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FINAL REMEDIAL ACTION WORK PLAN LANDFILL 5 REVISION 2 FORT SHERIDAN IL
9/13/2004
TETRA TECH EM, INC

REMEDIATION ACTION WORK PLAN

Landfill 5

DEPARTMENT OF DEFENSE OPERABLE UNIT FORT SHERIDAN, ILLINOIS

FINAL

13 September 2004

Revision 2.0

Prepared for:



Headquarters Department of Army BRAC Division
DSCPIM ATTN AFPIBC
1347 Thorne Avenue SW, Bldg 243
Fort McPherson, Georgia 30330

Prepared by:

KEMRON Fort Sheridan
Environmental
Tetra Tech EM, Inc. Restoration Team

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DEPARTMENT OF THE ARMY
BASE REALIGNMENT AND CLOSURE
ATLANTA FIELD OFFICE
1347 THORNE AVENUE SW, BLDG 243
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SEPTEMBER 14, 2004

Mr. Brian Conrath
Remedial Project Manager
Federal Facilities Unit
Illinois Environmental Protection Agency
1021 North Grand Avenue East
P.O. Box 19276
Springfield, IL 60601

Subject: FINAL – Landfill 5 Work Plan
Fort Sheridan Environmental Restoration Project

Dear Mr. Conrath:

Please find the enclosed copy of the Final Work Plan for Landfill 5, Revision 2.0, dated 13 September 2004, for the Department of Defense Operable Unit, Fort Sheridan, Illinois.

At the Army's direction, KEMRON Environmental Services, Inc. (KEMRON) is forwarding the document directly to the Illinois EPA for review.

If you have any questions, please call me at 847.266.6323.

Sincerely,



_____ for

Victor Bonilla
Forces Command
BRAC Division

cc:
Victor Bonilla, FORSCOM
Shoki Tabet, FORSCOM
Dan Fleming, U.S. Navy
Jeff Leach, USACHPPM
Chris Boes, AEC
Tracy Bergquist, KEMRON Environmental
Mary Lou Rochotte, KEMRON Environmental
Bill Walters – U.S. Army Reserve



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ATLANTA FIELD OFFICE
1777 HARDEE AVENUE, SW
FORT MCPHERSON, GEORGIA 30330-1062



JULY 12, 2004

DAIM-BO-A-SH

Mr. Brian A. Conrath
Illinois Environmental Protection Agency
1021 N. Grand Avenue
Springfield, Illinois 62794-9276

**Subject: Final Remedial Design Document, Landfill 5, Revision 3.0, 12 July 2004,
Fort Sheridan Environmental Restoration Project**

Dear Mr. Conrath:

Enclosed, please find three (3) copies of the Final Remedial Design Document for Landfill 5, Department of Defense Operable Unit, Fort Sheridan, Illinois, Revision 3.0, 12 July 2004.

The Final Remedial Design Document has been prepared to incorporate responses to comments received from Illinois EPA on the R3 100% Design Document, Revision 2, 10 June 2004. Illinois EPA was the sole commenter on the 10 June 2004, Revision 2 Design Document. The Army has prepared and enclosed a response to comments addressing each of the Illinois EPA comments. Three bound copies of the Final Design Document are enclosed.

Please note that no changes were made to the set of drawings included in the 10 June 2004 issuance, and the previously issued set of drawings should be filed with this Final Design Document.

If you have questions regarding this document, please contact Kurt Thomsen at (847) 266-6323.

Sincerely,

 for

Victor Bonilla
Forces Command
BRAC Division

Restoration Project Office

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12 July 2004

Mr. Victor Bonilla
Department of the Army
BRAC Division
Atlanta Field Office
1347 Thorne Avenue SW, Building 243
Fort McPherson, Georgia 30330-1062

**Re: Landfill 5 Final Remedial Design Document,
Revision 3, 12 July 2004
Fort Sheridan Environmental Restoration Project
Fort Sheridan, Illinois**

Dear Mr. Bonilla:

Please find enclosed two (2) copies of the Landfill 5 Final Remedial Design Document, Revision 3.0, dated 12 July 2004, for the Department of Defense Operable Unit, Fort Sheridan, Illinois.

A response to comments received from Illinois EPA on the R3 10 June 2004 Remedial Design Document is included in the document, and the final document reflects changes made in response to the Agency's comments.

Please note that there have been no changes to the drawings for Landfill 5 in response to comments received. Therefore, all recipients of the Final Remedial Design Document should combine the previously issued drawings (transmitted with the 10 June 2004 R3 version of the Landfill 5 Design Document) with this Final Design Document text for a complete set of documents that reflect the final Landfill 5 remedial design.

KEMRON will continue to coordinate with the Army regarding contracting and implementation of the design, to facilitate completion of this portion of the environmental restoration project. If you have any questions regarding the Landfill 5 Final Remedial Design Document, please contact me or Larry Emerson (847-266-1350 or lemerson@kemron.com).

KEMRON is pleased to achieve this additional important milestone in addressing the environmental restoration at Fort Sheridan.

Sincerely,
KEMRON Environmental Services, Inc.



Fort Sheridan Restoration Team
Project Manager

cc: Chaouki Tabet (1) – Headquarters Department of the Army
Kurt O. Thomsen (1) – Fort Sheridan Environmental Coordinator
Brian Conrath (3) – Illinois EPA
Dan Fleming (1) – US Navy
Kurt Zacharias (2) – USARC
Bill Walters (1) – US Army Reserve
Eric Johnson (1) – US Army Reserve State Environmental Manager
Jeff Leach (2) - USACHPPM
Chris Boes (1) – AEC Representative
Tony Nesky (1) – Army Regional Environmental Coordinator, Region 5
Tracy Bergquist (1) – KEMRON GFPR Project Manager
Larry Emerson (3) – KEMRON Project Engineer
Mary Lou Rochotte (1) – KEMRON Project Manager
Mindy Gould (2) – Tetra Tech
Patrick Brennan (1) – City of Highland Park
Paul P. Diambri (1) – City of Highwood
Robert R. Kiely, Jr. (1) – City of Lake Forest

**Army Response to Illinois EPA June 24, 2004 Comments on the Final Remedial Design Document
Landfill 5, Fort Sheridan, Illinois**

12 July 2004

This letter provides the Army's responses to your comments on the Draft Remedial Design Document dated June 25, 2004. As described below, the Landfill 5 Design Document and accompanying Appendices (C and D) have been revised and are submitted to you as attachments to this letter. These revisions were reviewed with you in a phone conversation on June 29, 2004 with Larry Emerson of Kemron and Mindy Gould of Tetra Tech EMI. As agreed during the call, these revisions will be the final revisions to the Landfill 5 Design Document and the Army will proceed to issue the complete 100% Design for bid and construction.

- 1. List of Acronyms – The definition of BCT should be BRAC Cleanup Team. Please revise.**

Response: Revision has been made.

- 2. Section 2.1, Response to Illinois EPA Comment (RtC) Number 4 – Comment is not fully addressed. The potential risks for all future scenarios should be presented, rather than just the value for residents exposed to surface soil. By only providing one risk value, this revision appears to downplay the other potential risks. Please list all of the calculated risk values that are within or above the risk management range.**

Response: Revision has been made.

- 3. Section 2.1.4, RtC Number 8 – The Agency does not agree with the provided revision. It is too vague. Suggest rewording the last sentence of the first paragraph as follows:**

The RAO for Landfill 5 is a human health risk value of 1×10^{-6} , but the final residual risk level may be within the risk management range of 1×10^{-4} to 1×10^{-6} or less than 10^{-6} .

Response: Revision has been made.

- 4. Section 2.2.8, RtC Number 9 – The revised version does not match the previously agreed to wording. Mr. Larry Emerson (Kemron) and I worked out the language for this section via e-mail between May 20 and May 24 of this year. Various wording from every paragraph of our agreed upon language has been omitted or changed. Please review the agreed upon proposed changes to the text and revise to match. Specifically, the last two sentences of the first paragraph, the last two sentences of the second paragraph, the last sentence of the third paragraph, and the last paragraph, as per the e-mail dated May 24 from Mr. Emerson to me.**

Response: Revision has been made.

- 5. Section 2.3.4.1, RtC Number 18 – The last sentence of the first paragraph includes the words “by weight”. This was not agreed to and is unacceptable. How can one make a visual determination by weight? The Agency suggests using “by volume”, in place of “by weight.”**

Response: The reference to "by weight" has been clarified by referencing the appropriate ASTM standard.

6. **Table 2-2 – The groundwater monitoring should, for this estimate, continue at least annually for the entire duration of the operation and maintenance (30 years) just as the inspections and repair work do. The groundwater monitoring may well not be terminated at the end of the initial five years of data collection. This will change the total and present worth costs for the remedy.**

Response: The following language suggested by Illinois EPA has been added to clarify this section: "Illinois EPA's concurrence will be based on the available data and may require additional monitoring."

7. **Table 2-2 – The bottom half of the table, which included the present worth costs of the bituminous pavement replacement at 10, 20, and 30 years, has been removed and replaced with the groundwater sampling information. These costs, or something akin to them, need to be added back. The operation and maintenance for Landfill 5 will need to maintain, and replace when necessary, all pavement remaining at the surface above the landfill, in perpetuity. This would include, but not be limited to, the parking area at Building 599 and First Street, unless other arrangements have been made.**

Response: No changes were made to the table. As explained by Larry Emerson and Mindy Gould, the repair costs were already included in the top half of the table and their removal actually eliminated a "double count" of the repair costs. The addition of the groundwater costs provides additional refinement of the estimate to account for the changing present worth costs that occur from Year 1 to Year 5.

8. **Appendix C, RtC Number 42 – The response states the correction has been made. It has not. Please revise according to the original comment.**

Response: The revision has been made.

9. **Appendix C, RtC Number 44 – See comment number 4 above. The language in this section (4.0) of this appendix should match that in Section 2.2.8 of the text, once it has been revised.**

Response: The language describing groundwater monitoring in Section 2.2.8 has been copied to Appendix C.

10. **Appendix C, Section 5.3 – The first sentence states that the quarterly reports will be submitted to the Army. Illinois EPA will also require a copy of these reports. Please include Illinois EPA on the list to receive copies.**

Response: The revision has been made. Additional changes to the language in Section 5.3 have been made to clarify that quarterly or annual reports will be submitted. The determination for quarterly or annual reporting will be based on requirements specified elsewhere in the plan for inspections and monitoring.

11. **Appendix D, Page 1, Agency Coordination** – There is a significant amount of text from the LUCMOA that should have been included in Appendix D that has not been. The first paragraph should have the following text added to it to be consistent with the LUCMOA language:

Such notification must be provided for the purpose of obtaining Illinois EPA concurrence with the HQDA BRAC AFO determination as to whether the contemplated change will or will not necessitate the need for re-evaluation of the selected remedy or implementation of specific measures to ensure continued protection of human health and the environment.

Except in the case of an emergency where the Navy, Reserve, and the HQDA BRAC AFO personnel reasonably believe it is not practicable to wait for Illinois EPA concurrence, no Land Use Change should be implemented until Illinois EPA concurrence is obtained, consistent with the timeliness requirements set below. Each notification or request for concurrence must include:

1. *An evaluation of whether the anticipated Land Use Change will pose unacceptable risks to human health and the environment or negatively impact the effectiveness of the selected Site remedy;*
2. *An evaluation of the need for any additional remedial action or LUCs resulting from implementation of the anticipated Land Use Change; and,*
3. *A proposal for any necessary changes in the selected Site remedy.*

After the HQDA BRAC AFO receives notice from either the Navy or Reserve of an anticipated Land Use Change at a Site, the HQDA BRAC AFO will notify the Illinois EPA. As provided above, the Illinois EPA shall evaluate the information and will provide a response within 30 working days to the affected party and the HQDA BRAC AFO. If a response is not provided within 30 working days, the Illinois EPA can request an extension. If a response is not provided within the requested and approved extension it is presumed that the Illinois EPA concurs with the proposed change.

Any of the following will constitute a Land Use Change:

1. *Any change in land use (e.g. from industrial to residential) inconsistent with any land use contained in those specific exposure assumptions in the human health or ecological risk assessments that served as the basis for the LUCs implemented at the Site;*
2. *Any Site activity disrupting the effectiveness of the implemented LUC. Examples include, but are not limited to: excavation at a landfill; groundwater pumping impacting a groundwater pump and treat system; a construction project impacting ecological habitat protected by the remedy; removal of a fence; unlocking of a gate; or removal of warning signs; or,*

3. Any Site activity intended to alter or negate the need for the specific LUC(s) implemented at the Site.

Response: The language has been added. The Army also added some language in this Revision 3.0 which does not affect the notification requirements described above.

12. Appendix D, Description of Land Use Controls – The first sentence should conclude with, as well as in the associated LUCIP.

Response: As agreed to during the conference call, all the site-specific language from the former LUCIP has been added to Appendix D, so there will be no separate LUCIP.

13. Appendix D, Site Access – The last sentence should read, “...at all reasonable times for purposes including, but not limited to, review compliance efforts...”

Response: This revision has been made.

14. Appendix D – Following the last paragraph, there should be another paragraph to read as follows:

“An annual report will be submitted to Illinois EPA signed by the Navy, Army Reserve, and the HQDA BRAC AFO certifying the continued retention of all implemented LUCs.”

Response: This revision has been made. Additionally, a cross-reference to Appendix C reporting requirements has been added to ensure consistency throughout the document.

15. Appendix D – The Land Use Control Implementation Plan (LUCIP) for Landfill 5, from the LUCMOA, must be included herein. It should be updated as necessary to include a description of the site after physical remedy implementation and include a map of the site.

Response: As agreed to during the conference call, all the site-specific language from the former LUCIP has been added to Appendix D, so there will be no separate LUCIP.

16. Drawing #19, RtC Number 47 – The response indicates that the drawing has been revised. It does not appear that it has.

Is the detail for the “Typical Asphalt Pavement Detail” provided to show the profile of a typical asphalt installation (for those areas that the pavement will not be replaced) or is it provided to show the detail for areas on Landfill 5 that will have the pavement replaced? If the former, then the detail is acceptable. If the latter, then the detail still requires revision to show the two feet of compacted clay and the GCL. Please verify which is the case and amend as necessary. It would also be helpful to spell out on the drawing to which case it is applicable.

Response: The detail in question is intended to show the asphalt profile only and not the entire landfill cover (which includes the clay and GCL). A detail of the entire cover is already included in the drawings.

Larry Emerson

From: Larry Emerson [lemerson@kemron.com]
Sent: Tuesday, March 02, 2004 10:29 AM
To: Sheridanbec@aol.com
Cc: 'Pat Bolger'; lemerson@kemron.com
Subject: Landfill 5 Design Issues
Importance: High

Kurt:

Now that the R1/R2 draft design drawings/specifications have been issued, KEMRON seeks feedback from the Navy and the Army Reserves regarding on-going design issues. These issues will need to be addressed before final designs can be completed. Some of the issues could potentially be resolved prior to the R3 submittal. In the interest of expediting the design review process, especially through the IEPA, we would like to get a dialogue started, if not resolutions to the issues at hand, within the next two weeks.

The topics and specific questions for the Navy and Army Reserves include:

LUC's

1. What is the future status of fencing needed, portions of which would cross landfill 5?
2. Must the fence physically cross over the landfill? Note, fence post penetrations into the landfill cap must be addressed in our design.
3. What is the boundary of Navy/Reserves property along the west and north banks of Bartlet Ravine, near CSA-3? Where is the survey documentation attesting to this dividing line?
4. Refer to the End Use Plan below for further discussion regarding the LUC's.

Utilities

5. Can the Navy determine if the "Signal Company" Communications cable, beneath the pavement west of Bldg 378, is still alive? No utility claimed it at our joint utility meet. Note, this cable currently spans over the Bartlet Ravine via concrete piers and steel trestles. We propose to abandon the buried portion in place and fill the manholes with sand if this utility is determined to be dead. If alive, we will have it tagged with utility marking tape. We are proposing to replace eroded soil at the scoured concrete pier with some riprap.
6. Likewise, can the Navy provide any guidance on the disposition of the abandoned steam lines which also span the Bartlet Ravine? These steam lines lie beneath the parking lot west of Building 378. We propose to fill the manholes with sand and abandon the lines in place. However, the lines exit the limits of the landfill near the east edge of Bartlet Ravine. We propose to protect the exit location with suitable materials. However, the Navy should note that the steam lines spanning over the ravine look to be insulated with asbestos or similar material.
7. We need both the Navy and Reserves to identify live vs. dead overhead power utilities as well as unneeded power poles. Many poles lie inside the landfill footprint. We propose to have the Navy remove dead poles and dead wires. We also propose that the Navy protect other wires by raising the low hanging lines to have adequate clearance after the landfill is raised several feet above existing grades.
8. The proposed plans indicate that several storm water catch basins will be raised to meet final grades due to their location within the footprint. Does either the Navy or Reserves have an issue with placing solid manhole lids over these catch basins? Please note, landfill runoff will be handled with a new storm water drain pipe parallel to the toe of landfill down to Bartlet Ravine.

Roadways/Paving/Parking

9. Does the Navy have any issues with the proposed driveway entrance modifications off Finley Street and the proposed parking lot modification for Building 378?

10. Do the Reserves have any issues with the paved asphalt driveway around Building 149?
11. Does either the Navy or Reserves have any vehicular access concerns with the proposed terminations at the B Street and Finley Road intersection?

Structures

12. Does the Navy have any plans and schedule for demolition of the bowling center building? As shown on the design plans, a new drain pipe will run around the east side of the building. Any demolition of the building could impact the drain pipe location as well as the cut and fill grades north of the building.

End Use Plan

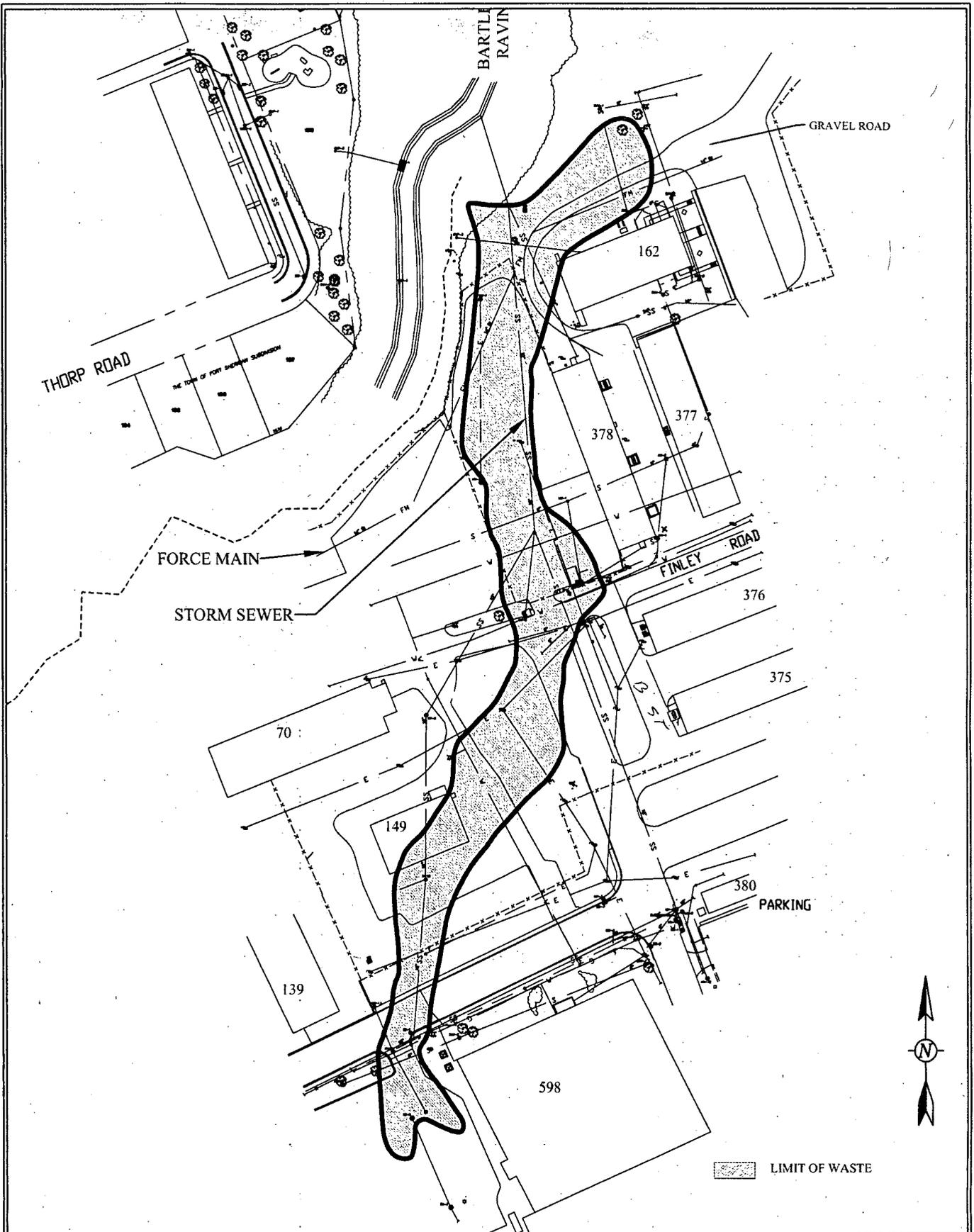
13. The proposed End Use Plan of the landfill cap includes a grassy knoll, about 3-5 feet above existing grades and asphalt paving, where needed. Routine maintenance will include mowing of the grass and clearing of debris and obstructions from the toe drain pipe inlets. Does either the Navy or Reserves have a preference to the use of turf grass seed versus prairie grass seed for vegetative cover? Due to cap liner construction, access atop the landfill should be limited to mowers and foot traffic. The capped landfill will include LUC's restricting future users.
14. The proposed plan includes Ravine slope protection both for landfill 5 and CSA3 which is on the opposite side of the ravine from the landfill. There is significant erosion on the east bank including scour and undermining of one concrete pier that supports the overhead communications conduits. The plan will include relocating some broken concrete on the slopes for stabilizing purposes, new drains, and placement of soil and or crushed rock to stabilize the slopes. Some areas will be reseeded. Does the Navy have any concerns with the use of any proposed materials placed on the slopes?

Please forward this request to Dan Fleming and Kurt Zacharias with instructions to have them forward this message to their appropriate staff members as they see fit. KEMRON has a full time engineering/project management presence on Fort Sheridan and is more than happy to meet with the appropriate parties to discuss any of these issues, answer questions or provide clarification. We would also welcome a site walkover to visually inspect any of the areas mentioned in the above issues.

Thanks.

Larry Emerson, P.E.
Senior Project Engineer
KEMRON Environmental Services, Inc.
Fort Sheridan, IL 60037
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KEMRON Fort Sheridan
 Environmental
 Tetra Tech EM, Inc. Restoration Team

0 75 150
 SCALE IN FEET

FIGURE 3

LANDFILL NO. 5 REMEDIES
 DECISION DOCUMENT
 FORT SHERIDAN, ILLINOIS

Pat Bolger

From: Larry Emerson [lemerson@kemron.com]
Sent: Tuesday, March 02, 2004 10:29 AM
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3/24/2004

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Thanks.

Larry Emerson, P.E.
Senior Project Engineer
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3/24/2004

REMEDIAL ACTION WORK PLAN

Landfill 5

DEPARTMENT OF DEFENSE OPERABLE UNIT FORT SHERIDAN, ILLINOIS

FINAL

13 September 2004

Revision 2.0

Prepared for:



Headquarters Department of Army BRAC Division
DSCPIM ATTN AFPIBC
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Fort McPherson, Georgia 30330

Prepared by:

KEMRON Fort Sheridan
Environmental
Tetra Tech EM, Inc. Restoration Team

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Appendix B Final Construction Drawings
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LIST OF ACRONYMNS

ARAR	Applicable or Relevant and Appropriate Requirement
BRAC	Base Realignment and Closure
BCT	BRAC Cleanup Team
BEC	Base Environmental Coordinator
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CIP	Community Involvement Plan
CQA	Construction Quality Assurance
CQAP	Construction Quality Assurance Plan
CY	Cubic Yards
DMP	Dust Mitigation Plan
ECP	Erosion Control Plan
EPA	Environmental Protection Agency
FS	Feasibility Study
GCL	Geosynthetic Clay Liner
HASP	Health and Safety Plan
HELP	Hydrologic Evaluation of Landfill Permeability
HHRA	Human Health Risk Assessment
Illinois EPA	Illinois Environmental Protection Agency
KEMRON	KEMRON Environmental Services
NPDES	National Pollutant Discharge Elimination System
O&M	Operations & Maintenance
OSHA	Occupational, Safety, and Health Administration
PAHs	Polycyclic Aromatic Hydrocarbons
PMP	Project Management Plan
PPE	Personal Protective Equipment
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
RAB	Restoration Advisory Board
RA	Remedial Action
RAWP	Remedial Action Work Plan
RI	Remedial Investigation
SCP	Spill Control Plan
SAP	Sampling and Analysis Plan
Surplus OU	Surplus Operable Unit
SWPPP	Stormwater Pollution Prevention Plan
TACO	Tiered Approach to Corrective Action Objective
U.S. EPA	United States Environmental Protection Agency

1.0 Introduction

This Remedial Action Work Plan (RAWP) outlines the construction methods and procedures to be followed for the Remedial Action (RA) at Landfill 5, Fort Sheridan, Illinois. The RAWP will be used as a comprehensive reference document for the requirements of the various construction aspects of the RA. It does not present all the details of the RA requirements, but rather references the previously approved Remedial Design Document for Landfill 5, Revision 3.0, July 2004, and other previously approved site-wide documents. Further details, as necessary, can be found in the documents referenced in each section of this RAWP. This plan has been prepared to be consistent with the documents in the RAWP References portion of this plan. This RAWP, including the Specifications and Drawings in Appendices A and B, form the comprehensive requirements for the RA at Landfill 5. Appendices A and B of this RAWP cross-reference the project specifications and engineering drawings contained within the Landfill 5 Final Remedial Design Document, Revision 3.0, July 2004.

All documents listed in the RAWP References that pertain to construction activities, including revisions to the documents, will be maintained, used and followed as part of this RAWP. Unless noted specifically otherwise, the requirements of the Project Specifications (Appendix A) and Drawings (Appendix B) will govern the construction requirements.

1.1 Site History and Enforcement Activities

This section provides background information about Fort Sheridan and Landfill 5. Background information for Landfill 5 will also include activities that led to the current environmental conditions, site investigations, and removal actions conducted to date.

1.1.1 Facility History

Fort Sheridan is a 712-acre former Department of Defense facility located approximately 25 miles north of downtown district of Chicago, along the western shores of Lake Michigan, in Lake County, Illinois. The facility is bounded by the communities of Lake Forest to the north, Highland Park to the south, and Highwood to the west (Figure 1). Fort Sheridan was an active U.S. Army installation from 1887 to 1993. In 1998, the Base Realignment and Closure (BRAC) Commission recommended to the U.S. Secretary of Defense that Fort Sheridan be closed. In 1993, approximately 206 acres of Fort Sheridan land were transferred to the U.S. Navy, and are now primarily used for military family housing. Approximately 100 acres of the base property were retained by the U.S. Army Reserve and are currently used for equipment storage and disbursement, training, and administrative functions. The remaining area, approximately 400 acres, was declared excess. The excess property is referred to as the Surplus Operable Unit (Surplus OU) and has been transferred to local municipal control for housing and a golf course.

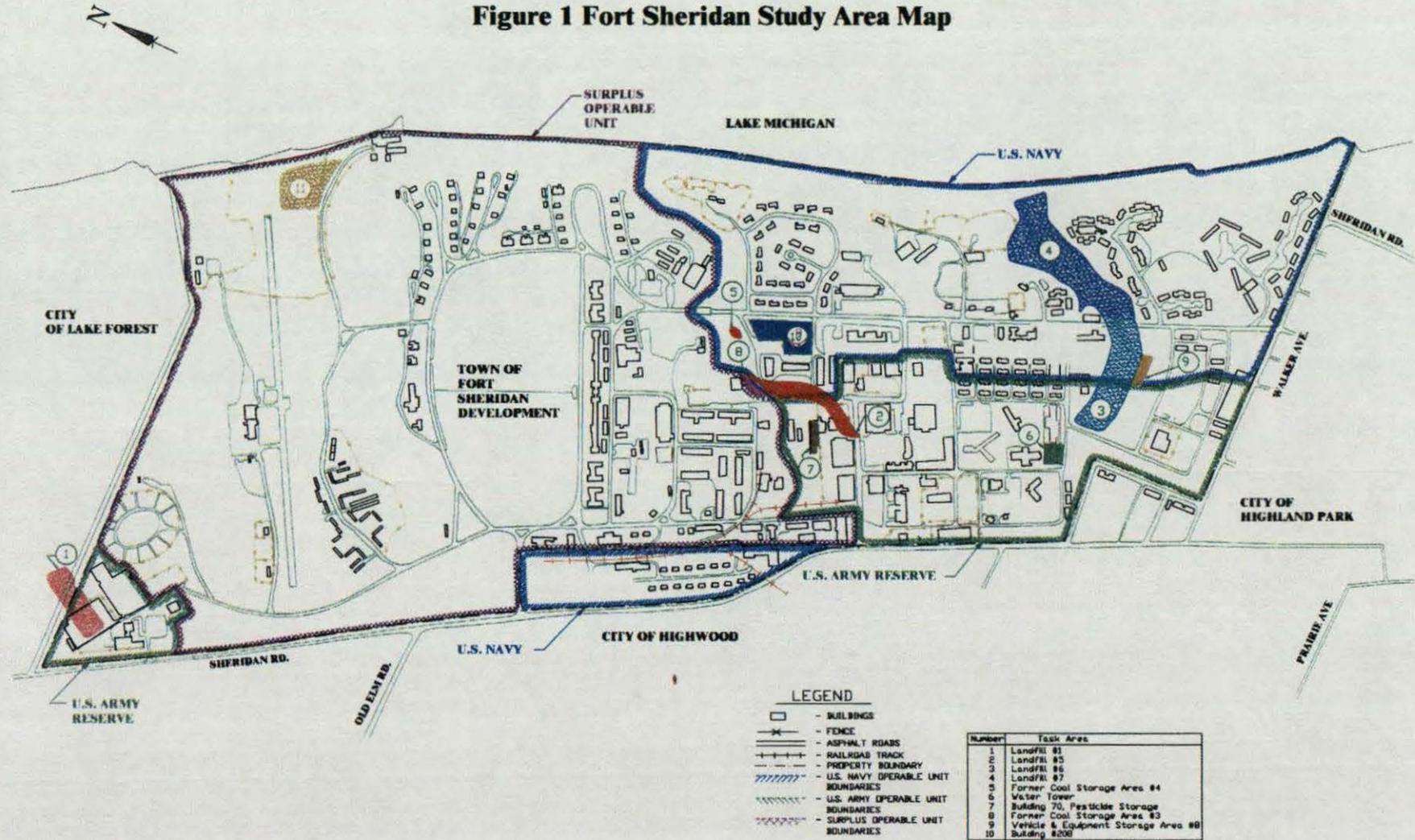
1.1.2 Landfill 5

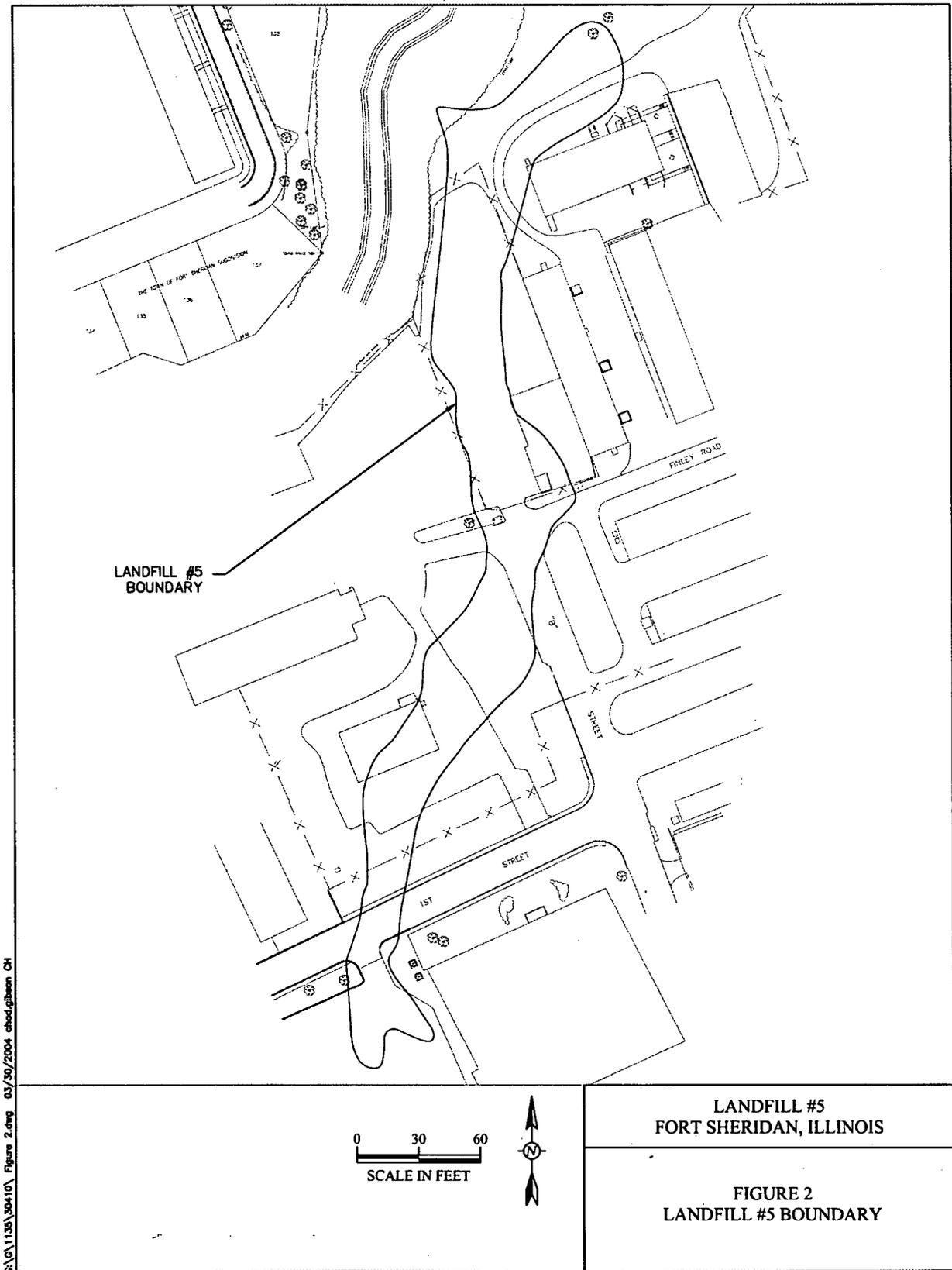
Landfill 5 encompasses approximately 2.3 acres, and is located in a light industrial area in Fort Sheridan and is surrounded by warehouse facilities. The borders are in a north-south trending tributary of Bartlett Ravine through the area along B Street with the southern boundary is south of 1st Street. Landfill 5 was used to dispose of general refuse, including fill and construction debris, from about 1900 through the 1960s. The site is currently used for shop activities along with vehicle and equipment storage. The majority of the site is fenced and overlain by concrete, asphalt, and soil. Numerous active sanitary and storm sewer lines intersect Landfill 5. The depths of these utility lines are estimated to range from 5 to 12 feet below ground surface. The available information concerning the utilities is shown in Appendix B, on Sheet 2 of the design drawings.

Based on soil boring data obtained during the Phase III RI and historical maps, the boundary of Landfill 5 was redefined as shown on Figure 2. Wastes encountered at the site include cinders and other burned material along with artifacts (for example, soft drink bottles) dating back to the early 1900s. Construction rubble reportedly was disposed of at this site during the mid-1960s. No records are available that document the disposal of hazardous wastes at the site. Based on available information, Landfill 5 contains approximately 99,000 cubic yards of soil/waste.

The Remedial Investigation (RI) results indicate that subsurface soil and waste within Landfill 5 is contaminated with polycyclic aromatic hydrocarbons (PAHs) and lead. The Human Health Risk Assessment (HHRA) indicates that risks for the current land-use scenarios achieve the U.S. EPA's standards for public health protection; however, levels of PAHs and lead may present risk to future residential and recreational land users through direct contact with or ingestion of the substances if they are exposed. The potential risk to residents exposed to surface soil (the most likely exposure scenario) can be expressed as 1×10^{-4} , or one additional chance in ten thousand of developing cancer as a result of lifetime exposure. The RI found no evidence that the waste in Landfill 5 is contributing to the degradation of underlying groundwater and found that no ecological risks are associated with current or future land-use scenarios at the landfill.

Figure 1 Fort Sheridan Study Area Map





1.2 Remedial Action Overview

Landfill 5's key RA elements include:

- Installation of erosion control measures and storm water conveyance facilities.
- Construction of an engineered cover on Landfill 5. For areas north of 1st Street, the general remedy includes a geomembrane, such as Claymax, or similar material that will be placed over graded sub-base material or existing asphalt; and 2 feet of clay that will be placed over the geomembrane and compacted. The geomembrane will create a low-permeability cover of 1×10^{-7} cm/sec, or less, hydraulic conductivity. Depending on the planned use for a particular area, either a minimum of three inches of asphalt and 11 inches of granular material (for parking) or 6 inches of topsoil (for green space) will be placed over the clay. The topsoil will be vegetated to minimize the loss of topsoil from erosion.
- Since (1) the concrete and asphalt will provide a media that result in rapid removal of water to the existing storm drainage system, (2) more than 2 feet of clay currently exists over this area; (3) the Hydrologic Evaluation of Landfill Permeability (HELP) Model estimates the same results for water penetration; (4) there are no ground water impacts; and (5) the existing cover already meets the definition of a physical barrier criteria; no modifications to 1st Street or the parking area south of 1st Street are proposed. As 1st street is the main truck entrance to the site, this will also prevent major traffic disruption, minimize fugitive dust and protect numerous utilities beneath 1st street and the parking lot.
- Long-term maintenance of the landfill's cover system
- Operations and Maintenance Plan
- Implementation of land use controls that allow for the future use of the open land space on the landfill surfaces while preventing potentially adverse/damaging activities and allowing unrestricted limited use of the adjacent areas
- A Groundwater Monitoring Plan is included in the Draft O&M Plan, Appendix C, of the Landfill 5 Remedial Design Document. Groundwater monitoring will be conducted as part of the long term monitoring actions for Landfill 5, as necessary based on monitoring results. Groundwater monitoring will be conducted in a manner that complies with the Applicable or Relevant and Appropriate Requirements (ARAR's) identified in the Feasibility Study (FS) and as agreed upon in discussions with the Illinois EPA's Remedial Project Manager. The draft plan includes groundwater samples collected from six (6) monitoring wells surrounding Landfill 5, and collection of leachate samples from three (3) piezometers located within the landfill footprint and screened within the landfill waste. The leachate and groundwater samples will be analyzed for an initial five-year period.

1.3 Remedial Action Work Plan Organization

The remainder of this RAWP organizes the requirements and presents the procedures to be followed during RA construction at Landfill 5. The RAWP is organized to present the RA requirements in a logical and chronological order; from environmental protection requirements and pre-mobilization to post construction and restoration. References and plan specifications throughout this RAWP refer to other work and/or project plans. It is the intent of this document to serve as a user friendly, comprehensive guide for the RA construction activities. It may reference existing information where possible and summarize information in a clear concise manner.

