

**OPERATION AND MAINTENANCE PLAN**

**FOR**

**SOUTHWEST FUNSTON LANDFILL**

**OPERABLE UNIT NO. 001**

**FORT RILEY, KANSAS**

**NATIVE SOIL COVER**

**KANSAS RIVER BANK STABILIZATION**

**HYDRAULIC STRUCTURES**

**MONITOR WELLS**

**SITE ACCESS CONTROLS**

September 30, 1996



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## LIST OF ACRONYMS AND ABBREVIATIONS

BLRA	Baseline Risk Assessment
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
EE/CA	Engineering Evaluation/Cost Analysis
EPA	Environmental Protection Agency
FFA	Federal Facility Agreement
FS	Feasibility Study
IAG	Interagency Agreement
ICP	Institutional Controls Plan
KAR	Kansas Agency Regulation
KDHE	Kansas Department of Health and Environment
LTMP	Long Term Monitoring Plan
MSL	Mean Sea Level
MSWLF	Municipal Solid Waste Landfill
O&M	Operation and Maintenance
RI	Remedial Investigation
ROD	Record of Decision

## 1.0 INTRODUCTION

### 1.1 PURPOSE

The purpose of this Operation and Maintenance (O&M) Plan is to document post-construction inspection, maintenance, and repair activities required to assure that the features of site investigations, removal actions, and institutional controls undertaken at Southwest Funston Landfill continue to function as they were designed, comply with applicable federal and state regulations, and remain protective of human health and the environment.

### 1.2 BACKGROUND

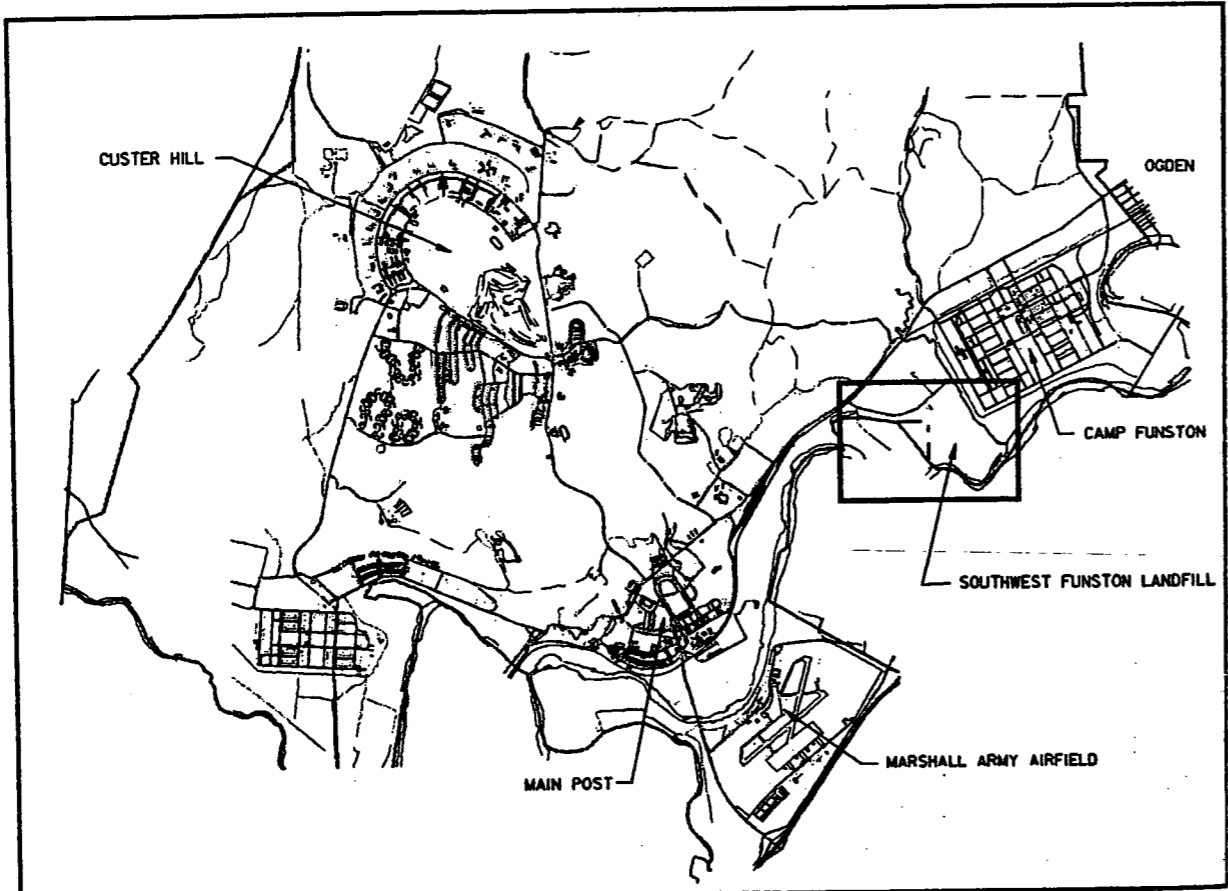
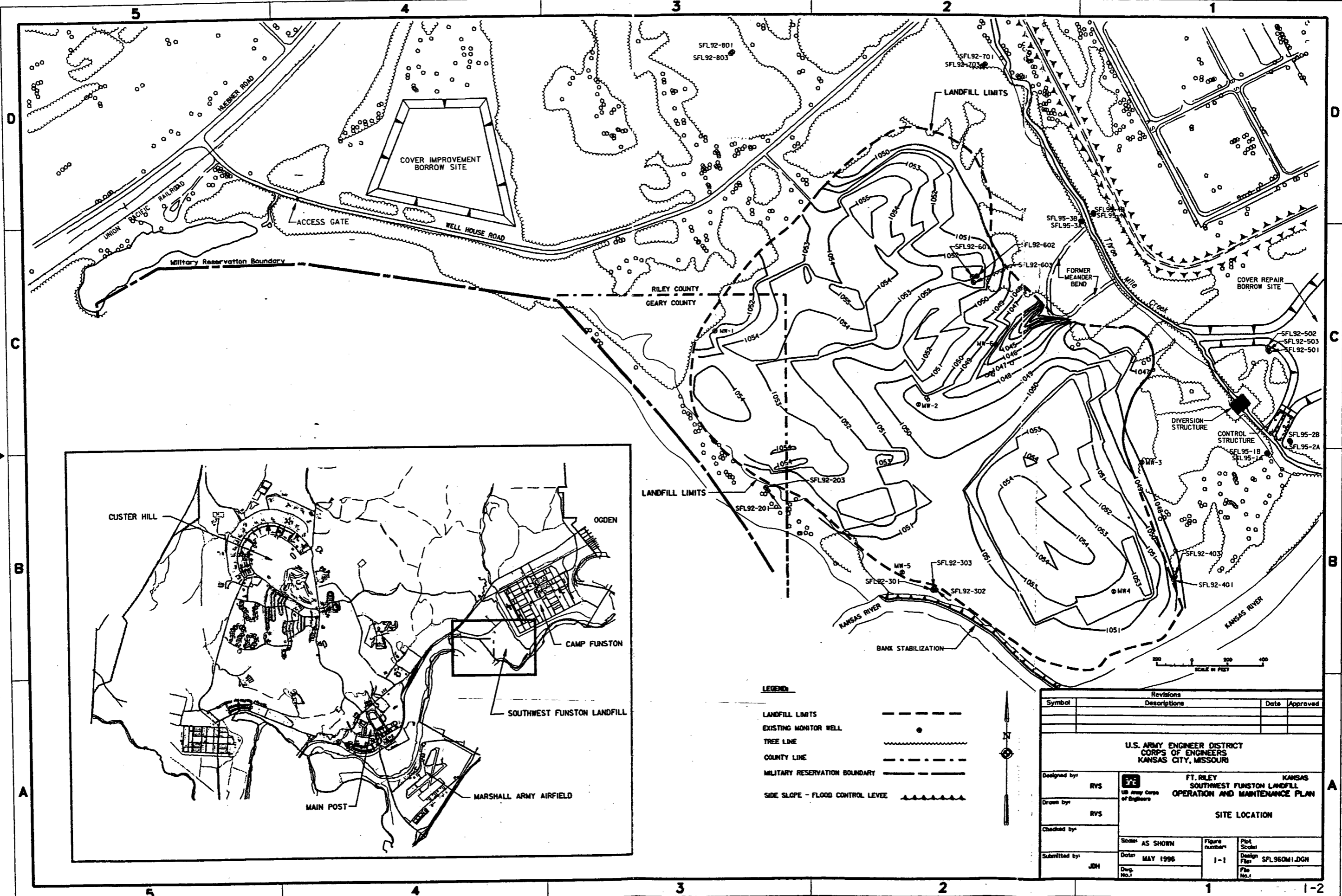
Southwest Funston Landfill covers approximately 107 acres and is located in the southern portion of Fort Riley (Figure 1-1). It is bordered on the south by the Kansas River, on the north by Well House road, on the west by a former meander bend in the Kansas River and on the east by Threemile Creek. Southwest Funston Landfill was operated from the mid 1950's until 1981. Typical municipal and industrial refuse from various activities at the Fort Riley military installation were deposited in trenches on the landfill during that timeframe. Some of the industrial wastes were hazardous substances and are thus potential sources of contamination. The landfill was closed in 1983 in a manner approved by the Kansas Department of Health and Environment (KDHE).

Fort Riley was proposed for inclusion on the National Priorities List (NPL) on July 14, 1989 pursuant to Section 105 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). To ensure that environmental impacts associated with activities at the installation were thoroughly investigated and appropriate remedial actions taken, Fort Riley, the Environmental Protection Agency (EPA), and the State of Kansas entered into a Federal Facilities Agreement (FFA) (also referred to as an Interagency Agreement (IAG)) effective June 28, 1991. Under Section IX.A, paragraph 2 of that Agreement, Southwest Funston Landfill was specifically addressed as a potential area of contamination and the requirement to conduct a site Remedial Investigation and Feasibility Study (RI/FS) was established.

A Site Investigation (SI) to characterize the contamination at Southwest Funston Landfill and a Baseline Risk Assessment (BLRA) to evaluate the potential risk to human health and the environment have been completed. The results of the investigation and assessment are presented in the Remedial Investigation (RI) Report dated October 1993, with revisions dated April 1994. The Feasibility Study (FS) Report dated April 1994 contains a presentation and analysis of alternatives available to address the potential risks identified in the RI Report. The FS Report was approved by EPA on May 16, 1994 and by KDHE on May 3, 1994. A Proposed Plan was issued in November 1994 which outlined the remedial alternatives considered for Southwest Funston Landfill and identified the preferred alternative with rationale for its selection. It was provided as a supplement to the RI and FS Reports to inform the public of Fort Riley's, EPA Region VII's, and KDHE's preferred remedy based on information contained in the Administrative Record and to solicit public comments pertaining to the remedial alternatives evaluated, including the preferred alternative. The major components of the preferred remedy include:



VALUE ENGINEERING PAYS



**LEGEND**

LANDFILL LIMITS	---
EXISTING MONITOR WELL	●
TREE LINE	~~~~~
COUNTY LINE	- - - - -
MILITARY RESERVATION BOUNDARY	— — — — —
SIDE SLOPE - FLOOD CONTROL LEVEE	▲▲▲▲▲



SCALE IN FEET  
0 200 400

Revisions			
Symbol	Descriptions	Date	Approved
<b>U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI</b>			
Designed by:	RVS	<b>FT. RILEY SOUTHWEST FUNSTON LANDFILL OPERATION AND MAINTENANCE PLAN</b>  <b>SITE LOCATION</b>	
Drawn by:	RVS		
Checked by:			
Submitted by:	JDH	Scale: AS SHOWN	Figure number: 1-1
		Date: MAY 1996	Plot Scale: SFL9601.DGN
		Draw. No.:	File No.:

- Institutional controls (including signage) to restrict future site uses and prohibit the future use of site groundwater.
- Placement of rock revetment along the northern bank of the Kansas River.
- Repair of the existing soil cover over the landfill so that it meets the criteria of 40 CFR 258.60.
- Semi-annual groundwater monitoring at the site.
- A contingency for future active remediation of the site, if warranted.

### **1.3 PLANS TO ADDRESS MAJOR COMPONENTS OF THE SELECTED REMEDY**

The selected remedial actions for Southwest Funston Landfill , Operable Unit 001 at Fort Riley, Kansas are recorded in the Record of Decision (ROD). Fort Riley, as lead agency under the IAG, has established a plan to accomplish each of the actions and all parties to the IAG have agreed to the execution schedule for those actions.

An Institutional Controls Plan (ICP) (1997) which is separate from this Operation and Maintenance Plan outlines actions to limit future site uses and prohibit the use of groundwater from the site.

Fort Riley executed removal actions to implement the bank stabilization and cover repair elements of the selected remedy for the site. As required under CERCLA, an Engineering Evaluation/Cost Analysis (EE/CA) was conducted to assess the appropriateness of performing non-time critical removal actions at the Southwest Funston Landfill site. The removal actions considered in the EE/CA included stabilization of a portion of the northern bank of the Kansas River to reduce the risk of exposing landfill contents and repair of the existing landfill cover to minimize erosion and limit infiltration. The results of the EE/CA are contained in a report dated July, 1993. In accordance with the requirements of CERCLA, a public comment period on the EE/CA was conducted from August 17 to September 16, 1993. An Action Memorandum and Responsiveness Summary was submitted to EPA and KDHE in December 1993. Having received no public or regulatory objections, Fort Riley implemented the removal actions. Riverbank stabilization was completed in the spring of 1994. A cover repair project was completed in the fall of 1995. A cover improvement project designed to meet the minimum cover thickness criteria of 40 CFR 258.60 was completed in October 1996.

The Long Term Monitoring Plan (LTMP) which is separate from this plan identifies monitoring wells to be sampled on a semi-annual basis in a continuing program to monitor the chemicals of potential concern for groundwater identified in the Record of Decision. That sampling will be accomplished to determine if the chemicals of potential concern are migrating off the Southwest Funston Landfill site or changing in concentration.

As outlined in the Record of Decision, if long-term groundwater monitoring indicates a need for further action a contingency would be implemented. It is anticipated that the contingency would be implemented if: 1) groundwater monitoring detects significant increases in the concentrations of potential chemicals of concern; and/or 2) the monitoring program reveals that significant concentrations of the potential chemicals of concern are migrating under Threemile Creek and/or off site.

## **1.4 REGULATORY BASIS FOR AN OPERATION AND MAINTENANCE PLAN**

The requirements for post closure care of Municipal Solid Waste Landfills (MSWLF) are outlined in the Code of Federal Regulations (CFR), Title 40, Part 258, Subpart F, paragraph 258.61 which is further defined in Kansas Agency Regulations (KAR), Agency 28, Article 29, Part 4, paragraph 28-29-121(p). Specifically, the KAR requires that post closure care include at least the following activities:

- a. maintaining the integrity and effectiveness of any final cover, including making repairs to the cover as necessary to correct the effects of settlement, subsidence, erosion, or other events, and preventing run-on and run-off from eroding or otherwise damaging the final cover.
- b. maintaining and operating the leachate collection system.
- c. monitoring the ground water and maintaining the groundwater monitoring system.
- d. maintaining and operating the gas monitoring system.

This Plan will address activities designed to meet the maintenance requirements of paragraphs a and c above. Neither a leachate collection system nor a gas monitoring system have been installed and, therefore, the requirements of paragraphs b and d above are not applicable to the Southwest Funston Landfill site. Activities to monitor the groundwater are presented in the Long Term Groundwater Monitoring Plan for the site. This O&M Plan will also address activities to maintain the rock revetment which was installed to stabilize the Kansas River bank, the water control structures which maintain the habitat established at the soil borrow site for the 1995 Cover Repair Project, and signage installed under the Institutional Controls Plan. The O&M Plan requirements of KAR 28-29-121(p) to "provide a description of the planned uses of the property during the post closure period," make provisions so that "Post closure use of the property shall not disturb the integrity of the final cover...or functions of the monitoring system," and provide the "name, address, and telephone number of the person or office to contact about the facility during the post-closure period" are addressed in the Institutional Controls Plan for Southwest Funston Landfill.

## **1.5 REMOVAL ACTION HISTORY**

The Removal Actions undertaken by Fort Riley which are documented in the EE/CA Report were accomplished in three separate contract actions. The specifics of those contracting actions are recorded herein for historical record and future reference:

- 1.5.1 Project Title: Bank Stabilization  
Contract: DACA41-93-R-0013  
Contractor: K & K Construction, Inc  
Wichita, Kansas  
Contract Amount: \$432,000  
Contract Award Date: 13 Jan 1994  
Notice to Proceed: 26 Jan 1994  
Contract Completion: Apr 1994

- 1.5.2 Project: Cover Repairs  
Contract: DACA41-94-C-0168  
Contractor: American Eagle Industries, Inc.  
Cheyenne, Wyoming 82003  
Contract Amount: \$1,593,000  
Contract Award Date: 27 Sep 1994  
Notice to Proceed: 26 Oct 1994  
Contract Completion: Nov 1995
- 1.5.3 Project Title: Cover Improvements  
Contract: DACA41-96-C-0013  
Contractor: Malco Steel, Inc.  
Kansas City, Missouri  
Contract Amount: \$1,019,432  
Contract Award Date: 28 Mar 1996  
Notice to Proceed: 29 Apr 1996  
Contract Completion: Oct 1996

## **1.6 OPERATION AND MAINTENANCE PLAN ORGANIZATION**

The complete Operation and Maintenance Plan for Southwest Funston Landfill includes the following Sections:

- a. Basic Operation and Maintenance Plan - Contains general information on the purpose of the Plan, a brief site history, and description of regulatory requirements. A major portion of the Plan is dedicated to specific criteria for inspection, maintenance and repair of the major components of the native soil cover, the rock revetment, the hydraulic structures, the monitoring wells, and the site access controls.
- b. Appendix A - Checklists to be used during inspections of the landfill cover, rock revetment, monitoring wells, signage, and hydraulic structures.
- c. Appendix B - Photographs of "as-built" conditions for Bank Stabilization, Cover Repair, and Cover Improvement Projects.
- d. Appendix C - A compendium of completed site inspection checklists, Inspection Reports, and Maintenance/Repair Reports. This appendix will be a dynamic instrument and continually updated.
- e. Appendix D - "As-Built" Record Drawings for:
  - A. Bank Stabilization Project
  - B. Cover Repair Project
  - C. Cover Improvement Project

f. Appendix E - Construction technical specifications for:

- A. Bank Stabilization Project
- B. Cover Repair Project
- C. Cover Improvement Project

**1.7 DOCUMENT DISTRIBUTION**

A distribution list with the names of key agencies involved in the approval and implementation of this plan is included as Table 1-1. The list will serve as a guide for the distribution of documents to be prepared in support of the requirements of this Plan. The list will be updated if changes in key agencies/document distribution occur. The revised distribution list will be placed in this Plan as Table 1-1 and the previous list will be archived in Appendix C.

Table 1-1  
**DISTRIBUTION LIST**  
 OPERATION AND MAINTENANCE PLAN  
 SOUTHWEST FUNSTON LANDFILL  
 FORT RILEY, KANSAS  
 SEPTEMBER 30 ,1996

Document Title >>	DOCUMENT DISTRIBUTION			
	Tech Memo	Inspection Checklist	Inspection Report	Maintenance Report
O & M Plan Section >>	Para 2.1	Para 2.2	Para 2.3	Para 2.4

AGENCY	NUMBER OF COPIES			
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Directorate of Environment and Safety Fort Riley, Kansas	5	5	5	5
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U.S. Environmental Protection Agency, Region VII Kansas City, Kansas	2	2	2	2
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Kansas Department of Health and Environment Topeka, Kansas	2	1	1	1
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Kansas Department of Health and Environment Salina , Kansas		1	1	1
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U.S. Army Engineer District, Kansas City Kansas City, Missouri	5	5	5	5
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U.S. Army Environmental Center Aberdeen Proving Ground, Maryland 21010-5401	2	2	2	2
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## **2.0 GENERAL OPERATION AND MAINTENANCE PROCEDURES**

### **2.1 OPERATION AND MAINTENANCE PLAN POLICY**

The operation, inspection, repair and maintenance of the native soil cover, monitor wells, rock revetment, water control structures and signage at Southwest Funston Landfill shall be in accordance with the instructions contained in this manual and appropriate federal (40 CFR 258) and state regulations (KAR 28-29-121). Changed conditions may, from time to time, necessitate minor departures from standing operating instructions. Significant departures from the instructions contained in this plan will be documented in a Technical Memorandum which will be reviewed and approved by the parties to the IAG, revised as necessary, and provided to all agencies on the distribution list (Table 1-1) for inclusion in Appendix C of this plan.

### **2.2 INSPECTION PROCEDURES**

Of primary importance in maintaining the native soil cover, monitoring wells, rock revetment, water control structures and signage is a systematic inspection program. The Directorate of Environment and Safety (DES) is the Fort Riley agency responsible for conducting the inspections. A complete inspection of the components of the landfill should be made on an annual basis. DES will notify EPA and KDHE 30 days in advance of scheduled annual inspections. In addition, inspections should be made after the following significant events:

- a. Whenever the Kansas River stage at the Fort Riley gage station exceeds a elevation of 1040 MSL. In those instances, the Kansas River will overtop the crest of the rock revetment and may cause erosional damage to the river bank or attack the upstream edge of the revetment.
- b. Instances when the rainfall at Marshall Army Airfield exceeds 3 inches per hour. In those cases, flow in Threemile creek will exceed the 25 year design storm runoff upon which the design of the hydraulic structures was based.

Examples of inspection checklists are included in Appendix A. Copies of completed checklists will be included as an appendix to the annual inspection report. Significant discrepancies noted during an inspection will be verbally relayed to the parties to the IAG as soon as practical after they are discovered. In addition, a photograph will be taken of each deficiency noted during the inspection. Copies of the photographs will be attached to the inspection report.

### **2.3 FIELD INSPECTION REPORTS**

After each field inspection, a written inspection report will be prepared. The report will include a description of the condition of all landfill features, documentation of any deficiencies noted, and recommendations, schedules and cost estimates for required and elective repairs. The Field Inspection Report will be submitted to the agencies listed in Table 1-1 within 30 calendar days following completion of the inspection. Copies of the report will be filed in Appendix C of this plan.

## **2.4 MAINTENANCE/REPAIR REPORTS**

A Maintenance/Repair Report will be prepared whenever these activities are accomplished on the landfill and/or its supporting features. The report will include a description of the work accomplished, a technical appraisal of its success in meeting project goals, and any recommendations for future required/elective work. The Maintenance/Repair Report will be submitted to the agencies listed in Table 1-1 within 30 calendar days following completion of the field work. Copies of the report will be filed in Appendix C of this plan.



### 3.0 NATIVE SOIL COVER

#### 3.1 DESCRIPTION OF NATIVE SOIL COVER

The native soil cover encompasses an area of 107 acres and is approximately 2 feet thick. A location plan is included as Figure 3-1. Southwest Funston Landfill lies entirely within the 50-year flood boundary (1052.6 MSL). Slopes across the landfill are generally less than 1.0% with slopes of 5.0% at the transitions between the additional fill placed during the 1996/1997 Cover Improvement project and the grade after the 1995/1996 Cover Repair project. The lower 18 inches is compacted fill material and the top 6 inches is material that will support vegetation. The landfill has been planted with a custom native seed mixture composed of the following grass species:

<u>Species</u>	<u>Percent</u>
Switchgrass	25.00
Western Wheatgrass	18.75
Sideoats Gramma	18.75
Big Bluestream	12.50
Little Bluestream	12.50
Indiangrass	12.50

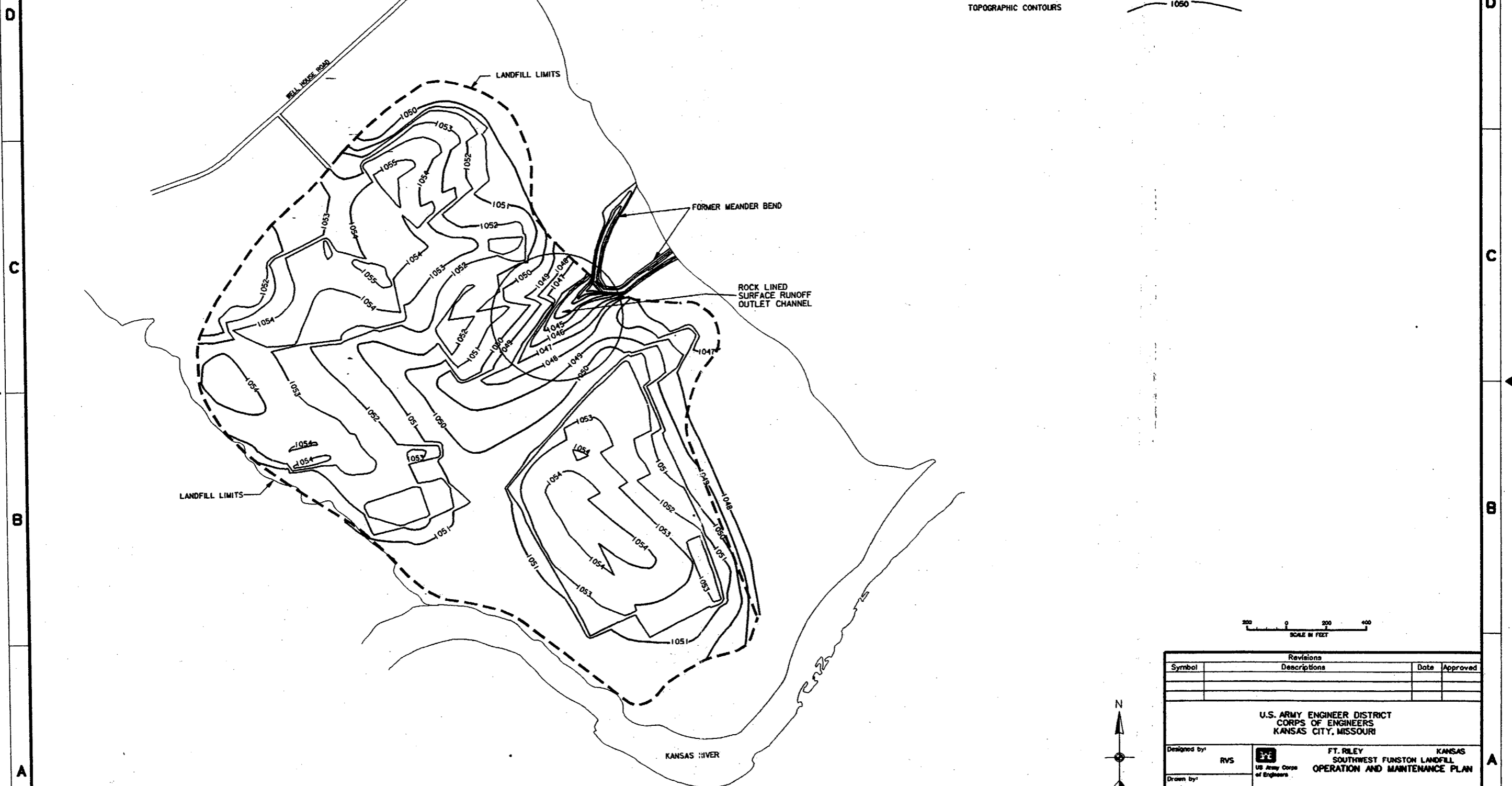
A surface runoff outlet channel which drains into a former meander bend of Threemile Creek is located on the northeast side of the landfill. The channel is approximately 500 feet long and 150 feet wide. A minimum 9 inch thick quarry run rock fill has been placed in the channel for protection against erosion.

#### 3.2 INSPECTION

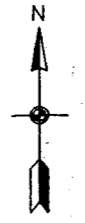
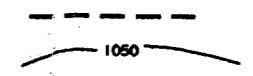
##### 3.2.1 Native Soil Cover - Inspect the cover to detect:

- Any observable settlement, ponding, sloughing, soil erosion, deep rooted vegetation, rodent damage or any other deleterious conditions.
- Any localized subsidence or saturated areas indicating poor drainage.
- Obstructions along the perimeter of the cover which may prevent flow off of the cover.
- Any signs of distressed vegetation and/or bare spots in the native grass.
- Signs of erosion, rutting, settlement, or soft areas in the monitoring well access road.

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LEGEND:  
 LANDFILL LIMITS  
 TOPOGRAPHIC CONTOURS



Revisions			
Symbol	Descriptions	Date	Approved
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	RVS	FT. RILEY US Army Corps of Engineers	KANSAS SOUTHWEST FUNSTON LANDFILL OPERATION AND MAINTENANCE PLAN
Drawn by:	RVS	NATIVE SOIL COVER	
Checked by:		Scale: AS SHOWN	Figure number: 3-1
Submitted by:	JDH	Date: MAY 1996	Plot Scale: SFL960M2.DGN
		Dwg. No.:	File No.:

5 4 3 2 1 3-2

### 3.2.2 Surface Runoff Outlet Channel - Inspect the outlet channel for:

- Evidence of erosion or localized depressions.
- Excessive sediment or debris deposition, tree sapling growth or any other condition which may prohibit or impede flow of runoff water or otherwise affect the operation of the channel.

### 3.3 REPAIR

A majority of the repairs for the landfill cover and surface runoff outlet channel will be on an "as-needed" basis. All items found to be damaged during site inspections will be repaired. The original contract specifications (Appendix E) will be used as basic guidance in selecting proper materials and techniques for the repairs so that they are compatible with the original repairs done on the landfill. Repairs which may be required include:

- Filling of depressed/ponded areas resulting from settlement/subsidence of landfill contents.
- Repair of erosional ruts (may also require rock armoring or other protective measures).
- Reseeding of areas covered with silt as the result of flooding.

### 3.4 MAINTENANCE

3.4.1 General Requirements - The following should be performed every third year for the life of the native soil cover, or more frequently if annual inspections reveal deficiencies which must be corrected at shorter interval:

- Removal of tree saplings/tall weeds from the rock armored drainage channel.
- Filling of animal burrows and trapping/relocation of persistent burrowers.

3.4.2 Native Grass Cover - The native grass within the perimeter of the landfill cover will require special care to develop a good ground cover which promotes evapotranspiration. The majority of the grass was planted in the Spring of 1997. For the first two growing seasons after that, Spring 1998 and 1999, the native grass cover will be mowed. The mowing is intended to promote expansion and filling of the young grass plants between the drill rows in which they were originally planted. Additionally, immature native grass roots are not resistant to damage resulting from burning. For the remainder of the maintenance program, the native grass will be burned off every three years. The burning is intended to eliminate the growth of tree saplings and tall weed grasses. Burning should be accomplished in late winter/early spring. All burning must be coordinated with the installation fire department and must comply with all federal, state, and local regulations. Areas where the grass cover has deteriorated so that total bare spots exceed 2 percent of the grassed area will be augmented through the application of supplemental seeding and possibly placement of additional fill.

## 4.0 KANSAS RIVER BANK STABILIZATION

### 4.1 DESCRIPTION OF ROCK REVETMENT

The revetment along the Kansas River and adjacent to the southern edge of the landfill is a Type "A" revetment with baffles (See figure 4-1). The revetment is approximately 1200 feet in length with 1 foot vertical on 1.5 foot horizontal slopes. The crown of the revetment is at elevation 1038 MSL, approximately 7 feet above the low flow stage of the river. On the landward side of the revetment, baffles have been placed every 75 feet extending up to an elevation of 1044 MSL, 6 feet above the revetment crown. The revetment is constructed of quarry run stone with a maximum stone size of 700 pounds and not more than 50 percent of the material smaller than 100 pounds.

### 4.2 INSPECTION OF REVETMENT

Inspect the rock revetment to detect:

- Any observable settlement, sloughing, soil erosion, deep rooted vegetation, weathering, high water damage or any other deleterious conditions.
- Any scour holes undermining the structure on the landward side of the revetment.
- Evidence that the revetment is being flanked at the upstream end.
- Evidence that bank erosion is occurring below the downstream end.
- Evidence of erosion on the opposite bank which may be caused by the revetment.

### 4.3 REPAIR OF REVETMENT

The majority of the repairs for the revetment will be on an "as-needed" basis. All items found to be damaged during site inspections will be repaired. The original contract specifications (Appendix E) will be used as basic guidance in selecting proper materials and techniques for the repairs so that they are compatible with the original design of the revetment. Repairs which might be required include:

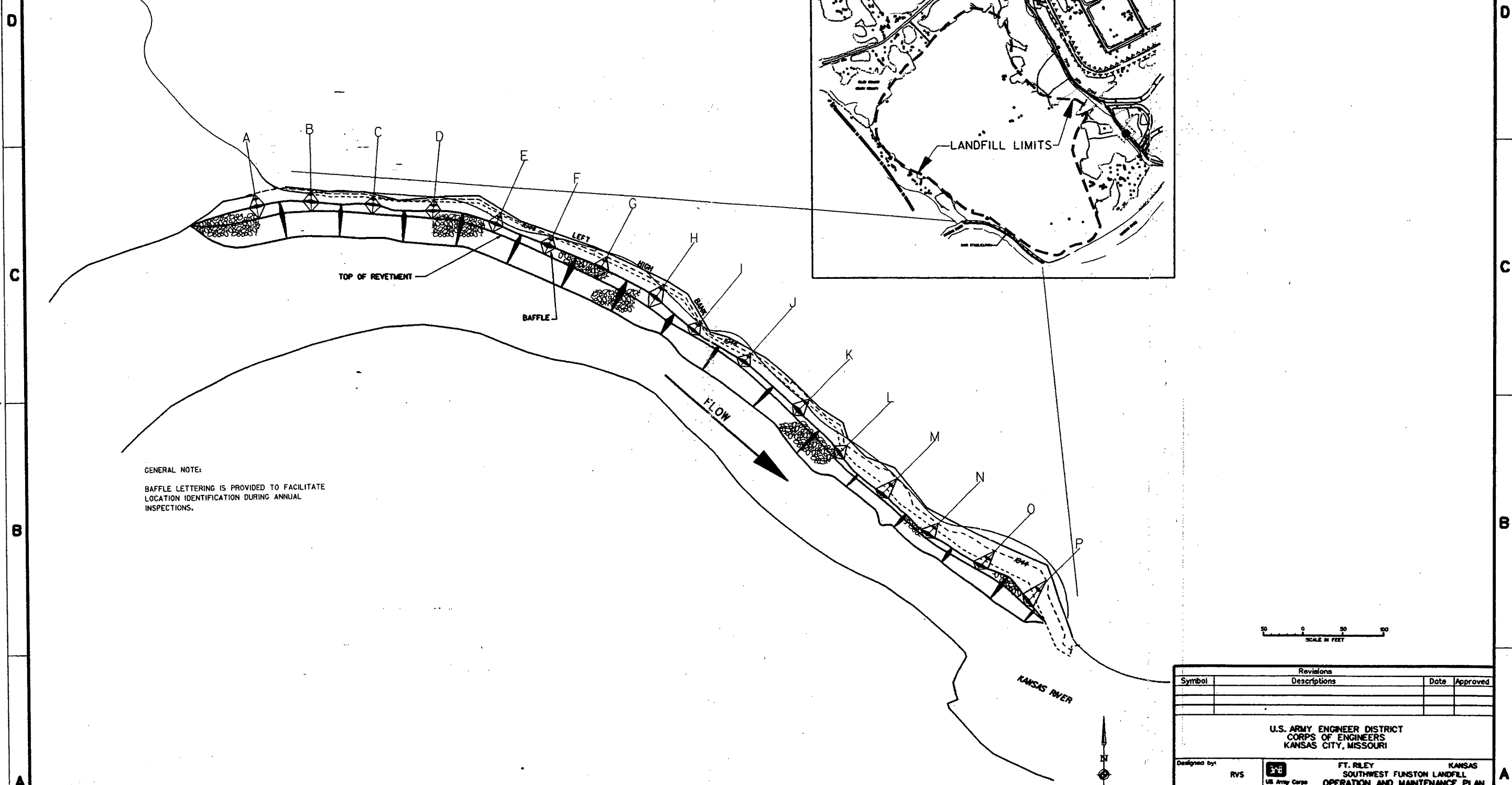
- Placement of additional new revetment upstream of the existing if there is evidence that the existing revetment is being flanked.
- Placement of additional quarry run stone at points along the revetment which display evidence of settlement/sloughing and/or freeze/thaw deterioration.

### 4.4 MAINTENANCE OF REVETMENT

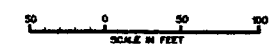
The following should be accomplished every four years for the life of the revetment or more frequently if annual inspections reveal deficiencies which must be corrected:


- Removal of tree saplings and tall weeds growing in the revetment.
- Removal of log/debris jams along the river side of the revetment.

5 4 3 2 1



GENERAL NOTE:  
 BAFFLE LETTERING IS PROVIDED TO FACILITATE  
 LOCATION IDENTIFICATION DURING ANNUAL  
 INSPECTIONS.



Revisions			
Symbol	Descriptions	Date	Approved
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	RVS	 FT. RILEY KANSAS SOUTHWEST FUNSTON LANDFILL OPERATION AND MAINTENANCE PLAN	
Drawn by:	RVS	BANK STABILIZATION	
Checked by:		Scale: AS SHOWN	Figure number: 4 - 1
Submitted by:	JDH	Date: MAY 1996	Plot Scale: Design File SFL960M3.DGN
			File No.:

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## 5.0 HYDRAULIC STRUCTURES

### 5.1 DESCRIPTION OF HYDRAULIC STRUCTURES

5.1.1 Water Diversion Structure - The sheet pile water diversion structure constructed across Threemile Creek is located approximately 1300 feet upstream of the confluence of Threemile Creek and the Kansas River (see figure 5-1). The top of the sheet piling is at elevation 1036.5 MSL, approximately 7.5 feet above the natural stream bed. The sheet pile is approximately 20 feet deep. The dam is 31 feet wide at the bottom and 51 feet wide at the top. Quarry run stone, approximately 2 feet thick, extends 40 feet upstream and downstream of the sheet piling. The sides of the channel along that reach of Threemile Creek have been laid back to 1.5 horizontal on 1 vertical slopes.

5.1.2 Water Control Structure - A reinforced concrete water control structure is located at the outlet of the borrow area (Figure 5-1). Three 30 inch concrete culverts pass through the control structure. The bottom of the culverts are at 1034 MSL and the top of the control structure is at 1037.5 MSL. The control structure is 30 feet wide at the bottom. It is 12 feet below the surrounding grade and the channel downstream of the control structure has 1V on 3H sideslopes. Water levels on the habitat side of the control structure are established by wood planking placed in slots on the upstream side of the culverts. The channel and sideslopes are armored with 9 inches of quarry run stone in the area between Threemile creek and the structure.

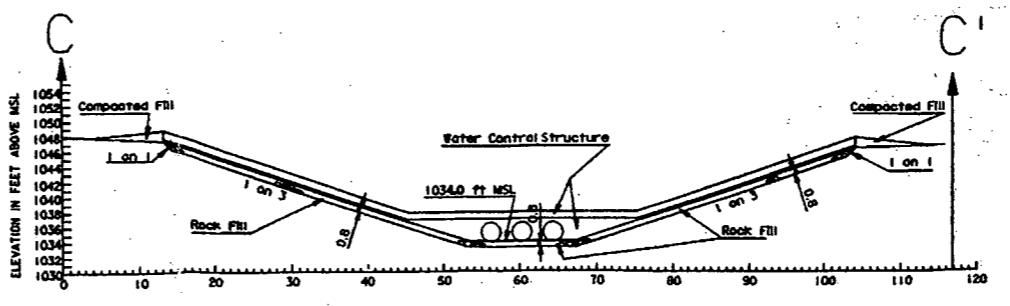
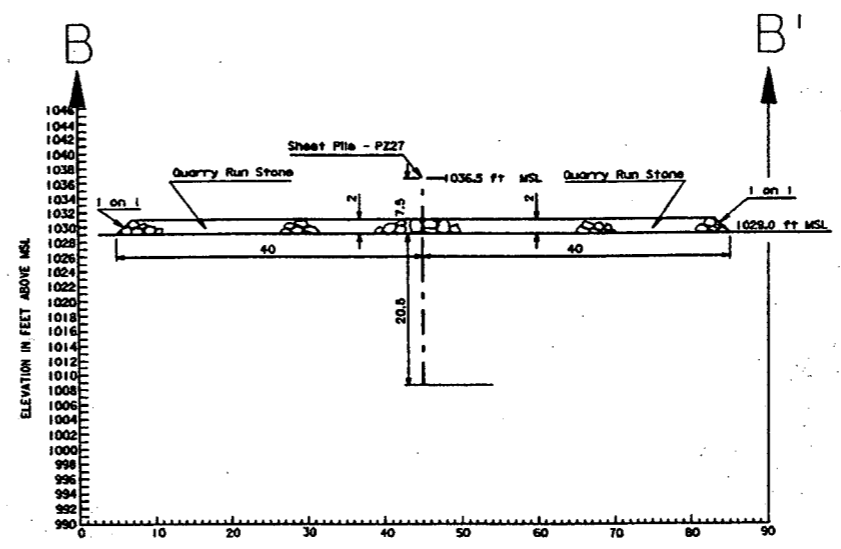
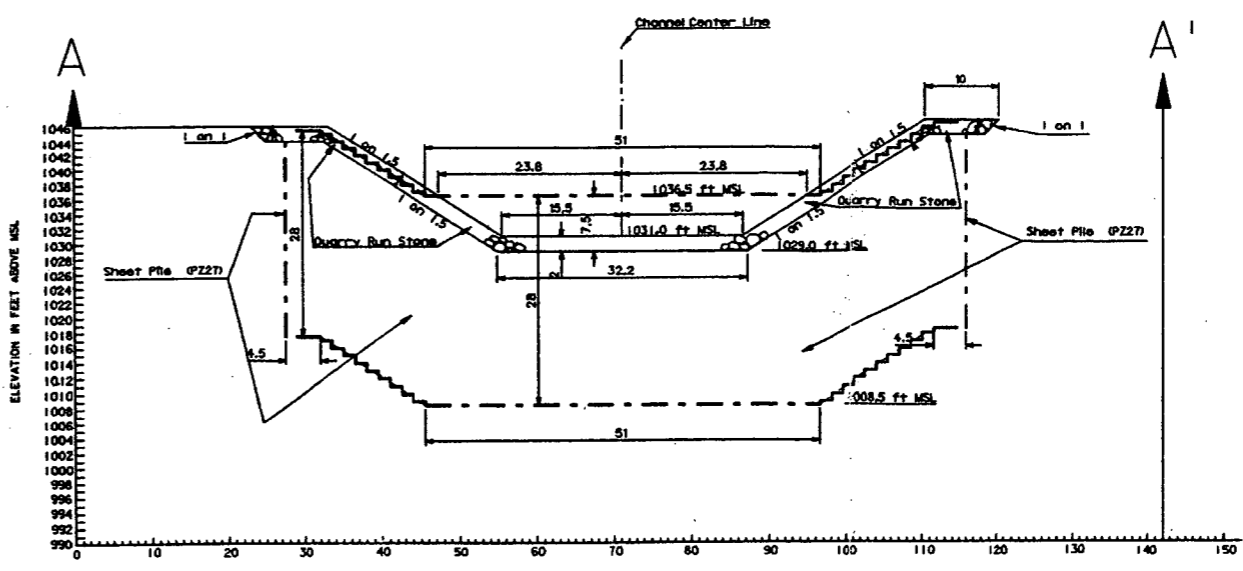
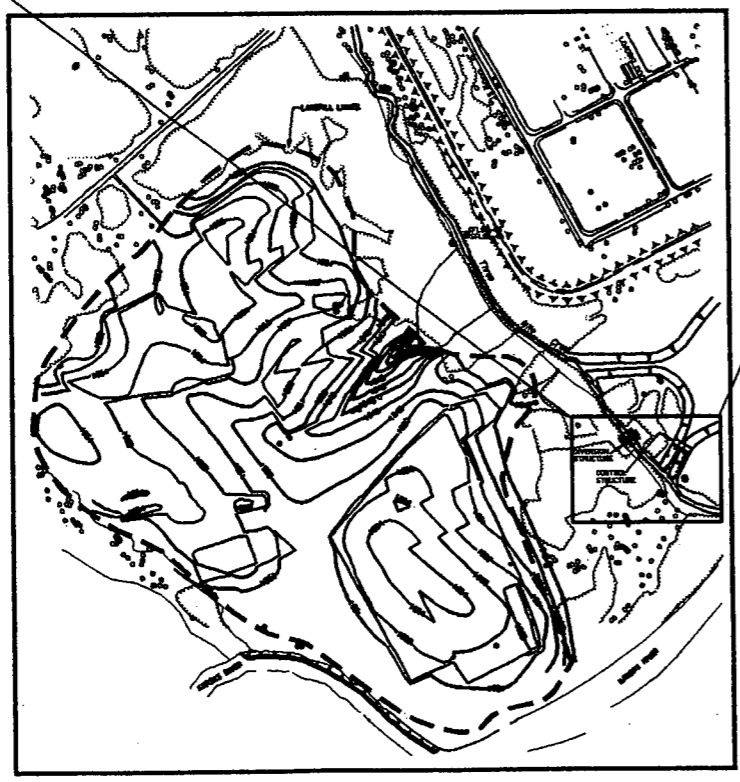
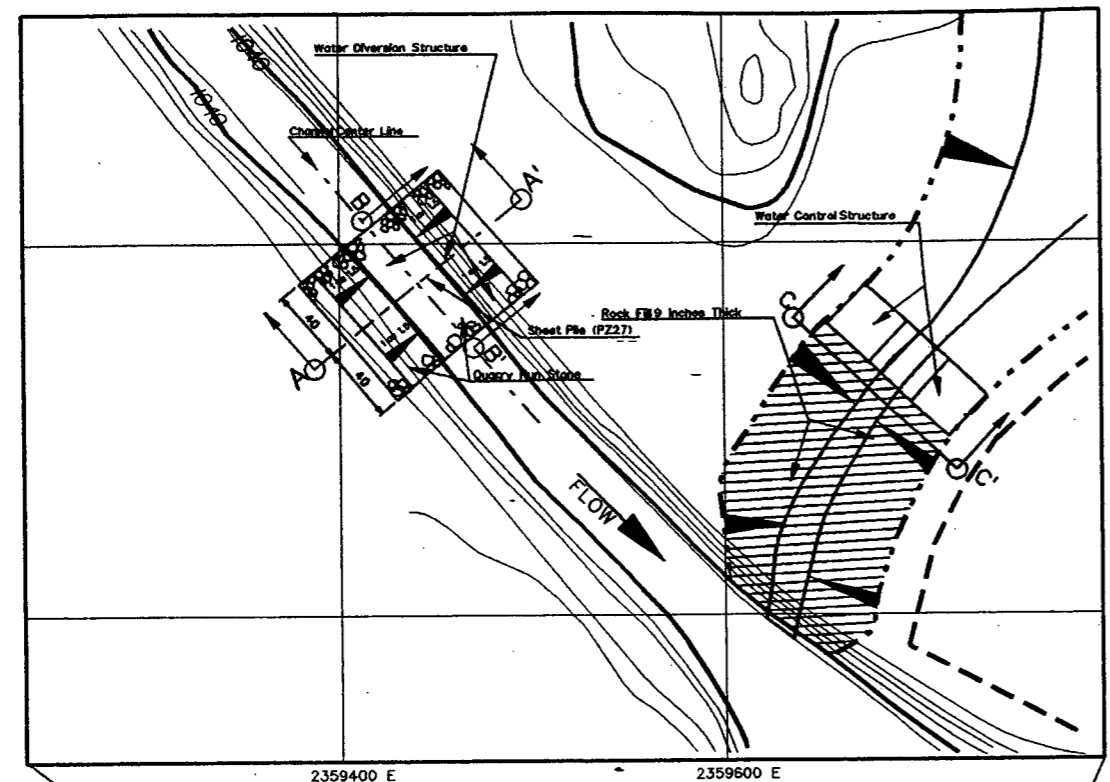
### 5.2 INSPECTION

Inspect the hydraulic structures to detect:

- Any observable signs of scour, soil erosion, high water damage, deep rooted vegetation, or any other deleterious conditions a minimum of 100 feet upstream or downstream.
- Cracking or spalling of the concrete in the water control structure.
- Cracking and rot in the water level control planking and corrosion of the steel support frame at the culvert pipe intakes on the water control structure.
- Evidence of sediment build up upstream of the water diversion structure.
- Signs of corrosion or significant leakage in the sheet piling of the water diversion structure.

### 5.3 REPAIR

The majority of the repairs for the hydraulic structures will be on an "as-needed" basis. All items found to be damaged during site inspections will be repaired. The original contract specifications (Appendix E) will serve as basic guidance in selecting proper materials and techniques for the repairs so that they are compatible with the original construction. Repairs which might be required include:



Revisions			
Symbol	Descriptions	Date	Approved
<b>U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI</b>			
Designed by:	RVS	<b>FT. RILEY SOUTHWEST FUNSTON LANDFILL OPERATION AND MAINTENANCE PLAN</b>	
Drawn by:	RVS		
Checked by:		<b>HYDRAULIC STRUCTURES</b>	
Submitted by:	JDH	Scale: AS SHOWN	Figure number: 5-1
		Date: MAY 1996	Plot Scale: Design File SFL960M.DGN
		Dep. No.:	File No.:

5

4

3

2

1

D

C

B

A

D

C

B

A

5

4

3

2

1

5-2

- Placement of additional quarry run stone and regrading of channel side slopes to repair scour damage from high water events.
- Repair of corrosion and holes in sheet piling.

