations (Blastech Corp.)	27	02221-1	7/9/96	NET		8/5/96
02221	1.04 A.	Blasting Operations (Maine Drilling & Blasting)	42	02221-2	10/3/96	NET		10/7/96
02221	1.05 A.	Blast Monitoring Report	51	02221-3	1/27/97	MCN	3/3/97	
02221	1.05 A.	Blast Monitoring Report (Response to MCN 3/3/97)	65	02221-4	3/20/97	NET	Response to MCN	3/24/97
02222	1.07 A.	Dredging methods and Water/Spoil Management and Disposal	20	02222-1	6/27/96		withdrawn by contractor	

Approval Codes
NET = No Exceptions Taken REJ = Rejected
MCN = Make Corrections Noted
ARS = Amend Resubmit

TECHNICAL SUBMITTA. EGISTER 1996-1997
RTC ALTERNATE COVER
INDUSTRI-PLEX SITE

Specification	Section	Description	GCS Item	Submittal No.	Submittal Date	Approval Code	Remarks	Submittal Completed
02223	2.07 A.	Certification that Soil Materials Comply with Specifications					Trust Provided	
02223	2.07 A.	Gradation of Cover Soil					Trust Provided	
02223	2.07 A.	Gradation of Road Struct. Fill and Gravel Borrow	9	02223-1	6/13/96	MCN		10/3/96
02223	2.07 A.	Gradation of Road Struct. Fill and Gravel Borrow	40	02223-2	10/2/96	NET		10/3/96
02223	2.07 B.	Certification of Compliance & Soil Samples for Testing	61	02223	3/10/97	NET	3/19/97	3/19/97
02234	2.02 A.	Certification of Compliance for Angular Stone	9	02234	6/13/96	MCN		10/3/96
02234	2.02 C.	Angular Stone Sample for Testing					Trust Collected	
02235	2.03 A.	Ballast Stone Sample for Testing	9	02242	6/13/96	MCN		10/3/96
02242	2.02 A.	Certification of Compliance for Cover Fill and Topsoil					Trust Provided	
02242	2.02 B.	Cover Fill and Topsoil Samples for Testing					Trust Collected	
02244	1.04 A.	Stream Sediment Remediation Construction Methods					Adopted CWM	
02244	1.04 B.	Stream Sediment Remediation, Panel Layout, Tie-in Details & Shop Drawings					Trust Prepared	
02271	1.03 A.	Test Results of Rip-Rap	15	02271-1	6/20/96	RS	6/25/96	7/11/96
02271	1.03 A.	" " " " "	21	02271-1	6/27/96	–		
02271	1.03 A.	" " " " "	28	02271-1A	7/10/96	NET		7/11/96
02271	1.03 B.	Rip-rap Lining, Panel Layout, Tie-in Details & Shop Drawings					Trust Prepared	
02271	2.03 A.	Test Results of Rip-Rap Samples					Trust Provided	
02400	1.04 A.	Storm Drain Pipe Shop Drawings (CMP)	13	02400-1	6/20/96	NET		6/25/96
02400	1.04 A.	Storm Drain Pipe Shop Drawings (PEP) (Flared End Only)	14	02400-2	6/20/96	ARS	6/25/96	
02400	1.04 A.	Storm Drain Pipe Shop Drawings (PEP) (Hancor Hi Q - Sur Lok 2.0)	23	02400-2A	7/3/96	NET		7/25/96
02400	1.04 A.	Storm Drain Pipe Shop Drawings (PEP) (Hancor Hi-Q - Standard)	43	02400-3	10/14/96	NET		10/14/96
02400	1.04 B.	Storm Drain As-Built Drawings			2/9/98	NET		2/11/98
02575	1.02 B.	Bituminous Concrete Mix Design	34	02575-1	8/20/96	NET		9/5/96
02575	1.02 C.	Dense Graded Crushed Stone Certificate and Test Results	61	2575	3/10/97	NET	3/19/97	3/19/97
02575	1.04 C.	Weight Slips for Materials					Received throughout the Work	
02595	1.03 A.	Geotextile Manufacturer's Certificate (16 ounce geotextile, Amoco 4516)	8	02595-1	6/13/96	MCN		
02595	1.03 A.	Geotextile Manufacturer's Specification (6 oz.Amoco 4552)	45	02595-1	11/5/96	NET		11/15/96
02595	1.03 A.	Geotextile Manufacturer's Certification (Amoco 4552 & 4516)	66	2595	4/4/97	NET		4/4/97
02595	1.03 B.	Geotextile Panel Layout, Tie-in Details & Shop Drawings					Trust Prepared	
02597	1.03 A.	Resumes of Crew and installation experience (Environmental Network)	29	02597	7/23/96	NET		8/5/96
02597	1.03 A.	Shop drawings, HDPE Panel layout and details (Environmental Network)	29	02597	7/23/96	NET		8/5/96
02597	1.03 A.	Manufacturer's certification (Agru-America)	41	02597-2	7/31/96	NET		10/3/96
02597	1.03 A.	Manufacturer's certification (GSE)	N/A	02597-3	9/12/97	NET		9/13/97
02597	1.03 A.	Schedule of Operations					Trust Prepared	
02597	1.03 A.	Subgrade Acceptance Form (Chenango)	50	02597-2	1/24/97	NET		1/24/97
02597	1.03 A.	Construction Progress Reports					GCS Received	
02597	1.03 A.	Weld Test Records (Chenango)	50	02597-3 & 4	1/24/97	NET		1/24/97
02597	1.03 A.	Destructive and Nondestructive field seam test results (Chenango)	50	02597-6,7,8,9	1/24/97	NET		1/24/97
02597	1.03 A.	As-built panel layout					Meridian Collected	
02597	1.03 A.	Summary of laboratory QC test results (Chenango)					GCS Conducted	1/24/97
02597	1.03 A.	Summary of field QC documentation (Chenango)	50	02597-3 thru 10	1/24/97	NET		1/24/97
02597	1.03 A.	Certificate that the material is installed according to the specifications (Chenango)	50	02597-11	1/24/97	NET		1/24/97
02597	1.03 A.	Statement of warranty	50	02597-11	1/24/97	NET		1/24/97
02600	1.03 A.	Procedure for cleaning culverts					Adopted CWM	
02600	1.03 B.	Shop drawings of reinforced concrete pipe	12	02600-1	6/20/96	NET		6/25/96
02600	1.03 C.	As-Built Drawings of reinforced concrete pipe placement			2/9/98		Meridian Collected	
02607	1.03	Shop drawings for manholes and catch basins	16	02607-1	6/20/96	ARS	6/25/96	
02607	1.03	" " " " " " " " "	26	02607-1A	7/9/96	ARS	7/25/96	
02607	1.03	" " " " " " " " "	31	02607-1B	7/31/96	ARS	8/20/96	

TECHNICAL SUBMITTAL REGISTER 1996-1997
RTC ALTERNATE COVER
INDUSTRI-PLEX SITE

Specification	Section	Description	GCS Item	Submittal No.	Submittal Date	Approval Code	Remarks	Submittal Completed
02607	1.03	" " " " " " " " "	32	02607-1C	8/15/96	NET		9/7/96
02607	1.03	" " " " " " " " " (Commerce Way & Presidential Way CBs)	44	02607-2	10/18/96	MC		10/23/96
02607	1.03	" " " " " " " " " (DCB 7 through 33)	46	02607-3	11/8/96	NET		11/11/96
02607	1.03	DCB1, 2,3,4,6,7,9,11,12,13,14,20,CB22,23,24,25,26,27,29,32 and modification of DMH3A			9/29/97			11/12/97
02607	1.04 A.	Certified copies of Manhole & Catch basin manufacturer's laboratory test results (Scit. Ray)	58	02607-4	3/10/97	REJ	5/27/97	
02607	1.04 A.	Certified copies of Manhole & Catch basin manufacturer's laboratory test results (Capital)	59	02607-3	3/10/97	REJ	5/27/97	
02607	1.04A.	Certified copies of Manhole & Catch basin manufacturer's laboratory test results (Concrete Sys)		02607	2/11/98	NET		2/16/98
02721	1.01 B.	Contractor's Engineered Design of Sedimentation Structure	24	03200-1	7/3/96	ARS		
02721	1.01 B.	" " " " " " " "	30	03200-1A	7/31/96	NET		8/20/96
02722	1.01 B.	Contractor's Engineered Design of Outlet Control Structure	24	03200-1	7/3/96	ARS		
02722	1.01 B.	" " " " " " " " "	30	03200-1A	7/31/96	NET		8/20/96
02723	1.01 B.	Contractor's Engineered Design of Atlantic Avenue Culvert Headwall	24	03200-1	7/3/96	ARS		
02723	1.01 B.	" " " " " " " " " "	30	03200-1A	7/31/96	NET		8/20/96
02724	1.04 A.	Contractor's Shop drawings of Precast reinforced concrete box culvert (3' x 4')	37	02724-1	9/17/96	NET		9/20/96
02724	1.04 A.	Contractor's Shop drawings of Precast reinforced concrete box culvert (6' x 4')	39	02724	10/2/96	NET		10/7/96
02724	1.04 B.	As-built Drawings for Precast reinforced concrete box culvert			2/11/98	NET		2/11/98
02831	1.04 A.	Contractor's Shop drawings of Chainlink Fencing					N/A	
02831	1.04 B.	As-built Drawings for Chainlink Fencing					N/A	
02936	1.05 A.	Manufacturer's certificate of compliance to seed mixture					Trust Ran Tests	
02936	1.05 B.	Soil analysis for suitability tests					Trust Performed	
02936	1.05 C.	Recommendations of local USDA Soil Conservation Office			1/8/98		Trust Performed	
02938	1.05 A.	As-built plans of the drainway planting sites.			1/8/98		Trust Performed	
02938	1.05 B.	Written record of the planting site construction.			1/8/98		Trust Performed	
03200	1.03 A.	Shop drawings of concrete reinforcing steel	36	03200-2	8/6/96	NET		9/16/96
03200	1.03 B.	Certified copies of mill tests performed on the reinforcing steel.	56	03200-3	3/7/97	REJ	5/27/97	
03300	3.02 B.	Concrete Mix design samples					N/A	
03300	3.02 D.	Standard deviation analysis of strength tests for the proposed mix.					N/A	
03300	3.02 E.	Contractor's engineered mix design with data	25	03300-1	7/3/96	ARS	8/5/96	
03300	3.02 E.	" " " " " " " "	33	03300-1A	8/15/96	ARS	9/9/96	
03300	3.02 E.	" " " " " " " "	38	03300-1B	9/25/96	NET	9/30/96	
03300	2.02 E.	" " " " " " " "		03300-	2/11/98	NET		2/11/98
03300	3.03 B.	Furnish delivery tickets of each concrete load					Received throughout the Work	

APPENDIX B.2

SUBMITTAL LOG (1992 - 1995)

INDUSTRI-PLEX SITE, WOBURN, MA
APPENDIX B.2 PRESIDENTIAL AND COMMERCE WAY EXTENSIONS
APPLICABLE SUBMITTALS (1992 - 1995)

Submittal Section	Item No.	No.	Description	Para	Copies	Code	Submittal Plan Date	Submittal Act. Date	Submittal Plan Approval	Submittal Actual Approval	Comments
2595	025S		Geo-tex Manufacturer Cert 6 ounce	1.03 (a)	8	C	9/23/92	9/4/92	10/17/92		
2595	025S-01		Geo-tex Manufacturer Cert.	1.03 (a)	8	A	9/23/92	9/17/92	10/7/92	9/18/92	
2595	025S-02		Geo-tex Manufacturer Cert.	1.03 (a)	8	A	9/23/92	9/17/92	10/7/92	9/18/92	
2595	025S-03		Geo-tex Manufacturer Cert.	1.03 (a)	8	A	9/23/92	9/17/92	10/7/92	9/18/92	
2595	025S-04		Geo-tex Manufacturer Cert.	1.03 (a)	4	A	11/19/92	11/19/92	12/2/92	11/19/92	
2595	025S-05		Geo-tex Manufacturer Cert.	1.03 (a)	4	A	11/19/92	11/19/92	12/2/92	11/19/92	
2595	025S-06		Geo-tex Manufacturer Cert.	1.03 (a)	4	A		1/7/94		2/9/94	
2595	025S-07		Geo-tex Manufacturer Cert.	1.03 (a)	4	A		3/17/94		5/5/94	
2595	025S-08		Geo-tex Manufacturer Cert.	1.03 (a)	4	A		4/11/94		5/3/94	
2595	025S-09		Geo-tex Manufacturer Cert.	1.03 (a)	4	A		4/11/94		5/3/94	
2595	025S-10		Geo-tex Manufacturer Cert.	1.03 (a)	4	A		4/30/94		6/3/94	
2595	025S-11		Geo-tex Manufacturer Cert.	1.03 (a)	4	A		5/7/94		6/3/94	
2595	025S-12		Geo-tex Manufacturer Cert.	1.03 (a)	4						Not Used
2595	025S-13		Geo-tex Manufacturer Cert.	1.03 (a)	4						Not Used
2595	025S-14		Geo-tex QC - Polyfelt	1.03 (a)	4			7/26/95	8/3/95		
2595	026S-12		Utility Corridor, Geo-tex panel layout	1.03 (a)	2	B		10/13/94		10/18/94	
2070	027S		Monitoring Well Abandonment Plan	1.03 (a)	4	C	10/7/92	10/6/92	10/20/92	10/20/92	
2070	027S-01		Monitor. Well Abandonment Plan (02070)	1.03 (a)	4	C	12/14/92	12/14/92	12/28/92	1/4/93	
2070	027S-02		Monitoring Well Abandonment Plan	1.03 (a)	4	B	2/4/93	2/4/93	2/18/93	2/9/93	
2070	027S-03		Well Abandonment Plan, UID 1 thru 28		1			3/30/93			
2070	027S-04		Well Abandonment Plan, UID 29 thru 34		1		4/6/93				
2070	027S-05		Well Abandonment Plan, UID 48 thru 56	1.03 (a)	4			1/17/96			
2070	028S		Monitoring Well Record Drawings	1.03 (a)	12		12/15/92	10/7/93	12/31/92	10/21/94	
2223	031-S-12		Hubbardston	2.07 (e)	4	A	N/A	8/26/93	N/A	9/2/93	
2242	124S		Sample; Hubbardston; Parrella	2.02 (b)	1		3/11/93		4/8/93		
2595	125S		Geo-tex Manufacturer Cert; 6 oz	1.03 (a)	4	B	1/25/94		2/9/94		
2595	126S		Geo-tex Manuf. Cert/NICOLON S1600	1.03 (a)	3	B	6/20/94	6/21/94	6/21/94	6/21/94	
2595	131S		Geo-tex COC; NICOLON S1600; 20Jun94ship	1.03 (a)	2	A		6/30/94		7/1/94	
2595	136S		Geo-tex COC; Nic S1600; 28 Jun 94		4	A		7/12/94		7/14/94	

Notes: (1) Submittals suffixed with a "-C" are for corrections made as requested and are submitted for the Trust's verification, e.g., 057S-C.
(2) A submittal suffixed with a letter in parentheses indicates a submission of a previous one requiring resubmission, e.g., 031S-11(A).
(3) Codes A = No Exceptions B = Make Corrections Noted C = Amend-Resubmit D= Rejected-Resubmit P = Pending

Appendix C

APPENDIX C

MODIFICATIONS

APPENDIX C.1

SUMMARY OF VARIANCES

VARIANCE SUMMARY
INDUSTRI-PLEX SITE
RTC ALTERNATE COVER 1996 - 1997

VARIANCE NO.	DESCRIPTION	DESIGN PLAN/SPEC	VARIANCE DATE	VARIANCE APPROVAL DATE
96-001	Grubbing Depth	Sec 02110 3.02	6/25/96	7/15/96
96-002	16 oz. Geotextile	Sec 02595 2.01	6/26/96	7/15/96
96-003	Coal Tunnel backfill	Sec 02060 3.04 C	7/2/96	7/15/96
96-004	Geomembrane Liner - AAD	Drwg 1/C-15	8/28/96	9/19/96
96-005	Geotextile - Created Wetland Berm	Drwg 6/C-10	8/29/96	11/6/96
96-006	Slope of Clean Corridor	Drwg C-18	9/12/96	11/15/96
96-007	Limits of demo debris	Drwg C-4	10/1/96	11/15/96
96-008	Revise Variance 96-004	Drwg 1/C-15	10/3/96	11/15/96
96-009	Blast rock size/placement	Sec 02110	10/4/96	11/15/96
96-010	Destructive Pass/Fail Criteria	Sec 02597 4.03 G	10/9/96	11/15/96
96-011	Cap strip with smooth HDPE	Sec 02597 2.02 C	10/23/96	11/15/96
96-012	Relocate water line	C-4 & C-8	8/27/96	6/23/97
96-013	Eliminate MH replace w/elbow	Drwg C-5, 3/C-17	9/3/96	6/23/97
96-014	Revised excavation for MBTA	C-4 & Details 2/C-19	10/28/96	6/23/97
96-015	Relocate FES 203	Drwg C-5 & C-5A	10/30/96	6/23/97
96-016	Revise dimensions for Sleeve	Drwg 3/C-17A	11/6/96	6/23/97
96-017	Revised comp. requirements for topsoil areas	Drwg 1/C-20 et al.	11/8/96	6/23/97
96-018	Replace SUR LOK 2.0 with standard	Sec 02400	11/11/96	6/23/97
96-019	Revision of 96-015	Drwg C-5 & C-5A	11/22/96	6/23/97
96-020	Revised crushed stone spec.	Sec 02234	11/25/96	6/23/97
96-021	Section for DMH-34	Drwg C-5 & C-15	11/25/96	6/23/97
96-022	Added sleeve for watermain	Drwg C-5	11/27/96	6/23/97
96-023	Revised 96-013	Drwg 3/C-17	11/27/96	6/23/97
96-024	Revised inverts 202 & 203	Drwg C-5 and C-5A	12/3/96	6/23/97
96-025	Replace Transition 3 of 18	Drwg C-9	9/17/96	6/23/97
96-026	Move Transition 7 to north	Drwg C-9	10/31/96	6/23/97

VARIANCE SUMMARY
INDUSTRI-PLEX SITE
RTC ALTERNATE COVER 1996 - 1997

VARIANCE NO.	DESCRIPTION	DESIGN PLAN/SPEC	VARIANCE DATE	VARIANCE APPROVAL DATE
96-027	ACM material	Spec Ref: Demo Assess Rpt, page 22, Sec 6.0	10/1/96	6/23/97 6/23/97
96-028	Organic material disposal	Sec 02110, 3.03 (A)&(F)	10/1/96	6/23/97
96-029	Added Table 1, Sec 02220	Sec 02220	10/1/96	6/23/97
96-030	Revised fence trench location	Drwg C-5 & 3/C-20	12/20/96	12/30/96
96-031	Revised clean corridor gas & elec	Drwg C-4 & C-5A	12/20/96	12/31/96
96-032	Place geotextile over geomembrane	Drwg 1/C-15, 2/C-15, 3/C-15 & C2/C-18	12/20/96	12/30/96
96-033	Compact detention basin soils	Drwg 2/C-18	12/20/96	12/30/96
96-034	Delete surcharge requirement	Drwg C-5	12/6/96	6/23/97
96-035	Maintain existing utility pile - MBTA	Drwg C-4, C-19	12/19/96	6/23/97
96-036	Revise 96-032	Drwg 1/C-15, 2/C-15 3/C-15, C2/C-18 and Sec 02597	12/20/96	6/23/97
96-037	Rip-rap Gradation	Sec 02271, C-9 - C-20	2/12/98	3/13/98
96-038	16. oz geotextile	Sec 02595 2.01	2/12/98	3/13/98
96-039	Compaction	Sec 02223	2/12/98	3/13/98
96-040	Cover thickness	C-9, 11A, 18 & 19	2/12/98	3/13/98
96-041	Binder mix	Sec 02575	2/12/98	3/13/98
96-042	Pavement density	Sec 02575	2/12/98	3/13/98
96-043	Concrete air content	Sec 03300	2/12/98	3/13/98
96-044	HDPE seam testing	Sec 02597	2/12/98	3/13/98

APPENDIX C.1.1

APPROVED VARIANCE REQUEST FORMS

INDUSTRI-PLEX SITE REMEDIAL TRUST
23 Atlantic Ave
Woburn, MA 01801

Tel. (617)938-7190
Fax (617)932-9589

VARIANCE REQUEST

Date of Request: 6/25/96 Suspense Date: ASAP Variance No: 96-001

Originator: Peter Neumann, Golder Associates, Inc., Resident Engineer

Proposed Variance: Drwg Ref: _____ Spec Ref: 02110 3.02 Site Location: CRC/RTC Area

3.02 B. Grubbing shall consist of removing roots, stumps, trash, and other debris from all graded areas according to the following:
Remove stumps and root masses to a depth of 6-inches from existing grade. All protruding roots shall be removed from the prepared ground surface on which geotextile will be placed.

E. Surface rocks and boulders 6-inches or more to a depth of 6-inches below the prepared ground surface on which geotextile will be placed shall be grubbed from the soil. Surface rocks and boulders will be reduced to less than 2 feet in greatest dimension or as approved by the Trustee Representative and EPA in consultation with MADEP and placed in areas of deep fills.

N: [Delete all of N]

Justification: There is limited vegetation on Janpet property and there will be fill soil placed over the existing ground before a soil cover is placed.

Review: Recommend Approval ☑ Modified ☐ Rejected ☐

Comments: _____

Peter Neumann 7/3/96
Reviewer Date

Disposition: Approved ☑ Modified ☐ Rejected ☐

Comments: _____

Joseph F. LeMay 7/15/96
Joseph F. LeMay Date
U.S.E.P.A. Remedial Project Manager

INDUSTRI-PLEX SITE REMEDIAL TRUST
23 Atlantic Ave
Woburn, MA 01801

Tel. (617)938-7190
Fax (617)932-9589

VARIANCE REQUEST

Date of Request: 6/26/96 Suspense Date: ASAP Variance No: 96-002

Originator: Peter Neumann, Golder Associates, Inc., Resident Engineer

Proposed Variance: Drwg Ref:_____ Spec Ref: 02595 2.01 Site Location: CRC/RTC Area

Change the required specification of 16 oz non woven geotextile from 180 mil to 175 mil according to ASTM D5199 standard.

Justification: The proposed geotextile manufactured by Amoco has properties which meet the specified minimum average roll values, with the exception of thickness. Thickness is considered more of a descriptive property than a design oriented property. Acceptance of this product will not affect cover integrity.

Review: Recommend Approval ☑ Modified ☐ Rejected ☐

Comments:

Peter Neumann 7/3/96
Reviewer Date

Disposition: Approved ☑ Modified ☐ Rejected ☐

Comments:

Joseph F. LeMay 7/15/96
Joseph F. LeMay Date
U.S.E.P.A. Remedial Project Manager

INDUSTRI-PLEX SITE REMEDIAL TRUST
23 Atlantic Ave
Woburn, MA 01801

Tel. (617)938-7190
Fax (617)932-9589

VARIANCE REQUEST

Date of Request: 7/02/96 Suspense Date: ASAP Variance No: 96-003

Originator: Peter Neumann, Golder Associates, Inc., Resident Engineer

Proposed Variance: Drwg Ref: CRC No. 7 Spec Ref: 02060 3.04.C Site Location: Coal Tunnel

Feature 24: Coal Tunnel
Remove rebar and place compacted fill in accordance with Section 02223 2.03

Justification: The alternative of filling the coal tunnel with compacted soil is an equivalent method to using lean concrete and soil is readily available.

Review: Recommend Approval ☑ Modified ☐ Rejected ☐

Comments:

Peter Neumann 7/3/96
Reviewer Date

Disposition: Approved ☑ Modified ☐ Rejected ☐

Comments:

Joseph F. LeMay 7/15/96
Joseph F. LeMay Date
U.S.E.P.A. Remedial Project Manager

OPTIONAL FORM 99 (7-90)

FAX TRANSMITTAL # of pages ▶ 1

To Peter Neuman	From Joe LeMay
Dept./Agency GA	Phone # 573-9622
Fax # 617 932 9589	Fax #

NSN 7540-01-317-7368 5099-101 GENERAL SERVICES ADMINISTRATION

SITE REMEDIAL TRUST
Atlantic Ave
urn, MA 01801

Tel. (617)938-7190
Fax (617)932-9589

VARIANCE REQUEST

Date of Request: 8/28/96 **Suspense Date:** ASAP **Variance No:** 96-004

Originator: Peter Neumann, Golder Associates Inc.

Proposed Variance: **Drwg Ref.** 1/C-15 **Spec Ref:** _____ **Site Location:** CRC/RTC Area

Revise detail 1/C-15 to include a geomembrane, flexible membrane liner of the relocated Atlantic Avenue Drainway. Southbank will have 5' +/- runout across the top of bank. The North bank will tie into the detention basin - wet basin liner. An anchor trench will tie the upstream end into the drainway bed. See Detail AAD-1. Downstream the geomembrane will connect to a concrete headwall footing. See Detail AAD-2.

~~Justification:~~ Other details affected: 3/C-15, 2/C-10

Justification: While excavating the relocated Atlantic Avenue drainway waste materials were exposed on the banks and the water was sampled for constituents. The results showed contaminants in the water. In order to minimize infiltration of these contaminants into surface waters the impermeable membrane is being installed from stations 4+00 to 10+36.4 as shown on Drawing C-5A

Review: Recommend Approval ☐ Modified ☐ Rejected ☐

Comments:

Reviewer **Date**

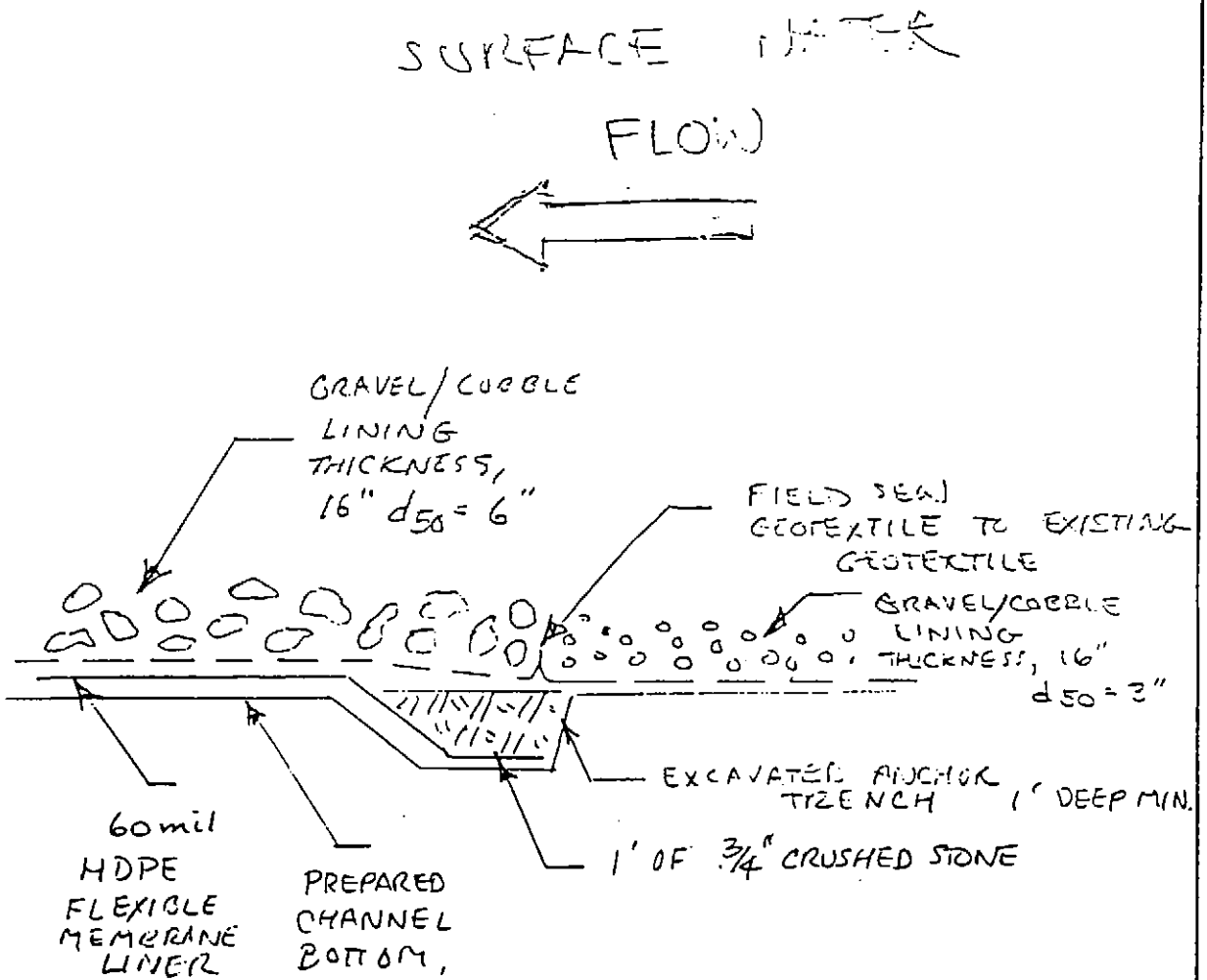
Disposition: Approved ☒ Modified ☐ Rejected ☐

Comments: ① How will the GEO MEMBRANE be connected to the new concrete headwall? ② ISRT is collecting additional surface water samples in the AAD (PERMEABLE COVER) IMMEDIATELY NORTH OF THE RELOCATED AAD (4+00 TO 10+36). The result will determine if the geomembrane should be extended further north in the AAD, per 8/29/96 const. progress meeting.

Joseph F. LeMay 9/13/96

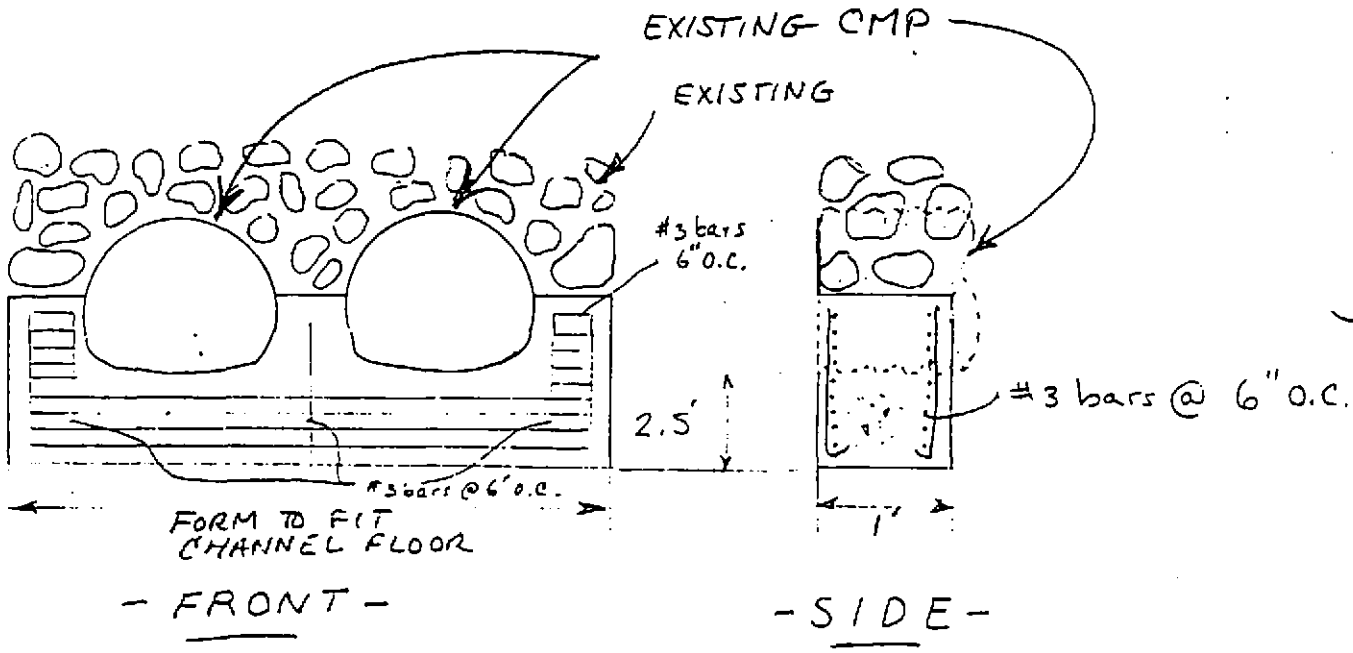
Joseph F. LeMay **Date**
U.S.E.P.A. Remedial Project Manager

DRAFT



JOB No.: 933-6142.960	SCALE: NOT TO SCALE	TYPICAL UPSTREAM TRANSITION ATLANTIC AVENUE DRAINWAY GRAVEL/COBBLE LINING
DRAWN: PCN	DATE: 8/8/96	
CHECKED:	DWG. No.:	
Golder Associates	INDUSTRI-PLEX SITE	FIGURE AAD-1

DRAFT



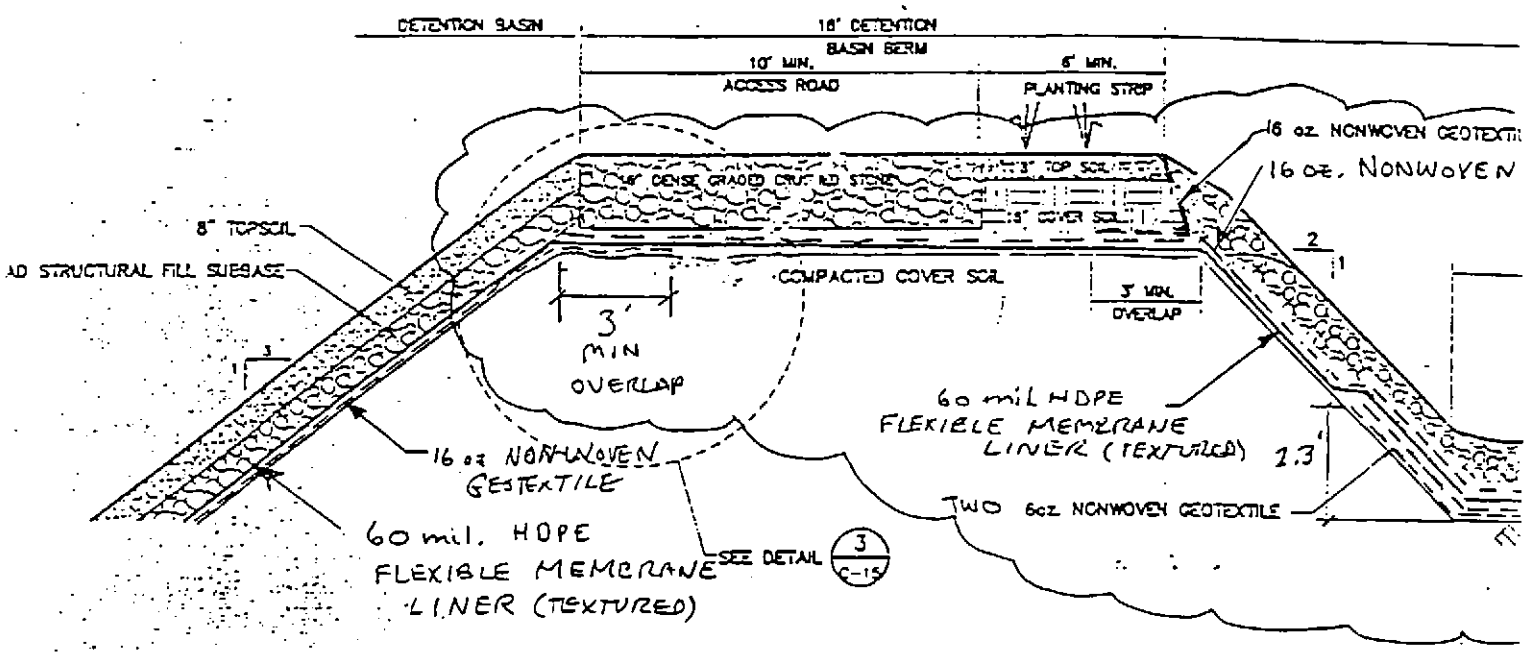
NEW CONCRETE HEADWALL FOOTING

NOTES:

1. Neat line finish is not required adjacent to headwall rip-rap.
2. See Project Manual for concrete mix reinforcement and formwork.

JOB No.: 933-6142.960	SCALE: AS SHOWN	HEADWALL - ATLANTIC AVE DRAINWAY
DRAWN: PCN	DATE: 8/8/96	
CHECKED:	DWG. No.:	
Golder Associates	INDUSTRI-PLEX SITE	FIGURE AAD-2

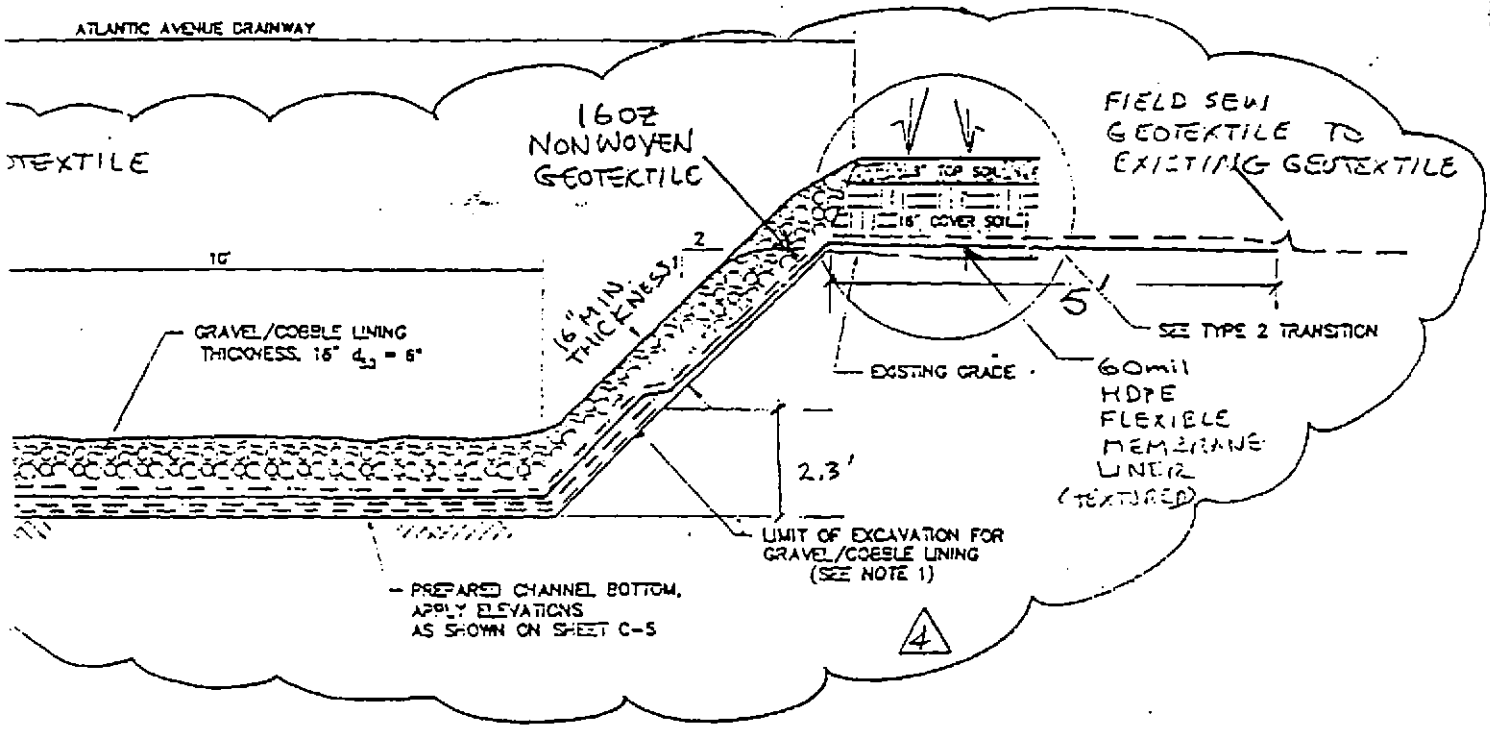
DRAFT



1
C-15

TYPICAL RELOCATE
DRAINWAY C

NOT TO SC



ATLANTIC AVENUE
ER SECTION

OPTIONAL FORM 99 (7-90) DATE: 11/6/96

FAX TRANSMITTAL # of pages ▶ 2

To Peter Neumann	From Joseph LeMay
Agency GA	Phone # 573-9622
Fax # 932-9589	Agency EPA

NSN 7540-01-317-7368 5099-101 GENERAL SERVICES ADMINISTRATION

9. 3.1996 15:51 P. 2

:X SITE REMEDIAL TRUST
:3 Atlantic Ave
ɔburn, MA 01801

Tel. (617)938-7190
Fax (617)932-9589

VARIANCE REQUEST

Date of Request: 8/29/96 Suspense Date: ASAP Variance No: 96-005

Originator: Peter Neumann, Golder Associates, Inc., Resident Engineer

Proposed Variance: Drwg Ref: 6/C-10 Spec Ref: _____ Site Location: Janpet Property

Revise geotextile placement adjacent to Created Wetland Berm.

Justification: Depth of compacted site fill is deeper than anticipated.

Review: Recommend Approval ☐ Modified ☐ Rejected ☐

Comments: _____

Peter Neumann 8/29/96
Reviewer Date

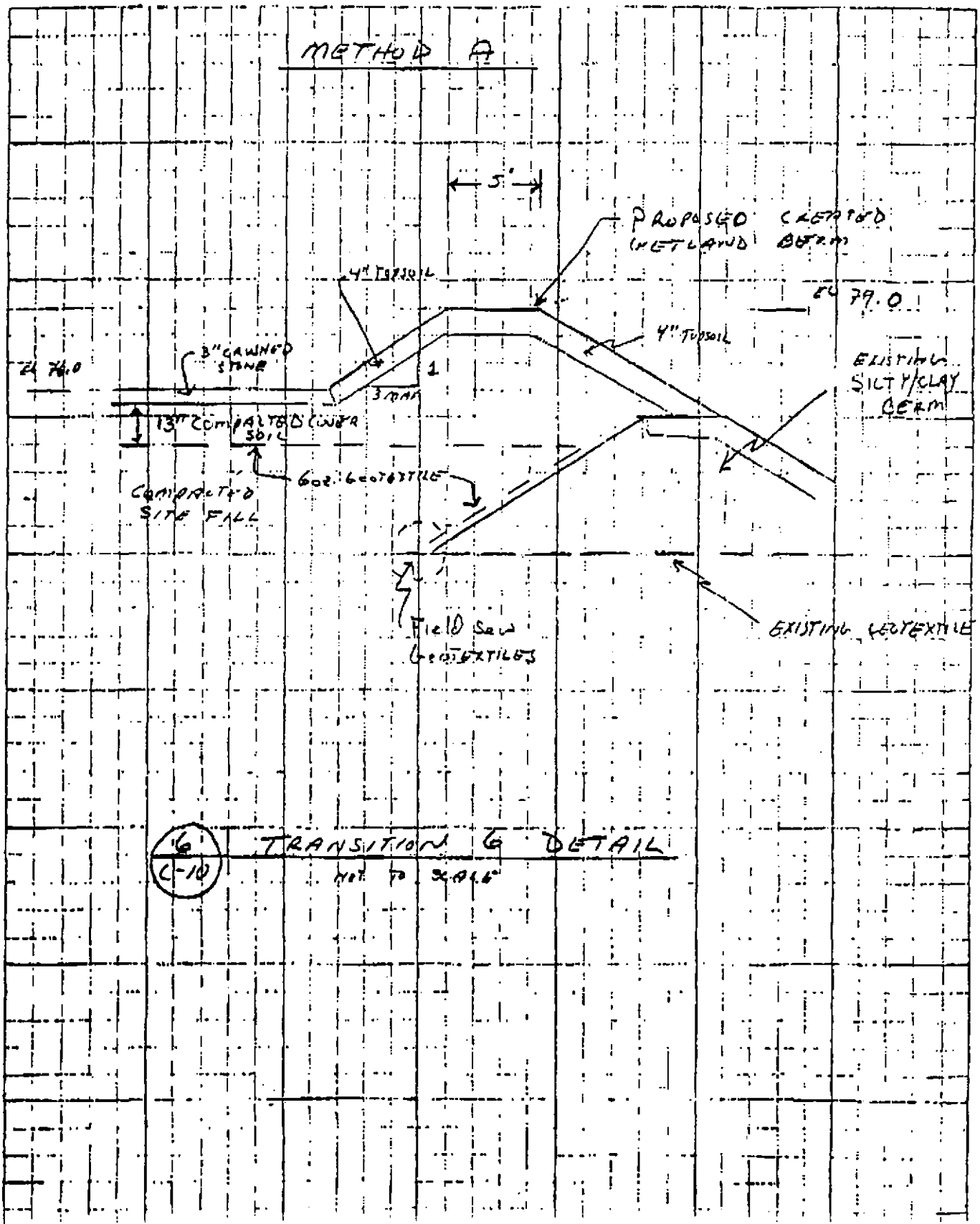
Disposition: Approved ☒ Modified ☐ Rejected ☐

Comments: Based upon the ISRT submittal of the average clean fill cover calculations over the Janpet Property as 2.6 feet, EPA approves the variance for the Created wetland berm. The calculation of the clean fill cover was submitted to EPA during the 10/10/96 Construction Progress Meeting.

Joseph F. LeMay 11/6/96
Joseph F. LeMay Date
U.S.E.P.A. Remedial Project Manager

Golder Associates

SUBJECT Transition		
Job No. 933-6142.960	Made by AMT	Date 08/29/96
Ref.	Checked	Sheet 3 of 4
	Reviewed	



6 / C-10 TRANSITION G DETAIL

NOT TO SCALE

OPTIONAL FORM 99 (7-90)

FAX TRANSMITTAL | # of pages ▶ 6

To Peter Neumann	From Joseph LeMay
Dept./Agency GAI	Phone # 573-9622
Fax # 932 9589	Fax # US EPA

NSN 7540-01-317-7368 5099-101 GENERAL SERVICES ADMINISTRATION

SITE REMEDIAL TRUST
Atlantic Ave
urn, MA 01801

Tel. (617)938-7190
Fax (617)932-9589

VARIANCE REQUEST

Date of Request: 9/12/96 Suspense Date: _____ Variance No: 96-006

Originator: Peter Neumann, Golder Associates Inc.

Proposed Variance: Drwg Ref: C-18 Spec Ref: _____ Site Location: RTC Area

Revise Detail 3 showing 4H:1V slope for clean corridor excavation for 48-inch RCP to 2H:1V slope.

Justification:

Excavation slope steepness for clean corridors are limited by OSHA requirements. Since the corridor will be backfilled, there is no need to maintain a 4H:1V slope for stability.

Review: Recommend Approval ☐ Modified ☐ Rejected ☐

Comments: _____

Peter Neumann 10/16/96
Reviewer Date

Disposition: Approved ☑ Modified ☐ Rejected ☐

Comments: EPA received variance 11/7/96

Joseph F. LeMay 11/15/96
Joseph F. LeMay Date
U.S.E.P.A. Remedial Project Manager

INDUSTRI-PLEX SITE REMEDIAL TRUST
23 Atlantic Ave
Woburn, MA 01801

Tel. (617)938-7190
Fax (617)932-9589

VARIANCE REQUEST

Date of Request: 10/1/96 Suspense Date: _____ Variance No: 96-007

Originator: Peter Neumann, Golder Associates Inc.

Proposed Variance: Drwg Ref: C-4 Spec Ref: _____ Site Location: RTC Area

1. Revise limits of Demolition Debris Placement by increasing the width (East-West) by an additional 5 feet to the east.

2. Revise limits of Demolition Debris Placement by placing material over the three concrete underground storage tanks, and coal tunnel.

Justification:

There has been a reduction in available volume and an increase in demolition debris quantities. At EPA's request, the 4-inch cushion layer has been increased to between 4 to 12-inches thick. This reduces the available volume. Several more foundations were found in the MBTA right of way which were subsequently demolished. This volume was not anticipated.

Review: Recommend Approval ☐ Modified ☐ Rejected ☐

Comments: _____

Peter Neumann 10/16/96
Reviewer Date

Disposition: Approved ☑ Modified ☐ Rejected ☐

Comments: EPA received request 11/7/96

Joseph F. LeMay 11/15/96
Joseph F. LeMay Date
U.S.E.P.A. Remedial Project Manager

INDUSTRI-PLEX SITE REMEDIAL TRUST
23 Atlantic Ave
Woburn, MA 01801

Tel. (617)938-7190
Fax (617)932-9589

VARIANCE REQUEST

Date of Request: 10/3/96 Suspense Date: _____ Variance No: 96-008

Originator: Peter Neumann, Golder Associates Inc.

Proposed Variance: Drwg Ref: 1/C-15 Spec Ref: _____ Site Location: RTC Area

Revise detail 1/C-15 to include a cushion layer of geocomposite over the geomembrane liner and under the 16 oz. nonwoven geotextile. See attached figure RAAD-1.

Justification:

Rip-rap being placed on the 16 oz. geotextile may damage underlying geomembrane, a cushion layer will help protect the geomembrane during construction.

Review: Recommend Approval ☐ Modified ☐ Rejected ☐

Comments: _____

Peter Neumann 10/16/96
Reviewer Date

Disposition: Approved ☑ Modified ☐ Rejected ☐

Comments: EPA received request 11/7/96

Joseph F. LeMay 11/15/96
Joseph F. LeMay Date
U.S.E.P.A. Remedial Project Manager

INDUSTRI-PLEX SITE REMEDIAL TRUST
23 Atlantic Ave
Woburn, MA 01801

Tel. (617)938-7190
Fax (617)932-9589

VARIANCE REQUEST

Date of Request: 10/4/96 Suspense Date: _____ Variance No: 96-009

Originator: Peter Neumann, Golder Associates Inc.

Proposed Variance: Drwg Ref: _____ Spec Ref: 02110 Site Location: RTC Area

02110-3, 3.02, E. Add the following, "Blast rock will be reduced to 2 feet in the smallest dimension and placed with fines in lifts not exceeding 2 feet in deep fill areas:

Justification:

Blast rock dimension was not defined in the specifications and with the blast fines can be placed as rock fill without having to reduce the rock to 2 feet in the maximum dimension.

Review: Recommend Approval ☐ Modified ☐ Rejected ☐

Comments:

Peter Neumann
Reviewer

10/16/96
Date

Disposition: Approved ☐ Modified ☑ Rejected ☐

Comments: Variance request submitted to EPA on 11/7/96

Variance request is unclear and needs to be revised. According to Peter Neumann, Blast Rock > 2 feet (i.e. slab) would be placed in lifts not exceeding 2 feet in deep fill areas. Based upon this discussion, the request is not accurate.

Also, Golder Associates observed only a very small amount of blast rock being > 2 feet.

Joseph F. LeMay
Joseph F. LeMay
U.S.E.P.A. Remedial Project Manager

11/15/96
Date

INDUSTRI-PLEX SITE REMEDIAL TRUST
23 Atlantic Avenue
Woburn, Massachusetts

Tel. (617) 938-7190
Fax. (617) 932-9589

VARIANCE REQUEST

Date of Request 10/09/96 Suspense Date:_____ Variance No. 96-010

Originator: Peter Neumann, Golder Associates Inc.

Proposed Variance: Drwg Ref: ____ Spec Ref. Section 02597 4.03 G. Site Location: AAD

Revise the pass/fail criteria of a field seam destructive test. Currently the specification requires a passing test of 5 out of 5 specimens. Industry standards for the pass/fail criteria is for 4 of 5 specimens passing result in a passing sample.

Justification:

The specifications are stricter than industry standards. Modification to industry standard is appropriate. See attached examples of specifications and guidance documents, 7 pages.

Review: Recommend Approval ☐ Modified ☐ Rejected ☐

Comments:

Peter Neumann 11/7/96
Reviewer Date

Disposition: Approved ☑ Modified ☐ Rejected ☐

Comments:

Joseph F. LeMay 11/15/96
Joseph F. LeMay Date
U.S.E.P.A. Remedial Project Manager

GCS

Golder Construction Services, Inc.
Quality Assurance and Construction Management

October 9, 1996 957-1263.1

Mr. Peter Neumann, P.E.
Resident Engineer
Golder Associates Inc.
23 Atlantic Avenue
Woburn, MA 01801

Dear Peter:

As requested per our telephone conservation this morning, the following summarizes the industry standards for geomembrane laboratory destructive testing pass/fail criteria.

Attached are several examples of pass/fail criteria for geomembrane destructive samples from previous GCS projects. Each of the examples require 4 out of 5 specimens passing to result in a passing sample. The examples are from the following:

- Waste Management - Quality Assurance Manual for the Installation of Lining Systems;
- EPA - Technical Guidance Document;
- Chester County Solid Waste Authority, Pennsylvania;
- Atlantic County Utilities Authority, New Jersey; and
- National Seal Company - Construction Quality Control Manual.

It is GCS' opinion that the 4 out of 5 specimens criteria is an acceptable requirement for geomembrane laboratory destructive testing.

I hope that this information is sufficient for your needs. If you have any questions, please contact me at (609) 273-9877.

Sincerely,

GOLDER CONSTRUCTION SERVICES, INC.

James E. Whitty, P.E.
Associate

mlb:jew

Attachments

be shipped as soon as possible to expedite laboratory testing. The Project Manager will be responsible for storing the archive samples. Test samples shall be tested by the Geosynthetic QAL.

Testing shall include seam strength and peel adhesion (ASTM D4437). The minimum acceptable values to be obtained in these tests shall be provided in the project specifications. At least 5 specimens shall be tested, each in both shear and peel. Specimens shall be selected alternately by test from the samples (i.e., peel, shear, peel, shear). A passing test shall meet the minimum acceptable values in at least 4 of the 5 specimens tested for each method.

The Geosynthetic QAL shall provide test results within 24 hours of receiving the samples. The Geosynthetic QAE shall review laboratory test results as soon as they become available, and make appropriate recommendations to the Project Manager.

9.9.7 Destructive Test Failure

When a sample fails a destructive test, whether that test is conducted by the Geosynthetic QAL or by field tensiometer, the Installer has two options:

1. The Installer can repair the seam between any two passing destructive test locations.
2. The Installer can trace the welding path to an intermediate location 10 ft (3 m) minimum from the point of the failed test in each direction and take a sample with a 1 in (25 mm) wide die for an additional field test at each location. If these additional samples pass the test, then full laboratory samples are taken. If these laboratory samples pass the tests, then the seam is repaired between these locations. If either sample fails, then the process is repeated to establish the zone in which the seam should be repaired.

All acceptable repaired seams shall be bound by two locations from which samples passing laboratory destructive tests have been taken. Passing laboratory destructive tests of trial seam samples taken as indicated in Section 9.7.4 may be used as a boundary for the failing seam. In cases exceeding 150 ft (50 m) of repaired seam, a sample taken from the zone in which the seam has been repaired must pass destructive testing. Repairs shall be made in accordance with Section 9.10.

The Geosynthetic QAC shall document all actions taken in conjunction with destructive test failures.

9.10 DEFECTS AND REPAIRS

9.10.1 Identification

All seams and non-seam areas of the geomembrane shall be examined by the Geosynthetic QAC for identification of defects, holes, blisters, undispersed raw materials, large wrinkles and any sign of contamination by foreign matter. The geomembrane surface shall be cleaned by the Installer prior to examination if the Geosynthetic QAC determines that the amount of dust or mud inhibits examination.

geomembrane sheet must be included. The nominal sheet thickness is usually used. If the actual sheet thickness is used, a large amount of thickness measurements will be required to obtain a statistically reliable value. It is not a recommended procedure.

