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G.I.

ANDERSEN AFB
GUAM

ADMINISTRATIVE RECORD
COVER SHEET

AR File Number 171

THE UNITED STATES AIR FORCE INSTALLATION RESTORATION PROGRAM

LANDFILL NUMBER 2 CAP CONSTRUCTION COST EVALUATION REPORT

For

ANDERSEN AIR FORCE BASE, GUAM

February 1994

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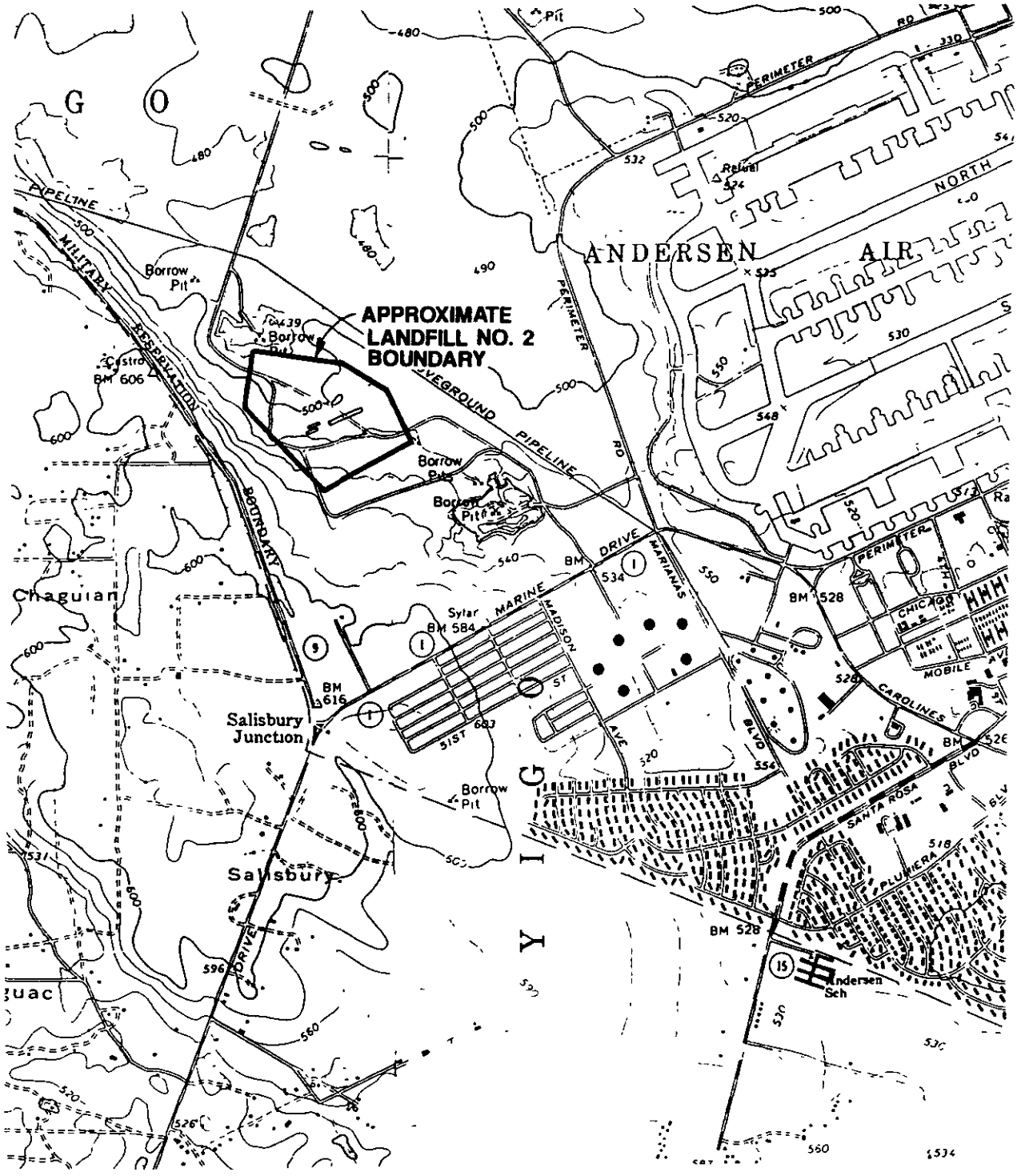
1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE

This report presents the results of an evaluation of factors that will impact the cost of capping Landfill Number 2 (LF2) at Andersen Air Force Base (AAFB), Guam, including a conceptual site grading plan and feasibility-level cost estimates for two capping alternatives. Hensel Phelps Construction Company (HPCC) and Woodward-Clyde (W-C) recently completed capping Landfill Number 5 (LF5) at AAFB, which is an approximately 1.5-acre area within the larger 60-acre LF2. LF5 contained drums of hazardous waste which were placed there in the early 1980s. The purpose of this report is to convey to the Air Force some of the factors that could impact future capping activities at AAFB, based on our experience; to identify some of the technical and regulatory issues that will impact costs; and to provide estimates of two alternatives for AAFB's use in long-range planning. The report includes conceptual design-level evaluations of site grading and precipitation run-off and run-on management requirements, and feasibility-level cost evaluations of various alternatives. The evaluation and cost estimates are based on site information provided by ICF Technology and the Air Force, assumptions regarding project design criteria, and experience on the LF5 project Further site characterization and design will need to be performed to develop more refined cost estimates for a remedial action.

1.2 LANDFILL NUMBER 2 LOCATION

LF2 is located northwest of Route 1 (Marine Drive) and east of Route 9, as shown on Figure 1-1. The landfill is approximately 60 acres in size and is located approximately 1 mile north of the main entrance to AAFB The site is accessed from the road to AAFB's operating sanitary landfill which is accessed from Route 1.



N

0 1000 2000 4000

SCALE IN FEET

Job No	4050
Prepared by	M.R.M.
Date	2/1/94

SITE LOCATION MAP
LANDFILL NUMBER 2
ANDERSEN AFB, GUAM

FIGURE 1-1

1.3 REPORT ORGANIZATION

Section 1.0 of this report discusses the report purpose and scope, site location, and report organization. Section 2.0 presents regulatory considerations that could affect the cost of capping LF2. Section 3.0 presents an evaluation of capping alternatives including site grading, precipitation run-off and run-on management, and description of alternatives Section 4.0 presents a discussion of how cost estimates were obtained and includes cost estimate tables.