#### **5.4 MAINTENANCE**

The following maintenance should be performed every four years for the life of the hydraulic structures or more frequently if annual inspections reveal deficiencies which must be corrected:

- Clear the stone protection upstream and downstream of the structures of all deep rooted vegetation such as trees.
- Remove trash, drift wood, and debris trapped upstream of the hydraulic structures.

The following maintenance should be accomplished as dictated by annual inspections:

- Removal of sediment build-up upstream of the water diversion structure.
- Drain water in habitat area and reestablish proper grade. It is anticipated that sediment will build up in the habitat area upstream of the water control structure.



## 6.0 MONITORING WELLS

### 6.1 DESCRIPTION

A total of 39 monitoring wells have been installed at the Southwest Funston Landfill site (See figure 6-1 for location plan). Six wells were installed in 1983 as required by the landfill closure plan. The risers in these wells have glued joints which renders them unusable for chemical monitoring. Twenty-one wells were installed in 1992 to support the Remedial Investigation. These wells were installed at 8 locations in clusters of two or three wells each. The well installation forms for the 1983 and 1992 wells are included in the Appendices of the Remedial Investigation Report for Southwest Funston Landfill. Twelve wells were installed in 1995 to support development of the Long Term Monitoring Plan for the site. The installation forms for those wells are on file in the Geology Section of the Kansas City District, Corps of Engineers. All monitoring wells installed at Southwest Funston landfill have protective covers and bumper posts. The 1992 and 1995 wells are equipped with dedicated bladder pumps. Water level sending gages, maintained by the US Geologic Survey are installed in the 1995 wells.

### 6.2 INSPECTION

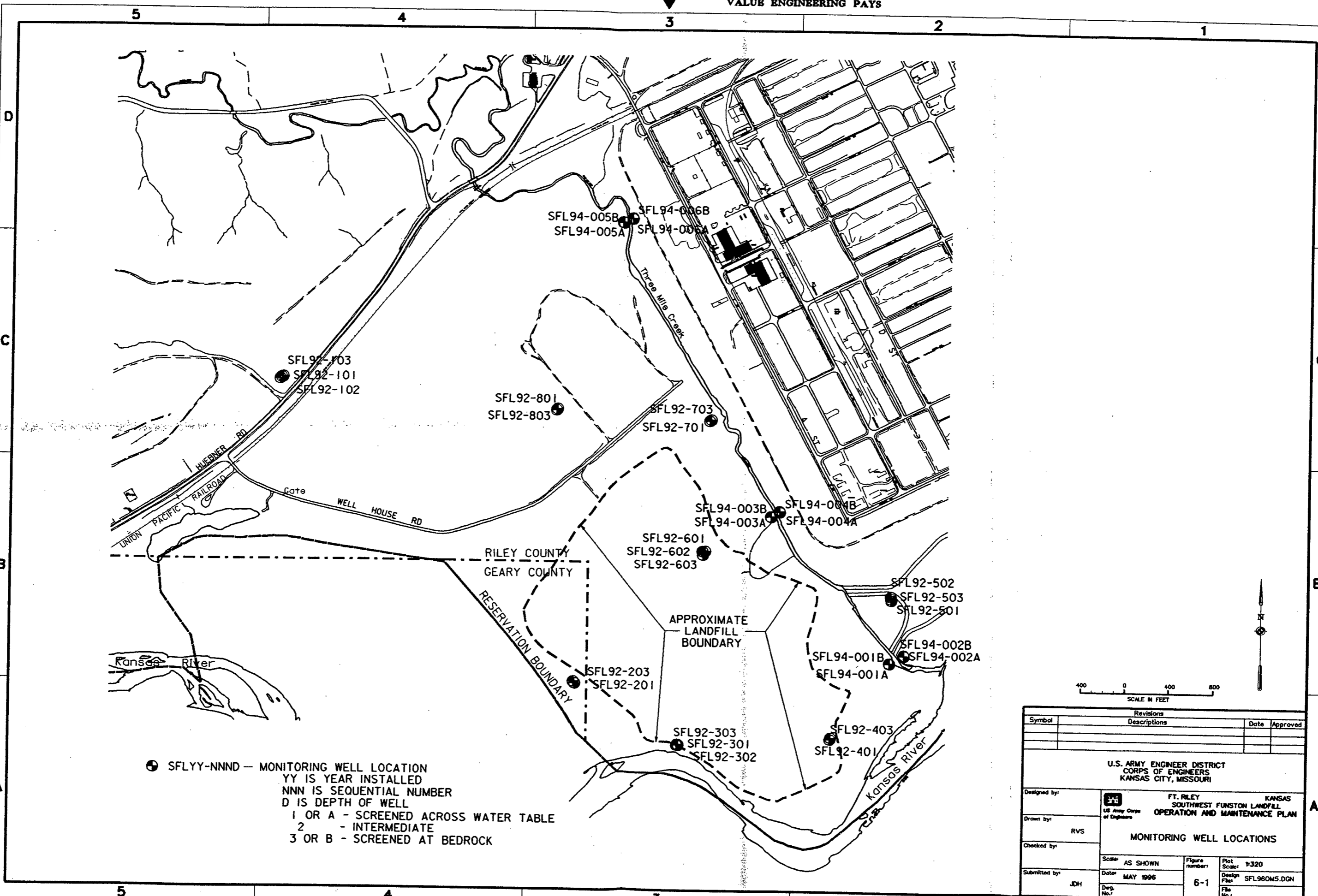
Monitoring well components will be inspected as indicated:

- Protective covers for damage and/or signs of vandalism or tampering.
- Concrete pad and protective posts for signs of damage or spalling.
- Weep hole in the protective cover too insure it is clear and free to drain.
- Survey marker mounted in the concrete pad to insure it is securely mounted and legible.
- Locks - Presence, integrity, and secured.
- The condition of the well riser and the serviceability of the bladder pumps will be noted during periodic sampling of the wells by a contractor with an approved Site Safety and Health Plan (SSHP).

### 6.3 REPAIR

The majority of the repairs for the monitoring wells will be on an "as-needed" basis. All items found to be damaged during site inspections will be repaired. The original well installation forms will serve as basic guidance in selecting proper materials and techniques for the repairs so that they are compatible with the original construction. Repairs which might be required include:

- Replacement of protective cover, concrete pad, survey marker, bladder pump or protective posts.



#### **6.4 MAINTENANCE**

The following maintenance should be performed every four years for the life of the monitoring wells or more frequently if annual inspections reveal deficiencies which must be corrected:

- Clear tree saplings and high brush within a 25 foot radius of each well.

The following maintenance should be accomplished as dictated by annual inspections:

- Corrosion control and paint protective covers and protective posts.

## **7.0 SITE ACCESS CONTROLS**

### **7.1 DESCRIPTION OF SITE ACCESS CONTROLS**

The Institutional Controls Plan (ICP) specifies actions to be taken to limit future site uses in accordance with the requirements of the Record of Decision. The plan includes the posting of signs and the maintenance of a locked site access gate (See figure 7-1).

### **7.2 INSPECTION OF SIGNPOSTS/ACCESS GATE**

The signposts and access gate will be inspected as follows:

- Access gate for serviceability and ease of operation.
- Access gate for lock presence, serviceability and secured position.
- Access gate for signs of bypassing.
- Signposts for presence, legibility, serviceability and observability.

### **7.3 REPAIR OF SIGNPOSTS/ACCESS GATES**

The majority of the repairs for the signposts and access gate will be on an "as-needed" basis. All items found to be damaged during site inspections will be repaired. The Institutional Controls Plan will serve as basic guidance in selecting proper materials and techniques for the repairs so that they are compatible with the original construction. Repairs which might be required include:

- Replacement of access gate/signs due to damage or future approved changes in wording of signs.
- Installation of bumper posts to prevent bypassing of the access gate if the inspection indicates that is occurring.

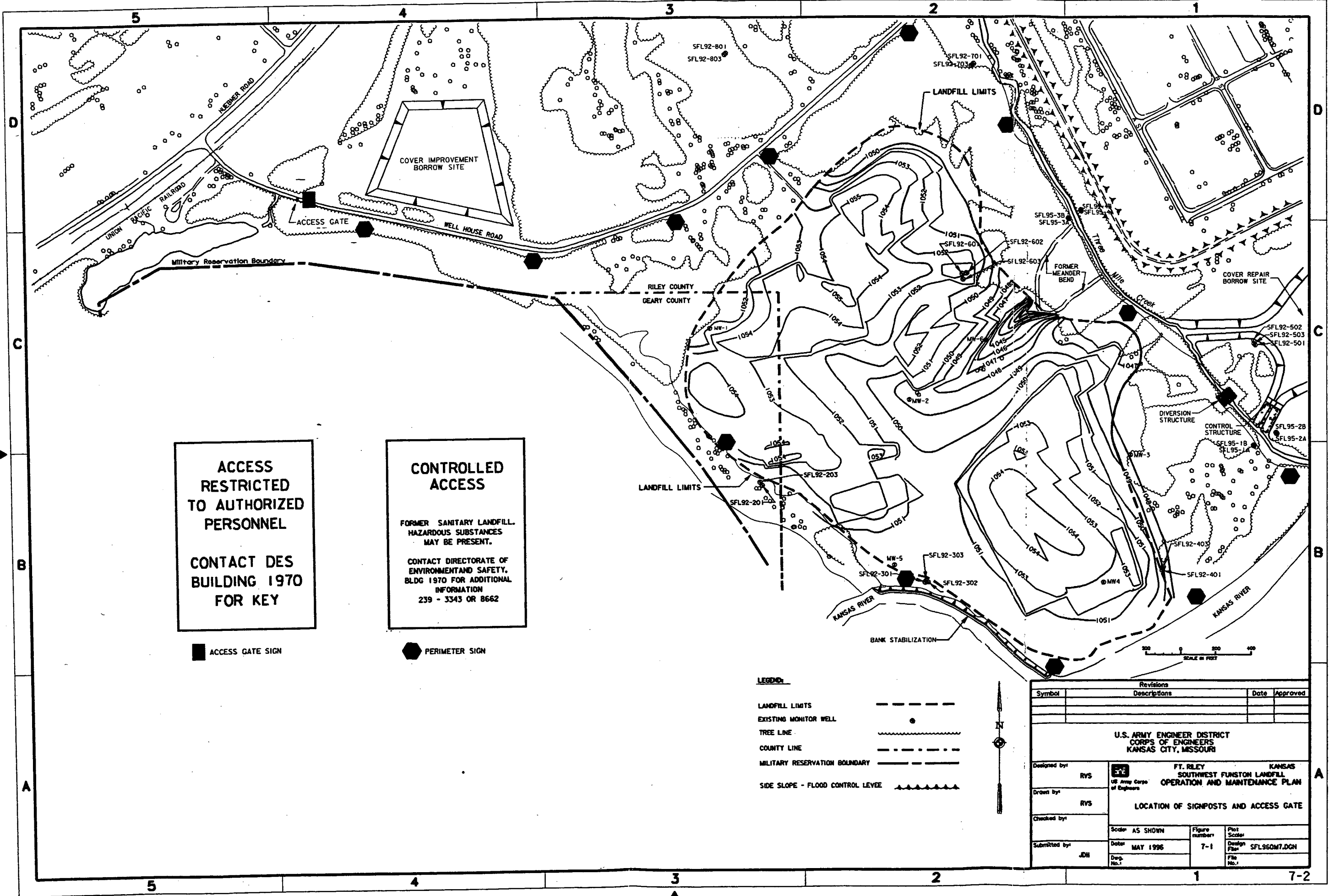
### **7.4 MAINTENANCE OF SIGNPOSTS AND ACCESS GATE**

The following maintenance should be performed every four years for the life of the site access controls or more frequently if annual inspections reveal deficiencies which must be corrected:

- Clear tree saplings and high brush which restricts observability of posted signs..

The following maintenance should be accomplished as dictated by annual inspections:

- Corrosion control and paint sign posts and access gate.
- Replace signs if they become illegible.



**ACCESS RESTRICTED TO AUTHORIZED PERSONNEL**

**CONTACT DES BUILDING 1970 FOR KEY**

**CONTROLLED ACCESS**

FORMER SANITARY LANDFILL. HAZARDOUS SUBSTANCES MAY BE PRESENT.

CONTACT DIRECTORATE OF ENVIRONMENT AND SAFETY, BLDG 1970 FOR ADDITIONAL INFORMATION

239 - 3343 OR 8662

ACCESS GATE SIGN

PERIMETER SIGN

**LEGEND**

LANDFILL LIMITS	---
EXISTING MONITOR WELL	●
TREE LINE	~~~~~
COUNTY LINE	- - - - -
MILITARY RESERVATION BOUNDARY	— · — · —
SIDE SLOPE - FLOOD CONTROL LEVEE	▲▲▲▲▲

Revisions			
Symbol	Descriptions	Date	Approved
<b>U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI</b>			
Designed by:	RYS	<b>FT. RILEY SOUTHWEST FUNSTON LANDFILL OPERATION AND MAINTENANCE PLAN</b>	
Drawn by:	RYS		
Checked by:		Scale: AS SHOWN	Figure number: 7-1
Submitted by:	JDH	Date: MAY 1996	Design File: SFL960M7.DGN

## 8.0 REFERENCES

Code of Federal Regulations (CFR), Title 40, Part 258, Subpart F, as amended at 57 Federal Register 28626, June 26, 1992.

Engineering Evaluation/Cost Analysis (EE/CA) for Remedial Investigation/Feasibility Study, Southwest Funston Landfill, Fort Riley, Kansas, July, 1994.

Federal Facility Agreement (FFA), USEPA Region VII, State of Kansas and U.S. Army, Fort Riley, Docket No. VII-90-F-0015, February 28, 1991.

Feasibility Study (FS) Report for Remedial Investigation/Feasibility Study, Southwest Funston Landfill, Fort Riley, Kansas, April 1994.

Kansas Administrative Regulations (KAR), Agency 28, Article 29, Part 4, effective October 24, 1994.

Proposed Plan (PP), Southwest Funston Landfill, Operable Unit 001, Fort Riley, Kansas, November 1994.

Remedial Investigation (RI) Report for Southwest Funston Landfill, Fort Riley, Kansas, October 1993, Revised April 1994.

Record of Decision (ROD), Southwest Funston Landfill, Operable Unit No. 001, Fort Riley, Kansas, June 15, 1995.

Long-Term Groundwater Monitoring Plan, Southwest Funston Landfill, Operable Unit No. 001, Fort Riley, Kansas, January 1997.

Institutional Controls Plan, Southwest Funston Landfill, Operable Unit No. 001, Fort Riley, Kansas, September 1997.

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**APPENDIX A**

**INSPECTION FORMS**

# RECORD OF INSPECTION

## DETAILED COMMENTS

**FACILITY:** SOUTHWEST FUNSTON LANDFILL  
**LOCATION:** FORT RILEY, KANSAS

**DATE INSPECTION PERFORMED:** \_\_\_\_\_

**INSPECTOR:** \_\_\_\_\_

**STRUCTURE INSPECTED:** \_\_\_\_\_

**DESCRIPTION OF OBSERVED CONDITION:**

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**RECOMMENDATION:**

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## RECORD OF INSPECTION - NATIVE SOIL COVER

FACILITY: SOUTHWEST FUNSTON LANDFILL  
 LOCATION: FORT RILEY, KANSAS

DATE INSPECTION PERFORMED: \_\_\_\_\_

WEATHER CONDITIONS

TEMPERATURE: \_\_\_\_\_

PRECIPITATION: \_\_\_\_\_

SKY: \_\_\_\_\_

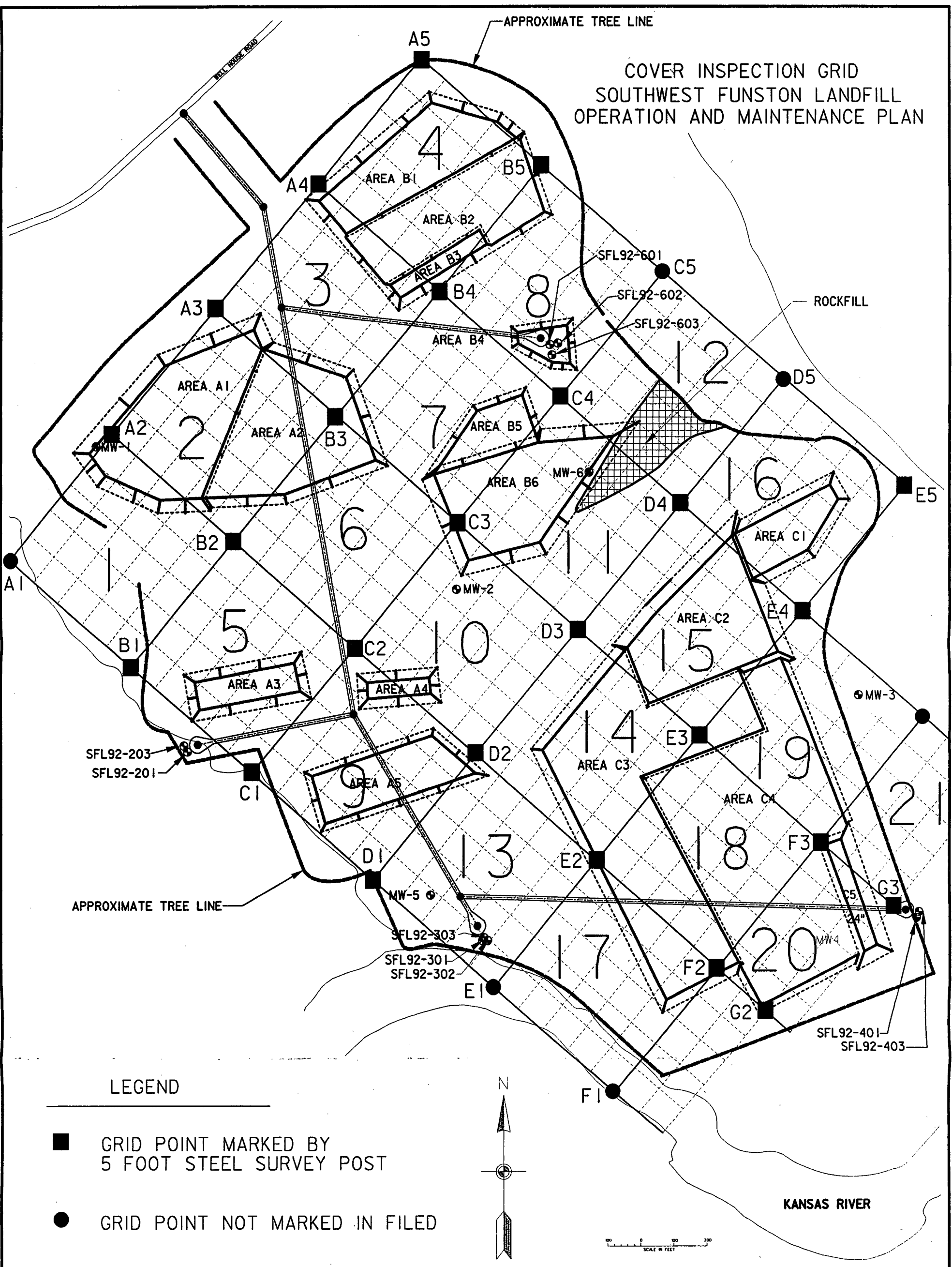
INSPECTOR	ORGANIZATION	DISCIPLINE

OBSERVED CONDITION	LANDFILL ZONE*																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
SETTLEMENT																					
PONDING																					
SLOUGHING																					
EROSION																					
SAPLINGS																					
BURROWS																					
SUBSIDENCE																					
OBSTRUCTIONS																					
DISTRESSED VEGETATION																					
BARE SPOTS																					
SATURATED CONDITION																					
EROSION/RUTS IN ROAD	■			■						■	■	■		■	■	■			■		■
DEPRESSION IN ROCKFILL	■	■	■	■	■	■	■	■	■	■			■	■	■	■	■	■	■	■	■
EROSION OF ROCKFILL	■	■	■	■	■	■	■	■	■	■			■	■	■	■	■	■	■	■	■
DEBRIS IN ROCKFILL	■	■	■	■	■	■	■	■	■	■			■	■	■	■	■	■	■	■	■
SAPLINGS IN ROCKFILL	■	■	■	■	■	■	■	■	■	■			■	■	■	■	■	■	■	■	■

\* Landfill Zones are indicated on the attached plan - nodal points on grid are marked with six foot posts on the landfill

O - Observed	U - Urgent Requirement
R - Requires Repair	N - Normal Requirement
M - Requires Maintenance	# - Number of Occurrences in Zone

COVER INSPECTION GRID  
SOUTHWEST FUNSTON LANDFILL  
OPERATION AND MAINTENANCE PLAN



LEGEND

- GRID POINT MARKED BY 5 FOOT STEEL SURVEY POST
- GRID POINT NOT MARKED IN FIELD

## RECORD OF INSPECTION - HYDRAULIC STRUCTURES

FACILITY: SOUTHWEST FUNSTON LANDFILL  
 LOCATION: FORT RILEY, KANSAS

DATE INSPECTION PERFORMED: \_\_\_\_\_

INSPECTOR	ORGANIZATION	DISCIPLINE

**WEATHER CONDITIONS**

TEMPERATURE: \_\_\_\_\_

PRECIPITATION: \_\_\_\_\_

SKY: \_\_\_\_\_

OBSERVED CONDITION	WATER DIVERSION STRUCTURE			WATER CONTROL STRUCTURE		
	UPSTREAM ROCKFILL	DOWNSTREAM ROCKFILL	SHEET PILING	DOWNSTREAM ROCKFILL	CONCRETE STRUCTURE	WOOD BAFFLES AND FRAME
SCOUR						
EROSION						
HIGH WATER DAMAGE						
DEEP ROOTED VEGETATION						
DEBRIS/LOG JAMS						
CRACK/SPALL/ROT						
SEDIMENT BUILDUP						
CORROSION/LEAKING						

O - Observed  
 R - Requires Repair  
 M - Requires Maintenance

U - Urgent Requirement  
 N - Normal Requirement

## RECORD OF INSPECTION - BANK STABILIZATION

FACILITY: SOUTHWEST FUNSTON LANDFILL  
 LOCATION: FORT RILEY, KANSAS

DATE INSPECTION PERFORMED: \_\_\_\_\_

WEATHER CONDITIONS

TEMPERATURE: \_\_\_\_\_

PRECIPITATION: \_\_\_\_\_

SKY: \_\_\_\_\_

INSPECTOR	ORGANIZATION	DISCIPLINE

OBSERVED CONDITION	REVETMENT SECTION*																
	A	A-B	B-C	C-D	D-E	E-F	F-G	G-H	H-I	I-J	J-K	K-L	L-M	M-N	N-O	O-P	P
SETTLEMENT																	
SLOUGHING																	
EROSION																	
DEEP ROOTED PLANTS																	
WEATHERING																	
HIGH WATER DAMAGE																	
DEBRIS/LOG JAMS																	
SCOUR HOLES																	
UPSTREAM FLANKING																	
DOWNSTREAM EROSION																	
OPPOSITE BANK EROSION																	

\* Revetment Sections are indicated on Figure 4-1. Page 4-2 of Basic O&M Plan

- |                          |                                   |
|--------------------------|-----------------------------------|
| O - Observed             | U - Urgent Requirement            |
| R - Requires Repair      | N - Normal Requirement            |
| M - Requires Maintenance | # - Number of Occurrences in Zone |

## RECORD OF INSPECTION - MONITORING WELLS

FACILITY: SOUTHWEST FUNSTON LANDFILL

DATE INSPECTION PERFORMED: \_\_\_\_\_

LOCATION: FORT RILEY, KANSAS

WEATHER CONDITIONS: \_\_\_\_\_

TEMP: \_\_\_\_\_

PRECIP: \_\_\_\_\_

SKY: \_\_\_\_\_

INSPECTOR	ORGANIZATION	DISCIPLINE

WELL ID	WELL INSPECTED Y/N	OBSERVED CONDITIONS							REMARKS
		COVER - DAMAGE / CORROSION	CONC. PAD - SPALL / DAMAGE	POSTS - DAMAGE / CORROSION	WEEP HOLE CLOGGED	SURVEY MARKER SECURE	SURVEY MARKER LEGIBLE	LOCK PRESENT	
SFL92-101,102,103									
SFL92-201,202									
SFL92-301,302,303									
SFL92-401,403									
SFL92-601,602,603									
SFL92-701,703									
SFL92-801,803									
SFL97-901,903									
SFL94-001A & B									
SFL94-002A & B									
SFL94-003A & B									
SFL94-004A & B									
SFL94-005A & B									
SFL94-006A & B									

DO NOT OPEN PROTECTIVE WELL COVER - HARMFUL VAPORS MAY BE PRESENT

O - Observed  
 R - Requires Repair  
 M - Requires Maintenance

U - Urgent Requirement  
 N - Normal Requirement

## RECORD OF INSPECTION - SIGNPOSTS/ACCESS GATE

FACILITY: SOUTHWEST FUNSTON LANDFILL  
 LOCATION: FORT RILEY, KANSAS

DATE INSPECTION PERFORMED: \_\_\_\_\_  
 WEATHER CONDITIONS: \_\_\_\_\_  
 TEMP: \_\_\_\_\_  
 PRECIP: \_\_\_\_\_  
 SKY: \_\_\_\_\_

INSPECTOR	ORGANIZATION	DISCIPLINE

SIGN NUMBER * *	OBSERVED CONDITIONS								REMARKS
	PRESENT	SIGN LEGIBLE	SERVICE ABLE	OBSERVABLE	CORROSION	LOCK PRESENT	LOCK SECURED	GATE OPERABLE	
A-1									
P-1									
P-2									
P-3									
P-4									
P-5									
P-6									
P-7									
P-8									
P-9									
P-10									
P-11									
P-12									
P-13									
P-14									
P-15									
P-16									

\* Sign Numbering will be established after ICP is approved and indicated on Fig 7-1, Page 7-2 of Basic O&M Plan

O - Observed  
 R - Requires Repair  
 M - Requires Maintenance

U - Urgent Requirement  
 N - Normal Requirement

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**APPENDIX B**

**AS-BUILT PHOTOGRAPHS**

## BANK STABILIZATION



View of Quarry Run Stone Revetment looking upstream (October 27, 1994). The revetment runs parallel to the north bank of the Kansas River and baffles extend perpendicular from revetment to original bank.



Close-up view (October 27, 1994) of quarry run stone baffle running perpendicular to revetment and original river bank.



## NATIVE SOIL COVER



View of Native Soil Cover in southeast quadrant of landfill during placement of fill under Cover improvement Project (July 30, 1996).



View of Native Soil Cover looking from southeast quadrant towards center of landfill. (July, 1996)

## HYDRAULIC STRUCTURES



View of sheet pile water diversion structure looking upstream on Threemile Creek (July 30, 1996).  
The channel bottom and sideslopes are protected with quarry run stone 40 feet  
upstream and downstream from the water diversion structure.



View of concrete water control structure looking upstream in outlet channel (July 30, 1996).  
The three 30 inch culvert pipe located in the center of structure can be fully or partially  
closed off with wood baffles to flood the waterfowl management area.

**COMPENDIUM**

**MAINTENANCE/REPAIR REPORTS**

**TECHNICAL MEMORANDA**

**HISTORICAL DOCUMENT DISTRIBUTION LISTS**

**MAINTENANCE/REPAIR REPORT REGISTER**  
**SOUTHWEST FUNSTON LANDFILL**  
**FORT RILEY, KANSAS**

REGISTER NUMBER	DATE REPORT PREPARED	DATE FILED IN COMPENDIUM	REMARKS
1			
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**TECHNICAL MEORANDUM REGISTER**  
**SOUTHWEST FUNSTON LANDFILL**  
**FORT RILEY, KANSAS**

REGISTER NUMBER	DATE TECH MEMO PREPARED	DATE FILED IN COMPENDIUM	REMARKS
1			
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**AS-BUILT RECORD DRAWINGS**

BANK STABILIZATION PROJECT

COVER REPAIR PROJECT

COVER IMPROVEMENT PROJECT



**US Army Corps  
of Engineers**

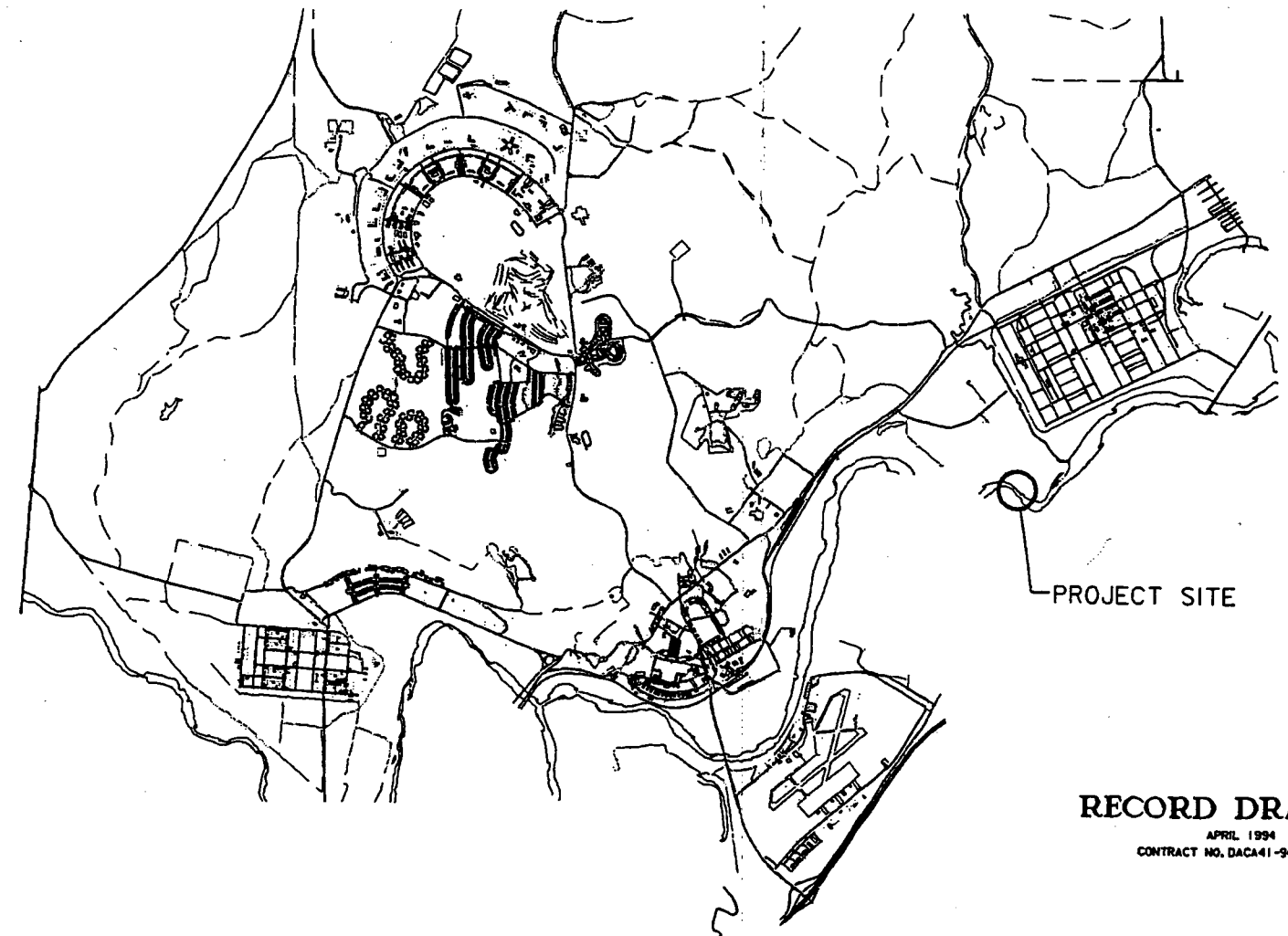
Kansas City District  
*Leaders In Customer Care*

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# BANK STABILIZATION

**SOUTHWEST FUNSTON LANDFILL  
FORT RILEY KANSAS**

**DECEMBER 1993**



**RECORD DRAWING**

APRIL 1994  
CONTRACT NO. DACA41-94-R-0013

INDEX OF DRAWINGS

GENERAL


- T-1 COVER SHEET
- T-2 INDEX OF DRAWINGS

CIVIL

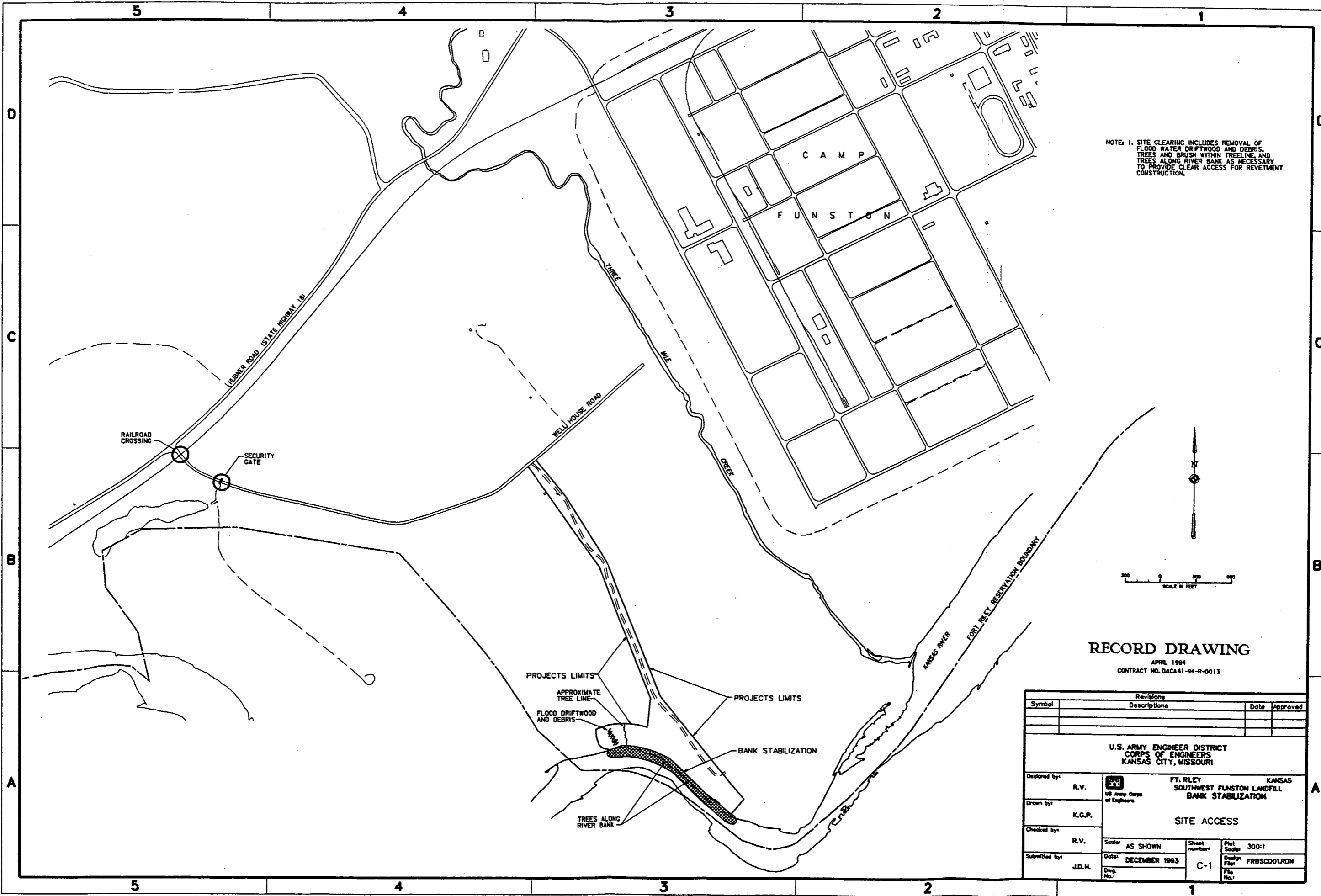
- C-1 SITE ACCESS
- C-2 BANK STABILIZATION PLAN
- C-3A BANK STABILIZATION SECTIONS 1-4
- C-3B BANK STABILIZATION SECTIONS 5-8
- C-4 BANK STABILIZATION SECTIONS 9-12
- C-5 BANK STABILIZATION SECTIONS 13-16

RECORD DRAWING

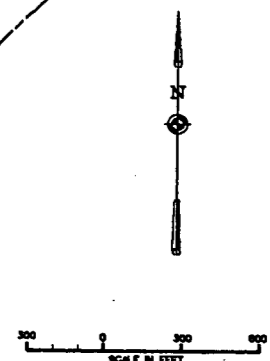
APRIL 1994  
CONTRACT NO. DACA41-94-R-0013

Revisions			
Symbol	Descriptions	Date	Approved
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	R.V.	 FT. RILEY KANSAS SOUTHWEST FUNSTON LANDFILL BANK STABILIZATION	
Drawn by:	K.G.P.	INDEX	
Checked by:	R.V.	Scale:	Plot Scale: 200:1
Submitted by:	J.D.H.	Date: DECEMBER 1993	Sheet number: T-2 Design File: FRBST002.RDN File No.:



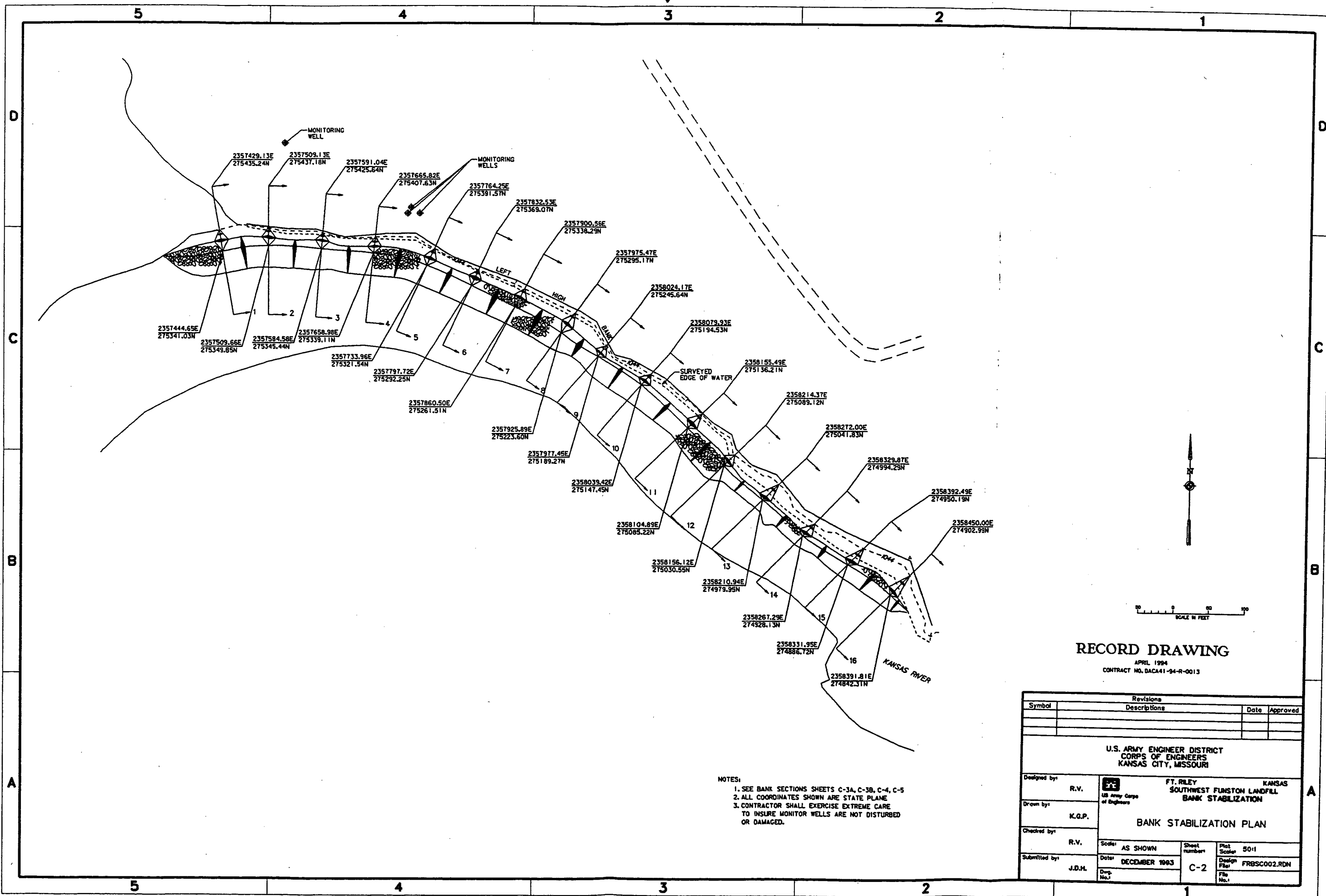


NOTE 1. SITE CLEARING INCLUDES REMOVAL OF FLOOD WATER DRIFTWOOD AND DEBRIS, TREES AND BRUSH WITHIN TREE LINE, AND TREES ALONG RIVER BANK AS NECESSARY TO PROVIDE CLEAR ACCESS FOR REVETMENT CONSTRUCTION.



**RECORD DRAWING**  
 APRIL 1994  
 CONTRACT NO. DACA41-94-R-0013

Revisions			
Symbol	Descriptions	Date	Approved
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	R.V.	FT. RILEY KANSAS SOUTHWEST FUNSTON LANDFILL BANK STABILIZATION	
Drawn by:	K.G.P.	SITE ACCESS	
Checked by:	R.V.	Scale: AS SHOWN	Sheet number: C-1
Submitted by:	J.D.H.	Date: DECEMBER 1993	Plot Scale: 300:1
		Dep. No.:	Design File: FRBSC001.RDN
			File No.:

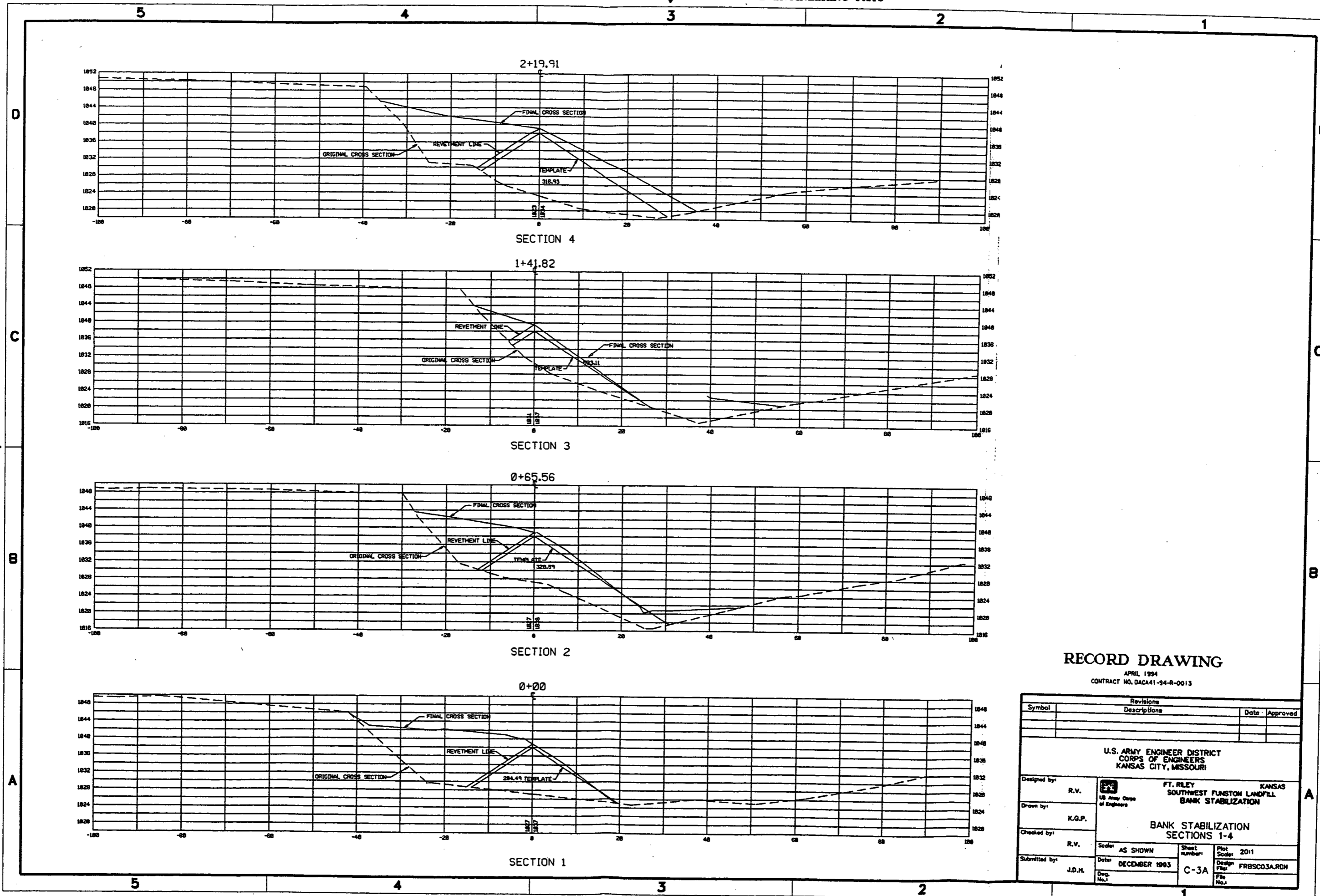


NOTES:  
 1. SEE BANK SECTIONS SHEETS C-3A, C-3B, C-4, C-5  
 2. ALL COORDINATES SHOWN ARE STATE PLANE  
 3. CONTRACTOR SHALL EXERCISE EXTREME CARE TO INSURE MONITOR WELLS ARE NOT DISTURBED OR DAMAGED.