The resulting value of seam peel strength is then compared to a specified value (the usual case) or to the strength of the unseamed geomembrane sheet. The testing procedures for obtaining these values are listed in Table 3.4. It can be seen, however, that only with PVC is the same width test specimen used for peel and sheet testing. For HDPE and VLDPE one is comparing a 1.0 in. uniform width peel test with a dumbbell shaped specimen, while for CSPE-R and EIA-R one is comparing a uniform width peel test with the strength from a grab shaped test specimen. If, however, one does have a specified sheet strength value or a measured value, a seam peel strength efficiency calculation can be made as follows:

$$E_{peel} = \frac{T_{seam\ in\ peel}}{T_{unseamed\ sheet}} (100) \tag{3.2}$$

where

E_{peel} = seam efficiency in peel (%)
T_{seam} = seam peel strength (force or stress units)
T_{sheet} = sheet tensile strength (force or stress units)

The contract plans, specifications or CQA documents should give the minimum allowable seam peel strength efficiency. As a minimum, the guidance listed below can be used whereby percentage peel efficiencies (or values) are listed as follows:

HDPE = 62% of specified minimum yield strength and FTB
VLDPE = typically 1000 lb/in^2
PVC = 10 lb/in.
CSPE-R = 10 lb/in. or FTB
EIA-R = 10 lb/in.

Lastly, the number of failures allowed per number of tests conducted should be addressed. If sets of 5 test specimens are performed for each field sample, many specifications allow for one failure out of the five tested. If the failure number is larger, then the plans, specifications or CQA documents must be clear on the implications.

When a destructive seam test sample fails, many specifications require an additional two samples to be taken, one on each side of the original spaced 3 m (10 ft) from it. If either one of these samples fail the iterative process of sampling every 3 m (10 ft) is repeated until successful samples result. In this case, the entire seam between the last successful test samples must be questioned. Remedies are to cap strip the entire seam or if the seam is HDPE or VLDPE made with a thermal fusion method (hot air or hot wedge) to extrude a fillet weld over the outer seam edge. When this is done the seams on the cap strip or extrusion fillet weld may be sampled and tested as just described.

Note that neither elongation of the specimen nor peel separation, during the test is usually monitored (although current testing trends are in this direction), the only value under consideration is the maximum tensile force that the seam can sustain. It should also be mentioned that both frontward and backward peel tests can be performed thereby challenging both sides of a seam. For

CQA SPECIFICATIONS - CHESTER COUNTY SOLID WASTE AUTHORITY, PENNSYLVANIA

pass, then the procedures outlined in Paragraph 3.03K of this section shall be followed.

4. Laboratory Testing: Testing by the geosynthetics laboratories will include "Seam Strength" and "Peel Adhesion" (ASTM D 4437) with 1-in. wide strip, tested at 2-in. per minute. Both tracks of double fusion seams shall be tested. At least 5 specimens will be tested for each test method. To be acceptable, 4 out of 5 samples shall pass shear and peel testing with strength values equal to those indicated in Table 02771-1 and fail in the sheet by film tearing bond (FTB). FTB is defined as no more than 10% separation at the seam. Specimens will be selected alternately by test from the samples (i.e., peel, shear, peel, shear...). CQA Laboratory shall provide test results to the site no more than 24 hours after the samples are received at the laboratory.

5. Destructive Test Failure:
   a. The following procedures shall apply whenever a sample fails a destructive test, whether the test is conducted by the CQA laboratory, the Geosynthetics Installer's laboratory, or by a field tensiometer. The Geosynthetics Installer shall have two options, as described in b and c below.
   b. The Geosynthetics Installer can reconstruct the seam (e.g., remove the old seam and reseam) between any two passed test locations.
   c. The Geosynthetics Installer can trace the welding path to an intermediate location, a minimum of 10 ft from the location of the failed test (in each direction) and take a small sample for an additional field test at each location. If these additional samples pass the tests, then full laboratory samples shall be taken. If these laboratory samples pass the tests, then the seam shall be reconstructed between these locations. If either sample fails, then the process shall be repeated to establish the zone in which the seam should be reconstructed. In any case, all acceptable seams must be bounded by two locations from which samples passing laboratory destructive tests have been taken. In cases where the length of reconstructed seam exceeds 150 ft, a destructive sample taken from within the reconstructed zone must pass destructive testing. Whenever a sample fails, the CQA Consultant may

If both samples pass the field test described above, a sample for laboratory testing shall be taken.

The sample for laboratory testing shall be located between the two samples which were tested. The sample for laboratory testing shall 12 inches (0.3 m) wide by 44 inches (1.1 m) long with the seam centered lengthwise. The sample shall be cut into three parts and distributed as follows:

- one portion to the Installer for laboratory testing, 12 in. x 12 in. (0.3 m x 0.3 m);
- one portion to the ACUA for archive storage, 12 in. x 12 in. (0.3 m x 0.3 m); and,
- one portion for the Geosynthetic Quality Assurance Laboratory testing, 12 in. x 18 in. (0.3 m x 0.5 m)

Final determination of the sample sizes shall be made at the Pre-Construction Meeting.

All holes in the geomembrane resulting from destructive seam sampling shall be immediately repaired in accordance with repair procedures described in Section 1.9. The continuity of the new seams in the repaired area shall be tested according to Section 1.8.2.

1.8.3.2 Geosynthetic Quality Assurance Laboratory Testing

CQA MANUAL — ATLANTIC COUNTY UTILITY AUTHORITY, NEW JERSEY

Packaging and shipping of destructive test samples shall be the responsibility of the QC Inspector and shall be conducted in a manner which will not damage the test sample. The ACUA shall verify that packing and shipping conditions are acceptable. The ACUA will be responsible for storing the archive samples. This procedure shall be fully outlined prior to construction. Test samples shall be tested by the Geosynthetic QC Laboratory. The Geosynthetic QC Laboratory shall be selected by the ACUA.

Testing shall include "Shear Strength" (ASTM Designation D638 with type M-1 specimen 0.5 inches (10 mm) wide tested at 2 inches (50 mm) per minute) and "Peel Adhesion" (ASTM Designation D4437). These terms are defined in the test specifications. The minimum acceptable values to be obtained in these tests are those indicated in Table 1, and the specifications. At least 5 specimens shall be tested for each test method. Specimens shall be selected alternately by test from the samples (i.e., peel, shear, peel, shear,. . .). At least 4 of the 5 specimens tested shall meet or exceed the requirements indicated in Table 1. The failed specimen must not be so significantly different in failure load (>75%) and mode so as to be "suspect" of other problems.

direction from the location of the initial non-complying sample. Perform a field test for peel strength. If these field samples pass, then laboratory samples can be cut and forwarded to the laboratory for full testing.

4.4.3.1.1 If the laboratory samples pass, then reconstruct the seam between the two (2) passing sample locations according to procedures detailed in Section 5.3.

4.4.3.1.2 If either of the samples are still in non-compliance, then additional samples are taken in accordance with the above procedure until two (2) passing samples are found to establish the zone in which the seam should be reconstructed.

4.4.3.2 All passing seams must be bounded by two (2) locations from which samples passing laboratory destructive tests have been taken.

4.4.3.3 In cases of reconstructed seams exceeding 150 feet, a sample must be taken and pass destructive testing from within the zone in which the seam has been reconstructed.

4.4.3.4 All destructive seam samples shall be numbered and recorded on National Seal Company's Destructive Test Form as exhibited in Appendix A.

4.5 Laboratory Testing of Destructive Seam Samples

4.5.1 Destructive Seam Testing Laboratory

Seam destructive samples will be sent to National Seal Company's laboratory when required by a site specific quality control plan or in the event that third party laboratory destructive testing is not being performed.

4.5.2 Acceptance Criteria

Destructive samples will be tested for "Shear Strength" and "Peel Adhesion" (ASTM D4437 as

modified by NSF). Five (5) specimens shall be tested for each test method. Four (4) out of the five (5) specimens must exhibit FTB (as defined by NSF Standard Number 54-1991) for each round of peel and shear testing. In addition, four (4) of the five (5) individual specimens and the average of the five (5) peel and shear tests must meet or exceed the strength requirements as listed in NSC's Material Specification Sheet in order for the seam to pass the destructive test.

5. Defects and Repairs

5.1 National Seal Company's CQC Coordinator and Project Superintendent shall conduct a detailed walk through and visually check all seams and non-seam areas of the geomembrane for defects, holes, blisters, and signs of damage during installation.

5.2 All other National Seal Company installation personnel shall, at all times, be on the lookout for any damaged areas. Damaged areas shall be marked and repaired.

5.3 Repair Procedures

Any portion of the geomembrane or geomembrane seam showing a flaw, or having a destructive or non-destructive test in non-compliance shall be repaired. Several procedures exist for repair and the decision as to the appropriate repair procedure shall be made by National Seal Company's Project Superintendent.

Procedures available for repair include the following:

5.3.1 Patching - used to repair large holes, tears, and destructive sample locations. All patches shall extend at least three inches (3") beyond the edges of the defect and all corners of patches shall be rounded.

5.3.2 Grinding and Welding - used to repair sections of extruded fillet seams.

5.3.3 Spot Welding or Seaming - used to repair small tears, pinholes, or other minor localized flaws.

5.3.4 Capping - used to repair lengths of extrusion or fusion welded seams.

INDUSTRI-PLEX SITE REMEDIAL TRUST
23 Atlantic Avenue
Woburn, Massachusetts

Tel. (617) 938-7190
Fax. (617) 932-9589

VARIANCE REQUEST

Date of Request 10/23/96 Suspense Date:_____ Variance No. 96-011

Originator: Peter Neumann, Golder Associates Inc.

Proposed Variance: Drwg Ref: ____ Spec Ref. Section 02597 2.02 C. Site Location: AAD

Modify the specification to allow cap stripping of failed or questionable wedge welded seams with smooth HDPE membrane sheet. The technique is described in the attached letters from the Contractor and Manufacturer.

Justification:

Cap stripping is an approved method of repairing larger lengths of failed seam as stated in Section 02597 4.03 M. Since the cap strip is only 2 to 4 feet widealong seams speced 15 feet apart, interface friction between the geotextile and adjacent texture sheet is provided. The overlying geotextile will be anchored by being sewn to the existing remedial cover geotextile at the top of both drainway banks.

Review: Recommend Approval ☐ Modified ☐ Rejected ☐

Comments:

Peter Neumann 11/7/96
Reviewer Date

Disposition: Approved ☑ Modified ☐ Rejected ☐

Comments:

Joseph F LeMay 11/15/96
Joseph F. LeMay Date
U.S.E.P.A. Remedial Project Manager

ENVIRONMENTAL NETWORK, LLC
221 Bart Clough Road, Weare, N.H. 03281
603-529-4401 / 4402

October 16, 1996

Mr. Mike Lovezzola
LRS Environmental Services
400 Lafayette Road
Hampton, NH 03842

TOPIC: Drainway Liner
I-Plex Industrial Site
Cap Stripped Liner Seams

Dear Mike:

Because of the problems encountered welding the A/A Manufacturing's 60 mil Textured liner material, EN has capped stripped the questionable seams with A/A 60 mil smooth liner.

This has been accomplished, as per A/A Manufacturing's recommendations, by scrapping the texturing off the existing inplace 60 mil textured liner and extruding the 60 mil smooth liner over the questionable inplace textured to textured wedge welded seams.

These activities are industry accepted practices that will achieve the necessary results to insure a secured liner system in the drainway.

If you need more information feel free to inquire.

Sincerely yours,

John C. Lange
Member

AGRU/AMERICA, INC.

Subsidiary of AGRU - ALOIS GRUBER GMBH

Executive Offices-22 Main Street, Salem, NH 03079 • Phone 603-890-6160 • Fax 603-890-6635
Mfg Facility-815 Bolivar Street, Canton, MA 02021 • Phone 617-821-0710 • Fax 617-821-4754
Sales Office-142C des Alouettes, St. Bruno, PQ J3V6S4 Canada • Phone 514-653-5793 • Fax 514-441-0854

October 23, 1996

Fax: 603-529-4402

Mr. John C. Lange,
Environmental Network, LLC,
221 Bart Clough Road,
Weare, NH 03281

Re: Drainway Liner, I - Plex Industrial Site - Woburn, MA

Dear John,

As requested, we wish to inform you the cap stripping procedure, followed by your company, to cover wedge welds of our .080" D-Tex geomembranes, was an appropriate technique. Evaluation of the worksmanship quality, for the work done, remains the engineer's responsability.

We wish to thank you for your cooperation and we remain,

Sincerely,

J.W. Gagnon

J.W. Gagnon,
Director, International sales.

962En-1

cc: Mr. Robert Johnson
Mr. R.P.C. Pelletier

INDUSTRI-PLEX SITE REMEDIAL TRUST
23 Atlantic Avenue
Woburn, Massachusetts

Tel. (617) 938-7190
Fax. (617) 932-9589

VARIANCE REQUEST

Date of Request 8/27/96 **Suspense Date:**_____ **Variance No.** 96-012

Originator: Peter Neumann, Golder Associates Inc.

Proposed Variance: **Drwg Ref:** C-4 & C-8 **Spec Ref.**____ **Site Location:** Janpet Property

Clean corridor for a 6-inch water line to the southern fire hydrant will be shifted 5-feet to the north.

Justification:

The water line alignment falls in line with an interior wall in the warehouse. By shifting the line five feet the wall will be avoided.

Review: Recommend Approval ☑ Modified ☐ Rejected ☐

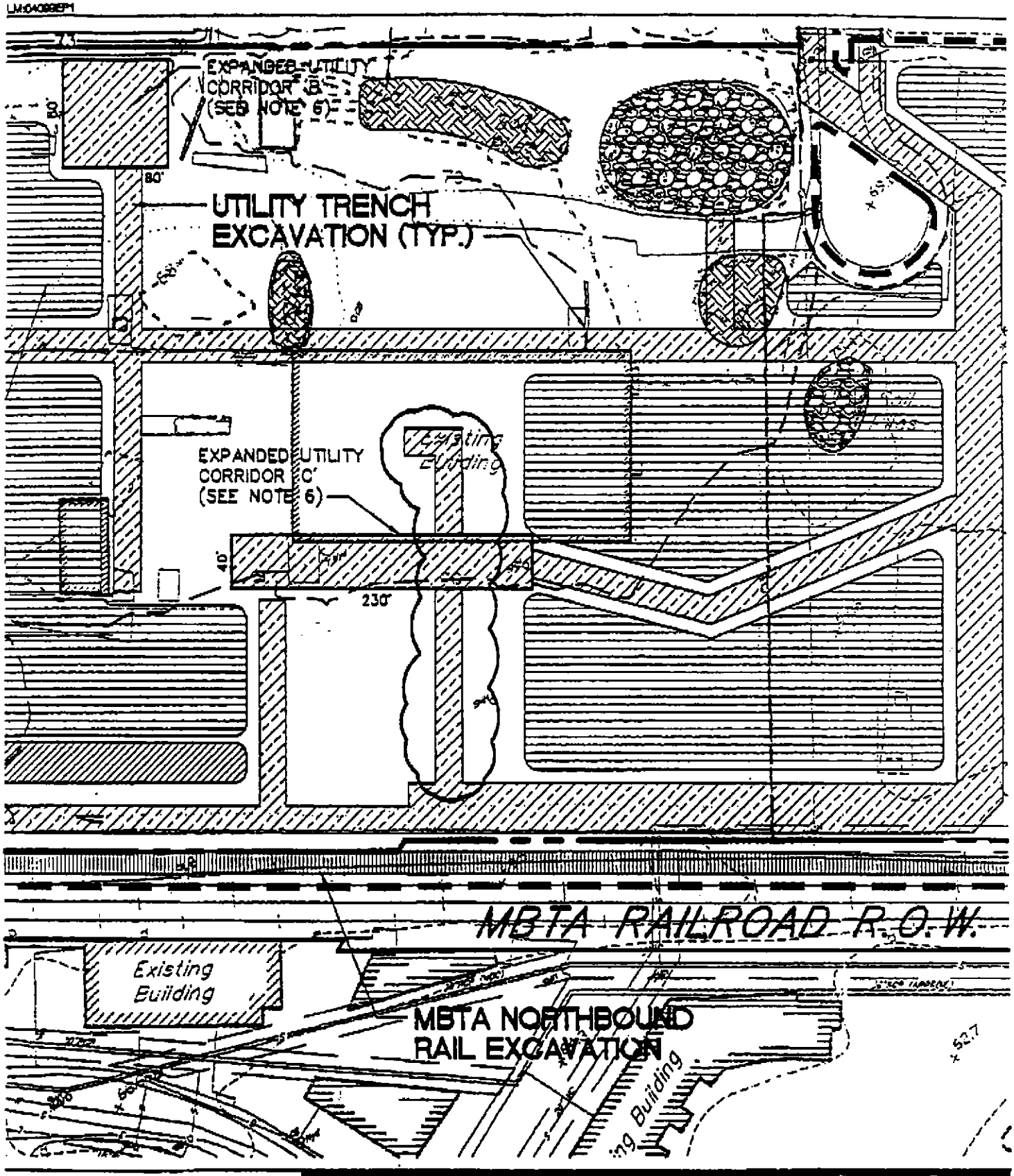
Comments:

Peter Neumann 12/13/96
Reviewer Date

Disposition: Approved ☒ Modified ☐ Rejected ☐

Comments:

Joseph F. LeMay 6/23/97
Joseph F. LeMay Date
U.S.E.P.A. Remedial Project Manager



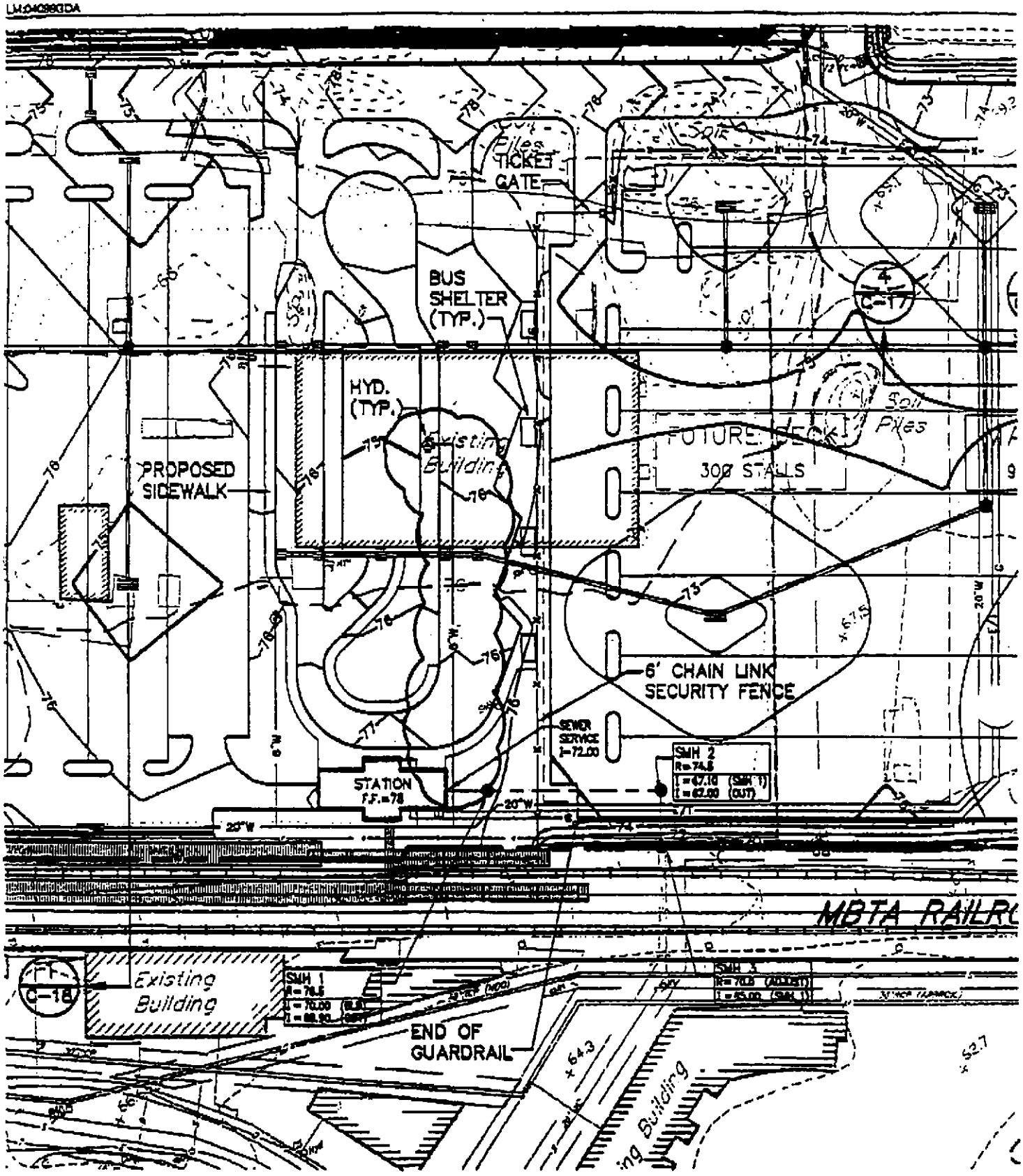
Vanasse Hangen Brustlin, Inc.

Construction Change Excavation Plan

Figure 1 of 2
Sept. 27, 1996

0 50 100 FEET

Alternate Cover Design
Regional Transportation Center
Woburn, Massachusetts



Vanasse Hangen Brustlin, Inc.

Construction Change
RTC Site Final Cover
Grading & Drainage Plan
Alternate Cover Design
Regional Transportation Center
Woburn, Massachusetts

Figure 2 of 2
Sept. 27, 1996

0 50 100 FEET

INDUSTRI-PLEX SITE REMEDIAL TRUST
23 Atlantic Avenue
Woburn, Massachusetts

Tel. (617) 938-7190
Fax. (617) 932-9589

VARIANCE REQUEST

Date of Request 9/3/96 **Suspense Date:**_____ **Variance No.** 96-013

Originator: Peter Neumann, Golder Associates Inc.

Proposed Variance: **Drwg Ref: Drwg** C-5, 3/C-17 **Spec Ref.**___ **Site Location:** AAD

Replace the manhole at the existing 36-inch diameter ACP with an elbow.

Justification:

VHB found that an elbow was available from local supplier for 36-inch pipe. The distance from the discharge to the elbow will be short so clean out will not be difficult.

Review: Recommend Approval ☑ Modified ☐ Rejected ☐

Comments:

Peter Neumann 12/13/96
Reviewer Date

Disposition: Approved ☒ Modified ☐ Rejected ☐

Comments: NOTE: See Variance 96-023

Joseph F. LeMay 6/23/97
Joseph F. LeMay Date
U.S.E.P.A. Remedial Project Manager

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Woburn, Massachusetts

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VARIANCE REQUEST

Date of Request 10/28/96 **Suspense Date:**_____ **Variance No.** 96-014

Originator: Peter Neumann, Golder Associates Inc.

Proposed Variance: **Drwg Ref:** C-4 & Details 2/C-19 **Spec Ref.**____ **Site Location:** MBTA

The existing detail 2/C-19 will be used at designated pull box locations. At all other locations the excavation will be minimized according to a revised detail 2/C-19 that shows a 2H:1V slope instead of a vertical cut. These changes were discussed with representatives of Amtrak and AT&T during a meeting held at the Industri-Plex Site on October 28, 1996.

Justification:

At the request of Amtrak the excavation along the MBTA rail line is being revised to minimize cuts near the existing rail.

Review: Recommend Approval ☑ Modified ☐ Rejected ☐

Comments:

Peter Neumann 12/13/96
Reviewer Date

Disposition: Approved ☒ Modified ☐ Rejected ☐

Comments:

Joseph F. LeMay 6/23/97
Joseph F. LeMay Date
U.S.E.P.A. Remedial Project Manager

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Woburn, Massachusetts

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VARIANCE REQUEST

Date of Request 10/30/96 **Suspense Date:**_____ **Variance No.** 96-015

Originator: Peter Neumann, Golder Associates Inc.

Proposed Variance: **Drwg Ref:** C-5 & C-5A **Spec Ref.**____ **Site Location:** Custodial Trust

Flared End Section 203 is relocated by VHB Variance. See 2 Figure attached.

Justification:

Future layout of Commerce and Presidential Way extensions require a relocation.

Review: Recommend Approval ☑ Modified ☐ Rejected ☐

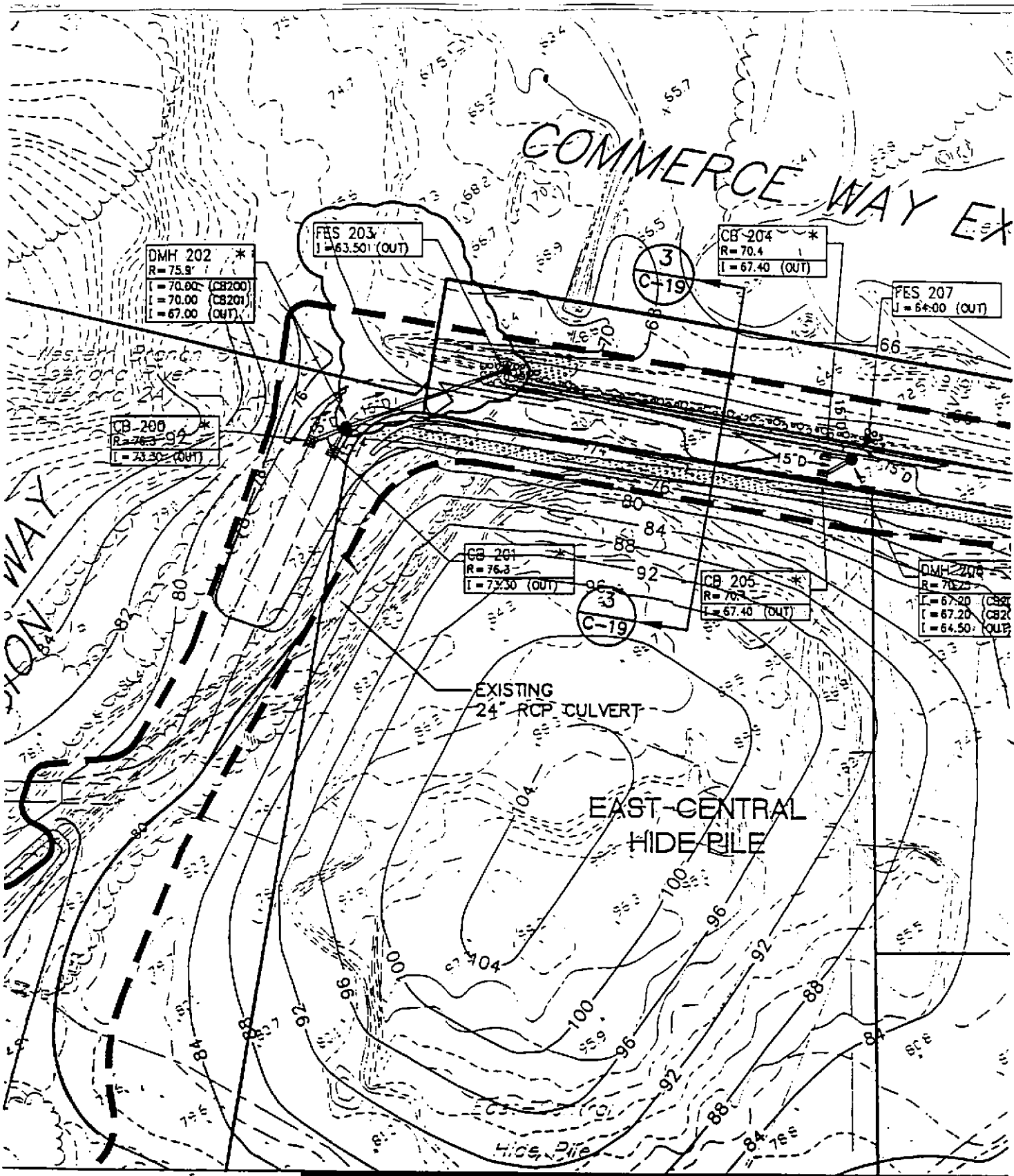
Comments:

Peter Neumann 12/13/96
Reviewer Date

Disposition: Approved ☒ Modified ☐ Rejected ☐

Comments: NOTE: See Variance # 96-019

Joseph F. LeMay 6/23/97
Joseph F. LeMay Date
U.S.E.P.A. Remedial Project Manager



Vanasse Hangen Brustlin, Inc.

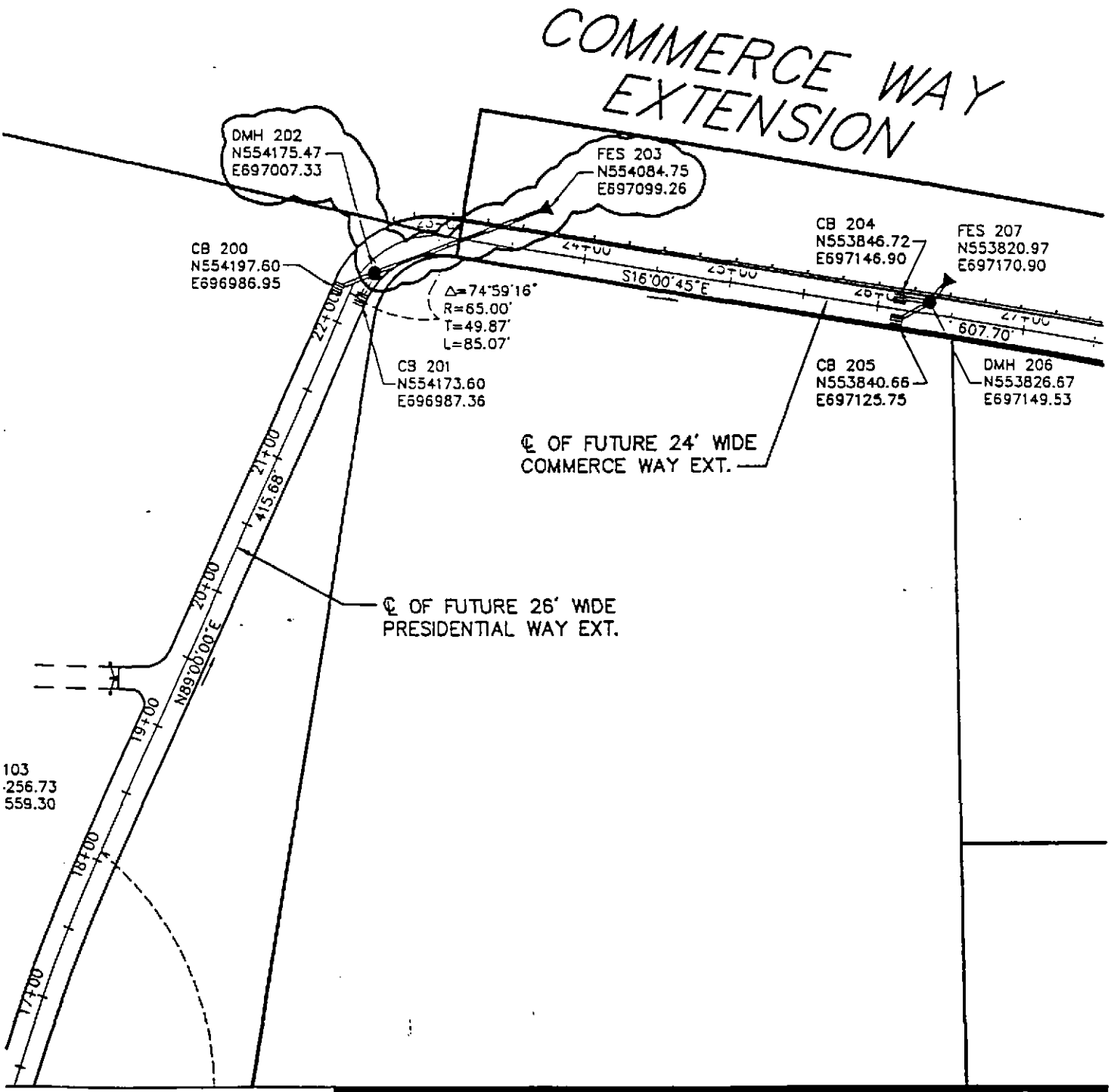
Regional Transportation Center
Alternate Cover Design

Variance
Figure 1 of 2

0 50 100 FEET

Flared End Section 203 Relocation

10/30/96



Vanasse Hangen Brustlin, Inc.

Regional Transportation Center
Alternate Cover Design

Variance
Figure 2 of 2

0 50 100 FEET

Flared End Section 203 Relocation

10/30/96

INDUSTRI-PLEX SITE REMEDIAL TRUST
23 Atlantic Avenue
Woburn, Massachusetts

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Fax. (617) 932-9589

VARIANCE REQUEST

Date of Request 11/6/96 **Suspense Date:**_____ **Variance No.** 96-016

Originator: Peter Neumann, Golder Associates Inc.

Proposed Variance: **Drwg Ref:** 3/C-17A **Spec Ref.**____ **Site Location:** N/F Janpet Prpty

Revise the dimensions for the 24-inch polyethylene pipe sleeve and cap the pipe ends. See attached Variance Box Culvert Section

Justification:

This revision will facilitate future construction of the water line.

Review: Recommend Approval ☑ Modified ☐ Rejected ☐

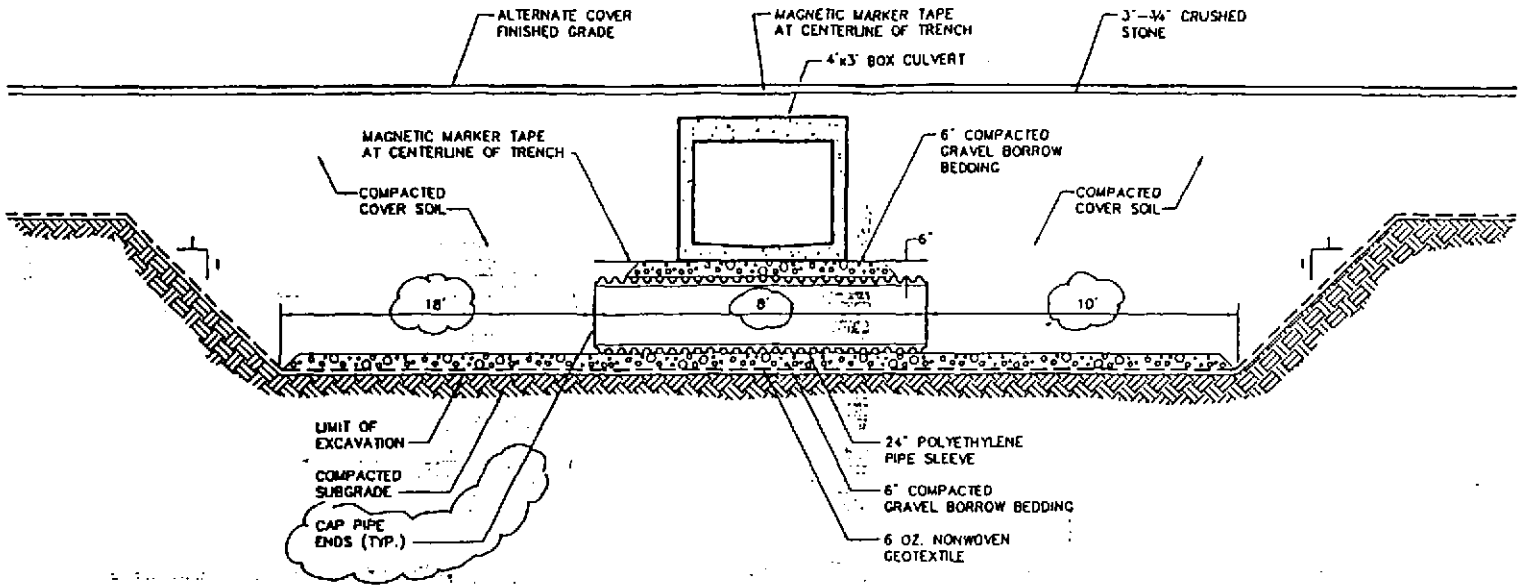
Comments:

Peter Neumann 12/13/96
Reviewer Date

Disposition: Approved ☒ Modified ☐ Rejected ☐

Comments:

Joseph F. LeMay 6/23/97
Joseph F. LeMay Date
U.S.E.P.A. Remedial Project Manager



3
C-17A

ALTERNATE COVER BOX CULVERT SECTION

SCALE: NTS

Vanasse Hangen Brustlin, Inc.

Variance 11/6/96

Alternate Cover
Box Culvert Section

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VARIANCE REQUEST

Date of Request 11/8/96 **Suspense Date:**_____ **Variance No.** 96-017

Originator: Peter Neumann, Golder Associates Inc.

Proposed Variance: **Drwg Ref:** 1/C-20 et al. **Spec Ref.**____ **Site Location:** N/F Janpet Prpty

Areas where topsoil is placed outside the influence limit of the future pavement can be compacted only by the nominal compaction of the placing equipment.

Justification:
This requirement will be consistent with the original 100% Design and will not impact the future quality of the RTC - Alternate Cover.

Review: Recommend Approval ☒ Modified ☐ Rejected ☐

Comments:

Peter Neumann 12/13/96
Reviewer Date

Disposition: Approved ☒ Modified ☐ Rejected ☐

Comments:

Joseph F. LeMay 6/23/97
Joseph F. LeMay Date
U.S.E.P.A. Remedial Project Manager

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VARIANCE REQUEST

Date of Request 11/11/96 **Suspense Date:**_____ **Variance No.** 96-018

Originator: Peter Neumann, Golder Associates Inc.

Proposed Variance: **Drwg Ref:** ____ **Spec Ref.** 02400 **Site Location:** N/F Janpet Prpty

The specifications call for a high density corrugated polyethylene pipe and fittings for drainage pipe. The contractor contacted the manufacturer and were informed that the Hancor 'Hi-Q' SUR-LOK 2.0 pipe is no longer in production. The specifications allow for an approved equal. The contractor selected a Hancor 'Hi-Q' SUR-LOK standard pipe as an alternate.

Justification:

The alternate is similar in every aspect to the specified pipe except the SUR LOK 2.0 pipe has a pressure rating of 2 psi. The alternate, SUR LOK standard pipe, has joint connections which are silt tight and are not necessarily water tight. All culverts and concrete pipe on site have not been specified as watertight. The specifications do not require water tight pipe.

Review: Recommend Approval ☑ Modified ☐ Rejected ☐

Comments:

Peter Neumann 12/13/96
Reviewer Date

Disposition: Approved ☒ Modified ☐ Rejected ☐

Comments: All drainage ~~features~~ Pipes are above the elevation of potentially contaminated groundwater. Water tight seals are not necessary.

Joseph F. LeMay 6/23/97
Joseph F. LeMay Date
U.S.E.P.A. Remedial Project Manager

HANCOR Hi-Q® Sure-Lok™ PIPE SPECIFICATIONS

Scope
This specification describes 12- to 30-inch Hancor Sure-Lok pipe for use in gravity flow drainage applications.

Pipe Requirements
Hi-Q Sure-Lok shall meet the requirements of AASHTO M294 Type S. The pipe shall have a smooth interior and annular-corrugated exterior. Manning's "n" value for use in design shall not exceed 0.010.

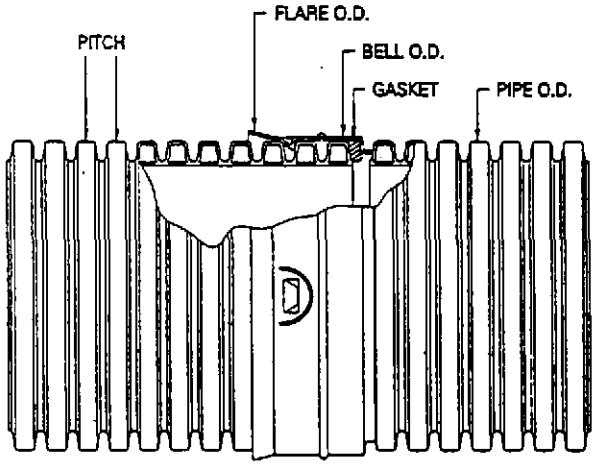
Joint Performance
Pipe shall be joined with the Hi-Q Sure-Lok (bell-and-spigot) joint meeting the requirements of AASHTO M294. The bell shall be an integral part of the pipe and provide a minimum pull-apart strength of 400 lbs.

The bell-and-spigot joint shall incorporate a gasket making it silt-tight. Gaskets shall be installed in the bell by the pipe manufacturer.

Fittings
Fittings shall conform to AASHTO M294. Fabricated fittings shall be welded on the interior and exterior at all junctions.

Material Properties
Pipe and fitting material shall be high density polyethylene meeting the requirements of ASTM D3350 Cell Classification 324420C; or ASTM D1248 Type III, Class C, Category 4, Grade P33.

Installation
Installation shall be in accordance with ASTM D2321 with the exception that minimum cover in trafficked areas shall be one foot.



	Nominal Diameter (in.)				
Pipe I.D. (in.)	12	15	18	24	30
Pipe O.D. (in.)	14.2	17.7	21.5	28.4	35.5
Bell O.D. (in.)	14.8	18.4	22.1	29.2	36.4
Flare O.D. (in.)	15.4	19.6	23.9	29.9	37.9
Pitch (in.)	2.0	2.4	3.0	4.0	4.0
Weight (lb./ft.)	3.3	4.7	6.7	12.0	16.0
Corrugation	Annular	Annular	Annular	Annular	Annular

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VARIANCE REQUEST

Date of Request 11/22/96 **Suspense Date:**_____ **Variance No.** 96-019

Originator: Peter Neumann, Golder Associates Inc.

Proposed Variance: Drwg Ref: C-5 & C-5A **Spec Ref.**___ **Site Location:** Custodial Trust Property

Disregard Variance 96-015. Revise locations of CB 204, CB 205, DMH 206, FES 207, CB 208, CB 209, DMH 210, and FES 211 for Commerce Way Extension. See attached Variances for Drainage Relocation

Justification:

The drainage structures need to be relocated to match the realignment of Commerce Way Extension. Rim and invert elevation differences remain as originally designed.

Review: Recommend Approval ☑ Modified ☐ Rejected ☐

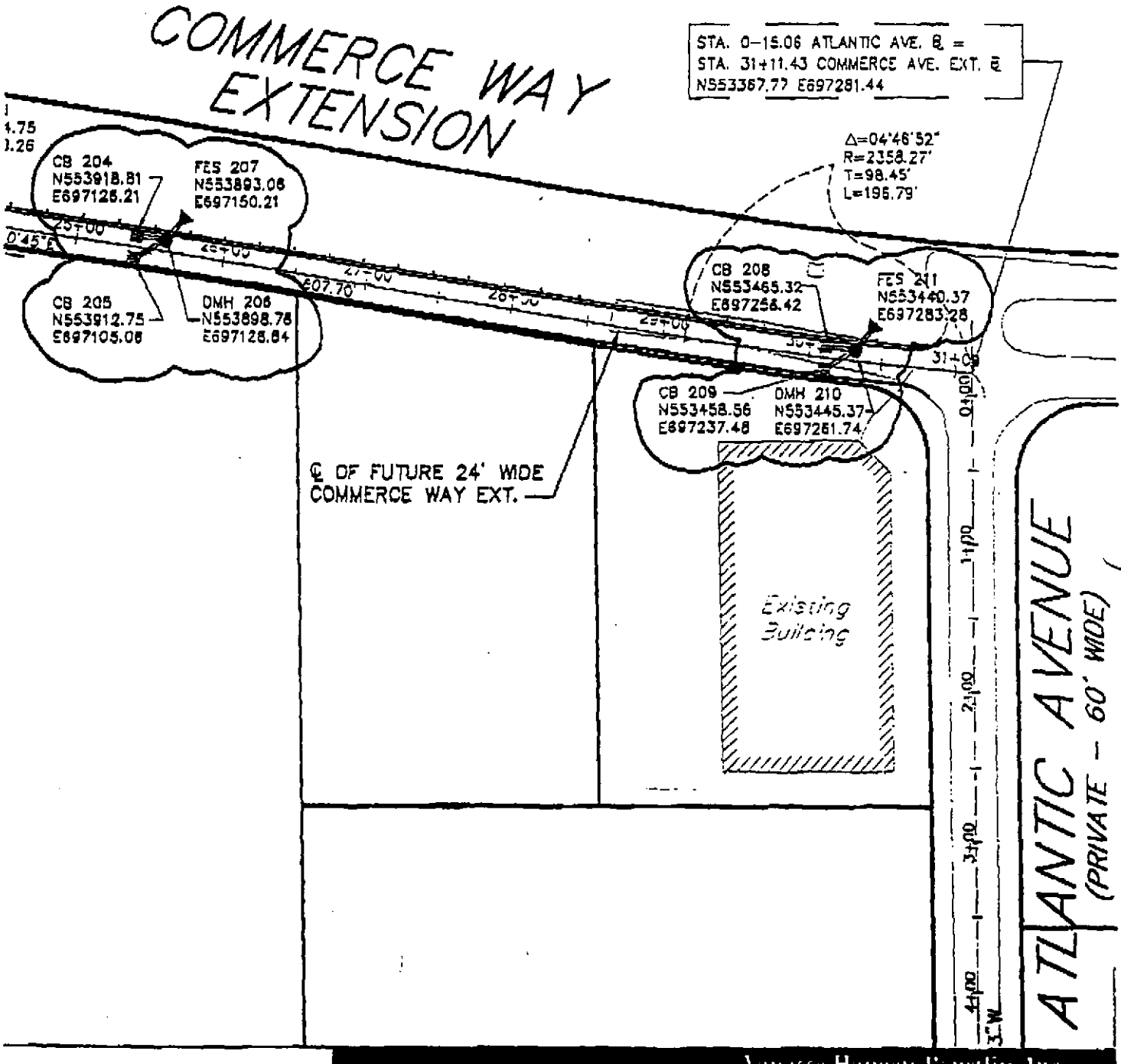
Comments:

Peter Neumann 12/13/96
Reviewer Date

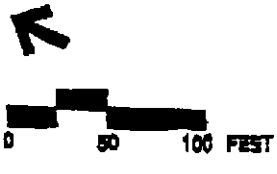
Disposition: Approved ☒ Modified ☐ Rejected ☐

Comments:

Joseph F. LeMay 6/23/97
Joseph F. LeMay Date
U.S.E.P.A. Remedial Project Manager



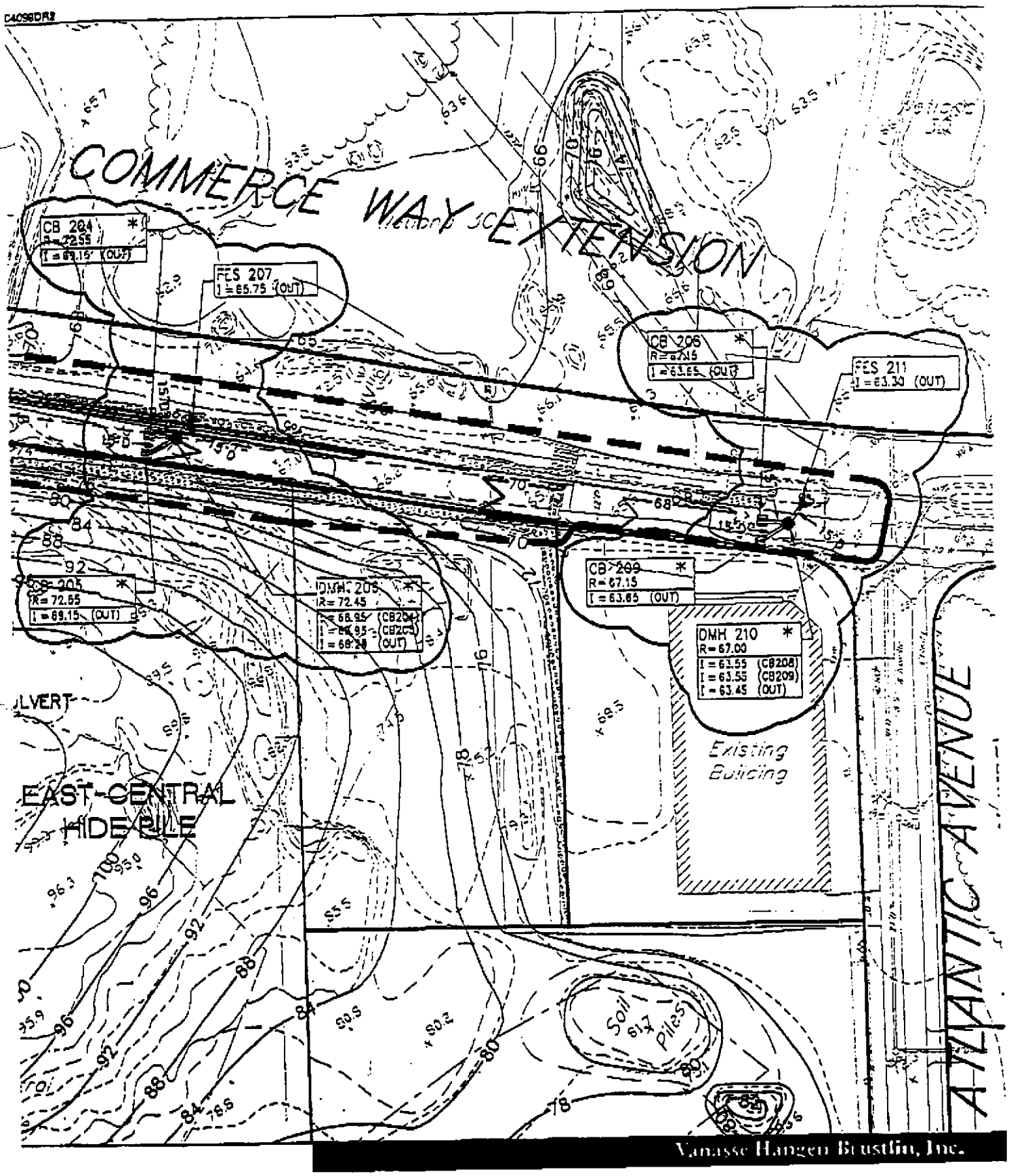
Vanasse Hangen Brustlin, Inc.



Regional Transportation Center
Alternate Cover Design

Variance
Figure 1 of 2

Commerce Way Extension
Drainage Relocation
11/22/96



Regional Transportation Center
Alternate Cover Design

Variance
Figure 2 of 2

0 50 100 FEET

Commerce Way Extension
Drainage Relocation
11/22/96

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23 Atlantic Avenue
Woburn, Massachusetts

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VARIANCE REQUEST

Date of Request 11/25/96 **Suspense Date:**_____ **Variance No.** 96-020

Originator: Peter Neumann, Golder Associates Inc.

Proposed Variance:Drwg Ref: _____ **Spec Ref.** 02234 **Site Location:** N/F Janpet Prpty

The angular stone specified in Section 02234 requires a specific gradation for the 3/4-inch crushed stone. This stone is used as the final covering over the compacted cover soils. Submitted gradation results meet the specifications. Independent laboratory test results indicated the gradation was slightly out of specification in the range of 3/4-inch by 1% and the #8 sieve. This variance would accept the material with the minor deviation from the specified gradation.

Justification:

The 3/4-inch crushed stone provides a temporary surface for the Alternate Cover. The surface is intended to minimize vegetative growth. The stone layer is not intended to support traffic.

Review: Recommend Approval ☑ Modified ☐ Rejected ☐

Comments:

Peter Neumann 12/13/96
Reviewer Date

Disposition: Approved ☒ Modified ☐ Rejected ☐

Comments:

Joseph F. LeMay 6/23/97
Joseph F. LeMay Date
U.S.E.P.A. Remedial Project Manager

TELEPHONE MEMORANDUM

INCOMING ____ OUTGOING X

JOB:	ISRT/RES. ENG. /MA	ROUTE TO:	JOB NO: 933-6142.960
PERSON:	JIM LAMP		DATE: 11/25/96
FIRM:	VHB		TIME: PM
PHONE NO:	603 644-0888		BY: PEN

REMARKS:

Called Jim to ask him about 3/4" crushed stone gradation

Specification Section 02234		Test Results from PSI	
Sieve	% Passing	% Passing	Sieve
1 inch	100	100	1"
3/4 inch	90-100	89 out by 1	3/4"
1/2 inch	10-50	20	1/2"
3/8 inch	0-20	5	3/8"
No. 4	0-3	1	#4
		0.8 out by 0.8	#8

I ask Jim if this result, even though slightly out of spec, would be acceptable. He said yes.

ACTION REQUIRED:

psi Environmental Geotechnical Construction
Consulting • Engineering • Testing

Facsimile Transmittal Sheet

DATE: 11/25 TIME 2:15 am pm

TOTAL NUMBER OF PAGES 2
IF YOU DO NOT RECEIVE ALL PAGES PLEASE CALL SENDER ASAP.

TO:

NAME: ~~AL TARDY~~ PETER NEUMANN

FIRM: GOLDER ASSOC

CITY:

FAX #:

FROM:

NAME: BILL LINDSAY

PLEASE DELIVER AS SOON AS POSSIBLE. OPERATOR INITIALS:

Writer's direct fax: (617) 821-6276

NOTES:

* The documents accompanying this facsimile transmission may contain confidential client information or attorney work product which is legally privileged. The information is intended only for the use of the recipient named above. If you have received this fax in error, please notify us, and you are hereby notified that any disclosure, copying, distribution, or the taking of this transmitted information is strictly prohibited.

Professional Service Industries

SAMPLE NO: GB-6

SIEVE SIZE	RESULT
1½	100
1	100
¾	89
½	20
⅜	5
#4	1
8	.8

PROJECT NAME		
I-PLEX	PROJECT NO. 30047	DATE 11/26/96

PSI A-300-4

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VARIANCE REQUEST

Date of Request 11/25/96 **Suspense Date:**_____ **Variance No.** 96-021

Originator: Peter Neumann, Golder Associates Inc.

Proposed Variance: Drwg Ref: C-5 & C-15 **Spec Ref.**___ **Site Location:** N/F Janpet Prpty

Attached is an anchor trench design for the west slope of the detention basin.

Justification:

A detail was not provided to show how the DMH-34 is constructed adjacent to the geomembrane anchor trench.

Review: Recommend Approval ☑ Modified ☐ Rejected ☐

Comments:

Peter Neumann 12/13/96
Reviewer Date

Disposition: Approved ☒ Modified ☐ Rejected ☐

Comments:

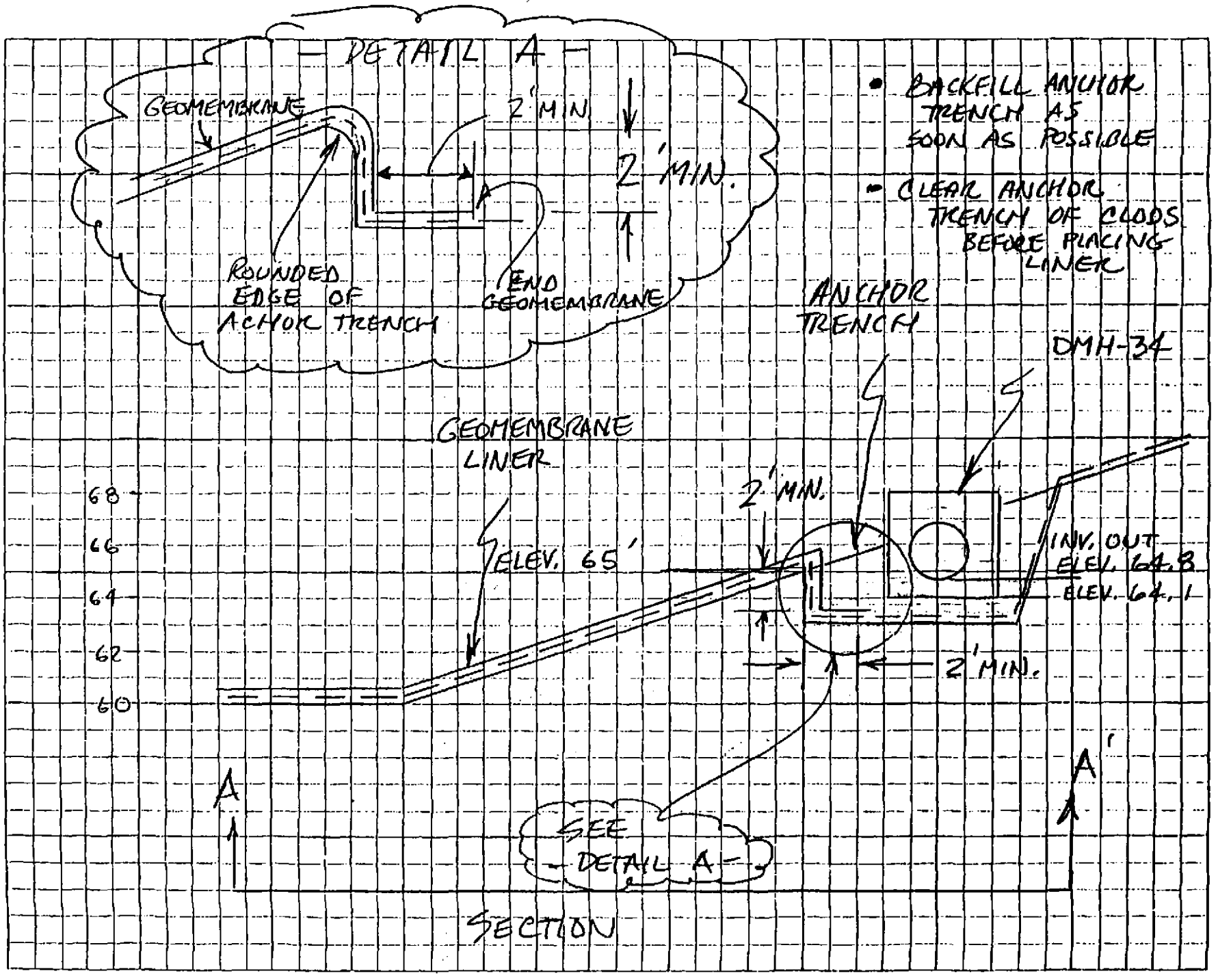
Joseph F. LeMay 6/23/97
Joseph F. LeMay Date
U.S.E.P.A. Remedial Project Manager

Golder Associates	SUBJECT		
	Job No. 933-6142.	Made by PCN	Date 11/25/96
	Ref.	Checked	Sheet of
		Reviewed	

CONSTRUCT ANCHOR TRENCH AT ELEVATION 65' FROM SEDIMENTATION STRUCTURE SOUTH TO THE 48" DIAMETER DISCHARGE-OUTLET STRUCTURE.