2.0
REGULATORY CONSIDERATIONS

The LF5 cap was originally planned as a closure under the Resource Conservation and Recovery Act (RCRA), but was conducted as a Removal Action under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) After AAFB was listed on the CERCLA National Priorities List (NPL) and negotiated a Federal Facilities Agreement (FFA) with the United States Environmental Protection Agency (EPA) and the Guam EPA, CERCLA, rather than RCRA, became the statute governing remediation activities at AAFB. However, RCRA Subtitle C design requirements for hazardous-waste disposal facilities were determined to be action-specific Applicable or Relevant and Appropriate Requirements (ARARs) for the LF5 cap, since hazardous constituents were suspected to be present in LF5.

The design requirements for the LF2 cap will depend on the statute(s) and/or regulation(s) requiring the cap According to the FFA, LF2 is an area of potential contamination within Operable Unit No. 1 on AAFB and, therefore, needs to be addressed under CERCLA. LF2 is largely uncharacterized If hazardous constituents are present in LF2, RCRA Subtitle C may be an ARAR for the LF2 cap It is possible, however, that RCRA Subtitle D for nonhazardous solid-waste landfills or local solid-waste regulations will be found to be ARARs. It is also possible that closure of LF2 has already occurred in accordance with local solid-waste regulations and that a cap will not be required. In any case, it is normally considered prudent practice to provide engineered surface drainage on closed landfills.

The LF2 cap will have a cross section similar to the LF5 cap, with geosynthetic lining and drainage materials, if RCRA Subtitle C governs the design requirements. If RCRA Subtitle D or local solid-waste regulations govern the design, the cap cross section may only have to contain soil materials and a vegetative cover However, Guam solid-waste regulations were not reviewed as part of this cost evaluation Either alternative would require grading the site to effectively manage precipitation run-off and run-on.

3.0
CAPPING ALTERNATIVES EVALUATION

A feasibility-level evaluation of alternatives was performed to use as a basis for the cost estimates and comparisons of relative costs This estimate level is typically used to evaluate project feasibility and assess alternatives Therefore, the level of design that has been completed does not address the final resolution of many issues that would affect the total project cost The conceptual layout of the site grading and precipitation run-off/run-on management system is summarized below.

3.1 SITE GRADING

In general, the purpose of a landfill cap is to reduce or minimize precipitation infiltration that could leach contaminants into the groundwater. Methods to reduce precipitation infiltration include·

- Providing improved surface drainage using 3 to 5 percent slopes to enhance precipitation run-off.

- Constructing a low-permeability barrier over the graded surface

Ideally, a grading design for a landfill cap will provide engineered surface drainage with a minimum of excavation and fill. To minimize costs in grading designs, it is desirable to reduce the quantity of fill to be imported from off site by balancing the required excavation and fill quantities. However, for a landfill cap, it is desirable to avoid or minimize waste excavation and regrading because of environmental and health and safety considerations. Therefore, an optimum design for a landfill cap may require some excavation, but result in fill quantities (to be imported) significantly greater than the excavation volume.

A conceptual grading design for the LF2 area was performed using a civil engineering-design computer program The grading design involves modeling the existing ground surface, and developing a proposed graded surface using approximately 3 to 5 percent

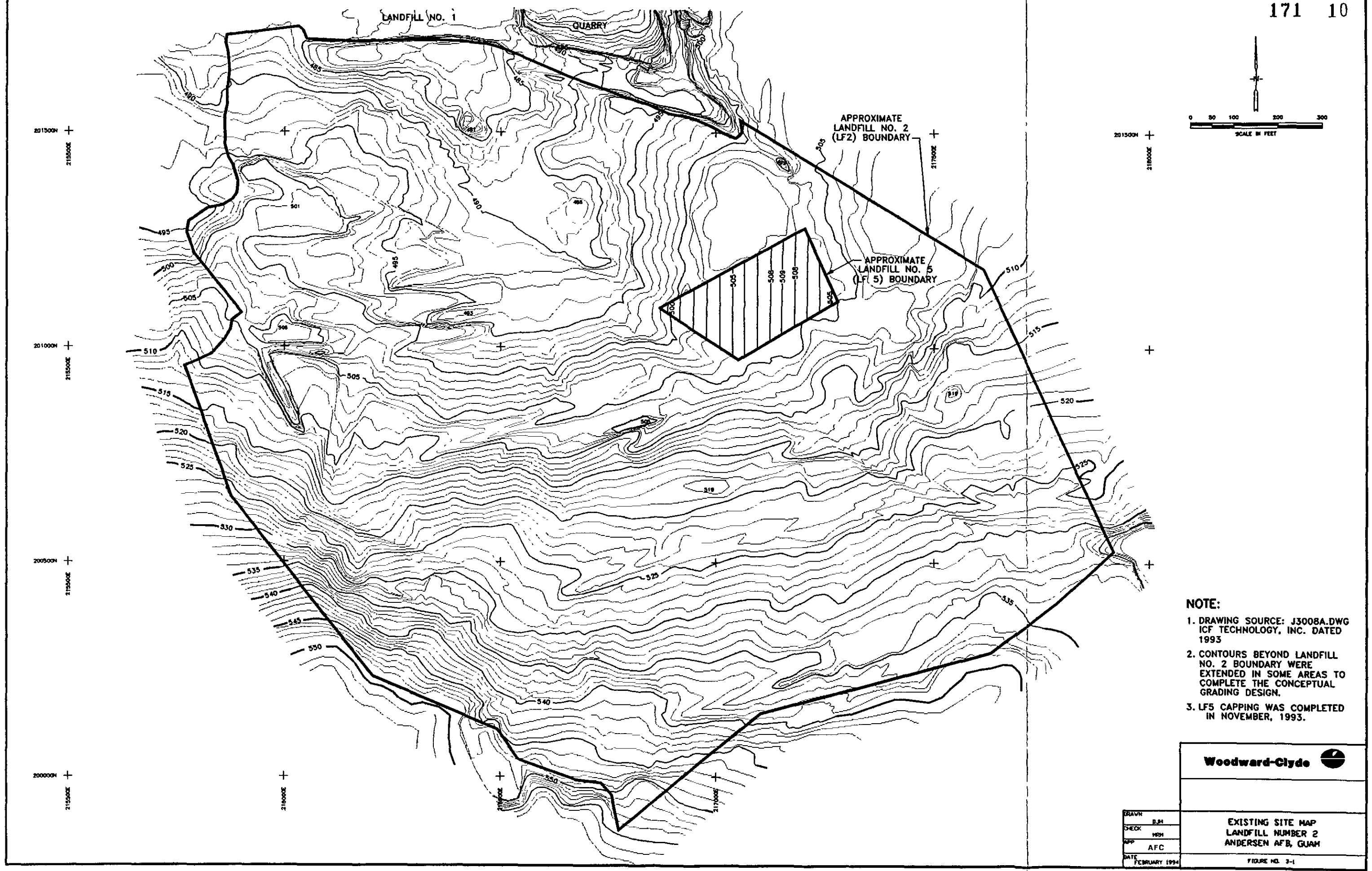
slopes and drainage channel slopes with a minimum of 2 percent slopes. The design grading surface and the existing ground surface are compared, and cut and fill grading quantities are calculated Adjustments in the design grading surface are made to reduce waste excavation quantities. The existing topography is shown on Figure 3-1, and Figure 3-2 shows the conceptual grading contours. Cross sections and a cut-fill depth contour map are shown on Figure 3-3 and 3-4, respectively. An oblique three dimensional representation of the proposed cap is shown on Figure 3-5 The contours shown are post-settlement grades and the potential for large settlements to occur in waste fill areas will need to be evaluated during further site characterization work and included in the design.