**RECORD DRAWING**

APRIL 1994  
 CONTRACT NO. DACA41-94-R-0013

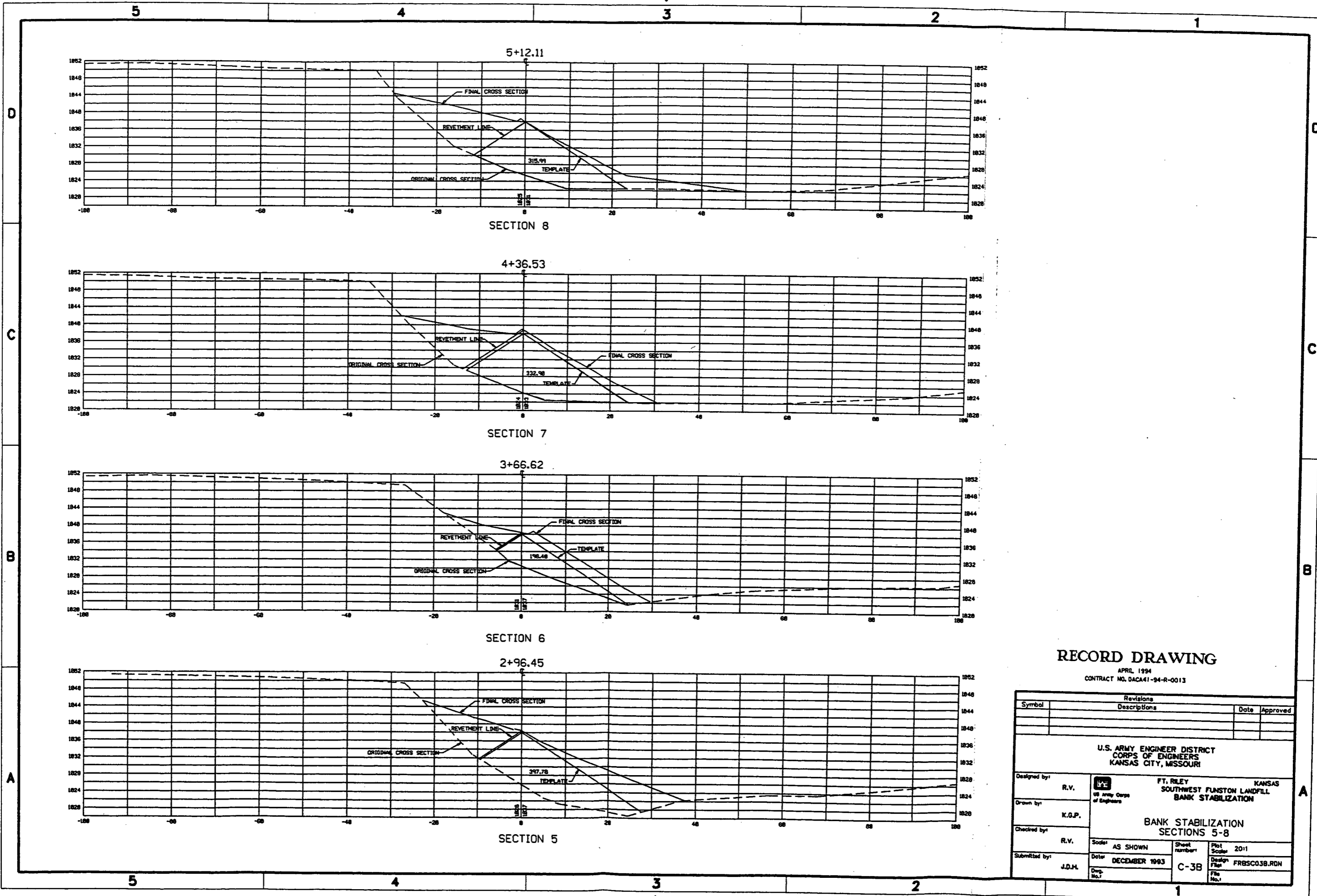
Revisions			
Symbol	Descriptions	Date	Approved
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	R.V.	FT. RILEY KANSAS SOUTHWEST FUNSTON LANDFILL BANK STABILIZATION	
Drawn by:	K.Q.P.	BANK STABILIZATION PLAN	
Checked by:	R.V.	Scale: AS SHOWN	Sheet number: C-2
Submitted by:	J.D.M.	Date: DECEMBER 1993	Plot Scale: 50:1
			Design File: FRSC002.RDN
			File No.:



RECORD DRAWING

APRIL 1994  
CONTRACT NO. DACA41-94-R-0013

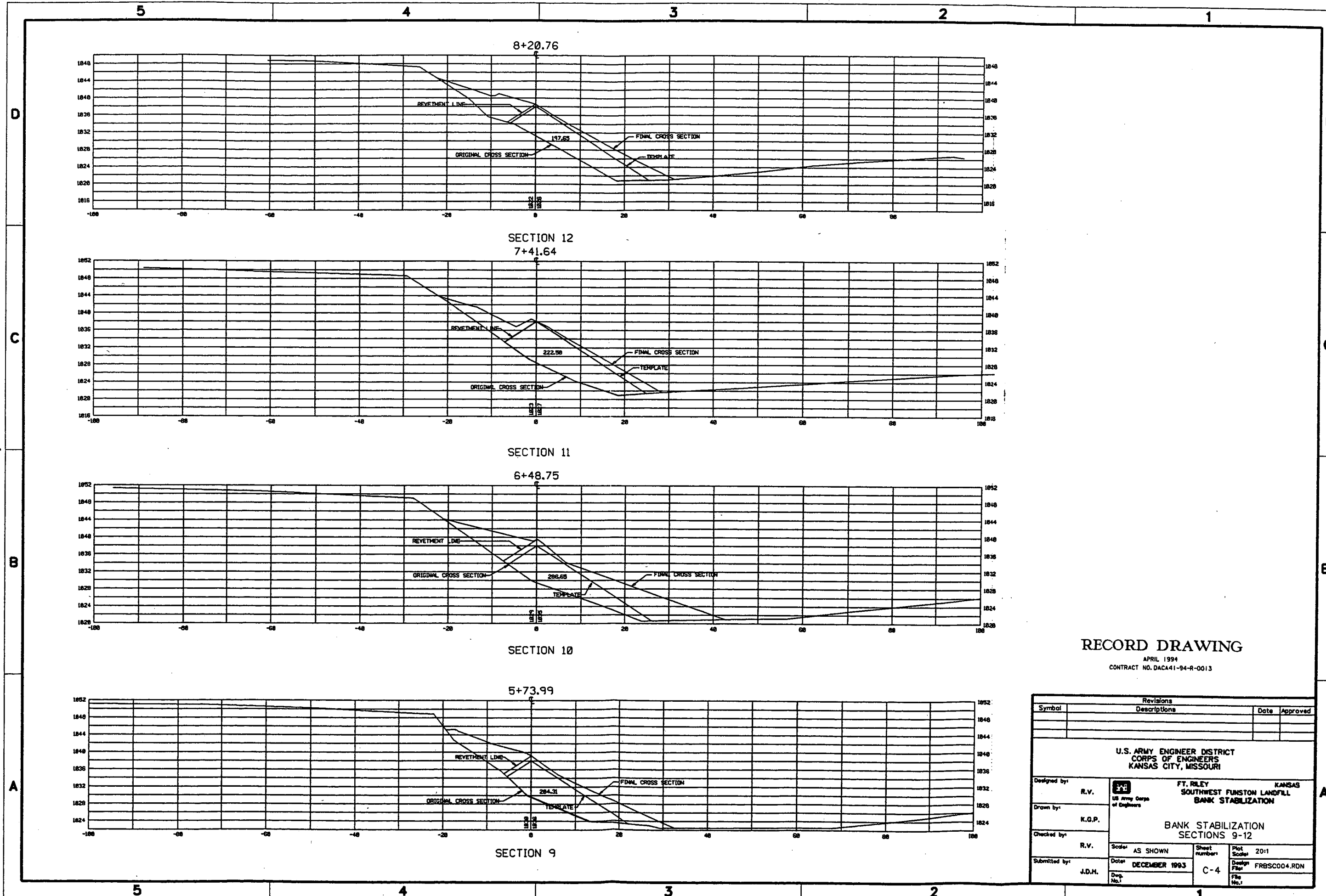
Revisions			
Symbol	Descriptions	Date	Approved
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	R.V.	<b>FT. RILEY KANSAS</b> SOUTHWEST FUNSTON LANDFILL BANK STABILIZATION	
Drawn by:	K.G.P.		
Checked by:	R.V.		
Submitted by:	J.D.H.		
Scale:	AS SHOWN	Sheet number:	C-3A
Date:	DECEMBER 1993	Plot Scale:	20:1
Design File:	FRBSC03A.RDN	File No.:	



RECORD DRAWING

APRIL 1994  
CONTRACT NO. DACA41-94-R-0013

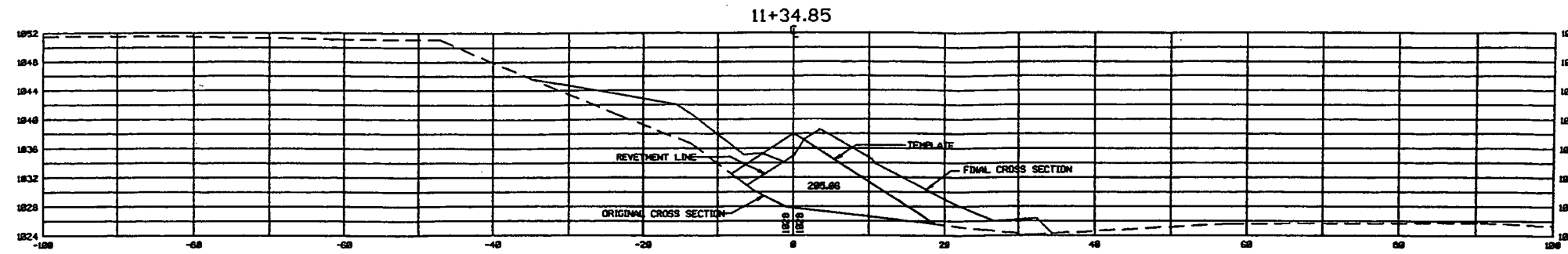
Revisions			
Symbol	Descriptions	Date	Approved
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	R.V.	 FT. RILEY SOUTHWEST FLANSTON LANDFILL BANK STABILIZATION	KANSAS BANK STABILIZATION SECTIONS 5-8
Drawn by:	K.G.P.		
Checked by:	R.V.		
Submitted by:	J.D.H.		
Scale:	AS SHOWN	Sheet number:	C-3B
Date:	DECEMBER 1993	Plot Scale:	2011
Draw. No.:		Design File:	FRBSC03B.RDN
		File No.:	



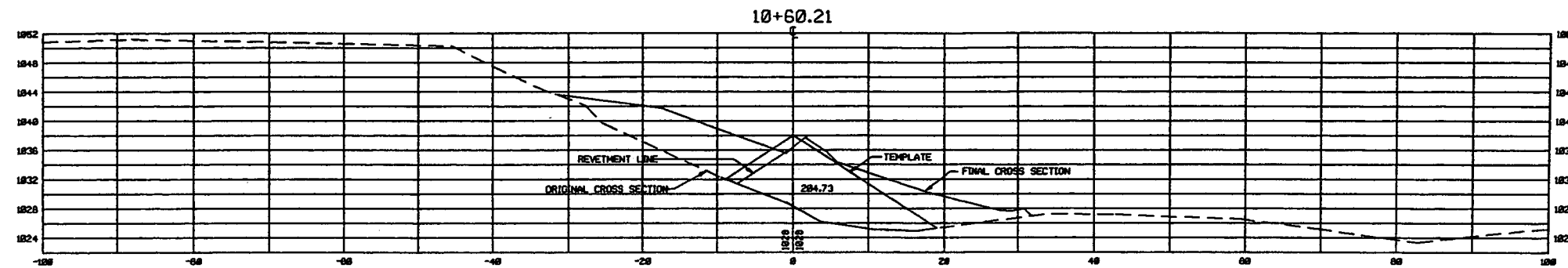
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APRIL 1994  
CONTRACT NO. DACA41-94-R-0013

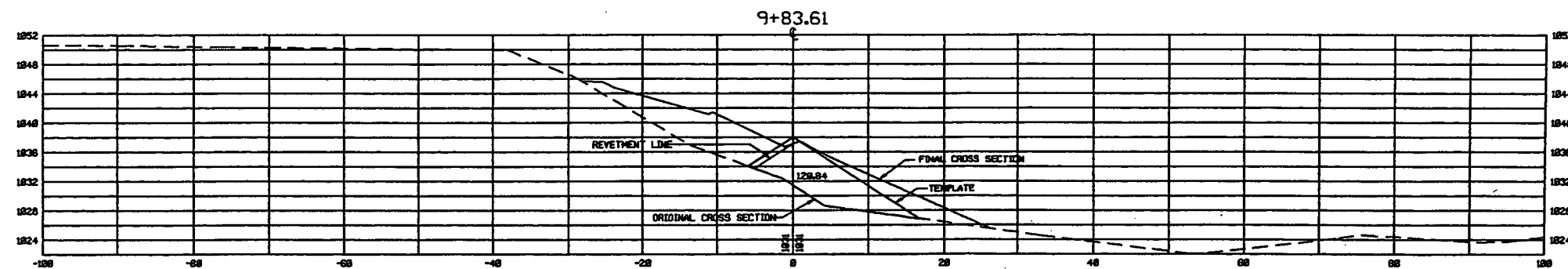
Revisions			
Symbol	Descriptions	Date	Approved
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	R.V.	FT. RILEY SOUTHWEST FUNSTON LANDFILL BANK STABILIZATION	
Drawn by:	K.G.P.		
Checked by:	R.V.	Scale: AS SHOWN	Sheet number: C-4
Submitted by:	J.D.H.	Date: DECEMBER 1993	Plot Scale: 20:1
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			File No.:



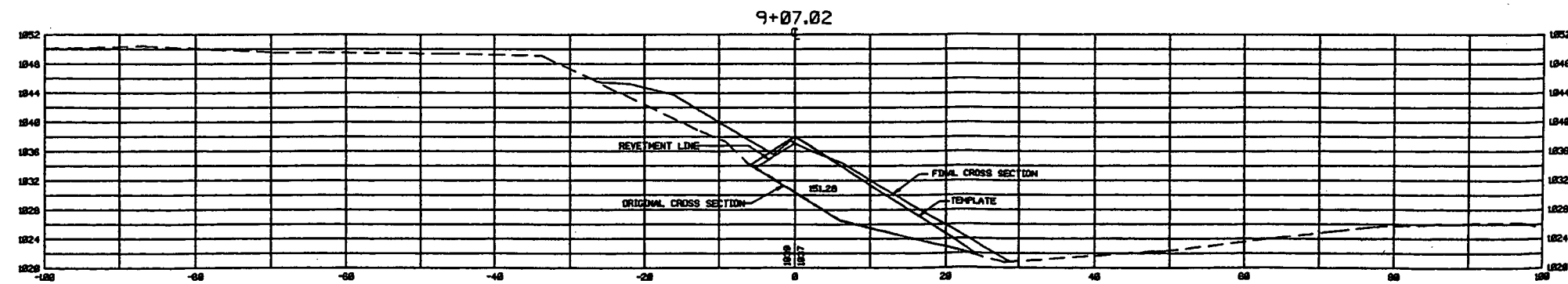
SECTION 16



SECTION 15



SECTION 14



SECTION 13

RECORD DRAWING

APRIL 1994  
CONTRACT NO. DAC411-94-R-0013

Revisions			
Symbol	Descriptions	Date	Approved
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	R.V.	FT. RILEY KANSAS SOUTHWEST FUNSTON LANDFILL BANK STABILIZATION	
Drawn by:	K.G.P.	BANK STABILIZATION SECTIONS 13-16	
Checked by:	R.V.	Scale: AS SHOWN	Sheet number: C-5
Submitted by:	J.D.H.	Date: DECEMBER 1993	Plot Scale: 20:1
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			File No.:



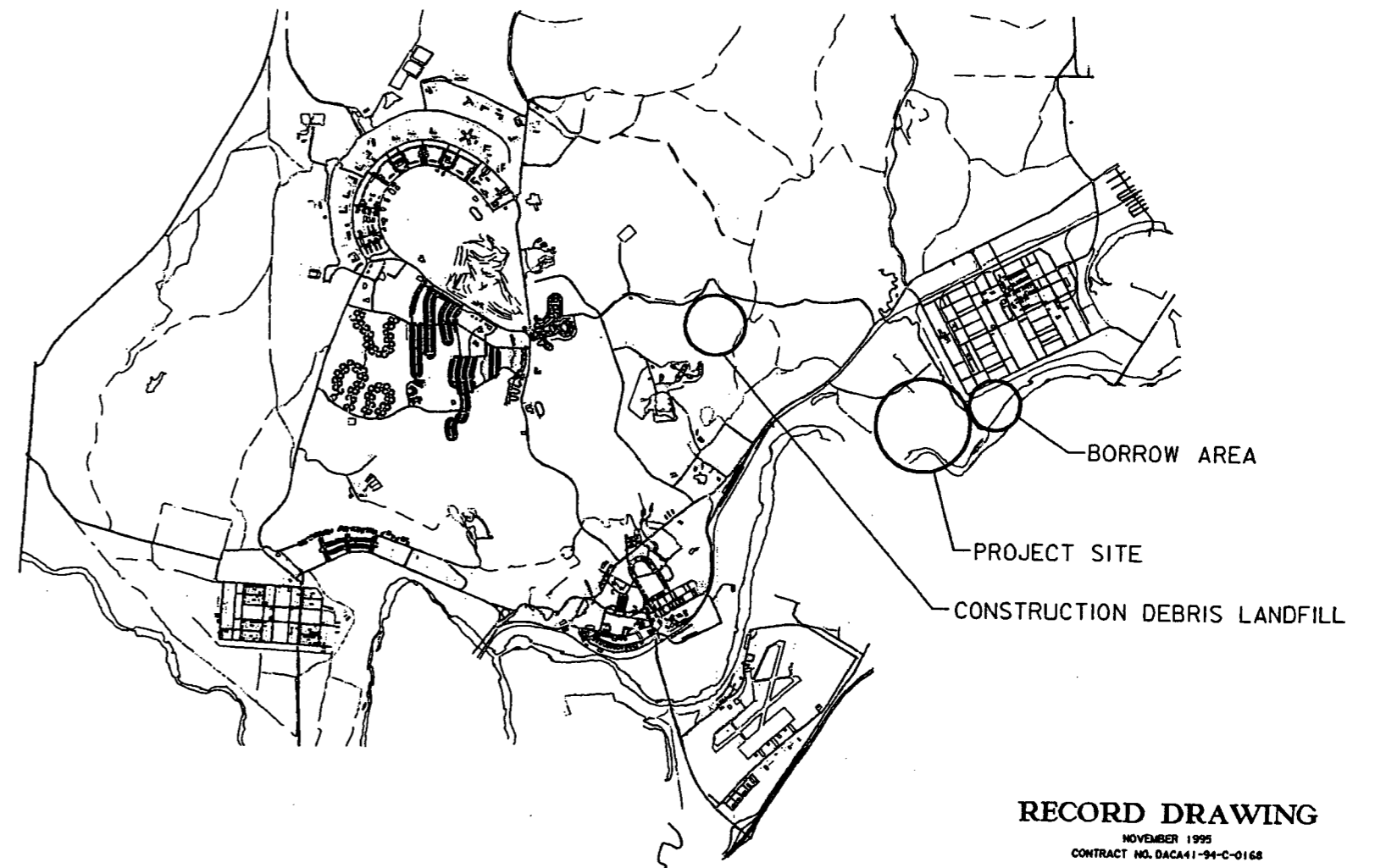
**US Army Corps  
of Engineers**

Kansas City District  
*Leaders In Customer Care*

# LANDFILL COVER REPAIR

**SOUTHWEST FUNSTON LANDFILL  
FORT RILEY KANSAS**

**JUNE 1994**



**RECORD DRAWING**

NOVEMBER 1995  
CONTRACT NO. DACA41-94-C-0168

INDEX OF DRAWINGS

GENERAL

- T-1 COVER SHEET
- T-2 INDEX
- T-3 SITE ACCESS

CIVIL

- C-1 EXISTING LANDFILL SITE PLAN
- C-2 COVER GRADING PLAN / CROSS SECTION LOCATIONS
- C-3 OUTLET CHANNEL
- C-4 BORROW AREA PLAN
- C-5 CROSS SECTIONS A - D
- C-6 CROSS SECTIONS E - I
- C-7 BORROW SITE WATER CONTROL STRUCTURE AND OTHER DETAILS
- C-8 BORROW AREA PLANTING & SOIL TREATMENT PLAN
- △ C-9 WATER DIVERSION STRUCTURE

RECORD DRAWING

NOVEMBER 1995  
CONTRACT NO. DAC41-94-C-0188

SIGNATURES AFFIXED BELOW INDICATE OFFICIAL RECOMMENDATION AND APPROVAL OF DRAWINGS IN THIS SET AS INDEXED ON THIS SHEET

APPROVAL RECOMMENDED:  
\_\_\_\_\_  
CHIEF, CE/TECHNICAL BRANCH

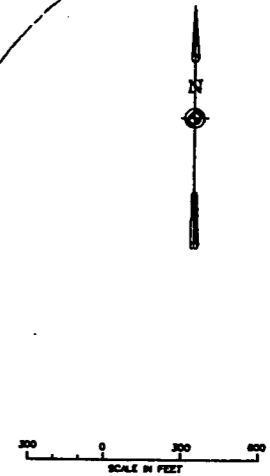
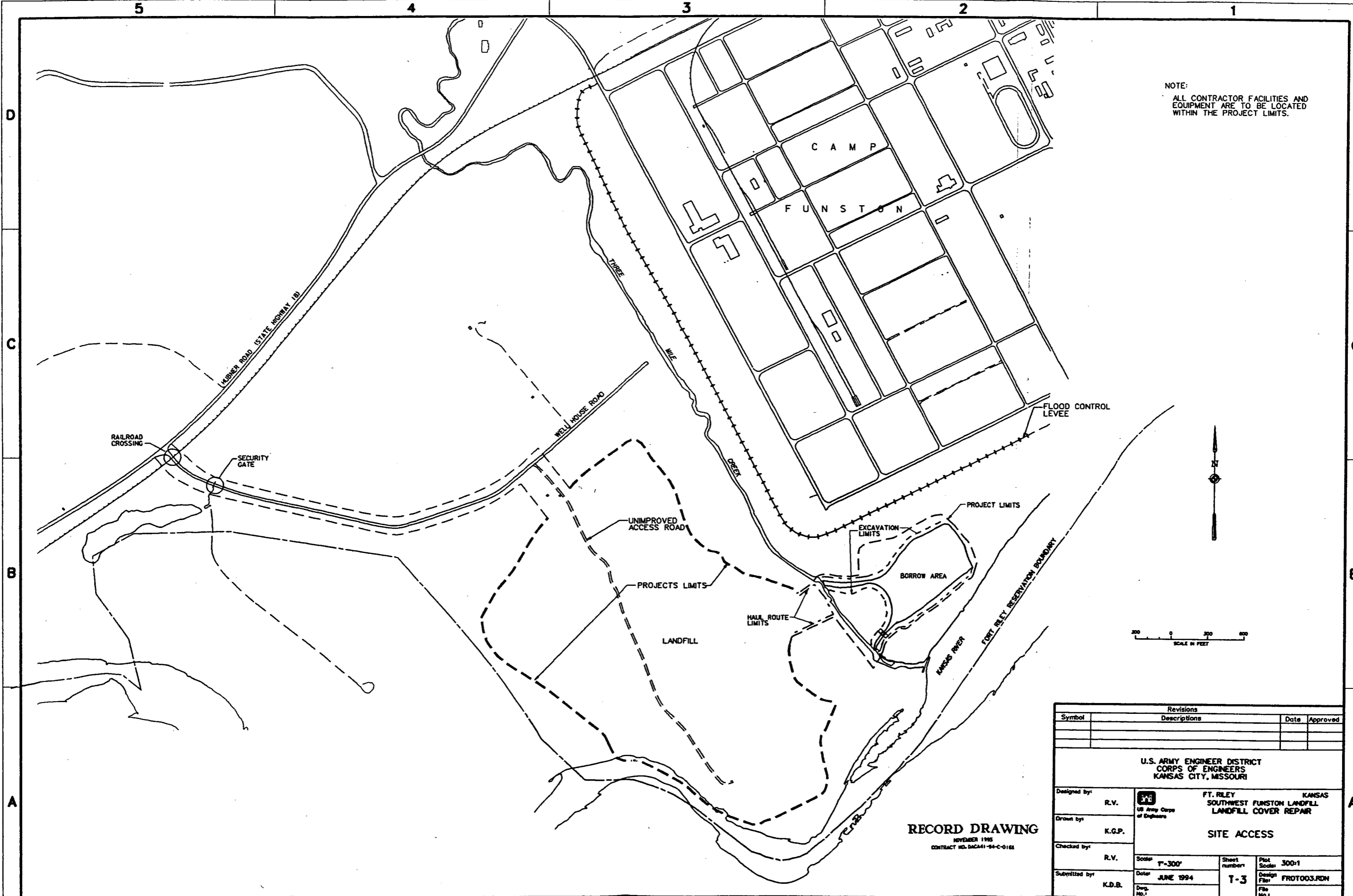
APPROVAL RECOMMENDED:  
\_\_\_\_\_  
CHIEF, ENGINEERING DIVISION

Revisions			
Symbol	Descriptions	Date	Approved
△	New Drawing Added per Amendment No. 003	9Aug94	RYS
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	R.V.	FT. RLEY KANSAS SOUTHWEST FUNSTON LANDFILL LANDFILL COVER REPAIR	
Drawn by:	K.G.P.	INDEX	
Checked by:	R.V.	Scale:	Sheet number: Plot Scale: 200:1
Submitted by:	K.D.B.	Date: JUNE 1994	Design File: PROT002.RDW
		Dep. No.:	File No.:
			T-2



VALUE ENGINEERING PAYS

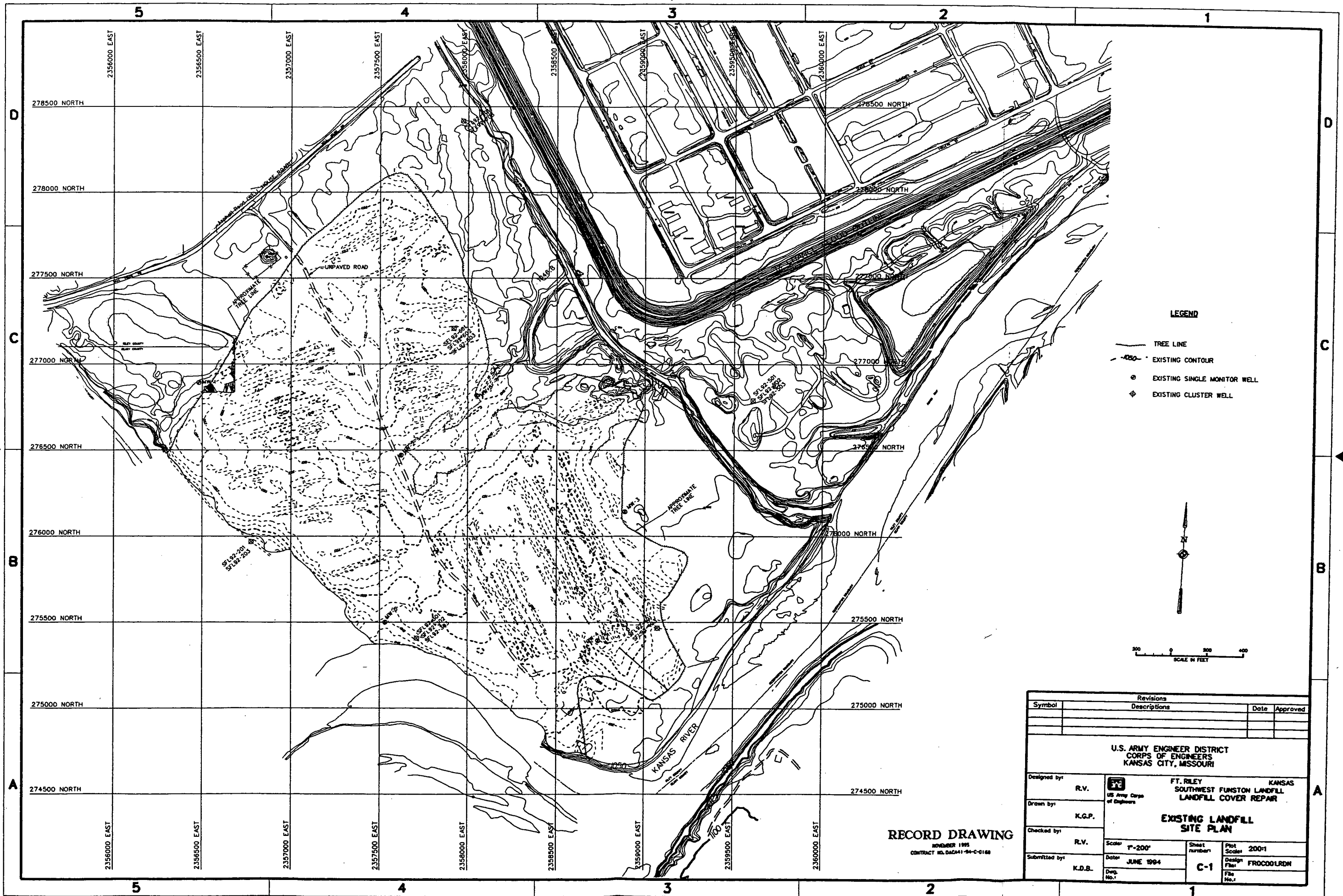
NOTE:  
ALL CONTRACTOR FACILITIES AND  
EQUIPMENT ARE TO BE LOCATED  
WITHIN THE PROJECT LIMITS.



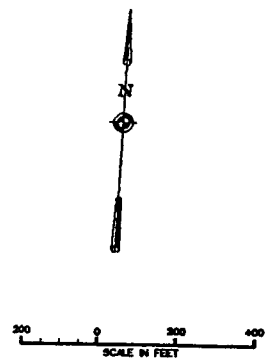
**RECORD DRAWING**  
NOVEMBER 1995  
CONTRACT NO. DACM41-94-C-0168

Revisions			
Symbol	Descriptions	Date	Approved
<b>U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI</b>			
Designed by:	R.V.	 U.S. Army Corps of Engineers	<b>FT. RILEY SOUTHWEST FUNSTON LANDFILL LANDFILL COVER REPAIR</b>
Drawn by:	K.G.P.		
Checked by:	R.V.	Scale:	Sheet number:
Submitted by:	K.D.B.	Date:	Plot Scale:

VALUE ENGINEERING PAYS



- LEGEND**
- TREE LINE
  - - - EXISTING CONTOUR
  - EXISTING SINGLE MONITOR WELL
  - ⊕ EXISTING CLUSTER WELL



Revisions			
Symbol	Descriptions	Date	Approved
<b>U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI</b>			
Designed by:	R.V.	<b>FT. RILEY SOUTHWEST FUNSTON LANDFILL LANDFILL COVER REPAIR</b>	
Drawn by:	K.G.P.		
Checked by:	R.V.	<b>EXISTING LANDFILL SITE PLAN</b>	
Submitted by:	K.D.B.		
Scale: 1"=200'		Sheet number: C-1	Plot Scale: 200:1
Date: JUNE 1994		Design File: FROCD0LRDN	File No.:
Dep. No.:			

**RECORD DRAWING**  
NOVEMBER 1995  
CONTRACT NO. D4C41-94-C-0166

VALUE ENGINEERING PAYS

GENERAL NOTES

1. REMOVE ALL TREES WITHIN PROJECT LIMITS EXCEPT THOSE MARKED FOR PROTECTION BY THE FORT RILEY NATURAL RESOURCES BRANCH.
2. EXTEND ALL MONITOR WELLS (DESIGNATED MW-XI) AND CLUSTER WELLS (DESIGNATED SFL92-XXXX) WITHIN "APPROXIMATE LIMITS OF COVER REPAIR" PER DETAIL ON SHEET C-7.
3. REMOVE AND STOCKPILE TOP 6" OF SOIL WITHIN LIMITS OF COVER REPAIR AFTER CLEARING, GRUBBING AND MOWING OPERATIONS ARE COMPLETED.
4. TREE PLANTING AREA IS TO BE FIRST PLANTED WITH NATIVE GRASS. CUTTINGS SHALL BE HARVESTED AND PLANTED IN THIS AREA IN ACCORDANCE WITH SECTION 4 SEEDING AND PLANTING OF THE SPECIFICATIONS. CUTTINGS SHALL BE PLANTED IN ROWS AT DISTANCES OF 10 FEET, 30 FEET, AND 50 FEET FROM THE TOP AND PARALLEL TO RIVER BANK. CUTTINGS SHALL BE PLANTED AT 7 FOOT INTERVALS IN EACH OF THE THREE ROWS.

LEGEND

- TREE LINE
- NEW CONTOUR 1' CONTOUR INTERVAL
- EXISTING CONTOUR 1' CONTOUR INTERVAL
- EXISTING SINGLE MONITOR WELL
- ◆ EXISTING CLUSTER WELL
- - - APPROXIMATE LIMITS OF COVER REPAIR

SURVEY CONTROL POINTS

ID NUMBER	NORTHING	EASTING	ELEVATION
SFL92-201	275989.27	235778.55	1046.00
SFL92-203	275987.22	235767.38	1047.30
SFL92-301	275397.67	2357706.99	1048.40
SFL92-302	275397.95	2357723.64	1048.50
SFL92-303	275406.63	2357711.67	1048.50
SFL92-401	275465.94	2359073.02	1048.20
SFL92-403	275483.76	2359080.34	1048.00
SFL92-501	276774.73	2359609.62	1047.40
SFL92-502	276806.60	2359604.37	1046.40
SFL92-503	276789.17	2359606.63	1045.00
SFL92-601	277208.53	2357919.89	1052.20
SFL92-602	277212.76	2357944.58	1051.90
SFL92-603	277176.13	2357925.98	1051.70



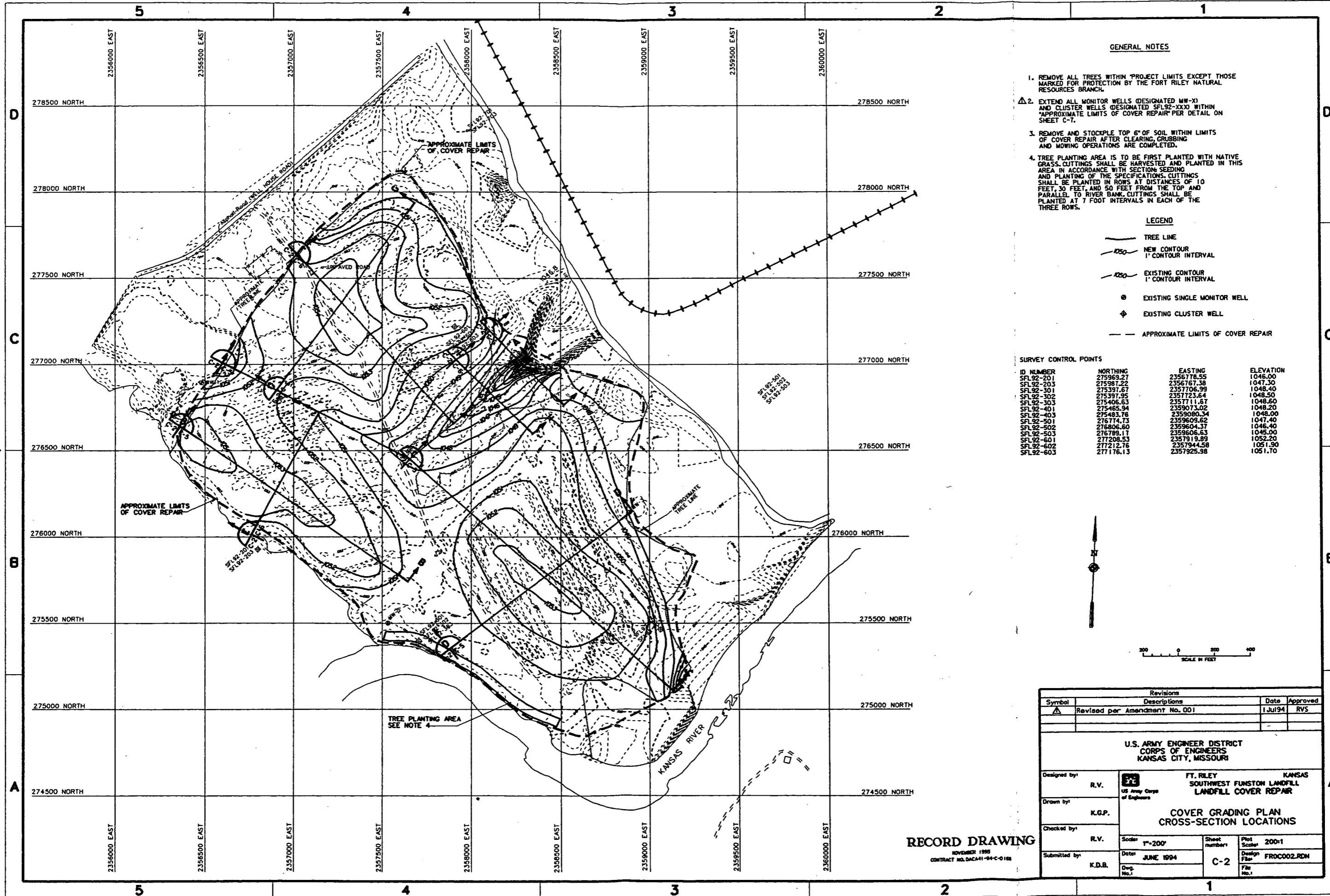
Revisions			
Symbol	Descriptions	Date	Approved
△	Revised per Amendment No. 001	1 Jul 94	RVS

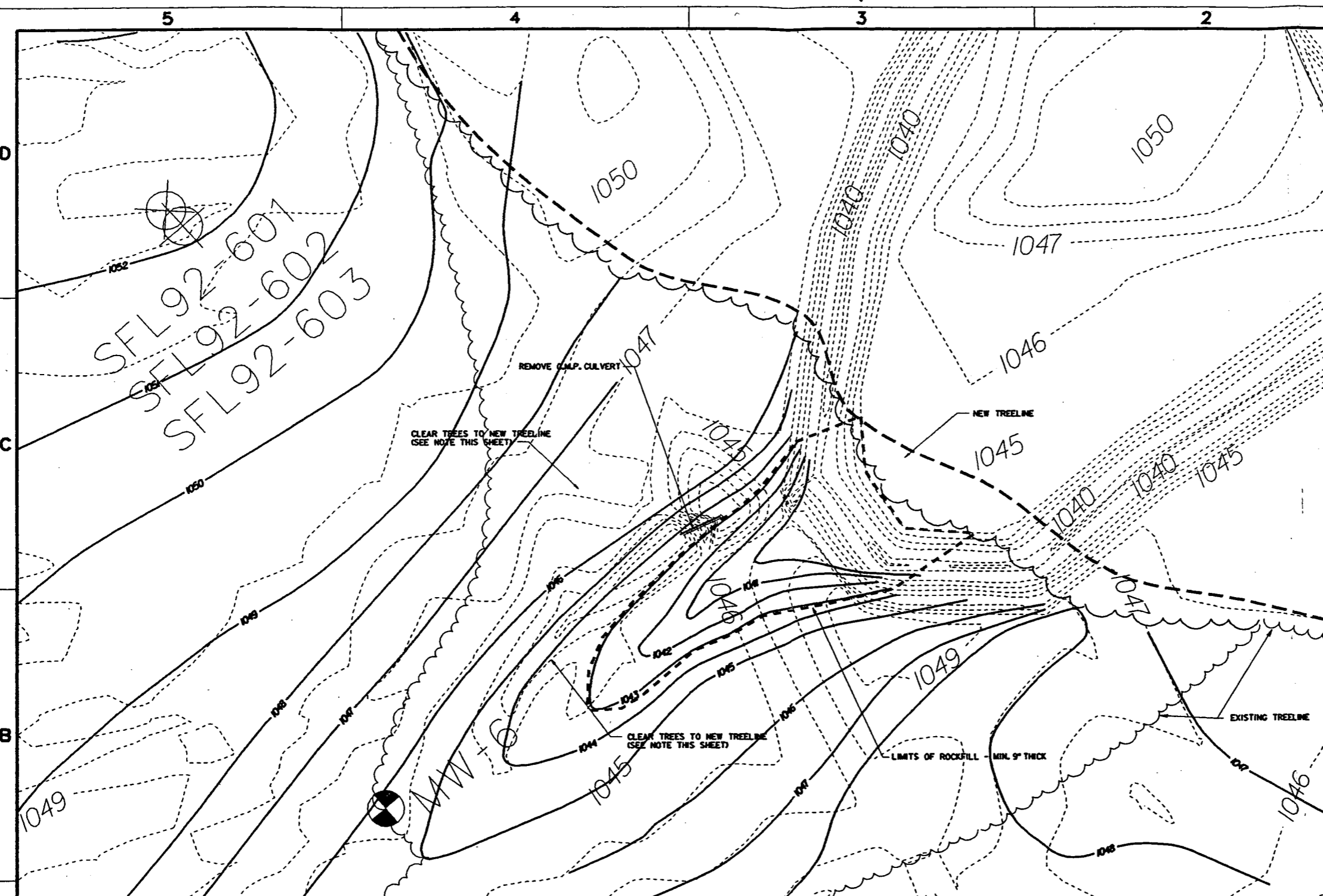
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	R.V.	FT. RILEY SOUTHWEST FUNSTON LANDFILL LANDFILL COVER REPAIR	
Drawn by:	K.G.P.		
Checked by:	R.V.	Scale:	1"=200'
Submitted by:	K.D.B.	Sheet number:	C-2
		Date:	JUNE 1994
		Plot Scale:	200:1
		Design File:	FROCO02.RDW
		Dwg. No.:	
		File No.:	

RECORD DRAWING

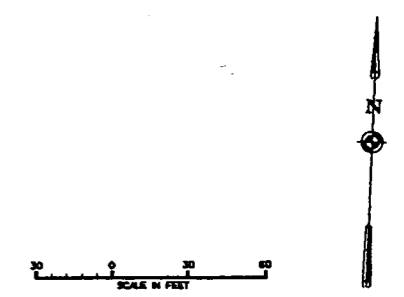
NOVEMBER 1993  
CONTRACT NO. DACA41-94-C-018



VALUE ENGINEERING PAYS



- LEGEND**
- TREE LINE
  - NEW TREE LINE
  - NEW CONTOUR  
1' CONTOUR INTERVAL
  - EXISTING SINGLE MONITOR WELL
  - EXISTING CLUSTER WELL
  - PROJECT LIMITS



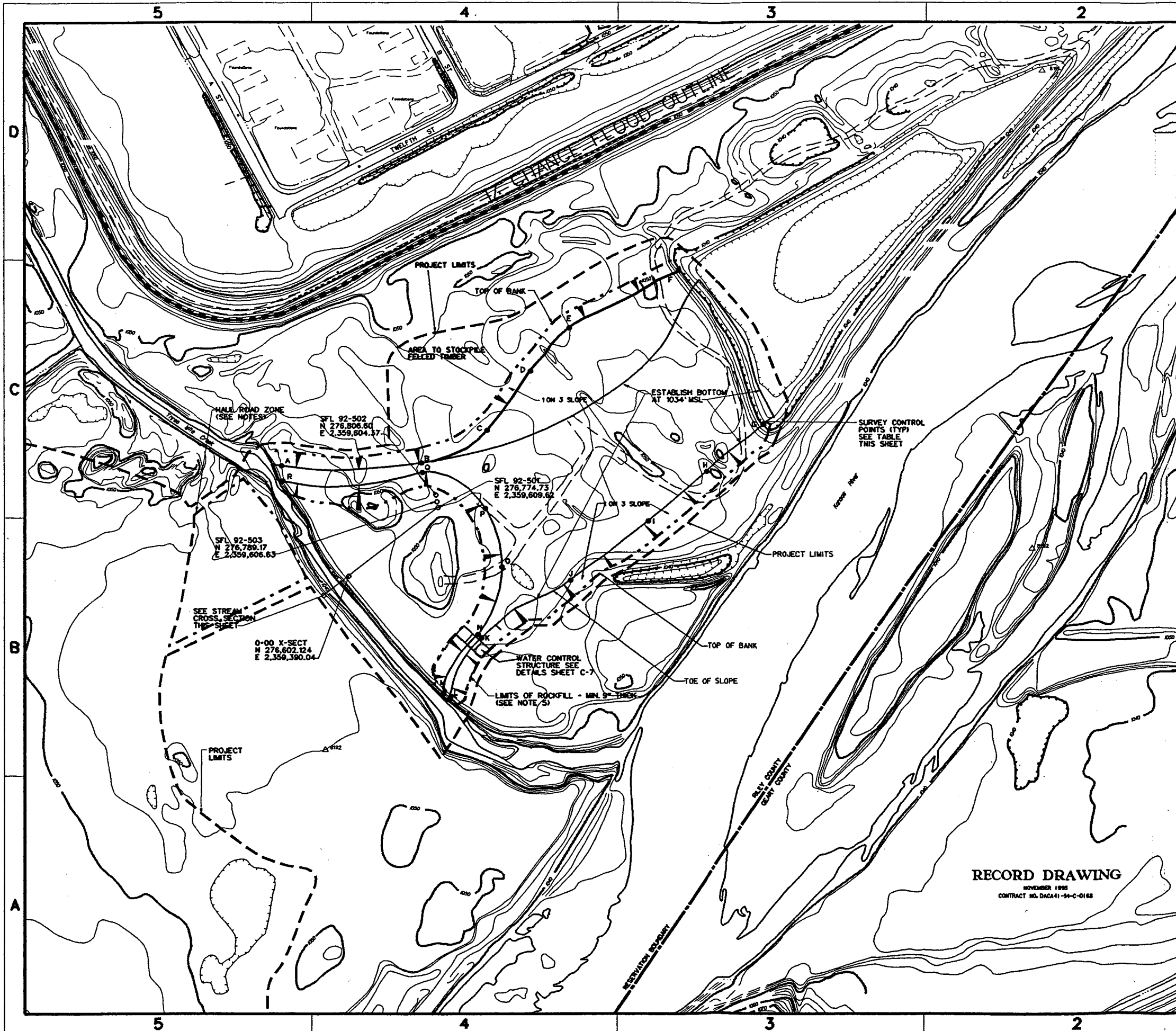
**NOTE:**  
 ▲ NOT ALL TREES WITHIN THE EXISTING TREELINE ARE TO BE REMOVED. TREES TO REMAIN HAVE BEEN MARKED BY THE FORT RILEY NATURAL RESOURCES SECTION.

**RECORD DRAWING**  
 NOVEMBER 1988  
 CONTRACT NO. DAC41-84-C-0188

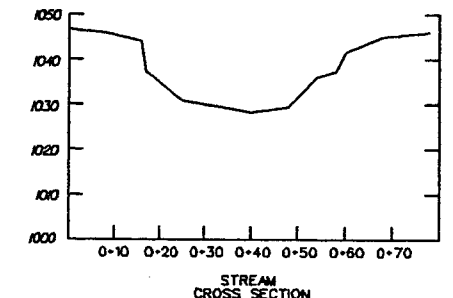
Revisions			
Symbol	Descriptions	Date	Approved
▲	Revised per Amendment No.001	1.Ju.94	RVS

U.S. ARMY ENGINEER DISTRICT  
 CORPS OF ENGINEERS  
 KANSAS CITY, MISSOURI

Designed by: M.I.W.	FT. RILEY SOUTHWEST FUNSTON LANDFILL LANDFILL COVER REPAIR	KANSAS	
Drawn by: K.G.P.		OUTLET CHANNEL	
Checked by: R.V.	Scale: 1"=30'	Sheet number: C-3	Plot Scale: 30:1
Submitted by: K.D.B.	Date: JUNE 1994	Design File: FROC003.3D	File No.:



- GENERAL NOTES:
1. THE BORROW AREA SHALL BE CLEARED AND GRUBBED PRIOR TO REMOVING FILL MATERIAL IN ACCORDANCE WITH THE SPECIFICATIONS. CLEARING AND GRUBBING SHALL BE WITHIN THE PROJECT LIMITS BUT SHALL BE RESTRICTED TO THE AREA REQUIRED FOR THE BORROW PIT. THE DESIGNATED AREA TO STOCKPILE FELLED TIMBER, AND NECESSARY EQUIPMENT ACCESS AND CLEARANCES ALONG THE PERIMETER OF THE BORROW PIT AND WATER DIVERSION STRUCTURE.
  2. BORROW OPERATIONS SHALL BE EXECUTED SO THAT A CONSTANT ELEVATION OF 1034.0 FEET MSL IS ESTABLISHED ACROSS BOTTOM OF THE EXCAVATION. SIDE WALLS OF THE EXCAVATION SHALL BE LAD BACK TO A 3 HORIZONTAL ON 1 VERTICAL SLOPE.
  3. THE CONTRACTOR SHALL ESTABLISH ANY AND ALL TEMPORARY HAUL ROUTE(S) REQUIRED ALONG WITH A TEMPORARY CROSSING OVER THREEMILE CREEK. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DESIGN THE CROSSING SO THAT FLOW WITHIN THREEMILE CREEK IS NOT RESTRICTED. THE CONTRACTOR SHALL MAINTAIN THE CROSSING AND MAKE ANY REPAIRS DUE TO HIGH WATER EVENTS IN THREEMILE CREEK. THE CROSSING SHALL BE REMOVED WHEN ALL BORROW AND FILL OPERATIONS ARE COMPLETE. EQUIPMENT HAULING FILL OR RETURNING TO LOAD FILL WILL NOT USE EXISTING PAVED SURFACES WITHIN THE CONFINES OF THE FORT RILEY INSTALLATION.
  4. THE CONTRACTOR SHALL INSTALL A SINGLE HAUL ROAD THRU THE "HAUL ROAD ZONE" INDICATED ON THESE DRAWINGS. THE CONTRACTOR SHALL ONLY CLEAR AN AREA 15 FEET EITHER SIDE OF THE HAUL ROAD CENTERLINE. THE CONTRACTOR SHALL ROUTE HIS HAUL ROAD SO THAT TREES DESIGNATED FOR RETENTION BY THE FORT RILEY NATURAL RESOURCES BRANCH ARE NOT DISTURBED OR DAMAGED.
  5. WITHIN "LIMITS OF ROCKFILL" OVEREXCAVATE 9 INCHES SO THAT TOP OF ROCKFILL MATCHES FINISH LINES AND GRADES.
  6. WITHIN "DESIGNATED AREA TO STOCKPILE FELLED TIMBER" TREES MARKED BY FORT RILEY'S NATURAL RESOURCES BRANCH SHALL BE PROTECTED FROM DAMAGE. TIMBER SHALL BE NEATLY ARRANGED IN EVEN SIZED PILES.



BORROW AREA CONTROL POINTS		
POINTS	NORTHING	EASTING
A	276880.00	2359224.59
B	276886.96	2359568.93
C	276966.73	2359729.59
D	277118.06	2359836.63
E	277227.06	2359931.08
F	277373.13	2360196.84
G	276984.08	2360407.18
H	276865.64	2360265.67
I	276740.32	2360123.84
J	276591.92	2359934.21
K	276446.44	2359716.40
L	276294.73	2359639.19
M	276307.26	2359623.88
N	276455.49	2359708.06
O	276624.60	2359765.79
P	276772.13	2359724.75
Q	276862.60	2359571.71
R	276842.42	2359227.38

Revisions			
Symbol	Descriptions	Date	Approved
Δ	Revised per Amendment No. 007	23Sep94	RVS

RECORD DRAWING  
NOVEMBER 1993  
CONTRACT NO. DAC41-94-C-0168

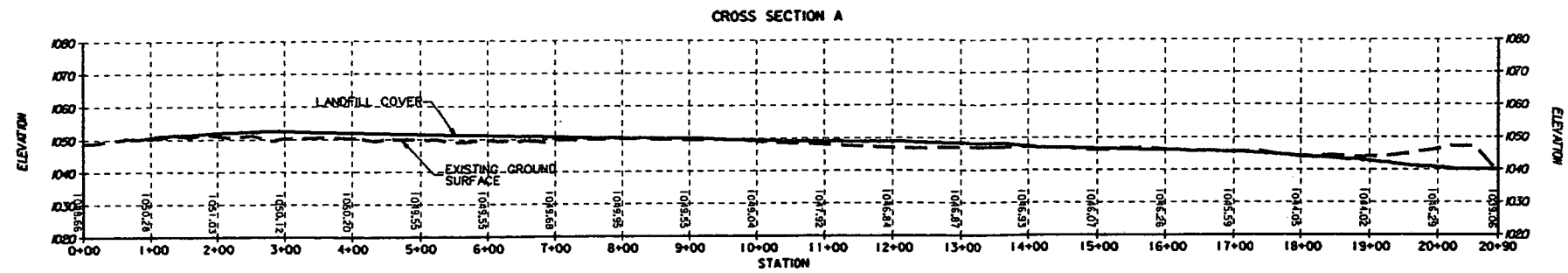
U.S. ARMY ENGINEER DISTRICT  
CORPS OF ENGINEERS  
KANSAS CITY, MISSOURI

Designed by: R.V.  
Drawn by: K.G.P.  
Checked by: R.V.  
Submitted by: K.D.B.