The RAWP presents the required information in the following sections:

Section 2 - Environmental Protection Requirements

This section defines the procedures to ensure adequate environmental protection from potential releases at the site during RA construction, and includes the following plans:

- Spill Control Plan
- Dust Mitigation Plan
- Decontamination Plan
- Stormwater Management Plan
- Erosion Control Plan

Section 3 - Pre-Mobilization Requirements

The pre-mobilization requirements define plans and procedures that will be addressed prior to conducting RA activities and to include:

- Permitting Plan
- Health and Safety Plan
- Community Involvement Plan
- Security Requirements

Section 4 - Remedial Actions and Project Construction Requirements

The fieldwork associated with the construction activities is described in this section, which defines the requirements for the implementation of the RA, and includes the following sections:

- Engineered Cover
- Stormwater Controls
- Erosion Controls

Section 5 - Construction Quality Assurance

This section discusses the requirements for testing, inspection, documentation and quality assurance of the construction activities, and generally outlines the requirements defined in the Construction Quality Assurance Plan (CQAP).

Section 6 - Post Construction Requirements

Post construction requirements included in the RAWP are as follows:

- Site Restoration (finish grade, topsoil seeding, erosion control, and fencing)
- Demobilization and Project Closeout
- Remedial Actions Documentation
- Operations and Maintenance Plan

Section 7 - Primary References

1.3.1 Project Organization

The project organization that pertains to the overall Base Realignment and Closure (BRAC) of the Fort Sheridan Base is found in the Project Management Plan. The current version of the Project Management Plan is Revision 4.0, dated May 2004. The information included in the Project Management Plan pertains to the Installation-wide Environmental Program Status, Installation-wide Strategy for Environmental Restoration, and Environmental Restoration Program. Specific to the RA at Landfill 5, the project organization will be as follows.

The Project Manager (Tracy Bergquist) will provide overall contract management support as well as local client liaison. The Project Manager will support BRAC Cleanup Team (BCT) and Restoration Advisory Board (RAB) meetings as needed and physically be at the site when effort dictates.

The Site Manager (Larry Emerson, P.E.) will be the day-to-day manager on site. The Site Manager will be on site regularly and support the Project Team in all aspects of the project, including regulatory, engineering and QA/QC, cost controls, scheduling, subcontract management, on site client support, and Health and Safety. He will also serve as Construction Quality Assurance Officer for this project. Any time the site manager is not on site, a qualified supervising person will be the acting site manager. It is expected that the Health and Safety Manager will be the regularly appointed acting site manager. All other site personnel will report through the respective chain up to the Site Manager.

Table 1.1 provides a list of the Fort Sheridan Environmental Remediation Team for Landfill 5 RA activities. Personnel listed in Table 1.1 may be changed in the future based on project needs,

All Contractor employees on site have the authority to stop work if they feel there is a threat to worker safety or a potential negative impact to the environment.

1.3.2 Schedule

The anticipated schedule for construction for RA at the Landfill 5 is August through December, 2004. Appendix C provides a detailed construction schedule for the RA.

1.3.3 Meetings and Reports

General requirements during RA construction in terms of meetings and reporting are defined in Specification 01039 – “Coordination and Meetings.” These procedures and requirements will be followed throughout the construction process to maintain an open channel of communications and ensure all project team members are kept up to date.

1.3.3.1 Pre-construction Meeting

Prior to field mobilization, a pre-construction meeting will be held to discuss the major site construction activities, introduce the project team and coordinate administrative requirements. The attendees will include the U.S. Army representatives, Contractor Site and Project Manager, Construction Quality Assurance (CQA) Contractor, and as necessary, other project team members. The meeting will be held at the Contractor’s field office locate at the Fort Sheridan base.

1.3.3.2 Progress Meetings

Progress meetings will be held periodically, (e.g. 1 or 2 times per month) in the Contractor’s field office at Fort Sheridan during periods of major construction activities. The attendees will include the U.S. Army representatives, Site Manager, major subcontractors, CQA Contractor, vendor representatives, and as necessary, other project team members. The purpose of the meetings will be to update all parties on the progress of the work, review schedule and upcoming tasks, and to discuss relative work issues.

KEMRON will preside over the meetings and will be responsible for creating the agendas. KEMRON will record the discussions and transcribe minutes, which will be reproduced and distributed to all attendees at the subsequent construction meeting. The meeting minutes will also be distributed to individuals included in Table 1.1 and any other parties directly involved in the Landfill 5 remedial activities

Table 1.1 Fort Sheridan Environmental Remedial Action Team

Name & Address	Project Function	Phone / Fax / email
Victor Bonilla Attn: AFPI-BC 1347 Thorne Avenue SW Bldg 243 Fort McPherson, GA 30330	Forces Command BRAC Division BRAC Environmental Coordinator	(608) 388-4776 (608) 388-4704 bonilav@forscom.army.mil
Chaouki Tabet 1347 Thorne Avenue SW Bldg 243 Fort McPherson, GA 30330	Forces Command BRAC Division, GFPR Army Representative	(404) 464-6346 (404) 464-7040 chaouki.tabet@forscom.army.mil
Daniel M. Fleming EFA Midwest 201 Decatur Avenue Great Lakes, IL 60088	U.S. Navy	(847) 688-5999 (847) 688-2319 daniel.fleming@navy.mil
David Moore 88 th Regional Support Command 506 Roeder Circle Fort Snelling, MN 55111	U.S. Army Reserve Center Representative	david.moore31@us.army.mil
Kurt Thomsen 3155 Blackhawk Drive Suite 17, Building 379 Fort Sheridan, IL 60037	Fort Sheridan Environmental Coordinator	(847) 266-6323 (847) 266-3584 sheridanbec@aol.com
Brian A. Conrath 1021 N Grand Avenue Springfield, IL 62794	Illinois Environmental Protection Agency	(217) 557-8155 (217) 782-3258 brian.conrath@epa.state.il.us
Tracy Bergquist KEMRON Environmental 1359-Ellsworth Industrial Blvd. Atlanta, GA 30319	Project Manager	(404) 636-0928 (404) 636-7162 tbergquist@kemron.com
Larry Emerson, P.E. KEMRON Environmental 3155 Black Hawk Drive Building 379, Suite 17 Fort Sheridan, IL 60037	Site Manager and QC Engineer	(847) 266-1350 (847) 815-3768 lemerson@kemron.com
Tim Duda KEMRON Environmental 3155 Black Hawk Drive Building 379, Suite 17 Fort Sheridan, IL 60037	Project Health and Safety Manager	(847) 266-1350 (847) 815-3768 tduda@kemron.com

1.3.3.3 Post-Construction Meeting

Following substantial completion of the construction activities, two additional meetings will be held: (1) a pre-final inspection and (2) final inspection meeting to review the status of the construction and to perform a final inspection for acceptance of the RA. The pre-final inspection will be held following installation of the majority of the cover components. A punch list will be developed and documented for resolution of incomplete items, items that need repair, or items that need replacement. Following completion of the punch list items, the final inspection meeting will be held and the construction activities will be verified as complete, and the final documentation will be submitted.

1.3.3.4 Daily Reports

Daily written reports will be prepared when the Subcontractor's personnel are working full-time on-site or faxed to the Fort Sheridan Site Manager when field activities are intermittent. Both the selected Subcontractor and QA Technician will be responsible for preparing, signing and submitting the report to the Fort Sheridan Site Manager at the end of each day.

The report will summarize the field activities performed and the associated QC activities. A list of all on-site personnel, equipment, materials, rental vehicles, etc. will be included in each report. The report will also provide a description of any problems, the corrective action(s) taken, and the effectiveness of the corrective action(s).

1.3.3.5 Weekly Reports

The Subcontractor will provide a written brief weekly report at the end of each week that summarizes field activities and tasks performed. The report will also briefly describe upcoming activities planned for the following two weeks. The report will be provided directly to the Fort Sheridan Site Manager. The Site Manager will add the Subcontractors' report information into KEMRON's written monthly report supplied to the Army Base Environmental Coordinator (BEC).

1.3.3.6 Monthly Reports

A monthly status report will be prepared and submitted by the Subcontractor. The exact date will be coordinated with the Site Manager. KEMRON, in turn, will provide a written monthly report with the Subcontractors' information to the Army BEC by the 10th day of each calendar month. The Army will distribute the report as it deems necessary. The KEMRON monthly progress report, submitted to the U.S. Army and the BEC, will indicate work performed during the reporting month, any problem(s) that occurred during the month, steps implemented to resolve the problem(s), and the effectiveness of such steps.

2.0 Environmental Protection Requirements

2.1 Spill Control Plan

The Spill Control Plan (SCP) summarizes spill and discharge control procedures and methods for construction activities associated with the RA at Landfill 5, Fort Sheridan, Illinois.

Specifications 01560 – “Temporary Controls” and all other applicable Specifications will be followed during construction activities. Appendix B, Sheets 4-9 present the anticipated areas for excavation near the Landfill and Appendix B, Sheet 2 pertains to surface water management. The selected earthwork contractor will adhere to the Specifications, plan set of drawings, Stormwater Pollution Prevention Plan (SWPPP), and this SCP.

2.1.1 Sources of Potential Spills

2.1.1.1 Fuel Storage and Handling

Most fueling and routine maintenance of construction equipment (excavators, dozers, loaders, off road trucks, compaction equipment, etc.) will be performed on-site. Fuel storage tanks will be set up on-site during construction activities when several pieces of equipment are being used. The tanks will be periodically refilled from fuel delivery tank trucks, and will be used as the fuel source for on-site equipment. During periods when fewer pieces of equipment are required for the work, the on-site equipment may be fueled directly from fuel delivery trucks that visit the site on an on call basis.

2.1.1.2 Temporary Water Storage Tank

No water is expected to be pumped from the perimeter trench excavations. Therefore no water storage tanks are anticipated for use during construction.

2.1.2 Spill Prevention Measures

2.1.2.1 Fuel Storage and Handling

One 1,000 gallon diesel fuel storage tank will be used on-site. The tank will be placed at a convenient location near the Landfill 5 boundaries. The location may be changed periodically to avoid interference with work activities (the tank will be emptied before relocation). The fuel delivery system on the tank will be provided with a cover and lock that will be locked during all non-regularly scheduled work periods.

The temporary tank used will be provided with a secondary containment of sufficient size to contain the volume of the tank. The secondary containment will be a metal tank system integral to the fuel storage tank and will extend under the tank. The secondary containment area will be periodically inspected to verify that it is functional (no holes or damage).

All fueling of the mobile construction equipment will be at the fuel tank when the tank is on-site. Spill containment and control measures will be provided at the tanks. The measures will include, but not necessarily be limited to, storing shovels, absorbent pads, plastic bags, buckets, drip pans, and other similar material. Any equipment leaking or spilling fuel will be contained and removed from the site or repaired prior to further use.

2.1.2.2 Temporary Water Storage Tank

No temporary water storage tanks will be located within the work area on Landfill 5.

2.1.2.3 Others

Liquids and solid chemicals that may be used at the site or for other reasons, will be transported, stored, and handled following the manufacturer's recommendations and applicable regulations. The materials will be used for the work as indicated by the manufacturer's specifications.

2.1.3 Spill and/or Discharge Response

Spills are generally defined as incidental spills or emergency spills under 29 CFR 1910.120 as follows:

- Incidental Spills – Leaks, spills or discharges that can be safely absorbed, neutralized or otherwise controlled by employees in the immediate release area.
- Emergency spills – Leaks spills or discharges that require a response effort by employees from outside the immediate release area or by other designated responders (HAZMAT Team)

The definitions are based on hazards to workers responding to and/or cleaning up the spill. Sources of potential spills and/or discharges anticipated at the site would strictly result in incidental spills under the above federal definitions. The following discussions of spill and/or discharge response procedures are for incidental spills.

2.1.4 Responsibilities and Communications

All site workers are responsible for conducting their assigned duties in a manner that will prevent spills. The Site Manager, Project Health and Safety Manager, and all crew foremen will be responsible to train each worker on the specific duties to perform to prevent spills and discharges, and will be responsible for monitoring workers' performance and site conditions to reduce the chances of spills and/or discharges.

The person who discovers a spill and/or discharge will take immediate actions to safely stop the spill and/or discharge. Workers that are near the spill and/or discharge will be warned and no actions will be taken that may jeopardize the workers' safety. That appropriate supervisor (crew foremen, Site Manager, Health and Safety Manager) will be notified and will arrange for further notifications; assist in evaluating the spill and/or discharge; and determine the necessary remedial actions. All notifications to the appropriate individuals and agencies, if necessary, will be made in a timely manner.

In the event of an emergency spill, as previously defined, the appropriate emergency response and government agencies will be contacted.

The following information will be included in spill and/or discharge incident notifications:

- The name of the person making the notification
- Facility name, location of spill, and phone number
- A brief description of incident and time discovered
- Material(s) spilled, source, and approximate quantity
- Areas affected
- Possible hazards to human health or the environment

Table 2.1 Emergency Phone Numbers

Contact	Emergency Phone Numbers
Fire Department	911
Police Department	911
Emergency Medical Services	911
Poison Control Center	(404) 588-4400
Hospital	(847) 480-3751
Non-Emergency Fire	(847) 432-7622
Non-Emergency Police	(847)432-2152
CHEMTREC	(800) 424-9300
National Response Center	(800) 424-8802
National Poison Control Center	(800) 362-9922
Federal Emergency Management Agency	(202) 646-2400
Centers for Disease Control	(404) 488-4100
United States Coast Guard	(804) 441-3516
AT & F (Explosives Information)	(800) 424-9555
KEMRON Environmental Services, Inc.	(800) 548-6938
US Environmental Protection Agency, Region V	(312) 886-4843
Illinois Environmental Protection Agency	(217) 557-8155

In the event that the spill and/or discharge is reportable under local, state, or federal laws, the Site Manager or the Health and Safety Manager will prepare a detailed incident report which describes events that led to the spill and/or discharge; corrective actions taken to contain and remove materials; decontamination procedures utilized; and any follow-up actions taken. A copy of the report will be provided to the Project Manager and will be maintained as part of the site records.

An assessment will be made of all spills and/or discharges to determine the source of material spilled and/or discharged; proper actions to be taken to stop and/or control the spill and/or discharge; methods to reduce hazards; and actions to remediate affected areas. The detail of the assessment and the type of corrective actions will vary depending on the severity of the spill.

2.1.5 Spills and/or Discharges of Liquids

The actions and procedures of this plan will be initiated upon the discovery of any spill and/or discharge. Immediate actions will be taken to locate the source of any petroleum product spills and to stop the flow of the product. The following measures are among those that will be used to stop a spill and/or discharge:

- Isolate Source of spill and/or discharge
- Stop the flow of the liquid(s) by closing valves, shutting off pumps, isolating plugs, and /or other appropriate methods

Possible ignition sources, including motors, electrical equipment, electrical circuits, open flames, and other possible sources of sparks or fire will be shut off, as appropriate. Remedial measures to mitigate the affects of the spill and/or discharge will start after stopping the source and ensuring that appropriate safety measures have been taken. The remedial measures used will be contingent upon the liquids spilled and/or

discharged. Measures will be implemented to contain the spill and/or discharge to a small area that is practical. The use of earth berms or absorbent booms may be utilized to temporarily contain the spill and/or discharge.

All petroleum product spills and/or discharges that occur will be contained and collected, regardless of their source or size. This includes spills and/or discharges resulting from broken or damaged hydraulic hoses on construction equipment. Free liquids will be collected using buckets and/or absorbent materials. All soils contaminated by the petroleum product spills and/or discharges will be excavated and placed in buckets, bags or sacks or other appropriate containers for temporary on-site storage and eventual off-site disposal at an approved disposal facility. All such material shipped off-site for disposal will be documented in the project files.

2.1.6 Spills and/or Discharges of Solids

Spilled and/or discharged solids as well as affected soils will be collected and placed in appropriate containers. The containers will be clearly labeled describing the contents. Disposal and/or treatment of the materials will be determined based on the type of material spilled and/or discharged and the applicable regulations. The disposal and/or treatment methods will be reviewed with the Site Manager.

2.2 Dust Mitigation Plan

This Dust Mitigation Plan (DMP) summarizes dust control procedures for construction activities associated with the RA. It is based on and consistent with appropriate sections of the Fort Sheridan Health and Safety Plan (HASP).

2.2.1 Dust Control Methods

The following methods will be used to control dust during site construction activities:

- The work will be planned and conducted to reduce the size and number of areas being actively worked.
- Roads and work areas will be sprinkled with water to prevent excessive dust and will be cleaned using sweepers as required.
- Construction vehicles will be cleaned before driven on Fort Sheridan streets from the work areas.
- Vehicles will not be permitted to be taken from work areas onto the Fort Sheridan streets when areas are wet and muddy to eliminate tracking of excessive soil materials.

Water used for dust control will be from the Fort Sheridan fire hydrant water system. Water will be sprinkled or sprayed using hoses and/or equipment such as water trucks. The rate of water application will be controlled to provide complete coverage and to avoid creating overly wet, muddy conditions and runoff.

Real-time dust monitoring will be performed to document the effectiveness of dust control measures as specified in the HASP.

2.3 Decontamination Plan

The Decontamination Plan summarizes vehicle and equipment decontamination procedures for construction activities associated with the RA. The selected earthwork contractor will be responsible for decontamination of the vehicles that come in contact with potential waste from the landfill. Waste excavation is not expected at Landfill 5, due to the design and clay fill soils, which covers the waste. However, in the unlikely event that waste is encountered in the perimeter pipe trench excavation or sewer

manhole repairs, the procedures described in Section 8.0 of the HASP will serve as a guide to more detailed decontamination procedures.

2.4 Stormwater Management Plan

A Stormwater Pollution Prevention Plan (SWPPP) has been prepared for Landfill 5 (insert the latest date and revision of the SWPPP that is referenced here). The SWPPP was prepared to meet the substantive requirements (but not the reporting requirements) of the National Pollutant Discharge Elimination System (NPDES) regulations for stormwater discharges from industrial activities. The site is not currently connected to a separate municipal stormwater sewer system serving a population of more than 100,000 people; does not maintain salt piles on site; and does not qualify for Emergency Planning and Community Right-to-know Act, Section 313 reporting requirements. Subsequently, no special reporting requirements were necessary. The facility is on federal property and is being closed under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) requirements and regulations. Therefore the reporting requirements for NPDES do not apply to this project.

Specifications 01560 – “Temporary Controls”, 02720 – “Storm Drainage System” and its related sections, 02930 – “Seeding”, and all other applicable Specifications will be followed during construction activities. Drawings Sheet 19 presents the sediment and erosion control details and Drawing Sheet 11 through 14 and 18 pertain to surface water management. The selected earthwork contractor will follow the specifications, plan set, SWPPP, and this Stormwater Management Plan.

Key items contained in the SWPPP are:

- Pollutant Inventory/Source Assessment (Materials, Spill and/or Discharge History, Non-Stormwater Discharges, and Stormwater Runoff)
- Best Management Practices
- SWPPP Implementation
- SWPPP Evaluation
- Site Maps and Inspection Forms

Storm water inspections will be conducted and documented on a schedule and in a manner described in the SWPPP.

2.5 Erosion Control Plan

The Erosion Control Plan (ECP) summarizes erosion control procedures and methods for construction activities associated with the RA.

Specifications 01560 – “Temporary Controls” and all other applicable Specifications will be followed during construction activities. Appendix B, Sheets 4-9 presents the anticipated areas for excavation near the landfill and Appendix B, Sheet 2 pertains to surface water management. The selected earthwork contractor will adhere to the Specifications, plan set of drawings, SWPPP, and this ECP.

2.5.1 Erosion Control Procedures and Methods

The work will be planned and conducted to control runoff and to reduce soil erosion and sediment transport from construction area. This plan provides guidelines for runoff and erosion control measures that may be used during work activities. It will be the responsibility of the Site Manager and crew foremen to implement, inspect, repair, and upgrade all erosion control measures.

Methods and actions to reduce soil erosion include, but are not necessarily limited to:

- Planning, conducting and controlling the work to reduce areas disturbed by construction

- Prompt stabilization of disturbed areas
- Controlling precipitation runoff
- Effective maintenance of erosion and sediment control measures during the construction period

No active streams are located within the construction area; however, runoff from the site leads to the Bartlett Ravine, which has a series of gutters and culvert pipes which discharge to Lake Michigan. Shallow drainage swales at the site will help collect and route stormwater runoff into existing storm drains.

Existing drainage features will be protected from disturbance during construction operations. Measures to protect drainage features and Lake Michigan will include one or more of the following:

- Preventing siltation by constructing diversions, silt fences or other measures as appropriate.
- Cleanout and restoration of sediment traps during construction activities
- Avoidance by equipment traffic
- Use of culverts where repeated equipment crossings of low areas are necessary
- Protection of storm drain inlets

Spilling, discharging or tracking soil, trash or other construction materials on roads used for access to the site will be avoided. Any soil, trash or other construction materials that are spilled and/or discharged on site access roads will be promptly removed. Roads and construction areas will be sprinkled with water as required to prevent excessive dust.

Frequent site inspections of the installed erosion and sediment control measures will be checked for effectiveness and to determine conditions needing RA. The site will be inspected at least once each work shift and during and immediately following each precipitation event exceeding 0.5 inches in 24 hours. Control measures will be maintained to permit full effectiveness during the construction period.

2.5.2 Care of Water

All water from construction areas including groundwater and precipitation runoff will be controlled and handled using ditches, basins, sumps, site grading, silt fences, straw bales, pumps, tanks, or other similar devices to divert, collect and remove it from work areas.

Although not expected, any water that comes in contact with refuse will be controlled within the refuse work area, collected and disposed of in a licensed facility. In this event, it may be necessary to pump and collect the potentially contaminated water from the excavations. Trash pumps will be used to evacuate the liquid as necessary to complete the work. Accumulated water will then be either pumped into temporary tanks or directly into tanker trucks located in close proximity to the waste excavation areas. When the tanks are full, the water will be transferred to tanker trucks for off-site disposal.

To the extent practical, runoff across areas not disturbed by construction will be diverted around the construction area, and runoff from undisturbed areas and construction areas will not be allowed to intermingle. Water from undisturbed areas (existing grassed and paved areas) and water from areas disturbed by construction (exposed earth, etc.) will be controlled to reduce intermingling of those waters. Runoff water may be temporarily detained to allow sediments to settle. Discharge of site runoff water will be at locations and by methods approved by the Site Manager.

Drainage features will be constructed to have sufficient capacity to provide for continuous removal of water so that flooding of work areas does not occur. The features will be so arranged to avoid degradation of the ground surface around construction areas. Existing storm water sewers and catch basins will be kept clean and clear of obstructions during construction.

Surface runoff from undisturbed areas will be collected and routed around construction areas using ditches, berms or curbs upstream of the areas. These features will be maintained to reduce erosion and to collect sediments.

Temporary earth channels, ditches and other similar diversions will be constructed to intercept and convey surface water to stable outlets in non-erosive velocities. The diversions will be constructed to be free of irregularities that could impede flow. Sediment traps will be constructed to collect sediments transported by storm water runoff from disturbed areas. The traps may consist of straw bales, silt fences, riprap or other similar features. The traps will be cleaned as required to provide sufficient area for additional sediment collection.

2.5.3 Standard Practices

The following are basic standard practices for temporary measures which may be used to control erosion and sedimentation.

- Diversions are earth channels and ditches, constructed across slopes to intercept and convey surface water to stable outlets at non-erosive velocities. Diversions can be used when runoff from higher areas has potential for causing erosion on lower areas. They will be excavated and shaped to lines, grades, and cross sections that are free of irregularities, which will impede normal flow. Fills, if needed, will be compacted to prevent unequal settlement in the completed diversion.
- Sediment Traps – A sediment trap is a temporary impoundment formed by excavation or a barrier to trap sediment being transported by storm runoff from small disturbed areas, for the purpose of preventing sediment from leaving the site or from entering natural or constructed drainage ways or storm drainage systems. Sediment traps can consist of straw bales, silt fences, riprap, or other similar devices placed in diversions or on the ground entrance.

Traps will be no less than one (1) foot nor more than two (2) feet deep measured from the invert of the outlet. Side slopes will not be steeper than 1:1 ratio. Sediment traps will be self-draining unless they are otherwise protected so as not to present a safety hazard.

Sediment traps will be constructed on natural ground surface or on an excavated surface provided they have a non-erodible outlet. In areas where excavation or other ground disturbing activity is being conducted, they will be checked at the end of each working day. Repairs and or cleaning will be done as necessary to ensure that sediment traps will operate as intended. Other sediment traps located outside areas of excavation or other ground disturbing activity will be checked on a weekly basis.

Sediment traps will be cleaned of sediment as necessary to maintain flow capacity. Sediments removed from the traps will be incorporated in the project work areas. Temporary sediment traps will be filled, graded, compacted and rehabilitated once the intended purpose has been accomplished and the contributing drainage areas have been properly stabilized.

3.0 Pre-Mobilization Requirements

3.1 Permitting

The selected site remedy for Landfill 5 will be accomplished on federally owned properties, thus is it not anticipated that permits and requirements under, State, County and City ordinances, related to construction and site development activities, will be required. The Landfill 5 Decision Document and Design Documents will be approved by the Illinois EPA before construction will begin at the facility.

3.2 Pre-construction Survey

The Contractor or CQA Consultant will have an Illinois licensed land surveyor perform a construction site wide survey to document preconstruction grading, and layout the construction staking. The Contractor will be responsible to protect the original stakes or replace any markers removed. The preconstruction survey will serve to verify the existing conditions and establish the various work zones for RA construction. The surveyor working for the Contractor or hired CQA Consultant will return to the Site as needed throughout construction to document grading, pipe placement, elevations, and RA component locations, as required in the Specifications, or as needed for future use.

3.3 Utilities

Numerous buried and overhead utilities exist at the site, which need to be located in the field prior to start of work. A joint utility meet has been performed to identify the utilities shown on the plans. A second meet will be conducted to confirm locations as shown. The Contractor will participate in these meetings and will exercise standard care and precautions while excavating around the buried utilities. Several overhead power and communication lines will be removed, relocated or raised to meet the clearances required by the new grades anticipated by the landfill.

3.4 Health and Safety Plan

The comprehensive set of health and safety concerns and documentation forms are located in the HASP for Fort Sheridan, Illinois, April 2002, Revision 3.0. This document describes the health and safety guidelines developed for performance of all activities of the RA. The plan is designed to provide measures necessary to protect on-site personnel, visitors, and the public from physical harm and exposure to the work to be conducted. Where appropriate, specific Occupational, Safety, and Health Administration (OSHA), EPA standards and / or other guidance will be cited and applied to the Health and Safety Plan.

The Fort Sheridan HASP contains:

- Site Entry Requirements
- Responsible Site Authority
- Site Characteristics
- Personal Protection Equipment
- Site Hazards
- Air Monitoring
- Site Control
- Decontamination
- Sanitary Facilities and Lighting Requirements
- Contingency Plan
- Site Safety Plan Review and Documentation

Daily health and safety meeting will be conducted and documented as specified in Section 1.3 of the HASP.

3.5 Community Involvement Plan

The Community Involvement Plan (CIP), dated July 2002, was prepared based on information contained in previous documents and on interviews conducted in December 2001 and January 2002 with local officials, RAB members, residents including new residents of the Town of Fort Sheridan development, and others interested in activities at Fort Sheridan.

Ongoing and planned activities discussed in the CIP are designed to inform the communities surrounding Fort Sheridan about the CERCLA process, site-specific investigation studies, the progress of activities at Fort Sheridan, and encourage open communication between residents and the U.S. Army as well as between federal and state regulators to assure involvement of all stakeholders in decision making.

The purpose of the CIP is to:

- Document community concerns regarding the Fort Sheridan Remedial Actions expressed by local residents and officials
- Define the roles and responsibilities of the U.S. Army and its cleanup contractors, regulators, and others responsible for protecting health and the environment, and the community including members of the RAB
- Outline and explain specific outreach techniques and activities that will be undertaken to involve the community and keep them informed of key decisions throughout the cleanup process, including those required under CERCLA and additional activities that address site-specific community concerns
- Provide contact information for the U.S. Army to use as part of its efforts on a day-to-day basis to keep the community apprised of ongoing and planned site activities and major developments
- Provide contact information for use by the public in voicing concerns.
- Provide a road map for Army staff and public for identifying and addressing concerns regarding cleanup activities at Fort Sheridan.

3.6 Site Security Plan

This plan summarizes security procedures and methods for construction activities associated with the Remedial Action at Landfill 5, Fort Sheridan, Illinois.

3.6.1 Personnel

A list of employees authorized to work at the site will be maintained at the project office. It will be provided to the Site Manager, Project Manager, and posted in the staging area. The list will include the names of each employee and their work classification. The list will also summarize employee training (health and safety, first aid, respirator fit tests, etc.) relative to the work to be performed. Only those employees on the list will be allowed on-site.

3.6.2 Site Access

All personnel will report to a staging area near the KEMRON office or subcontractor's trailer office at the start of each work shift. The Site Manager and crew foremen will assemble the work crews, prepare a daily log with the names of the personnel on each crew, and will arrange for transportation of the crews to their work areas. No personal vehicles will be allowed on the site.

No employees will be allowed on the site unless they have the minimum level of personal protective equipment (PPE). No personnel will be allowed to enter or work in an area requiring special training or upgraded levels of PPE unless they have that training and the additional PPE is available at the work area.

Signs will be posted at the site indicating that "unauthorized access to the site is prohibited, that all visitors must report to the site office, and that all deliveries must be checked through the site office". All visitors will be briefed with respect to site safety and hazards before being allowed on the site. All visitors will be required to wear the minimum level of PPE, for the task at hand, when on-site. Visitor access to work areas requiring special training or upgraded levels of PPE (if required) will not be allowed unless the visitors have the required training, provided documentation of that training, have read the Site Specific Health and Safety Plan, and have signed the HASP Acknowledgement page. A log of visitors on the site will be maintained.

Unauthorized personnel and vehicles will not be allowed on the site. All employees will be instructed to report to a supervisor if they notice any unknown person or vehicle on the site. The supervisor will determine if the unknown person or vehicle is authorized to be on the site. If not, the supervisor will escort the person and vehicle from the site.

3.6.3 Site Security

The existing six-foot chain link fence around Landfill 5 and temporary construction fences placed around specific work areas will be used to limit access into the work areas. Other work areas that may present a hazard will also be enclosed within a temporary fence at all times when work is not actively being performed at those work areas.

Signs will be placed on the fences and around the Landfill 5 indicating the area is a construction area and that unauthorized access are prohibited. The signs will also direct visitors to the site office.

Access to the site will be controlled as previously discussed. Access into specific work areas will also be controlled following requirements detailed in the Site Specific Health and Safety Plan.

All equipment and site offices will be secured and locked at the end of each working shift. Fuel oil tanks will also be secured and locked when not in use and when construction personnel are not at the site.

3.7 Site Traffic Plan

KEMRON will use the existing Final Transportation Plan dated July 2002, for all new truck traffic required for construction of the Landfill 5 cover with the following additional changes. All new truck traffic coming on site will still enter from the main truck gate onto 1st Street. These trucks will be directed left into the Army Reserve Gate entrance to Building 149 for site access. Alternatively, trucks may be routed to Patton Road for entry to the northern end of Landfill 5.

New materials for the site work will include about 2500 cubic yards (CY) approximately 192 truck loads of topsoil; 300 CY of asphalt and concrete aggregate, piping, and sewers; Claymax liner and miscellaneous materials. Topsoil is expected to be accepted at a rate of 50 loads per day for three (3) days, for roughly 7-8 loads per hour, maximum. Approximately 10,000 CY of clay is currently stockpiled at McKibben Road, east of Patton Road. This clay will be trucked to Landfill 5, north on Patton Road, and left on the unnamed street immediately north of Finley Road. The reverse route will be used for removing a few loads of tree cuttings and demolition debris not suitable for burial beneath the landfill cover.

4.0 Remedial Actions and Construction Requirements

4.1 Excavation

Soil and asphalt will be excavated along the perimeter drainage pipe trench and placed within the footprint of the landfill cover as shown on the design drawings. Waste excavation for construction of Landfill 5 is not anticipated due to the depth of waste and design features. Information gathered during pre-design investigations was employed to propose a suitable location of the perimeter drainage collection trenches so that waste relocation is avoided to the extent practical.

If, however, waste is encountered during removal or repair of a stormwater manhole or excavation of the perimeter trench, the waste will be temporarily stored in roll-off boxes prior to shipping offsite to a Subtitle D disposal facility. Waste shipping manifests will be used and retained in the project files.

Specifications 02222 – “Excavating” and 02223 – “Backfilling” will be followed during these construction activities. Appendix B, Sheet 2 presents the anticipated areas for excavation along the perimeter of the landfill and for storm sewer manholes. The Fort Sheridan HASP trenching and excavating requirements also will be applied during applicable construction activities.

Concrete and asphalt demolition debris and soils excavated from the perimeter trench, ravine erosion areas and manhole repairs will be used as the grading layer under the engineered cover. The construction/demolition debris excavated during construction activities will be placed within the landfill footprint and will be covered with soils excavated or graded from the landfill, to provide a “cushion” between the debris and the geocomposite clay layer.

To the extent possible, larger pieces of concrete debris will be located off of existing, buried sewer alignments. This will permit easier access to utilities in the future.

Excavations will be kept to the manageable size necessary to provide a safe work environment and to accomplish the project objectives. Care will be taken to minimize the disturbance to the surrounding environment and excavated material will be kept within the excavation limits during excavation and loading, as much as possible. Excavations will also be backfilled in a timely manner to prevent cave-ins. In addition, silt fencing and/or erosion control fabric will be installed in accordance with the Erosion Control Plan, to reduce erosion and transport of sediments. At the end of each day the open excavations will be fenced off.

4.1.1 Groundwater and Leachate Monitoring Wells

Groundwater monitoring wells and leachate monitoring piezometers will be installed or raised within or near the perimeter of the landfill inside and outside the engineered cover limits, to depths of 15-40 feet. Section 2.2.8 – “Groundwater Monitoring” and Appendix C, Draft O&M Plan, of the Landfill 5 Remedial Design Document describe the materials and installation requirements for the wells, as well as parameters for testing and sampling frequencies. Wells will be completed up to the surface with either flush mount covers in driveways or extended through the cover and protected with a metal covers and bollards, and clearly marked so that they can be located in the future.

4.2 Cover Plan

This plan describes the earthwork activities and geosynthetic installations to be conducted during construction at Landfill 5. The landfill cover will include the following layers, listed in descending order:

- Six (6) inches of topsoil
- Two (2) feet of compacted clay
- Geosynthetic Clay Liner (GCL) layer

- Intermediate grading layer
- Trench spoil (clay soils, aggregate, broken concrete and asphalt)

4.2.1 Borrow Soils

The clay and topsoil components of the cover construction will require suitable borrow soils. Soils will be obtained from the clay stockpile along McKibben Road which has passed all required analytical (not yet – but this should be resolved prior to final RAWP issuance) and geotechnical testing. Approved topsoil will be stockpiled near Building 70 for later use on the cover. Additional soils, if required, will be imported from an off-site source(s).

Suitability of potential borrow sources will be evaluated as required by the Design Document Specifications. Clay and topsoil borrow sources will be tested by a geotechnical laboratory to determine if the soil is appropriate to use as landfill cover material. Additionally, both soils will be tested for the TACO Tier I requirements described in the Remedial Design Document.

4.2.2 Backfilling

Prior to cover construction, excavated materials will be placed along the centerline of the cover. Generally, the broken concrete and asphalt and bricks will be placed first in areas determined to be free of all known utilities. Next, the aggregate materials will be placed over the broken concrete and asphalt and bricks. Finally, excavated clay soils will be placed over the landfill cover footprint, as shown on the Design Drawings, at least six (6) inches in depth. Following placement of all on-site excavated material, additional backfill materials will be provided from the borrow area, if needed, for grading or thickness control.

4.2.3 Sub-grade Preparation

The placement of excavated soils and demolition debris from the perimeter drainage trench, manhole repairs, and ravine slope improvements will be placed so that protruding objects within the subgrade are minimized. The subgrade layer will serve as a stable base so that an engineered cover can be placed on top of the landfill.

Specification 02222 – “Excavating” and 02223 – “Backfilling” contains the requirements for subgrade preparation prior to initiating cover construction. Appendix B, Sheets 4-9 present the approximate grades expected during subgrade work. The grades are subject to field changes depending on actual volumes of excavated materials placed and the arrangement of materials (e.g. concrete rubble in piles away from buried utilities). In general, the subgrade of soils will be proof-rolled to produce a smooth, stable surface without evidence of pumping. Newly placed soils will be compacted to the specified densities.

Existing piezometers, manholes, and monitoring wells will be abandoned, replaced, extended, or otherwise modified as indicated on the Drawings, prior to placing the engineered cover. The fence posts likewise will be installed such that the cover can be placed around the posts.

4.2.4 Engineered Cover

4.2.4.1 Compacted Clay

This clay will be installed in accordance with the requirements of Specification 02205 – “Soil Materials”. To protect the underlying GCL, the first clay layer lift will be carefully placed with low-ground pressure equipment. Compaction will be achieved and tested as specified.

4.2.4.2 Geosynthetic Clay Liner (GCL)

The GCL to be placed over the finished subgrade soils will be rolled out and overlapped in accordance with Specification 02244 – “Geosynthetic Clay Liner.” The GCL will be installed so as to reduce horizontal seams along slopes, and provide a consistent, low permeability layer. The liner will be tested and inspected as specified.

4.2.4.3 Topsoil

The top layer of the protective soil component will be a six (6)-inch topsoil layer that will be planted with shallow-rooted vegetation. Cover soils will be obtained from off-site sources, as long as the sources meet the requirements of the Specification 02205 – “Soil Materials.”

The six (6)-inch topsoil layer will be compacted only to ensure proper placement and integrity and will be fertilized, if necessary for the specified grass mix, with nitrogen, potassium, and phosphorus, for proper root growth. Specification 02930 – “Seeding” defines the requirements for the topsoil selection, amendments, and placement.

5.0 Construction Quality Assurance

Implementation of the specified construction quality assurance tasks and certification will be the responsibility of KEMRON, the landfill RA contractor. KEMRON will retain the services of an independent third-party QC surveyor and field/lab testing company to perform, supervise and certify the identified CQA tasks required by the CQAP. The CQA requirements apply to all aspects of the RA construction, including the landfill cover, storm water piping systems, fencing and erosion controls.

Individual tasks associated with each of these construction aspects, including the earthwork and grading, geosynthetic installations, surface water management, sediment and erosion control, and storm water collection piping systems, are defined in the relevant Specifications and Drawings, and the required CQA testing associated with each of the tasks is defined in Section 2.3, CQAP, of the Remedial Design Document.

6.0 Post Construction Requirements

Following completion of the RA construction activities, a number of items will need to be developed or finished, so that the RA is completed and documented as intended. These items include final site restoration, demobilization of materials and equipment, and documentation of the RA activities.

6.1 Site Restoration

As the last task of RA construction, Landfill 5 will be developed to the conditions indicated on Appendix B, Sheet 17, Facility Use Plan. Surface water conveyance structures will be finished as shown on Appendix B, Sheets 11 - 14. The fence between the Navy and Army Reserve property will be finished as well.

6.1.1 Vegetative Layer

In order to establish a healthy vegetated layer atop the landfill, the landfill cover will be seeded with grass seed mix, as specified in Specification 02930 - "Seeding." Seed mix will be planted on the majority of the landfill surface area, while the remainder is dedicated to asphalt driveway. Either hydro-seeding or conventional techniques will be utilized to place the vegetation. Due to the steep slopes along the ravine area, protection will be provided using erosion control blanketing and/or turf reinforcement matting.

6.1.2 Erosion Control

The final erosion control measures, including installing permanent features and erosion control matting will be installed. Silt fencing or silt checks that have been silted in will be cleaned out, and restored to function over the first year of establishing vegetation at the Site. Specifications 01560 - "Temporary Controls" further define the requirements for the final erosion control measures at Landfill 5. Specification 02720, "Storm Drainage System", describes the piping, catch basins, storm water drain inlets, and manholes that will be used at the site.