The conceptual grading plan results in an excavation quantity of approximately 65,000 cubic yards and a fill quantity of approximately 269,000 cubic yards. The conceptual grading plan includes an area of relatively deep fill (i.e., 10 to 15 feet) in the northwest-central portion of the site. During design, the grading plan should be further refined to address this area.

We have assumed that excess fill required to complete site grading would consist of a crushed, coral limestone material imported from on site or off site. Because of the quantity that is likely to be needed, a closer and more economical borrow site should be considered for LF2. Fill could potentially be obtained from an infiltration pond excavation if a pond is used for cap run-off discharge (see Section 3.2 below)

3.2 PRECIPITATION RUN-OFF AND RUN-ON MANAGEMENT

An evaluation of run-off and run-on management requirements was conducted to develop a conceptual stormwater control system for run-off and run-on around LF2. The evaluation included estimating peak flows and volumes associated with a site-design storm event. The peak flows, storm volume, and a system of channels, berms, and/or ponds which were developed for the conceptual design are described below.



NOTE:

1. DRAWING SOURCE: J3008A.DWG ICF TECHNOLOGY, INC. DATED 1993
2. CONTOURS BEYOND LANDFILL NO. 2 BOUNDARY WERE EXTENDED IN SOME AREAS TO COMPLETE THE CONCEPTUAL GRADING DESIGN.
3. LF5 CAPPING WAS COMPLETED IN NOVEMBER, 1993.

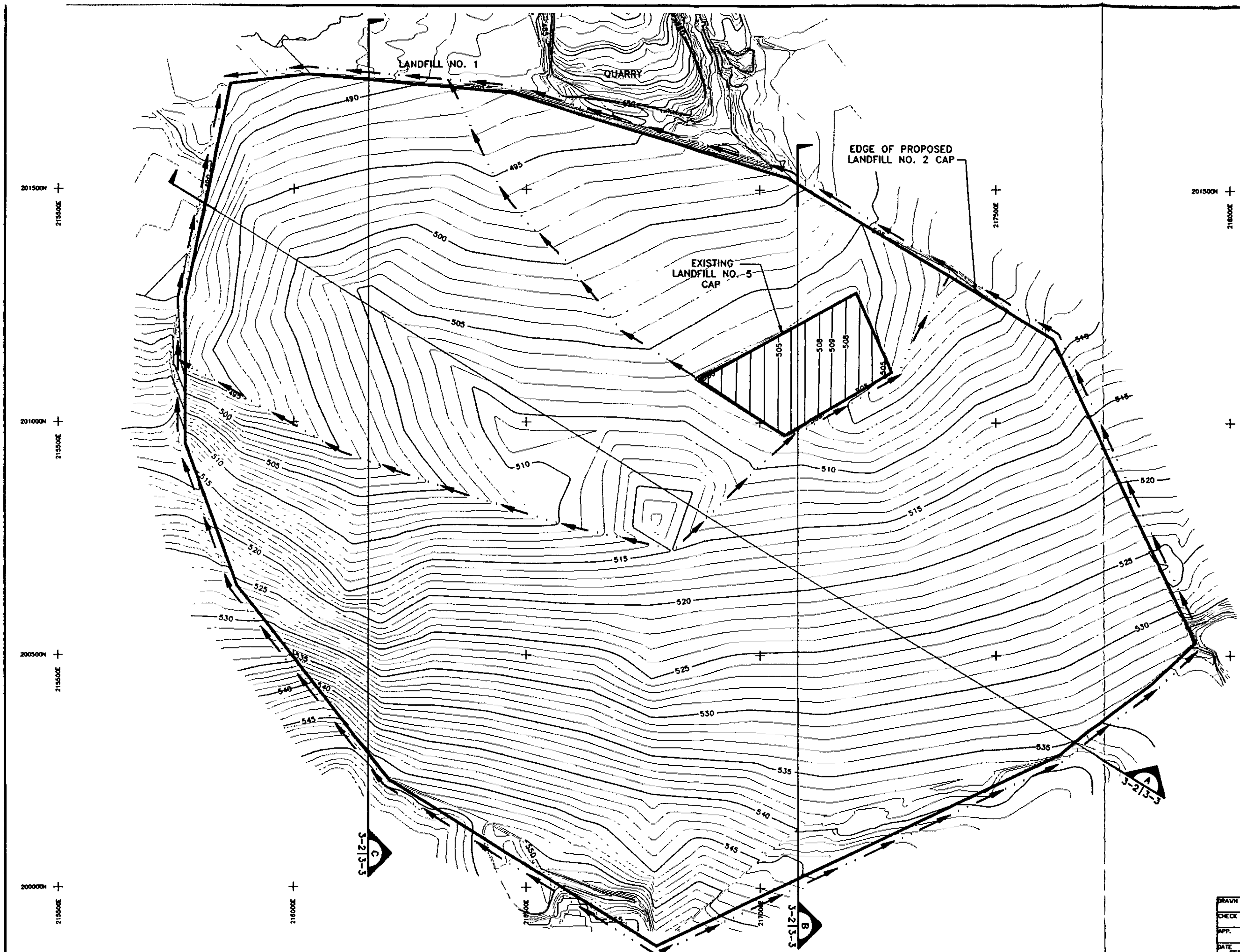
FILE NO. 46203-1	LOC. DENVER
SCALE 1:2	PROJ. GUAM
DRAWER LACES	PROJ. NO.
DATE	TASK NO.
SEND TO	
PHONE	