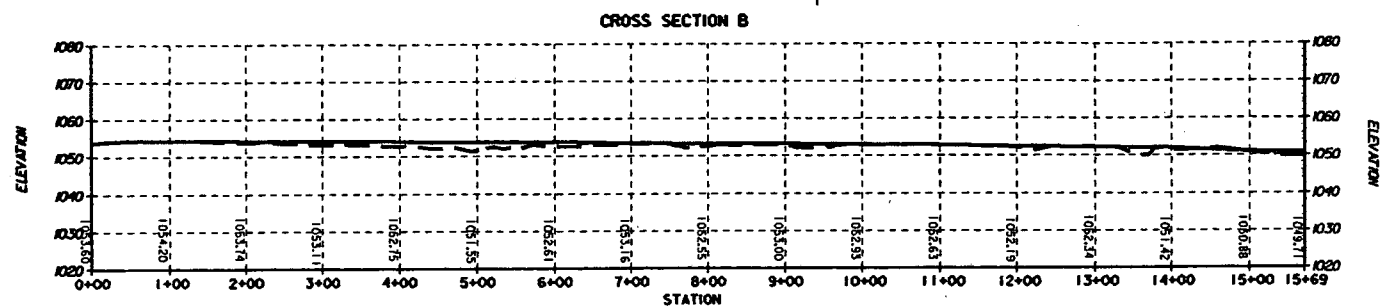
FT. RILEY  
SOUTHWEST FUNSTON LANDFILL  
LANDFILL COVER REPAIR

**BORROW AREA PLAN**

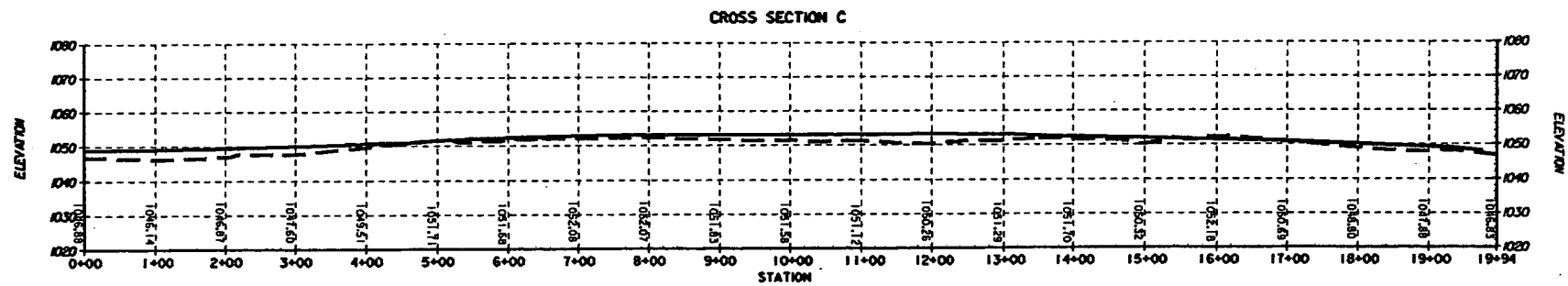
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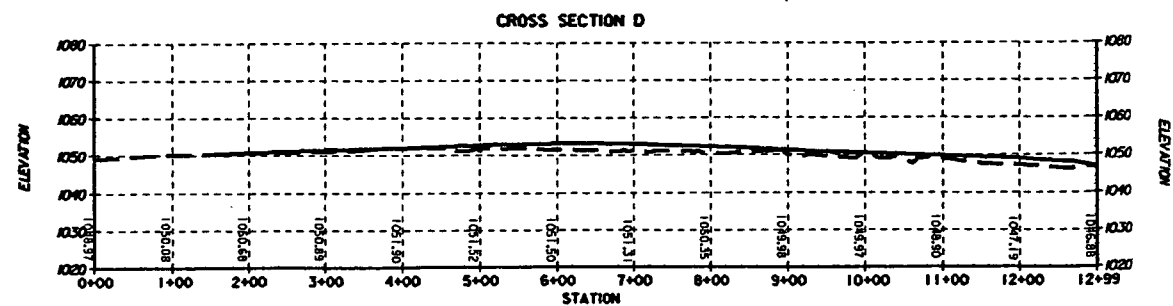
A CROSS SECTION  
C-2 | C-5



B CROSS SECTION  
C-2 | C-5



C CROSS SECTION  
C-2 | C-5

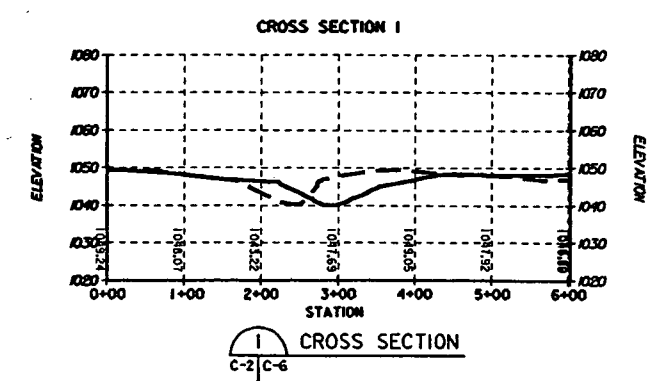
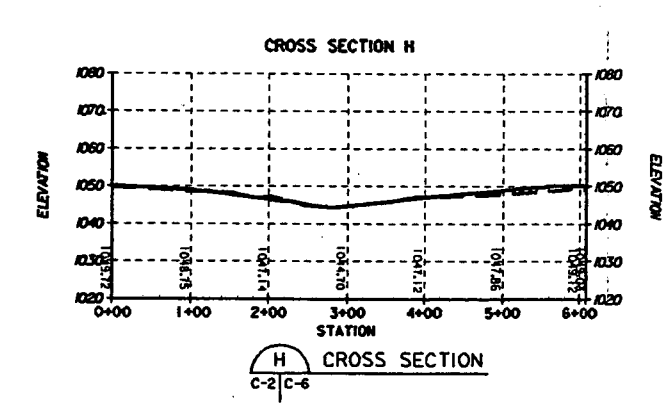
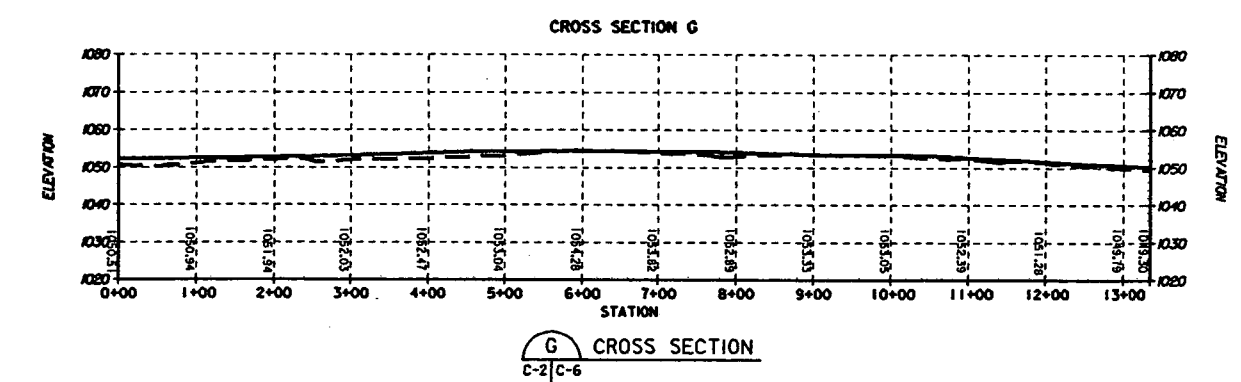
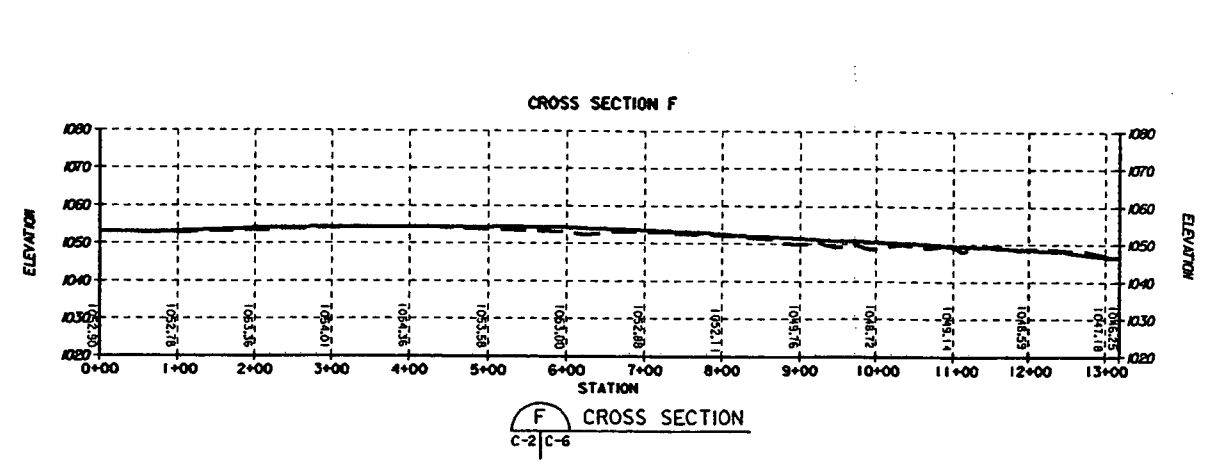
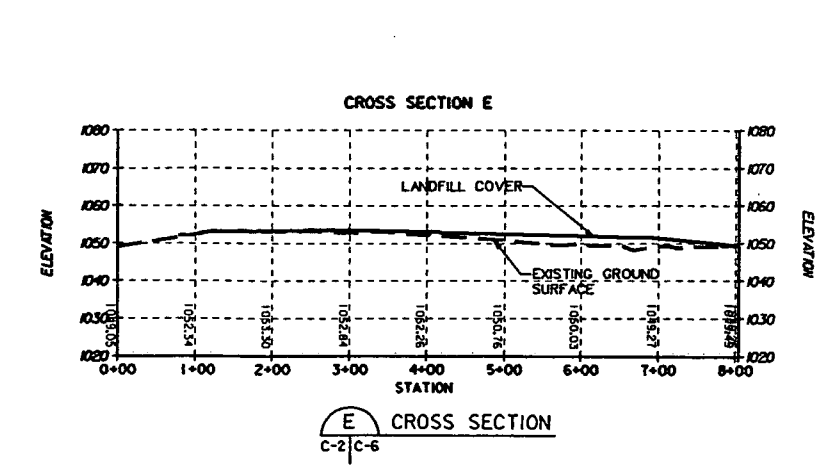


D CROSS SECTION  
C-2 | C-5

**RECORD DRAWING**  
NOVEMBER 1995  
CONTRACT NO. DCA41-94-C-0168

Revisions			
Symbol	Descriptions	Date	Approved
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	R.V.	FT. RLEY SOUTHWEST FUNSTON LANDFILL LANDFILL COVER REPAIR	KANSAS
Drawn by:	K.O.P.	<b>CROSS SECTIONS A - D</b>	
Checked by:	R.V.	Scale: AS SHOWN	Sheet number: C-5
Submitted by:	K.D.B.	Date: JUNE 1994	Plot Scale: 100=1
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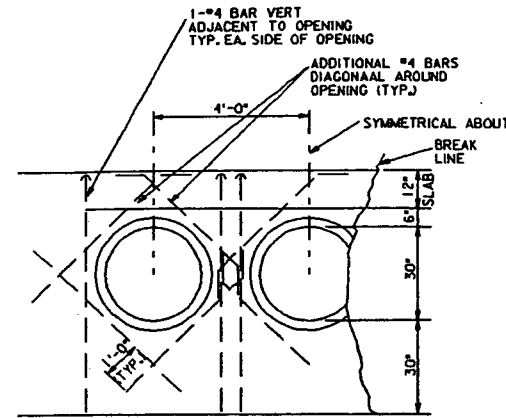
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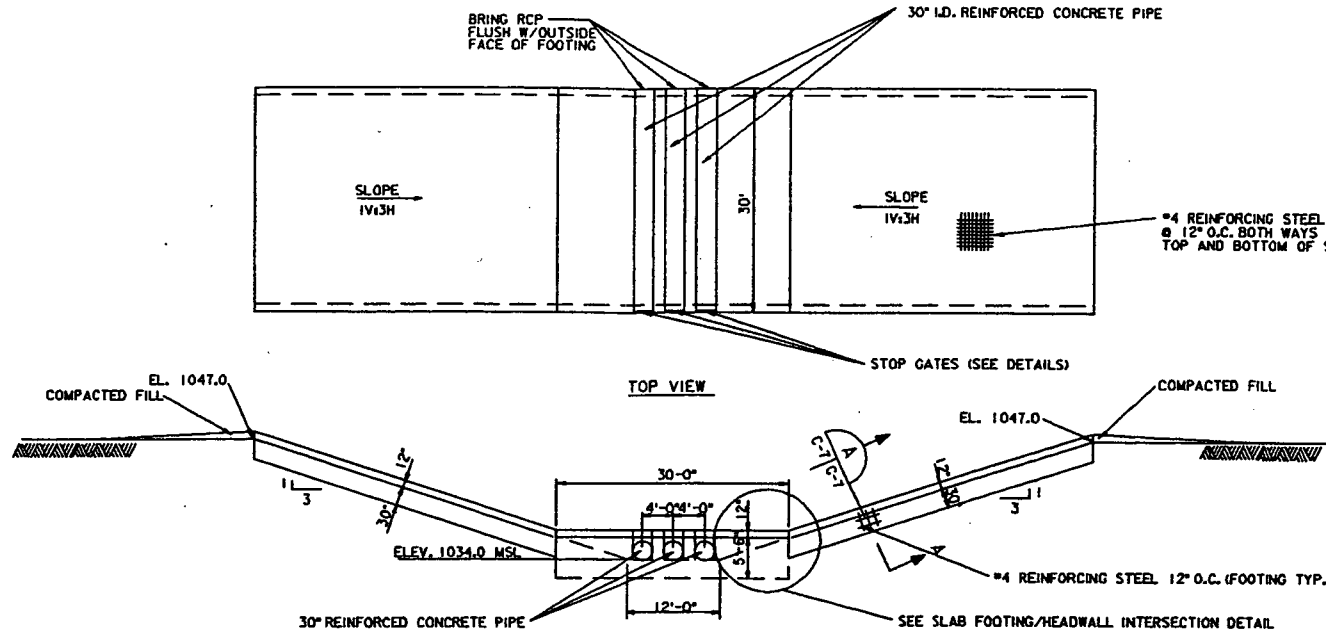
**RECORD DRAWING**  
NOVEMBER 1995  
CONTRACT NO. DAC41-94-C-0168

Revisions			
Symbol	Descriptions	Date	Approved
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	R.V.	FT. RILEY KANSAS SOUTHWEST FUNSTON LANDFILL LANDFILL COVER REPAIR	
Drawn by:	K.G.P.	<b>CROSS SECTIONS E - I</b>	
Checked by:	R.V.		
Submitted by:	K.D.B.	Scale:	Sheet number:
Date:	JUNE 1994	Plot Scale:	100-1
Dep. No.:		Design File:	FROCC06.RDM
		File No.:	

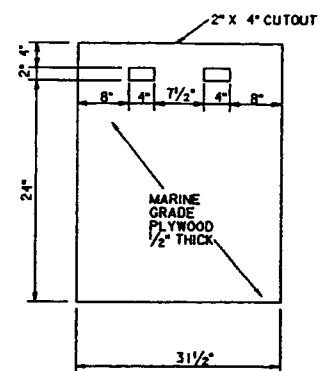
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CULVERT PIPE OPENING REINFORCEMENT DETAIL  
SCALE: 1/2" = 10'-0"

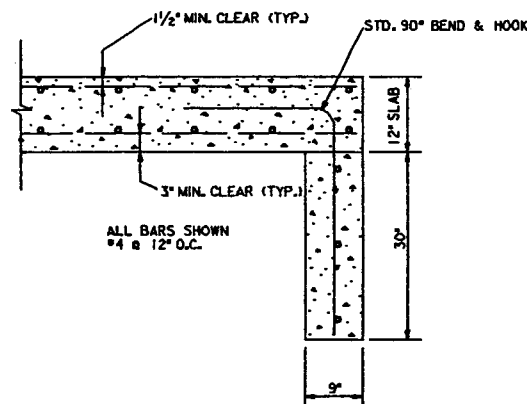


SIDE VIEW FROM BORROW SITE  
SCALE: 1" = 10'-0"

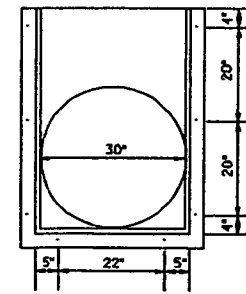


STOP GATE  
NOTE: MARINE GRADE PLYWOOD SHALL BE IN ACCORDANCE WITH U.S. PRODUCT STANDARD PS 1-83, HIGH DENSITY OVERLAY

↑ = INDICATES BEND INTO PLANE OF DRAWING

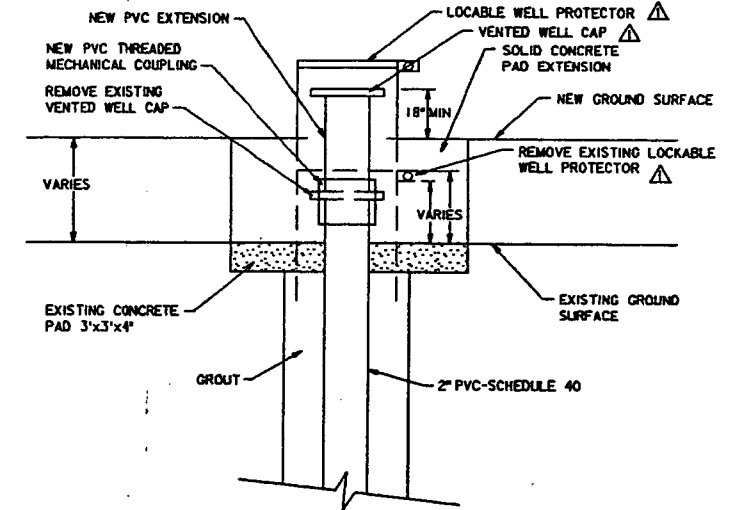


AA SECTION (TYPICAL)  
C-7/C-7 SCALE: 1" = 1'-0"



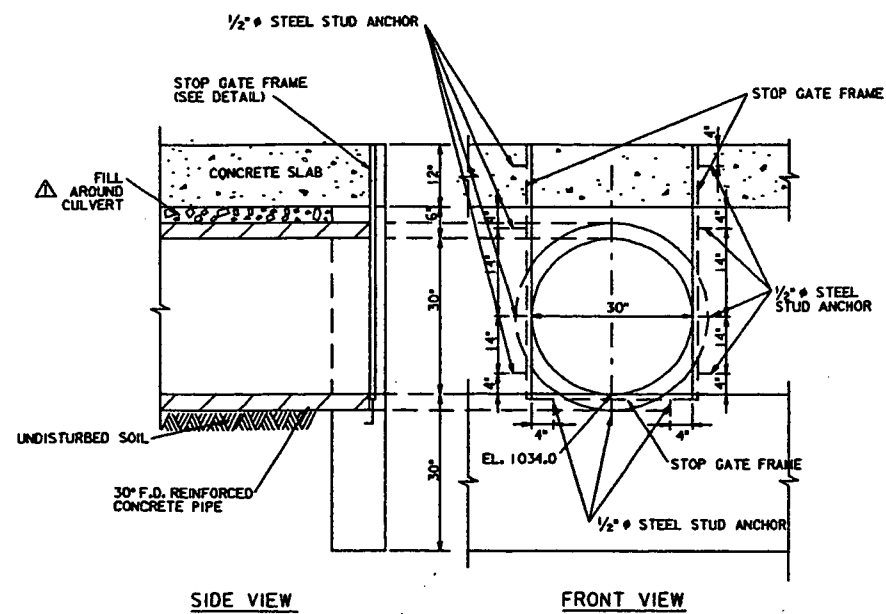
SLAB FOOTING/HEADWALL INTERSECTION (TYPICAL-4 LOCATIONS)

FIELD CHANGE: USE ORIGINAL STOP GATE FRAME WELD 3\"/>



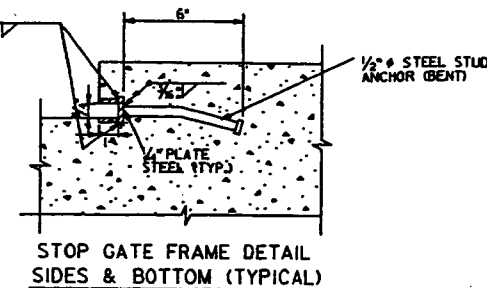
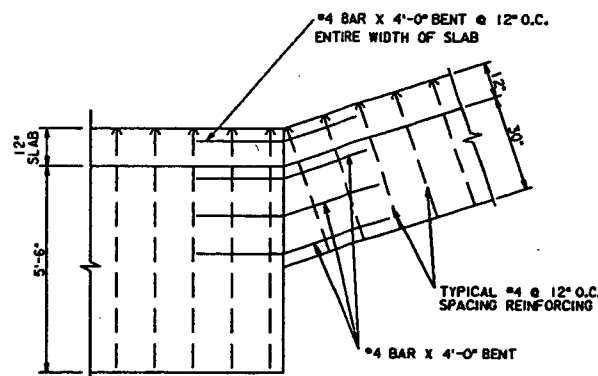
EXISTING MONITOR WELL EXTENSION  
NOT TO SCALE

1. SURVEY TOP OF RISER EXTENSION AND TOP OF NEW CONCRETE PAD. INSTALL BRASS SURVEY MARKER IN NEW CONCRETE PAD WITH RISER NORTHING, EASTING, AND ELEVATION.
2. CONTRACTOR SHALL SALVAGE EXISTING LOCKABLE WELL PROTECTOR AND VENTED WELL CAP.
3. NO GLUES OR SOLVENTS SHALL BE USED IN EXTENDING PVC WELL CASING.
4. MONITOR WELLS WHICH MAY BE AFFECTED BY CHANGES IN GRADE DUE TO FILL OPERATIONS AND REQUIRE EXTENSION INCLUDE: MW-2, MW-3, MW-4, MW-5, MW-6, SFL92-201, SFL92-203, SFL92-301, SFL92-302, SFL92-303, SFL92-401, SFL92-403, SFL92-601, SFL92-602, SFL92-603. SEE SHEET C-1 FOR LOCATIONS.



SIDE VIEW

FRONT VIEW



STOP GATE FRAME DETAIL SIDES & BOTTOM (TYPICAL)

RECORD DRAWING

NOVEMBER 1995  
CONTRACT NO. DAC441-94-C-0168

Revisions			
Symbol	Descriptions	Date	Approved
Δ	Revised per Amendment No. 001	1 Jul 94	RVS

U.S. ARMY ENGINEER DISTRICT  
CORPS OF ENGINEERS  
KANSAS CITY, MISSOURI

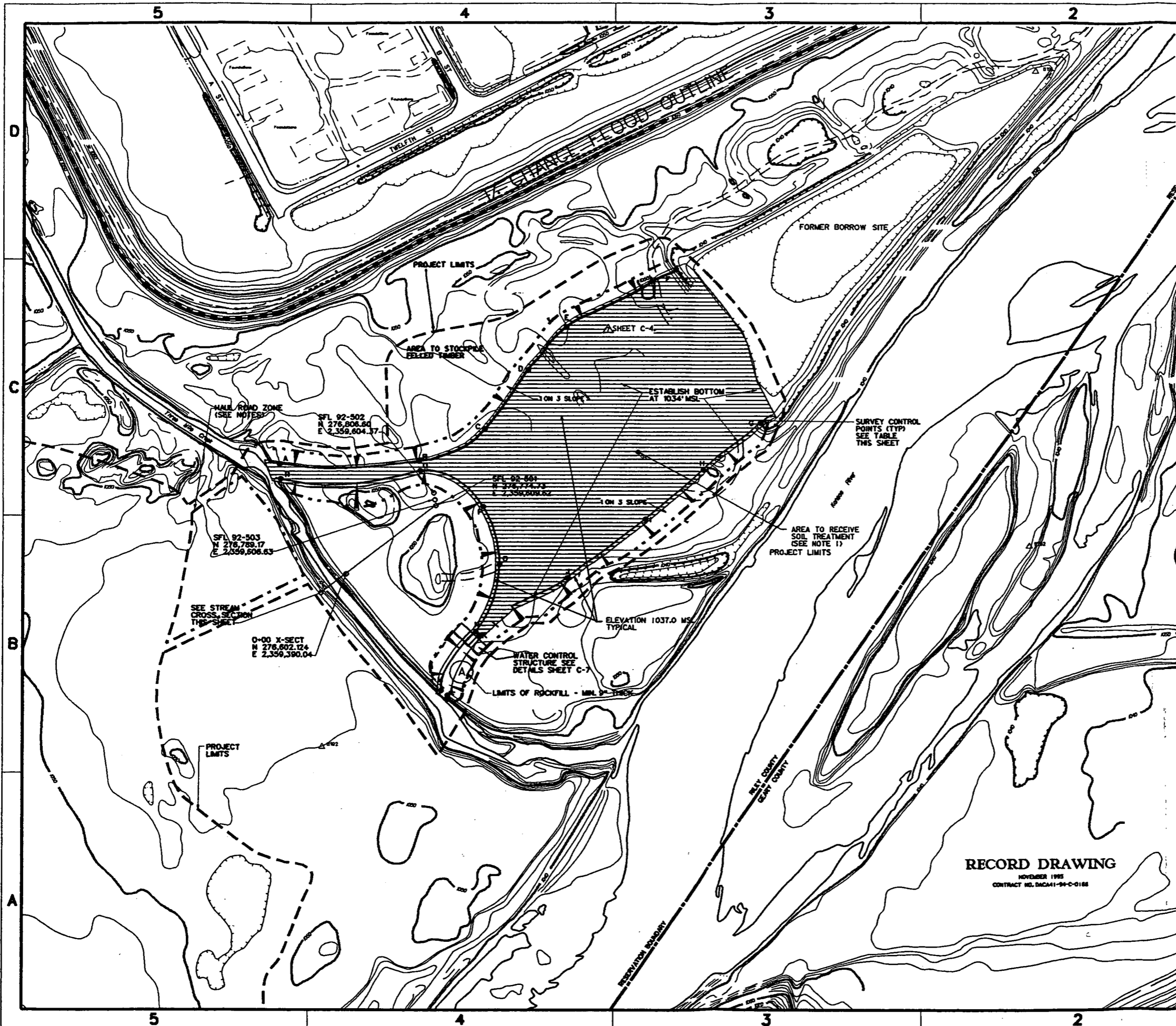
Designed by: M.J.W. **FT. RILEY** KANSAS  
US Army Corps of Engineers SOUTHWEST FUNSTON LANDFILL  
LANDFILL COVER REPAIR

Drawn by: J.G.S. BORROW SITE  
WATER CONTROL STRUCTURE  
AND OTHER DETAILS

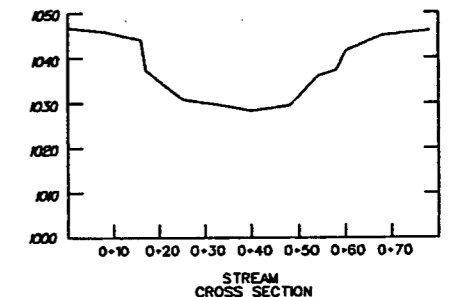
Checked by: R.V. Scale: AS SHOWN Sheet number: C-7 Plot Scale: Bt1

Submitted by: K.D.B. Date: JUNE 1994 Design File: FROCO07.RDW  
Dwg. No.: File No.:





- NOTES
1. AREA DESIGNATED WITH CROSS HATCH TO RECEIVE SOIL TREATMENT AS FOLLOWS: APPLY GRANULAR BENTONITE AT THE RATE OF 2 POUNDS PER SQUARE FOOT. THE BENTONITE SHALL HAVE A MINIMUM SODIUM MONTMORILLONITE CLAY CONTENT OF NOT LESS THAN 75%. THE CONTRACTOR SHALL SUBMIT A CERTIFICATE FROM THE SUPPLIER ATTESTING TO THE CONSTITUENTS OF THE BENTONITE FURNISHED. THOROUGHLY MIX THE SODIUM BENTONITE INTO THE TOP 8 INCHES OF SOIL. COMPACT SOIL/BENTONITE MIXTURE WITH A MINIMUM OF THREE PASSES OF A CRAWLER TYPE TRACTOR HAVING A MINIMUM CONTACT PRESSURE OF 10 POUNDS PER SQUARE INCH. THE AREA TO RECEIVE THIS SOIL TREATMENT INCLUDES THE ENTIRE BOTTOM OF THE BORROW PIT AND EXTENDS UP THE SIDE SLOPES TO AN ELEVATION OF 1037.0 FEET MSL.
  2. THE SIDE SLOPES OF THE EXCAVATION ABOVE AN ELEVATION OF 1037.0 FEET MSL ARE TO BE PLANTED WITH SMOOTH BROME AS SPECIFIED IN SECTION 2910 - SEEDING AND PLANTING IN THE SPECIFICATIONS.
  3. AREAS DISTURBED ALONG THE PERIMETER OF THE BORROW AREA BETWEEN THE TOP OF THE EXCAVATION AND PROJECT LIMITS AREA TO BE PLANTED IN NATIVE GRASS AS SPECIFIED IN SECTION 2910.
  4. ALONG THE TOP AND BOTTOM OUTER LIMITS OF THE BORROW SITE FROM THREEMILE CREEK TO THE FORMER BORROW SITE, PLANT A SINGLE ROW PARALLEL TO THE TOP OF THE BORROW SITE EXCAVATION OF COTTONWOOD CUTTINGS SPACED 7' ON CENTERS.



BORROW AREA CONTROL POINTS		
POINTS	NORTHING	EASTING
A	276880.00	2359224.59
B	276886.96	2359568.93
C	276968.73	2359729.59
D	277118.06	2359836.63
E	277227.06	2359931.08
F	277373.13	2360196.84
G	276984.08	2360407.18
H	276865.64	2360265.67
I	276740.32	2360123.84
J	276591.92	2359934.21
K	276446.44	2359716.40
L	276294.73	2359639.19
M	276307.26	2359823.88
N	276455.49	2359708.06
O	276624.60	2359765.79
P	276772.13	2359724.75
Q	276862.60	2359571.71
R	276842.42	2359227.38

RECORD DRAWING

NOVEMBER 1995

CONTRACT NO. DAC41-94-C-0188

Symbol	Revisions	Date	Approved
(A)	Revised per Amendment No. 007	25Sep94	RVS
(B)	Remove Cross Hatch - WCS to Threemile Creek	25Aug95	RVS

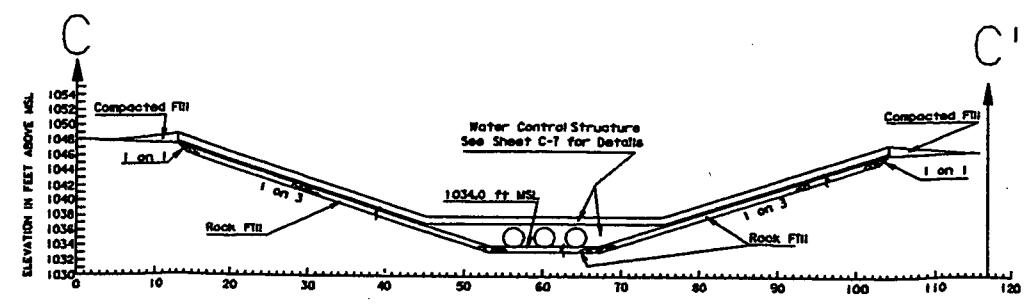
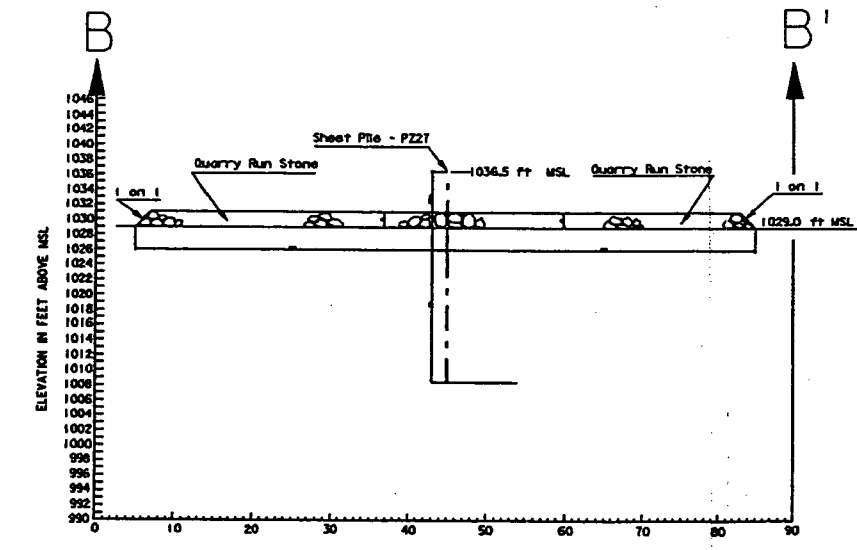
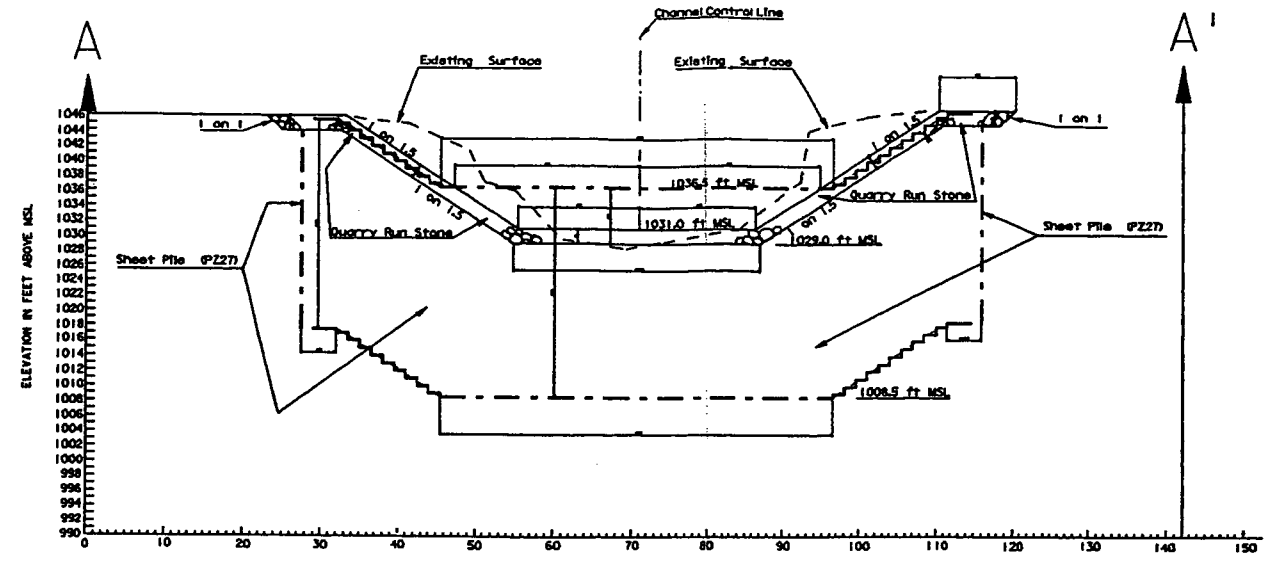
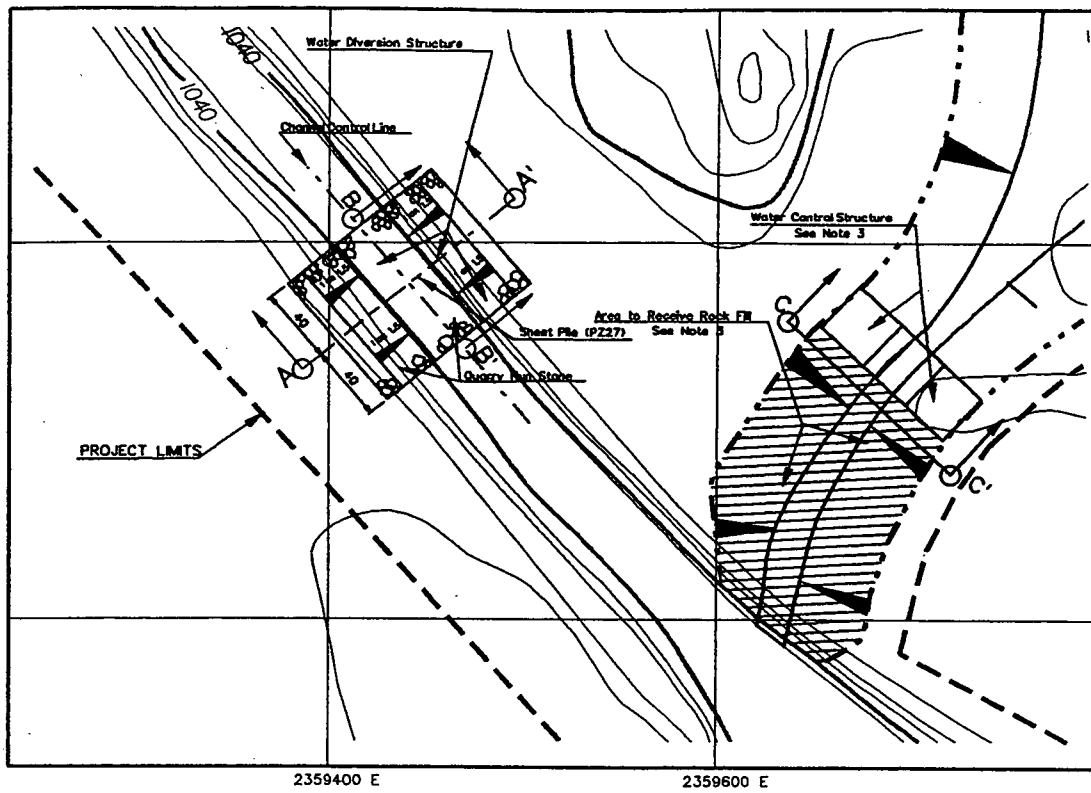
U.S. ARMY ENGINEER DISTRICT  
CORPS OF ENGINEERS  
KANSAS CITY, MISSOURI

Designed by: R.V. FT. RILEY  
SOUTHWEST FUNSTON LANDFILL  
LANDFILL COVER REPAIR

Drawn by: K.G.P. BORROW AREA  
PLANTING & SOIL TREATMENT PLAN

Checked by: R.V. Scale: 1"=100' Sheet number: C-8 Plot Scale: 100:1

Submitted by: K.D.B. Date: JUNE 1994 Design File: FROCD08.RDN



SURVEY CONTROL POINTS		
POINT	EASTING	NORTHING
A	2359386.776	276432.303
A'	2359495.554	276523.578
B	2359412.166	276512.352
B'	2359470.163	276443.529
C	2359636.132	276458.342
C'	2359720.361	276377.381

- NOTES:
1. CLEAR AND GRUB WITHIN PROJECT LIMITS AS NECESSARY TO CONSTRUCT WATER DIVERSION STRUCTURE.
  2. SHEET PILING SHALL NOT BE INSTALLED UNTIL FINISH GRADING AND SOIL TREATMENT ARE COMPLETED IN THE BORROW AREA.
  3. THE CROSS HATCH BELOW THE WATER CONTROL STRUCTURE AND SECTION C ARE PROVIDED ON THIS PAGE TO EMPHASIZE THE AREA TO RECEIVE ROCKFILL AS INDICATED ON PAGE C-4.
  4. ALL DIMENSIONS ON THIS SHEET ARE IN FEET.

RECORD DRAWING  
NOVEMBER 1993  
CONTRACT NO. DACM11-94-C-0168

Revisions			
Symbol	Descriptions	Date	Approved

U.S. ARMY ENGINEER DISTRICT  
CORPS OF ENGINEERS  
KANSAS CITY, MISSOURI

Designed by: R.V.S. **FT. RILEY KANSAS**

Drawn by: R.V.S. **SOUTHWEST FUNSTON LANDFILL LANDFILL COVER REPAIR**

Checked by: **WATER DIVERSION STRUCTURE**

Submitted by: JQH

Scale: AS INDICATED  
Date: AUGUST 1994  
Dwg. No.:

Sheet number: C-9  
Plot Scale: 40:1  
Design File: FROCC009.RDW  
File No.:

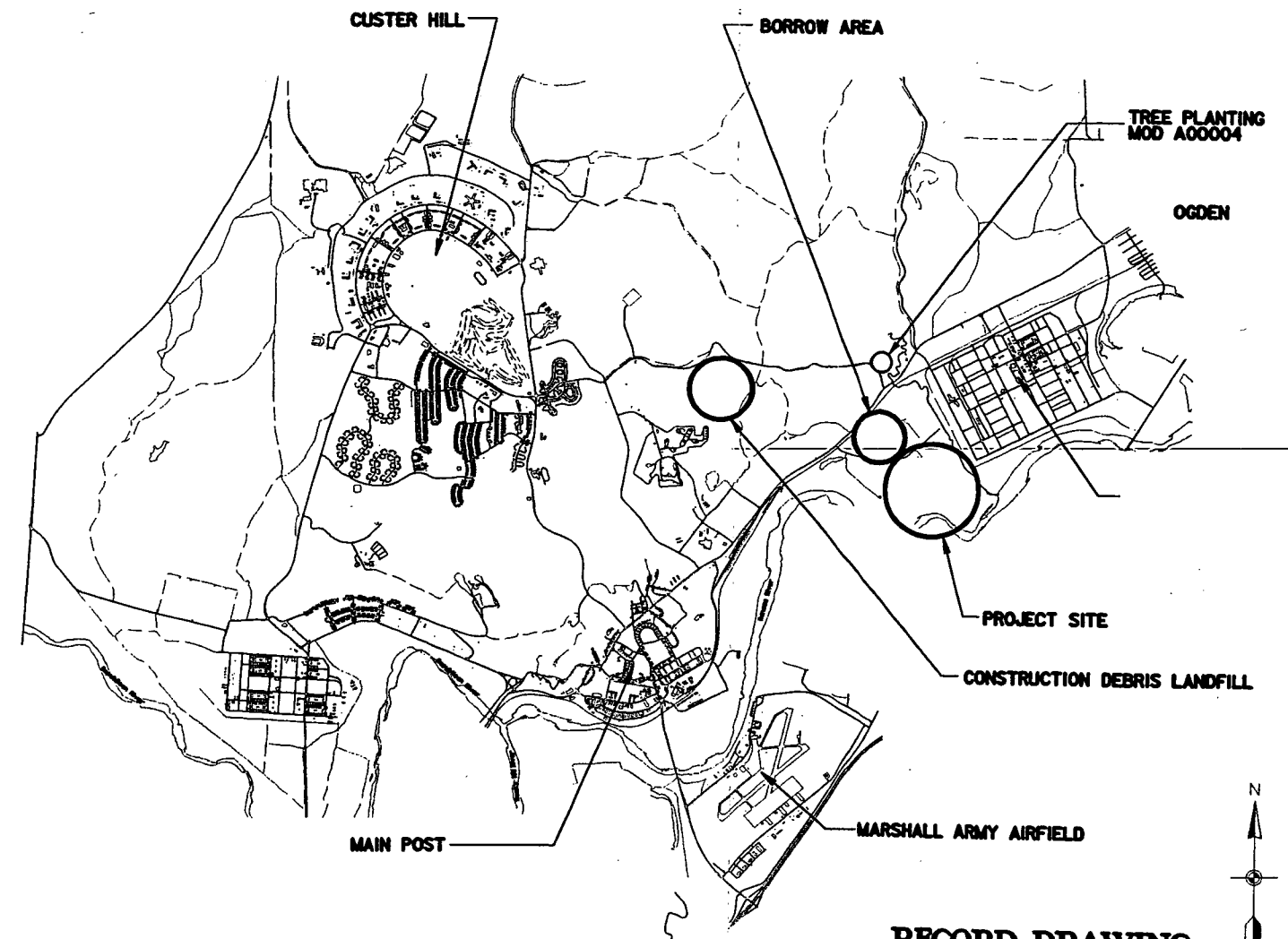


**US Army Corps  
of Engineers**  
Kansas City District  
*Leaders In Customer Care*

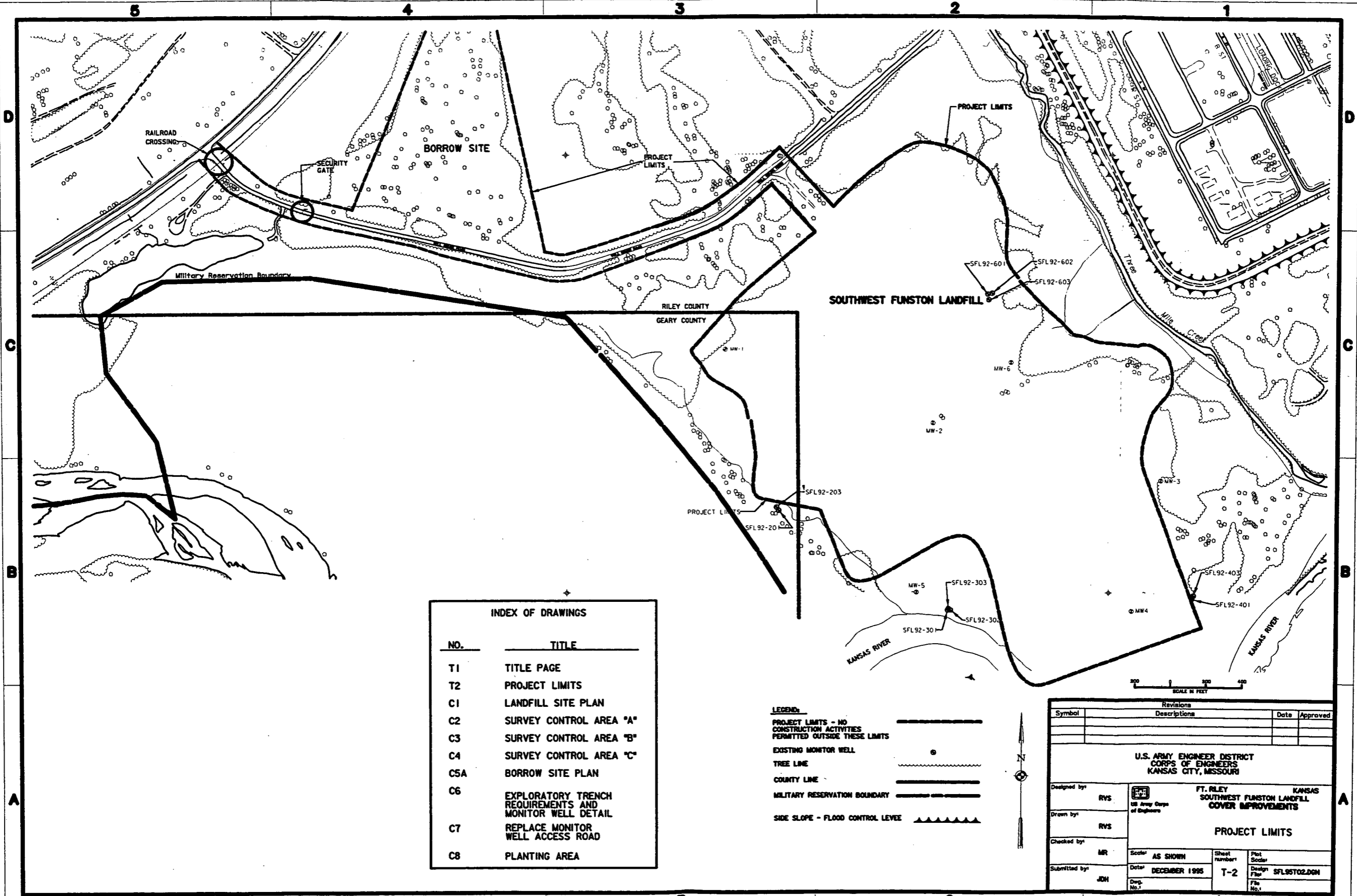
# COVER IMPROVEMENTS

**SOUTHWEST FUNSTON LANDFILL  
FORT RILEY KANSAS**

**DECEMBER 1995**



**RECORD DRAWING**  
NOVEMBER 1996  
CONTRACT NO. DACA41-96-C-8006



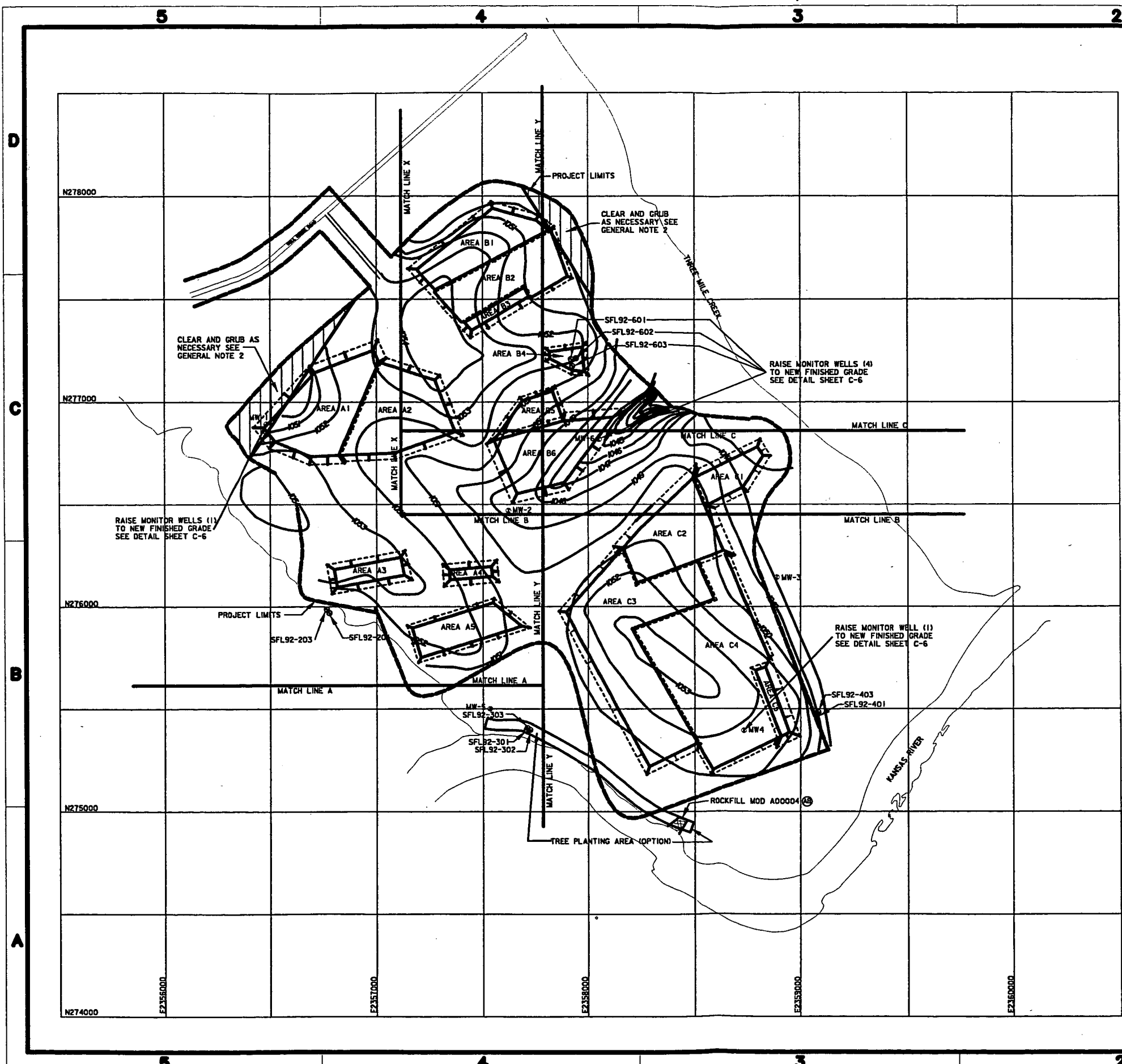
**INDEX OF DRAWINGS**

NO.	TITLE
T1	TITLE PAGE
T2	PROJECT LIMITS
C1	LANDFILL SITE PLAN
C2	SURVEY CONTROL AREA "A"
C3	SURVEY CONTROL AREA "B"
C4	SURVEY CONTROL AREA "C"
CSA	BORROW SITE PLAN
C6	EXPLORATORY TRENCH REQUIREMENTS AND MONITOR WELL DETAIL
C7	REPLACE MONITOR WELL ACCESS ROAD
C8	PLANTING AREA