6.1.3 Fencing

A final chain link fence demarking the Navy/Army Reserve property will be installed across the landfill as shown on Appendix B, Sheets 17 and 19. The posts will be installed so that the cover's integrity is not compromised.

6.2 Demobilization and Project Closeout

Following the completion of the site restoration activities, the contractor and subcontractors will demobilize from the site. Required activities as part of demobilization include removal of stored materials, removal of equipment and temporary facilities, final cleaning, and documentation submittal. Further details on the project closeout procedures are in Specification 01700 - "Project Closeout."

6.3 Remedial Action Documentation

All RA documentation will be prepared and retained in a manner consistent with applicable sections of the Fort Sheridan Data Management Plan, October 2003, Revision 1.0, the Landfill 5 Remedial Design Document, July 2004, Revision 3.0, and other previously approved site-wide documents (e.g., QAPP, SAP and HASP).

6.3.1 As-Builts

As part of the project closeout procedures, the contractor will produce red-lined drawings from which as-built conditions can be documented. As-Builts will include surveyed conditions of the constructed facilities, changes or modifications of the final design due to unforeseen field conditions, and additions or deletions to the systems, as required to produce fully functional systems, in accordance with the final design.

6.3.2 Construction Quality Assurance Documentation

All QC activities that produced documentation, including test results, inspection reports, photographic logs, discrepancy reports and resolution, and certification reports, will be submitted to the Army following construction. Specification 01400 defines the general requirements for contractor QC. As a final submittal, a Final Report will be developed to certify that all the required specifications were met. The report will include a narrative of construction activities, all CQA/QC observation logs and testing data sheets, discussion and support for changes that occurred during construction, record drawings, and a signed, sealed certification statement from a licensed, Illinois Professional Engineer.

6.4 Operations and Maintenance Plan

KEMRON will be responsible for inspecting and maintaining the landfill cover for a period of four years following construction. The O&M contractor will follow and implement the O&M Plan during the period of performance for post-closure long-term operations (maintenance, monitoring, and inspection activities) at Landfill 5.

The O&M Plan includes summary information on site maintenance, monitoring, and inspections. The current Draft O&M Plan also provides example forms that will be used by O&M field personnel for inspection, reporting, and documentation purposes. The O&M Plan is recognized as a "living" document and shall be modified as operations and maintenance activities proceed over the operational life of the remedial systems that are constructed for the Landfill 5. A Draft O&M Plan is included in the Landfill 5 Final Remedial Design Document, Revision 3.0, July 2004, as Appendix C. The O&M Plan will be finalized upon completion of Landfill 5 RA activities, incorporating changes as necessary based on final remedial activities and field findings.

Key information contained in the O&M Plan includes:

- Landfill Cover Inspection and Maintenance
- Surface Water and Perimeter Storm Drain Controls
- Reporting and Record Keeping
- Health and Safety
- Groundwater Monitoring

7.0 PRIMARY REFERENCES

KEMRON Environmental Services, Inc., 2004, Landfill 5 Final Remedial Design Document, Fort Sheridan Environmental Restoration Project, Revision 3.0, July 12, 2004.

KEMRON Environmental Services, Inc., 2004, Project Management Plan for Environmental Restoration Project, Fort Sheridan, Illinois, Revision 4.0, May 2004.

KEMRON Environmental Services, Inc., 2003, Fort Sheridan Environmental Restoration Data Management Plan, Revision 1.0, October 21, 2003.

KEMRON Environmental Services, Inc., 2002, Final Community Involvement Plan for Environmental Restoration Project, Fort Sheridan, Illinois, July 2002.

KEMRON Environmental Services, Inc., 2002, Fort Sheridan Environmental Restoration Project Quality Assurance Project Plan, Revision 4.0, December 12, 2002, and associated addenda.

KEMRON Environmental Services, Inc., 2003, Fort Sheridan Environmental Restoration Project Sampling and Analysis Plan, Revision 5.0, March 23, 2003.

KEMRON Environmental Services, Inc., 2003, Fort Sheridan Environmental Restoration Project Health and Safety Plan, Revision 3.0, April 12, 2002.

KEMRON Environmental Services, Inc., 2004, Fort Sheridan Environmental Restoration Landfill 5 / CSA 3 Stormwater Pollution Prevention Plan, Revision 0, August 2004.

Science Applications International Corporation, 2002, "Final Fort Sheridan Feasibility Study DoD Operable Unit Fort Sheridan, Illinois."

Appendix A

Project Specifications

Fort Sheridan Landfill 5 Remedial Action

SECTION 01000

SUMMARY OF WORK

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SECTION 01000

SUMMARY OF WORK

1. GENERAL

1.1 This section includes the following:

1.1.1 Work covered by contract documents

1.1.2 Work by Owner

1.1.3 Owner furnished products

1.1.4 Contractor's duties

1.1.5 Work construction sequence

1.1.6 Contractor's use of site and premises

1.1.7 Existing facilities

1.1.8 Partial owner occupancy

1.1.9 Work on private property

1.1.10 Abbreviations

1.2 Work Covered By Contract Documents

The work to be performed is described in the Invitation to Bid and shown on the drawings.

1.3 Work by Owner

1.3.1 The owner has awarded a contract Work under these contracts includes the following:

1.3.1.1 Well abandonment

1.3.1.2 Miscellaneous work

1.4 Owner Furnished Products

1.4.1 Products furnished by the owner for installation by the contractor:

1.4.1.1

1.4.1.2

1.4.2 Owner's Responsibility

1.4.2.1 Arrange for and deliver owner reviewed shop drawings, product data, and samples to Contractor.

1.4.2.2 Arrange and pay for product delivery to site.

1.4.2.3 On delivery, inspect products jointly with Contractor.

1.4.2.4 Submit claims for transportation damage and replace damaged, defective, or deficient items.

1.4.2.5 Arrange for manufacturers' warranties, inspections and service.

1.4.3 Contractor's Responsibility

1.4.3.1 Review owner reviewed shop drawings, product data, and samples.

1.4.3.2 Receive and unload products at site; inspect for completeness or damage, jointly with owner.

1.4.3.3 Handle, store, install, and finish products

1.4.3.4 Repair or replace items damaged after receipt.

1.4.3.5 Arrange for manufacturers' warranties, inspections and service.

1.5 Contractor's Duties

1.5.1 Except as specifically noted, provide and pay for

1.5.1.1 Labor, materials, and equipment

Tools, construction equipment, and machinery

Samples, shipping costs, and tests

1.5.1.2 Necessary utilities, such as water, gas, electrical power, telephones, roads, fences, and sanitary facilities, including maintenance thereof

1.5.1.3 Other facilities and services necessary for proper execution and completion of the Work

1.5.2 Perform all the work described in these General Requirements except where specifically indicated to be done by others.

1.5.3 Pay legally required sales, consumer, and use taxes.

1.5.4 Secure and pay for legally required permits, licenses, and government fees.

1.5.5 Give required notices.

1.5.6 Employ workmen and foremen with sufficient knowledge, skill, and experience to perform the work assigned to them.

1.5.7 Comply with the codes, laws, ordinances, rules, regulations, orders, and other legal requirements of public authorities bearing on the conduct of the work.

- 1.5.8 Submit written notice to Engineer of observed variance of Contract Documents from legal requirements. Any necessary changes will be adjusted as provided in the Contract for changes in the Work.
- 1.5.9 Enforce discipline and good order among Contractor and subcontractor employees. Any person employed by Contractor or subcontractors who does not perform his work in a skillful manner, is incompetent, or acts in a disorderly or intemperate manner shall, at the written request of Engineer, be removed from the project immediately and shall not be employed again in any portion of the Work without the approval of Engineer.
- 1.5.10 Provide at all times facilities for access and inspection of the Work by representatives of Owner and of official governmental agencies designated by Owner as having the right to inspect the work.
- 1.5.11 Contact Miss Dig (800) 482-7171 prior to starting any underground activities.

1.6 Construction Sequence

- 1.6.1 Contractor shall submit a work sequence so that the entire project can be properly coordinated.
- 1.6.2 The work sequence to be submitted shall include details on how the following operations will be performed.

INCLUDE CONSTRUCTION SEQUENCE HERE!!

1.7 Contractor's Use of Premises

- 1.7.1 Confine operations at site to areas permitted by law, ordinances, permits, and the contract documents.
- 1.7.2 Do not load or permit any part of a structure to be subjected to any force that will endanger its safety.
- 1.7.3 Comply with and enforce Owner's instructions regarding signs, advertisements, fires, and smoke.
- 1.7.4 Assume responsibility for protection and safekeeping of products stored on site.
- 1.7.5 Do not discharge smoke, dust, or other contaminants into the atmosphere, or fluids or materials into any waterway as will violate regulations of any legally constituted authority.
- 1.7.6 Move stored products which interfere with the operations of Owner or other contractors.

- 1.7.7 Obtain and pay for additional storage or work areas needed for operations.
- 1.7.8 Comply with Owner's regulations regarding consumption of alcohol on the site.
- 1.7.9 Do not turn on any hydrants unless permission is obtained. If potable water is desired, make arrangements with the water utility and pay for water at the established rate.
- 1.8 Partial Owner Occupancy
 - 1.8.1 Owner, at its discretion, may place into service certain portions of the completed work.
 - 1.8.2 Contractor shall provide proper access to Owner's personnel for this purpose.
 - 1.8.3 Use and operation of a completed portion to Owner will constitute acceptance of the Work. Contractor shall notify Owner when to insure the work placed in beneficial use.
 - 1.8.4 Liability of Contractor for defects due to faulty construction will extend for 1 year after the Work is placed in service.
 - 1.8.5 Payment will be made for that portion of the Work placed in service by Owner, including any retained percentage of the amount due, immediately after the Work is placed in service. The value of any uncompleted portion of the Work placed in service will be excluded from the payment.
- 1.9 Existing Facilities
 - 1.9.1 The existing facilities will be in continuous operation during the construction period.
 - 1.9.2 Plan and conduct construction operations to avoid disturbing existing structures, piping, and services in any manner which will interrupt or impair operations, except as approved by Engineer.
- 1.10 Abbreviations

The following abbreviations as used in the Contract Documents have the listed meanings:

 - 1.10.1 Standards Organizations
 - AA..... Aluminum Association
 - AASHTO.... American Association of State Highway and Transportation Officials
 - ACI..... American Concrete Institute
 - ADC Air Diffusion Council
 - AGA American Gas Association

AGMA.....	American Gear Manufacturers Association
AISC.....	American Institute of Steel Construction
ANSI.....	American National Standards Institute
ARI.....	Air Conditioning and Refrigeration Institute
ASHRAE....	American Society of Heating, Refrigerating, and Air Conditioning Engineers
ASME.....	American Society of Mechanical Engineers
ASTM.....	American Society for Testing and Materials
AWS.....	American Welding Society
AWWA.....	American Water Works Association
CRSI.....	Concrete Reinforcing Steel Institute
FIA	Factory Insurance Association
FM.....	Factory Mutual
FS	Federal Specifications
GRI.....	Geosynthetic Research Institute
IEEE	Institute of Electrical and Electronic Engineers
MS.....	Military Specifications
NBBPVI	National Board of Boiler and Pressure Vessel Inspectors
NBS.....	National Bureau of Standards
NEC.....	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA.....	National Fire Protection Association
OSHA.....	Occupational Safety and Health Administration
UL.....	Underwriters Laboratory

1.10.2 Units of Weight and Measure

A.....	ampere
btu.....	British thermal unit
C	degrees Celsius
cc	cubic centimeter
cf.....	cubic foot
cfm.....	cubic feet per minute
cy.....	cubic yard
dB	decibel

F.....	degrees Fahrenheit
fpm	feet per minute
fps.....	feet per second
ft	feet
g.....	gram
ga	gauge
gal.....	gallon
gpm.....	gallons per minute
hp.....	horsepower
h.....	hour
Hz.....	hertz
in.....	inches
kV.....	kilovolts
kVA.....	kilovolt-amperes
kW.....	kilowatts
kWh.....	kilowatt hours
L.....	liter
lb.....	pound
lbs.....	pounds
mA.....	milliamperes
mg/L.....	milligrams per liter
mgd.....	million gallons per day
mL.....	milliliter
mm.....	millimeter
mph.....	miles per hour
MVA.....	megavolt-ampere
ppm.....	parts per million
psf.....	pounds per square foot
psi.....	pounds per square inch gauge
rpm.....	revolutions per minute
scfm.....	standard cubic feet per minute
sf.....	square feet
sy.....	square yard
V.....	volt
VA.....	volt-ampere

1.10.3 Units of Weight and Measure

A.....	ampere
C.....	degrees Celsius
cc.....	cubic centimeter
dB.....	decibel
h.....	hour
Hz.....	hertz
J.....	joule
K.....	Kelvin
L.....	liter
lm.....	lumen
m.....	meter
N.....	Newton
Pa.....	pascal
ppm.....	parts per million
rad.....	radian
rpm.....	revolutions per minute
s.....	second
V.....	volt
W.....	watt

Metric Prefixes

G.....	giga = 1,000,000,000
M.....	mega = 1,000,000
k.....	kilo = 1,000
d.....	deci = 0.1
c.....	centi = 0.01
m.....	milli = 0.001
u.....	micro = 0.000 001
n.....	nano = 0.000 000 001

1.10.4 Other Abbreviations

AC.....	alternating current
---------	---------------------

AHU air handling unit

Bil basic impulse insulation level
BOD biochemical oxygen demand

Co company
conc concrete
Corp corporation
cu cubic

DC direct current
dpdt double pole, double throw

H-O-A.....	hand-off-automatic
Inc.....	Incorporated
LPG	liquid petroleum gas
max	maximum
min.....	minimum
N.C.	normally closed
N.O.	normally open
No.....	number
pvc.....	polyvinyl chloride
Rms.....	root mean square
RTRP.....	reinforced thermosetting resin pipe
scr	silicon controlled rectifier
SDR.....	standard dimension ratio
spdt	single pole, double throw
sq	square
std	square transmission coefficient
U.S.....	United States

2. **PRODUCTS** - Not Used

3. **EXECUTION** - Not Used

END OF SECTION 01000

SECTION 01039

COORDINATION AND MEETINGS

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SECTION 01039

COORDINATION AND MEETINGS

1. GENERAL

1.1 This section includes:

- 1.1.1 Coordination
- 1.1.2 Field Engineering
- 1.1.3 Alteration Project Procedures
- 1.1.4 Cutting and Patching
- 1.1.5 Preconstruction Conference
- 1.1.6 Site Mobilization Conference
- 1.1.7 Progress Meetings
- 1.1.8 Preinstallation Conference

1.2 Related Sections

- 1.2.1 Section 01000 - Summary of Work
- 1.2.2 Section 01300 - Submittals
- 1.2.3 Section 01700 - Project Closeout

1.3 Coordination

- 1.3.1 Coordinate scheduling, submittals, and work of the various sections of specifications to assure efficient and orderly sequence of installation of interdependent construction elements
- 1.3.2 Coordinate completion and clean up of work of separate sections in preparation for substantial completion and for portions of work designated for owners occupancy.

- 1.3.3 After owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with contract documents, to minimize disruption of owner's activities.

1.4 Field Engineering

- 1.4.1 Employ a Land Surveyor registered in the State of Illinois and acceptable to the Engineer.
- 1.4.2 Contractor shall locate and protect survey control and reference points.
- 1.4.3 Control datum for survey is that shown on drawings.
- 1.4.4 Provide field engineering services. Establish elevations, lines, and levels, utilizing recognized engineering survey practices.
- 1.4.5 Submit a copy of registered site drawing and certificate signed by the land surveyor that the elevations and locations of the work are in conformance with the contract documents.

1.5 Cutting and Patching

- 1.5.1 Employ original skilled and experienced installer to perform cutting and patching.
- 1.5.2 Submit written request in advance of cutting or altering elements which affects:
 - 1. Structural integrity of element
 - 2. Integrity of weather-exposed or moisture-resistant elements
 - 3. Efficiency, maintenance, or safety of element
 - 4. Visual qualities of sight-exposed elements
 - 5. Work of owner or separate contractor
- 1.5.3 Execute cutting, fitting, and patching, including excavation and fill, to complete work, and to:
 - 1. Fit the several parts together, to integrate with other work
 - 2. Uncover work to install or correct ill-timed work
 - 3. Remove and replace defective and nonconforming work
 - 4. Remove samples of installed work for testing
 - 5. Provide openings in elements of work for penetrations of mechanical and electrical work

- 1.5.4 Execute work by methods which will avoid damage to other work, and provide proper surfaces to receive patching and finishing.
- 1.5.5 Cut rigid materials using masonry saw or core drill.
- 1.5.6 Restore work with new products in accordance with requirements of contract documents.
- 1.5.7 Fit work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- 1.5.8 Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.
- 1.5.9 Identify any hazardous substance or condition exposed during the work to the engineer for decision or remedy.
- 1.6 Alternation Project Procedures
 - 1.6.1 Materials: As specified in product sections; match existing products and work for patching and extending work.
 - 1.6.2 Remove, cut, and patch work in a manner to minimize damage and to provide a means of restoring products and finishes to original specified condition.
 - 1.6.3 Where new work abuts or aligns with existing, perform a smooth and even transition. Patched work shall match existing adjacent work in texture and appearance.
 - 1.6.4 When finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to engineer.
 - 1.6.5 Patch or replace portions of existing surfaces which are damaged, lifted, discolored, or showing other imperfections.
 - 1.6.6 Finish surfaces as specified in individual product sections.
- 1.7 Preconstruction Conference
 - 1.7.1 Owner Engineer will schedule a conference after notice of award.
 - 1.7.2 Attendance required: owner, engineer, and contractor.

- 1.7.3 Agenda
 - 1.7.3.1 Execution of Owner-Contractor agreement.
 - 1.7.3.2 Submission of executed bonds and insurance certificates.
 - 1.7.3.3 Distribution of contract documents.
 - 1.7.3.4 Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
 - 1.7.3.5 Designation of personnel representing the parties in contract, owner, and the engineer.
 - 1.7.3.6 Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, change orders and contract closeout procedures.
 - 1.7.3.7 Scheduling.
 - 1.7.3.8 Scheduling activities of geotechnical engineer.

- 1.8 Site Mobilization Conference
 - 1.8.1 Engineer/Owner will schedule a conference at the project site prior to contractors occupancy.
 - 1.8.2 Required attendance: owner, engineer, special consultants, contractor, contractor's superintendent, and major subcontractors.
 - 1.8.3 Agenda:
 - 1.8.3.1 Use of premises by owner and contractor.
 - 1.8.3.2 Owner's requirements .
 - 1.8.3.3 Construction facilities and controls provided by owner.
 - 1.8.3.4 Temporary utilities provided by owner
 - 1.8.3.5 Survey and layout.
 - 1.8.3.6 Security and housekeeping procedures.

- 1.8.3.7 Schedules
 - 1.8.3.8 Procedures for testing
 - 1.8.3.9 Procedures for maintaining record documents.
 - 1.8.3.10 Requirements for start-up of equipment.
 - 1.8.3.11 Inspection and acceptance of equipment put into service during construction period.
- 1.9 Progress Meetings
- 1.9.1 Schedule and administer meetings throughout progress of the work at maximum weekly intervals.
 - 1.9.2 Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings, record minutes, and distribute copies within two days to engineer, owner, participants, and those affected by decisions made.
 - 1.9.3 Attendance required: Project superintendent, major subcontractors and suppliers, owner, engineer, as appropriate to agenda topics for each meeting.
 - 1.9.4 Agenda.
 - 1.9.4.1 Review minutes of previous meetings.
 - 1.9.4.2 Review of work progress.
 - 1.9.4.3 Field observations, problems, and decisions.
 - 1.9.4.4 Identification of problems which impede planned progress.
 - 1.9.4.5 Review of submittals schedule and status of submittals.
 - 1.9.4.6 Review of off-site fabrication and delivery schedules.
 - 1.9.4.7 Maintenance of progress schedule.
 - 1.9.4.8 Corrective measures to regain projected schedules.
 - 1.9.4.9 Planned progress during succeeding work period.
 - 1.9.4.10 Coordination of projected progress.

- 1.9.4.11 Maintenance of quality and work standards.
- 1.9.4.12 Effect of proposed changes on progress schedule and coordination.
- 1.9.4.13 Other business relating to work.

2. **PRODUCTS** - Not Used

3. **EXECUTION** - Not Used

END OF SECTION 01039

SECTION 01039

COORDINATION AND MEETINGS

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SECTION 01300

SUBMITTALS

1. GENERAL

1.1 Section Includes:

- 1.1.1 Submittal Procedure
- 1.1.2 Construction Progress Schedule
- 1.1.3 Proposed Product List
- 1.1.4 Shop Drawings
- 1.1.5 Product Data
- 1.1.6 Samples
- 1.1.7 Manufacturer=s Instructions
- 1.1.8 Manufacturer=s Certificates
- 1.1.9 Breakdown of Contract Amount
- 1.1.10 Drawings Showing Deviations from Contract Drawings
- 1.1.11 Operation and Maintenance Manual
- 1.1.12 Health and Safety Requirements
- 1.1.13 As-constructed Drawings
- 1.1.14 Final Aerial Survey

1.2 Related Sections:

- 1.2.1 Section 01400 - Quality Control: Manufacturer=s field services and reports
- 1.2.2 Section 01700 - Contract Closeout: Contract warranty and manufacturer=s certificates, closeout submittals.

1.3 Submittal Procedures

- 1.3.1 Transmit each submittal with a form acceptable to KEMRON.
- 1.3.2 Sequentially number the transmittal forms. Resubmittals shall have original number with an alphabetic suffix.
- 1.3.3 Identify Project, Contractor, Subcontractor or Supplier; pertinent Drawing sheet, and Specification Section number.
- 1.3.4 Apply Contractor's stamp, signed or initialed certifying that review, verification of Products required, field dimensions, adjacent construction Work, and coordination of information, is in accordance with the requirements of the Work and Contract Documents.
- 1.3.5 Identify variations, deviations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed work.
- 1.3.6 Provide adequate space for Contractor and KEMRON review stamps.
- 1.3.7 Revise and resubmit submittals as required, identify all changes made since previous submittal
- 1.3.8 Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with the provisions of the contract documents.

1.4 Construction Progress Schedule

- 1.4.1 Prepare a detailed progress schedule in graphic form showing proposed dates of starting and completing each major division of the Work
- 1.4.2 The schedule shall be consistent with the time and order of work requirements of the Specifications, and shall be the basis of Contractor's operations.
- 1.4.3 The schedule shall be prepared utilizing the critical path method.
- 1.4.4 Submit three copies to KEMRON within 14 days after notice to proceed.
- 1.4.5 At the end of every month, Contractor shall submit a revised schedule showing the current status of the Work as compared to the projected status. The current application for a progress payment will not be processed until the revised schedule is delivered to KEMRON.

1.5 Proposed Product List

1.5.1 Within 15 days after execution of the Contract, submit to KEMRON a complete list of major products proposed with name of manufacturer of items of equipment or assembly fabricated off the site which are intended to be furnished.

1.5.2 Furnish the Manufacturer's specifications and Performance data for each item. Submit additional data as necessary to demonstrate that the materials and equipment comply with the provisions and intent of the Contract Documents

1.5.3 If the information shows deviations from the Contract Documents, submit in writing a statement with the submittal advising KEMRON of the deviations and the reasons therefore, and state that there will be no additional cost to Owner.

1.6 Shop Drawings

1.6.1 Shop drawings are original drawings prepared by Contractor, subcontractors, suppliers, or distributors, illustrating some portion of the work and showing fabrication, layout, setting, or erection details of equipment, materials, and components.

1.6.2 Unless otherwise instructed, Contractor shall submit to KEMRON for review and approval three prints of each plan or two prints and one reproducible. KEMRON will return with review comments one print or one reproducible.

1.6.3 Shop Drawings Deviations from Contract Drawings

1.6.3.1 Submit detailed drawings of modifications to or deviations from the drawings, as required to accommodate equipment, facilities, or processes included in the awarded Contract.

1.6.3.2 The drawings shall show modifications to site work, structures, mechanical work, electrical work, piping, equipment, and all other changes.

1.6.4 Contractor Responsibilities

1.6.4.1 Review and approve shop drawings, project data, and samples before submitting them.

1.6.4.2 Verify field measurements, field construction criteria, catalog numbers, and similar data.

1.6.4.3 Coordinate each submittal with the requirements of the Contract Documents.

- 1.6.4.4 For each major equipment item, submit all shop drawings in one complete package to permit checking complete installation details.
- 1.6.4.5 In a clear space above the title block of the shop drawings, or on the back, hand stamp the following, and enter the required information:

Ft. Sheridan Environmental
Restoration Project Landfill 5
Date
Project No.
Identification
Contract Drawing No. ...
Specification Section

This document has been checked for accuracy of content and for compliance with the Contract Documents and is hereby approved. The information contained herein has been coordinated with all involved contractors.

Contractor..

Signed.....

- 1.6.4.6 Contractor's responsibility for errors, omissions, and deviations from requirements of the Contract Documents in submittals is not relieved by KEMRON's review.
- 1.6.4.7 At time of submittal, notify KEMRON in writing of deviations in submittals from requirements of the Contract Documents.
- 1.6.4.8 Do not install materials or equipment which require submittals until the submittals are returned with KEMRON's stamp and initials or signature indicating approval.
- 1.6.4.9 Revise returned shop drawings as required and resubmit until final approval is obtained. Indicate on the drawings any changes which have been made other than those requested by KEMRON.
- 1.6.4.10 Submit new project data and samples when the initial submittal is returned disapproved.
- 1.6.4.11 No claim will be allowed for damages or extension of time because of delays in the work resulting from rejection of material or from revision and resubmittal of shop drawings, project data, or samples.

- 1.6.5 KEMRON's Duties
 - 1.6.5.1 KEMRON will review submittals for compliance with the Contract Documents and with the design concept of the project.
 - 1.6.5.2 Review of a separate item does not constitute acceptance of an assembly in which the item functions.
 - 1.6.5.3 KEMRON will affix a stamp to the returned copy of each submittal. The stamp will be marked to indicate whether the submittal is "Approved," "Approved as Noted," "Revise and Resubmit," "Not Approved," or "Information" and an explanation will be given if the submittal is unsatisfactory. The stamp will be initialed or signed certifying the submittal review.
- 1.7 Product Data
 - 1.7.1 Submit the number of copies which contractor requires, plus one copy which will be retained by the KEMRON.
 - 1.7.2 Product data are manufacturers' standard schematic drawings, catalog sheets, brochures, diagrams, schedules, performance charts, illustrations, and other standard descriptive data.
 - 1.7.3 Mark each copy of printed material to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information unique to this project.
 - 1.7.4 Project data shall show the name, mailing address, and telephone number of the manufacturer and supplier.
 - 1.7.5 After review, distribute in accordance with submittal procedures and provide copies for Record Documents described in Section 01700 - Contract Closeout.
- 1.8 Samples
 - 1.8.1 Submit samples to illustrate materials, equipment, or workmanship and to establish standards by which completed work is judged.
 - 1.8.2 Samples submitted shall be of sufficient size and quantity to illustrate functional characteristics of product or material, textures, and patterns available for KEMRON's selection.
 - 1.8.3 Include identification on each sample, with full Project information.
 - 1.8.4 When required by the specifications, field samples and mock-ups shall be erected at the project site where directed by KEMRON.

- 1.8.5 Submit the number of samples specified in individual specification Sections; one of which will be retained by KEMRON.
- 1.9 Manufacturers Certificates
 - 1.9.1 Submit manufacturers certificates as required by individual sections.
- 1.10 Breakdown of Contract Amount
 - 1.10.1 Submit a typewritten breakdown of contract amount for use in computing and checking periodic payment estimates.
 - 1.10.2 No payment will be made until the breakdown has been submitted and accepted by KEMRON.
- 1.11 Operating and Maintenance Manuals
 - 1.11.1 Furnish three copies of the operation and maintenance manual for each item of equipment which has a purchase cost of \$5,000 or more.
 - 1.11.2 Include instructions for all components.
 - 1.11.3 Included Material
 - 1.11.3.1 Names, addresses, and telephone numbers of organization to contact for servicing the equipment.
 - 1.11.3.2 Other pertinent information of value to obtain peak performance.
 - 1.11.4 Maintenance Schedule
 - 1.11.4.1 In addition to maintenance manuals, a maintenance schedule shall be prepared. The schedule shall list routine preventive maintenance recommended by the manufacturer. The schedule shall be listed as daily, weekly, monthly, quarterly, semi-annually, and annually.
 - 1.11.4.2 The items listed in the schedule shall include all maintenance functions Contractor and suppliers expect the personnel to perform in order to meet warranty provisions when the
 - 1.11.5 Assembly
 - 1.11.5.1 Assemble in five sets and bind in 3- or 4-inch post type, three-hole, hard cover binders.
 - 1.11.5.2 Remove bindings of individual manuals.

- 1.11.5.3 Insert index tabs labeled with the respective piece of equipment to distinguish individual manuals.
- 1.11.5.4 Provide a table of contents at the front of each volume, showing the equipment items in the order they appear. Each equipment item shall include the functional name, applicable specifications section, and the plan listing, if any.
- 1.11.5.5 The preventive maintenance schedule shall be bound in the front of each section, immediately following the index tab sheet. The schedule shall be identified with respect to the piece of equipment it refers to.
- 1.11.5.6 Sheet size: 8-1/2 x 11 inches
- 1.11.5.7 Drawings may be submitted on 11- x 17-inch sheets folded to 8-1/2 x 11 inches.
- 1.11.5.8 Contractor shall imprint cover with name of project, date of contract, and volume number.

1.11.6 Submittal

- 1.11.6.1 Submit one manual, contained in a post binder, to KEMRON for approval.
- 1.11.6.2 After approval, contractor shall deliver the remaining copies of the manual to KEMRON.

1.12 Health and Safety Requirements

1.12.1 General

Prepare a Site Safety Plan. Submit three copies to KEMRON and Owner for review and comment no later than 10 days after Notice to Proceed and prior to the start of any field work.

- 1.12.1.1 The contractor shall review KEMRON's Health and Safety Plan prior to preparation of the plan
- 1.12.1.2 These requirements do not supersede, but are in addition to any federal, OSHA, state, or local regulations. If a conflict occurs between these requirements and current regulations, the more stringent shall apply. These requirements are in accordance with and incorporate the current health and safety guidelines established in the Standard Operating Safety Guides, prepared by the EPA Office of Emergency and Remedial Response, Hazardous Response Support Division, September 1984, and the Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, U.S. Department of Health and Human Services, October 1985, hereinafter called OSHA Guidance

Manual. Contractor shall also comply with all federal, OSHA, state, and local health and safety regulations and as required by 40 CFR 300.150 and 29 CFR 1910.120.

1.12.2 Contractor's Responsibilities

1.12.2.1 Contractor is solely responsible for the health, safety, and protection of all on-site personnel during the performance of the work. Contractor shall perform the work specified in these contract documents in accordance with the health and safety requirements specified herein. It shall be the responsibility of Contractor to be familiar with the required health and safety regulations in the performance of this work.

1.13 As-constructed Drawings

Contractor shall keep an up-to-date set of As-Constructed drawings at the site. Drawings will be available for review by KEMRONing and shall be submitted at project closure.

2. **MATERIALS** (not used)

3. **EXECUTION** (not used)

END OF SECTION 01300

SECTION 01400
QUALITY CONTROL
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SECTION 01400
QUALITY CONTROL

1. GENERAL

1.1 This Section Includes

1.1.1 Quality assurance and control at installation

1.1.2 References

1.1.3 Field samples

1.1.4 Inspection and testing laboratory services

1.1.5 Manufacturer's field services and reports

1.2 Related Sections

1.2.1 Section 01300 - Submittals

1.2.2 Section 01600 - Material and Equipment

1.3 Quality Assurance/Quality Control at Installation

1.3.1 Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship to produce work of specified quality.

1.3.2 Comply fully with manufacturer's instructions, including each step in sequence.

1.3.3. Should manufacturer's instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

1.3.4 Comply with specified standards as a minimum quality for the work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

1.3.5 Perform work by persons qualified to produce workmanship of specified quality.

1.3.6 Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.4 References

- 1.4.1 Conform to reference standard by date of issue current on [date of Contract Documents] [date for receiving bids] [date of contract agreement].
- 1.4.2 Obtain copies of standards when required by Contract Documents.
- 1.4.3 Should specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.
- 1.4.4 The Contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.5 Field Samples

- 1.5.1 Install field samples at the site as required by individual specification sections for review.
- 1.5.2 Acceptable samples represent a quality level for the work.
- 1.5.3 Where field sample is specified in individual sections to be removed, clear area after field sample has been accepted by Engineer.

1.6 Inspection and Testing Laboratory Services

- 1.6.1 The independent firm will perform inspections, tests, and other services specified in individual specification sections and as required by Engineer.
- 1.6.2 Reports will be submitted by the independent firm to the Engineer in duplicate, indicating observations and results of tests and indicating compliance or noncompliance with Contract Documents.
- 1.6.3 Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, and assistance as required.
 - 1.6.3.1 Notify Engineer and independent firm 24 hours prior to expected time for operations requiring services.
 - 1.6.3.2 Make arrangements with independent firm and pay for additional samples and tests.
- 1.6.4 Retesting required because of noncompliance to specified requirements shall be performed by the same independent firm on instructions by Engineer. payment for retesting will be charged to the Contractor by deducting inspection or testing changes from the Contract Lump Sum.

- 1.7 Manufacturer's Field Services and Reports
 - 1.7.1 Submit qualifications of manufacturers to Engineer 30 days in advance of required services.
 - 1.7.2 When specified in individual specification sections, require material or product manufacturers or suppliers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, as applicable, and to initiate instructions when necessary.
 - 1.7.3 Individuals to report observations and site decisions or instructions given to installers that are supplemented or contrary to manufacturer's written instructions.
 - 1.7.4 Submit report in duplicate within 30 days of observation to Engineer for review.
2. **PRODUCTS (Not used)**
3. **EXECUTION (Not used)**

END OF SECTION 01410

SECTION 01560

TEMPORARY CONTROLS

1. GENERAL

1.1 Section includes

- 1.1.1 Water control
- 1.1.2 Dust control
- 1.1.3 Erosion and sediment control
- 1.1.4 Pollution control

1.2 Related Sections

- 1.2.1 Section 01000 - Summary of Work
- 1.2.2 Section 01039 - Coordinator and Meetings
- 1.2.3 Section 01300 - Submittals

1.3 Water Control

- 1.3.1 Grade site to drain properly. Maintain all excavation free of water. Provide, operate, and maintain pumping equipment, siltation tanks, silt fences and filters, and all other equipment required.
- 1.3.2 Protect site from puddling or running water. Provide water barriers such as berms, as necessary, to protect from soil erosion, mud slides, and flooding.
- 1.3.3 Relocate existing streams and ponds that may interfere with the work. When work is complete, restore the site to its original condition.

1.4 Dust Control

- 1.4.1 Excavate work by methods to minimize raising dust from construction operations.
- 1.4.2 Provide positive means to prevent airborne dust from dispersing into atmosphere.

1.4.3 Water or treat roadways and other areas of construction to prevent dust from becoming a nuisance.

1.5 Erosion and Sediment Control

1.5.1 Submit erosion and sediment control plan prior to start of any excavation.

1.5.2 Plan and execute work by methods to control surface runoff from cuts and fills and from borrow and waste disposal areas. Install temporary measures to prevent erosion and sedimentation.

1.5.3 Minimize area of bare soil exposed at one time.

1.5.4 Install temporary measures such as berms, dikes, drains, silt fences, and other means to control water flow and prevent sedimentation.

1.5.5 Construct fill areas by selective placement of soils to avoid erosive surface silts or clays.

1.5.6 Inspect and maintain earthwork to detect evidence of erosion and sedimentation; make necessary report to correct noted deficiencies.

1.6 Pollution Control

1.6.1 Provide methods, means, and facilities to prevent contamination of soil, water, and air from discharge of noxious, toxic substances and pollutants produced by construction operations.

1.6.2 Collect all runoff from the waste areas and treat it prior to discharge.

1.6.3 Collect all decontamination wastewater and dispose of it in accordance with state and local requirements.

2. MATERIALS (Not Used)

3. EXECUTION (Not Used)

END OF SECTION 01560

SECTION 01600

MATERIALS AND EQUIPMENT

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SECTION 01600

MATERIALS AND EQUIPMENT

1. GENERAL

1.1 This Section Includes

1.1.1 Products

1.1.2 Transportation and handling

1.1.3 Storage and protection

1.1.4 Product options

1.1.5 Substitutions

1.2 Related Sections

1.2.1 Section 01300 - Submittals

1.2.2 Section 01400 - Quality Control: Product quality monitoring

1.3 Products

1.3.1 Products, includes materials, equipment, machinery, components, fixtures, systems, and assemblies forming the work. It does not include machinery and equipment used for preparation, fabrication, conveying, and erection of the work. Products may also include existing materials or components required for reuse.

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

1.3.3 Provide interchangeable components of the same manufacturer, for similar components.

1.4 Transportation and Handling

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

1.4.2 Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products delivered are undamaged.

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

1.5 Storage and Protection

- 1.5.1 Store and protect products in accordance with manufacturer=s instructions, with all seals and labels intact and legible. Store sensitive products such as electrical and electronic equipment in weather-tight, climate-controlled enclosures.
- 1.5.2 For exterior storage of fabricated products, place on sloped supports, above ground.
- 1.5.3 Cover products subject to deterioration with impervious sheet covering. Provide proper ventilation to prevent condensation.
- 1.5.4 Arrange storage of products to permit access for inspection. Periodically inspect to ensure products are undamaged and maintained under specified conditions.
- 1.5.5 Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- 1.5.6 All equipment installed but not in operation shall be considered in storage and shall be protected accordingly.

1.6 Product Options

- 1.6.1 Products specified by reference standards or by description only: any products meeting those standards or description.
- 1.6.2 Products specified by naming one or more manufacturers: Products of manufacturers named and meeting specifications, no options or substitutions allowed.
- 1.6.3 Products specified by naming one or more manufacturers with a provision for substitution (or equal): submit a written request for substitution for any manufacturer not named.

1.7 Substitutions

- 1.7.1 Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.
- 1.7.2 Document each request with complete data substantiating compliance of proposed substitution with Contract Document requirements.
- 1.7.3 A request constitutes a representation that the contractor
 - 1.7.3.1 Has investigated the proposed product and determined that it meets or exceeds the quality level of the specified product.
 - 1.7.3.2 Will provide the same warranty for the substitution as for the specified product.
 - 1.7.3.3 Has investigated proposed product and determined that it meets or exceeds the performance criteria specified and intended for originally specified products.

1.7.3.4 Will coordinate installation and make changes to other work which may be required for the work to be complete and operational with no additional cost to Owner.

1.7.3.5 Waive claims for additional costs and time extension which may subsequently become apparent.

1.7.4 Substitutions will not be considered when they are indicated or implied on shop drawings or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

1.7.5 Substitution Submittal Procedure:

1.7.5.1 Submit three copies of request for substitution for consideration. Limit each request to one proposed substitution.

1.7.5.2 Submit shop drawings, product data, and certified test results attesting to the proposed produce equivalence. See Section 01300 for submittal requirements.