NOTE:

- BACKFILL ANCHOR TRENCH AT LEAST PARTIALLY AS SOON AS POSSIBLE AFTER GEOMEMBRANE INSTALLATION TO AVOID PONDING WATER.
- REMOVE LOOSE SOIL FROM EXCAVATED ANCHOR TRENCH.
- ROUND EDGE OF ANCHOR TRENCH
- ANCHOR TRENCH SHALL HAVE A STRAIGHT ALLIGNMENT AND FOLLOW THE 65' CONTOUR (APPROXIMATELY).
- CONTINUE SEAM WELDS INTO ANCHOR TRENCH AND AS CLOSE TO THE BACK AS POSSIBLE.
- SOIL BACKFILL SHALL BE COMPACTED CLEAN FILL
- PROTECT ANCHOR TRENCH FROM SURFACE WATER FLOWS.



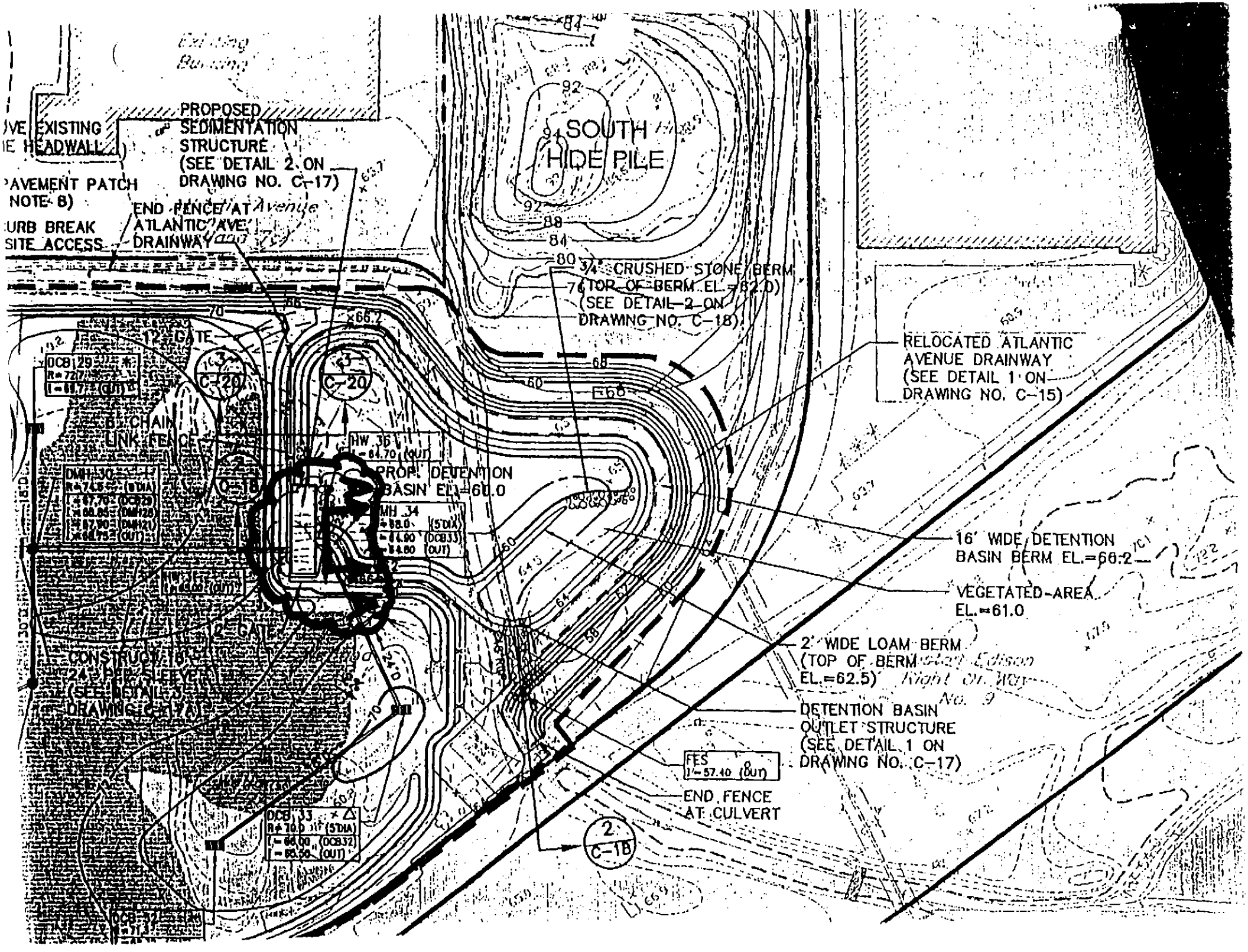
SUBJECT ISRT / RES. ENG. / MA — ANCHOR TRENCH

Job No. 933-6142966 | Made by PCN | Date 11/25/96

Ref. | Checked | Sheet of

Reviewed

Golder Associates



SOUTH HIDE PILE
PROPOSED SEDIMENTATION STRUCTURE (SEE DETAIL 2 ON DRAWING NO. C-17)
END FENCE AT ATLANTIC AVE. DRAINWAY
PAVEMENT PATCH NOTE 8)
URB BREAK SITE ACCESS
3/4" CRUSHED STONE BERM (TOP OF BERM EL.=62.0) (SEE DETAIL 2 ON DRAWING NO. C-18)
RELOCATED ATLANTIC AVENUE DRAINWAY (SEE DETAIL 1 ON DRAWING NO. C-15)
12' GATE
6' CHAIN LINK FENCE
PROP. DETENTION BASIN EL.=60.0
16' WIDE DETENTION BASIN BERM EL.=66.2
VEGETATED AREA EL.=61.0
2' WIDE LOAM BERM (TOP OF BERM EL.=62.5)
DETENTION BASIN OUTLET STRUCTURE (SEE DETAIL 1 ON DRAWING NO. C-17)
END FENCE AT CULVERT
FES
DCB 29
DMH 30
DCB 33
DCB 32
HW 36
MH 34
C-20
C-18

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VARIANCE REQUEST

Date of Request 11/27/96 **Suspense Date:**_____ **Variance No.** 96-022

Originator: Peter Neumann, Golder Associates Inc.

Proposed Variance:Drwg Ref: C-5 **Spec Ref.**___ **Site Location:** N/F Janpet Prpty

Add protective PE sleeve for future 20-inch diameter water main north of DMH 28 as was done for DMH 30

Justification:

The water line must pass beneath the drainage line north of DMH 28. A sleeve will facilitate future construction.

Review: Recommend Approval ☑ Modified ☐ Rejected ☐

Comments:

Peter Neumann 12/13/96
Reviewer Date

Disposition: Approved ☐ Modified ☐ Rejected ☐

Comments: According to GAI 6/26/97 response, the sleeve was 24" in diameter and both ends were capped with plug-wood.

Joseph F. LeMay 6/23/97
Joseph F. LeMay Date
U.S.E.P.A. Remedial Project Manager

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VARIANCE REQUEST

Date of Request 11/27/96 **Suspense Date:**_____ **Variance No.** 96-023

Originator: Peter Neumann, Golder Associates Inc.

Proposed Variance: Drwg Ref: 3/C-17 **Spec Ref.**___ **Site Location:** Atlantic Ave. Drainway

Disregard Variance 96-013 and replace the elbow for the 36-inch pipe with a Massachusetts Department of Public Works (MDPW) Manhole 202.2.0 with standard type B frame and cover.

Justification:

A constructed manhole would meet the existing pipe more effectively than a pre-cast structure. Additional ledge would have to be removed to fit a pre-cast structure in place.

Review: Recommend Approval ☑ Modified ☐ Rejected ☐

Comments:

Peter Neumann 12/13/96
Reviewer Date

Disposition: Approved ☒ Modified ☐ Rejected ☐

Comments: According to GAI 6/26/97 correspondence, VHB approved the use of Public Works manhole via a 12/2/96 telephone conversation.

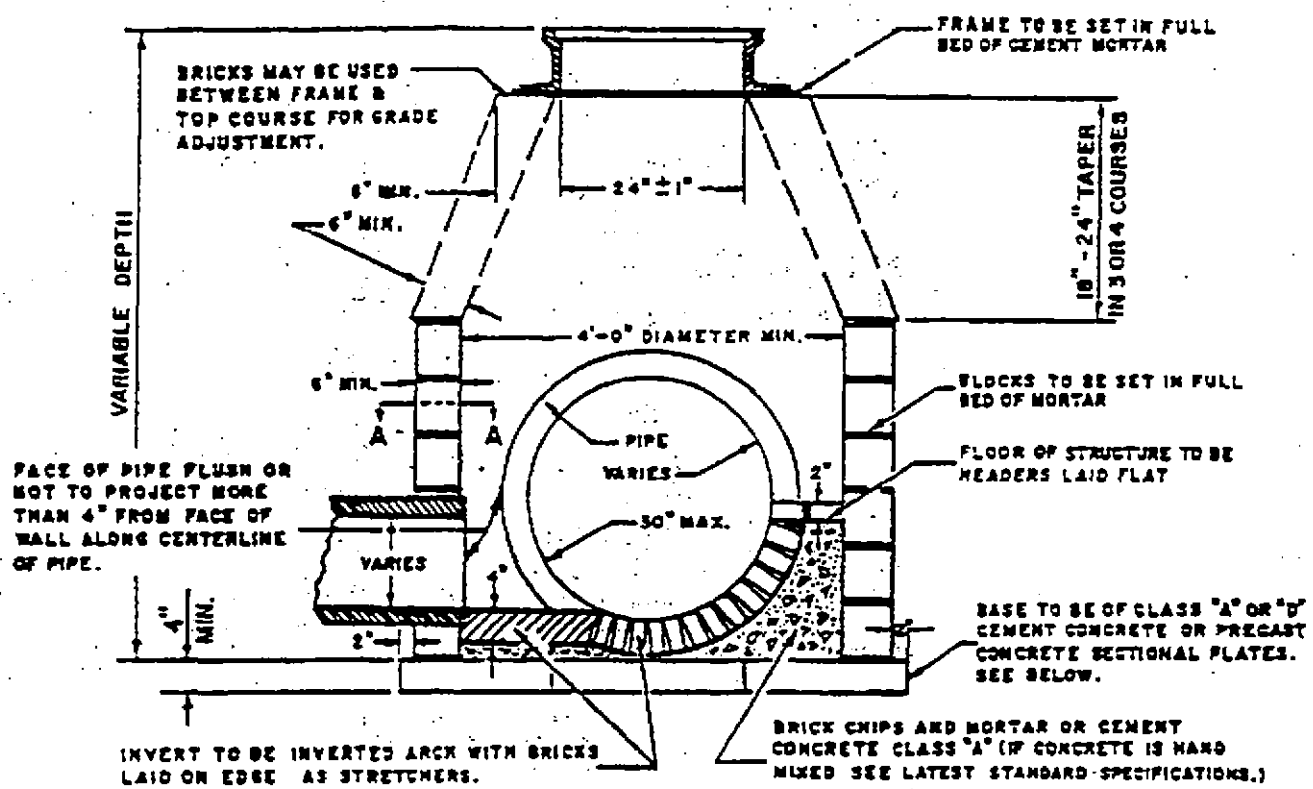
Joseph F. LeMay 6/23/97
Joseph F. LeMay Date
U.S.E.P.A. Remedial Project Manager

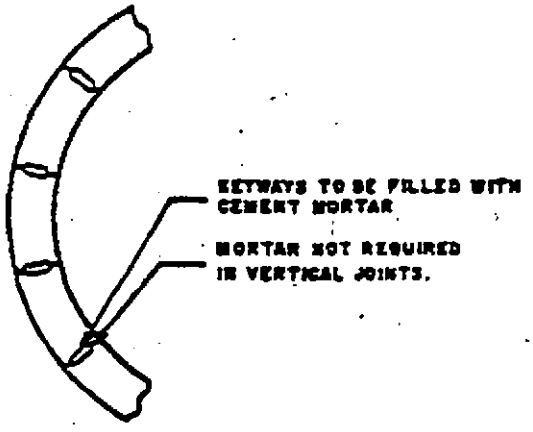
CONCRETE BLOCK MANHOLES

MANHOLES 9 FT. OR LESS IN DEPTH

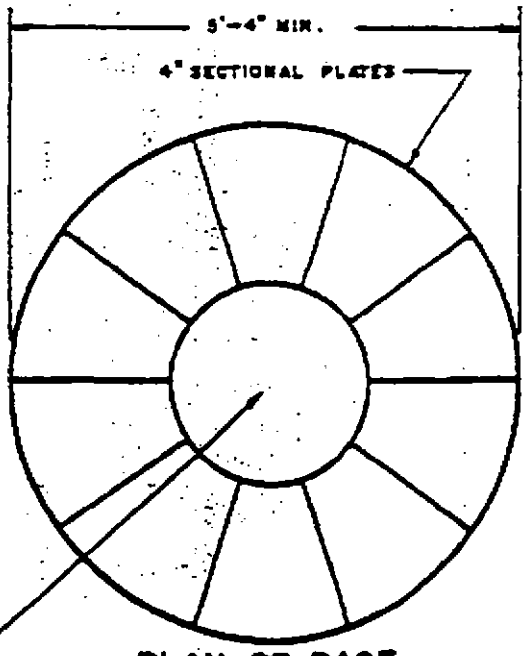
NOTE:

1. DESIGN SHOWN IS FOR MANHOLE DEPTHS OF 9 FT. OR LESS AND PIPE DIAMETER OF 30 INCHES OR LESS.
2. STANDARD MANHOLE DEPTH TO BE 6 FEET 6 INCHES.





SECTION A-A

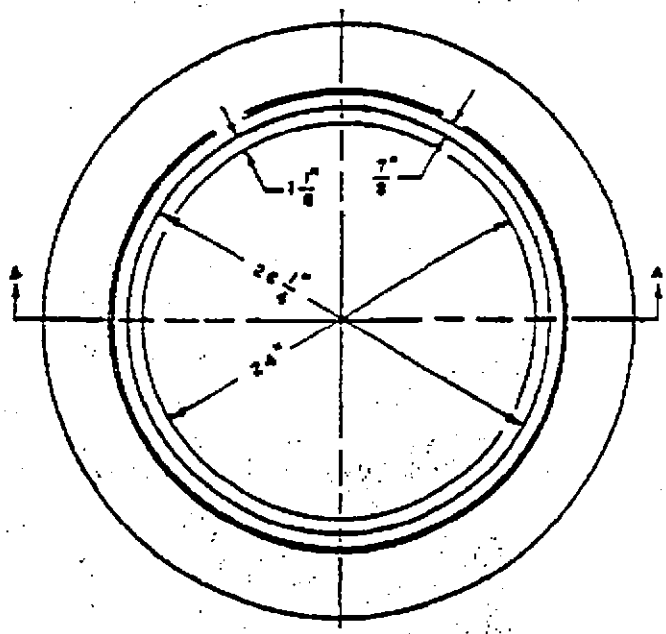


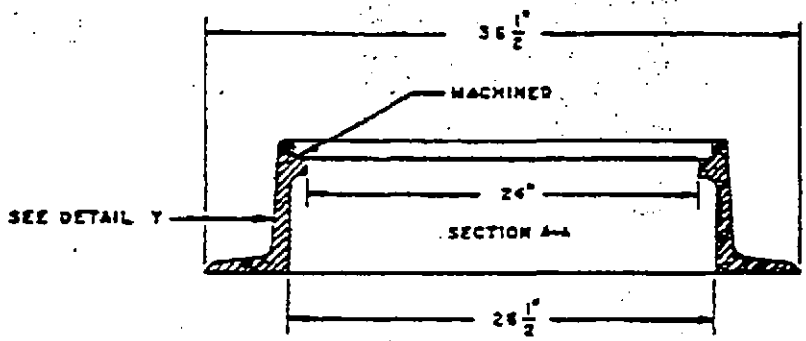
PLAN OF BASE

SOLID SECTION; OR FILL HOLE WITH BRICKS AND MORTAR; OR FILL HOLE WITH CLASS "A" OR "B" CONCRETE. (IF CONCRETE IS HAND MIXED SEE LATEST STANDARD SPECIFICATIONS.)

MASS. D.P.W. — MARCH 1977

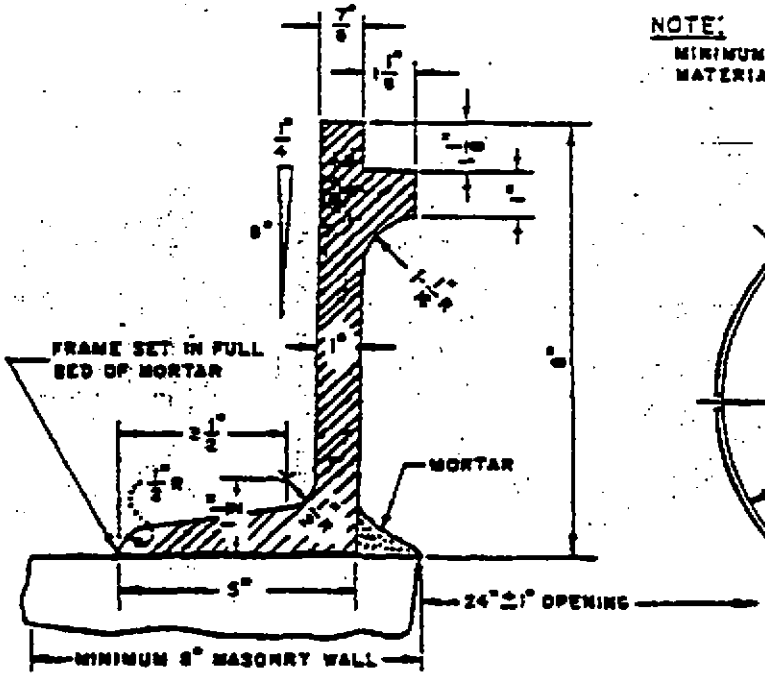
MANHOLE FRAME AND COVER



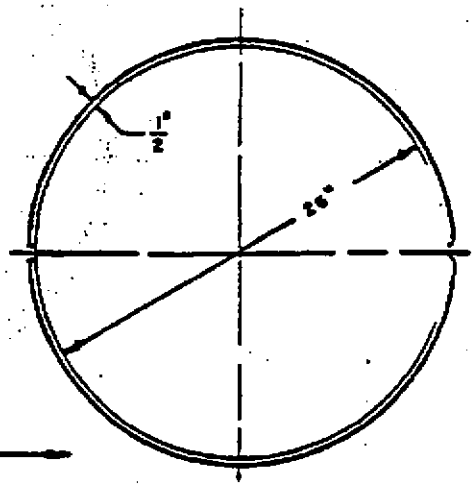


TYPE-B FRAME

NOTE:
MINIMUM FRAME WEIGHT 265 LBS.
MATERIAL—CAST IRON



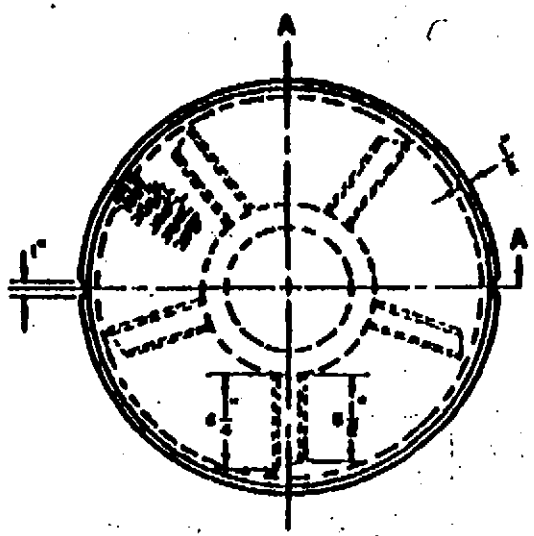
DETAIL Y



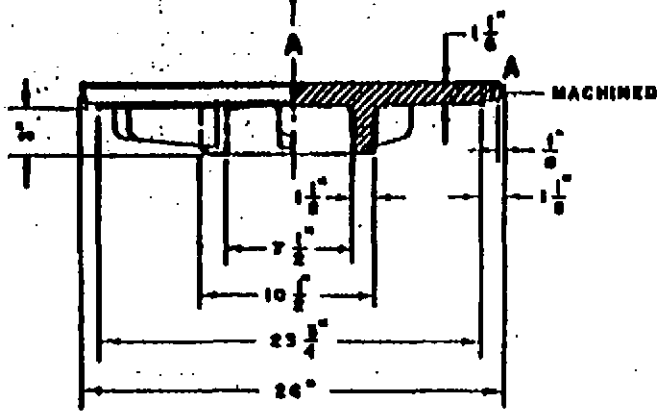
STANDARD COVER
FOR COVER DETAIL, SEE 202.8.0

MASS. D.P.W. — MARCH 1977

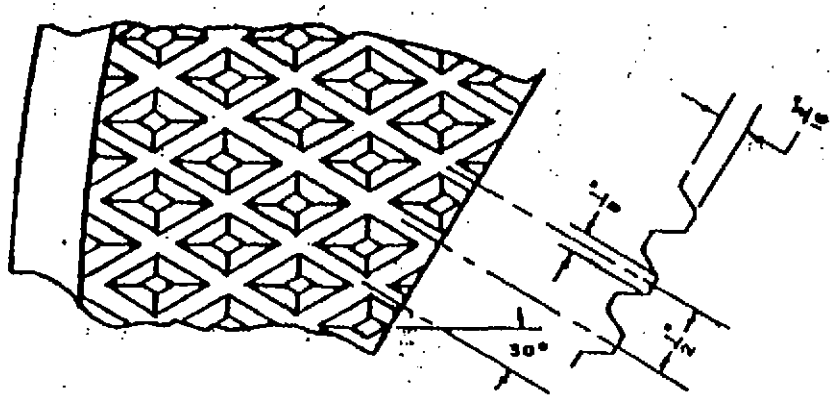
MANHOLE COVER
DETAILS



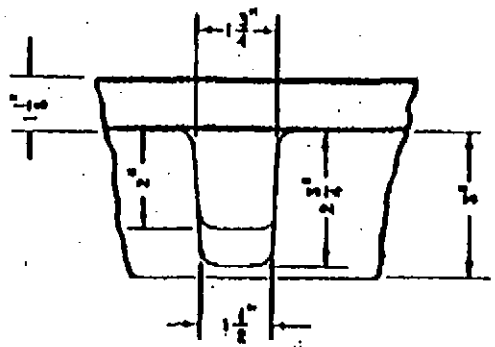
MATERIAL—CAST IRON; SEE SPECIFICATIONS.
MINIMUM COVER WEIGHT—200 LBS.



MANHOLE COVER FOR TYPE A & B FRAMES

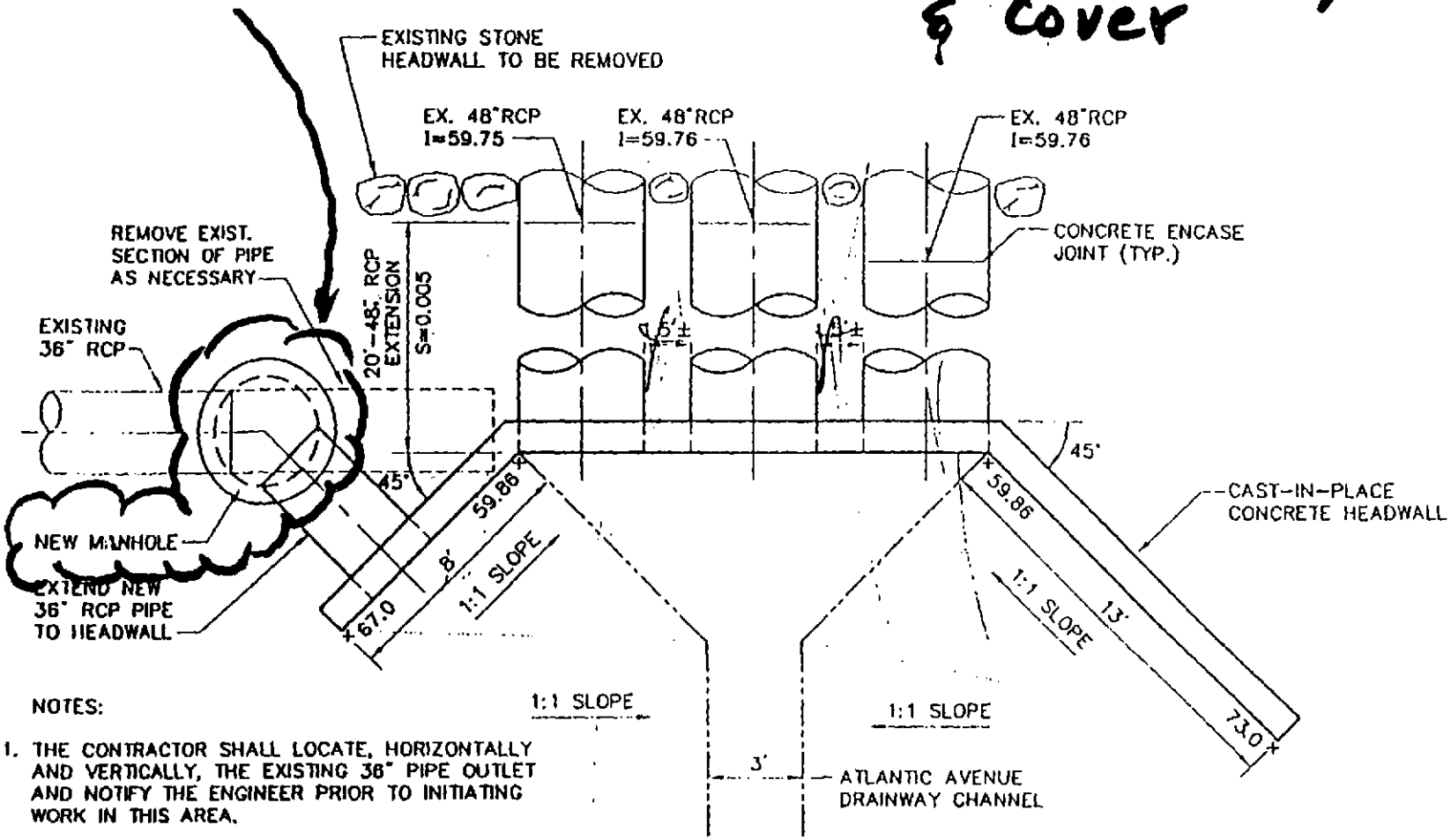


DETAIL OF TREAD



DETAIL OF FIN

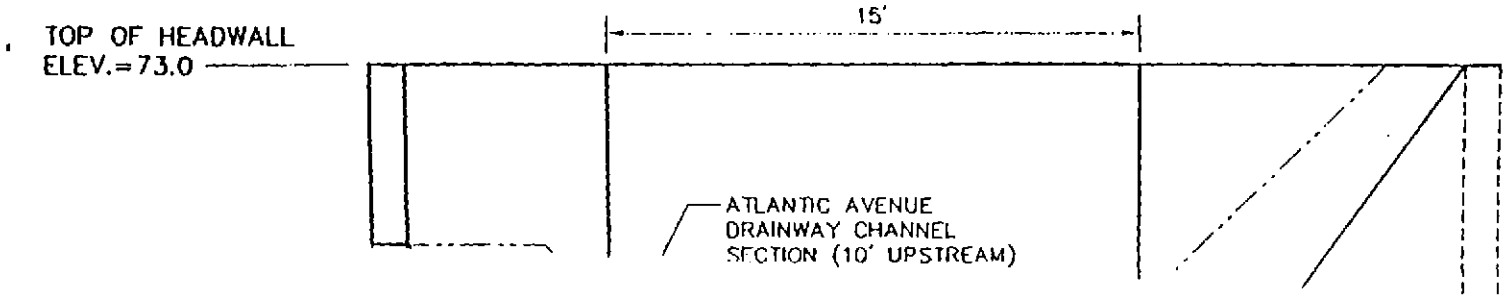
Propose to use Mass PW Manhole 202.2.
& Standard Type B frame
& cover



NOTES:

1. THE CONTRACTOR SHALL LOCATE, HORIZONTALLY AND VERTICALLY, THE EXISTING 36" PIPE OUTLET AND NOTIFY THE ENGINEER PRIOR TO INITIATING WORK IN THIS AREA.

2. THE CONTRACTOR SHALL VERIFY THE CONDITION OF THE EXISTING 48" PIPES AND COORDINATE THEIR EXTENSION AND COUPLING WITH THE ENGINEER PRIOR TO INITIATING WORK IN THIS AREA.



INDUSTRI-PLEX SITE REMEDIAL TRUST
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Fax. (617) 932-9589

VARIANCE REQUEST

Date of Request 12/03/96 **Suspense Date:**_____ **Variance No.** 96-024

Originator: Peter Neumann, Golder Associates Inc.

Proposed Variance: Drwg Ref: C-5 and C-5A **Spec Ref.**___ **Site Location:** N/F Janpet Prpty

The attached variance revises the inverts and locations for DMH 202 and FES 203.

Justification:

The manhole sections delivered to site could be more easily retrofitted to the revised invert elevations.

Review: Recommend Approval ☑ Modified ☐ Rejected ☐

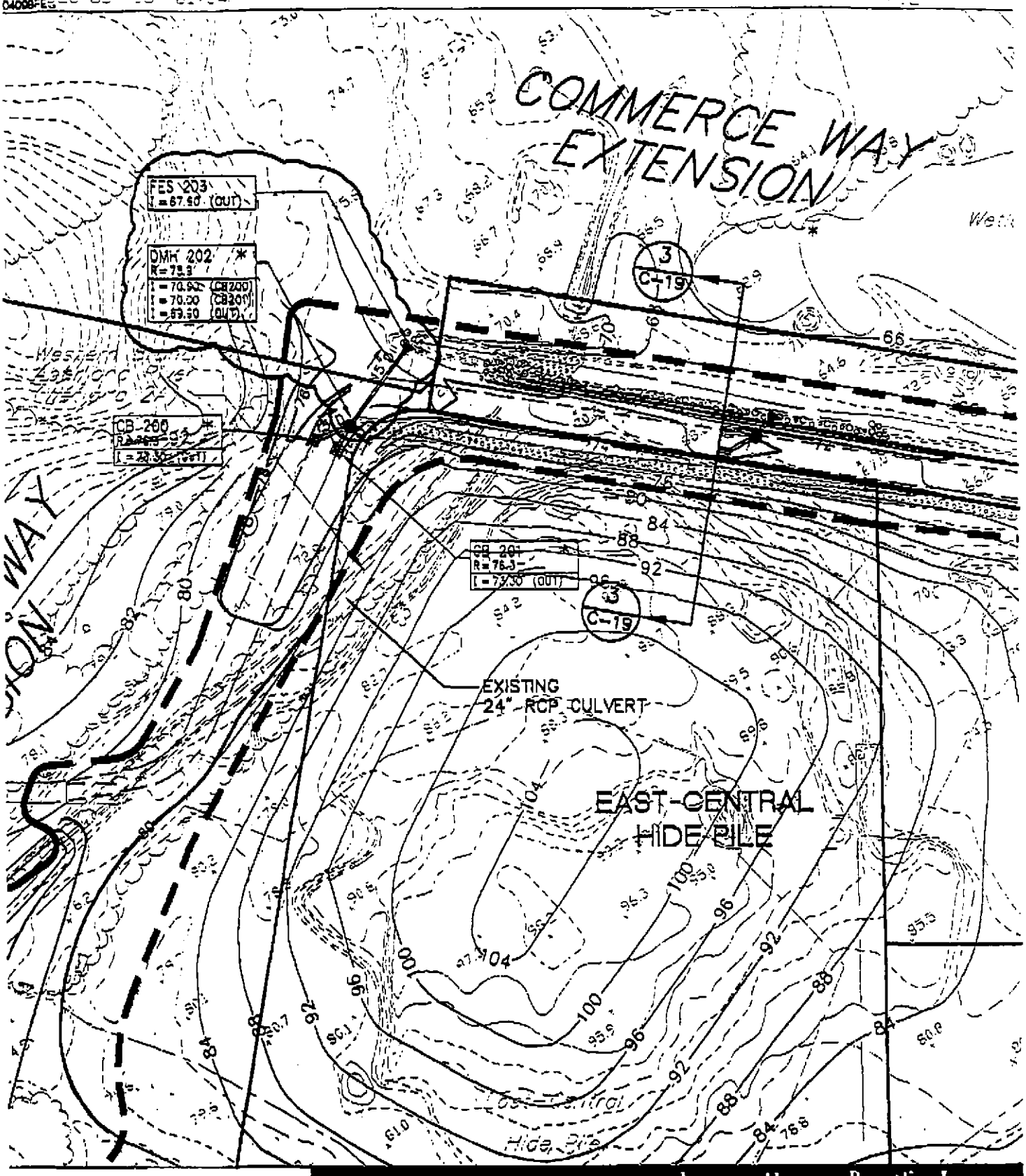
Comments:

Peter Neumann 12/13/96
Reviewer Date

Disposition: Approved ☒ Modified ☐ Rejected ☐

Comments: According to a GAI 6/27/97 correspondence, These manholes & catch basins were installed.

Joseph F. LeMay 7/7/97
Joseph F. LeMay Date
U.S.E.P.A. Remedial Project Manager



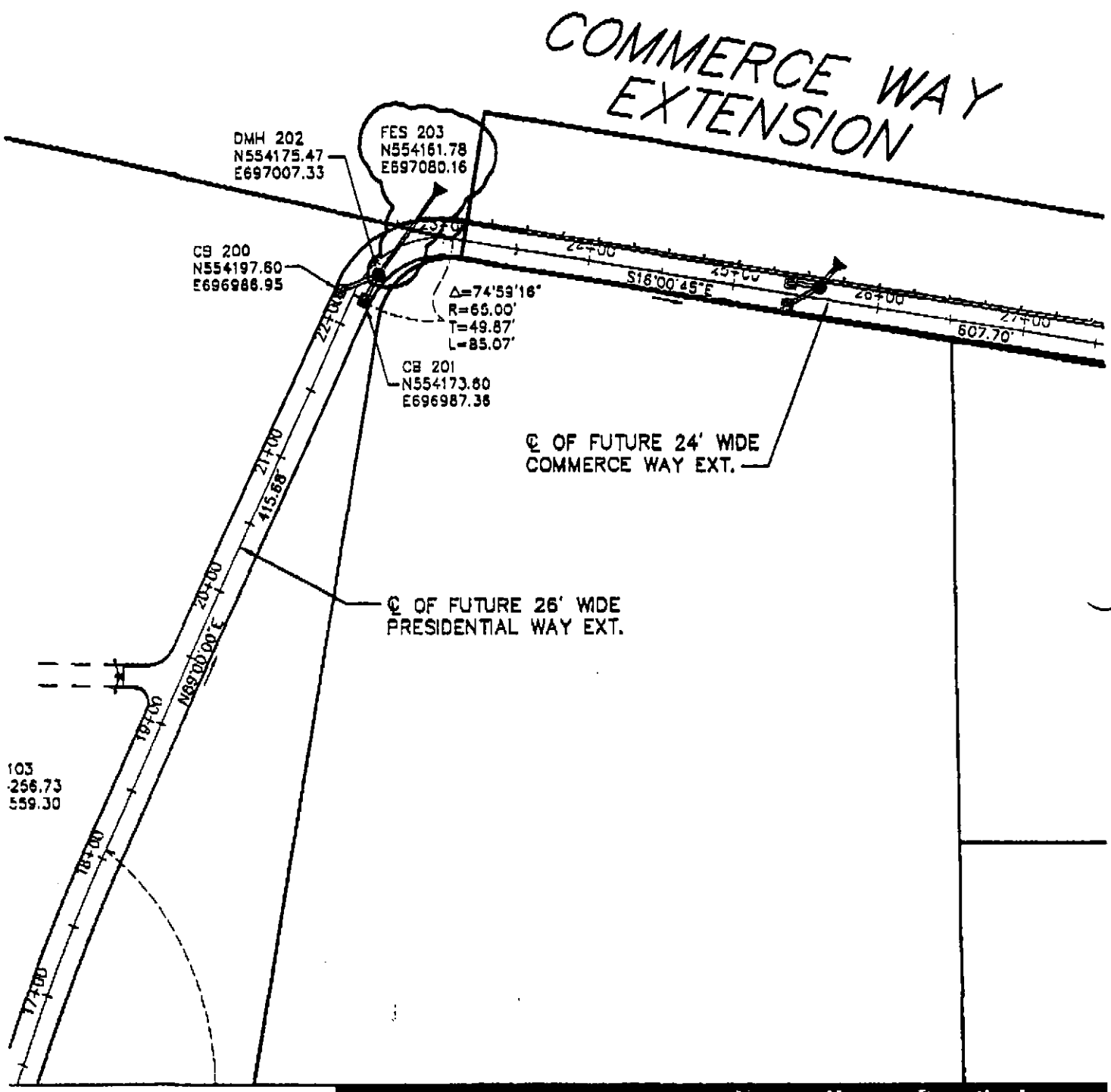
Regional Transportation Center
Alternate Cover Design

Variance
Figure 1 of 2

0 50 100 FEET

Revised Inverts - DMH 202 & FES 203

12/3/96



Vanasse Hangen Brustlin, Inc.

Regional Transportation Center
Alternate Cover Design

Variance
Figure 2 of 2

0 50 100 FEET

12/3/96

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VARIANCE REQUEST

Date of Request 09/17/96 **Suspense Date:**_____ **Variance No.** 96-025

Originator: Peter Neumann, Golder Associates Inc.

Proposed Variance: Drwg Ref: C-9 **Spec Ref.**_____ **Site Location:** N/F Janpet Prpty

Transition 3 along the MBTA at the south end of the construction site should be changed to a Transition 18. See field memo 10, dated 9/17/97

Justification:

Transition 18 will allow for a continuation of the future subdrain for the MBTA.

Review: Recommend Approval ☑ Modified ☐ Rejected ☐

Comments:

Peter Neumann 12/20/96
Reviewer Date

Disposition: Approved ☒ Modified ☐ Rejected ☐

Comments:

Joseph F. LeMay 6/23/97
Joseph F. LeMay Date
U.S.E.P.A. Remedial Project Manager

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VARIANCE REQUEST

Date of Request 10/31/96 **Suspense Date:**_____ **Variance No.** 96-026

Originator: Peter Neumann, Golder Associates Inc.

Proposed Variance: Drwg Ref: C-9 **Spec Ref.**_____ **Site Location:** N/F Janpet Prpty

Shift Transition 7 at the north end of the Site outside the limit of the future pavement limit. See field memo 17, dated 10/31/96. The 3/4-inch crushed gravel cover surface is to be located within the future pavement footprint. Topsoil covered areas of the Alternate Cover are to be outside the pavement area.

Justification:

Organic topsoil is fair to poor subgrade soil for roadway or parking lot construction.

Review: Recommend Approval ☑ Modified ☐ Rejected ☐

Comments:

Peter Neumann 12/20/96
Reviewer Date

Disposition: Approved ☒ Modified ☐ Rejected ☐

Comments:

Joseph F. LeMay 6/23/97
Joseph F. LeMay Date
U.S.E.P.A. Remedial Project Manager

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VARIANCE REQUEST

Date of Request 10/01/96 **Suspense Date:**_____ **Variance No.** 96-027

Originator: Peter Neumann, Golder Associates Inc.

Proposed Variance: Drwg Ref: **Site Location:** N/F Janpet Prpty
Spec Ref.: Demolition Assessment Report, page 22, Section 6.0

The attached page shows the revision as presented to the EPA in the response to RTC and CRC Alternate Cover Comments, Industri-Plex Site, dated October 1, 1996.

Justification:

EPA requested a modification to the Demolition Assessment Report in a letter to the Trust, September 30, 1996. This work has already been completed and all ABC and pre-existing ACM material disposed of on-site was less than six (6) inches in diameter.

Review: Recommend Approval ☑ Modified ☐ Rejected ☐

Comments:

Peter Neumann 12/20/96
Reviewer Date

Disposition: Approved ☒ Modified ☐ Rejected ☐

Comments:

Joseph F. LeMay 6/23/97
Joseph F. LeMay Date
U.S.E.P.A. Remedial Project Manager

Specifications for completing the demolition will include requirements for special handling of asbestos and lead. The specification will also include requirements for additional analysis and characterization of materials that were not analyzed as part of this study, including materials in drums, ACM, and other materials that are not readily identifiable. The specification will also require that the contractor obtain all permits (including beneficial reuse described below) and make all notifications required to handle, transport and dispose of all materials.

Based on Golder's review of MADEP guidelines on handling asphalt, brick, and concrete (ABC) rubble, it will be possible to dispose of ABC rubble by burying it on site. To comply with the guidelines, hazardous materials such as ACM, lead containing materials, or other hazardous materials that may be present in drums will be disposed of off site in an acceptable manner. Because the work is being completed as part of a CERCLA remedial action, it is not likely that a permit for beneficial reuse of ABC rubble will have to be obtained for MADEP to allow on site disposal (discussion with Anna Mayor, MADEP). However, it will have to be demonstrated that the handling and disposal of the demolition debris is consistent with the requirements for beneficial reuse of solid waste. At a minimum, it will be necessary to provide information including a description of the rubble, including quantity estimates, a description of the source of the rubble, and the proposed used (in this case as fill). According to the regulations, all ACM material should be reduced to less than 2 feet in the longest direction to facilitate handling and compaction. **The ACM material disposed of on-site will be reduced to less than six (6) inches in the longest .** All metal and exposed rebar will be removed and disposed of off site. The demolition contractor will be required to submit a health and safety plan and a remedial action work plan (or modification to an existing plan) to describe methods and protocols that will be used to characterize wastes materials and determine or confirm disposal options. The remedial action work plan will provide the basis determining compliance with the beneficial reuse requirements.

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VARIANCE REQUEST

Date of Request 10/01/96 **Suspense Date:**_____ **Variance No.** 96-028

Originator: Peter Neumann, Golder Associates Inc.

Proposed Variance: Drwg Ref: ____ **Site Location:** Alternate Cover Scope of Work
Spec Ref. Section 02110, 3.03 (A) and (F)

Organic material will be screened from grubbed soils and disposed of off site rather than in the Consolidation Area.

Justification:

EPA requested a modification to the Specification in order to be consistent with the Consent Decree. The Consent Decree only allows for soils below action level but above background to be disposed in the Consolidation Area.

Review: Recommend Approval ☑ Modified ☐ Rejected ☐

Comments:

Peter Neumann 12/20/96
Reviewer Date

Disposition: Approved ☒ Modified ☐ Rejected ☐

Comments:

Joseph F. LeMay 6/23/97
Joseph F. LeMay Date
U.S.E.P.A. Remedial Project Manager

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VARIANCE REQUEST

Date of Request 10/01/96 **Suspense Date:**_____ **Variance No.** 96-029

Originator: Peter Neumann, Golder Associates Inc.

Proposed Variance: Ref: ____ **Spec Ref.** Section 02220 **Site Location:** Industri-Plex Site

Table 1 was inadvertently left out of the July, 1996 Specifications. This table is attached to this variance and is included in the scope of work for the RTC Alternate Cover.

Justification:

***EPA requested in their letter of September 30, 1996 comments to the RTC Alternate Cover Design* that Table 1, Surface water sampling, shall be required on-site until the remedial action is completed. Table 1 must be reinstated into the text.**

Review: Recommend Approval ☑ Modified ☐ Rejected ☐

Comments:

Peter Neumann 12/20/96
Reviewer Date

Disposition: Approved ☒ Modified ☐ Rejected ☐

Comments:

Joseph F. LeMay 6/23/97
Joseph F. LeMay Date
U.S.E.P.A. Remedial Project Manager

Table 02220-1

Surface Water Quality Standards				
Constituent	Acute (AWQC)	Chronic (AWQC)	Adopted I-Plex Action Levels	Assessment Threshold Level
Arsenic	360 ppb	190 ppb	190 ppb	-
Chromium (III)	1700 ppb	210 ppb	210 ppb	-
Lead	82 ppb	3.2 ppb	82 ppb	30 ppb

Notes:

1. Acute and chronic toxicity for constituents listed above has been shown to vary with hardness (USEPA Gold Book, Quality Criteria for Water). Historic surface water testing data for the Industri-Plex site shows hardness values predominantly within the range cited by USEPA for a moderately hard water of 75 to 150 ppm. The above-tabulated AWQC limits correspond to a hardness of 100 PPM, which is commonly adopted for this hardness range.

2. Values are based upon current USEPA Gold Book, Quality Criteria for Water.

3. As indicated above, the AWQC chronic concentration for arsenic (190 ppb) and chromium (210 ppb) and AWQC acute concentration for lead (82 ppb) will be used to identify the need for response actions at the Industri-Plex Site.

4. Surface water quality will be assessed depending on turbidity measurements or the lead concentrations indicating a change in the surface water quality.

   If the turbidity exiting the site increases significantly for three consecutive days, the Contractor will investigate the source of the increased turbidity. The Contractor will evaluate the erosion and sediment controls and construction activities upstream of the sample location.

   A lead concentration of 30 ppb will serve as an assessment threshold level. A review of the historical surface water data collected from the Industri-Plex Site indicates that lead concentrations of 25 ppb have been detected without an identifiable contribution from upstream remedial activities. This intermediate assessment threshold level of 30 ppb lead has been

identified to allow timely assessment of conditions which may lead to an action level exceedance.

If the turbidity increases significantly for three consecutive days or the lead concentration exceeds 30 ppb, ISRT or an authorized representative will notify the EPA's on-site contractor, or the EPA.

5. Surface water exceeding the AWQC chronic concentration for arsenic and chromium or the AWQC acute level for lead will trigger response procedures including:

   - Evaluating levels of dissolved and undissolved constituents, and field turbidity measurements;
   - monitoring results from upstream locations;
   - evaluating the location of remedial construction activities at time of sampling; and
   - considering the presence of a direct hydraulic connection of surface water and groundwater at or upstream of the sampling location.

6. In the case where observed concentrations reach 80 percent of the Action Levels or Threshold Level the Contractor shall perform an investigation to determine the source of the elevated concentration.

INDUSTRI-PLEX SITE REMEDIAL TRUST
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VARIANCE REQUEST

Date of Request 12/20/96 Suspense Date:_____ Variance No. 96-030

Originator: Peter Neumann, Golder Associates Inc.

Proposed Variance: Drwg Ref: C-5 and 3/C-20 Spec Ref.___ Site Location: N/F Woburn Industrial Associates Inc.

The attached variance revises the perimeter fence from a location designated at the mid-slope to one that shares a clean corridor with the guard rail at the top of the slope. See attached revised plan.

Justification:

- The referenced plan and detail are not in agreement. Drawing C-5 shows a fence located mid-slope. A section view, detail 3/C-20, through the north slope, shows a future guard rail without a fence or clean corridor for a fence.
- Snow plowed into the detention basin could topple a fence placed on the slope.
- A fence located on top of the slope will be easier for future litter clean up.

Review: Recommend Approval ☑ Modified ☐ Rejected ☐

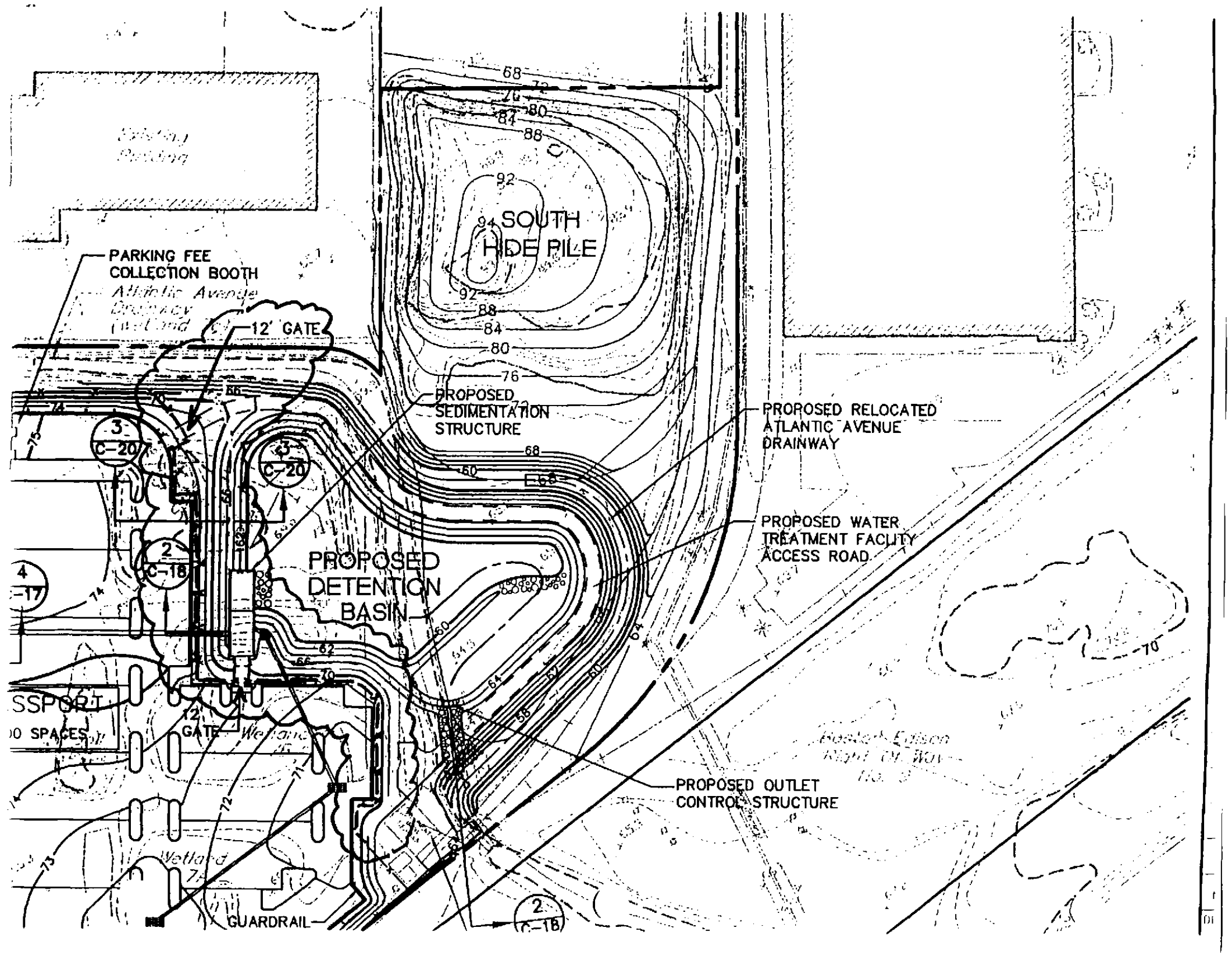
Comments:

Peter Neumann 12/20/96
Reviewer Date

Disposition: Approved ☒ Modified ☐ Rejected ☐

Comments:
Based upon a 12/24/96 telephone conversation with Jim Lamp, VHB, MASSPORT [redacted] approves of the fence re-location.

Joseph F. LeMay 12/30/96
Joseph F. LeMay Date
U.S.E.P.A. Remedial Project Manager



PARKING FEE COLLECTION BOOTH
12' GATE
SOUTH HIDE PILE
PROPOSED SEDIMENTATION STRUCTURE
PROPOSED RELOCATED ATLANTIC AVENUE DRAINWAY
PROPOSED WATER TREATMENT FACILITY ACCESS ROAD
PROPOSED DETENTION BASIN
PROPOSED OUTLET CONTROL STRUCTURE
GUARDRAIL
12' GATE
SSPORT
SPACES

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VARIANCE REQUEST

Date of Request 12/20/96 Suspense Date: _____ Variance No. 96-031

Originator: Peter Neumann, Golder Associates Inc.

Proposed Variance: Drwg Ref: C-4 and C-5A Spec Ref. ___ Site Location: Atlantic Avenue

The clean corridor layout for electric, and gas in the Atlantic Avenue is revised. See attached layout plan for location of clean corridor.

Justification:

Avoidance of existing features (fire hydrant, catch basins and drain lines, terminus of gas line, and existing location of water line),

Review: Recommend Approval ☒ Modified ☐ Rejected ☐

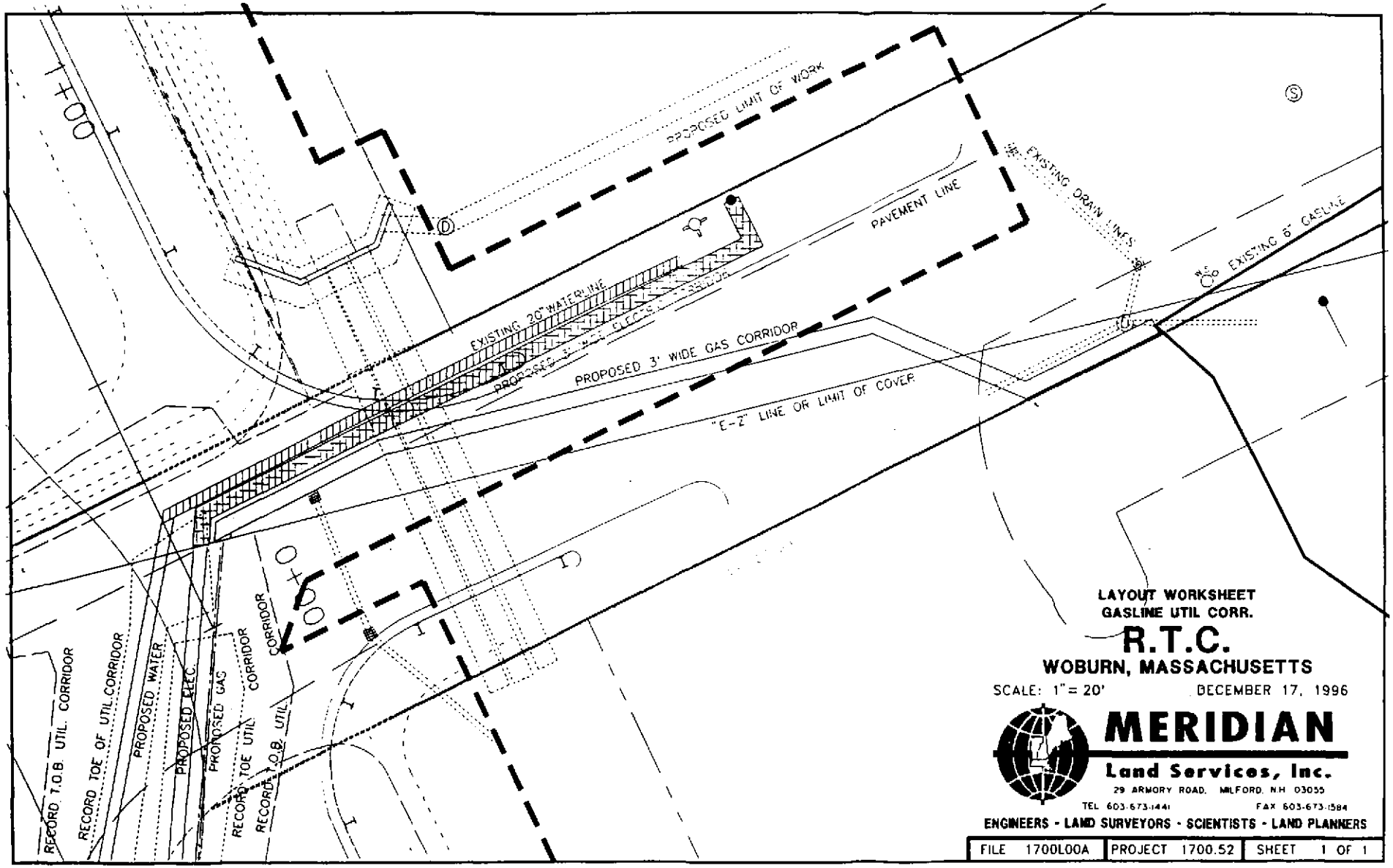
Comments:

Peter Neumann 12/20/96
Reviewer Date

Disposition: Approved ☒ Modified ☐ Rejected ☐

Comments:
Based upon a 12/31/96 telephone conversation with Mr. John Fiore, the GAS Line utility corridor was re located to the South side of the ATLANTIC AVENUE because the existing GAS LINE CONNECTION is SITUATED ON the South side.