**LEGEND:**

PROJECT LIMITS - NO CONSTRUCTION ACTIVITIES PERMITTED OUTSIDE THESE LIMITS	
EXISTING MONITOR WELL	
TREE LINE	
COUNTY LINE	
MILITARY RESERVATION BOUNDARY	
SIDE SLOPE - FLOOD CONTROL LEVEE	

Revisions			
Symbol	Descriptions	Date	Approved
<b>U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI</b>			
Designed by:	RVS	<b>FT. RILEY KANSAS SOUTHWEST FUNSTON LANDFILL COVER IMPROVEMENTS</b>	
Drawn by:	RVS		
Checked by:	MR		
Submitted by:	JDH	Scale: AS SHOWN Date: DECEMBER 1995 Dwg. No.:	Sheet number: T-2 Plot Scale: SFL95T02.DGN File No.:

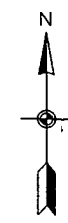


- LEGEND:**
- PROJECT LIMITS - NO CONSTRUCTION ACTIVITIES PERMITTED OUTSIDE THESE LIMITS
  - FILL LIMITS - FILL IS TO BE PLACED WITHIN THESE LIMITS TO THE DEPTHS SPECIFIED ON SHEETS C2, C3 AND C4
  - SLOPE LIMITS - PLACE FILL BETWEEN SLOPE LIMIT AND FILL LIMIT AT A CONSTANT 20H TO 1V SLOPE
  - EXISTING MONITOR WELL
  - EXISTING GROUND CONTOUR

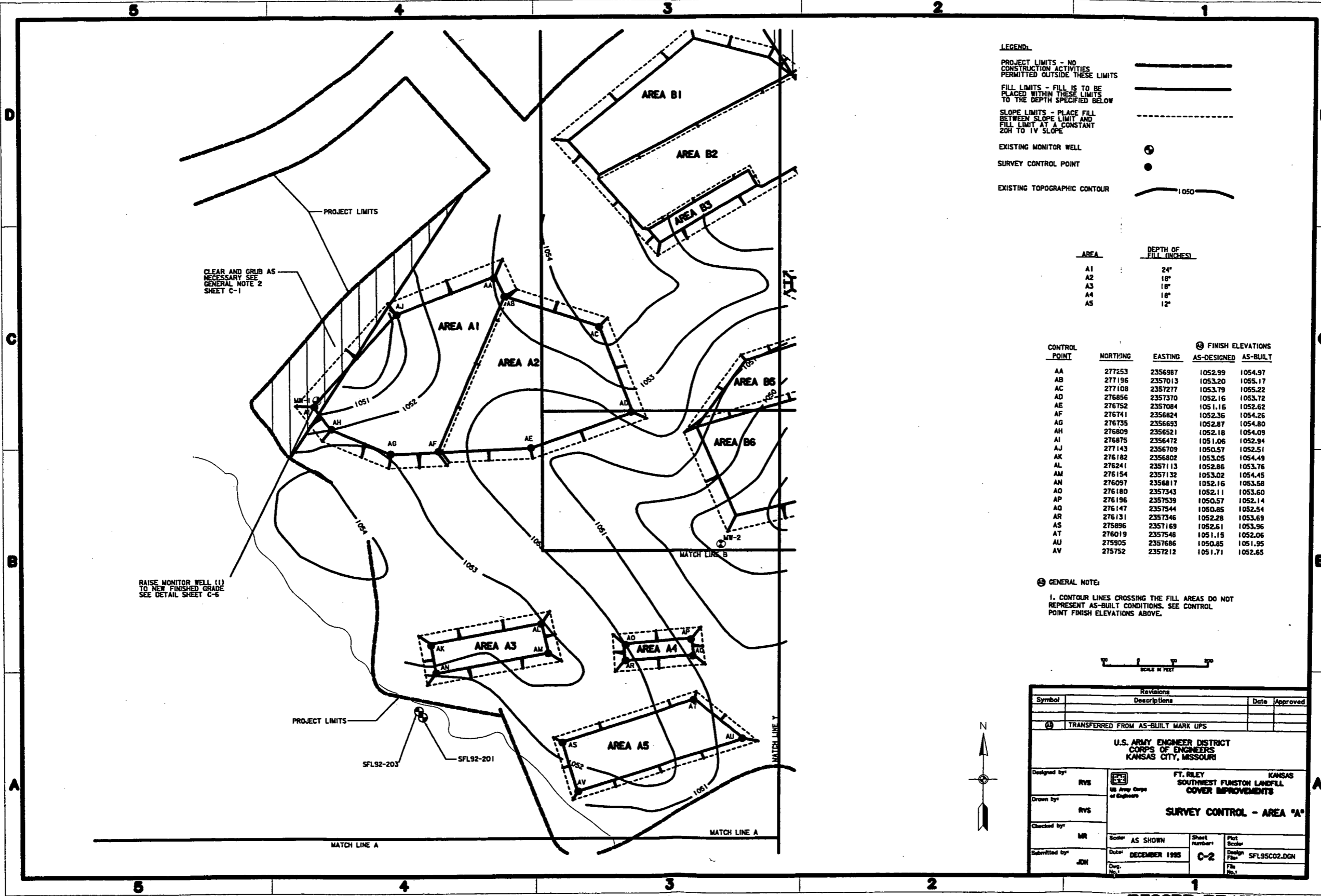
- GENERAL NOTES:**
1. CLEARING AND GRUBBING ON THE LANDFILL SURFACE SHALL BE LIMITED TO CLOSE CROPPED MOWING, REMOVAL OF CUTTINGS, AND LIGHT DISKING TO A DEPTH OF 3 INCHES IN AREAS DESIGNATED TO RECEIVE FILL.
  2. AN EXCEPTION TO THE NOTE ABOVE APPLIES TO THE TWO CROSS HATCHED ZONES SHOWN ON THIS SHEET. IN THESE AREAS, CLEARING AND GRUBBING SHALL ALSO INCLUDE REMOVAL OF ALL TREES AND ROOTS IN AREAS TO BE FILLED AND AS NECESSARY FOR CONSTRUCTION OPERATIONS, THE CONTRACTOR SHALL LIMIT GRUBBING IN THESE AREAS TO THE GREATEST EXTENT PRACTICABLE.
  3. GRID DISPLAYED IS KANSAS STATE PLANE, SURVEY BENCHMARK SHALL BE TOP OF RISER AT MONITOR WELL SFL92-201; NORTHING = 275,969.27, EASTING=2,356,778.55 ELEVATION=1047.46 (MSL).
  4. CONTOUR LINES ON THIS DRAWING DO NOT REPRESENT AS BUILT CONDITIONS. SEE DRAWINGS C-2, C-3, C4



Revisions			
Symbol	Descriptions	Date	Approved
(A)	TRANSFERRED FROM AS-BUILT MARK UFS	NOV 96	
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
Designed by:	RYS	US Army Corps of Engineers	FT. RILEY SOUTHWEST FUNSTON LANDFILL COVER IMPROVEMENTS
Drawn by:	RYS		LANDFILL SITE PLAN
Checked by:	MR	Scale: AS SHOWN	Sheet number: C-1 Plot Scale:
Submitted by:	JOM	Date: DECEMBER 1995	Design File: SFL95C01.DGN
		Dep. No.:	File No.:



VALUE ENGINEERING PAYS



CLEAR AND GRUB AS NECESSARY SEE GENERAL NOTE 2 SHEET C-1

RAISE MONITOR WELL (1) TO NEW FINISHED GRADE SEE DETAIL SHEET C-6

- LEGEND**
- PROJECT LIMITS - NO CONSTRUCTION ACTIVITIES PERMITTED OUTSIDE THESE LIMITS
  - FILL LIMITS - FILL IS TO BE PLACED WITHIN THESE LIMITS TO THE DEPTH SPECIFIED BELOW
  - SLOPE LIMITS - PLACE FILL BETWEEN SLOPE LIMIT AND FILL LIMIT AT A CONSTANT 20H TO 1V SLOPE
  - EXISTING MONITOR WELL
  - SURVEY CONTROL POINT
  - EXISTING TOPOGRAPHIC CONTOUR

AREA	DEPTH OF FILL (INCHES)
A1	24"
A2	18"
A3	18"
A4	18"
A5	12"

CONTROL POINT	NORTHING	EASTING	FINISH ELEVATIONS	
			AS-DESIGNED	AS-BUILT
AA	277253	2356987	1052.99	1054.97
AB	277196	2357013	1053.20	1055.17
AC	277108	2357277	1053.79	1055.22
AD	276856	2357370	1052.16	1053.72
AE	276752	2357084	1051.16	1052.62
AF	276741	2356824	1052.36	1054.26
AG	276735	2356693	1052.87	1054.80
AH	276809	2356521	1052.18	1054.09
AI	276875	2356472	1051.06	1052.94
AJ	277143	2356709	1050.57	1052.51
AK	276182	2356802	1053.05	1054.49
AL	276241	2357113	1052.86	1053.76
AM	276154	2357132	1053.02	1054.45
AN	276097	2356817	1052.16	1053.58
AO	276180	2357343	1052.11	1053.60
AP	276196	2357539	1050.57	1052.14
AQ	276147	2357544	1050.85	1052.54
AR	276131	2357346	1052.28	1053.69
AS	275896	2357169	1052.61	1053.96
AT	276019	2357548	1051.15	1052.06
AU	275905	2357686	1050.85	1051.95
AV	275752	2357212	1051.71	1052.65

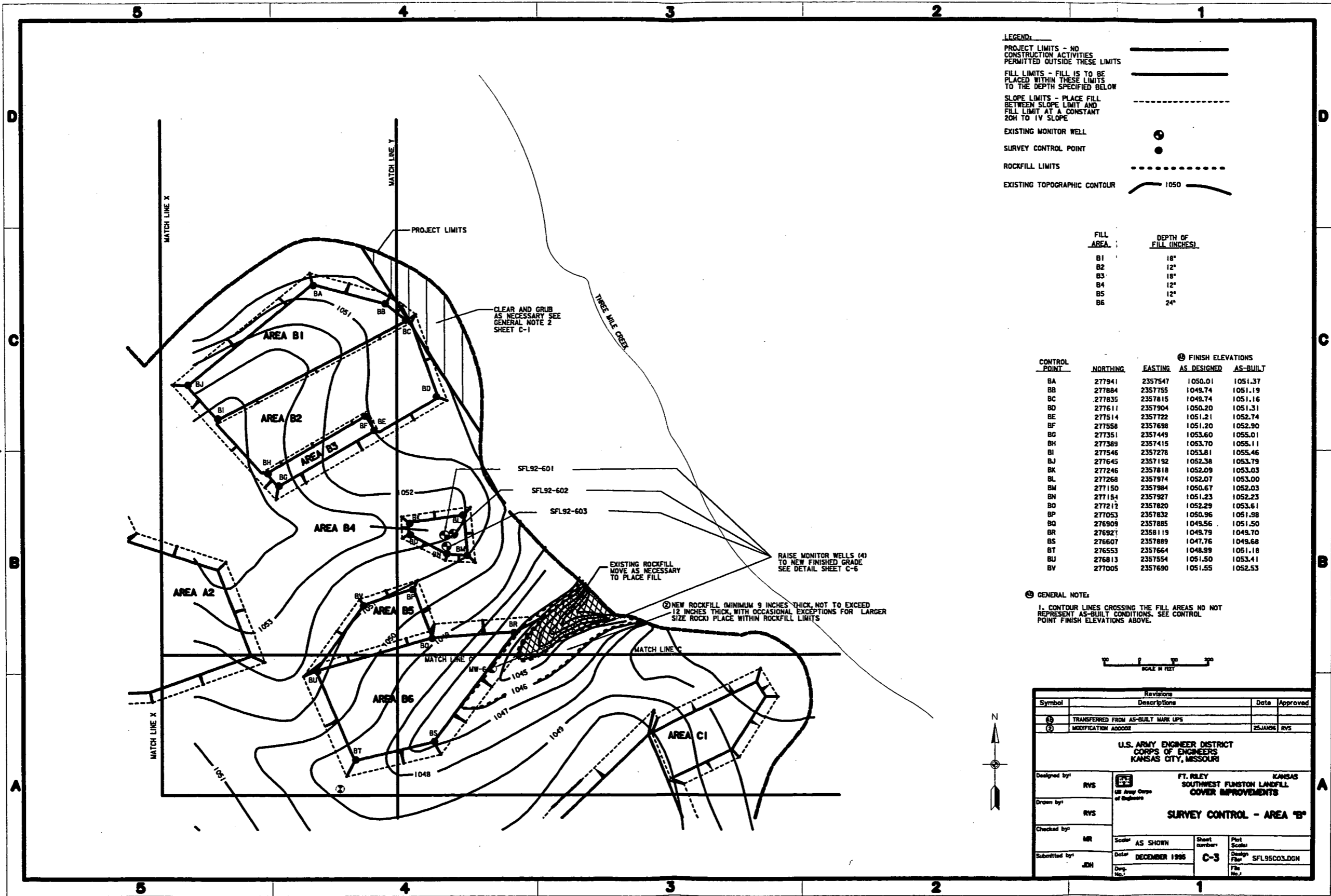
**GENERAL NOTE:**  
 1. CONTOUR LINES CROSSING THE FILL AREAS DO NOT REPRESENT AS-BUILT CONDITIONS. SEE CONTROL POINT FINISH ELEVATIONS ABOVE.



Symbol	Revisions	Date	Approved
	Descriptions		
	TRANSFERRED FROM AS-BUILT MARK UPS		
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI			
FT. RILEY KANSAS SOUTHWEST FUNSTON LANDFILL COVER IMPROVEMENTS			
<b>SURVEY CONTROL - AREA "A"</b>			
Designed by:	RVS		
Drawn by:	RVS		
Checked by:	MR		
Submitted by:	JON		
Scale:	AS SHOWN	Sheet number:	Plot Scale:
Date:	DECEMBER 1995	Design File:	SFL95C02.DGN
Drawn No.:		File No.:	

**RECORD DRAWING**  
 NOVEMBER 1996  
 CONTRACT NO. DAC411-96-C-8006

VALUE ENGINEERING PAYS



**LEGEND:**

- PROJECT LIMITS - NO CONSTRUCTION ACTIVITIES PERMITTED OUTSIDE THESE LIMITS
- FILL LIMITS - FILL IS TO BE PLACED WITHIN THESE LIMITS TO THE DEPTH SPECIFIED BELOW
- SLOPE LIMITS - PLACE FILL BETWEEN SLOPE LIMIT AND FILL LIMIT AT A CONSTANT 20H TO 1V SLOPE
- EXISTING MONITOR WELL
- SURVEY CONTROL POINT
- ROCKFILL LIMITS
- EXISTING TOPOGRAPHIC CONTOUR 1050

FILL AREA	DEPTH OF FILL (INCHES)
B1	18"
B2	12"
B3	18"
B4	12"
B5	12"
B6	24"

CONTROL POINT	NORTHING	EASTING	FINISH ELEVATIONS	
			AS DESIGNED	AS-BUILT
BA	277941	2357547	1050.01	1051.37
BB	277884	2357755	1049.74	1051.19
BC	277835	2357815	1049.74	1051.16
BD	277611	2357904	1050.20	1051.31
BE	277514	2357722	1051.21	1052.74
BF	277558	2357698	1051.20	1052.90
BG	277351	2357449	1053.60	1055.01
BH	277389	2357415	1053.70	1055.11
BI	277546	2357278	1053.81	1055.46
BJ	277645	2357192	1052.38	1053.79
BK	277246	2357818	1052.09	1053.03
BL	277268	2357974	1052.07	1053.00
BM	277150	2357984	1050.67	1052.03
BN	277154	2357927	1051.23	1052.23
BO	277212	2357820	1052.29	1053.61
BP	277053	2357832	1050.96	1051.98
BQ	276909	2357885	1049.56	1051.50
BR	276921	2358119	1049.79	1049.70
BS	276607	2357889	1047.76	1049.68
BT	276553	2357664	1048.99	1051.18
BU	276813	2357554	1051.50	1053.41
BV	277005	2357690	1051.55	1052.53

GENERAL NOTE:  
 1. CONTOUR LINES CROSSING THE FILL AREAS DO NOT REPRESENT AS-BUILT CONDITIONS. SEE CONTROL POINT FINISH ELEVATIONS ABOVE.



Revisions			
Symbol	Descriptions	Date	Approved
①	TRANSFERRED FROM AS-BUILT MARK UPS		
②	MODIFICATION ADDOZE	25JAN96	RYS

**U.S. ARMY ENGINEER DISTRICT**  
**CORPS OF ENGINEERS**  
**KANSAS CITY, MISSOURI**

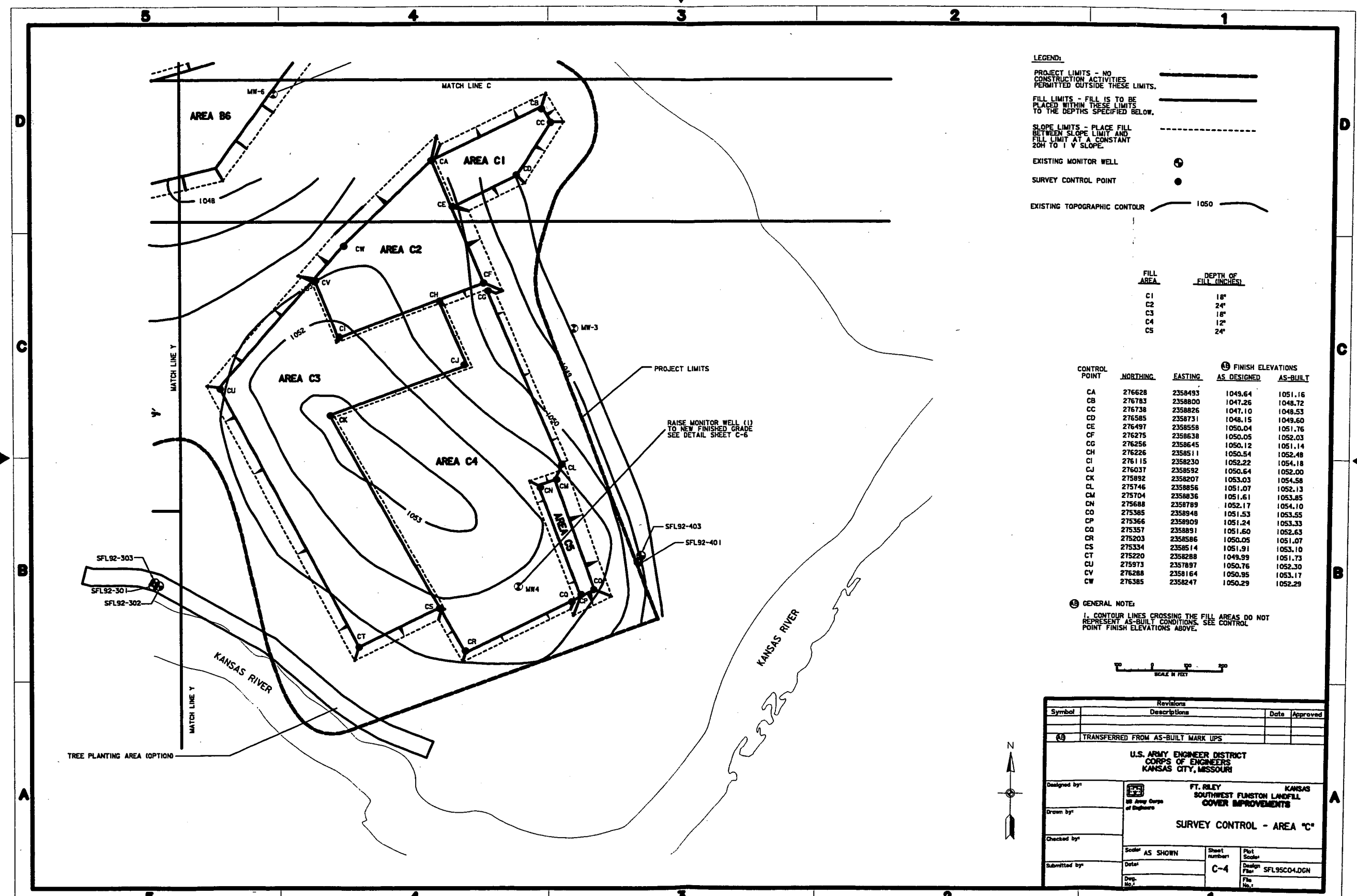
Designed by: RYS  
 Drawn by: RYS  
 Checked by: MR  
 Submitted by: JKH

**FT. RILEY KANSAS**  
**SOUTHWEST FLUNTON LANDFILL**  
**COVER IMPROVEMENTS**  
**SURVEY CONTROL - AREA "B"**

Scale: AS SHOWN	Sheet Number: C-3	Plot Scale:
Date: DECEMBER 1995	Design File: SFL95C03.DGN	File No.:

**RECORD DRAWING**  
 NOVEMBER 1996  
 CONTRACT NO. DACA41-96-C8006

VALUE ENGINEERING PAYS

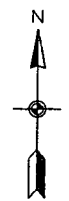


- LEGEND:**
- PROJECT LIMITS - NO CONSTRUCTION ACTIVITIES PERMITTED OUTSIDE THESE LIMITS.
  - FILL LIMITS - FILL IS TO BE PLACED WITHIN THESE LIMITS TO THE DEPTHS SPECIFIED BELOW.
  - SLOPE LIMITS - PLACE FILL BETWEEN SLOPE LIMIT AND FILL LIMIT AT A CONSTANT 20H TO 1 V SLOPE.
  - EXISTING MONITOR WELL
  - SURVEY CONTROL POINT
  - EXISTING TOPOGRAPHIC CONTOUR 1050

FILL AREA	DEPTH OF FILL (INCHES)
C1	18"
C2	24"
C3	18"
C4	12"
C5	24"

CONTROL POINT	NORTHING	EASTING	FINISH ELEVATIONS	
			AS DESIGNED	AS-BUILT
CA	276628	2358493	1049.64	1051.16
CB	276783	2358800	1047.26	1048.72
CC	276738	2358826	1047.10	1048.53
CD	276585	2358731	1048.15	1049.60
CE	276497	2358558	1050.04	1051.76
CF	276275	2358638	1050.05	1052.03
CG	276256	2358645	1050.12	1051.14
CH	276226	2358511	1050.54	1052.48
CI	276115	2358230	1052.22	1054.18
CJ	276037	2358592	1050.64	1052.00
CK	275892	2358207	1053.03	1054.58
CL	275746	2358856	1051.07	1052.13
CM	275704	2358836	1051.61	1053.85
CN	275688	2358789	1052.17	1054.10
CO	275385	2358948	1051.53	1053.55
CP	275366	2358909	1051.24	1053.33
CQ	275357	2358891	1051.60	1052.63
CR	275203	2358586	1050.05	1051.07
CS	275334	2358514	1051.91	1053.10
CT	275220	2358288	1049.99	1051.73
CU	275973	2357897	1050.76	1052.30
CV	276288	2358164	1050.95	1053.17
CW	276385	2358247	1050.29	1052.29

GENERAL NOTE:  
 1. CONTOUR LINES CROSSING THE FILL AREAS DO NOT REPRESENT AS-BUILT CONDITIONS. SEE CONTROL POINT FINISH ELEVATIONS ABOVE.



Revisions			
Symbol	Descriptions	Date	Approved
AS	TRANSFERRED FROM AS-BUILT MARK UPS		

**U.S. ARMY ENGINEER DISTRICT  
 CORPS OF ENGINEERS  
 KANSAS CITY, MISSOURI**

Designed by: **FT. RILEY KANSAS**  
 Drawn by: **SOUTHWEST FUNSTON LANDFILL**  
 Checked by: **COVER IMPROVEMENTS**

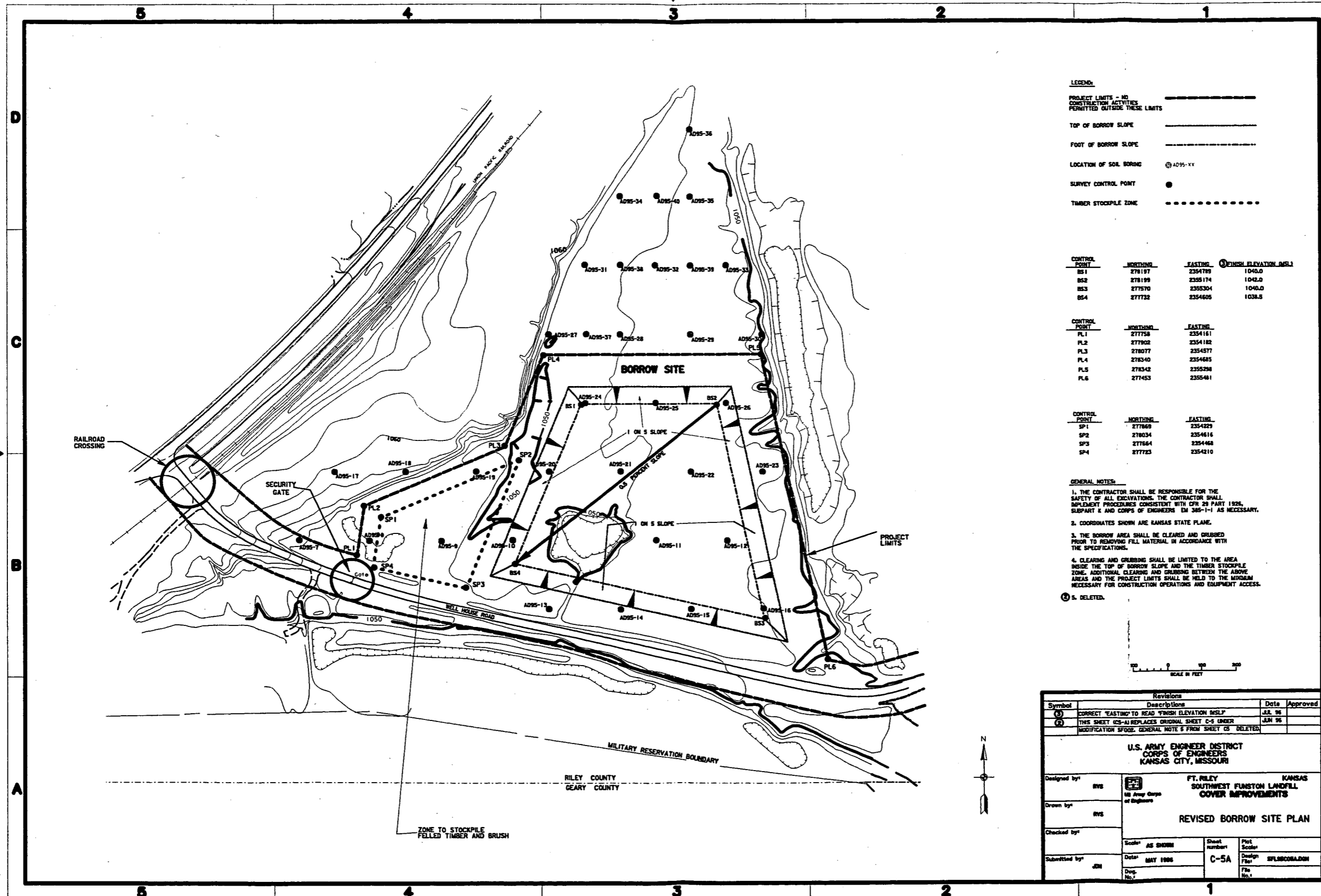
**SURVEY CONTROL - AREA "C"**

Submitted by:	Scale: AS SHOWN	Sheet number: C-4	Plot Scale:
Date:			Design File: SFL95C04.DGN
Dep. No.:			File No.:

**RECORD DRAWING**  
 NOVEMBER 1995  
 CONTRACT NO. DACA41-95-C-8006



VALUE ENGINEERING PAYS



**LEGEND:**

PROJECT LIMITS - NO CONSTRUCTION ACTIVITIES PERMITTED OUTSIDE THESE LIMITS

TOP OF BORROW SLOPE

FOOT OF BORROW SLOPE

LOCATION OF SOIL BORING

SURVEY CONTROL POINT

TIMBER STOCKPILE ZONE

CONTROL POINT	NORTHING	EASTING	FINISH ELEVATION (MSL)
BS1	278187	2354789	1042.0
BS2	278199	2355174	1042.0
BS3	277570	2355304	1040.0
BS4	277732	2354605	1038.5

CONTROL POINT	NORTHING	EASTING	FINISH ELEVATION (MSL)
PL1	277758	2354161	
PL2	277802	2354182	
PL3	278077	2354577	
PL4	278340	2354685	
PL5	278342	2355298	
PL6	277453	2355481	

CONTROL POINT	NORTHING	EASTING	FINISH ELEVATION (MSL)
SP1	277869	2354229	
SP2	278034	2354615	
SP3	277864	2354468	
SP4	277723	2354210	

- GENERAL NOTES:**
1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFETY OF ALL EXCAVATIONS. THE CONTRACTOR SHALL IMPLEMENT PROCEDURES CONSISTENT WITH CFR 29 PART 1926, SUBPART K AND CORPS OF ENGINEERS EM 385-1-1 AS NECESSARY.
  2. COORDINATES SHOWN ARE KANSAS STATE PLANE.
  3. THE BORROW AREA SHALL BE CLEARED AND GRUBBED PRIOR TO REMOVING FILL MATERIAL IN ACCORDANCE WITH THE SPECIFICATIONS.
  4. CLEARING AND GRUBBING SHALL BE LIMITED TO THE AREA INSIDE THE TOP OF BORROW SLOPE AND THE TIMBER STOCKPILE ZONE. ADDITIONAL CLEARING AND GRUBBING BETWEEN THE ABOVE AREAS AND THE PROJECT LIMITS SHALL BE HELD TO THE MINIMUM NECESSARY FOR CONSTRUCTION OPERATIONS AND EQUIPMENT ACCESS.
  5. DELETED.



Symbol	Revisions	Date	Approved
1	CORRECT 'EASTING' TO READ 'FINISH ELEVATION (MSL)'	JUL 96	
2	THIS SHEET (C-5-A) REPLACES ORIGINAL SHEET C-5 UNDER MODIFICATION SPOGE. GENERAL NOTE 5 FROM SHEET C5 DELETED.	JUN 96	

**U.S. ARMY ENGINEER DISTRICT  
CORPS OF ENGINEERS  
KANSAS CITY, MISSOURI**

**FT. RILEY KANSAS  
SOUTHWEST FUNSTON LANDFILL  
COVER IMPROVEMENTS**

**REVISED BORROW SITE PLAN**

Designed by: RVS  
 Drawn by: RVS  
 Checked by:  
 Submitted by: JON

Scale: AS SHOWN  
 Date: MAY 1996  
 Draw. No.:

Sheet number: C-5A  
 Plot Scale:  
 Design File: SFLM300A.DGN  
 File No.:

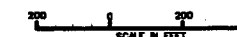
**RECORD DRAWING**  
 NOVEMBER 1996  
 CONTRACT NO. DAC41-96-C-8006

LEGEND:

- PROJECT LIMITS - NO CONSTRUCTION ACTIVITIES PERMITTED OUTSIDE THESE LIMITS
- FILL LIMITS - FILL IS TO BE PLACED WITHIN THESE LIMITS TO THE DEPTHS SPECIFIED ON SHEETS C2, C3 AND C4
- SLOPE LIMITS - PLACE FILL BETWEEN SLOPE LIMIT AND FILL LIMIT AT A CONSTANT 20H TO 1V SLOPE
- TOPOGRAPHIC CONTOURS AT END OF CONSTRUCTION
- EXISTING MONITOR WELL

GENERAL NOTES:

1. AFTER ALL CONSTRUCTION ACTIVITIES ON THE LANDFILL ARE COMPLETE, THE CONTRACTOR SHALL EXCAVATE TRENCHES ALONG LINES TO BE DESIGNATED BY THE CONTRACTING OFFICER. THE PURPOSE OF THESE TRENCHES IS TO VERIFY THE THICKNESS OF THE LANDFILL COVER.
2. THE CONTRACTOR SHALL PROVIDE A MINIMUM OF 15 CALENDAR DAYS NOTICE OF HIS INTENT TO BEGIN TRENCHING.
3. THE TRENCHES SHALL BE CONTINUOUS ALONG LINES DESIGNATED BY THE CONTRACTING OFFICER. THE TRENCHES SHALL BE 2 FEET DEEP AND A MINIMUM OF 16 INCHES WIDE.
4. THE CONTRACTOR SHALL PROVIDE SURVEY SUPPORT TO MARK THE TRENCH LOCATIONS.
5. UPON NOTIFICATION FROM THE CONTRACTING OFFICER, THE CONTRACTOR SHALL BACKFILL AND SEED THE TRENCH LINES. THE FILL SHALL BE PLACED IN MAXIMUM 12 INCH LIFTS AND TAMPED. SEEDING SHALL COMPLY WITH THE SPECIFICATIONS FOR THE TIME IT IS PLANTED.
6. FOR PURPOSES OF PREPARING A PROPOSAL, THE CONTRACTOR SHALL PROVIDE ONE BACKHOE, ONE OPERATOR AND ONE SURVEY CREW FOR TWO 8 HOUR DAYS, THE TOTAL LENGTH OF TRENCHES TO BE EXCAVATED SHALL NOT EXCEED 300 FEET.



Symbol	Revisions	Date	Approved
Ⓐ	TRANSFERRED FROM AS-BUILT MARK LPS		
Ⓚ	MODIFICATION 001	22DEC96	RVS

U.S. ARMY ENGINEER DISTRICT  
CORPS OF ENGINEERS  
KANSAS CITY, MISSOURI

Designed by:	RVS	FT. RILEY SOUTHWEST FUNSTON LANDFILL COVER IMPROVEMENTS	
Drawn by:	RVS	EXPLORATORY TRENCH REQUIREMENTS AND MONITOR WELL DETAIL	
Checked by:	MR	Scale: AS SHOWN	Sheet number: C-6
Submitted by:	JDM	Date: DECEMBER 1995	Design File: SFL95C06.DGN

MW 1  
July-92  
USA-ED-TP-KCMO  
north 276893.46  
east 2356481.70  
Elevation of top of casing 1054.38  
Elevation of top of brass hub 1052.70  
SFL-92-1

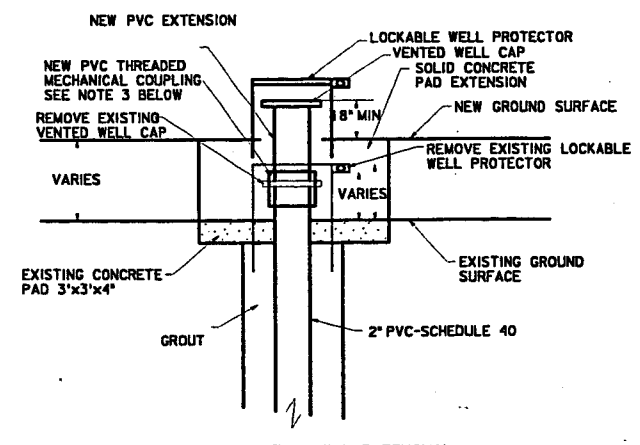
MW601  
July-92  
USA-ED-TP-KCMO  
north 277208.53  
east 2357919.89  
Elevation of top of casing 1055.61  
Elevation of top of brass hub 1053.48  
SFL-92-601

MW602  
July-92  
USA-ED-TP-KCMO  
north 277212.76  
east 2357944.58  
Elevation of top of casing 1055.13  
Elevation of top of brass hub 1053.16  
SFL-92-602

MW603  
July-92  
USA-ED-TP-KCMO  
north 277176.13  
east 2357925.58  
Elevation of top of casing 1054.98  
Elevation of top of brass hub 1052.99  
SFL-92-603

MW 6  
July-92  
USA-ED-TP-KCMO  
north 276818.52  
east 2358051.30  
Elevation of top of casing 1051.10  
Elevation of top of brass hub 1048.74  
SFL-92-6

MW 4  
July-92  
USA-ED-TP-KCMO  
north 275394.36  
east 2357732.51  
Elevation of top of casing 1055.16  
Elevation of top of brass hub 1053.17  
SFL-92-4



1. SURVEY TOP OF RISER EXTENSION AND TOP OF NEW CONCRETE PAD. INSTALL BRASS OR ALUMINUM SURVEY MARKER (3 INCH MINIMUM DIAMETER) IN NEW CONCRETE PAD STAMPED WITH RISER NORTHING, EASTING, ELEVATION AND WELL DESIGNATION.
2. CONTRACTOR SHALL SALVAGE EXISTING LOCKABLE WELL PROTECTOR AND VENTED WELL CAP.
3. NO GLUES OR SOLVENTS SHALL BE USED IN EXTENDING THE PVC WELL CASING. EXISTING WELL CASING MUST BE THREADED BEFORE FILL IS PLACED AROUND THE WELL.
4. EXTEND EXISTING WELL PROTECTORS (4 PER WELL) TO 3 FEET ABOVE FINISH GRADE. EXISTING WELL PROTECTORS ARE 4 INCH O.D. BLACK METAL PIPE FILLED WITH CONCRETE. WELD BLACK METAL EXTENSIONS TO EXISTING, FILL WITH CONCRETE, PRIME AND PAINT (COLOR TO BE SAFETY ORANGE).
5. MONITOR WELLS HAVE SHOWN PARTS PER BILLION RANGE CONCENTRATIONS OF HAZARDOUS CONSTITUENTS, SUCH AS VINYL CHLORIDE. THESE CONCENTRATIONS ARE NOT BY THEMSELVES HARMFUL BUT, TO AVOID THE POSSIBILITY OF AN INHALATION HAZARD, ALLOW THE WELLS TO VENTILATE A MINIMUM OF THIRTY MINUTES WITH WELL COVERS AND CAPS OFF. SCREEN AIR SPACE ABOVE WELL OPENING WITH A PHOTO IONIZATION DETECTOR (PID) BEFORE COMMENCING WORK. IF A DETECTION GREATER THAN 10 PARTS PER MILLION IS RECORDED, CEASE ALL WORK AT THE WELL AND ADVISE THE CONTRACTING OFFICER.

LEGEND:

PROJECT LIMITS - NO CONSTRUCTION ACTIVITIES PERMITTED OUTSIDE THESE LIMITS

FILL LIMITS - FILL IS TO BE PLACED WITHIN THESE LIMITS TO THE DEPTHS SPECIFIED ON SHEETS C2, C3 AND C4

SLOPE LIMITS - PLACE FILL BETWEEN SLOPE LIMIT AND FILL LIMIT AT A CONSTANT 20H TO 1V SLOPE

TOPOGRAPHIC CONTOURS AT END OF CONSTRUCTION

EXISTING MONITOR WELL

ACCESS ROAD

SURVEY CONTROL POINT

SURVEY CONTROL POINT	NORTHING	EASTING
AR1	277911	2356767
AR2	277628	2357017
AR3	277321	2357073
AR4	277228	2357891
AR5	276981	2356811
AR6	276684	2357300
AR7	275531	2357637
AR8	275442	2357691
AR9	275490	2359039

SURVEY NOTES:

- COORDINATES ARE KANSAS STATE PLANE.
- CONTROL POINTS ARE PROVIDED AT INTERSECTION OF CENTERLINES OR CENTER OF TURN RADIUS.



Revisions			
Symbol	Descriptions	Date	Approved
	Sheet added to contract under Modification SF001	AUG 96	

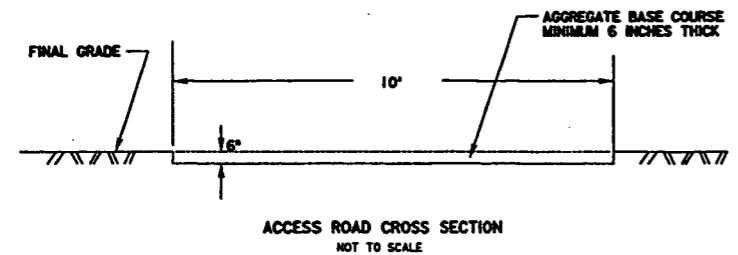
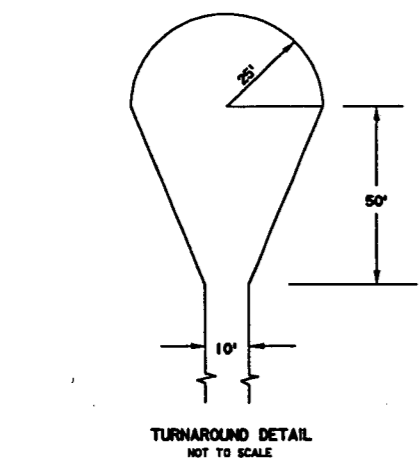
U.S. ARMY ENGINEER DISTRICT  
CORPS OF ENGINEERS  
KANSAS CITY, MISSOURI

Designed by: RVS  
Drawn by: RVS  
Checked by:  
Submitted by:

**FT. RILEY KANSAS  
SOUTHWEST FUNSTON LANDFILL  
COVER IMPROVEMENTS**

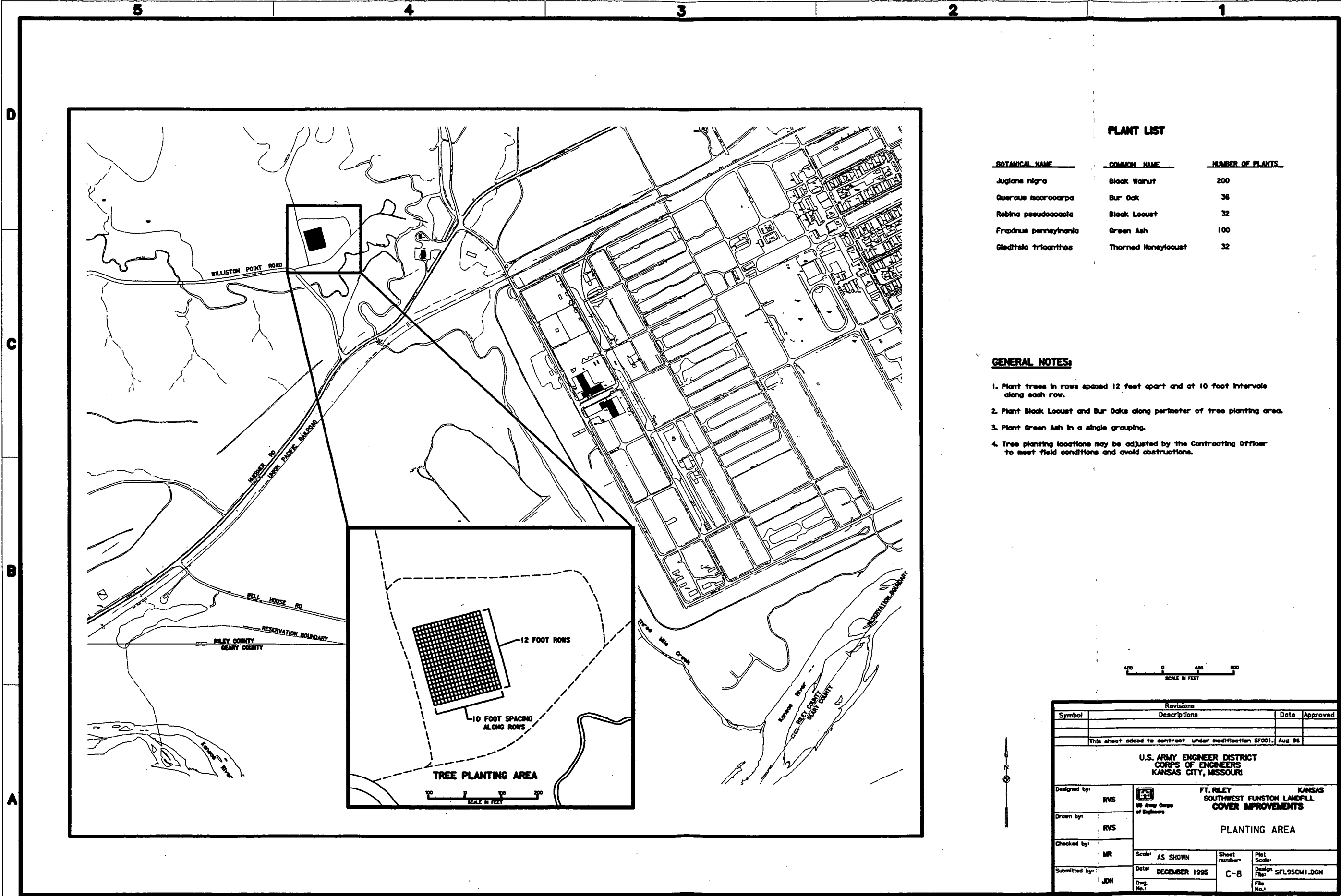
**REPLACE MONITOR WELL ACCESS ROAD**

Scale: AS SHOWN	Sheet number: C-7	Plot Scale:
Date: MAY 1996	Design File: SFL95C07.DGN	File No.:
Dwg. No.:		



DETAIL NOTES:

- AGGREGATE BASE COURSE - Gradation shall be as specified in Subsection 1105, Table C, Type AB-3 of the Standard Specifications for State Road and Bridge Construction, Kansas Department of Transportation, 1990 Edition.
- Construct access road after all fill is placed in a given area. Excavate 6 inches for aggregate base course. Use soil removed for cover on other areas of the landfill.
- Compact aggregate base course with two passes of a rubber tired roller.



**PLANT LIST**

BOTANICAL NAME	COMMON NAME	NUMBER OF PLANTS
<i>Juglans nigra</i>	Black Walnut	200
<i>Quercus macrocarpa</i>	Bur Oak	36
<i>Robinia pseudoacacia</i>	Black Locust	32
<i>Fraxinus pennsylvanica</i>	Green Ash	100
<i>Gleditsia triacanthos</i>	Thorned Honeylocust	32

**GENERAL NOTES:**

- Plant trees in rows spaced 12 feet apart and at 10 foot intervals along each row.
- Plant Black Locust and Bur Oaks along perimeter of tree planting area.
- Plant Green Ash in a single grouping.
- Tree planting locations may be adjusted by the Contracting Officer to meet field conditions and avoid obstructions.