1.7.5.3 Engineer will notify Contractor, in writing, of decision to accept or reject requests.

2. **PRODUCTS (Not used)**

3. **EXECUTION (Not used)**

END OF SECTION 01600

SECTION 01700
PROJECT CLOSEOUT
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SECTION 01700

PROJECT CLOSEOUT

1. GENERAL

- 1.1 This Section Includes
 - 1.1.1 Closeout procedures
 - 1.1.2 Final cleaning
 - 1.1.3 Project record documents
 - 1.1.4 Operation and Maintenance data
 - 1.1.5 Warranties
- 1.2 Related Sections
 - 1.2.1 Section 01300 - Submittals
 - 1.2.2 Section 01500 - Construction facilities and temporary controls: progress cleaning
- 1.3 Closeout Procedures
 - 1.3.1 Submit written certification that Contract Documents have been reviewed, work has been inspected, and that the work is completed in accordance with Contract Documents and ready for Engineer's inspection.
 - 1.3.2 Provide submittals to Engineer that are required by governing or other authorities.
 - 1.3.3 Submit final Application for Payment identifying total adjusted Contract among, previous payments, and sum remaining due.
- 1.4 Final Cleaning
 - 1.4.1 Execute final cleaning prior to final inspection
 - 1.4.2 Clean debris from manholes, sewers, inlets, gutters, drainage systems, and storage areas.
 - 1.4.3 Clean site, sweep paved areas, rake clean landscaped surfaces.

1.4.4 Remove waste and surplus materials, rubbish, and construction facilities from site.

1.5 Project Record Documents

1.5.1 Maintain on site, one set of the following record documents; record all revision, modifications, additions, and changes to the Work:

1.5.1.1 Contract drawings

1.5.1.2 Specifications

1.5.1.3 Addenda

1.5.1.4 Change orders and all other modifications to the Contract.

1.5.1.5 Reviewed and approved shop drawings, product data, and samples

1.5.2 Store Record Documents separate from documents used for construction.

1.5.3 Record all information concurrent with construction progress.

1.5.4 Specifications: Legibly mark and record at each Product section a description of actual products installed including the following:

1.5.4.1 Manufacturer's name and product model and number

1.5.4.2 Product substitution or alternates used

1.5.4.3 Changes made by Addenda and modifications

1.5.5 Record Drawings and Shop Drawings: Legibly mark each item to record actual construction, including:

1.5.5.1 Actual dimensions and elevations

1.5.5.2 Actual horizontal and vertical locations of underground utilities and appurtenance referenced to buildings, bench marks, and local data.

1.5.5.3 Actual locations of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of work.

1.5.5.4 All field changes of dimensions, details, and elevations.

1.5.5.5 All details not shown on the original drawings.

1.5.6 Delete Engineer's title block and seal from all documents.

1.5.7 Submit all documents to Engineer with Application for Final Payment.

1.6 Operation and Maintenance Data

- 1.6.1 Submit one draft set prior to project 50 percent completion, bound in 8-1/2 by 11-inch text pages, three-hole hard cover binders with durable cloth covers. No payment in excess of 50 percent will be made until draft O&M is submitted.
- 1.6.2 Prepare binder covers with printed title "OPERATION AND MAINTENANCE MANUAL," the title of the project.
- 1.6.3 Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
- 1.6.4 Contents: Prepare a Table of Contents for each volume, with each product, equipment, or system description identified, printed on 24-pound white paper.
- 1.6.5 Part 1: Directory - list names, addresses, telephone numbers, fax numbers, and e-mail addresses of Engineer, Contractor, subcontractors, and major equipment suppliers.
- 1.6.6 Part 2: Operation and Maintenance Instructions - arranged by systems and subdivided by specification sections. For each category, identify names of subcontractors, suppliers, their addresses, telephone numbers, fax numbers, and e-mail addresses. Identify the following:
 - 1.6.6.1 Significant design criteria
 - 1.6.6.2 List of equipment
 - 1.6.6.3 Parts list for each piece of equipment
 - 1.6.6.4 Other pertinent information of value to obtain peak performance.
- 1.6.7 Part 3: Project Documents and Certificates - include the following:
 - 1.6.7.1 Shop drawings and product data.
 - 1.6.7.2 Air, water, and balance reports
 - 1.6.7.3 Certificates
 - 1.6.7.4 Photocopies of warranties and bonds
- 1.6.8 Submit one copy of completed volumes in final form 15 days prior to final inspection. This copy will be returned after final inspection with Engineer's comments. Revised content of documents as required prior to final submittal.
- 1.6.9 Submit final revised volumes within 15 days after final inspection.

1.7 Warranties

- 1.7.1 Provide duplicate notarized copies.
 - 1.7.2 Execute and assemble documents from subcontractors, suppliers, and manufacturers.
 - 1.7.3 Provide Table of Contents and assemble in three-ring binder with durable plastic cover.
 - 1.7.4 Submit prior to final Application for Payment.
 - 1.7.5 For items of work delayed beyond date of Substantial Completion, provide updated submittal within 10 days after acceptance, listing date of acceptance as start of warranty period.
2. **PRODUCTS** - (Not Used)
3. **EXECUTION** - (Not Used)

END OF SECTION 01700

SECTION 01700
PROJECT CLOSEOUT
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SECTION 02060

DEMOLITION

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	3.3 Pavement Demolition	<u>02060-3</u>

SECTION 02060

DEMOLITION

1. GENERAL

1.1 This section includes:

- 1.1.1 Demolition and removal of the existing structures, walkways, and pavement shown to be removed on the drawings
- 1.1.2 Demolition and removal of fences, and manholes, storm water inlets, monitoring wells protective casings and bollards,
- 1.1.3 Disconnecting and capping or removal of identified utilities

1.2 Related Sections

- 1.2.1 Section 02110 - Site Clearing
- 1.2.2 Section 02222 - Excavating
- 1.2.3 Section 02223 - Backfilling
- 1.2.4 Section 02205 - Soil Materials
- 1.2.5 Section 02207 - Aggregate Materials
- 1.2.6 Section 02225 - Trenching

1.3 Project Record Documents

- 1.3.1 Submit record documents
- 1.3.2 Accurately record actual locations of capped utilities and subsurface obstructions

1.4 Regulatory Requirements

- 1.4.1 Conform to applicable Navy and Army Reserve requirements for demolition of structures, safety of adjacent structures, dust control, runoff control, and disposal of demolished materials
- 1.4.2 Obtain required permits from Navy and Army Reserve.
- 1.4.3 Notify affected utility companies before starting work and comply with their requirements.

- 1.4.4 Do not close or obstruct roadways sidewalks hydrants without special permits.
 - 1.4.5 Notify Engineer when discovering potentially hazardous or contaminated materials during demolition work.
 - 1.4.6 Perform required testing.
 - 1.5 Sequencing
 - 1.5.1 Sequence activities to demolish the work in the following order
 - 1.5.1.1 Remove all fences as shown on the drawings
 - 1.5.1.2 Remove bituminous pavement as shown on the drawings
 - 1.5.1.3 Remove concrete pavement and walkways as shown on the drawings
 - 1.5.1.4 Excavate unpaved areas which will receive new pavement
 - 1.6 Off-Site Disposal
 - 1.6.1 Obtain all required permits to dispose of all demolition debris at an approved landfill.
 - 1.6.2 Submit to Engineer three copies of the manifests signed by the landfill operator or receipts from a recycling or salvage operator.
 - 1.6.3 Transport all debris in compliance with federal, state, and local laws and regulations.
 - 1.7 Bituminous pavement
 - 1.7.1 Bituminous pavement demolition debris will be considered nonhazardous for bidding purposes.
- 2. MATERIALS**
- 2.1 Fill materials
 - 2.1.1 Fill material type S1 fill, specified in Section 02205
 - 2.1.2 Fill material types S3 fill, specified in Section 02205
 - 2.1.3 Soil excavated from LF5 area
- 3. DEMOLITION**
- 3.1 Preparation
 - 3.1.1 Provide, erect, and maintain temporary barriers and security devices.

- 3.1.2 Protect existing structures, appurtenances, and landscaping which are not to be demolished.
- 3.1.3 Mark location of utilities.
- 3.1.4 Prevent movement and settlement of adjacent structures. Provide proper bracing and shoring.
- 3.2 Demolition Requirements
 - 3.2.1 Conduct demolition to minimize interference with adjacent structures and traffic.
 - 3.2.2 Cease operations immediately if adjacent structures appear to be in danger, Notify Engineer, and Do not resume operations until directed.
 - 3.2.3 Conduct operations with minimum interference to public or private accesses. Maintain [protect] egress and access at all times.
 - 3.2.4 Sprinkle work with water to minimize dust. Provide hoses and water connections for this purpose.
- 3.3 Pavement Demolition
 - 3.3.1 Remove existing sidewalks, pavements, curbs and gutters as required for new construction or as indicated to provide for new grade or new pavement.
 - 3.3.2 Saw cut pavement and curb and cutters as shown on the drawings. Remove concrete pavements and sidewalk to the nearest joint, or saw cut as shown.
 - 3.3.3 Determine the thickness of existing pavement, curb, gutter, driveway pavement and sidewalk to be removed, and the extent to which they are reinforced. No additional compensation will be made because of variations from the assumed thickness or thickness shown or for variations in the amount of reinforcing.
 - 3.3.4 Break into pieces not over 2 feet on any side existing pavement, curbs, gutters, sidewalks which are removed.
 - 3.3.6 Remove all demolition debris from the site or if approved by Engineer use as on site fill.

END OF SECTION 02060

SECTION 02110

SITE CLEARING

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	3.1 Preparation	<u>02110-1</u>
	3.2 Protection	<u>02110-2</u>
	3.3 Clearing	<u>02110-2</u>
	3.4 Disposal	<u>02110-3</u>

SECTION 02110

SITE CLEARING

1. GENERAL

1.1 This section includes:

- 1.1.1 Removal of trees and shrubs
- 1.1.2 Removal of root systems of trees and shrubs
- 1.1.3 Removal of plant life and grass
- 1.1.4 Removal of debris

1.2 Related Sections

- 1.2.1 Section 02060 - Demolition
- 1.2.2 Section 02211 - Rough Grading

1.3 Regulatory requirements

- 1.3.1 Obtain all required permits to dispose of all debris at an approved landfill.
- 1.3.2 Submit to Engineer a copy of the manifests signed by the landfill operator or receipts from a recycling/salvage operator.
- 1.3.3 Transport all debris in compliance with federal, state, and local laws and regulations.
- 1.3.4 Any salvage value of the materials removed shall be reflected in the bid submittal.
- 1.3.5 Coordinate clearing work with utility companies.

2. MATERIALS

2.1 Herbicide

- 2.1.1 Garlon

3. EXECUTION

3.1 Preparation

- 3.1.1 Verify that existing plant life designated to remain is identified.
- 3.1.2 Locate and identify all utilities

3.2 Protection

- 3.2.1 Protect utilities that are to remain from damage.

- 3.2.2 Protect bench marks and survey stakes from damage or displacement. 3.2.3
Protect existing structures, fences, and so forth, that are to remain
from damage.
- 3.2.4 Do not remove or damage trees or shrubs that are not to be removed.
- 3.2.5 Trees and shrubs to be saved shall be protected by temporary enclosures or
other methods approved by the Engineer.
- 3.2.6 All trees designated to be saved within the project area shall be trimmed of
dead limbs and branches 1 inch and larger in diameter. Limbs and branches
to be removed shall be cut close to the tree trunk or main limb. Treat cuts 1
inch or more in diameter with commercial pruning compound.
- 3.2.7 Remove all trees and woody growth, to be removed by hand using chainsaws,
loppers, or pruning saws.
- 3.2.8 Repair or replace trees or shrubs, if damaged during construction, in
accordance with standard horticultural practice. Treat wound surfaces 1 inch
or more in diameter with pruning compound.
- 3.3 Clearing
 - 3.3.1 Clear areas required for access to site and execution of Work.
 - 3.3.2 Remove paving, curbs, and gutters as indicated.
 - 3.3.3 Remove all miscellaneous surface debris and rocks from site prior to starting
on-site construction activities.
 - 3.3.4 Remove trees in the areas to be paved down to 12 inches below ground.
 - 3.3.5 Remove stumps and matter roots in areas to be occupied by structures or
pavements.
 - 3.3.6 Clear undergrowth and dead wood, without disturbing subsoil.
 - 3.3.7 Apply herbicide to all tree, sapling, and shrub stumps by hand. Do not spray
herbicide. Apply herbicide same day the trees are cut. Employ personnel
licensed in herbicide application
- 3.4 Disposal
 - 3.4.1 All other vegetation, branches, and tree trunks shall be removed from site and
disposed of in a licensed disposal facility.
 - 3.4.2 Remove debris, rock, and extracted plant life from site and dispose of in a
licensed disposal facility.

END OF SECTION 02110

SECTION 02110

SITE CLEARING

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SECTION 02205

SOIL MATERIALS

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SECTION 02205

SOIL MATERIALS

1. GENERAL

1.1 This section includes

- 1.1.1 Subsoil materials
- 1.1.2 Topsoil materials

1.2 Related sections

- 1.2.1 Document Ft. Sheridan RI/FS report; borehole locations, and findings of subsurface materials
- 1.2.2 Section 02207 - Aggregate Materials
- 1.2.3 Section 02211 - Rough Grading
- 1.2.4 Section 02223 - Backfilling
- 1.2.5 Section 02225 - Trenching
- 1.2.6 Section 02231 - Aggregate Base Course
- 1.2.7 Section 02930 - Seeding

1.3 References

- 1.3.1 ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-pound (4.45 Kg) Rammer and 18-inch (457 mm) Drop.
- 1.3.2 ASTM D2487 - Classification of Soils for Engineering Purposes
- 1.3.3 Illinois Department of Transportation (IDOT) Standard Specification Section 1081
- 1.3.4 Illinois Department of Transportation (IDOT) Standard Specification Section 204

1.4 Submittals

1.4.1 Materials Source: Submit name of imported materials suppliers. Provide materials from same source throughout the work. Change of source requires Engineer approval.

1.4.2 Material from off-site source shall be free of hazardous or toxic constituents. Engineer shall supply list of compounds to be analyzed for. Chemical characterization results shall meet the requirements of IEPA's Tiered Approach to Corrective Action Objectives (TACO): 35 IAC Part 742.

1.5 Source Quality Control

1.5.1 Tests and analysis of soil material will be performed in accordance with ANSI/ASTM D1557.

1.5.2 If tests indicate materials do not meet specified requirements, change material and retest at no additional cost.

2. MATERIALS

2.1 Subsoil

2.1.1 Subsoil Type S1 Conforming to IDOT Section 204.02

2.2 Topsoil

2.2.1 Topsoil Type S3 Conforming to IDOT Section 1081.05(a)

3. EXECUTION

3.1 Stockpiling

3.1.1 Stockpile materials on site at locations designated by Engineer.

3.1.2 Stockpile in sufficient quantities to met project schedule and requirements.

3.1.3 Separate differing materials with dividers or stockpile apart to prevent mixing.

3.1.4 Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

3.1.5 Schedule material delivery so it does not hinder other work at site.

3.2 Stockpile Cleanup

3.2.1 Remove stockpile, leave area in a clean and neat condition.

3.2.2 Leave unused materials in a neat, compact stockpile.

END OF SECTION 02205

SECTION 02207

AGGREGATE MATERIALS

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SECTION 02207

AGGREGATE MATERIALS

1. GENERAL

1.1 This section includes
Aggregate materials

1.2 Related Sections

1.2.1 Section 02060 - Demolition

1.2.2 Section 02205 - Soil Materials

1.2.3 Section 02223 - Backfilling

1.2.4 Section 02225 - Trenching

1.2.5 Section 02231 - Aggregate Base Course

1.3 References:

The following documents are applicable to this specification.

1.3.1 AASHTO M147 - Materials for Aggregate and Soil-Aggregate

1.3.2 AASHTO T180 - Moisture-Density Relations of Soil Using a 10-lb (4.54 kg)
Rammer and an 18-in. (457 mm) Drop

1.3.3 ANSI/ASTM C136 - Method for Sieve Analysis of Fine and Coarse
Aggregates

1.3.4 ANSI/ASTM D2487 - Classification of Soils for Engineering Purposes

1.3.5 ANSI/ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate
in Place by Nuclear Methods (Shallow Depth)

1.3.6 ASTM D4318 - Test Method for Liquid Limit, Plastic Limit, and Plasticity
Index of Soils

1.3.7 Illinois Department of Transportation (IDOT) Standard Specifications Section
1004

1.4 Submittals

1.4.1 Submit test reports.

- 1.4.2 Submit aggregate supplier's name, address, and telephone number. Provide all materials from same source throughout the work. Change of material source requires written approval from the Engineer.

2. MATERIALS

2.1 Aggregate Materials

- 2.1.1 Coarse aggregate type A1 shall be gravel or crushed stone CA-6 graded in accordance with IDOT Section 1004.01
- 2.1.2 Coarse aggregate type A2 shall be gravel or crushed stone CA-15, graded in accordance with IDOT Section 1004.01
- 2.1.3 Fine aggregate type A4 shall be natural river or bank sand, washed, free of silt, clay, loam, friable or soluble materials, and organic matter. It shall be graded in accordance with ASTM C136. ASTM D2487 group symbol SW with the following limits.

2.2 Source Quality Control

- 2.2.1 Field inspection and testing shall be performed in accordance with Section 01410.
- 2.2.2 Tests and analysis of aggregate material shall be performed in accordance with IDOT section 1004.01
- 2.2.3 If test indicate materials do not meet specified requirements, change material, or material supplier and retest.

3. EXECUTION

3.1 Stockpiling

- 3.1.1 Stockpile materials on site at a location designated or approved by Engineer.
- 3.1.2 Stockpile materials in sufficient quantities to meet project schedule and requirements.

- 3.1.3 Separate differing materials with special dividers or stockpile apart to prevent mixing.
- 3.1.4 Divert surface water away from stockpile site to prevent erosion or deterioration of materials.
- 3.2 Stockpile Cleanup
 - 3.2.1 Remove stockpiled excess materials from the site, leave area in a clear and neat condition. Grade site surface to prevent free standing water.
 - 3.2.2 If borrow area is indicated, leave borrow area in a clean and neat condition. Grade site surface as directed by Engineer.

END OF SECTION 02207

SECTION 02211
ROUGH GRADING
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SECTION 02211

ROUGH GRADING

1. GENERAL

- 1.1 This section includes the following:
 - 1.1.1 Removal of topsoil and subsoil
 - 1.1.2 Cutting, grading, filling, and rough contouring of the site for concrete pavements, walkways, bituminous pavements, and top of existing landfill.
- 1.2 Related Sections
 - 1.2.1 Section 02060 - Demolition
 - 1.2.2 Section 02205 - Soil Materials
 - 1.2.3 Section 02110 - Site Clearing
 - 1.2.4 Section 02222 - Excavation
 - 1.2.5 Section 02231 - Aggregate Base Course
 - 1.2.6 Section 02223 - Backfilling
 - 1.2.7 Section 02225 - Trenching
- 1.3 References
 - 1.3.1 AASHTO T180 - Moisture-Density Relations of Soils Using a 10-lb (4.54 kg) Rammer and an 18-Inch (457 mm) Drop
 - 1.3.2 ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using a 10-lb (4.54 kg) Rammer and an 18-Inch (457 mm) Drop
 - 1.3.3 ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
 - 1.3.4 ASTM D3017 - Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures
- 1.4 Submittals
 - 1.4.1 Submit all field test results.

- 1.4.2 Submit an accurate record showing actual locations of utilities remaining, by horizontal dimension, elevations, and slope and gradients.

1.5 Project and Site Conditions

- 1.5.1 Verify site conditions.
- 1.5.2 Verify that survey benchmark and intended elevations for the work are as shown.

2. MATERIALS

2.1 Topsoil

Top soil shall be as specified in Section 02205.

2.2 Subsoil fill

2.2.1 Subsoil shall be as specified in Section 02205

2.2.2 Stockpiled subsoil

3. EXECUTION

3.1 Preparation

- 3.1.1 Identify required lines, levels, contours, and datum.
- 3.1.2 Stake and flag locations of known utilities.
- 3.1.3 Locate, identify, and protect all utilities that are to remain from damage.
- 3.1.4 Notify utility company to remove or relocate utilities.
- 3.1.5 Protect plant life, lawns, and other features remaining as a portion of final landscaping.
- 3.1.6 Protect benchmarks, existing structures, fences, sidewalks, paving, and curbs from construction equipment and vehicular traffic.

3.2 Topsoil Stripping

- 3.2.1 Remove topsoil from areas that will be disturbed by further excavation or grading and regrading operations. Stockpile topsoil in the areas where the stockpiles will not interfere with other construction work.
- 3.2.2 Do not excavate wet topsoil. Drain or dewater marshy areas and allow soil to dry prior to removal.

- 3.2.3 Topsoil is defined as friable loam containing liberal amounts of humus, suitable for agricultural use similar to soils commonly occurring in the vicinity of the project. Topsoil shall be free of lumps, plants, and other foreign materials.
 - 3.2.4 Remove objectionable materials encountered during excavation and dispose of as directed by Engineer.
 - 3.2.5 Stockpile topsoil to height not exceeding 8 feet. Cover stockpiled material to protect from erosion.
 - 3.2.6 Schedule the construction activities such that stockpiled materials are kept to a minimum.
- 3.3 Subsoil Excavation
- 3.3.1 Excavate subsoil from areas to be further excavated, relandscaped, or regraded.
 - 3.3.2 Stockpile in area designed on site to depth not exceeding 8 feet. Protect from erosion. Remove subsoil not being reused from site.
 - 3.3.3 Do not excavate wet subsoil.
 - 3.3.4 When excavating through roots, perform work by hand and cut roots with sharp ax.
- 3.4 Filling
- 3.4.1 Fill areas to the required contours and elevations with unfrozen materials.
 - 3.4.2 Place fill materials in continuous layers and compact in accordance with Schedule at end of this section.

- 3.4.3 Maintain optimum moisture content of fill materials to attain required compaction density.
- 3.4.4 Slope grade away from building minimum 2 inches in 10 feet, unless otherwise noted.
- 3.4.5 Make grade changes gradual. Blend slope into level areas.
- 3.5 Tolerances
 - Top surface of subgrade: Plus or minus 1/10 foot
- 3.6 Field Quality Control.
 - 3.6.1 Field inspection and testing will be performed under provisions of Section 01410.
 - 3.6.2 Compaction testing will be performed in accordance with ANSI/ASTM D1557 ASTM D2922 ASTM D3017.
 - 3.6.3 If tests indicate Work does not meet specified requirements, remove Work, replace, and retest.
 - 3.6.4 Perform one compaction test per 5,000 c.y. of fill placed.
- 3.7 Schedules
 - 3.7.1 Subsoil fill
 - 3.7.1.1 Fill type: S1; Maximum 8 inches compacted depth
 - 3.7.1.2 Compact to minimum 90 percent of maximum density.

END OF SECTION 02211

SECTION 02211
ROUGH GRADING
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SECTION 02216

GEOTEXTILE FILTER FABRICS

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SECTION 02216

GEOTEXTILE FILTER FABRICS

1. GENERAL

1.1 This Section Includes

1.1.1 Furnishing and installing geotextile filter fabric.

1.2 Related Sections

1.2.1 Section 02225 -Trenching

1.2.2 Section 02244 - Geosynthetic Clay Liners

1.3 Reference Standards

1.3.1 ASTM D 123 Standard Terminology Relating to Textiles Materials

1.3.2 ASTM D 3776 Weight (Mass) per Unit Area of Woven Fabric

1.3.3 ASTM D 3786 Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics: Diaphragm Bursting Strength Test

1.3.4 ASTM D 4355 Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water (Xenon-Arc Type Apparatus)

1.3.5A STM D 4491 Water Permeability of Geotextiles by Permittivity

1.3.6 ASTM D 4533 Trapezoidal Tearing Strength of Geotextiles

1.3.7 ASTM D 4632 Breaking Load and Elongation of Geotextiles (Grab Method)

1.3.8 ASTM D 4751 Determining the Apparent Opening Size of a Geotextile

1.3.9 ASTM D 4833 Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products

1.4 Submittals

The following material shall be submitted: Manufacturer's certified material property data sheet

Manufacturer's quality control manual

Certified laboratory interface friction test results including description of equipment and test method

Manufacturer's certified quality control test results

Geotextile fabric samples

1.5 Delivery, Storage, and Handling

Geotextiles shall be delivered only after the required submittals have been received and approved. Geotextiles shall be kept dry at all time and shall be stored off the ground, adequately protected from ultraviolet exposure, excessive heat, precipitation, contamination from dirt, debris, or any other damaging circumstances. Geotextiles shall be marked or tagged with the following information: (1) manufacturer's name, (2) product identification, (3) lot number, (4) roll number, (5) roll dimensions, and (6) date manufactured. Contractor shall handle the material in accordance with manufacturer's recommendations.

Any geotextile damaged during delivery, storage, or handling methods shall be repaired or replaced as directed by the Engineer at no additional cost.

1.6 Warranty

Written warranties addressing geotextile material and proper installation workmanship shall be submitted to the Engineer. The manufacturer's warranty shall state that the installed material meets all requirements of the contract documents and is warranted for 20 years. The installer's warranty shall state that the field and factory seams will not fail within 20 years of the installation.

2. PRODUCTS

2.1 Materials

2.1.1 General Requirements

The Contractor shall select a geotextile which meets all specification requirements and is chemically compatible with all contact materials.

2.1.2 Raw Materials

The geotextile shall be a non-woven pervious sheet of polymeric yarn as determined by ASTM D 123. The geotextile fiber shall consist of long-chain polymers composed of at least 85 percent by weight of polypropylene, polyester, or polyethylene. Stabilizers or inhibitors shall be added to the base polymer if necessary to make the filaments resistant to deterioration by ultraviolet and heat

exposure. The fabric shall be fixed so that the yarns will retain their relative position with respect to each other. The edges of the fabric shall be finished to prevent the outer yarn from pulling away from the fabric. The geotextile physical properties shall equal or exceed the minimum values listed in below. Test values shown are minimum average roll values.

<u>Property</u>	<u>Test Method</u>	<u>Test Value</u>
Fabric weight (oz/yd ³)	ASTM D 3776	8.0
Thickness (mil)	ASTM D 5199	90
Apparent opening size (AOS) (U.S. sieve)	ASTM D 4751	70 to 100
Water flow rate (gpm/ft ²)	ASTM D 4491	100
Mullen burst (psi)	ASTM D 3786	320
Puncture (lbs)	ASTM D 4833	130
Tensile grab (lbs)	ASTM D 4632	200
Tensile elongation (percent)	ASTM D 4632	50
Trapezoidal tear (lbs)	ASTM D 4533	70
Ultraviolet degradation % at 500 hours	ASTM D 4355	70 percent strength retained
Permeability, cm/sec % retained at 500 hours	ASTM D 4491	.30

2.1.3 Seams

The seams of the geotextile shall be sewn with thread of a material meeting the chemical requirements given above for geotextile yarn or shall be bonded by cementing or by heat. The sheets of geotextile shall be attached at the factory or another approved location to form sections not less than 18 feet wide. Seams shall be tested in accordance with method ASTM D 4632. The strengths shall be not be less than 90 percent of the required tensile strength of the unaged geotextile in any principal direction.

2.2 Tests and Inspections

2.2.1 Manufacturing Sampling and Testing

All geotextiles shall be randomly sampled and tested in accordance with the manufacturer's quality control program manual to evaluate the required physical properties.

The manufacturer's quality control program shall perform tests at the following frequencies, or at a minimum of one per lot, whichever results in the greater number of tests:

<u>Property</u>	<u>Test Frequency</u>
-----------------	-----------------------

Fabric weight	One per 50,000 square feet
AOS	One per 100,000 square feet
Water flow rate	One per 50,000 square feet
Mullen burst	One per 50,000 square feet
Puncture	One per 50,000 square feet
Tensile grab	One per 50,000 square feet
Tensile elongation	One per 50,000 square feet
Trapezoidal tear	One per 50,000 square feet
Ultraviolet degradation	One per 100,000 square feet

2.2.2 Verifications

Certified test results on each sample shall be submitted to the Engineer. In addition, one sample of each geotextile type shall be provided to the Engineer for quality assurance review and permanent record of actual furnished material. Each sample shall be the full manufactured width of the geotextile by at least 5 feet long. Samples not meeting the minimum requirements specified shall result in the rejection of the corresponding rolls.

3. EXECUTION

3.1 Surface Preparation

The surface underlying the geotextile shall be prepared to a relatively smooth condition free of obstructions, depressions, debris, and soft or low density pockets of material. Erosion features (e.g., rills, gullies, etc.) shall be graded out of the surface before geotextile placement. Approval of the Engineer shall be obtained prior to placement of geotextile.

3.2 Installation

3.2.1 The geotextile shall be installed in accordance with the manufacturer's recommendations.

3.2.2 The geotextile shall be placed with minimum handling such that the geotextile and underlying materials are not damaged. Any portion of the geotextile damaged during installation shall be removed or repaired, as determined by the Engineer at no additional cost to the Owner. The geotextile shall be placed with the long direction oriented parallel to the slope direction and laid smooth so as to minimize tension, stress, folds, wrinkles, or creases. The strips shall be placed to provide a minimum width of 12 inches of overlap for each joint.

3.2.3 The geotextile shall be protected at all times during construction from contamination by surface runoff, dirt, mud, or any other foreign materials. Any

geotextile so contaminated shall be removed and replaced with uncontaminated geotextile at no additional cost to the Owner. Adequate loading (e.g. sand bags) shall be placed on the geotextile to prevent uplift by wind. Any equipment used shall not damage the geotextile. No vehicular traffic will be allowed directly on the geotextile. The work shall be scheduled so that covering of the geotextile with the specified material is accomplished within 5 days after placement of the geotextile. The cover material shall be placed and spread to prevent wrinkle and slippage of the geotextile.

- 3.2.4 Temporary pinning of the textile to help hold it in place until the cover material is placed shall be allowed. The temporary pins shall be removed as the cover material is placed to relieve high tensile stress which may occur during placement of material on the geotextile.
- 3.2.5 The placement procedure requires that the length of the geotextile be approximately 15 percent greater than the slope length. The Contractor shall adjust the actual length of the geotextile used based on initial installation experience.
- 3.2.6 Additional pins regardless of location shall be installed as necessary to prevent any slippage of the geotextile. The geotextile shall be placed so that the upper strip of geotextile will overlap the next lower strip. Each securing pin shall be pushed through the geotextile until the washer bears against the geotextile and secures it firmly to the foundation. The geotextile shall be protected at all times during construction from contamination by surface runoff and any geotextile so contaminated shall be removed and replaced with uncontaminated geotextile.

3.3 Defects and Repairs

Holes or tears in the geotextile shall be repaired by placing a patch of geotextile extending a minimum of 24 inches beyond the edges of the hole or tear. All patches shall be continuously fastened by sewing or other methods recommended by the manufacturer and approved by the Engineer. Excessively damaged geotextile, as determined by the Engineer, shall be replaced at no additional cost to the Owner.

3.4 Penetrations

The Contractor shall submit details of all geotextile penetrations. Geotextile penetration details shall be as recommended by the geotextile manufacturer, and as approved by the Engineer.

END OF SECTION 02216

SECTION 02222

EXCAVATING

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	3.1 Excavation	<u>02222-2</u>
	3.2 Protection	<u>02222-2</u>

SECTION 02222

EXCAVATING

1. GENERAL

1.1 This section includes

1.1.1 Excavating for placement of cover materials

1.2 Related documents and sections

1.2.1 Ft Sheridan RI/FS report, borehole locations and findings of subsurface materials.

1.2.2 Section 02211 - Rough Grading: Top soil and subsoil removal from site surface

1.2.3 Section 02223 - Backfilling

1.2.4 Section 02225 - Trenching: Excavation for utility trenches.

1.3 References

1.3.1 20CFR Section 1926.650, OSHA Regulations, Excavating and Trenching Operations

1.4 Submittals

1.4.1 Submit excavation plan. Plan shall include the following.

1.4.1.1 Type of equipment to be used

1.4.1.2 Excavated material disposal plans

1.5 Field Quantity Control

1.5.1 Provide for visual inspection of bearing surfaces.

2. MATERIALS (Not used)

3. EXECUTION

3.1 Excavation

- 3.1.1 Excavate subsoil required to accommodate, clay, soil and paving.
- 3.1.2 Machine slope banks to angle of repose or less, until shored.
- 3.1.3 Stockpile excavated material in area designated on site and remove excess material not being reused, from site.

3.2 Protection

- 3.2.1 Protect excavations from water.

END OF SECTION 02222

SECTION 02223

BACKFILLING

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	3.5 Protection of Finished Work.....	<u>02223-4</u>
	3.6 Schedule	<u>02223-4</u>

SECTION 02223

BACKFILLING

1. GENERAL

- 1.1 This section includes
 - 1.1.1 Site filling and backfilling
 - 1.1.2 Fill under slabs-on-grade
 - 1.1.3 Fill under paving
 - 1.1.4 Consolidation and compaction as scheduled.
 - 1.1.5 Fill for over-excavation.
- 1.2 Materials installed but not furnished under this section.
 - 1.2.1 Section 02205 - Soil Materials
 - 1.2.2 Section 02207 - Aggregate Materials
 - 1.2.3 Section 02510 - Bituminous Concrete Paving
 - 1.2.4 Section 03300 - Cast-In-Place Concrete
- 1.3 Related Sections
 - 1.3.1 Document :Ft. Sheridan RI/FS report; bore hole locations and findings of subsurface materials
 - 1.3.2 Section 02205 - Soil Materials.
 - 1.3.3 Section 02207 - Aggregate Materials.
 - 1.3.4 Section 02222 - Excavating
 - 1.3.5 Section 02225 - Trenching: Backfilling of utility trenches.
- 1.4 References
 - 1.4.1 AASHTO T180 - Moisture-Density Relations of Soils Using a 10-lb Rammer and an 18-inch Drop

- 1.4.2 ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 10 lb Rammer and 18-inch Drop
- 1.4.3 ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- 1.4.4 ASTM D3017 - Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures.
- 1.5 Field Quality Control
 - 1.5.1 Compaction testing will be performed in accordance with ANSI/ASTM D1557. AASHTO T180. ASTM D2922. ASTM D3017.
 - 1.5.2 If tests indicate Work does not meet specified requirements, remove Work replace and retest.
 - 1.5.3 Frequency of Tests: - two per acre and as requested by Engineer.
 - 1.5.4 Proof roll compacted fill surfaces under paving
- 2. **MATERIALS** (Installed but not furnished under this section)
 - 2.1 Fill Materials
 - 2.1.1 Fill Type S1: As specified in Section 02205.
 - 2.1.2 Structural Fill Type A1: As specified in Section 02207.
- 3. **EXECUTION**
 - 3.1 Examination
 - 3.1.1 Verify piping, and subbase installation has been inspected.
 - 3.2 Preparation
 - 3.2.1 Compact subgrade to density requirements for subsequent backfill materials.
 - 3.2.2 Cut out soft areas of subgrade not capable of in situ compaction. Backfill with Type A1 fill and compact to density equal to or greater than requirements for subsequent fill material.
 - 3.3 Backfilling
 - 3.3.1 Backfill areas to contours and elevations with unfrozen materials.

- 3.3.2 Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.
- 3.3.3 Granular Fill Type A1: Place and compact materials in continuous layers not exceeding 8 inches compacted depth.
- 3.3.4 Soil Fill Type S1 Place and compact material in continuous layers not exceeding 8 inches compacted depth.
- 3.3.5 Employ a placement method that does not disturb or damage other work.
- 3.3.6 Maintain moisture content of backfill materials within +/-2% of optimum to attain required compaction density.
- 3.3.7 Slope grade away from building minimum 2 inches in 10 feet unless noted otherwise.
- 3.3.8 Make gradual grade changes. Blend slope into level areas.
- 3.3.9 Remove surplus backfill materials from site.
- 3.3.10 Leave fill material stockpile areas free of excess fill materials.
- 3.4 Tolerances
 - 3.4.1 Top Surface of Backfilling Under Paved Areas Plus or minus 0.2 feet from required elevations.
 - 3.4.2 Top Surface of General Backfilling: Plus or minus 0.2 feet from required elevations.
- 3.5 Protection of Finished Work
 - 3.5.1 Protect finished Work.
 - 3.5.2 Reshape and recompact fills subject to vehicular traffic.
- 3.6 Schedule
 - 3.6.1 Fill Under Grass Areas:
 - 3.6.1.1 Fill Type S1, to 6 inches below finish grade, compacted to 85 percent modified proctor density.

- 3.6.2 Fill for Berming:
 - 3.6.2.1 Fill Type S1 to 4 inches below finish grade, compacted to 85 percent modified proctor density.
- 3.6.3 Fill Under Bituminous or Concrete Paving:
 - 3.6.3.1 Compact subsoil to 95 percent of its maximum dry density.
 - 3.6.3.2 Fill Type A1 to 3 inches below finish paving elevation, compacted to 95 percent.

END OF SECTION 02223

SECTION 02225

TRENCHING

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SECTION 02225

TRENCHING

1. GENERAL

- 1.1 This section includes the following:
 - 1.1.1 Trenching and backfilling for storm water drainage
 - 1.1.2 Compacted bedding and backfill
- 1.2 Materials installed but not furnished under this section
 - 1.2.1 Section 02207 - Aggregate Materials
- 1.3 Related Section
 - 1.3.1 Section 02060 - Demolition
 - 1.3.2 Section 02110 - Site Clearing
 - 1.3.3 Section 02510 - Bituminous Concrete Paving
- 1.4 References
 - 1.4.1 ANSI/ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregate
 - 1.4.2 ANSI/ASTM D698 - Test Methods for Moisture-Density Relation of Soils and Soil-Aggregate Mixtures (Standard Proctor)
 - 1.4.3 ANSI/ASTM D1556 - Test Method for Density of Soil In Place by the Sand-Core Method
 - 1.4.4 ANSI/ASTM D1157 - Test Method for Moisture-Density Relations of Soils and Soils-Aggregate Mixtures (Modified Proctor)
 - 1.4.5 ANSI/ASTM D448 - Classification for Sizes of Aggregate for Road and Bridge Construction
- 1.5 Submittals
 - 1.5.1 Submit field density test reports
 - 1.5.2 Submit backfill materials test reports

2. MATERIALS

2.1 Bedding Materials

2.1.1 Bedding material for nonmetallic pipelines shall be A2 crushed aggregate as specified in Section 02207

2.1.2 Concrete cradle or encasement, including reinforcing steel, shall be provided when specified or shown, or when ordered in writing by Engineer. Concrete shall be Class B as specified in Section 03300.

2.2 Buried Warning and Identification Tape

2.2.1 Provide polyethylene plastic and metallic core or metallic-faces, polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 3-inch-minimum width, color coded as stated below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED (intended service) LINE BELOW" or similar wording. Color and printing is to be permanent, unaffected by moisture or soil.

Warning Color Codes	
Red	Electric
Yellow	Storm-Water, Ground-Water Force Main, Gas, Oil, Wastewater Force Main
Orange	Telephone and Other Communications

2.2.2 Detectable Warning Tape for Non-Metallic Piping

Polyethylene plastic tape conforming to the width, color, and printing requirements indicated above. Minimum thickness of the tape shall be 0.004 inch. Tape shall have a minimum strength of 1,500 psi lengthwise and 1,250 psi crosswise. The tape shall be manufactured with integral wires, foil backing, or other means of enabling detection by a metal detector when the tape is buried up to 3 feet deep. Encase the metallic element of the tape in a protective jacket or provide with other means of corrosion protection.

3. EXECUTION

3.1 Examination

Verify fill materials to be reused are acceptable.

