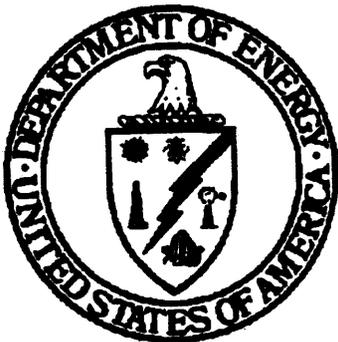

DOE/OR/21548-411
CONTRACT NO. DE-AC05-86OR21548

**CONCEPTUAL DESIGN REPORT FOR
REMEDIAL ACTION AT THE CHEMICAL
PLANT AREA OF THE WELDON SPRING
SITE, VOLUME II TECHNICAL
INFORMATION DOCUMENT
BOOK 3 OF 5**

Weldon Spring Site Remedial Action Project
Weldon Spring, Missouri

JANUARY 1994

REV. 0



U.S. Department of Energy
Oak Ridge Operations Office
Weldon Spring Site Remedial Action Project

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**Conceptual Design Report, for Remedial Action at the Chemical Plant Area of the
Weldon Spring Site, Volume II Technical Information Document**

Book 1 of 5 contains Sections 1-5

Book 2 of 5 contains Sections 6-12

Book 3 of 5 contains the figures for all sections

Book 4 of 5 contains the tables for all sections

Book 5 of 5 contains Appendix A, Unpublished Documents, and Appendix B, Acronyms

DOE/OR/21548-411

Weldon Spring Site Remedial Action Project

**Conceptual Design Report, for Remedial Action at the Chemical Plant Area of the
Weldon Spring Site, Volume II Technical Information Document**

**Figures
Book 3 of 5**

Revision 0

January 1994

Prepared by

**MK-FERGUSON COMPANY
and
JACOBS ENGINEERING GROUP
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for the

**U.S. DEPARTMENT OF ENERGY
Oak Ridge Operations Office
Under Contract DE-AC05-86OR21548**

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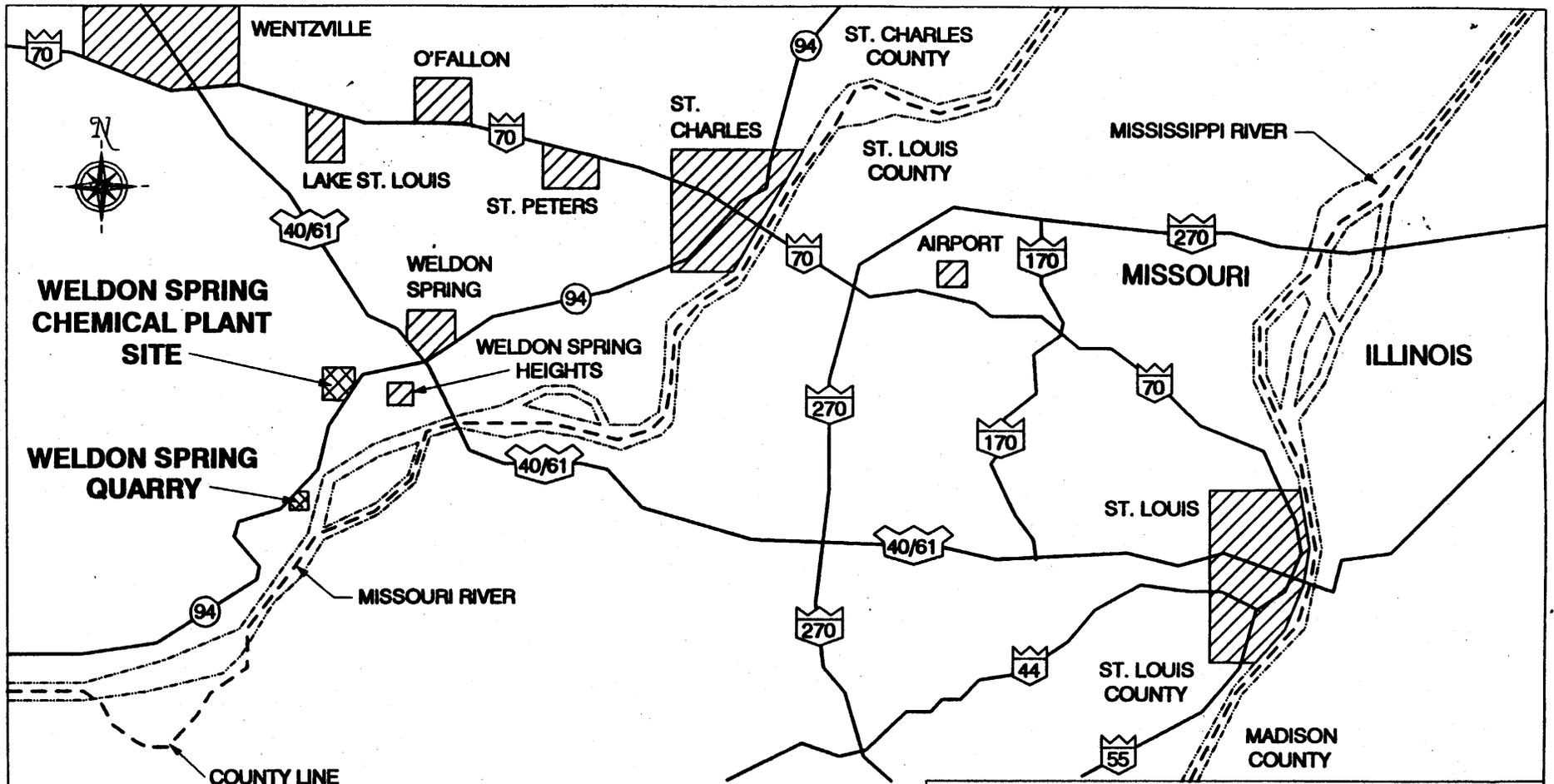
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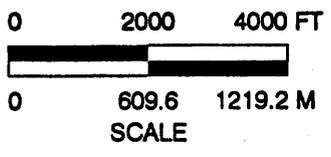
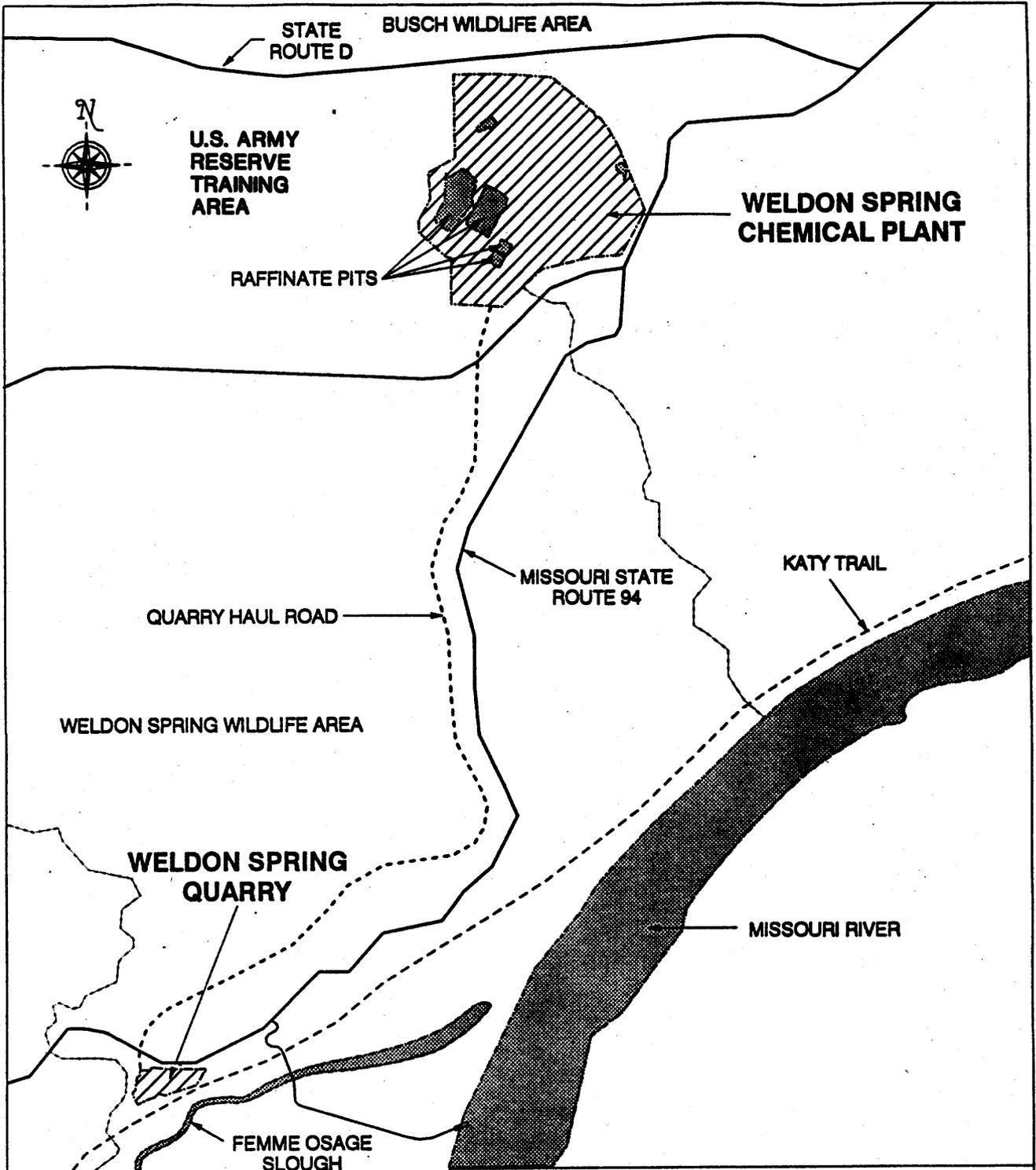


**AREA AND VICINITY MAP OF
THE WELDON SPRING SITE,
WELDON SPRING, MISSOURI**

FIGURE 1-1

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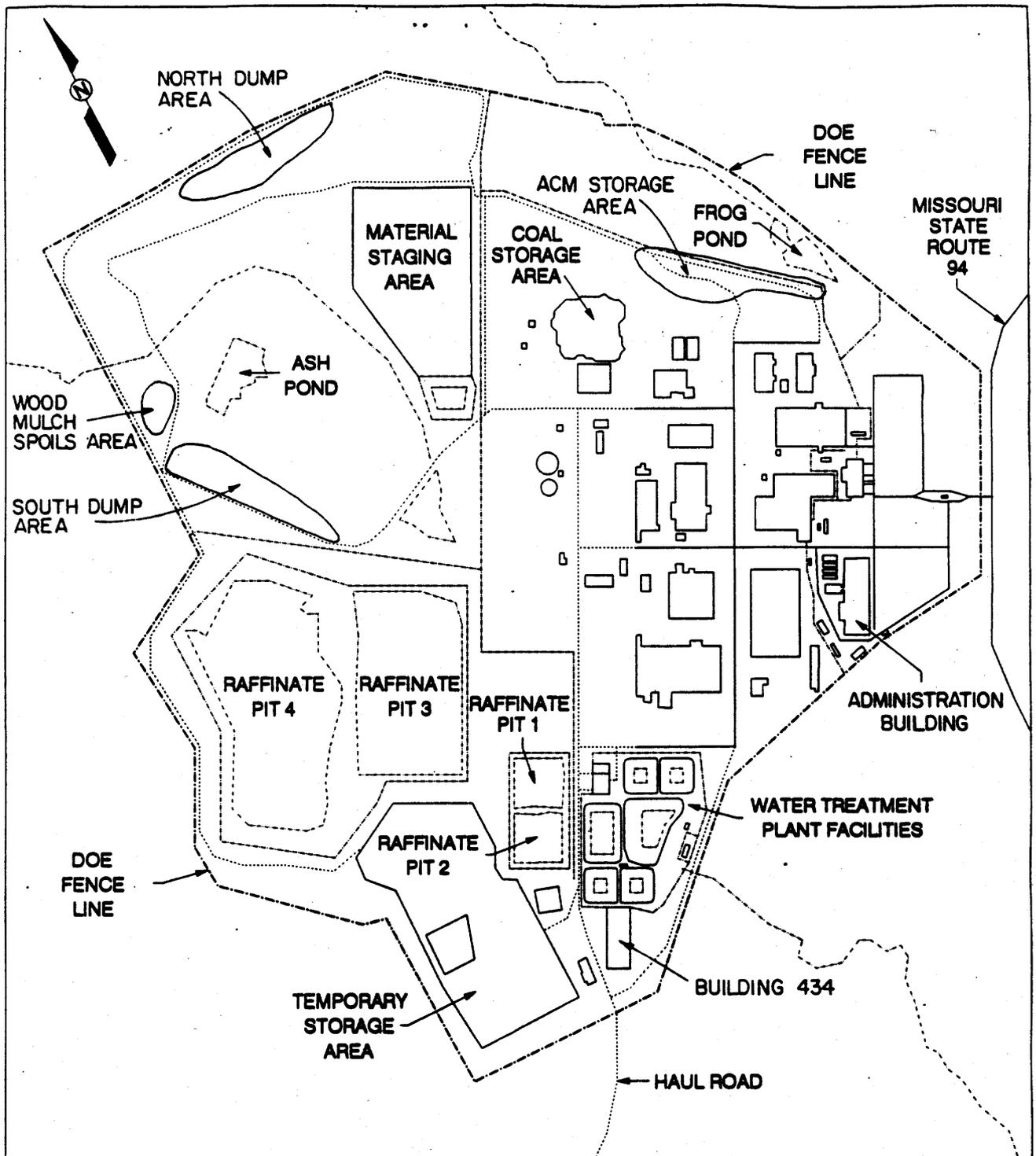
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WELDON SPRING SITE AND VICINITY MAP

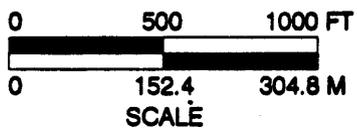
FIGURE 1-2

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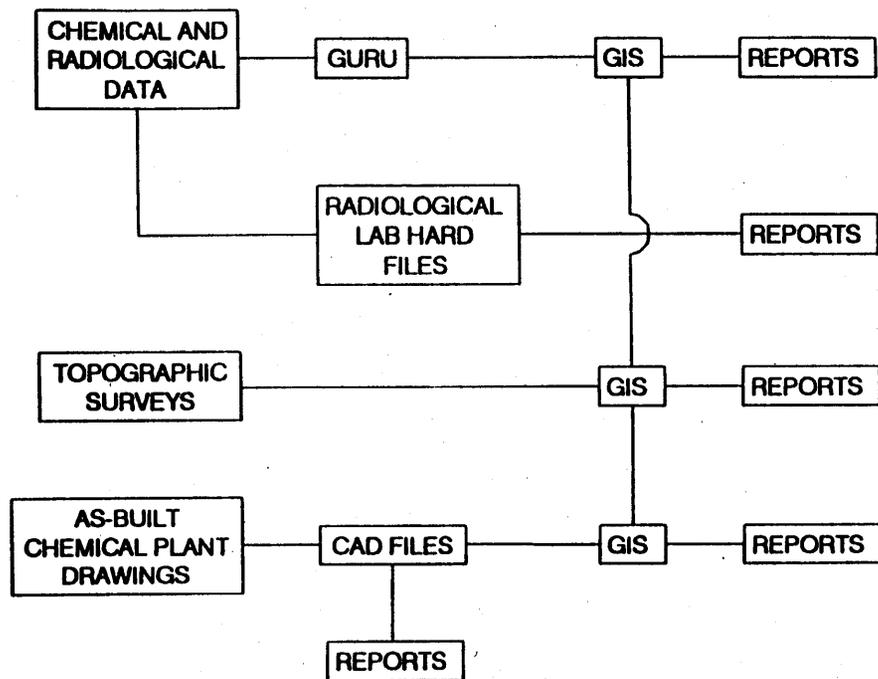


SITE LAYOUT PRIOR TO REMEDIATION ACTIVITIES

FIGURE 1-3



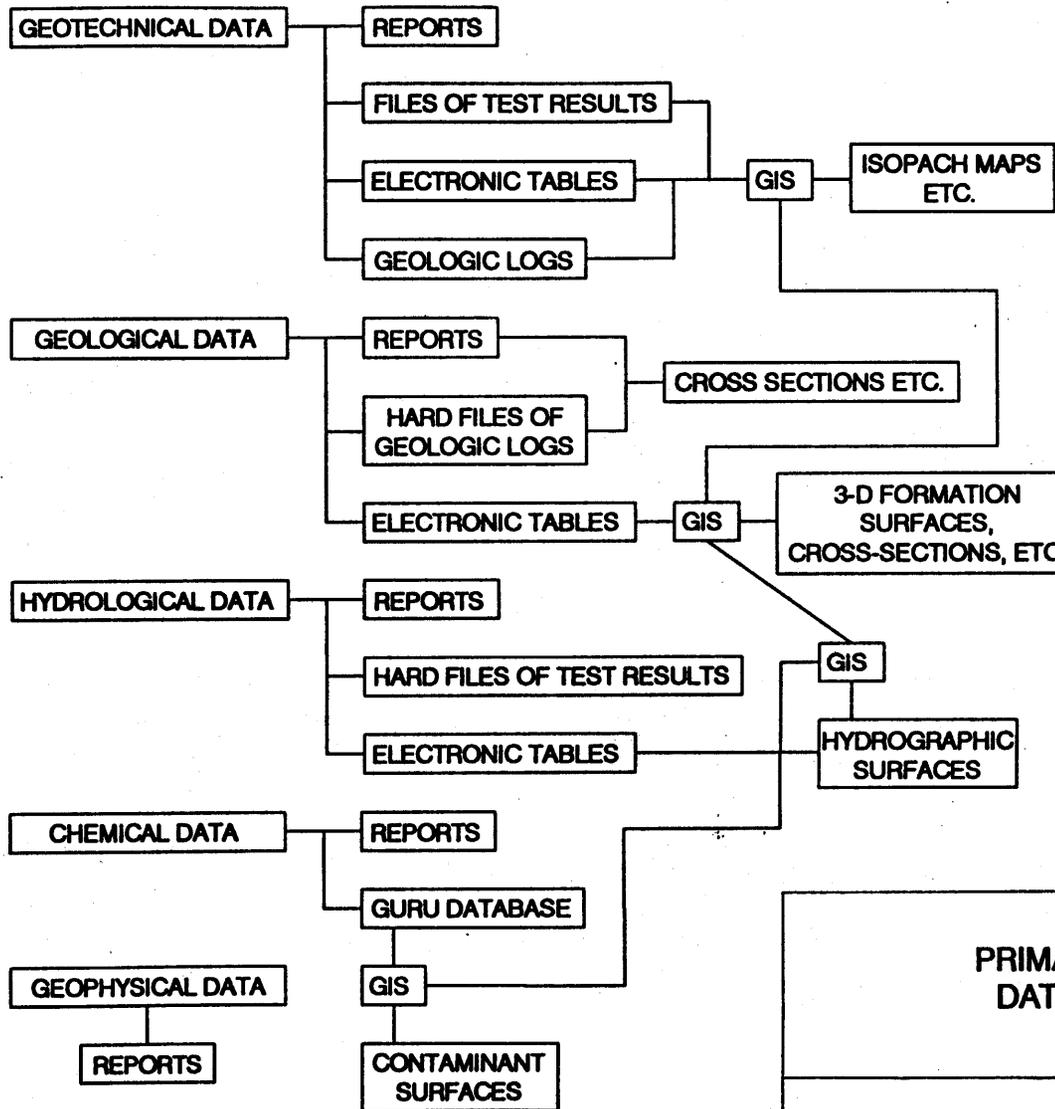
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**PRIMARY SURFACE
DATA COMPONENTS**

FIGURE 2-1

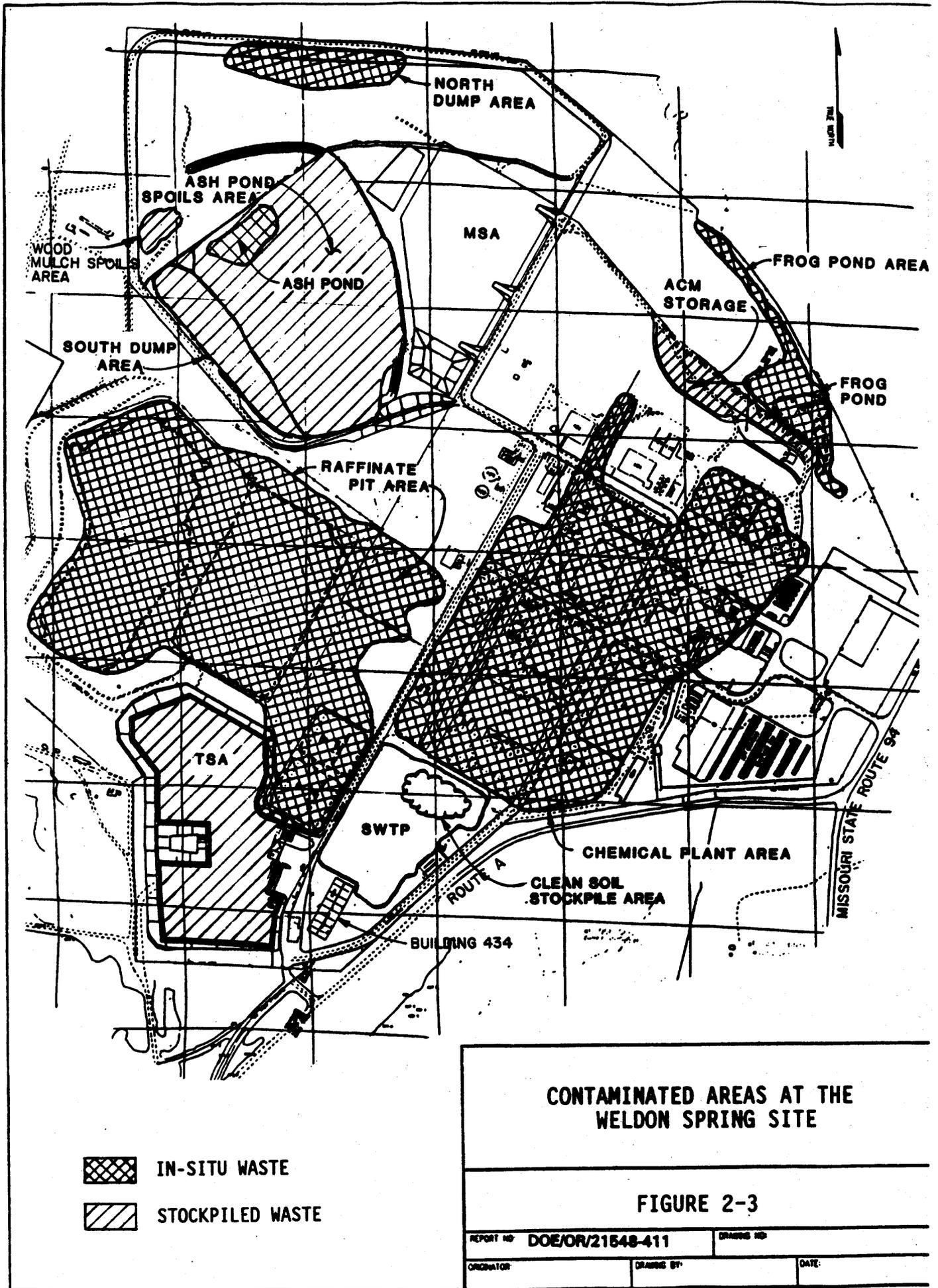
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	DATE: 4/93

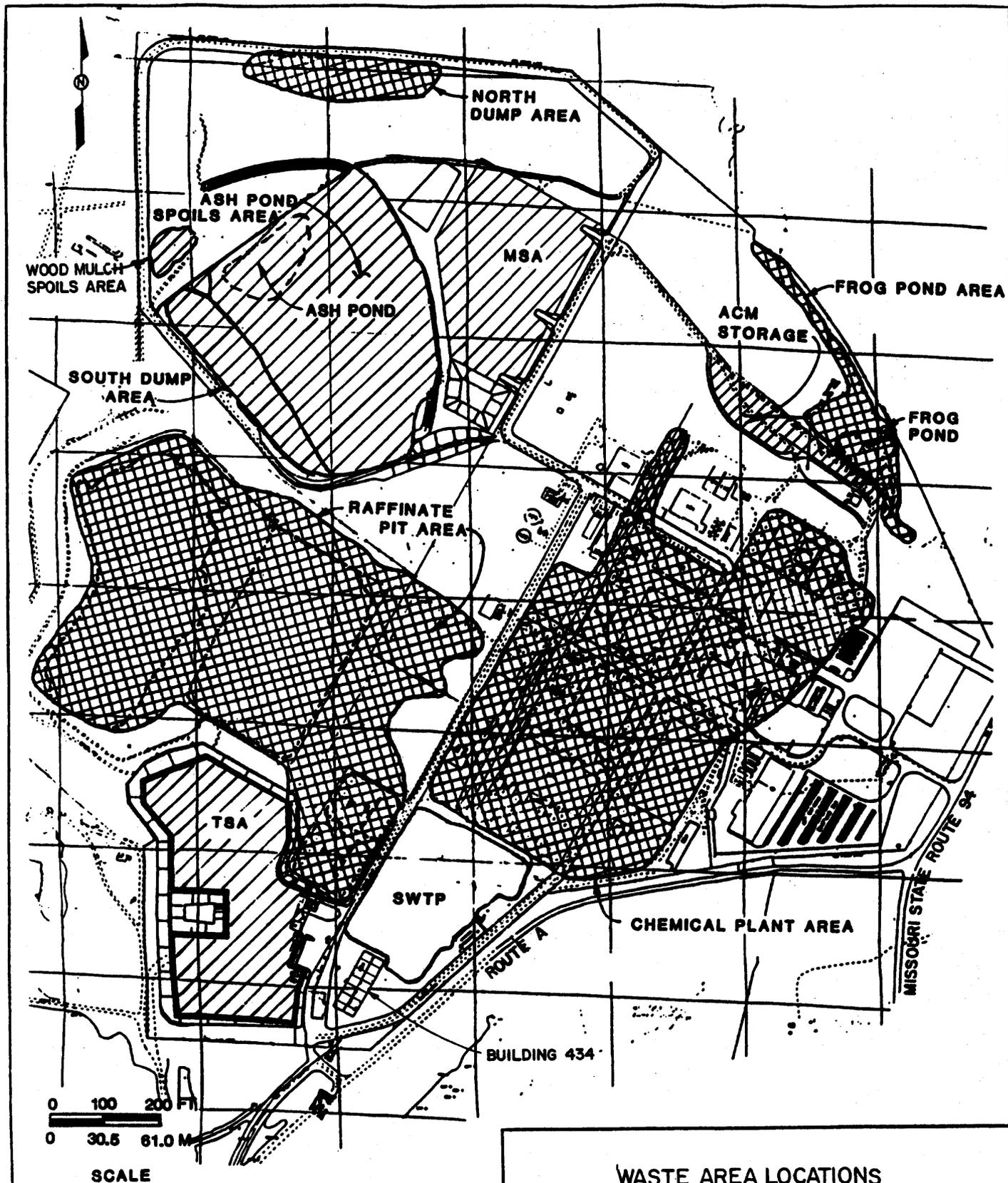


**PRIMARY SUBSURFACE
DATA COMPONENTS**

FIGURE 2-2

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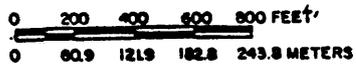
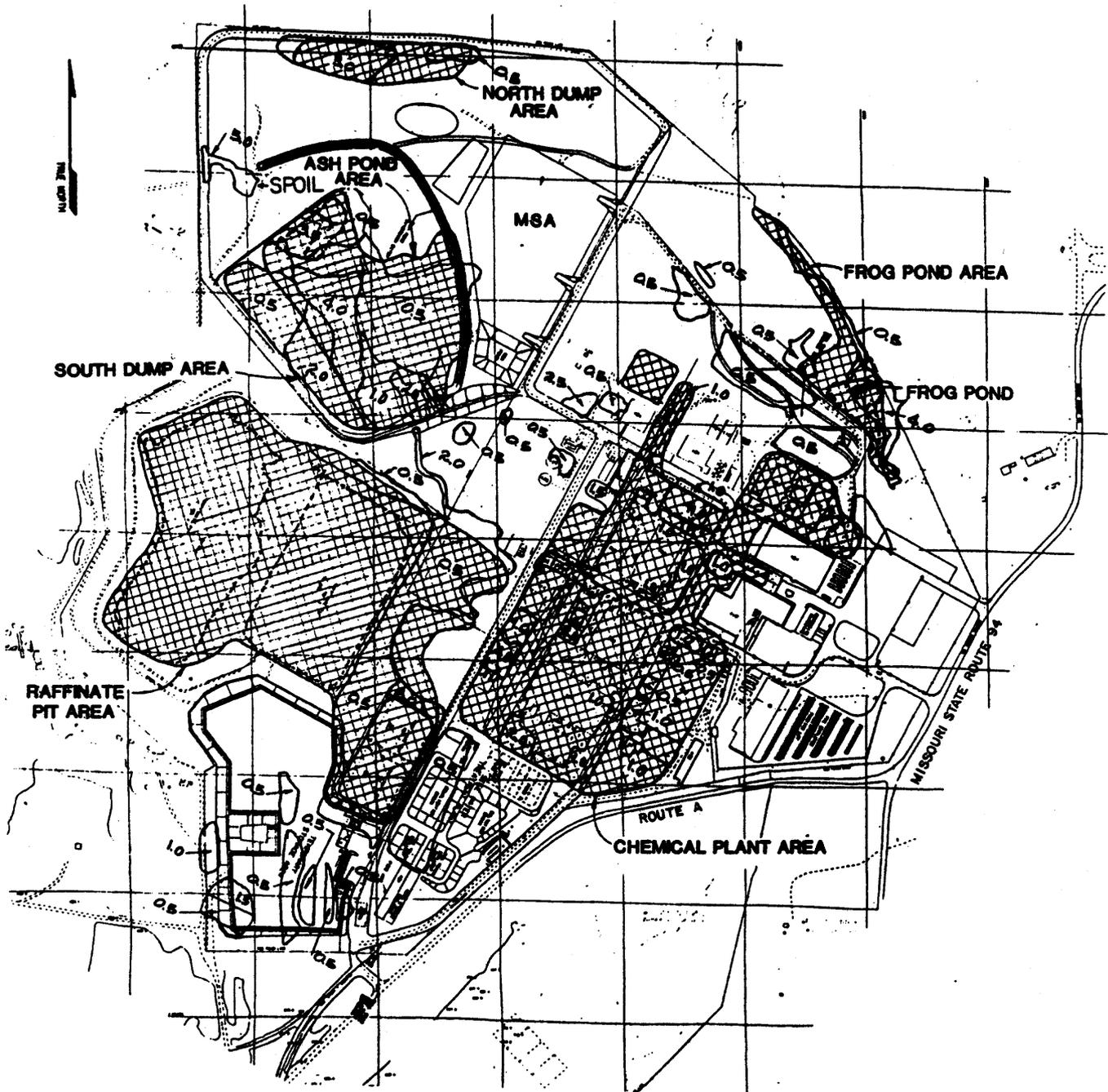


- LEGEND**
-  IN SITU WASTE
 -  STOCKPILED WASTE

**WASTE AREA LOCATIONS
CHEMICAL PLANT**

FIGURE 5.1.2-1

REPORT NO DOE/OR/21548-411	DRAWING NO
ORIGINATOR RJS	DATE 6/29/93

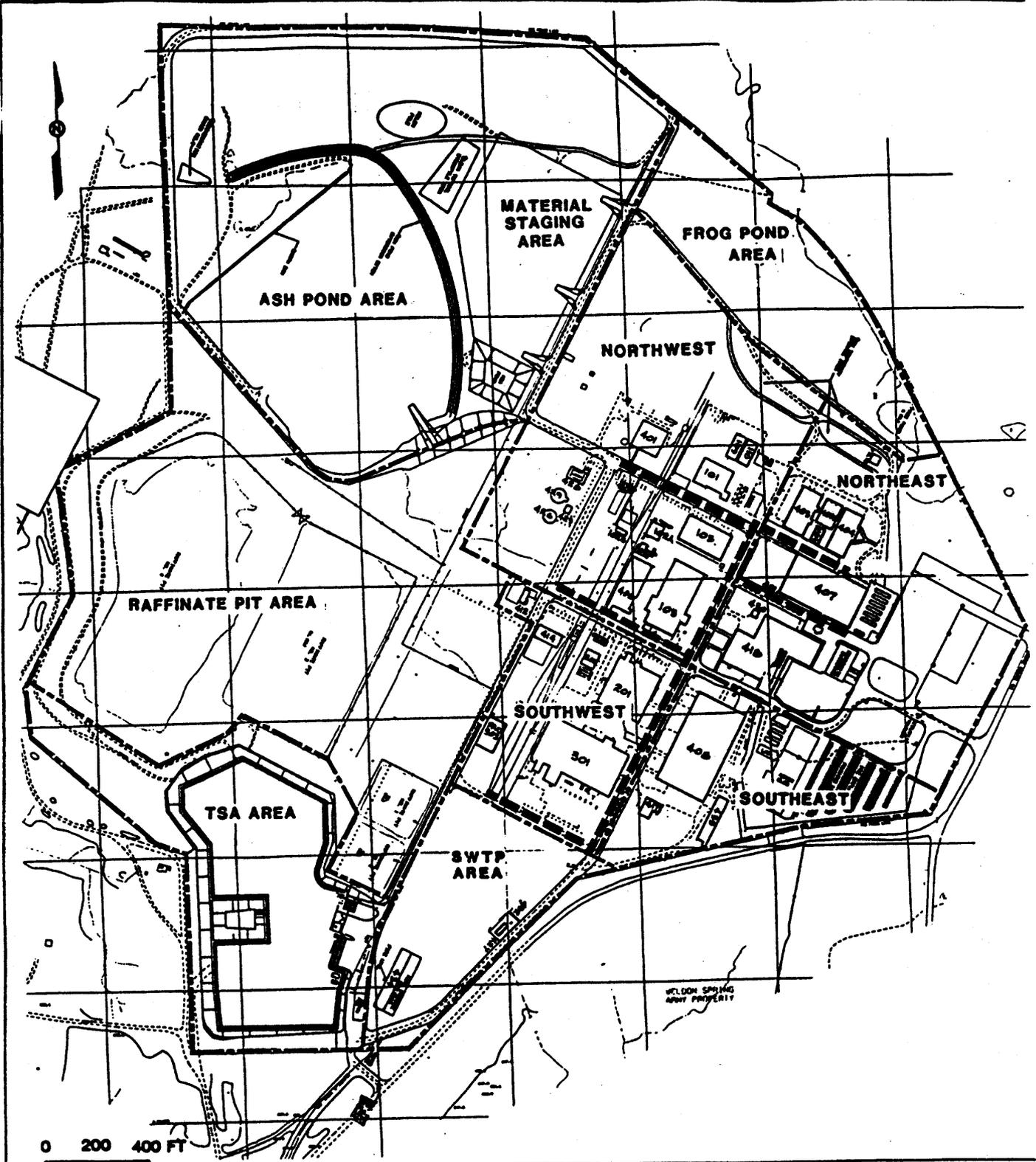


- LEGEND:**
-  CONTAMINATED AREA
 -  REMOVED CONTAMINATION
 - 1.0 DEPTH IN FEET

**CONTAMINATED SOILS
 APPROXIMATE DEPTHS & BOUNDARIES**

FIGURE 5.1.2-3

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ORIGINATOR:	DRAWING BY:
	DATE:



0 200 400 FT
 0 61.0 121.9 M

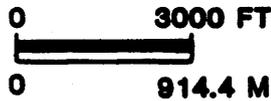
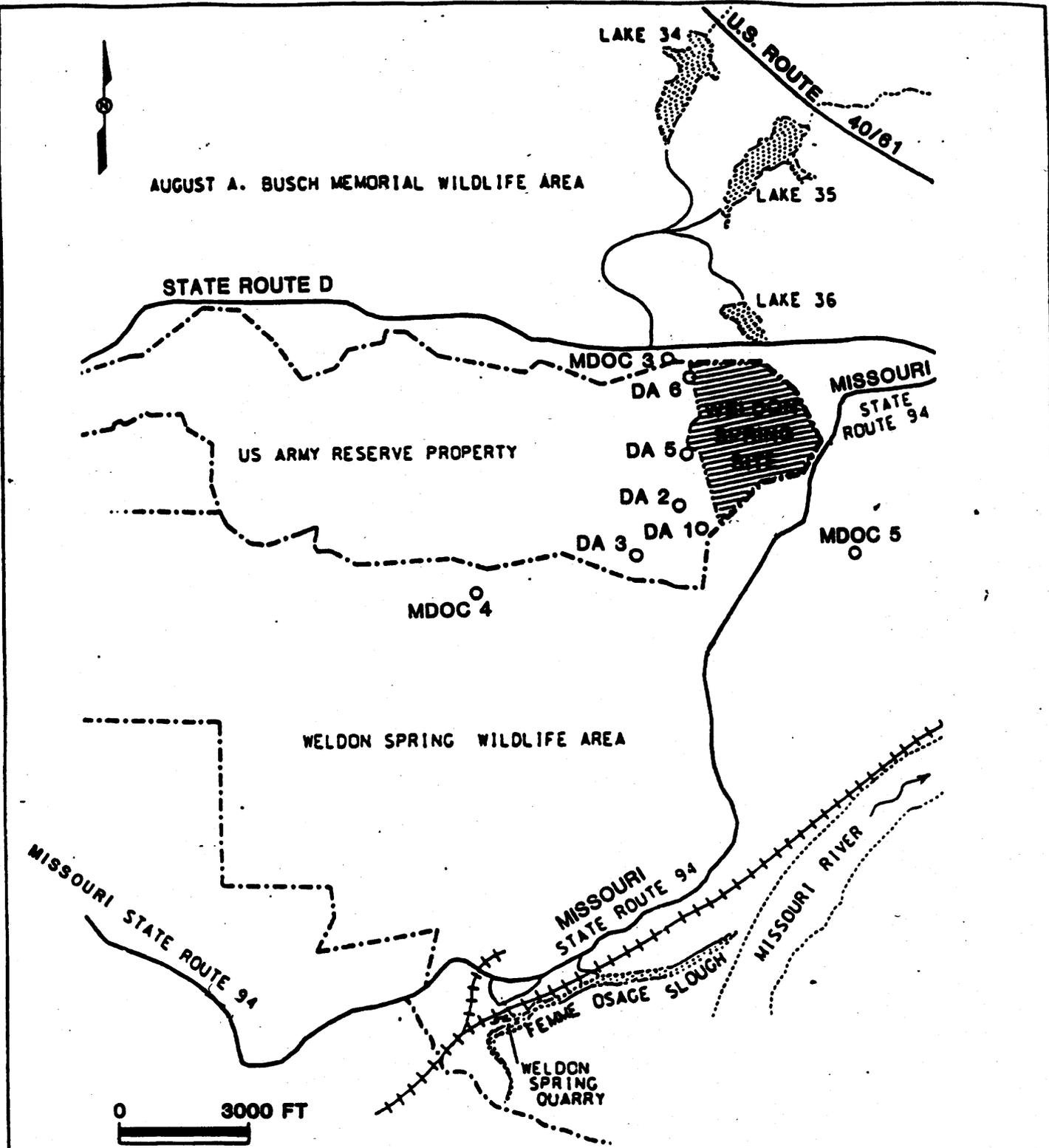
SCALE
LEGEND

- — — QUADRANT BOUNDARY
- — — — — MAJOR UNDERGROUND PIPING ROUTE

**FOUNDATIONS LOCATIONS
 MAJOR UNDERGROUND PIPING ROUTES**

FIGURE 5.1.2-4

<small>REPORT NO:</small> DOE/OR/21548-411	<small>DRAWING NO:</small>
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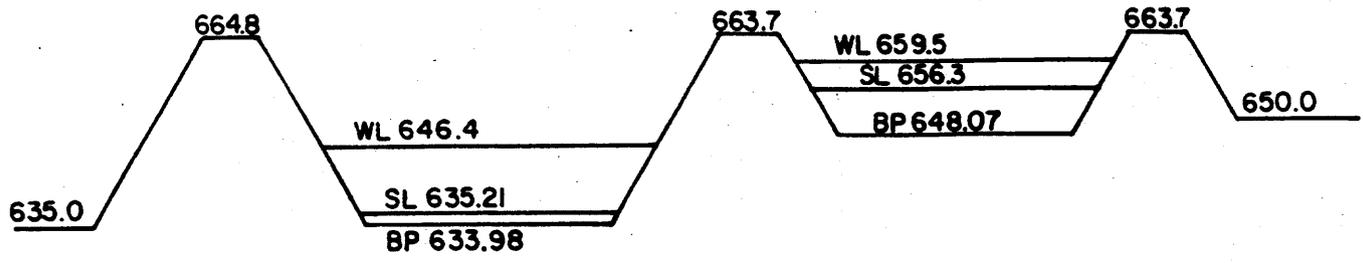
LEGEND

- DA DEPARTMENT OF ARMY
- MDOC DEPARTMENT OF CONSERVATION
-  CONTAMINATED LAKE

**VICINITY PROPERTY
CONTAMINATED AREA LOCATIONS**

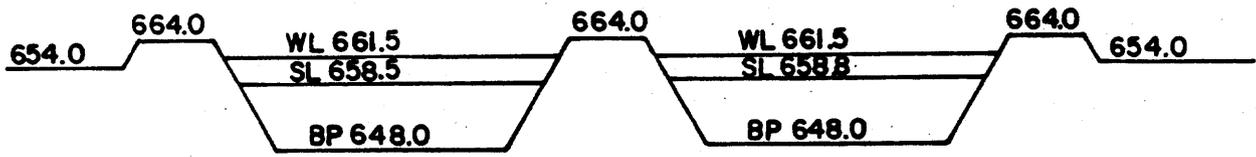
FIGURE 5.1.2-2

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PREPARED BY		DATE	4/93



RAFFINATE PIT 4

RAFFINATE PIT 3



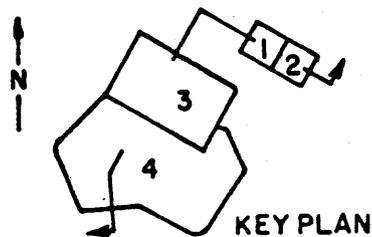
RAFFINATE PIT 1

RAFFINATE PIT 2

NO SCALE

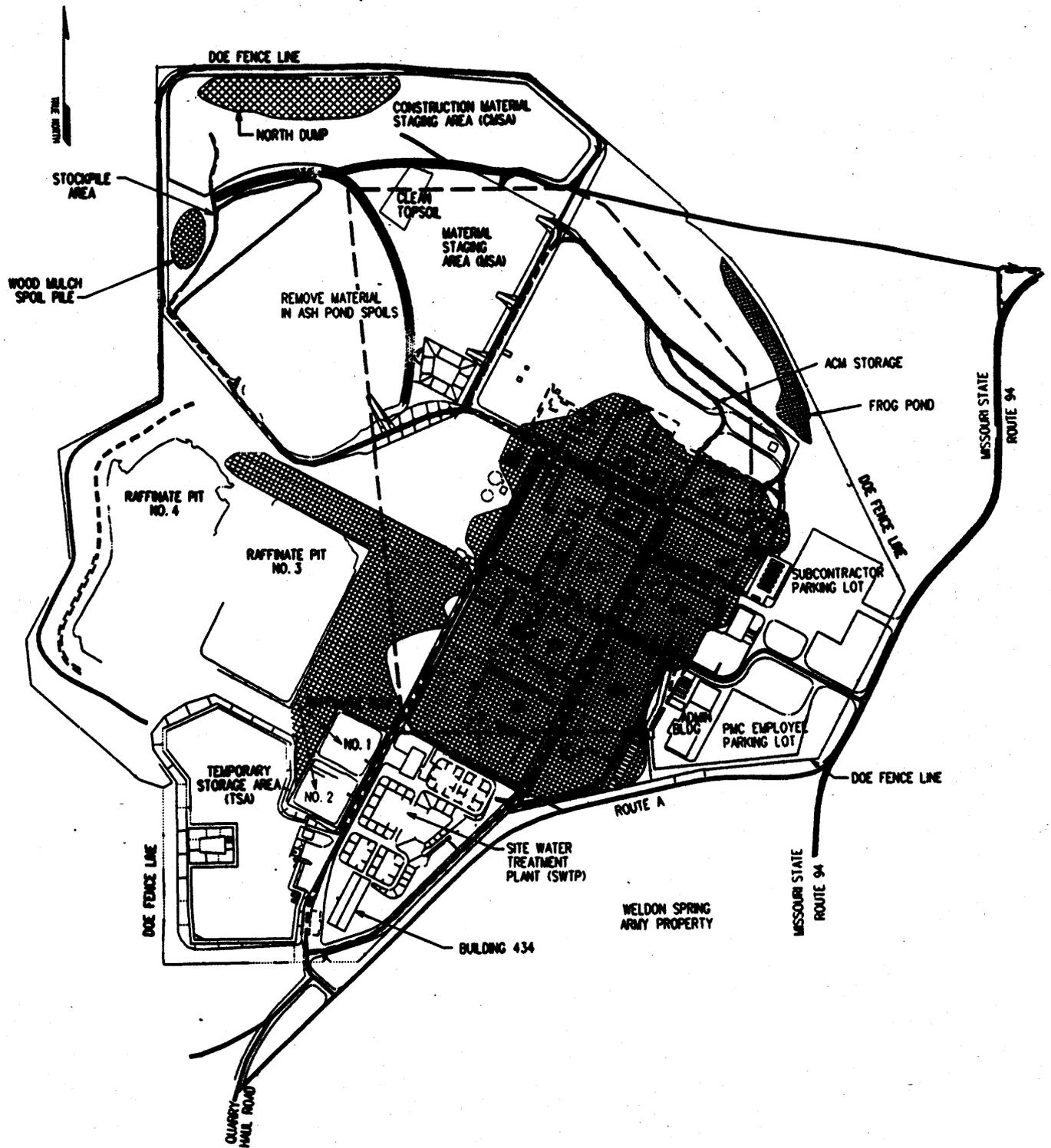
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-  CROSS SECTION
- WL MEAN WATER LEVEL
- SL MEAN SLUDGE LEVEL
- BP BOTTOM OF PIT
- 650 ELEVATION

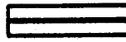
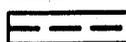


REFERENCE: SEPTEMBER 8, 1992 I.O.C.
SLUDGE VOLUME CALC'S.

RAFFINATE PIT CROSS-SECTIONAL VIEW		
FIGURE 5.1.2-5		
REPORT NO DOE/OR/21548-411	DRAWING NO	
DESIGNER FJH	DRAWN BY HMK	DATE



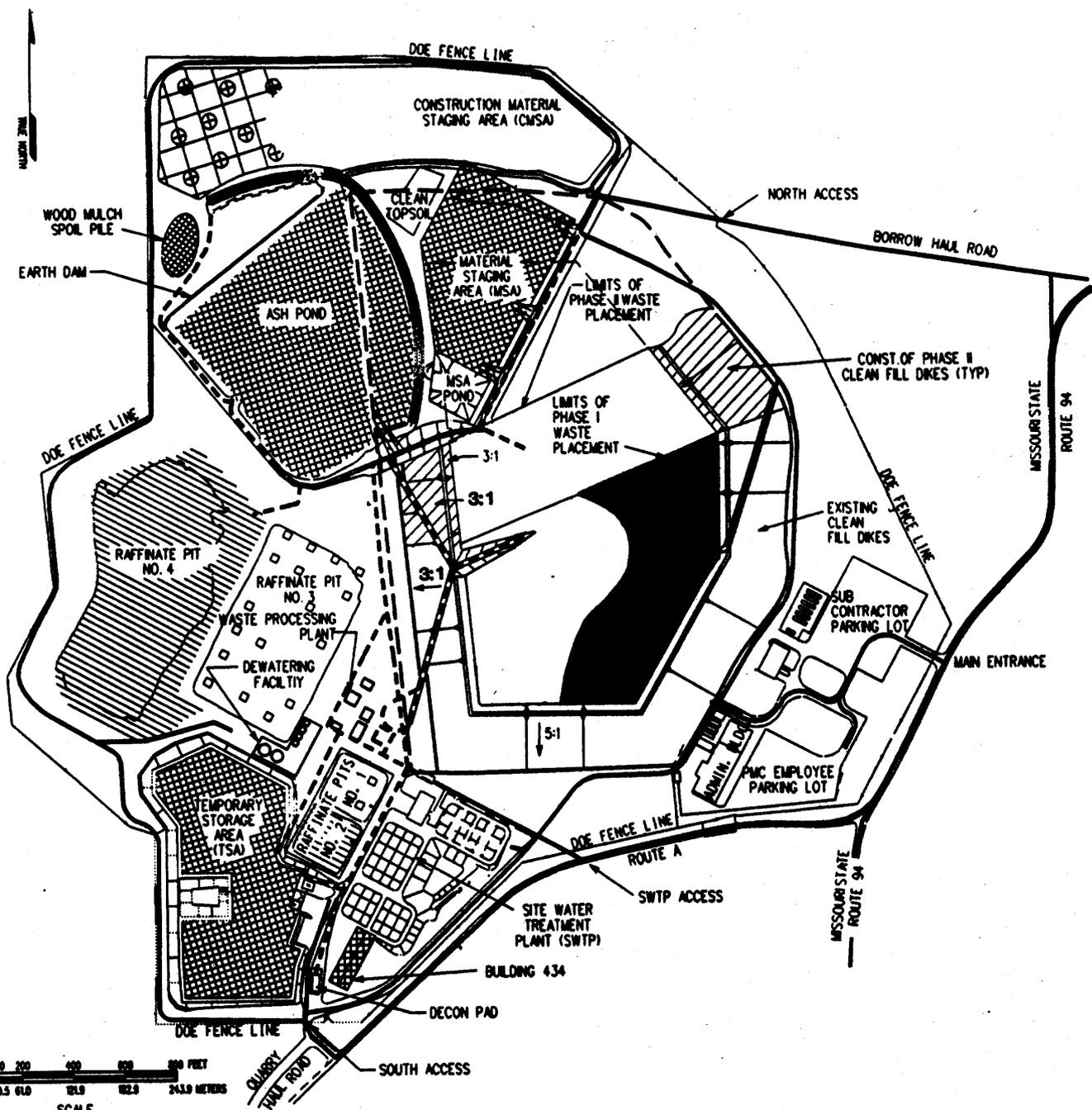
LEGEND

-  DIRTY HAUL ROADS
-  CLEAN HAUL ROADS
-  REMOVING STOCKPILED MATERIAL AND PLACING INTO DISPOSAL CELL
-  OUTLINE OF DISPOSAL CELL (TO BE CONSTRUCTED LATER)

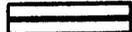
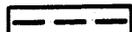
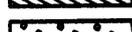
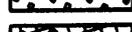
**MATERIAL REMOVAL
SEQUENCE 1**

FIGURE 5.12-6

REPORT NO.	DOE/OR/21548-411	DRAWING NO.	3840/FRAN1.DGN
ORIGINATOR	FJH	DRAWING BY	AMF
		DATE	08/31/93



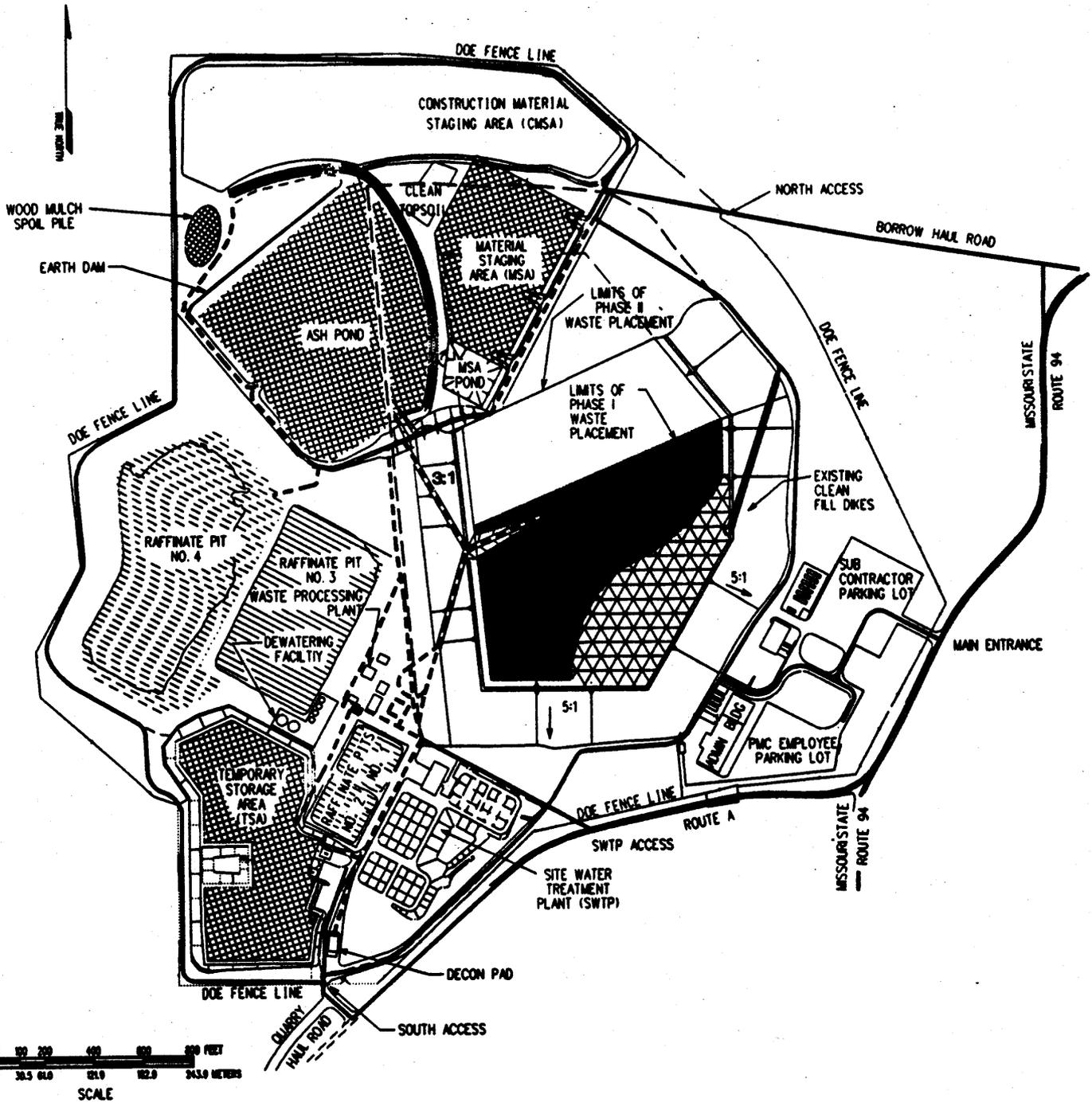
LEGEND

-  EXISTING OR PROPOSED DIRTY ROADS
-  EXISTING OR PROPOSED CLEAN ROADS
-  OUTLINE OF DISPOSAL CELL TO BE CONSTRUCTED LATER
-  REMOVING STOCKPILE MATERIAL AND PLACING INTO DISPOSAL CELL
-  WASTE PLACEMENT IN CELL
-  DREDGE WASTE FROM RAFFINATE PITS
-  EXISTING CONTAMINATED MATERIALS TO BE REMOVED LATER
-  REMOVING STOCKPILE MATERIAL TO BUILD CLEAN FILL DIKES
-  CONSTRUCTION OF CLEAN FILL DIKES

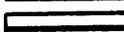
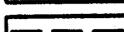
MATERIAL REMOVAL SEQUENCE 2

FIGURE 5.1.2-7

REPORT NO.	DOE/OR/21548-411	DRAWING NO.	3840/FAN2.DGN
ORIGINATOR	FJH	DRAWING BY	AMF
		DATE:	08/31/93



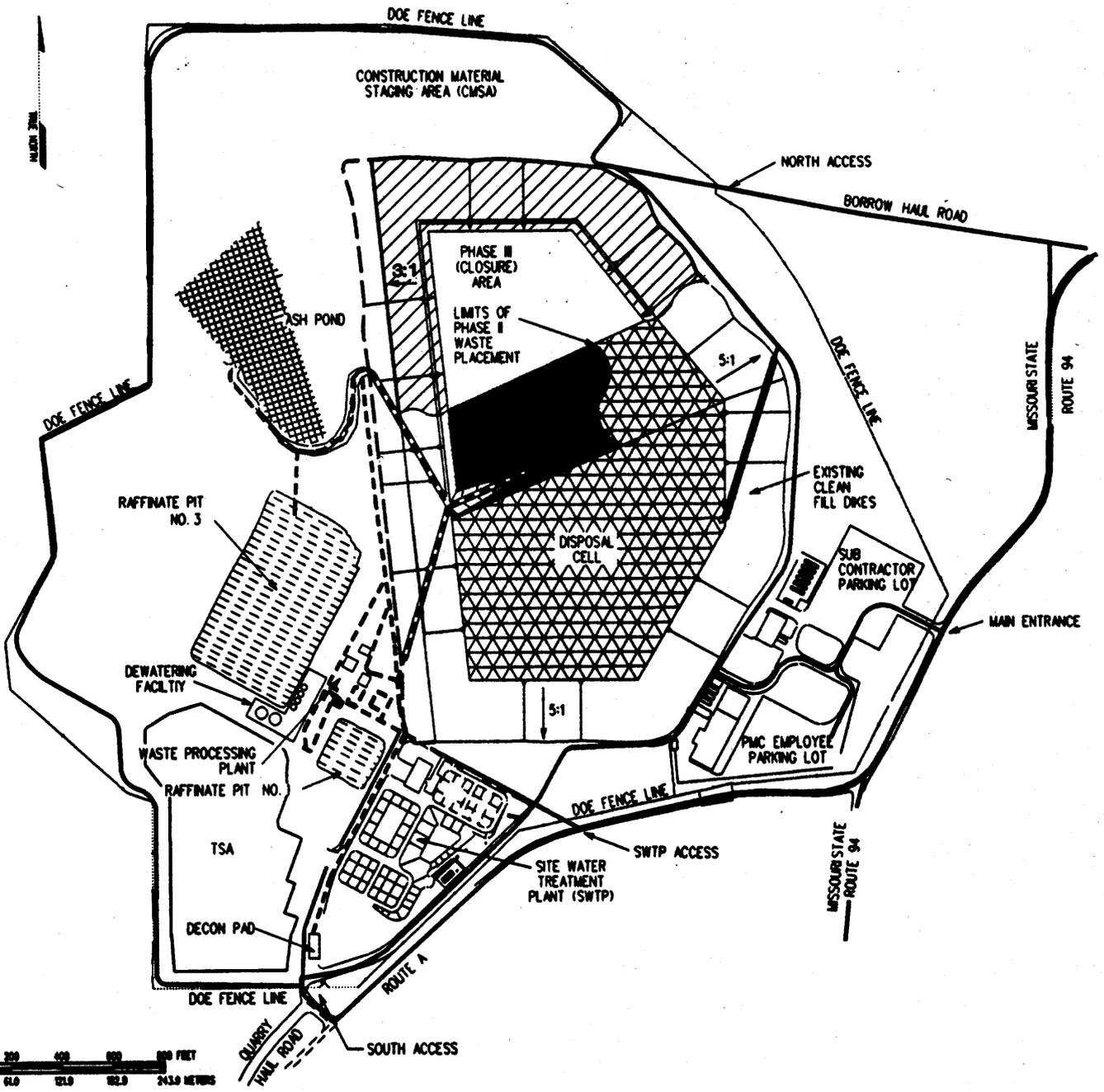
LEGEND

-  EXISTING OR PROPOSED DIRTY ROADS
-  EXISTING OR PROPOSED CLEAN ROADS
-  OUTLINE OF DISPOSAL CELL TO BE CONSTRUCTED LATER
-  REMOVING STOCKPILE MATERIAL AND PLACING INTO DISPOSAL CELL
-  WASTE PLACEMENT IN CELL
-  DREDGE WASTE FROM RAFFINATE PITS
-  TOP & BOTTOM LINER REMOVAL OF RAFFINATE PITS
-  CELL CLOSURE (COVER)

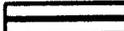
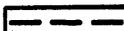
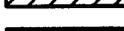
**MATERIAL REMOVAL
SEQUENCE 3**

FIGURE 5.12-8

REPORT NO. DOE/OR/21548-411	DRAWING NO. 3840/Fran3.DGN
ORIGINATOR FJH	DRAWING BY AMF
	DATE 08/31/93



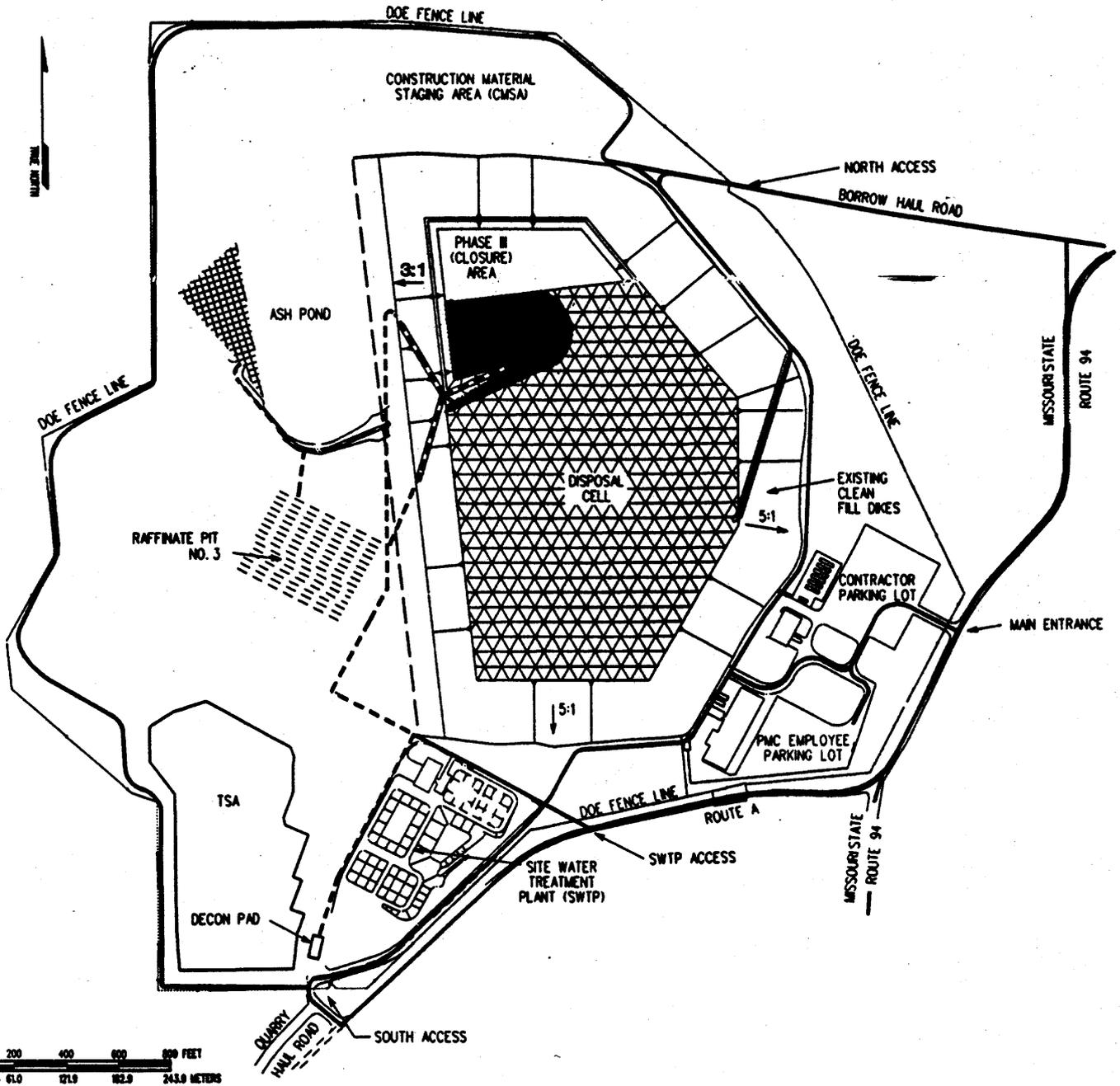
LEGEND

-  EXISTING OR PROPOSED DIRTY ROADS
-  EXISTING OR PROPOSED CLEAN ROADS
-  OUTLINE OF DISPOSAL CELL TO BE CONSTRUCTED LATER
-  REMOVING STOCKPILE MATERIAL AND PLACING INTO DISPOSAL CELL
-  WASTE PLACEMENT IN CELL
-  CONSTRUCTION OF CLEAN FILL DIKES
-  TOP & BOTTOM LINER REMOVAL OF RAFFINATE PITS
-  CELL CLOSURE (COVER)

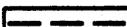
**MATERIAL REMOVAL
SEQUENCE 4**

FIGURE 5.1.2-0

REPORT NO. DOE/OR/21548-411	DRAWING NO. 3840/FRA4.DGN
ORIGINATOR FJH	DRAWING BY AMF
	DATE: 09/01/93



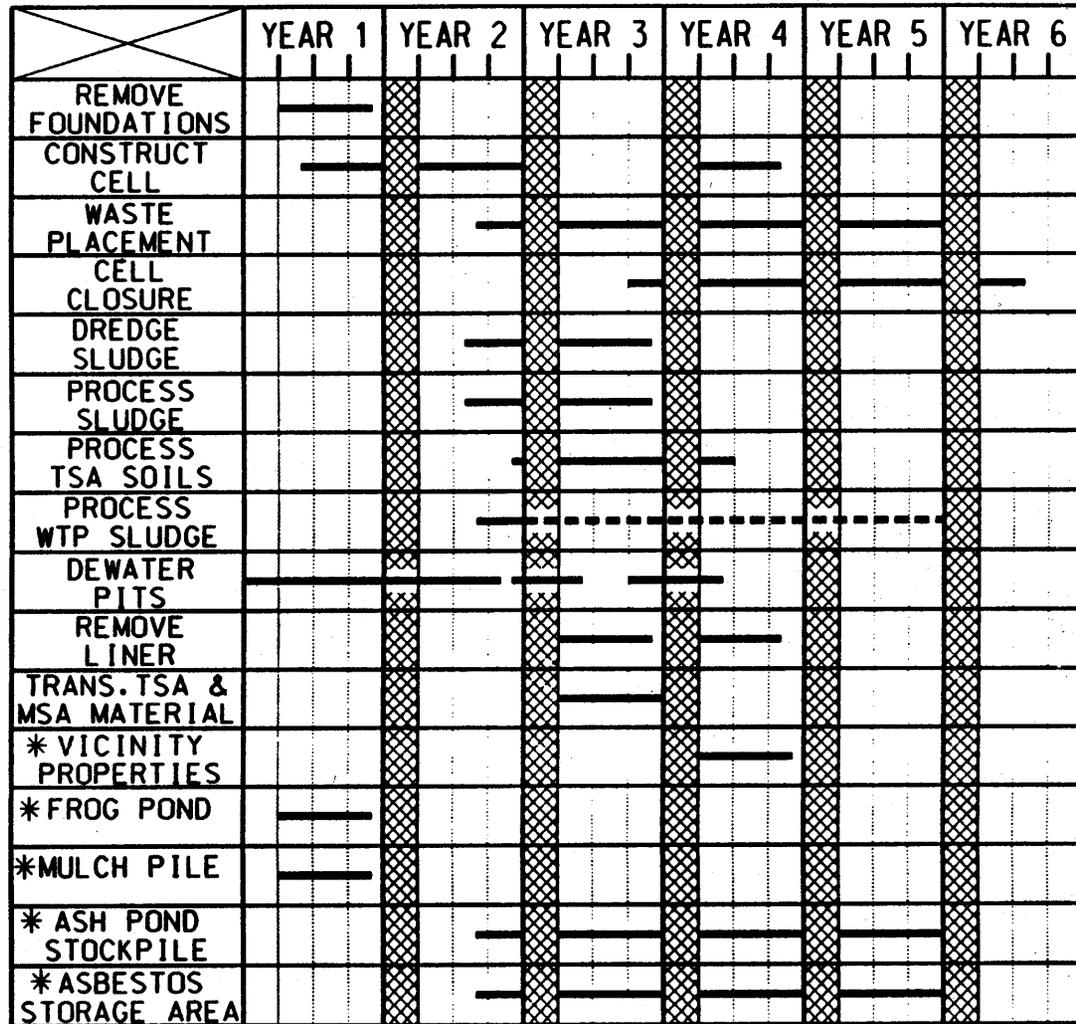
LEGEND

-  EXISTING OR PROPOSED DIRTY ROADS
-  EXISTING OR PROPOSED CLEAN ROADS
-  OUTLINE OF DISPOSAL CELL TO BE CONSTRUCTED LATER
-  REMOVING STOCKPILE MATERIAL AND PLACING INTO DISPOSAL CELL
-  WASTE PLACEMENT IN CELL
-  TOP & BOTTOM LINER REMOVAL OF RAFFINATE PITS
-  CELL CLOSURE (COVER)