Revisions			
Symbol	Descriptions	Date	Approved
	This sheet added to contract under modification SF001.	Aug 96	
<b>U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI</b>			
<b>FT. RILEY SOUTHWEST FUNSTON LANDFILL COVER IMPROVEMENTS</b>		<b>PLANTING AREA</b>	
Designed by:	RVS	Scale:	AS SHOWN
Drawn by:	RVS	Sheet number:	C-8
Checked by:	MR	Date:	DECEMBER 1995
Submitted by:	JDM	Design File No.:	SFL95CM1.DGN

**RECORD DRAWING**

**CONSTRUCTION TECHNICAL SPECIFICATIONS**

BANK STABILIZATION PROJECT

COVER REPAIR PROJECT

COVER IMPROVEMENT PROJECT



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Kansas City District  
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DACA41-94-R-0013

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# **Bank Stabilization Southwest Funston Landfill**

Fort Riley, Kansas

## **Construction Solicitation Specifications and Drawings**

**This is an 8(a) Set-Aside**

December 1993

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SECTION 02110

SITE CLEARING

PART 1 - GENERAL

1.1 SCOPE. This section covers all site clearing requirements, and the handling and/or disposal of the resulting materials.

1.2. DEFINITIONS.

Clearing shall consist of the felling, trimming, and cutting of trees into sections and the satisfactory disposal of the trees and other vegetation designated for removal, including down timber, snags, brush, and rubbish occurring in the areas to be cleared.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

3. EXECUTION.

3.1 Clearing

3.1.1 Clearing shall be performed on the landfill surface along the river bank to the limits indicated on the contract drawings.

3.1.2 Clearing. Trees, stumps, roots, brush, and other vegetation in areas designated to be cleared shall be cut off flush with or within 2 inches above the original ground surface. Clearing shall also include the removal and disposal of structures or objects that obtrude, encroach upon, or otherwise obstruct the proper placement of material on the riverbank slope.

3.1.3 Special Conditions for Site Clearing. Based upon best available data, the cover on the landfill is believed to be a minimum of 2 feet thick. Clearing of material from the landfill surface shall be conducted in a manner to insure that the landfill refuse is not exposed to the greatest extent possible. Damage to the landfill cover shall be repaired the same day it occurs. If landfill refuse is exposed during the clearing operations, all work in that area will cease immediately and the contracting officer will be notified.



3.3 Disposal of Materials

3.3.1 Timber. Timber shall be disposed of by burning on site. A burn permit shall be obtained from the Fort Riley Fire Department prior to conducting any burn operations.

3.3.2 Materials Other than Timber. Materials other than timber which result from site clearing and other operations during the performance of this work as well as the residue from timber burn operations shall be disposed of in the Fort Riley sanitary landfill.

\* \* \* \* \*

## SECTION 02130

## SURVEY REQUIREMENTS

## PART 1 - GENERAL

1.1 SCOPE. The Contractor shall furnish labor, materials, equipment and incidentals to perform the required surveys.

1.2 Existing horizontal and vertical control for the work is shown on the contract drawings. The monitor well cluster on the site shall serve as the primary control for all survey work performed under this contract. A 3.5 inch diameter doomed brass survey marker is set in the concrete pad surrounding each monitor well casing. Survey data for the wells is as follows:

<u>POINT NO.</u>	<u>NORTHING</u>	<u>EASTING</u>	<u>TOP OF CASING ELEVATION</u>
SFL92-301	275,397.67	2,357,706.99	1050.30
SFL92-302	275,397.95	2,357,723.64	1050.19
SFL92-303	275,406.63	2,357,711.67	1050.48

The Contractor shall establish additional benchmarks as required for performance of the work. These shall be tied into the existing control. The state plane coordinate system shall be used.

1.3 The Contractor is responsible for providing surveying control to construct the bank stabilization to the lines and grades as shown on the drawings, to provide quantity estimates for materials as required in SECTION: MEASUREMENT AND PAYMENT, and any other surveying required to properly perform the work as specified in the contract documents. Any earthwork or rock quantity errors caused by survey errors shall be resurveyed at the Contractor's expense. The Contractor shall use duplicating field books and the Government will retain the original notes.

1.4 The Contractor shall use surveyors with current State of Kansas registration for all surveying activities.

1.5 Surveying instruments shall be calibrated prior to the start of the project and certificates attesting to the calibration shall be submitted to the Contracting Officer.

1.6 Survey measurements shall be performed to an accuracy of 1.0 foot for horizontal measurements and 0.1 foot for vertical measurements.

## PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

3.1 Quantity Surveys. Surveys shall be completed and mapped to determine the quantities of stone placed for the bank stabilization construction as described in Section 02271 of these specifications.

3.2 The Contractor shall reduce all cross section notes and plot the cross sections. The scale of the plots shall be one inch equals 10 feet unless otherwise approved by the Contracting Officer. The first set of cross section plots shall have the initial conditions of the existing riverbank slope. Subsequent surveys shall be superimposed over the previous plots to compute quantities of bank stabilization.

3.3 The Contractor shall compute all quantities, including quantities to support partial payments. Quantities shall be computed using the average-end-area method and rounded to the nearest cubic yard based on the accumulative total. The computations and quantities shall be submitted for the Contracting Officer's review and approval.

\* \* \* \* \*

## SECTION 02271

## BANK STABILIZATION

## PART 1 - GENERAL

## 1.1. SCOPE

This section covers bank stabilization, complete.

## 1.2 GENERAL

## 1.2.1 Plan of Operations

The source quarry and descriptions of methods to be used in placing operations, including the required tests, shall be submitted to the Contracting Officer.

## 1.2.2 Quarry Operations

If the methods used fail to produce the required materials, changes in production methods shall be made until the required product is produced. Blasting and handling of rock shall be controlled to minimize the development of small fractures. Techniques such as the use of low density powders, sloped blast holes, removal of previously blasted materials between each shot, and minimizing the height from which rock is dropped during loading and processing will be required to produce the specified materials.

## PART 2 - PRODUCTS

## 2.1 MATERIALS

## 2.1.1 General

Stone for ripap and bedding shall be sound durable limestone or calcareous cemented sandstone, free from cracks, seams, shale partings, and overburden spoil and shall be supplied from a source and geologic unit listed in the SPECIAL CLAUSES.

## 2.1.2 Elongation

Stone for bank stabilization shall be approximately rectangular in cross section, free from thin slabby pieces having elongation ratio more than four, and the quantity of stone having an elongation ratio more than three shall not exceed 20 percent by weight.

2.1.3 Deleterious substances which include soft friable particles, objectionable materials, and other foreign matter, shall not exceed 10 percent by weight.

## 2.1.4 Gradation

The stone shall be graded from coarse to fine. The material shall have a maximum size of 700 pounds, with not more than 50 percent of the material smaller than 100 pounds. The material may contain up to a maximum of 25 percent fines (by weight), except that the outer 3 feet of the rock shell section shall not contain more than 15 percent fines (by weight). Fines are defined as material smaller than 3 inches in size.

PART 3 - EXECUTION

3.1 PLACEMENT

Bank stabilization stone used as temporary fill, and placed below the existing water surface, may be placed in one lift. Bank stabilization stone shall otherwise be placed in lifts not exceeding 3 feet in thickness. Excavation shall not proceed more than 300 feet ahead of finished rockfill lines. Care shall be taken in placing stone against existing pipes and other structures; stone placed within a distance of 1 foot from the exterior of pipes or structures shall be placed by hand; stone placed in the remainder of the area may be placed in one lift. Bridging shall be broken down so that the resulting fill forms a fully stable mass. Any crust or concentration of fines at the surface of the lift which, in the opinion of the Contracting Officer, will interfere with the bonding, shall be broken up prior to adding the next lift. Dumping and spreading shall be controlled to obtain rock to rock contact without objectionable pockets of fines or concentrations of larger pieces. Generally, the larger pieces of stone shall be placed near the riverside slope. A tolerance of plus 0.2 feet from the indicated lines and grades for rockfill will be permitted.

3.2 QUALITY CONTROL

3.2.1 General

Tests shall be performed for stone protection as specified below, and as directed, to determine if the rockfill material delivered to the job meets the gradation, elongation, and deleterious requirements specified herein. Tests for elongation shall be run on the plus 6-inch material only. The tests shall be coordinated to minimize interference with the construction progress. If the materials fail to meet the gradation, elongation, and deleterious materials limits specified, the Contractor shall adjust his operations as required to produce acceptable materials, or he shall propose another source of materials. Prior to placement of any materials, the Contractor shall submit for approval in writing, the detailed methods of testing. The Contractor shall state in writing the method used in processing, loading and handling of materials for each test, and shall notify the Contracting Officer any time any production methods are changed. The field acceptance test shall be performed on random loads selected by the Contracting Officer. Materials from load testing shall be placed in the work if the materials meet specification requirements.

3.2.2 Tests Required

<u>Type of Test</u>	<u>Minimum Size of Test</u>	<u>Minimum No. of Tests Required</u>
Truckload gradation	10 tons	5

3.3 MAINTENANCE

The Contractor shall maintain the bank stabilization material until the project is completed and any material displaced by the cause, except as provided in paragraph: DAMAGE TO WORK of the SPECIAL CLAUSES, shall be repaired to the lines and grades shown on the drawings as directed.



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# **Cover Repairs Southwest Funston Landfill**

## **Fort Riley, Kansas**

### **Construction Solicitation and Specifications**

### **Total Small Disadvantaged Business Set-Aside**

June 1994

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## DIVISION 02 - SITE WORK

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## SECTION 02110

## CLEARING AND GRUBBING

## PART 1 - GENERAL

1.1 SCOPE. This section covers all clearing and grubbing requirements, and the handling and/or disposal of the resulting materials.

## 1.2 DEFINITIONS.

1.2.1 Clearing shall consist of the felling, trimming, and cutting of trees into sections and the satisfactory disposal of the trees and other vegetation designated for removal, including down timber, snags, brush, construction debris and rubbish occurring in the areas to be cleared.

1.2.2 Grubbing shall consist of the removal and disposal of stumps, roots larger than 1.5 inches in diameter, and matted roots from the cleared areas.

## 1.3 CONTRACTOR RESPONSIBILITIES

1.3.1 The Contractor shall be responsible for the preservation of all public and private property, equipment, structures, fences, existing trees, plants and other vegetation that are to remain adjacent to the limits of work and shall use every precaution necessary to prevent damage or injury thereto from his operations. The Contractor shall repair or replace any material damage incurred by his Work to a condition that is acceptable to the Contracting Officer, and reseed, in accordance with SECTION 02910: SEEDING AND PLANTING, all grass areas beyond the limits of work which have been damaged by the Contractor's Work. The Contractor shall not remove, cut, injure, or destroy trees or shrubs outside the limits of work without written approval from the Contracting Officer. Trees within the project limits which have been marked for retention shall be protected from injury.

1.3.2 When or where any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, neglect or misconduct, on the part of the Contractor in the execution of the Work, such property shall be restored by the Contractor, at his expense, to a condition equal to that existing before such damage or injury was done, or he shall make good such damage or injury in such manner as may be acceptable to the property owner and the Contracting Officer.

## 1.4 REGULATORY REQUIREMENTS

1.4.1 All burning must be coordinated with the installation fire department and must comply with all federal, state and local regulations.

1.4.2 Off-site disposal of rubble and debris shall be performed in accordance with all applicable laws and regulations.

## PART 2 - PRODUCTS

2.1 EQUIPMENT: The Contractor shall provide all equipment, labor and materials required to perform Work as specified in this Section.

## PART 3 - EXECUTION

**3.1 Clearing**

3.1.1 Clearing shall be performed on the landfill surface, borrow area and haul route within the limits indicated on the contract drawings.

3.1.2 Clearing. Trees, stumps, roots, brush, and other vegetation in areas designated to be cleared shall be cut off flush with or within 2 inches above the original ground surface. Clearing shall also include the removal and disposal of structures or objects that obstruct, encroach upon, or otherwise obstruct the proper placement of fill on the landfill surface or removal of good, clean fill from the borrow area.

**3.2 Grubbing.**

3.2.1 Grubbing shall be performed on the landfill surface and borrow area and haul route within the limits indicated on the contract drawings.

3.2.2 Borrow Area and Haul Route Grubbing. Within the borrow area and haul route, all stumps, roots, and matted roots, construction debris and other organic debris or metallic objects shall be removed. Soil obtained at the borrow area which is to be used as fill at the landfill shall be free of all organic and metallic material and concrete debris.

3.2.3 Landfill Area Grubbing. Based upon best available data, the cover on the landfill is believed to be a minimum of 2 feet thick. Grubbing on the landfill surface shall be conducted in a manner to minimize the exposure of landfill contents to the greatest extent possible. Within the landfill limits, stumps, roots larger than 1.5 inches in diameter, and matted roots shall be removed to a maximum depth of six (6) inches. The landfill surface shall then be mowed to within 1 inch of the ground surface and the cuttings shall be gathered and burned. Mowing and clearing of the cuttings shall be accomplished not more than seven calendar days prior to removal and stockpiling of the topsoil. If that time period is exceeded, the area shall be mowed and the cuttings removed again. All burning shall be coordinated with the installation fire department. If landfill refuse is exposed during the grubbing operations, all work in that area will cease immediately and the contracting officer will be notified. No explosives shall be used.

3.2.4 All holes and depressions larger than 3 feet in depth on the landfill surface resulting from tree root, stump, and debris removals shall be backfilled with available material approved by the Contracting Officer. Backfill material shall be compacted to a minimum density equal to the density of the surrounding natural soil.

3.3 The Contractor shall clear and grub on an as-needed basis as his work progresses to limit erosion and to comply with the contractor's Erosion Control Plan.

**3.4 Disposal of Materials**

3.4.1 Timber. All felled timber shall be stockpiled at the locations indicated on the contract drawings. The disposal of the stockpiled timber will be by the Government.

3.4.2 Disposal of cleared and grubbed material. All burnable materials resulting from clearing and grubbing operations on the landfill and the borrow area, with the exception of timber, shall be stockpiled to permit it to dry and then burned at locations directed by the contracting officer and in a manner to prevent damage to existing structures and appurtenances, construction in progress, trees, and other vegetation. The Contractor shall be responsible for compliance with all Federal and State laws and regulations

## PART 3 - EXECUTION

## 3.1 Clearing

3.1.1 Clearing shall be performed on the landfill surface, borrow area and haul route within the limits indicated on the contract drawings.

3.1.2 Clearing. Trees, stumps, roots, brush, and other vegetation in areas designated to be cleared shall be cut off flush with or within 2 inches above the original ground surface. Clearing shall also include the removal and disposal of structures or objects that obstruct, encroach upon, or otherwise obstruct the proper placement of fill on the landfill surface or removal of good, clean fill from the borrow area.

## 3.2 Grubbing.

3.2.1 Grubbing shall be performed on the landfill surface and borrow area and haul route within the limits indicated on the contract drawings.

3.2.2 Borrow Area and Haul Route Grubbing. Within the borrow area and haul route, all stumps, roots, and matted roots, construction debris and other organic debris or metallic objects shall be removed. Soil obtained at the borrow area which is to be used as fill at the landfill shall be free of all organic and metallic material and concrete debris.

3.2.3 Landfill Area Grubbing. Based upon best available data, the cover on the landfill is believed to be a minimum of 2 feet thick. Grubbing on the landfill surface shall be conducted in a manner to minimize the exposure of landfill contents to the greatest extent possible. Within the landfill limits, stumps, roots larger than 1.5 inches in diameter, and matted roots shall be removed to a maximum depth of six (6) inches. The landfill surface shall then be mowed to within 1 inch of the ground surface and the cuttings shall be gathered and burned. Mowing and clearing of the cuttings shall be accomplished not more than seven calendar days prior to removal and stockpiling of the topsoil. If that time period is exceeded, the area shall be mowed and the cuttings removed again. All burning shall be coordinated with the installation fire department. If landfill refuse is exposed during the grubbing operations, all work in that area will cease immediately and the contracting officer will be notified. No explosives shall be used.

3.2.4 All holes and depressions larger than 3 feet in depth on the landfill surface resulting from tree root, stump, and debris removals shall be backfilled with available material approved by the Contracting Officer. Backfill material shall be compacted to a minimum density equal to the density of the surrounding natural soil.

**3.3 The Contractor shall clear and grub on an as-needed basis as his work progresses to limit erosion and to comply with the contractors Erosion Control Plan. The Erosion Control Plan shall be developed to retain as much ground cover as is practical.**

## 3.4 Disposal of Materials

3.4.1 Timber. All felled timber shall be stockpiled at the locations indicated on the contract drawings. The disposal of the stockpiled timber will be by the Government.

3.4.2 Disposal of cleared and grubbed material. All burnable materials resulting from clearing and grubbing operations on the landfill and the borrow area, with the exception of timber, shall be stockpiled to permit it to dry and then burned at locations directed by the contracting officer and in a manner to prevent damage to existing structures and appurtenances, construction in progress, trees, and other vegetation. The Contractor shall be responsible for compliance with all Federal and State laws and regulations

and with reasonable practice relative to the building of fires. Material which cannot be burned such as metallic and concrete debris shall be hauled to and disposed of at the Fort Riley construction landfill. Burning or other disposal of refuse and debris and any accidental loss or damage attendant thereto shall be the Contractor's responsibility.

\* \* \* \* \*

## SECTION 02210

## EARTHWORK

## PART 1 - GENERAL

1.1 SCOPE: This section covers materials, construction and testing requirements for material excavation and filling required for general site grading.

1.2 APPLICABLE PUBLICATIONS: The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only and shall be the latest published revision.

1.2.1 American Society for Testing and Materials (ASTM) Publications:

D 422-63	Particle-Size Analysis of Soils
D 2487-85	Classification of Soils for Engineering Purposes
D 4318-84	Liquid Limit, Plastic Limit, and Plasticity Index of Soils

1.2.2 29 CFR 1926.650, Excavations

1.3 DEFINITIONS:

1.3.1 Satisfactory materials shall include all material being either cohesionless or cohesive not included in the unsatisfactory materials definition below.

1.3.2 Unsatisfactory materials from the borrow site shall include all materials that contain debris, roots, brush, sod, organic or frozen materials, materials classified in ASTM D 2487 as MH, PT, OH, and OL, stone having a maximum dimension larger than 3 inches and materials that are determined by the Contracting Officer as unsuitable for providing a stable slope, fill, subgrade or foundation for structures. The Contracting Officer has the right to reject material prior to placement if the material is hauled onsite in a saturated or watered down state.

1.3.3 Cohesionless and cohesive materials: Cohesionless materials include materials classified in ASTM D 2487 as GW, GP, SW, and SP. Cohesive materials include materials classified as GC, SC, ML, CL, MH, and CH. Materials classified as GM and SM will be identified as cohesionless only when the fines are nonplastic. When there is a disagreement as to the classification or suitability of a material proposed for use as fill on the landfill surface, the contractor shall have the material classified at his expense. Testing required to classifying materials shall be in accordance with ASTM D 4318 and D 422.

PART 2 - PRODUCTS  
(NOT USED)

## PART 3 - EXECUTION

## 3.1 Excavation.

3.1.1 Excavation Safety. The Contractor shall be solely responsible for making all excavations in a safe manner. The Contractor shall install and maintain shoring, sheeting, bracing, and sloping as required by 29 CFR 1926.650 thru 29 CFR 1926.653, and as necessary to support the sides of the excavation, to prevent any movement which may damage adjacent pavements, utilities, or structures, damage or delay the work, or endanger life and health.

3.1.2 The Contractor shall perform excavation of every type of material encountered within the limits of the project, to the lines, grades, and elevations indicated and as required. Grading shall be in conformity with the typical sections shown and the tolerances specified in subparagraph Finishing. Satisfactory excavated materials shall be transported to and placed in onsite fill areas in accordance with these specifications. During construction, excavation and fill operations shall be performed in a manner and sequence that will provide proper drainage at all times.

## 3.2 Drainage and dewatering.

3.2.1 Drainage: Surface water shall be directed away from excavations so as to prevent erosion. Diversion ditches, dikes and grading shall be provided and maintained as necessary during construction. Excavated slopes and backfill surfaces shall be protected to prevent erosion and sloughing. Excavation shall be performed so that the site and the area immediately surrounding the site and affecting operations at the site shall be continually and effectively drained.

3.2.2 General dewatering: Groundwater flowing toward or into excavations shall be controlled to prevent sloughing of excavation slopes and walls, boils, uplift and heave in the excavation and to eliminate interference with orderly progress of construction. Control measures shall be taken by the time the excavation reaches the water level in order to maintain the integrity of the in situ material. While the excavation is open, the water level shall be maintained continuously below the working level.

## 3.3 Subgrade preparation.

3.3.1 Subgrade to support concrete: Excavation to final grade shall not be made until just before concrete is to be placed. Unsatisfactory materials in surfaces to receive fill or in excavated areas shall be removed and replaced with common borrow. The surface shall be scarified to a depth of 6 inches before the fill is started. Sloped surfaces steeper than 1 vertical to 4 horizontal shall be plowed, stepped, benched, or broken up so that the fill materials will bond with the existing material. Material shall not be placed on surfaces that are muddy, frozen, or contain frost. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, or other approved equipment well suited to the soil being compacted. Material shall be moistened or aerated as necessary to plus or minus 3 percent of optimum moisture. Minimum subgrade density shall be as specified in subparagraph Filling and Backfilling.

3.3.2 Subgrade protection: During construction, excavations shall be kept shaped and drained. Ditches and drains along subgrade shall be maintained in such a manner as to drain effectively at all times. The finished subgrade shall not be disturbed by traffic or other operation and shall be protected

PART 3 - EXECUTION

3.1 Excavation.

3.1.1 Excavation Safety. The Contractor shall be solely responsible for making all excavations in a safe manner. The Contractor shall install and maintain shoring, sheeting, bracing, and sloping as required by 29 CFR 1926.650 thru 29 CFR 1926.653, and as necessary to support the sides of the excavation, to prevent any movement which may damage adjacent pavements, utilities, or structures, damage or delay the work, or endanger life and health.

3.1.2 The Contractor shall perform excavation of every type of material encountered within the limits of the project to the lines, grades, and elevations indicated and as required. Grading shall be in conformity with the typical sections shown and the tolerances specified in subparagraph Finishing. Satisfactory excavated materials shall be transported to and placed in onsite fill areas in accordance with these specifications. During construction, excavation and fill operations shall be performed in a manner and sequence that will provide proper drainage at all times.

\*\* 3.2 Drainage and dewatering.

3.2.1 Drainage: Surface water shall be directed away from excavations so as to prevent erosion. Diversion ditches, dikes and grading shall be provided and maintained as necessary during construction. Excavated slopes and backfill surfaces shall be protected to prevent erosion and sloughing. Excavation shall be performed so that the site and the area immediately surrounding the site and affecting operations at the site shall be continually and effectively drained. The Contractor shall submit a dewatering plan for Contracting Officer approval.

3.2.2 General dewatering: Groundwater flowing toward or into excavations shall be controlled to prevent sloughing of excavation slopes and walls, boils, uplift and heave in the excavation and to eliminate interference with orderly progress of construction. Control measures shall be taken by the time the excavation reaches the water level in order to maintain the integrity of the in situ material. During borrow site operations, the water level shall be maintained continuously below the working level.

3.3 Subgrade preparation.

3.3.1 Subgrade to support concrete: Excavation to final grade shall not be made until just before concrete is to be placed. Unsatisfactory materials in surfaces to receive fill or in excavated areas shall be removed and replaced with common borrow. The surface shall be scarified to a depth of 6 inches before the fill is started. Sloped surfaces steeper than 1 vertical to 4 horizontal shall be plowed, stepped, benched, or broken up so that the fill materials will bond with the existing material. Material shall not be placed on surfaces that are muddy, frozen, or contain frost. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, or other approved equipment well suited to the soil being compacted.

3.3.2 Subgrade protection: During construction, excavations shall be kept shaped and drained. Ditches and drains along subgrade shall be maintained in such a manner as to drain effectively at all times. The finished subgrade shall not be disturbed by traffic or other operation and shall be protected.

PART 3 - EXECUTION

3.1 Excavation.

3.1.1 Excavation Safety. The Contractor shall be solely responsible for making all excavations in a safe manner. The Contractor shall install and maintain shoring, sheeting, bracing, and sloping as required by 29 CFR 1926.650 thru 29 CFR 1926.653, and as necessary to support the sides of the excavation, to prevent any movement which may damage adjacent pavements, utilities, or structures, damage or delay the work, or endanger life and health.

3.1.2 The Contractor shall perform excavation of every type of material encountered within the limits of the project, to the lines, grades, and elevations indicated and as required. Grading shall be in conformity with the typical sections shown and the tolerances specified in subparagraph Finishing. Satisfactory excavated materials shall be transported to and placed in onsite fill areas in accordance with these specifications. During construction, excavation and fill operations shall be performed in a manner and sequence that will provide proper drainage at all times.

3.2 Drainage and dewatering.

\*\* 3.2.1 Borrow area and water diversion structure: The borrow area and water diversion structure are not subject to these drainage and dewatering criteria.

3.2.2 Drainage: Surface water shall be directed away from excavations so as to prevent erosion. Diversion ditches, dikes and grading shall be provided and maintained as necessary during construction. Excavated slopes and backfill surfaces shall be protected to prevent erosion and sloughing. Excavation shall be performed so that the site and the area immediately surrounding the site and affecting operations at the site shall be continually and effectively drained.

3.2.3 General dewatering: Groundwater flowing toward or into excavations shall be controlled to prevent sloughing of excavation slopes and walls, boils, uplift and heave in the excavation and to eliminate interference with orderly progress of construction. Control measures shall be taken by the time the excavation reaches the water level in order to maintain the integrity of the in situ material. During excavation operations, the water level shall be maintained continuously below the working level. The contractor shall submit a dewatering plan for Contracting Officer approval.

3.3 Subgrade preparation. \*\*

3.3.1 Subgrade to support concrete: Excavation to final grade shall not be made until just before concrete is to be placed. Unsatisfactory materials in surfaces to receive fill or in excavated areas shall be removed and replaced with common borrow. The surface shall be scarified to a depth of 6 inches before the fill is started. Sloped surfaces steeper than 1 vertical to 4 horizontal shall be plowed, stepped, benched, or broken up so that the fill materials will bond with the existing material. Material shall not be placed on surfaces that are muddy, frozen, or contain frost. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, or other approved equipment well suited to the soil being compacted.

3.3.2 Subgrade protection: During construction, excavations shall be kept shaped and drained. Ditches and drains along subgrade shall be maintained in such a manner as to drain effectively at all times. The finished subgrade shall not be disturbed by traffic or other operation and shall be protected



and maintained by the Contractor in a satisfactory condition. The storage or stockpiling of materials on the finished subgrade will not be permitted. Liner construction will not start until the subgrade has been checked and approved by the Contracting Officer.

#### 3.4 Removal of Topsoil on the Landfill Surface

After the landfill surface has been cleared, grubbed and mowed as required in the SECTION: CLEARING AND GRUBBING, the top six inches of topsoil shall be removed and stockpiled. The stockpiled topsoil shall be retained in piles for a minimum of 30 calendar days before it is reapplied to the landfill surface.

#### 3.5 Spreading and Compaction of Fill

Satisfactory material obtained from the borrow site and the stockpiled topsoil shall be used in bringing fills to the lines and grades indicated and for replacing unsatisfactory materials. At all locations on the landfill surface, the stockpiled topsoil shall be used as the final top compacted 4 inches of fill as a minimum. The materials shall be spread by bulldozer or other approved means in successive horizontal layers of loose material not more than 12-inches in depth. Each layer shall be spread uniformly; plowed, disked, or otherwise broken up; moistened or aerated as necessary; thoroughly mixed to blend the fill material with the previous lift. Each layer shall be compacted by not less than three complete passes of a crawler type tractor. The tractor shall be equipped with standard tracks having a contact pressure of not less than 10 psi. A complete pass shall consist of coverage of the entire surface of the layer. Compacted materials are not subject to specific moisture and density requirements. At his option the contractor may propose an alternate method of compaction for approval by the Contracting Officer. It shall be the contractor's responsibility to provide sufficient engineering support for his alternative to clearly demonstrate that it will provide a compactive effort equivalent to the method specified.

#### 3.6 Finishing

The surface of all excavations, embankments and subgrades shall be finished to a smooth and compact condition in accordance with the lines, grades, and cross sections or elevations shown. The degree of finish for all graded areas shall be within 0.1 feet of the grades and elevation indicated on the contract drawings. The surface of areas to be seeded shall be finished to a smoothness suitable for the seeding method to be used.

\* \* \* \* \*

## SECTION 02271

## ROCKFILL/QUARRY-RUN STONE

## PART 1 - GENERAL

## 1.1. SCOPE

This section covers rockfill, complete.

## 1.2 GENERAL

## 1.2.1 Plan of Operations

The source quarry and descriptions of methods to be used in placing operations, including the required tests, shall be submitted to the Contracting Officer.

## 1.2.2 Quarry Operations

If the methods used fail to produce the required materials, changes in production methods shall be made until the required product is produced. Blasting and handling of rock shall be controlled to minimize the development of small fractures. Techniques such as the use of low density powders, sloped blast holes, removal of previously blasted materials between each shot, and minimizing the height from which rock is dropped during loading and processing will be required to produce the specified materials.

## PART 2 - PRODUCTS

## 2.1 MATERIALS

## 2.1.1 General

Stone for rockfill and quarry-run stone shall be sound durable limestone or calcareous cemented sandstone, free from cracks, seams, shale partings, and overburden spoil and shall be supplied from a source and geologic unit listed in the SPECIAL CLAUSES.

## 2.1.2 Elongation

Stone for rockfill and quarry-run stone shall be approximately rectangular in cross section, free from thin slabby pieces having elongation ratio more than four, and the quantity of stone having an elongation ratio more than three shall not exceed 20 percent by weight.

2.1.3 Deleterious substances which include soft friable particles, objectionable materials, and other foreign matter, shall not exceed 10 percent by weight.

## 2.1.4 Gradation

2.1.4.1 Rockfill - The stone shall be graded from course to fine. The material shall have a maximum size of 12 inches. Fifty percent of the material shall be larger than 6 inches and not more than 20 percent shall be less than 2 inches.

## SECTION 02271

## ROCKFILL

## PART 1 - GENERAL

## 1.1. SCOPE

This section covers rockfill, complete.

## 1.2 GENERAL

## 1.2.1 Plan of Operations

The source quarry and description of methods to be used in placing operations, including the required tests, shall be submitted to the Contracting Officer.

## 1.2.2 Quarry Operations

If the methods used fail to produce the required materials, changes in production methods shall be made until the required product is produced. Blasting and handling of rock shall be controlled to minimize the development of small fractures. Techniques such as the use of low density powders, sloped blast holes, removal of previously blasted materials between each shot, and minimizing the height from which rock is dropped during loading and processing will be required to produce the specified materials.

## PART 2 - PRODUCTS

## 2.1 MATERIALS

## 2.1.1 General

Stone for rockfill shall be sound durable limestone or calcareous cemented sandstone, free from cracks, seams, shale partings, and overburden spoil and shall be supplied from a source and geologic unit listed in the SPECIAL CLAUSES.

## 2.1.2 Elongation

Stone for rockfill shall be approximately rectangular in cross section, free from thin slabby pieces having elongation ratio more than four, and the quantity of stone having an elongation ratio more than three shall not exceed 20 percent by weight.

2.1.3 Deleterious substances which include soft friable particles, objectionable materials, and other foreign matter, shall not exceed 10 percent by weight.

## 2.1.4 Gradation

\*\* The stone shall be graded from course to fine. The material shall have a maximum size of 12 inches. Fifty percent of the material shall be larger than 6 inches and not more than 20 percent shall be less than 2 inches.

## SECTION 02271

## ROCKFILL

## PART 1 - GENERAL

## 1.1. SCOPE

This section covers rockfill, complete

## 1.2 GENERAL

## 1.2.1 Plan of Operations

The source quarry and descriptions of methods to be used in placing operations, including the required tests, shall be submitted to the Contracting Officer.

## 1.2.2 Quarry Operations

If the methods used fail to produce the required materials, changes in production methods shall be made until the required product is produced. Blasting and handling of rock shall be controlled to minimize the development of small fractures. Techniques such as the use of low density powders, sloped blast holes, removal of previously blasted materials between each shot, and minimizing the height from which rock is dropped during loading and processing will be required to produce the specified materials.

## PART 2 - PRODUCTS

## 2.1 MATERIALS

## 2.1.1 General

Stone for rockfill shall be sound durable limestone or calcareous cemented sandstone, free from cracks, seams, shale partings, and overburden spoil and shall be supplied from a source and geologic unit listed in the SPECIAL CLAUSES.

## 2.1.2 Elongation

Stone for rockfill shall be approximately rectangular in cross section, free from thin slabby pieces having elongation ratio more than four, and the quantity of stone having an elongation ratio more than three shall not exceed 20 percent by weight.

2.1.3 Deleterious substances which include soft friable particles, objectionable materials, and other foreign matter, shall not exceed 10 percent by weight.

## 2.1.4 Gradation

The stone shall be graded from coarse to fine. The material shall have a maximum size of 700 pounds, with not more than 50 percent of the material smaller than 100 pounds. The material may contain up to a maximum of 25 percent fines (by weight). Fines are defined as material smaller than 3 inches in size.

PART 3 - EXECUTION

3.1 PLACEMENT

Rockfill may be placed in one lift. Care shall be taken in placing stone against existing pipes and other structures; stone placed within a distance of 1 foot from the exterior of pipes or structures shall be placed by hand; stone placed in the remainder of the area may be placed in one lift. Bridging shall be broken down so that the resulting fill forms a fully stable mass. Any crust or concentration of fines at the surface of the lift which, in the opinion of the Contracting Officer, will interfere with the bonding, shall be broken up prior to adding the next lift. Dumping and spreading shall be controlled to obtain rock to rock contact without objectionable pockets of fines or concentrations of larger pieces.

3.2 QUALITY CONTROL

3.2.1 General

Tests shall be performed for rockfill as specified below, and as directed, to determine if the rockfill material delivered to the job meets the gradation, elongation, and deleterious requirements specified herein. Tests for elongation shall be run on the plus 6-inch material only. The tests shall be coordinated to minimize interference with the construction progress. If the materials fail to meet the gradation, elongation, and deleterious materials limits specified, the Contractor shall adjust his operations as required to produce acceptable materials, or he shall propose another source of materials. Prior to placement of any materials, the Contractor shall submit for approval in writing, the detailed methods of testing. The Contractor shall state in writing the method used in processing, loading and handling of materials for each test, and shall notify the Contracting Officer any time any production methods are changed. The field acceptance test shall be performed on random loads selected by the Contracting Officer. Materials from load testing shall be placed in the work if the materials meet specification requirements.

3.2.2 Tests Required

<u>Type of Test</u>	<u>Minimum Size of Test</u>	<u>Minimum No. of Tests Required</u>
Truckload gradation	10 tons	1
In-place gradation	15' x 15'	1

3.3 MAINTENANCE

The Contractor shall maintain the rockfill material until the project is completed and any material displaced by the cause, except as provided in paragraph: DAMAGE TO WORK of the SPECIAL CLAUSES, shall be repaired to the lines and grades shown on the drawings as directed.

\* \* \* \* \*

2.1.4.2 Quarry-run Stone - The stone shall be graded from coarse to fine. The material shall have a maximum size of 700 pounds, with not more than 50 percent of the material smaller than 100 pounds. The material may contain up to a maximum of 25 percent fines by weight. Fines are defined as material smaller than 3 inches in size.

PART 3 - EXECUTION

3.1 PLACEMENT

Rockfill and quarry-run stone may be placed in one lift. Care shall be taken in placing stone against existing pipes and other structures; stone placed within a distance of 1 foot from the exterior of pipes or structures shall be placed by hand; stone placed in the remainder of the area may be placed in one lift. Bridging shall be broken down so that the resulting fill forms a fully stable mass. Any crust or concentration of fines at the surface of the lift which, in the opinion of the Contracting Officer, will interfere with the bonding, shall be broken up prior to adding the next lift. Dumping and spreading shall be controlled to obtain rock to rock contact without objectionable pockets of fines or concentrations of larger pieces.

3.2 QUALITY CONTROL

3.2.1 General

Tests shall be performed for rockfill and quarry-run stone as specified below, and as directed, to determine if the rockfill material delivered to the job meets the gradation, elongation, and deleterious requirements specified herein. Tests for elongation shall be run on the plus 6-inch material only. The tests shall be coordinated to minimize interference with the construction progress. If the materials fail to meet the gradation, elongation, and deleterious materials limits specified, the Contractor shall adjust his operations as required to produce acceptable materials, or he shall propose another source of materials. Prior to placement of any materials, the Contractor shall submit for approval in writing, the detailed methods of testing. The Contractor shall state in writing the method used in processing, loading and handling of materials for each test, and shall notify the Contracting Officer any time any production methods are changed. The field acceptance test shall be performed on random loads selected by the Contracting Officer. Materials from load testing shall be placed in the work if the materials meet specification requirements.

3.2.2 Tests Required

3.2.2.1 Rockfill

<u>Type of Test</u>	<u>Minimum Size of Test</u>	<u>Minimum No. of Tests Required</u>
Truckload gradation	10 tons	1
In-place gradation	15' x 15'	1

3.2.2 Quarry-run Stone

<u>Type of Test</u>	<u>Minimum Size of Test</u>	<u>Minimum No. of Tests Required</u>
Truckload gradation	10 tons	1
In-place gradation	15' x 15'	1

3.3 MAINTENANCE

The Contractor shall maintain the rockfill material until the project is completed and any material displaced by any cause, except as provided in paragraph: DAMAGE TO WORK of the SPECIAL CLAUSES, shall be repaired to the lines and grades shown on the drawings as directed.

\* \* \* \* \*

## SECTION 02411

## STEEL SHEET PILING

## PART 1 - GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 328	(1989) Steel Sheet Piling
ASTM A 572	(1988c) High-Strength Low-Alloy Columbium-Vanadium Steels of Structural Quality

## 1.2 SUBMITTALS

The following shall be submitted in accordance with Section 01300 SUBMITTAL DESCRIPTIONS:

## 1.2.1 Metal Sheet Piling

Detail drawings for sheet piling including fabricated sections shall show complete piling dimensions and details, driving sequence and location of installed piling. Detail drawings shall include details and dimensions of templates and other temporary guide structures for installing piling. Detail drawings shall provide details of the method of handling piling to prevent permanent deflection, distortion or damage to piling interlocks.

## 1.2.2 Pile Driving Equipment

Complete descriptions of sheet piling driving equipment including hammers, extractors, protection caps and other installation appurtenances shall be submitted for approval prior to commencement of work.

## 1.2.3 Pulling and Redriving

The proposed method of pulling sheet piling shall be submitted and approved prior to pulling any piling.

## 1.2.4 Materials Tests

Certified materials tests reports showing that sheet piling and appurtenant metal materials meet the specified requirements shall be submitted for each shipment and identified with specific lots prior to installing materials.

## 1.2.5 Driving

Records of the sheet piling driving operations shall be submitted after driving is completed. These records shall provide a system of identification which shows the disposition of approved piling in the work, driving equipment performance data, piling penetration rate data, piling dimensions and top and bottom elevations of installed piling.



1.3 DELIVERY, STORAGE AND HANDLING

Materials delivered to the site shall be new and undamaged and shall be accompanied by certified test reports. The manufacturer's logo and mill identification mark shall be provided on the sheet piling as required by the referenced specifications. Sheet piling shall be stored and handled in the manner recommended by the manufacturer to prevent permanent deflection, distortion or damage to the interlocks. Storage of sheet piling should also facilitate required inspection activities.

PART 2 - PRODUCTS

2.1 METAL SHEET PILING

2.1.1 General: At the contractors option, sheet pile sections other than the type indicated on the drawings are listed below and may be substituted. Only one type of piling shall be used for construction of the water diversion structure. Any dimensional changes to the details shown on the drawings due to the use of acceptable sections shall be made by the contractor at his own expense. These changes shall be submitted for approval with the shop drawings. The interlocks of sheet piling shall be free-sliding, provide a swing angle suitable for the intended installation but not less than 5 degrees when interlocked, and maintain continuous interlocking when installed. Sheet piling shall be full-length sections of the dimensions shown on the drawings. Sheet piling shall be provided with standard pulling holes.

2.1.2 Hot rolled steel sheet piling: Sheet piling shall be new hot-rolled steel sections conforming to ASTM A 328. Piling shall have properties similar to those listed in the following table:

SECTION	NOMINAL WEB THICKNESS (IN)	NOMINAL WIDTH (IN)	SECTION MODULUS PER LIN FT OF WALL (CU IN)	WEIGHT PER LIN FT OF WALL (LBS)	WEIGHT PER SQ FT OF WALL (LBS)
PZ27	0.375	18.0	30.2	40.6	27.0
PLZ25	0.375	24.0	32.8	49.6	24.8

2.1.2 Cold formed steel sheet piling: Sheet piling shall be new cold formed steel sections conforming to ASTM A 572, Grade 50. Piling shall have properties similar to those listed in the following table:

SECTION	NOMINAL WEB THICKNESS (IN)	NOMINAL WIDTH (IN)	SECTION MODULUS PER LIN FT OF WALL (CU IN)	WEIGHT PER LIN FT OF WALL (LBS)	WEIGHT PER SQ FT OF WALL (LBS)
SPZ-26	0.375	24.00	34.82	51.62	25.81
SZ-27	0.375	22.00	32.40	46.90	26.50

## 2.3 TESTS, INSPECTIONS, AND VERIFICATIONS

### 2.3.1 Materials Tests

Sheet piling and appurtenant materials shall be tested and certified by the manufacturer to meet the specified chemical, mechanical and section property requirements prior to delivery to the site. Testing of sheet piling for mechanical properties shall be performed after the completion of all rolling and forming operations.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

#### 3.1.1 Pile Driving Equipment

Hammers shall be steam, air, or diesel drop, single-acting, double-acting, or differential-acting type. The driving energy of the hammers shall be between 8,750 and 16,000 foot-pounds as recommended by the manufacturer for the piling weights and subsurface materials to be encountered.

#### 3.1.2 Placing

Any excavation required within the area where sheet pilings are to be installed shall be completed prior to placing sheet pilings. Pilings shall be carefully located as shown on the drawings. Pilings shall be placed plumb with out-of-plumbness not exceeding 1/8 inch per foot of length and true to line. Temporary wales, templates, or guide structures shall be provided to insure that the pilings are placed and driven to the correct alignment. At least two templates shall be used in placing each piling and the maximum spacing of templates shall not exceed 20 feet. Pilings properly placed and driven shall be interlocked throughout their length with adjacent pilings to form a continuous diaphragm throughout the length or run of piling wall.

#### 3.1.3 Driving

Prior to driving pilings in water a horizontal line shall be painted on both sides of each piling at a fixed distance from the bottom so that it shall be visible above the water line after installation. This line shall indicate the profile of the bottom elevation of installed pilings and potential problem areas can be identified by abrupt changes in its elevation. Pilings shall be driven with the proper size hammer and by approved methods so as not to subject the pilings to damage and to ensure proper interlocking throughout their lengths. Driving hammers shall be maintained in proper alignment during driving operations by use of leads or guides attached to the hammer. A protecting cap shall be employed in driving when using impact hammers to prevent damage to the tops of pilings. Pilings damaged during driving or driven out of interlock shall be removed and replaced at the Contractor's expense. Pilings shall be driven without the aid of a water jet. Adequate precautions shall be taken to insure that pilings are driven plumb. If at any time the forward or leading edge of the piling wall is found to be out-of-plumb in the plane of the wall the piling being driven pilings shall be driven to the required depth and tapered pilings shall be provided and driven to interlock with the out-of-plumb leading edge or other approved corrective measures shall be taken to insure the plumbness of succeeding pilings. The maximum permissible taper for any tapered piling shall be 1/8 inch per foot of length. Pilings in each run or continuous length of piling wall shall be driven alternately in increments of depth to the required depth or elevation.

No piling shall be driven to a lower elevation than those behind it in the same run except when the pilings behind it cannot be driven deeper. If the piling next to the one being driven tends to follow below final elevation it may be pinned to the next adjacent piling. If obstructions restrict driving a piling to the specified penetration the obstructions shall be removed or penetrated with a chisel beam. If the Contractor demonstrates that removal or penetration is impractical the Contractor shall make changes in the design alignment of the piling structure as directed by the Contracting Officer to insure the adequacy and stability of the structure. Pilings shall be driven to depths shown on the drawings and shall extend up to the elevation indicated on the drawings for the top of pilings. A tolerance of six (6) inches above the indicated top elevation will be permitted. Pilings shall not be driven within 100 feet of concrete less than 7 days old.

#### 3.1.4 Cutting-Off and Splicing

Pilings driven to refusal or to the point where additional penetration cannot be attained and are extending above the required top elevation in excess of the specified tolerance shall be cut off to the required elevation. No splicing is allowed without approval of the Contracting Officer. The tops of pilings excessively battered during driving shall be trimmed when directed at no cost to the Government. Piling cut-offs shall become the property of the Contractor and shall be removed from the site. The Contractor shall cut holes in pilings for bolts, rods, drains or utilities as shown on the drawings or as directed. All cutting shall be done in a neat and workmanlike manner. A straight edge shall be used in cuts made by burning to avoid abrupt nicks. Bolt holes in steel piling shall be drilled or shall be burned and reamed by approved methods which will not damage the surrounding metal. Holes other than bolt holes shall be reasonably smooth and the proper size for rods and other items to be inserted.

#### 3.2 INSPECTION OF DRIVEN PILING

The Contractor shall inspect the interlocked joints of driven pilings extending above ground. Pilings found to be out of interlock shall be removed and replaced at the Contractor's expense.

#### 3.3 PULLING AND REDRIVING

The Contractor shall pull selected pilings after driving to determine the condition of the underground portions of pilings when directed by the Contracting Officer. Any piling so pulled and found to be damaged to the extent that its usefulness in the structure is impaired shall be removed and replaced at the Contractor's expense. Pilings pulled and found to be in satisfactory condition shall be redriven when directed by the Contracting Officer. The method of pulling piling must be approved by the Contracting Officer. Pulling holes shall be provided in pilings as required. Extractors shall be of suitable type and size. Care shall be exercised during pulling of pilings to avoid damaging piling interlocks and adjacent construction. If the Contracting Officer determines that adjacent permanent construction has been damaged during pulling the Contractor will be required to repair this construction at no cost to the Government. Pilings shall be pulled one sheet at a time. Pilings fused together shall be separated prior to pulling unless the Contractor demonstrates to the satisfaction of the Contracting Officer that the pilings cannot be separated. The Contractor will not be paid for the removal of pilings damaged beyond structural use due to proper care not being exercised during pulling.

## SECTION 02720

## CULVERT

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 76

(1990) Reinforced Concrete Culvert,  
Storm Drain, and Sewer Pipe

## 1.2 SUBMITTALS

The following shall be submitted for government approval in accordance with SECTION: SUBMITTAL PROCEDURES:

## 1.2.1 Placing Pipe.

Printed copies of the manufacturer's recommendations for installation procedures of the material being placed, prior to installation.

## 1.2.2 Certificates.

Certified copies of test reports demonstrating conformance to applicable pipe specifications, before pipe is installed.

## 1.3 DELIVERY, STORAGE, AND HANDLING

## 1.3.1 Delivery and Storage

Materials delivered to site shall be inspected for damage, unloaded, and stored with a minimum of handling. Materials shall not be stored directly on the ground. The inside of pipes and fittings shall be kept free of dirt and debris. Gasket materials and plastic materials shall be protected from exposure to the direct sunlight over extended periods.

## 1.3.2 Handling

Materials shall be handled in such a manner as to insure delivery to the trench in sound, undamaged condition. Pipe shall be carried to the trench, not dragged.

## PART 2 PRODUCTS

## 2.1 PIPE FOR CULVERTS

Pipe for culverts shall be of the sizes indicated and shall conform to the requirements specified.

Concrete Pipe

ASTM C 76, Class I.

PART 3 EXECUTION

3.1 EXCAVATION FOR PIPE CULVERTS AND DRAINAGE STRUCTURES

3.1.1 Removal of Rock

Rock in either ledge or boulder formation shall be replaced with suitable materials to provide a compacted earth cushion having a thickness between unremoved rock and the pipe of at least 8 inches or 1/2 inch for each (foot) of fill over the top of the pipe, whichever is greater, but not more than three-fourths the nominal diameter of the pipe. Where bell-and-spigot pipe is used, the cushion shall be maintained under the bell as well as under the straight portion of the pipe.

3.1.2 Removal of Unstable Material

Where wet or otherwise unstable soil incapable of properly supporting the pipe, as determined by the Contracting Officer, is unexpectedly encountered in the bottom of a trench, such material shall be removed to the depth required and replaced to the proper grade with satisfactory material and compacted as provided in SECTION: EARTHWORK. When removal of unstable material is due to the fault or neglect of the Contractor in his performance of shoring and sheeting, water removal, or other specified requirements, such removal and replacement shall be performed at no additional cost to the government.

3.2 BEDDING

The bedding surface for the pipe shall provide a firm foundation of uniform density throughout the entire length of the pipe. When no bedding class is specified or detailed on the drawings, concrete pipe shall be bedded carefully in a soil foundation accurately shaped and rounded to conform to the lowest one-fourth of the outside portion of circular pipe or to the lower curved portion of pipe arch for the entire length of the pipe or pipe arch. When necessary, the bedding shall be tamped. Bell holes and depressions for joints shall be only of such length, depth, and width as required for properly making the particular type of joint.

3.3 PLACING PIPE

Each pipe shall be carefully examined before being laid, and defective or damaged pipe shall not be used. Pipelines shall be laid to the grades and alignment indicated. Proper facilities shall be provided for lowering sections of pipe into trenches. Under no circumstances shall pipe be laid in water, and no pipe shall be laid when trench conditions or weather are unsuitable for such work. Diversion of drainage or dewatering of trenches during construction shall be provided as necessary. All pipe in place shall be inspected before backfilling, and those pipes damaged during placement shall be removed and replaced.

3.3.1 Concrete Pipe

Laying shall proceed upgrade with spigot ends of bell-and-spigot pipe and tongue ends of tongue-and-groove pipe pointing in the direction of the flow.