3.2 Preparation

3.2.1 Identify required lines, levels, contours, and datum.

- 3.2.2 Maintain and protect existing utilities which pass through the work areas.
- 3.2.3 Protect all trees, plants, lawns, and private property.
- 3.2.4 Protect bench marks, existing structures, fences, sidewalks, mail boxes, and paving from excavation equipment.
- 3.3 Excavation
 - 3.3.1 Trench Width
 - 3.3.1.1 Trenches excavated for pipeline or other utilities shall be wide enough to permit proper installation of the materials and to provide space for backfilling around and under the installed lines.
 - 3.3.1.2 The maximum trench width for unencased pipe which will have 4 feet or more of cover shall be 18 inches for 8-inch pipe and smaller, and 1-1/2 times the inside diameter plus 8 inches for larger pipe.
 - 3.3.1.3 Maintain these maximum widths from the bottom of the trench to a plane 8 inches above the crown of the pipe. For sheeted trenches, the width shall be measured between inside faces of the sheeting.
 - 3.3.1.4 If the width of the trench exceeds the maximum limit specified above, fill the extra width with bedding material up to a plane 8 inches above the crown of the pipe.
 - 3.3.2 Trench Depth

Trenches shall be excavated a minimum 4 inches deeper than required to install the pipe or duct line at the proper elevation. The space below the pipe shall be filled with bedding material, or with concrete if the pipe or duct is cradled or encased.
- 3.4 Trench Backfill
 - 3.4.1 Bedding Material Placement
 - 3.4.1.1 Shape and form the bedding material so that the bottom third of each pipe is uniformly supported along its entire length. Recess the bedding material at the bells, if any, so that they are relieved of any load. Backfill the space between the pipe and the sides of the trench 8 inches above the top of the pipe with bedding material.

- 3.4.1.2 Bedding material below the centerline of the pipe shall be placed in not greater than 12-inch layers and spaded and vibrated into position below the curve of the pipe.
- 3.4.1.3 Sheeting extending below the top bedding material shall be cut off and left in place after the bedding material has been placed. No extra payment will be made for sheeting left in place below the top of bedding.
- 3.4.1.4 Bedding material shall be compacted to 95 percent of maximum density in accordance with ASTM D1557.
- 3.4.2 Backfill Placement
 - 3.4.2.1 Backfill trenches above the bedding material with the soil removed, if suitable, or with other approved material. Do not drop rocks larger than 6 inches in the largest dimension into the trench nor place within 3 feet of the pipe or duct, nor within 4 inches of each other. Backfill shall be compacted to at least 90 percent of maximum density in accordance with ASTM D1557 in 12-inch maximum lifts, loose measure.
 - 3.4.2.2 Backfill trenches within the limits of existing or proposed paved areas above the bedding material with sand or other low void non-compressible material, and compact to at least 95 percent of maximum density in accordance with ASTM D1557 in 12-inch maximum lifts, loose measure. No extra payment will be made for backfill under pavements shown on the Drawings.
 - 3.4.2.3 Place warning and identification tape above all buried lines two feet below grade.
 - 3.4.2.4 Place warning and identification tape above all existing buried pipelines, which will be covered by the landfill cap, shown on the drawings or found in the field during construction. The identification tape shall be placed directly on top of the GCL liner, and covered with the remaining cap layers.

END OF SECTION 02225

SECTION 02231

AGGREGATE BASE COURSE

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SECTION 02231

AGGREGATE BASE COURSE

1. GENERAL

- 1.1 This section includes
 - 1.1.1 Aggregate base course
- 1.2 Materials installed but not furnished under this section.
 - 1.2.1 Section 02207 - Aggregate materials
- 1.3 Related sections.
 - 1.3.1 Section 02211 - Rough Grading - preparation of site for base course
 - 1.3.2 Section 02223 - Backfilling - compacted fill under base course.
 - 1.3.3 Section 02225 - Trenching - compacted fill under base course.
 - 1.3.4 Section 02510 - Bituminous Concrete Paving
- 1.4 References
 - 1.4.1 AAHTO T180 - Moisture-Density Relations of Soils Using a 10 lb Rammer and 18-inch Drop.
 - 1.4.2 ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soils-Aggregate Mixtures using 10 lb Rammer and 18-inch Drop.
 - 1.4.3 ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
 - 1.4.4 ASTM D3017 - Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures.

2. MATERIALS

- 2.1 Coarse Aggregate Fill
Type A1, as specified in Section

3. EXECUTION

3.1 Examination

- 3.1.1 Verify substrate has been inspected, gradient and elevations are correct, and surface is dry.

3.2 Aggregate placement

- 3.2.1 Spread aggregate over prepared surface to a total compacted thickness of 6 inches.
- 3.2.2 Place aggregate in maximum 6 inch layers and roller compact.
- 3.2.3 Level and contour surfaces to elevations and gradients indicated on the drawings.
- 3.2.4 Add water to assist compaction. If excess water is apparent, remove aggregate and re-aerate to reduce moisture content.

3.3 Field Quality Control

- 3.3.1 Compaction testing will be performed in accordance with ASTM D2922, ASTM D3017
- 3.3.2 If tests indicate work does not meet specified requirements, remove work, replace, and retest.
- 3.3.3 Frequency of tests: 2 per acre

3.4 Schedules

- 3.4.1 Under Bituminous Pavement: compact placed aggregate to achieve compaction to 95 percent
- 3.4.2 Under Concrete Pavement: compact placed aggregate to achieve compaction to 95 percent

END OF SECTION 02231

SECTION 02244

GEOSYNTHETIC CLAY LINERS

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SECTION 02244

GEOSYNTHETIC CLAY LINERS

1. GENERAL

- 1.1 This section includes furnishing and installing geosynthetic clay liners.
- 1.2 Related Sections
 - 1.2.1 Section 02211 - Rough Grading
 - 1.2.2 Section 02216 - Geotextile Filter Fabrics
 - 1.2.3 Section 02222 - Excavation
- 1.3 Definitions of terms
 - 1.3.1 Geosynthetic Clay Liner (GCL): factory manufactured, hydraulic barrier typically consisting of bentonite clay or very low permeability materials, supported by geotextiles and or geomembranes which are held together by needling, stitching, or chemical adhesives.
 - 1.3.2 Overlap: Where two adjacent GCL panels contact, the distance measuring perpendicular from the overlying edge of one panel to the underlying edge of the other panel.
 - 1.3.3 Accessory bentonite: Bentonite used to augment seams and penetrations of GCLs.
 - 1.3.4 Minimum Average Roll Value (MARV): The minimum average value of a representative number of tests made on selected rolls of a production lot, with a 95 percent confidence level.
- 1.4 Quality Assurance
 - 1.4.1 Manufacturer's Testing Laboratory (MTL): Maintain a competent laboratory at point of manufacture of GLC to ensure quality control in accordance with ASTM testing or other specified procedures. The MTL shall maintain records of its quality control results and provide, prior to shipment, QC testing results of GCL physical properties in accordance with the approved manufacturer's QC Plan, and manufacturer's material certificate as specified in part 1.6. The MTL shall have successfully completed the GAI_LAP for ASTM test methods referenced by this specifications, including methods

required by the manufacturer's Quality Control (QC) Plan. GAI-LAP Accreditation is only required for ASTM tests that are currently being offered for accreditation under the GAI-LAP Program.

- 1.4.2 Quality Assurance Laboratory (QAL): Maintain and pay for services of a competent independent geosynthetics testing laboratory to perform specified testing.
- 1.4.3 Perform Construction Quality Assurance (CQA) testing on the delivered/installed product. If the CQA results show that the product is defective or nonconforming in any material respect due to fault of the installer and/or manufacturer, repair or replace defective products and retest to show compliance with the requirements of these specifications.
- 1.4.4 Develop and submit for approval, prior to its use, field inspection forms as specified in part 1.6. The forms shall be completed daily whenever GCL is being installed, and copies submitted for approval. Installation of any overlying layers shall not proceed until all of the field inspection forms have been submitted and approved.

1.5 References

The following documents are applicable to this specification

- 1.5.1 ANSI/ASTM D 422 - Sieve Analyses of Fine and Coarse Aggregates;
- 1.5.2 ANSI/ASTM D 638 - Test Method for tensile Properties of Plastics;
- 1.5.3 ANSI/ASTM D 698 - Moisture Density Relations of Soils Using 5.5 lb. Hammer and 12 Inch Drop;
- 1.5.4 ANSI/ASTM D 2922 - Density of Soil in Place by Nuclear Methods (Use Direct Scatter Method)
- 1.5.5 ANSI/ASTM D 3786 - Standard Test Method for Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics - Diaphragm Bursting Strength Tester Method;
- 1.5.6 ANSI/ASTM D 4533 - Standard Test Method for Trapezoidal Testing Strength of Geotextiles;
- 1.5.7 ANSI/ASTM D 4595 - Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method;

- 1.5.8 ANSI/ASTM D 4632 - Standard Test Method for Breaking Load and Elongation of Geotextiles (Grab Method);
- 1.5.9 ANSI/ASTM D 4643 - Standard Test Method for Determination of Water (Moisture) Content of Soil by Microwave Oven Method;
- 1.5.10 ANSI/ASTM D 4833 - Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products;
- 1.5.11 ANSI/ASTM D 5084 - Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter;
- 1.5.12 ANSI/ASTM D 5101 - Standard Test Method for Measuring the Soil-Geotextile System Clogging Potential by the Gradient Ratio;
- 1.5.13 ANSI/ASTM D 5199 - Standard Test Method for Measuring Nominal Thickness of Geotextiles and Geomembranes;
- 1.5.14 ANSI/ASTM D 5261 - Standard Test Method for Measuring Mass Per Unit Area of Geotextile;
- 1.5.15 ANSI/ASTM D 5321 - Standard Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by Direct Shear Method;
- 1.5.16 ANSI/ASTM D 5887 - Standard Test Method for Measurement of Index Flux through Saturated Geosynthetic Clay Liner Specimens Using a Flexible Wall Permeameter;
- 1.5.17 ANSI/ASTM D 5888 - Standard Guide for Storage and Handling of Geosynthetic Clay Liners;
- 1.5.18 ANSI/ASTM D 5889 - Standard Practice for Quality Control of Geosynthetic Clay Liners
- 1.5.19 ANSI/ASTM D 5890 - Standard Test Method for Swell Index of Clay-Mineral Component of Geosynthetic Clay Liners;
- 1.5.20 ANSI/ASTM D 5891 - Standard Test Method for Fluid Loss of Clay Component of Geosynthetic Clay Liners;
- 1.5.21 ANSI/ASTM D 5893 - Standard Test Method for Measuring Mass Per Unit of Geosynthetic Clay Liners;

- 1.5.22 ANSI/ASTM D 6243 - Standard for Determining the Internal and Interface Shear Resistance for Geosynthetic Clay Liners by Direct Shear Method; Geosynthetic Research Institute (GRI), Standard Test Methods
 - 1.5.23 GRI GCL-1 - Standard Conformance Test Method: for Swell Measurement of the Clay Component of GCL's;
 - 1.5.24 GRI GCL 2 - Standard Test Method for Permeability of Geosynthetic Clay Liners;
- 1.6 Submittals
- 1.6.1 Submit shop drawings, project data, samples, and test reports. Submit the following as minimum:
 - 1.6.1.1 Materials data sheet - Manufacturer's certified raw materials and roll material data sheets
 - 1.6.1.2 Installation instructions
 - 1.6.1.3 Plan for placement of GCL rolls over the area of installation
 - 1.6.1.4 Samples
 - 1.6.2 A copy of manufacturer's QC Plan for the finished product that includes sampling frequency and methods which, upon approval, shall be implemented and followed during the manufacturing of the GCL. At minimum, the following QC testing and procedures shall be included within the CQ Plan:
 - 1.6.2.1 QC tests of raw materials (sodium monmorillonite content) shall include; swell index per ASTM D 5890 or GRI GCL-1: moisture content per ASTM D 2216 or ASTM D 4643; and fluid loss per ASTM D 5891.
 - 1.6.2.2 QC tests of geotextile components shall include tensile strength per ASTM D 4632 or ASTM D 4595 and puncture resistance per ASTM D 4833.
 - 1.6.2.3 QC tests of the final product shall include thickness per ASTM D 5199, total product mass per unit area per ASTM D 5261, Hydraulic conductivity per ASTM D 5887 or GRI GCL-2, and moisture content per ASTM D 4643. Quality control practices shall be in accordance with ASTM D 5889.
 - 1.6.2.4 As minimum, rolls produced immediately prior to and immediately after the failed roll shall be tested for the same perimeters. Testing shall continue until two successive rolls on both sides of the original failed roll pass all tests.

- 1.6.2.5 Other tests may be substituted for the specified tests providing they are submitted with the proposed QC Plan, and they test for the same properties. Any alternative testing methods must be approved by the Engineer prior to any testing.
- 1.6.3 The QC testing results for the raw materials, GCL components, and manufactured rolls shall be submitted by the MTL. Testing results shall comply with the ASTM, GRI, and other testing requirements contained within the submitted and approved QC Plan. The MTL shall provide the results as a single complete submittal with the Certificate of Compliance, which certifies that all rolls of the GCL supplied for the project meet the product specifications, including the required internal friction angle.
- 1.6.4 Verification that GCLs produced by needling and needle punched geotextiles used in the manufacturing of GCLs have been inspected continuously for presence of broken needles using an in-line metal detector or other approved device.
- 1.6.5 GCL manufacturer's experience and qualifications demonstrating their ability to manufacture the GCL products required for this project
- 1.6.6 GCL installer's experience and qualifications demonstrating their ability to install the GCL products specified for this project. Include a resume of the installer's QC Inspector who will be on site during the entire GCL installation.
- 1.6.7 CQC forms for approval prior to use by installer: installation inspection form which includes the inspection of 100% overlap, daily certificate of acceptance of soil subgrade by the GCL installer.
- 1.6.8 Test reports of field CQA testing.
- 1.6.9 Manufacturer's documentation demonstrating the GCL's ability not to exceed the permeability of 1.0×10^{-8} cm/sec under landfill cover conditions. The documentation shall include evidence of seam integrity using the proposed installation technique as described in the submitted installation instructions.
- 1.6.10 Submit written evidence of the ground load distribution for each piece of equipment that is proposed to travel upon previously placed GCL or other geosynthetics. The equipment shall meet the requirements of as specified in part 2.
- 1.6.11 Submit the GAI-LAP accreditation for the MTL
- 1.6.12 Submit the GAI-LAP accreditation for QTL

1.6.13 Submit physical properties of the accessory bentonite as specified in part 2.

1.7 Delivery, Storage, and Handling

1.7.1 The GCL materials shall be packaged, shipped, stored, and handled by appropriate means so that no damage is incurred. Materials shall be delivered only after the required submittals have been received and approved by Engineer. The Contractor shall be responsible for keeping the GCL materials properly stored in accordance with ASTM D 5888. Any GCL material found to be damaged shall be replaced with new materials at the Contractor's expense. Each roll shall be labeled with the Manufacturer's name, product identification, lot number, roll number, and roll dimensions.

1.7.2 The GCL shall be wrapped around a core that is structurally sound, such that it can support the weight of the entire roll without excessive bending or buckling under normal handling conditions as recommended by the manufacturer. Each roll shall be wrapped in a waterproof covering. Contractor shall be responsible for all damages to the materials incurred prior to its installation.

1.7.3 Any protective wrapping that is damaged shall be repaired immediately.

1.7.4 All rolls shall be stored in their original, unopened wrapping on a flat, dry surface. Storage of GCL at the field site shall be as brief as possible to prevent any damage to the materials. The rolls shall not be stacked so high as to cause thinning of the product at point of contact.

1.7.5 All rolls stored at the site shall be protected from precipitation.

1.7.6 Rolls shall be handled utilizing a steel bar or pipe inserted through the core and slings or chains attached at the ends. The core bar or pipe shall be suspended from a spreader bar so that the edges of the GCL liner are not damaged by the suspending slings or chains.

1.8 Qualifications

1.8.1 The manufacturer shall provide qualifications demonstrating their ability to manufacture the products specified in this section. The manufacturer shall have successfully produced at least 2 million square feet of GCL for at least five large installations in the United States.

2. PRODUCTS

2.1 Raw Materials

2.1.1 Geosynthetic Clay Liner (GCL)

- 2.1.1.1 GCL shall be a factory manufactured hydraulic barrier consisting of bentonite clay or other very low permeability clay materials, supported by geotextiles that are held together by needling or stitching
- 2.1.1.2 GCL shall have a hydraulic conductivity equal to or lower than 1.0×10^{-8} cm/sec when tested at a confining stress pressure of not more than 10 psi and a head pressure of not less than 5 psi in accordance with ASTM D 5084 or GRI GCL-2.
- 2.1.1.3 GCL shall be fabricated with geotextiles on both sides of the sodium bentonite component. At least one of the geotextiles shall be of nonwoven construction. The geotextile components shall have a single or combined minimum tensile strength of at least 70 psi when tested in accordance with ASTM D 4632. Each geotextile component shall have a minimum elongation value of 10% when tested in accordance with ASTM D 2246 or ASTM D 4595.
- 2.1.1.4 The sodium bentonite content shall be at least 1.00lb per ft² (MARV) as determined by ASTM D 5261 when adjusted to moisture content of not greater than 20%. Moisture content shall be determined by ASTM D 2216 or ASTM D 4643.
- 2.1.1.5 The width of the GCL shall not be less than 12 ft and the length shall not be less than 100 ft.
- 2.1.1.6 GCL shall be capable of maintaining its integrity and bentonite content per square foot during normal installation conditions.
- 2.1.1.7 The overlap distance shall be marked on both sides of GCL with continuous waterproof lines or other method to aid in field placement.
- 2.1.1.8 GCL shall have an internal friction angle (shear) of no less than 21 degrees over the normal stress range of 1 to 4 lb per in² according to ASTM D 5321. External friction value shall be as specified and as verified in accordance with Section 02246.

2.1.2 Accessory Bentonite

- 2.1.2.1 For GCL seam augmentation: powdered sodium montmorillonite of the same type as the material within the GCL itself, capable of producing low permeability seams in the range of 1.0×10^{-8} cm/sec.

2.1.2.2 If seam augmentation is not proposed, submit evidence of self sealing seams.

2.2 Equipment

2.2.1 No motorized machinery/equipment, other than small lightweight, rubber-tired all terrain vehicles (ATV) that exert no more than 4 psi ground pressure shall be allowed on the GCL.. The tires used on the ATVs shall have smooth tread with no protruding lugs and shall be properly inflated The ATVs shall make no sudden stops, starts, or sharp turns while being driven directly on GCL. Spinning of tires while deploying rolls will not be allowed and, if observed, will be just cause to remove these machines from the job site.

2.2.2 Special installation equipment such as roll goods trailers used to transport and deploy GCL rolls shall not be allowed upon previously placed GCL unless trailers exert no more than 4 psi ground pressure. All tires shall have smooth treads and shall be properly inflated.

3. EXECUTION

3.1 Preparation

3.1.1 Surface Preparation

3.1.1.1 Prior to placement of the GCL the below cap fill shall be properly graded and compacted in accordance with Section 02211.

3.1.1.2 Prior to installing the GCL the below cap surface shall be surveyed in accordance with Section 02211.

3.1.1.3 Do not start installation of GCL until authorized by Engineer

3.2 Placement/Installation

3.2.1 Install GCL on top of the below cap fill where shown on the drawings in accordance with manufacturer's recommended installation instructions and as specified in this section.

3.2.2 At the end of each day complete, sign and submit CQA forms

3.2.3 During GCL placement inspect the surface to be covered for stones, concrete chunks, broken pavement, and other material which can damage the overlying GCL, or can hamper subsequent seaming of GCL.

3.2.4 Do not drag GCL panels over the ground surface. The equipment used to deploy the GCL shall not damage the supporting subgrade surface.

- 3.2.5 Place the GCL with non-woven geotextile side down..
- 3.2.6 GCL panels shall be placed free of tension or stress and without wrinkles or folds. Panels shall be anchored first and the roll shall be slowly lowered down the slope. On slopes steeper than 6:1 seams shall be parallel with the direction of the slope, with no horizontal seams unless approved by the Engineer. On other areas the GCL can be placed across the slope providing that the overlaps are "shingled" to prevent flow into the seam.
- 3.2.7 Seam areas or runs shall be flat and clear of any rocks, debris or ruts. Contacting surfaces shall be clean and clear of dirt or native soil with all edges pulled tight to maximize contact and to smooth out any wrinkles or creases. All overlaps shall be per approved manufacturer's installation instructions and verified by the installer's CQA Inspector. The preprinted lap lines on the panels shall be used to assist in proper overlaps.
- 3.2.8 All seams shall be augmented with accessory bentonite to ensure seam integrity when required by approved manufacturer's installation instructions. Accessory bentonite shall be dispersed evenly from the roll edge to the lap line edge at a minimum rate as required by the approved manufacturer's installation instructions.
- 3.2.9 Work only on an area which can be adequately protected from precipitation and completed in one working day. Completion is defined as the full installation of the GCL with placement of the specified clay cover. All exposed edges of GCL shall be covered by a temporary tarpaulin or other such water resistant sheet.
- 3.2.10 Remove and replace GCL that becomes hydrated, or that exceeds moisture content of 40 % when measured in accordance with ASTM D 4643
- 3.2.11 Do not install GCL during periods of precipitation. Take care to keep the GCL dry during installation to prevent hydration of the mat. Areas which are exposed to standing water or excess precipitation and allowed to hydrate prior to being covered by confining soil layer shall be removed and replaced. Hydrated GCL is defined as material which has become soft as determined by squeezing the material with finger pressure, material which has exhibited swelling, or material which has a moisture content greater than 100% as determined by ASTM D 2216 or ASTM D 4643.
- 3.2.12 Any GCL material exposed to hydrocarbons, fuels, chemicals, pesticides, leachates, or other such liquids during installation shall be removed and replaced.

3.3 Repairs

3.3.1 Large rips, tears or loss of bentonite material caused by placing activities shall be repaired by completely exposing the affected area, removing all foreign objects and soil, and then placing a full GCL patch over the damaged area with a minimum overlap of 12 inches on all edges. Accessory bentonite shall be placed between the patch and the repaired material. This procedure shall also be implemented if a rip or tear occurs on a sloped surface steeper than 6:1. In this instance the edges of the patch shall be fastened to the repaired liner with a construction epoxy-based adhesive, in addition to bentonite enhanced seam.

3.3.2 Damage to the geotextile component shall be repaired by patching with geotextile of the same physical properties as the damaged geotextile. The geotextile patch shall extend at least 12 inches beyond any portion of damaged geotextile and shall be adhesive or heat bonded to the product to avoid shifting during backfilling operation or installation of geomembrane.

3.4 Final Cover

Upon completion and acceptance of the GCL in an area, the GCL shall be covered with the required materials the same day of acceptance in accordance with the drawings.

END OF SECTION 02244

SECTION 02275

**RIPRAP
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SECTION 02275

RIPRAP

1. GENERAL

- 1.1 This section includes:
 - 1.1.1 Riprap placed loose
 - 1.1.2 Riprap placed in sacks
- 1.2 Related Sections
 - 1.2.1 Section 02205 - Soil Materials
 - 1.2.2 Section 02211 - Rough Grading: Site Contouring
 - 1.2.3 Section 02222 - Excavating: Excavating for Riprap
 - 1.2.4 Section 02223 - Backfilling
 - 1.2.5 Section 02225 - Trenching, backfilling trenches
 - 1.2.6 Section 02609 - Pipe Culverts
- 1.3 Quality Assurance
 - 1.3.1 Perform work in accordance with [state] Department of Transportation standards.
 - 1.3.2 Maintain one copy of document on site.

2. PRODUCTS

- 2.1 Materials (*select only one)
 - *2.1.1 Riprap materials: Provide in accordance with [state] Department of Transportation standards.
 - *2.1.1 Riprap: [Granite] [Limestone] [] type; [broken stone] [irregular shaped rock]; solid and nonfriable; [] inch minimum size, [] maximum size
 - *2.1.1 Riprap: [Broken stone] [irregular shaped rock] solid and nonfriable; [] inch minimum size, [] maximum size

- 2.1.2 Aggregate Type: [A1] [], as specified in Section 02207
- 2.1.3 Bags: [Woven jute] [geotextile fabric]
- 2.1.4 Binder: [Portland cement] [lime]
- 2.1.5 Geotextile Fabric: Non-biodegradable, [woven] [non-woven][];
manufactured by [].
- 2.2 Bagged Riprap
 - 2.2.1 Mixed riprap, cement, [sand], and aggregate dry. [Quantity of cement not to exceed [10] [] percent of dry mixed materials by volume.
 - 2.2.2 Bagging: Fill bags with dry ingredients to 70 percent capacity and close by sewing or stapling to a straight seam.

3. EXECUTION

- 3.1 Examination
 - 3.1.1 Do not place riprap bags over frozen or spongy subgrade surfaces
 - 3.1.2 Do not place riprap bags in standing water.
- 3.2 Placement
 - 3.2.1 Place geotextile fabric over substrate, lap edges, and ends.
 - 3.2.2 Place riprap at [culvert pipe ends] [at embankment slopes] and as indicated.
 - 3.2.3 Place [bags] into position. [Knead, ram, or pack the filled bag to conform to contour of adjacent material and other bags previously placed.]
 - 3.2.4 Place [bags] in a staggered pattern. Remove foreign matter from bag surfaces.
 - 3.2.5 Installed thickness: [6], [12] inch average
 - 3.2.6 After placement, spray with water to moisten the bagged mix. Maintain moistness for 24 hours.

3.3 Schedules

- 3.3.1 Culvert pipe ends: Bagged, placed one layer thick, 6-inch average thickness, concealed with topsoil fill.
- 3.3.2 Sloped grade at retaining wall: Individual riprap units, 6-inch thickness; placed prior to finish topsoil.
- 3.3.3 All other areas shown on drawings; in accordance with details shown on [].

END OF SECTION 02275

SECTION 02510

BITUMINOUS CONCRETE PAVING

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SECTION 02510

BITUMINOUS CONCRETE PAVING

1. GENERAL

- 1.1 This Section Includes
 - 1.1.1 Bituminous concrete paving subsurface sealer wearing binder, or base course.
 - 1.1.2 Aggregate base course
- 1.2 Products Installed but not Furnished Under this Section
 - 1.2.1 Manhole frames and covers for placement by this section
- 1.3 Related Sections
 - 1.3.1 Section 02211 - Rough Grading: Preparation of Site for Paving [and base]
 - 1.3.2 Section 02223 - Backfilling
 - 1.3.3 Section 02231 - Aggregate Base Course
 - 1.3.4 Section 02720 - Storm Drainage System
- 1.4 References
 - 1.4.1 Illinois Department of Transportation (IDOT) Standard Specification Section 406
- 1.5 Performance Requirements
 - 1.5.1 Paving: Designed for parking residential streets main streets; movement of trucks up to 60,000 pounds (27,200 kg)]
- 1.6 Submittals
 - 1.6.1 Submit mix design for asphalt
 - 1.6.2 Submit proposed mix design of each class of mix for review prior to commencement of work
 - 1.6.3 Test samples in accordance with IDOT Section 406.16
- 1.7 Quality Assurance

- 1.7.1 Perform work in accordance with Illinois Department of Transportation Section 406
- 1.7.2 Obtain materials from same source throughout.
- 1.7.3 Maintain one copy each document on site
- 1.8 Environmental Requirements
 - 1.8.1 Do not place binder course when ambient temperature is 40 degrees F, or less, or surface is wet or frozen.
 - 1.8.2 Do not place surface course when ambient temperature is 45 degrees F or less, or surface is wet or frozen.

2. PRODUCTS

2.1 Materials

- 2.1.1 Asphalt Cement: shall be in accordance with Illinois Department of Transportation (IDOT) Standard Specifications Section 1009
- 2.1.2 Aggregate for Binder Course Mix: In accordance with Illinois Department of Transportation (IDOT) Standard Specifications Section 406.13.
- 2.1.3 Aggregate for Wearing Course Mix: In accordance with Illinois Department of Transportation (IDOT) Standard Specifications Section 406.13.

2.2 Accessories

- 2.2.1 Primer medium curing, In accordance with Illinois Department of Transportation (IDOT) Standard Specifications Section 1009.09

2.3 Asphalt Paving Mix

- 2.3.1 Use dry material to avoid foaming. Mix uniformly.
- 2.3.2 Binder Course: 4.5 to 6 percent of asphalt cement by weight in mixture in accordance with IDOT Section 406.11
- 2.3.3 Wearing Course: 5 to 7 percent of asphalt cement by weight in mixture in accordance with IDOT Section 406.11

3. EXECUTION

3.1 Examination

3.1.1 Verify base conditions

3.1.2 Verify that compacted granular base is dry and ready to support paving and imposed loads.

3.1.3 Verify gradients and elevations of base are correct and in accordance with the design.

3.2 Subbase

3.2.1 Section 02231 - Aggregate Base Course forms the base construction for work under this section.

3.3 Preparation - Primer

3.3.1 Apply primer in accordance with IDOT Section 406.07

3.3.2 Apply primer on base subbase over subgrade surface at uniform rate of 1/4 to 1/2 gallon/square yard.

3.3.3 Apply primer to contact surfaces of curbs and gutters.

3.4 Placing Asphalt Pavement - Double Course

3.4.1 Place asphalt binder course within 24 hours of applying primer or tack coat.

3.4.2 Place binder course to 1 2 inch compacted thickness

3.4.3 Place wearing course or surface course within 2 hours of placing and compacting binder course.

3.4.4 Place wearing course to 1 2 inch compacted thickness

3.4.5 Install gutter drainage grills and frames and manhole frames in correct position and at correct elevation.

- 3.4.6 Compact pavement by rolling. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.
- 3.4.7 Develop rolling with consecutive passes to achieve even and smooth finish without roller marks.
- 3.5 Curbs
 - 3.5.1 Install extruded concrete curbs as shown on the drawings.
- 3.6 Tolerances
 - 3.6.1 Flatness: Maximum variation at 1/4 inch measured with 16-foot straight edge
 - 3.6.2 Scheduled Compacted Thickness: within 3/8 inch
 - 3.6.3 Variation from true elevation: within 2 inch.
- 3.7 Field Quality Control
 - 3.7.1 Take samples and perform tests in accordance with IDOT Section 406.16 b.
- 3.8 Protection
 - 3.8.1 Immediately after placement, protect pavement from mechanical injury for 2 days.

END OF SECTION 02510

SECTION 02720
STORM DRAINAGE SYSTEM
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	3.8 Field Quality Control	<u>02720-10</u>

SECTION 02720

STORM DRAINAGE SYSTEM

1. GENERAL

1.1 This section includes:

1.1.1 Storm drainage piping, fittings, and accessories.

1.1.2 Catch basins, storm water inlets, manholes,

1.1.3 Landfill toe drains, subsurface drainage

1.2 Related Sections

1.2.1 Section 02205 - Soil Materials

1.2.2 Section 02207 - Aggregate Materials

1.2.3 Section 02216 - Geotextile Filter Fabrics

1.2.4 Section 02222 - Excavating

1.2.5 Section 02223 - Backfilling

1.2.6 Section 02225 - Trenching

1.3 References

The following documents are applicable to this specification .

A American Society for Testing and Materials (ASTM) standards

1.3.1 ANSI/ASTM A 36 - Standard Specifications for Carbon Structural Steel

1.3.2 ANSI/ASTM A 48 - Standard Specifications for Gray Iron Castings

1.3.3 ANSI/ASTM A 74 - Standard Specification for Cast Iron Soil Pipe and Fittings

1.3.4 ANSI/ASTM A 746 - Standard Specification for Ductile Iron Gravity Sewer Pipe

- 1.3.5 ANSI/ASTM A 888 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, and Vent Piping Applications
- 1.3.6 ANSI/ASTM C 12 - Standard Practice for Installing Vitrified Clay Pipe Lines
- 1.3.7 ANSI/ASTM C 76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
- 1.3.8 ANSI/ASTM C 270 - Standard Specification for Mortar for Unit Masonry
- 1.3.9 ANSI/ASTM C 425 - Standard Specification for Compression Joints for Vitrified Clay Pipe and Fittings
- 1.3.10 ANSI/ASTM C 443 - Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets
- 1.3.11 ANSI/ASTM C 478 - Standard Specification for Precast Reinforced Concrete Manhole Sections
- 1.3.12 ANSI/ASTM C 564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings
- 1.3.13 ANSI/ASTM C 700 - Standard Specification for Vitrified Clay Pipe, Extra Strength, and Perforated
- 1.3.14 ANSI/ASTM C 890 - Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures
- 1.3.15 ANSI/ASTM C 923 - Standard Specifications for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals
- 1.3.16 ANSI/ASTM C 1277 - Standard Specifications for Shielded Couplings Join
- 1.3.17 ANSI/ASTM D 2321 - Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe
- 1.3.18 ANSI/ASTM D 2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
- 1.3.19 ANSI/ASTM D 2774 - Recommended Practice for Underground Installation of Thermoplastic Pressure Piping
- 1.3.20 ANSI/ASTM D 3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings

- 1.3.21 ANSI/ASTM F 679 - Standard Specification for Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings
- B American Association of Highways and Transportation Officials (AASHTO) Standards
- 1.3.22 AASHTO M 294 - Standard Specifications for Corrugated Polyethylene Pipe and Fittings
- C American Water Works Association (AWWA)
- 1.3.23 ANSI/AWWA C153/A 21.53 - Ductile iron Fittings
- 1.3.24 ANSI/AWWA C111/A 21.11 - Rubber Gasket
- 1.4 Submittals
 - 1.4.1 Submit shop drawings
 - 1.4.2 Submit product and material data
 - 1.4.3 Submit manufacturer=s installation instructions.
 - 1.4.4 Submit manufacturer=s certificate that products furnished meet or exceed specified requirements.
- 1.5 Project Record Documents
 - 1.5.1 Submit record documents.
 - 1.5.2 Accurately record actual locations of pipe runs, connections, catch basins, manholes, cleanouts, and their invert elevations.
 - 1.5.3 Identify and describe unexpected variations to subsoil conditions or uncharted utilities
- 1.6 Regulatory Requirements
 - 1.6.1 Conform to applicable code for work safety in trenches, safety of adjacent structures, dust control, and runoff control.
 - 1.6.2 Obtain required permits from local authorities.

- 1.6.3 Notify affected utility companies before starting work and comply with their requirements.
- 1.6.4 Do not close or obstruct roadways sidewalks hydrants without special permits.
- 1.6.5 Notify Engineer when discovering potentially hazardous or contaminated materials during Storm Drainage System work.
- 1.6.6 Perform required testing.
- 1.7 Field Measurements
 - Verify that field measurements and elevations are as indicated on the drawings
- 1.8 Coordination
 - 1.8.1 Coordinate work under this section with landfill cap work.
 - 1.8.2 Coordinate work with termination of sewer connections and trenching.

2. MATERIALS

- 2.1 Manufacturers of Sewer Pipe Material
 - 2.1.1 Cast Iron Pipe U.S. Pipe, American Cast Iron Pipe Company, Tyler Pipe
 - 2.1.2 Vitrified Clay Pipe Superior Clay Corporation, Can-Clay Corporation
 - 2.1.3 Concrete Pipe Price Brothers, or equal
 - 2.1.4 PVC Pipe PW Pipe Company, or equal
 - 2.1.5 Corrugated Metal Pipe Pacific Corrugated Pipe Company, Contech Construction Products,
- 2.2 Sewer Pipe Materials
 - 2.2.1 Cast Iron Pipe
 - 2.2.1.1 Cast Iron Pipe: - ANSI/ASTM A74, and/or ANSI/ASTM A 888 extra heavy XH type; inside nominal diameter as indicated on drawings, bell and spigot end joints.

- 2.2.1.2 Cast Iron pipe joint device: - ANSI/ASTM C 564, rubber gaskets, ANSI/ASTM C 1277, shielded coupling
- 2.2.2 Ductile Iron Pipe
 - 2.2.2.1 Ductile Iron Sewer Pipe: - ANSI/ASTM A 746
 - 2.2.2.2 Ductile Iron Fittings: - ANSI/AWWA C153/A 21.53
 - 2.2.2.3 Gasket Joints: - ANSI/AWWA C111/A21.11, rubber gasket
- 2.2.3 Vitrified Clay Pipe
 - 2.2.3.1 Vitrified clay pipe: - ANSI/ASTM C 700, Extra strength, unperforated; inside diameter as indicated on drawings, bell and spigot end joints.
 - 2.2.3.2 Vitrified clay pipe joints: - ANSI/ASTM C 425, compression gasket.
- 2.2.4 Reinforced Concrete Pipe
 - 2.2.4.1 Reinforced concrete pipe: - ANSI/ASTM C 76, Class III with wall type B; bar reinforcement; inside diameter as indicated on drawings; bell and spigot end joints.
 - 2.2.4.2 Reinforced concrete pipe joints device: ANSI/ASTM C 443, rubber compression gasket.
- 2.2.5 Plastic Pipe
 - 2.2.5.1 PVC pipe Type PSP: - ANSI/ASTM D 3033, inside diameter as indicated on drawings, bell and spigot, solvent welded joint ends.
 - 2.2.5.2 PVC pipe: - ANSI/ASTM D 2729, inside diameter as indicated on drawings, bell and spigot, solvent welded joint ends.
 - 2.2.5.3 PVC pipe 18-inch and larger - ANSI/ASTM F 679, inside diameter as indicated on drawings, bell and spigot for gasketed joints with elastomeric seals 9ASTM F 477
 - 2.2.5.4 PVC pipe Type PSM 15-inch and smaller,: - ANSI/ASTM D 3034, inside diameter as indicated on drawings; bell and spigot style rubber ring sealed gasketed joints with elastomeric seals ASTM F 477.
 - 2.2.5.5 Corrugated Polyethylene Pipe
 - 2.2.5.5.1 Corrugated polyethylene pipe and fittings: - AASHTO M 294, Type S, with smooth waterway
 - 2.2.5.5.2 Soil tight corrugated type couplings matching pipe and fittings to form a tight joints: - AASHTO M 294

2.3 Pipe Accessories

- 2.3.1 Pipe joints: Mechanical clamp ring type, cast iron, expanding and contracting sleeve, neoprene ribbed gasket for positive seal.
- 2.3.2 Fittings: same material as pipe, molded to suit pipe size and end design, in required AT=s@, bends, elbows, cleanouts, reducers, traps, laterals, and other configurations required.
- 2.3.3 Filter fabric: - water pervious type, black polyester; as specified in Section 02216

2.4 Catch Basins and Area Storm Inlets

- 2.4.1 Lid and frame: Cast iron construction, hinged lid, manufactured by Neenah Foundry Company or Equal
 - 2.4.1.1 Lid design: [Linear grill] [Checkerboard grill]
 - 2.4.1.2 Nominal Lid and Frame size; as shown on drawings
- 2.4.2 Shaft construction and concentric cone top section: Reinforced precast concrete pipe sections (ASTM C 913) designed according to ASTM C 890, lipped male/female dry joints, nominal shaft diameter as indicated on drawings, manufactured by Price Brothers or equal.
- 2.4.3 Base slab: Precast concrete
- 2.4.4 Pipe connectors: ASTM C923

2.5 Cleanouts

- 2.5.1 Cleanout Lid and Frame: Cast iron construction, hinged lid, manufactured by Neenah Foundry company or Equal
 - 2.5.1.1 Lid design: [Linear grill] [Checkerboard grill]
 - 2.5.1.2 Nominal Lid and Frame size; as shown on drawings
- 2.5.2 Shaft construction and concentric cone top section: Reinforced precast concrete pipe sections (ASTM C 913) designed according to ASTM C 890, lipped male/female dry joints, nominal shaft diameter as indicated on drawings, manufactured by Price Brothers or equal.
- 2.5.3 Base slab: Precast concrete

- 2.5.4 Pipe connectors: ASTM C923
- 2.6 Manholes
 - 2.6.1 Manhole Lid and Frame: Cast iron construction, removable lid, manufactured by Neenah Foundry company or Equal
 - 2.6.1.1 Lid design: open checkerboard grill
 - 2.6.1.2 Nomianl Lid and Frame size; as shown on drawings
 - 2.6.2 Shaft construction and concentric cone top section: Reinforced precast concrete pipe sections (ASTM C 478), lipped male/female dry joints, cast steel ladder rungs in shaft section at 12 inches; nominal shaft diameter as indicated on drawings, manufactured by Price Brothers or equal.
 - 2.6.3 Base slab: Precast concrete leveled top surface to receive concrete shaft sections, sleeved to receive sewer pipe sections.
- 2.7 Bedding Materials
 - 2.7.1 Bedding material: Aggregate type A2 as specified in Section 02207 and installed under Section 02225
- 2.8 Filter Aggregate
 - 2.8.1 Coarse Filter Material: Aggregate type A2 as specified in Section 02207
 - 2.8.2 Fine Filter Material: Aggregate type A4 as specified in Section 02207
- 3. EXECUTION
 - 3.1 Examination
 - 3.1.1 Verify that trench cut is ready to receive work end trench dimensions and elevations are as indicated on drawings.
 - 3.2 Preparation
 - 3.2.1 Hand trim excavations to required elevations. Correct over excavation with course aggregate.
 - 3.2.2 Remove large stones or other hard matter which could damage piping or impede consistent backfilling or compaction.