**MATERIAL REMOVAL
SEQUENCE 5**

FIGURE 5.1.2-10

REPORT NO. DOE/OR/21548-411	DRAWING NO. 3840/FRAN5.DGN
ORIGINATOR FJH	DRAWING BY AMF
	DATE: 09/01/93



* MATERIAL REMOVAL & TRANSPORTATION

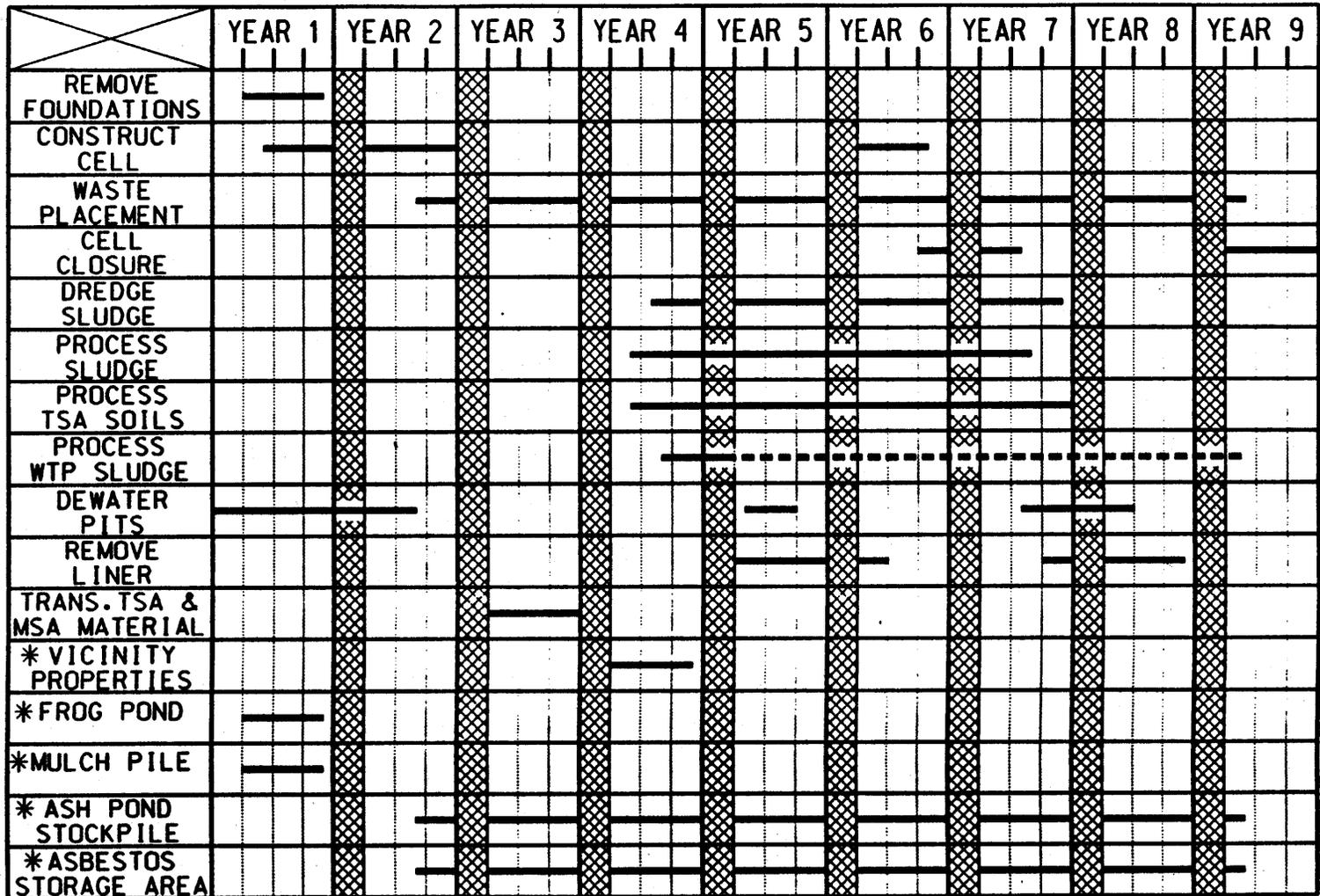
⊗ WINTER SHUTDOWN PERIOD

REFERENCE: REPPOND D.. 1992

CSS SCHEDULE

FIGURE 5.12-11

REPORT NO.	DOE/OR/21548-411	DRAWING NO.	3840/FRAN-SCH.DGN
DESIGNER	FJH	DRAWING BY	AMF
		DATE	09/01/93



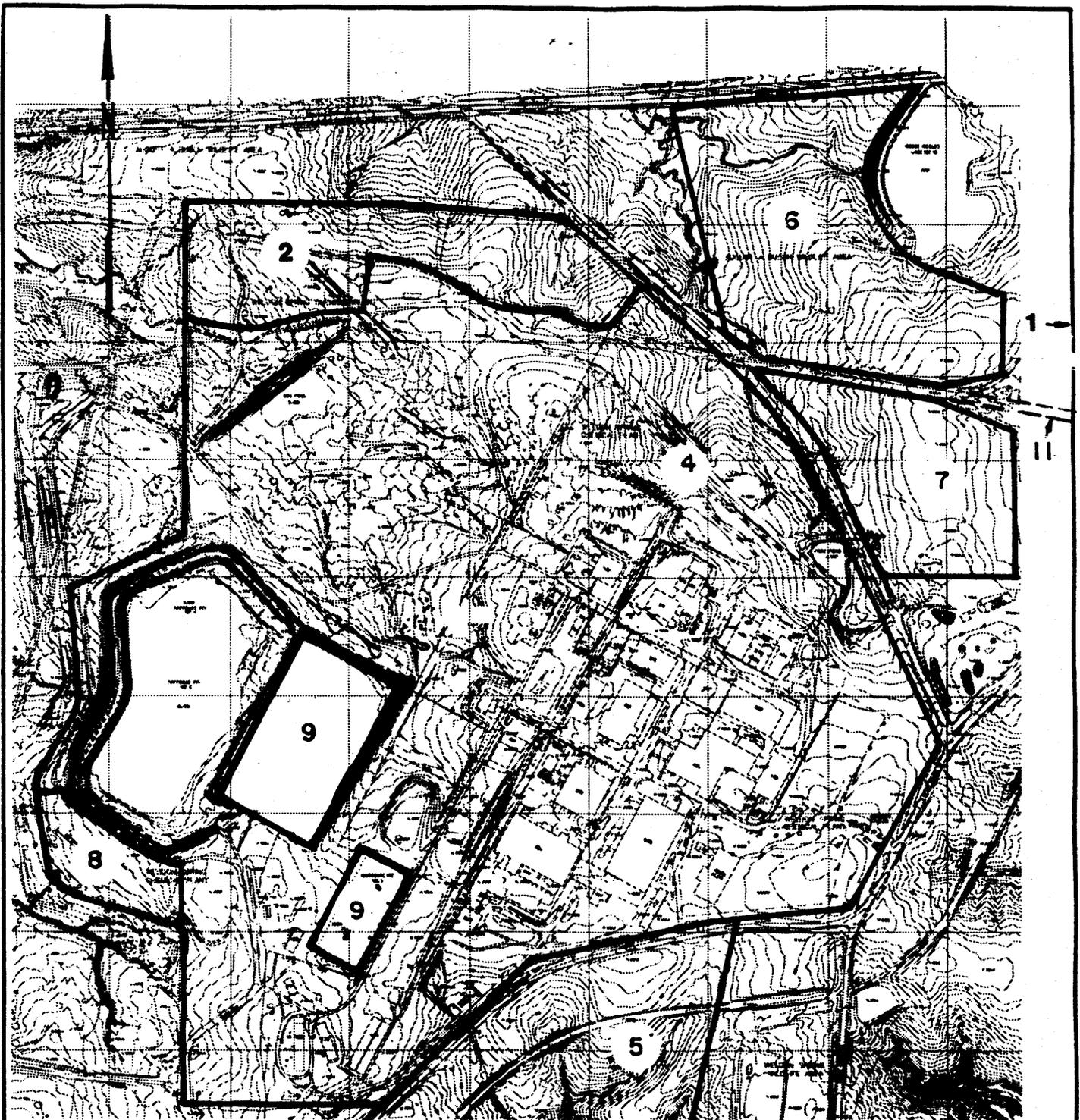
* MATERIAL REMOVAL & TRANSPORTATION

■ WINTER SHUTDOWN PERIOD
 REFERENCE: REPPOND D., 1992

VIT SCHEDULE

FIGURE 5.12-12

REPORT NO. DOE/OR/21548-411	DRAWING NO. 3840/FRAN-SCH.DGN
DESIGNER FJH	DRAWING BY AMF
	DATE: 09/01/93



SEE FIGURE 5.1.4-2(2 of 3) FOR CONTINUATION

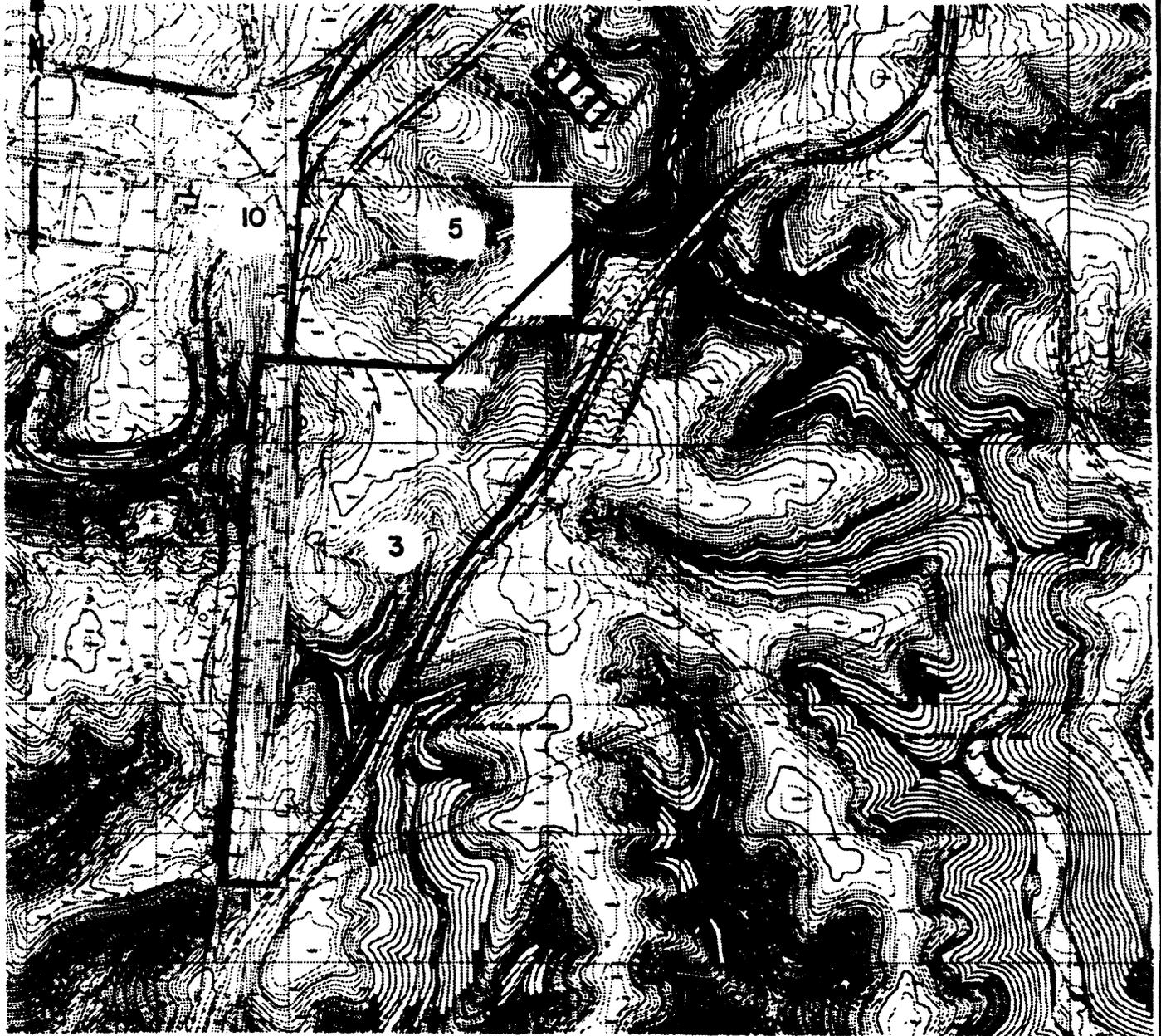
**NOTE:
SEE FIGURE 5.1.4-3(3 of 3)
FOR DESCRIPTION OF
AREA NUMBERS**

**PROPOSED CONSTRUCTION MATERIALS
STAGING AREA (CMSA) LOCATIONS
(1 OF 3)**

FIGURE 5.1.4-1

REPORT NO: DOE/OR/21548-411	DRAWING NO:
ORIGINATOR: MLB	DRAWN BY: HK
DATE: NOV. 92	

FOR CONTINUATION
SEE FIGURE 5.1.4-1 (1 of 3)



NOTE:
SEE FIGURE 5.1.4-3 (3 of 3)
FOR DESCRIPTION OF
AREA NUMBERS

**PROPOSED CONSTRUCTION MATERIALS
STAGING AREA (CMSA) LOCATIONS
(2 OF 3)**

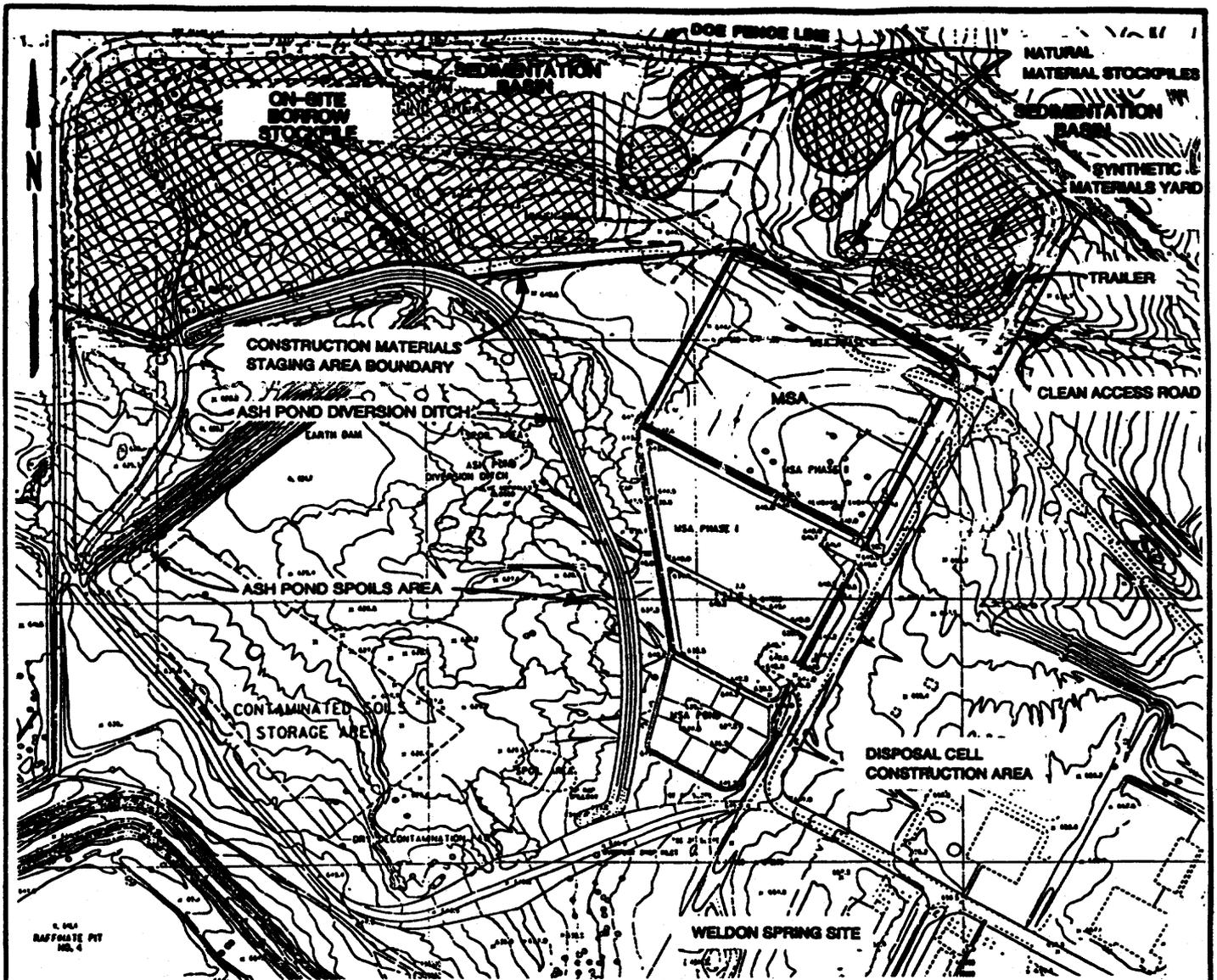
FIGURE 5.1.4-2

REPORT NO: DOE/OR/21548-411	DRAWING NO:	
ORIGINATOR: MLB	DRAWN BY: HK	DATE: NOV. 92

AREA NO. DESCRIPTION

- (1) **BORROW SOURCE, AN AREA AT OR ADJACENT TO THE OFF-SITE BORROW SOURCE. SOUTHEAST OF FRANCIS HOWELL HIGH SCHOOL.**
- (2) **NORTH OF ASH POND. AREA CURRENTLY PROPOSED AS CMSA.**
- (3) **MARSHALLING YARD. AREA ADJACENT TO THE QUARRY HAUL ROAD AT OLD RAILROAD STAGING AREA SOUTH OF THE WELDON SPRING CHEMICAL PLANT.**
- (4) **DISPOSAL CELL SITING AREA. WITHIN THE DISPOSAL CELL SITING AREA CURRENTLY DEFINED, NORTHERN PORTION.**
- (5) **ARMY PROPERTY. AREA SOUTH OF ROUTE A.**
- (6) **MDOC-NORTH: SOUTH OF MISSOURI STATE ROUTE D AND NORTH OF WELDON SPRING CHEMICAL PLANT FENCE LINE.**
- (7) **HIGHWAY DEPARTMENT PROPERTY (MDOC-SOUTH). TRIANGULAR PROPERTY ON MDOC LAND SOUTH OF ABANDONED ROAD, WEST OF MISSOURI STATE ROUTE 94, NORTHEAST OF WELDON SPRING CHEMICAL PLANT FENCE LINE, NORTH OF EXISTING HIGHWAY DEPARTMENT MAINTENANCE FACILITY.**
- (8) **SOUTH OF RAFFINATE PITS. SOUTH OF RAFFINATE PITS 3 AND 4.**
- (9) **IN RAFFINATE PITS. IN RAFFINATE PITS 1, 2, AND 3 AFTER WASTE REMOVAL.**
- (10) **QUARRY HAUL ROAD EASEMENT. AREA WITHIN QUARRY HAUL ROAD 100-FT. EASEMENT.**

PROPOSED CONSTRUCTION MATERIALS STAGING AREA (CMSA) LOCATIONS (3 OF 3) DESCRIPTION OF AREAS			
FIGURE 5.1.4-3			
<small>REPORT NO.</small>	DOE/OR/21548-411	<small>DRAWING NO.</small>	A/P1/093/0693
<small>ORIGINATOR</small>	RJS	<small>DRAWN BY</small>	GLN
		<small>DATE</small>	6/28/93



0 200 400 FT
 0 61.0 121.9 M

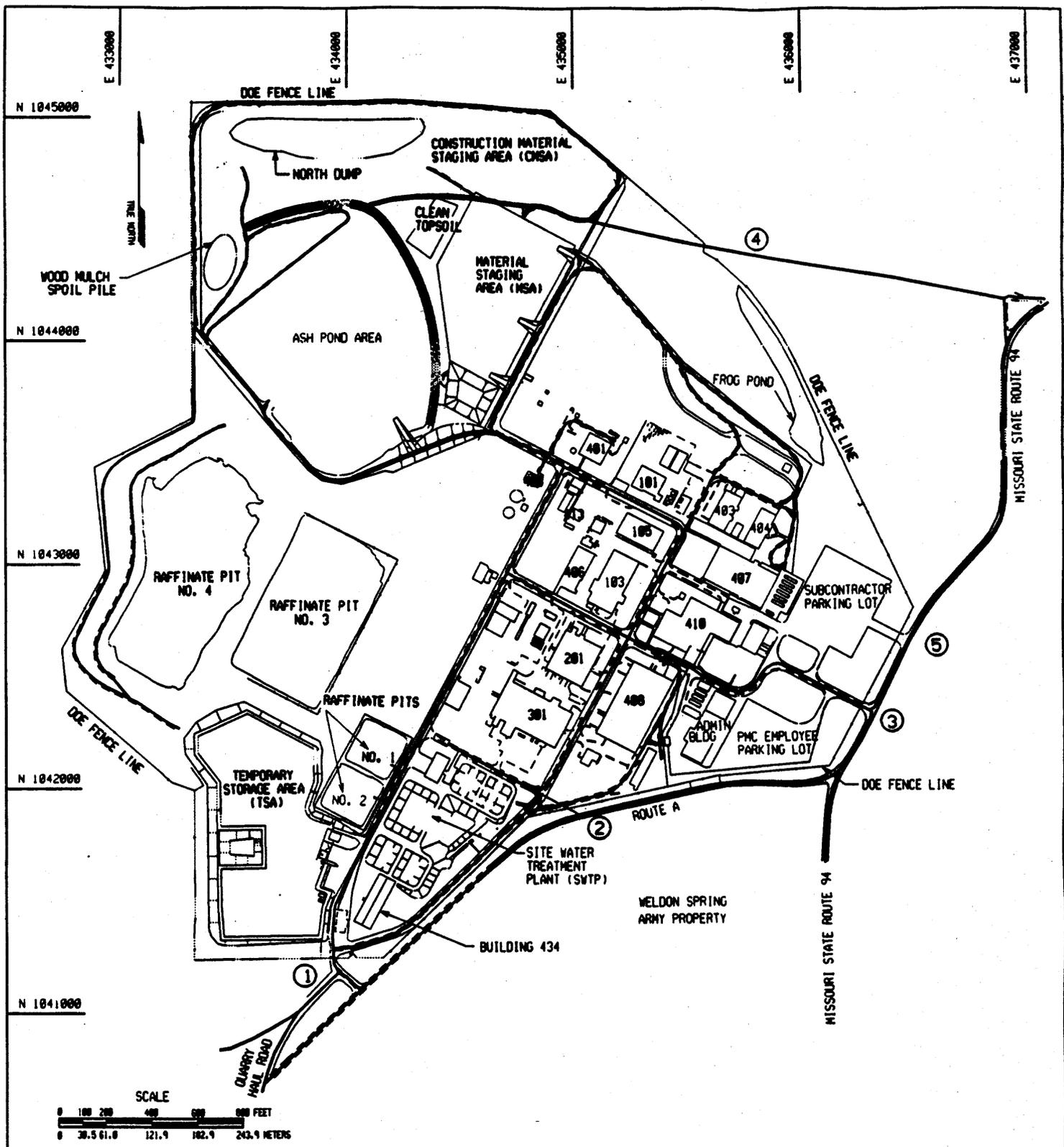
SCALE

**CONSTRUCTION MATERIALS STAGING
 AREA (CMSA) SITE LAYOUT**

FIGURE 5.1.4-4

REPORT NO: DOE/OR/21548-411 | DRAWING NO:

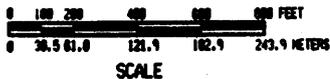
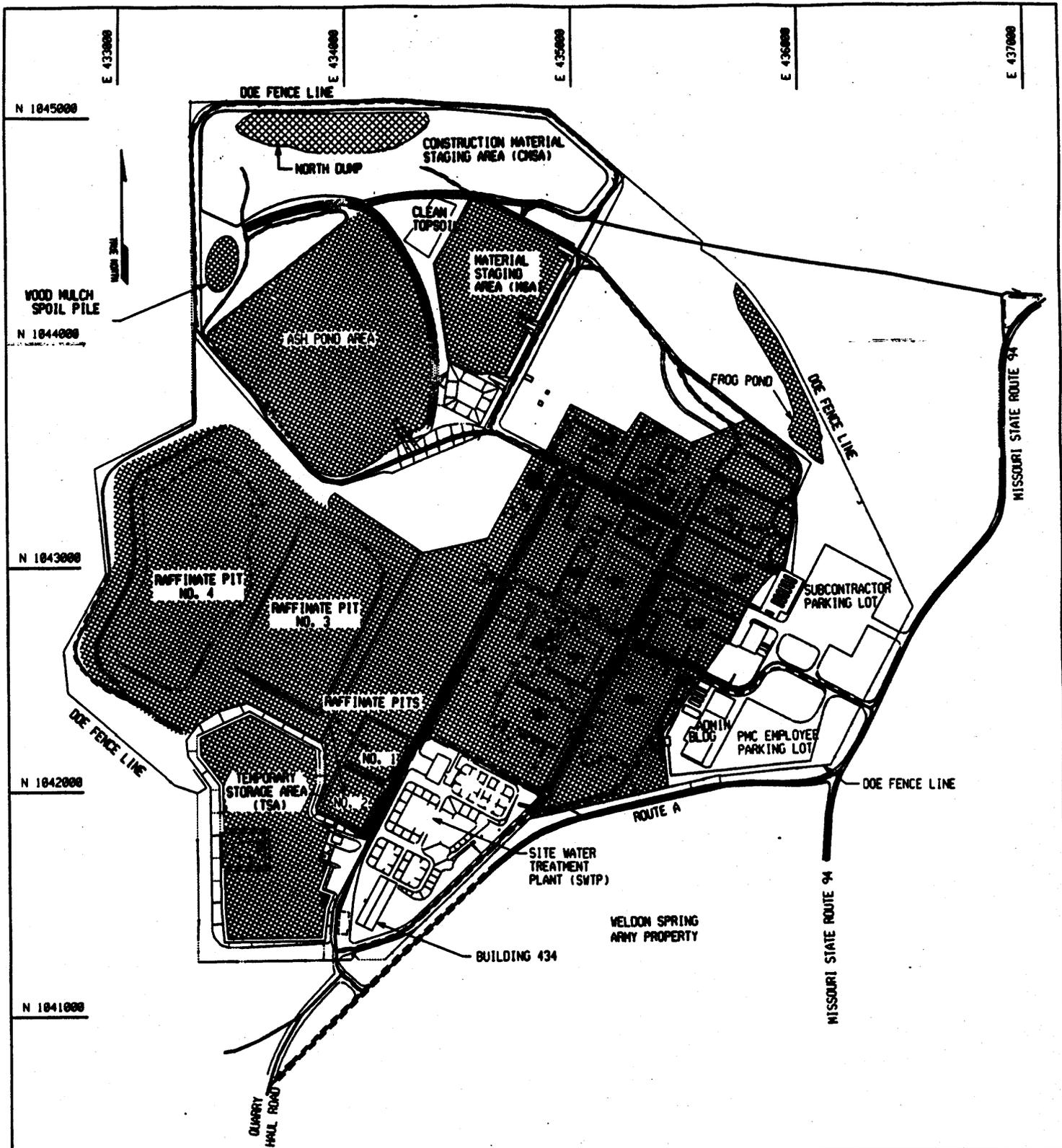
ORIGINATOR: MLB | DRAWN BY: HK | DATE: NOV. 92



LEGEND

- ① EXISTING SOUTH ACCESS (QUARRY HAUL ROAD)
- ② EXISTING SWTP ACCESS FROM ROUTE A
- ③ EXISTING PMC EMPLOYEE SUBCONTRACTOR ACCESS
- ④ PROPOSED NORTH ACCESS (OFFSITE BORROW HAUL ROAD)
- ⑤ PROPOSED EMPLOYEE/CONTRACTOR/SUBCONTRACTOR ACCESS (EXISTING ACCESS WOULD BE ABANDONED)
- EXISTING ROADWAY SYSTEM

EXISTING ROADWAY SYSTEM		
FIGURE 5.1.5-1		
REPORT NO: DOE/OR/21548-411	DRAWING NO: 3840/SE01.DGN	
ORIGINATOR: MLB / F JH	DRAWING BY: S. HART	DATE: 09/07/93



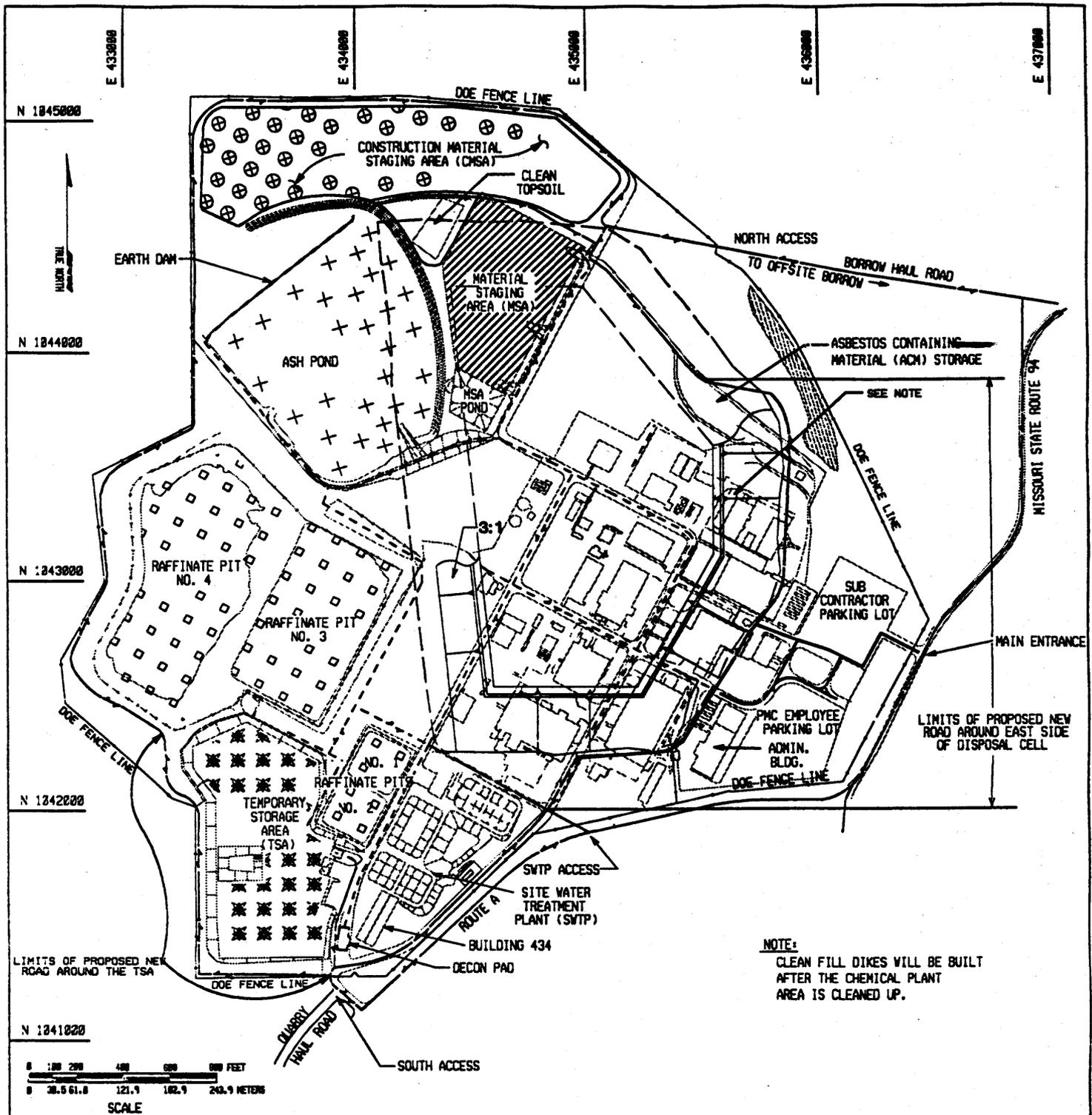
LEGEND

 AREAS OF CONTAMINATION

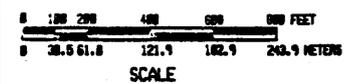
**AREAS OF CONTAMINATION
PRIOR TO DISPOSAL CELL
CONSTRUCTION**

FIGURE 5.1.5-2

REPORT NO:	DOE/OR/21548-411	DRAWING NO:	3840/SE01.DGN
ORIGINATOR:	MLB / FJH	DRAWING BY:	S. HART
		DATE:	09/03/93



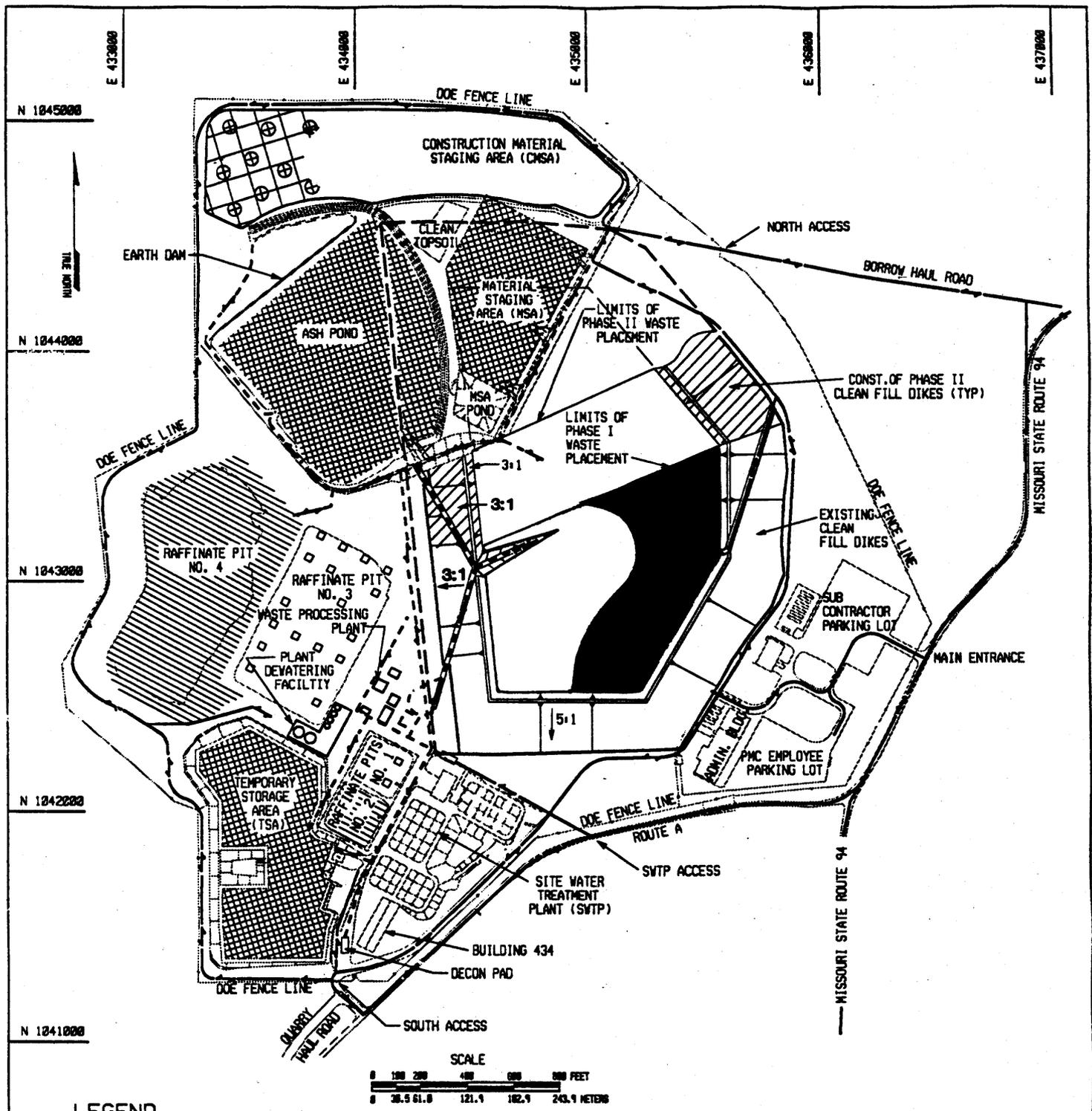
NOTE:
 CLEAN FILL DIKES WILL BE BUILT
 AFTER THE CHEMICAL PLANT
 AREA IS CLEANED UP.



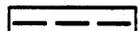
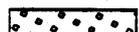
LEGEND

- EXISTING OR PROPOSED DIRTY ROADS
- EXISTING OR PROPOSED CLEAN ROADS
- OUTLINE OF DISPOSAL CELL TO BE CONSTRUCTED LATER
- EXCAVATION OF CONTAMINATED MATERIALS, SOIL, CONCRETE, METAL & PIPING
- CONTAMINATED SOIL AND/OR CONCRETE
- STOCKPILE CONTAMINATED MATERIAL FROM QUARRY TO BE REMOVED LATER
- STOCKPILE OF CLEAN SOIL FROM THE CHEMICAL PLANT AREA
- EXISTING CONTAMINATED MATERIAL TO BE REMOVED LATER

CONSTRUCTION OF DISPOSAL CELL (SEQUENCE 1)		
FIGURE 5.1.5-3		
REPORT NO: DOE/OR/21548-411	DRAWING NO: 384001/SEQ2.DGN	
ORIGINATOR: MLB / FJH	DRAWING BY: AMF	DATE: 09/27/93



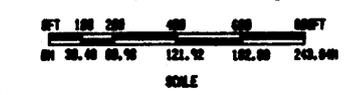
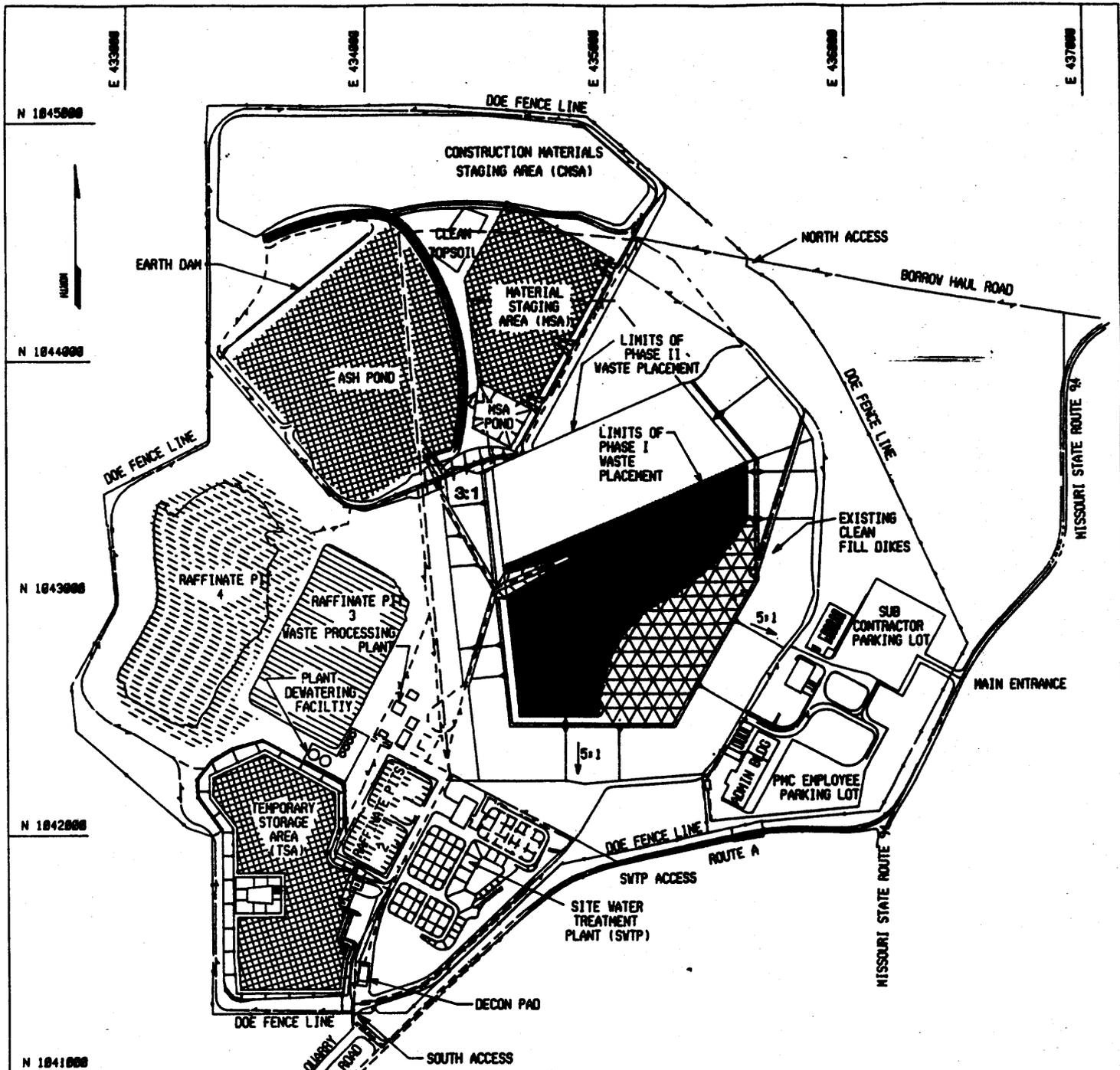
LEGEND

-  EXISTING OR PROPOSED DIRTY ROADS
-  EXISTING OR PROPOSED CLEAN ROADS
-  OUTLINE OF DISPOSAL CELL TO BE CONSTRUCTED LATER
-  REMOVING STOCKPILE MATERIAL AND PLACING INTO DISPOSAL CELL
-  WASTE PLACEMENT IN CELL
-  DREDGE WASTE FROM RAFFINATE PITS
-  EXISTING CONTAMINATED MATERIALS TO BE REMOVED LATER
-  REMOVING STOCKPILE MATERIAL TO BUILD CLEAN FILL DIKES
-  CONSTRUCTION OF CLEAN FILL DIKES

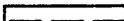
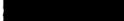
**CONSTRUCTION OF DISPOSAL CELL
(SEQUENCE 2)**

FIGURE 5.1.5-4

REPORT NO:	DOE/OR/21548-411	DRAWING NO:	384001/SEQ3.DGN
ORIGINATOR:	MLB / FJM	DRAWING BY:	AMF
		DATE:	11/20/92



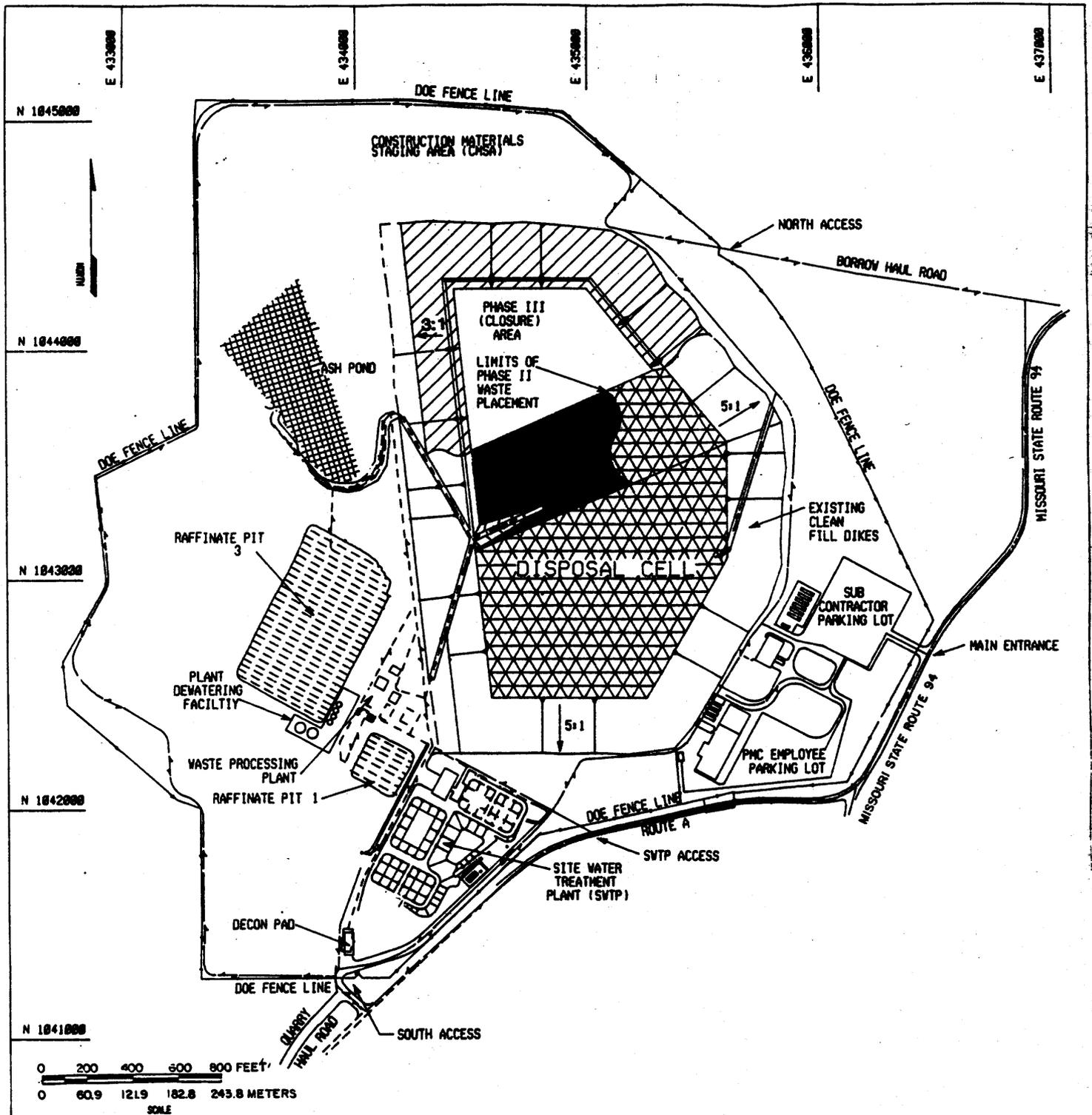
LEGEND

-  EXISTING OR PROPOSED DIRTY ROADS
-  EXISTING OR PROPOSED CLEAN ROADS
-  OUTLINE OF DISPOSAL CELL (TO BE CONSTRUCTED LATER)
-  REMOVAL OF STOCKPILE MATERIAL AND PLACEMENT INTO DISPOSAL CELL
-  WASTE PLACEMENT IN DISPOSAL CELL
-  DREDGE WASTE FROM RAFFINATE PITS
-  REMOVAL OF CLAY BOTTOM FROM RAFFINATE PITS
-  DISPOSAL CELL CLOSURE (COVER)

**CONSTRUCTION OF DISPOSAL CELL
(SEQUENCE 3)**

FIGURE 5.1.5-5

REPORT NO: DOE/OR/21548-411	DRAWING NO:
ORIGINATOR: MLB / FJH	DRAWING BY: AMF
	DATE: 3/10/93



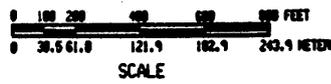
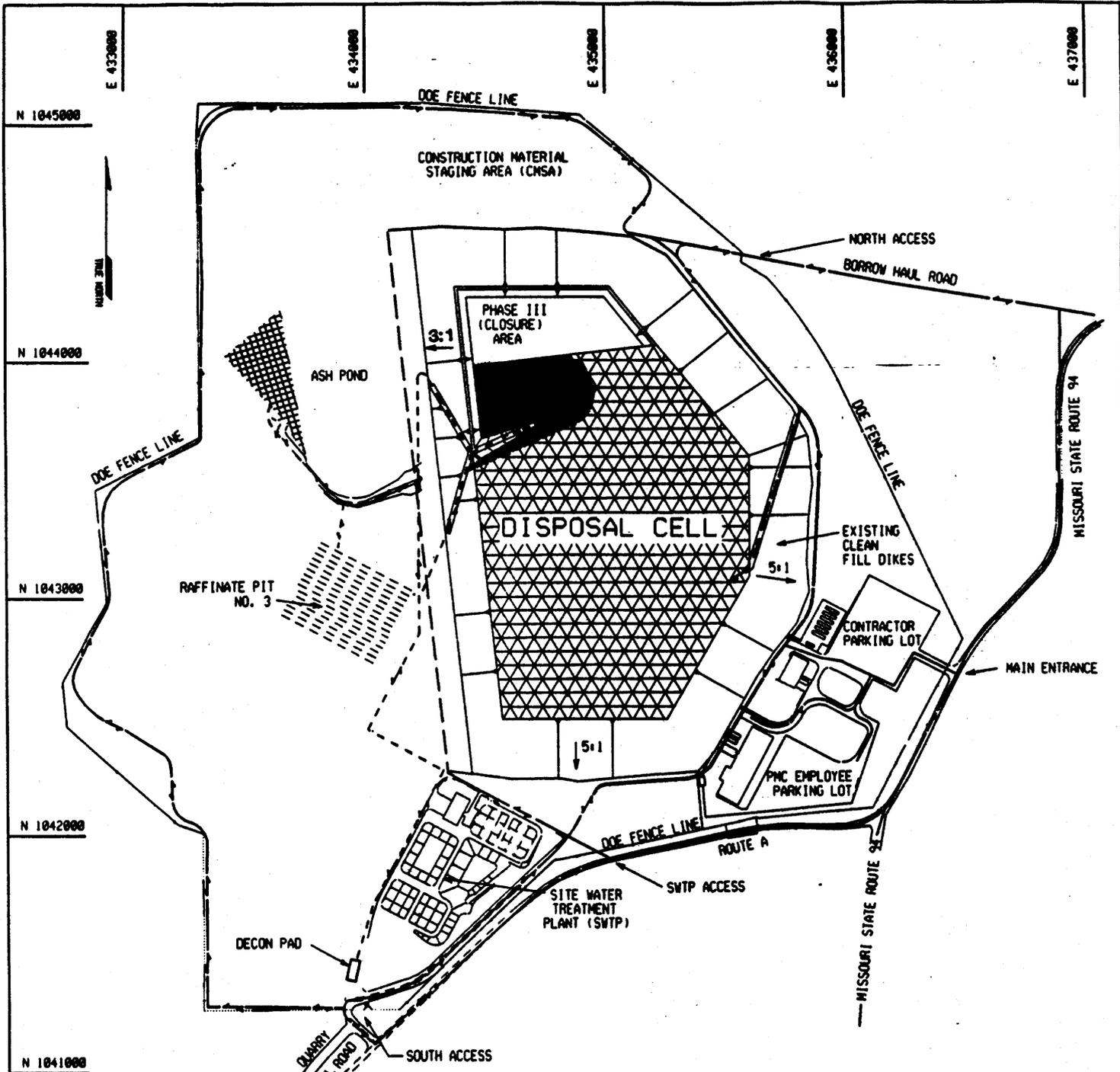
LEGEND

- EXISTING OR PROPOSED DIRTY ROADS
- EXISTING OR PROPOSED CLEAN ROADS
- OUTLINE OF DISPOSAL CELL (TO BE CONSTRUCTED LATER)
- REMOVAL OF STOCKPILE MATERIAL AND PLACEMENT INTO DISPOSAL CELL
- WASTE PLACEMENT IN DISPOSAL CELL
- CONSTRUCTION OF CLEAN-FILL DIKES
- REMOVAL OF CLAY BOTTOM FROM RAFFINATE PITS
- DISPOSAL CELL CLOSURE (COVER)

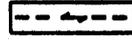
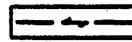
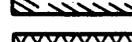
**CONSTRUCTION OF DISPOSAL CELL
(SEQUENCE 4)**

FIGURE 5.1.5-6

REPORT NO: DOE/OR/21548-411	DRAWING NO:
ORIGINATOR: MLB / FJH	DRAWING BY: AMF
	DATE: 3/10/93



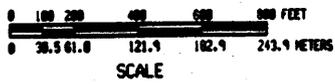
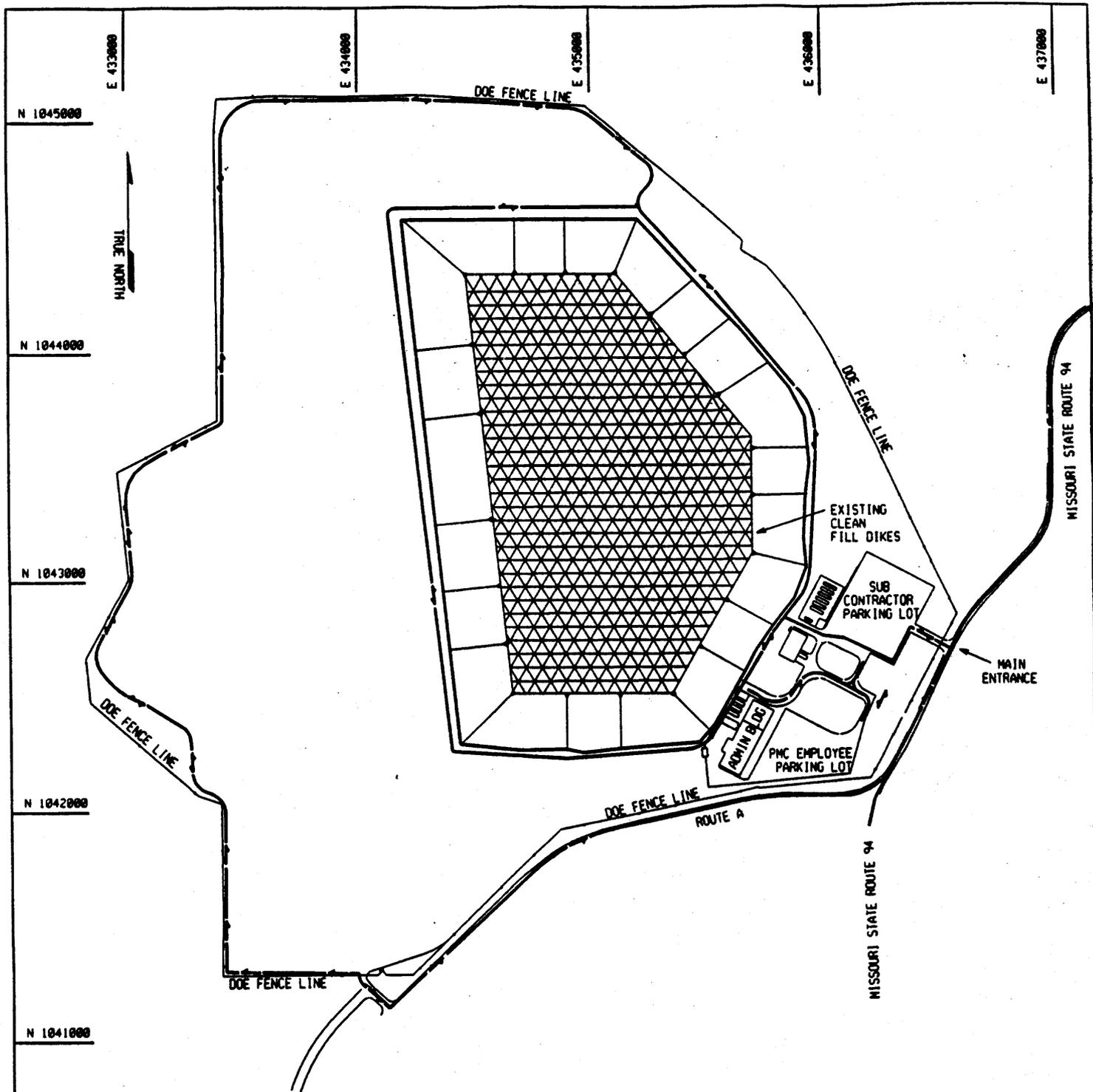
LEGEND

-  EXISTING OR PROPOSED DIRTY ROADS
-  EXISTING OR PROPOSED CLEAN ROADS
-  OUTLINE OF DISPOSAL CELL TO BE CONSTRUCTED LATER
-  REMOVING STOCKPILE MATERIAL AND PLACING INTO DISPOSAL CELL
-  WASTE PLACEMENT IN CELL
-  TOP & BOTTOM LINER REMOVAL OF RAFFINATE PITS
-  CELL CLOSURE (COVER)

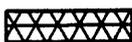
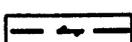
**CONSTRUCTION OF DISPOSAL CELL
(SEQUENCE 5)**

FIGURE 5.1.5-7

REPORT NO:	DOE/OR/21548-411	DRAWING NO:	384001/SE06.DGN
ORIGINATOR:	MLB / FJH	DRAWING BY:	AMF
		DATE:	09/07/93



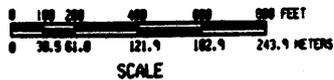
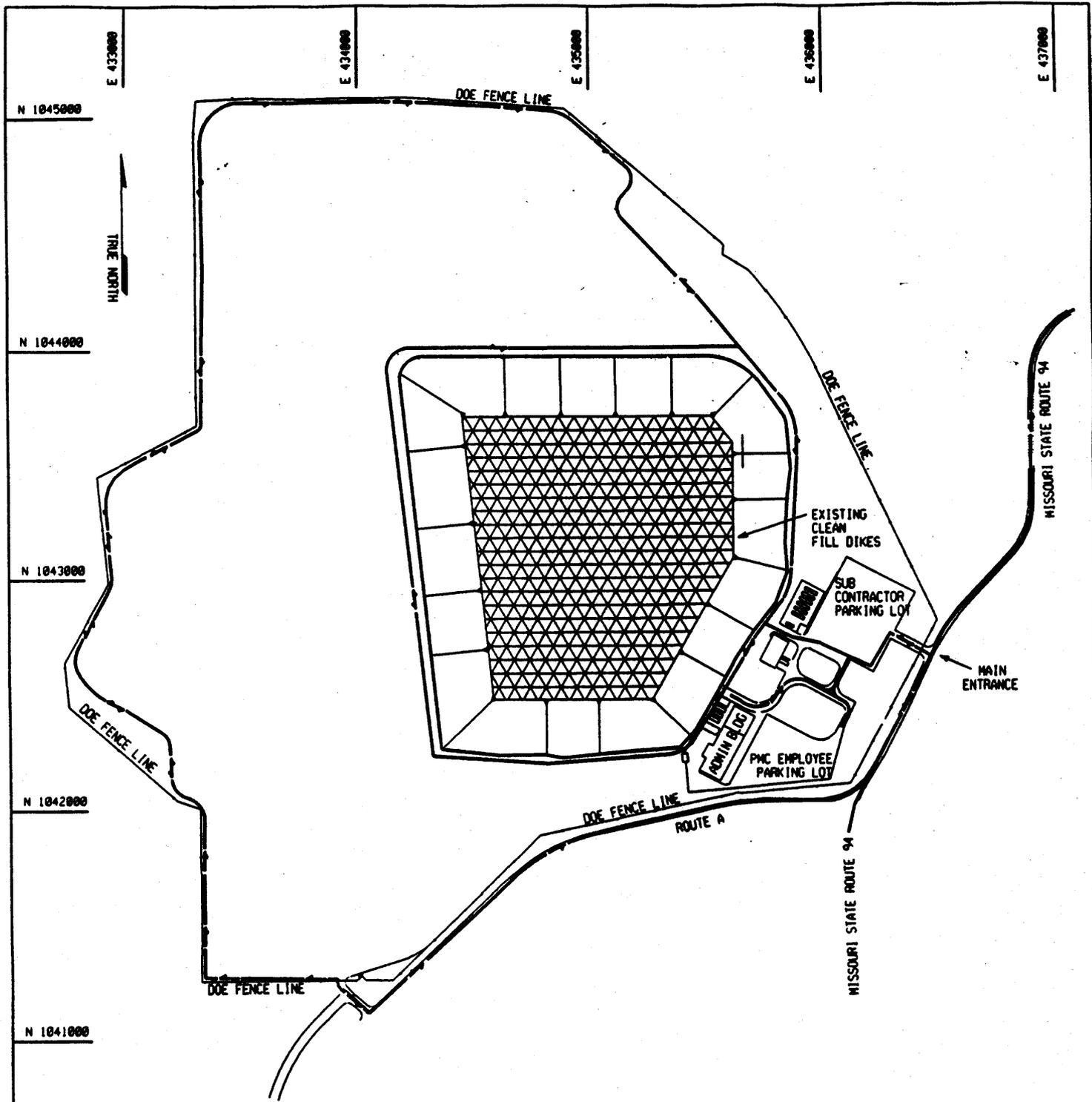
LEGEND

-  CELL CLOSURE (COVER)
-  CLEAN ROADS

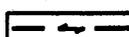
**CSS ALTERNATIVE
CONSTRUCTION OF DISPOSAL CELL
1.5 MILLION C.Y. OF WASTE
(CLOSURE PHASE)**

FIGURE 5.1.5-8

REPORT NO: DOE/OR/21548-411	DRAWING NO: 384001/SE07.DGN
ORIGINATOR: MLB / FJH	DATE: 09/07/93
DRAWING BY: AMF	



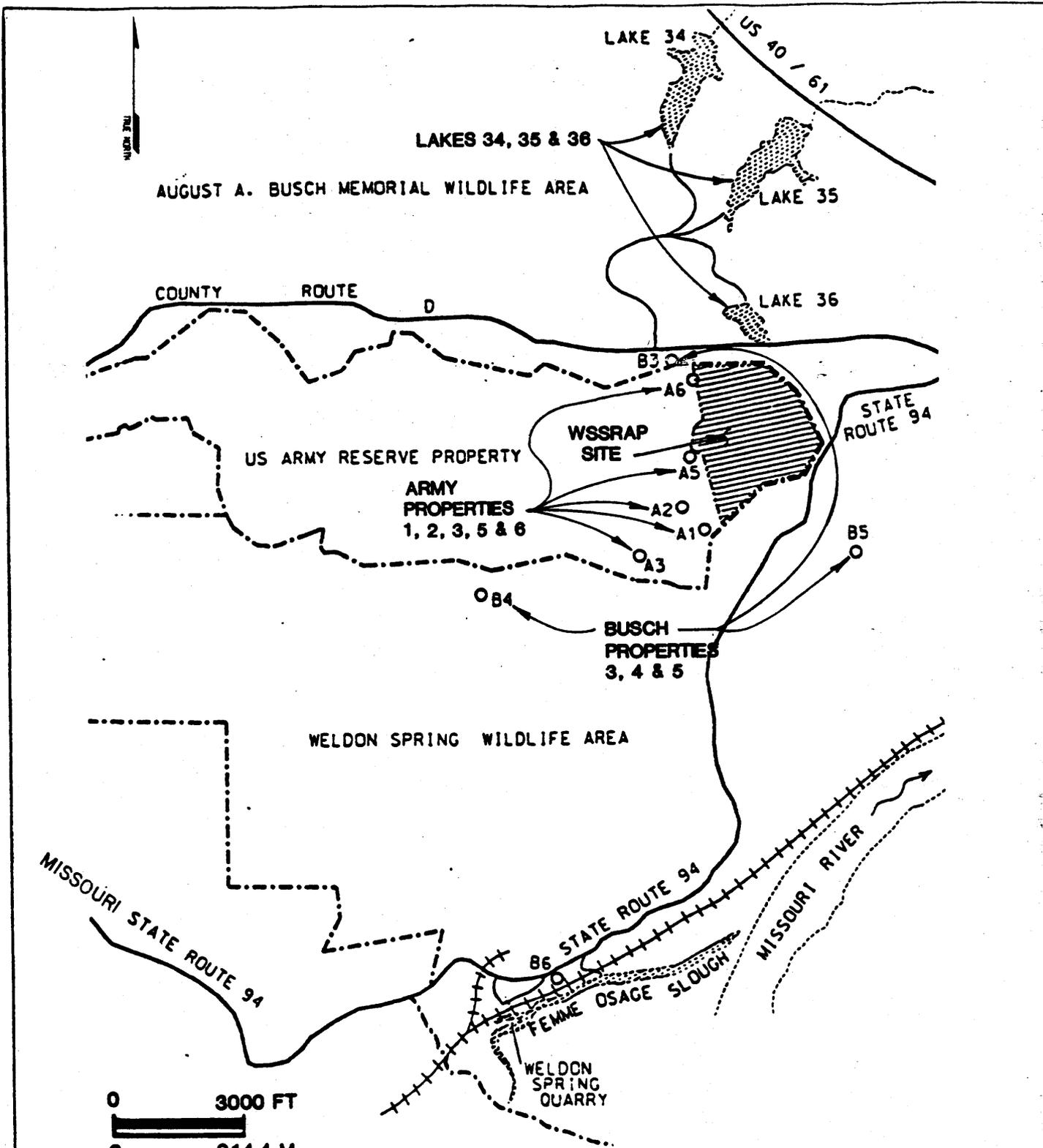
LEGEND

-  CELL CLOSURE (COVER)
-  CLEAN ROADS

**VIT ALTERNATIVE
 CONSTRUCTION OF DISPOSAL CELL
 1 MILLION C.Y. OF WASTE
 (CLOSURE PHASE)**

FIGURE 5.1.5-9

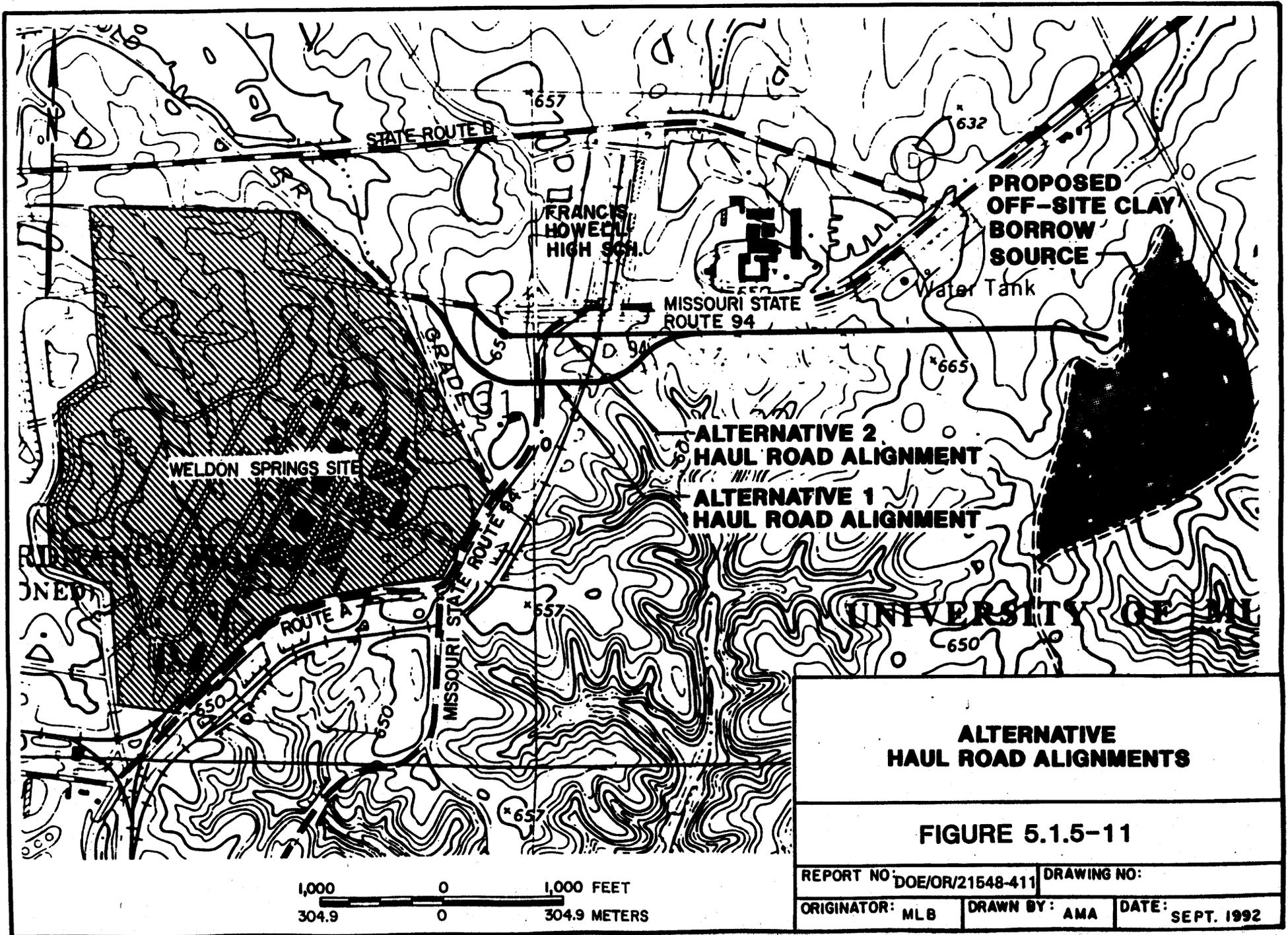
REPORT NO: DOE/OR/21548-411	DRAWING NO: 384001/SE07.DGN
ORIGINATOR: MLB / FJH	DRAWING BY: AMF
	DATE: 09/07/93