Woodward-Clyde

DRAWN	BJH
CHECK	MRH
APP	AFC
DATE	FEBRUARY 1994

EXISTING SITE MAP
LANDFILL NUMBER 2
ANDERSEN AFB, GUAM

FIGURE NO. 3-1



LEGEND

CHANNEL

CROSS-SECTION (A, 3-2|3-3)

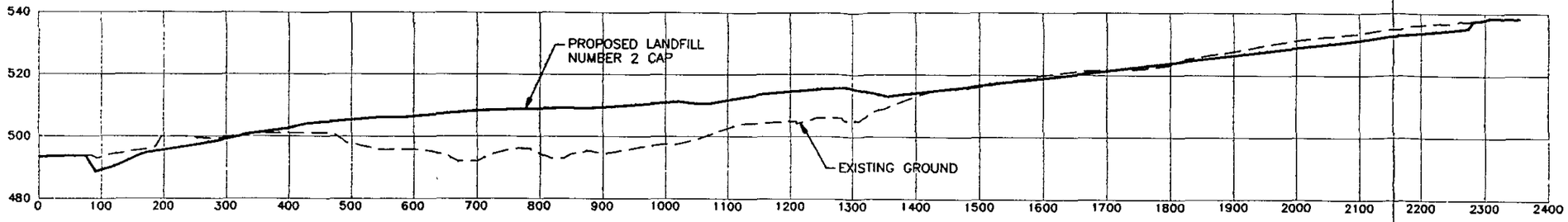
NOTES:

1. CONTOURS INSIDE LANDFILL ARE TOP OF REGRADING ELEVATIONS (BOTTOM OF CAP).
2. CONTOURS BEYOND EDGE OF CAP WERE EXTENDED IN SOME AREAS TO COMPLETE THE CONCEPTUAL GRADING DESIGN.
3. THE GENERAL DRAINAGE OF THE CAP PERIMETER IS SHOWN, BUT GRADING HAS NOT BEEN MODIFIED FOR THE CONCEPTUAL DESIGN.

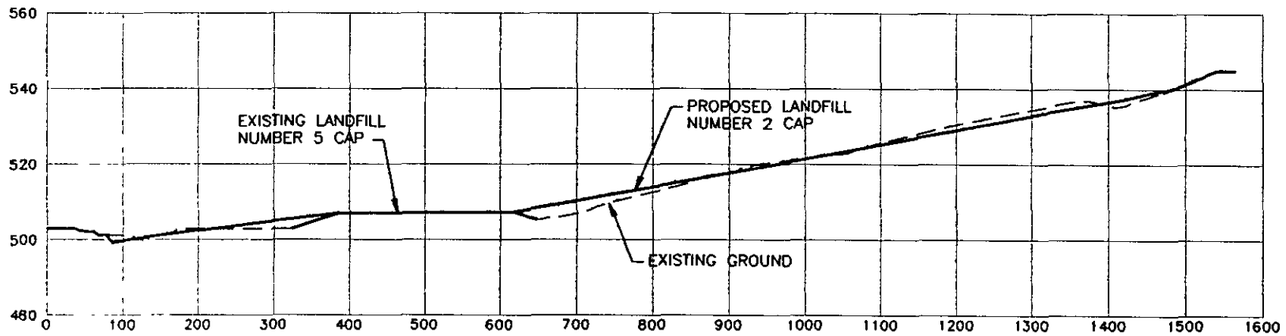
Woodward-Clyde

DRAWN B.J.H.	CONCEPTUAL GRADING PLAN PROPOSED LANDFILL NUMBER 2 CAP ANDERSEN AFB, GUAM
CHECK M.R.M.	
APP. A.F.C.	
DATE FEBRUARY 1994	FIGURE NO. 3-2

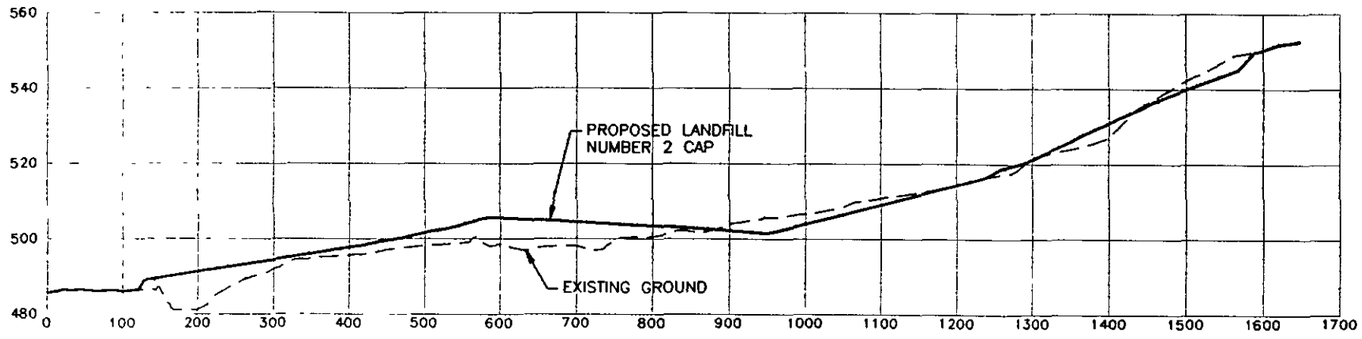
FILE NO. 40453-E	LOC. DENVER	SEND TO
SCALE 100	PROJ. GUAM	PHONE
DPPER. TAL	PROJ. NO. 4050	
DATE 2/11/94	TASK NO. 405	