Joseph F. LeMay 12/31/96
Joseph F. LeMay Date
U.S.E.P.A. Remedial Project Manager



LAYOUT WORKSHEET
GASLINE UTIL CORR.

R.T.C.

WOBURN, MASSACHUSETTS

SCALE: 1" = 20' DECEMBER 17, 1996

MERIDIAN
Land Services, Inc.
29 ARMORY ROAD, MILFORD, N.H. 03055
TEL 603-673-1441 FAX 603-673-1584
ENGINEERS - LAND SURVEYORS - SCIENTISTS - LAND PLANNERS

FILE 1700L00A	PROJECT 1700.52	SHEET 1 OF 1

Note: Reduced 75% for [illegible]

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23 Atlantic Avenue
Woburn, Massachusetts

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VARIANCE REQUEST

Date of Request 12/20/96 Suspense Date:_____ Variance No. 96-032

Originator: Peter Neumann, Golder Associates Inc.

Proposed Variance: Spec Ref.___ Site Location: Detention Basin
Drwg Ref: 1/C-15, 2/C-15, 3/C-15 & C2/C-18

Place the geomembrane liner over the prepared ground surface of the detention basin. Then place the 16 ounce geotextile over the geomembrane.

Justification:

The contractor has placed dense graded aggregate on the floor of the detention basin which stabilized the floor and enabled the contractor to work more readily with clean, dry conditions.

Review: Recommend Approval ☑ Modified ☐ Rejected ☐

Comments:

Peter Neumann 12/20/96
Reviewer Date

Disposition: Approved ☒ Modified ☐ Rejected ☐

Comments:
The dense graded aggregate placed in the detention basin is acceptable subgrade for the geomembrane liner, and serves to stabilize the basin over the winter and prevent erosion in the spring (if geomembrane is not installed). However, the dense grade has been cross-contaminated w/ surface water and sediments in the basin and is not considered "clean". Future work in the basin is still considered part of the exclusion zone until the geomembrane is successfully installed.

Joseph F. LeMay 12/30/96
Joseph F. LeMay Date
U.S.E.P.A. Remedial Project Manager

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VARIANCE REQUEST

Date of Request 12/20/96 Suspense Date:_____ Variance No. 96-033

Originator: Peter Neumann, Golder Associates Inc.

Proposed Variance: Drwg Ref: 2/C-18 Spec Ref.___ Site Location: Detention Basin

Compaction of road structural fill and top soil in the detention basin can beaccomplished by the placing equipment. Compaction testing is not required.

Justification:

- Compaction by the placing equipment only is consistent with the 100% Design.
- Compaction by placing equipment will minimize pressure between the road structural fill and geomembrane.
- Compaction to meet structural fill standards is not necessary since the area will not be supporting a structure or vehicle traffic.
- Compaction by placing equipment on slopes is consistent and proven by the hide pile cover construction.

Review: Recommend Approval ☑ Modified ☐ Rejected ☐

Comments:

Peter Neumann 12/20/96
Reviewer Date

Disposition: Approved ☒ Modified ☐ Rejected ☐

Comments:

Joseph F. LeMay 12/30/96
Joseph F. LeMay Date
U.S.E.P.A. Remedial Project Manager

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VARIANCE REQUEST

Date of Request 12/6/96 **Suspense Date:**_____ **Variance No.** 96-034

Originator: Peter Neumann, Golder Associates Inc.

Proposed Variance: Drwg Ref: C-5 **Spec Ref.**___ **Site Location:** Janpet/Woburn Industrial Prpty

Eliminating the specified one foot surcharge as shown in Drawing C-5 and described in notes 1 and 11 on the same Drawing.

Justification:

The justification is presented in a report prepared for the Trust by Golder Associates Inc. entitled"Subsurface Investigation-Alternate Cover, Industri-Plex Site Remedial Trust", dated December 4, 1996.

Review: Recommend Approval ☐ Modified ☐ Rejected ☐

Comments:

Peter Neumann 5/7/97
Reviewer Date

Disposition: Approved ☒ Modified ☐ Rejected ☐

Comments:

Joseph F. LeMay 6/23/97
Joseph F. LeMay Date
U.S.E.P.A. Remedial Project Manager

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23 Atlantic Avenue
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VARIANCE REQUEST

Date of Request 12/19/96 **Suspense Date:**_____ **Variance No.** 96-035

Originator: Peter Neumann, Golder Associates Inc.

Proposed Variance: Drwg Ref: C-4 and C-19 **Spec Ref.**___ **Site Location:** MBTA right of way

End the excavation along the MBTA right of way 50 to 60 feet south of the northern limit of work.

Justification:

Two utility poles located near the area of excavation could be undermined. A representative of BECO visited the site and said we could extend the MBTA excavation 25-30-feet north without impacting the pole. BECO said the poles were supported by guy wires and had 8 feet of embedment. Excavation could proceed provided a three feet horizontal area around the pole and a 1H:1V slope away is left undisturbed.

This modification was discussed at the Construction Progress Meeting of December 20, 1996.

Review: Recommend Approval ☐ Modified ☐ Rejected ☐

Comments:

Peter Neumann 5/7/97
Reviewer Date

Disposition: Approved ☒ Modified ☐ Rejected ☐

Comments:

Joseph F. LeMay 6/23/97
Joseph F. LeMay Date
U.S.E.P.A. Remedial Project Manager

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VARIANCE REQUEST

Date of Request 12/20/96 **Suspense Date:**_____ **Variance No.** 96-036

Originator: Peter Neumann, Golder Associates Inc.

Proposed Variance: Drwg Ref: 1/C-15, 2/C-15, 3/C-15, C2/C-18 **Spec Ref.** 02597 **Site Location:** Detention Basin

Revise Variance Request 96-032. Overlap instead of sewing the geotextile placed over the geomembrane in the detention basin and eliminate conformance testing for geotextile placed in the detention basin.

Justification:

Since the geotextile is acting as a cushion layer and not acting as a direct separation between clean soils and dirty soils, the geomembrane is providing that separation, the required method of joining the geotextile and required testing is not needed.

Review: Recommend Approval ☐ Modified ☐ Rejected ☐

Comments:

Peter Neumann 5/7/97
Reviewer Date

Disposition: Approved ☒ Modified ☐ Rejected ☐

Comments:

Joseph F. LeMay 6/23/97
Joseph F. LeMay Date
U.S.E.P.A. Remedial Project Manager

INDUSTRI-PLEX SITE REMEDIAL TRUST
Commerce Way/Atlantic Avenue
Woburn, Massachusetts

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VARIANCE REQUEST

Date of Request 2/12/98 **Suspense Date:**_____ **Variance No.** 96-037

Originator: Peter Neumann, Golder Associates Inc.

Proposed Variance: Drwg Ref: C-9 through C-20 **Spec Ref.** 02271
Site Location: Atlantic Avenue Drainway, Aberjona River and Detention Basin

Allow the rip-rap diameter to be revised from d_{50} = 3 inch , d_{50} = 6 inch and d_{50} =12 inch to the rip-rap gradations utilized at the above locations.

Justification:

Calculations show the factor of safety is 1.0 or greater against overturning for the smaller sized rip-rap placed in the drainway bed, on the drainway slope and in the Atlantic Avenue drainway bend. The calculations considered the 50 year 24 hour storm peak flow depth of 1.3 feet.

The relocated Atlantic Avenue drainway and Detention basin are lined with a geomembrane and geotextile so channel flows causing scour and undermining the rip-rap is not a factor. The rip rap has stayed intact for over a year. The Aberjona River (wetland 2B) flow has been placed in a culvert and the channel has been backfilled.

Review: Recommend Approval ☒ Modified ☐ Rejected ☐

Comments:

Peter Neumann 2/16/98
Reviewer Date

Disposition: Approved ☐ Modified ☐ Rejected ☐

Comments:

Joseph F. LeMay 3/13/98
Joseph F. LeMay Date

Golder Associates	SUBJECT RIP-RAP SIZE EVALUATION		
	Job No. 933-6143 Ref. ISRT/RES. ENG/MA	Made by PCN Checked MRT Reviewed	Date 2/13/95 Sheet 1 of 12

OBJECTIVE: TO EVALUATE THE STABILITY OF RIP-RAP PLACED ON THE DRAINWAY CHANNEL BED, SLOPE AND CHANNEL BEND FOR RELOCATED ATLANTIC AVENUE DRAINWAY. MINIMUM FACTOR OF SAFETY AGAINST OVERTURNING ≥ 1.0 AT THE PROPOSED 50 YEAR - 24 HOUR STORM EVENT.

REFERENCES:

1. GOLDER ASSOCIATES, INC. 1997 DRAFT RTC ALTERNATE COVER CERTIFICATION REPORT, JUNE.

2. GOLDER ASSOCIATES, INC. 1992, 100% DESIGN REPORT, JUNE, VOLUME 3 (SEE ATTACHMENT A).

3. HAAN, BARFIELD & HAYES, 1994, DESIGN HYDROLOGY AND SEDIMENTOLOGY FOR SMALL CATCHMENTS, ACADEMIC PRESS, 589 p.

4. JUMIKIS, A.R., 1979 ROCK MECHANICS (SEE ATTACHMENT A).

Golder Associates	SUBJECT RIP-RAP SIZE EVALUATION		
	Job No. 933-6143 Ref. ISRT/ RES. ENG. /MA	Made by PCN Checked MBT Reviewed	Date 2/13/98 Sheet 2 of 12

METHODS:

1. CHANNEL BED STABILITY - CSU PROCEDURE (REF. 3 p. 126-129)

- Mannings n,

$n = 0.0395 D_{50}^{1/6}$ where:

n = Mannings roughness
D_{50} = Rip-rap diameter in feet such that 50% of stones have a diameter smaller than D_{50}.

- Tractive force τ,

$\tau = 1.0 \gamma d S$ where:

τ = Tractive force, lb/ft.^{2} at bottom for trapezoidal channels and $b/d > 8$ (See Figure 4.8(b) Ref 3)

γ = weight of water, 62.4 pcf
d = depth required to convey flow, ft.
S = channel slope, ft/ft.
b = channel width

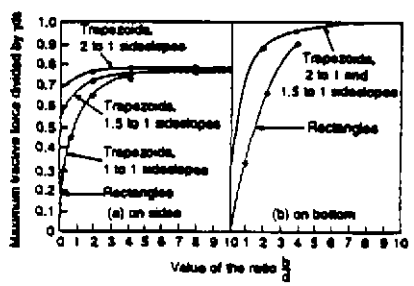


Figure 4.8 Tractive force distribution for trapezoidal channels (Lane and Carlson, 1953).

- Stability factor, η_b

$$\eta_b = \frac{21\,\tau}{\gamma\,(S.G. - 1)\,D_{50}}$$

where:

η_b = Stability factor (unit less)

S.G. = Bulk Specific Gravity

- Safety factor against overturning, $S.F_b$

$$S.F_b = \frac{\cos\theta \tan\phi}{\sin\theta + \eta_b \tan\phi}$$

where:

θ = slope of channel in degrees.

ϕ = rock angle of repose

$S.F_b$ = Safety factor against overturning in channel bottom

2. CHANNEL SIDE SLOPE STABILITY, STEVENS & SIMONS (1971) AND SIMONS & SENTURK (1977, 1992) (REF. 3, p. 130 - 131)

- Maximum tractive force, τ_{max}

$$\tau_{max} = 0.78\,\gamma\,d\,S$$

where:

τ_{max} = Maximum tractive force lb/ft^2 for 2H:1V side slope and $b/d > 4$

γ = weight of water, 62.4 pcf

d = depth of water required to convey flow, ft.

S = channel slope, ft/ft.

b = channel width, ft.

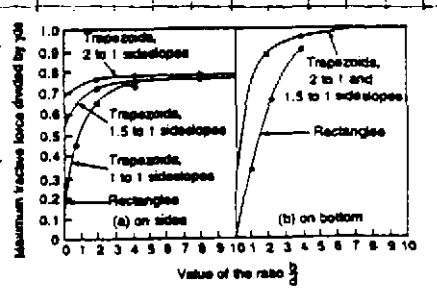


Figure 4.8 Tractive force distribution for trapezoidal channels (Lane and Carlson, 1953).

- Channel side slope stability factor, η'

$$\eta' = \eta \left[\frac{1 + \sin(\lambda + \beta)}{2} \right]$$

where:

η' = channel side slope stability factor.

$\eta = \dfrac{2\tau_{max}}{\gamma(S.G.-1)D_{50}}$

$\lambda \cong \theta$ = channel slope in degrees, assuming uniform flow

$\beta = \tan^{-1}\left[\dfrac{\cos\lambda}{(2\sin\alpha/\eta\tan\phi) + \sin\lambda} \right]$

α = slope of bank (°)

ϕ = rock angle of repose

- Channel side slope safety factor, SF

$$SF = \frac{\cos\alpha \tan\phi}{\eta' \tan\phi + \sin\alpha \cos\beta}$$

Golder Associates	SUBJECT RIP-RAP SIZE EVALUATION		
	Job No. 933-6143 Ref. ISRT/RES. ENG./MA	Made by PCN Checked MRT Reviewed	Date 2/13/98 Sheet 5 of 12

3. CHANNEL BEND STABILITY
NORMAN (1975) (REF 3, p 130-131)

- Average velocity in a straight channel, v_{ave}

$$v_{ave} = \frac{1.486}{n} R^{2/3} S^{1/2}$$

where:

$n = 0.0395 (D_{50})^{1/6}$

R = Hydraulic Radius

S = Channel Slope

- Measure outerbank radius, Rd.

- Shear correction factor, K_3

Use: v_{ave}^2 / Rd, and Figure 4.21, Ref 3

$$K_3 \cong 3\left(v_{ave}^2 / Rd\right) + 1$$

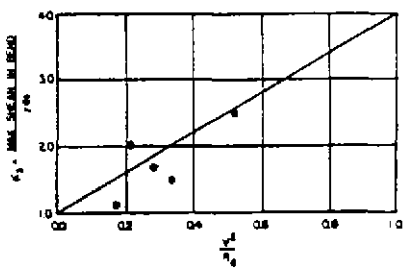


Figure 4.21 Correction factor for shear in flow in a bend (Normann, 1975).

- Corrected Bank Shear, τ

$$\tau = K_3 \gamma d S$$ where:

γ = weight of water, 62.4 pcf.

d = depth required to convey flow, ft.

S = Channel slope, ft/ft.

- Calculate corrected factor for channel side slope stability factor, η'

$$\eta' = \eta \left[\frac{1 + \sin(\lambda + \beta)}{2} \right]$$

where:

$$\eta = \frac{21\ \tau}{\gamma\,(S.G. - 1)\,D_{50}}$$

$\lambda \cong \theta$ = channel slope in degrees assuming uniform flow

$$\beta = \tan^{-1} \left[\frac{\cos \lambda}{(2 \sin \alpha / \eta \tan \phi) + \sin \lambda} \right]$$

α = channel side slope in degrees, and ϕ = rock angle of repose.

- Channel Bend safety factor, S.F.

$$S.F. = \frac{\cos \alpha \tan \phi}{\eta' \tan \phi + \sin \alpha \cos \beta}$$

Golder Associates	SUBJECT RIP-RAP SIZE EVALUATION		
	Job No. 933-6143 Ref. JSRT/RES. ENG./MA	Made by PCN Checked MRT Reviewed	Date 2/13/98 Sheet 7 of 12

ASSUMPTIONS

• RIP-RAP MATERIAL

1. S.G. = 2.7 for Gabbro Diorite (Ref 4, Table 4-2) Attach. A

2. RIP-RAP is crushed ledge rock - angular

3. Location of rip-rap:

D_{50} = 5" placed in relocated Atlantic Avenue Drainway channel bottom & side slopes.

$D_{50} \cong 10"$ placed in relocated Atlantic Avenue Drainway channel bend.

D_{50} = 2" placed in Aberjona River - now backfilled. No need to evaluate rip-rap size.

4. Angle of repose for crushed ledge rock $\approx 42°$ (Ref. 3, Figure 4.17)

• FLOW IN ATLANTIC AVENUE DRAINWAY

5. For 50 year - 24 hour storm proposed peak flow at flow at railroad tracks (Ref. 2, 1992) Attachment A

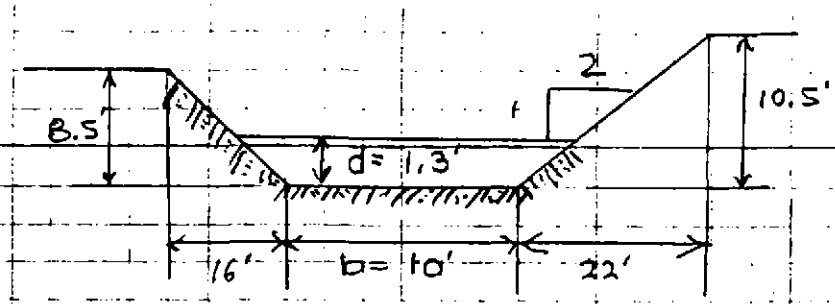
55.5' 50 YEAR-24 HOUR PEAK STAGE
54.2' CHANNEL BOTTOM
1.3' Above channel bottom = d_{max}

6. Flow from the RTC detention basin and into the relocated Atlantic Avenue drainway - flows will be detained so as not to exceed the 50 year - 24 hour storm peak flow as stated in assumption 5.

Golder Associates	SUBJECT RIP-RAP SIZE EVALUATION		
	Job No. 93J-6143 Ref. ISRT/RES. ENG./MA	Made by PCN Checked MRT Reviewed	Date 2/13/98 Sheet 8 of 12

CALCULATIONS

A. DEVELOP CROSS-SECTION FOR DRAINWAY FROM AS-BUILT DRAWING (REFERENCE 1) SEE ATTACHMENT B



ATLANTIC AVENUE DRAINWAY SECTION A-A (SEE ATTACHMENT B)

- $b/d = 10/1.3 \cong 8$
- Slope of channel $= \frac{55.98 - 55}{418'} = 0.0023$ (ATTACH. B)

B. CALCULATE FACTOR OF SAFETY FOR $D_{50} = 5''$ RIP-RAP IN CHANNEL BED, USING CSU METHOD.

- Mannings, n $\quad n = 0.0395\left(\frac{5''}{12''}\right)^{1/6} = 0.034$
- Tractive Force, τ $\quad \tau = 1.0\,\gamma d S = 1.0(62.4)\,1.3'(0.0023) = 0.187$
  ($d = 1.3$, see Assumptions 5 and 6)
- Channel bed stability factor, η_b $\quad$ (S.G. = 2.7, ASSUMP. 1)

$$\eta_b = \frac{21\tau}{\gamma(S.G.-1)D_{50}} = \frac{21(0.187)}{62.4(2.7-1)\,5/12} = 0.089$$

- Safety Factor for channel bed, SF_b

$$SF_b = \frac{\cos\theta \tan\phi}{\sin\theta + \eta_b \tan\phi} = \frac{\cos(0.13)\tan 42^\circ}{\sin(0.13) + 0.089\tan 42^\circ} = 11.0$$

where:

$\theta = \tan^{-1}(0.0023) = 0.13$

$SF_b = 11.0 > 1.0$

See Table 1

C. CALCULATE FACTOR OF SAFETY FOR $D_{50} = 5''$ RIP-RAP ON CHANNEL SIDE SLOPES

- Maximum Tractive Force on channel side slope, τ_{max}

$\tau = 0.78\ \gamma d S$ where:

$\tau = 0.78(62.4)1.3(0.0023)$ Use 0.78 since $b/d \cong 8 > 4$ See Figure 4.8 (a)

$\tau = 0.146$

- Factor for side slope stability, η

$$\eta = \frac{21\ \tau}{\gamma\,(S.G.-1)\,D_{50}} = \frac{21\,(0.146)}{62.4\,(2.7-1)\ 5/12} = 0.069$$

- Angle for drag force vector, β

$$\beta = \tan^{-1}\left[\frac{\cos\lambda}{(2\sin\alpha)/\eta\tan\phi) + \sin\lambda}\right]$$

where:

$\lambda \cong \theta = 0.13$

$\alpha = \tan^{-1}(1/2)$

$\alpha = 26.6°$

$\phi = 42°$ See Assumptions 2 and 4

$$\beta = \tan^{-1}\left[\frac{\cos 0.13}{(2\sin 26.6)/0.069\tan 42°) + \sin 0.13}\right]$$

$$\beta = \tan^{-1}\left[\frac{1.0}{(0.90/0.62) + 0.002}\right] = 3.98$$

- Channel side slope stability factor, η'

$$\eta' = \eta\left[\frac{1 + \sin(\lambda + \beta)}{2}\right]$$

$$\eta' = 0.069\left[\frac{1 + \sin(0.13 + 3.98)}{2}\right] = 0.037$$

• Channel Side Slope, Safety Factor, S.F.

$$SF = \frac{\cos\alpha \tan\phi}{\eta' \tan\phi + \sin\alpha \cos\beta}$$

$$SF = \frac{\cos 26.6 \ \tan 42}{0.037 \tan 42 + \sin 26.6 \cos 3.98}$$

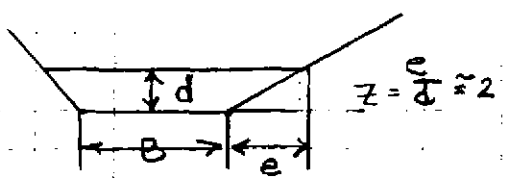
$SF = 1.7 > 1.0$ See Table 1

D. CALCULATE FACTOR OF SAFETY FOR $D_{50} \cong 10''$ RIP-RAP FOR CHANNEL BEND (see Assumption 3)

• Determine velocity in straight channel stretch

From Manning's Equation

$$V_{ave} = \frac{1.486}{n} R^{2/3} S^{1/2} \qquad n = 0.0395 (D_{50})^{1/6}$$



$Z = \frac{e}{d} \cong 2$

$$R = \frac{dB + Zd^2}{B + 2d\sqrt{Z^2+1}}$$

$$R = \frac{1.3(10') + 2(1.3')^2}{10' + [2(1.3') \times (2^2+1)^{1/2}]}$$

$R = 1.036$

$V_{ave} = 1.905$ ft/sec

- Determine radius of curvature of the outside bank, Rd

Measured from Attachment C: Rd = 31'

- Calculate $v^2/Rd = (190\ ft/sec)^2/31' = 0.117$

- Determine correction factor K_3 from Figure 4.21, Ref. 3.

$K_3 = 3(0.117) + 1 = 1.35$

- Calculate corrected bank shear

$$\tau_{max} = K_3 \gamma d S = 1.35(62.4)(1.3)(0.0023) = 0.252$$

- Calculate corrected factor for channel side slope stability factor η'

$$\eta' = \eta = \left[\frac{1+\sin(\lambda+\beta)}{2}\right] = 0.060\left[\frac{1+\sin(0.13+3.4)}{2}\right] = 0.032$$

where:

$$\eta = \frac{21\ \tau_{max}}{\gamma(S.G.-1)\ D_{50}} = \frac{21\ (0.252)}{62.4(2.7-1)(10/12)} = 0.060$$

$$\beta = \tan^{-1}\left[\frac{\cos\lambda}{(2\sin\alpha)/\eta\ \tan\phi + \sin\lambda)}\right]$$

$$\beta = \tan^{-1}\left[\frac{\cos 0.13}{(2\sin 26.6)/0.060\ \tan 42^\circ + \sin 0.13)}\right]$$

$$\beta = \tan^{-1}\left[\frac{1.0}{16.57 + 0.002}\right] = 3.45$$

Golder Associates	SUBJECT RIP-RAP SIZE EVALUATION		
	Job No. 933-6142 Ref. JSRT/RES. ENG/MA	Made by PCN Checked MRT Reviewed	Date 2/16/98 Sheet 12 of 12

- Calculate corrected channel side slope safety factor for channel bend. SF.

$$SF = \frac{\cos\alpha \tan\phi}{\eta' \tan\phi + \sin\alpha \cos\beta}$$

$$SF = \frac{\cos 26.6 \tan 42}{0.03 \tan 42 + \sin 26.6 \cos 3.5}$$

$$SF = \frac{0.805}{0.032 + 0.45} = 1.7 > 1.0 \text{ OK}$$ See Table 1

RESULTS / DISCUSSION / CONCLUSION

FROM TABLE 1

EVALUATION OF RIP-RAP SIZE FOR CHANNEL BED

where $D_{50} = 5''$, Section A-A' and $d = 1.3'$

$SF_b = 11 > 1.0$, OK

EVALUATION OF RIP-RAP SIZE FOR CHANNEL SIDE SLOPE

where: $D_{50} = 5''$, Section A-A' and $d = 1.3'$

$SF = 1.7 > 1.0$ OK

EVALUATION OF RIP RAP SIZE FOR CHANNEL BEND.

where $D_{50} = 10''$, straight channel - Section A-A', and Bend Radius of 31', $d = 1.3'$

$SF = 1.7 > 1.0$ OK

Scour beneath rip-rap not a concern since channel is lined w/ geomembrane.

TABLE 1a

Evaluating Rip-Rap Size for Channel Bed

CSU Procedure

D_{50} (in)	D_{50} (ft)	Manning's n	Slope (ft/ft)	Depth to convey flow, d (ft)	Angle of Repose (°)	Theta Slope (°)	Specific Gravity	Tractive force T (lb/ft²)	Channel bed stability factor (n_b)	Safety factor for channel bed (SF_b)
5	0.42	0.034	0.0023	1.3	42	0.13	2.7	0.18658	0.089	11.0

TABLE 1b

Evaluating Rip Rap Size for Bank Stability

Stevens & Simons (1971) and Simons & Senturk (1977, 1992)

Section	D_{50} (in)	D_{50} (ft)	Manning's n	Slope (ft/ft)	Depth to convey flow, d (ft)	Angle of Repose (°)	Theta Slope (°)	Specific Gravity	Maximum tractive force on channel bed (lb/ft2)	Channel bed stability factor (n_b)	Safety factor for channel bed (SFb)	Maximum tractive force on walls (lbs/ft2)	Channel Wall Slope alpha (o)	Factor for channel wall stability factor (n)	Angle for Drag Force Vector, B (°)	Channel wall stability factor (n')	Channel wall safety factor (SF)
A-A'	5	0.4	0.034	0.0023	1.3	42	0.13	2.7	0.19	0.089	11.0	0.146	26.57	0.069	3.98	0.037	1.7

Section A-A': d=1.3, b=10; b/d = 8 and Max Tractive Force on bank factor = 0.78

TABLE 1c

Evaluating Rip Rap Size in Channel Bend

Norman (1975)

D_{50} (in)	D_{50} (ft)	Manning's n	Slope (ft/ft)	Depth to convey flow, d (ft)	Base Width, b (ft)	Hydraulic Radius at d_{max} (ft)	Average Velocity (f/sec)	Angle of Repose (°)	Theta Slope (°)	Specific Gravity	Maximum tractive force on channel bed (lb/ft2)	Channel Wall Slope alpha (o)	Channel bed stability factor (n_b)	Safety factor for channel bed (SFb)	Maximum tractive force on walls (lbs/ft2)	Radius of Curvature of outside bank, Rd (ft)	Factor v^2/R_d	Maximum Shear in Bend K_2	Maximum tractive force on walls, T_{max} (lbs/ft2)	Factor for channel wall stability factor (n)	Angle for Drag Force Vector, B (°)	Channel bend bank stability factor (n')	Channel bend bank safety factor (SF)
10	0.8	0.038	0.0023	1.3	10	1.04	1.90	42	0.13	2.70	0.19	26.57	0.044	21.33	0.15	31	0.117	1.4	0.252	0.060	3.45	0.032	1.7

From (Jumikis, 1979) ATTACHMENT A 1 OF 5

where

n = porosity of rock or soil,
G = specific gravity,
γ_w = unit weight of water
= 1 g_f/cm^3 = 1 t_f/m^3 = 9.81 kN/m^3 = 62.4 lb/ft^3

When inundated, the rock and soil particles are subject to buoyancy. The buoyant or submerged unit weight γ_{sub} is expressed as:

$$\gamma_{sub} = (1-n)(G-1)\gamma_w = \gamma_{sat} - \gamma_w \qquad (4\text{-}11)$$

Dry unit weights of some American rocks are compiled after GRIFFITH (35) in Table 4-2:

$$1\ lb/ft^3 = 0.157092\ kN/m^3 = 0.0160184\ t_f/m^3 = 16.01846\ kg_f/m^3$$

TABLE 4-2

Dry Unit Weight and Porosity Values of Some American Rocks
(after J. H. GRIFFITH, Ref. 35)

Type of rock	Bulk or apparent specific gravity	Dry unit weight t_f/m^3	Porosity n %
1	2	3	4
Igneous:			
Basalt	2.21 – 2.77	2.21 – 2.77	0.22 – 22.06
Diabase	2.82 – 2.95	2.82 – 2.95	0.17 – 1.00
Gabbro	2.72 – 3.00	2.72 – 3.00	0.00 – 3.57
Granite	2.53 – 2.62	2.53 – 2.62	1.02 – 2.87
Sedimentary:			
Dolomite	2.67 – 2.72	2.67 – 2.72	0.27 – 4.10
Limestone	2.67 – 2.72	2.67 – 2.72	0.27 – 4.10
Sandstone	1.91 – 2.58	1.91 – 2.58	1.62 – 26.40
Shale	2.00 – 2.40	2.00 – 2.40	20.00 – 50.00
Metamorphic:			
Gneiss	2.61 – 3.12	2.61 – 3.12	0.32 – 1.16
Marble	2.51 – 2.86	2.51 – 2.86	0.65 – 0.81
Quartzite	2.61 – 2.67	2.61 – 2.67	0.40 – 0.65
Schist	2.60 – 2.85	2.60 – 2.85	10.00 – 30.00
Slate	2.71 – 2.78	2.71 – 2.78	1.84 – 3.61

Porosity of Rock

Voids, i.e. pores
uniformity of structu

Pores in rock are
air also.

The quality of roc
degree of porosity d

Pores have a con
on the behavior of rc

The presence of
mechanical—viz., st
form of cracks has
crystalline materials
ing upon their type,
is the result of ter
and tempera or
as in compact cryst
stresses (20). Upon
is, fine crystals form
rock; whereas upon
released upon coolin

The porosity of a
("glue") of the agg
rock. Usually, the lar

The amount of vo
of porosity n, and as

Porosity n is the a

n

where V_v = volu

$e = \frac{n}{1-}$

W_s = dry v
G = speci
γ_w = unit
$V = V_s +$
= total

APPENDIX H.3

SUMMARY OF RIP RAP & BALLAST LABORATORY TEST RESULTS

SITE SAMPLE NUMBER	LAB SAMPLE NUMBER	DATE	SOURCE	GRADATION (% PASSING) 18"	12"	8"	7"	6"	5"	4"	3"	2"	1-1/2	1"	3/4"	ABRASION TEST (%) ASTM C535	FREEZE THAW AASHTO T103 (%)	SPECIFIC GRAVITY ASTM C-127
Saugus Quarry Ledge Stone	-	7/20/95	Bardon Trimount													17.4	1.07	
Stockyard	C-603b	8/16/95	Bardon Trimount								100	50	7	2				
LRS Certification	-	7/8/96	Bardon Trimount													17-18		2.78-2.94
RR-1	C-539b	7/18/96	Bardon Trimount								100	78	12	2	1			
RR-2	C-807c	9/13/96	Bardon Trimount			100	83	72	51	41	12	4	0.2	0	0			
RR-3	C-865f	10/1/96	Ballast	NOTE 2												12.0		
RR-4	FIELD	12/16/96	Bardon Trimount		100													
RR-5	FIELD	12/20/96	Heffron		80													

Note:
1. See abbreviation Table 2.
2. Meets AREA Size No. 4 Requirements.

ATTACHMENT A
2 OF 5

Golder Associates	SUBJECT RIP-RAP SIZE EVALUATION		
	Job No. 933-6143	Made by PCN	Date 12/12/97
	Ref. ISRT/RES. ENG/MA	Checked	Sheet of
		Reviewed	

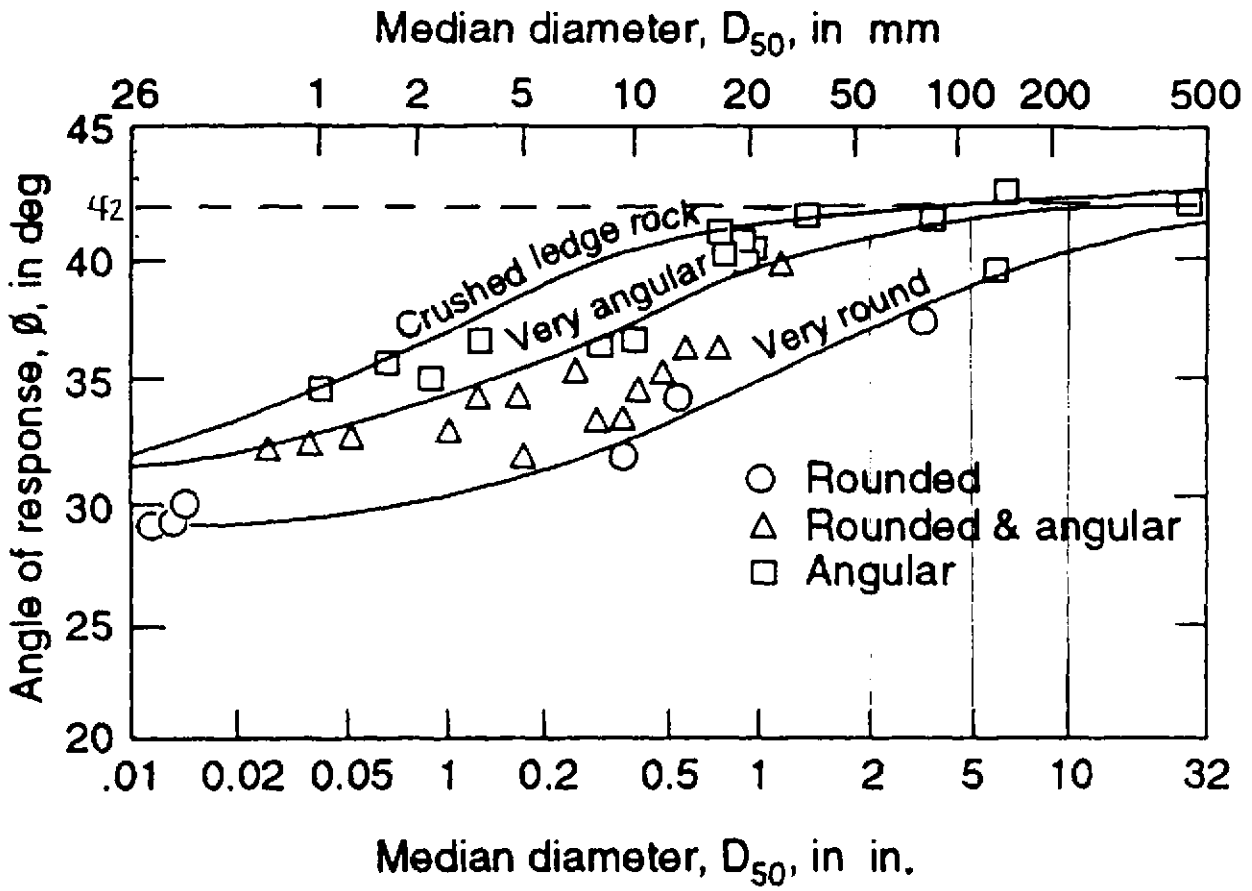


Figure 4.17 Angle of repose of dumped riprap (after Simons and Senturk, 1977, 1992).

FROM: Vol. 3 of 8, Appendix 10E
HEC-1, 50 yr. - 24 hr. Storm.
PROPOSED CONDITIONS

```
                 **************
                 *            *
346 KK           *   SHD10C   *
                 *            *
                 **************

347 KO           OUTPUT CONTROL VARIABLES
                       IPRNT          1  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL         0.  HYDROGRAPH PLOT SCALE
                              STORAGE ROUTING THROUGH ATLANTIC AVENUE CHANNEL at RR TRACKS

                HYDROGRAPH ROUTING DATA

349 RS           STORAGE ROUTING
                       NSTPS          1  NUMBER OF SUBREACHES
                        ITYP       STOR  TYPE OF INITIAL CONDITION
                      RSVRIC        .00  INITIAL CONDITION
                           X        .00 WORKING R AND D COEFFICIENT

350 RC           NORMAL DEPTH CHANNEL ROUTING
                         ANL       .080  LEFT OVERBANK N-VALUE
                        ANCH       .030  MAIN CHANNEL N-VALUE
                         ANR       .080  RIGHT OVERBANK N-VALUE
                       RLNTH       800.  REACH LENGTH
                         SEL      .0070  ENERGY SLOPE
                       ELMAX       63.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                          --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
352 RY          ELEVATION    63.00    62.50    62.00    54.20    54.20    62.00    62.50    63.00
 1 RX           DISTANCE       .00    10.00    20.00    28.00    42.00    50.00    60.00    70.00

                                                   ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

                STORAGE       .00      .12      .25      .39      .54      .70      .86     1.03     1.21     1.40
                OUTFLOW       .00    16.05    50.89   100.12   162.22   236.42   322.34   419.79   528.71   649.14
              ELEVATION     54.20    54.66    55.13    55.59    56.05    56.52    56.98    57.44    57.91    58.37

                STORAGE      1.59     1.80     2.01     2.23     2.46     2.70     2.94     3.19     3.55     4.07
                OUTFLOW    781.14   924.85  1080.41  1247.98  1427.76  1619.93  1824.69  2050.08  2334.15  2644.58
              ELEVATION     58.83    59.29    59.76    60.22    60.68    61.15    61.61    62.07    62.54    63.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN        0. TO     2645.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

*****************************************************************************************************************************

                                                HYDROGRAPH AT STATION   SHD10C

*****************************************************************************************************************************
                                                  *                                                  *
DA MON HRMN ORD  OUTFLOW  STORAGE   STAGE  *  DA MON HRMN ORD  OUTFLOW  STORAGE   STAGE  *  DA MON HRMN ORD  OUTFLOW  STORAGE   STAGE
                                                  *                                                  *
28 FEB 0100   1      0.       .0    54.2  *  28 FEB 0915  34      2.       .0    54.3  *  28 FEB 1730  67     19.       .1    54.7
   FEB 0115   2      1.       .0    54.2  *  28 FEB 0930  35      2.       .0    54.3  *  28 FEB 1745  68     20.       .1    54.7
   FEB 0130   3      1.       .0    54.2  *  28 FEB 0945  36      2.       .0    54.3  *  28 FEB 1800  69     20.       .1    54.7
   FEB 0145   4      1.       .0    54.2  *  28 FEB 1000  37      3.       .0    54.3  *  28 FEB 1815  70     20.       .1    54.7
28 FEB 0200   5      1.       .0    54.2  *  28 FEB 1015  38      3.       .0    54.3  *  28 FEB 1830  71     20.       .1    54.7
28 FEB 0215   6      1.       .0    54.2  *  28 FEB 1030  39      3.       .0    54.3  *  28 FEB 1845  72     20.       .1    54.7
28 FEB 0230   7      1.       .0    54.2  *  28 FEB 1045  40      4.       .0    54.3  *  28 FEB 1900  73     20.       .1    54.7
```

				ELEV.						ELEV.					
28 FEB 0245	8	1.	MIN .0	54.2 *	28 FEB 1100	41	4.	.0	54.3 *	28 FEB 1915	74	20.	.1	54.7
28 FEB 0300	9	1.	.0	54.2 *	28 FEB 1115	42	5.	.0	54.3 *	28 FEB 1930	75	20.	.1	54.7
28 FEB 0315	10	1.	.0	54.2 *	28 FEB 1130	43	6.	.0	54.4 *	28 FEB 1945	76	20.	.1	54.7
28 FEB 0330	11	1.	.0	54.2 *	28 FEB 1145	44	7.	.1	54.4 *	28 FEB 2000	77	20.	.1	54
28 FEB 0345	12	1.	.0	54.2 *	28 FEB 1200	45	8.	.1	54.4 *	28 FEB 2015	78	20.	.1	[illegible]
28 FEB 0400	13	1.	.0	54.2 *	28 FEB 1215	46	9.	.1	54.5 *	28 FEB 2030	79	20.	.1	54
28 FEB 0415	14	1.	.0	54.2 *	28 FEB 1230	47	11.	.1	54.5 *	28 FEB 2045	80	21.	.1	54.7
28 FEB 0430	15	1.	.0	54.2 *	28 FEB 1245	48	15.	.1	54.6 *	28 FEB 2100	81	21.	.1	54.7
28 FEB 0445	16	1.	.0	54.2 *	28 FEB 1300	49	26.	.2	54.8 *	28 FEB 2115	82	22.	.1	54.7
28 FEB 0500	17	1.	.0	54.2 *	28 FEB 1315	50	56.	.3	55.2 *	28 FEB 2130	83	23.	.1	54.8
28 FEB 0515	18	1.	.0	54.2 *	28 FEB 1330	51	87.	MAX .4	55.5 *	28 FEB 2145	84	23.	.1	54.8
28 FEB 0530	19	1.	.0	54.2 *	28 FEB 1345	52	84.	.3	55.4 *	28 FEB 2200	85	23.	.2	54.8
28 FEB 0545	20	1.	.0	54.2 *	28 FEB 1400	53	66.	.3	55.3 *	28 FEB 2215	86	24.	.2	54.8
28 FEB 0600	21	1.	.0	54.2 *	28 FEB 1415	54	48.	.2	55.1 *	28 FEB 2230	87	24.	.2	54.8
28 FEB 0615	22	1.	.0	54.2 *	28 FEB 1430	55	37.	.2	54.9 *	28 FEB 2245	88	24.	.2	54.8
28 FEB 0630	23	1.	.0	54.2 *	28 FEB 1445	56	29.	.2	54.8 *	28 FEB 2300	89	24.	.2	54.8
28 FEB 0645	24	1.	.0	54.2 *	28 FEB 1500	57	25.	.2	54.8 *	28 FEB 2315	90	24.	.2	54.8
28 FEB 0700	25	1.	.0	54.2 *	28 FEB 1515	58	22.	.1	54.7 *	28 FEB 2330	91	24.	.2	54.8
28 FEB 0715	26	1.	.0	54.2 *	28 FEB 1530	59	20.	.1	54.7 *	28 FEB 2345	92	24.	.2	54.8
28 FEB 0730	27	1.	.0	54.2 *	28 FEB 1545	60	19.	.1	54.7 *	1 MAR 0000	93	23.	.2	54.8
28 FEB 0745	28	1.	.0	54.2 *	28 FEB 1600	61	19.	.1	54.7 *	1 MAR 0015	94	23.	.2	54.8
28 FEB 0800	29	1.	.0	54.2 *	28 FEB 1615	62	18.	.1	54.7 *	1 MAR 0030	95	23.	.1	54.8
28 FEB 0815	30	1.	.0	54.2 *	28 FEB 1630	63	18.	.1	54.7 *	1 MAR 0045	96	23.	.1	54.8
28 FEB 0830	31	1.	.0	54.2 *	28 FEB 1645	64	19.	.1	54.7 *	1 MAR 0100	97	22.	.1	54.7
28 FEB 0845	32	1.	.0	54.2 *	28 FEB 1700	65	19.	.1	54.7 *					
28 FEB 0900	33	2.	.0	54.2 *	28 FEB 1715	66	19.	.1	54.7 *					
				*					*					

****

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.00-HR
+ (CFS)	(HR)					
		(CFS)				
+ 87.	12.50		31.	15.	15.	15.
		(INCHES)	3.566	6.690	6.690	6.690
		(AC-FT)	15.	29.	29.	29.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.00-HR
+ (AC-FT)	(HR)				
0.	12.50	0.	0.	0.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.00-HR
+ (FEET)	(HR)				
55.46	12.50	54.85	54.53	54.53	54.53

CUMULATIVE AREA = .08 SQ MI

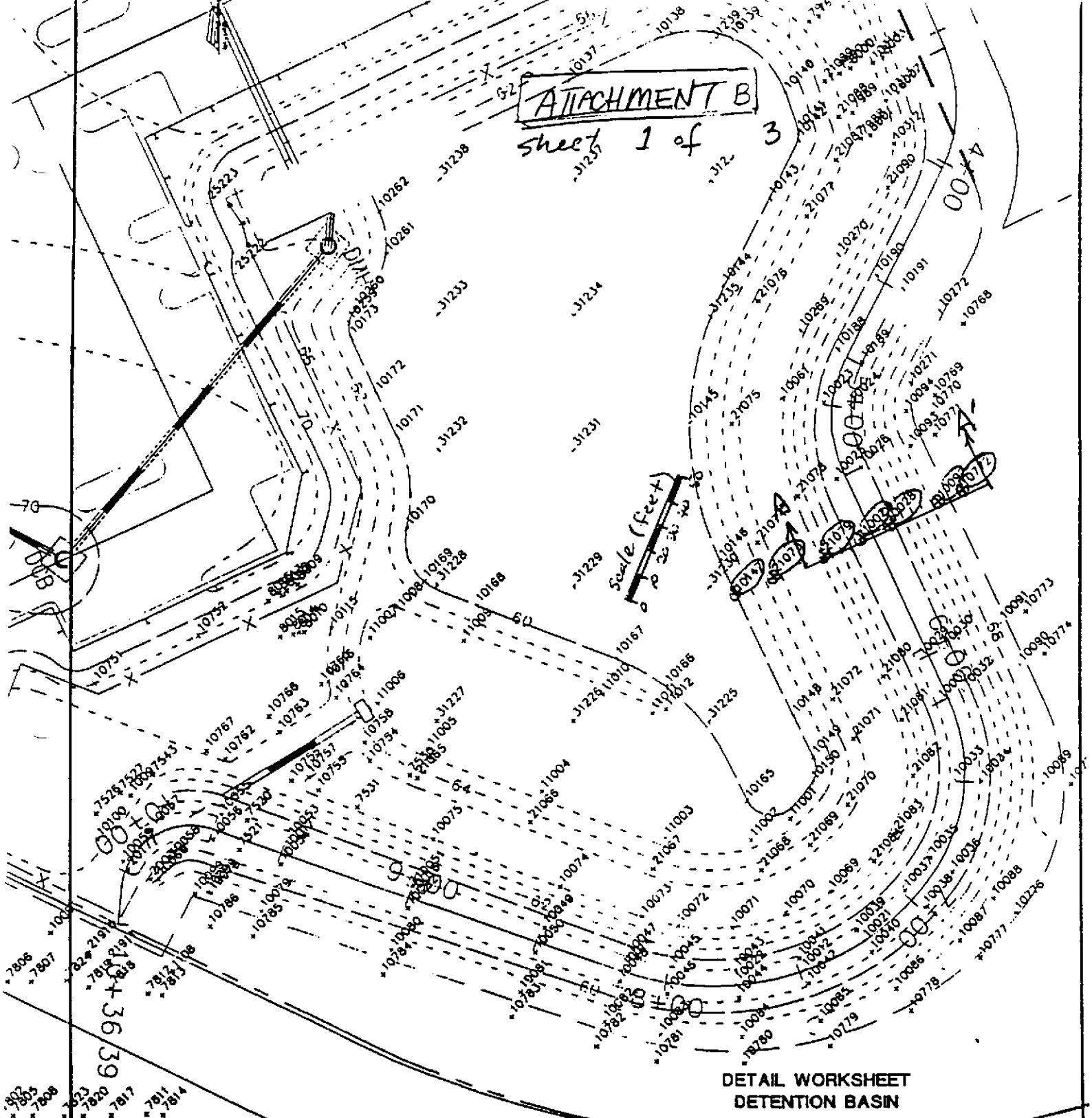
*** ***

```
            **************
            *            *
353 KK      *   40CHAB   *
            *            *
            **************
```

354 KO OUTPUT CONTROL VARIABLES

IPRNT	1	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

DIRECT INPUT OF HYDROGRAPH FROM NW WOBURN & WILMINGTON



DETAIL WORKSHEET
DETENTION BASIN

R.T.C.

WOBURN, MASSACHUSETTS

SCALE: 1" = 50' FEBRUARY 14, 1997

MERIDIAN
Land Services, Inc.
29 ARMORY ROAD, MILFORD, N.H. 03055
TEL 603-673-1441 FAX 603-673-1584
ENGINEERS - LAND SURVEYORS - SCIENTISTS - LAND PLANNERS

FILE 1700X53A	PROJECT 1700.53	SHEET 1 OF 1

Path: C:\TOPCON\DATA
File: XSECSUB .NEZ 330 .a.. 2-14-97 10:43:00 am

POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
10772	552436.23895	696594.33686	66.800	BEOP-SG
10092	552431.89243	696585.29208	66.490	TOB-SG
10028	552422.76749	696565.96808	55.840	TOE-SG
10027	552418.50315	696556.91085	55.820	TOE-SG
21079	552411.61135	696542.26763	63.840	TOB-SG
21073	552403.72151	696523.70584	63.840	TOB-SG
10147	552396.80808	696510.11812	59.020	TOE-SG

NOTES:

BEOP = BACK EDGE OF PLANTER

TOB = TOP OF BANK

TOE = TOE OF SLOPE

SG = SUBGRADE

ATTACHMENT B
2 of 3

ATTACHMENT B

3 OF 3

SOURCE:
PROJECT RECORD
DWG M-7.1

ELEV. 55.98

50'

50'

SCALE

0 10 20 30 40 50

LIMIT

AREA OF PLACED BLASTED LEDGE

ELEV. 55.00

SLOPE

$S = \frac{55.98 - 55.00}{418'}$

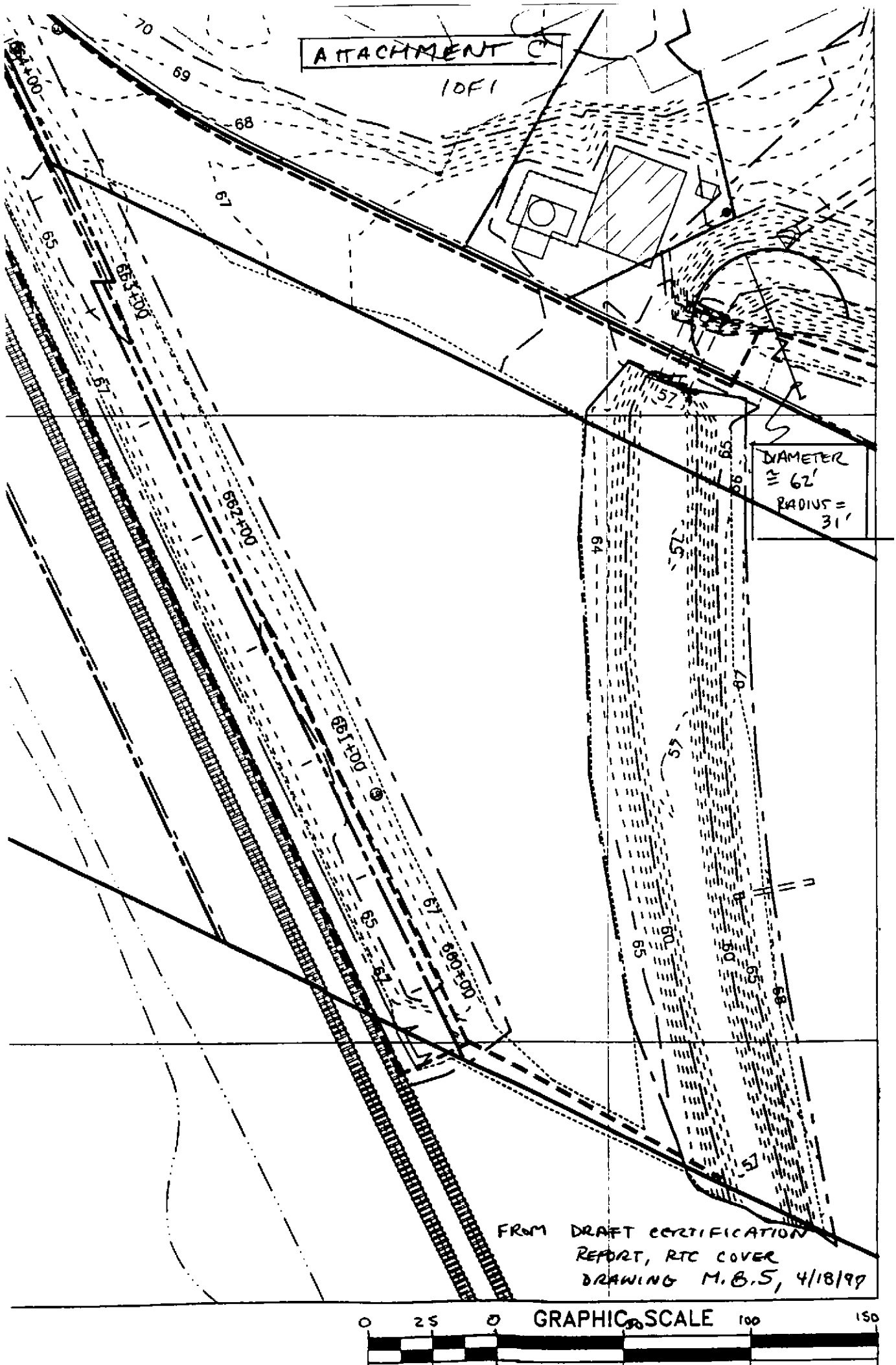
$= 0.0023$

$d_{50} = 5''$ RIP RAP

418'

ATTACHMENT C

1 OF 1



DESIGNED

DESIGNED BY:

PROJECT RECORD

DESIGNED B

DRAFTED B

CHECKED B

U.S.E.P.A. Remedial Project Manager

INDUSTRI-PLEX SITE REMEDIAL TRUST
Commerce Way/Atlantic Avenue
Woburn, Massachusetts

Tel. (781) 933-2492
Fax. (781) 933-4821

VARIANCE REQUEST

Date of Request 2/12/98 **Suspense Date:**_____ **Variance No.** 96-038

Originator: Peter Neumann, Golder Associates Inc.

Proposed Variance: Drwg Ref: __ **Spec Ref.** 02595 2.01 **Site Location:** Aberjona River

Allow 16 oz non woven geotextile used in lining of the Aberjona River with a grab strength of 337 and burst strength of 500 lbs. Allow a thickness of 95 mil.

Justification:

Due to the tight construction schedule it was not possible to perform conformance testing prior to installation. The manufacturer's certification received prior to installation indicated the geotextile met the required conformance values. Subsequent conformance testing results indicated low values for grab strength and burst strength. The performance of the geotextile with the low grab and burst strength values was evaluated and found to exceed recommended values FHWA survivability requirements for embankment protection applications. Since the geotextile was used as part of the Aberjona River embankment protection, the geotextile should be considered accepted.