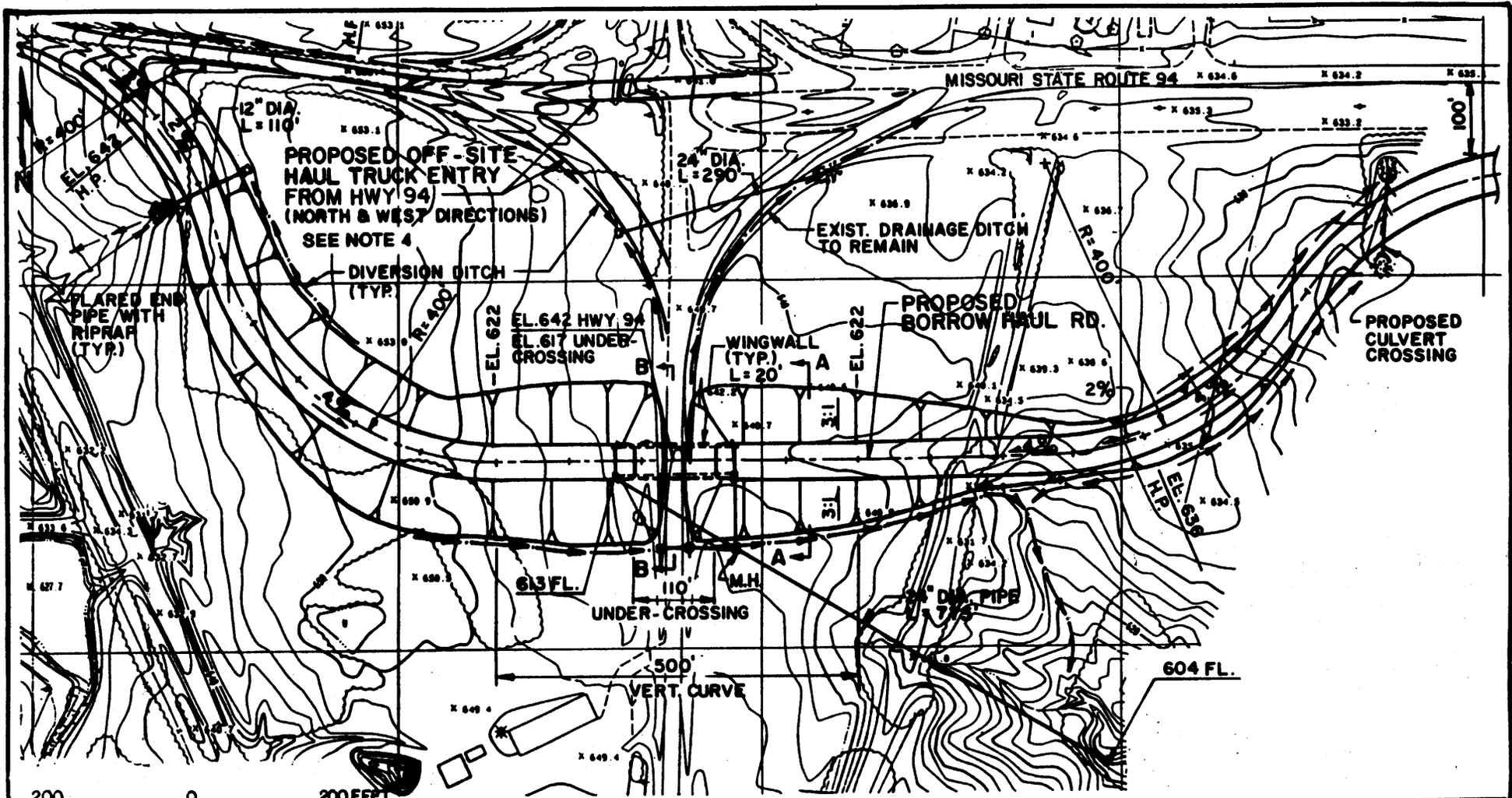


RADIOLOGICALLY CONTAMINATED VICINITY PROPERTY LOCATIONS

FIGURE 5.1.5-10

REPORT NO	DOE/OR/21548-411	DRAWING NO	
ORIGINATOR		DRAWING BY	
			DATE





LEGEND

- D PROPOSED DRAINAGE STRUCTURE
- M.H. MANHOLE
- EL. ELEVATION
- R RADIUS
- L LENGTH
- FL. FLOWLINE ELEVATION
- H.P. HIGH POINT
- TT CUT / EXCAVATION

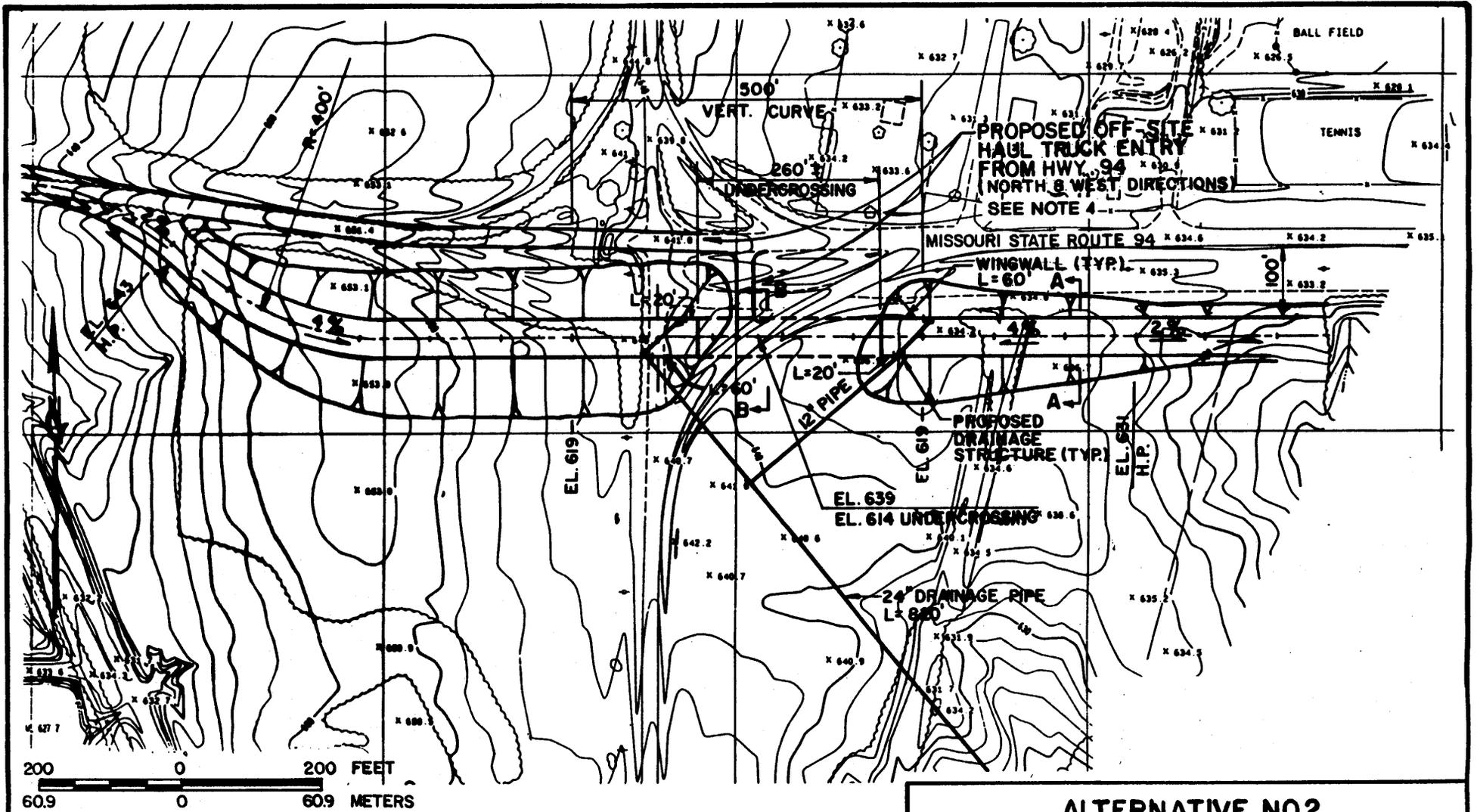
NOTES:

1. EXISTING UTILITIES ALONG MSR. 94 TO BE RELOCATED AS NECESSARY.
2. SEE FIGURE 5.1.5-16 FOR SECTION B-B
3. SEE FIGURE 5.1.5-15 FOR SECTION A-A
4. ACCESS ROADS FROM HIGHWAY 94 TO BE PROVIDED, AS SHOWN, FOR DELIVERY TRUCKS TO EXIT OFF OF HIGHWAY 94 AND ENTER ONTO THE HAUL ROAD

**ALTERNATIVE NO.1
TRUCK ALIGNMENT
MISSOURI STATE ROUTE 94
BORROW HAUL ROAD CROSSING**

FIGURE 5.1.5-13

REPORT NO: DOE/OR/21548-411	DRAWING NO:
ORIGINATOR: MLB	DRAWN BY: AMA
DATE: SEPT. 1992	



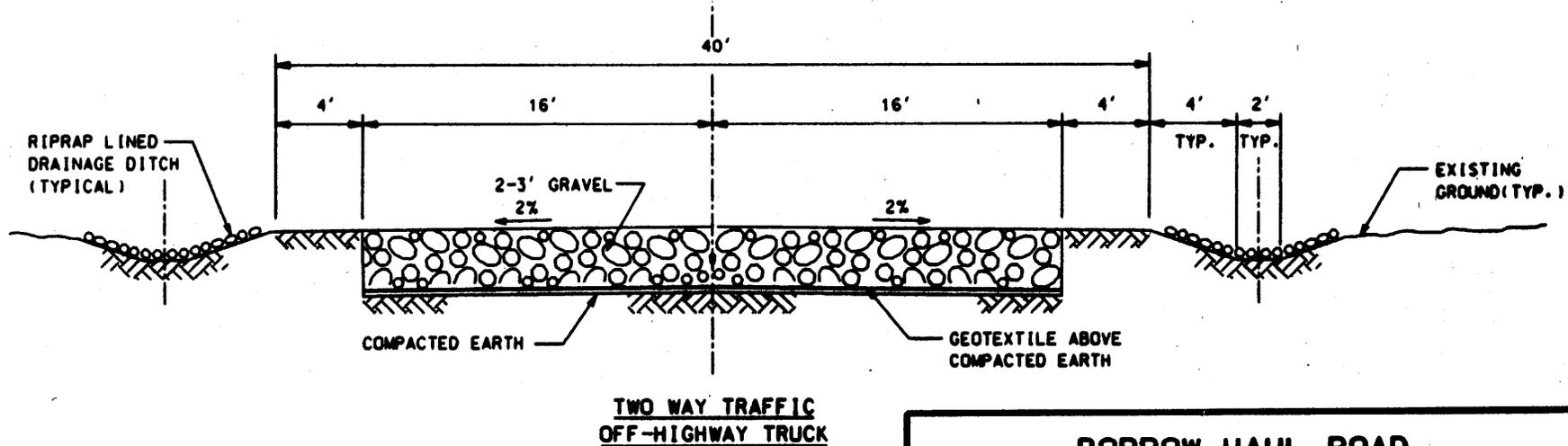
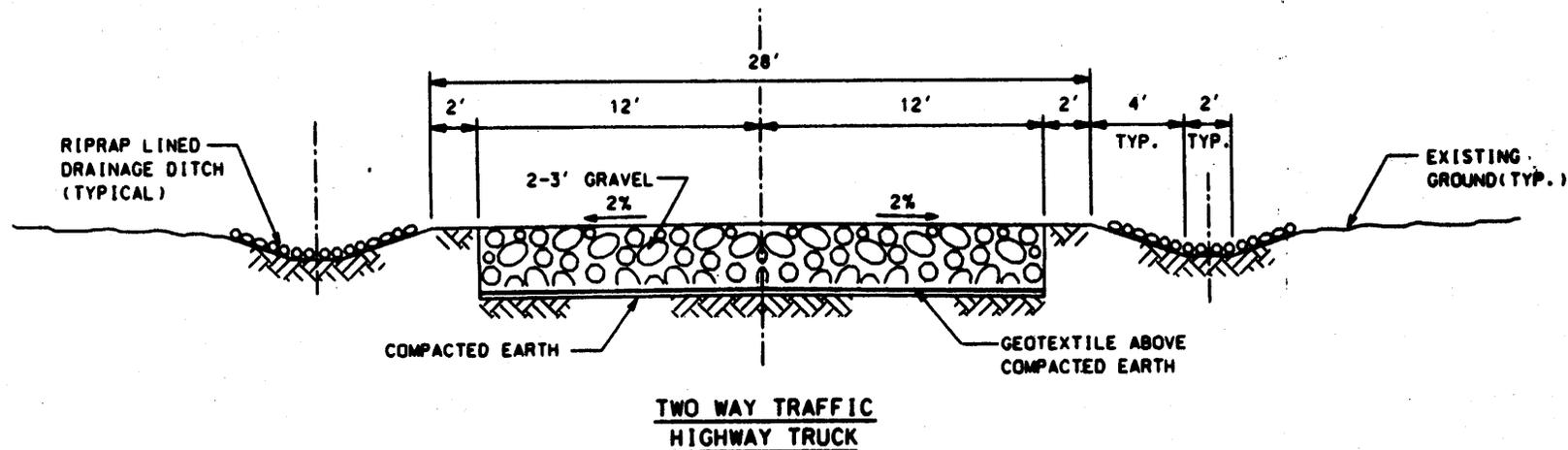
- LEGEND:**
- PROPOSED DRAINAGE STRUCTURE
 - M.H. MANHOLE
 - EL. ELEVATION
 - R RADIUS
 - L LENGTH
 - FL. FLOWLINE ELEVATION
 - H.P. HIGH POINT
 - TT CUT / EXCAVATION

- NOTES:**
1. EXISTING UTILITIES ALONG M.S.R. 94 TO BE RELOCATED AS NECESSARY.
 2. SEE FIGURE 5.1.5-16 FOR SECTION B-B
 3. SEE FIGURE 5.1.5-15 FOR SECTION A-A
 4. ACCESS ROADS FROM HIGHWAY 94 TO BE PROVIDED, AS SHOWN, FOR DELIVERY TRUCKS TO EXIT OFF OF HIGHWAY 94 AND ENTER ONTO THE HAUL ROAD

**ALTERNATIVE NO.2
TRUCK ALIGNMENT
MISSOURI STATE ROUTE 94
BORROW HAUL ROAD CROSSING**

FIGURE 5.1.5-14

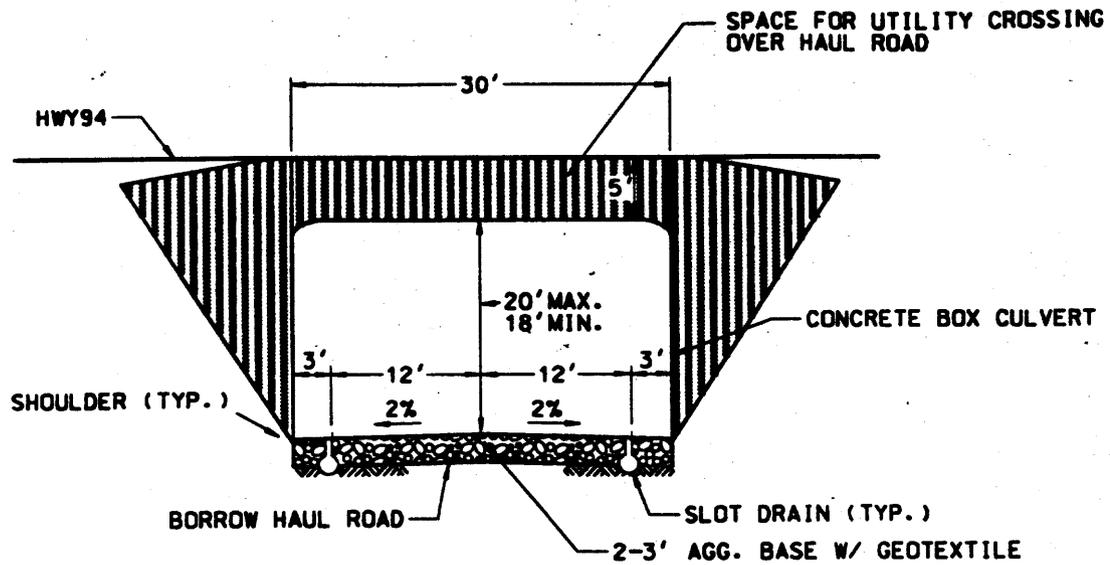
REPORT NO: DOE/OR/21548-411	DRAWING NO:
ORIGINATOR: MLB	DRAWN BY: AMA
DATE: SEPT. 1992	



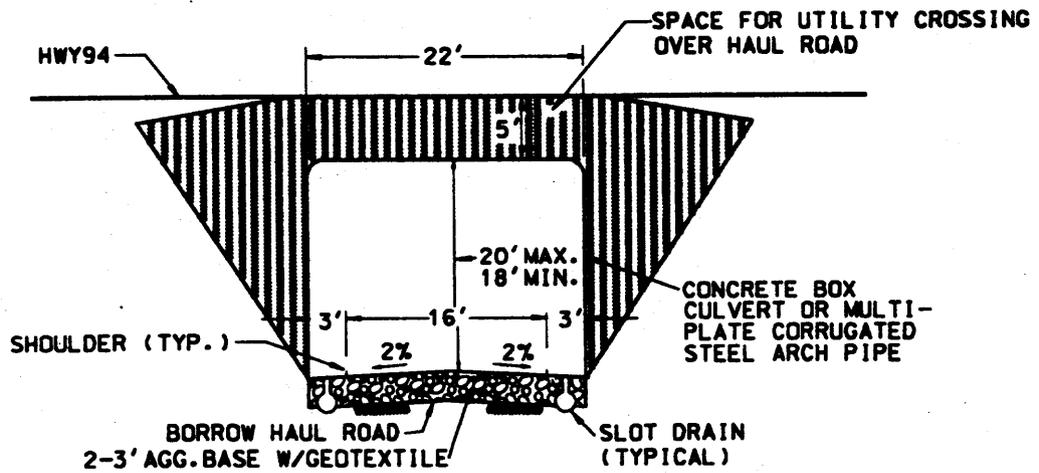
**BORROW HAUL ROAD
TYPICAL CROSS SECTIONS
HIGHWAY & OFF-HIGHWAY TRUCKS
(SECTION A-A)**

FIGURE 5.1.5-15

REPORT NO.:	DOE/OR/21548-411	DRAWING NO.:	
ORIGINATOR:	MLB	DRAWN BY:	KSR
		DATE:	SEPT. 92



TWO-WAY OFF-HIGHWAY TRUCK UNDERCROSSING



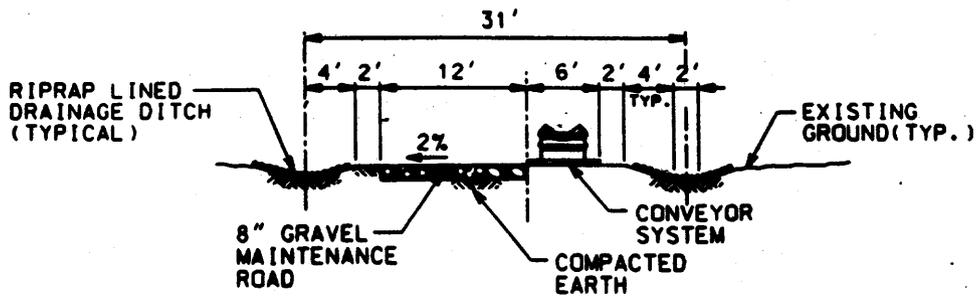
ONE-WAY OFF-HIGHWAY TRUCK UNDERCROSSING

NO SCALE

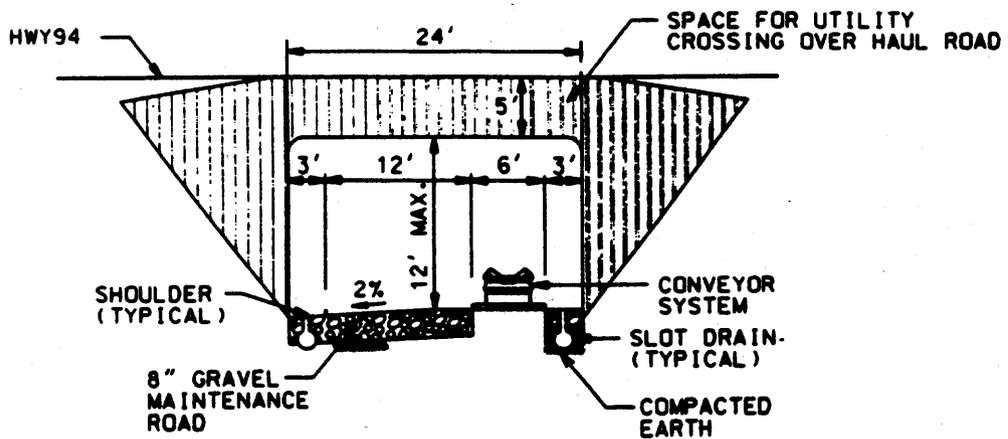
MISSOURI STATE ROUTE 94/BORROW HAUL
ROAD CROSSING - SECTION B-B

FIGURE 5.1.5-16

REPORT NO:	DOE/OR/21548-411	DRAWING NO:	
ORIGINATOR:	MLB / FJH	DRAWING BY:	AMF
		DATE:	SEPT. 92



**TYPICAL OVERLAND CONVEYOR
INSTALLATION AT GRADE**



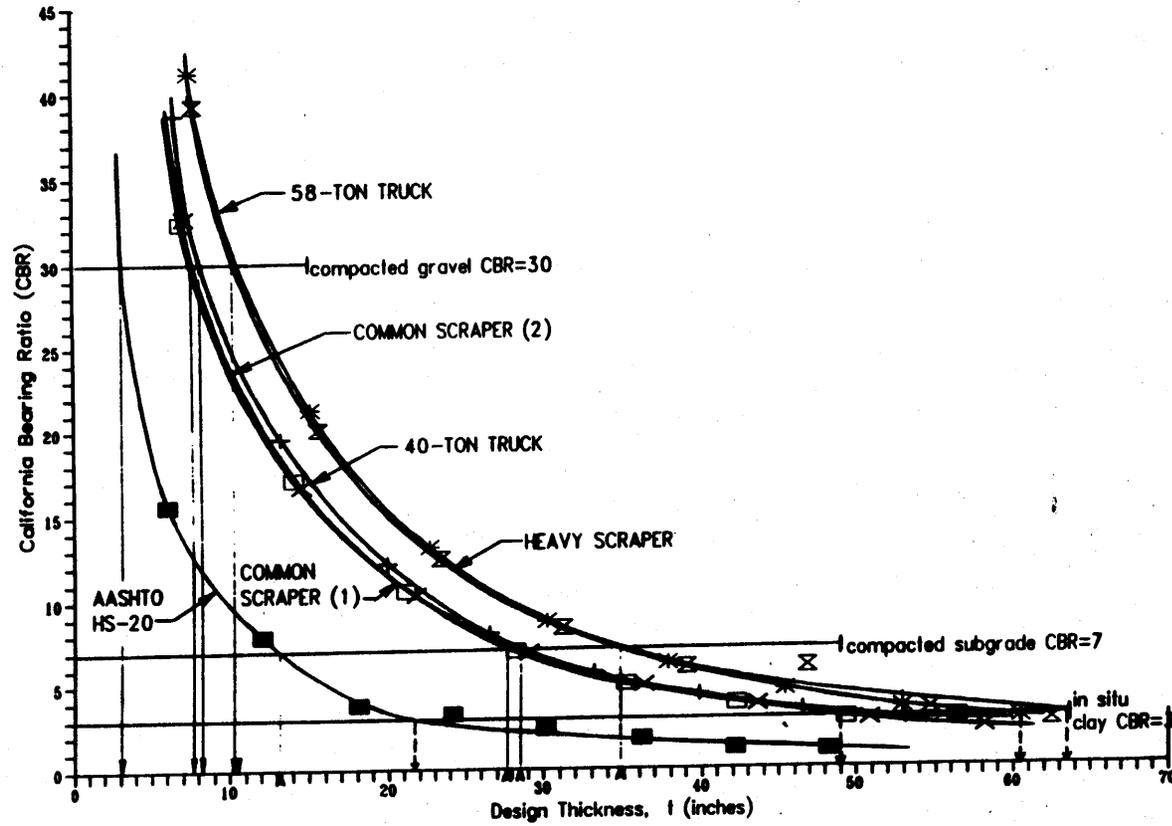
**CONVEYOR SYSTEM UNDERCROSSING
AT MISSOURI STATE ROUTE 94**

NOT TO SCALE

**CONVEYOR SYSTEM
TYPICAL CROSS SECTIONS**

FIGURE 5.1.5-17

REPORT NO.:	DOE/OR/21548-411	DRAWING NO.:	
ORIGINATOR:	MLB	DRAWN BY:	KSR
		DATE:	SEPT. 92



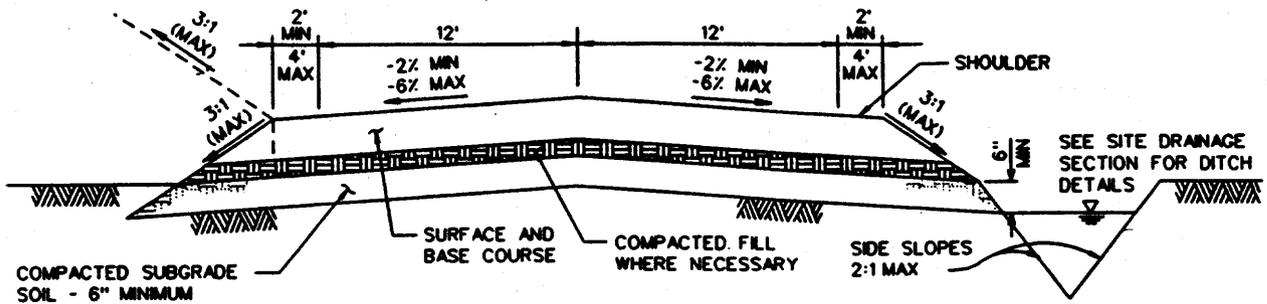
LEGEND

- HS-20 LOADING
- + 40-TON TRUCK
- * 58-TON TRUCK
- COMMON SCRAPER (1)
- × COMMON SCRAPER (2)
- ⊗ HEAVY SCRAPER

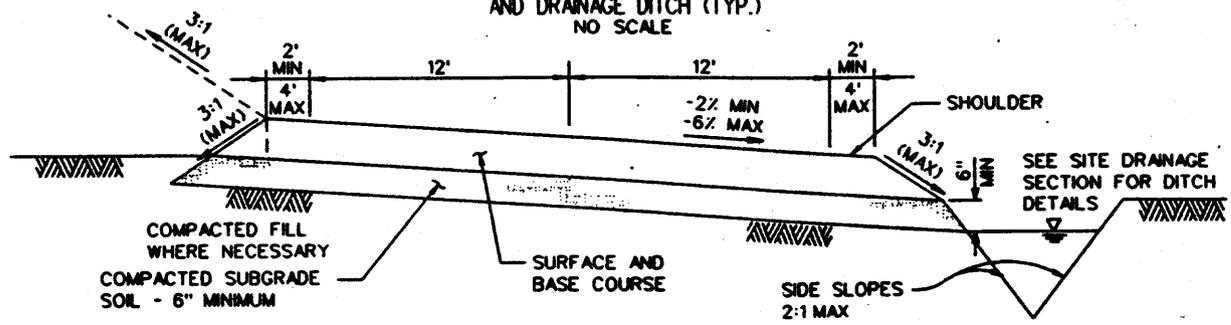
Required CBR vs. Design Thickness

FIGURE 5.1.5-18

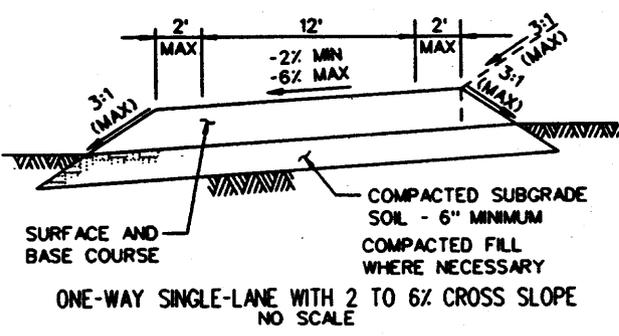
REPORT NO. DOE/OR/21548-411		ISSUED NO.
ORIGINATOR	DESIGNED BY	DATE



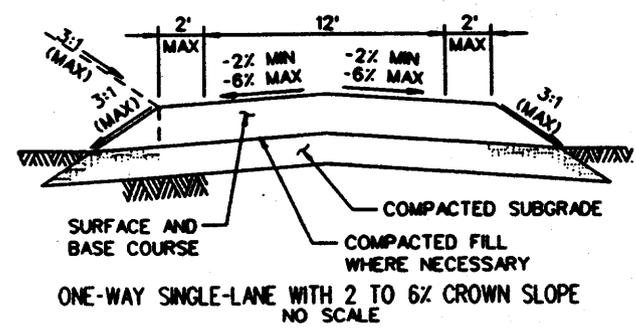
TWO-WAY DOUBLE-LANE WITH 2 TO 6% CROWN SLOPE AND DRAINAGE DITCH (TYP.) NO SCALE



TWO-WAY DOUBLE-LANE WITH 2 TO 6% CROSS SLOPE AND DRAINAGE DITCH (TYP.) NO SCALE

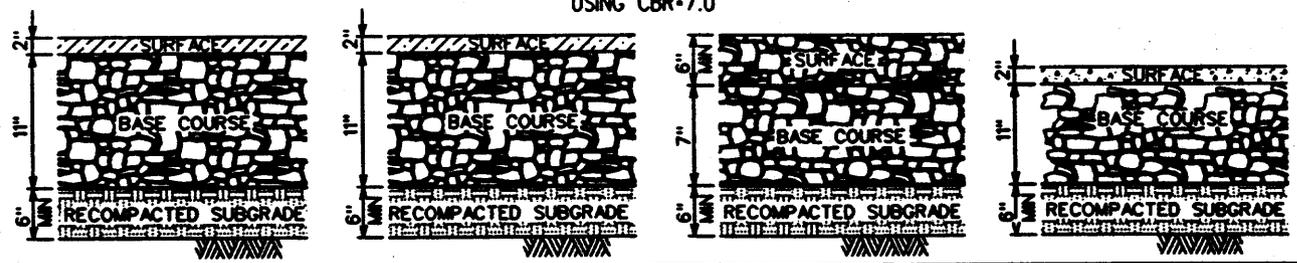


ONE-WAY SINGLE-LANE WITH 2 TO 6% CROSS SLOPE NO SCALE



ONE-WAY SINGLE-LANE WITH 2 TO 6% CROWN SLOPE NO SCALE

ALTERNATIVE PAVEMENT SECTIONS (AASHTO HS-20 LOADING): USING CBR-7.0

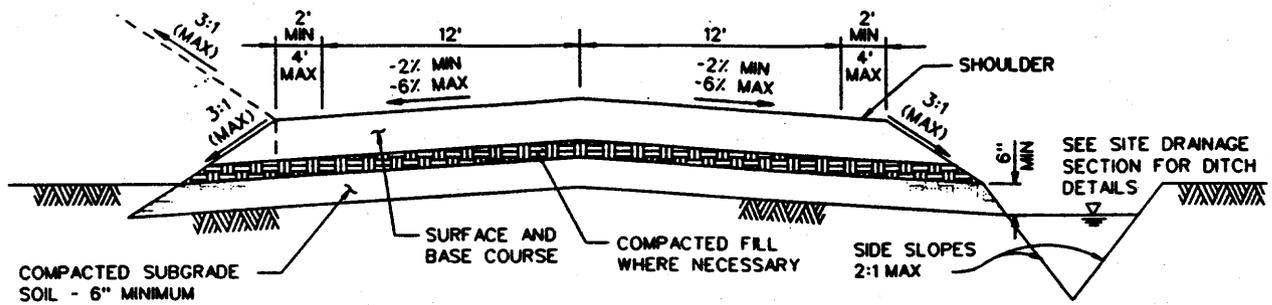


- LEGEND:
- ASPHALT CONCRETE
 - PORTLAND CEMENT CONCRETE
 - COMPACTED GRAVEL
 - OIL/ROCK SURFACE
 - COMPACTED SUBGRADE SOIL
 - GEOTEXTILE

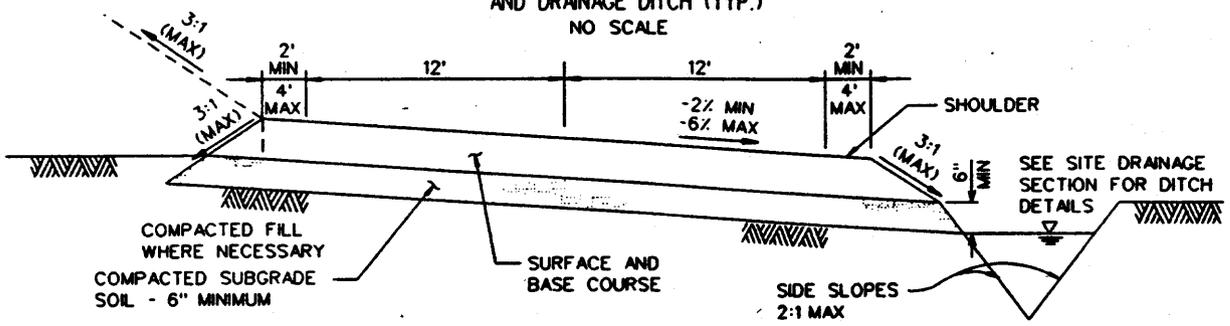
TYPICAL ROADWAY CROSS SECTIONS FOR HIGHWAY VEHICLE LOADING

FIGURE 5.1.5-19

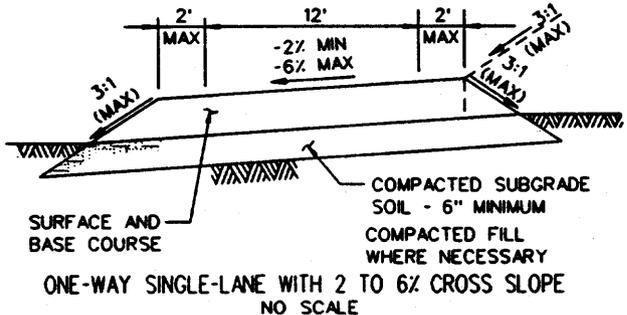
REPORT NO:	DOE/OR/21548-411	DRAWING NO:	713PFIG.DGN
OPERATOR:	MLB	DRAWING BY:	AMF
		DATE:	09/07/93



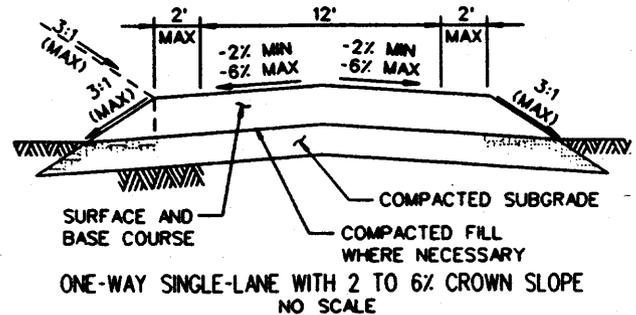
TWO-WAY DOUBLE-LANE WITH 2 TO 6% CROWN SLOPE AND DRAINAGE DITCH (TYP.)
NO SCALE



TWO-WAY DOUBLE-LANE WITH 2 TO 6% CROSS SLOPE AND DRAINAGE DITCH (TYP.)
NO SCALE

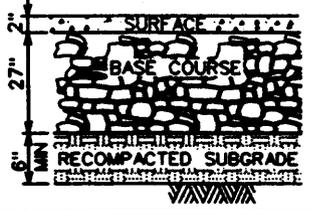
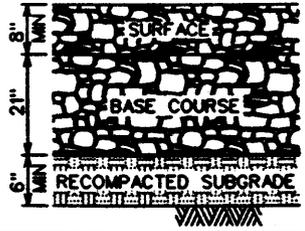
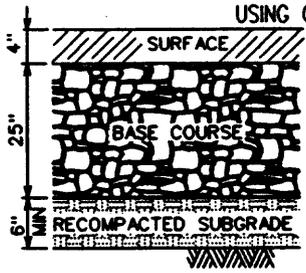
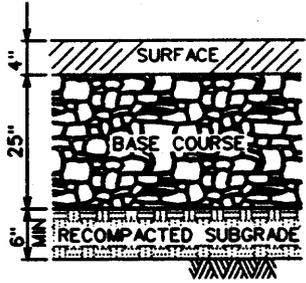


ONE-WAY SINGLE-LANE WITH 2 TO 6% CROSS SLOPE
NO SCALE



ONE-WAY SINGLE-LANE WITH 2 TO 6% CROWN SLOPE
NO SCALE

ALTERNATIVE PAVEMENT SECTIONS (AASHTO HS-20 LOADING):
USING CBR-7.0



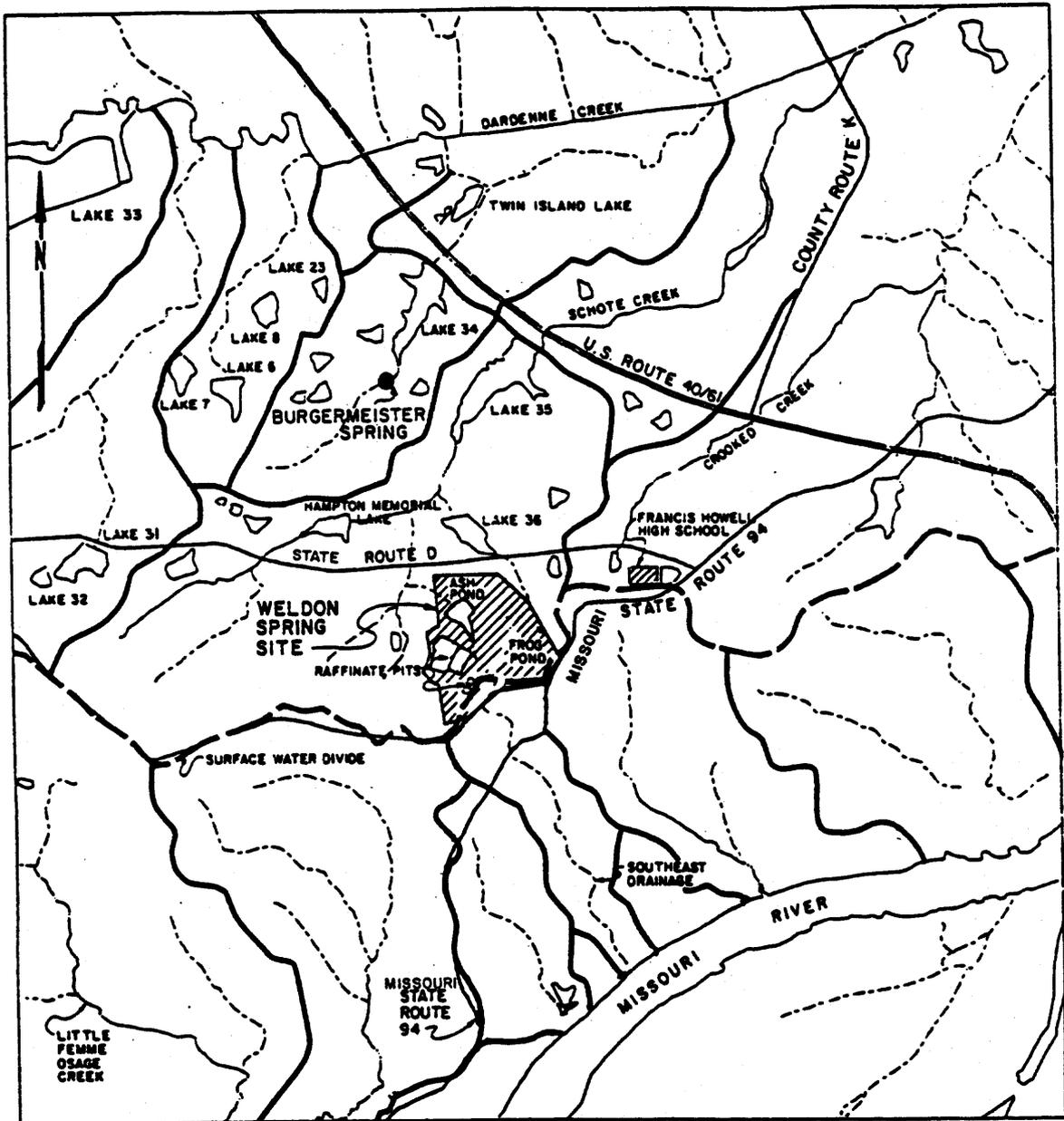
LEGEND:

- ASPHALT CONCRETE
- COMPACTED SUBGRADE SOIL
- PORTLAND CEMENT CONCRETE
- OIL/ROCK SURFACE
- COMPACTED GRAVEL
- GEOTEXTILE

TYPICAL ROADWAY CROSS SECTIONS FOR EXPECTED CONSTRUCTION VEHICLE LOADS

FIGURE 5.1.5-20

REPORT NO: DOE/OR/21548-411	DRAWING NO: 713PFIG.DGN
ORIGINATOR: .MLB	DRAWING BY: AMF
	DATE: 09/07/93



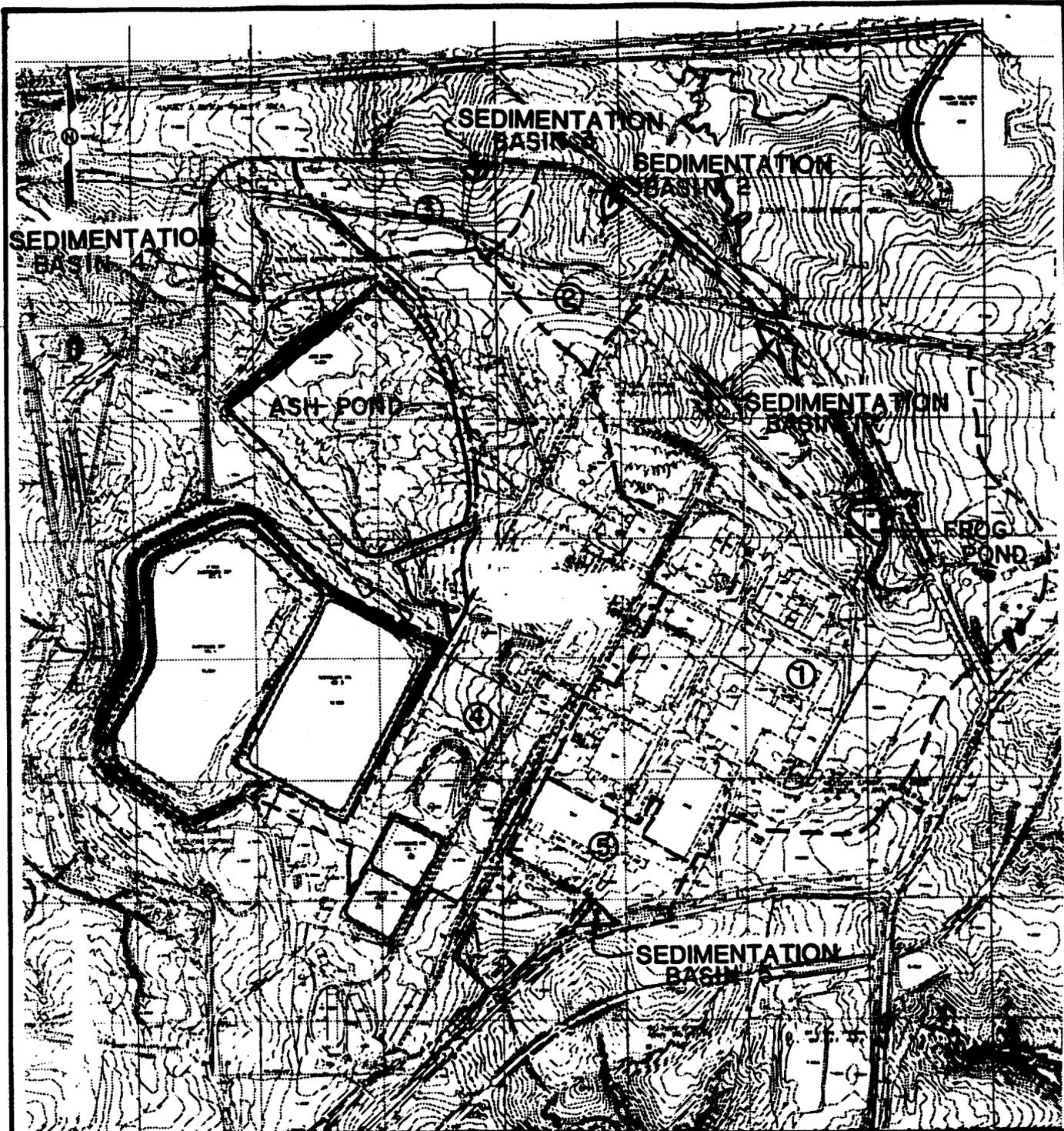
LEGEND

- — — SURFACE WATER DIVIDE BETWEEN MISSISSIPPI RIVER AND MISSOURI RIVER
- — — DRAINAGE BOUNDARY
- - - CREEK OR SURFACE DRAINAGE
- ◡ POND OR LAKE

SURFACE WATER FEATURES AND DRAINAGES AT THE WSS

FIGURE 5.1.6-1

REPORT NO.: DOE/OR/21548-411	DRAWING NO.:
ORIGINATOR: S.B.	DRAWN BY: K.W.
DATE: NOV., 1992	



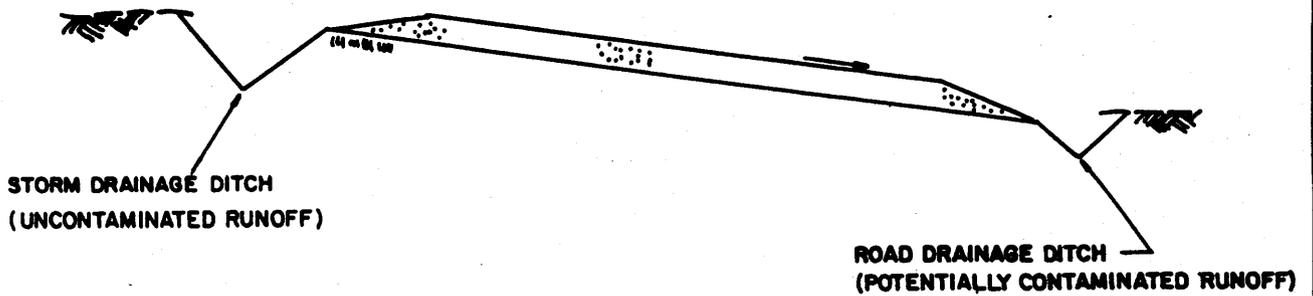
LEGEND

- DRAINAGE DIVIDE
- ④ WATERSHED NUMBER

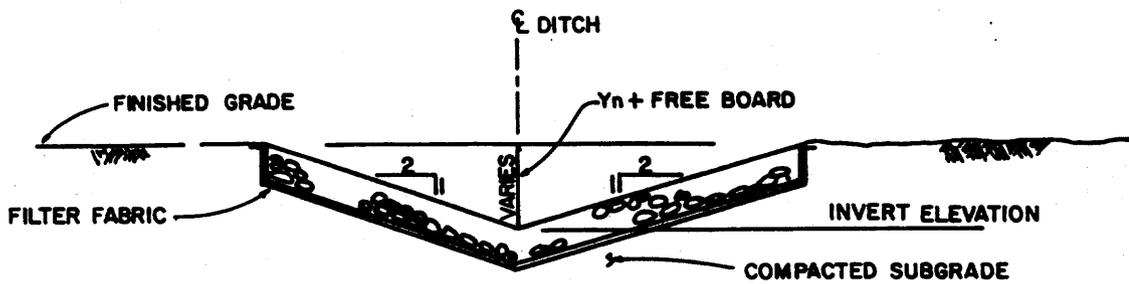
**PROPOSED SEDIMENTATION BASINS AND
WATERSHEDS AT THE WELDON SPRING
CHEMICAL PLANT SITE**

FIGURE 5.1.6-2

REPORT NO.: DOE/OR/21548-411	DRAWING NO.:
ORIGINATOR: S.B.	DRAWN BY: K.W.
DATE: NOV., 1992	



**DRAINAGE ON DIRTY
HAUL ROADS**
NOT TO SCALE



TYPICAL RIPRAP DIVERSION DITCH SECTION

NOT TO SCALE

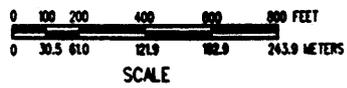
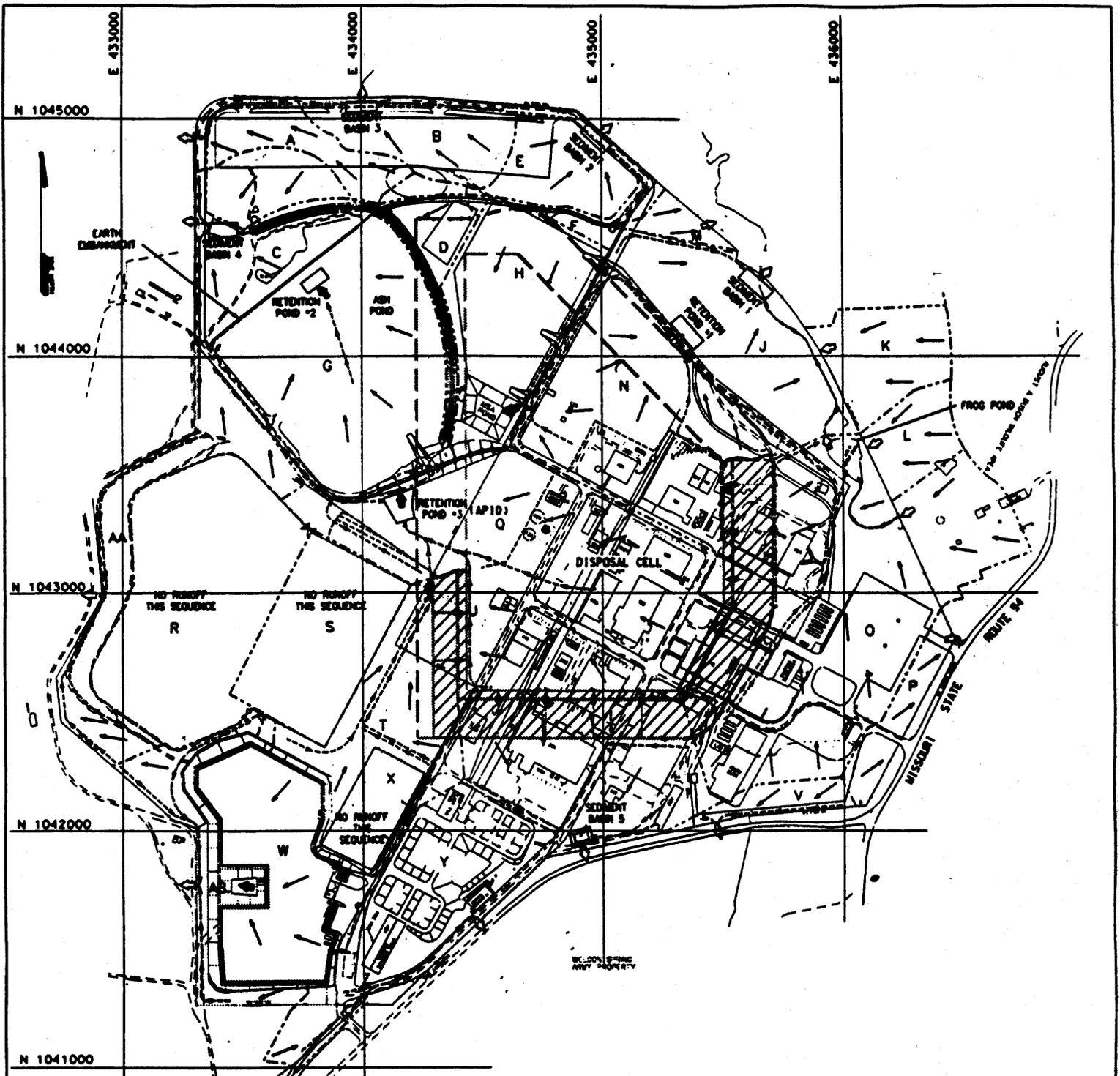
VARIABLES

Y_n = NORMAL DEPTH

SITE DRAINAGE DETAILS-DITCHES

FIGURE 5.1.6- 3

REPORT NO.:	DOE/OR/21548-411	DRAWING NO.:	
ORIGINATOR:	S.B.	DRAWN BY:	K.W.
		DATE:	NOV. , 1992



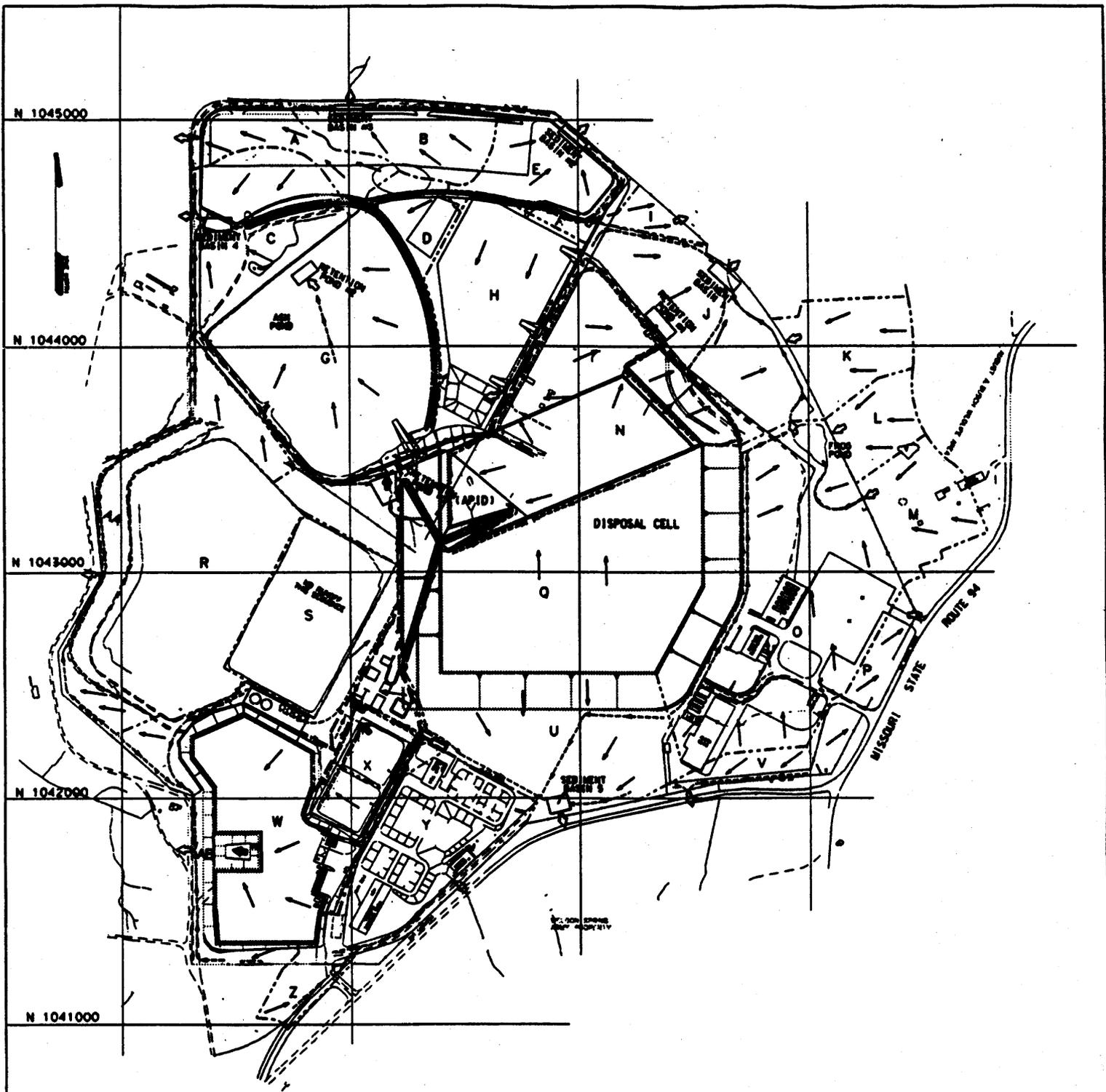
LEGEND :

- A-Z, AA, AB WATERSHED
- WATERSHED BOUNDARY
- OVERLAND FLOW DIRECTION
- DIRECTED FLOW
- ⬇ CONTAMINATED DISCHARGE LOCATION
- ⬆ UNCONTAMINATED DISCHARGE LOCATION
- ⌋ CULVERT

**SITE DRAINAGE SYSTEM DURING
DISPOSAL CELL CONSTRUCTION
(END OF SEQUENCE ONE)**

FIGURE 5.1.6-4

REPORT NO. : DOE/OR/21548-411	DRAWING NO. : 384001/564-1a
ORIGINATOR: SCB	DRAWN BY: Cwf
	DATE: 09/01/93



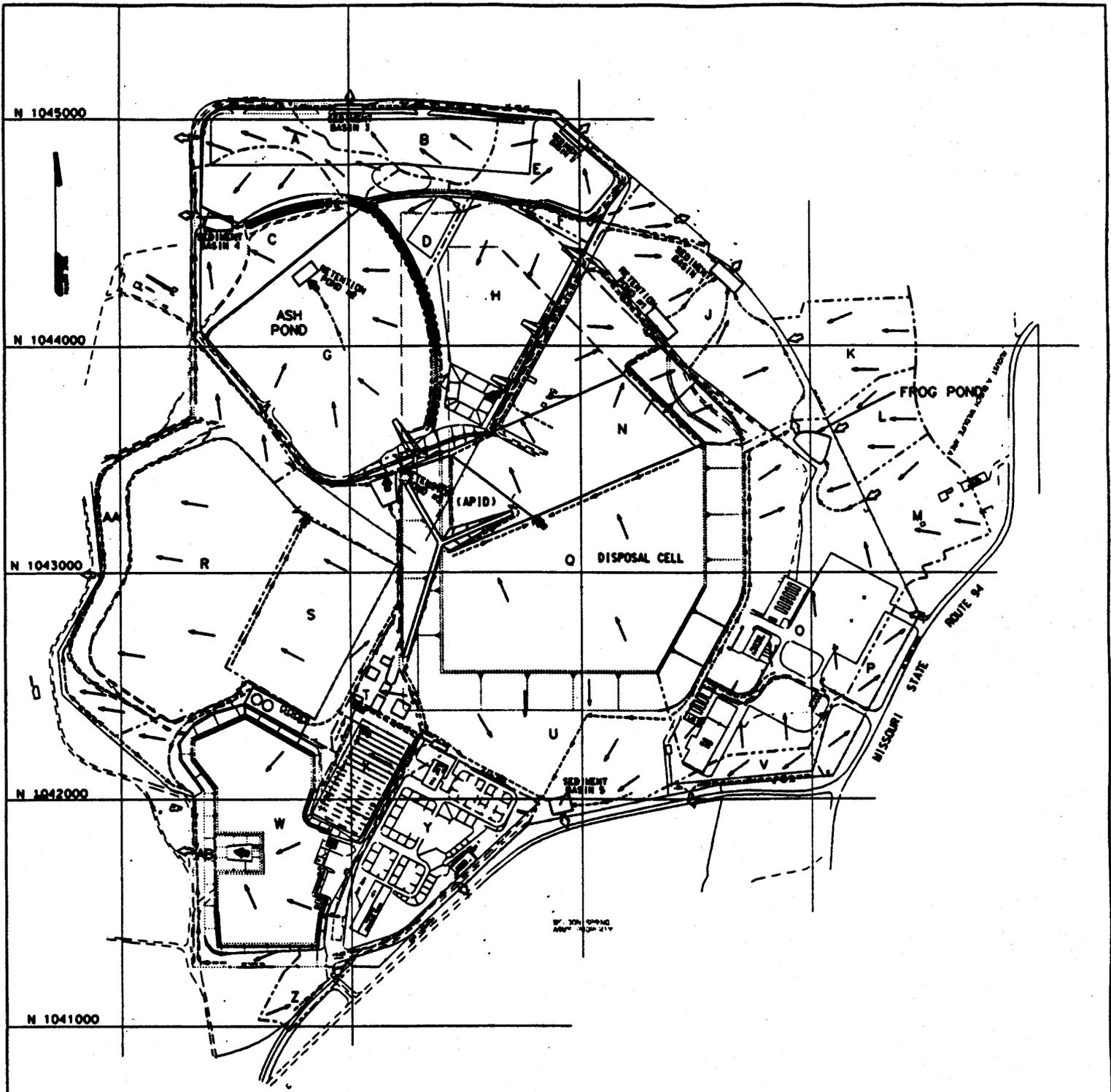
LEGEND :

- A-Z, AA, AB WATERSHED
- WATERSHED BOUNDARY
- OVERLAND FLOW DIRECTION
- DIRECTED FLOW
- ◆ CONTAMINATED DISCHARGE LOCATION
- ◇ UNCONTAMINATED DISCHARGE LOCATION
- ⌋ CULVERT

**SITE DRAINAGE SYSTEM DURING
 DISPOSAL CELL CONSTRUCTION
 (END OF SEQUENCE TWO)**

FIGURE 5.1.6-5

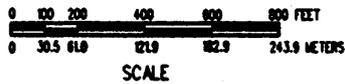
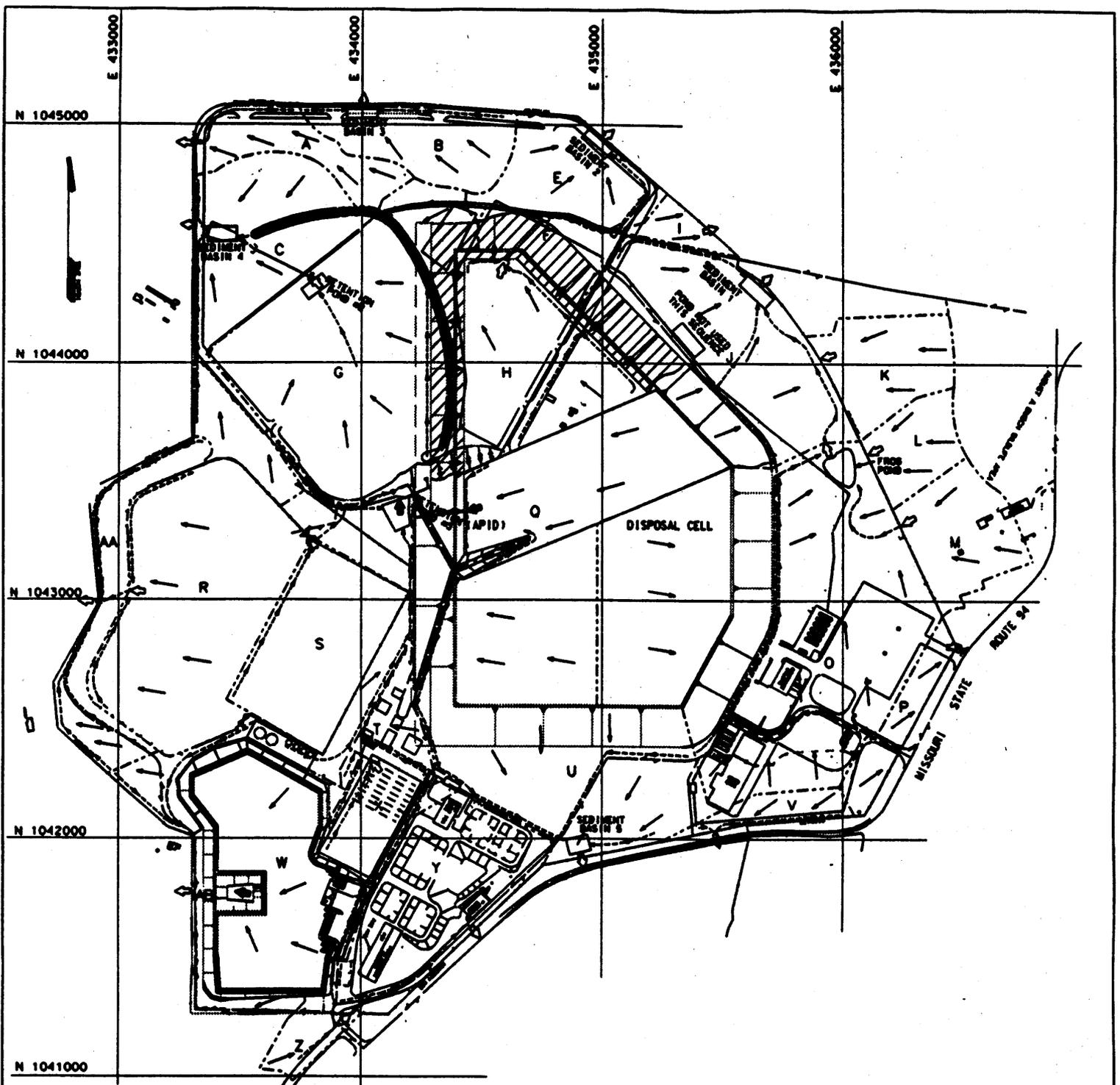
REPORT NO.:	DOE/OR/21548-411	DRAWING NO.:	384001/564-1b
ORIGINATOR:	SCB	DRAWN BY:	Cwf
		DATE:	09/02/93