- 3.2.3 Provide, erect, and maintain temporary barriers and security devices.
- 3.2.4 Protect existing structures, appurtenances, and landscaping which are not to be demolished.
- 3.2.5 Verify mark location of utilities.
- 3.3 Bedding
 - Bedding material - Installed under Section 02225
- 3.4 Pipeline Installation
 - 3.4.1 Install vitrified clay pipe and fittings according to recommendations in ANSI/ASTM C 12 and manufacturer=s instructions. Seal joints water tight.
 - 3.4.2 Install flexible plastic pipe and fittings according to recommendations in ANSI/ASTM D 2321 and manufacturer=s instructions. Seal joints water tight.
 - 3.4.3 Place pipe on bedding material installed under Section 02225
 - 3.4.4 Lay pipe to slope gradients shown on drawings, with maximum variation from true slop of 1/8 inches.
 - 3.4.5 Pipe backfill installed under Section 02225
- 3.5 Catch Basins and Cleanouts Installation
 - 3.5.1 Verify that bottom of excavation is clean and at proper elevation
 - 3.5.2 Form and place cast-in-place concrete or precast concrete base with provisions for storm sewer pipes end sections.
 - 3.5.3 level top surface of cast-in-place base to receive precast concrete shaft section, sleeved to receive storm sewer pipes.
 - 3.5.4 Establish locations and elevations of pipe inverts for inlets and outlets as indicated on drawings.
 - 3.5.5 Install additional shaft sections and top cone section as indicated on drawings.
 - 3.5.6 Mount frame and lid level in full bed of grout, secured to top cone section to elevation indicated on drawings.

- 3.5.7 Backfilling installed under Section 02223
- 3.6 Manholes Installation
 - 3.6.1 Verify that bottom of excavation is clean and at proper elevation
 - 3.6.2 Form and place cast-in-place concrete or precast concrete base with provisions for storm sewer pipes end sections.
 - 3.6.3 level top surface of cast-in-place base to receive precast concrete shaft section, sleeved to receive storm sewer pipes.
 - 3.6.4 Establish locations and elevations of pipe inverts for inlets and outlets as indicated on drawings.
 - 3.6.5 Install additional shaft sections and top cone section as indicated on drawings.
 - 3.6.6 Mount frame and lid level in full bed of grout, secured to top cone section to elevation indicated on drawings.
 - 3.6.7 Backfilling installed under Section 02223
- 3.7 Manhole Extensions (All existing manholes)
 - 3.7.1 Remove existing manhole frame and lid
 - 3.7.2 Remove adjusting rings and top cone section. Take care not to damage cone section or the shaft=s joints. If damaged replace it with new.
 - 3.7.3 Install additional precast shaft sections as indicated on drawings.
 - 3.7.4 Reinstall top cone section.
 - 3.7.5 Install adjusting rings as required and reinstall frame and lid in a full bed of mortar in accordance with details shown on drawings.
 - 3.7.6 Remove all debris from inside of manhole.
 - 3.7.7 Obtain written permission from adjacent property owners when demolition equipment will traverse, infringe upon, or limit access to their property.
 - 3.7.8 Backfilling of extension installed under Section 02223.
- 3.8 Field Quality Control

- 3.8.1 Field inspections and testing will be performed as necessary
- 3.8.2 Request inspection prior to and immediately after placing aggregate cover over pipe.
- 3.8.3 Compaction testing will be performed in accordance with ANSI/ASTM D 698, ANSI/ASTM D 2922, ANSI/ASTM D 3017
- 3.8.4 Frequency of tests: 1i per 200 ft of trench per lift

END OF SECTION 02720

SECTION 02930

SEEDING

1. GENERAL

1.1 Section includes the following:

1.1.1 Preparation of topsoil

1.1.2 Furnishing all materials, equipment, labor, and accessories to seed the area shown areas disturbed by construction , and all other areas as specified and as indicated on the drawings.

1.1.3 Performing the required soil testing

1.1.4 Seeding, applying fertilizer, lime, and required mulch.

1.1.5 Hydroseeding

1.1.6 Maintenance

1.2 Related sections:

1.2.1 Section 02110 - Site Clearing

1.2.2 Section 02205 - Soils Materials

1.2.3 Section 02223 - Backfilling

1.2.4 Section 02225 - Trenching

1.3 References

1.3.1 FS-O-F-241- Fertilizers, Mixed, Commercial

1.4 Quality Assurance

1.4.1 The contractor shall be responsible for having at least one person present at all times during seed application, who is thoroughly familiar with the materials being installed and the proper methods of their installation.

1.4.2 All seed mixture furnished shall be in sealed containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging. All containers shall be labeled in accordance with the U.S. Department of Agriculture Rules and Regulations under Federal Seed Act and shall be in accordance with the State of Illinois seed rules and regulations. Seed certificates or tags from the seed containers shall be submitted to Engineer.

1.5 Regulatory Requirements

- 1.5.1 Comply with regulatory agencies for fertilizer and herbicide composition and application.
- 1.5.2 Provide certificate of compliance from authority having jurisdiction indicating approval of seed mixtures.

1.6 Delivery, Storage and Handling

- 1.6.1 Deliver grass seed in sealed containers. Seed in damaged containers or packing will be rejected.
- 1.6.2 Deliver fertilizer in waterproof bags or other waterproof containers showing weight, chemical analysis, and manufacturer's name. Fertilizer in damaged bags or containers which have become damaged or caked will be rejected.

1.7 Maintenance

The Contractor shall be responsible for caring for the new stand of grass until it is accepted by the Engineer. In the event of damage to the new grass prior to acceptance, the damaged areas shall be repaired and/or replaced by the Contractor at no additional cost.

2. PRODUCTS

2.1 Seed Mixture

- 2.1.1 All seed shall be guaranteed by the seed producer to be true to name and variety.
- 2.1.2 All seed shall be guaranteed by the seed producer to be free from noxious weed seed or other seed of undesirable plants.
- 2.1.3 Seed mixtures:

- 2.1.3.1 Seed mixture Type "A" for landfill cap cover, berm and other areas disturbed by construction near northern end of the landfill:

Seed Mixture Type A

Appendix B

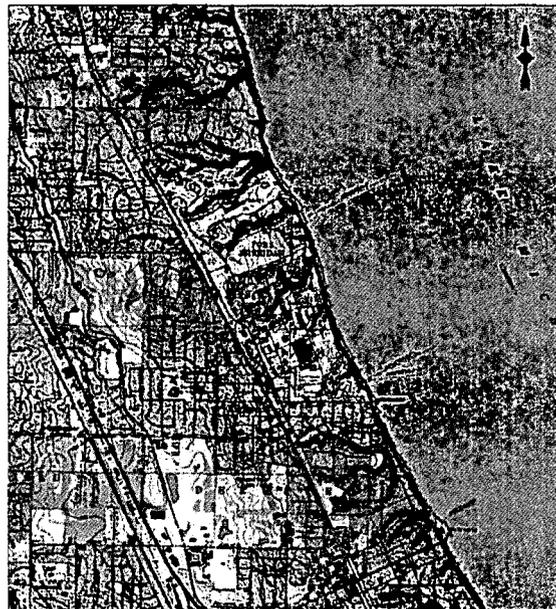
Final Construction Drawings

Fort Sheridan Landfill 5 Remedial Action

FORT SHERIDAN ENVIRONMENTAL RESTORATION PROJECT LANDFILL NO. 5

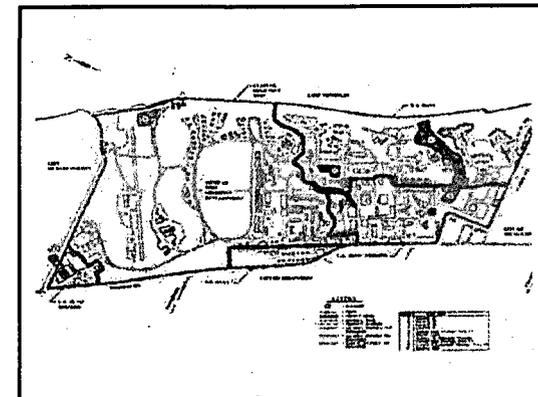
Fort Sheridan, Illinois

LOCATION MAP



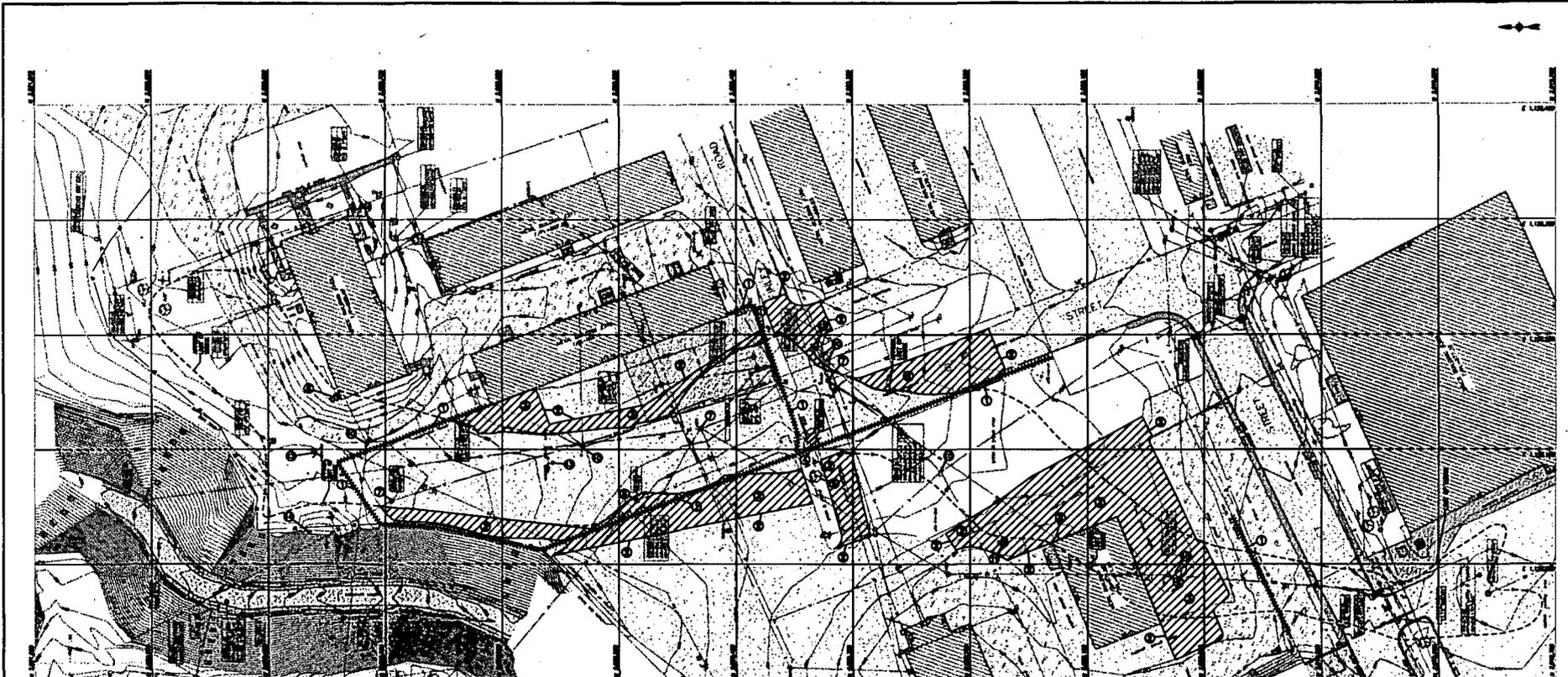
0 1000 2000
SCALE IN FEET

STUDY AREA MAP



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4	Interim Grading Plan
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16	Flood Cross-sections
17	Facility Use Plan
18	Manhole and Wall Details
19	Details

KEMRON Fort Sheridan
Environmental
Tetra Tech EM, Inc. Restoration Team



PLAT OF IMPROVEMENT
 That part of the southeast 1/4, of the southeast 1/4 of fractional section 10 and the northeast 1/4, of the northeast 1/4 of section 15, of Township 43 North, Range 12, East of the third principal meridian, in Lake County, Illinois.