As stated in Variance 96-002 the thickness is considered more of a descriptive property than a design oriented property.

Review: Recommend Approval ☒ Modified ☐ Rejected ☐

Comments:

Peter Neumann 2/16/98
Reviewer Date

Disposition: Approved ☐ Modified ☐ Rejected ☐

Comments:
Also, consideration for approval was given to the site modification made as a result of the Commerce Way Extension. Based upon this modification, 6 oz would be an appropriate application. Therefore, 16-oz is considered more protective.

Joseph F. LeMay Date

Joseph F. LeMay 3/13/98

VARIANCE 96-038

CONFORMANCE TEST	STANDARD		CONFORMANCE TEST RESULTS ROLL #77748 (1)	CURRENT APPROVED MODIFIED SPECIFCATIONS (2)	SURVIVABILITY STRENGTH REQUIREMENTS (3)	FACTOR OF SAFETY	REQUESTED REVISED SPECIFICATION
Grab Strength (lbs)	ASTM D4632	MD	337	340	200	1.7	337
		TD	458.8	340	200	1.7	337
Burst Strength (psi)	ASTM D3786		500	550	320	1.7	500

Notes
1. Conformance Test performed by Golder Associates Construction, February, 1997
2. Current Approved Modified Specifications (Variance 96-012)
3. Survivabilty Strength Requirements after FHWA, 1985

FIGURE 4

SURVIVABILITY STRENGTH REQUIREMENTS[a]

		GEOTEXTILE PROPERTY[b]					
		GRAB STRENGTH (lbs)	ELONGATION (%)	SEWN SEAM STRENGTH (lbs)	PUNCTURE STRENGTH (lbs)	BURST STRENGTH (psi)	TRAPEZOID TEAR (lbs)
MODERATE INSTALLATION CONDITIONS (TYPICAL DRAINAGE APPLICATIONS)	HIGH CONTACT STRESSES (ANGULAR DRAINAGE MEDIA) (HEAVY COMPACTATION) OR (HEAVY CONFINING STRESS)	180	N/A	160	80	290	50
	LOW CONTACT STRESSES (ROUNDED DRAINAGE MEDIA) (LIGHT COMPACTION) AND (LIGHT CONFINING STRESS)	80	N/A	70	25	130	25
SEVERE INSTALLATION CONDITIONS (SHORELINE PROTECTION AND ARMOURED SYSTEMS APPLICATIONS)	HIGH CONTACT STRESSES (DIRECT STONE PLACEMENT) (DROP HEIGHT > 3 ft)	200	15	180	80	320	50
	LOW CONTACT STRESSES (SAND OR GEOTEXTILE CUSHION) (DROP HEIGHT < 3 ft)	90	15	80	40	140	30

NOTE: (a) After FHWA, 1985.

(b) Test methods for determining geotextile properties given in Table 4-6 in "Geotextile Filter Design Manual"

VK 96-038

U.S.E.P.A. Remedial Project Manager

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VARIANCE REQUEST

Date of Request 2/12/98 **Suspense Date:**_____ **Variance No.** 96-039

Originator: Peter Neumann, Golder Associates Inc.

Proposed Variance: Drwg Ref: __ **Spec Ref.** 02223 **Site Location:** MBTA

Allow the ten failed compaction tests taken along the MBTA in the final lift of compacted cover fill on the clean corridor slope.

Justification:

Compaction was performed on the cover fill placed on the western slope. Compaction ranged from 86 to 94%. The final lift (about 12 inches thick) of compacted fill could be sensitive to erosion with the lower compacted values. However, the slope is armored with three inches of 1-1/2 inch crushed stone which provides protection against erosion. Sand has not eroded into the MBTA clean corridor during the past year. The RTC conceptual plans indicate this area will be graded and filled.

Review: Recommend Approval ☒ Modified ☐ Rejected ☐

Comments:

Peter Neumann 2/16/98
Reviewer Date

Disposition: Approved ☐ Modified ☐ Rejected ☐

Comments:

Joseph F. LeMay 3/13/98
Joseph F. LeMay Date
U.S.E.P.A. Remedial Project Manager

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VARIANCE REQUEST

Date of Request 2/12/98 **Suspense Date:**_____ **Variance No.** 96-040

Originator: Peter Neumann, Golder Associates Inc.

Proposed Variance: Drwg Ref: _C-9, 11A, 18 & 19_ Spec Ref._02242_Site Location: Detention Basin, MBTA

Allow the following areas of cover thickness where the thickness is less than 16-inches:

1. **Location: The northern portion of the detention basin bottom near coordinate 552500N, 696450E has an average depth of soil cover at 14.9 inches**
2. **Location: The southern portion of the detention basin bottom near coordinate 552350N, 696500E has an average depth of soil cover of 13.1 inches**
3. **Location: Grid points 1564- 1601 Southern half of the MBTA Corridor western bank**

Justification:

1 & 2. Both items 1 and 2 are areas where the finish grade is approximately 1 and 3 inches below the 16-inch soil cover requirement. The geomembrane liner serves as an additional layer of protection. The detention basin will have, partial fencing and ponded water, thus the area is not readily accessible to the public. The existing thinner cover in these 2 areas is adequate to protect the wet basin liner.

3. Because of restrictions from AMTRAK the cover thickness along the western bank was not increased. The locations of thin cover are in an area that it will not be readily accessible to the public. The RTC 30% conceptual design indicates the location of the thin cover areas will be under a concrete platform structure.

Review: Recommend Approval ☒ Modified ☐ Rejected ☐

Comments:

Peter Neumann 2/16/98
Reviewer Date

Disposition: Approved ☐ Modified ☐ Rejected ☐

Comments:

Joseph F. LeMay 3/13/98
Joseph F. LeMay Date
U.S.E.P.A. Remedial Project Manager

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VARIANCE REQUEST

Date of Request 2/12/98 **Suspense Date:**_____ **Variance No.** 96-041

Originator: Peter Neumann, Golder Associates Inc.

Proposed Variance: Drwg Ref: __ **Spec Ref.** 02575 **Site Location:** Atlantic Avenue

Accept the gradation of the binder course mix and temperature. The gradation for the binder course #8 sieve was 3% more than the required maximum of 38%. The temperature for the binder extraction was 350 degrees F. The MHD temperature of the mix should be no more than 325 degrees.

Justification:

While the gradation of the binder course did not meet the MHD specifications, typical binder specifications for a one-inch maximum size binder, according to the Asphalt Institute, can range up to 49 percent. An irregularity of 3-percent over the MHD specifications for binder can be considered within acceptable tolerance. Maximum temperatures that a mix can tolerate before the mix viscosity is damaged is 350 degrees F. The maximum temperature for maintaining the mix viscosity was not exceeded.

Review: Recommend Approval ☒ Modified ☐ Rejected ☐

Comments:

Peter Neumann 2/16/98
Reviewer Date

Disposition: Approved ☐ Modified ☐ Rejected ☐

Comments:
Also, consideration was given to the RTC conceptual design which indicates that the asphalt in this area will be either removed or cold planned and covered w/ an additional 3-4 feet of clean fill.

Joseph F. LeMay 3/13/98
Joseph F. LeMay Date
U.S.E.P.A. Remedial Project Manager

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VARIANCE REQUEST

Date of Request 2/12/98 **Suspense Date:**_____ **Variance No.** 96-042

Originator: Peter Neumann, Golder Associates Inc.

Proposed Variance: Drwg Ref: ___ **Spec Ref.** 02575 **Site Location:** Atlantic Avenue

Allow the lower compacted in-place densities for the areas where the pavement density failed to meet the design specifications of 97%.

Justification:

Density values ranged from 95.5 to 98.3%. The compactive effort exceeds the MHD compaction requirement of 95%.

Review: Recommend Approval ☐ Modified ☐ Rejected ☐

Comments:

Peter Neumann 2/16/98
Reviewer Date

Disposition: Approved ☐ Modified ☐ Rejected ☐

Comments:
ALSO, Consideration was given to The RTC Conceptual Design which indicates That The Asphalt in This AREA will BE EITher removed or COLD PLANNED AND Covered with an Additional 3-4 FeeT OF CLEAN FILL.

Joseph F. LeMay 3/13/98
Joseph F. LeMay Date
U.S.E.P.A. Remedial Project Manager

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VARIANCE REQUEST

Date of Request 2/12/98 **Suspense Date:**_____ **Variance No.** 96-043

Originator: Peter Neumann, Golder Associates Inc.

Proposed Variance: Drwg Ref: ___ **Spec Ref.** 03300 **Site Location:** Sedimentation Structure

Allow the percent Air Content for the concrete to vary +/- 1 percent for ready-mix concrete from the required 5 to 7 percent.

Justification:

The measured air content of the concrete placed for the sedimentation structure footing was tested twice at 4 and then 4.8 percent on October 18, 1996. The specification required a minimum percent air content of 5%. The project specifications reference American Concrete Institute (ACI) Manual of Concrete Practice, ACI 301-96. According to ACI 301-96, Table 4.2.2.4 for severe exposure with ¾ inch nominal maximum aggregate, the total air content should be at least 6 percent. A note at the bottom of the table states the air content tolerance is +1-1-1/2. So the percent air content could range from 4.5 to 7 percent. The 4.8 percent measurement is within this tolerance. Also since the concrete was poured for the footing rather than an exposed wall surface, the type of exposure could be considered moderate. For a moderate exposure, both 4 and 4.8 percent measurements are within the tolerance range from a 5 percent air content. Attached: ACI 301-96 p.27

Review: Recommend Approval ☒ Modified ☐ Rejected ☐

Comments:

Peter Neumann 2/16/98
Reviewer Date

Disposition: Approved ☐ Modified ☐ Rejected ☐

Comments:

Joseph F. LeMay 3/13/98
Joseph F. LeMay Date
U.S.E.P.A. Remedial Project Manager

Slump shall not exceed the specified slump. Submit evaluation results for acceptance.

4.2.2.2 *Slump*—Unless otherwise specified or permitted, concrete shall have, at the point of delivery, a slump of 4 in. Determine the slump by ASTM C 143. Slump tolerances shall meet the requirements of ACI 117.

When use of a plasticizing admixture conforming to ASTM C 1017 or when a Type F or G high range water reducing admixture conforming to ASTM C 494 is permitted to increase the slump of concrete, concrete shall have a slump of 2 to 4 in. before the admixture is added and a maximum slump of 8 in. at the point of delivery after the admixture is added, unless otherwise specified.

4.2.2.3 *Size of coarse aggregate*—Except when otherwise specified or permitted, nominal maximum size of coarse aggregate shall not exceed three-fourths of the minimum clear spacing between reinforcing bars, one-fifth of the narrowest dimension between sides of forms, or one-third of the thickness of slabs or toppings.

4.2.2.4 *Air content*—Unless otherwise specified, concrete shall be air-entrained. Unless otherwise specified, air content at the point of delivery shall conform to the requirements of Table 4.2.2.4 for severe exposure.

For specified compressive strengths above 5000 psi, the total air contents indicated in Table 4.2.2.4 may be reduced by 1 percent.

Air content shall be measured in accordance with ASTM C 138, C 173 or C 231. Unless otherwise specified, ASTM C 231 shall be used.

4.2.2.5 *Admixtures*—When admixtures are specified in Contract Documents for particular parts of the work, use the types specified.

Use of calcium chloride or other admixtures containing chloride ions shall be subject to the limitations in 4.2.2.6—Chloride ion concentration.

When accepted, use of calcium chloride shall be in solution form only, when introduced into the mixture.

4.2.2.6 *Chloride ion concentration*—Unless otherwise specified, maximum water soluble chloride ion concentrations in hardened concrete at ages from 28 to 42 days contributed from the ingredients including water, aggregates, cementitious materials, and admixtures shall not exceed the limits of Table 4.2.2.6. When testing is performed to determine water soluble chloride ion content, test procedures shall conform to AASHTO T 260.

The type of member described in Table 4.2.2.6 shall apply to the work as indicated in the Contract Documents.

4.2.2.7 *Concrete temperature*—When the average of the highest and lowest temperature during the period from midnight to midnight is expected to drop below 40 F for more than three successive days, concrete shall be delivered to meet the following minimum temperature immediately after placement:

- 55 F for sections less than 12 in. in the least dimension
- 50 F for sections 12 in. to 36 in. in the least dimension
- 45 F for sections 36 in. to 72 in. in the least dimension
- 40 F for sections greater than 72 in. in the least dimension

Table 4.2.2.4—Total air content* of concrete for various sizes of coarse aggregate

Nominal maximum size of aggregate, in.	Total air content,† percent		
	Severe exposure	Moderate exposure	Mild exposure
Less than 3/8	9	7	5
3/8	7.5	6	4.5
1/2	7	5.5	4
3/4	6	5	3.5
1	6	4.5	3
1 1/2	5.5	4.5	2.5
2	5	4	2
3	4.5	3.5	1.5
6	4	3	1

* Measured in accordance with ASTM C 128, C 173, or C 231.

† Air content tolerance is ±1 - 1 1/2 percent.

Table 4.2.2.6—Maximum allowable chloride ion content

Type of member	Maximum water soluble chloride ion (Cl^-) content in concrete, percent by weight of cement
Prestressed concrete	0.06
Reinforced concrete exposed to chloride in service	0.15
Reinforced concrete that will be dry or protected from moisture in service	1.00
Other reinforced concrete construction	0.30

The temperature of concrete as placed shall not exceed these values by more than 20 F.

These minimum requirements may be terminated when temperatures above 50 F occur during more than half of any 24 hr duration.

Unless otherwise specified or permitted, the temperature of concrete as delivered shall not exceed 90 F.

4.2.2.8 *Strength and water-cementitious material ratio*—The compressive strength and, when required, the water-cement or water-cementitious material ratio of the concrete for each portion of the work shall be as specified in the Contract Documents.

4.2.2.8.a If cementitious or pozzolanic mineral admixtures conforming to ASTM C 989 or ASTM C 618 are used, the cement portion of the water-cement ratio shall be the total weight of cementitious materials.

4.2.2.8.b When required for concrete exposed to deicing chemicals, the maximum weight of fly ash, pozzolan or ground granulated blast-furnace slag that is included in the calculation of water-cementitious material ratio shall not exceed the following percentages of the total weight of portland cement plus fly ash, pozzolan, and ground granulated blast-furnace slag:

- The combined weight of fly ash and pozzolan conforming to ASTM C 618 shall not exceed 25 percent of the total weight of cementitious material. The fly ash and pozzolan present in a ASTM Type IP or IPM blended cement conforming to ASTM C 595 shall be included in the calculated percentage.
- The weight of ground granulated blast-furnace slag

INDUSTRI-PLEX SITE REMEDIAL TRUST
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VARIANCE REQUEST

Date of Request 2/12/98 **Suspense Date:**_____ **Variance No.** 96-044

Originator: Peter Neumann, Golder Associates Inc.

Proposed Variance: Drwg Ref: __ **Spec Ref.** 02597 **Site Location:** Atlantic Avenue Drainway

Allow the non-testing of geomembrane seams at the locations described below:

1. **Seams connecting panels P26/P27 were tested 3 feet up the slope.**
2. **Seams connecting panels P32, P33, P34 and P35 were not tested. These panels were located along the top of the berm east of the groundwater treatment building.**

Justification:

1. **These two panels connect the Atlantic Avenue drainway work installed in August, 1996 to the liner installed in December, 1996. Testing of the seam was performed in the section that would be above the 50 year 24 hour storm event stage in the drainway.**
2. **Seams of these panels were put in to continue the geomembrane material to the top of the slope. The seams were located above the 50 year 24 hour storm event stage in the drainway.**

Review: Recommend Approval ☒ Modified ☐ Rejected ☐

Comments:

Peter Neumann 2/16/98
Reviewer Date

Disposition: Approved ☐ Modified ☐ Rejected ☐

Comments:

Joseph F. LeMay 3/13/98
Joseph F. LeMay Date
U.S.E.P.A. Remedial Project Manager

APPENDIX C.2

SUMMARY OF CLARIFICATIONS

CLARIFICATION SUMMARY
INDUSTRI-PLEX SITE
RTC ALTERNATE COVER 1996 - 1997

CLARIFICATION NUMBER	DESCRIPTION	DESIGN PLAN/SPEC	CLARIFICATION DATE
C001	Sedimentation Structure Location	C-5A	8/5/96
C002	Placement of D50=12 Rip-Rap - Atlantic Ave. Drnwy	C-5	8/6/96
C003	ElectricaL & gas line locations	C-5A	8/9/96
C004	Eliminate stepped foundation for Sedimentation Structure	2/C-17	8/9/96
C005	Coordinates defining northern limits of work	C-2D	8/27/96
C006	Dimensions of N bound track bedding	C-4	8/30/96
C007	Pipe diameter	4/C-17	9/3/96
C008	Geomembrane Wrinkle Detail	VR96-004	9/13/96
C009	Setting of manholes near foundations requires chipping	C-4 &C-5A	9/18/96
C010	Gravel borrow/cover soil	1/C-18	9/23/96
C011	Place Demolition Debris 4 - 12" from geotextile	1/C-18	9/24/96
C012	Pipe and manhole installation tolerances	C-5, Sec 02600	9/24/96
C013	Utility Details by surveyors	4/C-17	9/25/96
C014	Clean utility corridor subgrades	Sec 02223	10/1/96
C015	Utility horizontal & vertical locations in Atlantic Ave.	4/C-17	10/11/96
C016	Extend geotextile to sed.struct. wall	2/C-18	10/16/96
C017	Use detail 1/C-16 for manholes along box culvert	1/C-16	10/22/96
C018	Grading along Atlantic Ave. drainway	C-5, C-8 & 4/C-12	10/23/96
C019	Expanded Utility Corridor C	C-4, 1/C-17A	10/23/96
C020	Revise grading in MCP area.	C-6	10/24/96
C021	Double CB Opening Size	13/C-16	10/24/96
C022	Remedial Cover/MCP Cover	2/C-17A	10/24/96
C023	Trench detail for gas line clean corridor.	12/C-16	10/24/96
C024	Thickness of Gravel Borrow	C-16 &C-17	10/26/96
C025	Shorten length of geotextile separation layer.	5/C-10	10/28/96
C026	Sedimentation Structure Headwall Dimensions	2/C-17	11/7/96
C027	Geotextile limit for Atlantic Avenue Clean Corridor	C-9	11/14/96
C028	Fill between to box culvert and foundation with 3/4-inch gravel	1/C-18	11/14/96
C029	Clean corridor for gas and utility lines for future building	C-8	11/19/96
C030	Location of SMH-2 and SMH-3	C-3 & C-8	11/21/96
C031	Minimum gravel borrow bedding thicknesses	4/C-17 &4/C-17A	11/26/96
C032	Backfill of Sedimentation Structure	2/C-18	11/26/96
C033	Inverts for Wetland Connection Culvert	4/C-20 & C-5	12/5/96

APPENDIX C.3

MODIFICATIONS (1992 - 1995)

APPENDIX C.3 APPLICABLE RTC MODIFICATIONS (1992-1995)
APPLICABLE ISRT DESIGN/SPECIFICATION
CHANGE RECORD LOG

Change Record No.	DESCRIPTION	DATE	DOCUMENT SECTION	AGENCY APPROVAL
DSCR -003 R0	6 oz. Geotextile AOS requirement reduced to 70	11/10/92	02595 2.01	12/16/92
DSCR -023 R0	Grubbing Specification modified	05/05/93	02110 3.02	07/21/93
DSCR -023 R1	Revised Grubbing Specification	03/15/93	02110 3.02	N/A
DSCR -027 R0	Modify siltfence dimensions	07/28/93	SH 11-26/4	N/A
DSCR -030 R0	Geotextile Seam folding & missed sewing protocols	08/17/93	0295 3.02 (2)	N/A
DSCR -030 R1	Geotextile Seam / Cushion layer / Edge Protection	11/02/93	0295 3.02 (2)	N/A
DSCR -030 R2	Geotextile seaming	03/14/94	02595 3.02 (2)	N/A
DSCR -036 R0	Added utility corridor on each side of EHP access road	10/12/93	SH 12-8/5	N/A
DSCR -044 R0	Replace arch culvert with elliptical pipe & headwall	11/18/93	SH 11-7 &11-23	N/A
DSCR -057 R0	Geotextile Testing Method	05/05/94	02595 2.01	N/A
DSCR -058 R0	Added Abandonment of Rail Spur to Section 02060	05/05/94	02060 3.10	N/A
DSCR -060 R0	Modified placement "by hand" of Stream Sediment Remedy	06/02/94	02244 3.10	N/A
DSCR -062 R0	Revised slab for tank decommissioning, Woburn Ind. Property	06/02/94	SH 11.5	N/A
DSCR -066 R0	Revised decommissioning of pipe, Woburn Ind. Assoc.	02/24/94	SH 11-5	N/A
DSCR -068 R0	Added concrete pipe installation tolerances	06/03/94	02600 3.01 (b)	N/A
DSCR -069 R0	Revised fill grade tolerances	6/17/94	02223 1.05 (a)	N/A
DSCR -069 R1	Revised fill grade tolerances	07/01/94	02223 1.05 (a)	N/A

Notes:
1. N/A - Not Applicable
2. Between 1992 and approximately October 1994, EPA reviewed and approved significant design variances and changes. From November 1994-1995, EPA in consultation with MDEP has reviewed and issued verbal or written approvals for design variances.

APPENDIX C.3 APPLICABLE RTC MODIFICATIONS (1992-1995)
APPLICABLE ISRT VARIANCE CHANGE LOG

VARIANCE No.	DESCRIPTION	DATE	DOCUMENT SECTION	DISPOSITION DATE	STATUS
18	Revised pipe plugging method	09/21/94	02060	09/21/94	APPROVED
26	Layout utility corridor	10/03/94	SH 11-11	10/04/94	APPROVED
33	Access Road Aggregate cover type	10/20/94	02223	10/21/94	APPROVED
67	Revised 16 oz. geotextile specifications	03/16/95	02595 2.01 (c)	04/04/95	APPROVED
77	Increase AOS for 16 oz. geotextile from 100 to 70 sieve	04/26/95	02595 2.01	05/03/95	APPROVED
84	Revised cover E side of MBTA	05/23/95	SH 11-3B&C/11-7B&C	06/01/95	APPROVED
85	Replace arch culvert 3-18 inch RCP	05/23/95	SH 1/11-23	06/01/95	APPROVED

APPENDIX C.3 APPLICABLE RTC MODIFICATIONS (1992-1995)
ISRT SPEED LETTER SUMMARY

APPLICABLE SPEED LETTER SUMMARY

Speed Letter #	Description	Reason	Date	Transmittal Date
8	Atlantic Ave - 48" culvert joints	Subsidence of Atlantic Ave. pavement	8/9/95	8/9/95
9	Replace arch culvert w/3 18-inch RCP	RCP Readily available	8/9/95	8/9/95
10	East Central Hide Pile - Tie-in	Corrected detail reference	8/9/95	8/9/95
11	East Central Hide Pile - Culverts	Provided more detail to Memo 9	8/14/95	8/14/95
17	Wetland 3A, Manhole rim	Design did not include manhole	10/20/95	10/20/95
18	Wetland 3A, Waterline Cover	Ledge was encountered	10/24/95	10/25/95

APPENDIX C.3.1

APPROVED VARIANCE REQUEST FORMS (1992 - 1995)

RUST REMEDIAL SERVICES INC.

I-Plex Remediation Site
Woburn, Massachusetts
Project #492900

VARIANCE REQUEST

41 Atlantic Avenue
Woburn, MA 01801
Tel. (617) 938-7190
Fax (617) 938-7194

Date of Request: 9/21/94 Suspense Date: 9/22/94 Variance No: 018

Proposed Variance: Drwg Ref: 11-5 Spec Ref: 2060 Site Location: BECO BY MBTA

RRS IS PROCEEDING TO DECOMMISSION STRUCTURE #11, CONCRETE VALVE BOX, BY FILLING IT WITH CDF. THERE IS A PIPE OUTLET WITHIN THIS STRUCTURE. THE SPECIFICATION CALLS FOR PLUGGING THE PIPE WITH A MASONRY OR CONCRETE BULKHEAD. RRS WOULD INSTEAD LIKE TO BLOCK OFF THE OUTLET WITH WOOD WHEN WE FILL THE STRUCTURE WITH CDF MATERIAL.

The undersigned represents that the contract documents have been reviewed and that acceptance of this proposed variance will have no impact on cost or time of performance to this contract and that incorporation of this variance into the permanent work will not conflict or adversely effect follow on trades or the ultimate end product.

CC: R. VAUGHAN
C. RILEY
R. SANTUCCI

RUST Remedial Services Representative — Date: 9/21/94

Disposition: Approved [X] Modified [] Rejected []

Certifying Engineer — Date: 9/21/94

I-Plex Site Remedial Trust Representative — Date: 9/21/94

Printed on Recycled Paper.

VARIANCE REQUEST

I. Purpose: A variance request (VR) is a traceable document that confirms appr l rejection of a proposal to modify a contractual requirement that will not affect t contract price and/or schedule.

The variance must be minor in nature, create no adverse impact on the design function of the affected area, and not require a formal change order f implementation.

II. Information: VRs contain the following information:

A. References contract documents: scope of work, drawing(s), specification, etc.
B. States the proposed variation or deviation:

1. Use of different material
2. Employ different construction method
3. Relaxation of contract requirement

C. Explains reason for request, such as:

1. Specified material is not available

a. Unreasonable delivery time
b. Item is discontinued
c. Improved or updated model available

2. A less expensive but comparable material can be used
3. Construction application, eg, soil compaction, not practical to d conditions, eg, material not capable of meeting specified density requirement

III. Flow of Responsibilities:

A. Immediately upon discovery of the need for the variance, the Contractor submits the VR form containing the complete and correct information as outlined above to the certifying engineer.
B. The certifying engineer receives the variance and reviews the information.
C. The certifying engineer indicates their review status:

1. APPROVED
2. MODIFIED; provides explanation for this status
3. REJECTED; provides explanation for this status

D. The certifying engineer forwards approved or modified VRs to the Trust for their review and concurrence. Rejected VRs are returned directly by the certifying engineer to the Contractor. After their review, the Trust returns a copy to the Contractor who must maintain and track all submitted VRs regardless of their review status.

RUST REMEDIAL SERVICES INC.

I-Plex Remediation Site
Woburn, Massachusetts
Project #492900

VARIANCE REQUEST

41 Atlantic Avenue
Woburn, MA 01801
Tel. (617) 938-7190
Fax (617) 938-7194

Date of Request: 3 OCT 94 Suspense Date: 3 OCT 94 Variance No: 026

Proposed Variance: Drwg Ref: 11-11 Spec Ref: — Site Location: ECHP/east side

RRS PROPOSES TO CONSTRUCT THE ROAD ALONG THE EAST SIDE OF THE HIDE PILE ≈6' to the WEST TO LIMIT THE IMPACT ON THE ABEJONA RIVER. THE ~~SEO~~ DESIGNED SLOPE GRADES OF THE ECHP WILL NOT BE EFFECTED EXCEPT ONE SMALL AREA WHICH WILL HAVE A SLOPE ≈2:1 FOR ABOUT 3' up the slope. IT WILL COVERED WITH 6" RIP RAP AS REQ'D BY THE SPECIFICATIONS.

The undersigned represents that the contract documents have been reviewed and that acceptance of this proposed variance will have no impact on cost or time of performance to his contract and that incorporation of this variance into the permanent work will not conflict or adversely effect follow on trades or the ultimate end product.

X SECTIONS ATTACHED, PROFILE; PLAN ATTACHED } 2 copies
CC: R. SANTUCCI, RRS
C. RILEY; RRS

K B Fagan — RUST Remedial Services Representative — 3 OCT 94 Date

Disposition: Approved [X] Modified [ ] Rejected [ ]

Sean O'Hara for DA — Certifying Engineer — 10/5/94 Date

[signature] — I-Plex Site Remedial Trust Representative — 10/4/94 Date

Printed on Recycled Paper.

VARIANCE REQUEST

I. Purpose: A variance request (VR) is a traceable document that confirms approval c rejection of a proposal to **modify a contractual requirement** that will not affect th contract price and/or schedule.

The variance must be minor in nature, create no adverse impact on the design c function of the affected area, and not require a formal change order fo implementation.

II. Information: VRs contain the following information:

A. References contract documents: scope of work, drawing(s), specification, etc.
B. States the proposed variation or deviation:

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2. Employ different construction method
3. Relaxation of contract requirement

C. Explains reason for request, such as:

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b. Item is discontinued
c. Improved or updated model available

2. A less expensive but comparable material can be used
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3. REJECTED; provides explanation for this status

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MERIDIAN
Land Services, Inc.
29 ARMORY ROAD, MILFORD, N.H. 03055
TEL 603-673-1441 FAX 603-673-1584
ENGINEERS - LAND SURVEYORS - SCIENTISTS - LAND PLANNERS

E A R T H T E C H
198 BAKER AVENUE CONCORD, MA 01742

REV.	DATE	DESCRIPTION		DR	CK
B	9/30/94	ISSUED FOR RRS REVIEW	KF	JAH	
A	9/21/94	ISSUE FOR PRELIM CL L/O		JAH	

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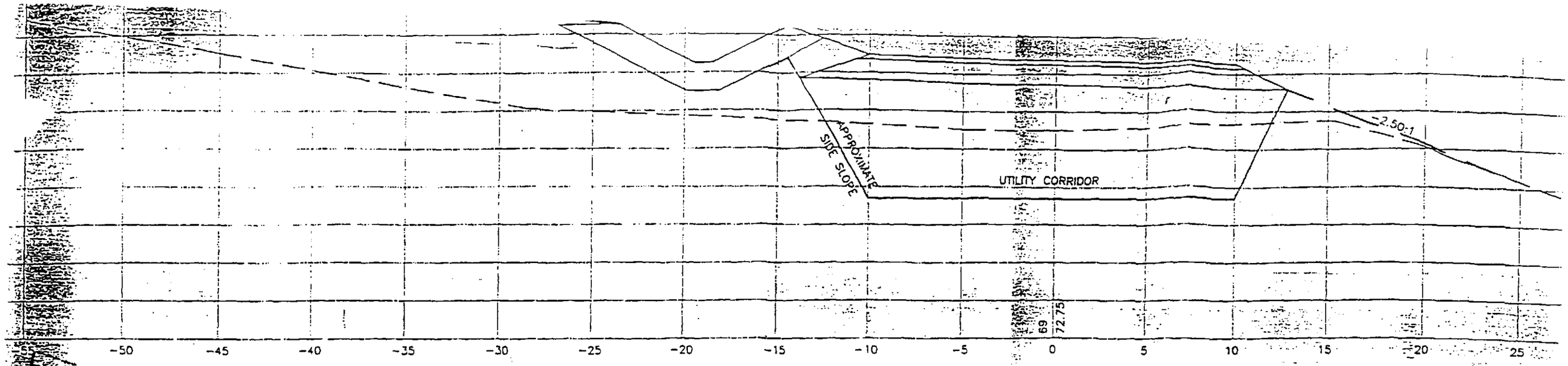

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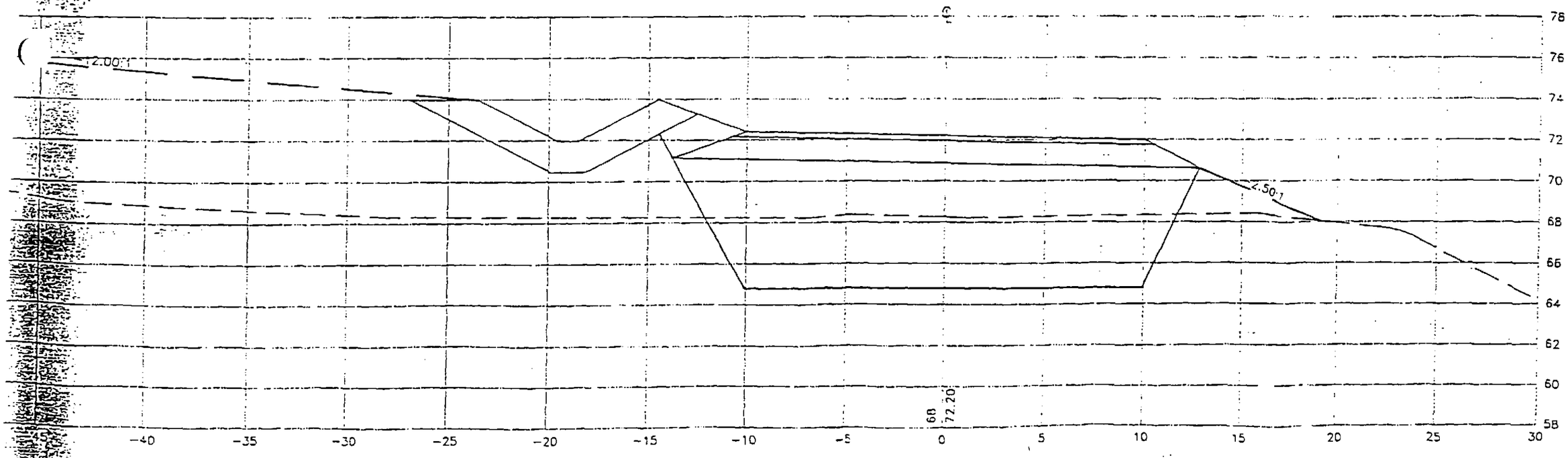
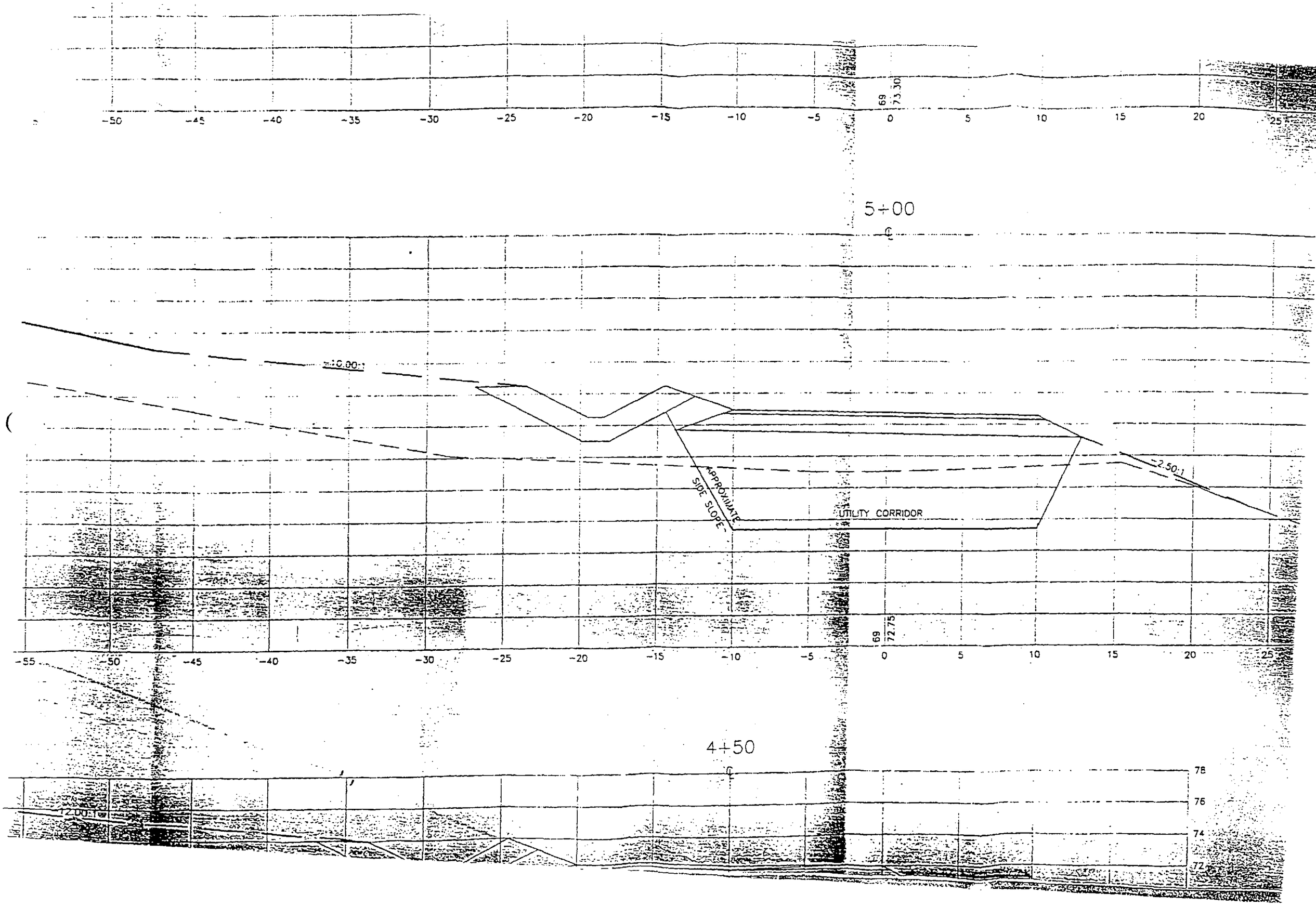


V.R. #026
10/3/94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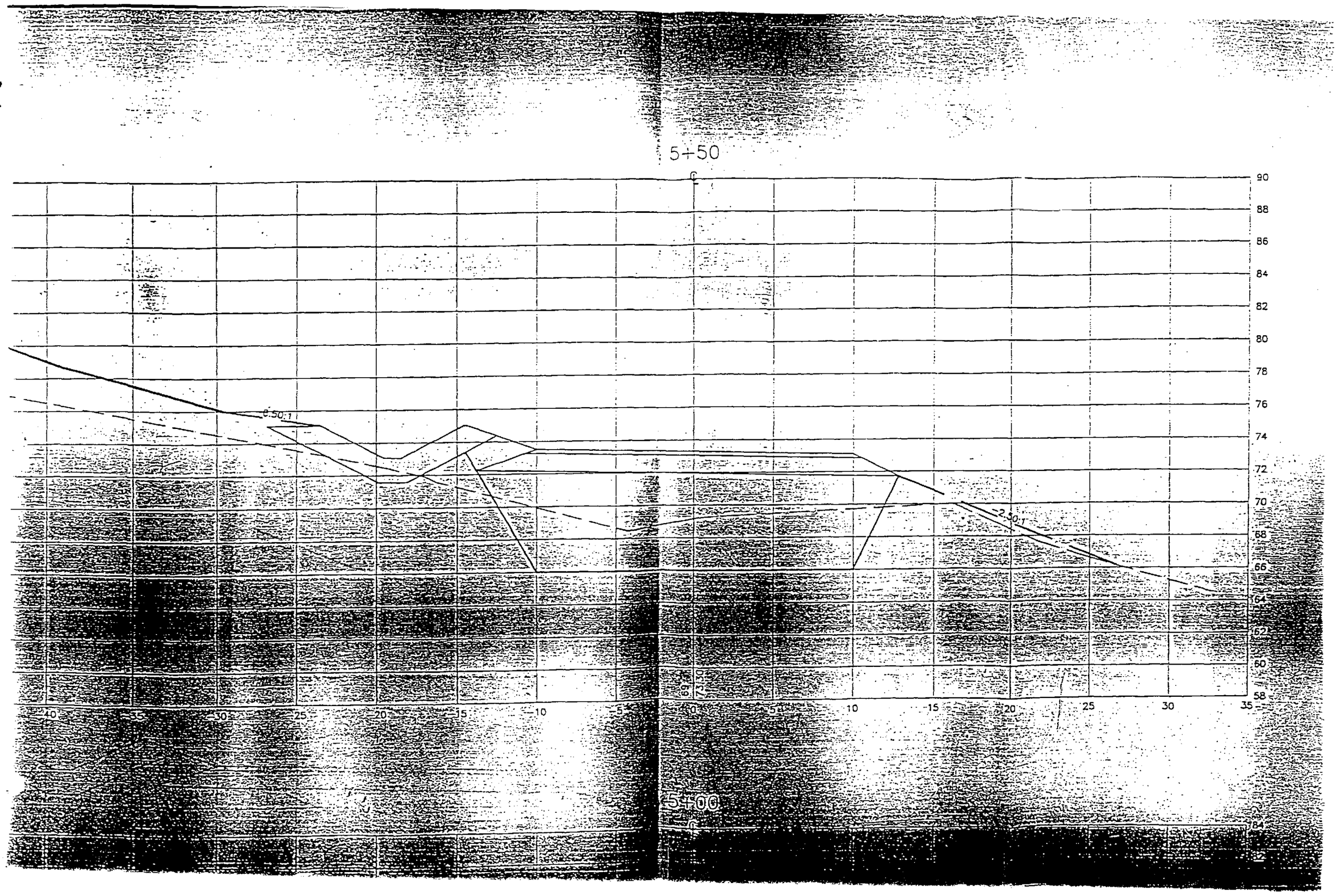
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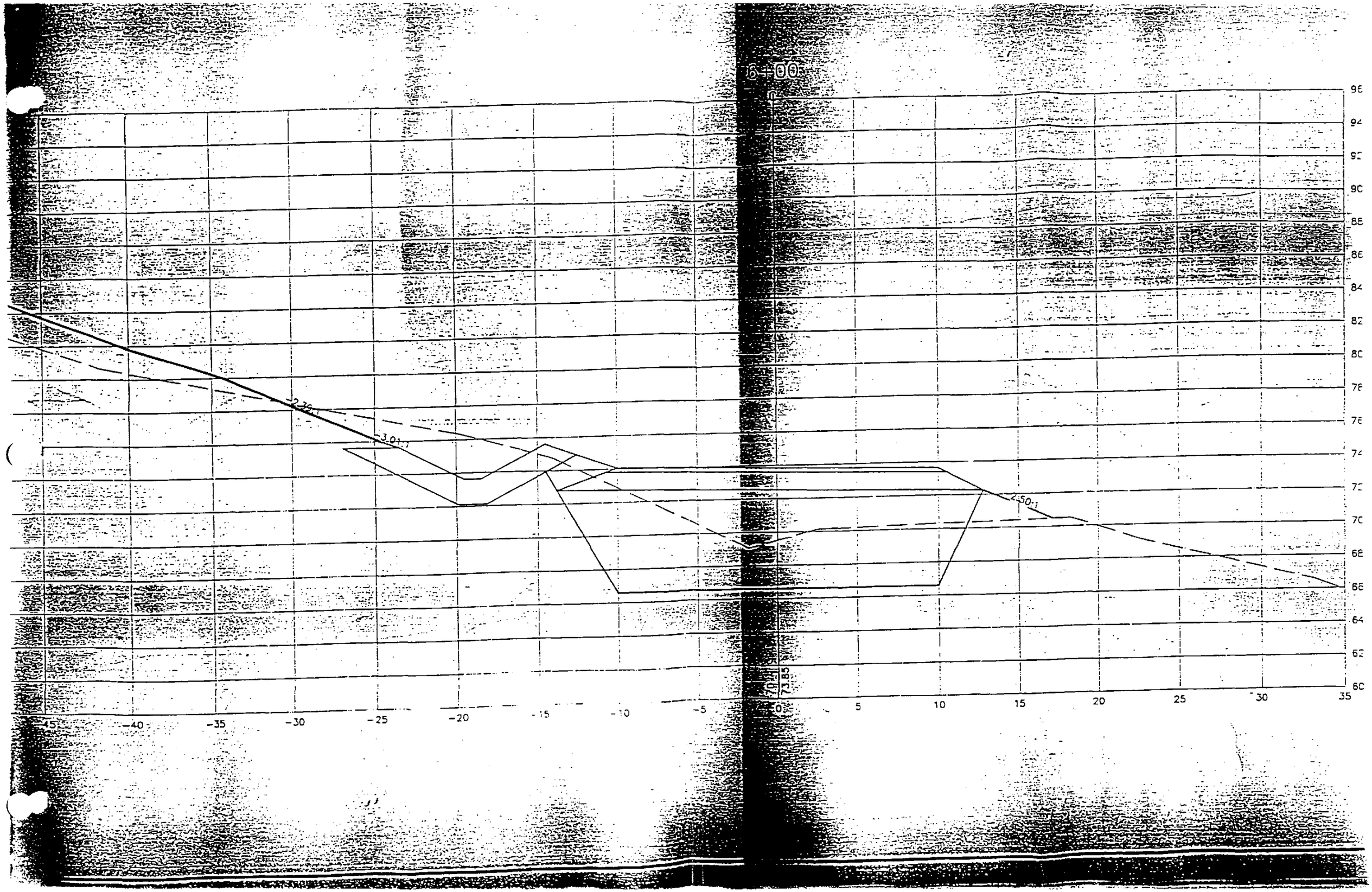
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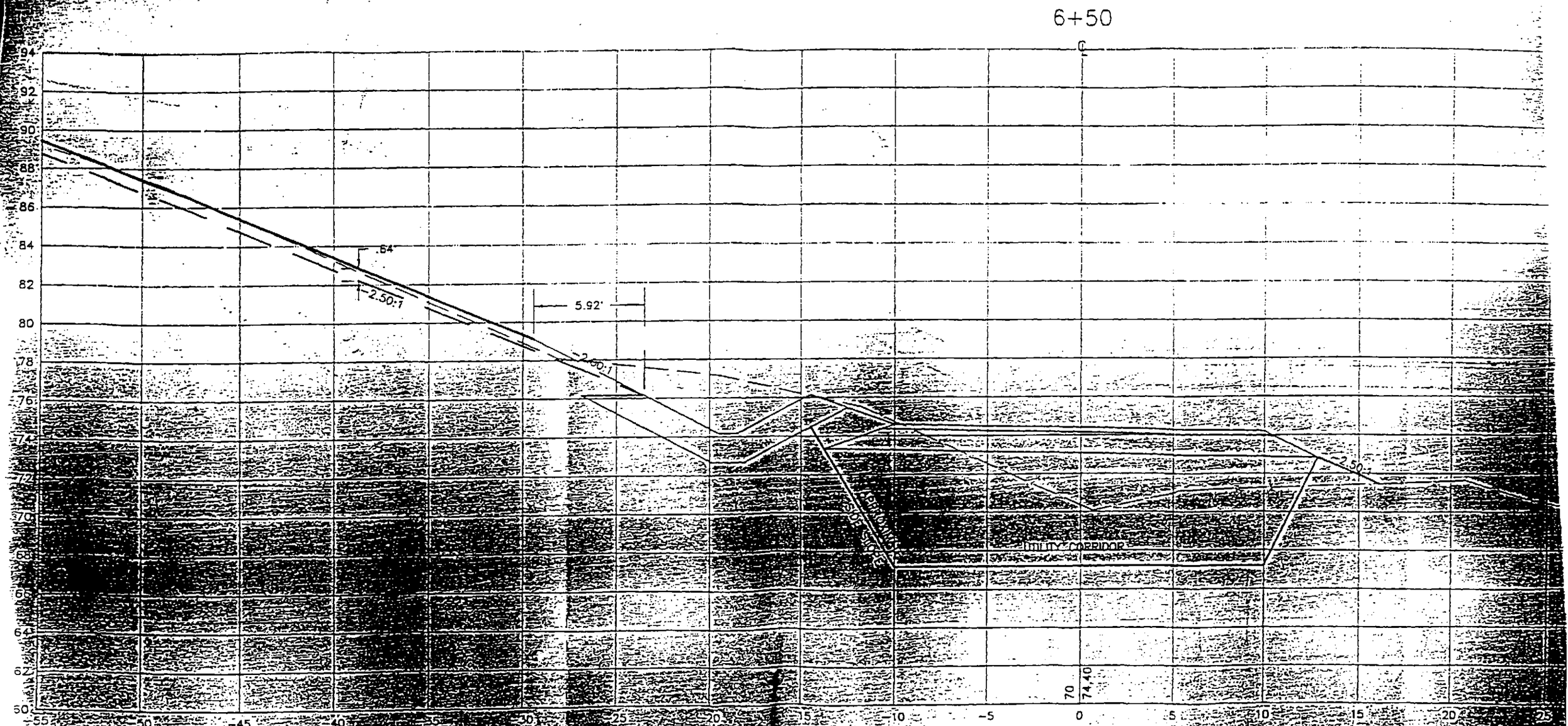
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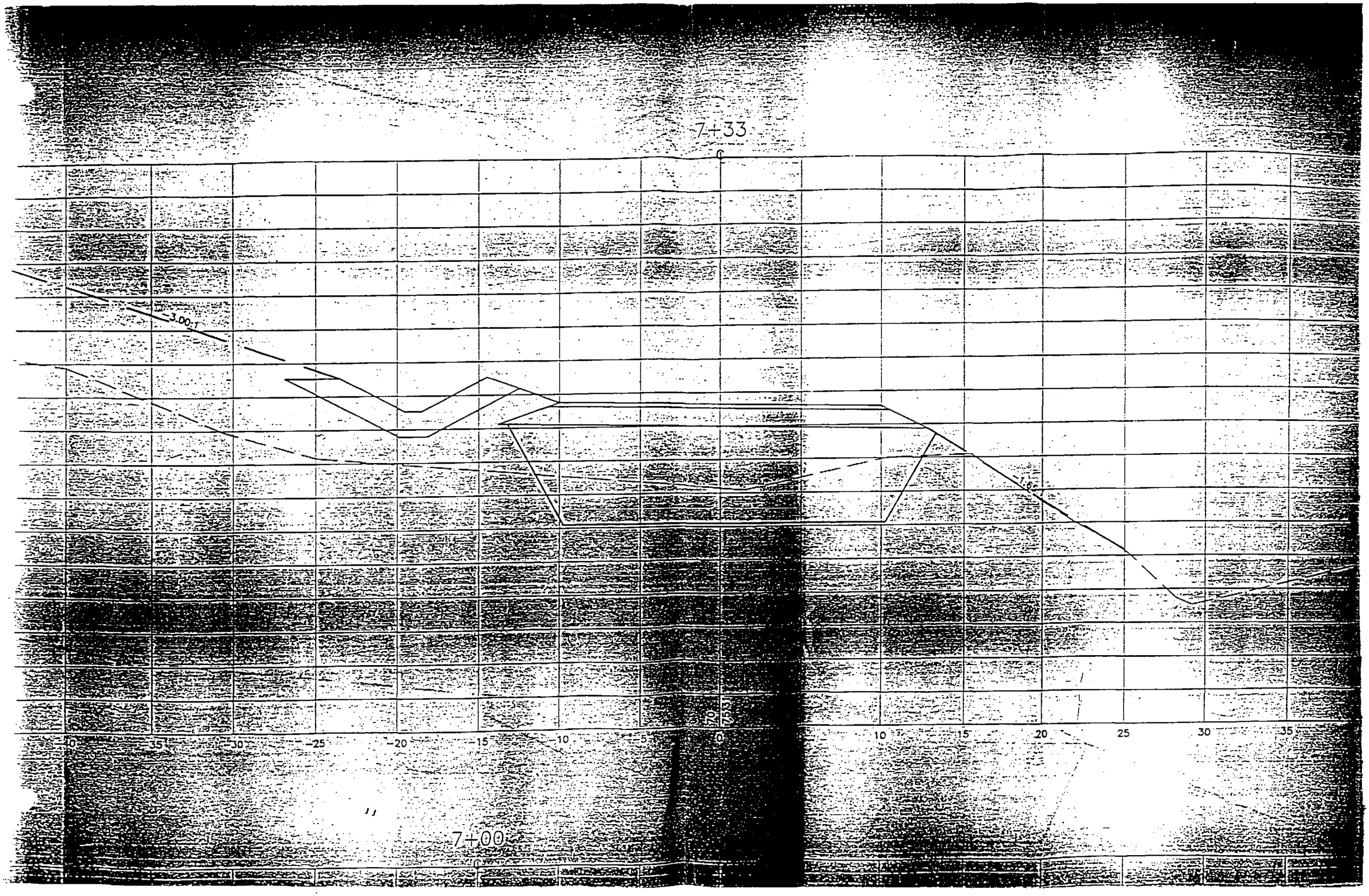
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RUST REMEDIAL SERVICES INC.

41 Atlantic Avenue
Woburn, MA 01801
Tel. (617) 938-7190
Fax (617) 938-7194

I-Plex Remediation Site
Woburn, Massachusetts
Project #492900

VARIANCE REQUEST

Date of Request: 10/20/94 Suspense Date: 10/26/94 Variance No: 033

Proposed Variance: Drwg Ref: 4&5/12-8 Spec Ref: 02223 Site Location: EHP; Access Rd

Details 4 & 5 on Drwg Sht 12-8 show a #57 stone surface course for the access road from Commerce Way to the EHP Tow.

A #57 stone would not compact due to the lack of fines, remain loose on the roadway, and eventually ravel away.

RUST has been ~~used~~ using a dense-graded aggregate (DGA) on our haul roads on the site and this aggregate has provided good service.

RUST requests approval to use DGA in lieu of the #57 stone for the surface course on the access road to the EHP Tow.

The undersigned represents that the contract documents have been reviewed and that acceptance of this proposed variance will have no impact on cost or time of performance to this contract and that incorporation of this variance into the permanent work will not conflict or adversely effect follow on trades or the ultimate end product.

RUST Remedial Services Representative — Date: 20 OCT 94

Disposition: Approved [X] Modified [ ] Rejected [ ]

Certifying Engineer — Date: 10/20/94

I-Plex Site Remedial Trust Representative — Date: 10/21/94

VARIANCE REQUEST

I. Purpose: A variance request (VR) is a traceable document that confirms approval or rejection of a proposal to **modify a contractual requirement** that will not affect the contract price and/or schedule.

The variance must be minor in nature, create no adverse impact on the design or function of the affected area, and not require a formal change order for implementation.

II. Information: VRs contain the following information:

A. References contract documents: scope of work, drawing(s), specification, etc.
B. States the proposed variation or deviation:

1. Use of different material
2. Employ different construction method
3. Relaxation of contract requirement

C. Explains reason for request, such as:

1. Specified material is not available

a. Unreasonable delivery time
b. Item is discontinued
c. Improved or updated model available

2. A less expensive but comparable material can be used
3. Construction application, eg, soil compaction, not practical to field conditions, eg, material not capable of meeting specified density requirement

III. Flow of Responsibilities:

A. Immediately upon discovery of the need for the variance, the Contractor submits the VR form containing the complete and correct information as outlined above to the certifying engineer.
B. The certifying engineer receives the variance and reviews the information.
C. The certifying engineer indicates their review status:

1. APPROVED
2. MODIFIED; provides explanation for this status
3. REJECTED; provides explanation for this status

D. The certifying engineer forwards approved or modified VRs to the Trust for their review and concurrence. Rejected VRs are returned directly by the certifying engineer to the Contractor. After their review, the Trust returns a copy to the Contractor who must maintain and track all submitted VRs regardless of their review status.

RUST REMEDIAL SERVICES INC.

41 Atlantic Avenue
Woburn, MA 01801
Tel. (617) 938-7190
Fax (617) 938-7194

I-Plex Remediation Site
Woburn, Massachusetts
Project #492900

VARIANCE REQUEST

Date of Request: 3/16/95 Suspense Date: 3/31/95 Variance No: 067

Proposed Variance: Drwg Ref: — Spec Ref: 02595 2.01(c) Site Location: ALL

RRS PROPOSED POLYFELT TS 1000 TO FULFILL THE 16-OZ NONWOVEN GEOTEXTILE NEEDS FOR THE I-PLEX PROJECT. COPIES OF OUR REQUEST LETTER AND THE TRUST'S ACCEPTENCE LETTER ARE ATTACHED. IN ADDITION, WE HAVE INCLUDED WITH THIS V.R. POLYFELT'S MQA/MQC TEST RESULTS FOR THE LOT SLATED FOR THIS PROJECT.

The undersigned represents that the contract documents have been reviewed and that acceptance of this proposed variance will have no impact on cost or time of performance to this contract and that incorporation of this variance into the permanent work will not conflict or adversely effect follow on trades or the ultimate end product.

cc: R. Santucci, RRS

K. Logan 3/31/95
RUST Remedial Services Representative Date

Disposition: Approved [X] Modified [] Rejected []

Peter Neumann PE 4/4/95
Resident Engineer

Certifying Engineer Date

4/4/95
I-Plex Site Remedial Trust Representative Date

Printed on Recycled Paper

VARIANCE REQUEST

I. Purpose: A variance request (VR) is a traceable document that confirms approval rejection of a proposal to modify a contractual requirement that will not affect the contract price and/or schedule.