**SITE DRAINAGE SYSTEM DURING
DISPOSAL CELL CONSTRUCTION
(END OF SEQUENCE THREE)**

FIGURE 5.1.6-6

REPORT NO.:	DOE/OR/21548-411	DRAWING NO.:	384001/564-1c
ORIGINATOR:	SCB	DRAWN BY:	Cwf
		DATE:	09/02/93



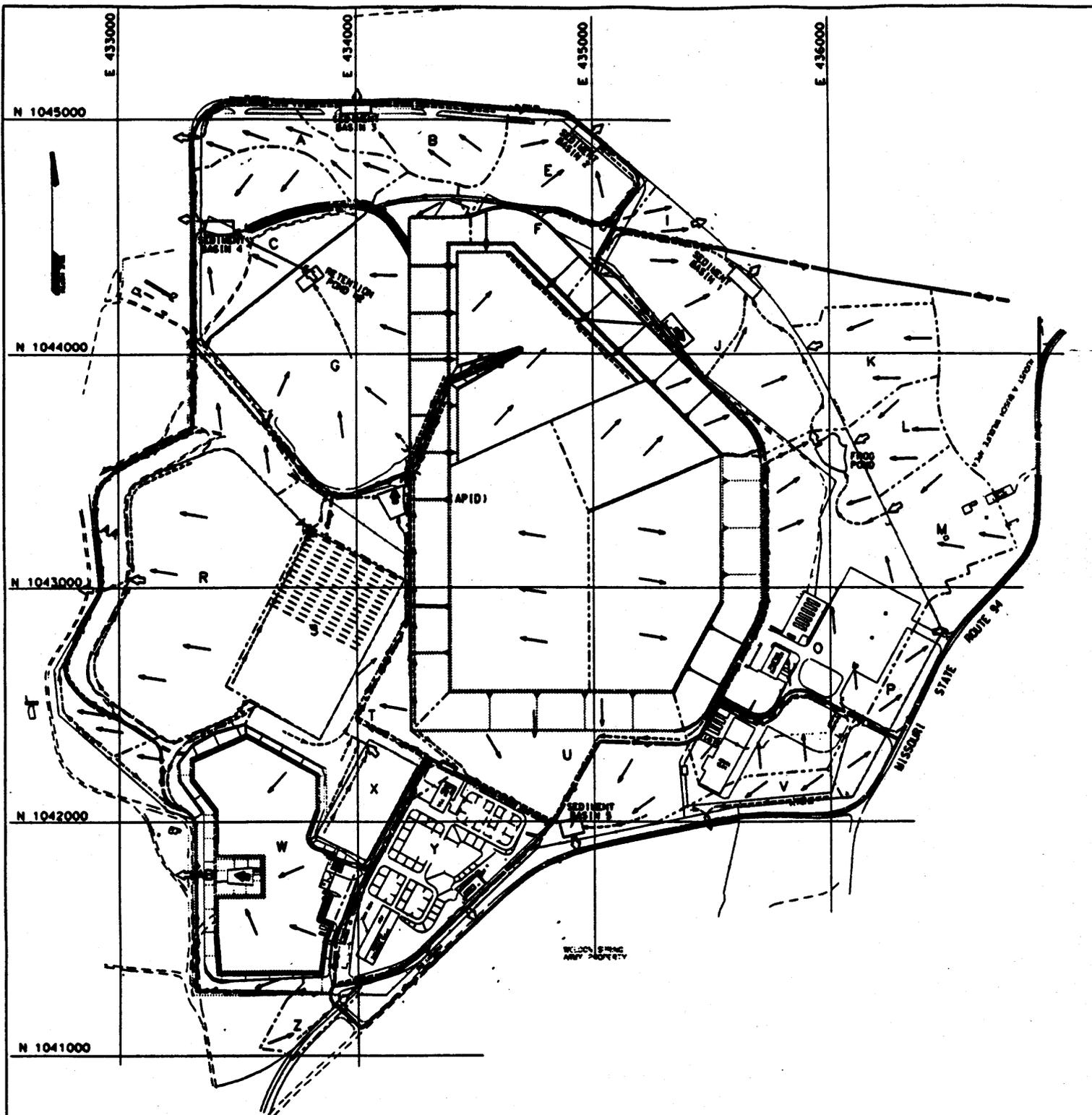
LEGEND :

- A-Z, AA, AB WATERSHED
- WATERSHED BOUNDARY
- OVERLAND FLOW DIRECTION
- DIRECTED FLOW
- ◆ CONTAMINATED DISCHARGE LOCATION
- ◇ UNCONTAMINATED DISCHARGE LOCATION
- ⌋ CULVERT

**SITE DRAINAGE SYSTEM DURING
 DISPOSAL CELL CONSTRUCTION
 (END OF SEQUENCE FOUR)**

FIGURE 5.1.6-7

REPORT NO.: DOE/OR/21548-411	DRAWING NO.: 384001/564-1d
ORIGINATOR: SCB	DATE: 09/02/93
DRAWN BY: Cwf	



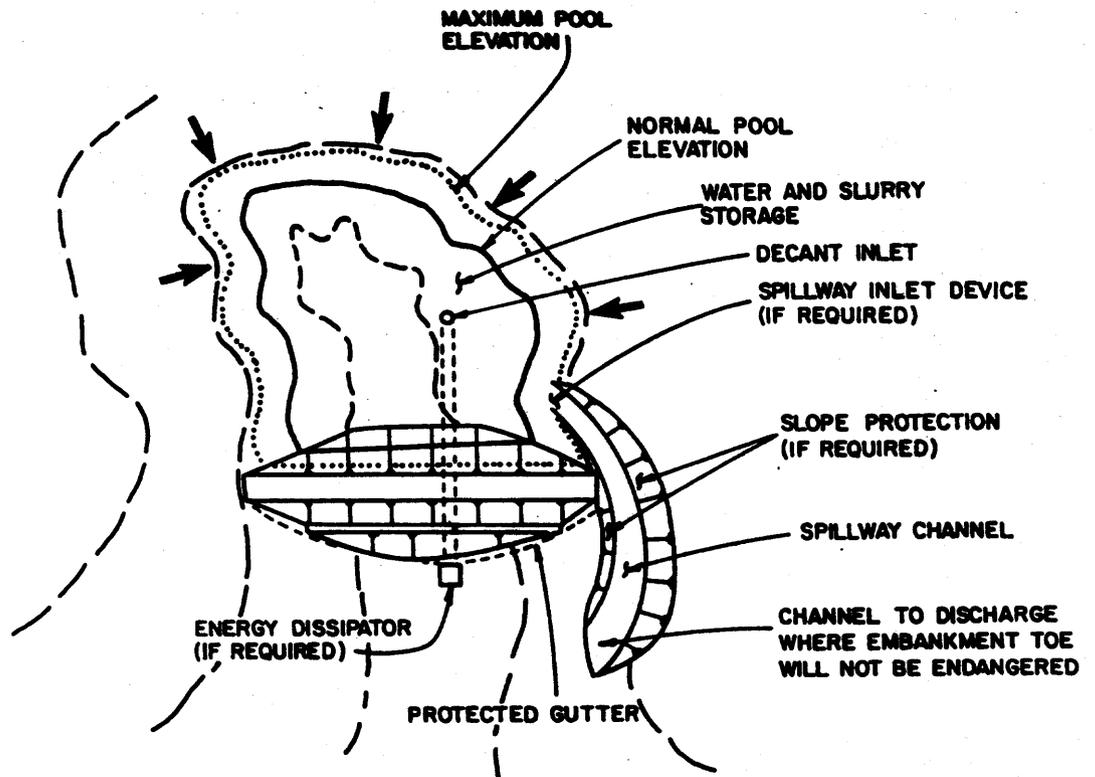
LEGEND :

- - - - - WATERSHED BOUNDARY
- OVERLAND FLOW DIRECTION
- - - - - DIRECTED FLOW
- ◆ CONTAMINATED DISCHARGE LOCATION
- ◇ UNCONTAMINATED DISCHARGE LOCATION
- ⌋ CULVERT

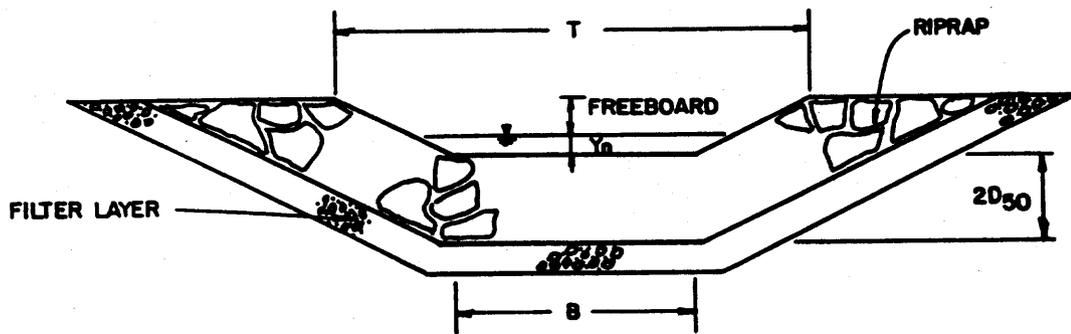
**SITE DRAINAGE SYSTEM DURING
DISPOSAL CELL CONSTRUCTION
(END OF SEQUENCE FIVE)**

FIGURE 5.1.6-8

REPORT NO.:	DOE/OR/21548-411	DRAWING NO.:	384001/564-1e
ORIGINATOR:	SCB	DRAWN BY:	Cwf
		DATE:	09/02/93



TYPICAL RETENTION POND
NOT TO SCALE



TYPICAL PERMANENT CHANNEL
NOT TO SCALE

VARIABLES

Y_n = NORMAL DEPTHS

B = BOTTOM WIDTH

T = TOP WIDTH

D_{50} = MEDIAN RIPRAP SIZE

→ = RUNOFF

**SITE DRAINAGE DETAIL RETENTION PONDS
AND PERMANENT CHANNELS**

FIGURE 5.1.6-9

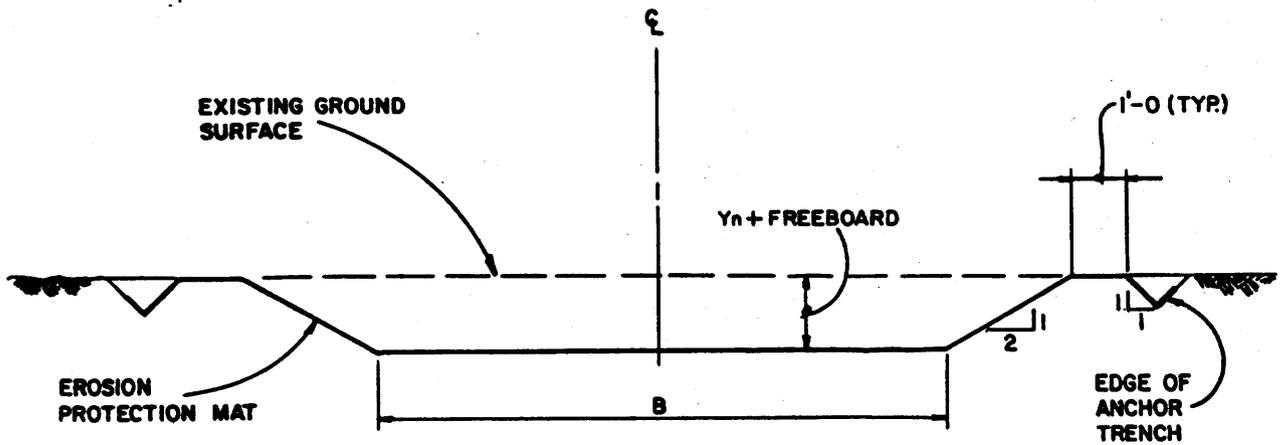
REPORT NO.: DOE/OR/21548-411

DRAWING NO.:

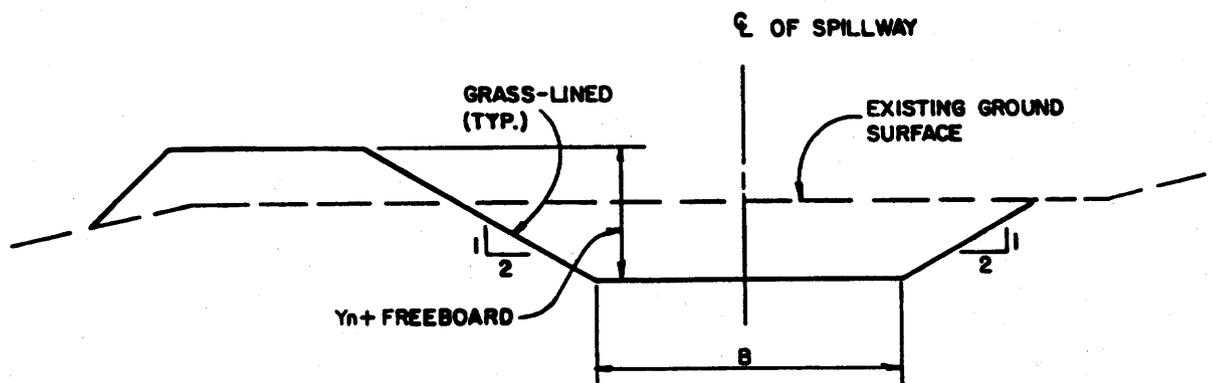
ORIGINATOR: S.B.

DRAWN BY: K.W.

DATE: NOV., 1992



**TYPICAL LINED (EROSION PROTECTION MAT)
TEMPORARY CHANNEL**
NOT TO SCALE



TYPICAL GRASS LINED TEMPORARY CHANNEL
NOT TO SCALE

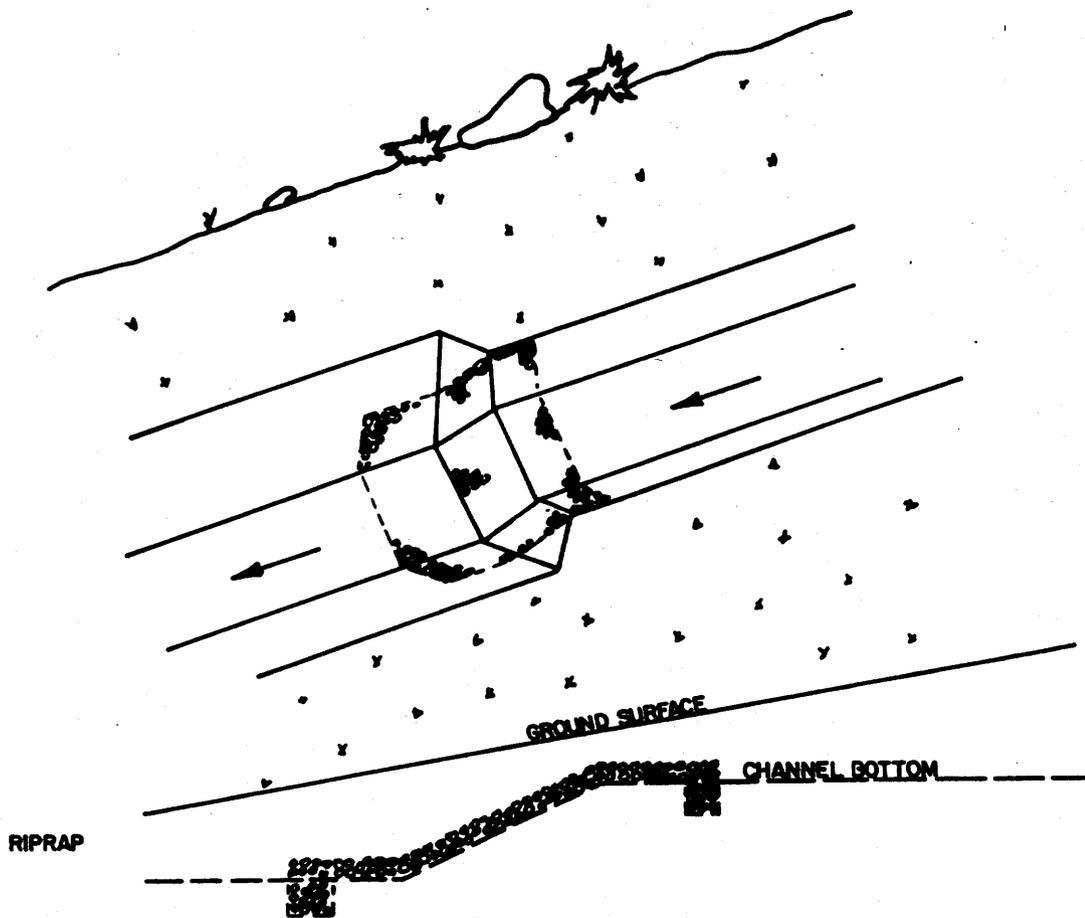
VARIABLES

Y_n = NORMAL DEPTH
 B = BOTTOM WIDTH

**SITE DRAINAGE DETAILS
TEMPORARY CHANNELS**

FIGURE 5.1.6-10

REPORT NO. : DOE/OR/21548-411		DRAWING NO. :	
ORIGINATOR : S.B.	DRAWN BY : K.W.	DATE : NOV., 1992	



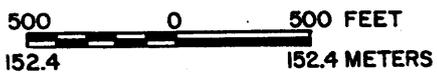
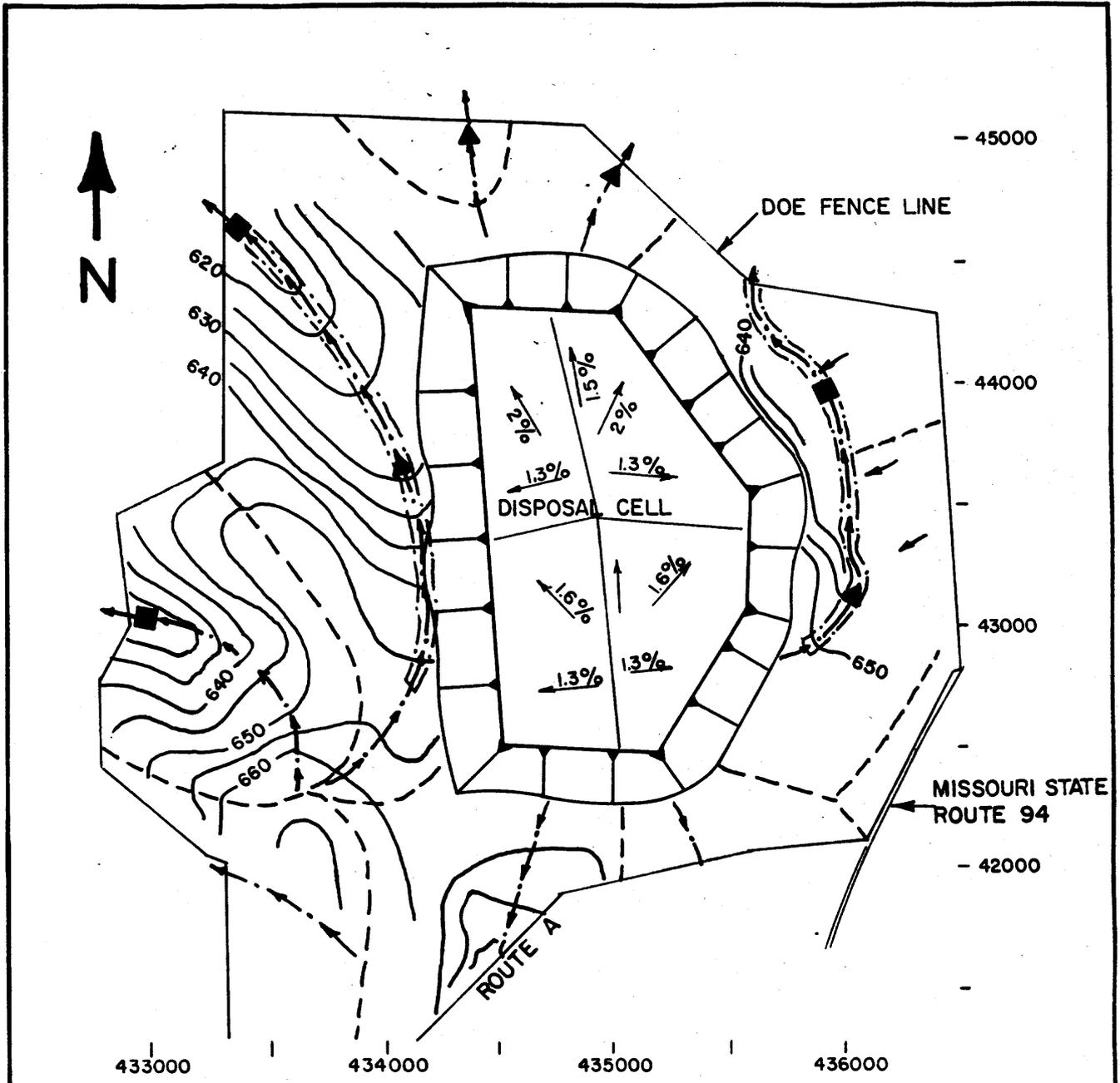
**ROCK RIPRAP DROP STRUCTURE
(PROTECTION UPSTREAM AND DOWNSTREAM)**

NOT TO SCALE

**SITE DRAINAGE DETAILS
DROP STRUCTURE**

FIGURE 5.1.6-11

REPORT NO.: DOE/OR/21548-411		DRAWING NO.:	
ORIGINATOR:	S.B.	DRAWN BY:	K.W.
		DATE:	NOV., 1992

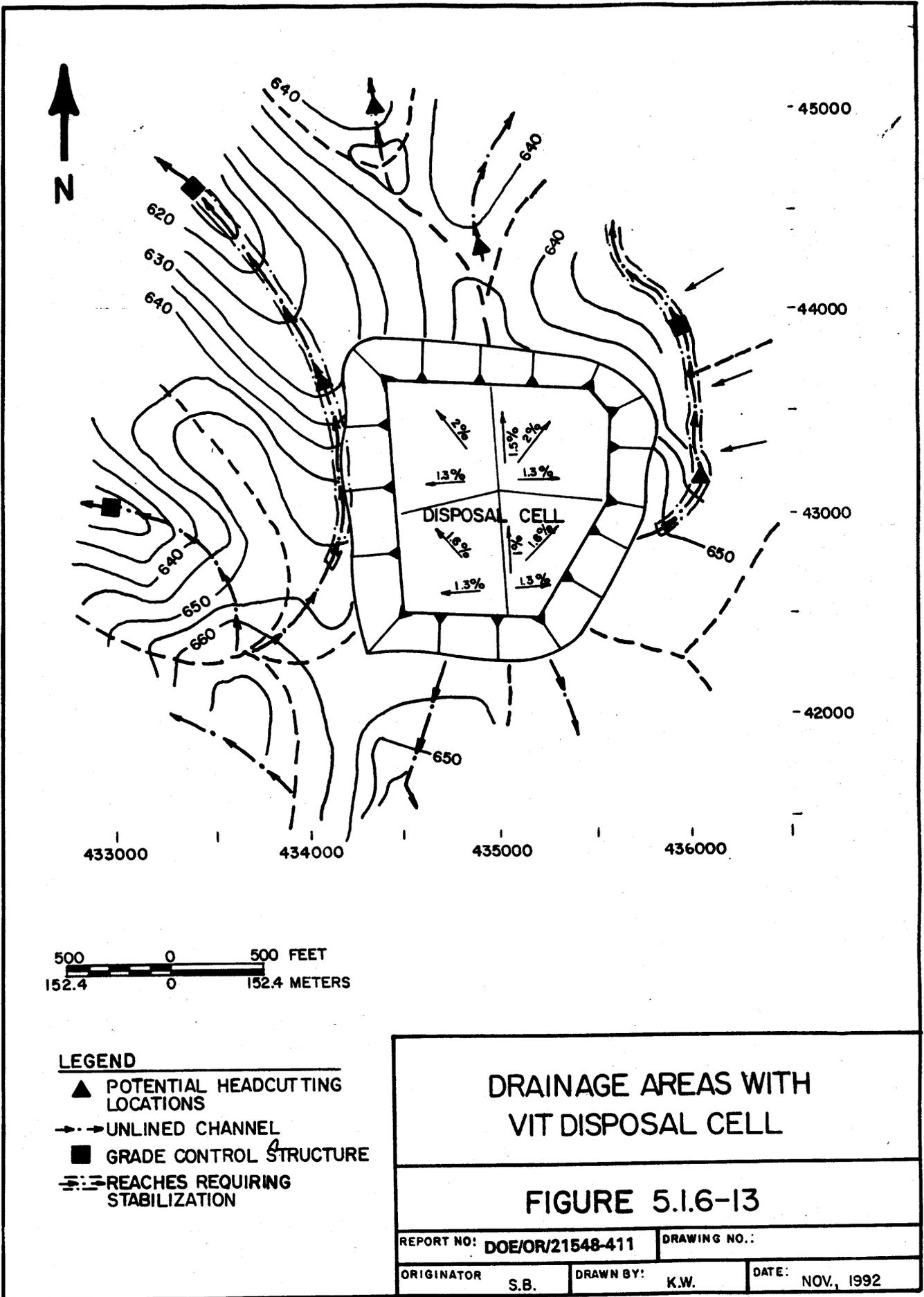


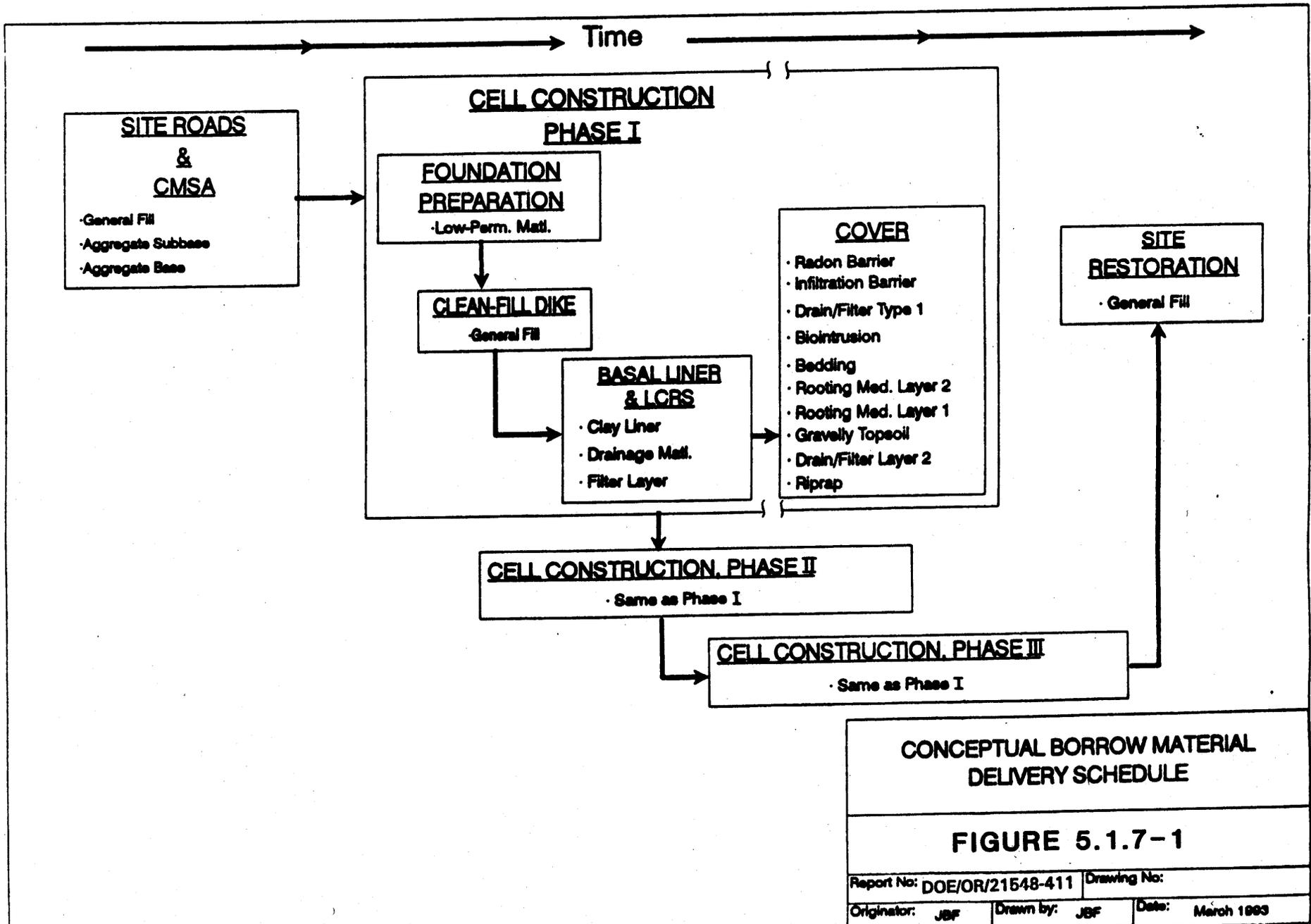
- LEGEND**
- ▲ POTENTIAL HEADCUTTING LOCATIONS
 - UNLINED CHANNEL
 - GRADE CONTROL STRUCTURE
 - ▨ REACHES REQUIRING STABILIZATION

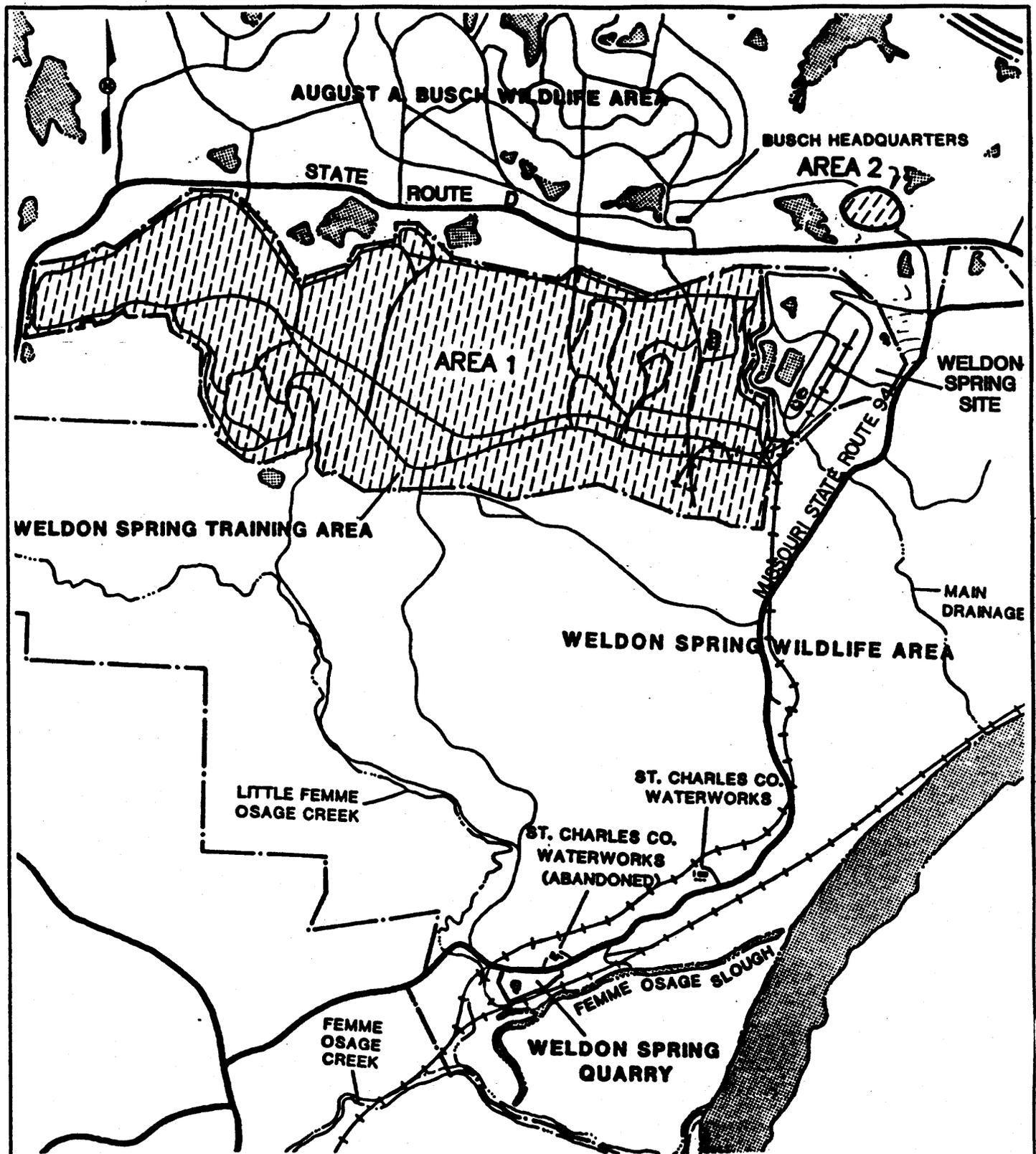
**PERMANENT DRAINAGE
STRUCTURES**

FIGURE 5.1.6-12

REPORT NO.: DOE/OR/21548-411	DRAWING NO.:
ORIGINATOR: S.B.	DRAWN BY: K.W.
DATE: NOV., 1992	







LEGEND

 POTENTIAL LOW - PERMEABILITY BORROW SOURCE AREAS

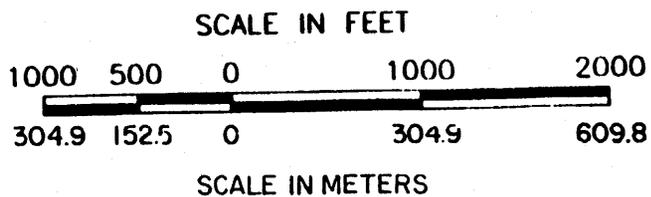
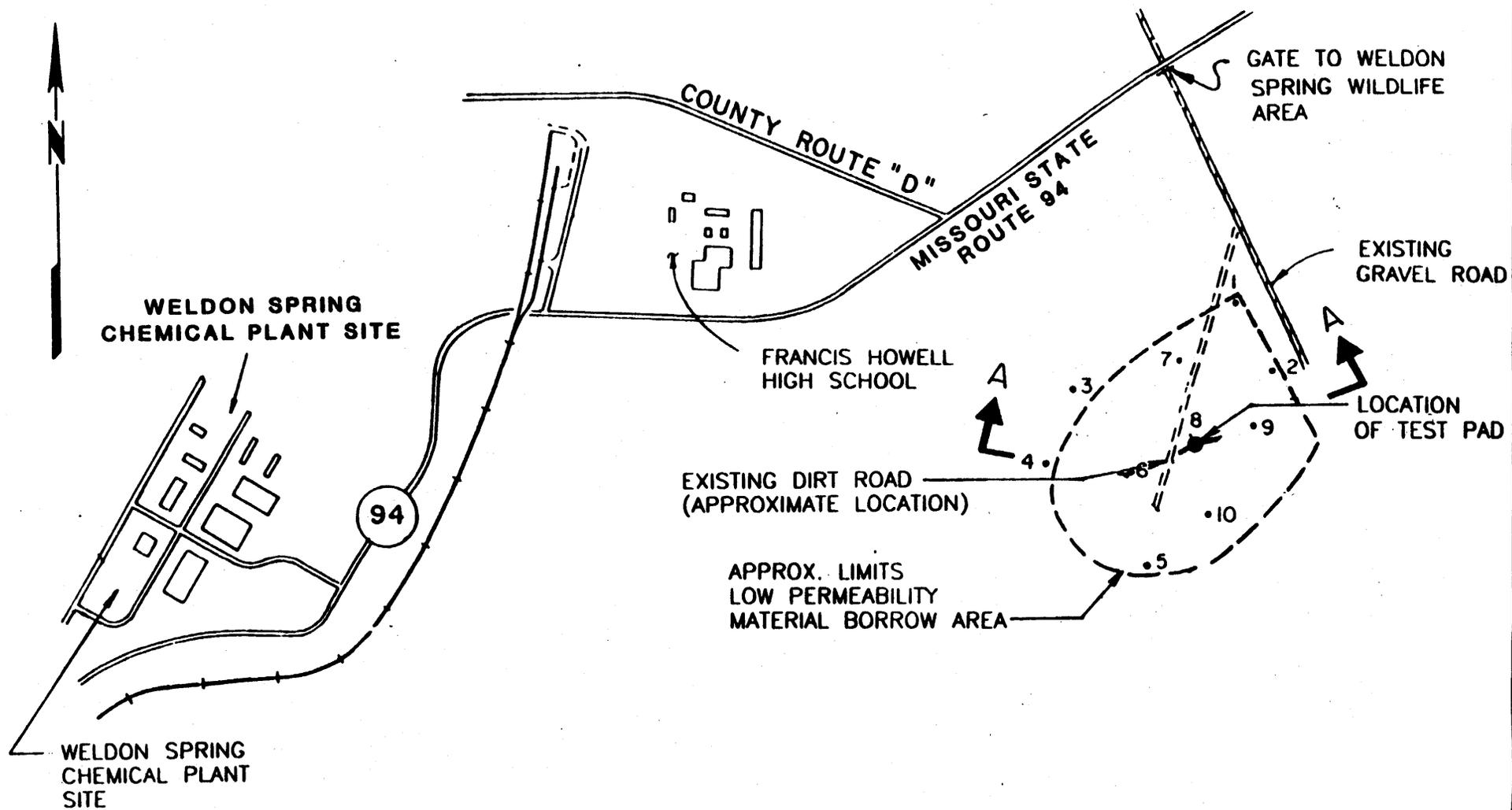
SCALE

0 3000 6000 FT
 0 914.4 18200 M

LOCATIONS OF POTENTIAL LOW PERMEABILITY BORROW SOURCE AREAS CONSIDERED (AREAS 1 & 2)

FIGURE 5.1.7-2

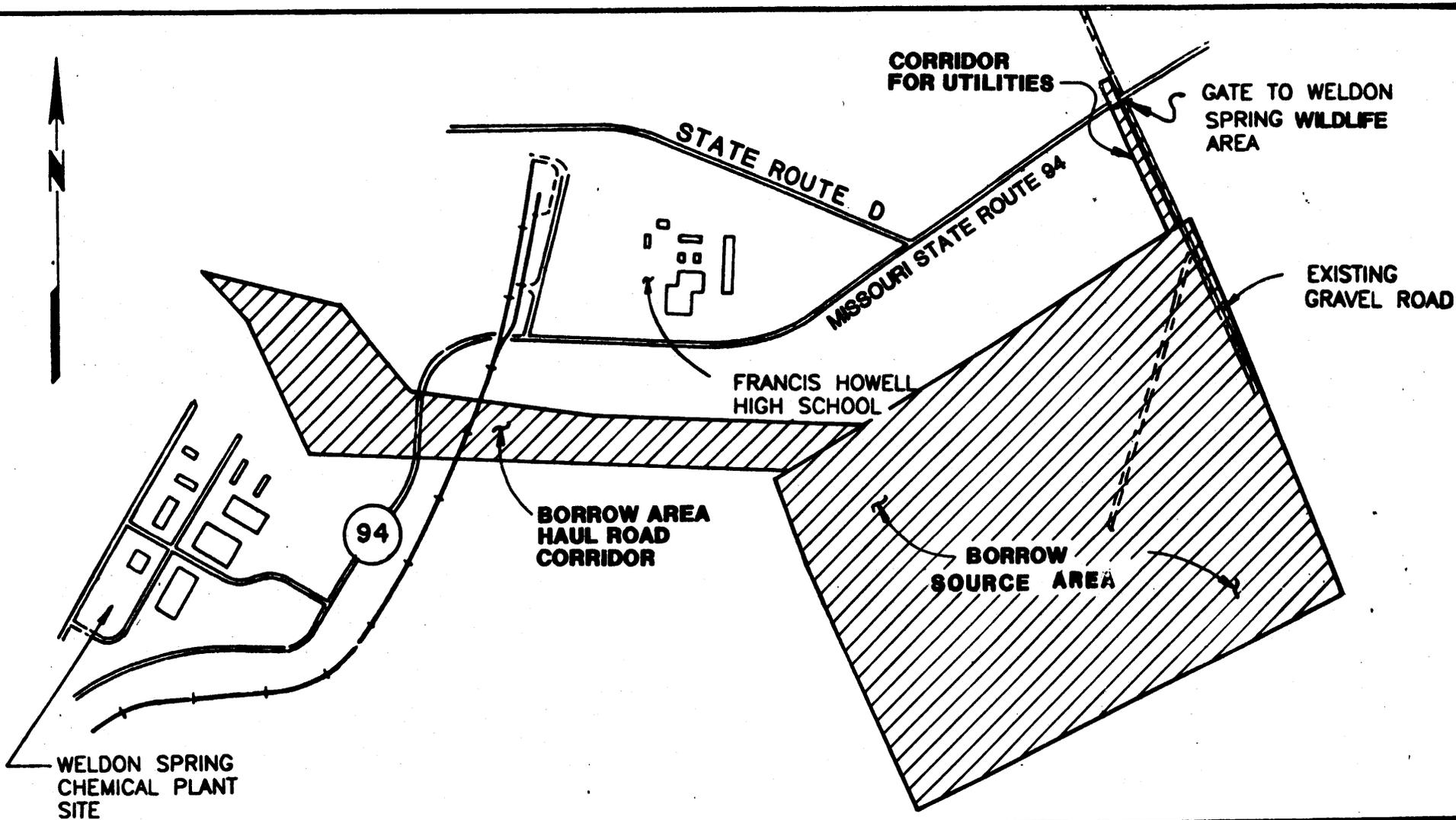
REPORT NO. DOE/OR/21548-411	DRAWING NO.
ORIGINATOR: KWL	DRAWN BY: JRM
DATE: MARCH 1993	



LOCATIONS OF POTENTIAL LOW PERMEABILITY BORROW AREAS CONSIDERED (CONT'D) (AREA 3)

FIGURE 5.1.7-3

REPORT NO.	DOE/OR/21548-411	DRAWING NO.	
OPERATOR	PS	DRAWN BY	JRM
		DATE	MARCH 1993



LEGEND

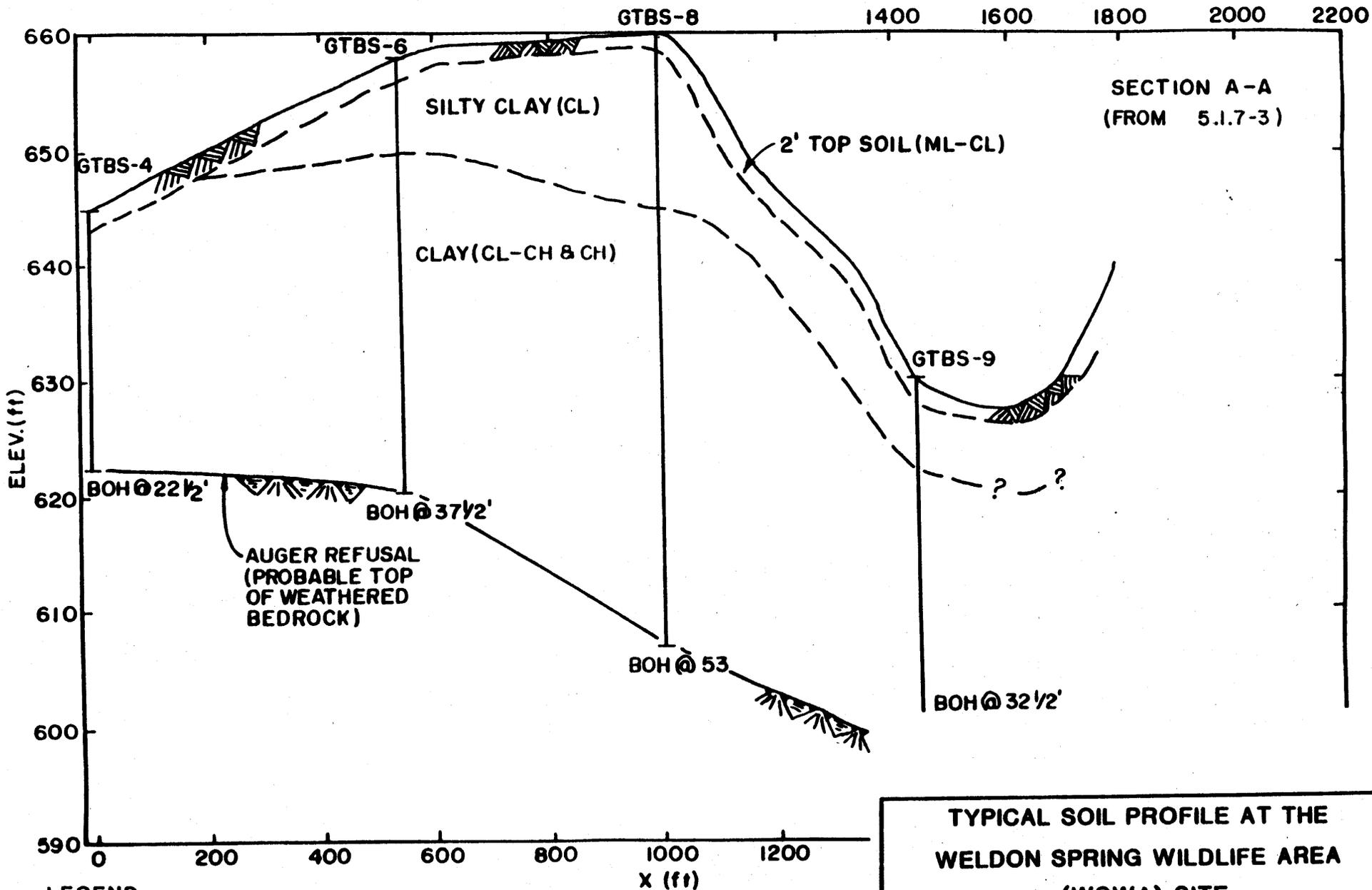
 **BORROW SOURCE AREA**

**LOCATION OF POTENTIAL BORROW SOURCE
AREA FOR LOW PERMEABILITY MATERIAL
AND GENERAL FILL (AREA 3-EXPANDED)**

FIGURE 5.1.7-4

REPORT NO. DOE/OR/21548-411 DRAWING NO.

ORIGINATOR: PS DRAWN BY: AMA DATE: MARCH 1993



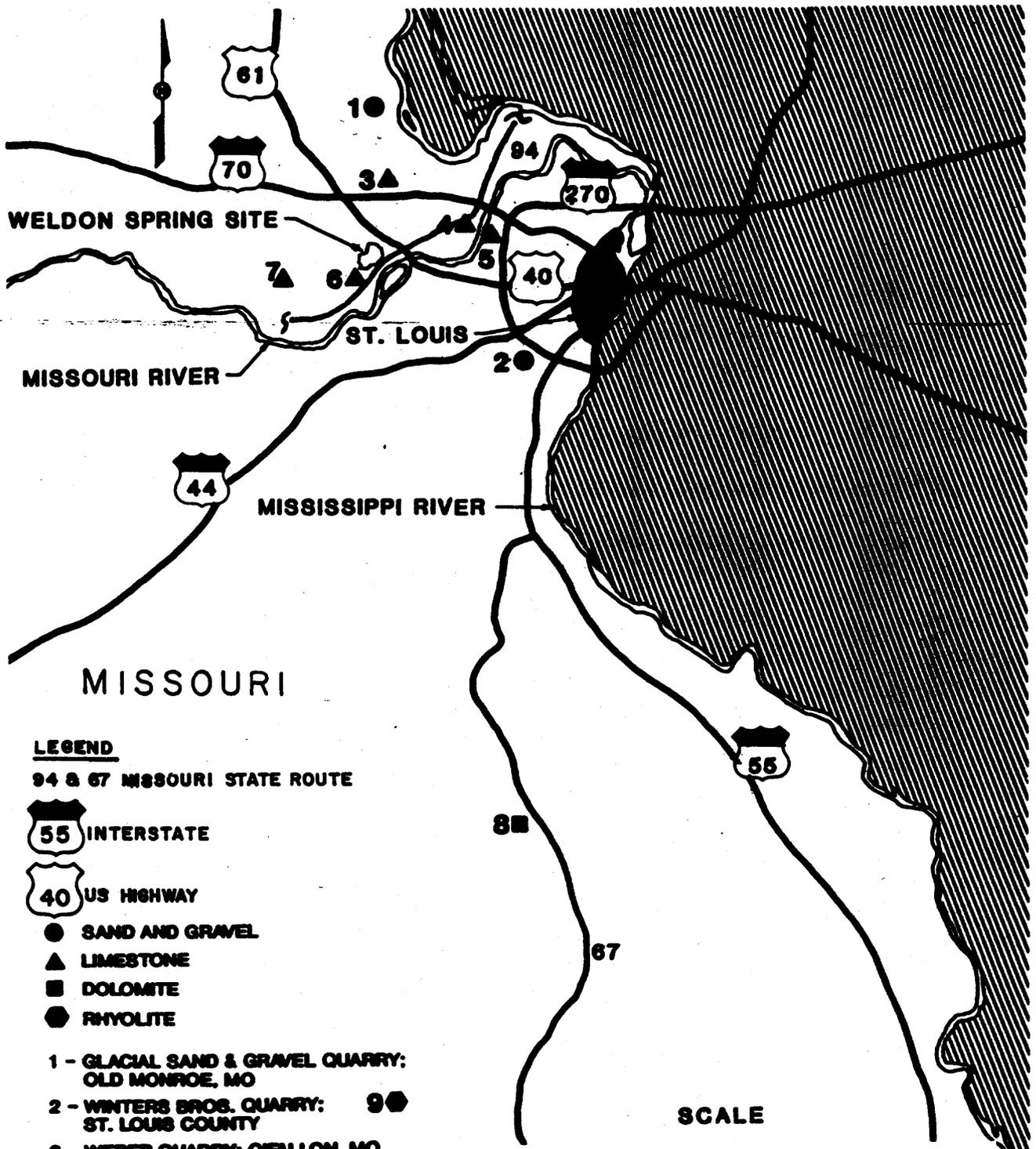
LEGEND

GTBS - GEOTECHNICAL BOREHOLE, BORROW SOURCE
BOH - BOTTOM OF HOLE

**TYPICAL SOIL PROFILE AT THE
WELDON SPRING WILDLIFE AREA
(WSWA) SITE**

FIGURE 5.1.7-5

REPORT NO.	DOE/OR/21548-411	DRAWING NO.	
DESIGNED BY	PS	DRAWN BY	BH
DATE	MARCH 1993		



LEGEND

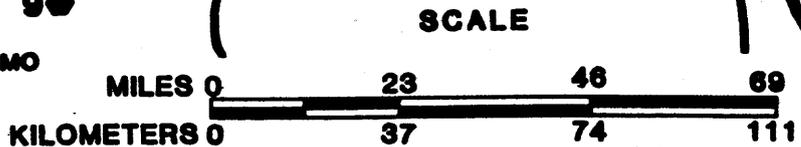
94 & 67 MISSOURI STATE ROUTE

55 INTERSTATE

40 US HIGHWAY

- SAND AND GRAVEL
- ▲ LIMESTONE
- DOLOMITE
- ◆ RHYOLITE

- 1 - GLACIAL SAND & GRAVEL QUARRY:
OLD MONROE, MO
- 2 - WINTERS BROS. QUARRY: 9●
ST. LOUIS COUNTY
- 3 - WEBER QUARRY: O'FALLON, MO
- 4 - ST. CHARLES QUARRY:
ST. CHARLES, MO
- 5 - WEBER QUARRY (N.PIT):
ST. LOUIS COUNTY
- 6 - DEFIANCE QUARRY; DEFIANCE, MO
- 7 - JOERLING QUARRY:
NEW MELLE, MO
- 8 - ST. FRANCOIS QUARRY:
FARMINGTON, MO
- 9 - QUALITY AGG QUARRY:
PIEDMONT, MO



QUARRY LOCATIONS INVESTIGATED
FOR BORROW MATERIALS
(SAND, GRAVEL AND ROCK)

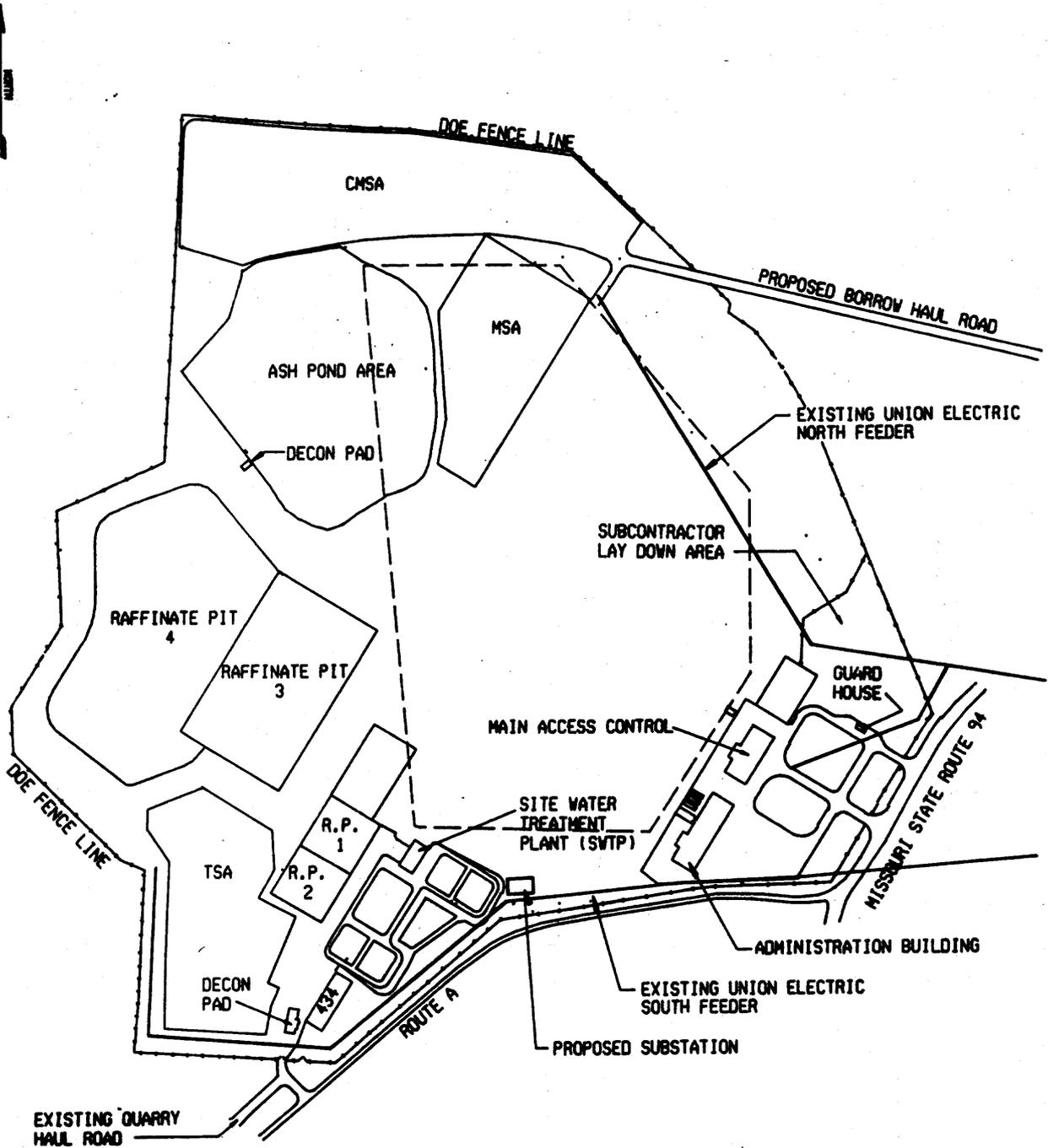
FIGURE 5.1.7-6

REPORT NO. DOE/OR/21548-411 DRAWING NO.

ORIGINATOR: PS

DRAWN BY: JRM

DATE: MARCH 1993

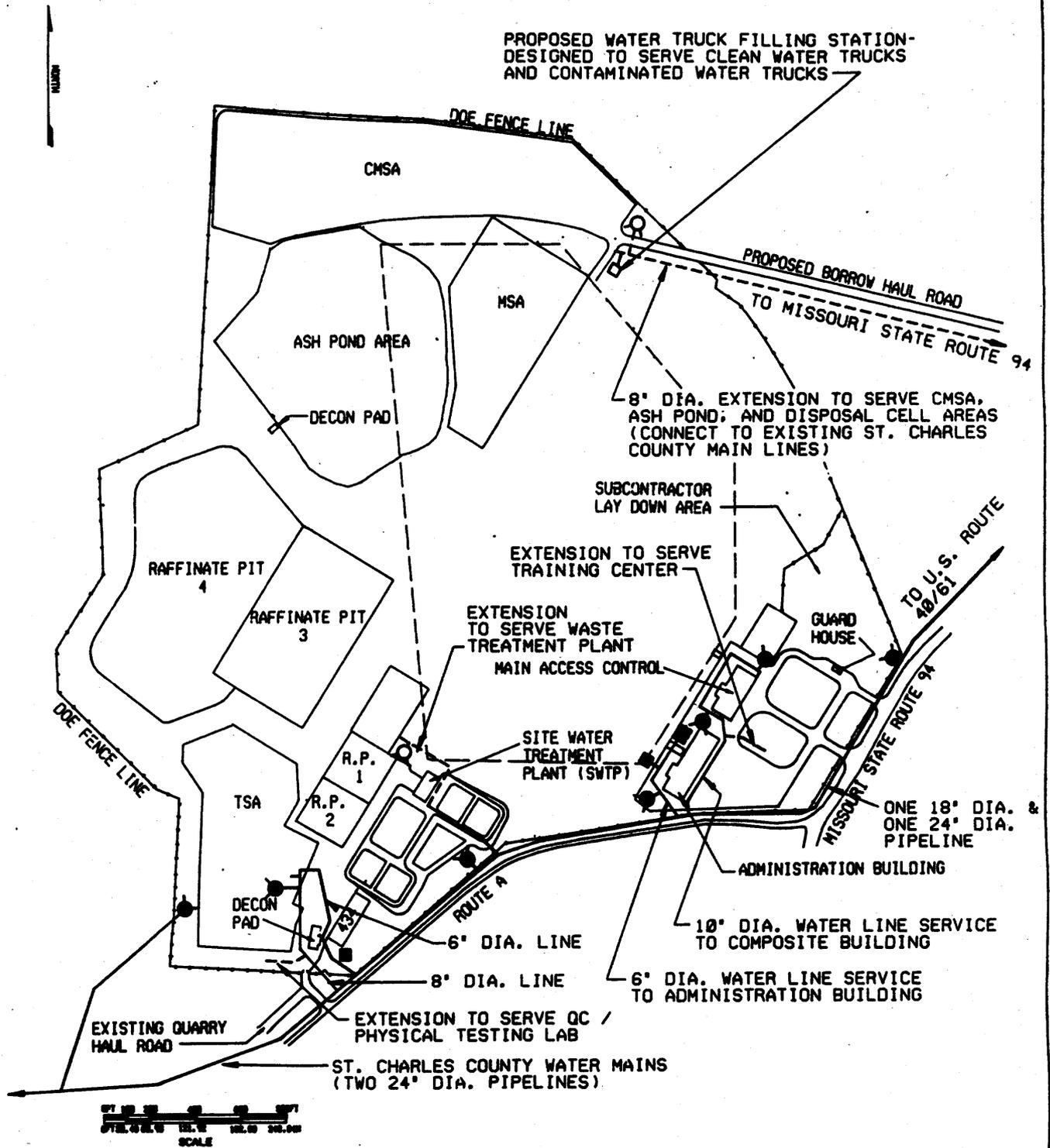


LEGEND
 OUTLINE OF DISPOSAL CELL
 (TO BE CONSTRUCTED) - - - - -

ELECTRICAL DISTRIBUTION SYSTEM

FIGURE 5.1.8-1

REPORT NO: DOE/OR/21548-411	DRAWING NO:
ORIGINATOR: E.G.C.	DRAWN BY: G.V.R.
DATE: APRIL 1993	



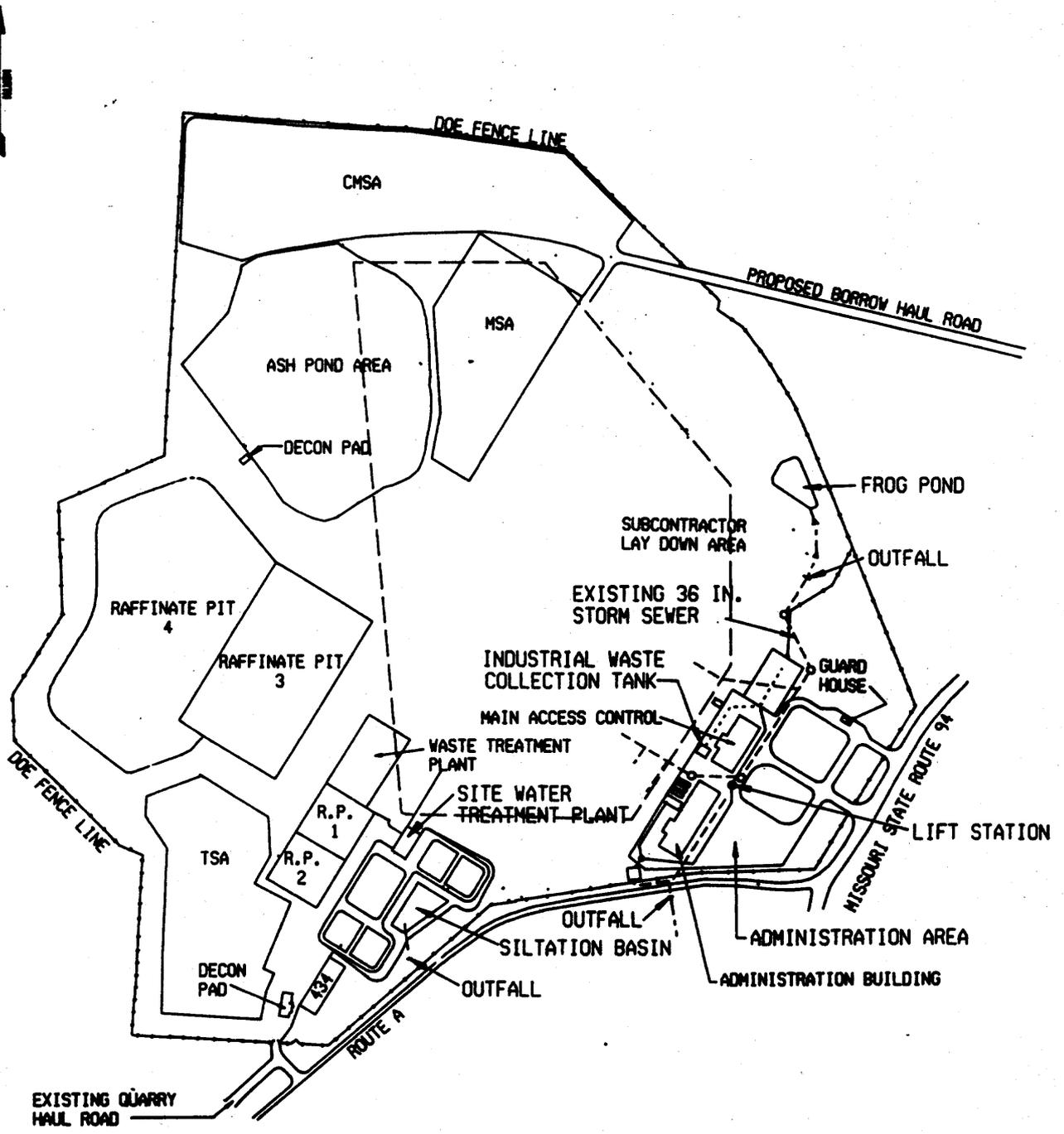
LEGEND

- OUTLINE OF DISPOSAL CELL
(TO BE CONSTRUCTED) -----
- EXISTING WATERLINE =====
- PROPOSED WATERLINE - - - - -
- EXISTING FIRE HYDRANT ●
- PROPOSED FIRE HYDRANT ○
- EXISTING WATER TRUCK FILLING STATION ■
- PROPOSED WATER TRUCK FILLING STATION □

WATER UTILITIES SITE PLAN

FIGURE 5.1.8-2

REPORT NO: DOE/OR/21548-411	DRAWING NO:
ORIGINATOR: E.G.C.	DATE: APRIL 1993
DRAWING BY: G.V.R.	