SECTION A



SECTION B



SECTION C

0 50 100 200
HORIZONTAL SCALE IN FEET

0 10 20 40
VERTICAL SCALE IN FEET

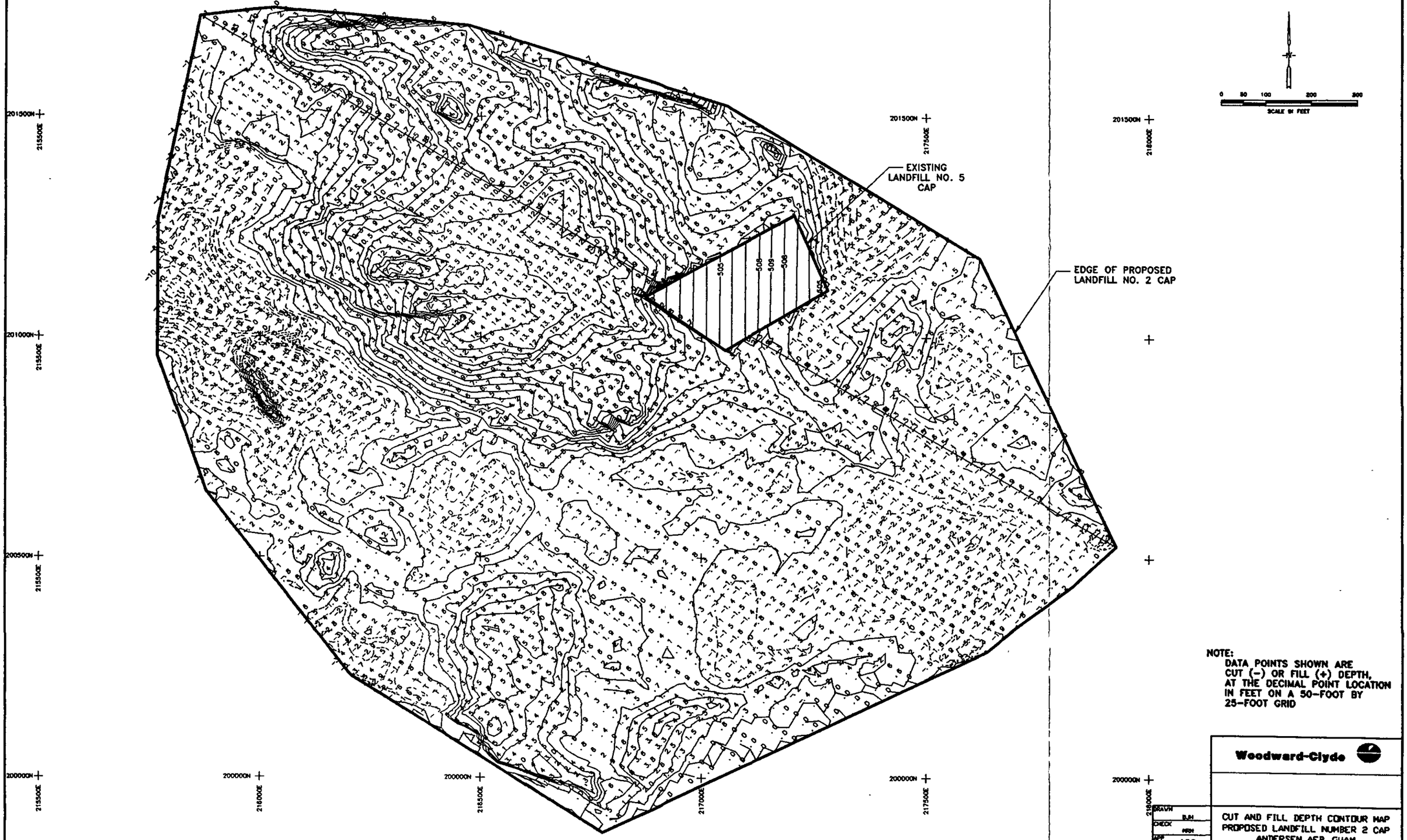
DRAWN	B.J.H.
CHECK	M.R.K.
APP	A.F.C.
DATE	FEBRUARY 1994

Woodward-Clyde

PRELIMINARY CROSS SECTIONS
PROPOSED LANDFILL NUMBER 2 CAP
ANDERSEN AFB, GUAM

FIGURE NO. 3-3

FILE NO. 40567-4	
SCALE	
DIPPER	
DATE	
LOC	DENVER
PROJ	GUAM
PROJ. NO.	4056
TASK NO.	405
SEND TO	
PHONE	



NOTE:
DATA POINTS SHOWN ARE CUT (–) OR FILL (+) DEPTH, AT THE DECIMAL POINT LOCATION IN FEET ON A 50-FOOT BY 25-FOOT GRID

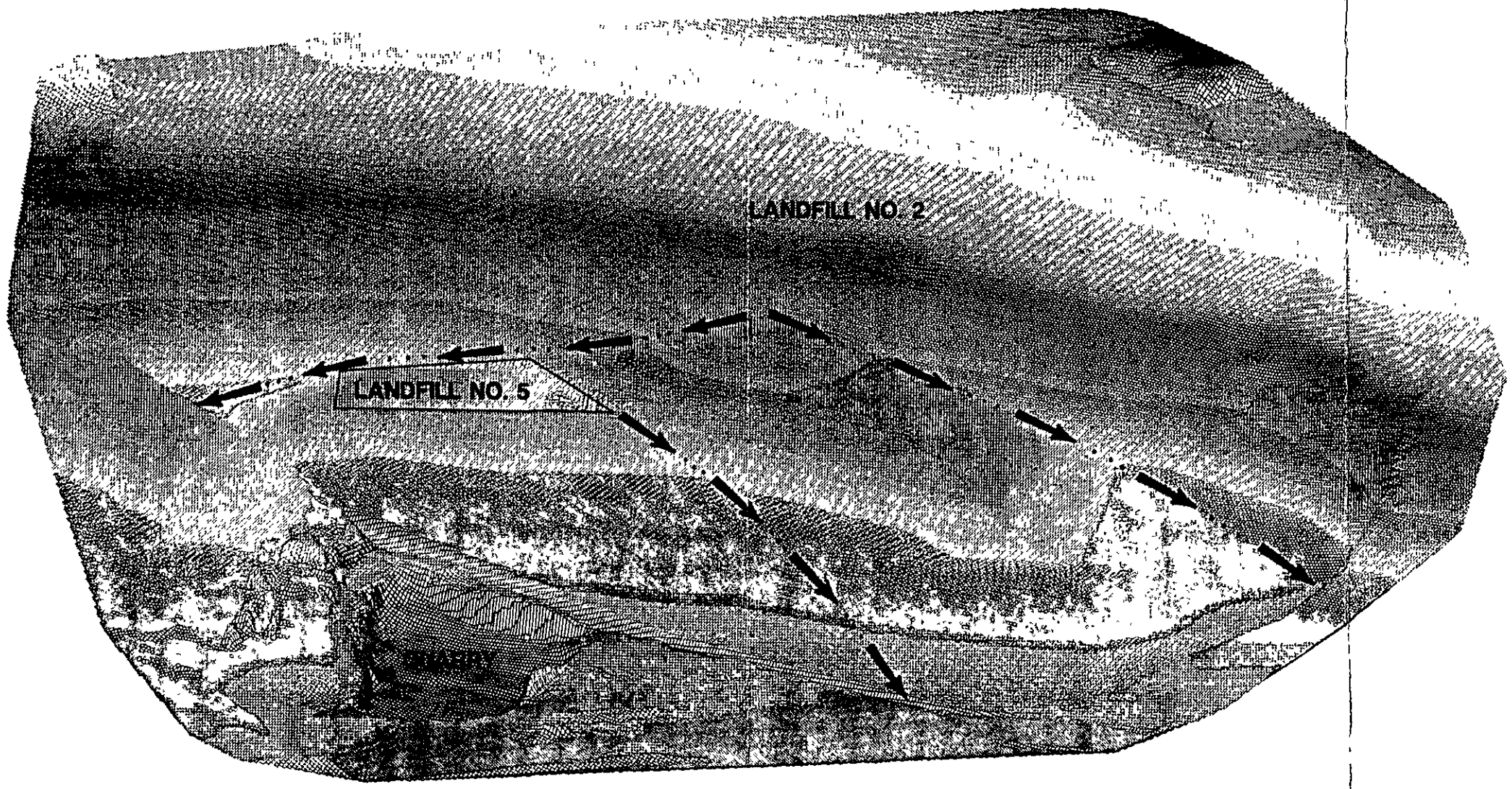
FILE NO. 4565-5	LOC. DENVER SEND TO
SCALE 100	PROJ. GUAM PHONE
DRAWN LADES	PROJ. NO.
DATE	TASK NO.