The variance must be minor in nature, create no adverse impact on the design or function of the affected area, and not require a formal change order for implementation.

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A. References contract documents: scope of work, drawing(s), specification, etc.
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Golder Associates Inc.

400 Commercial Street
Manchester, NH USA 03101-1113
Telephone (603) 668-0880
Fax (603) 668-1199

March 28, 1995

933-6142.960

Ms. Kelly A. Fagan
Project Engineer
Rust Remedial Services Inc.
41 Atlantic Avenue
Woburn, MA 01801

RE: POLYFELT 16 OZ GEOTEXTILE

Dear Kelly:

Dave Baumgartner of the Industri-Plex Site Remedial Trust has requested that Golder Associates Inc. respond to Rust Remedial Services Inc. request that the burst strength minimum value be lowered to the manufacturer's minimum value. Golder Associates Inc. has reviewed the request based on the copies of literature that were included with your letter of March16, 1995 to the Trust.

The minimum values for the Polyfelt Americas 16 oz geotextile, TS 1000, as shown on the Polyfelt table of minimum average roll values and typical average roll values, were compared with the 100% Design Report Specification requirements. Minimum values of the16 oz geotextile TS 1000 for Grab Tensile, Puncture Resistance, Mullen Burst and nominal Thickness do not meet the minimum Specification requirements of the 100% Design Report, Section 02595 2.01, (c). Minimum values for these properties in addition to the Mullen Burst will have to be reduced in order to accept the Polyfelt 16 oz geotextile.

After review of the property values Golder Associates Inc. is recommending that the Industri-Plex Site Remedial Trust accept the Polyfelt 16 oz geotextile, TS 1000 as an alternative 16 oz geotextile as described in the 100% Design Report. Minimum values as stated by the Polyfelt Americas must still be met and will be tested for conformance in accordance with the 100% Design Specifications.

The minimum values as listed in the Polyfelt literature are as follows:

Property	Requirement	Test Method
Mass per Unit Area	16 oz/sy	ASTM D5261
Grab Strength	340 lbs	ASTM D4632
Trapezoidal Tear Strength	110 lbs	ASTM D4533
Mullen Burst	550 psi	ASTM D3786
Puncture Strength	160 lbs	ASTM D4833
Thickness	150 mils	ASTM D5199
Apparent Opening Size	U.S. Sieve No. 100	ASTM D4751

If you have any questions regarding this acceptance, please let us know.

Very truly yours,

GOLDER ASSOCIATES INC.

Peter Neumann

Peter Neumann, P.E.
Resident Engineer

copies: Mr. David Baumgartner, ISRT
Mr. Peter C. Conti, Golder
Mr. Sam Talyor, GCS

RUST REMEDIAL SERVICES INC.

41 Atlantic Avenue
Woburn, MA 01801
Tel. (617) 938-7190
Fax (617) 938-7194

I-Plex Remediation Site
Woburn, Massachusetts
Project #492900

VARIANCE REQUEST

Date of Request: 4-26-95 Suspense Date: 4-27-95 Variance No: 077

Proposed Variance: Drwg Ref: — Spec Ref: 02595 2.01 Site Location: ALL

RRS requests the polyfelt 16-oz geotextile be accepted with a minimum AOS of 70. The conformance test results of samples taken and tested by GOLDER indicate the material will meet the project minimum of the 6-oz geotextile. Copies of the test results are attached.

The undersigned represents that the contract documents have been reviewed and that acceptance of this proposed variance will have no impact on cost or time of performance to this contract and that incorporation of this variance into the permanent work will not conflict or adversely effect follow on trades or the ultimate end product.

cc: R. Santucci, RRS
D. Hamel, REI

[signature] 4-26-95
RUST Remedial Services Representative Date

Disposition: Approved [] Modified [X] Rejected []

Based on conversation with Joe LeMay 5/2/95 16 oz geotextile with AOS of 70 or higher may be placed in upland areas. Only 16 oz geotextile with an AOS of 100 or more shall be placed ~~in~~ as wetland cover geotextile. The AOS of geotextile is determined by representative testing in accordance with Specification Section 02595.

Attached are conformance test results to date (16 oz Polyfelt) 2 pages

Peter Neumann, PE
Resident Engineer 5/3/95

[signature] 5/3/95
Certifying Engineer Date I-Plex Site Remedial Trust Representative Date

Variance No. 77
Page 1 of 3

Printed on Recycled Paper.

APRIL 1995

933-6142

SUMMARY OF 16 oz GEOTEXTILE CONFORMANCE TEST RESULTS

INDUSTR-PLEX SITE REMEDIAL TRUST
ENGINEERING SERVICES
WOBURN, MASSACHUSETTS

ROLL DESIGNATION	8736	8789	8839	8839(R)	8840	8911	8962	9018	9151	9255
THICKNESS (mils) ASTM D 1777	201.0	211.8	208.6	209.7	213.1	220.1	192.5	191.1	223.7	222.2
MASS/UNIT AREA (oz/sq yd) ASTM D 3776	16.7	17.0	15.9	-	-	19.6	16.3	16.0	18.1	18.0
GRAB STRENGTH (lbs)	391.8	405.7	379.1	-	-	457.1	405.8	426.2	471.0	443.2
MD/TD (1) ASTM D 4632	486.0	503.3	484.7	-	-	510.9	426.9	477.6	570.0	498.3
TRAPEZOIDAL TEAR STRENGTH	127.8	140.5	146.5	-	-	132.3	123.0	134.9	165.4	178.1
(lbs) MD/TD (1) ASTM D 4533	155.9	178.4	173.9	-	-	160.6	148.7	151.5	184.9	172.7
BURST STRENGTH (psi) ASTM D 3786	741	734	718	-	-	786	675	679	750	696
PUNCTURE STRENGTH (lbs) ASTM D 4833	223.6	223.6	208.1	-	-	230.2	210.5	216.3	237.9	234.3
APPARENT OPENING SIZE (mm)	0.150	0.168	0.169	0.180	0.180	0.106	0.117	0.135	0.136	0.194
(U.S. SIEVE NO.) ASTM D 4751	100	80	80	80	80	140	120	100	100	70

(1) MD/TD corresponds to Machine Direction / Transverse Direction.

814ZGT

Post-It™ Fax Note 7671	Date 4-17-95 # of pages ▸ 10
To PETER NEUMANN	From HENRY MOCK
Co./Dept. GCS	Co. GCS
Phone # 933-6142	Phone # 404-476-9445
Fax # 617-932-9589	Fax # -9457

Variance No. 77
Page 2 of 3

APRIL 1995

933-6142

SUMMARY OF 18 oz. GEOTEXTILE CONFORMANCE TEST RESULTS

INDUSTR-PLEX SITE REMEDIAL TRUST
ENGINEERING SERVICES
WOBURN, MASSACHUSETTS

ROLL DESIGNATION	930.1									
THICKNESS (mils) ASTM D 1777	219.1	-	-	-	-	-	-	-	-	-
MASS/UNIT AREA (oz/sq yd) ASTM D 3776	17.9	-	-	-	-	-	-	-	-	-
GRAB STRENGTH (lbs)	428.0	-	-	-	-	-	-	-	-	-
MD/TD (1)	531.4	-	-	-	-	-	-	-	-	-
ASTM D 4632										
TRAPEZOIDAL TEAR STRENGTH	158.9	-	-	-	-	-	-	-	-	-
(lbs) MD/TD (1)	182.5	-	-	-	-	-	-	-	-	-
ASTM D 4533										
BURST STRENGTH (psi) ASTM D 3786	783	-	-	-	-	-	-	-	-	-
PUNCTURE STRENGTH (lbs) ASTM D 4833	228.7	-	-	-	-	-	-	-	-	-
APPARENT OPENING SIZE (mm)	0.168	-	-	-	-	-	-	-	-	-
(U.S. SIEVE NO.)	80	-	-	-	-	-	-	-	-	-
ASTM D 4751										

(1) MD/TD corresponds to Machine Direction / Transverse Direction.

9142DT1

Variance No. 77
Page 3 of 3

APRIL 1996

933-6142

SUMMARY OF 16 oz GEOTEXTILE CONFORMANCE TEST RESULTS

INDUSTR-PLEX SITE REMEDIAL TRUST
ENGINEERING SERVICES
WOBURN, MASSACHUSETTS

ROLL DESIGNATION	8736	8789	8839	8839(R)	8840	8911	8962	9018	9151	9255
THICKNESS (mils) ASTM D 1777	201.0	211.8	208.6	209.7	213.1	220.1	192.5	191.1	223.7	222.2
MASS/UNIT AREA (oz/sq yd) ASTM D 3776	16.7	17.0	15.9	-	-	19.6	18.3	16.0	18.1	18.0
GRAB STRENGTH (lbs) MD/TD (1) ASTM D 4632	391.8	405.7	379.1	-	-	457.1	405.8	428.2	471.0	443.2
	466.0	503.3	496.7	-	-	510.9	426.9	477.8	570.0	498.3
TRAPEZOIDAL TEAR STRENGTH (lbs) MD/TD (1) ASTM D 4533	127.6	140.6	146.6	-	-	132.3	123.0	134.9	185.4	178.1
	155.9	178.4	173.9	-	-	180.8	148.7	151.5	184.9	172.7
BURST STRENGTH (psi) ASTM D 3786	741	734	715	-	-	786	675	679	750	696
PUNCTURE STRENGTH (lbs) ASTM D 4833	223.6	223.6	208.1	-	-	230.2	210.5	218.3	237.9	234.3
APPARENT OPENING SIZE (mm)	0.150	0.188	0.169	0.180	0.180	0.106	0.117	0.135	0.135	0.194
(U.S. SIEVE NO.) ASTM D 4751	100	80	80	80	80	140	120	100	100	70

(1) MD/TD corresponds to Machine Direction / Transverse Direction.

6142GT

Post-it™ Fax Note 7671	Date 4-17-96 # of pages ▶ 10
To PETER NEUMANN	From HENRY MOCK
Co./Dept. GCS	Co. GCS
Phone # 933-6142	Phone # 404-476-9445
Fax # 617-932-9589	Fax # -9457

APRIL 1995

933-6142

SUMMARY OF 16 oz GEOTEXTILE CONFORMANCE TEST RESULTS

INDUSTR-PLEX SITE REMEDIAL TRUST
ENGINEERING SERVICES
WOBURN, MASSACHUSETTS

ROLL DESIGNATION	9301									
THICKNESS (mils) ASTM D 1777	219.1	-	-	-	-	-	-	-	-	-
MASS/UNIT AREA (oz/sq yd) ASTM D 3776	17.9	-	-	-	-	-	-	-	-	-
GRAB STRENGTH (lbs)	428.0	-	-	-	-	-	-	-	-	-
MD/TD (1)	531.4	-	-	-	-	-	-	-	-	-
ASTM D 4632										
TRAPEZOIDAL TEAR STRENGTH	158.9	-	-	-	-	-	-	-	-	-
(lbs) MD/TD (1)	182.5	-	-	-	-	-	-	-	-	-
ASTM D 4533										
BURST STRENGTH (psi) ASTM D 3786	783	-	-	-	-	-	-	-	-	-
PUNCTURE STRENGTH (lbs) ASTM D 4833	228.7	-	-	-	-	-	-	-	-	-
APPARENT OPENING SIZE (mm)	0.168	-	-	-	-	-	-	-	-	-
(U.S. SIEVE NO.)	80	-	-	-	-	-	-	-	-	-
ASTM D 4751										

(1) MD/TD corresponds to Machine Direction / Transverse Direction.

6142GT1

RUST REMEDIAL SERVICES INC.

I-Plex Remediation Site
Woburn, Massachusetts
Project #492900

VARIANCE REQUEST

41 Atlantic Avenue
Woburn, MA 01801
Tel. (617) 938-7190
Fax (617) 938-7194

Date of Request: 5.23.95 Suspense Date: 5.25.95 Variance No: 084

Proposed Variance: Drwg Ref: 11-3BFC 11-7BFC Spec Ref: — Site Location: MBTA ROW

RRS proposes revising the above-grade permeable cover to facilitate drainage away from the MBTA tracks. The proposed cover will be above-grade/at-grade permeable cover as shown on the attached TYP. detail

The undersigned represents that the contract documents have been reviewed and that acceptance of this proposed variance will have no impact on cost or time of performance to this contract and that incorporation of this variance into the permanent work will not conflict or adversely effect follow on trades or the ultimate end product.

cc: R.J. SANTUCCI, RRS
C. Williams, RRS
D. Himes, REI

RUST Remedial Services Representative — Date: 5.23.95

Disposition: Approved [X] Modified [] Rejected []

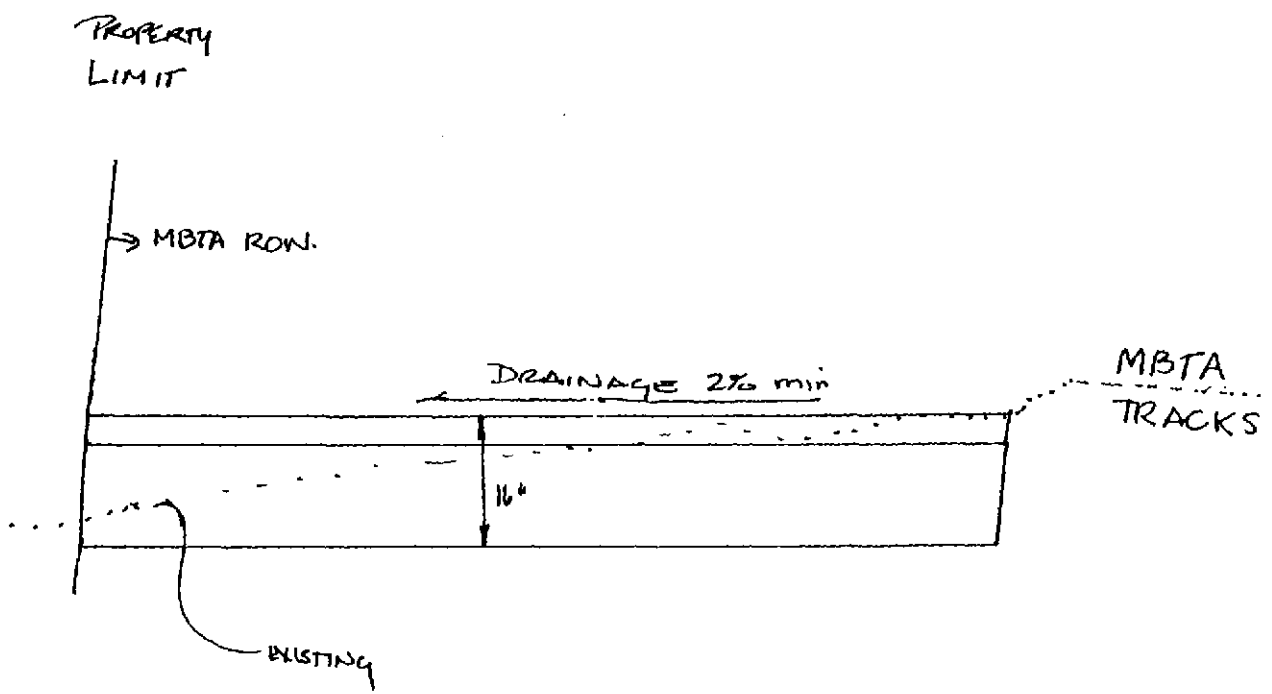
(PCN) Revised cover, also due to, ~~presence of~~ avoiding the ATT fiber optic line near the ~~surface~~ of the cover.

Peter Neumann PE 6/1/95
Resident Engineer

Certifying Engineer — Date

I-Plex Site Remedial Trust Representative — Date: 6/1/95

Printed on Recycled Paper.



Typ. DETAIL
COVER @ EAST SIDE
M.B.T.A. R.O.W.

V.R. #084
5.23.95

RUST REMEDIAL SERVICES INC.

I-Plex Remediation Site
Woburn, Massachusetts
Project #492900

VARIANCE REQUEST

41 Atlantic Avenue
Woburn, MA 01801
Tel. (617) 938-7190
Fax (617) 938-7194

Date of Request: 5/23/95 Suspense Date: 5/25/95 Variance No: 085

Proposed Variance: Drwg Ref: 1/11-23 Spec Ref: — Site Location: Utility Corridor CECHP

RRS PROPOSES REPLACEMENT OF THE 22" x 36" ARCHED CULVERT WITH 3 (three) 18"Ø RCP.

The undersigned represents that the contract documents have been reviewed and that acceptance of this proposed variance will have no impact on cost or time of performance to this contract and that incorporation of this variance into the permanent work will not conflict or adversely effect follow on trades or the ultimate end product.

CC: R. Santucci, RRS
D. Speedding, RRS
D. Himes, REI

RUST Remedial Services Representative — Date: 5-23-95

Disposition: Approved [X] Modified [ ] Rejected [ ]

Peter Neumann, PE — 6/1/95
Resident Engineer

Certifying Engineer — Date

I-Plex Site Remedial Trust Representative — Date: 6/1/95

Printed on Recycled Paper.

VARIANCE REQUEST

I. Purpose: A variance request (VR) is a traceable document that confirms approval or rejection of a proposal to **modify a contractual requirement** that will not affect the contract price and/or schedule.

The variance must be minor in nature, create no adverse impact on the design or function of the affected area, and not require a formal change order for implementation.

II. Information: VRs contain the following information:

A. References contract documents: scope of work, drawing(s), specification, etc.
B. States the proposed variation or deviation:

1. Use of different material
2. Employ different construction method
3. Relaxation of contract requirement

C. Explains reason for request, such as:

1. Specified material is not available

a. Unreasonable delivery time
b. Item is discontinued
c. Improved or updated model available

2. A less expensive but comparable material can be used
3. Construction application, eg, soil compaction, not practical to field conditions, eg, material not capable of meeting specified density requirement

III. Flow of Responsibilities:

A. Immediately upon discovery of the need for the variance, the Contractor submits the VR form containing the complete and correct information as outlined above to the certifying engineer.
B. The certifying engineer receives the variance and reviews the information.
C. The certifying engineer indicates their review status:

1. APPROVED
2. MODIFIED; provides explanation for this status
3. REJECTED; provides explanation for this status

D. The certifying engineer forwards approved or modified VRs to the Trust for their review and concurrence. Rejected VRs are returned directly by the certifying engineer to the Contractor. After their review, the Trust returns a copy to the Contractor who must maintain and track all submitted VRs regardless of their review status.

Appendix D

APPENDIX D

CONTRACTOR CONTROLS

APPENDIX D.1

AIR MONITORING

ENVIRONMENTAL HEALTH INC.
P.O. BOX 536 HOLLIS, NEW HAMPSHIRE 03049
(603) 465-7284

RECEIVED
APR - 3 1997

March 28, 1997

Bill McGovern
LRS Enviro-Services
400 Lafayette Road
Hampton, NH 03842

RE: Industri-Plex
Woburn, MA
Air Monitoring Data--11/29/96-2/19/97

Dear Bill,

I have reviewed the latest round of air monitoring data received from ESA Laboratory, an AIHA-accredited laboratory located in Chelmsford, MA. These samples were collected from November 29, 1996 to February 19, 1997 at perimeter locations #1 through #3.

Airborne contaminant concentrations for arsenic, chromium, lead and particulate met the site response levels for all locations. Please give me a call if you have any questions.

Sincerely,

C. R. Coe, CIH

CRC:jc

INDUSTRI-PLEX SITE REMEDIATION
WOBURN, MA
11/29/96-2/19/97

AIR SAMPLES

Contaminant: Arsenic, Chromium, Lead and Respirable Dust
Equipment: PM_{10} and TSP
Analysis: Atomic Absorption and NIOSH 0500

Standard:	Arsenic	Chromium	Lead	$Dust_{(Resp)}$
Site	0.02$\mu g/M^3$[a]	1.36 $\mu g/M^3$	0.15$\mu g/M^3$	90 $\mu g/M^3$
Personal	5 $\mu g/M^3$	250 $\mu g/M^3$	50 $\mu g/M^3$	5000 $\mu g/M^3$

Sample	Description	Ar ($\mu g/M^3$)	Cr ($\mu g/M^3$)	Pb ($\mu g/M^3$)	$Dust_{(Resp)}$ ($\mu g/M^3$)
011203	PM_{10} - Location #3				18
021203	TSP - Location #3	<0.0017	<0.04	<0.04	
031204	PM_{10} - Location #2				
041204	TSP - Location #2	0.0039	<0.04	<0.04	
051204	TSP - Location #2D	0.0034	<0.04	<0.04	
060207	PM_{10} - Location #1				30
070212	PM_{10} - Location #3				34
080212	TSP - Location #3	<0.0017	<0.04	<0.04	
090213	PM_{10} - Location #2				22
100213	TSP - Location #2	<0.0017	<0.04	<0.04	
110213	TSP - Location #2D	<0.0017	<0.04	<0.04	
120218	PM_{10} - Location #3				27
130218	TSP - Location #3	<0.0017	<0.04	<0.04	
140219	PM_{10} - Location #3				28
150219	TSP - Location #3	<0.0017	<0.04	<0.04	
161129	PM_{10} - Location #3				12
171129	TSP - Location #3	<0.0017	<0.04	<0.04	
150219					

[a] Micrograms per cubic meter of air

ESA LABORATORIES, INC.
22 ALPHA ROAD
CHELMSFORD, MA 01824
(508) 250-7150 FAX: (508) 250-7171

PO#/RELEASE: LETTER/NA
CLIENT JOB#: NA

ESAL BATCH#: 970809

53334
HARRY REUELS
LRS ENVIRO-SERVICES
400 LAFAYETTE ROAD
HAMPTON, NH 03842

RECEIVED
MAR 14 1997

DATE RECEIVED : 03-05-97
DATE ANALYZED : 03-11-97
DATE REPORTED : 03-12-97

Reginald M. Griffin, Ph.D.
Laboratory Director

TEST DESCRIPTION	REFERENCE	ANALYTICAL METHOD
ARSENIC-47 MM FILTER		HGAAS
CHROMIUM-47		AAFLAME
PARTICULATE - 47MM CASSETTE		GRAVIMETRIC
LEAD-47 MM FILTER		AAFLAME

SAMP NO.	DATE CLLCT	SAMPLE ID/OTHER	AS-47 UG/M3	CR-47 MG/M3	PART-47 MG/M3	PB-47 MG/M3	MESSAGES
1	12-03	PM10 96038 LOCATION #3	----	----	0.018	----	
0002	12-03	TSP LOC#3 12396	<0.0017	<0.00004	----	<0.00004	
0003	12-04	PM10 96004 LOCATION #2	----	----	0.040	----	
0004	12-04	TSP LOCATION #2 12496	0.0039	<0.00004	----	<0.00004	
0005	12-04	TSP LOCATION #2 12496D	0.0034	<0.00004	----	<0.00004	
0006	02-07	PM10 LOCATION #1 96048	----	----	0.030	----	
0007	02-12	PM10 LOCATION #3 96047	----	----	0.034	----	
0008	02-12	TSP LOCATION #3 21297	<0.0017	<0.00004	----	<0.00004	
0009	02-13	PM10 96059 LOCATION #2	----	----	0.022	----	
0010	02-13	TSP LOCATION #2 21397	<0.0017	<0.00004	----	<0.00004	

IMPORTANT: THIS SERVICE SHALL BE SUBJECT TO THE TERMS AND CONDITIONS SET FORTH ON THE REVERSE SIDE.

ESA LABORATORIES, INC.
22 ALPHA ROAD
CHELMSFORD, MA 01824
(508) 250-7150 FAX: (508) 250-7171

PO#/RELEASE: LETTER/NA
CLIENT JOB#: NA

ESAL BATCH#: 970809

DATE RECEIVED : 03-05-97
DATE ANALYZED : 03-11-97
DATE REPORTED : 03-12-97

53334
HARRY REUELS
LRS ENVIRO-SERVICES
400 LAFAYETTE ROAD
HAMPTON, NH 03842

RECEIVED
MAR 14 1997

TEST DESCRIPTION	REFERENCE	ANALYTICAL METHOD
ARSENIC-47 MM FILTER		HGAAS
CHROMIUM-47		AAFLAME
PARTICULATE - 47MM CASSETTE		GRAVIMETRIC
LEAD-47 MM FILTER		AAFLAME

SAMP NO.	DATE CLLCT	SAMPLE ID/OTHER	AS-47 UG/M3	CR-47 MG/M3	PART-47 MG/M3	PB-47 MG/M3	MESSAGES
1	02-13	TSP LOCATION #2 21397D	0.0017	<0.00004	----	<0.00004	
0012	02-18	PM10 LOCATION #3 96039	----	----	0.027	----	
0013	02-18	TSP LOCATION #3 21897	<0.0017	<0.00004	----	<0.00004	
0014	02-19	PM10 LOCATION 3 96052	----	----	0.028	----	
0015	02-19	TSP LOCATION #3 21997	<0.0017	<0.00004	----	<0.00004	
0016	11-29	PM10 LOCATION #3 96046	----	----	0.012	----	
0017	11-29	TSP LOCATION #3	<0.0017	<0.00004	----	<0.00004	
0018	12-10	PERSONAL 121696	VOID	VOID	----	VOID	

IMPORTANT: THIS SERVICE SHALL BE SUBJECT TO THE TERMS AND CONDITIONS SET FORTH ON THE REVERSE SIDE.

ENVIRONMENTAL HEALTH INC.
P.O. BOX 536 HOLLIS, NEW HAMPSHIRE 03049
(603) 465-7284

January 16, 1997

RECEIVED
JAN 21 1997

Bill McGovern
LRS Enviro-Services
400 Lafayette Road
Hampton, NH 03842

RE: Industri-Plex
Woburn, MA
Air Monitoring Data--8/6-10/10/96

Dear Bill,

On January 14, 1997 I met with you at the Industri-Plex site to review the last round of air monitoring data received from ESA Laboratory, an AIHA-accredited laboratory located in Chelmsford, MA. These samples were collected from August 14 to October 10, 1996 at perimeter locations #1 through #3 and at the parking lot at 41 Atlantic Avenue. Personal samples were also collected while workers drilled ledge in the east and southeast portions of the site, while workers installed fabric in the northeast corner of the site and while workers operated the roller along the west side of the site.

Airborne contaminant concentrations met the site and personal response levels for all locations.

Please note that I have attached a revised laboratory report prepared by ESA. There was an error in calculating the chromium concentrations for the personal samples. Should you have any questions, please call.

Sincerely,

C. R. Coe, CIH

CRC:jc

INDUSTRI-PLEX SITE REMEDIATION
WOBURN, MA
8/14/96-10/10/96

AIR SAMPLES

Contaminant: Arsenic, Chromium, Lead and Respirable Dust
Equipment: PM_{10} and TSP
Analysis: Atomic Absorption and NIOSH 0500

Standard:	Arsenic	Chromium	Lead	$Dust_{(Resp)}$
Site	0.02$\mu g/M^3$[a]	1.36 $\mu g/M^3$	0.15$\mu g/M^3$	90 $\mu g/M^3$
Personal	5 $\mu g/M^3$	250 $\mu g/M^3$	50 $\mu g/M^3$	5000 $\mu g/M^3$

Sample	Description	Ar ($\mu g/M^3$)	Cr ($\mu g/M^3$)	Pb ($\mu g/M^3$)	$Dust_{(Resp)}$ ($\mu g/M^3$)
010814	PM_{10} - Location #3				30.4
020814	TSP - Location #3	<0.002	<0.02	<0.02	
P-0814	Driller, S end site	<0.04	<0.5	<0.8	
030820	PM_{10} - Location #3				9.6
040820	TSP - Location #3	<0.002	<0.02	0.03	
050823	PM_{10} - Location #3				18.3
060823	TSP - Location #3	<0.002	<0.02	<0.02	
P-0823	Installing fabric, NE corner, wind from offsite	0.27	2.0	<0.02	
070827	TSP - Location #2D	<0.002	0.03	<0.02	
080827	TSP - Location #2	<0.002	<0.02	0.03	
090827	PM_{10} - Location #2	<0.002	<0.02	<0.02	30.8
P-0827	Roller, W side site	0.13	0.9	1.2	
100829	TSP - Location #1	<0.002	<0.02	0.03	
110905	TSP - Location #3	<0.002	<0.02	0.03	
120905	PM_{10} - Location #3	<0.002	<0.02	0.03	16.2
131008	TSP - Location #41	<0.002	<0.02	0.03	
141008	PM_{10} - Location #41	<0.002	<0.02	0.02	17.1
P-1008	Driller, E side site	0.05	0.7	1.1	
P-1010	Driller, E side site	<0.04	<0.5	1.0	

[a] Micrograms per cubic meter of air

ENVIRONMENTAL HEALTH INC.
P.O. BOX 536 HOLLIS, NEW HAMPSHIRE 03049
(603) 465-7284

RECEIVED
JAN 17 1997

January 13, 1997

Bill McGovern
LRS Enviro-Services
400 Lafayette Road
Hampton, NH 03842

RE: Industri-Plex
Woburn, MA
Air Monitoring Data--7/8-8/6/96

Dear Bill,

I have reviewed the latest round of air monitoring data received from ESA Laboratory, an AIHA-accredited laboratory located in Chelmsford, MA. These samples were collected from July 8, 1996 to August 6, 1996 at perimeter locations #1 through #4. Personal samples were also collected while workers were grubbing and clearing in the northeast corner of the site, and while chipping near other workers excavating tanks.

Contaminant concentrations met the site response levels for all locations but location #2, the intersection of Commerce Way and Atlantic Avenue, on July 15 and August 6, 1996 where particulate concentrations were exceeded. Please be aware that the corresponding arsenic, chromium and lead concentrations for that sample location, on these dates, were not detected. Truck traffic on the road is believed to be responsible for the higher than normal dust concentrations.

Should you have any questions, please call.

Sincerely,

C. R. Coe, CIH

CRC:jc

INDUSTRI-PLEX SITE REMEDIATION
WOBURN, MA
7/8/96-8/6/96

AIR SAMPLES

Contaminant: Arsenic, Chromium, Lead and Respirable Dust
Equipment: PM_{10} and TSP
Analysis: Atomic Absorption and NIOSH 0500

Standard:	Arsenic	Chromium	Lead	$Dust_{(Resp)}$
Area	0.02$\mu g/M^3$*	1.36 $\mu g/M^3$	0.15$\mu g/M^3$	90 $\mu g/M^3$
Personal	5 $\mu g/M^3$	250 $\mu g/M^3$	50 $\mu g/M^3$	5000 $\mu g/M^3$

Sample	Description	Ar ($\mu g/M^3$)	Cr ($\mu g/M^3$)	Pb ($\mu g/M^3$)	$Dust_{(Resp)}$ ($\mu g/M^3$)
010708	PM_{10} - Location #2				<0.6
020708	TSP - Location #2	<0.0005	<0.01	<0.01	
030708	PM_{10} - Location #2D				43.3
P-0708	Personal #3--grubbing	0.15	<0.50	1.2	
040709	PM_{10} - Location #1				3.2
050709	TSP - Location #1	<0.0004	<0.01	<0.01	
P-0709	Personal #4	0.05	<0.50	<0.5	
060711	PM_{10} - Location #4				9.3
070711	TSP - Location #4	<0.002	<0.05	<0.05	
080711	TSP - Location #4D	<0.002	<0.05	<0.05	
090712	PM_{10} - Location #4				35
100712	TSP - Location #4	<0.006	<0.14	<0.14	
110715	PM_{10} - Location #2				366
120715	PM_{10} - Location #2D				415
130715	TSP - Location #2	<0.04* [<0.004]	<0.99* [<0.099]	<0.99* [<0.099]	
P-0716	Personal #5	0.03	<0.51	0.9	
140717	PM_{10} - Location #1				82
150717	TSP - Location #1	<0.004	<0.09	0.1	
160718	PM_{10} - Location #3				54
170718	TSP - Location #3	<0.008	<0.09	0.1	

Sample	Description	Ar ($\mu g/M^3$)	Cr ($\mu g/M^3$)	Pb ($\mu g/M^3$)	$Dust_{(Resp)}$ ($\mu g/M^3$)
180722	PM_{10} - Location #4				17
190722	TSP - Location #4	<0.006	<0.11	<0.11	
200722	TSP - Location #4D	<0.005	<0.11	<0.11	
210724	PM_{10} - Location #3				30
220724	TSP - Location #3	<0.005	<0.11	<0.11	
230730	PM_{10} - Location #1				30
240730	TSP - Location #1	<0.005	<0.12	<0.12	
250806	PM_{10} - Location #2				1049
260806	PM_{10} - Location #2D				132
270806	TSP - Location #2	<0.004	<0.11	<0.11	

a Micrograms per cubic meter of air

* A mathematics error resulted in the sample volumes reported to the laboratory one order of magnitude lower than the actual air sample volume. The corrected concentration is in brackets.

95/18
HFS
Aur w M.

ENVIRONMENTAL HEALTH INC.
P.O. BOX 536 HOLLIS, NEW HAMPSHIRE 03049
(603) 465-7284

RECEIVED
JUL 31 1996

July 29, 1996

Barry Goldstein
LRS Enviro-Services
400 Lafayette Road
Hampton, NH 03842

RE: Industri-Plex
Woburn, MA
Air Monitoring Data

Dear Barry,

This morning I met with Bill McGovern to go over the latest round of air monitoring data received from ESA Laboratory, an AIHA-accredited laboratory located in Chelmsford, MA. Samples were collected from June 17, 1996 to July 2, 1996 at perimeter locations #1 through #4. Personal samples were also collected while workers were removing a knoll from the northern side of the site and while compacting site material.

Contaminant concentrations met the site response levels for all locations but #1 on June 26, 1996 where particulate concentrations were exceeded. Please be aware that the corresponding arsenic, chromium and lead concentrations for that site, during that time frame, were either not detected or well below the site response level. Truck traffic on the road is believed to be responsible for the higher than normal dust concentrations.

Two particulate pre-weighed filters appeared to have been switched when they were returned to their cassettes. Samples 10 and 11 results were recalculated by the laboratory. Both results are reported with the corrected set first and the original set in brackets.

Should you have any questions, please call.

Sincerely,

C. R. Coe, CIH

CRC:jc

INDUSTRI-PLEX SITE REMEDIATION
WOBURN, MA

AIR SAMPLES

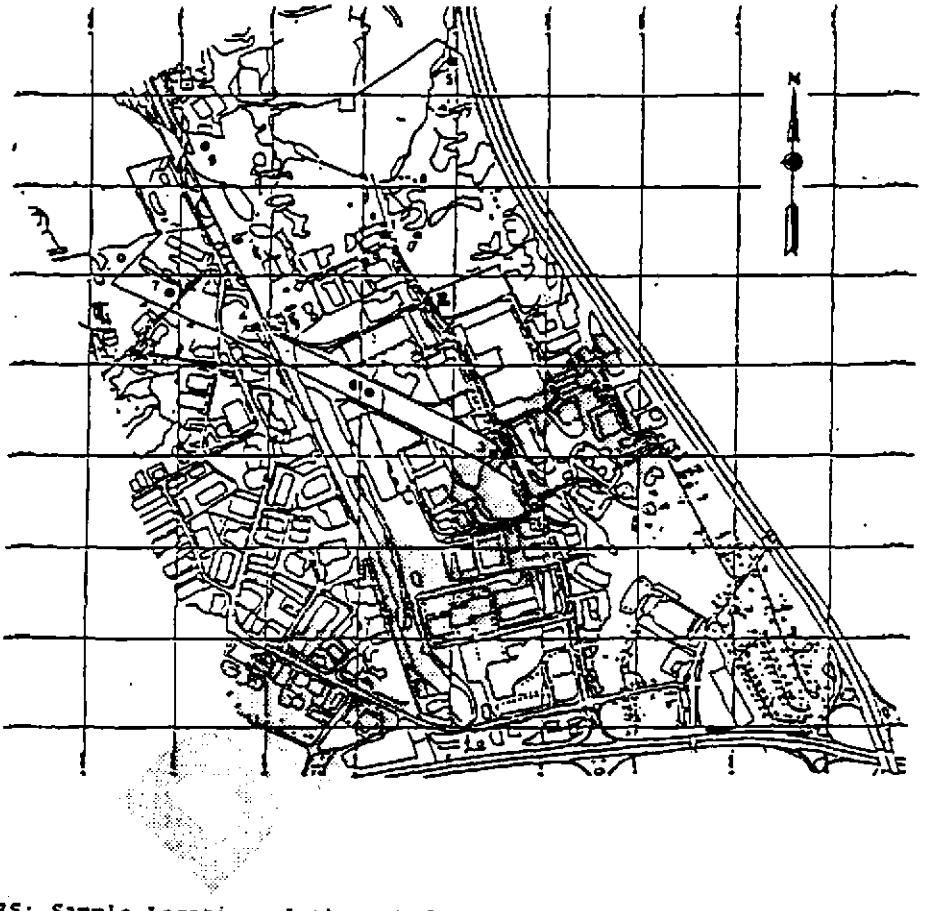
Contaminant: Arsenic, Chromium, Lead and Respirable Dust
Equipment: PM_{10} and TSP
Analysis: Atomic Absorption and NIOSH 0500

Standard:	Arsenic	Chromium	Lead	Dust
Area	0.02 μg[a]	1.36 μg	0.15 μg	90 μg
Personal	5 μg	250 μg	50 μg	5 mg/M^3[b]

Sample	Description	Ar (μg)	Cr (μg)	Pb (μg)	$Dust_{(Resp)}$ (μg)
0001	PM_{10} - Location #3				40
0002	TSP - Location #3	<0.005	<0.10	<0.05	
0003	PM_{10} - Location #1				21
0004	TSP - Location #1	<0.005	<0.09	<0.05	
0005	PM_{10} - Location #4				25
0006	TSP - Location #4	<0.005	<0.10	<0.05	
0007	TSP - Location #4D	<0.005	<0.10	0.1	
0008	PM_{10} - Location #4				22
0009	TSP - Location #4	<0.005	<0.10	<0.05	
0010	PM_{10} - Location #2				32 [<500]
0011	PM_{10} - Location #2				27 [556]
0012	TSP - Location #2	0.006	<0.10	<0.05	
0013	Personal - Grubbing knoll on northside of site	0.12	<0.44	<0.44	
0014	PM_{10} - Location #3				28
0015	TSP - Location #3	0.010	<0.10	0.1	
0016	PM_{10} - Location #1				132
0017	TSP - Location #1	0.006	<0.09	<0.05	
0018	PM_{10} - Location #4				6

Sample	Description	Ar (μg)	Cr (μg)	Pb (μg)	$Dust_{(Resp)}$ (μg)
0019	TSP - Location #4	<0.004	<0.08	<0.04	
0020	TSP - Location #4D	<0.004	<0.08	0.1	
0021	Personal - Compacting material on E side of 23 Atlantic Ave.	<0.02	<0.52	<0.52	
0022	PM_{10} - Location #3				57
0023	TSP - Location #3	<0.005	<0.10	0.1	

AMBIENT AIR LOCATIONS



TRS: Sample Locations 1 through 9
PM_{10} and TSP: Sample Locations 1 through 4. Duplicate PM_{10} sampler will be placed at location 2 and a duuplicate TSP smapler will be placed at location 4.

APPENDIX D.2

SURFACE WATER MONITORING

INDUSTRI-PLEX SI . _ REMEDIAL TRUST

SURFACE WATER MONITORING SUMMARY

DATE TIME	WEATHER CONDITION	WEATHER CONDITION LAST 24 HOURS	SAMPLING LOCATION	FIELD TESTS: TURBIDITY (NTU)	pH	CONDUCTIVITY (ms/cm)	DISSOLVED OXYGEN (mg/l)	TEMPERATURE (°C)	SALINITY (%)	SAMPLE: COLLECTION METHOD	APPEARANCE	COLOR	ODOR	FIELD MONITOR	LAB TEST RESULTS: TOTAL AS (mg/ L)	TOTAL PB (mg/ L)	TOTAL CR (mg/ L)	DISSOLVED AS (mg/ L)	DISSOLVED PB (mg/ L)	DISSOLVED CR (mg/ L)	HARDNESS (mg/L)	TSS (mg/ L)
8/21/96 0900	Clouds, Sunshine	Sunshine	HSW-8	13.5	_	_	_	_	_	Grab	Clear	None	None	TM	_	_	_	_	_	_	_	_
8/21/96 1100	Clouds, Sunshine	Sunshine	HSW-8	16.4	_	_	_	_	_	Grab	Clear	None	None	TM	_	_	_	_	_	_	_	_
8/21/96 1300	Clouds, Sunshine	Sunshine	HSW-8	16.8	_	_	_	_	_	Grab	Clear	None	None	TM	0.022	ND	ND	0.007	ND	ND	117	5
8/22/96 1500	Hazy Sunshine	Clouds, Sunshine	HSW-8	11.5	_	_	_	_	_	Grab	Clear	None	None	TM	_	_	_	_	_	_	_	_
8/23/96 1100	Sunshine	Hazy Sunshine	HSW-8	10.3	_	_	_	_	_	Grab	Clear	None	None	TM	_	_	_	_	_	_	_	_
8/26/96 1722	Clear	Clouds, Sunshine	HSW-8	9.5	_	_	_	_	_	Grab	Clear	None	None	PCN	_	_	_	_	_	_	_	_
8/26/96 1733	Clear	Clouds, Sunshine	HSW-7	10.25	_	_	_	_	_	Grab	Clear	None	None	PCN	_	_	_	_	_	_	_	_
8/27/96 1652	Hazy Sunshine	Clear	HSW-8	8.9	_	_	_	_	_	Grab	Clear	None	None	PCN	_	_	_	_	_	_	_	_
8/27/96 1708	Hazy Sunshine	Clear	HSW-7	12.6	_	_	_	_	_	Grab	Clear	None	None	PCN	_	_	_	_	_	_	_	_
8/28/96 1849	Light Sprinkle	Hazy Sunshine	HSW-8	9.2	_	_	_	_	_	Grab	Clear	None	None	PCN	_	_	_	_	_	_	_	_
8/28/96 1900	Light Sprinkle	Hazy Sunshine	HSW-7	17.6	_	_	_	_	_	Grab	Clear	None	None	PCN	_	_	_	_	_	_	_	_
8/28/96 1945	Light Sprinkle	Hazy Sunshine	HSW-11	7.8	_	_	_	_	_	Grab	Clear	None	None	PCN	_	_	_	_	_	_	_	_
8/29/96	Partly Cloudy	Light Sprinkle	HSW-7	8.7	_	_	_	_	_	Grab	Clear	None	None	PCN	_	_	_	_	_	_	_	_
8/29/96 1800	Partly Cloudy	Partly Cloudy	HSW-8	8.5	_	_	_	_	_	Grab	Clear	None	None	PCN	0.02	ND	ND	0.007	ND	ND	145	ND
8/29/96	Partly Cloudy	Partly Cloudy	HSW-11	9.2	_	_	_	_	_	Grab	Clear	None	None	PCN	ND	ND	ND	ND	ND	ND	87	38
8/30/96	Clear	Partly Cloudy	HSW-7	9.5	_	_	_	_	_	Grab	Clear	None	None	PCN	_	_	_	_	_	_	_	_

Required Limits (mg/l)

	As	Pb	Cr
Chronic	0.190	0.0032	0.210
Acute	0.360	0.082	1.700

Instruments used for field tests:

From 8/21/96 to 8/31/96 LAMOTE MODEL 280

From 9/3/96 to present HORIBA U10

Detection Limits used: See report by TOXIKON CORP.

Last daily sampling for the week.

g\project\933-6143\task18\monirep1

INDUSTRI-PLEX SITE REMEDIAL TRUST

SURFACE WATER MONITORING SUMMARY

DATE TIME	WEATHER CONDITION	WEATHER CONDITION LAST 24 HOURS	SAMPLING LOCATION	FIELD TESTS						SAMPLE				FIELD MONITOR	LAB TEST RESULTS							
															TOTAL			DISSOLVED				
				TURBIDITY (NTU)	pH	CONDUCTIVITY (ms/cm)	DISSOLVED OXYGEN (mg/l)	TEMPERATURE (°C)	SALINITY (%)	COLLECTION METHOD	APPEARANCE	COLOR	ODOR		AS (mg/ L)	PB (mg/ L)	CR (mg/ L)	AS (mg/ L)	PB (mg/ L)	CR (mg/ L)	HARDNESS (mg/L)	TSS (mg/ L)
8/30/96 1850	Clear	Partly Cloudy	HSW-8	9.2	_	_	_	_	_	Grab	Clear	None	None	PCN	_	_	_	_	_	_	_	_
8/30/96 1910	Clear	Partly Cloudy	HSW-11	8.2	_	_	_	_	_	Grab	Clear	None	None	PCN	_	_	_	_	_	_	_	_
9/3/96 1530	Sunshine	Clear	HSW-7	8	6.8	0.18	6.9	23	0	Grab	Clear	None	None	TM	0.007	ND	ND	ND	ND	ND	35	7
9/3/96 1600	Sunshine	Clear	HSW-8	6	6.9	0.23	4.4	22	0	_	_	_	_	TM	_	_	_	_	_	_	_	_
9/4/96 1125	Sunshine	Sunshine	HSW-7	8	6.81	0.192	5.3	21.4	0	_	_	_	_	TM	_	_	_	_	_	_	_	_
9/4/96 1145	Sunshine	Sunshine	HSW-8	5	6.94	0.303	9.3	21.3	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
9/5/96 0930	Sunshine	Sunshine	HSW-7	8	6.79	0.212	3.45	21.6	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
9/5/96 0955	Sunshine	Sunshine	HSW-8	3	7.09	0.342	1.66	22	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
9/6/96 0855	Sunshine Clouds	Sunshine	HSW-8	8	7.18	0.375	2.3	22.3	0.01	Grab	Clear	None	None	TM	0.007	ND	ND	ND	ND	ND	65	11
9/6/96 0920	Sunshine Clouds	Sunshine	HSW-7	8	7	0.241	4.26	21.8	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
9/9/96 1100	Fog, humid Clouds	Sunshine	HSW-8	5	7.34	0.367	4.6	18.7	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
9/10/96 1145	Showers, Sunshine	Fog, humid Clouds	HSW-8	5	7.12	0.393	1.15	20.6	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
9/11/96 0845	Sunshine, High clouds	Showers, Sunshine	HSW-8	3	7.24	0.412	1.14	20.2	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
9/12/96 1100	Overcast Rain	Sunshine High clouds	HSW-8	3	7.1	0.427	0.75	19.2	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
9/13/96 1000	Overcast Rain	Overcast Rain	HSW-8	5	7.24	0.447	1.04	18	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
9/13/96 1255	Overcast Rain	Overcast Rain	HSW-8	8	7.17	0.466	1.4	17.7	0.01	Grab	Clear	None	None	TM	0.028	ND	_	0.009	ND	_	138	4

Required Limits (mg/l)

	As	Pb	Cr
Chronic	0.190	0.0032	0.210
Acute	0.360	[illegible]	1.700

Instruments used for field tests:

From 8/21/96 to 8/31/96 LAMOTE MODEL 280

From 9/3/96 to present HORIBA U10

Detection Limits used: See report by TOXIKON CORP.

Last daily sampling for the week.

INDUSTRI-PLEX SITE REMEDIAL TRUST

SURFACE WATER MONITORING SUMMARY

DATE TIME	WEATHER CONDITION	WEATHER CONDITION LAST 24 HOURS	SAMPLING LOCATION	FIELD TESTS						SAMPLE				FIELD MONITOR	LAB TEST RESULTS							
															TOTAL			DISSOLVED				
				TURBIDITY (NTU)	pH	CONDUCTIVITY (ms/cm)	DISSOLVED OXYGEN (mg/l)	TEMPERATURE (°C)	SALINITY (%)	COLLECTION METHOD	APPEARANCE	COLOR	ODOR		AS (mg/ L)	PB (mg/ L)	CR (mg/ L)	AS (mg/ L)	PB (mg/ L)	CR (mg/ L)	HARDNESS (mg/L)	TSS (mg/ L)
9/16/96 0930	Clouds Sunny breaks	Overcast sunny breaks	HSW-8	3	7.15	0.379	1.42	17.2	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
9/17/96 0950	Rainy	Clouds Sunny breaks	HSW-8	4	7.28	0.375	3.5	17.1	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
9/17/96 1330	Rainy	Clouds Sunny breaks	HSW-8	9	7.04	0.336	2.19	16.7	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
9/17/96 1440	Rainy	Clouds Sunny breaks	HSW-8	13	6.99	0.335	2.23	16.8	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
9/18/96 1045	Rainy	Rainy	HSW-8	38	7.74	0.183	8.53	14.9	0	Grab	Cloudy	None	None	TM	ND	ND	_	ND	ND	_	51.4	ND
9/18/96 1520	Rainy	Rainy	HSW-9	34	7.82	0.113	10.92	14.7	0	Grab	Cloudy	None	None	TM	ND	0.016	_	ND	ND	_	43.4	ND
9/19/96 0820	Sunshine	Rainy	HSW-8	12	7.16	0.169	6.43	14	0	_	_	_	_	TM	_	_	_	_	_	_	_	_
9/19/96 0845	Sunshine	Rainy	HSW-9	18	7.84	0.134	10.64	14.7	0	_	_	_	_	TM	_	_	_	_	_	_	_	_
9/20/96 0915	Sunshine	Sunshine	HSW-8	8	7.29	0.192	6.59	14.8	0	_	_	_	_	TM	_	_	_	_	_	_	_	_
9/23/96 1200	Rainy	Sunshine	HSW-8	4	7.72	0.355	6.81	14.9	0.01	Grab	Clear	None	None	TM	0.008	ND	_	0.007	ND	_	78.6	ND
9/24/96 0915	Sunshine	Rainy	HSW-8	3	7.76	0.291	6.25	14.1	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
9/25/96 0925	Clouds Drizzle	Sunshine	HSW-8	2	7.43	0.333	6.59	14.5	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
9/26/96 0945	Sunshine	Clouds Drizzle	HSW-8	3	7.53	0.338	6.4	13.3	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
9/27/960 930	Clouds Clear	Sunshine	HSW-8	3	7.58	0.358	5.95	13.5	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
9/30/96 1200	Clear	Clouds Sunshine	HSW-8	4	7.34	0.287	6.55	16	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
10/1/96 1005	Sunshine	Clear	HSW-8	3	7.32	0.317	6.06	14	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_

Required Limits (mg/l)

	As	Pb	Cr
Chronic	0.190	0.0032	0.210
Acute	0.360	0.082	1.700

Instruments used for field tests:

From 8/21/96 to 8/31/96 LAMOTE MODEL 280

From 9/3/96 to present HORIBA U10

Detection Limits used: See report by TOXIKON CORP.

_____ Last daily sampling for the week.

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INDUSTRI-PLEX SITE REMEDIAL TRUST

SURFACE WATER MONITORING SUMMARY

DATE TIME	WEATHER CONDITION	WEATHER CONDITION LAST 24 HOURS	SAMPLING LOCATION	FIELD TESTS						SAMPLE				FIELD MONITOR	LAB TEST RESULTS							
															TOTAL			DISSOLVED				
				TURBIDITY (NTU)	pH	CONDUCTIVITY (ms/cm)	DISSOLVED OXYGEN (mg/l)	TEMPERATURE (°C)	SALINITY (%)	COLLECTION METHOD	APPEARANCE	COLOR	ODOR		AS (mg/ L)	PB (mg/ L)	CR (mg/ L)	AS (mg/ L)	PB (mg/ L)	CR (mg/ L)	HARDNESS (mg/L)	TSS (mg/ L)
10/2/96 0900	Sunshine	Sunshine	HSW-8	5	7.15	0.352	5.6	14.6	0.01	Grab	Clear	None	None	TM	0.013	ND	_	0.011	ND	_	84	ND
10/3/96 1130	Clouds Sunshine	Sunshine	HSW-8	3	7.14	0.397	5.31	16.4	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
10/4/96 1145	Sunshine	Clouds Sunshine	HSW-8	3	7.45	0.422	6.67	11.6	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
10/7/96 1700	Sunshine	Clouds Sunshine	HSW-8	2	7.48	0.488	6.78	13.4	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
10/8/96 1425	Clouds Sunshine	Sunshine	HSW-8	3	7.14	0.486	6.28	13.4	0.02	_	_	_	_	TM	_	_	_	_	_	_	_	_
10/9/96 1350	Drizzle Sunshine	Clouds Sunshine	HSW-8	8	7.23	0.208	7.94	13.4	0	_	_	_	_	TM	_	_	_	_	_	_	_	_
10/10/96 1100	Showers Sunshine	Drizzle Sunshine	HSW-8	11	7.84	0.231	6.91	12.9	0	Grab	Clear	None	None	TM	ND	ND	_	ND	ND	_	_	ND
10/11/96 0920	Clouds Sunshine	Showers Sunshine	HSW-8	10	6.88	0.263	6.58	10.7	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
10/14/96 1040	Clouds Sunshine	Sunshine	HSW-8	3	6.97	0.393	5.83	12.1	0.01	Grab	Clear	None	None	TM	0.015	ND	_	0.013	ND	_	97	ND
10/15/96 1500	Sunshine	Clouds Sunshine	HSW-8	2	7.18	0.414	7.28	10.5	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
10/16/96 1030	Sunshine	Sunshine	HSW-8	3	6.89	0.444	6	9.4	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
10/18/96 0900	Sunshine	Sunshine	HSW-8	2	7.38	0.465	5.79	11.6	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
10/21/96 1020	Rainy	Rainy	HSW-9	126	7.88	0.164	9.97	11	0	Grab	Turbid	None	None	TM	0.015	0.053	0.024	0.002	ND	0.002	68	ND
10/21/96 1200	Rainy	Rainy	HSW-8	13	7.36	0.071	8.33	11.1	0	Grab	Turbid	None	None	TM	ND	ND	_	ND	ND	_	23	ND
10/22/96 1400	Clouds Showers	Rainy	HSW-9	54	7.84	0.143	8.23	11.7	0	Grab	Cloudy	None	None	TM	0.008	0.021	_	0.004	ND	_	51	ND
10/22/96 1440	Clouds Showers	Rainy	HSW-8	8	7.27	0.127	6.37	12.4	0	_	_	_	_	TM	_	_	_	_	_	_	_	_

Required Limits (mg/l)

	As	Pb	Cr
Chronic	0.190	0.0032	0.210
Acute	0.360	0.082	1.700

Instruments used for field tests:

From 8/21/96 to 8/31/96 LAMOTE MODEL 280

From 9/3/96 to present HORIBA U10

Detection Limits used: See report by TOXIKON CORP.