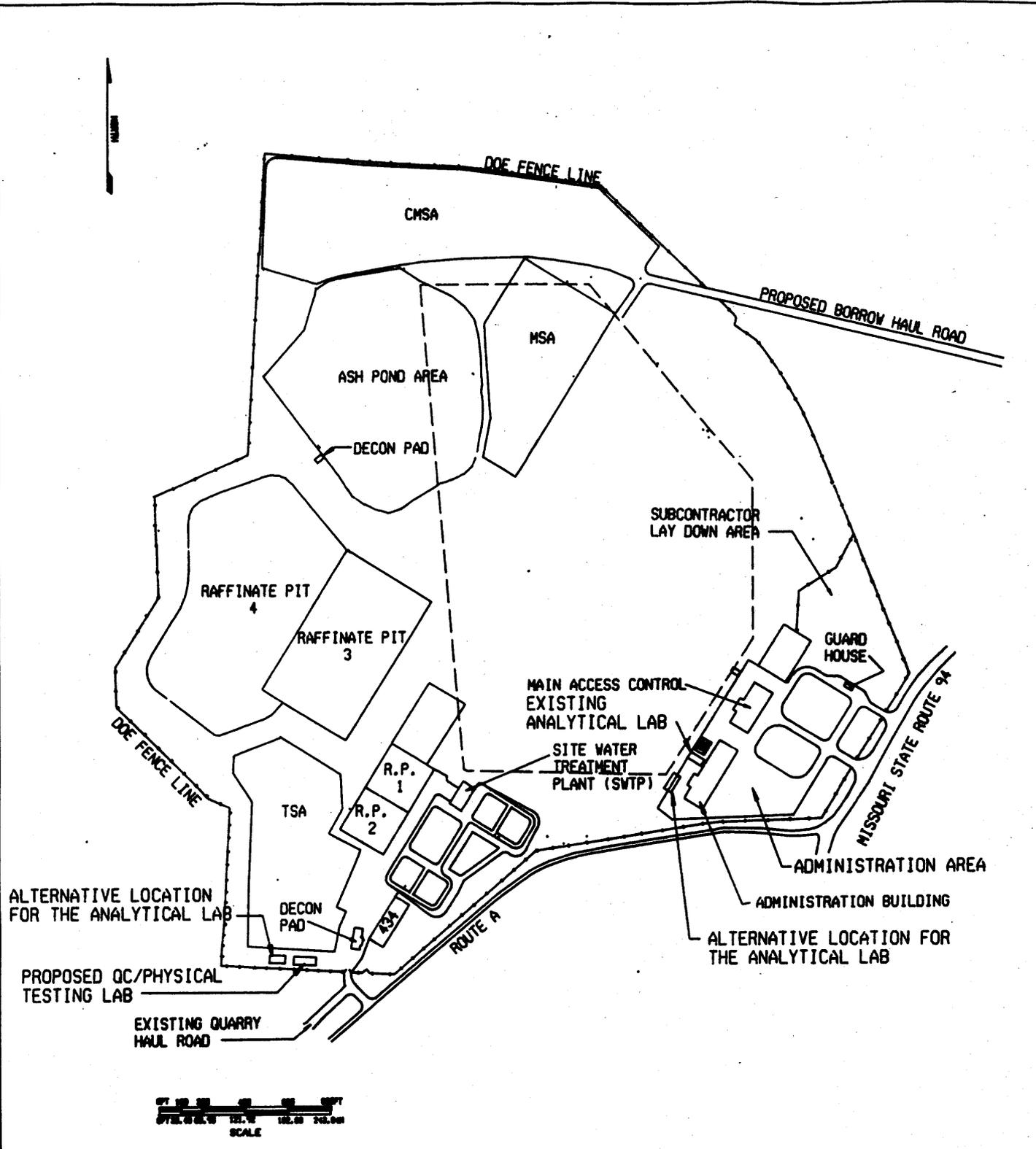
LEGEND

OUTLINE OF DISPOSAL CELL (TO BE CONSTRUCTED)	---
EXISTING STORM SEWER	- - - - -
EXISTING SANITARY SEWER	— — — — —
EXISTING MANHOLE	o
SURFACE DRAINAGE	- - - - ->
INDUSTRIAL WASTE SEWER

SEWER UTILITIES SITE PLAN

FIGURE 5.1.8-3

REPORT NO:	DOE/OR/21548-411	DRAWING NO:	
ORGANIZATION:	E.G.C.	DRAWING BY:	G.W.R.
		DATE:	APRIL 1993



ALTERNATIVE LOCATION FOR THE ANALYTICAL LAB
 PROPOSED QC/PHYSICAL TESTING LAB
 EXISTING QUARRY HAUL ROAD

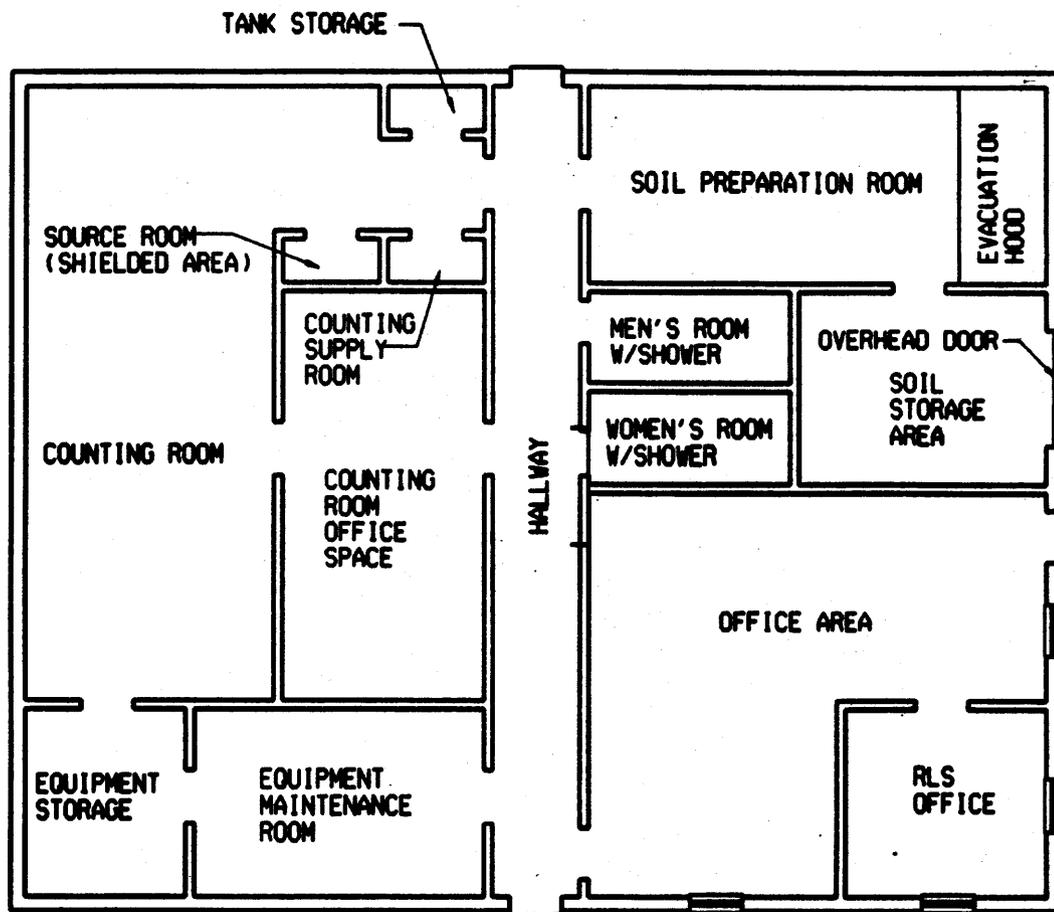


LEGEND
 OUTLINE OF DISPOSAL CELL (TO BE CONSTRUCTED) - - - - -

LABORATORY LOCATION PLAN

FIGURE 5.1.8-4

REPORT NO: DOE/OR/21548-411	DRAWING NO:
ORIGINATOR: E.G.C.	DRAWING BY: G.W.R.
	DATE: APRIL 1993



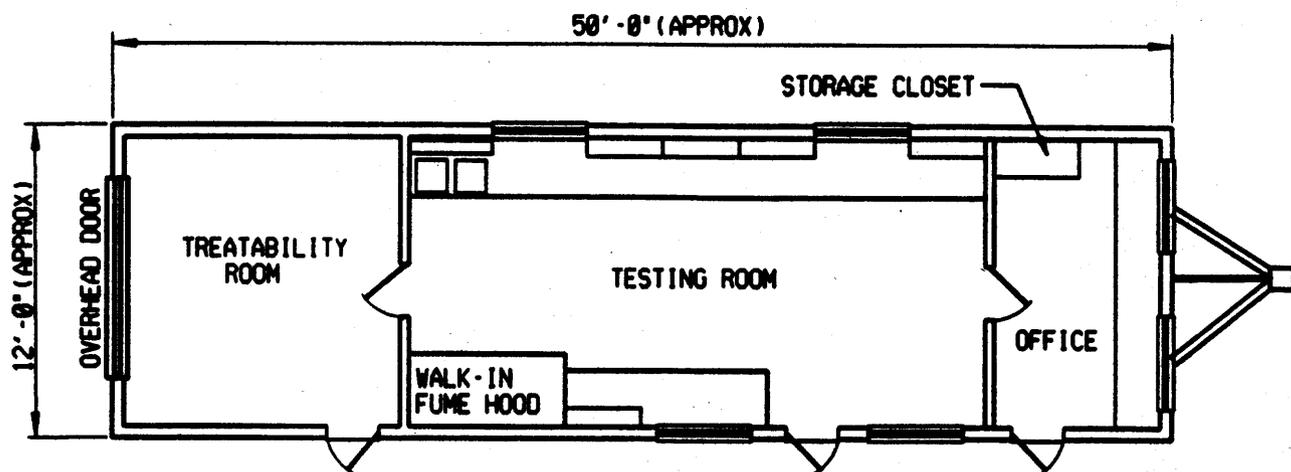
PLAN VIEW

NOT TO SCALE

ANALYTICAL RADIO-CHEMISTRY LAB

FIGURE 5.1.8-5

REPORT NO:	DOE/OR/21548-411	DRAWING NO:	W03840/EC51052.DGN
ORIGINATOR:	E.G.C.	DRAWN BY:	G.V.R.
		DATE:	APRIL 1993



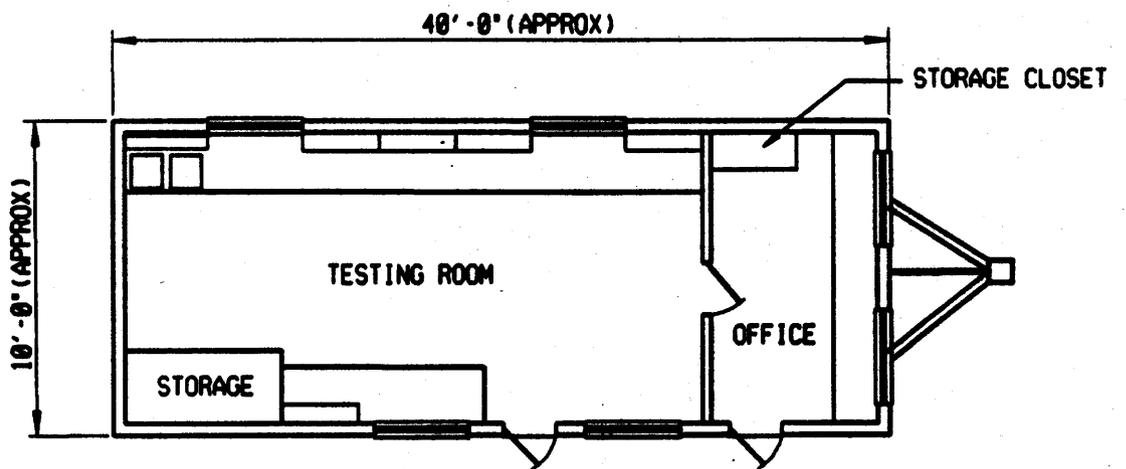
TYPICAL PLAN VIEW

NOT TO SCALE

QC/PHYSICAL TESTING TRAILER

FIGURE 5.1.8-6

REPORT NO. DOE/OR/21548-411	DRAWING NO. W03840/EC51053.DGN
ORIGINATOR: E.G.C.	DRAWING BY: G.W.R. DATE: APRIL 1993



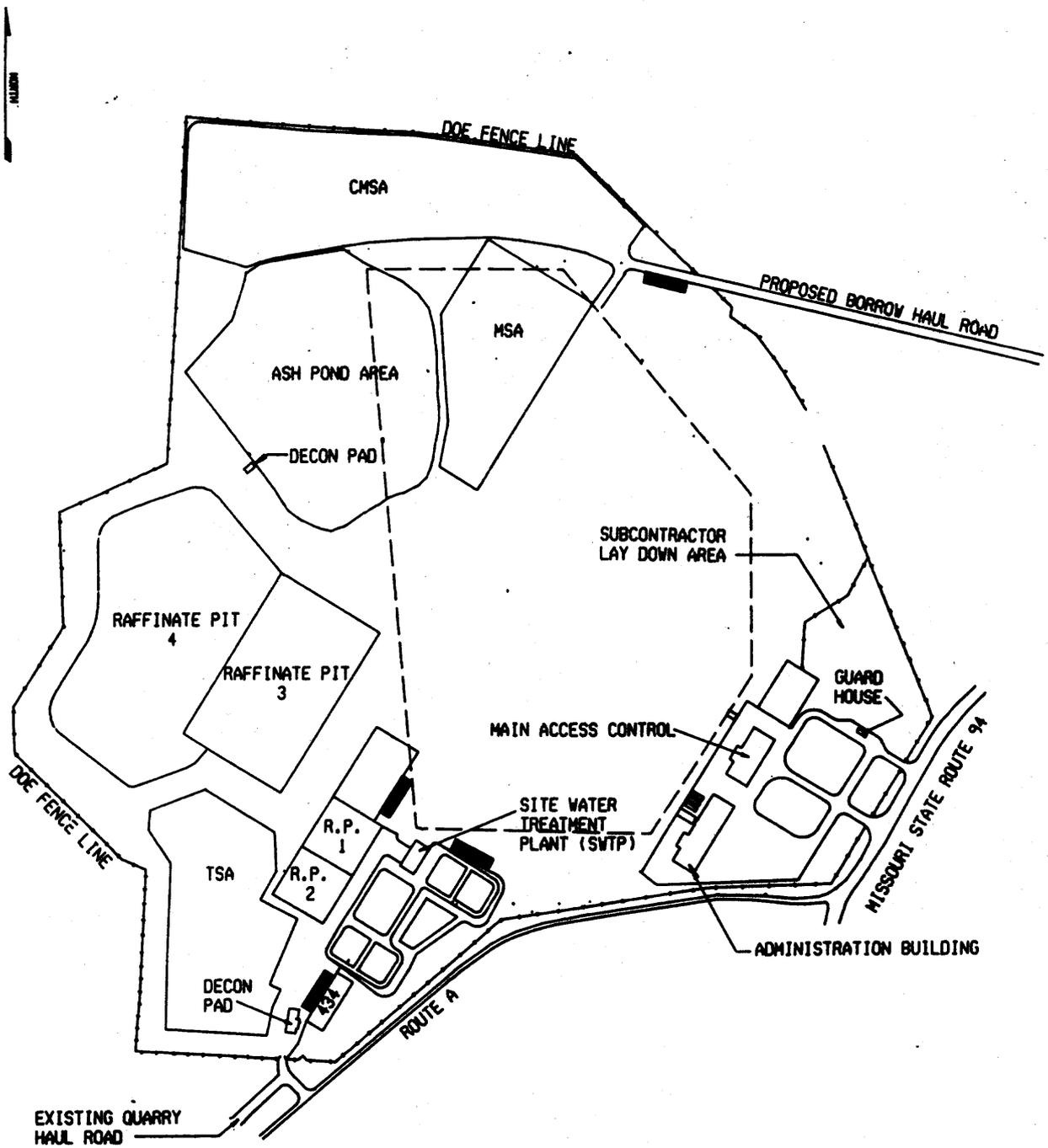
TYPICAL PLAN VIEW

NOT TO SCALE

GEOTECHNICAL TESTING TRAILER

FIGURE 5.1.8-7

REPORT NO.	DOE/OR/21548-411	DRAWING NO.	W03840/EC51054.DGN
ORIGINATOR	E.G.C.	DRAWING BY	G.V.R.
		DATE	MARCH 1993



LEGEND

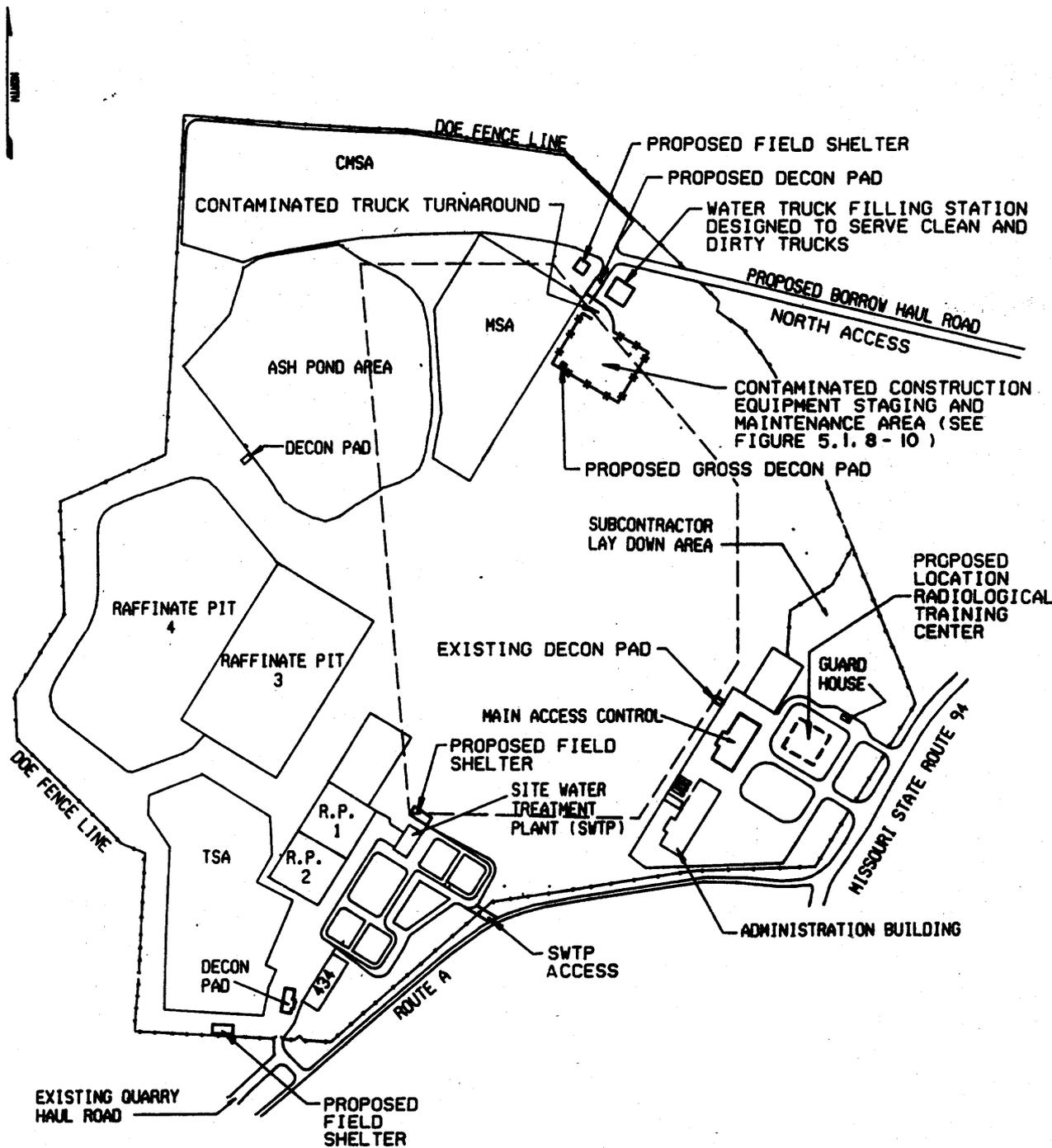
OUTLINE OF DISPOSAL CELL (TO BE CONSTRUCTED)

PROPOSED LOCATION FOR PARKING

CONTROLLED AREA PARKING

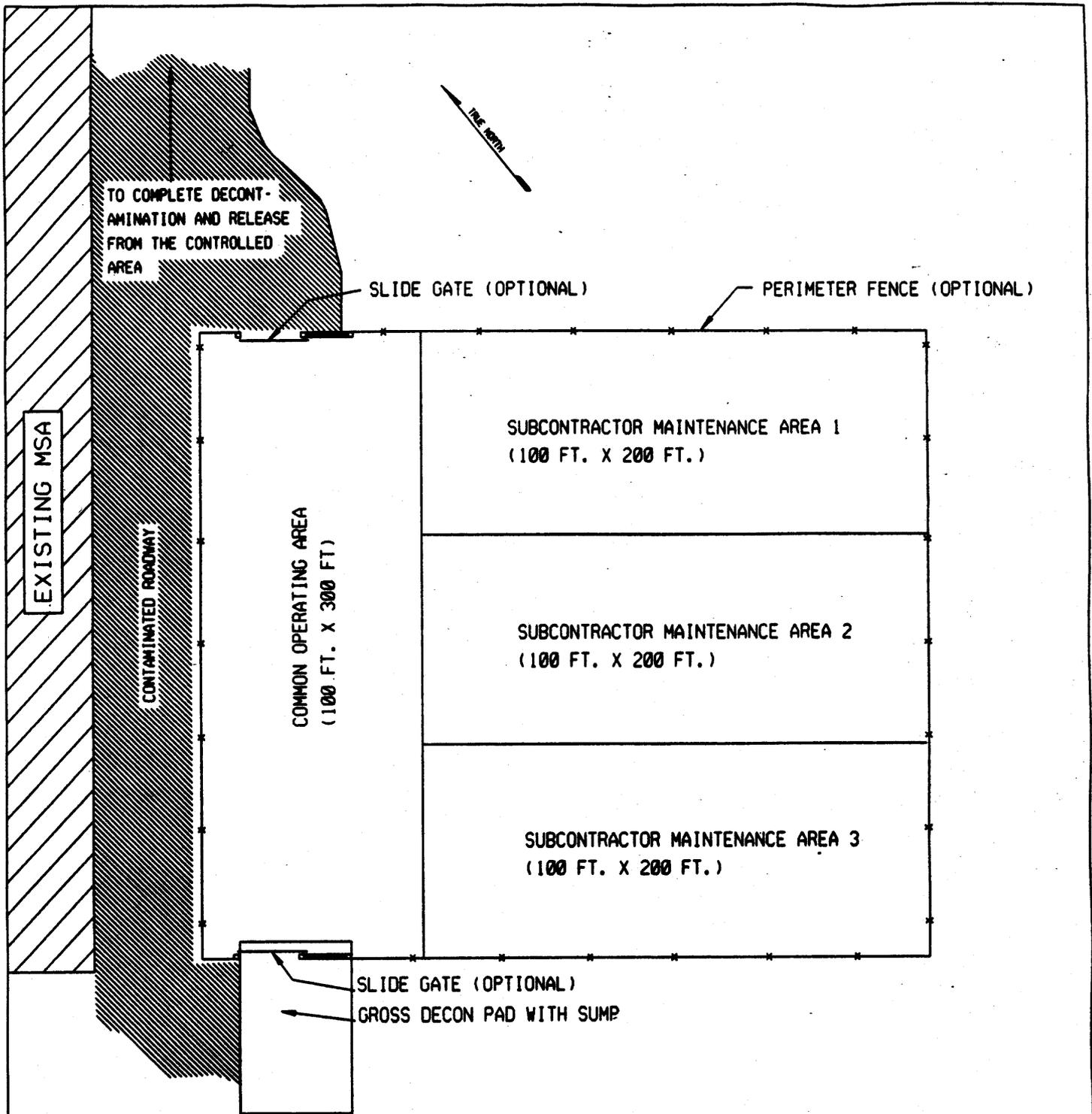
FIGURE 5.1.8-8

REPORT NO:	DOE/OR/21548-411	DRAWING NO:	
ORIGINATOR:	E.G.C.	DRAWING BY:	G.W.R.
		DATE:	APRIL 1993



LEGEND
 OUTLINE OF DISPOSAL CELL
 (TO BE CONSTRUCTED) - - - - -

<h2>ACCESS CONTROL FACILITIES</h2>		
<h3>FIGURE 5.1.8-9</h3>		
REPORT NO: DOE/OR/21548-411	DRAWING NO:	
ORIGINATOR: E.G.C.	DRAWING BY: G.W.R	DATE: APRIL 1993



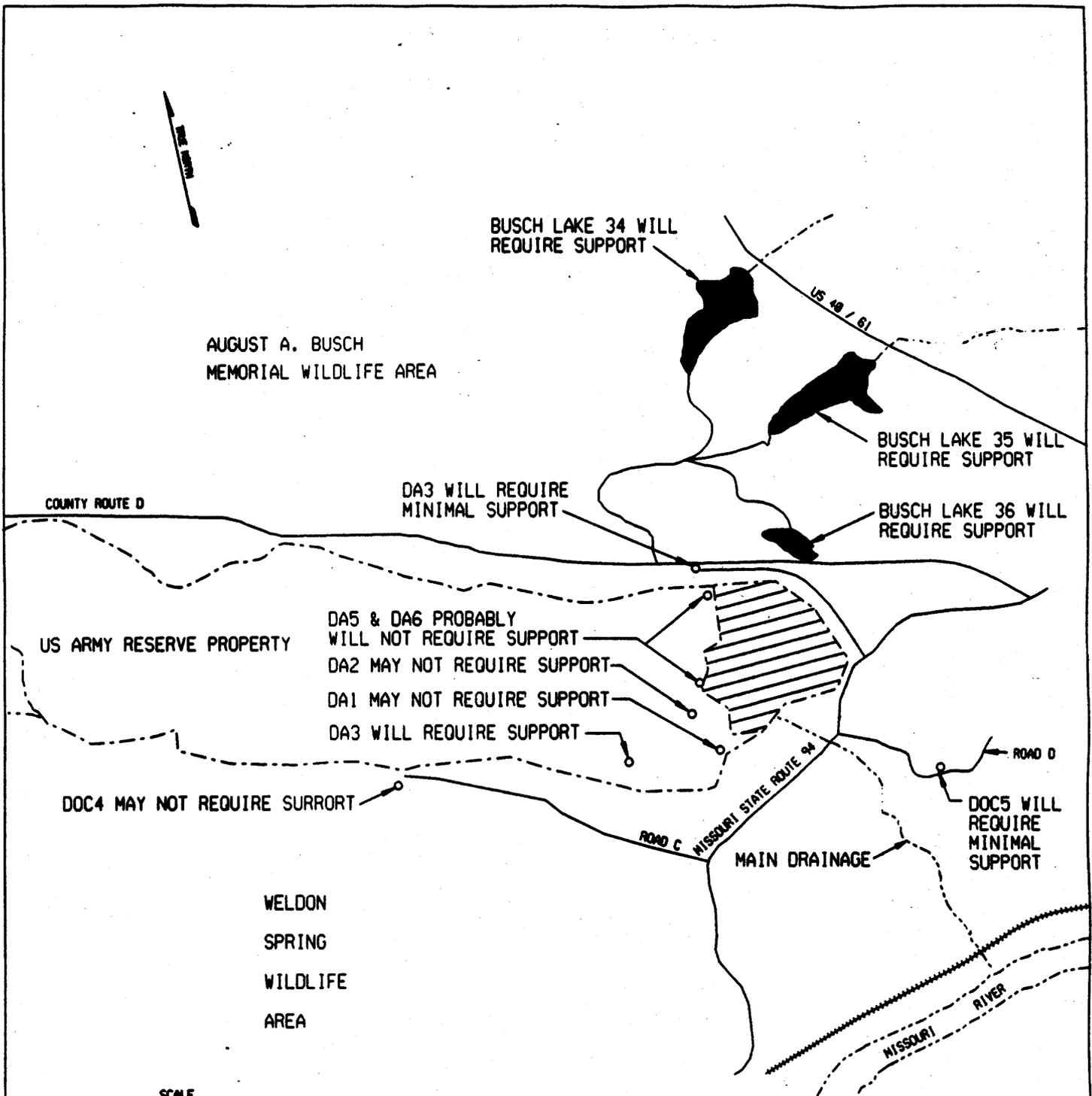
NOTES

1. APPROXIMATE SIZE - 2 ACRES
2. SURFACING IS AGGREGATE
3. SEE FIGURE 5.1.8-9 FOR LOCATION

**CONTAMINATED CONSTRUCTION EQUIPMENT
MAINTENANCE AREA**

FIGURE 5.1.8-10

REPORT NO:	DOE/OR/21548-411	DRAWING NO:	W03840/EC510101.DGN
ORIGINATOR:	E.G.C.	DRAWING BY:	G.W.R
		DATE:	APRIL 1993



LEGEND

DEPARTMENT OF ARMY DA
DEPARTMENT OF CONSERVATION DOC

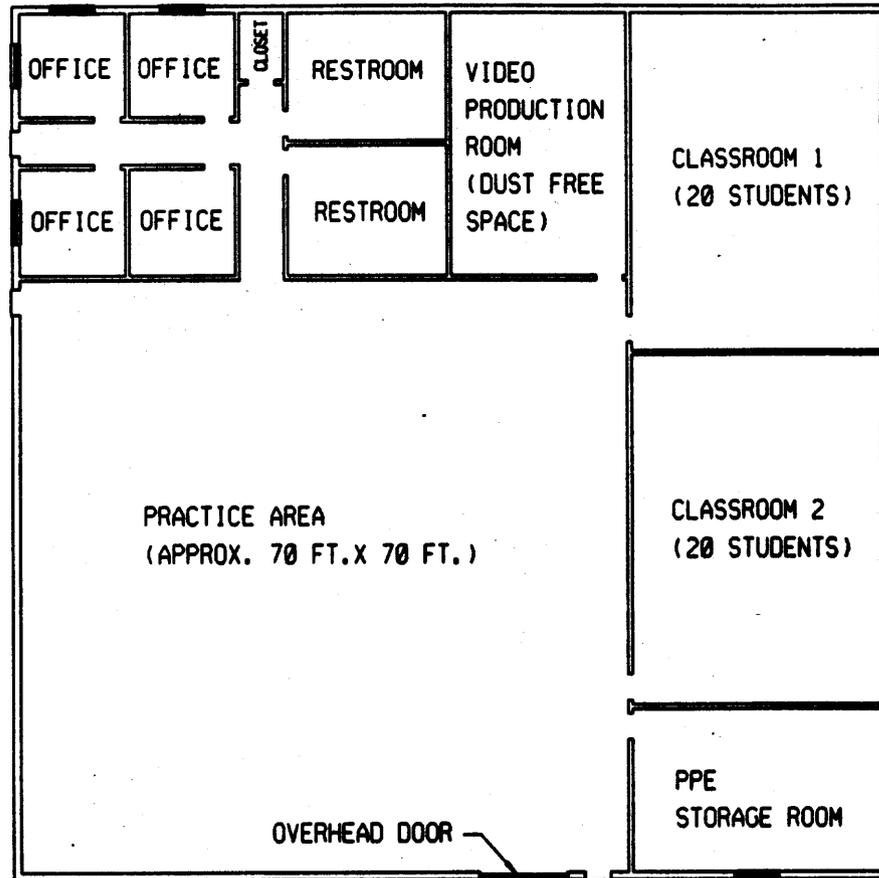
CONTAMINATED LAKE



**VICINITY PROPERTY
SUPPORT LOCATIONS**

FIGURE 5.1.8-11

REPORT NO: DOE/OR/21548-411	DRAWING NO: W03840/EC510141.DGN
ORIGINATOR: E.G.C.	DRAWING BY: G.W.R
	DATE: APRIL 1993



PLAN VIEW

(SEE FIGURE 5.1.8-9 FOR PROPOSED TRAINING CENTER LOCATION)

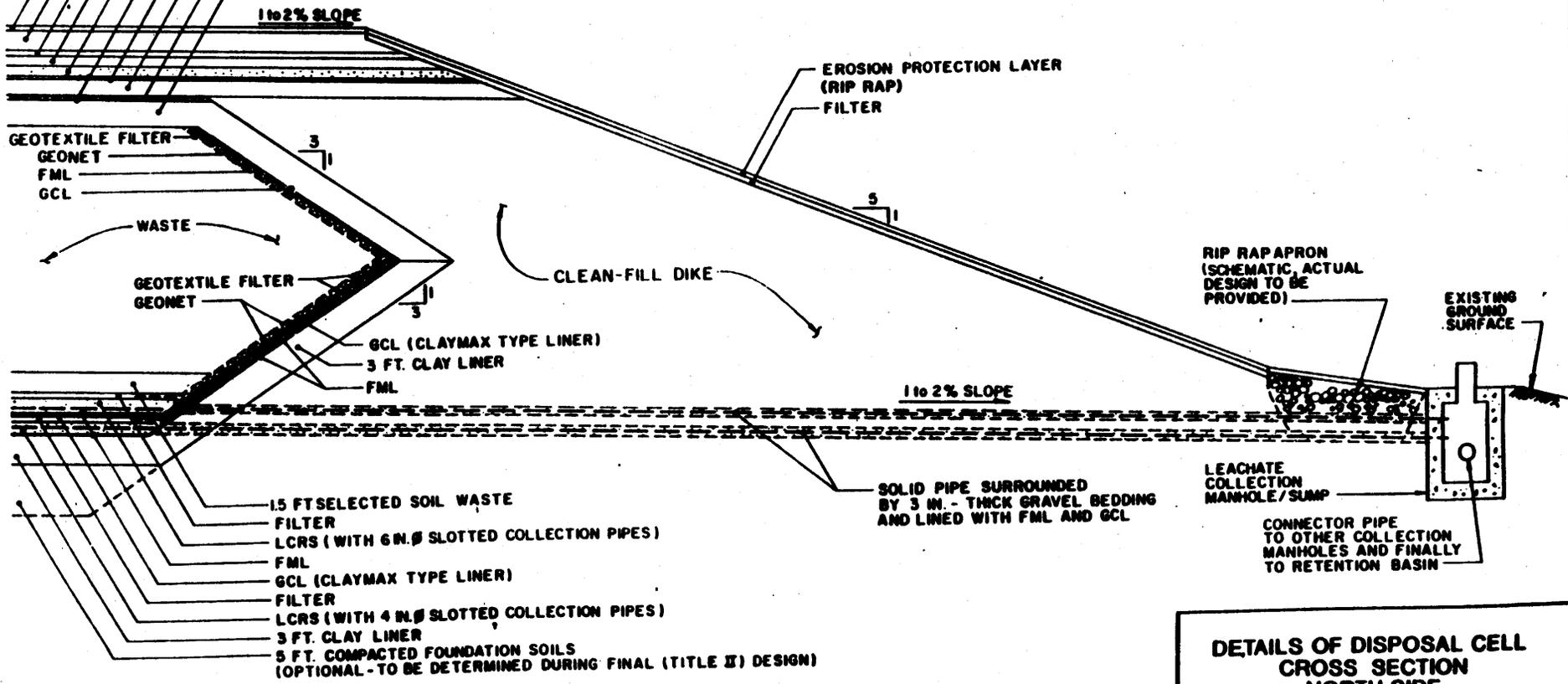
RADIOLOGICAL TRAINING CENTER

FIGURE 5.1.8-12

REPORT NO:	DOE/OR/21548-411	DRAWING NO:	W03840/EC510151.DGN
ORIGINATOR:	E.G.C.	DRAWING BY:	G.W.R
		DATE:	MARCH 1993

- VEGETATIVE TOP COVER
- ROOTING MEDIUM 1 AND 2
- FILTER
- BIOINTRUSION LAYER
- DRAIN / BEDDING LAYER
- FML
- GCL (CLAYMAX TYPE LINER) (OPTIONAL)
- INFILTRATION BARRIER (OPTIONAL)
- COVER FAILURE LEAK DETECTION SYSTEM (GEOGRID AND GEOFABRIC COMPOSITE) (OPTIONAL)
- RADON BARRIER

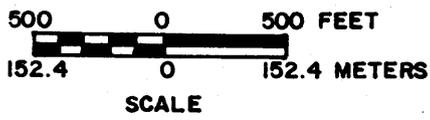
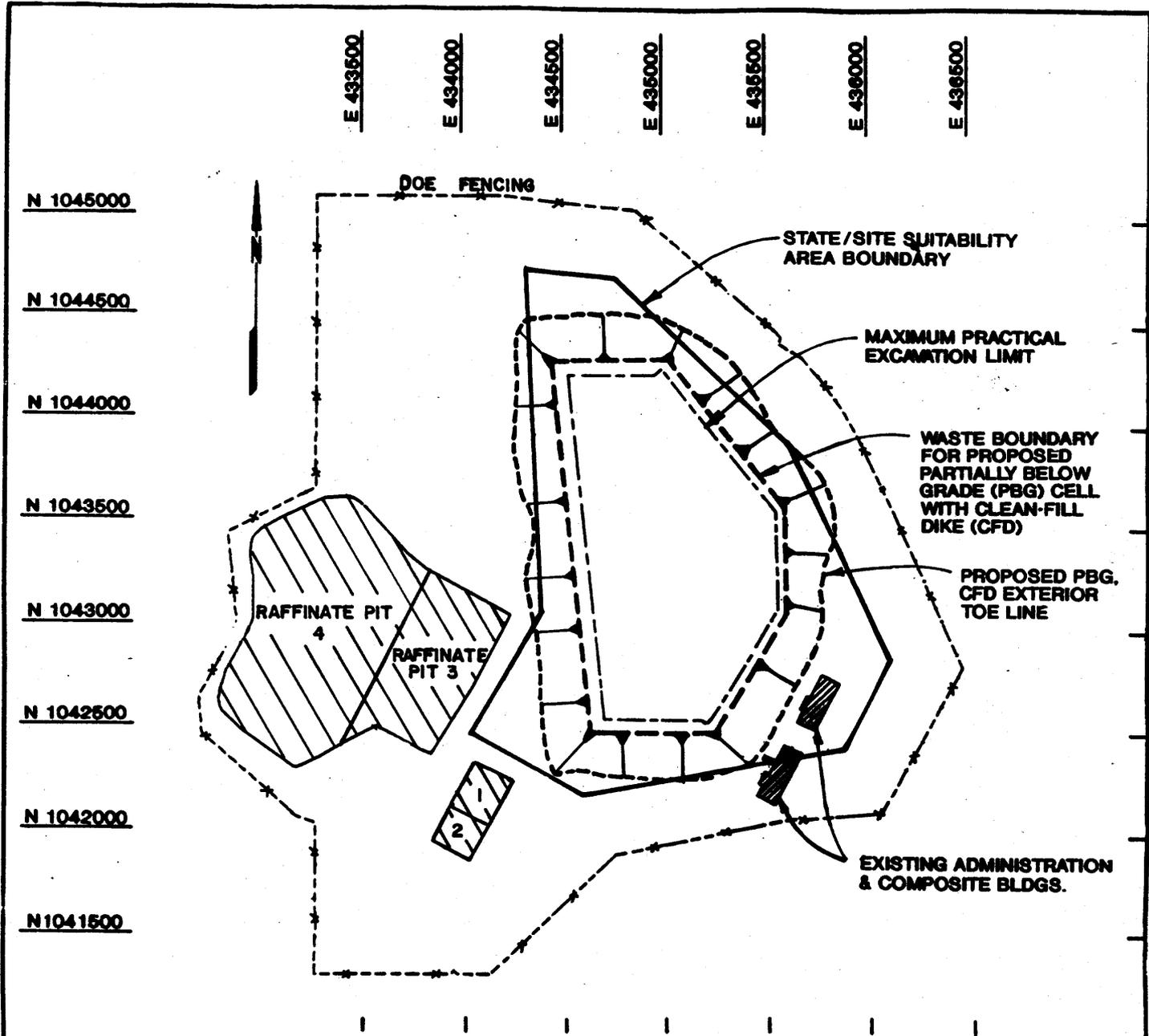
- NOTES:**
1. ANCHOR DETAILS FOR FMLs AND GEOSYNTHETIC PRODUCTS NOT SHOWN.
 2. DETAILS ALSO APPLY TO SECTIONS ON THE SOUTH, EAST AND WEST SIDE OF DISPOSAL CELL, EXCEPT THERE ARE NO COLLECTION PIPES AND COLLECTION SUMPS UNDERNEATH AND OUTSIDE THE CLEAN FILL DIKE.



**DETAILS OF DISPOSAL CELL
CROSS SECTION
NORTH SIDE**

FIGURE 5.2.1-1

REPORT NO: DOE/OR/21548-411	DRAWING NO.:
ORIGINATOR: KWL	DATE:
DRAWN BY: AMA	



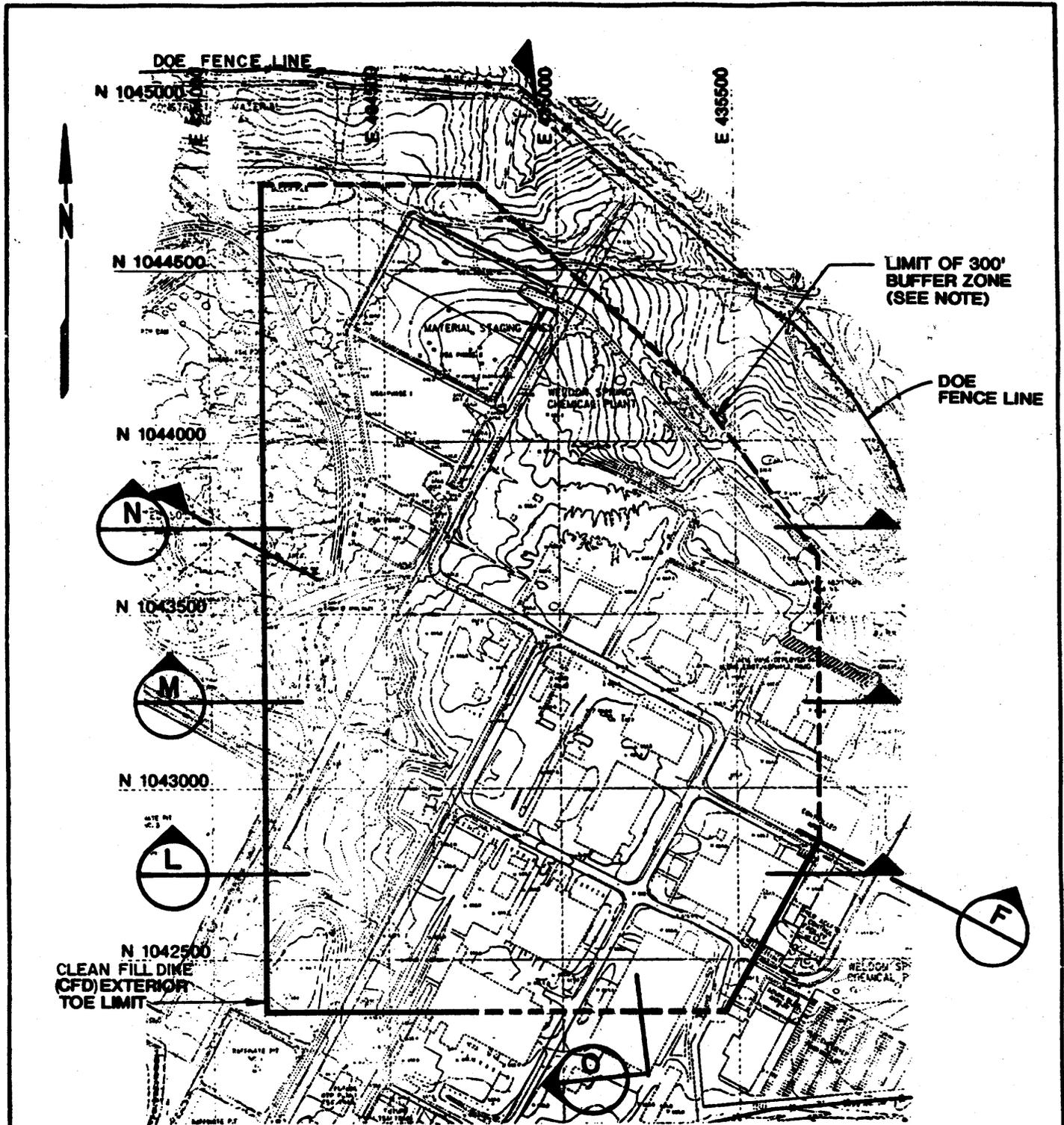
LEGEND

 RAFFINATE PIT

**CELL, SITE, WASTE,
AND STATE SUITABILITY AREA
AND BOUNDARIES
(SCHEMATIC)**

FIGURE 5.2.2-1

REPORT NO.:	DOE/OR/21548-411	DRAWING NO.:	
ORIGINATOR:	KWL	DRAWN BY:	AMA
		DATE:	



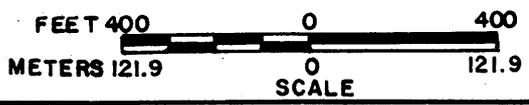
NOTE:

THE LIMIT OF 300-FOOT BUFFER ZONE IS THE TOE LINE OF AN IMAGINARY 3H:1V SLOPE PROJECTED OUTWARD FROM THE OUTERMOST LIMIT OF THE WASTE.

LEGEND



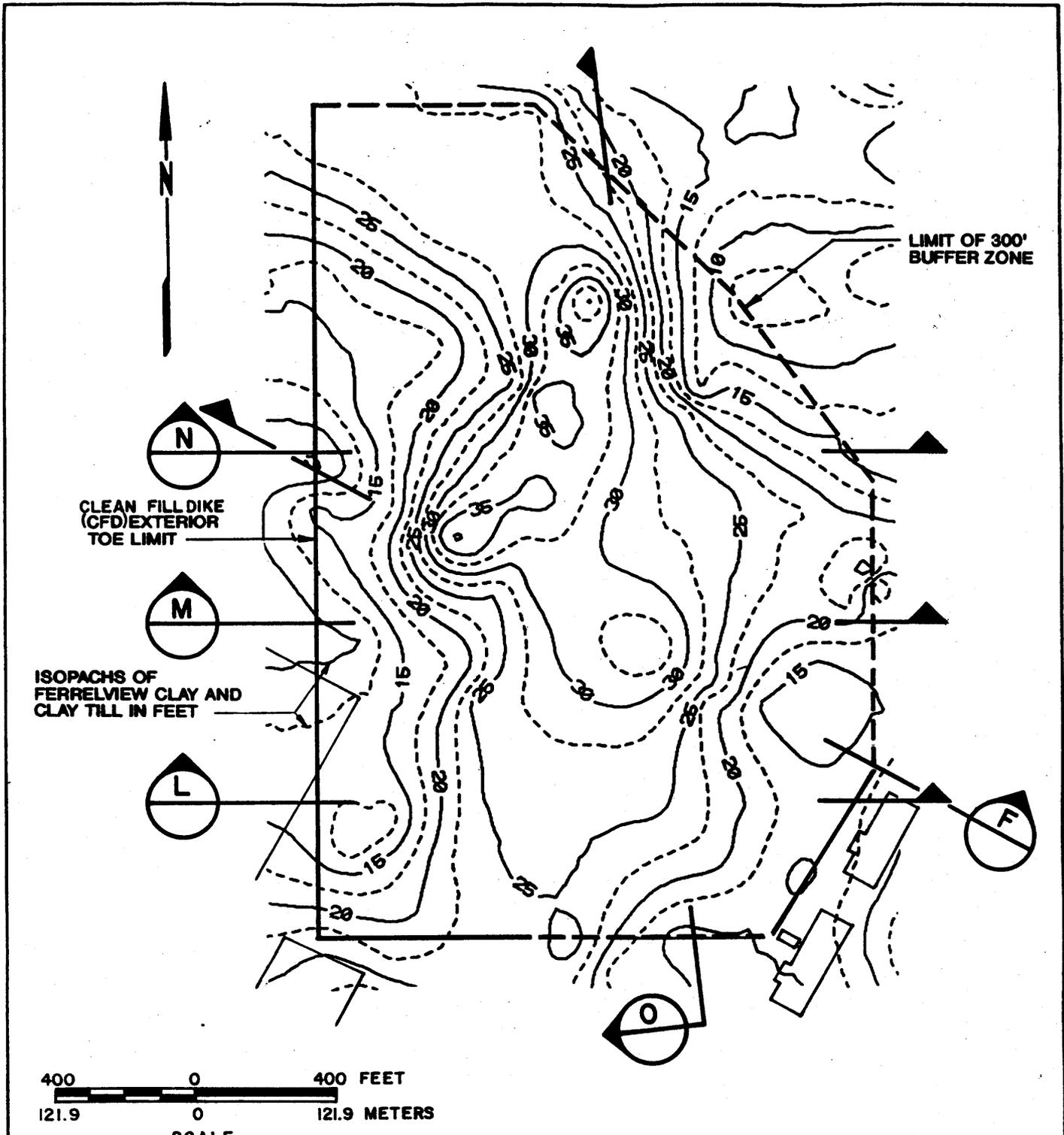
GEOLOGIC CROSS SECTION



CELL SITING LAYOUT

FIGURE 5.2.2-2

REPORT NO: DOE/OR/21548-411	DRAWING NO:
ORIGINATOR: KWL	DRAWN BY: AMA
DATE:	



400 0 400 FEET
 121.9 0 121.9 METERS
 SCALE

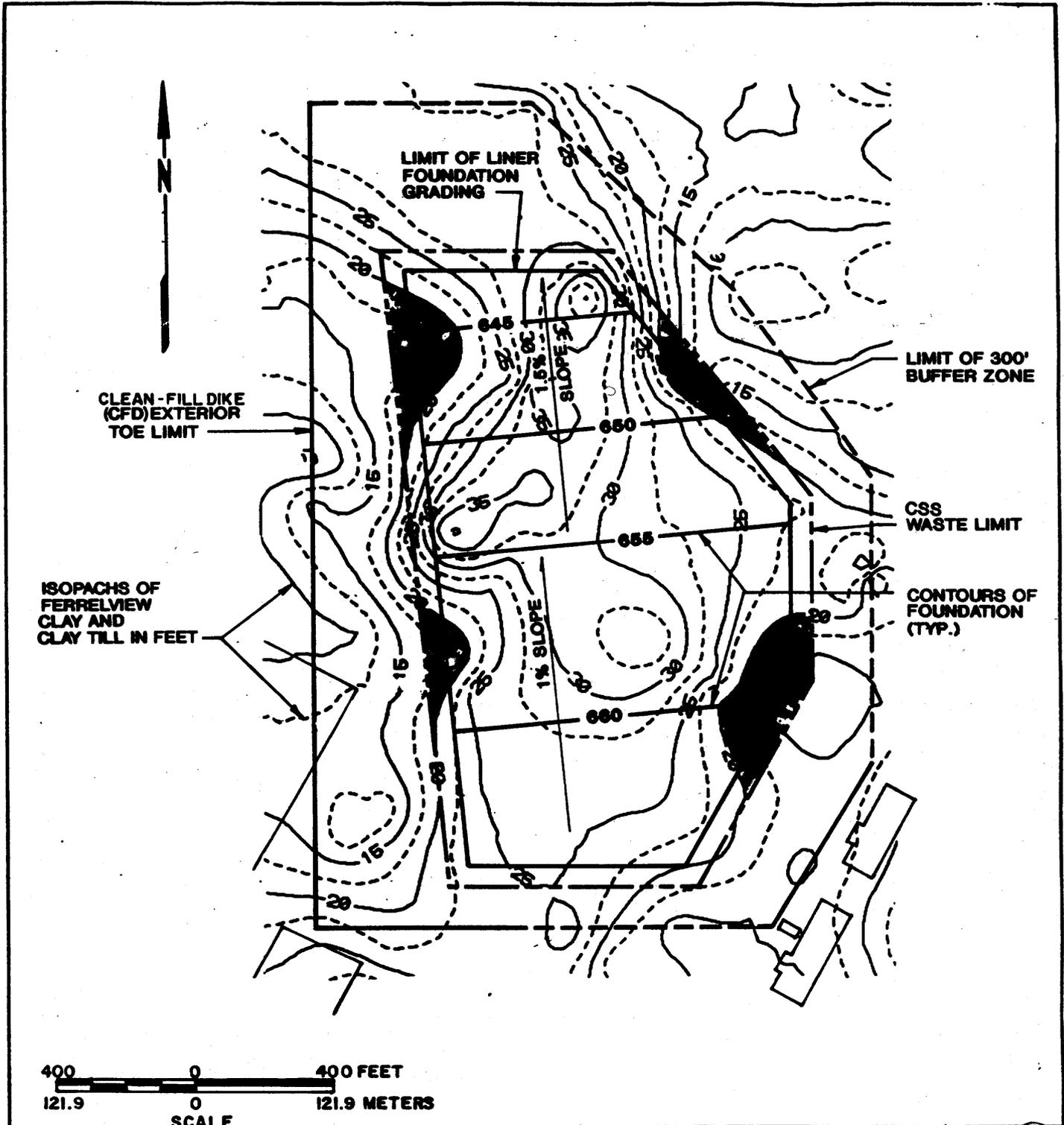
LEGEND

 **GEOLOGIC CROSS SECTION**

**ISOPACH MAP OF
 FERRELVIEW CLAY AND CLAY TILL**

FIGURE 5.2.2-3

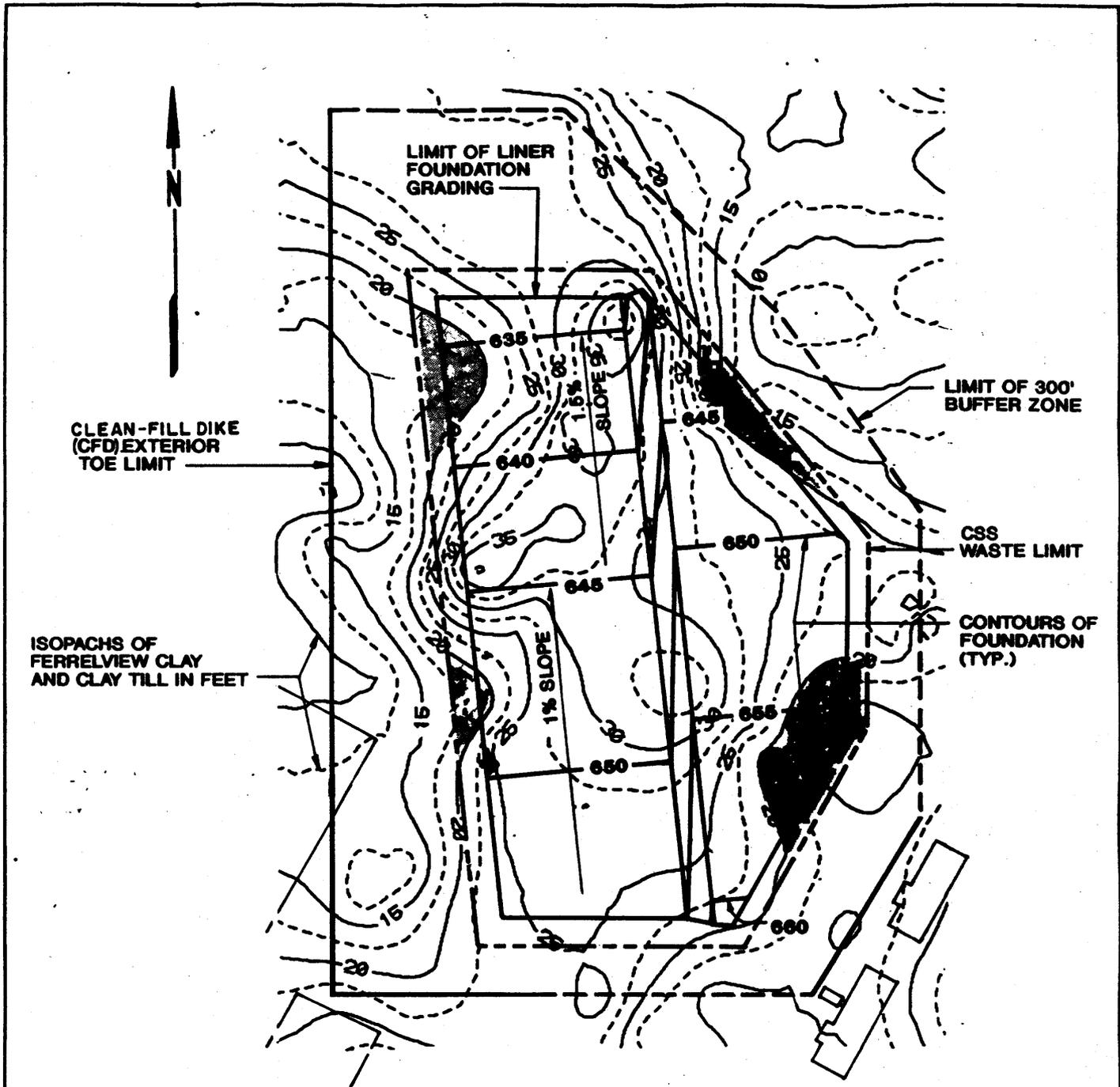
REPORT NO: DOE/OR/21548-411	DRAWING NO:	
ORIGINATOR: KWL	DRAWN BY: AMA	DATE:



LEGEND

 AREA WITH LESS 20 FEET OF FERRELLVIEW CLAY AND CLAY TILL

CSS DISPOSAL CELL FOUNDATION PLAN MINIMUM EXCAVATION CONFIGURATION		
FIGURE 5.2.3-1		
REPORT NO: DOE/OR/21548-411	DRAWING NO:	
ORIGINATOR: KWL	DRAWN BY: AMA	DATE:



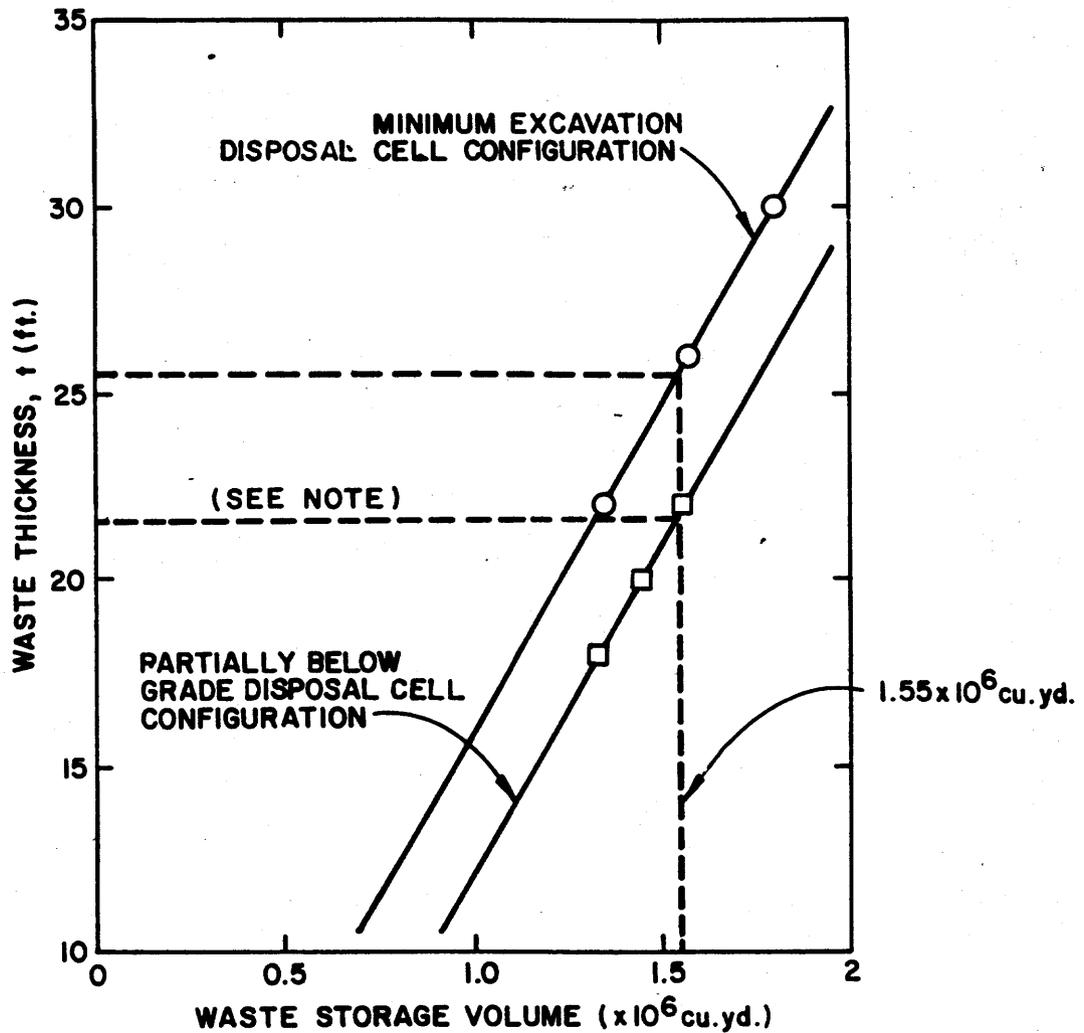
LEGEND

 AREA WITH LESS THAN 20 FEET OF FERRELLVIEW CLAY AND CLAY TILL

**CSS DISPOSAL CELL FOUNDATION PLAN
PARTIALLY BELOW GRADE OR
DEEP EXCAVATION CONFIGURATION**

FIGURE 5.2.3-2

REPORT NO: DOE/OR/21548-411		DRAWING NO:	
ORIGINATOR: KWL	DRAWN BY: AMA	DATE:	

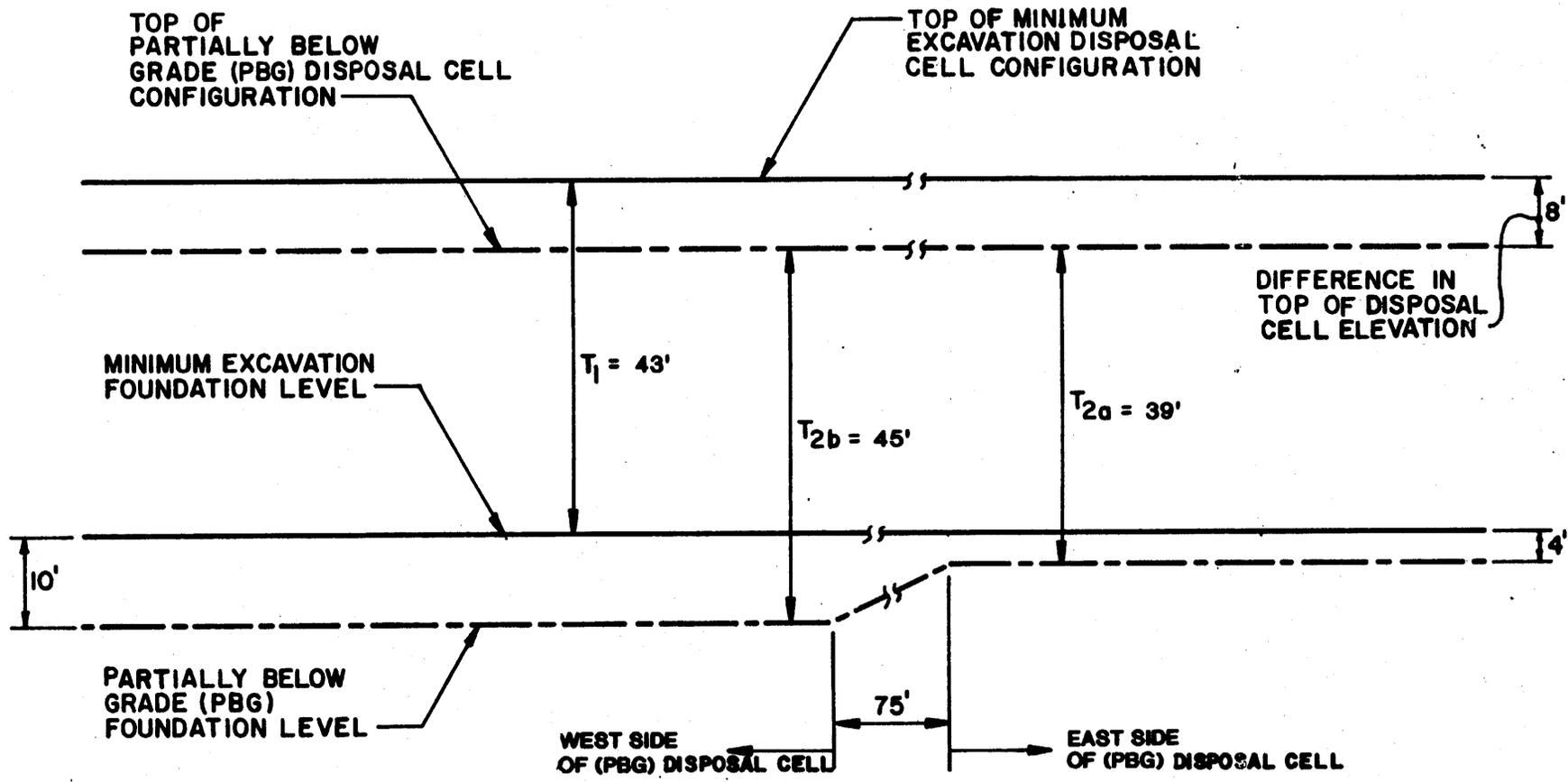


NOTE: WASTE THICKNESS BASED ON THE EASTERN HALF OF THE DISPOSAL CELL

**WASTE THICKNESS VERSUS
WASTE STORAGE VOLUME FOR
CSS DISPOSAL CELL**

FIGURE 5.2.3-3

REPORT NO: DOE/OR/21548-411	DRAWING NO:
ORIGINATOR: KWL	DRAWN BY: AMA
DATE:	



NOT TO SCALE

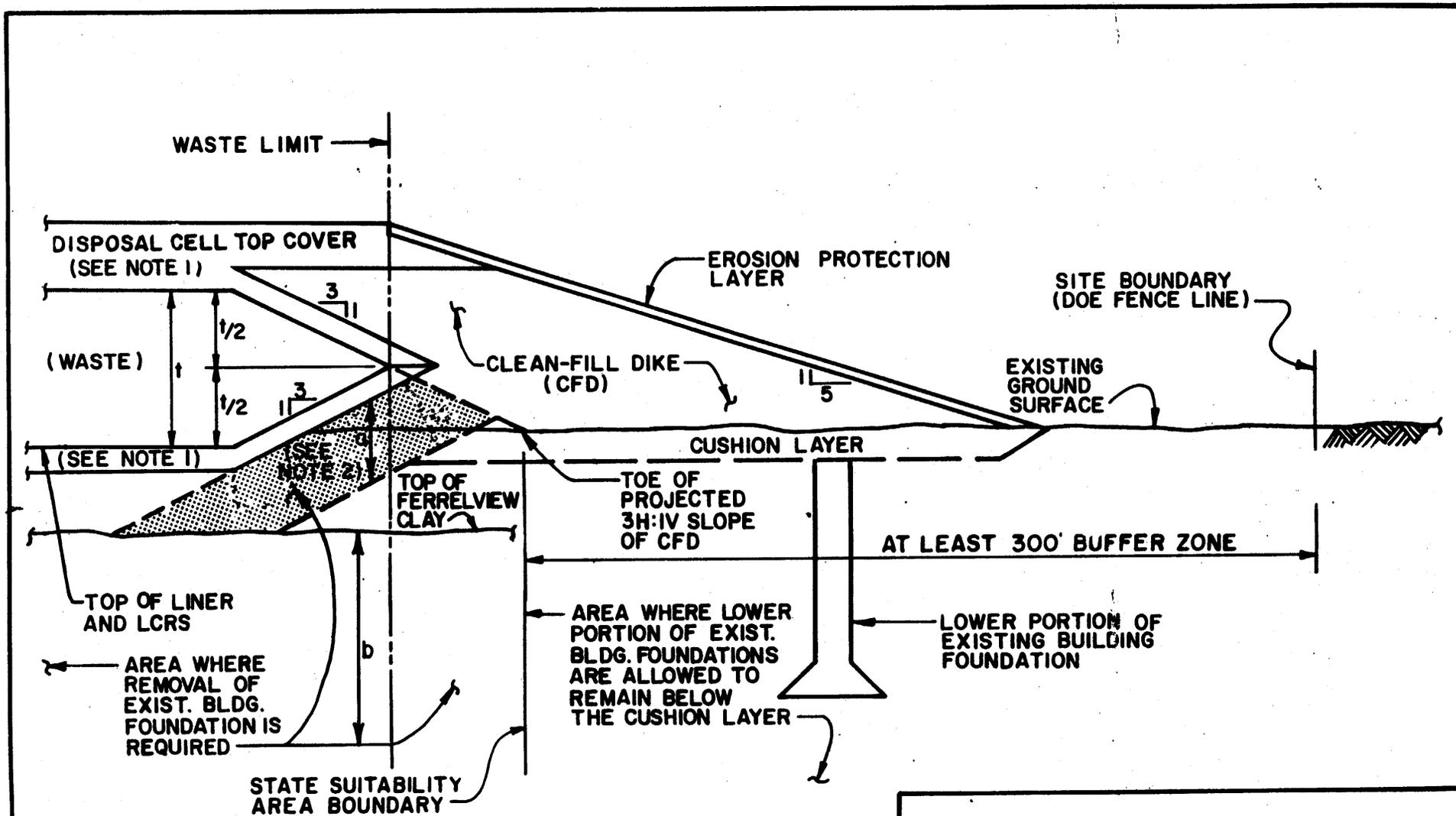
NOTES:

- T_1 = TOTAL DISPOSAL CELL THICKNESS FOR MINIMUM EXCAVATION CELL CONFIGURATION
- T_{2a} = TOTAL DISPOSAL CELL THICKNESS FOR THE EAST SIDE OF PARTIALLY BELOW GRADE CELL CONFIGURATION
- T_{2b} = TOTAL DISPOSAL CELL THICKNESS FOR THE WEST SIDE OF PARTIALLY BELOW GRADE CELL CONFIGURATION

COMPARISON OF TOTAL DISPOSAL CELL THICKNESS

FIGURE 5.2.3-4

REPORT NO.:	DOE/OR/21548-411	DRAWING NO.:	
ORIGINATOR:	KWL	DRAWN BY:	AMA
		DATE:	



NOT TO SCALE

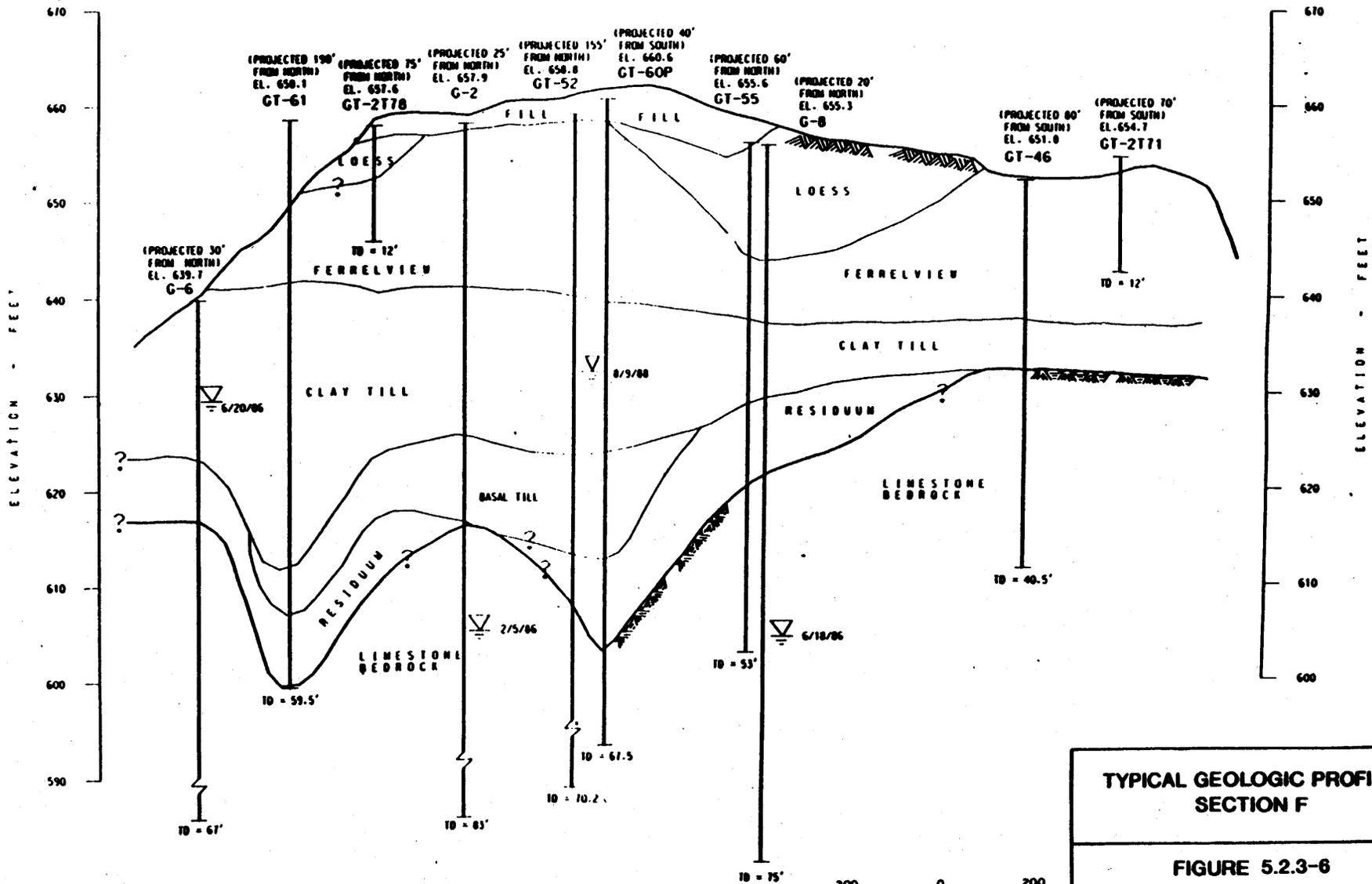
NOTES:

1. SEE DETAILS IN FIGURE 5.2.5-3
2. THE MINIMUM 20 FT. THICKNESS SHOWN (a + b) IS EQUIVALENT TO 30 FT. OF 1×10^{-7} cm/s PERMEABILITY MATERIAL AND IS INCLUDED IN THE SUM OF THE COMPACTED LOW-PERMEABILITY FILL BENEATH THE ENGINEERED LINER AND EXISTING LOW-PERMEABILITY SOIL ABOVE THE UPPERMOST REGIONAL AQUIFER.