Woodward-Clyde

DRAWN	B.H.
CHECK	MRH
APP	AFC
DATE	FEBRUARY 1994

CUT AND FILL DEPTH CONTOUR MAP
PROPOSED LANDFILL NUMBER 2 CAP
ANDERSEN AFB, GUAM

FIGURE NO. 3-4



LEGEND

CHANNEL

FILE NO. 49853-5	LOC.	DRAWER	ISSUED TO
SCALE 200	PROJ.	GUAM	PHASE
DRAWER LACEY	PROJ. MGR.		
DATE	TASK NO.		

Woodward-Clyde

DRAWN	MDL
CHECK	MRH
APP	AFC
DATE	FEBRUARY 1994

OBLIQUE 3-D REPRESENTATION
PROPOSED LANDFILL NUMBER 2 CAP
ANDERSEN AFB, GUAM

FIGURE NO. 3-5

Hydrologic Analysis

The run-off quantity from the landfill cover is dependent on the total rainfall, soil type, and vegetative cover for the capped area. ICF Technology provided the following precipitation intensities as the basis for the hydrologic analysis conducted for the LF5 design:

- 8 inches of precipitation in 2 hours,
- 18 inches of precipitation in 12 hours, and/or
- 24 inches of precipitation in 24 hours

Each rainfall was distributed using a soil conservation service (SCS) Type III distribution. Results indicated that the 24-hour precipitation included intensities greater than the 2 and 12-hour precipitations. Therefore, the 24-inch rainfall in 24 hours was adopted for this evaluation as the design storm event.

Two vegetative cover conditions are anticipated for the landfill-capped area. A bare soil over the capped area was used to simulate conditions during and immediately following construction, while a dense grass was used to simulate conditions for successful cover vegetation. A SCS Run-off Curve Number (CN) was estimated for the two cover conditions. The CN is an index of run-off potential which incorporates soil types and vegetative cover. The maximum CN is 100, under which all rainfall would run-off. The lower the CN, the lower the run-off potential. A CN of 65 was used for the vegetated scenario, and a CN of 85 was used for the bare soil scenario

The landfill cover was divided into seven sub-drainage areas, based on the conceptual grading plan Each of the areas would contribute run-off, associated with the design storm event, to drainage channels on the cap and at the landfill perimeter The drainage channel locations are shown on Figure 3-2. Peak flows from each of the sub-drainage areas were estimated using the computer program for the Graphical Peak Discharge Method, presented in the SCS Technical Release No. 55 (TR-55), "Urban Hydrology for Small Watersheds " For purposes of the conceptual design, bare soil conditions were used to estimate the run-off, because they generate a higher run-off quantity The peak flows

from each of the sub-drainage areas ranged from approximately 60 cubic feet per second (cfs) to 230 cfs.

Precipitation Management Design

The landfill cover and perimeter channels were sized according to the peak flows from contributory sub-drainage areas. The design peak flows ranged from approximately 125 cfs to 365 cfs Manning's open-channel flow equation was used to develop the channel geometry. Based on the conceptual grading plan, using trapezoidal channels with 1-2 percent slopes, that are approximately 4 feet deep, with a 5-foot bottom width and 2:1 (Horizontal Vertical) side slopes, would convey approximately 365 cfs. The channels will require erosion protection such as paving or riprap. The channels were sized assuming riprap would be used for erosion protection. A 9-inch-thick layer of grouted riprap was used for the cost estimates.

Overall, the direction of flow in the cap and perimeter channels is toward the northwest corner of the landfill, as shown on Figure 3-2. Two alternatives were considered for discharge of run-off from the outflow point at the northwest corner, including (1) an infiltration pond adjacent to the site and (2) a conduit to transfer run-off away from LF2 and to an outlying low area.

An infiltration pond could be constructed adjacent to the northwest corner of LF2. Based on the rainfall design used, an estimated 115 acre-feet of storm volume would be stored in the pond. However, based on infiltration criteria developed by ICF Technology during the LF5 design, approximately 50 percent of this volume would infiltrate in the pond immediately Therefore, the size of this pond could be reduced to approximately 58 acre-feet A 10-foot deep infiltration pond would be approximately 7 or 8 acres in size.

An alternative would be to convey outflow through a pipe to a low area outside of LF2. We have assumed that a conduit approximately 2,000 feet in length would be required to convey the flow to an outlying area. We understand from ICF's LF5 design engineer that the Guam EPA has developed criteria for a "low area" to be used for infiltration We did not evaluate these criteria as part of this study, however,a review of United States Geological Survey (USGS) topography indicates there may be several candidate low areas

within 2,000 feet of LF2. Given the total estimated discharge, a 12-foot by 12-foot concrete box culvert, two 7-foot by 7-foot concrete box culverts, or an open channel with an equivalent capacity, would be recommended.

In general, run-on from areas outside the landfill area is not anticipated. However, in areas where run-on may occur, run-on control berms around the perimeter of LF2 would be appropriate to minimize any run-on contact with the landfill area.