Last daily sampling for the week

INDUSTRI-PLEX SI. REMEDIAL TRUST

SURFACE WATER MONITORING SUMMARY

DATE TIME	WEATHER CONDITION	WEATHER CONDITION LAST 24 HOURS	SAMPLING LOCATION	FIELD TESTS						SAMPLE				FIELD MONITOR	LAB TEST RESULTS							
															TOTAL			DISSOLVED				
				TURBIDITY (NTU)	pH	CONDUCTIVITY (ms/cm)	DISSOLVED OXYGEN (mg/l)	TEMPERATURE (°C)	SALINITY (%)	COLLECTION METHOD	APPEARANCE	COLOR	ODOR		AS (mg/ L)	PB (mg/ L)	CR (mg/ L)	AS (mg/ L)	PB (mg/ L)	CR (mg/ L)	HARDNESS (mg/L)	TSS (mg/ L)
10/23/96 1335	Sunshine	Clouds Sunshine	HSW-8	8	6.54	0.184	5.01	11.2	0	_	_	_	_	TM	_	_	_	_	_	_	_	_
10/23/96 1400	Sunshine	Clouds Sunshine	HSW-9	20	7	0.177	6.27	11.5	0	_	_	_	_	TM	_	_	_	_	_	_	_	_
10/24/96 1405	Sunshine	Sunshine	HSW-9	14	7.35	0.194	6.16	12.1	0	_	_	_	_	TM	_	_	_	_	_	_	_	_
10/24/96 1430	Sunshine	Sunshine	HSW-8	3	6.56	0.248	5.03	13.1	0	_	_	_	_	TM	_	_	_	_	_	_	_	_
10/25/96 1030	Sunshine	Sunshine	HSW-8	2	6.58	0.279	5.01	11.2	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
10/25/96 1130	Sunshine	Sunshine	HSW-9	10	7.2	0.214	4.81	12.2	0	_	_	_	_	TM	_	_	_	_	_	_	_	_
10/28/961 130	Clouds Showers	Sunshine	HSW-8	2	6.76	0.358	5.51	11.9	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
10/28/96 1530	Clouds Showers	Sunshine	HSW-9	114	7.4	0.514	8.97	13.2	0.02	Grab	Turbid	None	None	TM	0.181	**0.453**	0.066	0.027	ND	ND	64	ND
10/29/96 1030	Sunshine	Clouds Showers	HSW-9	165	7.33	0.745	9.29	11	0.03	Grab	Clear	None	None	TM	0.099	**0.216**	0.065	0.014	ND	ND	360	34
10/29/96 1655	Sunshine	Clouds Showers	HSW-8	21	6.77	0.335	6.78	11	0.01	Grab	Clear	None	None	TM	0.01	ND	_	0.007	ND	_	80	ND
10/30/96 1115	Clouds Sunshine	Sunshine	HSW-11	23	7.49	0.276	8.68	9.4	0.01	Grab	Clear	None	None	TM	ND	ND	_	ND	ND	_	76	ND
10/30/96 1130	Clouds Sunshine	Sunshine	HSW-7	4	7.75	0.358	6.97	8.4	0.01	Grab	Clear	None	None	TM	ND	ND	_	ND	ND	_	65	ND
10/30/96 1145	Clouds Sunshine	Sunshine	HSW-8	5	7.16	0.357	6.38	8.8	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
10/31/96 1100	Sunshine	Clouds Sunshine	HSW-8	14	7.09	0.356	6.98	9.3	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
11/1/96 0835	Sunshine	Sunshine	HSW-8	2	6.77	0.379	6.78	7.2	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
11/4/96 1000	Sunshine	Sunshine	HSW-8	4	7.18	0.388	8.21	5.1	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_

Required Limits (mg/l)

	As	Pb	Cr
Chronic	0.190	0.0032	0.210
Acute	0.360	0.082	1.700

Instruments used for field tests:

From 8/21/96 to 8/31/96 LAMOTE MODEL 280

From 9/3/96 to present HORIBA U10

Detection Limits used: See report by TOXIKON CORP.

_____ Last daily sampling for the week.

INDUSTRI-PLEX SITE REMEDIAL TRUST

SURFACE WATER MONITORING SUMMARY

DATE TIME	WEATHER CONDITION	WEATHER CONDITION LAST 24 HOURS	SAMPLING LOCATION	FIELD TESTS						SAMPLE				FIELD MONITOR	LAB TEST RESULTS							
															TOTAL			DISSOLVED				
				TURBIDITY (NTU)	pH	CONDUCTIVITY (ms/cm)	DISSOLVED OXYGEN (mg/l)	TEMPERATURE (°C)	SALINITY (%)	COLLECTION METHOD	APPEARANCE	COLOR	ODOR		AS (mg/ L)	PB (mg/ L)	CR (mg/ L)	AS (mg/ L)	PB (mg/ L)	CR (mg/ L)	HARDNESS (mg/L)	TSS (mg/ L)
11/5/96 1045	Sunshine	Sunshine	HSW-8	7	6.99	0.409	7.81	6.6	0.01	-	-	-	-	TM	-	-	-	-	-	-	-	-
11/6/96 1030	Overcast	Sunshine	HSW-8	9	6.91	0.411	7.53	7.2	0.01	-	-	-	-	TM	-	-	-	-	-	-	-	-
11/7/96 1550	Clouds Showers	Overcast	HSW-8	3	7.14	0.419	6.88	9.3	0.01	-	-	-	-	TM	-	-	-	-	-	-	-	-
11/8/96 1035	Clouds Rain	Clouds Showers	HSW-8	11	7.43	0.415	6.28	12	0.01	Grab	Clear	None	None	TM	0.007	ND	-	0.005	ND	-	103	ND
11/12/96 1620	Clouds Snow Flurry	Clouds Sunshine	HSW-8	11	7.3	0.369	6.38	7.3	0.01	Grab	Clear	Amber	None	TM	ND	ND	-	ND	ND	-	97.4	ND
11/13/96 1345	Clouds Sunshine	Clouds Snow Flurry	HSW-8	7	6.97	0.397	8.44	5.6	0.01	-	-	-	-	TM	-	-	-	-	-	-	-	-
11/14/96 1045	Sunshine	Clouds Sunshine	HSW-8	4	6.72	0.398	8.9	5.8	0.01	-	-	-	-	TM	-	-	-	-	-	-	-	-
11/15/96 1000	Sunshine Clouds	Sunshine	HSW-8	6	7.38	0.417	8.62	3.7	0.01	-	-	-	-	TM	-	-	-	-	-	-	-	-
11/18/96 1400	Sunshine High Clouds	Sunshine	HSW-8	4	6.96	0.447	8.05	5.5	0.01	-	-	-	-	TM	-	-	-	-	-	-	-	-
11/19/96 1600	Clouds Drizzle	Sunshine High Clouds	HSW-8	6	7.23	0.429	7.21	5.1	0.01	-	-	-	-	TM	-	-	-	-	-	-	-	-
11/20/96 1430	Clouds Sunshine	Clouds Drizzle	HSW-8	4	6.28	0.433	7.92	5.3	0.01	-	-	-	-	TM	-	-	-	-	-	-	-	-
11/21/96 1500	Sunshine High Clouds	Clouds Sunshine	HSW-8	4	7.35	0.436	8.53	5	0.01	-	-	-	-	TM	-	-	-	-	-	-	-	-
11/22/96 1400	Sunshine	Sunshine High Clouds	HSW-8	6	7.82	0.438	7.98	5	0.01	Grab	Clear	None	None	TM	0.011	ND	ND	0.009	ND	ND	110	ND
11/22/96 1530	Sunshine	Sunshine High Clouds	* HSW-9A	44	6.82	1.69	9.23	11.5	0.07	-	-	-	-	TM	-	-	-	-	-	-	-	-
11/23/96 1650	Sunshine	Sunshine	* HSW-9A	55	-	-	-	-	-	Grab	Clear	Light yellow	None	CDM	**0.511**	0.07	0.035	**0.363**	ND	0.004	669	34
11/23/96 1700	Sunshine	Sunshine	HSW-9	46	-	-	-	-	-	Grab	Clear	Light yellow	None	CDM	**0.414**	0.053	0.027	**0.284**	ND	0.004	703	33

* Sampled at discharge of hose.

Instruments used for field tests:

From 8/21/96 to 8/31/96 LAMOTE MODEL 280

From 9/3/6 to present HORIBA U10

Required Limits (mg/l)

	As	Pb	Cr
Chronic	0.190	0.0032	0.210
Acute	0.360	0.082	1.700

Detection Limits used: See report by TOXIKON CORP.

Last daily sampling for the week.

INDUSTRI-PLEX SITE REMEDIAL TRUST

SURFACE WATER MONITORING SUMMARY

DATE TIME	WEATHER CONDITION	WEATHER CONDITION LAST 24 HOURS	SAMPLING LOCATION	FIELD TESTS						SAMPLE				FIELD MONITOR	LAB TEST RESULTS							
															TOTAL			DISSOLVED				
				TURBIDITY (NTU)	pH	CONDUCTIVITY (ms/cm)	DISSOLVED OXYGEN (mg/l)	TEMPERATURE (°C)	SALINITY (%)	COLLECTION METHOD	APPEARANCE	COLOR	ODOR		AS (mg/ L)	PB (mg/ L)	CR (mg/ L)	AS (mg/ L)	PB (mg/ L)	CR (mg/ L)	HARDNESS (mg/L)	TSS (mg/ L)
11/24/96 1055	Sunshine	Sunshine	HSW-9A	58	_	_	_	_	_	_	_	_	_	CDM	_	_	_	_	_	_	_	_
11/24/95 1100	Sunshine	Sunshine	HSW-9	42	_	_	_	_	_	_	_	_	_	CDM	_	_	_	_	_	_	_	_
11/25/96 0815	Light snow sunshine	Sunshine	HSW-9	26	6.68	1.78	7.73	11.5	0.08	_	_	_	_	TM	_	_	_	_	_	_	_	_
11/25/96 0820	Light snow sunshine	Sunshine	HSW-9A	48	6.71	1.77	7.96	11.5	0.08	_	_	_	_	TM	_	_	_	_	_	_	_	_
11/25/96 0830	Light snow sunshine	Sunshine	HSW-8	3	7.77	0.449	8.95	3.4	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
11/25/96 1300	Light snow sunshine	Sunshine	HSW-9	23	_	_	_	_	_	_	_	_	_	TM	_	_	_	_	_	_	_	_
11/25/96 1530	Light snow sunshine	Sunshine	HSW-9	17	_	_	_	_	_	_	_	_	_	TM	_	_	_	_	_	_	_	_
11/25/96 1545	Light snow sunshine	Sunshine	HSW-8	3	_	_	_	_	_	_	_	_	_	TM	_	_	_	_	_	_	_	_
11/26/96 0940	Rain	Light snow sunshine	HSW-8	173	8.02	0.199	10.83	4.6	0	Grab	Turbid	Light brown	None	TM	0.027	**0.124**	0.013	0.007	ND	ND	69.1	101
11/26/96 1025	Rain	Light snow sunshine	HSW-9	180	7.1	0.57	6.11	7.5	0.02	Grab	Turbid	Light Yellow	None	TM	**0.269**	**0.125**	0.056	0.006	ND	ND	230	115
11/26/96 1330	Rain	Light snow sunshine	HSW-8	31	7.82	0.267	9.69	4.7	0	_	_	_	_	TM	_	_	_	_	_	_	_	_
11/27/96 1500	Snow Sunshine	Rain	HSW-8	6	7.77	0.215	8.98	3.8	0	_	_	_	_	TM	_	_	_	_	_	_	_	_
11/29/96 1450	Sunshine	Sunshine	HSW-8	8	7.47	0.279	10.03	3.5	0	Grab	Clear	None	None	TM	ND	ND	_	ND	ND	_	61.2	ND
11/30/96 1350	Sunshine Clouds	Sunshine	HSW-8	8	7.54	0.216	8.73	3.8	0	_	_	_	_	TM	_	_	_	_	_	_	_	_

* Sampled at end of discharge hose

Instruments used for field tests:

From 8/21/96 to 8/31/96 LAMOTE MODEL 280

From 9/3/6 to present HORIBA U10

Required Limits (mg/l)

	As	Pb	Cr
Chronic	0.190	0.0032	0.210
Acute	0.360	0.082	1.700

Detection Limits used: See report by TOXIKON CORP.

Last daily sampling for the week.

INDUSTRI-PLEX SITE REMEDIAL TRUST

SURFACE WATER MONITORING SUMMARY

DATE TIME	WEATHER CONDITION	WEATHER CONDITION LAST 24 HOURS	SAMPLING LOCATION	FIELD TESTS						SAMPLE				FIELD MONITOR	LAB TEST RESULTS							
															TOTAL			DISSOLVED				
				TURBIDITY (NTU)	pH	CONDUCTIVITY (ms/cm)	DISSOLVED OXYGEN (mg/l)	TEMPERATURE (°C)	SALINITY (%)	COLLECTION METHOD	APPEARANCE	COLOR	ODOR		AS (mg/ L)	PB (mg/ L)	CR (mg/ L)	AS (mg/ L)	PB (mg/ L)	CR (mg/ L)	HARDNESS (mg/L)	TSS (mg/ L)
12/2/96 1045	Rain Sunshine	Rain	HSW-8	52	8.21	0.28	9.47	9.5	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
12/2/96 1100	Rain Sunshine	Rain	HSW-7	13	7.9	0.306	8.4	9.7	0.01	Grab	Clear	None	None	TM	ND	0.002	_	ND	ND	_	51.6	ND
12/2/96 1135	Rain Sunshine	Rain	HSW-11	17	7.79	0.252	8.97	10.1	0	Grab	Clear	None	None	TM	ND	ND	_	ND	ND	_	103	ND
12/3/96 1000	Sunshine	Rain Sunshine	HSW-8	8	7.56	0.223	7.61	6.5	0	_	_	_	_	TM	_	_	_	_	_	_	_	_
12/4/96 1600	Sunshine	Sunshine	HSW-8	63	7.77	0.267	9.48	6.5	0.01	Grab	Clear	None	None	TM	ND	ND	ND	ND	ND	0.002	60.7	ND
12/5/96 1530	Sunshine	Sunshine	HSW-8	18	6.11	0.33	10.62	6.9	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
12/5/96 1615	Sunshine	Sunshine	HSW-9	14	6.66	0.92	7.12	7.1	0.03	Grab	Clear	None	None	TM	0.004	ND	0.006	0.004	ND	ND	434	ND
12/6/96 1930	Snow	Sunshine	HSW-8	12	7.73	0.254	8.37	5.7	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
12/6/96 1000	Snow	Sunshine	HSW-9	10	6.93	0.89	7.25	6	0	_	_	_	_	TM	_	_	_	_	_	_	_	_
12/7/96 1000	Snow	Snow	HSW-8	11	7.68	0.245	8.24	4.9	0	_	_	_	_	TM	_	_	_	_	_	_	_	_
12/9/96 1015	Sunshine	Sunshine	HSW-8	13	7.57	0.196	10.8	3.4	0	_	_	_	_	TM	_	_	_	_	_	_	_	_
12/10/96 1315	Sunshine	Sunshine	HSW-8	19	7.75	0.234	11.71	4.5	0	_	_	_	_	TM	_	_	_	_	_	_	_	_
12/10/96 1345	Sunshine	Sunshine	HSW-9	26	7.46	0.325	9.46	3.5	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
12/11/96 1400	Sunshine	Sunshine	HSW-9	37	7.4	0.662	8.64	4.1	0.02	_	_	_	_	TM	_	_	_	_	_	_	_	_
12/11/96 1430	Sunshine	Sunshine	HSW-8	4	8.2	0.277	10.98	4.8	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
12/12/96 1030	Drizzle	Sunshine	HSW-8	4	8.02	0.279	10.27	4.6	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_

Required Limits (mg/l)

	As	Pb	Cr
Chronic	0.190	0.0032	0.210
Acute	0.360	0.082	1.700

Instruments used for field tests:

From 8/21/96 to 8/31/96 LAMOTE MODEL 260

From 9/3/96 to present HORIBA U10

Detection Limits used: See report by TOXIKON CORP.

Last daily sampling for the week.

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INDUSTRI-PLEX SI . _ REMEDIAL TRUST

SURFACE WATER MONITORING SUMMARY

DATE TIME	WEATHER CONDITION	WEATHER CONDITION LAST 24 HOURS	SAMPLING LOCATION	FIELD TESTS						SAMPLE				FIELD MONITOR	LAB TEST RESULTS							
															TOTAL			DISSOLVED				
				TURBIDITY (NTU)	pH	CONDUCTIVITY (ms/cm)	DISSOLVED OXYGEN (mg/l)	TEMPERATURE (°C)	SALINITY (%)	COLLECTION METHOD	APPEARANCE	COLOR	ODOR		AS (mg/ L)	PB (mg/ L)	CR (mg/ L)	AS (mg/ L)	PB (mg/ L)	CR (mg/ L)	HARDNESS (mg/L)	TSS (mg/ L)
12/12/96 1110	Clouds Drizzle	Sunshines	HSW-9	7	7.02	1.14	8.54	7.7	0.05	_	_	_	_	TM	_	_	_	_	_	_	_	_
12/13/96 1500	Drizzle Clouds	Clouds Drizzle	HSW-9	156	6.56	1.44	5.93	9.2	0.06	Grab	Cloudy	None	None	TM	0.228	0.03	_	0.171	ND	_	517	15
12/13/96 1545	Drizzle Clouds	Drizzle Clouds	HSW-8	0.002	7.84	0.301	9.91	4.7	0.01	Grab	Clear	None	None	TM	0.006	ND	_	0.007	ND	_	66.4	ND
12/16/96 1350	Drizzle Clouds	Drizzle Clouds	HSW-9	274	6.68	1.49	7.16	10.8	0.06	Grab	Turbid	None	None	TM	**0.374**	**0.114**	_	0.047	ND	_	517	146
12/16/96 1600	Drizzle Clouds	Drizzle Clouds	HSW-8	3	7.77	0.323	10.16	5.5	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
12/17/96 1120	Showers Sunshine	Drizzle Clouds	HSW-9	293	6.72	1.57	7.42	7.5	0.05	Grab	Turbid	None	None	TM	0.175	0.005	_	0.05	ND	_	511	61
12/17/96 1330	Showers Sunshine	Drizzle Clouds	HSW-8	57	7.61	0.274	10.03	6.7	0.01	Grab	Turbid	None	None	TM	0.008	0.005	_	0.006	ND	_	75	ND
12/18/96 1030	Clouds Sunshine	Showers Sunshine	HSW-9	146	6.39	1.65	7.58	11.8	0.07	Grab	Clear	None	None	TM	**0.315**	0.061	_	0.074	ND	_	612	111
12/18/96 1100	Clouds Sunshine	Showers Sunshine	HSW-8	13	7.69	0.284	8.93	8.2	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
12/18/96 1835	Clouds Sunshine	Showers Sunshine	HSW-9A*	87	_	_	_	_	_	_	_	_	_	TM	_	_	_	_	_	_	_	_
12/18/96 1900	Clouds Sunshine	Showers Sunshine	HSW-9	34	6.82	1.62	6.91	11.8	0.07	_	_	_	_	TM	_	_	_	_	_	_	_	_
12/18/96 1915	Clouds Sunshine	Showers Sunshine	HSW-9A*	73	6.66	1.61	7.74	11.7	0.07	_	_	_	_	TM	_	_	_	_	_	_	_	_
12/19/96 0730	Rain	Clouds Sunshine	HSW-9	7	6.76	1.62	6.71	11.3	0.07	_	_	_	_	TM	_	_	_	_	_	_	_	_
12/19/96 0735	Rain	Clouds Sunshine	HSW-9A*	17	6.58	1.65	7.65	11.4	0.07	_	_	_	_	TM	_	_	_	_	_	_	_	_
12/19/96 0754	Rain	Clouds Sunshine	HSW-9A*	25	6.52	1.64	6.95	11.4	0.07	_	_	_	_	TM	_	_	_	_	_	_	_	_
12/19/96 0815	Rain	Clouds Sunshine	HSW-9A*	7	6.64	1.66	7.51	11.4	0.07	_	_	_	_	TM	_	_	_	_	_	_	_	_

* HSW-9A Represents sample taken at discharge of pump hose.

Instruments used for field tests:

From 8/21/96 to 8/31/96 LAMOTE MODEL 280

From 9/3/96 to present HORIBA U10

Required Limits (mg/l)

	As	Pb	Cr
Chronic	0.190	0.0032	0.210
Acute	0.360	0.082	1.700

Detection Limits used: See report by TOXIKON CORP.

Last daily sampling for the week.

INDUSTRI-PLEX SITE REMEDIAL TRUST

SURFACE WATER MONITORING SUMMARY

DATE TIME	WEATHER CONDITION	WEATHER CONDITION LAST 24 HOURS	SAMPLING LOCATION	FIELD TESTS						SAMPLE				FIELD MONITOR	LAB TEST RESULTS							
															TOTAL			DISSOLVED				
				TURBIDITY (NTU)	pH	CONDUCTIVITY (ms/cm)	DISSOLVED OXYGEN (mg/l)	TEMPERATURE (°C)	SALINITY (%)	COLLECTION METHOD	APPEARANCE	COLOR	ODOR		AS (mg/ L)	PB (mg/ L)	CR (mg/ L)	AS (mg/ L)	PB (mg/ L)	CR (mg/ L)	HARDNESS (mg/L)	TSS (mg/ L)
12/19/96 0818	Rain	Clouds Sunshine	HSW-9	7	6.75	1.64	6.96	11.1	0.07	_	_	_	_	TM	_	_	_	_	_	_	_	_
12/20/96 1045	Sunshine	Rain	HSW-8	10	7.32	0.283	5.8	5.8	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
12/20/96 1130	Sunshine	Rain	HSW-9	38	6.81	1.65	7.48	6.5	0.05	Grab	Clear	None	None	TM	0.079	0.019	_	0.03	ND	_	529	25
12/23/96 1030	Clouds Sunshine	Sunshine	HSW-9	13	6.97	1.38	8.96	9.1	0.06	_	_	_	_	TM	_	_	_	_	_	_	_	_
12/23/96 1100	Clouds Sunshine	Sunshine	HSW-8	11	8.13	0.332	10.49	4.2	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
12/24/96 0930	Clouds Sunshine	Clouds Sunshine	HSW-8	9	7.78	0.293	8.37	7.2	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
12/24/96 1100	Clouds Sunshine	Clouds Sunshine	HSW-9	12	6.86	1.65	10.21	8.4	0.05	_	_	_	_	TM	_	_	_	_	_	_	_	_
12/26/96 1000	Clouds Sunshine	Clouds Sunshine	HSW-8	7	7.62	0.293	10.03	6.8	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
12/26/96 1030	Clouds Sunshine	Clouds Sunshine	HSW-9	10	6.79	1.61	7.72	7.1	0.05	_	_	_	_	TM	_	_	_	_	_	_	_	_
12/27/96 1130	Sunshine	Clouds Sunshine	HSW-8	18	7.76	0.317	9.41	5.2	0.01	Grab	Clear	None	None	TM	0.006	ND	_	0.003	ND	_	86.2	ND
12/27/96 1320	Sunshine	Clouds Sunshine	HSW-9	16	6.88	1.32	8.77	10.1	0.05	Grab	Clear	None	None	TM	0.136	ND	_	0.017	ND	_	543	16
12/30/96 1415	Clouds Sunshine	Clouds Sunshine	HSW-9	17	7.2	1.13	10.08	7.9	0.04	_	_	_	_	TM	_	_	_	_	_	_	_	_
12/30/96 1455	Clouds Sunshine	Clouds Sunshine	HSW-8	3	8.14	0.357	10.36	5.3	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
12/31/96 1000	Clouds Snow	Clouds Sunshine	HSW-8	6	7.75	0.294	10.02	6.7	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
12/31/96 1115	Clouds Snow	Clouds Sunshine	HSW-9	12	6.76	1.61	6.73	7.3	0.05	_	_	_	_	TM	_	_	_	_	_	_	_	_
1/2/97 1315	Snow, Mist	Clouds Snow	HSW-8	5	7.62	0.295	10.06	5.4	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_

Required Limits (mg/l)

	As	Pb	Cr
Chronic	0.190	0.0032	0.210
Acute	0.360	0.082	1.700

Instruments used for field tests:

From 8/21/96 to 8/31/96 LAMOTE MODEL 280

From 9/3/96 to present HORIBA U10

Detection Limits used: See report by TOXIKON CORP.

Last daily sampling for the week.

INDUSTRI-PLEX S. . REMEDIAL TRUST

SURFACE WATER MONITORING SUMMARY

DATE TIME	WEATHER CONDITION	WEATHER CONDITION LAST 24 HOURS	SAMPLING LOCATION	FIELD TESTS						SAMPLE				FIELD MONITOR	LAB TEST RESULTS							
															TOTAL			DISSOLVED				
				TURBIDITY (NTU)	pH	CONDUCTIVITY (ms/cm)	DISSOLVED OXYGEN (mg/l)	TEMPERATURE (°C)	SALINITY (%)	COLLECTION METHOD	APPEARANCE	COLOR	ODOR		AS (mg/ L)	PB (mg/ L)	CR (mg/ L)	AS (mg/ L)	PB (mg/ L)	CR (mg/ L)	HARDNESS (mg/L)	TSS (mg/ L)
1/2/97 1400	Snow, Mist	Clouds Snow	HSW-9	15	6.87	1.41	8.75	6.2	0.05	_	_	_	_	TM	_	_	_	_	_	_	_	_
1/3/97 1100	Clouds	Snow, Mist	HSW-9	24	7.3	1.24	9.53	4.2	0.05	Grab	Clear	None	None	TM	0.017	ND	_	0.004	ND	_	494	ND
1/3/97 1135	Clouds	Snow, Mist	HSW-8	7	7.5	0.418	10.03	2.6	0.01	Grab	Clear	None	None	TM	0.004	ND	_	0.003	ND	_	100	ND
1/6/97 1100	Clouds Sunshine	Clouds	HSW-9	8	6.99	1.23	7.66	10	0.05	_	_	_	_	TM	_	_	_	_	_	_	_	_
1/6/1997 1225	Clouds Sunshine	Clouds	HSW-8	5	7.6	0.42	10.01	9.7	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
1/7/97 1045	Clouds Sunshine	Clouds Sunshine	HSW-8	7	7.48	0.357	10.02	8.9	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
1/7/97 1130	Clouds Sunshine	Clouds Sunshine	HSW-9	10	6.75	1.62	6.72	9.3	0.05	_	_	_	_	TM	_	_	_	_	_	_	_	_
1/8/97 1315	Clouds Sunshine	Clouds Sunshine	HSW-9*	220	7.33	1.22	8.7	3.9	0.05	Grab	Cloudy	None	None	TM	0.031	ND	0.016	0.019	ND	0.002	412	8
1/8/97 1515	Clouds Sunshine	Clouds Sunshine	HSW-8	8	7.77	0.42	10.47	2.4	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
1/9/97 1100	Sunshine High Coluds	Clouds Sunshine	HSW-8	8	7.43	0.424	7.99	2.5	0.01	_	_	_	_	TM	_	_	_	_	_	_	_	_
1/10/97 1115	Clouds Bright spots	Sunshine High Coluds	HSW-11	77	8.38	0.315	13.14	4.9	0.01	Grab	Clear	None	None	TM	ND	ND	_	ND	ND	_	124	ND
1/10/97 1135	Clouds Bright spots	Sunshine High Coluds	HSW-7	13	8.11	0.399	11.28	2.2	0.01	Grab	Clear	None	None	TM	ND	ND	_	ND	ND	_	77.3	ND
1/10/97 11/55	Clouds Bright spots	Sunshine High Coluds	HSW-8	10	7.75	0.426	10.33	2.6	0.01	Grab	Clear	None	None	TM	0.007	ND	_	0.005	ND	_	109	ND

*Last sample taken for HSW-9 before the trench box dam is removed.

Required Limits (mg/l)

	As	Pb	Cr
Chronic	0.190	0.0032	0.210
Acute	0.360	0.082	1.700

Instruments used for field tests:

From 8/21/96 to 8/31/96 LAMOTE MODEL 280

From 9/3/96 to present HORIBA U10

Detection Limits used: See report by TOXIKON CORP.

Last daily sampling for the week.

INDUSTRI-PLEX SITE REMEDIAL TRUST

SURFACE WATER MONITORING SUMMARY

DATE TIME	WEATHER CONDITION	WEATHER CONDITION LAST 24 HOURS	SAMPLING LOCATION	FIELD TESTS						SAMPLE				FIELD MONITOR	LAB TEST RESULTS							
															TOTAL			DISSOLVED				
				TURBIDITY (NTU)	pH	CONDUCTIVITY (ms/cm)	DISSOLVED OXYGEN (mg/l)	TEMPERATURE (°C)	SALINITY (%)	COLLECTION METHOD	APPEARANCE	COLOR	ODOR		AS (mg/L)	PB (mg/L)	CR (mg/L)	AS (mg/L)	PB (mg/L)	CR (mg/L)	HARDNESS (mg/L)	TSS (mg/L)
1/13/97 1510	Clear	Clear	HSW-8	36	4.45	0.343	13.20	7.8	0.01	-	-	-	-	PCN	-	-	-	-	-	-	-	-
1/14/97 1155	Sunshine	Sunshine	HSW-8	21	6.56	0.363	8.53	7.2	0.01	-	-	-	-	TM	-	-	-	-	-	-	-	-
1/15/97 0900	Partly Cloudy	Sunshine	HSW-8	13	7.17	0.465	11.18	1.7	0.01	-	-	-	-	PCN	-	-	-	-	-	-	-	-
1/16/97 1535	Rain	Rain	HSW-8	123	7.22	0.368	11.64	3.5	0.01	Grab	Cloudy	Amber	None	PCN	0.006	0.002	-	ND	ND	ND	82.8	31
1/17/97 0745	Cold Clearing	Freezing Rain	HSW-8	46	7.28	0.358	11.90	0.2	0.01	Grab	Clear	Amber	None	PCN	0.004	ND	-	0.002	ND	ND	70.7	ND
1/20/97 1015	Cold Clear	Cold Clear	HSW-8	35	6.73	0.480	11.71	1.8	0.01	-	-	-	-	PCN	-	-	-	-	-	-	-	-
1/21/97 1200	Cold Clear	Cold Clear	HSW-8	12	7.10	0.477	9.74	2.6	0.01	-	-	-	-	PCN	-	-	-	-	-	-	-	-
1/22/97	Cold Clear	Cold Clear	HSW-8	8	6.50	0.449	15.64	4.9	0.01	-	-	-	-	PCN	-	-	-	-	-	-	-	-
1/23/97 0930	Cold Cloudy	Rain	HSW-8	44	6.73	0.401	11.82	3.6	0.01	Grab	Clear	None	None	PCN	ND	ND	-	ND	ND	-	101	ND
1/24/97 0900	Cloudy Snow	Cold	HSW-8	22	6.81	0.375	8.19	2.1	0.01	-	-	-	-	PCN	-	-	-	-	-	-	-	-
1/27/97 1130	Clear	Cold	HSW-8	8	6.62	0.382	8.48	3.1	0.01	-	-	-	-	PCN	-	-	-	-	-	-	-	-
1/28/97 0900	Rain	Snow	HSW-8	137	7.15	0.165	14.73	4.1	0.01	Grab	Clear	None	None	PCN	ND	ND	-	ND	ND	-	44.6	100
1/29/97 1000	Cold	Cold	HSW-8	39	7.80	0.434	9.71	1.3	0.01	Grab	Clear	None	None	PCN	ND	ND	-	ND	ND	-	48.6	ND
1/30/97 1400	Cold Cloudy	Cold Clear	HSW-8	15	7.06	0.433	6.59	3.0	0.01	-	-	-	-	PCN	-	-	-	-	-	-	-	-
1/31/97 1200	Cold	Cold	HSW-8	32	7.04	0.429	10.58	1.7	0.01					PCN	-	-	-	-	-	-	-	-

*Last sample taken for HSW-9 before the trench box dam is removed.

Required Limits (mg/l)

	As	Pb	Cr
Chronic	0.190	0.0032	0.210
Acute	0.360	0.082	1.700

Instruments used for field tests:

From 8/21/96 to 8/31/96 LAMOTE MODEL 280

From 9/3/96 to present HORIBA U10

Detection Limits used: See report by TOXIKON CORP.

Last daily sampling for the week.

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INDUSTRI-PLEX SITE REMEDIAL TRUST

SURFACE WATER MONITORING SUMMARY

DATE TIME	WEATHER CONDITION	WEATHER CONDITION LAST 24 HOURS	SAMPLING LOCATION	FIELD TESTS						SAMPLE				FIELD MONITOR	LAB TEST RESULTS							
															TOTAL			DISSOLVED				
				TURBIDITY (NTU)	pH	CONDUCTIVITY (ms/cm)	DISSOLVED OXYGEN (mg/l)	TEMPERATURE (°C)	SALINITY (%)	COLLECTION METHOD	APPEARANCE	COLOR	ODOR		AS (mg/ L)	PB (mg/ L)	CR (mg/ L)	AS (mg/ L)	PB (mg/ L)	CR (mg/ L)	HARDNESS (mg/L)	TSS (mg/ L)
2/03/97 1010	Rain	Rain	HSW-8	55	6.63	0.433	8.03	3.9	0.01	Grab	Clear	Amber	None	PCN	ND	ND	_	ND	ND	_	75	ND
2/4/97 0850	Cloudy	Cloudy/Rain	HSW-8	29	5.66	0.532	8.72	2.3	0.02	_	_	_	_	AAT	_	_	_	_	_	_	_	_
2/5/97 1030	Rain	Rain	HSW-8	366	6.03	0.483	9.09	3.0	0.01	Grab	Clear	Gray Amber	None	AAT	0.003	0.007	_	ND	ND	_	69.5	94
2/6/97 0745	Cloudy	Cloudy, Rain Sunshine	HSW-8	11	5.54	0.574	3.66	2.5	0.02	_	_	_	_	AAT	_	_	_	_	_	_	_	_
2/7/97 1030	Sunny	Cloudy	HSW-8	20	6.66	0.458	8.71	3.5	0.01	_	_	_	_	AAT	_	_	_	_	_	_	_	_
2/8/97 0855	Sunny	Cloudy	HSW-8	27	6.48	0.475	9.82	2.2	0.01	_	_	_	_	CDM	_	_	_	_	_	_	_	_
2/9/97 1325	Sunny	Sunny	HSW-8	9	6.92	0.434	7.78	5.6	0.01	_	_	_	_	AAT	_	_	_	_	_	_	_	_
2/10/97 1800	Cold Sunny	Cold Clear	HSW-8	8	7.77	0.461	9.91	4.3	0.01	_	_	_	_	PCN	_	_	_	_	_	_	_	_
2/11/97 1800	Cold	Snow Cloudy	HSW-8	37	7.30	0.435	9.10	4.3	0.01	Grab	Clear	None	None	PCN	0.006	0.002	_	ND	ND	_	80.9	7
2/12/97 1715	Clear Cloudy	Clear	HSW-8	32	7.59	0.439	9.31	4.0	0.01	_	_	_	_	PCN	_	_	_	_	_	_	_	_
2/13/97 1545	Cold	Clear	HSW-8	16	7.47	0.432	8.91	4.5	0.01	_	_	_	_	PCN	_	_	_	_	_	_	_	_
2/14/97 0900	Snowing	Cloudy	HSW-8	31	7.54	0.524	9.84	2.9	0.01	_	_	_	_	PCN	_	_	_	_	_	_	_	_
2/17/97 1545	Clear	Snow	HSW-8	28	7.91	0.472	11.91	3.5	0.01	Grab	Clear	None	None	PCN	ND	ND	_	ND	ND	_	76.8	ND
2/19/97 0900	Cloudy	Clear	HSW-8	25	7.25	0.477	10.50	4.5	0.01	_	_	_	_	PCN	_	_	_	_	_	_	_	_
2/20/97 1130	Cloudy	Cloudy	HSW-8	4	7.77	0.452	10.99	4.3	0.01					PCN	_	_	_	_	_	_	_	_

*Last sample taken for HSW-9 before the trench box dam is removed.

Required Limits (mg/l)

	As	Pb	Cr
Chronic	0.190	0.0032	0.210
Acute	0.360	0.082	1.700

Instruments used for field tests:

From 8/21/96 to 8/31/96 LAMOTE MODEL 280

From 9/3/96 to present HORIBA U10

Detection Limits used: See report by TOXIKON CORP.

_____ Last daily sampling for the week.

INDUSTRI-PLEX SITE REMEDIAL TRUST

SURFACE WATER MONITORING SUMMARY

DATE TIME	WEATHER CONDITION	WEATHER CONDITION LAST 24 HOURS	SAMPLING LOCATION	FIELD TESTS						SAMPLE				FIELD MONITOR	LAB TEST RESULTS							
															TOTAL			DISSOLVED				
				TURBIDITY (NTU)	pH	CONDUCTIVITY (ms/cm)	DISSOLVED OXYGEN (mg/l)	TEMPERATURE (°C)	SALINITY (%)	COLLECTION METHOD	APPEARANCE	COLOR	ODOR		AS (mg/ L)	PB (mg/ L)	CR (mg/ L)	AS (mg/ L)	PB (mg/ L)	CR (mg/ L)	HARDNESS (mg/L)	TSS (mg/ L)
2/21/97 1615	Cloudy	Cloudy	HSW-8	25	7.59	0.317	10.91	7.1	0.01	-	-	-	-	PCN	-	-	-	-	-	-	-	-
2/24/97 0940	Partly Cloudy	Partly Cloudy	Site Limit	158	7.63	0.375	8.47	3.8	0.01	Grab	Clear	Light Brown	None	PCN	0.006	0.005	-	ND	ND	-	76.2	67
2/24/97 0955	Rain	Rain	South HSW-8	368	7.48	0.524	7.13	3.5	0.02	Grab	Cloudy	Brown	None	PCN	0.037	0.037	-	ND	ND	-	123	385
2/26/97	Cloudy	Cloudy, Rain Sunshine	South HSW-8	63	7.40	0.439	8.50	5.2	0.01	-	-	-	-	PCN	-	-	-	-	-	-	-	-
2/27/97 1030	Rain	Rain	HSW-8	78	7.70	1.440	8.00	7.0	0.06	-	-	-	-	PCN	-	-	-	-	-	-	-	-
3/5/97 0855	Sunny	Cloudy	HSW-8	29	8.83	0.427	9.59	6.2	0.01	Grab	Clear	None	None	PCN	ND	ND	ND	ND	ND	ND	98.4	ND
3/6/97 1645	Sunny	Sunny	HSW-8	28	7.69	0.268	9.84	4.3	0.00	-	-	-	-	PCN	-	-	-	-	-	-	-	-
3/7/97 1800	Cold Sunny	Cold Clear	HSW-8	23	7.78	0.350	9.64	2.8	0.01	-	-	-	-	PCN	-	-	-	-	-	-	-	-
3/10/97 1715	Cold	Snow Cloudy	HSW-8	27	7.62	0.465	9.97	4.4	0.01	Grab	Clear	None	None	PCN	ND	ND	ND	ND	ND	ND	78.4	4.00
3/11/97 1515	Clear Cloudy	Clear	HSW-8	22	8.63	0.438	10.06	4.6	0.01	-	-	-	-	PCN	-	-	-	-	-	-	-	-
3/12/97 1345	Cold	Clear	HSW-8	21	8.22	0.491	10.48	5.0	0.01	-	-	-	-	PCN	-	-	-	-	-	-	-	-
3/13/97 1545	Snowing	Cloudy	HSW-8	18	8.08	0.528	10.63	5.8	0.02	-	-	-	-	PCN	-	-	-	-	-	-	-	-
3/14/97 1000	Clear	Snow	HSW-8	16	8.58	0.533	10.19	0.1	0.02	-	-	-	-	PCN	-	-	-	-	-	-	-	-

*Last sample taken for HSW-9 before the trench box dam is removed.

Required Limits (mg/l)

	As	Pb	Cr
Chronic	0.190	0.0032	0.210
Acute	0.360	0.082	1.700

Instruments used for field tests:

From 8/21/96 to 8/31/96 LAMOTE MODEL 280

From 9/3/96 to present HORIBA U10

Detection Limits used: See report by TOXIKON CORP.

Last daily sampling for the week.

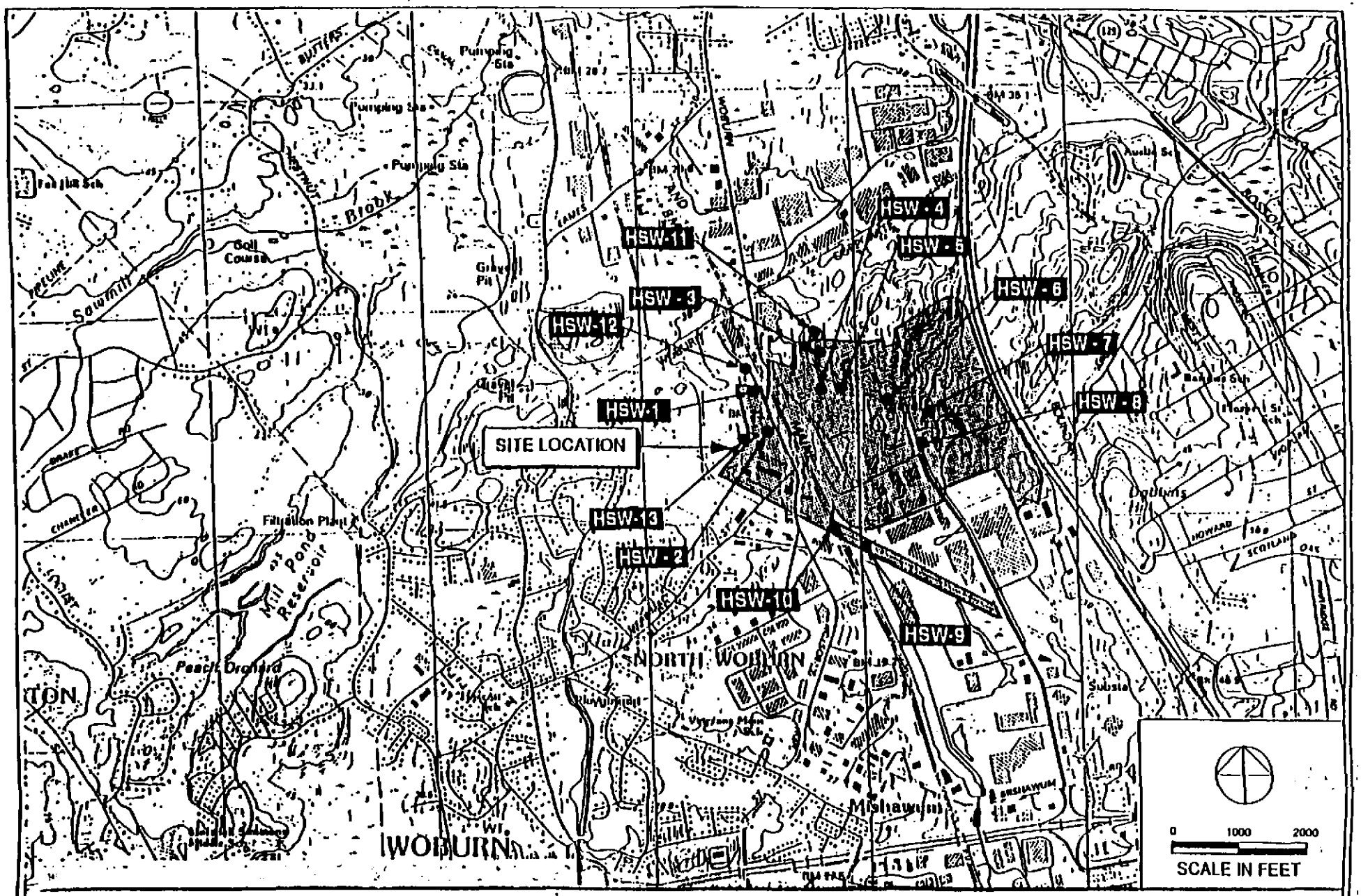

FIGURE 1: SURFACE WATER QUALITY SAMPLING LOCATIONS AT THE INDUSTRI-PLEX SITE, WOBURN, MA

APPENDIX D.2.1

SURFACE WATER MONITORING EXCEEDANCES

1993-1995

APPENDIX D.2.1
SUMMARY OF SURFACE WATER QUALITY EXCEEDANCES
1993-1995

DATE	ARSENIC (ppb) Chronic Limit - 190 ppb Acute Limit - 360 ppb						CHROMIUM (ppb) Chronic Limit - 210 ppb Acute Limit - 1700 ppb						LEAD (ppb) Chronic Limit - 3.2 ppb Acute Limit - 82 ppb						TURBIDITY NTU Limit - 85 NTU					
	SW-8	SW-7	SW-11	SW-9	SW-10	SW-12	SW-8	SW-7	SW-11	SW-9	SW-10	SW-12	SW-8	SW-7	SW-11	SW-9	SW-10	SW-12	SW-8	SW-7	SW-11	SW-9	SW-10	SW-12
4/6/94	11/ND				ND/ND								91/33				43/19		3.4	1.4	7.5		7.1	5.9
4/16/94	ND/ND				ND/ND		ND/ND				108/ND		49/ND				231/ND		18.7	1.7	7.8		42.9	19.1
7/23/94																			207.0				16.0	
7/23/94																			209.0				151.0	
9/24/94	ND/ND			31/7									ND/ND			195/8			8.0			240.0	4.0	
10/19/94	22/12												ND/ND						109.0					
11/22/94	8/5	26/7	ND/ND				ND/ND	80/ND	ND/ND				9/ND	55/ND	ND/ND				27.0	160.0	9.0			
11/28/94	19/ND						ND/ND						ND/ND						115.0			36.0		
2/14/95		18/7												20/ND					11.0	101.0	8.0			
4/28/95	37/ND						14/ND						11/ND						95.0	6.0				
6/29/95																			>200					
6/29/95	140/17						152/ND						68/ND						391.0					
6/29/95																			339.0					
6/29/95	36/10						ND/ND						ND/ND						94.0					
6/30/95																			178.0					
6/30/95	51/27						24/ND						14/ND						295.0					
6/30/95	39/10						17/ND						8/ND						266.0					
6/30/95	43/7						16/17						6/ND						143.0					
7/5/95																			96.5					
7/5/95	65/29						26/15						11/ND						179.0					
7/5/95	61/28						21/11						8/ND						292.0					
9/29/95	24/ND						11/ND						7/ND						126.0					
10/5/95	48/11						20/ND						15/ND						168.0					
10/10/95	28/8						14/ND						25/ND						95.0					
10/31/95	153/12						335/ND						374/ND						426.0					
10/31/95																			282.0					
11/2/95	34/ND						23/ND						45/ND						968.0					

All arsenic, chromium, and lead results presented as Total/Dissolved
ND - Non-detect
[ ] - Not Analyzed
* - Test by HNUS

APPENDIX D.3

DECONTAMINATION

L · R · S

ENVIRO-SERVICES, INC.

February 9, 1998

Peter Nuemann,
Golder Associates, Inc.
400 Commercial St.
Manchester, NH 03101

Re; LRS Enviro-Services, Inc.
LRS Project No. 95118
Industri-Plex Remedial Site
Woburn, MA
Decontamination Certification

Dear Peter:

The attached documentation is being submitted as certification of decontamination for items that were encountered at the Industri-Plex Remedial Site in Woburn, MA, per your request.

Please contact the writer should you have any further questions regarding the certification of decontamination.

Yours truly,

Gary Paul Stevens
Project Manager

Attachments

cc: File - Decontamination
John Fiore, de Maximus, Inc.
Tom Melican, LRS

ils/95118/DeconDoc

LRS ENVIRO—SERVICES, INC.
5 Batchelder Road • Seabrook, NH 03874-4402
Tel: 603/474-9266 Fax: 603/474-5344

EXISTING STRUCTURE DECONTAMINATION – ITEMS LEFT ABOVE THE COVER

ITEM	DESCRIPTION	DATE OF DECONTAMINATION
Boulders	Washed boulders at existing concrete slab. Placed decontaminated boulders at N. Janpet	July 1996 - October 1996
Manholes along MBTA	Existing structures brush washed, booted with geotextile.	December 1996
RCP (3/48") – Atlantic Avenue Drainway	High Pressure washed, joints sealed with concrete.	November 1995
CMP (2/60")	High Pressure washed	January 1997

F:\\95111\DeconTable

APPENDIX D.4

OFF-SITE FACILITY DOCUMENTATION

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
JOHN F. KENNEDY FEDERAL BUILDING
BOSTON, MASSACHUSETTS 02203 0001

SITE: 3-1731-01
BREAK: 7.01
OTHER:

February 5, 1997

John Fiore
ISRT/demaximus
23 Atlantic Avenue
Woburn, MA 01801

Re: Industri-Plex Superfund Site: Off-site Disposal Facilities

Dear Mr. Fiore:

EPA has reviewed the ISRT's letter dated January 6, 1997, signed by Sam Taylor, requesting approval for temporary off-site disposal at the following facilities:

1) KTI Bio Fuels Limited Partnership, 38 Alfred Plourde Parkway, Lewiston, ME 04240 (ME identification number - LOI3266-05-A-N) for railroad ties and other miscellaneous non-contaminated wood debris;

2) Waste Management Turnkey landfill facility, Rochester, NH (EPA ID No. NHD980914634) for Personnel Protective Equipment (PPE) and miscellaneous non-contaminated debris; and

3) James G. Grant Company, Readville, MA (City of Boston Junk Shop Keepers License No. 3671; and EPA No. MAD019212331) for miscellaneous non-contaminated scrap metal.

I have contacted the regional off-site policy coordinator and the Maine Department of Environmental Protection (MEDEP) regarding these facilities, as well as the owner of James G. Grant Company. Based upon these discussions, EPA considers the facilities to have a "current acceptability status". Because the "acceptability status" is time-sensitive, delays in implementing the removal/off-site disposal of the materials beyond 60 days, i.e. April 5, 1997, will require reconfirmation of the status of these facilities.

As discussed during previous construction progress meetings, EPA expects the railroad ties and miscellaneous wood and metal from the site to be thoroughly decontaminated prior to off-site disposal.

Recycled/Recyclable
Printed with Soy/Canola Ink on paper that contains at least 75% recycled fiber

If you have any questions regarding this letter, please contact me at (617) 573-9622.

Sincerely,

Joseph F. LeMay

Joseph F. LeMay, RPM
MA Superfund

cc: Mel Checks, EPA
Randy McMullin, MEDEP
Anna Mayor, MADEP
Gordon Bullard, HNUS
Michael Light, ISRT

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
JOHN F. KENNEDY FEDERAL BUILDING
BOSTON, MASSACHUSETTS 02203-0001

October 7, 1996

John Fiore
ISRT/demaximus
23 Atlantic Avenue
Woburn, MA 01801

Re: Industri-Plex Superfund Site: Off-site Disposal Facilities

Dear Mr. Fiore:

EPA has reviewed the ISRT's letter dated October 1, 1996, signed by Sam Taylor, requesting approval for temporary off-site disposal of railroad ties and other miscellaneous wood debris to KTI Bio Fuels Limited Partnership 38 Alfred Plourde Parkway, Lewiston, ME 04240 (ME identification number - LOI3266-05-A-N).

I have contacted the regional off-site policy coordinator and the Maine Department of Environmental Protection (MEDEP) regarding this facility. Based upon these discussions, EPA considers the KTI facility to have a "current acceptability status". Because the "acceptability status" is time-sensitive, delays in implementing the removal/off-site disposal of the materials beyond 60 days, i.e. December 7, 1996, will require reconfirmation of the status of these facilities.

As discussed during previous construction progress meetings, EPA expects the railroad ties and miscellaneous wood from the site to be thoroughly decontaminated prior to off-site disposal. All soil from the site attached to the ties and wood must be removed prior to off-site disposal.

Recycled/Recyclable
Printed with Soy/Canola Ink on paper that contains at least 75% recycled fiber

If you have any questions regarding this letter, please contact me at (617) 573-9622.

Sincerely,

Joseph F. LeMay

Joseph F. LeMay, RPM
MA Superfund

cc: Anna Sawaya, EPA
Randy McMullin, MEDEP
Anna Mayor, MADEP
Gordon Bullard, HNUS
Michael Light, ISRT

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
JOHN F. KENNEDY FEDERAL BUILDING
BOSTON, MASSACHUSETTS 02203-0001

SITE: 3-1731-01
BREAK: 7.01
OTHER:

October 1, 1996

John Fiore
ISRT/demaximus
23 Atlantic Avenue
Woburn, MA 01801

Re: Industri-Plex Superfund Site: Off-site Disposal Facilities

Dear Mr. Fiore:

EPA has reviewed the ISRT's letter dated today, signed by Sam Taylor, requesting approval for temporary off-site disposal of non-hazardous scrap metals and debris including geotextile fabric, polyethylene, and plastic at the following facilities:

1) James G. Grant Company, Readville, MA (City of Boston Junk Shop Keepers License No. 3671; and EPA No. MAD019212331) for scrap metal; and

2) Waste Management Turnkey landfill facility, Rochester, NH (EPA ID No. NHD980914634) for debris including geotextile fabric, polyethylene, and plastic.

EPA considers these facilities to have a "current acceptability status". Because the "acceptability status" is time-sensitive, delays in implementing the removal/off-site disposal of the materials beyond 60 days, i.e. December 1, 1996, will require reconfirmation of the status of these facilities.

If you have any questions regarding this letter, please contact me at (617) 573-9622.

Sincerely,

Joseph F. LeMay

Joseph F. LeMay, RPM
MA Superfund

cc: Anna Mayor, MADEP
Gordon Bullard, HNUS
Michael Light, ISRT

Recycled/Recyclable
Printed with SoyCanola Ink on paper that contains at least 75% recycled fiber

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
JOHN F. KENNEDY FEDERAL BUILDING
BOSTON, MASSACHUSETTS 02203-0001

July 18, 1996

John Fiore
ISRT/demaximus
23 Atlantic Avenue
Woburn, MA 01801

Re: Industri-Plex Superfund Site: Off-site Disposal Facilities

Dear Mr. Fiore:

EPA has reviewed the ISRT's July 2, 1996 letter, signed by Peter Neumann, requesting approval for temporary off-site disposal of non-hazardous tires and scrap metals at the following facilities:

1) Tires Into Recycled Energy Sources, Eliot, ME (MEDEP License No. S-20744-WK-A-N) for tires; and

2) James G. Grant Company, Readville, MA (City of Boston Junk Shop Keepers License No. 3671; and EPA No. MAD019212331) for scrap metal.

I have contacted the regional off-site policy coordinator, the Massachusetts Department of Environmental Protection (MADEP), and the Maine Department of Environmental Protection (MEDEP), as well as the president of James G. Grant Company regarding these facilities. Based upon these discussions, EPA considers these facilities to have a "current acceptability status". Because the "acceptability status" is time-sensitive, delays in implementing the removal/off-site disposal of the materials beyond 60 days, i.e. September 18, 1996, will require reconfirmation of the status of these facilities.

As discussed during today's construction progress meeting, EPA expects all scrap metals and tires from the site to be thoroughly decontaminated prior to off-site disposal as non-hazardous.

Recycled/Recyclable
Printed with Soy/Canola Ink on paper that contains at least 75% recycled fiber

If you have any questions regarding this letter, please contact me at (617) 573-9622.

Sincerely,

Joseph F. LeMay

Joseph F. LeMay, RPM
MA Superfund

cc: Anna Sawayer, EPA
Anna Mayor, MADEP
Gordon Bullard, HNUS
Michael Light, ISRT

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
J.F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203-2211

June 10, 1996

John Fiore
ISRT/demaximus
41 Atlantic Avenue
Woburn, MA 01801

Re: Industri-Plex Superfund Site: Off-site Disposal Facilities

Dear Mr. Fiore:

ISRT recently requested the Environmental Protection Agency (EPA) approval to send waste discovered in the former Boiler House Building off-site for disposal at the following facilities: 1) ECC (Jetline Services), Stoughton, MA (EPA ID # MAD062979890); and 2) General Chemical, Framingham, MA (EPA ID # MAD019371079). EPA has reviewed your request made on June 6, 1996, through Tom Galvin, Adams Environmental, for off-site disposal. I have contacted the regional off-site policy coordinator and the Massachusetts Department of Environmental Protection (MADEP) regarding these facilities, who have determined that they are acceptable to receive such waste. Therefore, the facilities are considered to have a "current acceptability status".

Because the "acceptability status" is time-sensitive, delays in implementing the removal/off-site disposal of the wastes beyond 60 days, i.e. August 10, 1996 will require reconfirmation of the status of these facilities.

If you have any questions regarding this letter, please contact me at (617) 573-9622.

Sincerely,

Joseph F. LeMay

Joseph F. LeMay, RPM
MA Superfund

cc: Gordon Bullard, HNUS
Anna Mayor, MA DEP
Anna Sawayer, EPA
Michael Light, ISRT

PRINTED ON RECYCLED PAPER

APPENDIX D.4.1

MANIFESTS AND BILLS OF LADING

1996-1997

Waste Management of New Hampshire, Inc. – Rochester

NON-HAZARDOUS SPECIAL WASTE MANIFEST

01143

GENERATOR

Generator Name: Industri-Plex Site Remedial Trust

Street Generating Location: 41 Atlantic Avenue

Street Mailing Address: 41 Atlantic Avenue

City/State: Woburn, MA 01801

City/State: Woburn, MA 01801

Generator's US EPA No.: MP6179329599

Phone No.: 617-932-9599

Phone No.: 617-932-9599

Waste Profile Sheet Code No.: WMNA 275979

DESCRIPTION OF WASTE

NON-Hazardous, NON-Regulated Solid Waste

ADDITIONAL DESCRIPTIONS / HANDLING INSTRUCTIONS FOR MATERIAL LISTED ABOVE

Oil Contaminated Debris and Sludge

CONTAINERS

Units	No.	Type
Y	01	CM

I hereby certify that the above named material does not contain free liquid as defined by 40 CFR Part 260.10 or any applicable state law, is not a hazardous waste as defined by 40 CFR Part 261 or any applicable state law, has been properly described, classified and packaged, and is in proper condition for transportation according to applicable regulations.