**DETAILS OF WASTE AND
CLEAN-FILL DIKE INTERFACE
(SCHEMATIC)**

FIGURE 5.2.3-5

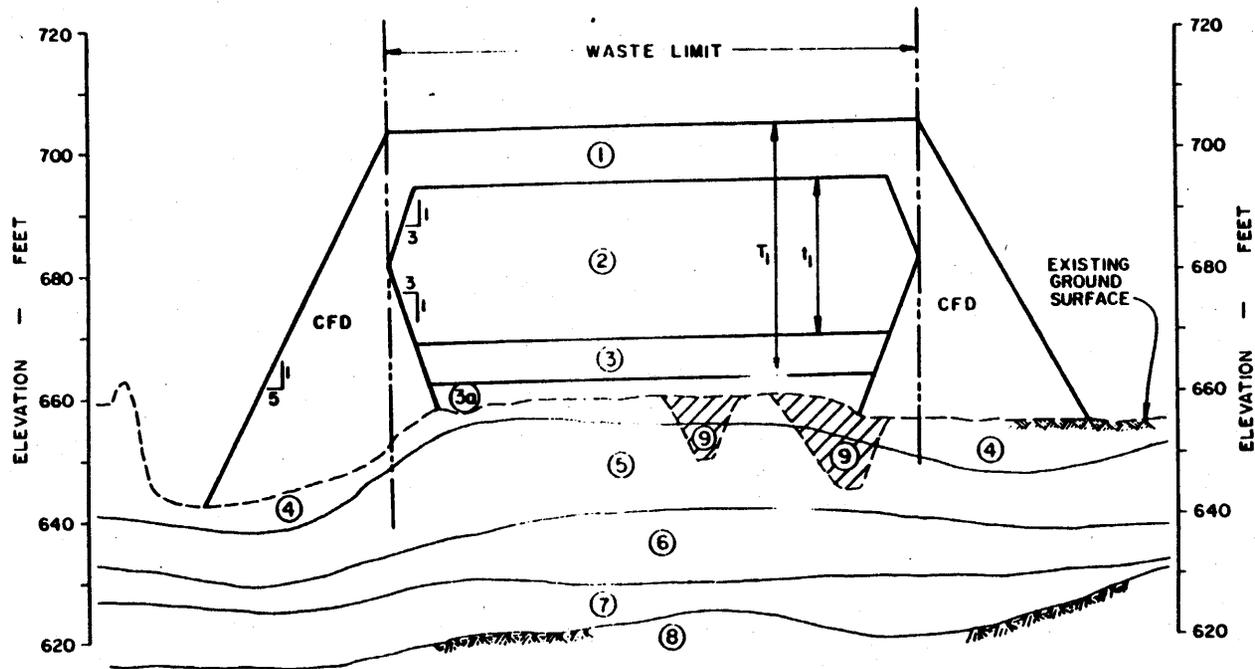
REPORT NO. DOE/OR/21548-411	DRAWING NO.:
ORIGINATOR: KWL	DRAWN BY: AMA
	DATE:



**TYPICAL GEOLOGIC PROFILE:
SECTION F**

FIGURE 5.2.3-6

REPORT NO. DOE/OR/21548-411	DRAWING NO.
ORIGINATOR: KWL	DRAWN BY: AMA
DATE:	



NOTES:

T_1 = TOTAL CELL THICKNESS FOR MINIMUM EXCAVATION CELL CONFIGURATION = 43 FT.
 t_1 = WASTE THICKNESS FOR MINIMUM EXCAVATION CELL CONFIGURATION = 26 FT.

LEGEND:

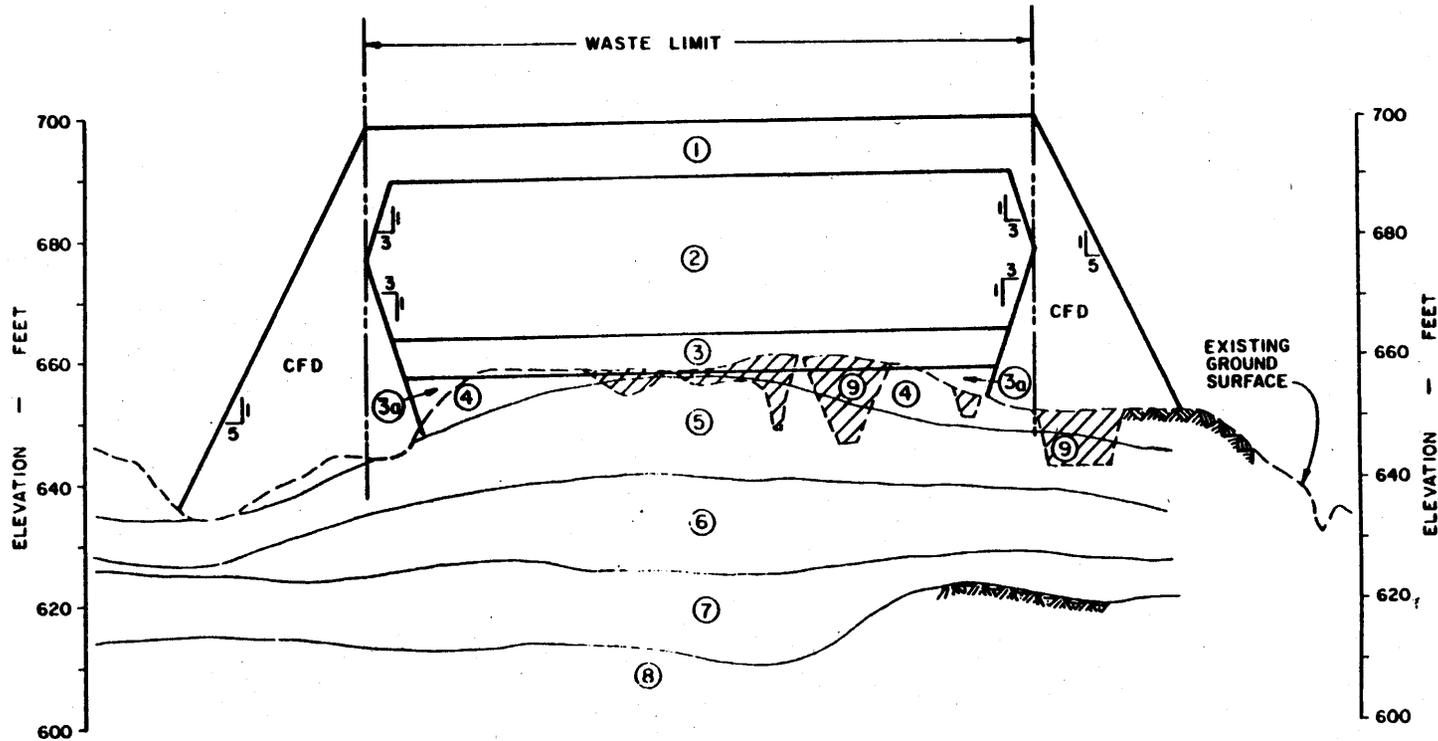
- ① COVER & CLEAN FILL DIKE (CFD) ENCAPSULATION SYSTEM
- ② WASTE
- ③ LINER & LEACHATE COLLECTION REMOVAL SYSTEM
- ④ FOUNDATION FILL
- ⑤ EXISTING FILL AND/OR LOESS
- ⑥ FERRELVIEW CLAY
- ⑦ CLAY TILL
- ⑧ BASAL TILL AND/ OR RESIDIUM
- ⑨ WEATHERED BEDROCK (LIMESTONE)
- ⑨ EXCAVATION REQUIRED FOR CONTAMINATED SOILS AND BUILDING FOUNDATIONS DEMOLITION



**DISPOSAL CELL CONFIGURATION
 MINIMUM EXCAVATION:
 SECTION L**

FIGURE 5.2.3-7

REPORT NO. DOE/OR/21548-411	DRAWING NO.
ORIGINATOR KWL	DRAWN BY AMA
DATE:	



LEGEND:

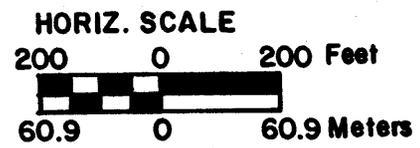
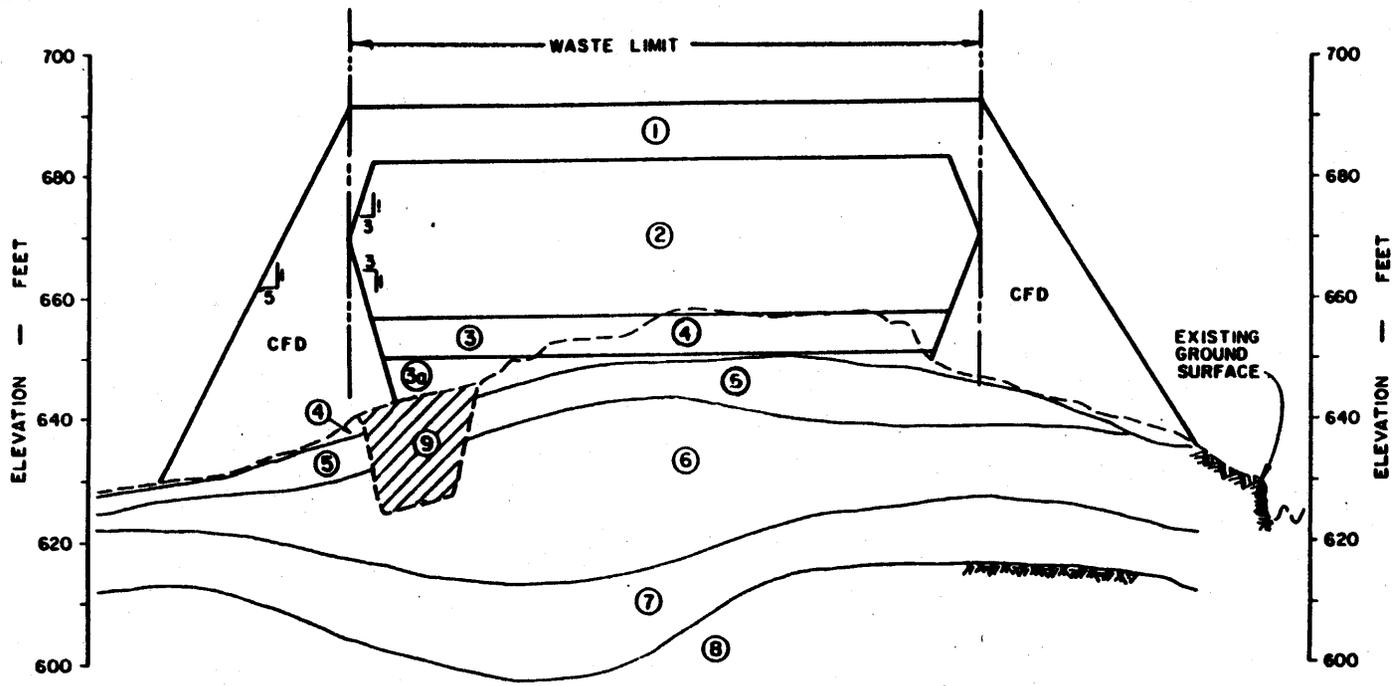
- ① COVER & CLEAN FILL DIKE (CFD) ENCAPSULATION SYSTEM
- ② WASTE
- ③ LINER & LEACHATE COLLECTION REMOVAL SYSTEM
- ④ FOUNDATION FILL
- ⑤ EXISTING FILL AND/OR LOESS
- ⑥ FERRELVIEW CLAY
- ⑦ CLAY TILL
- ⑧ BASAL TILL AND/OR RESIDUUM
- ⑨ WEATHERED BEDROCK (LIMESTONE)
- ⑩ EXCAVATION REQUIRED FOR CONTAMINATED SOILS AND BUILDING FOUNDATIONS DEMOLITION

**DISPOSAL CELL CONFIGURATION
MINIMUM EXCAVATION:
SECTION M**

FIGURE 5.2.3-8

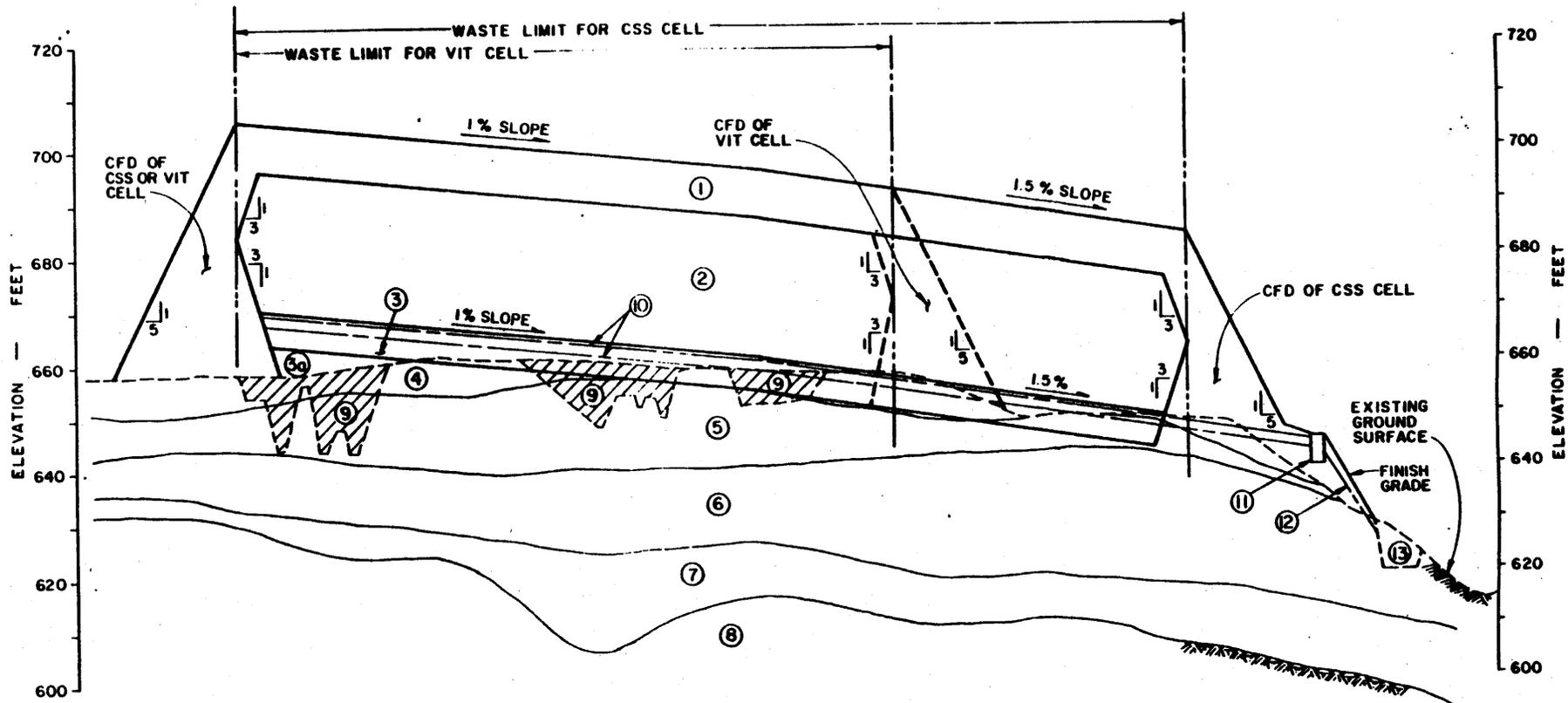
200 0 200
HORIZ SCALE FEET

PROJECT: DOE/OR/21548-411	DRAWING NO:
ORIGINATOR: KWL	DRAWN BY: AMA
DATE:	



- LEGEND:**
- ① COVER & CLEAN FILL DIKE (CFD) ENCAPSULATION SYSTEM
 - ② WASTE
 - ③ LINER & LEACHATE COLLECTION REMOVAL SYSTEM
 - ④ FOUNDATION FILL
 - ⑤ EXISTING FILL AND/OR LOESS
 - ⑥ FERRELVIEW CLAY
 - ⑦ CLAY TILL
 - ⑧ BASAL TILL AND/OR RESIDUUM
 - ⑨ WEATHERED BEDROCK (LIMESTONE)
 - ⑩ EXCAVATION FOR EXISTING MSA POND

DISPOSAL CELL CONFIGURATION MINIMUM EXCAVATION: SECTION N		
FIGURE 5.2.3-9		
REVISION DOE/OR/21548-411	DRAWING NO.	
ORIGINATOR KWL	DRAWN BY AMA	DATE



NOTE:

FOR VIT CELL, THE LEACHATE COLLECTION RETENTION BASIN MAY BE RELOCATED, AND EXCAVATED DITCH OR BURIED PIPE WILL BE REQUIRED TO DIVERT LEACHATE TO A POSITIVE DRAIN AREA WHERE THE RETENTION BASIN WILL BE LOCATED.

LEGEND:

- ① COVER & CLEAN FILL DIKE (CFD) ENCAPSULATION SYSTEM
- ② WASTE
- ③ LINER & LEACHATE COLLECTION REMOVAL SYSTEM
- ④ FOUNDATION FILL
- ⑤ EXISTING FILL AND/OR LOESS
- ⑥ FERRELVIEW CLAY
- ⑦ CLAY TILL
- ⑧ BASAL TILL AND/OR RESIDUUM
- ⑨ WEATHERED BEDROCK (LIMESTONE)

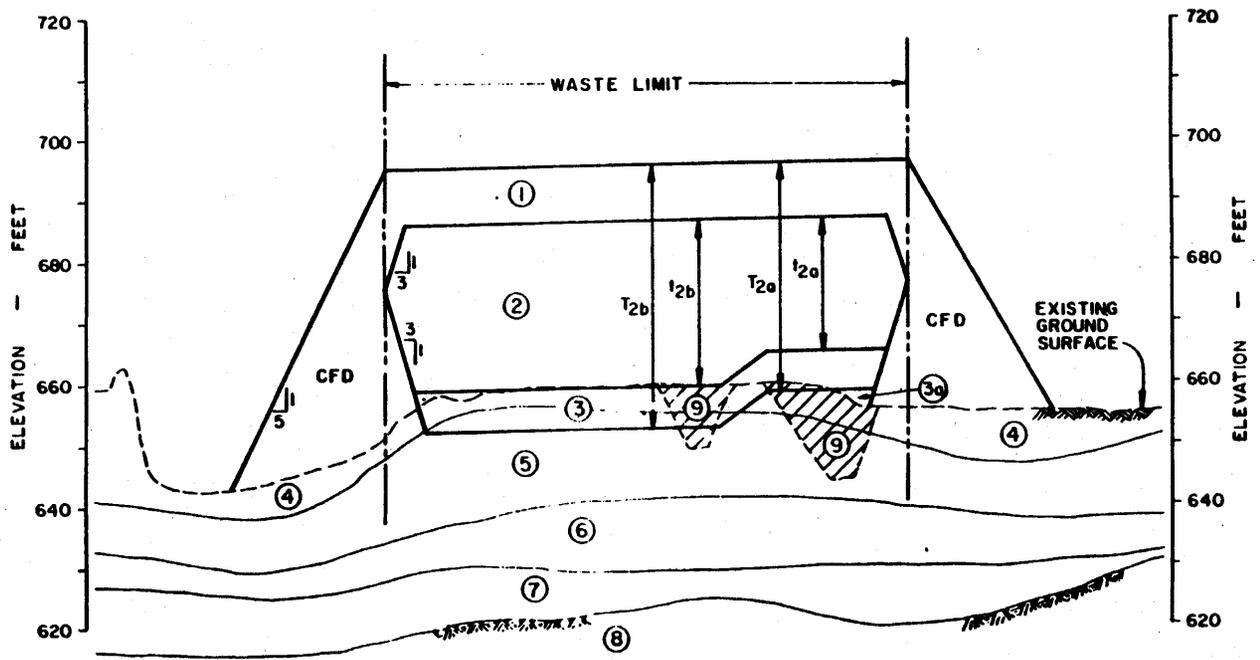
- ⑨ EXCAVATION REQUIRED FOR CONTAMINATED SOILS AND BUILDING FOUNDATIONS DEMOLITION.
- ⑩ COLLECTION PIPES
- ⑪ COLLECTION SUMP
- ⑫ CONNECTOR PIPE
- ⑬ POTENTIAL AREA FOR LEACHATE COLLECTION RETENTION BASIN FOR CSS CELL (PROJECTED APPROX. 200 FT. FROM WEST) (SEE NOTE FOR VIT CELL)



**DISPOSAL CELL CONFIGURATION
MINIMUM EXCAVATION:
SECTION O**

FIGURE 5.2.3-10

REPORT NO. DOE/OR/21548-411	DRAWING NO.
ORIGINATOR: KWL	DRAWN BY: AMA
	DATE:

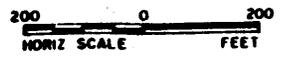


NOTES:

- T2a = TOTAL CELL THICKNESS FOR THE EAST SIDE OF PARTIALLY BELOW GRADE CELL CONFIGURATION = 39 FT.
- l2a = WASTE THICKNESS FOR THE EAST SIDE OF PARTIALLY BELOW GRADE CELL CONFIGURATION = 22 FT.
- T2b = TOTAL CELL THICKNESS FOR THE WEST SIDE OF PARTIALLY BELOW GRADE CELL CONFIGURATION = 45 FT.
- l2b = WASTE THICKNESS FOR THE WEST SIDE OF PARTIALLY BELOW GRADE CELL CONFIGURATION = 28 FT.

LEGEND:

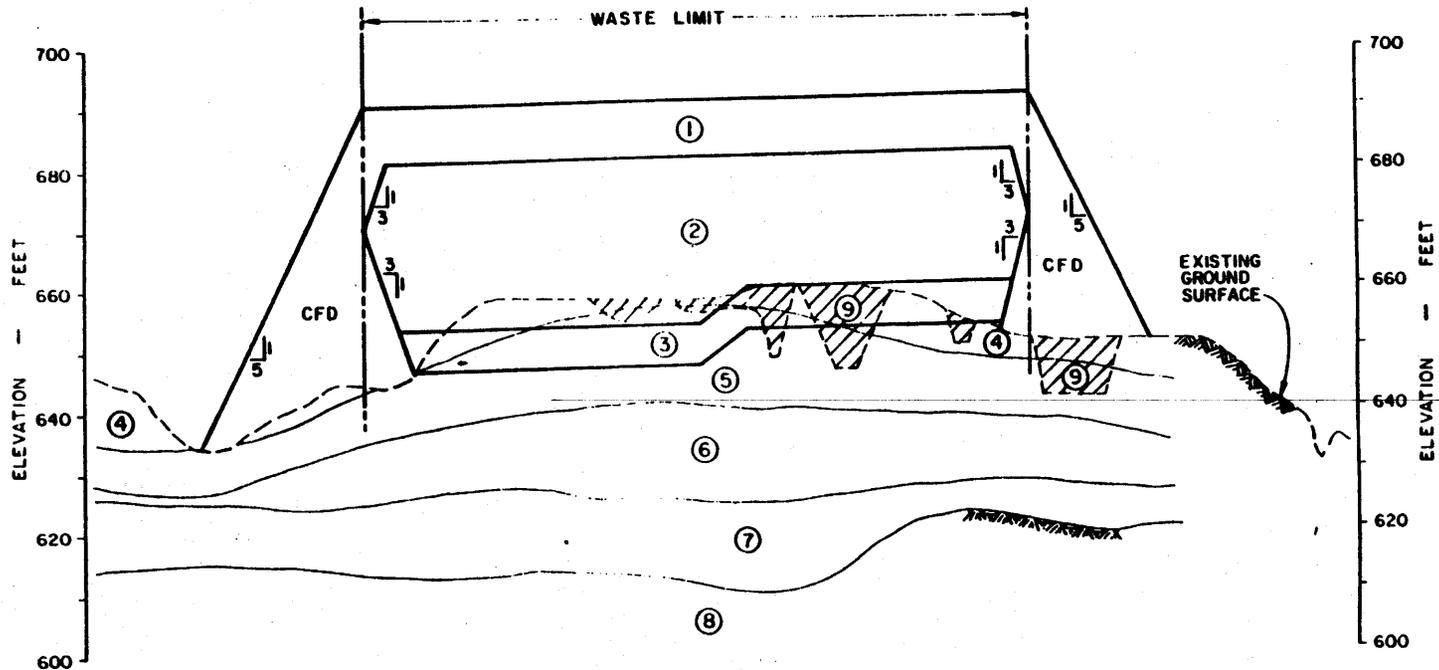
- ① COVER & CLEAN FILL DIKE (CFD) ENCAPSULATION SYSTEM
- ② WASTE
- ③ LINER & LEACHATE COLLECTION REMOVAL SYSTEM
- ④ FOUNDATION FILL
- ⑤ EXISTING FILL AND/OR LOESS
- ⑥ FERRELVIEW CLAY
- ⑦ CLAY TILL
- ⑧ BASAL TILL AND/ OR RESIDUUM
- ⑨ WEATHERED BEDROCK (LIMESTONE)
- ⑩ EXCAVATION REQUIRED FOR CONTAMINATED SOILS AND BUILDING FOUNDATIONS DEMOLITION



**DISPOSAL CELL CONFIGURATION
PARTIALLY BELOW GRADE:
SECTION L**

FIGURE 5.2.3-11

REPORT NO DOE/OR/21548-411	DRAWING NO
ORIGINATOR KWL	DRAWN BY AMA
DATE:	



LEGEND:

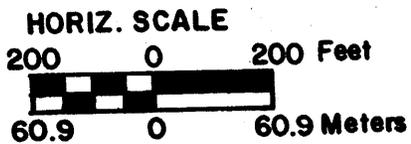
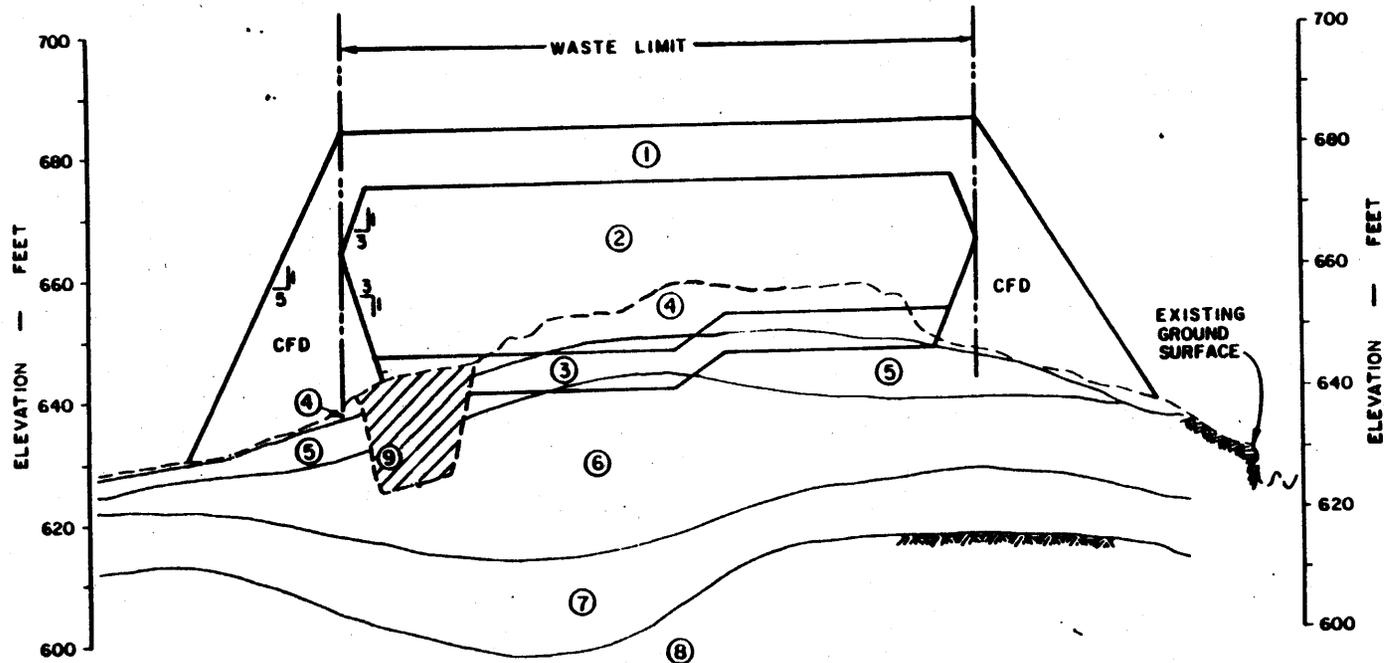
- ① COVER & CLEAN FILL DIKE (CFD) ENCAPSULATION SYSTEM
- ② WASTE
- ③ LINER & LEACHATE COLLECTION REMOVAL SYSTEM
- ④ EXISTING FILL AND/ OR LOESS
- ⑤ FERRELVIEW CLAY
- ⑥ CLAY TILL
- ⑦ BASAL TILL AND/ OR RESIDUUM
- ⑧ WEATHERED BEDROCK (LIMESTONE)
- ⑨ EXCAVATION REQUIRED FOR CONTAMINATED SOILS AND BUILDING FOUNDATIONS DEMOLITION



**DISPOSAL CELL CONFIGURATION
PARTIALLY BELOW GRADE:
SECTION M**

FIGURE 5.2.3-12

PROJECT NO. DOE/OR/21548-411	DRAWING NO.
ORIGINATOR KWL	DRAWN BY AMA
	DATE



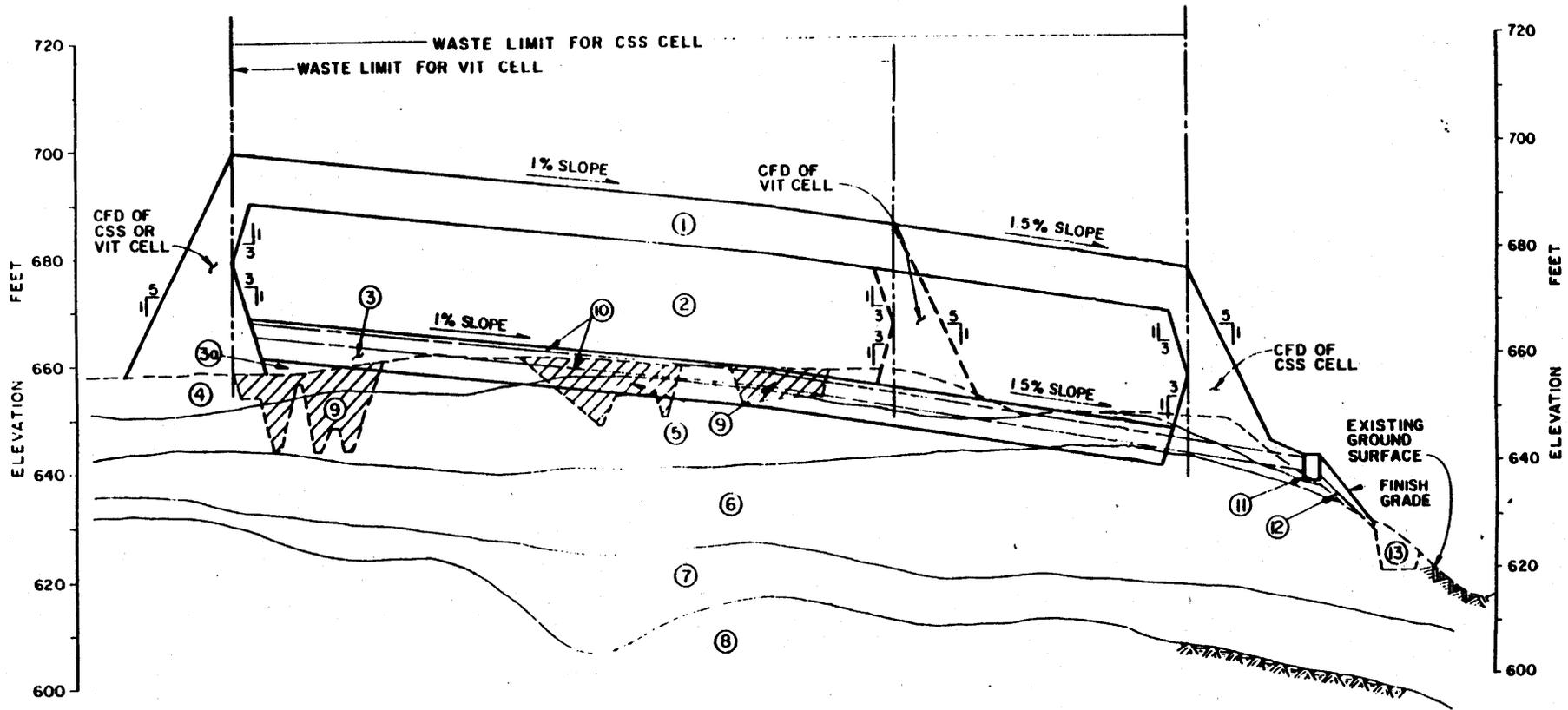
LEGEND:

- ① COVER & CLEAN FILL DIKE (CFD) ENCAPSULATION SYSTEM
- ② WASTE
- ③ LINER & LEACHATE COLLECTION REMOVAL SYSTEM
- ④ FOUNDATION FILL
- ⑤ EXISTING FILL AND/OR LOESS
- ⑥ FERRELVIEW CLAY
- ⑦ CLAY TILL
- ⑧ BASAL TILL AND/OR RESIDUUM
- ⑨ WEATHERED BEDROCK (LIMESTONE)
- ⑨ EXCAVATION FOR EXISTING MSA POND

**DISPOSAL CELL CONFIGURATION
PARTIALLY BELOW GRADE:
SECTION N**

FIGURE 5.2.3-13

PROJECT NO. 55E/08/21548-411	DRAWING NO.
ORIGINATOR KWL	DRAWN BY AMA
DATE	



NOTE:

FOR VIT CELL, THE LEACHATE COLLECTION RETENTION BASIN MAY BE RELOCATED, AND EXCAVATED DITCH OR BURIED PIPE WILL BE REQUIRED TO DIVERT LEACHATE TO A POSITIVE DRAIN AREA WHERE THE RETENTION BASIN WILL BE LOCATED

LEGEND:

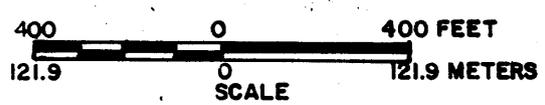
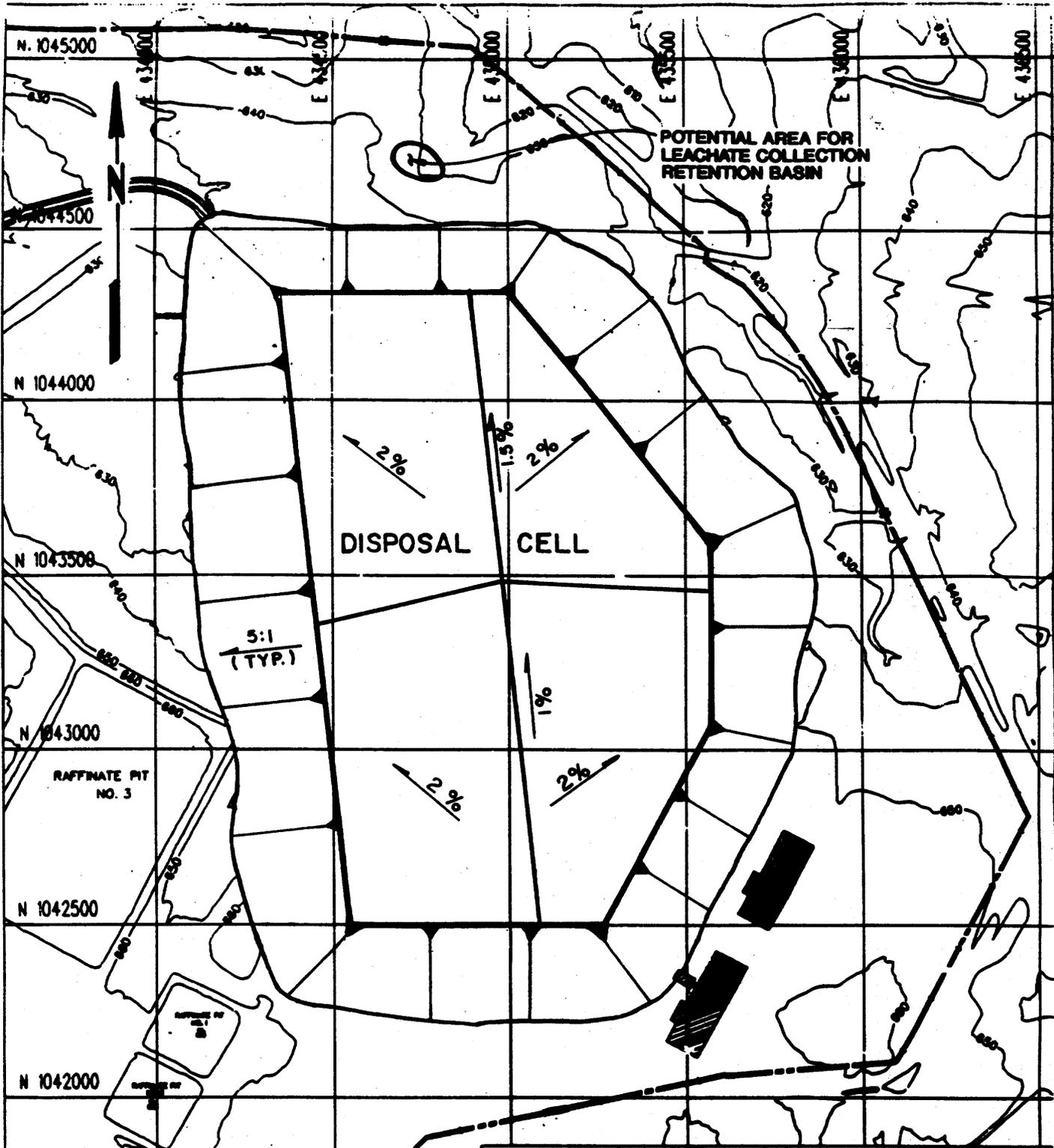
- | | |
|--|--|
| ① COVER & CLEAN FILL DIKE (CFD) ENCAPSULATION SYSTEM | ⑩ COLLECTION PIPES |
| ② WASTE | ⑪ COLLECTION SUMP |
| ③ LINER & LEACHATE COLLECTION REMOVAL SYSTEM | ⑫ CONNECTOR PIPE |
| ④ FOUNDATION FILL | ⑬ POTENTIAL AREA FOR LEACHATE COLLECTION RETENTION BASIN FOR CSS CELL (PROJECTED APPROX 200 FT. FROM WEST) (SEE NOTE FOR VIT CELL) |
| ⑤ EXISTING FILL AND/OR LOESS | |
| ⑥ FERRELVIEW CLAY | |
| ⑦ CLAY TILL | |
| ⑧ BASAL TILL AND/OR RESIDUUM | |
| ⑨ WEATHERED BEDROCK (LIMESTONE) | |
| ⑩ EXCAVATION REQUIRED FOR CONTAMINATED SOILS AND BUILDING FOUNDATIONS DEMOLITION | |

**DISPOSAL CELL CONFIGURATION
PARTIALLY BELOW GRADE:
SECTION O**

FIGURE 5.2.3-14



DOE/OR/21548-411	DRAWING NO
ORIGINATOR KWL	DRAWN BY AMA
	DATE:

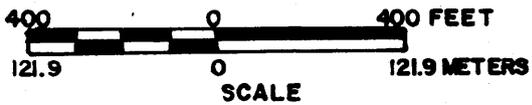
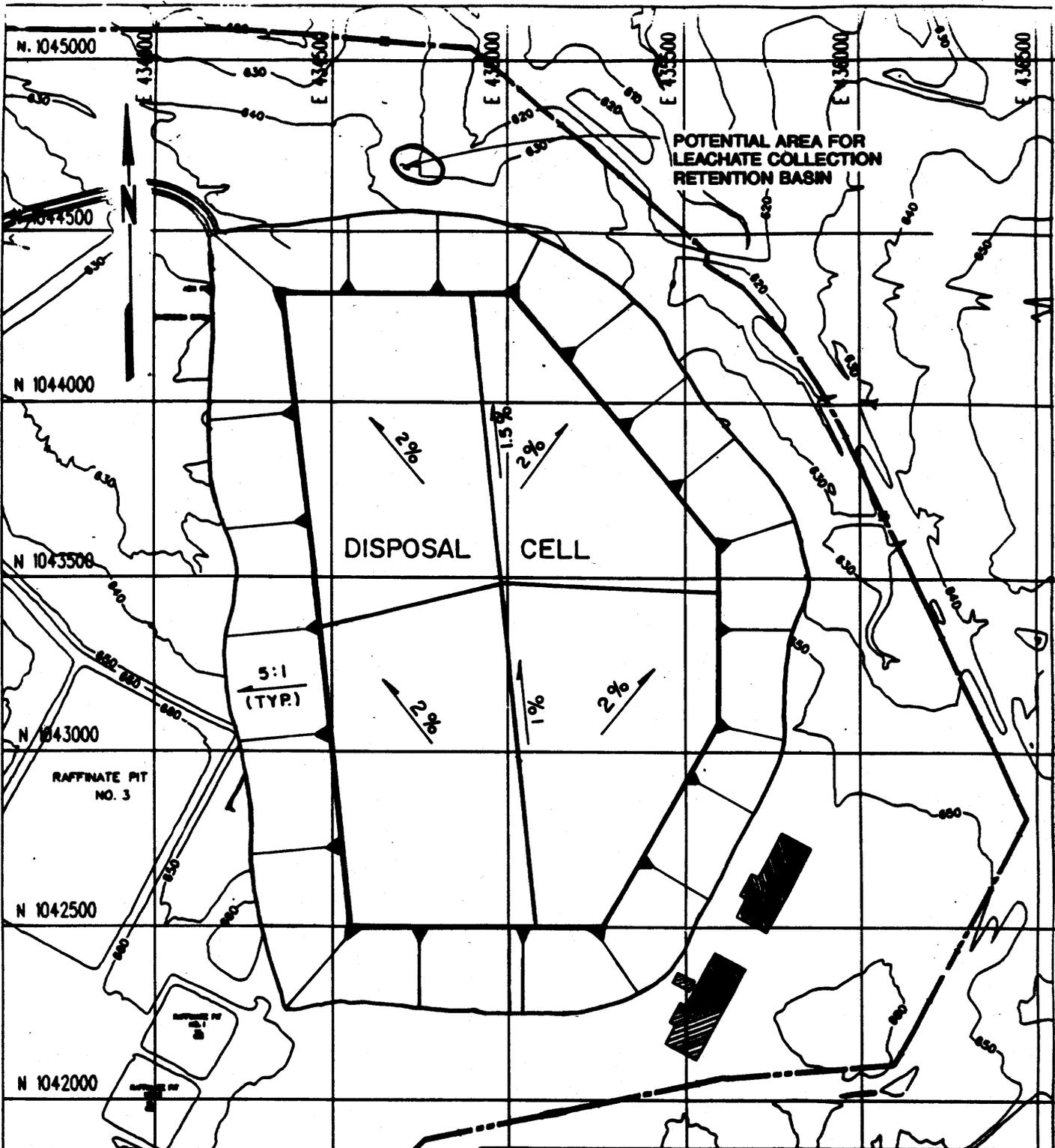


**PLAN VIEW OF CSS DISPOSAL CELL
MINIMUM EXCAVATION CONFIGURATION**

FIGURE 5.2.3-15

NOTE: CLEAN-FILL DIKE (CFD) TOE LINE SHOWN HERE IS BASED ON EXISTING TOPOGRAPHY.

REPORT NO.: DOE/OR/21548-411	DRAWING NO.:
ORIGINATOR: KWL	DRAWN BY: AMA
	DATE:

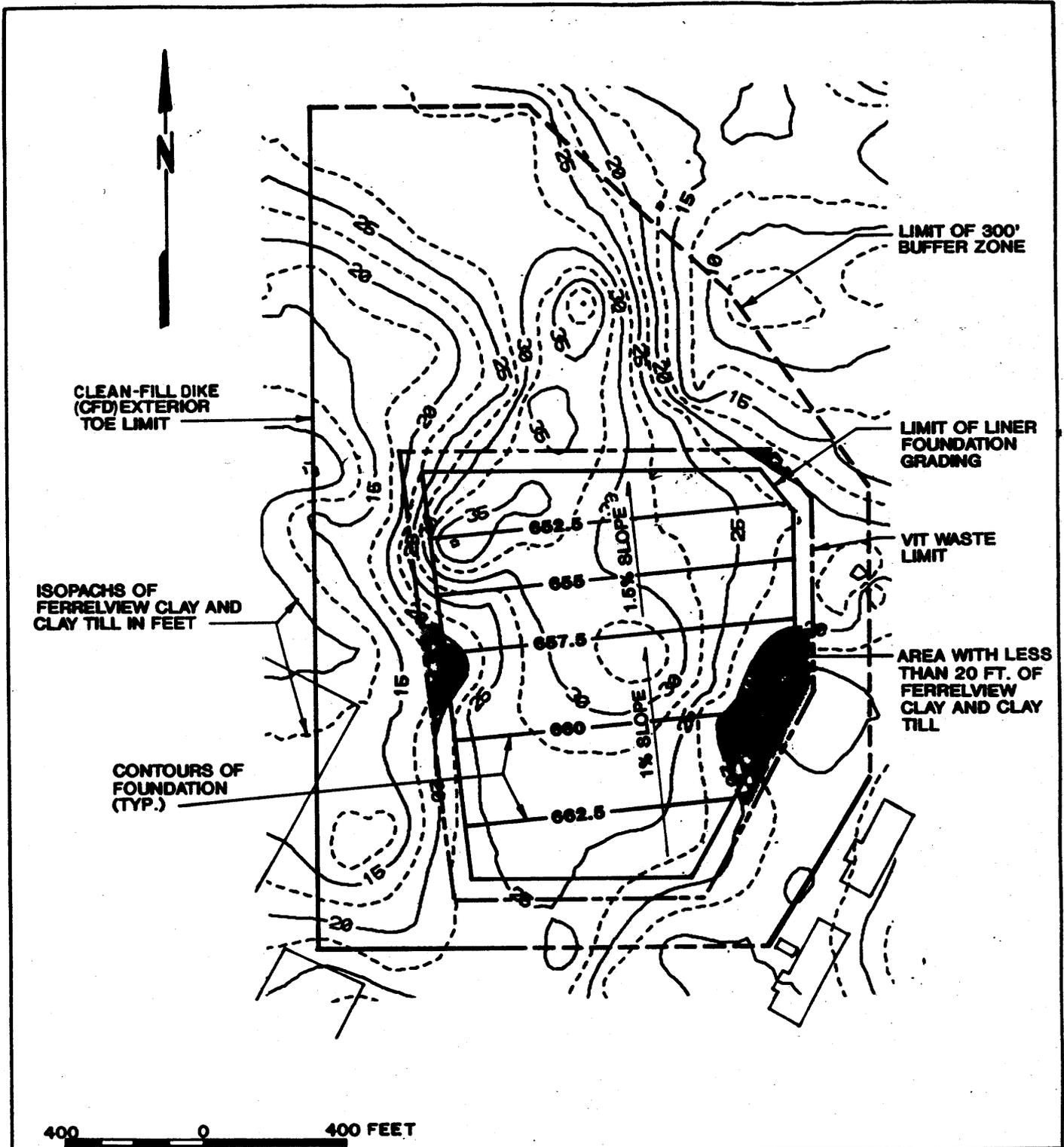


NOTE: CLEAN-FILL DIKE (CFD) TOE LINE SHOWN HERE IS BASED ON EXISTING TOPOGRAPHY.

**PLAN VIEW OF CSS DISPOSAL CELL
PARTIALLY BELOW GRADE CONFIGURATION**

FIGURE 5.2.3-16

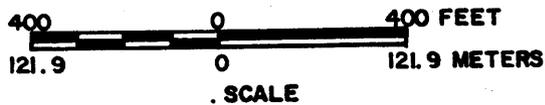
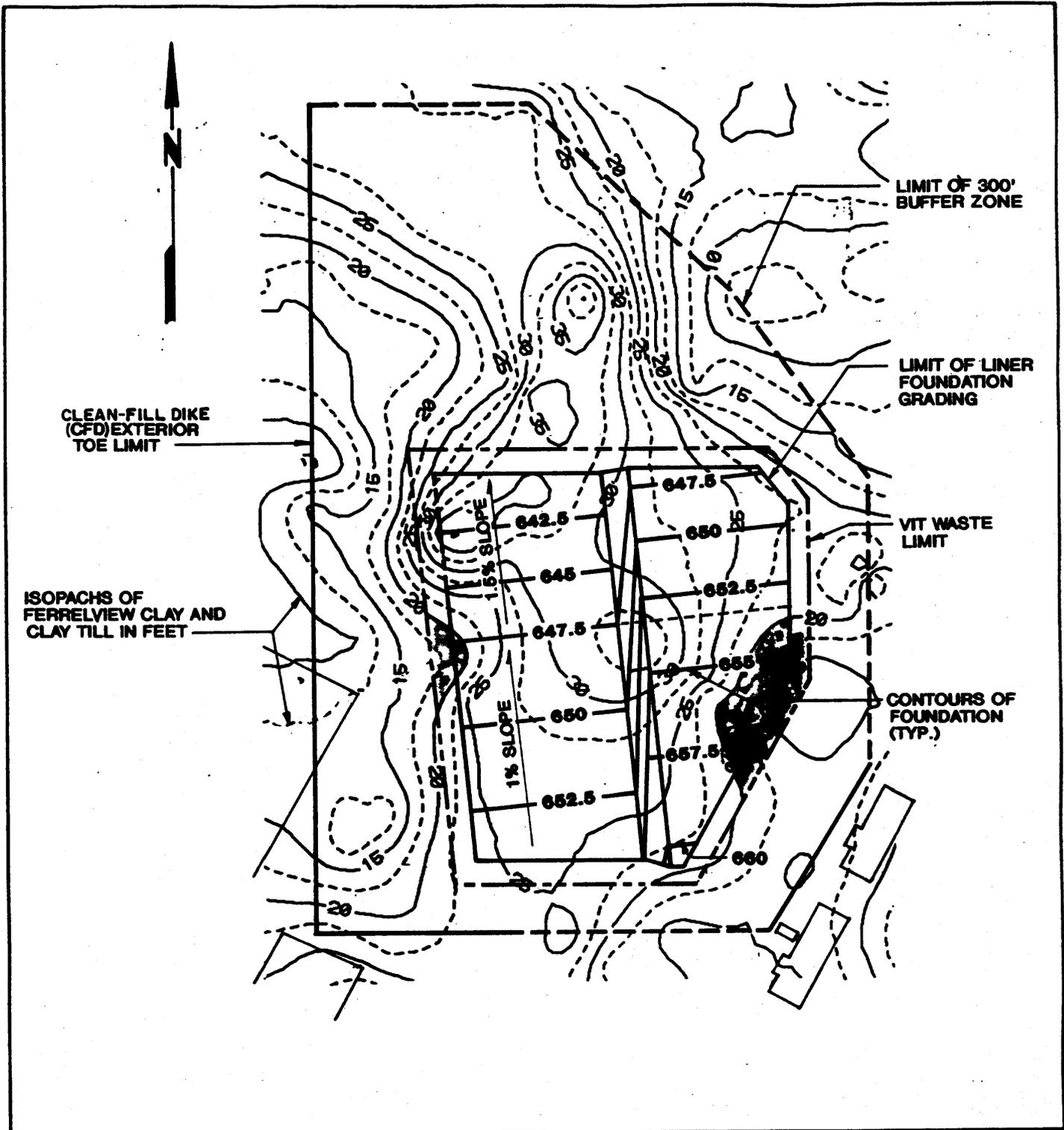
REPORT NO.: DOE/OR/21548-411		DRAWING NO.:
ORIGINATOR: KWL	DRAWN BY: AMA	DATE:



LEGEND

 = AREA WITH LESS THAN 20 FEET OF FERRELL VIEW CLAY AND CLAY TILL

VIT DISPOSAL CELL FOUNDATION PLAN MINIMUM EXCAVATION CONFIGURATION		
FIGURE 5.2.3-17		
REPORT NO. DOE/OR/21548-411	DRAWING NO.:	
ORIGINATOR: KWL	DRAWN BY: AMA	DATE:



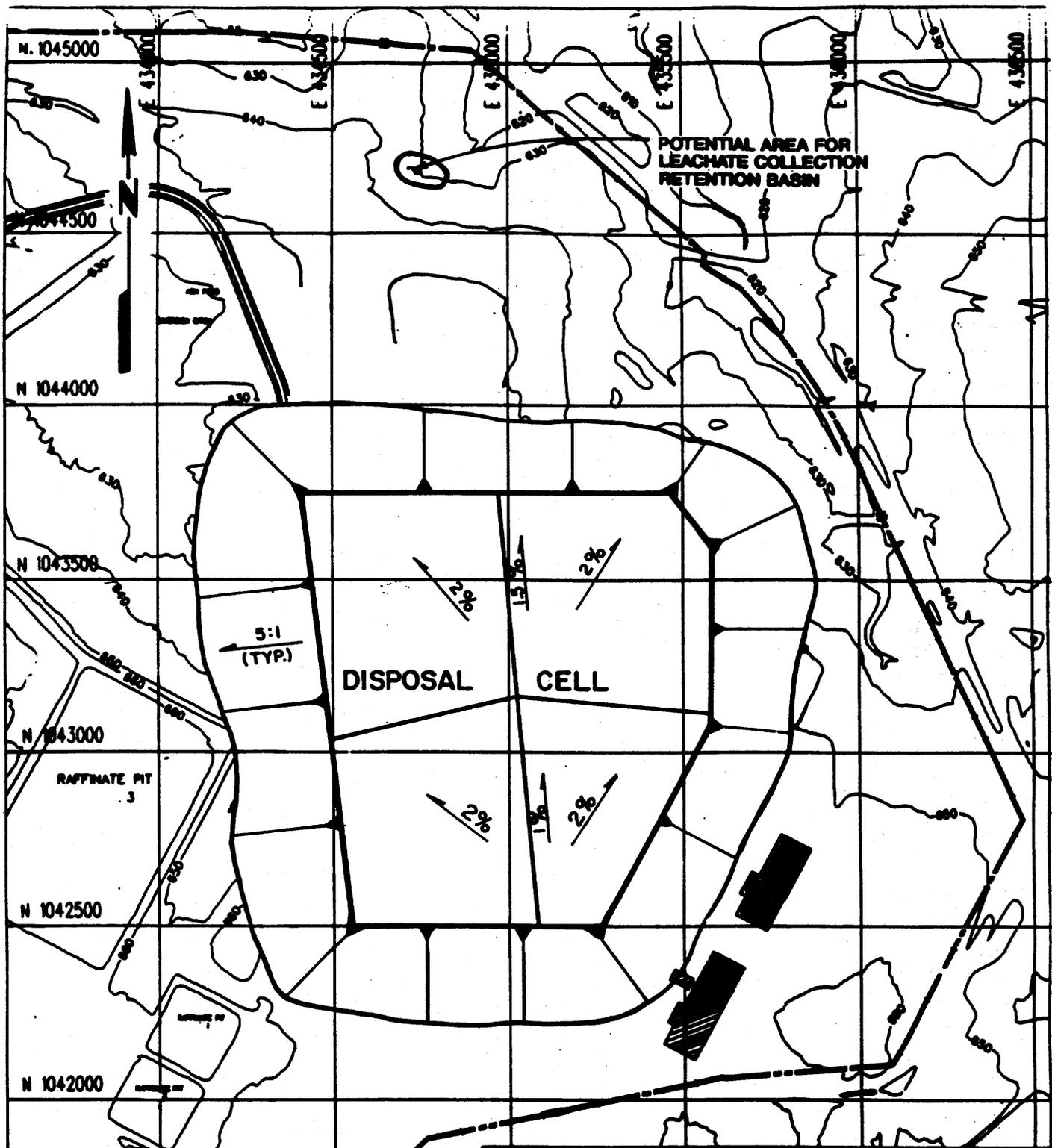
LEGEND

 = AREA WITH LESS THAN 20 FEET OF FERRELVIEW CLAY AND CLAY TILL

**VIT DISPOSAL CELL FOUNDATION PLAN
PARTIALLY BELOW GRADE CONFIGURATION**

FIGURE 5.2.3-18

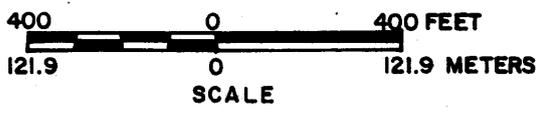
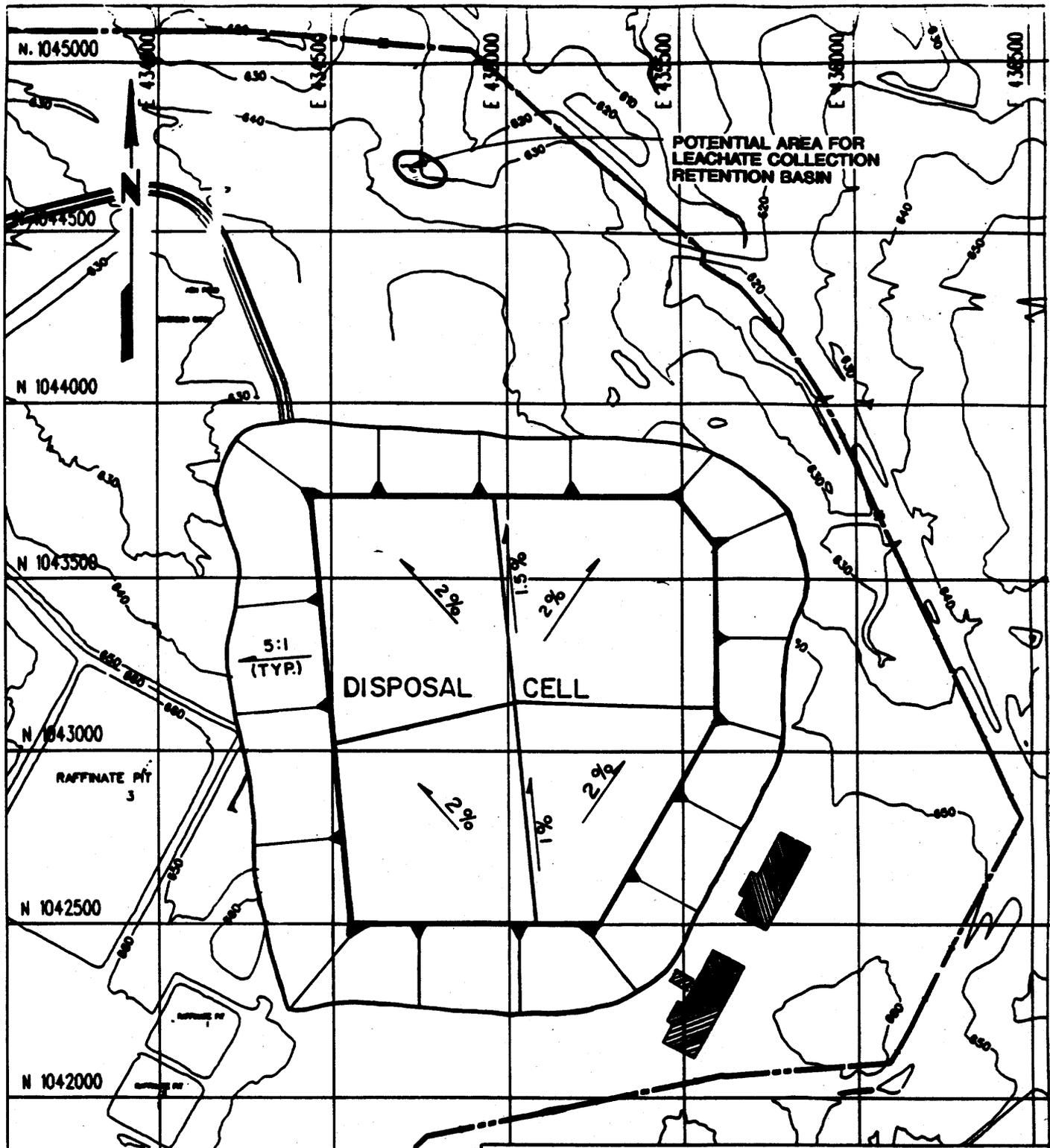
REPORT NO: DOE/OR/21548-411	DRAWING NO:
ORIGINATOR: KWL	DRAWN BY: AMA
DATE:	



**PLAN VIEW OF VIT DISPOSAL CELL
MINIMUM EXCAVATION CONFIGURATION**

FIGURE 5.2.3-19

REPORT NO.:	DOE/OR/21548-411	DRAWING NO.:	
ORIGINATOR:	KWL	DRAWN BY:	AMA
		DATE:	

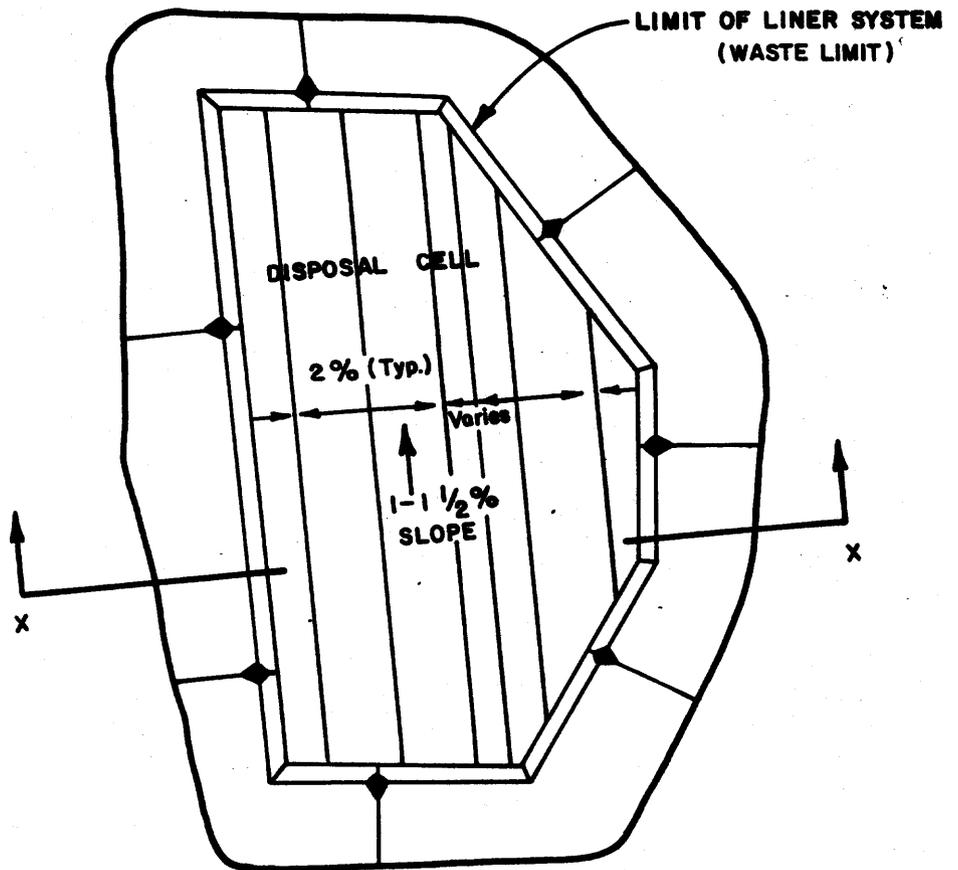


NOTE: CLEAN-FILL DIKE (CFD) TOE LINE SHOWN HERE IS BASED ON EXISTING TOPOGRAPHY.