### 3.4 JOINTS

#### 3.4.1 Concrete

##### 3.4.1.1 Cement-Mortar Bell-and-Spigot Joint

The first pipe shall be bedded to the established gradeline, with the bell end placed upstream. The interior surface of the bell shall be carefully cleaned with a wet brush and the lower portion of the bell filled with mortar to such depth as to bring inner surfaces of abutting pipes flush and even. The spigot end of each subsequent pipe shall be cleaned with a wet brush and uniformly matched into a bell so that sections are closely fitted. After each section is laid, the remainder of the joint shall be filled with mortar, and a bead shall be formed around the outside of the joint with sufficient additional mortar. If mortar is not sufficiently stiff to prevent appreciable slump before setting, the outside of the joint shall be wrapped or bandaged with cheesecloth to hold mortar in place.

##### 3.4.1.2 Cement-Mortar Oakum Joint for Bell-and-Spigot Pipe

A closely twisted gasket shall be made of jute or oakum of the diameter required to support the spigot end of the pipe at the proper grade and to make the joint concentric. Joint packing shall be in one piece of sufficient length to pass around the pipe and lap at top. This gasket shall be thoroughly saturated with neat cement grout. The bell of the pipe shall be thoroughly cleaned with a wet brush, and the gasket shall be laid in the bell for the lower third of the circumference and covered with mortar. The spigot of the pipe shall be thoroughly cleaned with a wet brush, inserted in the bell, and carefully driven home. A small amount of mortar shall be inserted in the annular space for the upper two-thirds of the circumference. The gasket then shall be lapped at the top of the pipe and driven home in the annular space with a caulking tool. The remainder of the annular space then shall be filled completely with mortar and beveled at an angle of approximately 45 degrees with the outside of the bell. If mortar is not sufficiently stiff to prevent appreciable slump before setting, the outside of the joint thus made shall be wrapped with cheesecloth. Placing of this type of joint shall be kept at least five joints behind laying operations.

##### 3.4.1.3 Cement-Mortar Diaper Joint for Bell-and-Spigot Pipe

The pipe shall be centered so that the annular space is uniform. The annular space shall be caulked with jute or oakum. Before caulking, the inside of the bell and the outside of the spigot shall be cleaned.

a. Diaper Bands: Diaper bands shall consist of heavy cloth fabric to hold grout in place at joints and shall be cut in such lengths that they will extend one-eighth of the circumference of pipe above the spring line on one side of the pipe and up to the spring line on the other side of the pipe. Longitudinal edges of fabric bands shall be rolled and stitched around two pieces of wire. Width of fabric bands shall be such that after fabric has been securely stitched around both edges on wires, the wires will be uniformly spaced not less than 200 mm (8 inches) apart. Wires shall be cut into lengths to pass around pipe with sufficient extra length for the ends to be twisted at top of pipe to hold the band securely in place; bands shall be accurately centered around lower portion of joint.

b. Grout: Grout shall be poured between band and pipe from only the high side of band, until grout rises to the top of band at the spring line of pipe, or as nearly so as possible, on the opposite side of pipe, to insure a

thorough sealing of joint around the portion of pipe covered by the band. Silt, slush, water, or polluted mortar grout forced up on the lower side shall be carefully forced out by pouring and removed.

c. Remainder of Joint: The remaining unfilled upper portion of the joint shall then be filled with mortar and a bead formed around the outside of this upper portion of the joint with a sufficient amount of additional mortar. The diaper shall be left in place. Placing of this type of joint shall be kept at least five joints behind actual laying of pipe. No backfilling around joints shall be done until joints have been fully inspected and approved.

#### 3.4.1.4 Cement-Mortar Tongue-and-Groove Joint

The first pipe shall be bedded carefully to the established gradeline with the groove upstream. A shallow excavation shall be made underneath the pipe at the joint and filled with mortar to provide a bed for the pipe. The grooved end of the first pipe shall be carefully cleaned with a wet brush, and a layer of soft mortar applied to the lower half of the groove. The tongue of the second pipe shall be cleaned carefully with a wet brush; while in horizontal position, a layer of soft mortar shall be applied to the upper half of the tongue. The tongue end of the second pipe then shall be inserted in the grooved end of the first pipe until mortar is squeezed out on interior and exterior surfaces. Sufficient mortar shall be used to fill the joint completely and to form a bead on the outside.

#### 3.4.1.5 Cement-Mortar Diaper Joint for Tongue-and-Groove Pipe

The joint shall be of the type described for cement-mortar tongue-and-groove joint in this paragraph, except that the shallow excavation directly beneath the joint shall not be filled with mortar until after a gauze or cheesecloth band dipped in cement mortar has been wrapped around the outside of the joint. The cement-mortar bead at the joint shall be at least 15 mm, (1/2-inch thick,) and the width of the diaper band shall be at least 200 mm. (8 inches.) The diaper shall be left in place. Placing of this type of joint shall be kept at least five joints behind the actual laying of the pipe. No backfilling around the joints shall be done until the joints have been fully inspected and approved.

#### 3.4.1.6 Plastic Sealing Compound Joints for Tongue-and-Grooved Pipe

Sealing compounds shall follow the recommendation of the particular manufacturer in regard to special installation requirements. Surfaces to receive lubricants, primers, or adhesives shall be dry and clean. Sealing compounds shall be affixed to the pipe not more than 3 hours prior to installation of the pipe, and shall be protected from the sun, blowing dust, and other deleterious agents at all times. Sealing compounds shall be inspected before installation of the pipe, and any loose or improperly affixed sealing compound shall be removed and replaced. The pipe shall be aligned with the previously installed pipe, and the joint pulled together. If, while making the joint with mastic-type sealant, a slight protrusion of the material is not visible along the entire inner and outer circumference of the joint when the joint is pulled up, the pipe shall be removed and the joint remade. After the joint is made, all inner protrusions will be cut off flush with the inner surface of the pipe. If nonmastic-type sealant material is used, the "Squeeze-Out" requirement above shall be waived.

#### 3.4.1.7 Flexible Watertight Joints

Gaskets and jointing materials shall be as recommended by the particular manufacturer in regard to use of lubricants, cements, adhesives, and other

special installation requirements. Surfaces to receive lubricants, cements, or adhesives shall be clean and dry. Gaskets and jointing materials shall be affixed to the pipe not more than 24 hours prior to the installation of the pipe, and shall be protected from the sun, blowing dust, and other deleterious agents at all times. Gaskets and jointing materials shall be inspected before installing the pipe; any loose or improperly affixed gaskets and jointing materials shall be removed and replaced. The pipe shall be aligned with the previously installed pipe, and the joint pushed home. If, while the joint is being made the gasket becomes visibly dislocated the pipe shall be removed and the joint remade.

3.5 BACKFILLING

3.5.1 Backfilling Pipe

Fill material shall be uniformly spread in layers longitudinally on both sides of the pipe, not exceeding 6 inches in compacted depth, and shall be compacted by rolling parallel with pipe or by mechanical tamping or ramming.

3.5.2 Movement of Construction Machinery

In compacting by rolling or operating heavy equipment parallel with the pipe, displacement of or injury to the pipe shall be avoided. Movement of construction machinery over a culvert or storm drain at any stage of construction shall be at the Contractor's risk. Any damaged pipe shall be repaired or replaced.

3.5.3 Compaction

Compaction of fill shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment well suited to the type of material being compacted. Deficiencies in construction shall be corrected by the Contractor at no additional cost to the Government.

3.5.4 Moisture and Density Requirements.

3.5.4.1 Moisture. Cohesive materials shall have a moisture content within 3% of optimum as defined by ASTM D 698 at the time the compactive effort is applied which may require the addition of water or aeration of materials. Cohesionless materials shall be placed at a moisture content which will facilitate compaction to the required relative density. This shall be accomplished by sprinkling after spreading and during the compaction process. Water shall not be directed at the embankment with such force that the finer materials will be washed out.

3.5.4.2 Density. Layers of fill shall be compacted to a density of at least 90 percent of the maximum density in accordance with the requirements of ASTM D 698 if the fill is constructed with cohesive materials. If the fill is constructed with cohesionless material, the fill shall be compacted to a minimum relative density of 50 percent in accordance with the requirements of ASTM D 4253.

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## SECTION 02910

## SEEDING AND PLANTING

## PART 1 - GENERAL

1.1 REFERENCES: The publication listed below forms a part of this specification to the extent referenced. The publication is referred to in the text by basic designation only.

## AGRICULTURAL MARKETING SERVICE (AMS)

AMS-01 (Sep 1977; amended Oct 29, 1986) Federal Seed Act Regulations (Part 20): Certified Seed Regulations

1.2 SUBMITTALS: Certificates of compliance certifying that materials meet the requirements specified, shall be submitted to the Contracting Officer for approval prior to the delivery of materials. Certified copies of the reports for the following materials shall be included:

Seed: For mixture, percent pure live seed, minimum percent germination and hard seed, maximum percent weed seed content, date tested and state certification.

## PART 2 - PRODUCTS

## 2.1 MATERIALS

## 2.1.1 Seed

2.1.1.1 State-certified seed of the latest season's crop shall be provided in original sealed packages bearing the producer's guaranteed analysis for percentages of mixture, purity, germination, hard seed, weed seed content, and inert material. Labels shall be in conformance with AMS-01 and applicable state seed laws.

2.1.1.2 Seed mixtures shall be proportioned by weight as follows:

## 2.1.1.2.1 Native Grass Custom Mixture:

<u>Species</u>	<u>Cultivar</u>	<u>Mixture Percent by Weight</u>	<u>Pure Live Seed Pounds per Acre</u>
Switchgrass	Blackwell	25.00	2.0
Western Wheatgrass	Barton	18.75	1.5
Sideoats Gramma	El Reno	18.75	1.5
Big Bluestream	Kaw	12.50	1.0
Little Bluestream	Aldous	12.50	1.0
Indiangrass	Osage	<u>12.50</u>	<u>1.0</u>
	Totals	100.00	8.0

Cultivar or percentage variations must be approved by the Fort Riley Range Conservationist.

2.1.1.2.2 Oat Temporary Mixture:

Oat seed (Botanical name - *Avena sativa*) shall be 100 percent of the mixture by weight with 90% pure live seed. Oats may be "bin-run" non-named seed.

2.1.1.2.3 Brome Seed Mixture:

Brome seed (Botanical name - *Bromus inermis*) shall be 100 percent of the mixture by weight with 90% pure live seed. Two cultivars shall be allowed; Achenbach is the preferred cultivar, and Lincoln is the secondary choice.

2.1.1.3 Weed seed shall not exceed 1 percent by weight of the total mixture. Wet, moldy, or otherwise damaged seed shall be rejected.

2.1.2 Water shall not contain elements toxic to plant life.

2.1.3 Soil erosion control shall conform to the following:

2.1.3.1 Soil Erosion Control Blanket: Machine produced mat of wood excelsior formed from a web of interlocking wood fibers, covered on one side with either knitted straw blanket-like mat construction, covered with biodegradable plastic mesh, or interwoven biodegradable thread, plastic netting or twisted kraft paper cord netting.

2.1.3.2 Soil Erosion Control Fabric: Knitted construction of polypropylene yarn with uniform mesh openings 3/4 to 1 inch square with strips of biodegradable paper. Filler paper strips shall last 6 to 8 months.

2.1.3.3 Soil Erosion Control Net: Heavy, twisted jute mesh weighing approximately 1.22 pounds per linear yard and 4 feet wide with mesh openings of approximately 1 inch square.

2.1.3.4 Erosion control anchor material shall be as recommended by the manufacturer.

2.1.3.5 Mulch shall consist of weed free wheat straw or native grass hay.

### PART 3 - EXECUTION

#### 3.1 SEEDING

3.1.1 SCOPE OF WORK: The landfill surface, the area between the top of the borrow area slope and the project limits and all areas disturbed as a result of work under this contract shall be seeded with a native grass mixture. Native grass seed shall only be sown from March 15 to May 15. From August 1 to September 1 a temporary planting of oats shall be accomplished after all construction activities are completed in a given area to serve as an erosion control measure until the native grass can be planted. All areas planted in oats shall be subsequently planted in native grass during the allowed planting season for native grass. The slopes of the wetland area above an elevation of 1037.0 feet MSL shall be seeded with smooth brome (*Bromus inermis*). Brome seed shall only be sown during the period of 15 August to 20 September or 1 April to 30 April provided the ground is not frozen.

3.1.2 SEEDBED PREPARATION: The seedbed will be prepared by disking just prior to seeding of either oats, native grass or brome to destroy weeds and provide a

Cultivar or percentage variations must be approved by the Fort Riley Range Conservationist.

2.1.1.2.2 Oat Temporary Mixture:

Oat seed (Botanical name - *Avena sativa*) shall be 100 percent of the mixture by weight with 90% pure live seed. Oats may be "bin-run" non-named seed.

2.1.1.2.3 Brome Seed Mixture:

Brome seed (Botanical name - *Bromus inermis*) shall be 100 percent of the mixture by weight with 90% pure live seed. Two cultivars shall be allowed; Achenbach is the preferred cultivar, and Lincoln is the secondary choice.

2.1.1.3 Weed seed shall not exceed 1 percent by weight of the total mixture. Wet, moldy, or otherwise damaged seed shall be rejected.

2.1.2 Water shall not contain elements toxic to plant life.

2.1.3 Soil erosion control shall conform to the following:

2.1.3.1 Soil Erosion Control Blanket: Machine produced mat of wood excelsior formed from a web of interlocking wood fibers, covered on one side with either knitted straw blanket-like mat construction, covered with biodegradable plastic mesh, or interwoven biodegradable thread, plastic netting or twisted kraft paper cord netting.

2.1.3.2 Soil Erosion Control Fabric: Knitted construction of polypropylene yarn with uniform mesh openings 3/4 to 1 inch square with strips of biodegradable paper. Filler paper strips shall last 6 to 8 months.

2.1.3.3 Soil Erosion Control Net: Heavy, twisted jute mesh weighing approximately 1.22 pounds per linear yard and 4 feet wide with mesh openings of approximately 1 inch square.

2.1.3.4 Erosion control anchor material shall be as recommended by the manufacturer.

2.1.3.5 Mulch shall consist of weed free wheat straw or native grass hay.

PART 3 - EXECUTION

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3.1 SEEDING

3.1.1 SCOPE OF WORK: The landfill surface, the area between the top of the borrow area slope and the project limits and all areas disturbed as a result of work under this contract shall be seeded with a native grass mixture. Native grass seed shall only be sown from March 15 to May 15. From August 1 to September 1 a temporary planting of oats shall be accomplished after all construction activities are completed in a given area to serve as an erosion control measure until the native grass can be planted. All areas planted in oats shall be subsequently planted in native grass during the allowed planting season for native grass. The slopes of the wetland area from an elevation of 1037.0 feet MSL to the top of the slope shall be seeded with smooth brome (*Bromus inermis*). Brome seed shall only be sown during the period of 15 August to 20 September or 1 April to 30 April provided the ground is not frozen.

3.1.2 SEEDBED PREPARATION: The seedbed will be prepared by disking just prior to seeding of either oats, native grass or brome to destroy weeds and provide a

firm and friable seedbed. A sufficient number of passes with the disk shall be employed to obtain a clean seedbed. A single pass of a cultipacker shall be employed prior to and following planting.

### 3.1.3 SEEDING

3.1.3.1 General: Prior to seeding, any previously prepared seedbed areas compacted or damaged by interim rain, traffic or other cause, shall be reworked to restore the ground condition previously specified.

3.1.3.2 Equipment Calibration: The equipment to be used and the methods of seeding shall be subject to the inspection and approval of the Contracting Officer prior to commencement of seeding operations. Immediately prior to the commencement of seeding operations, the Contractor shall conduct seeding equipment calibration tests in the presence of the Contracting Officer.

3.1.3.3 If oats are to be planted, they will be planted with a commercial grain drill at the rate of 90 pounds pure live seed per acre. Seeding depth for the oat cover crop will be no more than 1/2". Broadcast seeding methods shall not be used.

3.1.3.4 Native grass seeding will be done with a custom blended mixture of native grass species at the rate of 8 pounds pure live seed per acre. Native grass seed will be planted into either a clean tilled seedbed or the winter killed oat cover crop. A drill designed for the planting of native grass seed shall be used for seeding the native grass mixture. The drill must be equipped with double disk furrow openers, force feed mechanism, seedbox agitator, depth bands, and press wheels (drag chains shall not be used). Depth bands on the native grass drill will be set to deliver the seed at a depth of 1/4" to 3/4". Broadcast seeding methods shall not be used.

3.1.3.3 Smooth brome seed shall be planted on the side slope of the borrow pit from elevation 1037.0 feet MSL to the top of the slope using a grass drill. Smooth brome shall be drilled at the rate of 15 pounds pure live seed per acre. Brome seed shall be planted at 1/4" to 1/2" depth. Broadcast seeding methods shall not be used.

### 3.1.4 FERTILIZER

3.1.4.1 Fertilizer shall not be used with native grass seedings.

3.1.4.2 If oats are to be seeded as a cover crop, 30 pounds of actual nitrogen per acre will be applied to the area. Liquid fertilizer may be applied immediately prior to, during, or immediately after seeding the oats. Dry fertilizer will be incorporated into the soil prior to planting.

3.1.4.3 In areas where smooth brome is planted, fertilizer shall be applied to the area at the rate of 35 pounds each of actual nitrogen, phosphorous, and potassium per acre. Liquid fertilizer may be applied immediately prior to, during, or immediately after seeding the brome. Dry fertilizer will be incorporated into the soil prior to planting.

### 3.1.5 MULCHING

3.1.5.1 Mulching shall not be accomplished for either the oat cover crop or the native grass mixture.

3.1.5.2 In areas where smooth brome is planted, mulch consisting of weed free wheat straw or native grass hay, shall be applied to the area following seeding to prevent erosion. Mulch will be evenly applied at the rate of 2 tons per acre,

and shall be lightly disked to secure it to the surface.

### 3.1.6 EROSION CONTROL

Erosion Control Material: Erosion control material, where indicated or required, by the contractor's Erosion Control Plan shall be installed in accordance with manufacturer's instructions. Placement of the erosion control material shall be accomplished without damage to installed material or without deviation to finished grade.

## 3.2 PLANTING

### 3.2.1 SCOPE OF WORK

The contractor shall harvest, store, plant and maintain cottonwood tree cuttings. Two areas are indicated on the contract drawings to be planted with cottonwood cuttings. The first area is located at the southwestern edge of the landfill site along the Kansas River. Three rows of cuttings shall be planted at distances of 10, 30, and 50 feet parallel to the Kansas River Bank. The cuttings shall be planted at 7 foot intervals in each row. The length of each row is 1100 feet. The total number of cuttings to be planted in this area is 500. The second area is located at the borrow site. A single row of cottonwood cuttings shall be planted in the zone between the top of the borrow site excavation and the project limits, ten feet from and parallel to the top of the borrow site excavation. Two zones at the borrow site are to be planted one on the northern perimeter of the site and the other on the southern perimeter of the site. Both zones extend from Threemile Creek to a "Former Borrow Site". The length of each zone is 1000 feet. One hundred fifty cuttings shall be planted in each zone giving a total of 300 at the borrow site area.

### 3.2.2 HARVESTING OF TREE CUTTINGS

The contractor shall harvest cottonwood tree cuttings from within areas designated by the Fort Riley Natural Resources Branch. The harvest sites shall be within a three mile radius of the project site. The contractor shall notify the Contracting Officer at least 10 working days prior to the date he intends to begin harvesting so that arrangements can be made to have a Fort Riley Natural Resources Branch representative personnel accompany him to the harvesting site and identify trees from which the cuttings are to be gathered. The cuttings shall be harvested from January 15 to February 15. The cuttings shall be 24 inches in length and have at least 2 to 3 buds on the top 12 inches and shall not exceed 2 inches in diameter at the cut end. The cuttings shall be dipped in a fungicide (Capstan or approved equal) and then gathered in bundles of 25 to 30 and wrapped in a moist state in plastic with both ends open for ventilation. The bundles shall be stored with temperatures maintained between 35 and 38 degrees Fahrenheit. The cuttings shall be treated with fungicide, bundled, wrapped and stored the same day they are harvested. A total of 1000 cuttings shall be harvested. This quantity includes 500 cuttings for the landfill site, 300 for the borrow site and 200 for replacement of cuttings which die during the contract period. The 200 replacement cuttings shall be maintained in a temperature controlled environment of between 35 to 38 degrees Fahrenheit until they are planted or the end of the contract performance period whichever comes first. If the replacement cuttings are not used, they shall be delivered from storage to the Fort Riley Natural Resources Branch at the end of the contract performance period.

### 3.2.3 PREPARATION FOR PLANTING

Prior to planting the cuttings, the area shall be tilled to remove existing vegetation. A six foot wide strip of weed barrier (SunBelt Weed Barrier available from DeWitt Company, Fort Collins, Colorado or an approved equal) shall be laid down along the entire length of the row to be planted with cuttings. All edges of the weed barrier shall be buried a minimum of six inches into the ground along its entire perimeter. The cuttings shall be planted midway between the long edges of the weed barrier.

### 3.2.4 PLANTING OF CUTTINGS

All cuttings shall be planted from March 1 to May 1. Prior to planting, the bottom 1/2 inch shall be cut off and dipped in a rooting hormone (Hormodin or approved equal). A hole large enough to accept the cutting such that the cutting is not be forced into the ground shall be excavated or induced with an iron bar. The hole shall be deep enough so that 4 to 6 inches of the cutting and a minimum of 2 to 3 buds is exposed after planting. The annular space around the cutting shall be filled with soil and two gallons of water shall be applied within a one foot radius around each cutting immediately after planting.

**3.3 MAINTENANCE:** Maintenance of seeded areas and planted tree cuttings shall be continuous until the time of final acceptance by the Contracting Officer. Maintenance shall include, but not necessarily be limited to, the following items:

**3.3.1** Refilling, stabilizing, and reseeded of rain washed gullies and rutted areas or areas damaged by subsequent construction activities.

**3.3.2** All cuttings shall be watered with at least 2 gallons of water three times per week for a period of two months. The two gallons of water shall be applied within a 1 foot radius of each cutting.

**3.3.3** Two weeks prior to the end of the contract performance period or cutting maintenance period outlined in 3.5.2 above, whichever is later, all cuttings shall be inspected to identify those which have not survived. Up to a maximum of 200 dead cuttings shall be replaced with cuttings stored by the contractor as outlined in paragraph 3.2.2 above. A drawing shall be prepared identifying the locations of all replanted cuttings and the newly planted cuttings shall be tagged for ease of identification. The newly replanted cuttings will be watered for a period of two weeks after they are planted with 2 gallons of water three times per week.

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## SECTION 03300

## CAST-IN-PLACE CONCRETE

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SECTION 03200

CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 318                      1989; 318R-89 Building Code Requirements for Reinforced Concrete

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 82	1990a Steel Wire, Plain, for Concrete Reinforcement
ASTM A 184	1990 Fabricated Deformed Steel Bar Mats for Concrete Reinforcement
ASTM A 185	1990a Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
ASTM A 497	1990b Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement
ASTM A 499	1989 Steel Bars and Shapes, Carbon Rolled from "T" Rails
ASTM A 615	1990 Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM A 706	1990 Low-Alloy Steel Deformed Bars for Concrete Reinforcement

CONCRETE REINFORCING STEEL INSTITUTE (CRSI)

CRSI MSP-1                      1990 Manual of Standard Practice

1.2 SUBMITTALS

1.2.1 Drawings: Concrete Reinforcement System; Detail drawings showing reinforcing steel schedules, sizes, grades, and splicing and bending details. Drawings shall show support details including types, sizes and spacing.

1.2.2 Certificates: Reinforcing Steel; Certified copies of mill reports attesting that the reinforcing steel furnished meets the requirements specified, prior to the installation of reinforcing steel.



### 1.3 DELIVERY AND STORAGE

Reinforcement and accessories shall be stored off the ground on platforms, skids, or other supports.

## PART 2 - PRODUCTS

### 2.1 REINFORCING STEEL

Reinforcing steel shall be deformed bars conforming to ASTM A 615 or ASTM A 706, grades and sizes as indicated.

### 2.2 SUPPORTS

Bar supports for formed surfaces shall be designed and fabricated in accordance with CRSI MSP-1 and shall be steel or precast concrete blocks. Precast concrete blocks shall have wire ties and shall be not less than 4 by 4 inches when supporting reinforcement on ground. Precast concrete block shall have compressive strength equal to that of the surrounding concrete. Where concrete formed surfaces will be exposed to weather, steel supports within 13 mm (1/2 inch) of concrete surface shall be galvanized, plastic protected or of stainless steel. Concrete supports used in concrete exposed to view shall have the same color and texture as the finish surface. For slabs on grade, supports shall be precast concrete blocks, plastic coated steel fabricated with bearing plates, or specifically designed wire-fabric supports fabricated of plastic.

## PART 3 - EXECUTION

### 3.1 REINFORCEMENT

Reinforcement shall be fabricated to shapes and dimensions shown and shall conform to the requirements of ACI 318. Reinforcement shall be cold bent unless otherwise authorized. Bending may be accomplished in the field or at the mill. Bars shall not be bent after embedment in concrete. Safety caps shall be placed on all exposed ends of vertical concrete reinforcement bars that pose a danger to life safety. Wire tie ends shall face away from the forms.

#### 3.1.1 Placement

Reinforcement shall be free from loose rust and scale, dirt, oil, or other deleterious coating that could reduce bond with the concrete. Reinforcement shall be placed in accordance with ACI 318 at locations shown plus or minus one bar diameter. Reinforcement shall not be continuous through expansion joints and shall be as indicated through construction or contraction joints. Concrete coverage shall be as indicated or as required by ACI 318. If bars are moved more than one bar diameter to avoid interference with other reinforcement, conduits or embedded items, the resulting arrangement of bars, including additional bars required to meet structural requirements, shall be approved before concrete is placed.

#### 3.1.2 Splicing

Splices of reinforcement shall conform to ACI 318 and shall be made only as required or indicated. Splicing shall be by lapping or by mechanical or welded butt connection; except that lap splices shall not be used for bars larger than No. 11 unless otherwise indicated. Welding shall conform to AWS

D1.4. Welded butt splices shall be full penetration butt welds. Lapped bars shall be placed in contact and securely tied or spaced transversely apart to permit the embedment of the entire surface of each bar in concrete. Lapped bars shall not be spaced farther apart than one-fifth the required length of lap or 6-inches. Mechanical butt splices shall be in accordance with the recommendation of the manufacturer of the mechanical splicing device. Butt splices shall develop 125 percent of the specified minimum yield tensile strength of the spliced bars or of the smaller bar in transition splices. Bars shall be flame dried before butt splicing. Adequate jigs and clamps or other devices shall be provided to support, align, and hold the longitudinal centerline of the bars to be butt spliced in a straight line.

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## SECTION 03300

## CAST-IN-PLACE CONCRETE

## PART 1 - GENERAL

1.1 SCOPE: This section covers reinforced concrete, complete.

## 1.2 APPLICABLE PUBLICATIONS:

1.2.1 American Concrete Institute (ACI) Standards with Corresponding CRD Standard Indicated Where Available:

ACI 211.1-89 (CRD-C 99)	Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete
ACI 305R-89	Hot Weather Concreting
ACI 309R-87	Guide for Consolidation of Concrete
ACI 318-89	Building Code Requirements for Reinforced Concrete

1.2.2 American Society for Testing and Materials (ASTM) with Corresponding CRD Standard Indicated Where Available:

C 31-90 (CRD-C 11)	Making and Curing Concrete Test Specimen in the Field
C 33-90 (CRD-C 133)	Concrete Aggregates
C 39-86 (CRD-C 14)	Compressive Strength of Cylindrical Concrete Specimens
C 94-90 (CRD-C 31)	Ready-Mixed Concrete
C 136-84a (CRD-C 103)	Sieve Analysis of Fine and Coarse Aggregates
C 143-90 (CRD-C 5)	Slump of Portland Cement Concrete
C 150-89 (CRD-C 201)	Portland Cement
C 172-90 (CRD-C 4)	Sampling Fresh Concrete
C 231-89a (CRD-C 41)	Air Content of Freshly Mixed Concrete by the Pressure Method
C 260-86 (CRD-C 13)	Air-Entraining Admixtures for Concrete
C 311-90 (CRD-256)	Method for Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Portland Cement Concrete.
C 494-86 (CRD-C 87)	Chemical Admixtures for Concrete
C 618-89a (CRD-C 255)	Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete

1.2.3 U.S. Army Corps of Engineers Handbook for Cement and Concrete (CRD):

CRD-C 300-90

Specification for Membrane-Forming Compounds for Curing Concrete

PART 2 - PRODUCTS

2.1 MATERIALS:

2.1.1 Composition: Concrete shall be composed of portland cement, water, fine and coarse aggregate, retarder (when required) and an air-entraining admixture.

2.1.2 Cement:

2.1.2.1 General: Cement shall be furnished in bulk, except that cement necessary for finishing and patching may be packaged.

2.1.2.2 Portland cement shall conform to ASTM Standard C 150, type I or II. Type I or II portland cement shall be low alkali. The same type and source of manufacture of portland cement shall be used throughout the entire project.

2.1.2.3 Test requirements: The Contractor shall arrange for the cement sampling, testing and reporting. Cement shall be sampled and tested at the mill by the cement manufacturer in accordance with the specifications. The manufacturer shall furnish a report of results of tests for each lot of cement offered for use under this contract, shall identify the test report with the particular lot of cement, and shall certify that cement conforms with the requirements of the specifications.

2.1.3 Admixtures: All admixtures will be accepted on the basis of certification by the manufacturer indicating compliance with the specifications.

2.1.3.1 Air-entraining admixtures: The air-entraining admixture shall conform to ASTM C 260 and shall consistently entrain the air content in the specified ranges under field conditions. The air-entraining admixture shall be in a solution of suitable viscosity for field use.

2.1.3.2 Accelerators meeting the requirements of ASTM Standard C 494 Type C or E may be used as required only when their use is approved or directed.

2.1.3.3 Retarder: A retarding admixture shall meet the requirements of ASTM C 494, Type B, except that the 6-month and 1-year compressive strength tests are waived. The use of the admixture is at the option of the Contractor.

2.1.3.4 Water-reducer: A water-reducing admixture shall meet the requirements of ASTM C 494, Type A or D except that the 6-month and 1-year compressive strength tests are waived. The admixture may be added to the concrete mixture only when its use is approved or directed.

2.1.3.5 Pozzolan shall conform to ASTM C 618, Class C or F, including the Supplementary Optional Chemical Requirement for available alkalies and the Supplementary Optional Physical Requirements for uniformity and reactivity with cement alkalies. Maximum loss on ignition shall not be over 4 percent. Samples shall be obtained, prepared, and tested in accordance with ASTM C 311.

#### 2.1.4 Aggregates:

2.1.4.1 Quality: Aggregates as delivered to the mixer shall consist of clean, hard, uncoated particles meeting the requirements of ASTM C 33 and as modified herein: Concrete aggregates shall be produced from the sources listed in the SPECIAL CLAUSES SECTION. Coarse aggregate shall have a resistance to abrasion not to exceed a loss of 40 percent. Dust and other coating shall be removed from the coarse aggregates by washing.

2.1.4.2 Composition: Fine aggregate as delivered to the mixers shall not contain more than 0.1 percent lignite. Total lightweight aggregate particles, including coal and lignite, in natural sand shall be less than 0.25 percent as determined in accordance with ASTM Standard C 123. Coarse aggregate particles shall be sound and durable and free from objectionable coatings. Coarse aggregate shall not contain more than 0.5 percent by weight of white tripolitic chert that has a specific gravity, saturated surface dry, of less than 2.40. Tripolitic chert is the white porous silicious form of weathered chert found in nodules and beds within the Burlington limestone. The total amount of all types of chert shall not exceed 3 percent by weight. To keep chert from exceeding these specified maximum limits, it may be necessary to employ selective quarrying to utilize the lesser cherty portions of the limestone deposit and to remove cherty particles by processing, loading, and handpicking from the quarried material before and during final processing into finished aggregate sizes. The aggregate shall have a specific gravity, saturated surface dry, of not less than 2.60.

2.1.4.3 Acceptance sampling and testing: Before the start of operations and during construction, aggregates shall be sampled for acceptance testing as delivered to the mixer to determine compliance with specification quality requirements. Sampling and testing shall be the responsibility of the Contractor and shall be performed by an approved commercial testing laboratory. Testing shall be performed in accordance with the tests methods of ASTM C-33. Additional sampling and testing may be required as directed by the Contracting Officer if tests show the material to be marginal in quality.

#### 2.1.4.4 Grading:

(a) Fine aggregate: The grading and uniformity of the fine aggregate shall conform to the following requirements as delivered to the mixers:

<u>Sieve Designation</u>	<u>Percent by Weight Passing</u>
<u>U.S. Standard Square Mesh</u>	
3/8 - inch	100
No. 4	95-100
No. 8	80-95
No. 16	55-82
No. 30	30-60
No. 50	10-30
No. 100	1-10

In addition to the grading limits shown above, the fine aggregate, as delivered to the mixer shall have a fineness modulus of not less than 2.40 nor more than 3.10. The grading of the fine aggregate shall also be controlled so that the fineness moduli of at least four of any five consecutive test samples of the fine aggregate as delivered to the mixer shall not vary more than 0.15 from the average fineness modulus of all samples taken during the first 30 days of concrete placement unless otherwise directed. The fineness modulus shall be determined by dividing by 100, the sum of the cumulative percentages retained on U.S. Standard Sieves Nos. 4, 8, 16, 30, 50, and 100. At the

option of the Contractor, fine aggregate may be separated into two or more sizes or classifications, but the uniformity of grading of the separate sizes shall be controlled so that they may be combined throughout the job in fixed proportions established during the first 30 days of concrete placement.

(b) Coarse aggregate: The grading of the coarse aggregate within the separated size groups shall conform to the following requirements as delivered to the mixer.

Sieve Size U.S. Standard <u>Square Mesh</u>	<u>Percent by Weight Passing</u>
3/4 inch	100
1/2 inch	80-100
3/8 inch	40-70
No. 4	0-10
No. 10	0-3
No. 200	0-2

PART 3 - EXECUTION

3.1 QUALITY CONTROL:

3.1.1 General: Tests, except as otherwise specified herein, shall be performed by the Contractor as a part of the quality control program. The Contractor shall obtain representative samples of the materials required for the tests. Slump and air content tests shall be made at the beginning of each day's operations and repeated, as necessary, until results fall within specified limits; the tests shall also be performed when compression test specimens are made.

3.1.2 Slump shall be determined in conformance with the ASTM Standard C-143. Unless otherwise directed, the maximum slump in inches shall be as follows:

Reinforced concrete      2-1/2

3.1.3 Air content shall be determined in accordance with ASTM Standard C 231.

3.1.4 Production sampling and testing of aggregate: During construction, aggregates shall be sampled in accordance with ASTM C-136 as delivered to the mixer to determine compliance with specification requirements.

3.1.4.1 Additional testing is required when coarse aggregate is produced from burlington limestone. Test shall be for cherty stone with S.S.D. Specific Gravity of less than 2.40 Supplemented by visual examinations.

3.1.5 Strength tests during the work: the contractor shall make for test purposes a minimum of two sets of compression test specimens taken under the supervision of the contracting officer, from each 150 cubic yards placed. At least one set of test specimens shall be made for each 8-hour shift. Each set shall consist of three test specimens, and shall be made from a separate batch. Samples shall be secured in conformance with ASTM Standard C 172. Test specimens shall be made, cured, and packed for shipment in accordance with ASTM Standard C 31. Specimens shall be cured under laboratory conditions except that the contracting officer may require curing under field conditions when he considers that there is a possibility of the air temperature's falling below 40 degrees f. Cylinders shall be tested in accordance with ASTM

Standard C 39 and the results promptly furnished to the contracting officer. Each strength test result shall be the average of two cylinders from the same concrete sample at 7 days, 28 days and when the work requires strength determination to proceed unless otherwise specified or approved.

3.1.6 Additional tests: whenever there is reason to suspect that the concrete does not meet the specified requirements, additional tests shall be performed. Additional tests shall include, but not be limited to, aggregate gradation, strength tests, slump, and tests for air content.

### 3.2 PROPORTIONING OF CONCRETE:

3.2.1 Control: The proportions of all material entering into the concrete mix, including admixtures, shall be determined by the Contractor. The proportions shall be changed whenever such change is determined necessary to maintain the standard of quality required for the structures covered by these specifications and to meet the varying conditions encountered during construction. Mix proportions shall be determined in conformance with ACI Standard 211.1. At least 10 days prior to commencing concreting operations, the Contractor shall furnish a statement showing the mix proportions of all ingredients that will be used in the manufacture of the concrete. Proportions shall indicate weights of aggregates in saturated surface-dry conditions. The statement shall be accompanied by satisfactory evidence that the proportions furnished will produce concrete of the quality indicated. No substitutions shall be made in the work.

3.2.2 Design: Concrete shall be designed to produce a minimum compressive strength of 4,000 psi at 28 days.

3.2.3 Cement content shall be measured by weight. Cement content per cubic yard of concrete shall be 564 pounds, minimum.

3.2.4 Aggregate size: The maximum size of coarse aggregate to be used in the various parts of the work shall be 3/4 inch.

3.2.5 Air content: The air content by volume based on measurements made immediately after discharge from the mixer shall be 6 percent plus or minus 1.5 percent when determined in accordance with ASTM C 231.

3.3 READY-MIXED CONCRETE: If the Contractor chooses to use ready-mixed concrete, the mixing and transporting equipment and the method of placement shall be subject to approval. Except for materials specified herein, ready-mixed concrete shall conform to ASTM Standard C 94.

3.4 VOLUME BATCHING: The Contractor may batch and mix the concrete in accordance with ASTM Standard C 685.

### 3.5 CONVEYANCE:

3.5.1 General: Concrete shall be conveyed from mixer to forms as rapidly as practicable, by methods which will prevent segregation or loss of ingredients. Any concrete transferred from one conveying device to another shall be passed through a hopper which is conical in shape and shall not be dropped vertically more than 5 feet except where suitable equipment is provided to prevent segregation and where specifically authorized. Methods and equipment for handling and depositing the concrete in the form shall be subject to the approval of the Contracting Officer. Telephonic or other satisfactory means of rapid communications between the mixing plant and the forms in which concrete is being placed shall be provided and made available for use by the inspectors in the mixing plant and at the forms.

3.5.2 Buckets: Bottom-dump buckets shall have a capacity not exceeding 2 cubic yards and shall conform to the following requirements. The interior hopper slope shall be not less than 55 degrees from the horizontal, the minimum dimension of the clear gate opening shall be at least five times the maximum size aggregate; and the area of the gate opening shall be not less than 2 square feet. The maximum dimension shall not be greater than twice the minimum dimension. The bucket gates shall be essentially grout tight when closed and may be manually, pneumatically or hydraulically operated. The design of the bucket shall provide means for positive regulation of the amount and rate of deposit of concrete in each dumping position.

3.5.3 Truck mixers or agitators used for transporting central-mixed concrete shall conform to the applicable requirements of ASTM Standard C 94. Non-agitating equipment for transporting central-mixed concrete may be used when approved in writing by the Contracting Officer.

3.5.4 Chutes: When concrete can be placed directly from a truck mixer, agitator or nonagitating equipment, the chutes attached to this equipment may be used. Separate chutes and other similar equipment will not be permitted for conveying concrete except when specifically approved.

3.5.5 Belt conveyors may be used when approved. Such conveyors shall be designed and operated to assure a uniform flow of concrete from mixer to final place of deposit without segregation of ingredients or loss of mortar and shall have a speed of travel in excess of 500 feet per minute and be provided with positive means for preventing segregation of the concrete at the transfer points and the point of placing. Other belt conveyors shall not be used.

3.5.6 Pump placement: Concrete may be conveyed by positive displacement pump when approved. The pumping equipment shall be piston or squeeze pressure type. The pipeline shall be rigid steel pipe or heavy duty flexible hose. The diameter of the pipe shall be at least three times the nominal maximum size coarse aggregate in the concrete mixture to be pumped. The maximum size coarse aggregate shall not be reduced to accommodate the pumps. The distance to be pumped shall not exceed limits recommended by the pump manufacturer. The concrete shall be supplied to the concrete pump continuously. When pumping is completed, concrete remaining in the pipeline shall be ejected without contamination of concrete in place. After each operation, equipment shall be thoroughly cleaned, and flushing water shall be wasted outside of the forms.

### 3.6 PLACING:

3.6.1 Concrete shall be worked into the corners and angles of the forms and around all reinforcement and embedded items without permitting the material to segregate. Placing the concrete shall, so far as practicable, be done by bottom dump buckets conforming to requirements specified hereinbefore. Concrete shall be deposited as close as possible to its final position in the forms and in so depositing there shall be no vertical drop greater than 5 feet except where suitable equipment is provided to prevent segregation and where specifically authorized. Depositing of the concrete shall be so regulated that it may be effectively consolidated with a minimum of lateral movement. The amount deposited in each location shall be that which can be readily and thoroughly consolidated. All concrete placing equipment and methods shall be subject to approval. Concrete placement will not be permitted when, in the opinion of the Contracting Officer, weather conditions prevent proper placement and consolidation.

3.6.2 When the formed area contains water, it shall be dewatered unless otherwise approved by the Contracting Officer. Upon approval to place



concrete with water present, the concrete shall be placed starting at the bottom of the hole with no vertical free fall by means of a rigid pipe or a heavy duty flexible hose forcing the water out of the forms. The minimum size of the pipe shall be 3 inches in diameter.

3.6.3 Time interval between mixing and placing: Concrete shall be placed within 45 minutes after it has been mixed, unless otherwise authorized. When concrete is truck-mixed or is transported by truck mixer, the concrete shall be delivered to site of work and discharged within 1-1/2 hours after introduction of cement to aggregate, except that when the temperature of the concrete exceeds 85 degrees F. the time shall be reduced to 45 minutes. The concrete shall be placed within 15 minutes after it has been discharged.

3.6.4 Placing temperature: Concrete, when deposited in the forms during cold weather, shall have a temperature of not less than 50 degrees F. nor more than 70 degrees F. Heating of the mixing water or aggregate will not be permitted until the temperature of the concrete has decreased to 55 degrees F. The materials shall be free from ice, snow, and frozen lumps before entering the mixer. All methods and equipment shall be subject to approval. Concrete placement will not be permitted during daylight hours when the ambient temperature is above 90 degrees F. All concrete placed during warm weather shall be delivered to the forms at the coolest temperature which is practicable to produce under current conditions but not above 85 degrees F. unless it contains a retarding admixture.

3.6.5 Vibration of concrete: Concrete shall be consolidated with mechanical vibrating equipment. Except where otherwise approved or directed, internal vibrators shall be used. Surface vibrators will not be allowed. Handspading may be required if necessary with internal vibration along formed surfaces permanently exposed to view. Where specifically approved or directed, form vibrators shall be used to supplement internal vibration. The vibrators selected for use shall have adequate air pressure available for air vibrators, and voltage for electric vibrators. An adequate number of vibrators shall be on hand to meet placing requirements, and spare vibrators shall be available to maintain production in the event of a breakdown. The head diameter, frequency (measured immersed), and average amplitude (measured in air) of the vibrators shall conform to the following requirements:

<u>Application</u>	<u>Head Diameter (Inch)</u>	<u>Frequency VRM</u>	<u>Minimum Amplitude (Inch)</u>
Thin Sections (less than 8 inches)	1-1/4 - 2-1/2	9,000 - 13,500	0.02
General Construction	2 - 3-1/2	8,000 - 12,000	0.025

The minimum amplitude as used here is the average of two measurements, one taken near the tip and another taken near the back end of the head, using the procedures as described in ACI Standard 309 (Recommended Practice for consolidation of concrete). In no case shall vibrators be used to transport concrete within the forms. Vibration shall be systematic, with emphasis on closely spaced insertions. The duration shall be that necessary to produce good consolidation.

3.6.6 Embedded items: Before placing concrete, care shall be taken to determine that all embedded items are firmly and securely fastened in place as indicated on the drawings, or required. Embedded items shall be free of oil and other foreign matter such as loose coatings of rust, paint, and scale. Welding to reinforcing bars will not be permitted.

3.7 STEEL REINFORCEMENT:

3.7.1 General: The Contractor shall furnish, cut, bend, and place all steel reinforcement. All reinforcement shall be, when surrounding concrete is placed, free from loose, flaky rust, and scale, and free from oil, grease or other coating which might destroy or reduce its bond with the concrete. All placing shall be in accordance with the approved shop drawings.

3.7.2 Shop drawings: Complete shop drawings shall be submitted for approval. The shop drawings shall include details of the bending and placing schedule of the steel reinforcement, together with bar schedules indicating the number, size, and dimensions. Bar lists and bending diagrams shall be checked for accuracy and completeness before the bars are fabricated. Details of typical supports for reinforcing steel shall be approved prior to placing any concrete. Shop drawings shall show all concrete dimensions, elevations, reinforcing steel clearances, and the location of each piece of reinforcing steel and location of all construction joints shown on the drawings. The minimum scale used in the shop drawings shall be 3/8-inch to the foot.

3.7.3 Bending: Steel reinforcement may be mill or field bent. All bending shall be in accordance with ACI Standard 318 unless otherwise shown and by approved machine methods.

3.7.4 Quality: Deformed reinforcing bars shall conform to the following specification: Billet-steel, ASTM Standard A 615, grade 60.

3.7.5 Spacing of bars: The spacing of bars shall be as shown on the drawings or as directed.

3.7.6 Relation of bars to concrete surfaces: The minimum cover for all main reinforcement shall conform to the dimensions shown on the drawings.

3.7.7 Splicings: All splices in reinforcement shall be lapped as shown on the drawings. Deviations from design splices shall be subject to approval of the Contracting Officer. Lapped ends of bars may be placed in contact and securely wired or may be separated sufficiently to permit the embedment of the entire surface of each bar in concrete. Welding will not be permitted. Lap splices in vertical reinforcement in drilled columns and walls shall be staggered in accordance with ACI 318.

3.7.8 Supports: In accordance with the CRSI Manual of Standard Practice, all reinforcement shall be secured in place by use of metal or concrete supports, spacers or ties, as approved. Such supports shall be of sufficient strength to maintain the reinforcement in place throughout the concreting operation. The supports shall be used in such manner that they will not be exposed or contribute in any way to the discoloration or deterioration of the concrete. Welding will not be permitted. Wire ties shall be 16-gauge or heavier black annealed wire.

3.8 CONSTRUCTION JOINT TREATMENT:

3.8.1 Cleaning: Horizontal construction joints surfaces shall be prepared for receiving the next lift by removing all loose material to the satisfaction of the buyer.

3.9 EXPANSION AND VERTICAL CONSTRUCTION JOINTS:

3.9.1 General: Joints shall be provided at the locations indicated on the drawings and according to the details shown or as otherwise approved. The methods and materials used shall be subject to approval and the materials

shall conform to Federal Specifications wherever applicable. In no case shall any fixed metal, embedded in concrete, be continuous through an expansion or contraction joint.

3.9.2 Expansion joint filler shall conform to ASTM Standard D 1752, type I, for bridges, and shall be securely anchored to the concrete by an approved method.

3.9.3 Sealer: Joints indicated to be sealed shall be sealed with coal tar extended polysulfide joint sealant conforming to ASTM Standard D 1850.

3.10 SURFACE FINISH:

3.10.1 General: Immediately after removal of forms, all unsightly ridges or lips shall be removed and undesirable local bulging on the surfaces to be permanently exposed shall be remedied. Excessive rubbing of formed surfaces will not be permitted. Voids and holes left by the removal of tie rods in all surfaces shall be reamed and completely filled with dry-patching mortar, preshrunk, mixed in the proportions directed. The cement used in the proportioned so that the final color of the cured mortar will be the same as the color of the surrounding concrete. The sand shall pass a No. 16 sieve. Defective concrete shall be repaired by cutting out the unsatisfactory material and placing new concrete which shall be secured with keys, dovetails or anchors. Concrete for patching shall be drier than the usual mixture and shall be thoroughly tamped into place. All unformed surfaces of concrete that are not to be covered by additional concrete or backfill shall have a wood float finish, and shall be true to elevation as shown on the drawings. Every precaution shall be taken by the Contractor to protect finished surfaces from stains or abrasions.

3.11 CURING AND PROTECTION:

3.11.1 General: All concrete shall be cured by an approved method for the period of time given below:

Type I Portland cement	7 days
Type II Portland cement blended with pozzolan	14 days

Immediately after placement concrete shall be protected from premature drying, extremes in temperatures, rapid temperature change, mechanical injury and injury from rain and flowing water. All materials and equipment needed for adequate curing and protection shall be available and at the placement prior to start of concrete placement. Concrete shall be protected from the damaging effects of rain for 12 hours, flowing water for 7 days and direct rays of the sun for 3 days. All concrete shall be adequately protected from damage. No fire or excessive heat shall be permitted near or in direct contact with concrete at any time.

3.11.2 Where insulation is approved for cold weather protection, all joints in the insulation shall be sealed to prevent moisture loss and maintained sealed throughout curing period.

3.11.3 Membrane curing: Curing compound shall be of an approved pigmented or nonpigmented type.

3.11.3.1 A pigmented type curing compound conforming to CE Specification CRD-C 300 may be used on surfaces which will not be exposed to view when the project is completed, on surfaces where the appearance of the compound as

determined by the Contracting Officer is not objectionable. It may also be used on surfaces against which concrete is to be bonded, provided that it is completely removed by high-pressure water jet or by wet sandblasting prior to placing the new concrete.