SAMUEL W. TAYLOR — Generator Authorized Agent Name (Print)

Signature

05-28-96 — Shipment Date

TRANSPORTER

Truck No.: 452

Phone No.: 617 933-2113

Transporter Name: WASTE MANAGEMENT

Driver Name (Print): CARL STONE

Address: 204 MERRIMAC ST

Vehicle License No./State: 31607 / MA

City/State: WOBURN MA

Transporter's US EPA No.:

I hereby certify that the above named material was picked up at the generator site listed above.

Carl Stone — Driver Signature

05-28-96 — Shipment Date

I hereby certify that the above named material was delivered without incident to the destination listed below.

Carl Stone — Driver Signature

05-29-96 — Delivery Date

DESTINATION

Site Name: WMDSM-Crossroads

Phone No.: 207-634-2714

Address: Rt. 2 Norridgewock ME 04957

Designated Disposal Facility US EPA No.: MED982546699

I hereby certify that the above named material has been accepted for disposal at this facility.

187827 — SCALE TICKET NUMBER

Cynthia A. Berry — Signature

05-29-96 — Receipt Date

NHSWM-001

ORIGINAL - RETURN TO GENERATOR

Waste Management of New Hampshire, Inc. - Rochester

NON-HAZARDOUS SPECIAL WASTE MANIFEST

01144

GENERATOR

Generator Name: Industri-Plex Site Remedial Trust

Street Generating Location: 41 Atlantic Avenue

Street Mailing Address: 41 Atlantic Avenue

City/State: Woburn, MA 01801

City/State: Woburn, MA 01801

Generator's US EPA No.: MP6179329599

Phone No.: 617-932-9599

Phone No.: 617-932-9599

Waste Profile Sheet Code No.: WMNA 275979

DESCRIPTION OF WASTE

NON-Hazardous NON-Regulated Solid Waste

ADDITIONAL DESCRIPTIONS / HANDLING INSTRUCTIONS FOR MATERIAL LISTED ABOVE.

Oil Contaminated Debris and Sludge

CONTAINERS

Units	No.	Type
Y	01	CM

I hereby certify that the above named material does not contain free liquid as defined by 40 CFR Part 260.10 or any applicable state law, is not a hazardous waste as defined by 40 CFR Part 261 or any applicable state law, has been properly described, classified and packaged, and is in proper condition for transportation according to applicable regulations.

Samuel W Taylor — Generator Authorized Agent Name (Print)

Signature

05-28-96 — Shipment Date

TRANSPORTER

Truck No.: 452

Phone No.: 617-933-2113

Transporter Name: WASTE MANAGEMENT

Driver Name (Print): CARL STONE

Address: 204 Merrimac ST

Vehicle License No./State: 3607 MA

City/State: WOBURN MA

Transporter's US EPA No.:

I hereby certify that the above named material was picked up at the generator site listed above.

Carl Stone — Driver Signature

05-28-96 — Shipment Date

I hereby certify that the above named material was delivered without incident to the destination listed below.

Carl Stone — Driver Signature

05-29-96 — Delivery Date

DESTINATION

Site Name: WMDSM-Crossroads

Phone No.: 207-634-2714

Address: US Rt 2 Box 629, Norridgewock ME 04957

Designated Disposal Facility US EPA No.: MED982546699

I hereby certify that the above named material has been accepted for disposal at this facility.

187821 — SCALE TICKET NUMBER

G Chapman — Signature

05-29-[illegible] — Receipt Date

NHSWM-001

ORIGINAL - RETURN TO GENERATOR

Waste Management of New Hampshire, Inc. - Rochester

NON-HAZARDOUS SPECIAL WASTE MANIFEST

01145

GENERATOR

Generator Name: Industri-Plex Site Remedial Trust

Street Generating Location: 41 Atlantic Avenue

Street Mailing Address: 41 Atlantic Avenue

City/State: Woburn, MA 01801

City/State: Woburn, MA 01801

Generator's US EPA No.: MP6179329599

Phone No.: 617-932-9599

Phone No.: 617-932-9599

Waste Profile Sheet Code No.: WMNA 275979

DESCRIPTION OF WASTE

Non-Hazardous, Non-Regulated Solid Waste

ADDITIONAL DESCRIPTIONS / HANDLING INSTRUCTIONS FOR MATERIAL LISTED ABOVE

Oil Contaminated Debris and Sludge

CONTAINERS

Units	No.	Type
Y	01	CM

I hereby certify that the above named material does not contain free liquid as defined by 40 CFR Part 260.10 or any applicable state law, is not a hazardous waste as defined by 40 CFR Part 261 or any applicable state law, has been properly described, classified and packaged, and is in proper condition for transportation according to applicable regulations.

Generator Authorized Agent Name (Print): SAMUEL W TAYLOR

Signature: S W Taylor

Shipment Date: 05-29-96

TRANSPORTER

Truck No.: 452

Phone No.: 617 933-2113

Transporter Name: WASTE MANAGEMENT

Driver Name (Print): CARLSON

Address: 204 MERRIMAC ST

Vehicle License No./State: 31607

City/State: WOBURN

Transporter's US EPA No.:

I hereby certify that the above named material was picked up at the generator site listed above.

Driver Signature: Carl Sloan

Shipment Date: 5-29-96

I hereby certify that the above named material was delivered without incident to the destination listed below.

Driver Signature: Carl Sloan

Delivery Date: 5-30-96

DESTINATION

Site Name: WMDSM-Crossroads

Phone No.: 207-634-2714

Address: RT 2 Norridgewock, Me 04957

Designated Disposal Facility US EPA No.: MED982546699

I hereby certify that the above named material has been accepted for disposal at this facility.

SCALE TICKET NUMBER: 87939

Signature: [illegible]

Receipt Date: 05-30-96

NHSWM-001

ORIGINAL - RETURN TO GENERATOR

Waste Management of New Hampshire, Inc. – Rochester

NON-HAZARDOUS SPECIAL WASTE MANIFEST

01146

GENERATOR

Generator Name: Industri-Plex Site Remedial Trust

Street Generating Location: 41 Atlantic Avenue

Street Mailing Address: 41 Atlantic Avenue

City/State: Woburn, MA 01801

City/State: Woburn, MA 01801

Generator's US EPA No.: MPD079329599

Phone No.: 617-932-9599

Phone No.: 617-932-9599

Waste Profile Sheet Code No.: WMNA 275979

DESCRIPTION OF WASTE

NON-Hazardous, NON-Regulated Solid Waste

ADDITIONAL DESCRIPTIONS / HANDLING INSTRUCTIONS FOR MATERIAL LISTED ABOVE.

Oil Contaminated Debris and Sludge

CONTAINERS

Units	No.	Type
Y	01	CM

I hereby certify that the above named material does not contain free liquid as defined by 40 CFR Part 260.10 or any applicable state law, is not a hazardous waste as defined by 40 CFR Part 261 or any applicable state law, has been properly described, classified and packaged, and is in proper condition for transportation according to applicable regulations.

SAMUEL W. TAYLOR — Generator Authorized Agent Name (Print)

Signature

05-29-96 — Shipment Date

TRANSPORTER

Truck No.: 452

Phone No.: 617933 2113

Transporter Name: WASTE MANAGEMENT

Driver Name (Print): CARL STONE

Address: 204 MERRIMAC ST

Vehicle License No./State: 31607

City/State: WOBURN

Transporter's US EPA No.:

I hereby certify that the above named material was picked up at the generator site listed above.

Carl Stone — Driver Signature

5-29-96 — Shipment Date

I hereby certify that the above named material was delivered without incident to the destination listed below.

Carl Stone — Driver Signature

5-30-96 — Delivery Date

DESTINATION

Site Name: WMDSD-Crossroads

Phone No.: 207-634-2714

Address: RT 2 Norridgewock, ME 04957

Designated Disposal Facility US EPA No.: MED982546699

I hereby certify that the above named material has been accepted for disposal at this facility.

187933 — SCALE TICKET NUMBER

Signature

05-30-[illegible] — Receipt Date

NHSWM-001

ORIGINAL - RETURN TO GENERATOR

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF HAZARDOUS MATERIALS
One Winter Street
Boston, Massachusetts 02108

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator US EPA ID No. MP617248040 1 — Manifest Document No. 58194
2. Page 1 of 1 — Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address: INDUSTRY PLEX TRUST, 41 ATLANTIC AVENUE*, WOBURN, MA. 01801
4. Generator's Phone (617) 248-0401

A. State Manifest Document Number: MA J158194
B. State Gen. ID: SAME

5. Transporter 1 Company Name: WESTERN ENVIRONMENTAL SERVICES INC.
6. US EPA ID Number: MA5000000315
C. State Trans. ID: 35345 MA

7. Transporter 2 Company Name:
8. US EPA ID Number:
D. Transporter's Phone (617) 3447275
E. State Trans. ID:

9. Designated Facility Name and Site Address: ENVIRONMENTAL COMPLIANCE CORP., 441-R CANTON STREET, STOUGHTON, MA. 02072
10. US EPA ID Number: MAD062179890
F. Transporter's Phone ( )
G. State Facility's ID: Not Required
H. Facility's Phone (617) 297-3530

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
a. COMBUSTIBLE LIQUID n.o.s. (oil,water) COMBUSTIBLE LIQUID, NA1993, PGIII	001	TT	00628	G	[illegible]
b.					
c.					
d.					

J. Additional Descriptions for Materials Listed Above (include physical state and hazard code.)
a. LT - oil & water
b.
c.
d.

K. Handling Codes for Wastes Listed Above
a. 7B5
b.
c.
d.

15. Special Handling Instructions and Additional Information
24 HOUR EMERGENCY PHONE# (617) 344-7275 ERG#27

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name: TOM SEERVELD N.C.E.S A.O — Signature: Tom Seerveld N.C.E.S A.O — Date: Month 06 Day 06 Year 96

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: Philip MANION — Signature: Philip Manion — Date: Month 06 Day 06 Year 96

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name: — Signature: — Date: Month Day Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.
Printed/Typed Name: Richard Stankus — Signature: Richard Stankus — Date: Month 06 Day 06 Year 96

GENERATOR / TRANSPORTER / FACILITY

In case of emergency or spill, immediately call the National Response Center (800) 424-8802.

MA J158194 COPY>3: FACILITY MAILS TO GENERATOR

Form Approved OMB No. 2050-0039 Expires 9-30-96
EPA Form 8700-22 (Rev. 9-94) Previous editions are obsolete.

COPY>3: FACILITY MAILS TO GENERATOR

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NONHAZARDOUS WASTE TRANSPORTER
MANIFEST

NONHAZARDOUS WASTE TRANSPORTER DECAL NUMBER 9800036

GENERATOR (SOURCE)	WASTE TYPE
NAME LRS	( ) SPECIAL WASTE (specify)
ADDRESS [illegible]	(✓) SCRAP TIRES
TOWN PHONE	( ) CONSTRUCTION/DEMOLITION DEBRIS

TRANSPORTER	DISPOSAL FACILITY OR SITE
	CODE S20NUUWKFA
NAME Casella T.I.R.E.S., Inc.	NAME Casella T.I.R.E.S., Inc.
ADDRESS 66 Dow Highway	LOCATION 66 Dow Highway
TOWN Eliot, ME 03903 PHONE	PHONE Eliot, ME 03903
QUANTITY LOADED	QUANTITY RECEIVED
DATE LOADED 7-31-96	DATE RECEIVED 7-31-96
DRIVER'S NAME DUANE A Shapleigh	OPERATOR'S NAME
By signing this manifest form I certify that the information contained herein is true, correct, and accurate to the best of my ability.	OPERATOR'S SIGNATURE
DRIVER'S SIGNATURE [signature]	DATE SIGNED
DATE SIGNED	See Instructions on the back of this form

OTHER INFORMATION: 1379

9/94

Waste Management of Boston North
204 Merrimac St.
Woburn, MA 01801
617/933-2113 800/649-2945

226548

PO#

SERVICE TICKET AGREEMENT/NON-HAZARDOUS WASTES

ORDER NUMBER	SERVICE DATE
269061	7/29/96
TIME IN	TIME OUT
900	

DIVISION NUMBER	ACCOUNT NUMBER	SERVICE TYPE
265253	0255491	RO

ROUTE ID	DISPOSAL ID	DISPOSAL TICKET
482		

CUSTOMER LRS ENVIROMENTAL-PERSONAL PRO

ADDRESS [redacted]

SIGNATURE	COD AMOUNT
NOT REQRD	

CITY WOBURN 01801

ACTION	ORD QTY	SERVICE DESCRIPTION	WASTE TYPE	BILL CODE	MEASURE	BILL QUANTITY	AMOUNT
DE	1	30RLW 30 TD CONTAINER	SWS	DEL	LD		
[redacted]							
[redacted]							

COMMENTS CUST REQ A 2ND CAN//DLD

SERVICES ACCEPTED SUBJECT TO THE TERMS AND CONDITIONS ON THE REVERSE SIDE AND PAYMENT AGREED TO BE MADE IN ACCORDANCE WITH THE CONTRACTOR'S CURRENT RATE SCHEDULE

CUSTOMER SIGNATURE [signature] CONTRACTOR SIGNATURE [signature]

IMS-0038T (10/90) WHITE – OFFICE YELLOW – CUSTOMER PINK – CONTROL

Printed on recycled paper

Recycling *"Wood Waste to Fuel"* Since 1986
38 ALFRED A. PLOURDE PARKWAY
LEWISTON, ME 04240
FAX: (207) 784-9852
TEL: (207) 783-2941
Maine DEP License # L-013266-05-A-N

35068

Date 10/22/96
Time 7:45 AM PM

RECEIPT FOR WOOD WASTE

1. OWNER-SHIPPER

WASTE MANIFEST NO. _____

NAME LRS P.O. NO. _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

TELEPHONE NO. ____ / _____ FAX NO. ____ / _____

2. DELIVERING CARRIER

NAME Jolly Farmer

VEHICLE INITIALS _____

TRACTOR PLATE # _____ / State TRAILER PLATE # _____ / State

3. LOAD ORIGINATION:

JOB NAME LRS

ADDRESS _____

CITY Woburn STATE MA. ZIP _____

4. DESCRIPTION OF LOAD AND COMMENTS

Pallets & Tires (Crushed)

BILL OF LADING: _____

COST: CHECK ONE

☑ NUMBER TONS 29.96 @ $ _____ /TON

[ATTACH TWO WEIGHT SLIPS]

☐ BY THE TRUCKLOAD

WEIGHT TICKET NO. _____

99360 # GROSS -$ _____

39440 # TARE

59920 # NET -$ _____

PAYMENT: CHECK ONE

☑ BILL TO ACCOUNT # _____

☐ CASH ☐ CHECK NO. _____

☐ CERTIFIED CHECK # _____

INITIAL _____

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TRAIGHT BILL OF LADING PROFILE# 244968
ORIGINAL - NOT NEGOTIABLE

Shipper's No. D103

CARRIER: Waste Management SCAC Carrier's No. Date

TO: Consignee Turnkey
Street
Destination Rochester, NH Zip

FROM: Shipper IPLEX
Street 23 Atlantic Ave
Origin Woburn, Ma. Zip

Route:

Vehicle Number

No. Shipping Units	HM	Kind of Packages, Description of Articles (IF HAZARDOUS MATERIALS - PROPER SHIPPING NAME)	HAZARD CLASS	I.D. Number	WEIGHT (Subject to correction)	RATE	LABELS REQUIRED (or exemption)
30yds		Roll off					
		Wood, Roots, stumps, fabric, Metal	NA				
		Pipe, wood planks, Plastic fence,					
		wire, rocks, Masonry Debris, Nails,					
		dirt, building Materials, Plastic, Poly					
		Plastic fence, rubber, concrete, Rubber					
		HDPE					

Remit C.O.D. to:
Address:
City: State: Zip:

COD Amt: $

C.O.D. FEE: Prepaid ☐ Collect ☐ $

NOTE — Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property. The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding $ Per

Subject to Section 7 of the conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges. (Signature of Consignor)

FREIGHT CHARGES ☐ PREPAID ☐ COLLECT

RECEIVED, subject to the classifications and lawfully filed tariffs in effect on the date of issue of this Bill of Lading, the property described above in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said property over all or any portion of said route to destination and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the bill of lading terms and conditions in the governing classification on the date of shipment.
Shipper hereby certifies that he is familiar with all the bill of lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his agents.

This is to certify that the above-named materials are properly classified, described, packaged, marked and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation. Per

PLACARDS REQUIRED PLACARDS SUPPLIED ☐ YES ☐ NO — FURNISHED BY CARRIER DRIVER SIGNATURE:

SHIPPER: [signature] CARRIER: [signature]
PER: [signature] DATE: PER: DATE:

EMERGENCY RESPONSE TELEPHONE NUMBER ( )

Monitored at all times the Hazardous Material is in transportation including storage incidental to transportation (172.604).

FORM # 9-BLS-B3 (REV. 8/90)

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TRAIGHT BILL OF LADING PROFILE# 244968
ORIGINAL - NOT NEGOTIABLE

Shipper's No. D604

CARRIER: Waste Management SCAC

Carrier's No. Date

TO: Consignee Turnkey
Street
Destination Rochester, NH Zip

FROM: Shipper IPLEX
Street 23 Atlantic Ave
Origin Woburn, Ma. Zip

Route:

Vehicle Number

No. Shipping Units	HM	Kind of Packages, Description of Articles (IF HAZARDOUS MATERIALS - PROPER SHIPPING NAME)	HAZARD CLASS	I.D. Number	WEIGHT (subject to correction)	RATE	LABELS REQUIRED (or exception)
30yds		Roll off					
		Wood, Roots, stumps, fabric, Metal	NA				
		Pipe, wood planks, Plastic fence,					
		wire, rocks, Masonry Debris, Nails,					
		dirt, building Materials, Plastic, Poly					
		Plastic fence, rebar, concrete, Rubber					
		HDPE					

Remit C.O.D. to:
Address:
City: State: Zip:

COD Amt: $

C.O.D. FEE: Prepaid ☐ Collect ☐ $

NOTE — Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property. The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding $ Per

Subject to Section 7 of the conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.
(Signature of Consignor)

FREIGHT CHARGES ☐ PREPAID ☐ COLLECT

RECEIVED, subject to the classifications and lawfully filed tariffs in effect on the date of issue of this Bill of Lading, the property described above in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of, said property over all or any portion of said route to destination and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the bill of lading terms and conditions in the governing classification on the date of shipment.
Shipper hereby certifies that he is familiar with all the bill of lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

This is to certify that the above-named materials are properly classified, described, packaged, marked and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.

Per

PLACARDS REQUIRED

PLACARDS SUPPLIED ☐ YES ☐ NO — FURNISHED BY CARRIER
DRIVER SIGNATURE:

SHIPPER: [signature]
PER: ISRT DATE:

CARRIER: [signature]
PER: DATE:

EMERGENCY RESPONSE TELEPHONE NUMBER ( )

Monitored at all times the Hazardous Material is in transportation including storage incidental to transportation (172.604).

FORM # 9-BLS-B3 (REV. 8/90)

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TRAIGHT BILL OF LADING PROFILE# 244968
ORIGINAL - NOT NEGOTIABLE

Shipper's No. D105

CARRIER: Waste Management SCAC

Carrier's No.
Date

TO:
Consignee Turnkey
Street
Destination Rochester, NH Zip

FROM:
Shipper IPLEX
Street 23 Atlantic Ave
Origin Woburn, Ma. Zip

Route:

Vehicle Number

NO. SHIPPING UNITS	HM	Kind of Packages, Description of Articles (IF HAZARDOUS MATERIALS - PROPER SHIPPING NAME)	HAZARD CLASS	I.D. Number	WEIGHT (Subject to correction)	RATE	LABELS REQUIRED (Description)
30yds		Roll off					
		Wood, Roots, stumps, fabric, Metal	NA				
		Pipe, wood planks, Plastic fence,					
		wire, rocks, Masonry Debris, Nails,					
		dirt, building Materials, Plastic, Poly					
		Plastic fence, rebar, concrete, Rubber					
		HDPE					

Remit C.O.D. to:
Address:
City: State: Zip:

COD Amt: $

C.O.D. FEE:
Prepaid ☐
Collect ☐ $

NOTE — Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property. The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding $ Per

Subject to Section 7 of the conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges. (Signature of Consignor)

FREIGHT CHARGES
☐ PREPAID ☐ COLLECT

RECEIVED, subject to the classifications and lawfully filed tariffs in effect on the date of issue of this Bill of Lading, the property described above in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of, said property over all or any portion of said route to destination and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the bill of lading terms and conditions in the governing classification on the date of shipment.
Shipper hereby certifies that he is familiar with all the bill of lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

This is to certify that the above-named materials are properly classified, described, packaged, marked and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.
Per

PLACARDS REQUIRED

PLACARDS SUPPLIED ☐ YES ☐ NO — FURNISHED BY CARRIER
DRIVER SIGNATURE:

SHIPPER: [signature]
PER: JSRT DATE:

CARRIER: [signature]
PER: DATE:

EMERGENCY RESPONSE TELEPHONE NUMBER ( )

Monitored at all times the Hazardous Material is in transportation including storage incidental to transportation (172.604).

FORM # 9-BLS-83 (REV. 8/90)

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TRAIGHT BILL OF LADING PROFILE# 244968
ORIGINAL - NOT NEGOTIABLE

Shipper's No. D106

CARRIER: Waste Management SCAC Carrier's No. Date

TO: Consignee Turnkey
Street
Destination Rochester, NH Zip

FROM: Shipper IPLEX
Street 23 Atlantic Ave
Origin Woburn, Ma. Zip

Route: Vehicle Number

No. Shipping Units	HM	Kind of Packages, Description of Articles (IF HAZARDOUS MATERIALS - PROPER SHIPPING NAME)	HAZARD CLASS	I.D. Number	WEIGHT (subject to correction)	RATE	LABELS REQUIRED (or exemption)
30yds		Roll off					
		Wood, Roots, stumps, fabric, Metal	N A				
		Pipe, wood planks, Plastic fence,					
		wire, rocks, Masonry Debris, Nails,					
		dirt, building Materials, Plastic, Poly					
		Plastic fence, rebar, concrete, Rubber					
		HDPE					

Remit C.O.D. to:
Address:
City: State: Zip:

COD Amt: $

C.O.D. FEE: Prepaid ☐ Collect ☐ $

NOTE — Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property. The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding $ Per

Subject to Section 7 of the conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges. (Signature of Consignor)

FREIGHT CHARGES ☐ PREPAID ☐ COLLECT

RECEIVED, subject to the classifications and lawfully filed tariffs in effect on the date of issue of this Bill of Lading, the property described above in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of, said property over all or any portion of said route to destination and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the bill of lading terms and conditions in the governing classification on the date of shipment.
Shipper hereby certifies that he is familiar with all the bill of lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

This is to certify that the above-named materials are properly classified, described, packaged, marked and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation. Per

PLACARDS REQUIRED PLACARDS SUPPLIED ☐ YES ☐ NO — FURNISHED BY CARRIER DRIVER SIGNATURE:

SHIPPER: CARRIER:
PER: J SRT DATE: PER: DATE:

EMERGENCY RESPONSE TELEPHONE NUMBER ( )

Monitored at all times the Hazardous Material is in transportation including storage incidental to transportation (172.604).

FORM # 9-BLS-B3 (REV. 8/90)

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FRAIGHT BILL OF LADING
ORIGINAL - NOT NEGOTIABLE

PROFILE# 244968

Shipper's No. D107

CARRIER: Waste Management

SCAC

Carrier's No.
Date

TO:
Consignee Turnkey
Street
Destination Rochester, NH Zip

FROM:
Shipper IPLEX
Street 23 Atlantic Ave
Origin Woburn, Ma. Zip

Route:

Vehicle Number

No. Shipping Units	HM	Kind of Packages, Description of Articles (IF HAZARDOUS MATERIALS - PROPER SHIPPING NAME)	HAZARD CLASS	I.D. Number	WEIGHT (subject to correction)	RATE	LABELS REQUIRED (or exemption)
30yds		Roll off					
		Wood, Roots, stumps, fabric, Metal	NA				
		Pipe, wood planks, Plastic fence,					
		wire, rocks, Masonry Debris, Nails,					
		dirt, building Materials, Plastic, Poly					
		Plastic fence, rebar, concrete, Rubber					
		HDPE					

Remit C.O.D. to:
Address:
City: State: Zip:

COD Amt: $

C.O.D. FEE:
Prepaid ☐
Collect ☐ $

NOTE — Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property. The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding $ Per

Subject to Section 7 of the conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.
(Signature of Consignor)

FREIGHT CHARGES
☐ PREPAID ☐ COLLECT

RECEIVED, subject to the classifications and lawfully filed tariffs in effect on the date of issue of this Bill of Lading, the property described above in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of, said property over all or any portion of said route to destination and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the bill of lading terms and conditions in the governing classification on the date of shipment.
Shipper hereby certifies that he is familiar with all the bill of lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

This is to certify that the above-named materials are properly classified, described, packaged, marked and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.

Per

PLACARDS REQUIRED

PLACARDS SUPPLIED ☐ YES ☐ NO — FURNISHED BY CARRIER
DRIVER SIGNATURE:

SHIPPER: [signature]
PER: TRST DATE: 1-22-97

CARRIER:
PER: [signature] DATE: 1-22-97

EMERGENCY RESPONSE TELEPHONE NUMBER ( )

Monitored at all times the Hazardous Material is in transportation including storage incidental to transportation (172.604).

FORM # 9-BLS-B3 (REV. 8/90)

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF HAZARDOUS WASTE
One Winter Street
Boston, Massachusetts 02108

FOR IN-STATE WASTE OIL ONLY OR IN-STATE VSQG HW/WO

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

In case of emergency or spill, immediately call t tional Response Center (800) 424-8802.

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator US EPA ID No.: MP 6 1 7 9 8 2 9 5 9 9 — Manifest Document No.:
2. Page 1 of — Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address: Bnaletta, 23 Atlantic Ave. Woburn MA 01801
4. Generator's Phone (617) 932-9599

A. State Manifest Document Number: MA J207645
B. State Gen. ID: SAME
C. State Trans. ID: 22473MA
D. Transporter's Phone: 617 933-4928
E. State Trans. ID:
F. Transporter's Phone ( )
G. State Facility's ID: Not Required
H. Facility's Phone (617) 344-0265

5. Transporter 1 Company Name: Bill Murphy Waste Oil, Inc.
6. US EPA ID Number: MAD000358655
7. Transporter 2 Company Name:
8. US EPA ID Number:
9. Designated Facility Name and Site Address: Cyn Oil Corp./1771 Washington St./Stoughton, MA
10. US EPA ID Number: MAD082303777

GENERATOR

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt./Vol.	Waste No.
a. Petroleum Oil Combustible Liquid NA 1270 PG III (Waste Oil)	1	TT	350	GL	MA98
b.					
c.					
d.					

J. Additional Descriptions for Materials Listed Above (include physical state and hazard code.)
a. Waste Oil
b.
c.
d.

K. Handling Codes for Wastes Listed Above
a. S 0 2
b.
c. T 5 0
d.

15. Special Handling Instructions and Additional Information

MA98 - DOT EMERGENCY GUIDE #128 / EMERGENCY PHONE: (617) 933-4928

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name: x Michael Lovezzola — Signature: x [signature] — Date: Month 02 Day 10 Year 97

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: Bruce Garvey — Signature: Bruce Garvey — Date: Month 02 Day 10 Year 97

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name: — Signature: — Date: Month Day Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.
Printed/Typed Name: Richard S. Hume — Signature: [signature] — Date: Month 02 Day 10 Year 97

Form Approved OMB No. 2050-0039. Expires 9-30-96
EPA Form 8700-22 (Rev. 9-94) Previous editions are obsolete.

COPY>1: FACILITY MAILS TO GENERATOR

United Waste

CHICOPEE SANITARY LANDFILL FACILITY

SPECIAL WASTE LOG

Date: 4-18-97 Time: 8:31 Ticket Number: 9768017

1. ISRST
Generator's Name
141 ATLANTIC AVE.
WOBURN, MA 01801
Generator's Address
ATT: GIARPET PROPERTIES
Generator's Phone

2. ADVANCED BUILDING SYSTEMS
Operator's Name
97 SHARON RD.
SALEM, NH 03079
Operator's Address
(603) 893-0380
Operator's Phone

3. Waste Disposal Site Name, Mailing Address, Physical Site Name and Location, and Telephone Number:
Connecticut Valley Sanitary Waste Disposal, Inc., 600 New Ludlow Road, South Hadley, MA 01075
Chicopee Sanitary Landfill Facility, 161 New Lombard Road, Chicopee, MA - (413) 594-4172

4. Name and Address of Responsible Agency:
Regional Asbestos Coordinator, US EPA, Region 1, JFK Federal Building, Boston, MA 02203 or
DEP, Western Region, State House West, 436 Dwight Street, Springfield, MA 01103

5. Description of Waste Disposed: FRIABLE ASBESTOS

6. Number and Type of Containers: 1 PW 7. Total Quantity (yds):

8. Special Handling Instructions and Other Additional Information

9. JOE BERNIER - AGENT [signature] 4/11/97
Operator's Certification (Printed Name & Title) (Signature) (Date)

(I certify above that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, package, marked, and labeled; and, are in all respects in proper condition for transport by highway and for disposal according to applicable international and government regulations.)

10. Richard Bernier - DRIVER
Transporter 1 (Name, Title, Address & Tel. #)
J. O. B. / ROLLOFF,
BOX 6037, CHELSEA, MA
(617) 387-1495

11.
Transporter 2 (Name, Title, Address & Tel. #)
FOR: UWS TRANSPORT
19 HURRICANE CREEK RD.
HURRICANE, WV 25526

12. Discrepancies:

13. JAMES POWERS Scale Operator [signature] 4-18-97
Disposal Certification (Printed Name & Title) (Signature) (Date)

WHITE - LANDFILL YELLOW - GENERATOR PINK - HAULER

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF HAZARDOUS MATERIALS
One Winter Street
Boston, Massachusetts 02108

GCC FILE # 05082

5/5360

6162

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator US EPA ID No.: MP6179329597 — Manifest Document No.: 01290
2. Page 1 of 1 — Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address:
INDUSTRI PLEX REMEDIAL TRUST
23 ATLANTIC AVE WOBURN MA. 02101

4. Generator's Phone ( ) 617-932-9597

A. State Manifest Document Number: MA K001290
B. State Gen. ID: Same

5. Transporter 1 Company Name: GENERAL CHEMICAL CORPORATION
6. US EPA ID Number: MAD019371079
C. State Trans. ID: MA 41617
D. Transporter's Phone ( ) 508-872-5000

7. Transporter 2 Company Name:
8. US EPA ID Number:
E. State Trans. ID:

9. Designated Facility Name and Site Address:
GENERAL CHEMICAL CORPORATION
133 LELAND STREET
FRAMINGHAM MA 01702
10. US EPA ID Number: MAD019371079

F. Transporter's Phone ( )
G. State Facility's ID: Not Required
H. Facility's Phone ( ) 508-872-5000

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)		12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
BATTERIES, WET, FILLED WITH ACID 8 , UN2794, PGIII	ERG154	001	DF	00085	G	D002 D008
WASTE SULFURIC ACID 8 , UN2796, PGII	ERG157	001	DF	00095	G	D002
RQ, WASTE CAUSTIC ALKALI LIQUIDS, n.o.s. (SODIUM HYDROXIDE/POTASSIUM HYDROXIDE) 8 , UN1719, PGII , (D002)	ERG154	002	DF	00010	G	D002
d.						

J. Additional Descriptions for Materials Listed Above (include physical state and hazard code.)
Auth. # 674-18 — Auth. # 660-04
Auth. # 61361-2
b. — d.

K. Handling Codes for Wastes Listed Above
a. S 0 1 — c. S 0 1
b. S 0 1 — d.

15. Special Handling Instructions and Additional Information
JOHN FIORI 617-932-9597

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name: D. M. LIGHT — Signature: D M Light — Date: Month 04 Day 17 Year 97

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: TOM Holmes — Signature: Tom Holmes — Date: Month 04 Day 17 Year 97

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name: — Signature: — Date: Month Day Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.
Printed/Typed Name: SANDY FOSTER — Signature: Sandy Foster — Date: Month 05 Day 01 Year 97

GENERATOR — TRANSPORTER — FACILITY

In case of emergency or spill, immediately call the National Response Center (800) 424-8802.

MA K001290 COPY>3: FACILITY MAILS TO GENERATOR

Form Approved OMB No. 2050-0039
EPA Form 8700-22 (Rev. 9-94) Previous editions are obsolete

COPY>3: FACILITY MAILS TO GENERATOR

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF HAZARDOUS MATERIALS
One Winter Street
Boston, Massachusetts 02108

9591

GCC FILE # 05083

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator US EPA ID No.: MP6179329597 — Manifest Document No.: 01291

2. Page 1 of 1

Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address
INDUSTRI PLEX REMEDIAL TRUST
23 ATLANTIC AVE WOBURN MA. 02101

4. Generator's Phone ( ) 617-932-9597

A. State Manifest Document Number: MA K001291

B. State Gen. ID: Same

5. Transporter 1 Company Name: GENERAL CHEMICAL CORPORATION

6. US EPA ID Number: MAD019371079

C. State Trans. ID: MA 41617

7. Transporter 2 Company Name:

8. US EPA ID Number:

D. Transporter's Phone ( ) 508-872-5000

E. State Trans. ID:

9. Designated Facility Name and Site Address
GENERAL CHEMICAL CORPORATION
133 LELAND STREET
FRAMINGHAM MA 01702

10. US EPA ID Number: MAD019371079

F. Transporter's Phone ( )

G. State Facility's ID: Not Required

H. Facility's Phone ( ) 508-872-5000

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
RQ, WASTE CAUSTIC ALKALI LIQUIDS, n.o.s. (SODIUM HYDROXIDE/POTASSIUM HYDROXIDE) 8, UN1719, PGII, (D002) ERG154	001	DF	00085	G	D002
RQ, WASTE CAUSTIC ALKALI LIQUIDS, n.o.s. (SODIUM HYDROXIDE/POTASSIUM HYDROXIDE) 8, UN1719, PGII, (D002) ERG154	001	DF	00030	G	D002
STATE REGULATED WASTE OIL (NON REGULATED PER 40 CFR, 49 CFR)	002	DF	00170	G	MA01
STATE REGULATED WASTE OIL (NON REGULATED PER 40 CFR, 49 CFR)	004	DF	00220	G	MA01

J. Additional Descriptions for Materials Listed Above (include physical state and hazard code.)

Auth. # 660-04	Auth. # 660-07
Auth. # 660-04	Auth. # 660-07

K. Handling Codes for Wastes Listed Above

a. S 0 1	c. S 0 1
b. S 0 1	d. S 0 1

15. Special Handling Instructions and Additional Information
JOHN FIORI 617-932-9597

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name: D M. LIGHT — Signature: D M Light — Date: Month 04 Day 17 Year 97

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: Tom Holmes — Signature: Tom Holmes — Date: Month 04 Day 17 Year 97

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name: — Signature: — Date: Month Day Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.
Printed/Typed Name: SANDY FOSTER — Signature: Sandy Foster — Date: Month 05 Day 01 Year 97

GENERATOR — TRANSPORTER — FACILITY

In case of emergency or spill, immediately call the National Response Center (800) 424-8802.

MA K001291 COPY>3: FACILITY MAILS TO GENERATOR

Form Approved OMB No. 2050-0039
EPA Form 8700-22 (Rev. 9-94) Previous editions are obsolete

COPY>3: FACILITY MAILS TO GENERATOR

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF HAZARDOUS MATERIALS
One Winter Street
Boston, Massachusetts 02108

GCC FILE # 0508

1577

108/65 - 67
108/ 68-69
108/ 70 71

ase print or type. (Form designed for use on elite (12-pitch) typewriter.)

UNIFORM HAZARDOUS WASTE MANIFEST	1. Generator US EPA ID No. MP6179329597 Manifest Document No. 01292	2. Page 1 of 1	Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address
INDUSTRI PLEX REMEDIAL TRUST
23 ATLANTIC AVE WOBURN MA. 02101

4. Generator's Phone ( ) 617-932-9597

A. State Manifest Document Number: MA K001292

B. State Gen. ID: Same

5. Transporter 1 Company Name: GENERAL CHEMICAL CORPORATION
6. US EPA ID Number: MAD019371079

C. State Trans. ID: MA 4167

7. Transporter 2 Company Name:
8. US EPA ID Number:

D. Transporter's Phone ( ) 508-872-5000

E. State Trans. ID:

9. Designated Facility Name and Site Address
GENERAL CHEMICAL CORPORATION
133 LELAND STREET
FRAMINGHAM MA 01702

10. US EPA ID Number: MAD019371079

F. Transporter's Phone ( )

G. State Facility's ID: Not Required

H. Facility's Phone ( ) 508-872-5000

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
RQ, HAZARDOUS WASTE LIQUID, n.o.s. (LEAD/CHROME) 9 , NA3082, PGIII, (D007)(D008) ERG171	002	DF	00170	G	D007 D008 D004
RQ, HAZARDOUS WASTE LIQUID, n.o.s. (LEAD/CHROME) 9 , NA3082, PGIII, (D007)(D008) ERG171	003	DM	00165	G	D007 D008 D004
RQ, HAZARDOUS WASTE SOLIDS, n.o.s. (LEAD/CHROME) 9 , NA3077, PGIII, (D007)(D008) ERG171	002	DM	00170	G	D007 D008 D004
RQ, HAZARDOUS WASTE SOLIDS, n.o.s. (LEAD/CHROME) 9 , NA3077, PGIII, (D007)(D008) ERG171	002	DM	00110	G	D007 D008 D004

J. Additional Descriptions for Materials Listed Above (include physical state and hazard code.)

Auth. # 660-01 | Auth. # 660-06
Auth. # 660-01 | Auth. # 660-06

K. Handling Codes for Wastes Listed Above
a. S 0 1 | c. S 0 2
b. S 0 1 | d. S 0 2

15. Special Handling Instructions and Additional Information
JOHN FIORI 617-932-9597

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment, OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name	Signature	Date Month Day Year
DM. LIGHT	D M Light	04/17/97

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date Month Day Year
Tom Holmes	Tom Holmes	04/17/97

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date Month Day Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name	Signature	Date Month Day Year
Sandy Foster	Sandy Foster	05/01/97

GENERATOR

TRANSPORTER

FACILITY

In case of emergency or spill, immediately call the National Response Center (800) 424-8802.

MA K001292 COPY>3: FACILITY MAILS TO GENERATOR

Form Approved OMB No. 2050-0039
EPA Form 8700-22 (Rev. 9-94) Previous editions are obsolete

COPY>3: FACILITY MAILS TO GENERATOR

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF HAZARDOUS MATERIALS
One Winter Street
Boston, Massachusetts 02108

GCC FILE # 05085

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator US EPA ID No.: MP617932959 7 — Manifest Document No.: 01293
2. Page 1 of 1 — Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address
INDUSTRI PLEX REMEDIAL TRUST
23 ATLANTIC AVE WOBURN MA. 02101

4. Generator's Phone ( ) 617-932-9597

A. State Manifest Document Number: MA K001293
B. State Gen. ID: Same

5. Transporter 1 Company Name: GENERAL CHEMICAL CORPORATION
6. US EPA ID Number: MAD019371079
C. State Trans. ID: MA41617

7. Transporter 2 Company Name:
8. US EPA ID Number:
D. Transporter's Phone ( ) 508-872-5000
E. State Trans. ID:

9. Designated Facility Name and Site Address
GENERAL CHEMICAL CORPORATION
133 LELAND STREET
FRAMINGHAM MA 01702
10. US EPA ID Number: MAD019371079
F. Transporter's Phone ( )
G. State Facility's ID: Not Required
H. Facility's Phone ( ) 508-872-5000

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
NON RCRA/NON DOT REGULATED WASTE (RAGS WITH NON REGULATED SOLVENTS)	001	DF	00085	G	MA99
NON RCRA/NON DOT REGULATED WASTE (GREASE)	001	DM	00055	G	MA99
STATE REGULATED OILY SOLIDS (NON REGULATED PER 40 CFR, 49 CFR)	001	DF	00085	G	MA01
STATE REGULATED OILY SOLIDS (NON REGULATED PER 40 CFR, 49 CFR)	006	DM	00330	G	MA01

J. Additional Descriptions for Materials Listed Above (include physical state and hazard code.)
Auth. # 660-05 — Auth. # 660-13
Auth. # 660-08 — Auth. # 660-13

K. Handling Codes for Wastes Listed Above
a. S 0 1 — c. S 0 1
b. S 0 1 — d. S 0 1

15. Special Handling Instructions and Additional Information
JOHN FIORI 617-932-9597

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name: D.M. LIGHT — Signature: D M Light — Date: Month 04 Day 17 Year 97

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: Tom Holmes — Signature: Tom Holmes — Date: Month 04 Day 17 Year 97

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name: — Signature: — Date: Month Day Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.
Printed/Typed Name: SANDY FOSTER — Signature: Sandy Foster — Date: Month 05 Day 01 Year 97

GENERATOR — TRANSPORTER — FACILITY

In case of emergency or spill, immediately call the National Response Center (800) 424-8802.

MA K001293 COPY>3: FACILITY MAILS TO GENERATOR

Form Approved OMB No. 2050-0039
EPA Form 8700-22 (Rev. 9-94) Previous editions are obsolete

COPY>3: FACILITY MAILS TO GENERATOR

STATE OF ARKANSAS
Department of Pollution Control and Ecology
P.O. Box 8913 Little Rock, Arkansas 72219-8913
Telephone 501-682-0744

GCC FILE # 05086

108/68 72
108/68 73
108/68 74

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No. 2050-0039. EXPIRES 9-30-97

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. M P 6 1 7 9 3 2 9 5 9 7
Manifest Document No. 56159
2. Page 1 of 1
Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address
INDUSTRI PLEX REMEDIAL TRUST , 23 ATLANTIC AVE
WOBURN MA. 02101
4. Generator's Phone ( ) 617-932-9597

A. State Manifest Document Number AR-856159
B. State Generator's ID Same
C. State Transporter's ID PC 110,568
D. Transporter's Phone 508-872-5000
E. State Transporter's ID PC 1482 H 902
F. Transporter's Phone 903 562 1280
G. State Facility's ID
H. Facility's Phone 501-863-7173

5. Transporter 1 Company Name
GENERAL CHEMICAL CORPORATION
6. US EPA ID Number M A D 0 1 9 3 7 1 0 7 9

7. Transporter 2 Company Name
BECHEM TRANSPORT INC
8. US EPA ID Number C T 0 9 8 2 1 9 1 9 4 2

9. Designated Facility Name and Site Address
ENSCO INC
AMERICAN ROAD
EL DORADO AR 71730
10. US EPA ID Number A R D 0 6 9 7 4 8 1 9 2

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
a. RQ, WASTE FLAMMABLE LIQUIDS, n.o.s. (TOLUENE/XYLENE) 3 , UN1993, PGII , (D001)(F005)	001	DM	Est. 00055G		D001 F005 F003
b. WASTE HYDROGEN PEROXIDE AQUEOUS SOLUTIONS, 30% 5.1, UN2014, PGII	001	DF	Est. 00055G		D001 D002
c. RQ, WASTE ISOPROPANOL SOLUTION 3 , UN1219, PGII , (D001)	001	DF	Est. 00085G		D001
d.			Est.		

J. Additional Description for Materials Listed Above
a.Auth. # 228278 c.Auth. # 258874
b.Auth. # 674257

If no alternate TSDF, return to generator not used 479

K. Alternate Facility (or Generator) Location:
JOHN FIORI 617-932-9597

15. Special Handling Instructions and Additional Information
a.ERG 128 b.ERG 140 c.ERG 132

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations and Arkansas state regulations.
If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name: D. M. LIGHT
Signature: D M Light
Month Day Year: 04 17 97

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: Tom Holmes
Signature: Tom Holmes
Month Day Year: 04 17 97

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name: KRIS HBELIN
Signature: Kris Abelin
Month Day Year: 04 22 97

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.
Printed/Typed Name: Sherry Parker
Signature: Sherry Parker
Month Day Year: 05 09 97

EPA Form 8700-22 (Rev. 9-88) Previous edition is obsolete.

NOTICE: THE ORIGINAL AND NOT LESS THAN TWO (2) COPIES MUST MOVE WITH THE HAZARDOUS WASTE SHIPMENT. ONCE DELIVERED, THE TREATMENT/STORAGE/DISPOSAL FACILITY MUST RETURN THIS ORIGINAL COPY TO THE GENERATOR.

This Shipping Order must be legibly filled in, in ink, in indelible pencil, or in Carbon, and retained by the Agent.

Shipper No. B 05859

Carrier No.

Date 11-5-97

(Name of Carrier)

TO: Consignee JP Routhier & Sons	FROM: Shipper LRS ENVIRO-SERVICES
Street	Street
Destination Littleton, MA	Origin WOBURN MA
Route	Emergency Response Phone No. (508) 772-4251 — Vehicle Number

No. Shipping Units	HM*	Kind of Packaging, Description of Articles, Special Marks and Exceptions	Weight (Subject to correction)	Rate	CHARGES
		T/L Scrap Tires			
		Scrap Passenger Tires			
		Scrap Truck Tires			
14		" OVERSIZED TIRES			
		P/U Tr#			
		Drop Tr# Don Rudy			

When transporting hazardous materials include the technical or chemical name (or n.o.s. not otherwise specified) or general description of material with appropriate UN or NA number as defined in US DOT Emergency Communication Standard (HM-126C). Provide emergency response phone number in case of incident or accident involving carrier.

REMIT C.O.D. TO: ADDRESS:		COD Amt: $	C.O.D. FEE: PREPAID ☐ COLLECT ☐ $
NOTE – Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property. The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding $ _____ per _____	This is to certify that the above named materials are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation. _____ Signature	Subject to Section 7 of the conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges. _____ (Signature of Consignor)	TOTAL CHARGES: $ FREIGHT CHARGES FREIGHT PREPAID except when box at right is checked. Check box if charges are to be collect ☐

RECEIVED, subject to the classifications and lawfully filed tariffs in effect on the date of the issue of this Bill of Lading, the property described above in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said property over all or any portion of said route to destination and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the Bill of Lading terms and conditions in the governing classification on the date of shipment.

Shipper hereby certifies that he is familiar with all the Bill of Lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

NOTICE: Freight moving under this Bill of Lading is subject to the classifications and lawfully filed tariffs in effect on the date of this Bill of Lading. This notice supersedes and negates any claimed, alleged or asserted oral or written contract, promise, representation or understanding between the parties with respect to this freight, except to the extent of any written contract which establishes lawful contract carriage and is signed by authorized representatives of both parties to the contract.

SHIPPER J.P. ROUTHIER & SONS, INC.	CARRIER J. P. Routhier & Son
PER 256 Ayer Road	PER
Littleton, Massachusetts 01460-1010	DATE 11-5-97

2

*HAZARDOUS MATERIALS – MARK WITH "X" TO DESIGNATE HAZARDOUS MATERIALS AS REFERENCED IN 49CFR § 172.202.

Agent must detach and retain this Shipping Order and must sign the Original Bill of Lading.

This Shipping Order must be legibly filled in, in Ink, in Indelible Pencil, or in Carbon, and retained by the Agent.

Shipper No. B 09868

Carrier No.

Date 11-5-97

(Name of Carrier)

TO: Consignee	JP Routhier & Sons	FROM: Shipper	I.R.S ENVIRO-SERVICES
Street		Street	
Destination	Littleton, MA	Origin	LUBURN MA
Route		Emergency Response Phone No	(508) 772-4251
		Vehicle Number	78/XB6

No. Shipping Units	HM*	Kind of Packaging, Description of Articles, Special Marks and Exceptions	Weight (subject to correction)	Rate	CHARGES
		T/L Scrap Tires			
		Scrap Passenger Tires			
25		Scrap Truck Tires			
15		" OVERSIZED TIRES 15			
		P/U Tr# in 8:00 A.M.			
		Drop Tr# Out.			

*When transporting hazardous materials include the technical or chemical name for n.o.s. (not otherwise specified) or generic description of material, and the proper UN or NA number as defined in US DOT Emergency Communication Standard (BM-126C). Provide emergency response phone number in case of incident or accident in box above

REMIT C.O.D. TO: ADDRESS:

COD Amt: $

C.O.D. FEE: PREPAID ☐ COLLECT ☐ $

NOTE – Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property.
The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding
$ _____ per _____

This is to certify that the above named materials are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.
_____ Signature

Subject to Section 7 of the conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.
_____ (Signature of Consignor)

TOTAL CHARGES: $

FREIGHT CHARGES: FREIGHT PREPAID except when box at right is checked ☐ Check box if charges are to be collect

RECEIVED, subject to the classifications and lawfully filed tariffs in effect on the date of the issue of this Bill of Lading, the property described above in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said property over all or any portion of said route to destination and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the Bill of Lading terms and conditions in the governing classification on the date of shipment.

Shipper hereby certifies that he is familiar with all the Bill of Lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

NOTICE: Freight moving under this Bill of Lading is subject to the classifications and lawfully filed tariffs in effect on the date of this Bill of Lading. This notice supersedes and negates any claimed, alleged or asserted oral or written contract, promise, representation or understanding between the parties with respect to this freight, except to the extent of any written contract which establishes lawful contract carriage and is signed by authorized representatives of both parties to the contract.

SHIPPER	J.P. ROUTHIER & SONS, INC.	CARRIER	
PER	256 Ayer Road	PER	
	Littleton, Massachusetts 01460-1010	DATE	

2

[illegible] DESIGNATE HAZARDOUS MATERIALS AS REQUIRED [illegible]

Agent must detach and retain this *Shipping Order* and must sign the Original Bill of Lading.

WASTE MATERIAL PROFILE SHEET

GENERAL CHEMICAL
133-138 Leland St.
Framingham, MA 01701
(508) 872-5000
(508) 875-5271 (Fax)

730-01

EMERG. RESP. # _____

APPROVAL CODE: VT _____

SALESMAN: O'Leary

PLEASE ATTACH: All Material Safety Data Sheets (MSDS), Analysis Reports, Handling Precautions, Additional Hazard Information, Support Data & Comments.

Generator Name Industriplex Remedial
Facility Address 23 Atlantic Ave
City, State, Zip Woburn Ma 01801
Technical Contact MP6179329597 (Name) (Title)
Area Code (617) Telephone # 932-9597
Facility EPA ID # _____

Billing Address LRS Enviro Services
City, State, Zip _____
Business Contact Mike Lovezolla (Name) (Title)
Area Code (603) Telephone # 926-4884
Common Name of Waste Carbon
EPA Haz. Waste Nos. MA99
Container Type: ☐ Drum ☐ Bulk ☒ Other T-PACK
Rate of Generation: _____ (Quan) (Units) per (Time Interval)
Proper DOT Shipping Name: include RQ information
NON RCRA - NON DOT REGULATED
Add'l Desc. (_____)
Haz Class _____ UN/NA No. _____ PG _____

PROCESS GENERATING WASTE

CHEMICAL COMPOSITION (Totals to 100 %)

Spent Activated Carbon
(Analytical Attached)

PHYSICAL DESCRIPTION

Physical State	☐ Liquid	☐ Semi Solid	☒ Solid
Viscosity	☐ Low	☐ Medium	☐ High
Liquid Layering	☐ None	☐ Bilayered	☐ Multilayered

Solids: Suspended 100% Sulfides(ppm) 0
Free Liquid: 0 Flash (°F) NONE
Odor MILD Color BLACK
Specific Gravity <1 pH 5.9
Cyanides (ppm) 0 PCB (ppm) 0

METALS (Mg/l or ppm)

(Check One) ☐ TCLP ☐ TOTAL

Arsenic (D004)	0	Selenium (D010)	0
Barium (D005)		Silver (D011)	
Cadmium (D006)		Copper	
Chromium (D007)		Nickel	
Lead (D008)		Zinc	
Mercury (D009)		Thallium	
Other		Other	

ORGANICS (Mg/l or ppm) TCLP

Endrin	0	2,4-Dinitrotoluene	0
Lindane		Heptachlor	
Methoxychlor		Hexachlorobenzene	
Toxaphene		Hexachloro-1,3-butadiene	
2,4-D		Hexachloroethane	
2,4,5-TP (Silvex)		Methyl Ethyl Ketone	
Benzene		Nitrobenzene	
Carbon tetrachloride		Pentachlorophenol	
Chlordane		Pyridine	
Chlorobenzene		Tetrachloroethylene	
Chloroform		Trichloroethylene	
o-Cresol		2,4,5-Trichlorophenol	
m-Cresol		2,4,6-Trichlorophenol	
p-Cresol		Vinyl chloride	
Cresol		Mercaptans	
1,4-Dichlorobenzene		Phenol (ics)	
1,2-Dichloroethane		Other	
1,1-Dichloroethylene		Other	

Other Comments/Info _____

GCC USE ONLY

015

Approved for Acceptance Yes No

Description _____
GC Analysis _____
Flash _____ Halogens _____
CLASS IN _____

Lab Approval _____ ESM Approval _____

I hereby certify that I have personally examined and am familiar with the information submitted in this and all attached documents. I believe that the submitted information is true, accurate, and complete to the best of my knowledge and ability and that all known and suspected hazards have been disclosed. I further authorize General Chemical Corporation to transmit the above information to regulatory or TSD facilities as required for approvals.

DATE 11/14/97 By Donald Ruby (Name (Please Print)) Title Signature

White: Main File Yellow: Office Pink: Sales Goldenrod: Customer

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF HAZARDOUS MATERIALS
One Winter Street
Boston, Massachusetts 02108

GCC FILE # 08077

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator US EPA ID No. MP6179329597 Manifest Document No. 1717-1
2. Page 1 of 1
Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address
INDUSTRI PLEX REMEDIAL TRUST
23 ATLANTIC AVE WOBURN MA. 02101
4. Generator's Phone ( ) 617-932-9597

A. State Manifest Document Number MA K017806
B. State Gen. ID SAME
C. State Trans. ID MA 62331
D. Transporter's Phone ( ) 508-872-5000
E. State Trans. ID
F. Transporter's Phone ( )
G. State Facility's ID Not Required
H. Facility's Phone ( ) 508-872-5000

5. Transporter 1 Company Name: GENERAL CHEMICAL CORPORATION
6. US EPA ID Number: MAD019371079
7. Transporter 2 Company Name
8. US EPA ID Number
9. Designated Facility Name and Site Address
GENERAL CHEMICAL CORPORATION
133 LELAND STREET
FRAMINGHAM MA 01702
10. US EPA ID Number: MAD019371079

11. US DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
a. NON RCRA/NON DOT REGULATED MATERIAL (CARBON)	004	BA	00004	Y	NA99
b.					
c.					
d.					

J. Additional Descriptions for Materials Listed Above (include physical state and hazard code.)
a. Auth. # 730-01
b.
c.
d.

K. Handling Codes for Wastes Listed Above
a. S01
b.
c.
d.

15. Special Handling Instructions and Additional Information
JOHN FIORI 617-932-9597

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

GENERATOR — Printed/Typed Name: Donald Ruby — Signature: Donald Ruby — Date (Month Day Year): 11/14/97

TRANSPORTER
17. Transporter 1 Acknowledgement of Receipt of Materials — Printed/Typed Name: Bill Wade — Signature — Date (Month Day Year): 11/14/97
18. Transporter 2 Acknowledgement of Receipt of Materials — Printed/Typed Name — Signature — Date (Month Day Year)

FACILITY
19. Discrepancy Indication Space
20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.
Printed/Typed Name: SANDY FOSTER — Signature: Sandy Foster — Date (Month Day Year): 11/29/97

In case of emergency or spill, immediately call the National Response Center (800) 424-8802.

MA K017806 COPY>3: FACILITY MAILS TO GENERATOR

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EPA Form 8700-22 (Rev. 9-94) Previous editions are obsolete

COPY>3: FACILITY MAILS TO GENERATOR