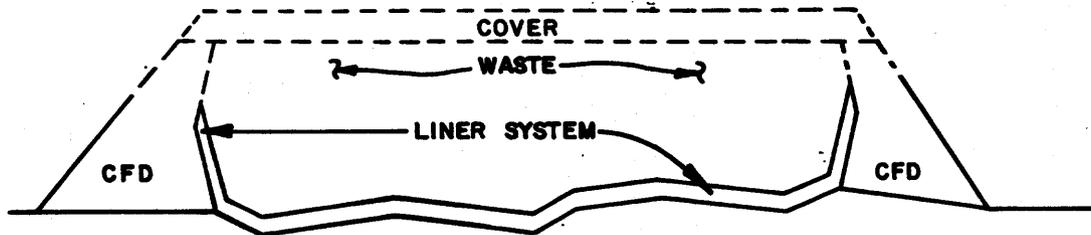
**PLAN VIEW OF VIT DISPOSAL CELL
PARTIALLY BELOW GRADE CONFIGURATION**

FIGURE 5.2.3-20

REPORT NO.:	DOE/OR/21548-411	DRAWING NO.:	
ORIGINATOR:	KWL	DRAWN BY:	AMA
		DATE:	



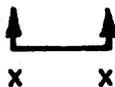
PLAN
NOT TO SCALE



SECTION
NOT TO SCALE

LEGEND

CFD = CLEAN FILL DIKE

 = CROSS SECTION

**LINER SYSTEM
SCHEMATIC PLAN and SECTION
CSS CELL**

FIGURE 5.2.5-1

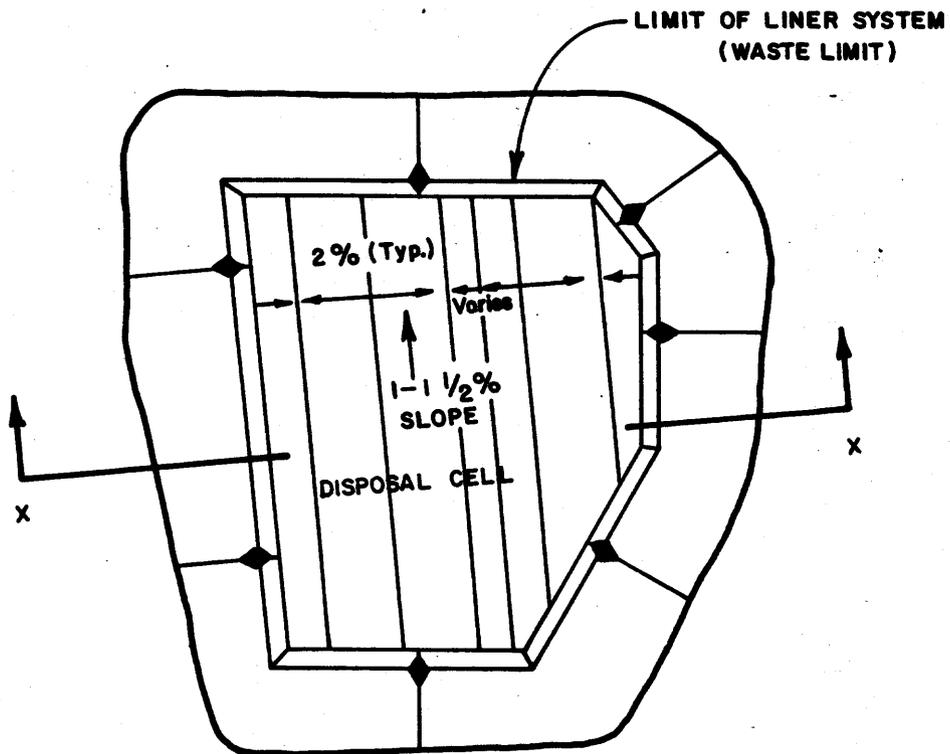
REPORT NO.: DOE/OR/21548-411

DRAWING NO.:

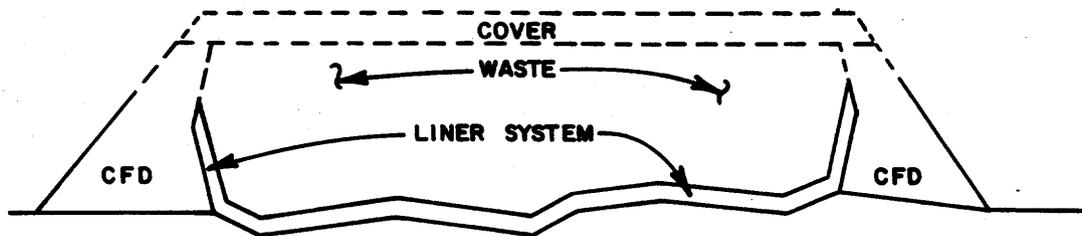
ORIGINATOR: K.O.

DRAWN BY: roy

DATE: AUG. ,1992

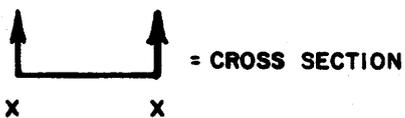


PLAN
NOT TO SCALE



SECTION
NOT TO SCALE

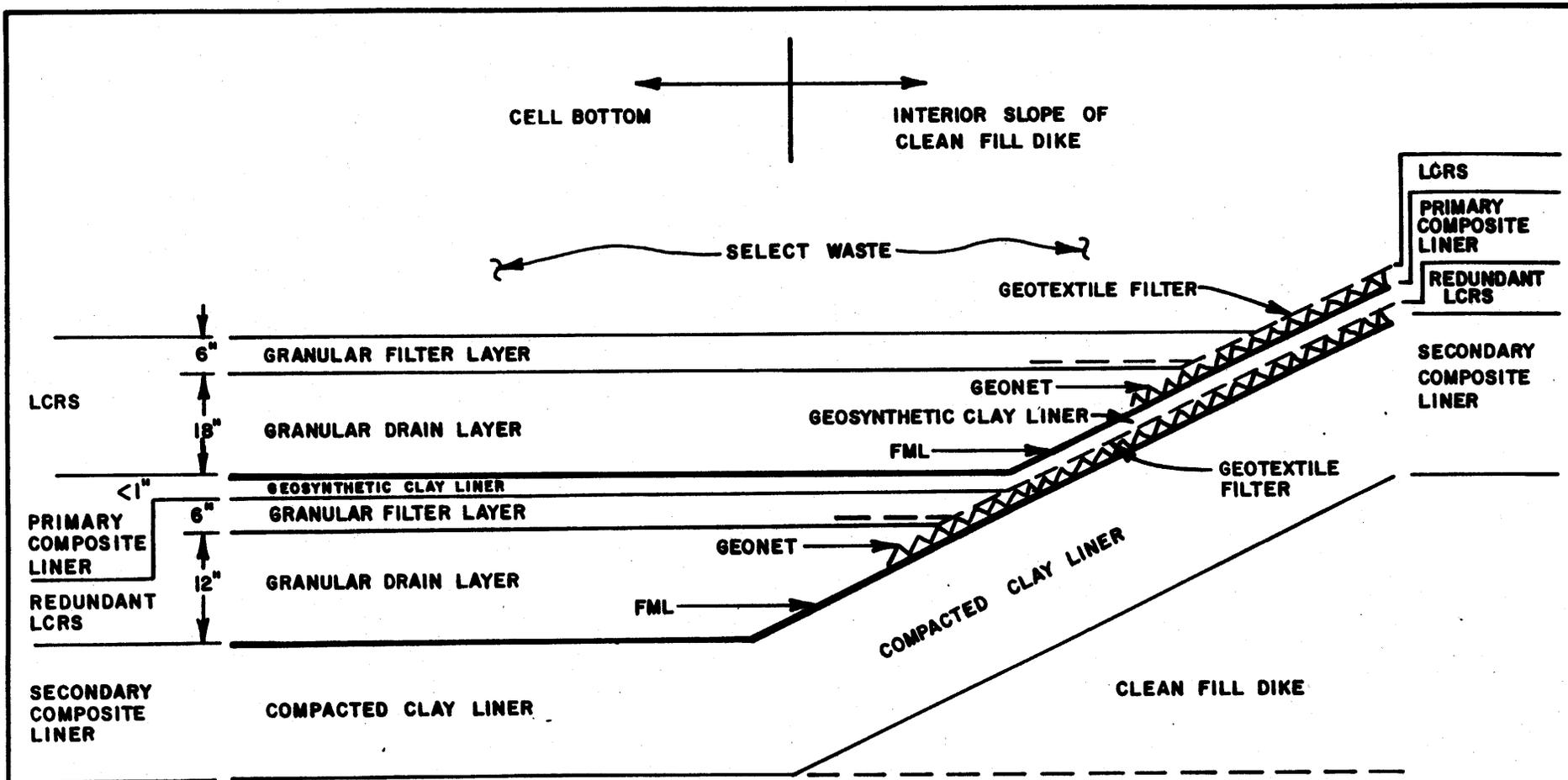
LEGEND
CFD = CLEAN FILL DIKE



**LINER SYSTEM
SCHEMATIC PLAN and SECTION
VIT CELL**

FIGURE 5.2.5-2

REPORT NO.: DOE/OR/21548-411	DRAWING NO.:	
ORIGINATOR: K.O.	DRAWN BY: roy	DATE: DEC., 1992

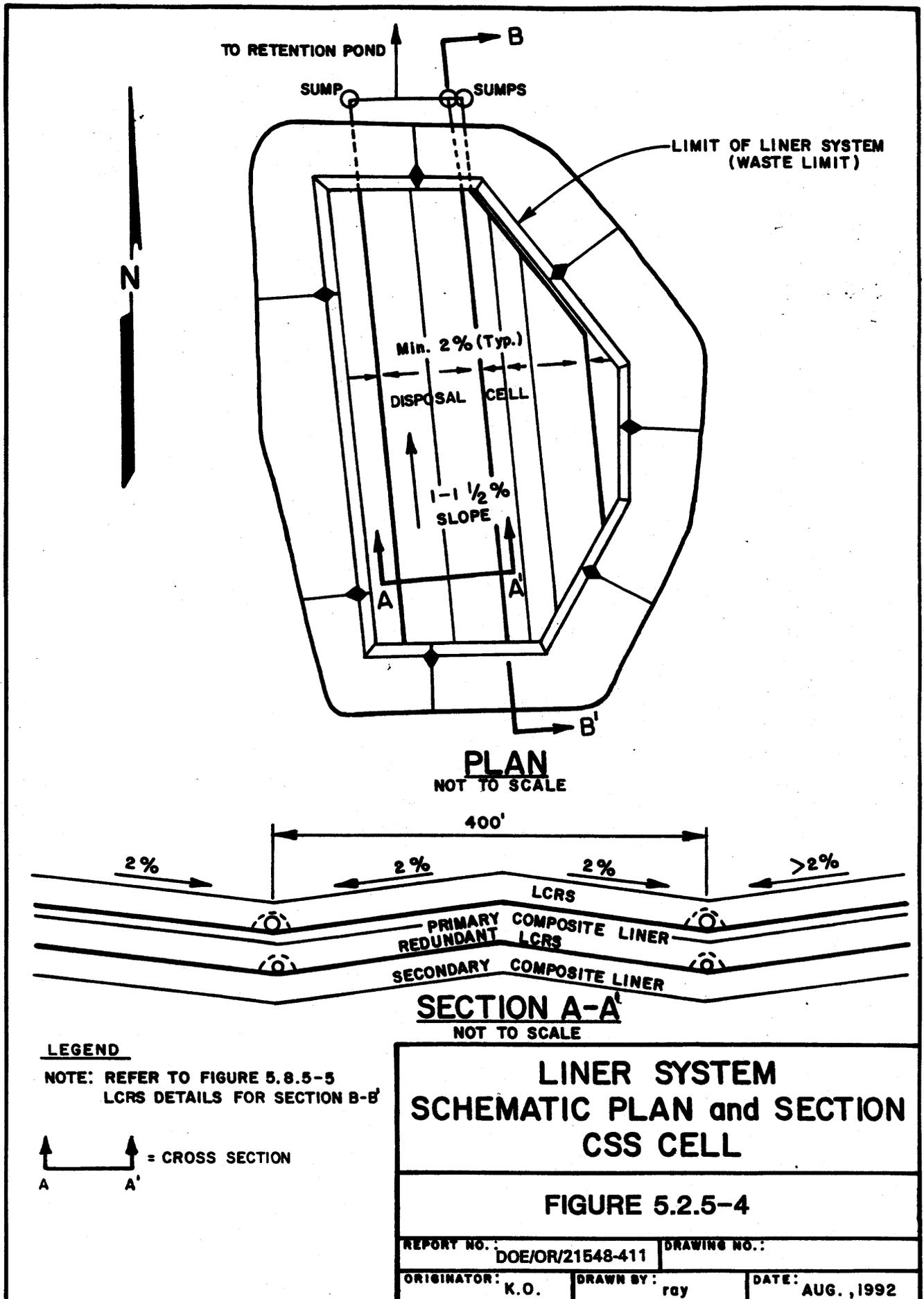


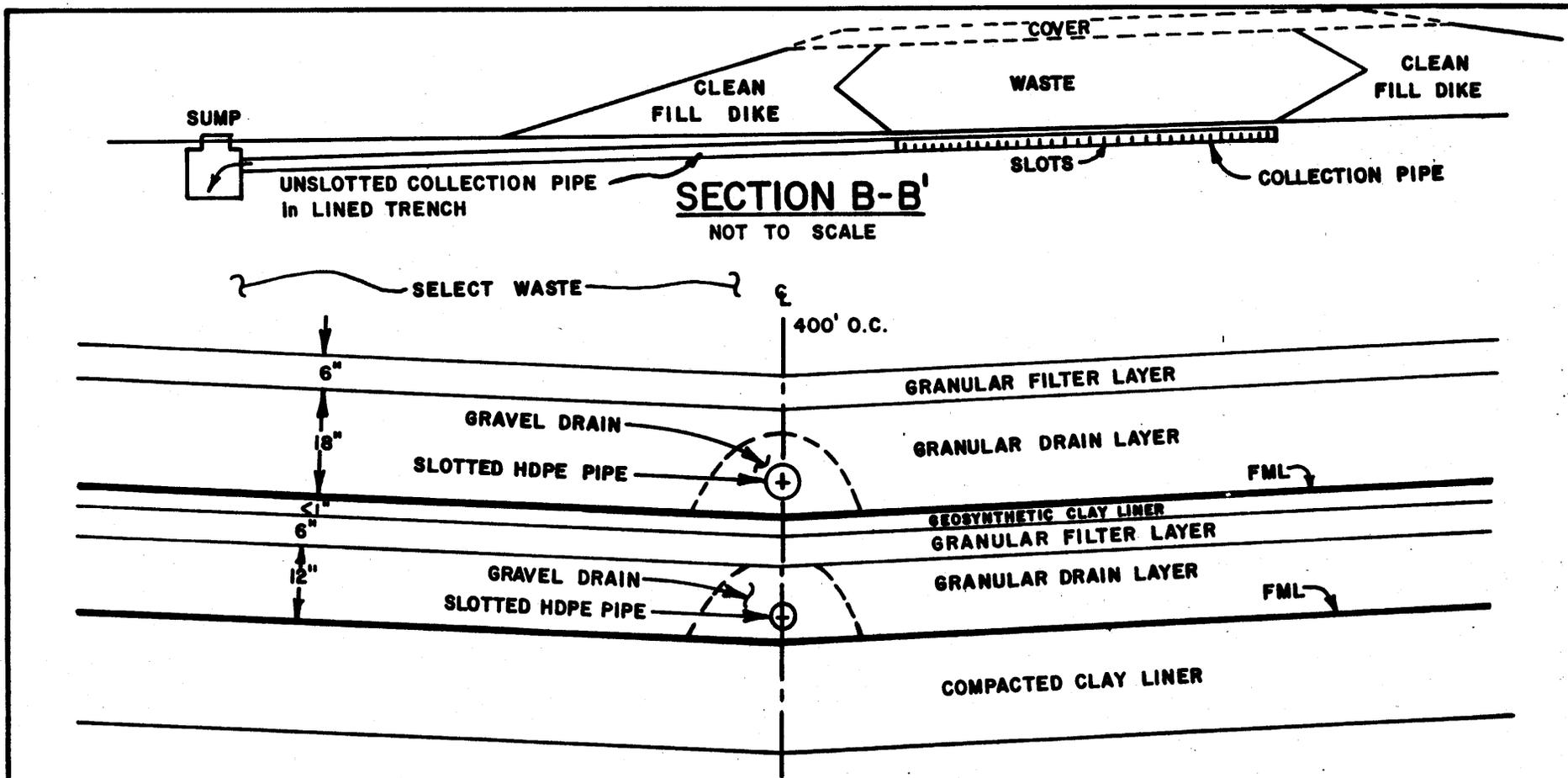
FOUNDATION SOILS
NOT TO SCALE

LINER SYSTEM SECTION and DETAILS

FIGURE 5.2.5-3

REPORT NO.: DOE/OR/21548-411		DRAWING NO.:	
ORIGINATOR:	K.O.	DRAWN BY:	ray
		DATE:	AUG., 1992





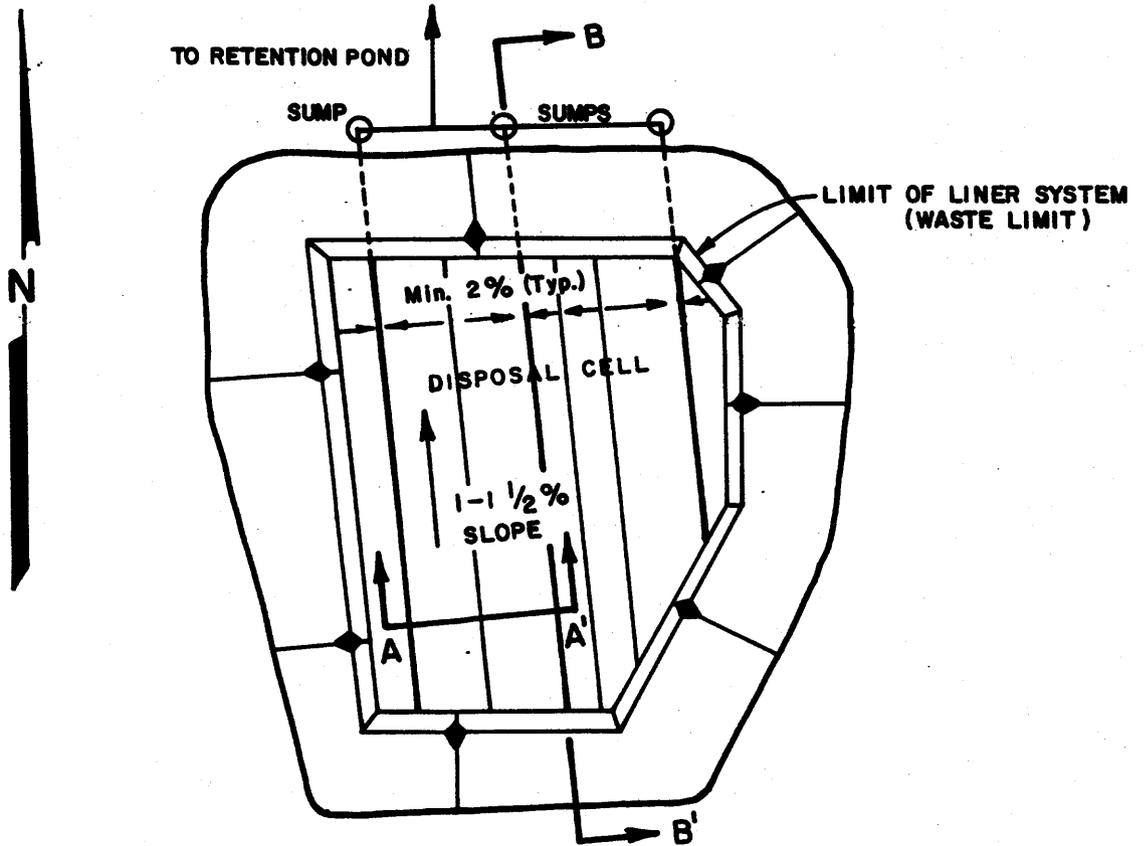
FOUNDATION SOILS

DETAIL
NOT TO SCALE

LCRS DETAILS

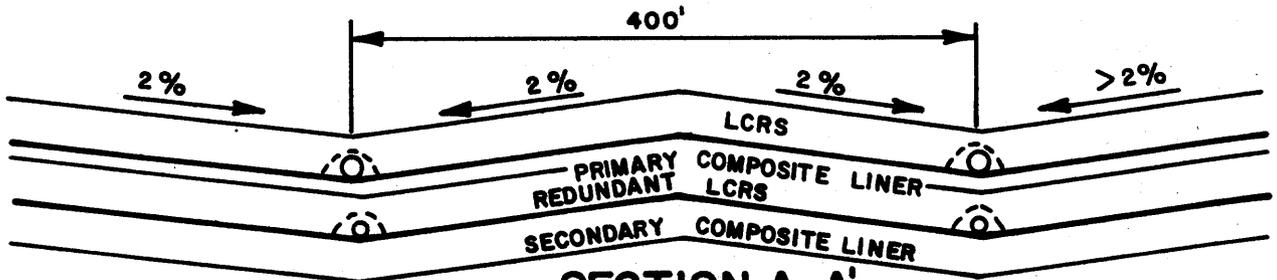
FIGURE 5.2.5-5

REPORT NO. DOE/OR/21548-411	DRAWING NO.:	
ORIGINATOR: K.O.	DRAWN BY: roy	DATE: AUG., 1992



PLAN

NOT TO SCALE



SECTION A-A'

NOT TO SCALE

LEGEND

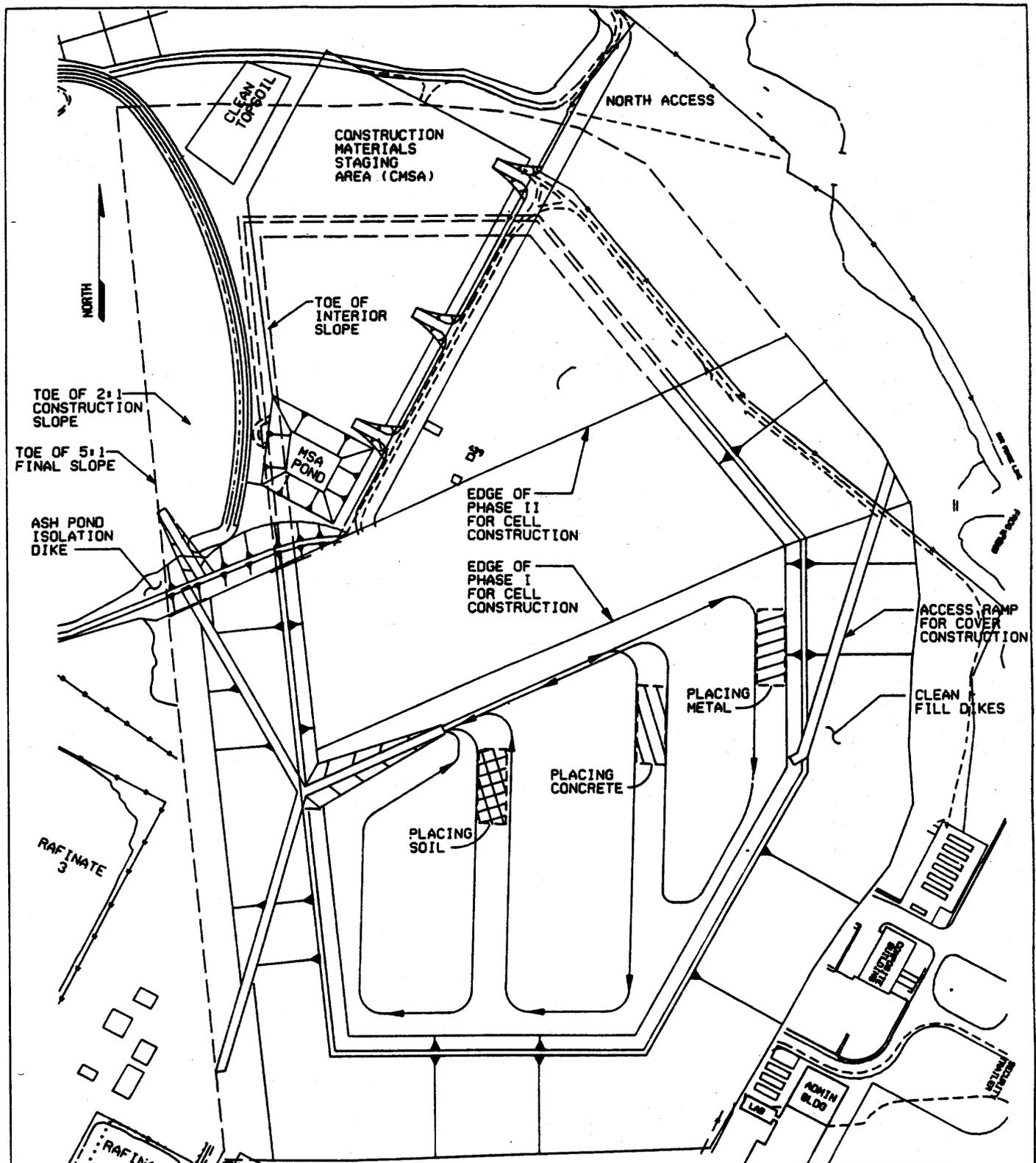
NOTE: REFER TO FIGURE 5.8.5-5
LCRS DETAILS FOR SECTION B-B'



**LINER SYSTEM
SCHEMATIC PLAN and SECTION
VIT CELL**

FIGURE 5.2.5-6

REPORT NO.:	DOE/OR/21548-411	DRAWING NO.:	
ORIGINATOR:	K.O.	DRAWN BY:	roy
		DATE:	DEC., 1992



LEGEND

-  METAL DEBRIS
-  CONCRETE DEBRIS
-  CONTAMINATED SOIL
-  CSS GROUT OVER METAL OR CONCRETE DEBRIS
-  DOTTED OUTLINE INDICATES AREA OF ACTIVE WASTE PLACEMENT

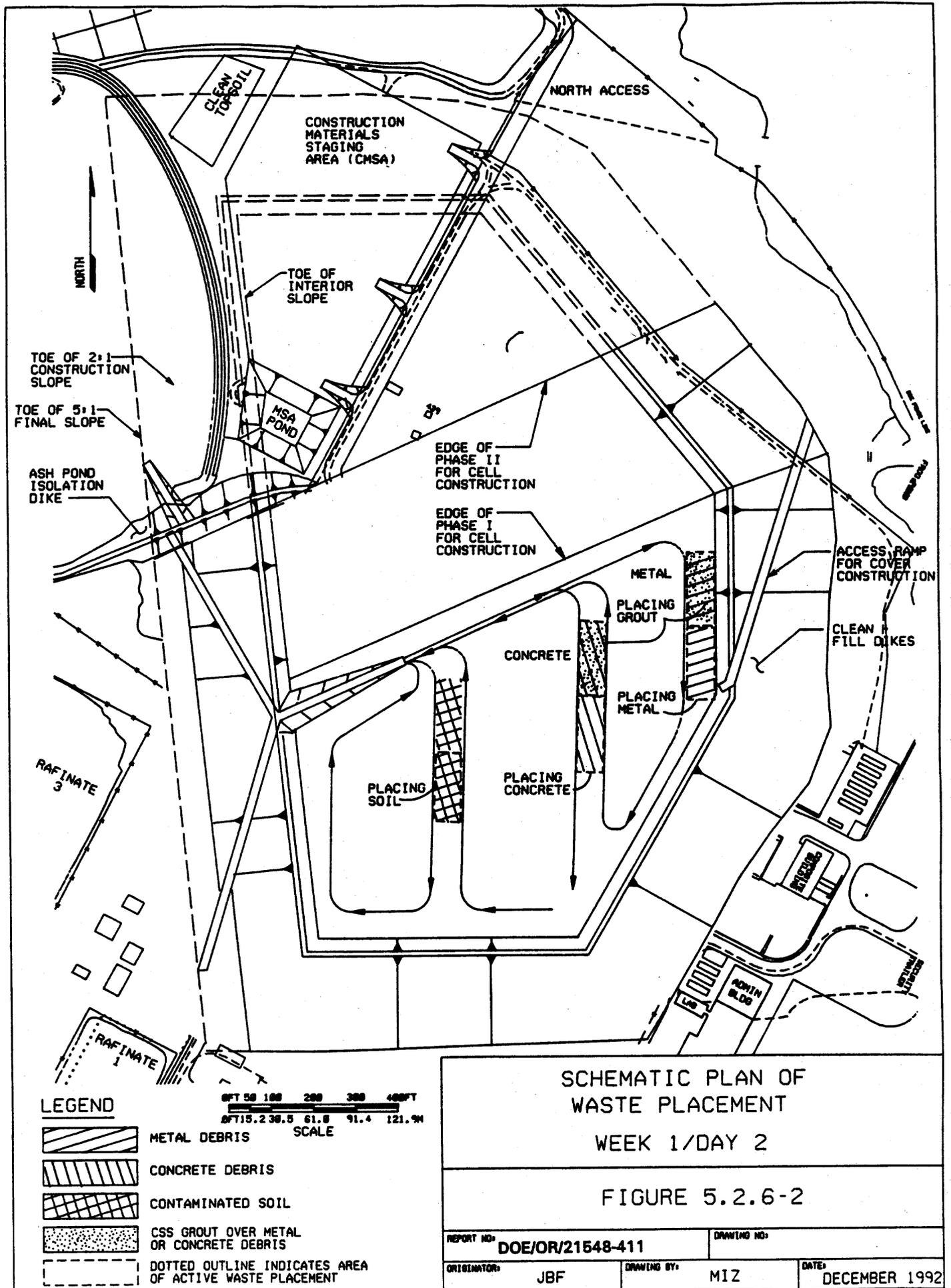


SCHEMATIC PLAN OF WASTE PLACEMENT

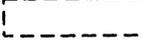
WEEK 1/DAY 1

FIGURE 5.2.6-1

REPORT NO:	DOE/OR/21548-411	DRAWING NO:	
ORIGINATOR:	JBF	DRAWING BY:	MIZ
		DATE:	DECEMBER 1992



LEGEND

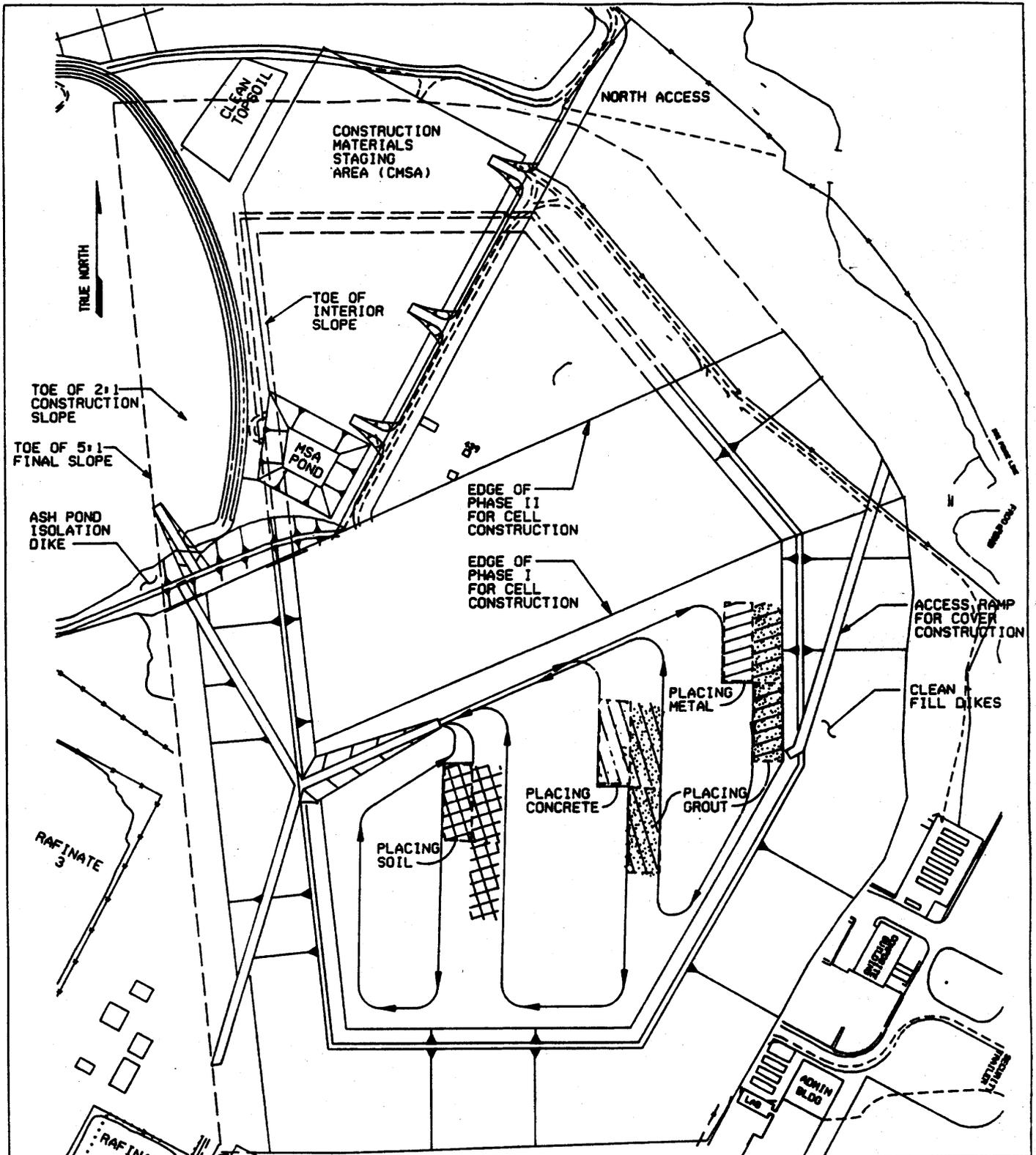
-  METAL DEBRIS
-  CONCRETE DEBRIS
-  CONTAMINATED SOIL
-  CSS GROUT OVER METAL OR CONCRETE DEBRIS
-  DOTTED OUTLINE INDICATES AREA OF ACTIVE WASTE PLACEMENT

0FT 50 100 200 300 400FT
 0FT 15.2 30.5 61.0 91.4 121.9M
 SCALE

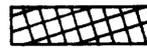
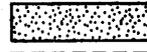
SCHEMATIC PLAN OF WASTE PLACEMENT
WEEK 1/DAY 2

FIGURE 5.2.6-2

REPORT NO: DOE/OR/21548-411	DRAWING NO:
ORIGINATOR: JBF	DRAWING BY: MIZ
DATE: DECEMBER 1992	



LEGEND

-  METAL DEBRIS
-  CONCRETE DEBRIS
-  CONTAMINATED SOIL
-  CSS GROUT OVER METAL OR CONCRETE DEBRIS
-  DOTTED OUTLINE INDICATES AREA OF ACTIVE WASTE PLACEMENT

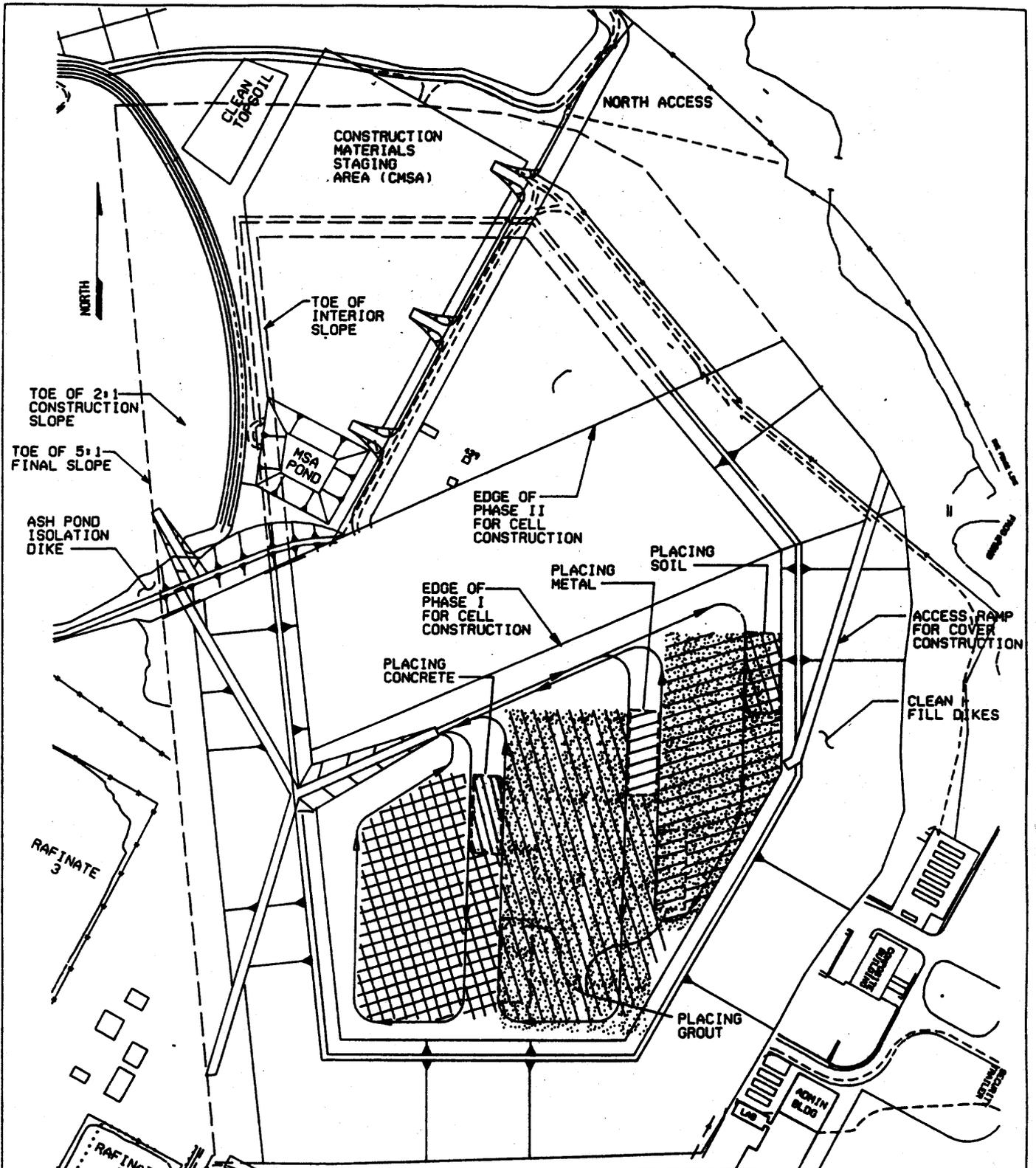


SCHEMATIC PLAN OF WASTE PLACEMENT

WEEK 1/DAY 3

FIGURE 5.2.6-3

REPORT NO:	DOE/OR/21548-411	DRAWING NO:	
ORIGINATOR:	JBF	DRAWING BY:	MIZ
		DATE:	DECEMBER 1992



LEGEND

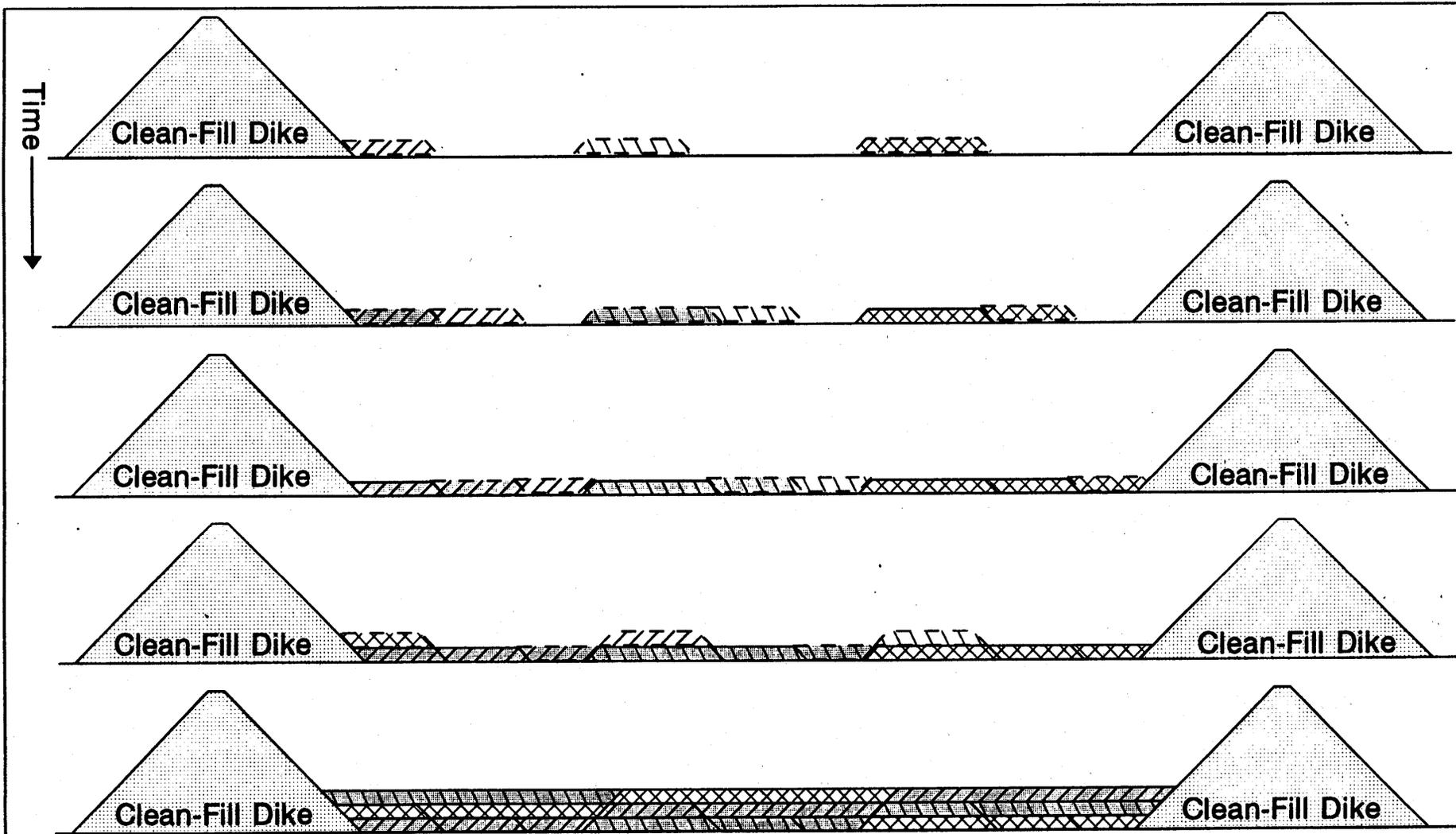
-  METAL DEBRIS
-  CONCRETE DEBRIS
-  CONTAMINATED SOIL
-  CSS GROUT OVER METAL OR CONCRETE DEBRIS
-  DOTTED OUTLINE INDICATES AREA OF ACTIVE WASTE PLACEMENT



**SCHEMATIC PLAN OF
 WASTE PLACEMENT
 WEEK 1/DAY 4**

FIGURE 5.2.6-4

REPORT NO:	DOE/OR/21548-411	DRAWING NO:	
ORIGINATOR:	JBF	DRAWING BY:	MIZ
		DATE:	DECEMBER 1992



Legend

-  Metal Waste
-  Metal Entombed w/ CSS Grout
-  Concrete Rubble
-  Concrete Entombed w/ CSS Grout
-  Contaminated Soil
-  Dashed Line = Active Placement Zone

SCHEMATIC SECTION OF CSS WASTE PLACEMENT SEQUENCE

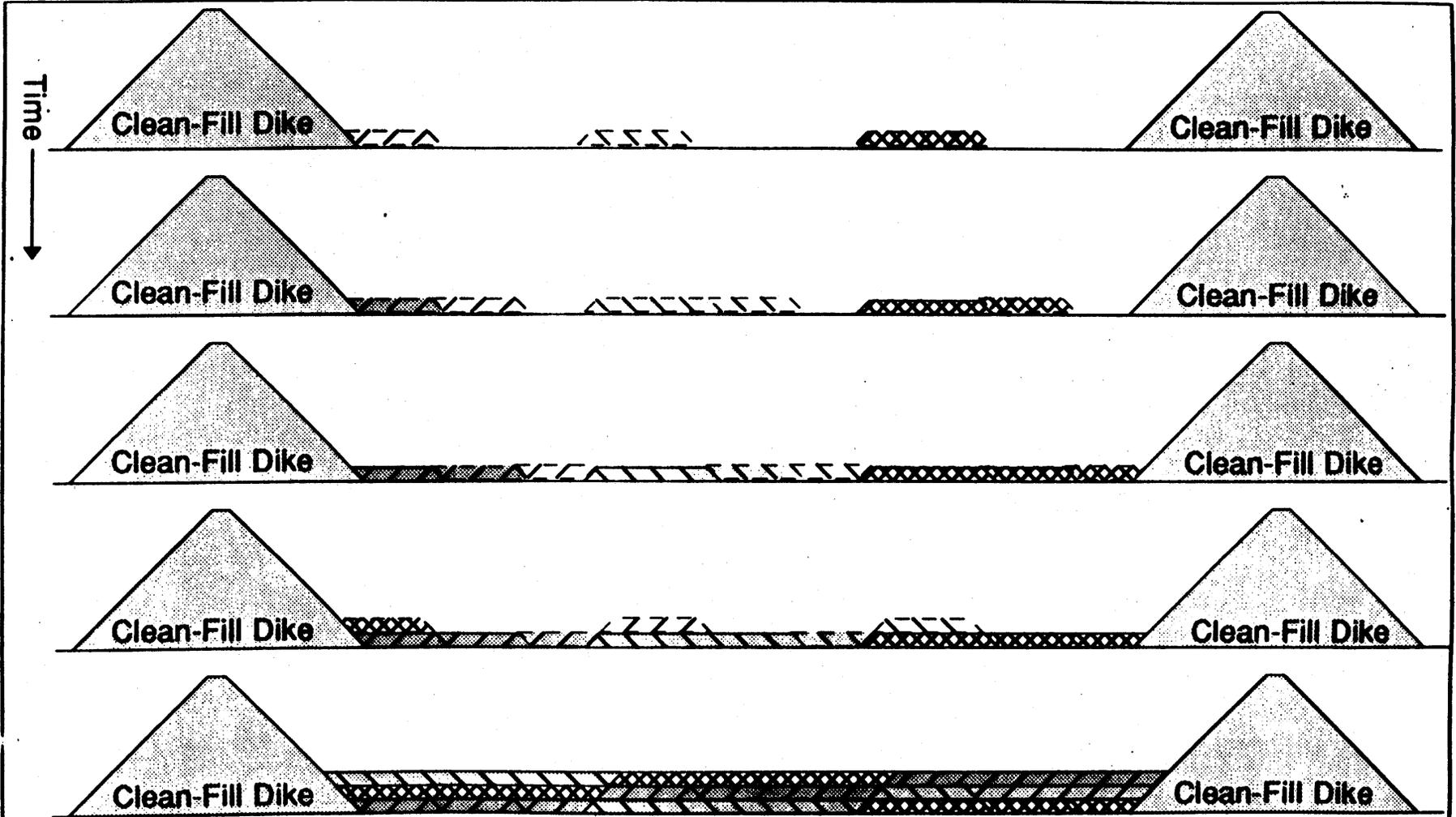
FIGURE 5.2.6-5

Doc.No. DOE/OR/21548-411

Originator: JBF

Drawn by: JBF

Date: December 1992



Legend

-  Metal Waste
-  Metal Entombed w/ Clean Grout
-  Concrete Rubble
-  Concrete filled w/ VIT, Soil, or Gravel
-  Contaminated Soil
-  Dashed Line = Active Placement Zone

**SCHEMATIC SECTION OF VIT
WASTE PLACEMENT SEQUENCE**

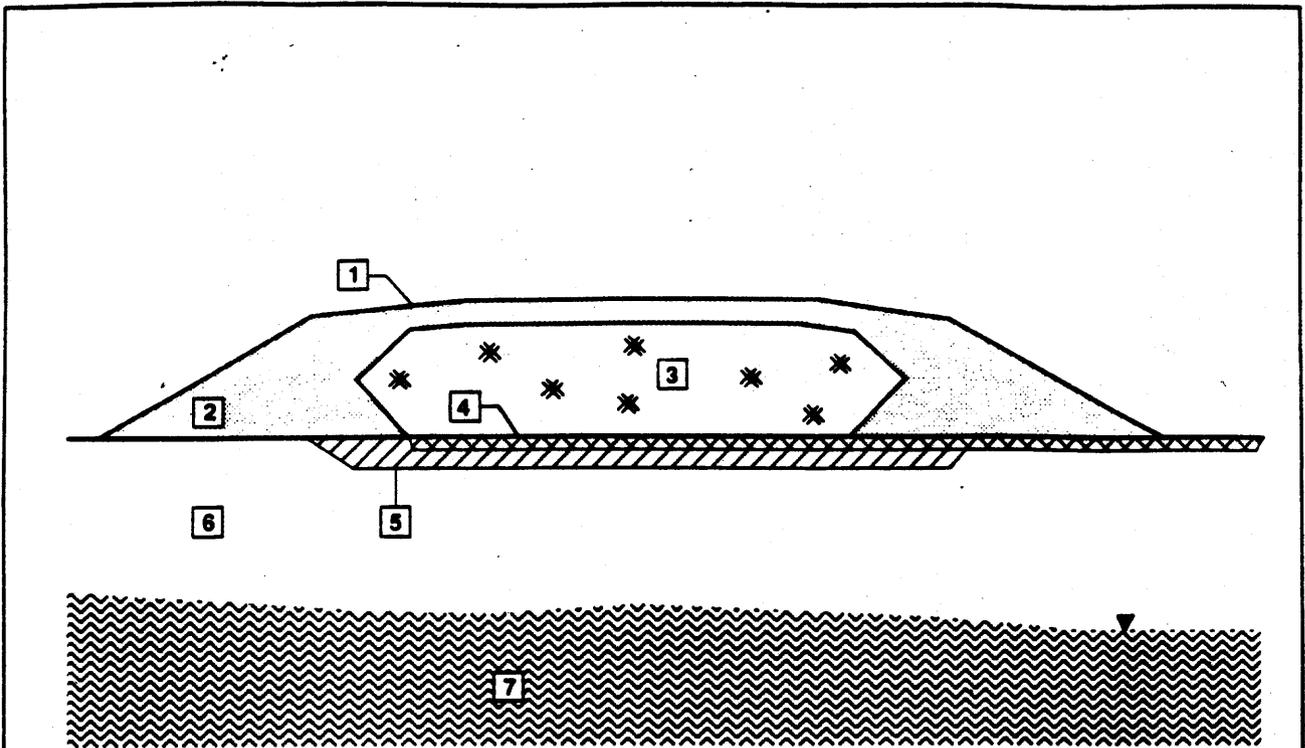
FIGURE 5.2.6-6

Doc. No DOE/OR/21548-411

Originator: JBF

Drawn by: JBF

Date: December 1992



LEGEND: CELL COMPONENTS

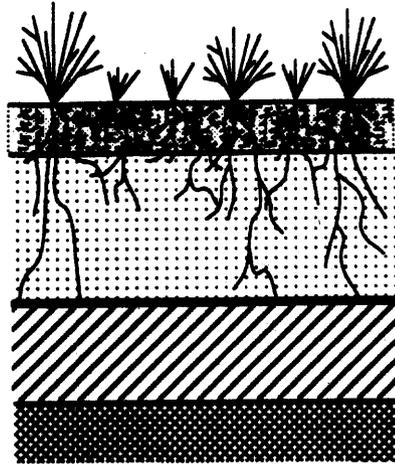
- 1** TOP COVER
- 2** PERIMETER ENCAPSULATION SYSTEM (CLEAN-FILL DIKES)
- 3** WASTE
- 4** BASAL LINERS AND LEACHATE COLLECTION AND REMOVAL SYSTEM
- 5** FOUNDATION
- 6** VADOSE ZONE
- 7** GROUNDWATER

WASTE ENCAPSULATION SYSTEM COMPONENTS

The essential parts of a waste encapsulation system which isolate waste and its emanation products from the environment are the cover, dikes, basal liners, drains, foundation soils and rocks.

FIGURE 5.2.7-1

REPORT NO. DOE/OR/21548-411		
ORIGINATOR JC	DRAWN BY MD	DATE 05-04-93



- VEGETATION**
- 1.0' **SOIL ①**
- 3.0' **FROST PROTECTION AND ROOTING ZONE ②**
- INFILTRATION BARRIER: GEOMEMBRANE ③**
- 1.5 - 2.0' **INFILTRATION/RADON BARRIER ④**
- WASTE**

- ① **MATERIALS: ALTERNATIVE TOP COMPONENTS**
 *0.5' EROSION RESISTANT ROCK
 *1.0' EROSION ROCK WITH SOIL IN VOIDS
 *1.0' GRAVEL MULCH (SOIL ROCK MIX)
- ② **MIXED CLAY SILT AND SAND**
- ③ **A GEOSYNTHETIC SUCH AS PVC OR HDPE**
- ④ **LOW-PERMEABILITY CLAY OR SILTY CLAY**

NOTE: THIS COVER HAS BEEN USED ON SANITARY LANDFILLS

**ALTERNATIVE COVER 1:
THE SIMPLE VEGETATED/ROCK COVER**

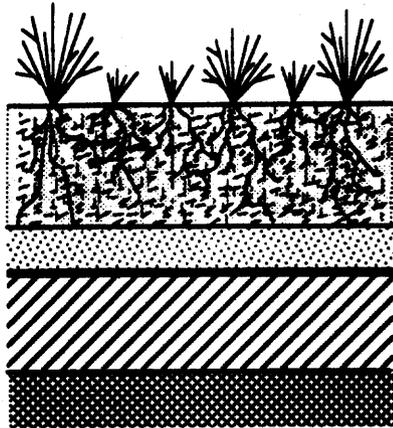
FIGURE 5.2.7-2

REPORT NO.
DOE/OR/21548-411

ORIGINATOR
JC

DRAWN BY
MD

DATE
05-04-93

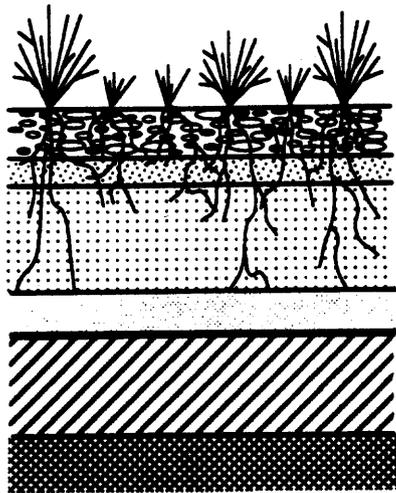


- VEGETATION**
- 2.5' SOIL: Random or selected***
- 1.0' FILTER/DRAIN/BEDDING: Sand
INFILTRATION BARRIER: Geomembrane**
- 2.0' RADON/INFILTRATION BARRIER: Silt & clay
WASTE**

***THESE MAY BE COVERED WITH ROCK MULCH.
ALTERNATIVELY, THE UPPER 0.5' MAY BE COARSER GRAINED GRAVEL.**

**NOTE: THIS COVER COMPLIES WITH EPA REGULATIONS FOR A COVER
FOR A HAZARDOUS WASTE FACILITY**

ALTERNATIVE COVER 2: THE RCRA COVER		
FIGURE 5.2.7-3		
REPORT NO		
DOE/OR/21548-411		
ORIGINATOR	DRAWN BY	DATE
JC	MD	05-04-93



1.0' EROSION BARRIER: Coarse gravel*
 0.5' FILTER/DRAIN/BEDDING: Sand

2.0' FROST PROTECTION: Random soil

1.0' FILTER/DRAIN/BEDDING: Fine-to-medium sand
 INFILTRATION BARRIER (OPTIONAL): Geomembrane

1.5 - 2.0' RADON/INFILTRATION BARRIER: Silt and clay

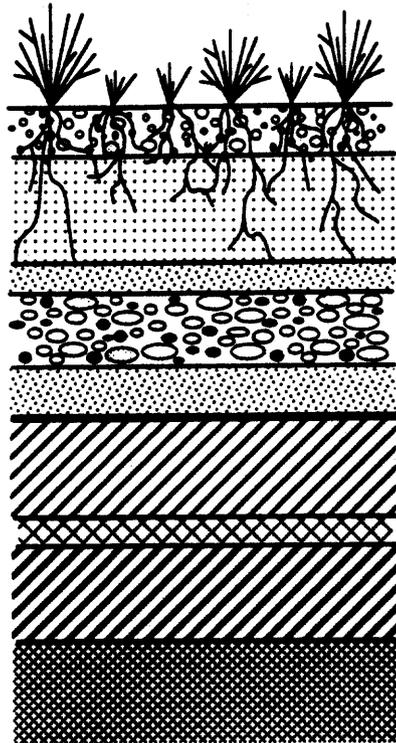
WASTE

NOTE: ALTERNATIVE TOP COMPONENTS

- *1.0' SOIL FOR VEGETATION
- *1.0' COARSE GRAVEL WITH SOIL IN VOIDS
- *1.0' GRAVEL MULCH

NOTE: THIS COVER HAS BEEN USED ON THE SIDE SLOPE OF A URANIUM MILL TAILINGS PILE. THE UPPER COMPONENT WAS ROCK.

ALTERNATIVE COVER 3: THE DOUBLE DRAIN COVER		
FIGURE 5.2.7-4		
REPORT NO. DOE/OR/21548-411		
ORIGINATOR JC	DRAWN BY MD	DATE 05-04-93



- 1.0' VEGETATION
- EROSION BARRIER: Gravelly silty sand *
- 2.0' FROST PROTECTION: Random soil
- 0.5' FILTER/DRAIN/BEDDING: Sand **
- 1.0' DRAIN/BIOBARRIER: Gravel
- 0.5' FILTER/DRAIN/BEDDING: Sand
- INFILTRATION BARRIER: Geomembrane and Geomat
- 1.5' INFILTRATION BARRIER: Silt and clay
- LEAK DETECTION SYSTEM: Geogrid
(Optional Design Component)
- 1.5' RADON BARRIER: Silt and clay
- WASTE

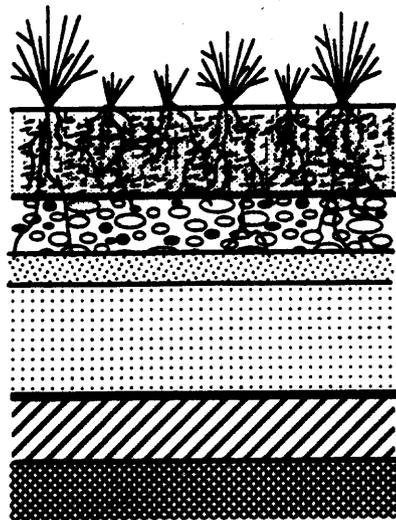
NOTE: ALTERNATE EROSION BARRIERS

- * 1.0' ROCK OVER BEDDING
- * 1.0' ROCK WITH SOIL IN VOIDS
- * 1.0' SOIL

** OPTIONAL: NOT NEEDED IF ROCK IS CHOKED.

NOTE: THIS IS THE MOST COMPLEX COVER CONSIDERED IN THIS REPORT. IT IS THE SELECTED COVER. VARIANTS HAVE BEEN USED TO COVER URANIUM MILL TAILINGS PILES.

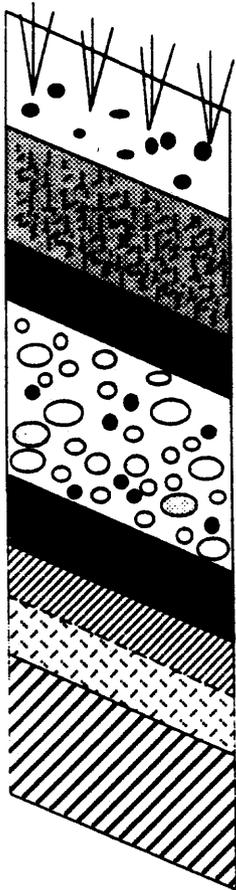
ALTERNATIVE COVER 4: THE MULTI-COMPONENT COVER		
FIGURE 5.2.7-5		
REPORT NO: DOE/OR/21548-411		
ORIGINATOR JC	DRAWN BY MD/BM	DATE 05-19-93



- VEGETATION**
- 0.5' - 1.5' **SOIL***
- 1.0' - 2.0' **EROSION BARRIER: Coarse gravel**
- 0.5' - 1.0' **FILTER/DRAIN/BEDDING: Sand**
- 2.0' **FROST PROTECTION: Selected soil**
- ← **INFILTRATION BARRIER: Geomembrane**
- 0.5' - 1.0' **RADON/INFILTRATION BARRIER: Silt and clay**
- WASTE**

*THIS SOIL MAY BE ENHANCED WITH GRAVEL TO INCREASE EROSION RESISTANCE. ALTERNATIVELY, THIS COULD BE A LAYER OF ROCK WITH SOIL IN THE VOIDS.