3.3 CAPPING ALTERNATIVES

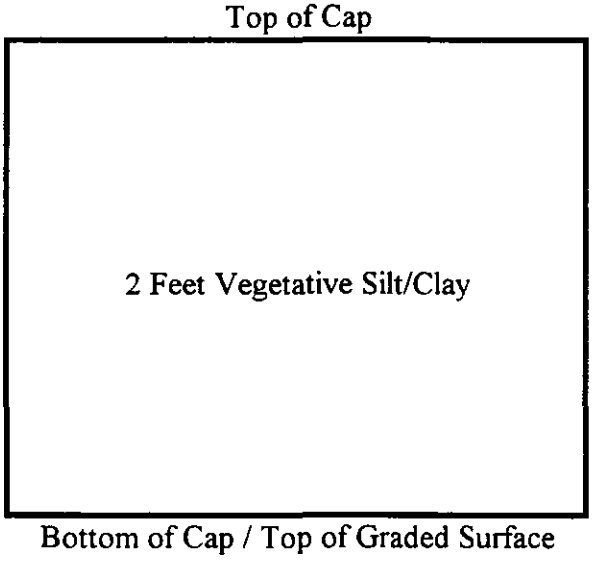
There are several alternatives that could be considered for the LF2 cap. For this report, two alternatives were evaluated, and incremental costs associated with sub-alternatives were considered. Two general alternatives based on regulatory requirements are. (1) a nonhazardous solid-waste landfill cap, conforming to RCRA Subtitle D or local solid-waste regulations; and (2) a hazardous-waste landfill cap, substantively conforming to RCRA Subtitle C. However, within each alternative, there are numerous details that could be varied regarding liner material properties, thicknesses, etc. The cap section alternatives are presented in Table 3-1.

Alternative 1 for the landfill cap would be a soil cap. Although local regulatory requirements may govern the section required, we have assumed a 2-foot-thick vegetative silt/clay material similar to the material used in the LF5 cap. No special considerations were evaluated for reducing the cap soil-permeability to a specified level.

Alternative 2 for the landfill cap would consist of a multi-layered soil and geosynthetic cap, similar to the LF5 cap After site grading, a 6-inch-thick layer of fine crushed coral (e g , 3/8-inch minus) would be placed and overlain with a multi-layered geosynthetic liner and drainage system. The liner system would then be covered with a 1.5-foot-thick layer of vegetative silt/clay. The geosynthetics for Alternative 2 would consist of a geosynthetic clay liner overlain by a 40-mil, high-density polyethylene (HDPE) geomembrane. A protective geotextile would be placed over the HDPE liner, and a geonet and geotextile filter layer would be placed over the protective geotextile

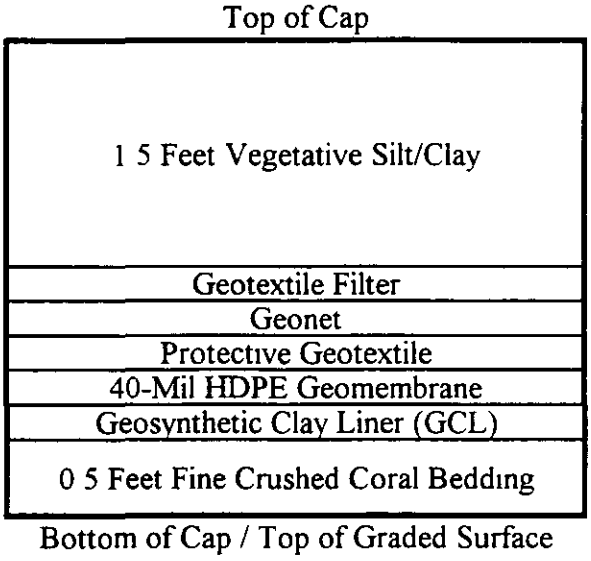
TABLE 3-1
CAP SECTION ALTERNATIVES

Alternative 1
Nonhazardous Solid Waste Cap
(RCRA Subtitle D)



Total Thickness = 2 Feet

Alternative 2
Hazardous Waste Cap
(RCRA Subtitle C)



Total Thickness = 2 Feet

4.0
COST ESTIMATES

Feasibility-level cost estimates were made to evaluate the relative economic feasibility of the various alternatives. "Feasibility-level" implies that less than 30 percent design-level information has been used to generate the costs. The primary intent is to evaluate relative costs between alternatives, and not the absolute cost of any one alternative In accordance with EPA's "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA," estimate costs are typically expected to provide an accuracy of plus 50 to minus 30 percent. Cost estimates are presented in Tables 4-1 and 4-2.

The following is a list of assumptions used in developing the cost estimates:

1. Coral limestone fill will be obtained from borrow sources within a few hundred feet of LF2. If the coral limestone fill is obtained off site, it will cost at least $3.30/cubic yard more than from an on-site borrow source.

2. The cleared material (e.g , brush, trees) can be disposed of in or adjacent to LF2, and will not have to be hauled off site.

3. Precipitation run-off will be discharged into an infiltration pond adjacent to the site.

4. The fence around LF2 is assumed to be a 6-foot chain-link fence in Alternative 2 (RCRA Subtitle C). The fence is assumed to be a 5-strand barbed-wire fence in Alternative 1 (RCRA Subtitle D).

5 Geosynthetic quantities were estimated assuming on an additional 10-foot width around the entire LF2 perimeter for anchor trenches The synthetic quantities were also increased by 10 percent for seams and waste.

6 All site work (e.g , clearing and grubbing, fill placement) will be conducted using Level D personal protective equipment (PPE)