LEGEND

- - WATER MANHOLE
- ⊕ - STORM MANHOLE
- ⊙ - MANHOLE ELECTRIC
- ⊖ - CATCH BASIN
- ⊗ - STORM INLET
- ⊘ - STORM INLET
- ⊙ - SANITARY MANHOLE
- ⊞ - CABLE PEDESTAL
- ⊠ - TRANSFORMER (GROUND)
- ⊡ - SIGNAL BOX
- ⊢ - SIGN
- ⊣ - POWER POLE
- ⊤ - TELEPHONE METER
- ⊥ - VALVE VAULT
- ⊦ - POLE TRANSFORMERS
- ⊧ - FIRE HYDRANT
- ⊨ - VALVE BOX
- ⊩ - MONITORING WELL WITH POSTS
- ⊪ - MONITORING WELL
- ⊫ - LIGHT POLE
- ⊬ - ANCHOR (POWER POLE)
- ⊭ - TREE AND SIZE
- - SILT FENCE
- - - - - APPROXIMATE LIMIT OF WASTE
- - - - - CHAIN LINK FENCE
- ~~~~~ FENCE TO BE REMOVED
- ⊙ MANHOLES TO BE RAISED
- ▨ PAVEMENT TO BE REMOVED AS NECESSARY TO ALLOW CONSTRUCTION OF TIE DRAIN AND LANDFILL CAP
- - - - - SEWAGE FORCE MAIN
- - - - - UNDERGROUND ELECTRICAL
- - - - - OVERHEAD ELECTRICAL
- - - - - SANITARY SEWER
- - - - - STORM SEWER
- - - - - WATER
- - - - - STEAM LINE
- - - - - SIGNAL CABLE
- - - - - GAS LINE

BENCHMARK
 CITY OF ROCKLAND PARK BENCHMARK NO. 1
 BRASS CAP ON 8"X8"X12" CONCRETE FOUNDATION AS SET BY AERO-METRIC ENGINEERING AND LOCATED AT THE SOUTHWEST CORNER OF THE INTERSECTION OF OLD ELM ROAD AND THE ACCESS AND SERVICE ROAD TO OLD ELM GOLF COURSE.
 ELEVATION = 702.973 FEET (U.S.G.S. DATUM)
 ALL COORDINATES ARE IN ILLINOIS STATE PLANE COORDINATE SYSTEM.

- WORK ITEMS:**
1. REMOVE EXISTING FENCE AS SHOWN OR AS REQUIRED FOR CONSTRUCTION OF LANDFILL CAP.
 2. REMOVE EXISTING ASPHALT PAVEMENT, AS SHOWN.
 3. REMOVE EXISTING PAVEMENT IN THIS AREA AS REQUIRED TO CONSTRUCT LANDFILL CAP AND TIE DRAIN.
 4. REMOVE STEAM WALK'S TOP SLAB, INCLUDING LID AND FRAME, AND ALL ABOVE GROUND PIPING. PUNCH FOUR HOLES IN THE BOTTOM SLAB. FILL THE STRUCTURE WITH SAND.
 5. PROTECT TREE DURING CONSTRUCTION.
 6. REMOVE FRAME AND LID FROM EXISTING STEAM MANHOLE. PUNCH TWO HOLES IN THE MANHOLE'S BOTTOM SLAB AND FILL MANHOLE WITH SAND.
 7. REMOVE MANHOLE FRAME, LID, ADJUSTING RINGS, OR BRICKS, AND CONE SECTION AS NECESSARY TO REBUILD MANHOLE AS INDICATED ON SHEET NUMBER 18. REINSTALL MANHOLE'S FRAME AND LID AS INDICATED ON SHEET NUMBER 18.
 8. REMOVE CONCRETE SLAB.
 9. REMOVE INLET'S FRAME AND LID. REBUILD OR REMOVE AND REPLACE STORM WATER INLET AND COVER AS INDICATED ON SHEET NUMBER 18.
 10. REMOVE AND/OR RELOCATE, AS NECESSARY, EXISTING POWER POLES. REROUTE ELECTRICAL POWER LINES AS NECESSARY OR INSTALL NEW POLES OF APPROPRIATE HEIGHT.
 11. RELOCATE EXISTING FIRE HYDRANT. SEE SHEET NOS. 4 AND 5 FOR NEW LOCATION.
 12. REMOVE EXISTING MANHOLE /W/LET AND REPLACE IT WITH NEW AS SHOWN ON SHEET NUMBER 18.
 13. PROTECT EXISTING MONITORING WELLS DURING CONSTRUCTION. MODIFY ALL DEGRADED WELLS AS SHOWN.
 14. REMOVE EXISTING 12" CORRUGATED METAL PIPE.

ORIGINAL DRAWING PREPARED BY PERDY, BENTON & CO., LTD.

NO.	DATE	REVISIONS

DESIGNED AS
 DRAWN JS
 CHECKED JR
 DATE JUNE 2004

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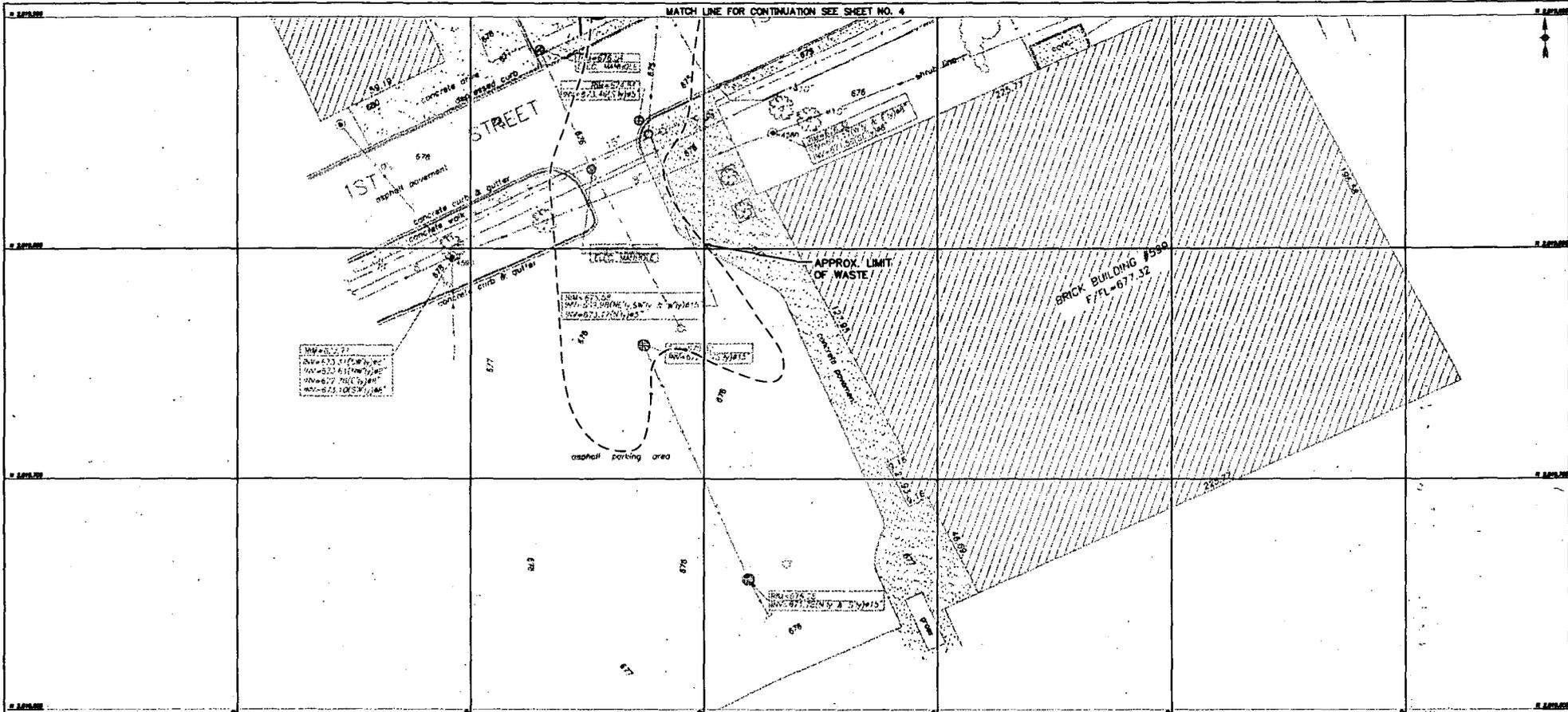
HEADQUARTERS DEPARTMENT OF THE ARMY
 BRAC DIVISION, FORT McPHERSON, GEORGIA
 FORT SHERIDAN ENVIRONMENTAL
 RESTORATION PROJECT

SCALE:

LANDFILL NO. 5
 EXISTING CONDITIONS AND
 DEMOLITION PLAN

SHEET 2
 OF 19
 PROJECT NO. 01130.20410

MATCH LINE FOR CONTINUATION SEE SHEET NO. 4



MANHOLE NO. 577
 INV=673.175
 100'-0.00' 4.12% S
 INV=672.750
 100'-0.00' 1.05% S

asphalt parking area

APPROX. LIMIT OF WASTE

BRICK BUILDING #550
 F.F.L.=677.32

REMARKS:
 CITY OF HIGHLAND PARK BENCHMARK NO. 1
 BRASS CAP ON 6"X6"X4" CONCRETE MONUMENT AS
 SET BY METRIC ENGINEERING AND LOCATED AT
 THE SOUTHEAST CORNER OF THE INTERSECTION OF
 OLD ELM ROAD AND THE ACCESS AND MAINTENANCE
 ROAD TO OLD ELM GOLF COURSE
 ELEVATION = 702.873 FEET (U.S.G.S. DATUM)

GENERAL NOTES:
 1. PROTECT EXISTING UTILITIES INCLUDING MONITORING WELLS DURING CONSTRUCTION WORK

LEGEND

- ⊙ - WATER MANHOLE
- ⊙ - STORM MANHOLE
- ⊙ - MANHOLE ELECTRIC
- ⊙ - CATCH BASIN
- ⊙ - STORM INLET
- ⊙ - STORM INLET
- ⊙ - SANITARY MANHOLE
- ⊙ - CABLE PEDESTAL
- ⊙ - TRANSFORMER (GROUND)
- ⊙ - SIGNAL BOX
- ⊙ - SIGN
- ⊙ - POWER POLE
- ⊙ - TELEPHONE METER
- ⊙ - VALVE WHIST
- ⊙ - FIRE HYDRANT
- ⊙ - VALVE BOX
- ⊙ - MONITORING WELL WITH POSTS
- ⊙ - LIGHT POLE
- ⊙ - ANCHOR (POWER POLE)
- ⊙ - TREE AND SIZE
- OUTLINE OF NEW PAVEMENT
- 6.35' EXISTING CONTOUR LINE
- 6.20' NEW CONTOUR LINE
- 6.8" NEW TIE DRAIN AND CLEANOUT
- APPROXIMATE LIMIT OF WASTE
- CROSS-SECTION CENTERLINE
- PROPERTY LINE
- STEAM LINE
- SIGNAL CABLE
- GAS LINE
- SEWAGE FORCE MAIN
- UNDERGROUND ELECTRICAL
- OVERHEAD ELECTRICAL
- SANITARY SEWER
- STORM SEWER

NO.	DATE	REVISIONS	APPROVED

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 CHECKED BR
 DATE: JUNE 2004

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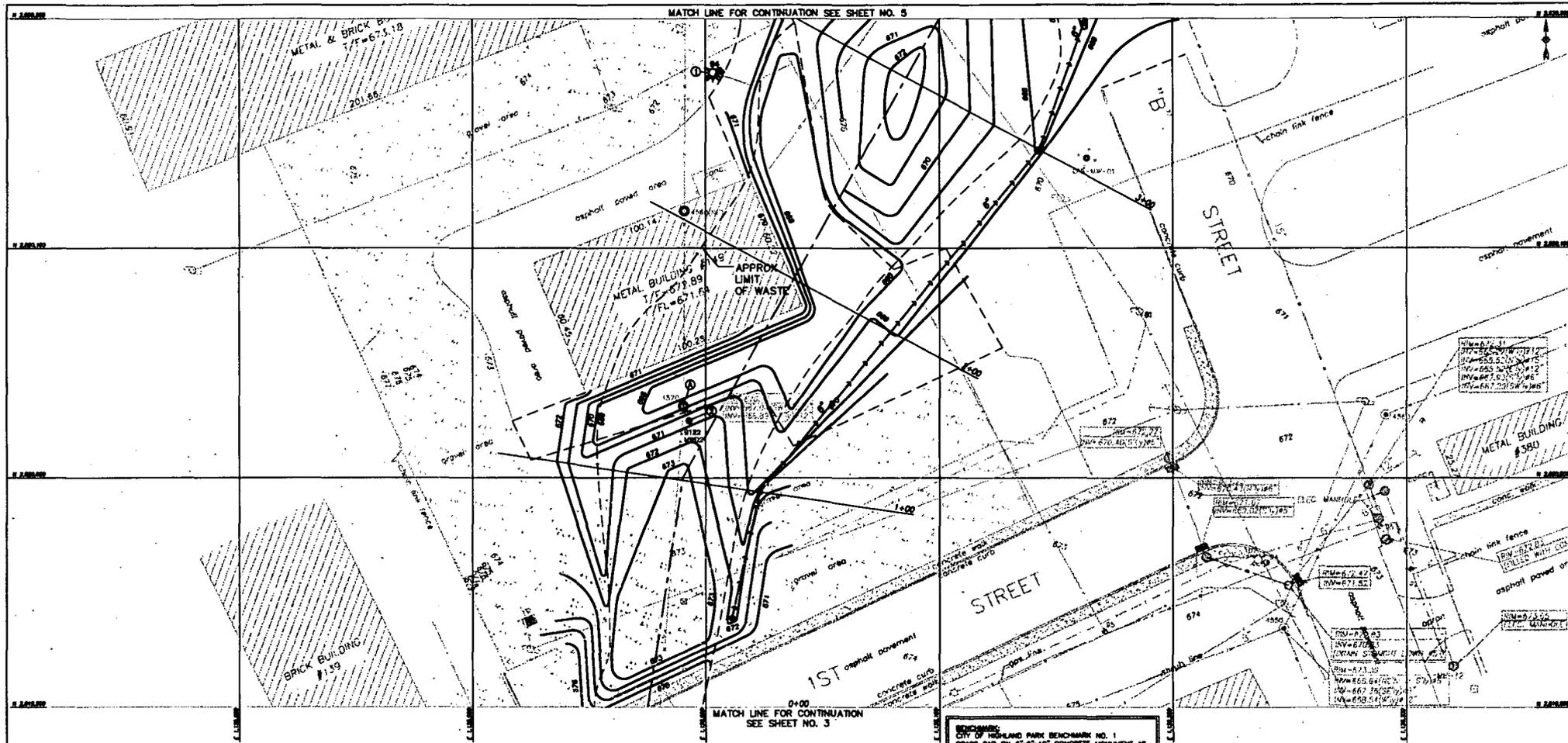
HEADQUARTERS DEPARTMENT OF THE ARMY
 BRAC DIVISION, FORT McPHERSON, GEORGIA
 FORT SHERIDAN ENVIRONMENTAL
 RESTORATION PROJECT

SCALE

 SCALE 1" = 20'

LANDFILL NO. 5
 PROPOSED INTERMEDIATE
 GRADING PLAN

SHEET 3
 of 19
 PROJECT NO. 0135.30410



BENCHMARK:
 CITY OF HIGHLAND PARK BENCHMARK NO. 1
 BRASS CAP ON 6" x 4" x 2" CONCRETE MONUMENT AS
 SET BY AERO-METRIC ENGINEERING AND LOCATED AT
 THE SOUTHEAST CORNER OF THE INTERSECTION OF
 OLD ELM ROAD AND THE ACCESS AND MAINTENANCE
 ROAD TO OLD ELM GOLF COURSE.
 ELEVATION = 702.873 FEET (U.S.G.S. DATUM)

LEGEND

- | | | | | | |
|----------------------|--------------------------|--------------------------------|---------------------------------|------------------------------|----------------------------|
| ⊙ - WATER MANHOLE | ⊙ - CABLE PEDESTAL | ⊙ - FIRE HYDRANT | --- OUTLINE OF NEW PAVEMENT | --- PROPERTY LINE | --- SEWAGE FORCE MAIN |
| ⊙ - STORM MANHOLE | ⊙ - TRANSFORMER (GROUND) | ⊙ - VALVE BOX | - - - - - EXISTING CONTOUR LINE | --- STEAM LINE | --- UNDERGROUND ELECTRICAL |
| ⊙ - MANHOLE ELECTRIC | ⊙ - SIGNAL BOX | ⊙ - MONITORING WELL WITH POSTS | - - - - - NEW CONTOUR LINE | --- SIGNAL CABLE | --- OVERHEAD ELECTRICAL |
| ⊙ - CATCH BASIN | ⊙ - SIGN | ⊙ - MONITORING WELL | --- NEW TOE DRAIN AND CLEANOUT | --- GAS LINE | --- SANITARY SEWER |
| ⊙ - STORM INLET | ⊙ - POWER POLE | ⊙ - LIGHT POLE | --- APPROXIMATE LIMIT OF WASTE | --- CROSS-SECTION CENTERLINE | --- STORM SEWER |
| ⊙ - STORM INLET | ⊙ - TELEPHONE METER | ⊙ - ANCHOR (POWER POLE) | | | --- WATER |
| ⊙ - SANITARY MANHOLE | ⊙ - VALVE W/VALT | ⊙ - TREE AND SIZE | | | |

GENERAL NOTES:

- PROTECT EXISTING UTILITIES INCLUDING MONITORING WELLS DURING CONSTRUCTION WORK.
- INTERMEDIATE CONTOURS ARE APPROXIMATE AND WILL BE ADJUSTED IN FIELD BASED ON ACTUAL CUT/FILL VOLUMES.

WORK ITEMS:

- RELOCATE EXISTING FIRE HYDRANT TO THE LOCATION SHOWN.
- PROTECT EXISTING PIEZOMETER. EXTEND AS REQUIRED TO MEET GRADE, OR REMOVE AND RELOCATE PER ENGINEERS DISCRETION.
- MANHOLE NUMBER. SEE SHEET 18 FOR MANHOLE/INLET WORK DETAILS.

NO.	DATE	DESCRIPTION	APPROVED

DESIGNED AS
 DRAWN JS
 CHECKED RR
 DATE JUNE 2004

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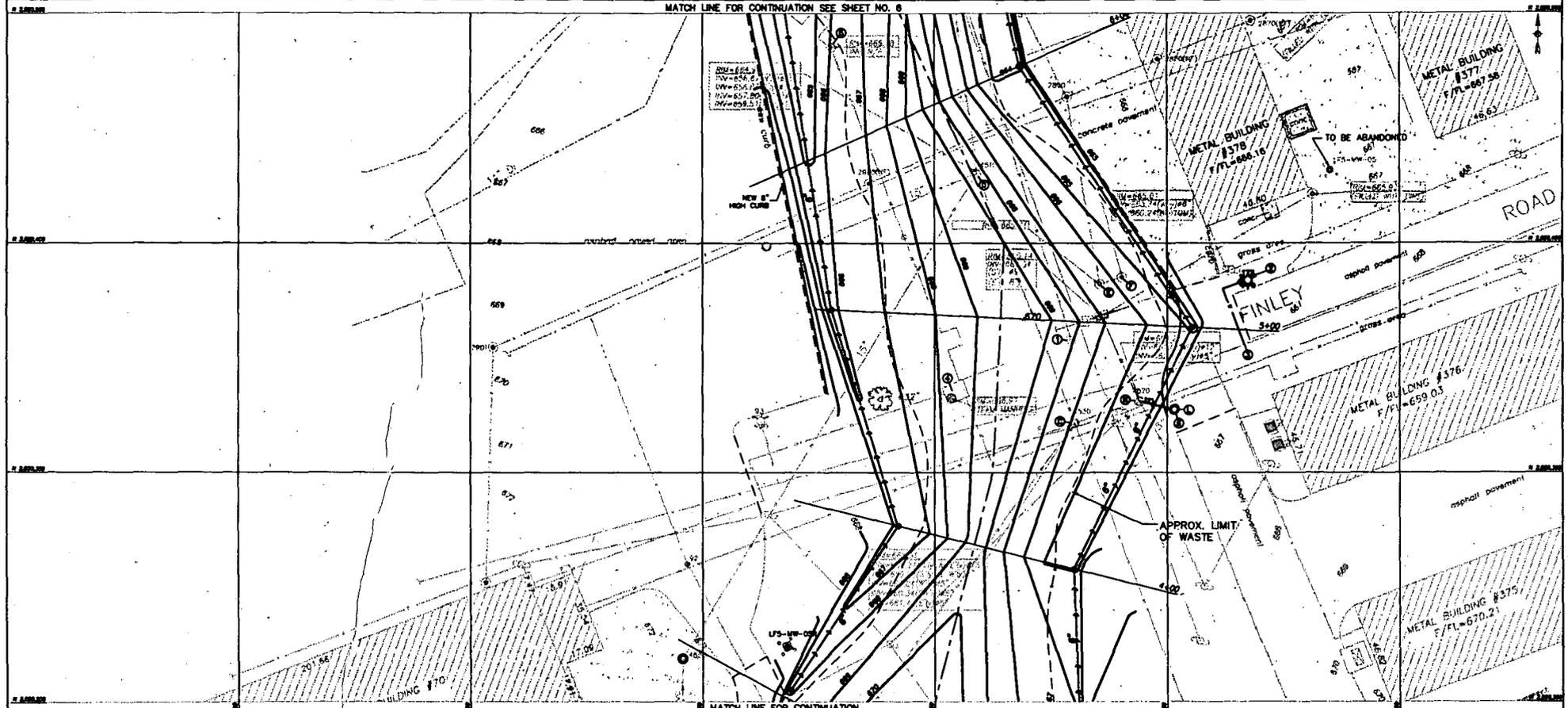
HEADQUARTERS DEPARTMENT OF THE ARMY
 BRAC DIVISION, FORT MCPHERSON, GEORGIA
 FORT SHERIDAN ENVIRONMENTAL
 RESTORATION PROJECT

SCALE
 1" = 20'

LANDFILL NO. 5
 PROPOSED INTERMEDIATE
 GRADING PLAN

SHEET 4
 OF 19
 PROJECT NO. 01135.30410

MATCH LINE FOR CONTINUATION SEE SHEET NO. 6



MATCH LINE FOR CONTINUATION SEE SHEET NO. 4

BENCHMARK:
CITY OF HIGHLAND PARK BENCHMARK NO. 1
BRASS CAP ON 8"X8"X41" CONCRETE MONUMENT AS
SET BY AGCO-METRIC ENGINEERING AND LOCATED AT
THE SOUTHEAST CORNER OF THE INTERSECTION OF
OLD ELM ROAD AND THE ACCESS AND MAINTENANCE
ROAD TO OLD ELM GOLF COURSE.
ELEVATION = 702.873 FEET (U.S.G.S. DATUM)

LEGEND

- | | | | | | |
|----------------------|--------------------------|--------------------------------|----------------------------------|-------------------------|------------------------------|
| ⊕ - WATER MANHOLE | ⊕ - CABLE PEDESTAL | ⊕ - FIRE HYDRANT | --- - OUTLINE OF NEW PAVEMENT | --- - PROPERTY LINE | --- - SEWAGE FORCE MAIN |
| ⊕ - STORM MANHOLE | ⊕ - TRANSFORMER (GROUND) | ⊕ - VALVE BOX | - - - - - EXISTING CONTOUR LINE | --- - STEAM LINE | --- - UNDERGROUND ELECTRICAL |
| ⊕ - MANHOLE ELECTRIC | ⊕ - SIGNAL BOX | ⊕ - MONITORING WELL WITH POSTS | - - - - - NEW CONTOUR LINE | --- - SIGNAL CABLE | --- - OVERHEAD ELECTRICAL |
| ⊕ - CATCH BASIN | ⊕ - SIGN | ⊕ - MONITORING WELL | --- - NEW TIE DRAIN AND CLEANOUT | --- - GAS LINE | --- - SANITARY SEWER |
| ⊕ - STORM INLET | ⊕ - POWER POLE | ⊕ - LIGHT POLE | --- - APPROXIMATE LIMIT OF WASTE | ⊕ - NEW MONITORING WELL | --- - STORM SEWER |
| ⊕ - STORM INLET | ⊕ - TELEPHONE METER | ⊕ - ANCHOR (POWER POLE) | --- - CROSS-SECTION CENTERLINE | ⊕ - NEW MANHOLE/INLET | --- - WATER |
| ⊕ - SANITARY MANHOLE | ⊕ - VALVE VAULT | ⊕ - TREE AND SIZE | | | |

- GENERAL NOTES:**
- PROTECT EXISTING UTILITIES INCLUDING MONITORING WELLS DURING CONSTRUCTION WORK.
 - INTERMEDIATE CONTOURS ARE APPROXIMATE AND WILL BE ADJUSTED IN FIELD BASED ON ACTUAL CUT/FILL VOLUMES.

- WORK ITEMS:**
- EXISTING SIGNAL CABLE VAULT/AN. EXTEND TO NEW GRADE OR ABANDON IN PLACE IF NO LONGER FUNCTIONAL.
 - RELOCATED EXISTING FIRE HYDRANT TO THE LOCATION SHOWN.
 - CONNECT TO EXISTING WATER MAIN.
 - REMOVE STEAM VAULT'S TOP SLAB AND ALL ABOVE GRADE PIPING. PUNCH TWO HOLES IN THE BOTTOM SLAB. FILL THE STRUCTURE WITH SAND.
 - REMOVE EXISTING FRAME AND LID, PUNCH TWO HOLES IN BOTTOM SLAB, AND FILL MANHOLE WITH SAND.
 - INSTALL NEW STORMWATER INLET. SEE SHEET NO. 18 FOR DETAILS.
 - MANHOLE NUMBER. SEE SHEET 18 FOR MANHOLE/INLET WORK DETAILS.

NO.	DATE	REVISIONS

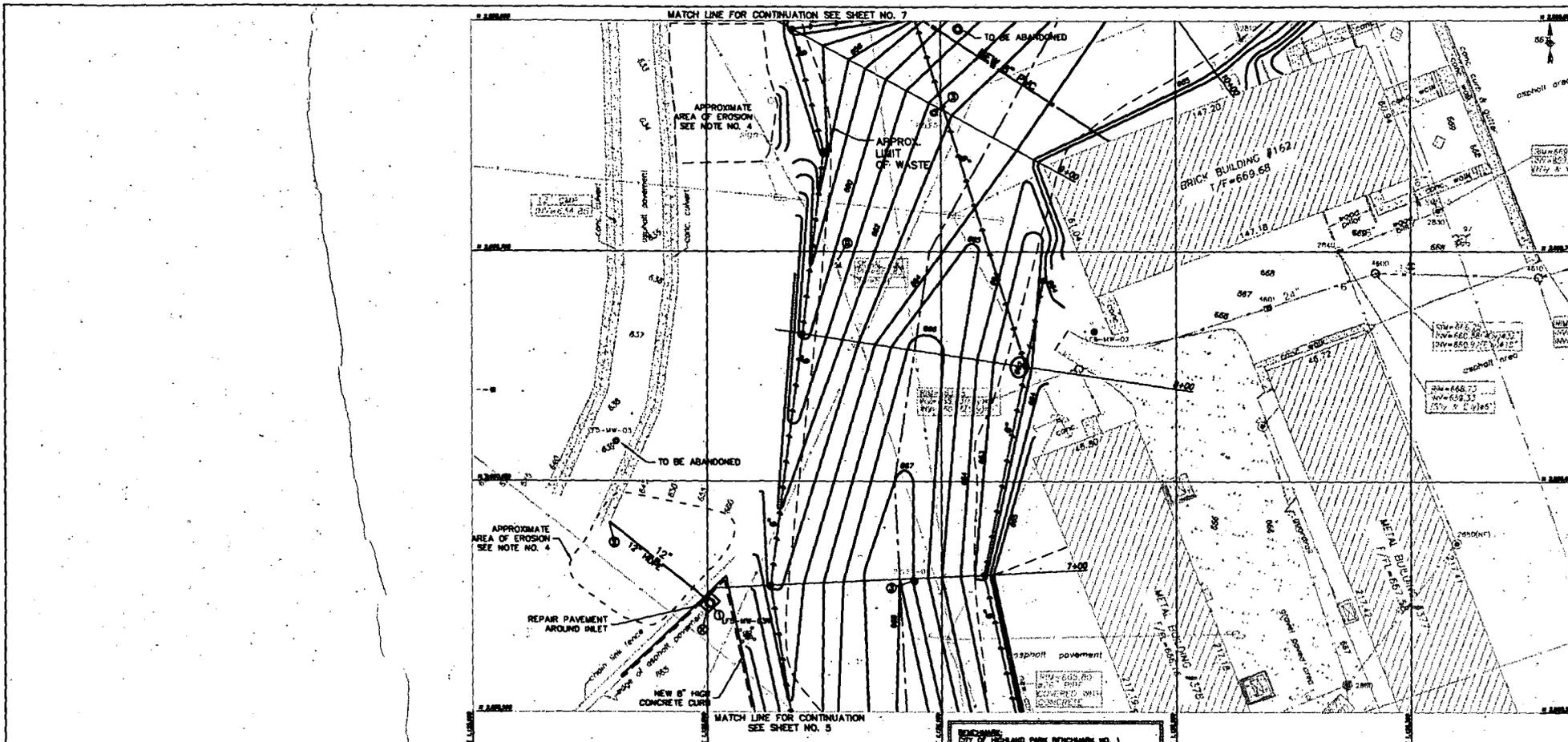
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HEADQUARTERS DEPARTMENT OF THE ARMY
BRAC DIVISION, FORT McPHERSON, GEORGIA
FORT SHERIDAN ENVIRONMENTAL
RESTORATION PROJECT

SCALE
SCALE 1" = 50'

LANDFILL NO. 5
PROPOSED INTERMEDIATE
GRADING PLAN
SHEET 5
OF 19
PROJECT NO. 01130.30410



BENCHMARK
CITY OF HIGHLAND PARK BENCHMARK NO. 1
BRASS CAP ON 8" DIA. CONCRETE MONUMENT AS
SET BY ALCO-HETTING ENGINEERS AND LOCATED AT
THE SOUTHEAST CORNER OF THE INTERSECTION OF
OLD ELM ROAD AND THE ACCESS AND MAINTENANCE
ROAD TO OLD ELM GOLF COURSE.
ELEVATION = 702.973 FEET (U.S.G.S. DATUM)

- GENERAL NOTES:**
1. PROTECT EXISTING UTILITIES INCLUDING MONITORING WELLS DURING CONSTRUCTION WORK.
 2. INTERMEDIATE CONTOURS ARE APPROXIMATE AND WILL BE ADJUSTED IN FIELD BASED ON ACTUAL CUT/FILL VOLUMES.
 3. BUILDING #162 IS SCHEDULED FOR DEMOLITION. THE GRADE IN THIS AREA MAY BE ADJUSTED IN FIELD TO PROVIDE PROPER GRADE FOR RUN-OFF CONTROL.
 4. REPAIRS TO THE PINE SLOPE SHALL CONSIST OF REMOVAL OF BROKEN CONCRETE, BACKFILLING WITH CLAY AND SOIL, SEEDING AND EROSION CONTROL BLANKETS, AND INSTALLATION OF PYRAMAT IN THE CHANNEL AS DIRECTED.
- WORK ITEMS:**
1. INSTALL NEW STORMWATER INLET. SEE DETAIL ON SHEET NO. 18.
 2. CONNECT NEW 12" STORMWATER SEWER TO EXISTING STORMWATER INLET OR CONSTRUCT A NEW MANHOLE/EXISTING STORM SEWER AND CONNECT TO NEW MANHOLE.
 3. MOODY EXISTING PEZZOMAT AS SHOWN ON SHEET NO. 18.
 4. MANHOLE NUMBER. SEE SHEET 18 FOR MANHOLE/INLET WORK DETAILS.

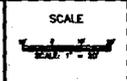
LEGEND

- | | | | | | |
|----------------------|--------------------------|--------------------------------|----------------------------------|-------------------------|------------------------------|
| ○ - WATER MANHOLE | ⊠ - CABLE PEDESTAL | ⊠ - FIRE HYDRANT | --- - OUTLINE OF NEW PAVEMENT | --- - PROPERTY LINE | --- - SEWAGE FORCE MAIN |
| ⊙ - STORM MANHOLE | ⊠ - TRANSFORMER (GROUND) | ⊠ - VALVE BOX | --- - EXISTING CONTOUR LINE | --- - STEAM LINE | --- - UNDERGROUND ELECTRICAL |
| ⊙ - MANHOLE ELECTRIC | ⊠ - SIGNAL BOX | ⊠ - MONITORING WELL WITH POSTS | --- - NEW CONTOUR LINE | --- - SIGNAL CABLE | --- - OVERHEAD ELECTRICAL |
| ⊙ - CATCH BASIN | ⊠ - SIGN | ⊠ - MONITORING WELL | --- - NEW TOE DRAIN AND CLEANOUT | --- - GAS LINE | --- - SANITARY SEWER |
| ⊙ - STORM INLET | ⊠ - POWER POLE | ⊠ - LIGHT POLE | --- - APPROXIMATE LIMIT OF WASTE | ⊠ - NEW MONITORING WELL | --- - STORM SEWER |
| ⊙ - STORM INLET | ⊠ - TELEPHONE METER | ⊠ - ANCHOR (POWER POLE) | --- - CROSS-SECTION CENTERLINE | ⊠ - NEW MANHOLE/INLET | --- - WATER |
| ⊙ - SANITARY MANHOLE | ⊠ - VALVE UNIT | ⊠ - TREE AND SIZE | | | |

NO.	DATE	DESCRIPTION	BY
		REVISIONS	

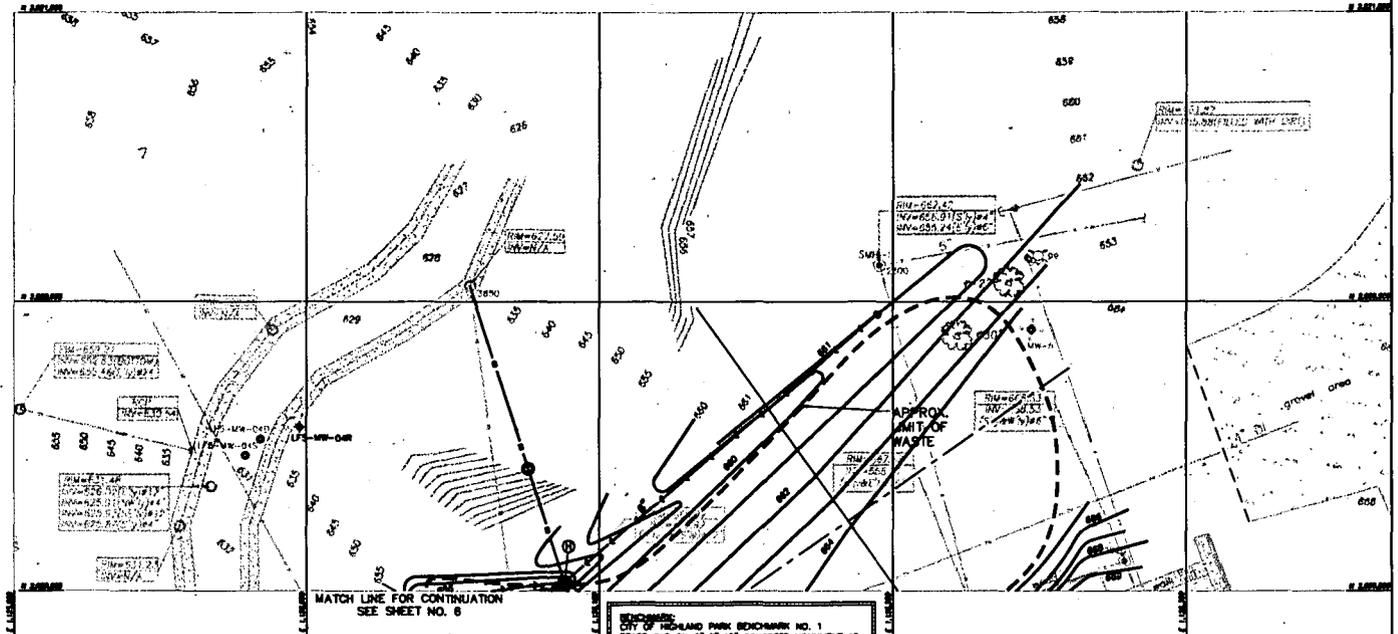
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DATE	APR 2004

HEADQUARTERS DEPARTMENT OF THE ARMY
BRAC DIVISION, FORT McPHERSON, GEORGIA
FORT SHERIDAN ENVIRONMENTAL
RESTORATION PROJECT



LANDFILL NO. 5
PROPOSED INTERMEDIATE
GRADING PLAN

SHEET 6
OF 19
PROJECT NO. 01135.30410



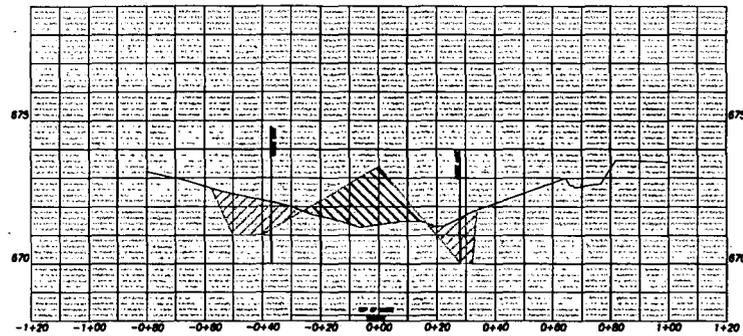
LEGEND

- | | | | | | |
|----------------------|--------------------------|--------------------------------|----------------------------------|-------------------------|------------------------------|
| ⊙ - WATER MANHOLE | ⊙ - CABLE PEDESTAL | ⊙ - FIRE HYDRANT | --- - OUTLINE OF NEW PAVEMENT | --- - PROPERTY LINE | --- - SEWAGE FORCE MAIN |
| ⊙ - STORM MANHOLE | ⊙ - TRANSFORMER (GROUND) | ⊙ - VALVE BOX | --- - EXISTING CONTOUR LINE | --- - STEAM LINE | --- - UNDERGROUND ELECTRICAL |
| ⊙ - MANHOLE ELECTRIC | ⊙ - SIGNAL BOX | ⊙ - MONITORING WELL WITH POSTS | --- - NEW CONTOUR LINE | --- - SIGNAL CABLE | --- - OVERHEAD ELECTRICAL |
| ⊙ - CATCH BASIN | ⊙ - SIGN | ⊙ - MONITORING WELL | --- - NEW TIE DRAIN AND CLEANOUT | --- - GAS LINE | --- - SANITARY SEWER |
| ⊙ - STORM INLET | ⊙ - POWER POLE | ⊙ - LIGHT POLE | --- - APPROXIMATE LIMIT OF WASTE | ⊙ - NEW MONITORING WELL | --- - STORM SEWER |
| ⊙ - STORM INLET | ⊙ - TELEPHONE METER | ⊙ - ANCHOR (POWER POLE) | --- - CROSS-SECTION CENTERLINE | ⊙ - NEW MANHOLE/INLET | --- - WATER |
| ⊙ - SANITARY MANHOLE | ⊙ - VALVE VAULT | ⊙ - TREE AND SIZE | | | |

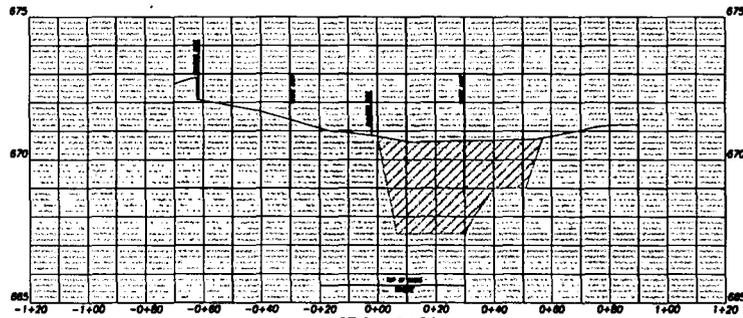
BENCHMARK:
CITY OF HIGHLAND PARK BENCHMARK NO. 1
BRASS CAP ON 8"X8"X12" CONCRETE MONUMENT AS SET BY AERO-METRIC ENGINEERING AND LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF OLD ELM ROAD AND THE ACCESS AND MAINTENANCE ROAD TO OLD ELM GOLF COURSE.
ELEVATION = 702.973 FEET (U.S.G.S. DATUM)

- GENERAL NOTES:**
1. PROTECT EXISTING UTILITIES INCLUDING MONITORING WELLS DURING CONSTRUCTION WORK
 2. INTERMEDIATE CONTOURS ARE APPROXIMATE AND WILL BE ADJUSTED IN FIELD BASED ON ACTUAL CUT/FILL VOLUMES.

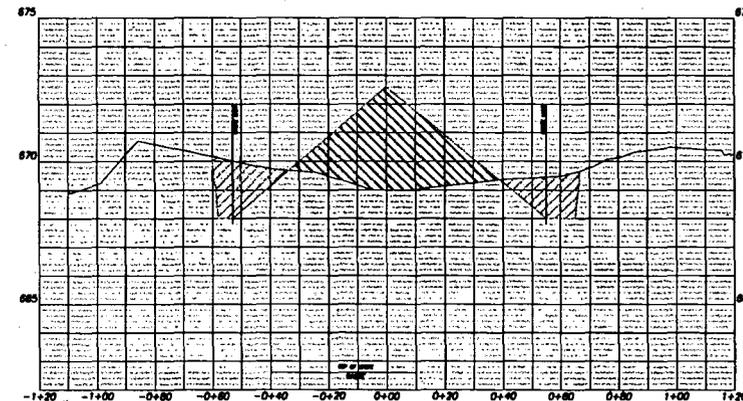
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REVISIONS										FORT SHERIDAN ENVIRONMENTAL RESTORATION PROJECT						PROJECT NO. 01135.30410	



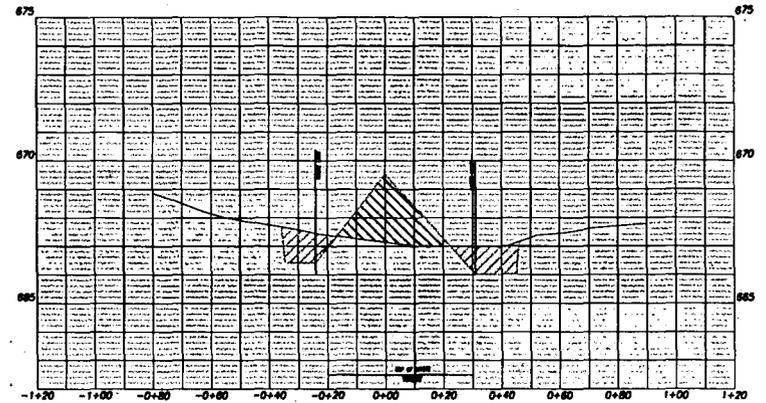
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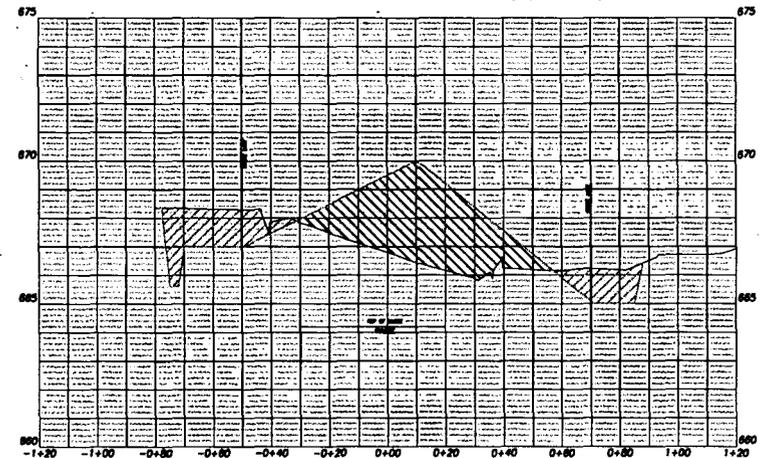
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SECTION 3+00



SECTION 4+00



SECTION 5+00

LEGEND

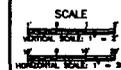
- CUT AREA
- FILL AREA
- EXISTING GROUND
- INTERMEDIATE GRADE

NOTE:
1. TOP OF WASTE INFORMATION IS BASED ON FE.

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REVISIONS	

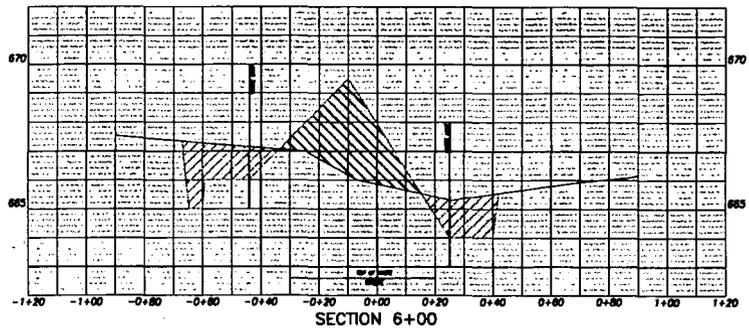
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 BRAC DIVISION, FORT McPHERSON, GEORGIA
 FORT SHERIDAN ENVIRONMENTAL
 RESTORATION PROJECT

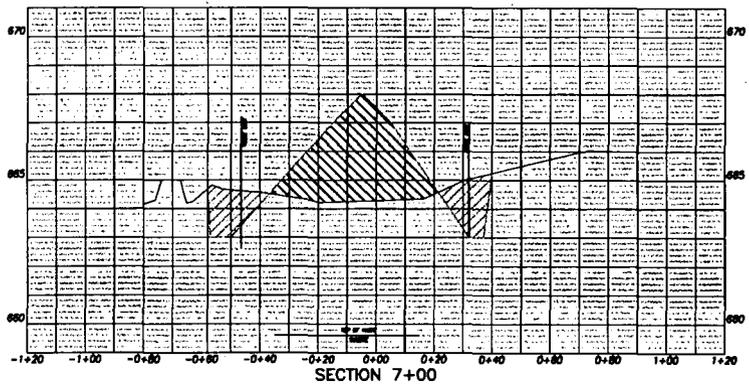


LANDFILL NO. 5
 CUT AND FILL CROSS-SECTIONS
 1+00 TO 5+00

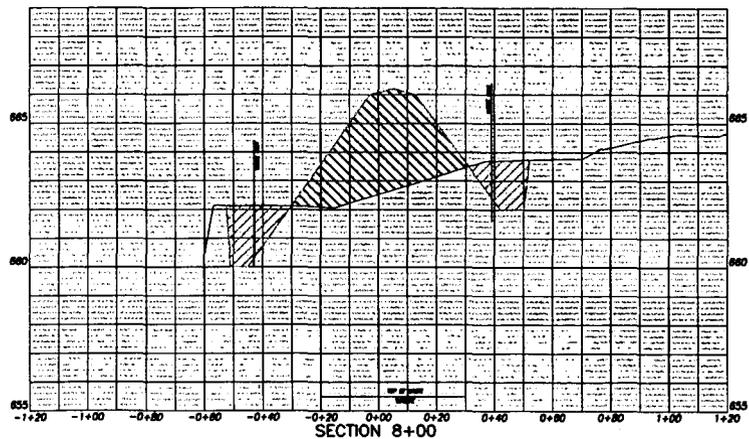
SHEET 8
 of 20
 PROJECT NO.



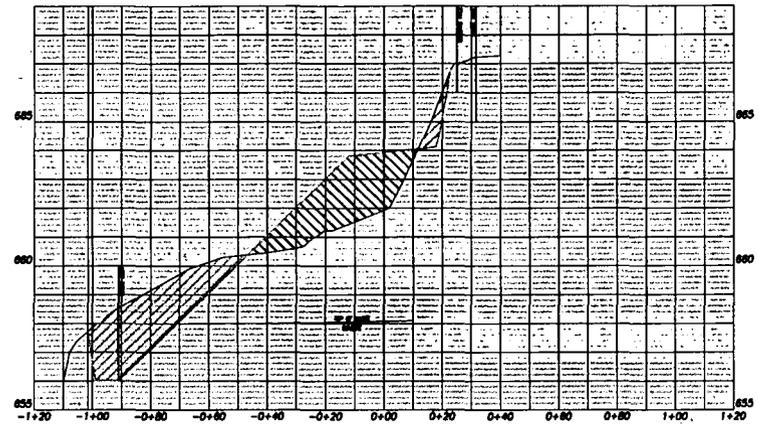
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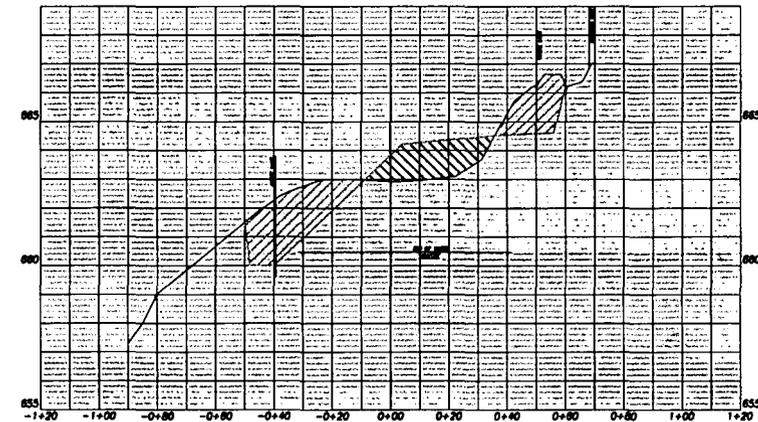
SECTION 7+00



SECTION 8+00



SECTION 9+00



SECTION 10+00

LEGEND

-  - CUT AREA
-  - FILL AREA
-  - EXISTING GROUND
-  - INTERMEDIATE GRADE

NO.	DATE	REVISIONS

DESIGNED AS
 DRAWN JS
 CHECKED RR
 DATE JUNE 2004

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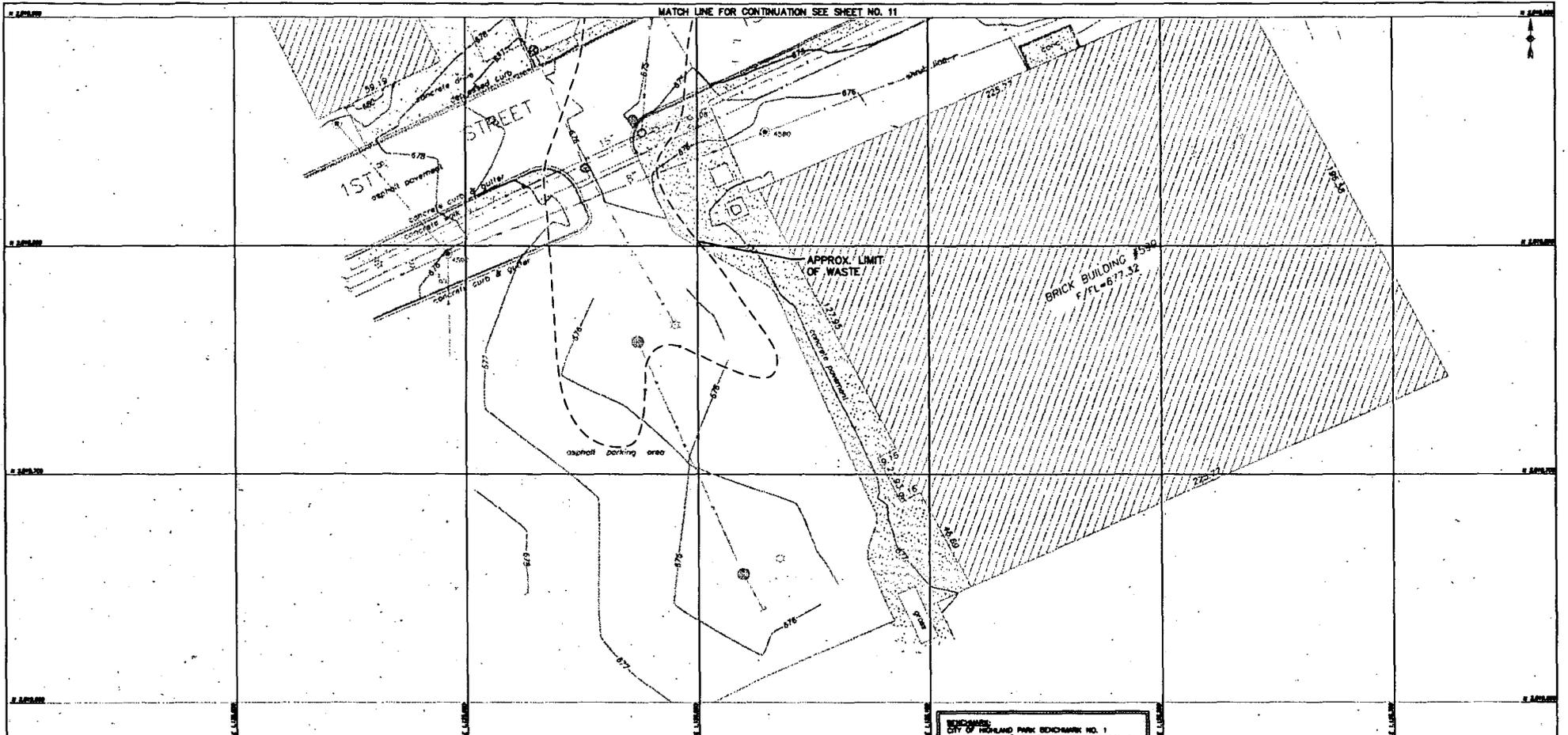
HEADQUARTERS DEPARTMENT OF THE ARMY
 BRAC DIVISION, FORT McPHERSON, GEORGIA
 FORT SHERIDAN ENVIRONMENTAL
 RESTORATION PROJECT

SCALE
 VERTICAL SCALE 1" = 4'
 HORIZONTAL SCALE 1" = 20'

LANDFILL NO. 5
 CUT AND FILL CROSS-SECTIONS
 6+00 TO 10+00

SHEET 9
 of 19
 PROJECT NO. G1135.30410

MATCH LINE FOR CONTINUATION SEE SHEET NO. 11



BENCHMARK:
 CITY OF HIGHLAND PARK BENCHMARK NO. 1
 BRASS CAP ON 6"X6"X43" CONCRETE MONUMENT AS
 SET BY AEGIS-METRIC ENGINEERING AND LOCATED AT
 THE SOUTHWEST CORNER OF THE INTERSECTION OF
 OLD ELM ROAD AND THE ACCESS AND MAINTENANCE
 ROAD TO OLD ELM GOLF COURSE.
 ELEVATION = 702.973 FEET (U.S.G.S. DATUM)

- GENERAL NOTES:**
1. PROTECT EXISTING UTILITIES INCLUDING MONITORING WELLS DURING CONSTRUCTION WORK.
 2. EXISTING ASPHALT ROADWAY, PARKING LOT, AND CONCRETE SIDEWALKS PROVIDE ADEQUATE COVER AND PROTECTION OF HUMAN HEALTH FROM CONTACT WITH WASTE. THEREFORE, WASTE BENEATH AND SOUTH OF FIRST STREET WILL REMAIN IN PLACE.

LEGEND

- | | | | | | | |
|----------------------|--------------------------|--------------------------------|--------------------------------------|----------------------------------|--------------------------------|----------------------------|
| ⊙ - WATER MANHOLE | ⊠ - CABLE PEDESTAL | ⊕ - FIRE HYDRANT | --- - OUTLINE OF NEW PAVEMENT | ----- - PROPERTY LINE | ----- - SEWAGE FORCE MAIN | ▭ - EXISTING PAVEMENT |
| ⊙ - STORM MANHOLE | ⊠ - TRANSFORMER (GROUND) | ⊕ - VALVE BOX | - - - - - EXISTING CONTOUR LINE | ----- - STEAM LINE | ----- - UNDERGROUND ELECTRICAL | ▨ - EXISTING CONCRETE WALK |