3.11.3.2 The curing compound shall be applied to formed surfaces immediately after the forms are removed and prior to any patching or other surface treatment except the cleaning of loose sand, mortar, and debris from the surface. The surfaces shall be thoroughly moistened with water and the curing compound applied as soon as free water disappears. The curing compound shall be applied to unformed surfaces as soon as free water has disappeared. The curing compound shall be applied in a 2-coat continuous operation at a uniform coverage of not more than 400 square feet per gallon for each coat. Concrete surfaces which have been subjected to rainfall within 3 hours after curing compound has been applied shall be resprayed at the coverage herein specified. All concrete surfaces on which the curing compound has been applied shall be adequately protected for the duration of the entire curing period from pedestrian and vehicular traffic and from any other cause which will disrupt the continuity of the curing membrane.

3.11.4 Cold weather: When the mean daily outdoor temperature is less than 40 degrees F., the temperature of the concrete shall be maintained between 50 degrees F. and 70 degrees F. for the required curing period. In addition, during the period of protection removal, the air temperature adjacent to the concrete surfaces shall be controlled so that concrete near the surface will not be subjected to a temperature differential of more than 25 degrees F. as determined by observation of ambient and concrete temperatures indicated by suitable thermometers installed adjacent to the concrete surface and 2 inches inside the surface of the concrete. The installation of the thermometers shall be made by the Contractor at such locations as may be directed.) Curing compounds shall not be used on concrete surfaces which are maintained at curing temperature by use of free steam.

3.11.5 Hot weather: When the rate of evaporation of surface moisture, as determined by use of Fig. 2.1.5 of ACI 305, may reasonably be expected to exceed 0.2 pound per square foot per hour, provision for windbreaks, shading, fog spraying, or wet covering with a light colored material shall be made in advance of placement, and such protective measures shall be taken as quickly as finishing operations will allow.

### 3.12 FORMS:

3.12.1 General: The forms shall be built mortar-tight and of sound materials sufficient in strength and rigidity to prevent distortion during the placing and curing of concrete. They shall be built true to the lines designated, and shall be so maintained until the concrete is sufficiently hardened to permit their removal. If forms are built long in advance of their use, they shall be so maintained as to eliminate warping and shrinkage. If, at any stage of the work during or after placing the concrete, the forms sag or show signs of sagging or bulging to such an extent as to allow the concrete to fall outside the true line of the form, the concrete affected shall be removed, the forms shall be brought to proper elevation or line, and new concrete shall be placed. No allowance will be made to the Contractor for such extra work.

3.12.2 Forms shall be plywood or other approved material for all exterior exposed surfaces. Material shall be sound and free from loose or rotten knots, knotholes, checks, spreads, or wane showing on the surfaces in contact with concrete. The spacing of supports and thickness of face lumber shall be such that the form is of sufficient rigidity to prevent distortion due to the pressure of the concrete, but in any case the face lumber shall be not thinner

than 1 inch nominal for solid lumber or 5/8 inch for plywood. Forms reused shall be maintained at all times in good condition as to accuracy of shape, strength, rigidity, watertightness, and smoothness of surface. Any warped or cupped lumber shall be carefully resized before being reused. Form lumber which is unsatisfactory in any respect shall not be used and if condemned, shall be removed immediately from the site.

3.12.3 Construction: Forms shall be securely braced to prevent movement while placing concrete. All face form lumber on upright studs shall be secured to the studs or uprights with true horizontal joints. Except where special bevels are shown on the plans, mill cut triangular molding, dressed on three sides and having 3/4-inch width on each of the two form sides shall be used to bevel all edges of the structure. Bevels need not be used on edges of footings. Forms shall be designed and constructed so as to permit their removal without damage to the concrete. In framing forms and around offsets, the forms may be given a sufficient draft to permit removal without damage to the concrete, but not more than 1 inch per foot. For narrow walls where access to the bottoms of the forms is not ordinarily obtainable otherwise, the lower form boards shall be left loose so that immediately prior to placing concrete they may be removed for cleaning out of chips, dirt, sawdust, or other extraneous material.

3.12.4 Ties and spreaders: All metal appliances used inside of forms to hold them to correct alignment and location shall be so constructed that after removal of forms the metal may be removed to a depth of at least 1 inch below the surface of the concrete. Metal tie rods used for internal ties shall be so arranged that when the forms are removed, metal will be not less than 2 inches from any concrete surface. Tie rods shall be held in place by devices attached to the wales and shall be capable of developing the strength of the rod. Any anchors used to support forms shall be of a type which can be removed to a minimum of 2 inches below the concrete surface. Bolts and rods used as ties shall not be removed by pulling them through the concrete. Wire ties and gas pipe spreaders will not be permitted and metal or wooden spreaders separate from form ties shall be entirely removed as concrete is being placed. All cavities produced by the removal of metal tie rods and anchors shall be carefully filled with mortar composed of approximately one part cement to two parts sand. The mortar shall be of the same texture and color as the base concrete. White cement may be added to the mortar to obtain the required color. In order to reduce the shrinkage, no mortar shall be placed in the cavities until 45 minutes after the initial mixing. In lieu of the above, any approved nonshrinking, nonstaining type of mortar may be used. After the cavities are filled, the surface shall be left smooth, even and uniform in color.

3.12.5 Coating: Forms for exposed or painted surfaces shall be coated with form oil or form-release agent before the form or reinforcement is placed in final position. The coating shall be a commercial formulation of satisfactory and proven performance that will not bond with, stain or adversely affect concrete surfaces, and will not impair subsequent treatment of concrete surfaces depending upon bond or adhesion nor impede the wetting of surfaces to be cured with water or curing compounds. The coating shall be used as recommended in the manufacturer's printed or written instructions. Forms for unexposed surfaces may be wet with water in lieu of coating immediately before placing concrete, except that in cold weather with probable freezing temperatures coating shall be mandatory. Surplus coating on form surfaces and coating on reinforcing steel and construction joints shall be removed before placing concrete.

3.12.6 Metal forms adequate to meet the performance requirements of wood

forms may be used when approved (except that permanent metal forms for forming underside of concrete deck will not be permitted).

3.12.7 Removal of forms shall be in a manner to ensure complete safety of the structure after the following conditions have been met. Forms for vertical surfaces may be removed after 24 hours, provided concrete is sufficiently hard not to be injured thereby. Forms (and falsework) under the deck slab (and beams) shall not be removed until the concrete has attained its design strength as determined from test cylinders made at the time the concrete was placed and cured under similar conditions.

3.13 REMOVAL AND DISPOSAL: Removed portions of concrete and reinforced concrete, cutoff reinforcing steel and other scrap metals shall be disposed of off government property.

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## DIVISION 05 - METALS

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## SECTION 05500

## MISCELLANEOUS METAL

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SECTION 05055  
WELDING, STRUCTURAL  
PART 1 - GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC S335 (1989) Specification for Structural Steel Buildings - Allowable Stress Design and Plastic Design

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z49.1 (1988) Safety in Welding and Cutting

AMERICAN SOCIETY FOR NONDESTRUCTIVE TESTING (ASNT)

ASNT-01 (1988) Recommended Practice SNT-TC-1A

AMERICAN WELDING SOCIETY (AWS)

AWS A2.4 (1986) Symbols for Welding, Brazing and Nondestructive Examination

AWS A3.0 (1989) Standard Welding Terms and Definitions

AWS D1.1 (1992) Structural Welding Code - Steel

1.2 DEFINITIONS

Definitions of welding terms shall be in accordance with AWS A3.0.

1.3 GENERAL REQUIREMENTS

The design of welded connections shall conform to AISC S335 unless otherwise indicated or specified. Material with welds will not be accepted unless the welding is specified or indicated on the drawings or otherwise approved. Welding shall be as specified in this section, except where additional requirements are shown on the drawings or are specified in other sections. Welding shall not be started until welding procedures, welders, welding operators, and tackers have been qualified and the submittals approved by the Contracting Officer. Qualification testing shall be performed at or near the work site. Each Contractor performing welding shall maintain records of the test results obtained in welding procedure, welder, welding operator, and tacker performance qualifications.



#### 1.4 SUBMITTALS

The following shall be submitted in accordance with Section 01305 SUBMITTAL PROCEDURES:

Statements: Copies of the welding procedure specifications; the procedure qualification test records; and the welder, welding operator, or tacker qualification test records.

#### 1.5 WELDING PROCEDURE QUALIFICATIONS

Except for prequalified (per AWS D1.1) and previously qualified procedures, each Contractor performing welding shall record in detail and shall qualify the welding procedure specification for any welding procedure followed in the fabrication of weldments. Qualification of welding procedures shall conform to AWS D1.1 and to the specifications in this section. Copies of the welding procedure specification and the results of the procedure qualification test for each type of welding which requires procedure qualification shall be submitted for approval. Approval of any procedure, however, will not relieve the Contractor of the sole responsibility for producing a finished structure meeting all the requirements of these specifications. This information shall be submitted on the forms in Appendix E of AWS D1.1. Welding procedure specifications shall be individually identified and shall be referenced on the detail drawings and erection drawings, or shall be suitably keyed to the contract drawings. In case of conflict between this specification and AWS D1.1, this specification governs.

##### 1.5.1 Previous Qualifications

Welding procedures previously qualified by test may be accepted for this contract without requalification if the following conditions are met:

- a. Testing was performed by an approved testing laboratory, technical consultant, or the Contractor's approved quality control organization.
- b. The qualified welding procedure conforms to the requirements of this specification and is applicable to welding conditions encountered under this contract.
- c. The welder, welding operator, and tacker qualification tests conform to the requirements of this specification and are applicable to welding conditions encountered under this contract.

##### 1.5.2 Prequalified Procedures

Welding procedures which are considered prequalified as specified in AWS D1.1 will be accepted without further qualification. The Contractor shall submit for approval a listing or an annotated drawing to indicate the joints not prequalified. Procedure qualification shall be required for these joints.

##### 1.5.3 Retests

If welding procedure fails to meet the requirements of AWS D1.1, the procedure specification shall be revised and requalified, or at the Contractor's option, welding procedure may be retested in accordance with AWS D1.1. If the welding procedure is qualified through retesting, all test results, including those of test welds that failed to meet the requirements, shall be submitted with the welding procedure.

## 1.6 WELDER, WELDING OPERATOR, AND TACKER QUALIFICATION

Each welder, welding operator, and tacker assigned to work on this contract shall be qualified in accordance with the applicable requirements of AWS D1.1 and as specified in this section. Welders, welding operators, and tackers who make acceptable procedure qualification test welds will be considered qualified for the welding procedure used.

### 1.6.1 Previous Qualifications

At the discretion of the Contracting Officer, welders, welding operators, and tackers qualified by test within the previous 6 months may be accepted for this contract without requalification if all the following conditions are met:

- a. Copies of the welding procedure specifications, the procedure qualification test records, and the welder, welding operator, and tacker qualification test records are submitted and approved in accordance with the specified requirements for detail drawings.
- b. Testing was performed by an approved testing laboratory, technical consultant, or the Contractor's approved quality control organization.
- c. The previously qualified welding procedure conforms to the requirements of this specification and is applicable to welding conditions encountered under this contract.
- d. The welder, welding operator, and tacker qualification tests conform to the requirements of this specification and are applicable to welding conditions encountered under this contract.

### 1.6.2 Certificates

Before assigning any welder, welding operator, or tacker to work under this contract, the Contractor shall submit the names of the welders, welding operators, and tackers to be employed, and certification that each individual is qualified as specified. The certification shall state the type of welding and positions for which the welder, welding operator, or tacker is qualified, the code and procedure under which the individual is qualified, the date qualified, and the name of the firm and person certifying the qualification tests. The certification shall be kept on file, and 3 copies shall be furnished. The certification shall be kept current for the duration of the contract.

### 1.6.3 Renewal of Qualification

Requalification of a welder or welding operator shall be required under any of the following conditions:

- a. It has been more than 6 months since the welder or welding operator has used the specific welding process for which he is qualified.
- b. There is specific reason to question the welder or welding operator's ability to make welds that meet the requirements of these specifications.
- c. The welder or welding operator was qualified by an employer other than those firms performing work under this contract, and a qualification test has not been taken within the past 12 months. Records showing periods of employment, name of employer where welder, or welding operator, was last

employed, and the process for which qualified shall be submitted as evidence of conformance.

d. A tacker who passes the qualification test shall be considered eligible to perform tack welding indefinitely in the positions and with the processes for which he is qualified, unless there is some specific reason to question the tacker's ability. In such a case, the tacker shall be required to pass the prescribed tack welding test.

#### 1.7 SYMBOLS

Symbols shall be in accordance with AWS A2.4, unless otherwise indicated.

#### 1.8 SAFETY

Safety precautions during welding shall conform to ANSI Z49.1.

### PART 2 - PRODUCTS

#### 2.1 WELDING EQUIPMENT AND MATERIALS

All welding equipment, electrodes, welding wire, and fluxes shall be capable of producing satisfactory welds when used by a qualified welder or welding operator performing qualified welding procedures. All welding equipment and materials shall comply with the applicable requirements of AWS D1.1.

### PART 3 - EXECUTION

#### 3.1 WELDING OPERATIONS

##### 3.1.1 Requirements

Workmanship and techniques for welded construction shall conform to the requirements of AWS D1.1 and AISC S335. When AWS D1.1 and the AISC S335 specification conflict, the requirements of AWS D1.1 shall govern.

##### 3.1.2 Identification

Welds shall be identified in one of the following ways:

a. Written records shall be submitted to indicate the location of welds made by each welder, welding operator, or tacker.

b. Each welder, welding operator, or tacker shall be assigned a number, letter, or symbol to identify welds made by that individual. The Contracting Officer may require welders, welding operators, and tackers to apply their symbol next to the weld by means of rubber stamp, felt-tipped marker with waterproof ink, or other methods that do not cause an indentation in the metal. For seam welds, the identification mark shall be adjacent to the weld at 1 meter (3-foot) intervals. Identification with die stamps or electric etchers shall not be allowed.

#### 3.2 STANDARDS OF ACCEPTANCE

Dimensional tolerances for welded construction, details of welds, and quality of welds shall be in accordance with the applicable requirements of AWS D1.1 and the contract drawings. Nondestructive testing shall be by visual inspection methods. Inspection and tests in the mill or shop will not relieve

the Contractor of the responsibility to furnish weldments of satisfactory quality. When materials or workmanship do not conform to the specification requirements, the Government reserves the right to reject material or workmanship or both at any time before final acceptance of the structure containing the weldment.

### 3.3 CORRECTIONS AND REPAIRS

When inspection or testing indicates defects in the weld joints, the welds shall be repaired using a qualified welder or welding operator as applicable. Corrections shall be in accordance with the requirements of AWS D1.1 and the specifications. Defects shall be repaired in accordance with the approved procedures. Defects discovered between passes shall be repaired before additional weld material is deposited. Wherever a defect is removed and repair by welding is not required, the affected area shall be blended into the surrounding surface to eliminate sharp notches, crevices, or corners. After a defect is thought to have been removed, and before rewelding, the area shall be examined by suitable methods to insure that the defect has been eliminated. Repair welds shall meet the inspection requirements for the original welds. Any indication of a defect shall be regarded as a defect, unless reevaluation by nondestructive methods or by surface conditioning shows that no unacceptable defect is present.



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# **Cover Improvements, Southwest Funston Landfill**

Fort Riley, Kansas

**CONSTRUCTION SOLICITATION AND  
SPECIFICATIONS**

**This is an 8(a) Set-Aside**

December 1995

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## SECTION 05500

## MISCELLANEOUS METAL

## PART 1 - GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 36	Structural Steel
ASTM A 283	Low and Intermediate Tensile Strength Carbon Steel Plates

## AMERICAN WELDING SOCIETY (AWS)

AWS D1.1	Structural Welding Code - Steel
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## 1.2 SUBMITTALS

The following shall be submitted in accordance with Section 01300 SUBMITTALS

Drawings: Detail drawings indicating material thickness, type, grade, and class; dimensions; and construction details. Drawings shall include catalog cuts, erection details, manufacturer's descriptive data and installation instructions, and templates. Detail drawings for the following items: WATER CONTROL STRUCTURE STOP GATE FRAME.

## 1.3 GENERAL REQUIREMENTS

The Contractor shall verify all measurements and shall take all field measurements necessary before fabrication. Welding to or on structural steel shall be in accordance with AWS D1.1. Exposed fastenings shall be compatible materials, shall generally match in color and finish, and shall harmonize with the material to which fastenings are applied. Materials and parts necessary to complete each item, even though such work is not definitely shown or specified, shall be included. Poor matching of holes for fasteners shall be cause for rejection. Fastenings shall be concealed where practicable. Thickness of metal and details of assembly and supports shall provide strength and stiffness. Joints exposed to the weather shall be formed to exclude water.

## 1.4 WORKMANSHIP

Miscellaneous metalwork shall be well formed to shape and size, with sharp lines and angles and true curves. Drilling and punching shall produce clean true lines and surfaces. Welding shall be continuous along the entire area of contact except where tack welding is permitted. Exposed connections of work in place shall not be tack welded. Exposed welds shall be ground smooth. Exposed surfaces of work in place shall have a smooth finish, and unless otherwise approved, exposed riveting shall be flush. Where tight fits are

required, joints shall be milled. Corner joints shall be coped or mitered, well formed, and in true alignment. Work shall be accurately set to established lines and elevations and securely fastened in place. Installation shall be in accordance with manufacturer's installation instructions and approved drawings, cuts, and details.

#### 1.5 ANCHORAGE

Anchorage shall be provided where necessary for fastening miscellaneous metal items securely in place. Anchorage not otherwise specified or indicated shall include slotted inserts made to engage with the anchors, expansion shields, and power-driven fasteners when approved for concrete; toggle bolts and through bolts for masonry; machine and carriage bolts for steel; and lag bolts and screws for wood.

### PART 2 - PRODUCTS

#### 2.1 SHOP PAINTING

Surfaces of ferrous metal except galvanized surfaces, shall be cleaned and shop coated with the manufacturer's standard protective coating unless otherwise specified. Surfaces of items to be embedded in concrete shall not be painted. Items to be finish painted shall be prepared according to manufacturer's recommendations or as specified.

#### 2.2 STOP GATE FRAME

The stop gate frame for the water control structure shall be all welded steel construction. The stop gate frame shall be fabricated from 1/4 inch steel plate.

### PART 3 - EXECUTION

#### 3.1 GENERAL REQUIREMENTS

The stop gate frame shall be installed at the locations shown on the drawings.

## SECTION 02110.

## CLEARING AND GRUBBING

## PART 1 - GENERAL

1.1 SCOPE. This section covers all clearing and grubbing requirements, and the handling and/or disposal of the resulting materials.

## 1.2 DEFINITIONS.

1.2.1 Clearing shall consist of the felling, trimming, and cutting of trees into sections and the satisfactory disposal of the trees and other vegetation designated for removal, including down timber, snags, brush, construction debris and rubbish occurring in the areas to be cleared.

1.2.2 Grubbing shall consist of the removal and disposal of stumps, roots larger than 1.5 inches in diameter, and matted roots from the cleared areas.

## 1.3 CONTRACTOR RESPONSIBILITIES

1.3.1 The Contractor shall be responsible for the preservation of all public and private property, equipment, structures, fences, existing trees, plants and other vegetation that are to remain adjacent to the limits of work and shall use every precaution necessary to prevent damage or injury thereto from his operations. The Contractor shall repair or replace any material damage incurred by his Work to a condition that is acceptable to the Contracting Officer, and reseed, in accordance with SECTION 02910: SEEDING AND PLANTING, all grass areas beyond the limits of work which have been damaged by the Contractor's Work. The Contractor shall not remove, cut, injure, or destroy trees or shrubs outside the limits of work without written approval from the Contracting Officer. Trees within the project limits which have been marked for retention shall be protected from injury.

1.3.2 When or where any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, neglect or misconduct, on the part of the Contractor in the execution of the Work, such property shall be restored by the Contractor, at his expense, to a condition equal to that existing before such damage or injury was done, or he shall make good such damage or injury in such manner as may be acceptable to the property owner and the Contracting Officer.

## 1.4 REGULATORY REQUIREMENTS

1.4.1 All burning must be coordinated with the installation fire department and must comply with all federal, state and local regulations.

1.4.2 Off-site disposal of rubble and debris shall be performed in accordance with all applicable laws and regulations.

## PART 2 - PRODUCTS

2.1 EQUIPMENT: The Contractor shall provide all equipment, labor and materials required to perform work as specified in this Section.



PART 3 - EXECUTION

3.1 Clearing

3.1.1 Clearing shall be performed on the landfill surface and borrow area within the limits indicated on the contract drawings.

3.1.2 Clearing. Trees, stumps, roots, brush, and other vegetation in areas designated to be cleared shall be cut off flush with or within 2 inches above the original ground surface. Clearing shall also include the removal and disposal of structures or objects that obtrude, encroach upon, or otherwise obstruct the proper placement of fill on the landfill surface or removal of good, clean fill from the borrow area.

3.2 Grubbing.

3.2.1 Grubbing shall be performed on the borrow site and the landfill surface within the limits indicated on the contract drawings and as indicated in the following paragraphs.

3.2.2 Borrow Area Grubbing. Within the borrow area, all stumps, roots, and matted roots, construction debris and other organic debris or metallic objects shall be removed. Soil obtained at the borrow area which is to be used as fill at the landfill shall be free of all organic and metallic material and concrete debris.

3.2.3 Landfill Area Grubbing. The areas within the slope limits identified on the contract drawings on the landfill surface to receive fill shall be mowed to within 1 inch of the ground surface and the cuttings shall be gathered and burned. Mowing and clearing of the cuttings shall be accomplished not more than seven calendar days prior to placing fill. If the seven calendar day time period is exceeded, the area shall be mowed and the cuttings removed again. All burning shall be coordinated with the installation fire department. No explosives shall be used. After mowing is complete and before placing fill, the surface shall be disked to a maximum depth of 3 inches.

**3.3 The Contractor shall clear and grub the landfill surface on an as-needed basis as his work progresses to limit erosion and to comply with the contractors Erosion Control Plan.**

3.4 Disposal of Materials

3.4.1 Timber. All felled timber shall be stockpiled at the locations indicated on the contract drawings. The disposal of the stockpiled timber will be by the Government.

3.4.2 Disposal of cleared and grubbed material. All burnable materials resulting from clearing and grubbing operations on the landfill and the borrow area, with the exception of timber, shall be stockpiled to permit it to dry. Material which cannot be burned such as metallic and concrete debris shall be hauled to and disposed of at the Fort Riley construction landfill.

## SECTION 02210

## EARTHWORK

## PART 1 - GENERAL

1.1 SCOPE: This section covers materials, construction and testing requirements for material excavation and filling required for general site grading.

1.2 APPLICABLE PUBLICATIONS: The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only and shall be the latest published revision.

1.2.1 American Society for Testing and Materials (ASTM) Publications:

D 422-63	Particle-Size Analysis of Soils
D 2487-85	Classification of Soils for Engineering Purposes
D 4318-84	Liquid Limit, Plastic Limit, and Plasticity Index of Soils

1.2.2 29 CFR 1926.650, Excavations

1.3 DEFINITIONS:

1.3.1 Satisfactory materials shall include all material being either cohesionless or cohesive not included in the unsatisfactory materials definition below.

1.3.2 Unsatisfactory materials from the borrow site shall include all materials that contain debris, roots, brush, sod, organic or frozen materials, materials classified in ASTM D 2487 as MH, PT, OH, and OL, stone having a maximum dimension larger than 3 inches and materials that are determined by the Contracting Officer as unsuitable for providing a stable slope, fill, subgrade or foundation for structures. The Contracting Officer has the right to reject material prior to placement if the material is hauled onsite in a saturated or watered down state.

1.3.3 Cohesionless and cohesive materials: Cohesionless materials include materials classified in ASTM D 2487 as GW, GP, SW, and SP. Cohesive materials include materials classified as GC, SC, ML, CL, MH, and CH. Materials classified as GM and SM will be identified as cohesionless only when the fines are nonplastic. When there is a disagreement as to the classification or suitability of a material proposed for use as fill on the landfill surface, the contractor shall have the material classified at his expense. Testing required to classifying materials shall be in accordance with ASTM D 4318 and D 422.

PART 2 - PRODUCTS  
(NOT USED)

PART 3 - EXECUTION

3.1 Excavation.

3.1.1 Excavation Safety. The Contractor shall be solely responsible for making all excavations in a safe manner. The Contractor shall install and maintain shoring, sheeting, bracing, and sloping as required by 29 CFR 1926.650 thru 29 CFR 1926.653, and as necessary to support the sides of the excavation, to prevent any movement which may damage adjacent pavements, utilities, or structures, damage or delay the work, or endanger life and health.

3.1.2 The Contractor shall perform excavation of every type of material encountered within the limits of the project, to the lines, grades, and elevations indicated and as required. Grading shall be in conformity with the typical sections shown and the tolerances specified in subparagraph Finishing. Satisfactory excavated materials shall be transported to and placed in onsite fill areas in accordance with these specifications. During construction, excavation and fill operations shall be performed in a manner and sequence that will provide proper drainage at all times.

3.2 Drainage and dewatering.

3.2.1 Drainage: Surface water shall be directed away from excavations so as to prevent erosion. Diversion ditches, dikes and grading shall be provided and maintained as necessary during construction. Excavated slopes and backfill surfaces shall be protected to prevent erosion and sloughing. Excavation shall be performed so that the site and the area immediately surrounding the site and affecting operations at the site shall be continually and effectively drained.

3.2.2 General dewatering: Groundwater flowing toward or into excavations shall be controlled to prevent sloughing of excavation slopes and walls, boils, uplift and heave in the excavation and to eliminate interference with orderly progress of construction. Control measures shall be taken by the time the excavation reaches the water level in order to maintain the integrity of the in situ material. While the excavation is open, the water level shall be maintained continuously below the working level.

3.3 Spreading and Compaction of Fill

Satisfactory material obtained from the borrow site shall be used in bringing fills to the lines and grades indicated and for replacing unsatisfactory materials. The fill soil shall be spread by bulldozer or other approved means in successive horizontal layers of loose material not more than 12-inches in depth. Each layer including the existing ground surface prior to placement of the first fill lift shall be plowed, disked, or otherwise broken up; moistened or aerated as necessary; thoroughly mixed to blend the fill material with the previous lift. Each layer shall be compacted by not less than three complete passes of a crawler type tractor. The tractor shall be equipped with standard tracks having a contact pressure of not less than 10 psi. A complete pass shall consist of coverage of the entire surface of the layer. Compacted materials are not subject to specific moisture and density requirements. At his option the contractor may propose an alternate method of compaction for approval by the Contracting Officer. It shall be the contractors responsibility to provide sufficient engineering support for his alternative to clearly demonstrate that it will provide a compactive effort equivalent to the method specified.

3.4 Finishing

The surface of all excavations, embankments and fill areas shall be finished to a smooth and compact condition in accordance with the lines, grades, and cross sections or elevations shown. The degree of finish for all graded areas shall be within 0.1 feet of the grades and elevation indicated on the contract drawings. The surface of areas to be seeded shall be finished to a smoothness suitable for the seeding method to be used.

\* \* \* \* \*

## SECTION 02271

## ROCKFILL

## PART 1 - GENERAL

## 1.1. SCOPE

This section covers rockfill complete.

## 1.2 GENERAL

## 1.2.1 Plan of Operations

The source quarry and descriptions of methods to be used in placing operations, including the required tests, shall be submitted to the Contracting Officer.

## 1.2.2 Quarry Operations

If the methods used fail to produce the required materials, changes in production methods shall be made until the required product is produced. Blasting and handling of rock shall be controlled to minimize the development of small fractures. Techniques such as the use of low density powders, sloped blast holes, removal of previously blasted materials between each shot, and minimizing the height from which rock is dropped during loading and processing will be required to produce the specified materials.

## PART 2 - PRODUCTS

## 2.1 MATERIALS

## 2.1.1 General

Stone for rockfill shall be sound durable limestone or calcareous cemented sandstone, free from cracks, seams, shale partings, and overburden spoil and shall be supplied from a source and geologic unit listed in the SPECIAL CLAUSES.

## 2.1.2 Elongation

Stone for rockfill shall be approximately rectangular in cross section, free from thin slabby pieces having elongation ratio more than four, and the quantity of stone having an elongation ratio more than three shall not exceed 20 percent by weight.

2.1.3 Deleterious substances which include soft friable particles, objectionable materials, and other foreign matter, shall not exceed 10 percent by weight.

## 2.1.4 Rockfill Gradation

The stone shall be graded from coarse to fine. The material shall have a maximum size of 12 inches. Fifty percent of the material shall be larger than 6 inches and not more than 20 percent shall be less than 2 inches.

PART 3 - EXECUTION

3.1 PLACEMENT

Rockfill may be placed in one lift. Care shall be taken in placing stone against existing pipes and other structures; stone placed within a distance of 1 foot from the exterior of pipes or structures shall be placed by hand; stone placed in the remainder of the area may be placed in one lift. Bridging shall be broken down so that the resulting fill forms a fully stable mass. Any crust or concentration of fines at the surface of the lift which, in the opinion of the Contracting Officer, will interfere with the bonding, shall be broken up prior to adding the next lift. Dumping and spreading shall be controlled to obtain rock to rock contact without objectionable pockets of fines or concentrations of larger pieces.

3.2 MAINTENANCE

The Contractor shall maintain the rockfill material until the project is completed and any material displaced by any cause, except as provided in paragraph: DAMAGE TO WORK of the SPECIAL CLAUSES, shall be repaired to the lines and grades shown on the drawings as directed.

\* \* \* \* \*

SECTION 02910

SEEDING AND PLANTING

PART 1 - GENERAL

1.1 REFERENCES: The publication listed below forms a part of this specification to the extent referenced. The publication is referred to in the text by basic designation only.

AGRICULTURAL MARKETING SERVICE (AMS)

AMS-01 (Sep 1977; amended Oct 29, 1986) Federal Seed Act Regulations (Part 20): Certified Seed Regulations

1.2 SUBMITTALS: Certificates of compliance certifying that materials meet the requirements specified, shall be submitted to the Contracting Officer for approval prior to the delivery of materials. Certified copies of the reports for the following materials shall be included:

Seed: For mixture, percent pure live seed, minimum percent germination and hard seed, maximum percent weed seed content, date tested and state certification.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Seed

2.1.1.1 State-certified seed of the latest season's crop shall be provided in original sealed packages bearing the producer's guaranteed analysis for percentages of mixture, purity, germination, hard seed, weed seed content, and inert material. Labels shall be in conformance with AMS-01 and applicable state seed laws.

2.1.1.2 Seed mixtures shall be proportioned by weight as follows:

2.1.1.2.1 Native Grass Custom Mixture:

<u>Species</u>	<u>Cultivar</u>	<u>Mixture Percent by Weight</u>	<u>Pure Live Seed Pounds per Acre</u>
Switchgrass	Blackwell	25.00	2.0
Western Wheatgrass	Barton	18.75	1.5
Sideoats Gramma	El Reno	18.75	1.5
Big Bluestream	Kaw	12.50	1.0
Little Bluestream	Aldous	12.50	1.0
Indiangrass	Osage	<u>12.50</u>	<u>1.0</u>
	Totals	100.00	8.0

Cultivar or percentage variations must be approved by the Fort Riley Range Conservationist.

2.1.1.2.2 Oat Temporary Mixture:

Oat seed (Botanical name - *Avena sativa*) shall be 100 percent of the mixture by weight with 90% pure live seed. Oats may be "bin-run" non-named seed.

2.1.1.2.2 Milo Temporary Mixture:

Milo seed (Botanical name - Grain sorghum) shall be 100 percent of the mixture by weight with 90% pure live seed. Milo may be "bin-run" non-named seed.

2.1.1.3 Weed seed shall not exceed 1 percent by weight of the total mixture. Wet, moldy, or otherwise damaged seed shall be rejected.

2.1.2 Water shall not contain elements toxic to plant life.

2.1.3 Soil erosion control shall conform to the following:

2.1.3.1 Soil Erosion Control Blanket: Machine produced mat of wood excelsior formed from a web of interlocking wood fibers, covered on one side with either knitted straw blanket-like mat construction, covered with biodegradable plastic mesh, or interwoven biodegradable thread, plastic netting or twisted kraft paper cord netting.

2.1.3.2 Soil Erosion Control Fabric: Knitted construction of polypropylene yarn with uniform mesh openings 3/4 to 1 inch square with strips of biodegradable paper. Filler paper strips shall last 6 to 8 months.

2.1.3.3 Soil Erosion Control Net: Heavy, twisted jute mesh weighing approximately 1.22 pounds per linear yard and 4 feet wide with mesh openings of approximately 1 inch square.

2.1.3.4 Erosion control anchor material shall be as recommended by the manufacturer.

### PART 3 - EXECUTION

#### 3.1 SEEDING

3.1.1 SCOPE OF WORK: Fill areas on the landfill surface, the side slopes and the bottom of the borrow pit and the area between the top of the borrow area slope and the project limits and all areas disturbed as a result of work under this contract shall be seeded. Native grass seed shall only be sown from March 15 to May 15. From May 15 to August 1 a planting of milo (grain sorghum) shall be accomplished after all construction activities are completed in a given area. From August 1 to September 1 a planting of oats shall be accomplished after all construction activities are completed in a given area. Seeding shall be completed as soon as possible but not later than 10 calendar days after construction operations are completed in a given area (areas as designated on sheets C-2, C-3, and C-4 of the drawings).

3.1.2 SEEDBED PREPARATION: The seedbed will be prepared by disking just prior to seeding of either, native grass oats or milo to destroy weeds and provide a firm and friable seedbed. A sufficient number of passes with the disk shall be employed to obtain a clean seedbed. A single pass of a cultipacker shall be employed prior to and following planting.



### 3.1.3 SEEDING

3.1.3.1 General: Prior to seeding, any previously prepared seedbed areas compacted or damaged by interim rain, traffic or other cause, shall be reworked to restore the ground condition previously specified.

3.1.3.2 Equipment Calibration: The equipment to be used and the methods of seeding shall be subject to the inspection and approval of the Contracting Officer prior to commencement of seeding operations. Immediately prior to the commencement of seeding operations, the Contractor shall conduct seeding equipment calibration tests in the presence of the Contracting Officer.

3.1.3.3 Native grass seeding will be done with a custom blended mixture of native grass species at the rate of 8 pounds pure live seed per acre. Native grass seed will be planted into either a clean tilled seedbed or the winter killed oat cover crop. A drill designed for the planting of native grass seed shall be used for seeding the native grass mixture. The drill must be equipped with double disk furrow openers, force feed mechanism, seedbox agitator, depth bands, and press wheels (drag chains shall not be used). Depth bands on the native grass drill will be set to deliver the seed at a depth of 1/4" to 3/4". Broadcast seeding methods shall not be used.

3.1.3.4 If oats are to be planted, they shall be planted with a commercial grain drill at the rate of 90 pounds pure live seed per acre. Seeding depth for the oat cover crop will be no more than 1/2". Broadcast seeding methods shall not be used.

3.1.3.5 If milo is to be planted, it shall be planted with a commercial grain drill at the rate of 10 pounds pure live seed per acre. Seeding depth for the oat cover crop will be no more than 1/2". Broadcast seeding methods shall not be used.

### 3.1.4 FERTILIZER

3.1.4.1 Fertilizer shall not be used with native grass seedings.

3.1.4.2 If oats are to be seeded as a cover crop, 30 pounds of actual nitrogen per acre will be applied to the area. Liquid fertilizer may be applied immediately prior to, during, or immediately after seeding the oats. Dry fertilizer will be incorporated into the soil prior to planting.

3.1.4.3 If milo is to be seeded as a cover crop, 80 pounds of actual nitrogen per acre and 35 pounds of actual phosphorous per acre shall be applied to the area. Liquid fertilizer may be applied immediately prior to, during, or immediately after seeding the oats. Dry fertilizer will be incorporated into the soil prior to planting.

### 3.1.5 MULCHING

Mulching shall not be accomplished.

### 3.1.6 EROSION CONTROL

Erosion Control Material: Erosion control material, where indicated or required, by the contractor's Erosion Control Plan shall be installed in accordance with manufacturer's instructions. Placement of the erosion control material shall be accomplished without damage to installed material or without deviation to finished grade.

### 3.2 PLANTING (OPTION)

#### 3.2.1 SCOPE OF WORK

The contractor shall harvest, store, plant and maintain cottonwood tree cuttings. The area to receive cottonwood cuttings is located at the southwestern edge of the landfill site along the Kansas River as indicated on the drawings. Three rows of cuttings shall be planted at distances of 10, 30, and 50 feet parallel to the Kansas River Bank. The cuttings shall be planted at 7 foot intervals in each row. The length of each row is 1100 feet. The total number of cuttings to be planted in this area is 500.

#### 3.2.2 HARVESTING OF TREE CUTTINGS

The contractor shall harvest cottonwood tree cuttings from within areas designated by the Fort Riley Natural Resources Branch. The harvest sites shall be within a three mile radius of the project site. The contractor shall notify the Contracting Officer at least 10 working days prior to the date he intends to begin harvesting so that arrangements can be made to have a Fort Riley Natural Resources Branch representative personnel accompany him to the harvesting site and identify trees from which the cuttings are to gathered. The cuttings shall be harvested from January 15 to February 15. The cuttings shall be 24 inches in length and have at least 2 to 3 buds on the top 12 inches and shall not exceed 2 inches in diameter at the cut end. The cuttings shall be dipped in a fungicide (Capstan or approved equal) and then gathered in bundles of 25 to 30 and wrapped in a moist state in plastic with both ends open for ventilation. The bundles shall be stored with temperatures maintained between 35 and 38 degrees Fahrenheit. The cuttings shall be treated with fungicide, bundled, wrapped and stored the same day they are harvested. A total of 750 cuttings shall be harvested. This quantity includes 500 cuttings for the landfill site and 250 for replacement of cuttings which die during the contract period. The 250 replacement cuttings shall be maintained in a temperature controlled environment of between 35 to 38 degrees Fahrenheit until they are planted or the end of the contract performance period whichever comes first. If the replacement cuttings are not used, they shall be delivered from storage to the Fort Riley Natural Resources Branch at the end of the contract performance period.

#### 3.2.3 PREPARATION FOR PLANTING

A six foot wide strip of weed barrier is in place at the planting area. The cuttings shall be planted midway between the long edges of the weed barrier.

#### 3.2.4 PLANTING OF CUTTINGS

All cuttings shall be planted from March 1 to May 1. Prior to planting, the bottom 1/2 inch shall be cut off and dipped in a rooting hormone (Hormodin or approved equal). A hole large enough to accept the cutting such that the cutting is not be forced into the ground shall be excavated or induced with an iron bar. The hole shall be deep enough so that 4 to 6 inches of the cutting and a minimum of 2 to 3 buds is exposed after planting. The annular space around the cutting shall be filled with soil and two gallons of water shall be applied within a one foot radius around each cutting immediately after planting.

**3.3 MAINTENANCE:** Maintenance of seeded areas and planted tree cuttings shall be continuous until the time of final acceptance by the Contracting Officer. Maintenance shall include, but not necessarily be limited to, the following items:

3.3.1 Refilling, stabilizing, and reseeding of rain washed gullies and rutted areas or areas damaged by subsequent construction activities.

3.3.2 All cuttings shall be watered with at least 2 gallons of water three times per week for a period of two months. The two gallons of water shall be applied within a 1 foot radius of each cutting.

3.3.3 Two weeks prior to the end of the contract performance period or cutting maintenance period outlined in 3.5.2 above, whichever is later, all cuttings shall be inspected to identify those which have not survived. Up to a maximum of 200 dead cuttings shall be replaced with cuttings stored by the contractor as outlined in paragraph 3.2.2 above. A drawing shall be prepared identifying the locations of all replanted cuttings and the newly planted cuttings shall be tagged for ease of identification. The newly replanted cuttings will be watered for a period of two weeks after they are planted with 2 gallons of water three times per week.

\* \* \* \* \*

## RESPONSE TO COMMENTS

### DRAFT FINAL OPERATION AND MAINTENANCE PLAN

SOUTHWEST FUNSTON LANDFILL  
FORT RILEY, KANSAS

Commentor: Kansas Department of Health and Environment, letter dated 29  
October 1996

#### Comments:

1. Section 1.4, page 1-4, & Response to KDHE Comment 3: Fort Riley has elected to submit three separate plans to address closure/post-closure requirements at the SAFL: the Institutional Controls Plan (ICP), the Long-Term Monitoring Plan (LTMP), and the O&M Plan. Each plan was developed to "stand alone". Thus, information provided in one document is referenced but not restated, in the other documents. KDHE agrees with this approach, provided that all three documents (even in draft form) are concurrently available while reviewing any one of the documents.

With regard to "providing a description of the planned uses of the property" so that the "use of the property shall not disturb the integrity of the final cover...or the monitoring system," the O&M Plan references the ICP which has not yet been submitted to KDHE. Consideration of land use is relevant to developing an effective O&M Plan. For example, the Fort Riley Department of Environment and Safety (DES) recently disapproved an Army proposal to conduct vehicle testing at the SFL because of possible damage to the cover. Future requests to use the SFL for Army operations is likely. Accordingly, the O&M Plan cannot be approved until KDHE has had the opportunity to review the planned use presented in the forthcoming ICP. The schedule submitted by Fort Riley on 12 February 1996 provided a submittal date of 1 September 1996 for the draft ICP.

The remaining KDHE comments (below) require only minor revisions to the text. Fort Riley should be able to make the revisions without having to submit a new document. Thus, KDHE can approve the O&M Plan conceptually once these comments have been addressed. However, approval of the O&M Plan will be postponed until KDHE has had the opportunity to review the planned future land use outlined in the ICP.

**RESPONSE:** The IC Plan will identify planned uses of the landfill and land use controls to be implemented.

2. Section 2.2: KDHE requests to be included in the annual inspections at the SFL. One of the inspection procedures in Section 2.2 should be to provide KDHE timely notice of the annual inspections.

**RESPONSE:** A requirement to advise EPA, and KDHE 30 days prior to annual inspections has been included in Section 2.2.

3. In the recent inspections for adequate cover thickness at the landfill, KDHE noted that the upper six inches of cover in some areas of the landfill where improvements had recently been made was composed of the same silt material as the lower 18 inches of cover rather than topsoil. Fort Riley representatives said that an agronomist had assured them that alluvial silt material would support a native grass stand. KDHE requests to be included in the inspections following seeding of native grasses in 1997. For those areas of the landfill which do not support the growth of native grasses, KDHE may request Fort Riley to perform additional actions, such as placement of topsoil. Section 3.4, Maintenance, of the subject document allows for the possible placement of additional material over the landfill surface.

**RESPONSE:** As indicated in the response to comment 2 above, EPA and KDHE will be advised 30 days prior to annual inspections of the landfill including the native grass cover. Per section 3.4.2 of the O&M Plan, placement of additional fill in areas of the landfill with bare spots exceeding 2% of the grassed area might possibly be considered if, in the opinion of a qualified agronomist, the restricted growth is due to soil type in the area rather than lack of moisture, nutrients, or other causes.

4. Section 8.0, page 8-1: The ICP and the LTMP discussed previously in Comment 1 should be listed as references in Section 8.0.

**RESPONSE:** The ICP and the LTMP have been added to the list of references in Section 8.0 as requested. The list will be redistributed after the ICP and LTMP are finalized.

## RESPONSE TO COMMENTS

### DRAFT OPERATION AND MAINTENANCE PLAN

SOUTHWEST FUNSTON LANDFILL  
FORT RILEY, KANSAS

**Commentor:** Kansas Department of Health and Environment (KDHE)

1. In addition to addressing the following comments, Fort Riley should provide the information noted in the italicized parts of the text of the subject document.

**Response:** Italicized parts of the Draft O&M Plan have been updated as follows:

- a. Section 1.3, page 1-3, second paragraph : The text has been updated to indicate that the Institutional Controls Plan (ICP) outlines actions to limit future site uses and prohibit the use of groundwater from the site.
- b. Section 1.3, page 1-4, fourth paragraph of section: The text has been revised to indicate that the Long Term Groundwater Monitoring Plan (LTGWMP) identifies monitoring wells which will be sampled on a semi-annual basis.
- c. Section 1.5.3, page 1-5: The contract completion date for the cover improvement project is still forecast for October 1996. The text will be revised to reflect that completion date.
- d. Section 3.4.2, Page 3-3: As part of the cover improvement project, native grass will be planted on the landfill in Spring 1997 which is the next available planting season following completion of the cover improvement project in October 1996.
- e. Section 7.0 and Figure 7-1: The plan section has been updated to refer the reader to the ICP for specific information on land use restrictions. Figure 7-1 will be updated if the locations and/or wording of the signs change during the post-closure period.

2. Section 1.3, page 1-4 first sentence: The text states that the cover repair project was completed in the fall of 1994. KDHE recalls that the cover repair project was completed in the fall of 1995.

**Response:** As pointed out, the text was in error and has been revised to reflect the Fall 1995 completion.

3. Section 1.4, page 1-4, first paragraph: The following three comments deal with incorporating into the discussion the following items from the Kansas Agency Regulation (KAR) 28-29-121(p) which was cited by Fort Riley.

a) In past verbal communications, Fort Riley has presented to KDHE a conceptual plan for future land use at the SFL. KDHE concurs with Fort Riley's conceptual plan. However, this plan should be stated in the text. As stated in KAR 28-29-121(p)(3)(D), the O & M Plan should include "a description of the planned uses of the property during the post closure period."

b) Also, the text should discuss briefly the implementation of KAR 28-29-121(p)(3)(D)(i): "Post-closure use of the property shall not disturb the integrity of the final cover...or functions of the monitoring system..."

c) Finally, according to KAR 28-29-121(p)(3)(C), the "name, address, and telephone number of the person or office to contact about the facility during the post-closure period" should be included in the text.

**Response:** Three different documents apply to the post-closure period at Southwest Funston Landfill: the O&M Plan, the Institutional Controls Plan, and the Long Term Groundwater Monitoring Plan. To minimize the chance for inconsistencies between these documents and facilitate future updates, they have been designed as "stand-alone" documents to the greatest extent possible. Information which has been provided in one of the documents is referenced but not restated in the others. The text of section 1.4 has been revised to refer the reader to the ICP which provides the information required by KAR 28-29-121 with respect to post closure use of the landfill which is designed to protect the integrity of the final cover and the office to contact about the facility during the post-closure period.

4. Sections 2.2, 2.3, & 2.4 & Table 1-1: With respect to the two copies of the completed inspection checklists, inspection reports, and maintenance reports to be sent to KDHE, one (1) copy should be sent to KDHE's District Office in Salina, Kansas, and one (1) copy should be sent to KDHE's offices in Topeka, Kansas.

**Response:** The distribution list (Table 1-1) has been revised to include the Salina District Office of KDHE .

5. Section 2.2, page 2-1, second paragraph: The text should designate the person(s) and the department(s) from Fort Riley responsible for conducting the inspections at the SFL.

**Response:** The Directorate of Environment and Safety (DES), Fort Riley is responsible for the maintenance and execution of the O&M Plan. They may choose to perform the inspections in-house, hire a consultant, or have the Corps of Engineers perform the inspections. Therefore, it is not possible to identify an individual who will conduct the inspections. The text of Section 2.2 has been revised to identify DES as the agency responsible for conducting the inspections.

6. Section 3.3, page 3-3, third bullet: The text states that reseeded will occur in areas covered with silt as the result of flooding. The text should also state that reseeded will occur in any sparsely vegetated areas.

**Response:** Reseeding required as the result of flood damage is identified as a repair item in the plan. The requirement to reseed sparsely vegetated areas is identified as a maintenance item in the plan under section 3.4.

7. Section 3.4, page 3-4: The text states that burning will be done during "late winter/early fall." However, in "late winter/early spring" is probably meant, since plant transpiration continues into the early fall.

**Response:** As pointed out, the text is in error and has been revised to require burning in "late winter/early spring."

8. Section 6.0, Monitoring Wells, page 6-1 and Figure 6-1: In previous discussions with Fort Riley, the nested Monitoring Wells SFL92-501, 502, and 503 were to be moved to another location because of the difficulty in sampling the wells. From the hydrological perspective presented by Fort Riley in the March 1996 meeting, these wells now serve to monitor water quality from the nearby wetlands and Threemile Creek, not the water quality from the SFL. Figure 6-1 should show where these wells will be located.

**Response:** Specific information regarding monitoring wells to be sampled, wells to be closed and potential installation of new wells is provided in the Long Term Groundwater Monitoring Plan (LTGWMP) for Southwest Funston Landfill. Figure 6-1 will be updated as new wells are installed or abandoned under the LTGWMP. The updated figure will be provided to all agencies on the Distribution List.



9. Section 6.0, Figure 6-1: Figure 6-1 should depict the boundary of the landfill, thereby distinguishing wells located inside the landfill from wells located outside the landfill.

**Response:** The boundary of the landfill has been added to Figure 6-1.

10. Section 6.1 The wells installed in 1983, which are unusable for chemical monitoring, should be abandoned. In addition, the wells screened in the intermediate zone of the alluvial aquifer and no longer monitored should be abandoned.

**Response:** Although not suitable for chemical monitoring purposes, these wells continue to provide valuable information on groundwater levels across the site. Decisions to abandon wells will be made as outlined in the LTGWMP.

11. Section 6.2, page 6-1, last bullet: The first sentence with all capitalized letters appears to be a warning sign to restrict access to a well. It is unrelated to the sentence which follows and to Section 6.2. It would be more appropriate in a section describing the signs to be installed at a monitoring well.

**Response:** The sentence was intended to warn a future inspector, unfamiliar with the chemicals of concern in the groundwater, not to open the protective well cover. It is not proposed as a sign at the wells. The sentence will be deleted from this bullet and included on the monitoring well inspection form.