TABLE 4-1
ALTERNATIVE 1 (RCRA SUBTITLE D CAP) COST ESTIMATE
LANDFILL NO. 2, ANDERSEN AFB, GUAM

DESCRIPTION	APPROX. QUANTITY	UNIT	UNIT COST	TOTAL COST
33-01 MOBILIZATION AND PREPARATORY WORK				
Equipment and Personnel Mobilization	1	Lump Sum	NA	$386,363
Bonding and Insurance	1	Lump Sum	NA	$257,575
Engineering Planning	1	Lump Sum	NA	$772,726
Decontamination Pad	1	Lump Sum	$20,000	$20,000
33-03 SITE WORK				
Clearing and Grubbing	60	Acre	$7,810	$468,600
Cap Excavation	65,000	CY	$5 00	$325,000
Borrow Excavation (Coral Limestone)	97,000	CY	$5 00	$485,000
Place Coral Limestone Fill	269,000	CY	$10 21	$2,746,490
Place Vegetative Silt/Clay Layer (2-Feet Thick)	199,000	CY	$26 40	$5,253,600
Development of Borrow Pit and Haul Roads	5,000	LF	$25	$125,000
Fence (5-Strand Barbed Wire)	7,000	LF	$10	$70,000
Hydroseeding	60	Acre	$3,500	$210,000
Reroute Landfill Road	3,500	LF	$25	$87,500
SITE WORK SUBTOTAL				$9,771,190
Construction QA/QC	1	Lump Sum	NA	$586,271
Project Administration	1	Lump Sum	NA	$488,560
33-05 SURFACE WATER COLLECTION AND CONTROL				
Infiltration Pond Excavation	107,000	CY	$5 00	$535,000
Conveyance Structure	200	LF	$1,070	$214,000
Channel Grouted Riprap	5,055	CY	$250	$1,263,750
FACILITY SUBTOTAL				$12,878,771
33-21 DEMOBILIZATION				
Equipment and Personnel Demobilization	1	Lump Sum	NA	$257,575
Closure Documents	1	Lump Sum	NA	$257,575
TOTAL				$14,810,587
Contingency	1	Lump Sum	NA	$2,962,117
TOTAL COST (FISCAL YEAR 1994)				$17,772,704
TOTAL COST PER ACRE (60 ACRES TOTAL)				$296,212

NOTES APPROX - Approximate CY - Cubic Yard LF - Linear Feet NA - Not Applicable
QA/QC - Quality Assurance/Quality Control SF - Square Feet

TABLE 4-2
ALTERNATIVE 2 (RCRA SUBTITLE C CAP) COST ESTIMATE
LANDFILL NO. 2, ANDERSEN AFB, GUAM

DESCRIPTION	APPROX. QUANTITY	UNIT	UNIT COST	TOTAL COST
33-01 MOBILIZATION AND PREPARATORY WORK				
Equipment and Personnel Mobilization	1	Lump Sum	NA	$758,587
Bonding and Insurance	1	Lump Sum	NA	$505,725
Engineering Planning	1	Lump Sum	NA	$1,517,174
Decontamination Pad	1	Lump Sum	$20,000	$20,000
33-03 SITE WORK				
Clearing and Grubbing	60	Acre	$7,810	$468,600
Cap Excavation	65,000	CY	$5 00	$325,000
Borrow Excavation (Coral Limestone)	97,000	CY	$5 00	$485,000
Place Coral Limestone Fill	269,000	CY	$10 21	$2 746 490
Place 3/8" Minus Crushed Coral (0 5-feet Thick)	50,000	CY	$29 50	$1,475,000
Place Vegetative Silt/Clay Layer (1 5-feet Thick)	149,000	CY	$26 40	$3,933,600
Geosynthetic Clay Liner (GCL)	2,947,000	SF	$1 70	$5,009,900
40-Mil HDPE Geomembrane	2,947,000	SF	$0 50	$1,473,500
Protective Geotextile	2,947,000	SF	$0 50	$1,473,500
Geonet	2,947,000	SF	$0 50	$1,473,500
Geotextile Filter	2,947,000	SF	$0 50	$1,473,500
Development of Borrow Pit and Haul Roads	5,000	LF	$25	$125,000
Fence (6-Foot Chain Link)	7,000	LF	$27	$189,000
Hydroseeding	60	Acre	$3,500	$210,000
Reroute Landfill Road	3,500	LF	$25	$87,500
SITE WORK SUBTOTAL				$20,949,090
Construction QA/QC	1	Lump Sum	NA	$1,256,945
Project Administration	1	Lump Sum	NA	$1,047,455
33-05 SURFACE WATER COLLECTION AND CONTROL				
Infiltration Pond Excavation	107,000	CY	$5 00	$535,000
Conveyance Structure	200	LF	$1,070	$214,000
Channel Grouted Riprap	5,055	LF	$250	$1,263,750
FACILITY SUBTOTAL				$25,286,240
33-21 DEMOBILIZATION				
Equipment and Personnel Demobilization	1	Lump Sum	NA	$505,725
Closure Documents	1	Lump Sum	NA	$505,725
TOTAL COST				$29,079,176
Contingency	1	Lump Sum	NA	$5,815,835
TOTAL COST (FISCAL YEAR 1994)				$34,895,011
TOTAL COST PER ACRE (60 ACRES TOTAL)				$581,584

NOTES: APPROX. - Approximate CY - Cubic Yard HDPE - high-density polyethylene LF - Linear Feet
NA - Not Applicable QA/QC - Quality Assurance/Quality Control SF - Square Feet

7. Costs for site characterization, groundwater monitoring, permitting, and surveying were not considered.

4.1 ALTERNATIVE 1 (RCRA SUBTITLE D)

The cost estimate for Alternative 1 is outlined in Table 4-1. The total cost for Alternative 1 is approximately $17,800,000, or $297,000 per acre (assuming LF2 is 60 acres) Two options for run-off discharge were evaluated, including (1) infiltration pond adjacent to the site and (2) a conduit to transfer run-off away from LF2 to an outlying low area. Two options for fill sources were also evaluated (on-site and off-site sources). The base estimate was modified using the different options outlined above. The estimated cost for the options are:

- Base estimate - $17,800,000 ($297,000 per acre)
- On-site fill with discharge conduit - $20,500,000 ($341,000 per acre)
- Off-site fill with infiltration pond - $18,300,000 ($305,000 per acre)
- Off-site fill with discharge conduit - $21,600,000 ($360,000 per acre)

4.2 ALTERNATIVE 2 (RCRA SUBTITLE C)

The cost estimate for Alternative 2 is outlined in Table 4-2 The total cost for Alternative 2 is approximately $34,900,000, or $582,000 per acre (assuming LF2 is 60 acres). The major cost difference between Alternative 2 and Alternative 1 is the cost of geosynthetics in the RCRA Subtitle C closure Two options for run-off discharge were evaluated, including (1) infiltration pond adjacent to the site and (2) a conduit to transfer run-off away from LF2 to an outlying low area. Two options for fill sources were also evaluated (on-site and off-site sources). The base estimate was modified using the different options outlined above. The estimated cost for the options are

- Base estimate - $34,900,000 ($582,000 per acre)
- On-site fill with discharge conduit - $37,600,00 ($626,000 per acre)
- Off-site fill with infiltration pond - $35,400,000 ($590,000 per acre)
- Off-site fill with discharge conduit - $38,700,000 ($645,000 per acre)

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