| ⊙ - MANHOLE ELECTRIC | ⊠ - SIGNAL BOX | ⊕ - MONITORING WELL WITH POSTS | - - - - - NEW CONTOUR LINE | ----- - SIGNAL CABLE | ----- - OVERHEAD ELECTRICAL | ▨ - EXISTING BUILDINGS |
| ⊙ - CATCH BASIN | ⊠ - SIGN | ⊕ - MONITORING WELL | - - - - - NEW TIE DRAIN AND CLEANOUT | ----- - GAS LINE | ----- - SANITARY SEWER | |
| ⊙ - STORM INLET | ⊠ - POWER POLE | ⊕ - LIGHT POLE | ----- - APPROXIMATE LIMIT OF WASTE | ----- - CROSS-SECTION CENTERLINE | ----- - STORM SEWER | |
| ⊙ - STORM INLET | ⊠ - TELEPHONE METER | ⊕ - ANCHOR (POWER POLE) | | | | |
| ⊙ - SANITARY MANHOLE | ⊠ - VALVE VAULT | ⊕ - TREE AND SIZE | | | | |

NO.	DATE	DESCRIPTION	APPROVED

DESIGNED - AS
 DRAWN - JS
 CHECKED - BR
 DATE JUNE 2004

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HEADQUARTERS DEPARTMENT OF THE ARMY
 BRAC DIVISION, FORT McPHERSON, GEORGIA
 FORT SHERIDAN ENVIRONMENTAL
 RESTORATION PROJECT

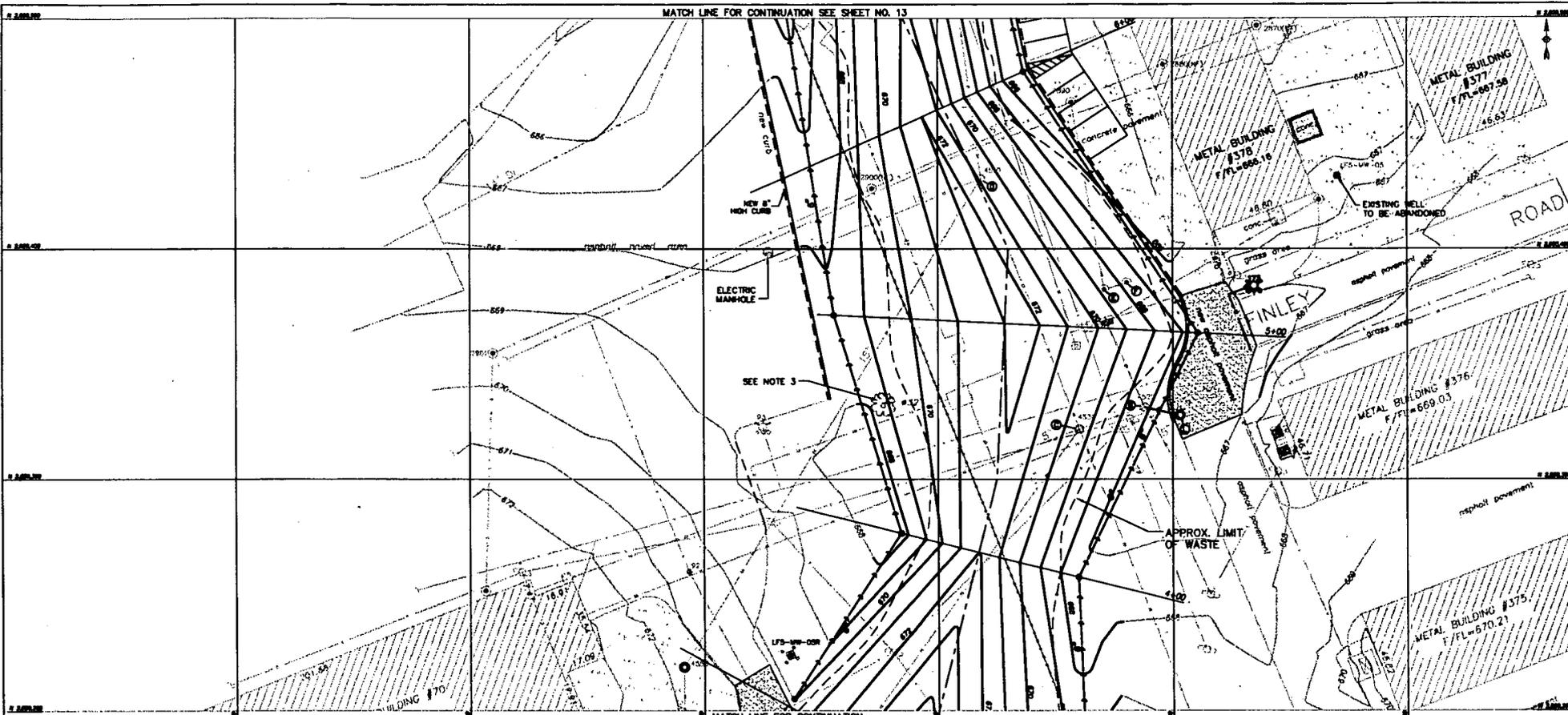
SCALE

 SCALE: 1" = 30'

LANDFILL NO. 5
 PROPOSED FINAL
 GRADING PLAN

SHEET 10
 of 19
 PROJECT NO. 01135.30410

MATCH LINE FOR CONTINUATION SEE SHEET NO. 13



ELECTRIC MANHOLE

SEE NOTE 3

APPROX. LIMIT OF WASTE

MATCH LINE FOR CONTINUATION SEE SHEET NO. 11

ENGINEERING: CITY OF TROBAND PARK BENCHMARK NO. 1 BRASS CAP ON 6"X6"X42" CONCRETE MONUMENT AS SET BY ARCHITECT-ENGINEERING AND LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF OLD BLM ROAD AND THE ACCESS AND MAINTENANCE ROAD TO OLD BLM GOLF COURSE. ELEVATION = 702.973 FEET (U.S.O.S. DATUM)

LEGEND

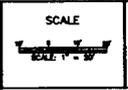
- | | | | | | | |
|----------------------|--------------------------|--------------------------------|---------------------------------------|-------------------------|------------------------------|----------------------------|
| ⊙ - WATER MANHOLE | ⊠ - CABLE PEDESTAL | ⊠ - FIRE HYDRANT | --- - OUTLINE OF NEW PAVEMENT | --- - PROPERTY LINE | --- - SEWAGE FORCE MAIN | ▭ - EXISTING PAVEMENT |
| ⊙ - STORM MANHOLE | ⊠ - TRANSFORMER (GROUND) | ⊠ - VALVE BOX | - - - - - 6.35' EXISTING CONTOUR LINE | --- - STEAM LINE | --- - UNDERGROUND ELECTRICAL | ▭ - EXISTING CONCRETE WALK |
| ⊙ - MANHOLE ELECTRIC | ⊠ - SIGNAL BOX | ⊠ - MONITORING WELL WITH POSTS | - - - - - NEW CONTOUR LINE | --- - SIGNAL CABLE | --- - OVERHEAD ELECTRICAL | ▭ - EXISTING BUILDINGS |
| ⊙ - CATCH BASIN | ⊠ - SIGN | ⊠ - MONITORING WELL | - - - - - NEW TOE DRAIN AND CLEANDOUT | --- - GAS LINE | --- - SANITARY SEWER | ▭ - NEW PAVEMENT |
| ⊙ - STORM INLET | ⊠ - POWER POLE | ⊠ - LIGHT POLE | - - - - - APPROXIMATE LIMIT OF WASTE | ⊠ - NEW MONITORING WELL | --- - STORM SEWER | |
| ⊙ - STORM INLET | ⊠ - TELEPHONE METER | ⊠ - ANCHOR (POWER POLE) | - - - - - CROSS-SECTION CENTERLINE | ⊠ - NEW MANHOLE/INLET | --- - WATER | |
| ⊙ - SANITARY MANHOLE | ⊠ - VALVE VALVE | ⊠ - TREE AND SIZE | | | | |

- GENERAL NOTES:**
1. PROTECT EXISTING UTILITIES INCLUDING MONITORING WELLS DURING CONSTRUCTION WORK.
 2. SEE SHEET NO. 19 FOR FENCE INSTALLATION DETAILS.
 3. PROTECT EXISTING OAK TREES DURING CONSTRUCTION OF LANDFILL CAP.
 4. FOR WORK ON MANHOLES WITHIN THE LANDFILL CAP SEE SHEET NO. 18.
 5. SEE SHEET NO. 18 FOR NEW MONITORING WELL DETAILS AND EXISTING MONITORING WELL MODIFICATIONS.

DESIGNED	AS
DRAWN	JS
CHECKED	BR
DATE	JUNE 2004

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HEADQUARTERS DEPARTMENT OF THE ARMY
BRAC DIVISION, FORT McPHERSON, GEORGIA
FORT SHERIDAN ENVIRONMENTAL RESTORATION PROJECT

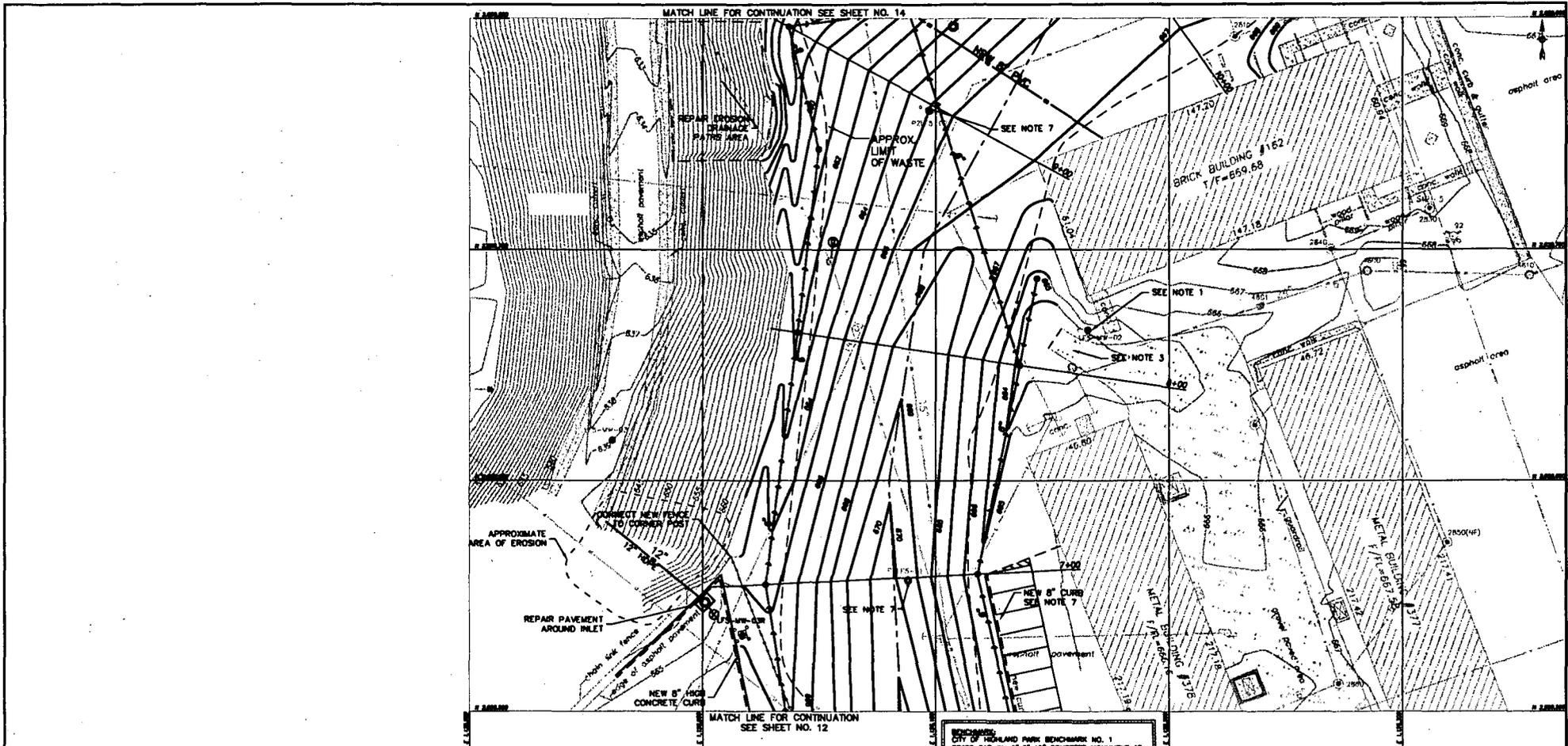


SCALE
1" = 50'

LANDFILL NO. 5
PROPOSED FINAL
GRADING PLAN

SHEET 12
of 19

PROJECT NO. 01135.30410



MATCH LINE FOR CONTINUATION SEE SHEET NO. 14

MATCH LINE FOR CONTINUATION SEE SHEET NO. 12

BENCHMARK:
CITY OF HIGHLAND PARK BENCHMARK NO. 1
BRASS CAP ON 8"X8"X12" CONCRETE MONUMENT AS SET BY AERO-METRIC ENGINEERING AND LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF OLD ELM ROAD AND THE ACCESS AND MAINTENANCE ROAD TO OLD ELM GOLF COURSE. ELEVATION = 702.973 FEET (U.S.G.S. DATUM)

- GENERAL NOTES:
1. PROTECT EXISTING UTILITIES INCLUDING MONITORING WELLS DURING CONSTRUCTION WORK
 2. SEE SHEET NO. 19 FOR FENCE INSTALLATION DETAILS.
 3. LOCATE EXISTING MANHOLE (#880). MAKE NECESSARY ADJUSTMENTS TO RAISE IT ABOVE FINISHED GRADE IF REQUIRED.
 4. FOR WORK ON MANHOLES WITHIN THE LANDFILL CAP SEE SHEET NO. 18.
 5. SEE SHEET NO. 18 FOR NEW MONITORING WELL DETAILS AND EXISTING MONITORING WELL ADJUSTATIONS.
 6. SEE SHEET NO. 18 FOR NEW CURB DETAIL.
 7. REMOVE PROTECTIVE WELL CASING AND BOLLARDS AND MODIFY EXISTING PNEUMETER AS SHOWN ON SHEET NO. 18.

LEGEND

- | | | | | | | |
|----------------------|--------------------------|--------------------------------|---|---------------------------|------------------------------|----------------------------|
| ⊙ - WATER MANHOLE | ⊠ - CABLE PEDESTAL | ⊠ - FIRE HYDRANT | --- - OUTLINE OF NEW PAVEMENT | --- - PROPERTY LINE | --- - SEWAGE FORCE MAIN | ▭ - EXISTING PAVEMENT |
| ⊙ - STORM MANHOLE | ⊠ - TRANSFORMER (GROUND) | ⊠ - VALVE BOX | - - - - - 6.35' - - - - - EXISTING CONTOUR LINE | --- - STEAM LINE | --- - UNDERGROUND ELECTRICAL | ▭ - EXISTING CONCRETE WALK |
| ⊙ - MANHOLE ELECTRIC | ⊠ - SIGNAL BOX | ⊠ - MONITORING WELL WITH POSTS | - - - - - 6.75' - - - - - NEW CONTOUR LINE | --- - SIGNAL CABLE | --- - OVERHEAD ELECTRICAL | ▭ - EXISTING BUILDINGS |
| ⊙ - CATCH BASIN | ⊠ - SIGN | ⊠ - MONITORING WELL | --- - NEW TOE DRAIN AND CLEANOUT | --- - GAS LINE | --- - SANITARY SEWER | ▭ - NEW PAVEMENT |
| ⊙ - STORM INLET | ⊠ - POWER POLE | ⊠ - LIGHT POLE | --- - APPROXIMATE LIMIT OF WASTE | --- - NEW MONITORING WELL | --- - STORM SEWER | |
| ⊙ - STORM INLET | ⊠ - TELEPHONE METER | ⊠ - ANCHOR (POWER POLE) | --- - CROSS-SECTION CENTERLINE | ⊙ - NEW MANHOLE/INLET | --- - WATER | |
| ⊙ - SANITARY MANHOLE | ⊠ - VALVE VAULT | ⊠ - TREE AND SIZE | | | | |

NO.	DATE	DESCRIPTION	APPROVED
REVISIONS			

DESIGNED AS
DRAWN JS
CHECKED BR
DATE: JUNE 2004

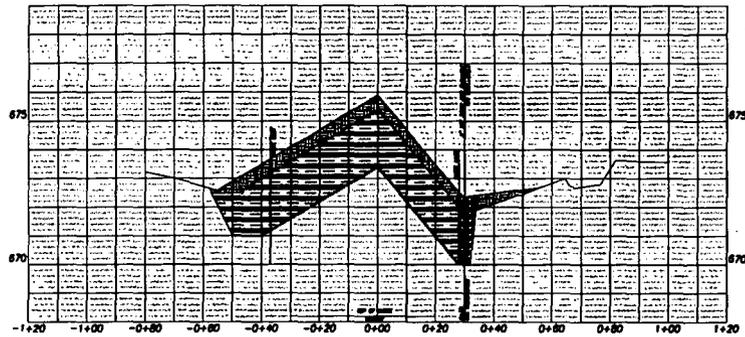
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HEADQUARTERS DEPARTMENT OF THE ARMY
BRAC DIVISION, FORT McPHERSON, GEORGIA
FORT SHERIDAN ENVIRONMENTAL
RESTORATION PROJECT

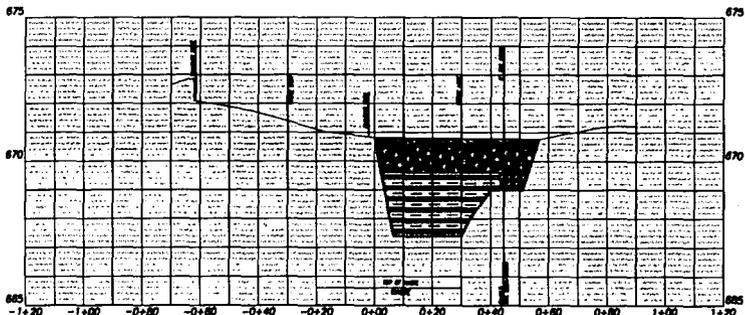
SCALE
SCALE 1" = 20'

LANDFILL NO. 5
PROPOSED FINAL
GRADING PLAN

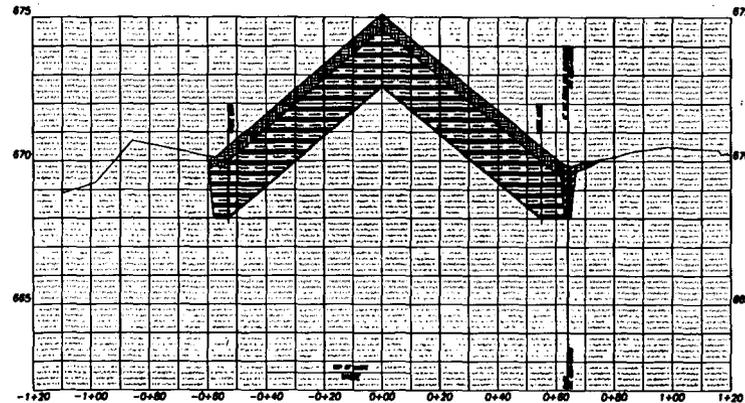
SHEET 13
OF 19
PROJECT NO. 01135.30410



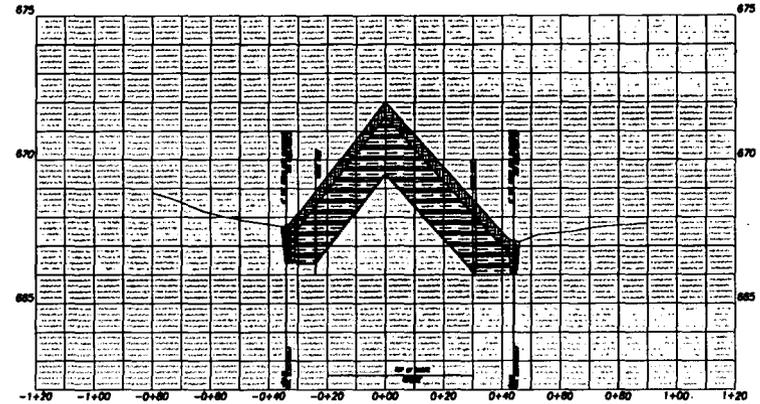
SECTION 1+00



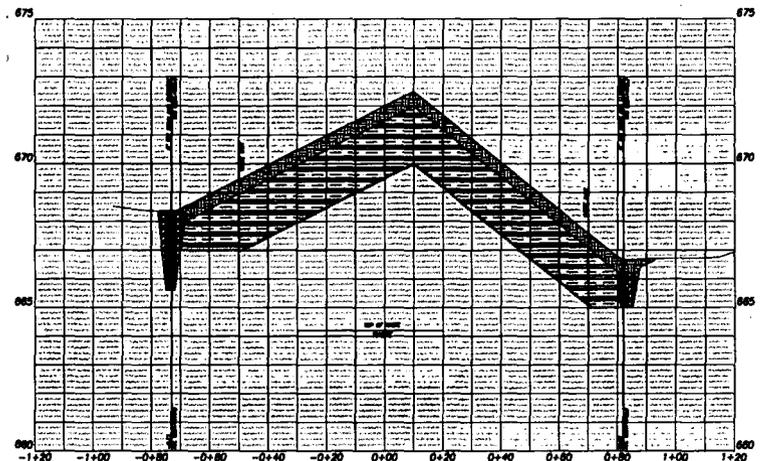
SECTION 2+00



SECTION 3+00



SECTION 4+00



SECTION 5+00

LEGEND

- TOPSOIL FILL
- CLAY COVER
- GRAVEL
- INTERMEDIATE GRADE
- GEOSYNTHETIC CLAY LINER
- ASPHALT
- AGGREGATE

NOTE:
 1. FOR ICE DRAIN DETAIL SEE SHEET NO. 18.
 2. FOR PAVEMENT DETAIL SEE SHEET NO. 18.
 3. FOR LANDFILL CAP DETAIL SEE SHEET NO. 18.

NO.	DATE	REVISIONS	DESIGNED	DRAWN	CHECKED	APPROVED
			AS	JS	RR	

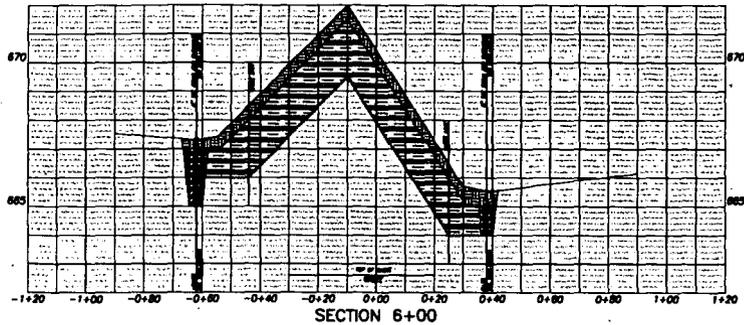
DATE JUNE 2004
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HEADQUARTERS DEPARTMENT OF THE ARMY
 BRAC DIVISION, FORT McPHERSON, GEORGIA
 FORT SHERIDAN ENVIRONMENTAL
 RESTORATION PROJECT

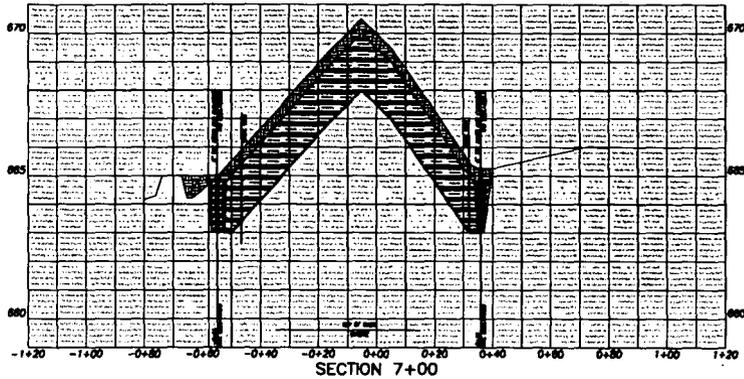
SCALE
 VERTICAL SCALE 1" = 4'
 HORIZONTAL SCALE 1" = 20'

LANDFILL NO. 5
 FINAL CROSS-SECTIONS
 1+00 TO 5+00

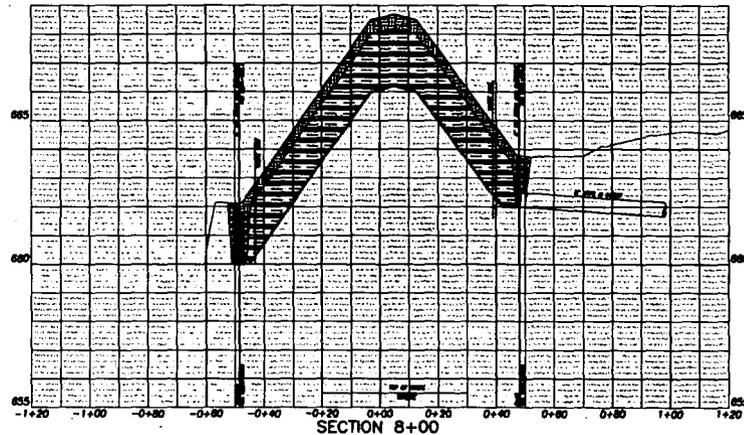
SHEET 15
 OF 19
 PROJECT NO. 01135.30410



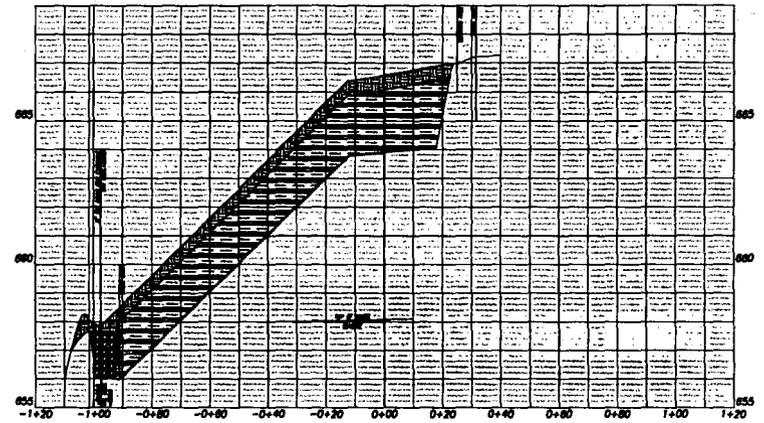
SECTION 6+00



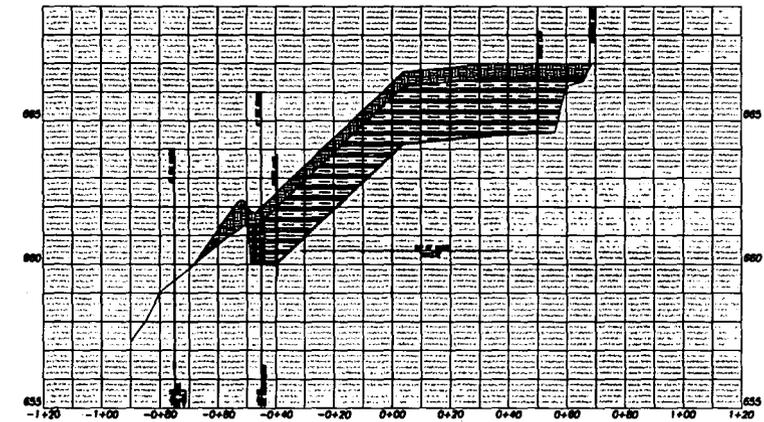
SECTION 7+00



SECTION 8+00



SECTION 9+00



SECTION 10+00

LEGEND

- TOPSOIL FILL
- CLAY COVER
- GRAVEL
- INTERMEDIATE GRADE
- GEOSYNTHETIC CLAY LINER

NOTE:
 1. FOR TIE DRAIN DETAIL SEE SHEET NO. 18.
 2. FOR LANDFILL CAP DETAIL SEE SHEET NO. 19.

NO.	DATE	REVISIONS

DESIGNED AS
 DRAWN JS
 CHECKED RR
 DATE JUNE 2004

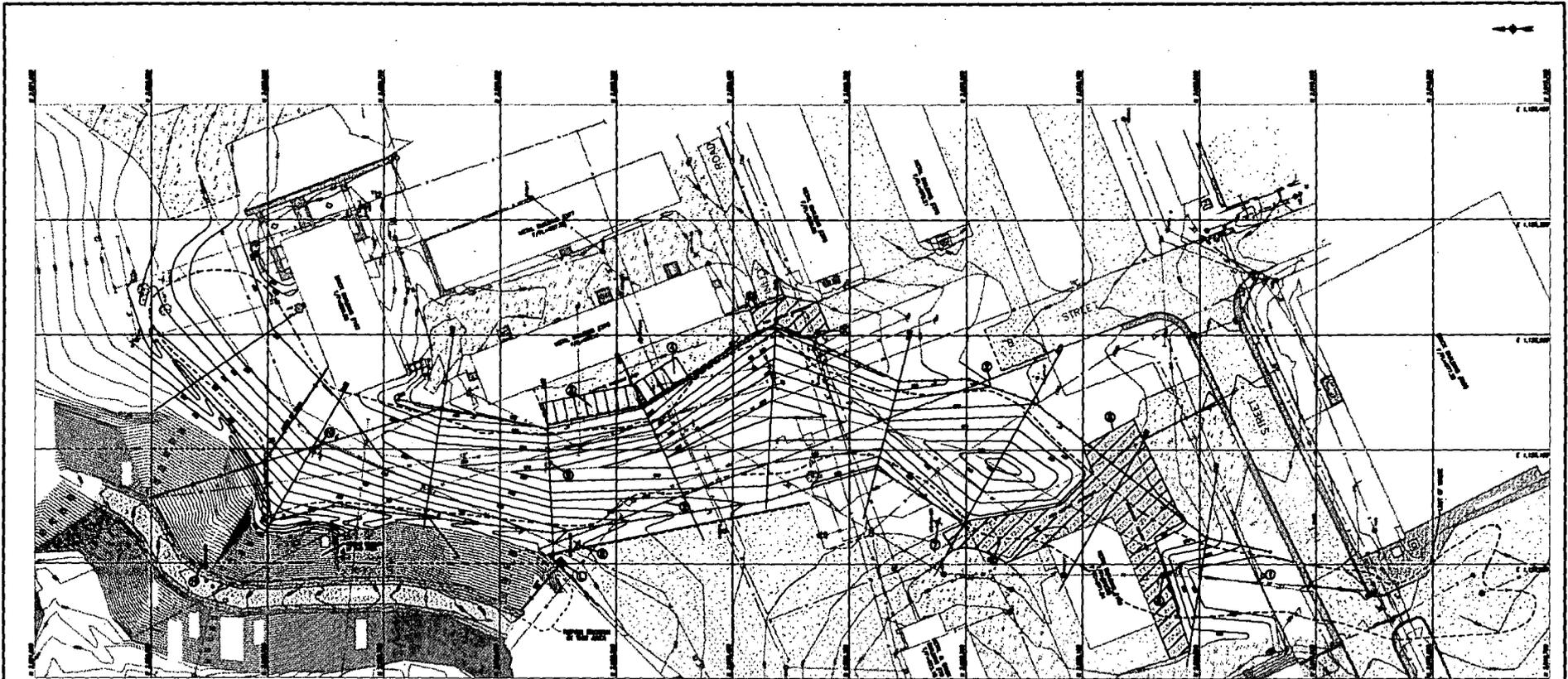
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HEADQUARTERS DEPARTMENT OF THE ARMY
 BRAC DIVISION, FORT McPHERSON, GEORGIA
 FORT SHERIDAN ENVIRONMENTAL
 RESTORATION PROJECT

SCALE
 VERTICAL SCALE 1" = 2'
 HORIZONTAL SCALE 1" = 50'

LANDFILL NO. 5
 FINAL CROSS-SECTIONS
 6+00 TO 10+00

SHEET 16
 OF 19
 PROJECT NO. 01130.30410



LEGEND

- ⊙ - WATER MANHOLE
- ⊙ - STORM MANHOLE
- ⊙ - MANHOLE ELECTRIC
- ⊙ - CATCH BASIN
- ⊙ - STORM INLET
- ⊙ - STORM INLET
- ⊙ - SANITARY MANHOLE
- ⊞ - CABLE PEDESTAL
- ⊞ - TRANSFORMER (GROUND)
- ⊞ - SIGNAL BOX
- ⊞ - SIGN
- ⊞ - POWER POLE
- ⊞ - TELEPHONE METER
- ⊞ - VALVE VAULT
- ⊞ - FIRE HYDRANT
- ⊞ - VALVE BOX
- ⊞ - MONITORING WELL WITH POSTS
- ⊞ - MONITORING WELL
- ⊞ - LIGHT POLE
- ⊞ - ANCHOR (POWER POLE)
- ⊞ - TREE AND SIZE
- - APPROXIMATE LIMIT OF WASTE
- - PROPERTY LINE
- - NEW TOE DRAIN
- - NEW STORM WATER SEWER
- - NEW MANHOLE INLET
- - NEW MONITORING WELL
- - NEW PAVEMENT

- - SEWER FORCE MAIN
- - UNDERGROUND ELECTRICAL
- - OVERHEAD ELECTRICAL
- - SANITARY SEWER
- - STORM SEWER
- - WATER
- - STEAM LINE
- - SIGNAL CABLE
- - GAS LINE

REMARKS:
 CITY OF TROBAND PARK BENCHMARK NO. 1
 BEING CAP ON 8" x 8" x 48" CONCRETE MONUMENT AS
 SET BY AERO-METRIC ENGINEERING AND LOCATED AT
 THE SOUTHEAST CORNER OF THE INTERSECTION OF
 OLD ELM ROAD AND THE ACCESS AND MAINTENANCE
 ROAD TO OLD ELM GOLF COURSE.
 ELEVATION = 702.873 FEET (U.S.S. DATUM)

- NOTES:**
1. NEW FENCE, CONNECT TO EXISTING AS NECESSARY. REPAIR OR REPLACE ANY DAMAGE CAUSED BY CONSTRUCTION.
 2. NEW FENCE, CONNECT TO EXISTING CORNER POST AND ENDPOST AS REQUIRED.
 3. MARK PARKING SPACES ON EXISTING PARKING AREA WEST FROM BUILDING 578. PARKING SPACES SHALL BE AT LEAST 18 FEET.
 4. MARK ONE PARKING SPACE FOR ADA PARKING.
 5. NEW PAVEMENT SEE DETAIL ON SHEET 19.
 6. REPAIR OR REPLACE EXISTING STORMWATER INLET. REINSTALL FRAME AND LID.
 7. NEW MONITORING WELL NO. LFS-189-03R.
 8. NEW MONITORING WELL NO. LFS-189-03R.
 9. MODIFIED PRECONCRETE PFLP-01.
 10. MODIFIED PRECONCRETE PFLP-02.
 11. NEW MONITORING WELL NO. LFS-189-04R.

NO.	DATE	REVISIONS

DRAWN AS
 CHECKED BR
 DATE JUNE 2004

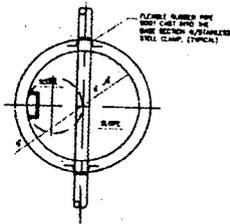
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HEADQUARTERS DEPARTMENT OF THE ARMY
 BRAC DIVISION, FORT McPHERSON, GEORGIA
 FORT SHERIDAN ENVIRONMENTAL
 RESTORATION PROJECT

SCALE:

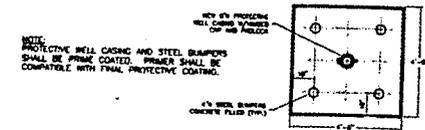
LANDFILL NO. 5
 FACILITY USE PLAN

SHEET 17
 of 19
 PROJECT NO. 01130-20410

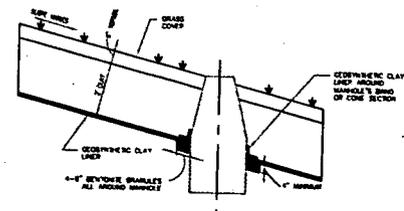


MANHOLE PLAN
SCALE 1/2" = 1'-0"

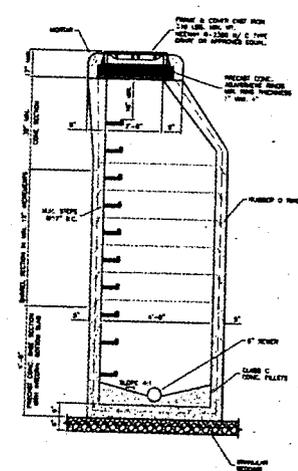
Manhole No.	Type of Service	Existing Elev. at Inlet	Existing Elev. at Outlet	Condition	New Elev. at Inlet	Change in Elevation	Proposed Service
A	Intermittent Sewer	876.41	785.10	GOOD	877.20	21.18	Remove existing well casing and install new casing with 18" diameter schedule 40 pipe.
B	Intermittent Sewer	882.28	822.78	GOOD	883.20	22.18	Remove existing well casing and install new casing with 18" diameter schedule 40 pipe.
C	Intermittent Sewer	882.77	822.71	GOOD	883.70	22.18	Remove existing well casing and install new casing with 18" diameter schedule 40 pipe.
D	Intermittent Sewer	882.77	822.71	GOOD	883.70	22.18	Remove existing well casing and install new casing with 18" diameter schedule 40 pipe.
E	Intermittent Sewer	882.77	822.71	GOOD	883.70	22.18	Remove existing well casing and install new casing with 18" diameter schedule 40 pipe.
F	Intermittent Sewer	882.77	822.71	GOOD	883.70	22.18	Remove existing well casing and install new casing with 18" diameter schedule 40 pipe.
G	Intermittent Sewer	882.77	822.71	GOOD	883.70	22.18	Remove existing well casing and install new casing with 18" diameter schedule 40 pipe.
H	Intermittent Sewer	882.77	822.71	GOOD	883.70	22.18	Remove existing well casing and install new casing with 18" diameter schedule 40 pipe.
I	Intermittent Sewer	882.77	822.71	GOOD	883.70	22.18	Remove existing well casing and install new casing with 18" diameter schedule 40 pipe.
J	Intermittent Sewer	882.77	822.71	GOOD	883.70	22.18	Remove existing well casing and install new casing with 18" diameter schedule 40 pipe.
K	Intermittent Sewer	882.77	822.71	GOOD	883.70	22.18	Remove existing well casing and install new casing with 18" diameter schedule 40 pipe.
L	Intermittent Sewer	882.77	822.71	GOOD	883.70	22.18	Remove existing well casing and install new casing with 18" diameter schedule 40 pipe.
M	Intermittent Sewer	882.77	822.71	GOOD	883.70	22.18	Remove existing well casing and install new casing with 18" diameter schedule 40 pipe.
N	Intermittent Sewer	882.77	822.71	GOOD	883.70	22.18	Remove existing well casing and install new casing with 18" diameter schedule 40 pipe.
O	Intermittent Sewer	882.77	822.71	GOOD	883.70	22.18	Remove existing well casing and install new casing with 18" diameter schedule 40 pipe.
P	Intermittent Sewer	882.77	822.71	GOOD	883.70	22.18	Remove existing well casing and install new casing with 18" diameter schedule 40 pipe.
Q	Intermittent Sewer	882.77	822.71	GOOD	883.70	22.18	Remove existing well casing and install new casing with 18" diameter schedule 40 pipe.
R	Intermittent Sewer	882.77	822.71	GOOD	883.70	22.18	Remove existing well casing and install new casing with 18" diameter schedule 40 pipe.
S	Intermittent Sewer	882.77	822.71	GOOD	883.70	22.18	Remove existing well casing and install new casing with 18" diameter schedule 40 pipe.
T	Intermittent Sewer	882.77	822.71	GOOD	883.70	22.18	Remove existing well casing and install new casing with 18" diameter schedule 40 pipe.
U	Intermittent Sewer	882.77	822.71	GOOD	883.70	22.18	Remove existing well casing and install new casing with 18" diameter schedule 40 pipe.
V	Intermittent Sewer	882.77	822.71	GOOD	883.70	22.18	Remove existing well casing and install new casing with 18" diameter schedule 40 pipe.
W	Intermittent Sewer	882.77	822.71	GOOD	883.70	22.18	Remove existing well casing and install new casing with 18" diameter schedule 40 pipe.
X	Intermittent Sewer	882.77	822.71	GOOD	883.70	22.18	Remove existing well casing and install new casing with 18" diameter schedule 40 pipe.
Y	Intermittent Sewer	882.77	822.71	GOOD	883.70	22.18	Remove existing well casing and install new casing with 18" diameter schedule 40 pipe.
Z	Intermittent Sewer	882.77	822.71	GOOD	883.70	22.18	Remove existing well casing and install new casing with 18" diameter schedule 40 pipe.



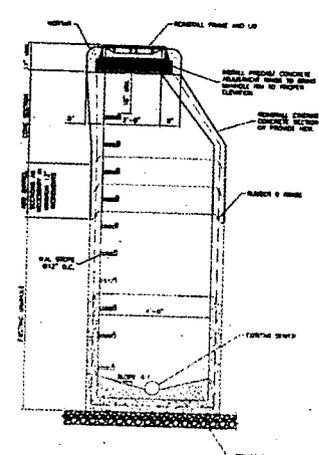
EXISTING WELL PLAN
SCALE 1/2" = 1'-0"



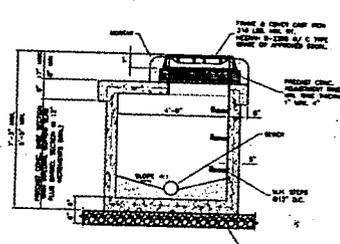
MANHOLE SEALING DETAIL
SCALE NOT TO SCALE



NEW MANHOLE SECTION
SCALE 1/2" = 1'-0"

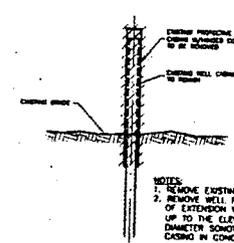


MANHOLE MODIFICATION SECTION
SCALE 1/2" = 1'-0"



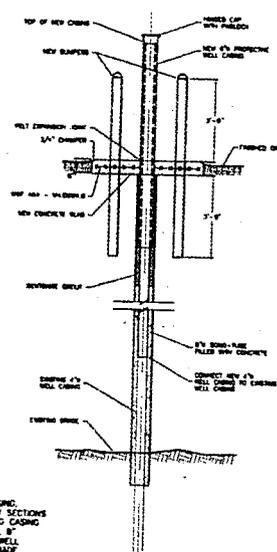
NEW SHALLOW MANHOLE SECTION
SCALE 1/2" = 1'-0"

1. REMOVE AND SALVAGE EXISTING MANHOLE FRAME AND COVER.
2. REMOVE EXISTING ADJUSTING RINGS OR BRICKS.
3. REMOVE AND SALVAGE EXISTING CONE SECTION.
4. INSTALL NEW BARREL SECTIONS TO RAISE TOP OF MANHOLE TO NEW ELEVATION. SEE MANHOLE SCHEDULE.
5. REINSTALL CONE SECTION OR INSTALL NEW CONE SECTION.
6. INSTALL NEW ADJUSTING RINGS AS REQUIRED AND REINSTALL SALVAGED FRAME AND COVER.



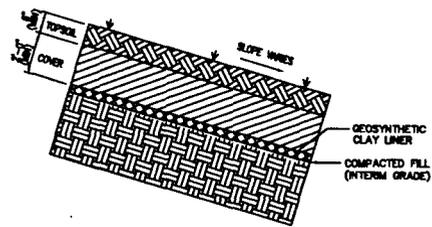
EXISTING WELL SECTION
SCALE 1/2" = 1'-0"

- NOTES:
1. REMOVE EXISTING PROTECTIVE WELL CASING.
 2. REMOVE WELL PLUG AND CONNECT NEW SECTIONS OF EXTENSION WELL CASING TO EXISTING CASING UP TO THE ELEVATION SHOWN. INSTALL 18" DIAMETER SCHEDULE 40 AND ENCASE THE WELL CASING IN CONCRETE UP TO FINISHED GRADE.



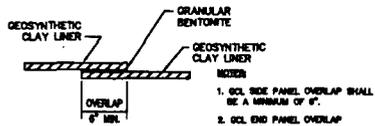
EXISTING WELL MODIFIED SECTION
SCALE 1/2" = 1'-0"

DESIGNED AS		fort_sheridan.BMP	HEADQUARTERS DEPARTMENT OF THE ARMY BRAC DIVISION, FORT McPHERSON, GEORGIA	SCALE SCALE 1/2" = 1'-0"	LANDFILL NO. 5 MANHOLE AND WELL DETAILS	SHEET 18 OF 19 PROJECT NO. 01138.30410
DRAWN JS						
CHECKED ER						
DATE JUNE 2004						
REVISIONS						



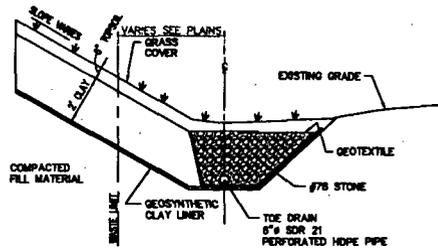
NOTE: GEOSYNTHETIC IS SHOWN AT AN ENLARGED SCALE FOR CLARITY.

(A) CAP DETAIL
NOT TO SCALE

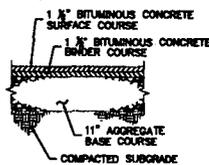


1. GCL SIDE PANEL OVERLAP SHALL BE A MINIMUM OF 6".
2. GCL END PANEL OVERLAP

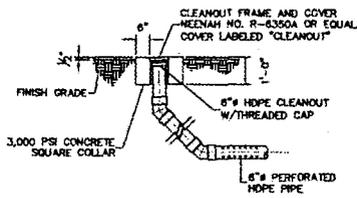
(C) GEOSYNTHETIC CLAY LINER SEAL DETAIL
NOT TO SCALE



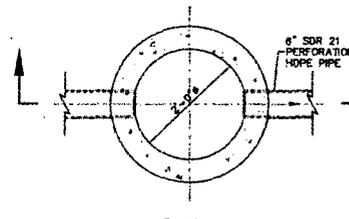
(B) TOE DRAIN DETAIL
SCALE: 1/2" = 1'-0"



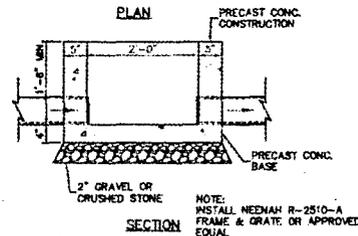
(F) TYPICAL ASPHALT PAVEMENT DETAIL
NOT TO SCALE



(D) END OF LINE CLEANOUT DETAIL
SCALE: 1/2" = 1'-0"



(E) SHALLOW STORM WATER
SCALE: 1" = 1'-0"



(E) SHALLOW STORM WATER
SCALE: 1" = 1'-0"

1. SET POSTS AND EXCAVATE A 4" X 4" TRENCH UPLOPE ALONG THE LINE OF POSTS.



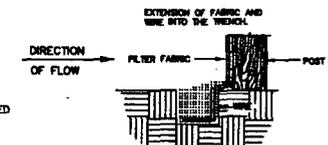
2. STAPLE WIRE FENCING TO THE POSTS.



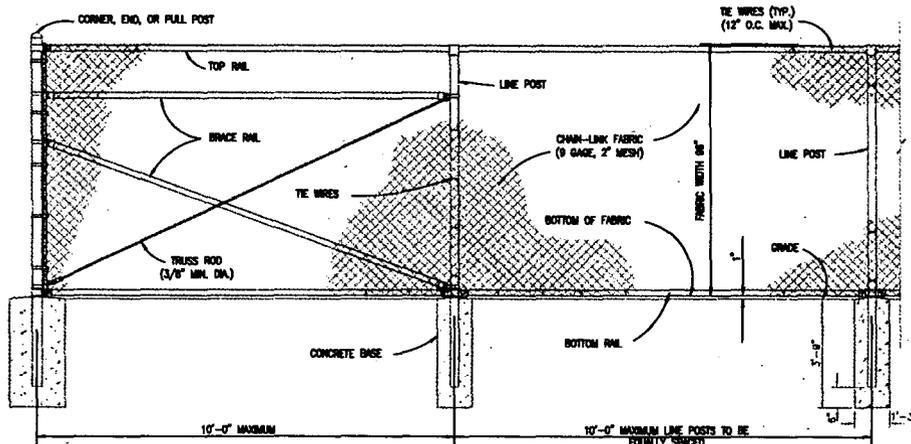
3. ATTACH THE FILTER FABRIC TO THE WIRE FENCING AND EXTEND IT INTO THE TRENCH.



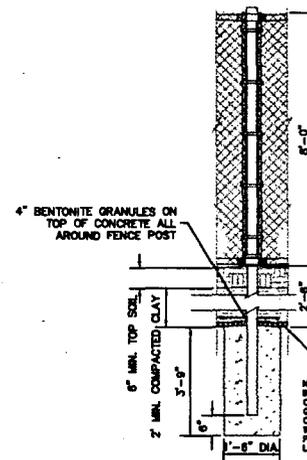
4. BACKFILL AND COMPACT THE EXCAVATED SOIL.



(G) SILT FENCE DETAIL
NOT TO SCALE



(H) CHAIN-LINK FENCE DETAIL
NOT TO SCALE



(I) FENCE POST THROUGH LANDFILL CAP
NOT TO SCALE

1. EXCAVATE THE TRENCH.



2. PLACE AND STAKE STRAW BALES.



3. WEDGE LOOSE STRAW BETWEEN BALES.



4. BACKFILL AND COMPACT THE EXCAVATED SOIL.



CONSTRUCTION OF A STRAW BALE BARRIER. PROPER PLACEMENT OF STRAW BALE BARRIER IN DRAINAGE WAY. STRAW BALE DROP INLET SEDIMENT FILTER.

(J) STAKED STRAW BALE BARRIER DETAIL
NOT TO SCALE

NO.	DATE	REVISIONS	APPROVED

DESIGNED	AS
DRAWN	JS
CHECKED	FR
DATE	JUNE 2004

HEADQUARTERS DEPARTMENT OF THE ARMY
BRAC DIVISION, FORT McPHERSON, GEORGIA
FORT SHERIDAN ENVIRONMENTAL
RESTORATION PROJECT

SCALE
AS SHOWN

LANDFILL NO. 5
DETAILS

SHEET 19
OF 19
PROJECT NO. D130.30410