ALTERNATIVE COVER 5: THE EROSION RESISTER		
FIGURE 5.2.7-6		
REPORT NO. DOE/OR/21548-411		
ORIGINATOR JC	DRAWN BY MD/BM	DATE 05-05-93



COVER COMPONENT	FUNCTION	MATERIAL
VEGETATION	<ul style="list-style-type: none"> • Aesthetics • Evapotranspiration • Erosion Control 	Prairie Grass
TOP SOIL	<ul style="list-style-type: none"> • Support Vegetation • Control Erosion 	Gravelly Soil
SOIL	<ul style="list-style-type: none"> • Frost Protection • Root Zone 	Mixed Clay, Silt and Sand
FILTER	<ul style="list-style-type: none"> • Control Piping 	Clean Sand
BIOINTRUSION	<ul style="list-style-type: none"> • Inhibit Roots • Control Burrowing Animals 	Cobbles and Boulders
BEDDING	<ul style="list-style-type: none"> • Protect Geomembrane • Shed Water 	Clean Sand
INFILTRATION BARRIER	<ul style="list-style-type: none"> • Reduce and Control Infiltration 	(a) FML: Geomembrane (b) GLC: Bentonite Mat (c) Soil: Clay-Silt
*LEAK DETECTION	<ul style="list-style-type: none"> • Monitor Infiltration 	Geogrid
RADON BARRIER	<ul style="list-style-type: none"> • Control Radon Flux 	Silty/Clay

*Design Option

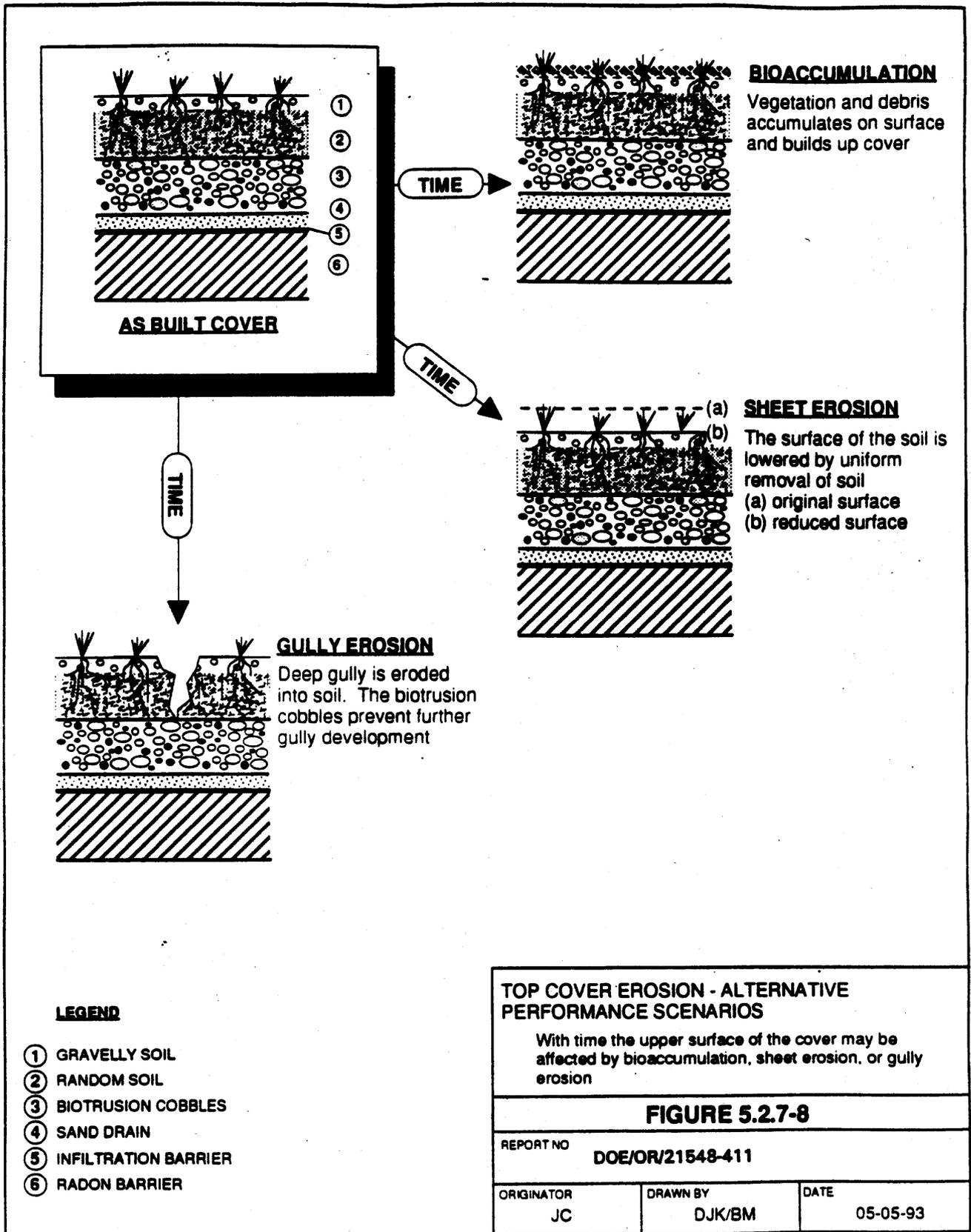
TOP SLOPE COVER:

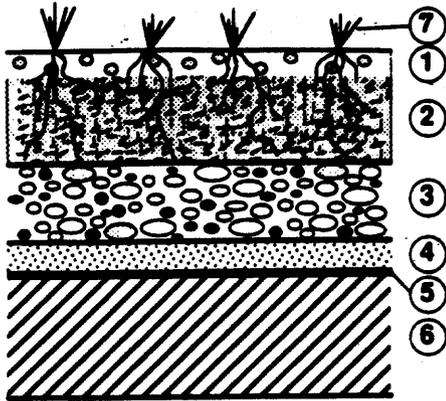
A typical disposal cell multi-component cover provides multiple protection of the waste

FIGURE 5.2.7-7

REPORT NO: **DOE/OR/21548-411**

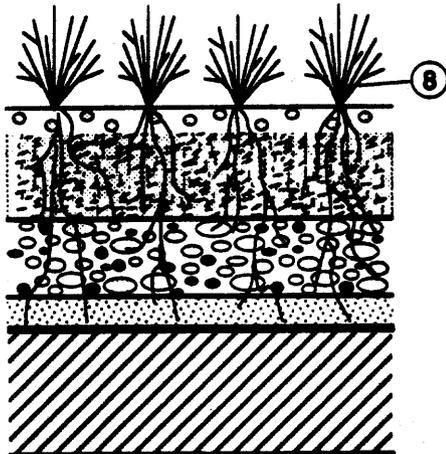
ORIGINATOR JC	DRAWN BY BR/MD/BM	DATE 05-05-93
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NORMAL SITUATION:

Roots grow in upper random soil. Downward advance impeded by biointrusion rock, lack of moisture in voids, grass type.

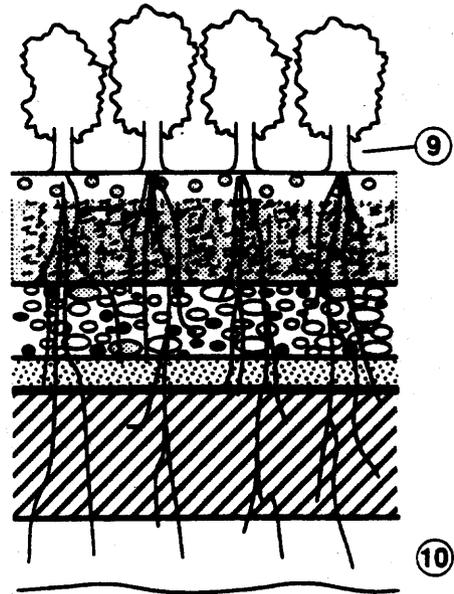


FAILURE SCENARIO I:

Roots penetrate biointrusion and drain. Shedding of water in drains is impeded and infiltration increased. Further root advance impeded by geomembrane, bentonite, and compacted clay.

COVER FEATURES TO PRECLUDE FAILURE

- Thick soils for root growth
- Biointrusion barrier cobbles
- Low moisture content of cobbles and sand
- Geomembrane and bentonite
- Compacted clay
- Grass mowing and burning



FAILURE SCENARIO II:

Roots penetrate waste. Increased infiltration and radon flux. Physical degradation of cover components.

LEGEND

- | | |
|--------------------------|--------------------|
| ① GRAVELLY SOIL | ⑧ GRASS AND BUSHES |
| ② RANDOM SOIL | ⑨ BUSHES AND TREES |
| ③ COBBLES | ⑩ WASTE |
| ④ SAND | |
| ⑤ GEOMEMBRANE AND GEOMAT | |
| ⑥ SILT AND CLAY | |
| ⑦ GRASS | |

VEGETATION PENETRATION FAILURE SCENARIOS

Root penetration is impeded by the multicomponents of the cover

FIGURE 5.2.7-9

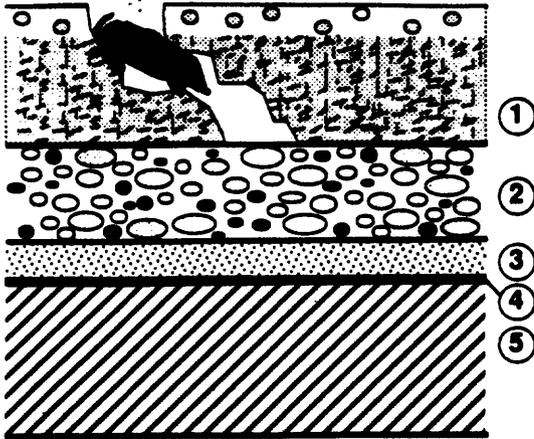
REPORT NO

DOE/OR/21548-411

ORIGINATOR
JC

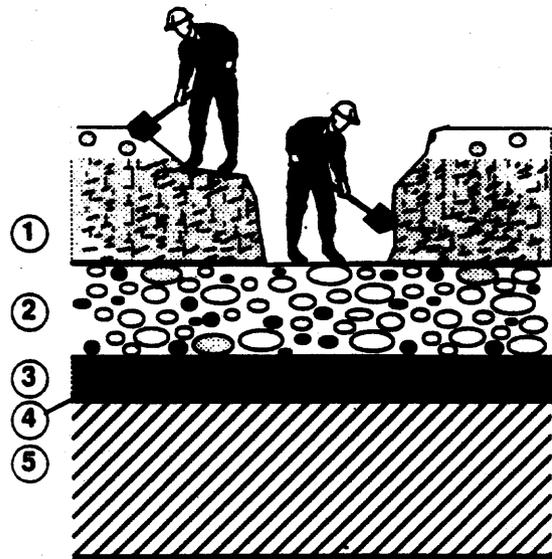
DRAWN BY
MD

DATE
05-05-93



ANIMAL INTRUSION

A burrowing animal's progress is impeded by the cobbles of the biointrusion barrier.



HUMAN INTRUSION

Inadvertent human intrusion may be impeded or slowed by the cobbles of the biointrusion barrier.

LEGEND

- ① RANDOM SOIL
- ② BIOINTRUSION COBBLES
- ③ DRAIN SAND
- ④ INFILTRATION BARRIER
- ⑤ RADON BARRIER

ANIMAL AND HUMAN INTRUSION FAILURE SCENARIOS

The large cobbles of the biointrusion barrier may intercept and impede animals and humans and hence protect the remainder of the cover and the wastes.

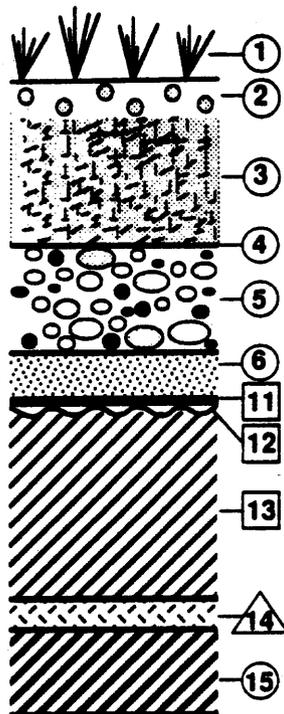
FIGURE 5.2.7-10

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ORIGINATOR: JC

DRAWN BY: DJK

DATE: 05-05-93



COVER PROTECTION LAYERS ABOVE INFILTRATION BARRIER

- ① VEGETATION: Control erosion and increase evapotranspiration
- ② GRAVELLY SOIL: Control erosion
- ③ RANDOM SOIL: Freeze/Thaw protection; rooting medium
- ④ FILTER: Control particle migration into biointrusion layer
- ⑤ BIOINTRUSION COBBLES: Animal, human, and root intrusion control
- ⑥ DRAIN SAND: Bedding to preclude cobble punching and deformation

INFILTRATION BARRIER COMPONENTS

- ⑪ GEOMEMBRANE: Very low permeability; may deteriorate with time
- ⑫ BENTONITE LAYER (IN GEOMAT): Very low permeability; long-term durable natural material; also seals geomembrane pinhole leaks.
- ⑬ RADON BARRIER CLAY/SILT: Low permeability. Seepage not sensitive to water ponding. Long-term functioning and effectiveness may be affected by deformation, freeze/thaw, or dessication.

INFILTRATION BARRIER MONITORING

- △* ⑭ GEOGRID: Intercepts and directs infiltration barrier seepage to monitoring stations.
*(Design Option)

BACK-UP INFILTRATION BARRIER

- ⑮ RADON BARRIER: Low-permeability soil may function as a back-up or secondary infiltration barrier

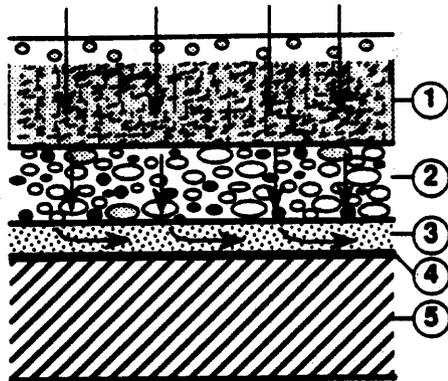
INFILTRATION BARRIER COMPONENTS: THEIR NATURE AND FUNCTION
Each component of the cover plays a part in protecting the infiltration barrier and limiting infiltration

FIGURE 5.2.7-11

REPORT NO. DOE/OR/21548-411		
ORIGINATOR. JC	DRAWN BY DJK/BM	DATE 05-19-93

FEATURES THAT PRECLUDE MALPERFORMANCE

The very high-permeability biointrusion cobbles are not susceptible to clogging. loss of flow capacity in the drain can be augmented by cobble layer flow capacity.

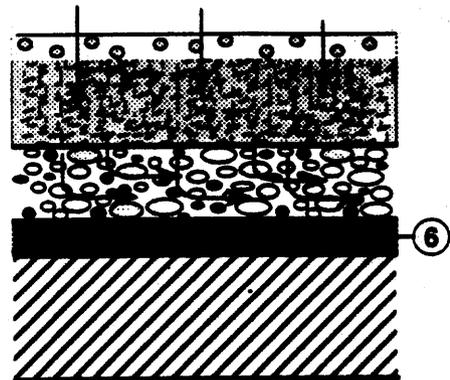


NORMAL PERFORMANCE

Seepage through soil and cobbles flows into drain sand and flows laterally in drain layer above infiltration barrier.

- ① RANDOM SOIL
- ② BIOINTRUSION COBBLES
- ③ DRAIN SAND
- ④ INFILTRATION BARRIER
- ⑤ RADON BARRIER

⑥ BLOCKED OR CLOGGED DRAIN



**FAILURE SCENARIO:
BLOCKED OR CLOGGED DRAIN**

Seepage through soil and cobbles flows laterally in cobble layer above clogged drain.

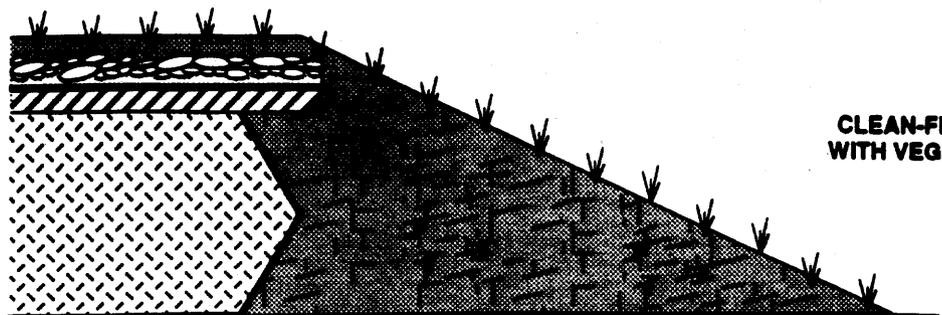
COVER DRAIN CLOGGING SCENARIO ANALYSIS

Blocking or clogging of the cover drain by physical or chemical processes will not impair the cover's ability to shed water

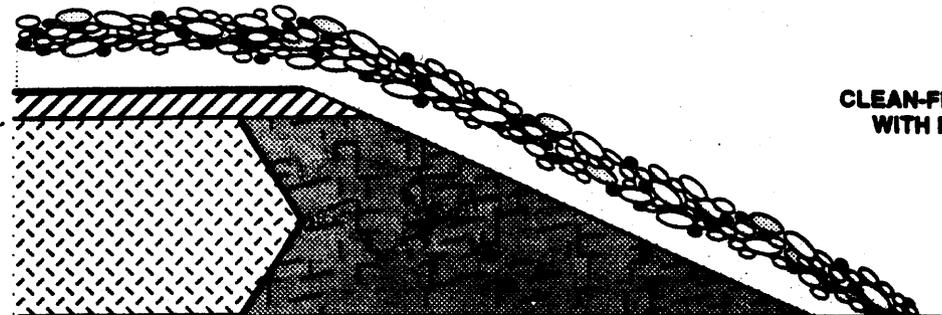
FIGURE 5.2.7-12

REPORT NO: DOE/OR/21548-411

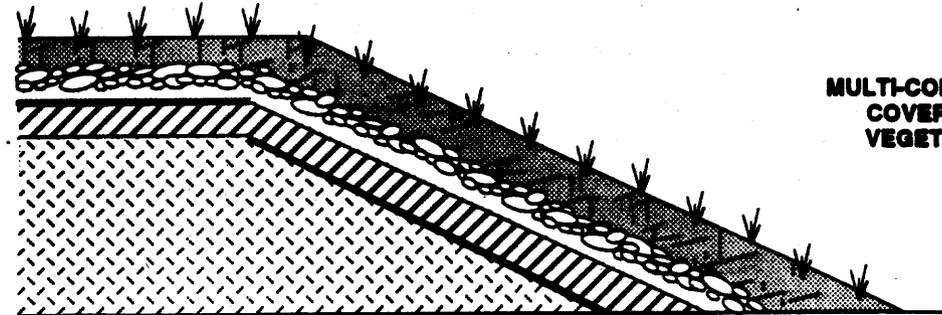
ORIGINATOR: JC	DRAWN BY: DJK	DATE 05-18-93
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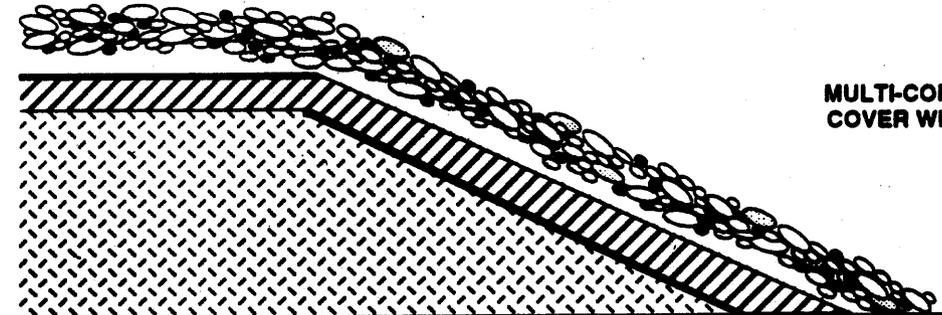
CLEAN-FILL DIKE WITH VEGETATION



CLEAN-FILL DIKE WITH ROCK



MULTI-COMPONENT COVER WITH VEGETATION



MULTI-COMPONENT COVER WITH ROCK

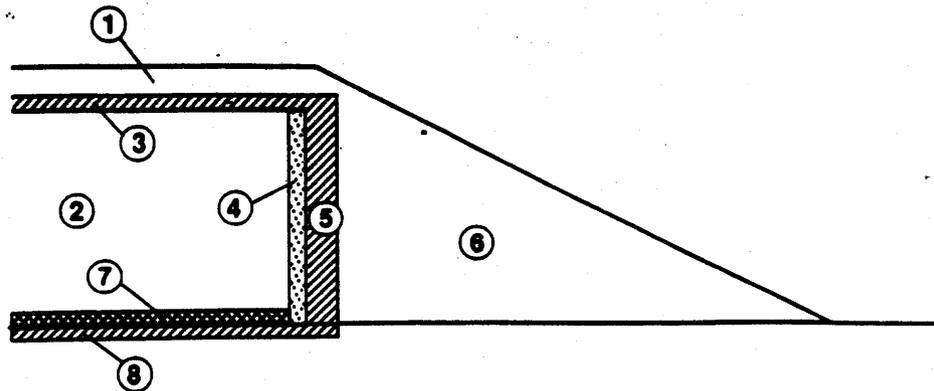
LEGEND	
SOIL	GRAVEL
VEGETATION	CLAY AND SOIL
SAND	WASTE
ROCK	GEOMEMBRANE

PERIMETER ENCAPSULATION:
 Four perimeter encapsulation systems were evaluated and compared

FIGURE 5.2.7-13

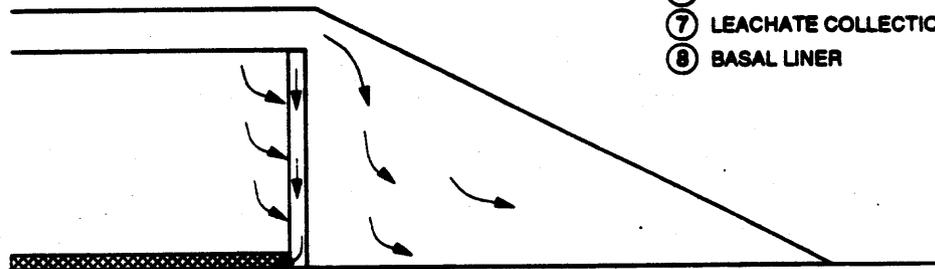
REPORT NO: DOE/OR/21548-411

ORIGINATOR: JC	DRAWN BY: BR/MD/BM	DATE: 05-17-93
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SECTION OF VERTICAL INNER FACE CLEAN-FILL DIKE

- ① COVER
- ② WASTE
- ③ INFILTRATION BARRIER
- ④ VERTICAL DRAIN
- ⑤ LOW-PERMEABILITY CLAY ZONE
- ⑥ CLEAN-FILL DIKE
- ⑦ LEACHATE COLLECTION SYSTEM
- ⑧ BASAL LINER



FUNCTION OF VERTICAL DRAIN

SEEPAGE FROM THE WASTE INTO THE VERTICAL DRAIN WILL FLOW DOWN TO THE BASAL LEACHATE COLLECTION SYSTEM. DIKE INFILTRATION WILL BE IMPEDED FROM ENTERING THE DRAIN BY THE LOW PERMEABILITY CLAY ZONE.

VERTICAL FACE CLEAN-FILL DIKE

To achieve all the advantages of a clean-fill dike, and increase cell capacity, the inner face of the dike may be vertical

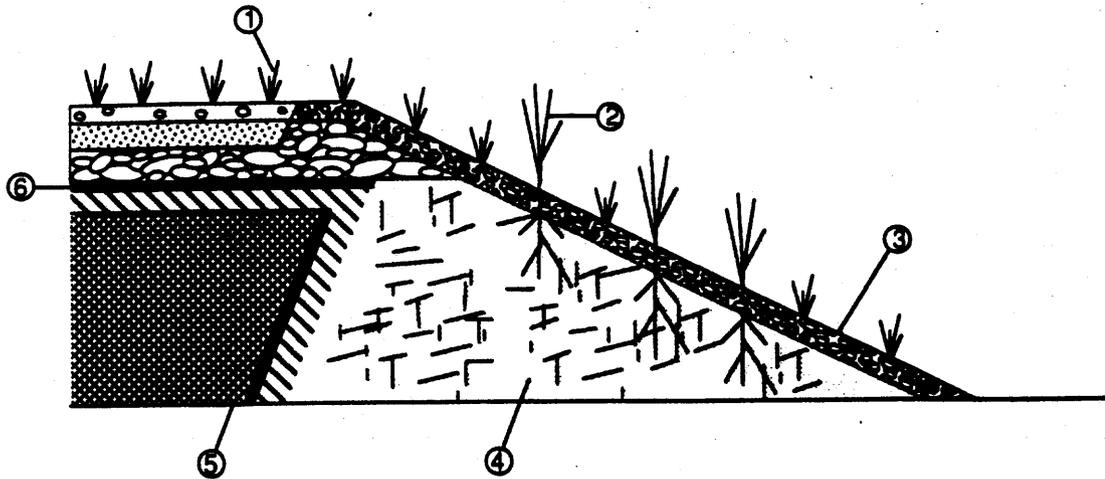
FIGURE 5.2.7-14

REPORT NO. DOE/OR/21548-411

ORIGINATOR:
JC

DRAWN BY:
MD

DATE:
05-17-93



LEGEND

- ① SHALLOW-ROOTING VEGETATION
- ② OCCASIONAL DEEP-ROOTING VEGETATION
- ③ EROSION BARRIER
- ④ CLEAN-FILL DIKE
- ⑤ DRAINS AND LINER
- ⑥ BIOINTRUSION LAYER
- ⑦ WASTE

VEGETATION GROWTH & ROOTING PATTERNS

To inhibit root penetration, the top cover includes a biointrusion barrier, and the side slope clean-fill dikes provide volume for root growth

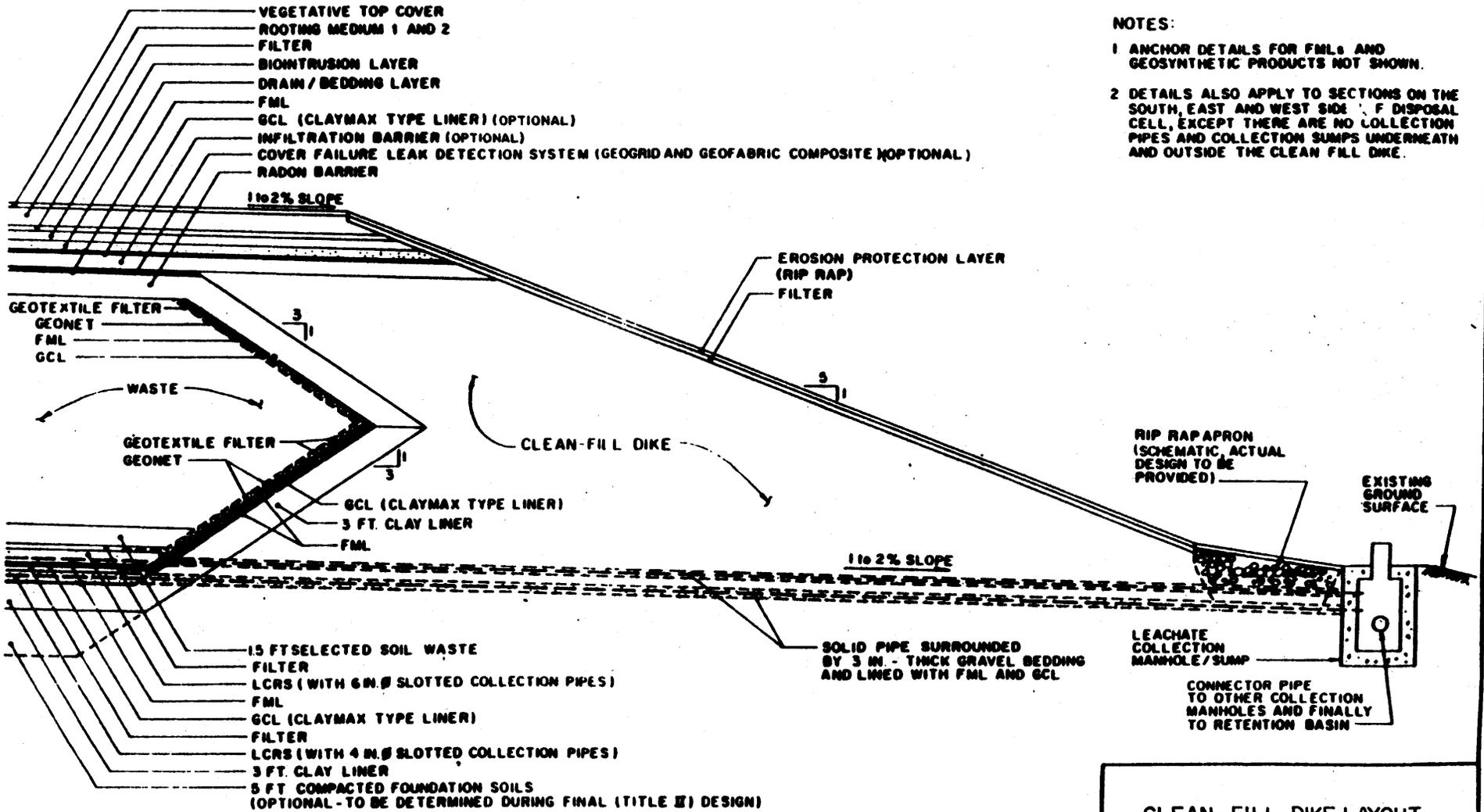
FIGURE 5.2.7-15

REPORT NO: **DOE/OR/21548-411**

ORIGINATOR:
JC

DRAWN BY:
EBR

DATE
05-17-93

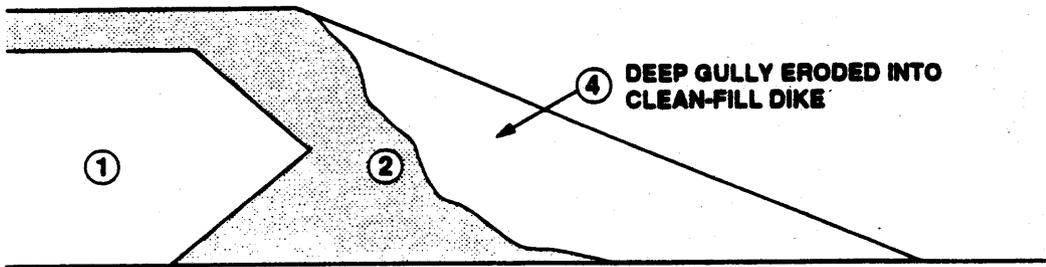
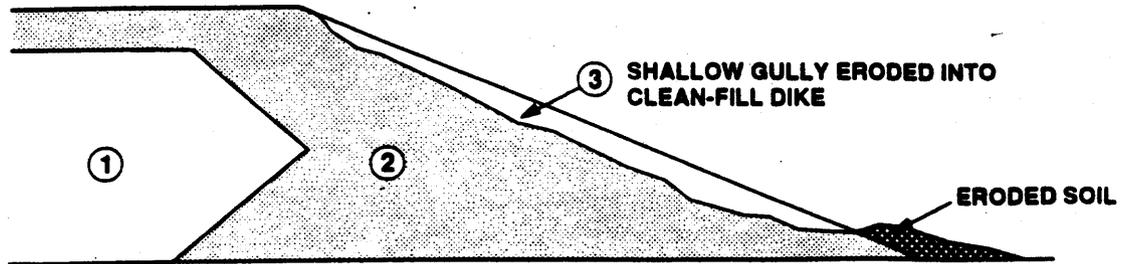


- NOTES:
- ANCHOR DETAILS FOR FMLs AND GEOSYNTHETIC PRODUCTS NOT SHOWN.
 - DETAILS ALSO APPLY TO SECTIONS ON THE SOUTH, EAST AND WEST SIDE OF DISPOSAL CELL, EXCEPT THERE ARE NO COLLECTION PIPES AND COLLECTION SUMPS UNDERNEATH AND OUTSIDE THE CLEAN FILL DIKE.

CLEAN-FILL DIKE LAYOUT

FIGURE 5.27-16

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ORIGINATOR EVL	DRAWN BY AMA
	DATE



LEGEND

- ① WASTE
- ② CLEAN-FILL DIKE
- ③ SHALLOW GULLY
- ④ DEEP GULLY

CLEAN-FILL DIKE EROSION GULLY GEOMETRY

Even significant gully formation by erosion of the clean-fill dike will not expose the encapsulated wastes

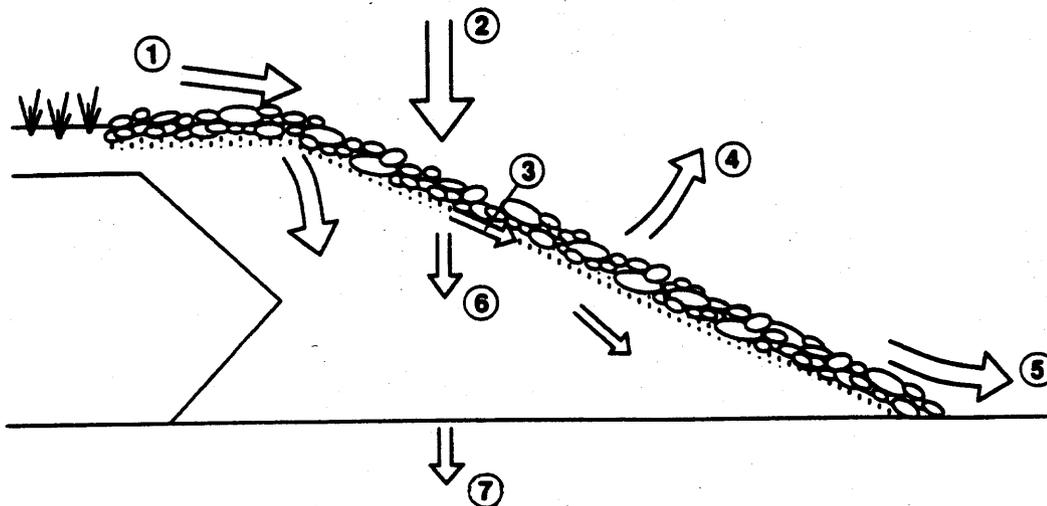
FIGURE 5.2.7-17

REPORT NO: DOE/OR/21548-411

ORIGINATOR: JC

DRAWN BY: MD

DATE: 05-17-93



CLEAN-FILL DIKE SECTION WITH FLOW COMPONENTS

FLOW COMPONENTS	
①	TOP COVER RUNOFF
②	SIDE SLOPE INCIDENT PRECIPITATION
③	SIDE SLOPE RUNOFF
④	SIDE SLOPE EVAPOTRANSPIRATION
⑤	TOTAL CELL RUNOFF
⑥	DIKE INFILTRATION
⑦	SEEPAGE TO VADOSE ZONE

CLEAN-FILL DIKE WATER BALANCE MODEL FOR ROCK COVER

Some incident precipitation on the dike runs off and some infiltrates to seep to the groundwater

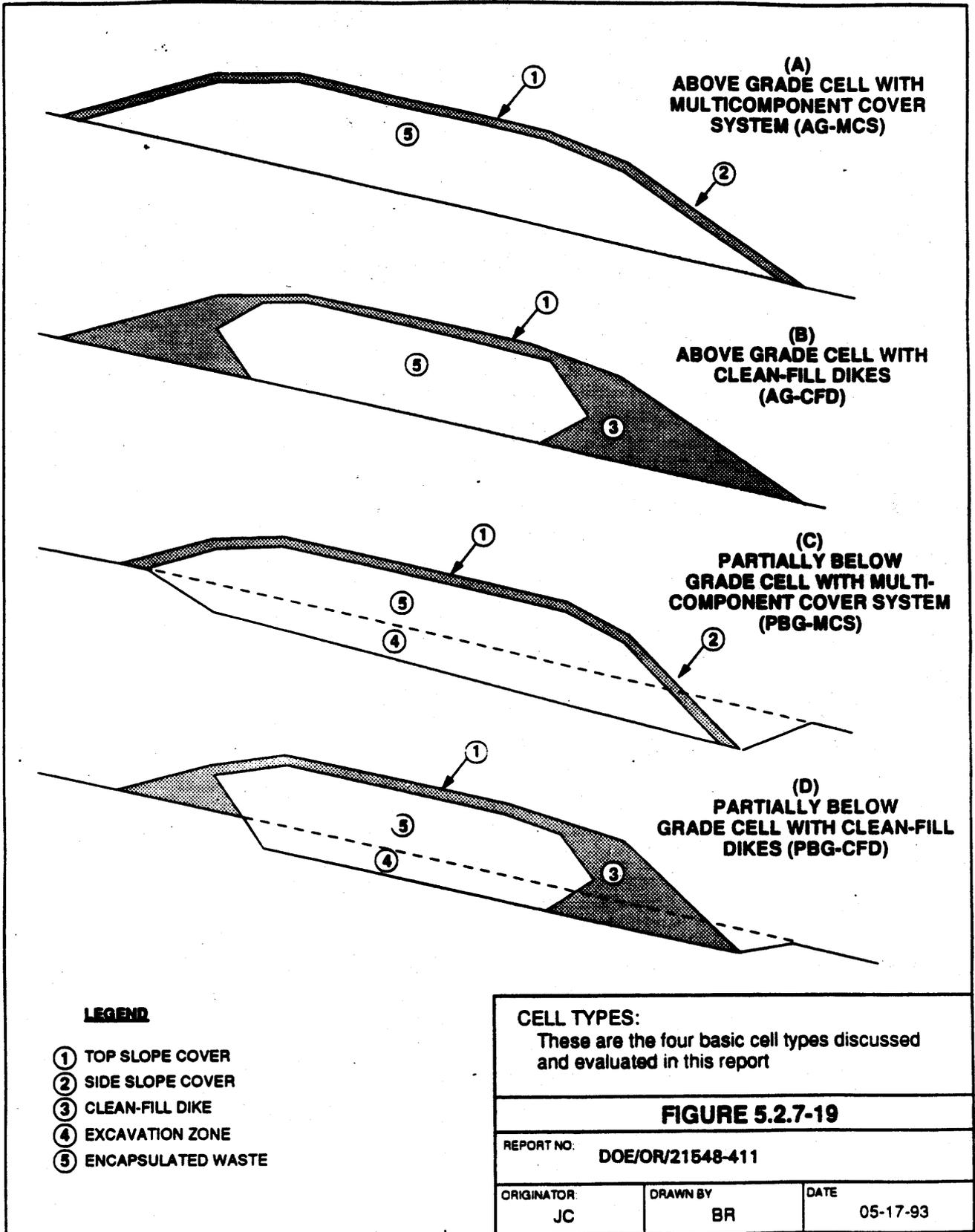
FIGURE 5.2.7-18

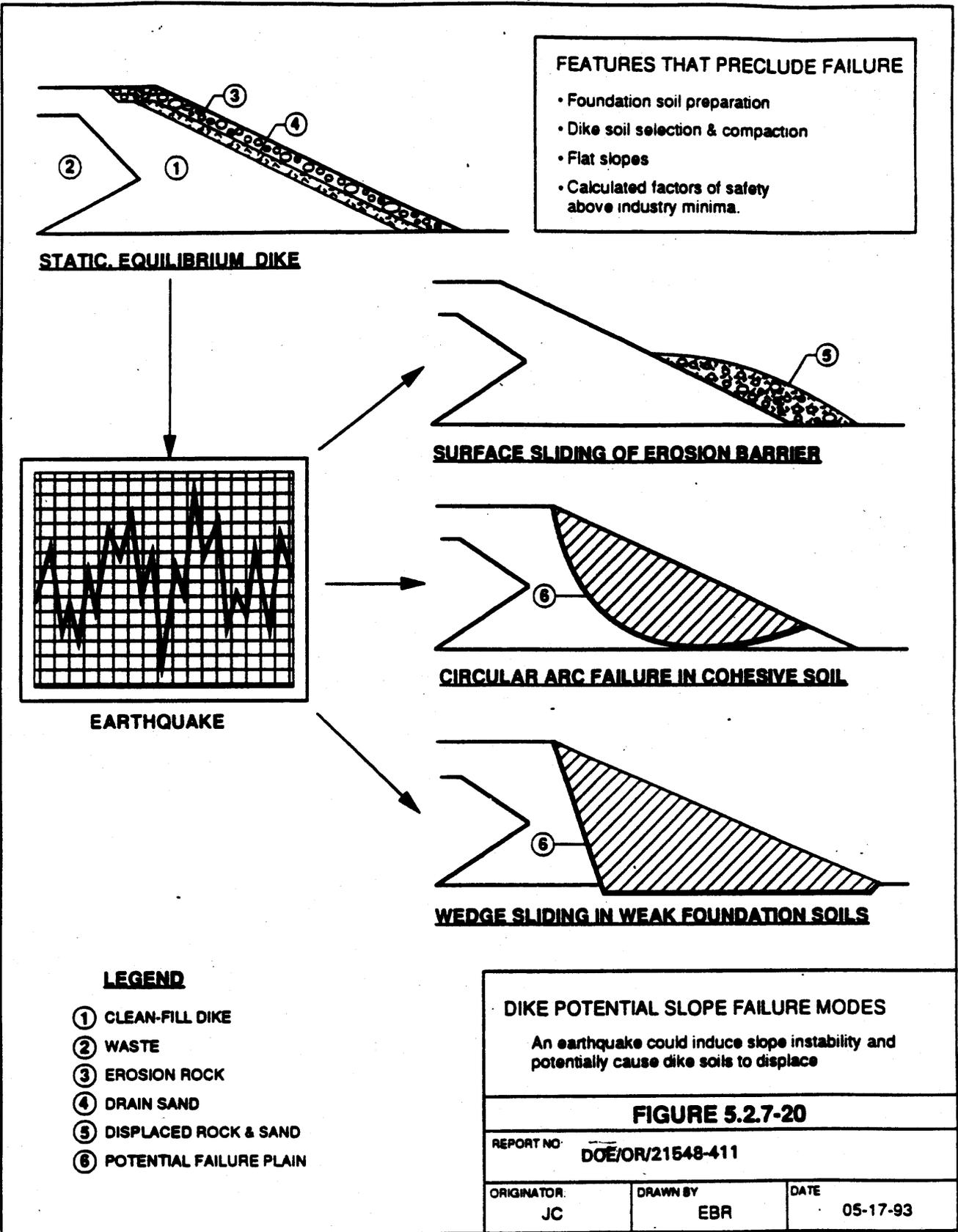
REPORT NO. **DOE/OR/21548-411**

ORIGINATOR
JC

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MD/BM

DATE
05-17-93





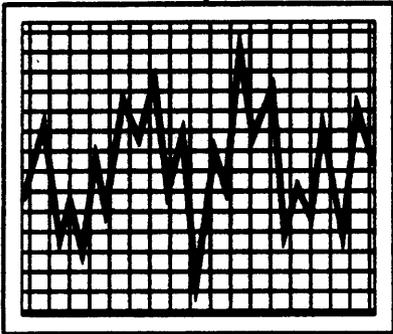
- FEATURES THAT PRECLUDE FAILURE**
- Foundation soil preparation
 - Dike soil selection & compaction
 - Flat slopes
 - Calculated factors of safety above industry minima.

STATIC EQUILIBRIUM DIKE

SURFACE SLIDING OF EROSION BARRIER

CIRCULAR ARC FAILURE IN COHESIVE SOIL

WEDGE SLIDING IN WEAK FOUNDATION SOILS

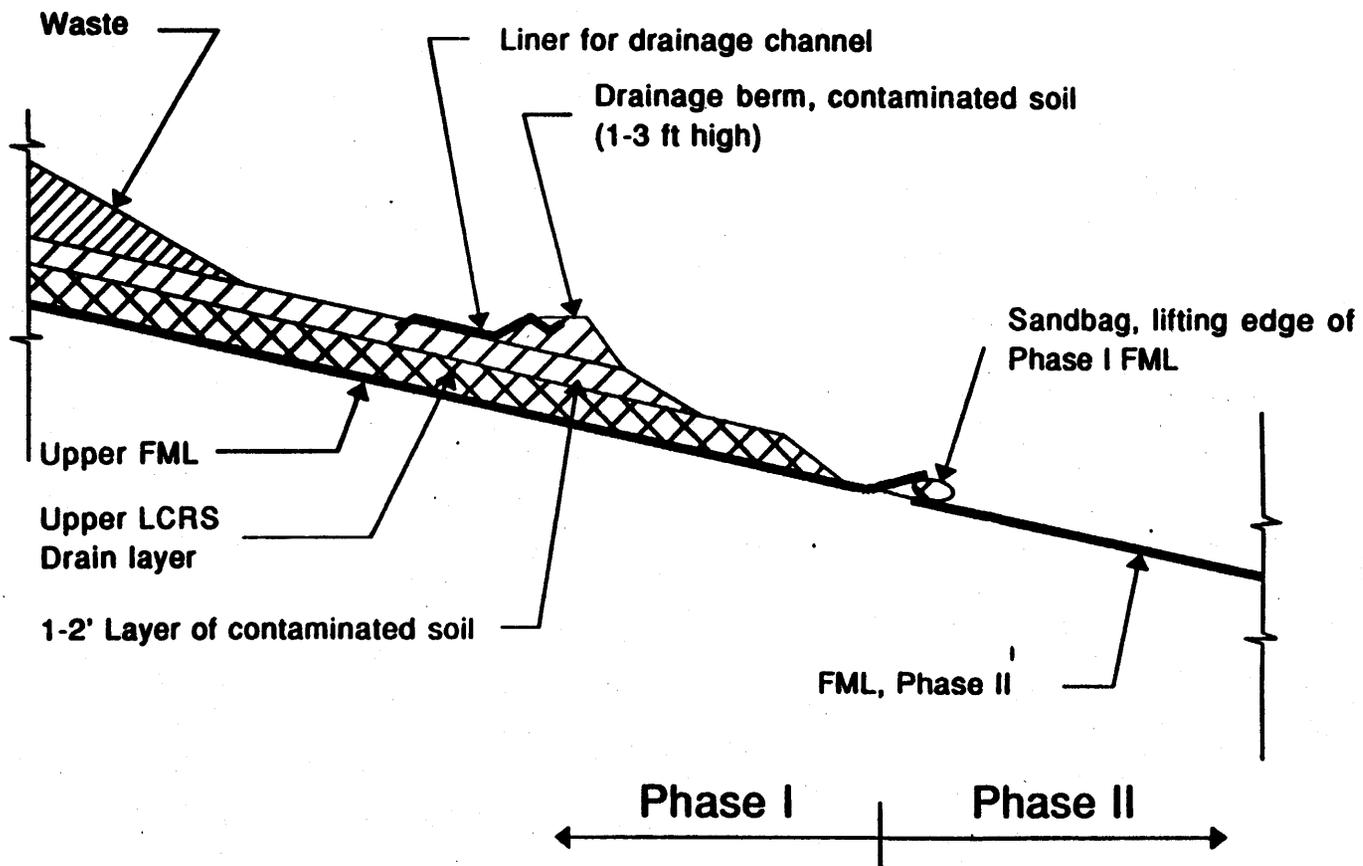


EARTHQUAKE

LEGEND

- ① CLEAN-FILL DIKE
- ② WASTE
- ③ EROSION ROCK
- ④ DRAIN SAND
- ⑤ DISPLACED ROCK & SAND
- ⑥ POTENTIAL FAILURE PLAIN

DIKE POTENTIAL SLOPE FAILURE MODES		
An earthquake could induce slope instability and potentially cause dike soils to displace		
FIGURE 5.2.7-20		
REPORT NO: DOE/OR/21548-411		
ORIGINATOR: JC	DRAWN BY: EBR	DATE: 05-17-93



Legend

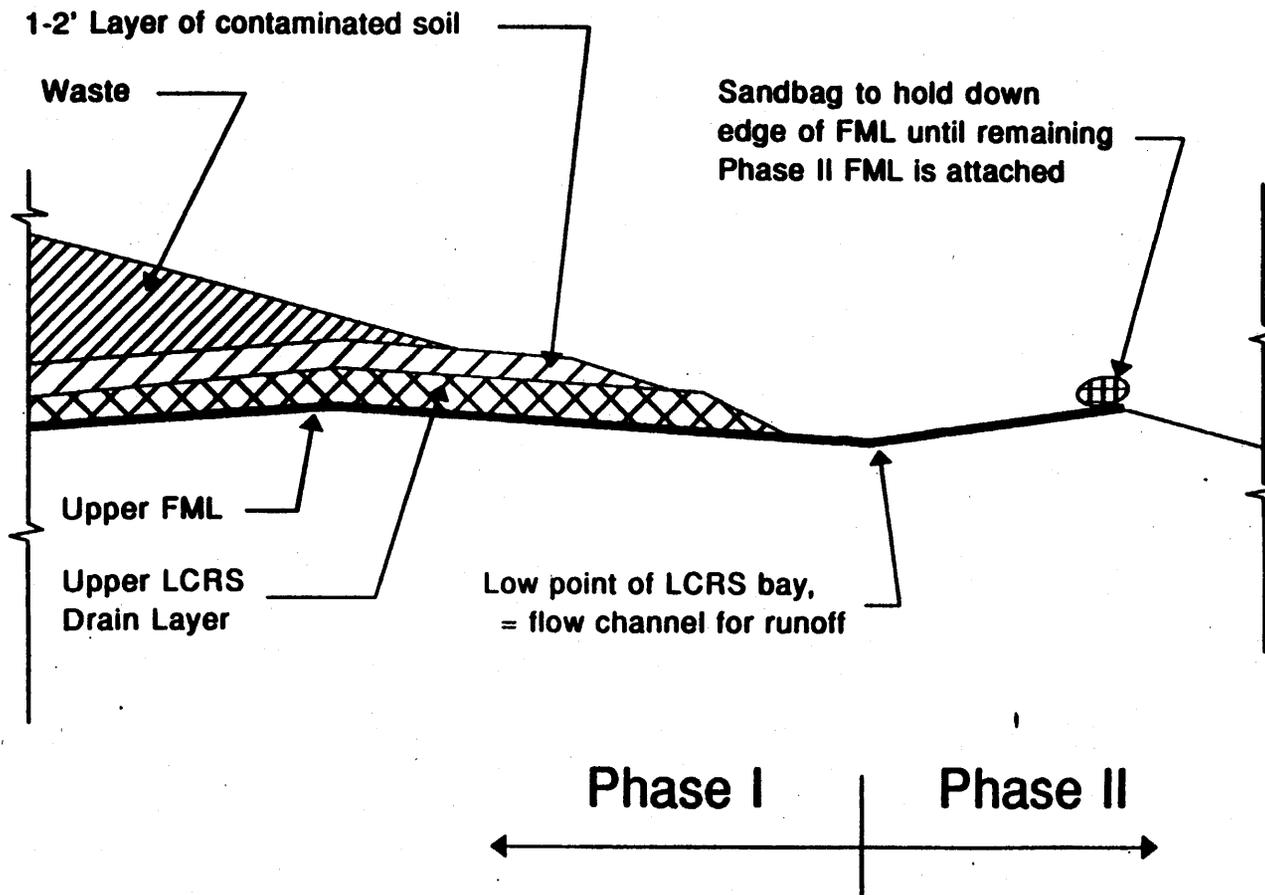
FML Flexible Membrane Liner
 LCRS Leachate Collection and Removal System

Note: Figure is schematic and not drawn to scale.

**Drainage Collection at
 Edge of Phases I & II
 (Alternatives A-A, B-B, C-C)**

Figure 5.2.8-1

Report No. DOE/OR/21548-411	Drawing No.	
Originator: JBF	Drawn by: JBF	Date: December 1992



Legend

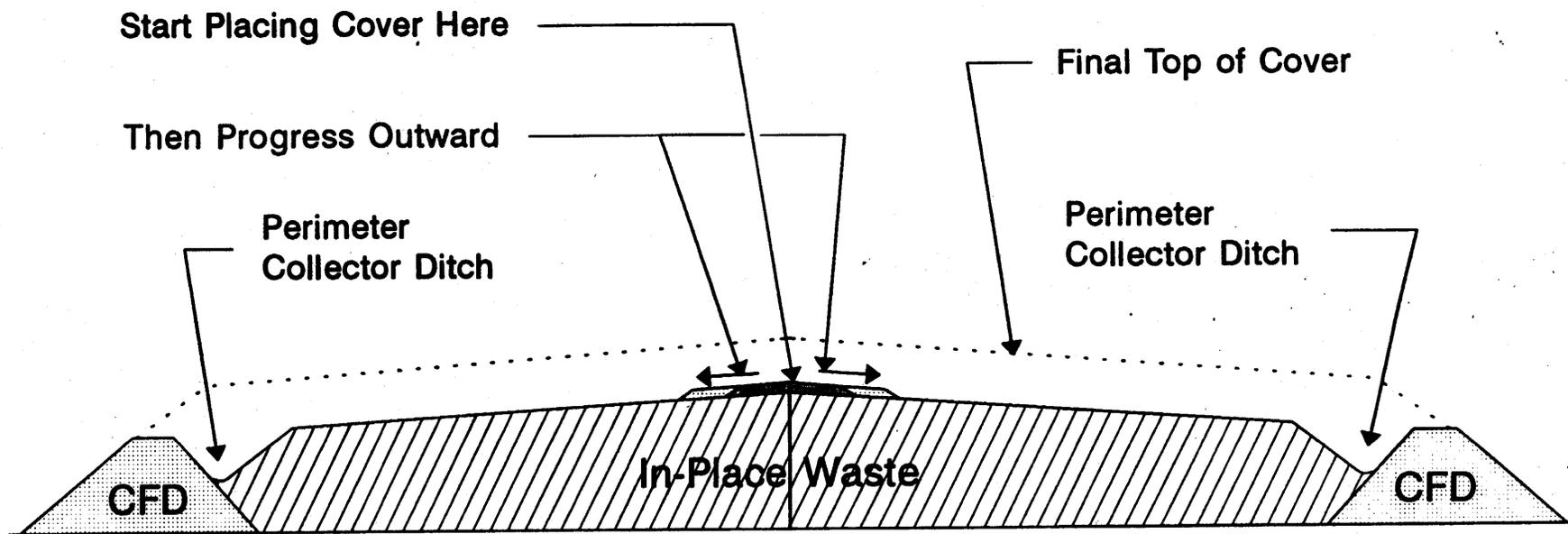
FML Flexible Membrane Liner
 LCRS Leachate Collection and Removal System

Note: Figure is schematic and not drawn to scale.

**Drainage Collection
 Edges of Phases I & II
 (Alternative D-D)**

Figure 5.2.8-2

Report No. DOE/OR/21548-411	Drawing No.
Originator: JBF	Drawn by: JBF
Date: December 1992	



Legend

-  Clean-Fill Dike
-  Area of Clean Cover Placement
-  Area of In-Place Clean Cover

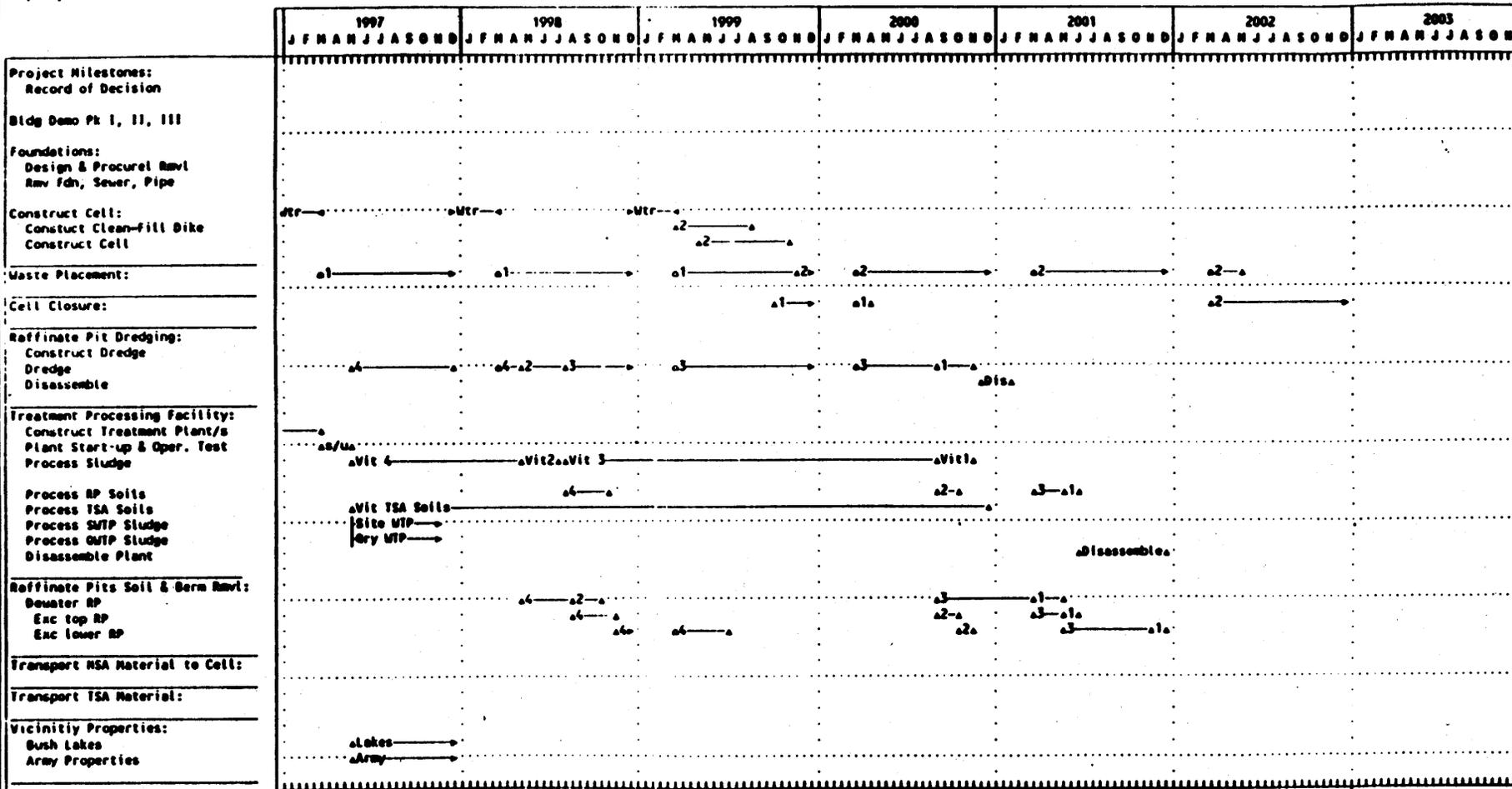
Note: Figure is schematic and not drawn to scale.

Placement of Initial Lifts of Disposal Cell Cover

FIGURE 5.2.8-3

Report No:	DOE/OR/21548-411	Drawing No.
Originator:	JBF	Drawn by: JBF
		Date: November 1992

WSSRAP CDR Schedule
 Disposal Cell Operation
 c:\qs\VIT_simp.05
 July 20, 1992



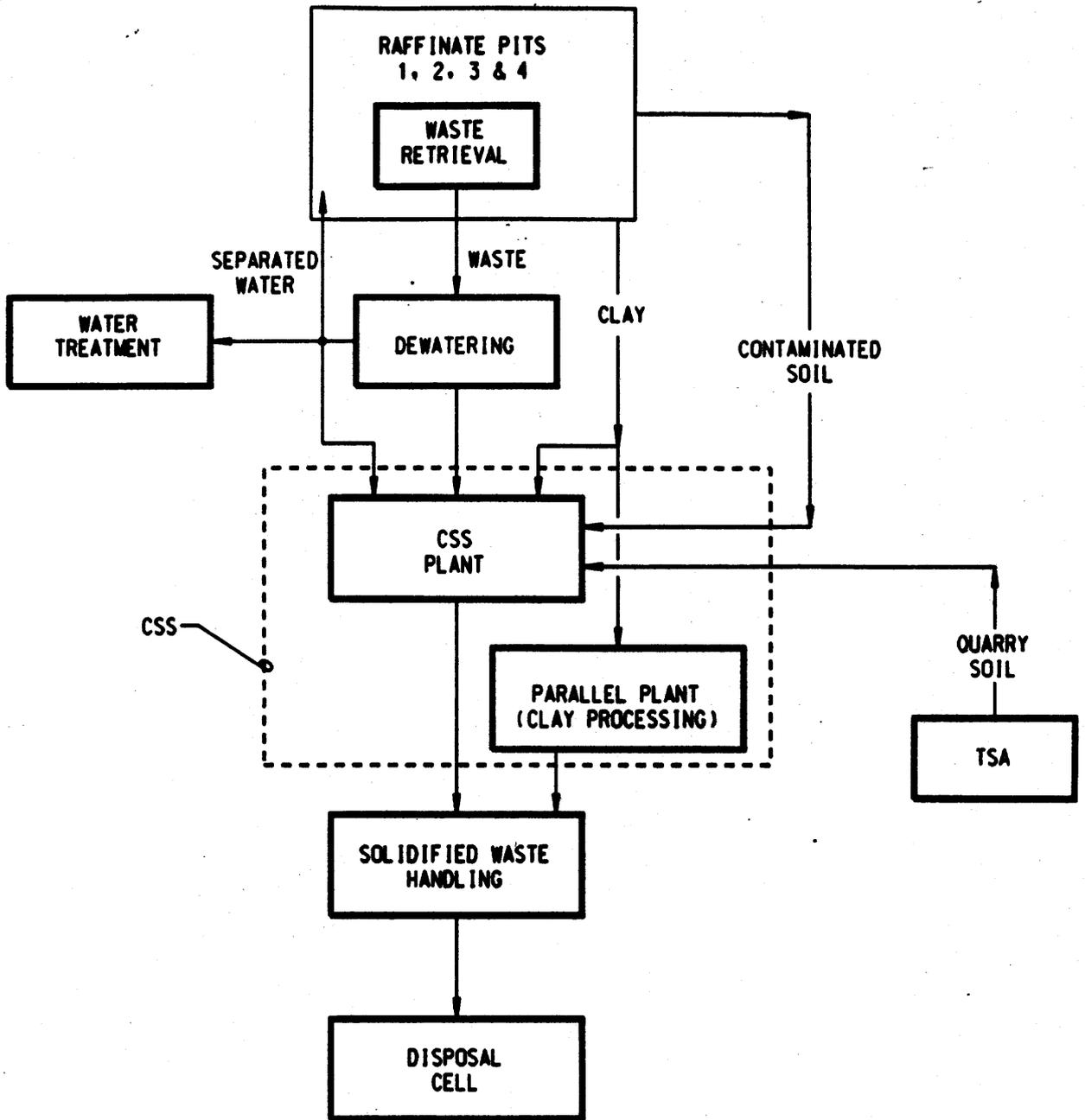
VIT Simplified Schedule

(Page 2 of 2: 1997-2003)

FIGURE 5.2.9-3

NOTE: FOR MORE DETAILED SCHEDULE, MVE SESSION: INTEGRATED SCHEDULE FOR EXCAVATION, TREATMENT, PLACEMENT AND CELL CONSTRUCTION

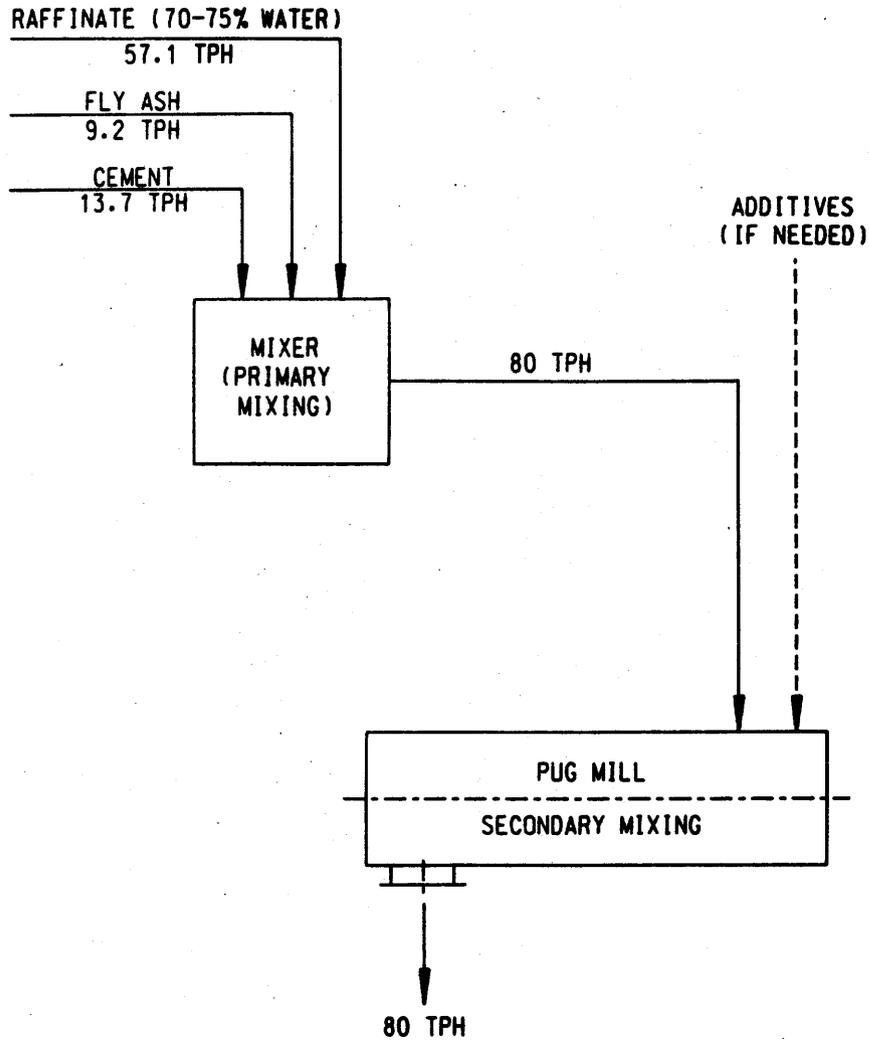
Report No:	DOE/OR/21548-411	Drawing No.	
Originator:	JBF	Drawn by:	JBF
Date:	December 1992		



MAJOR COMPONENTS OF THE
WSS
WASTE TREATMENT PROCESS

FIGURE 5.3.1-1

REPORT NO.	DOE/OR/21548-411	DRAWING NO.	
ORIGINATOR		DRAWN BY	
		DATE	



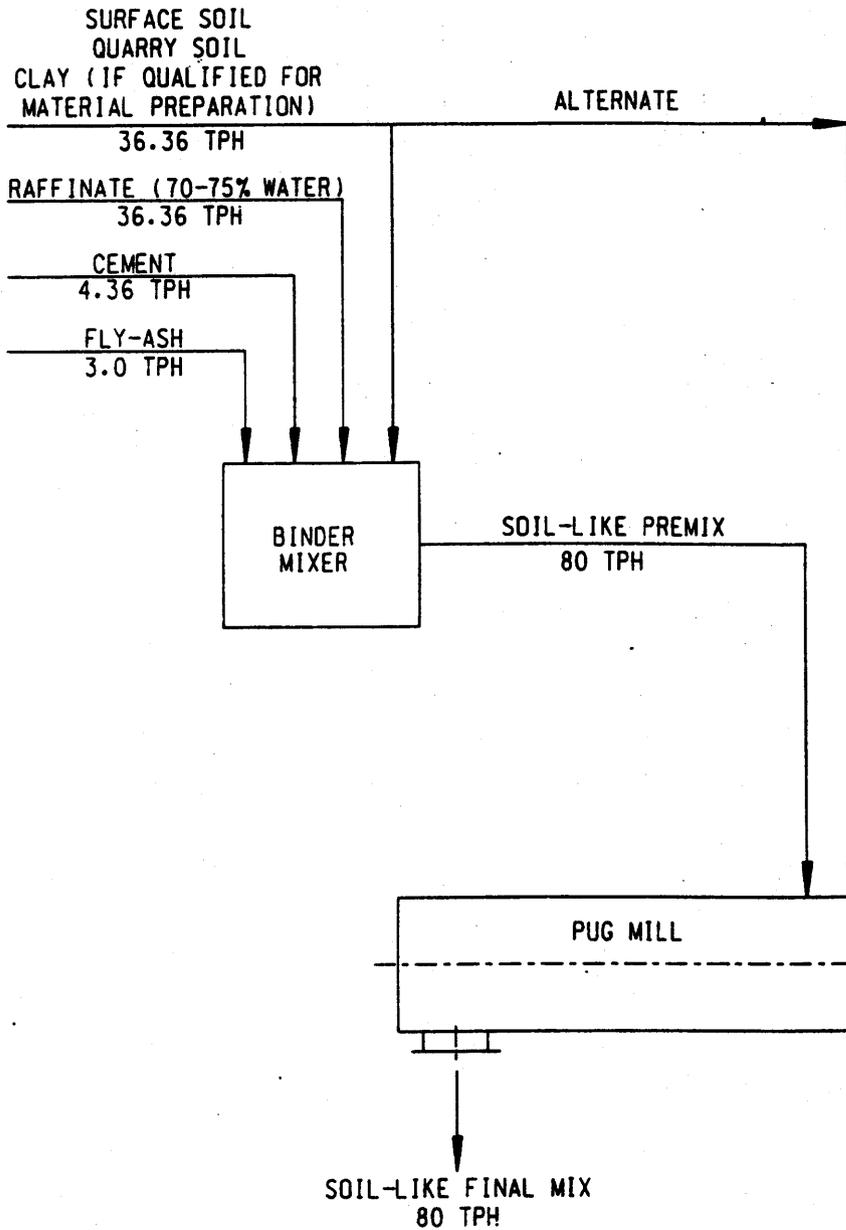
THIS DIAGRAM DEPICTS THE PRODUCTION OF A GROUT-LIKE PRODUCT BASED ON THE RAFFINATE + BINDER MIX. TWO-STEP MIXING IS RECOMMENDED. NO ADDITIONAL WATER IS REQUIRED.

NOTE: BASED ON WTG MATERIAL BALANCE

MATERIAL BALANCE
RAFFINATE PITS 1, 2, 3 & 4
GROUT-LIKE PRODUCT
(RAFFINATE SLUDGE AND BINDER)

FIGURE 5.3.2-1

REPORT NO: DOE/OR/21548-411	DRAWING NO:
ORIGINATOR:	DATE: 05/28/93



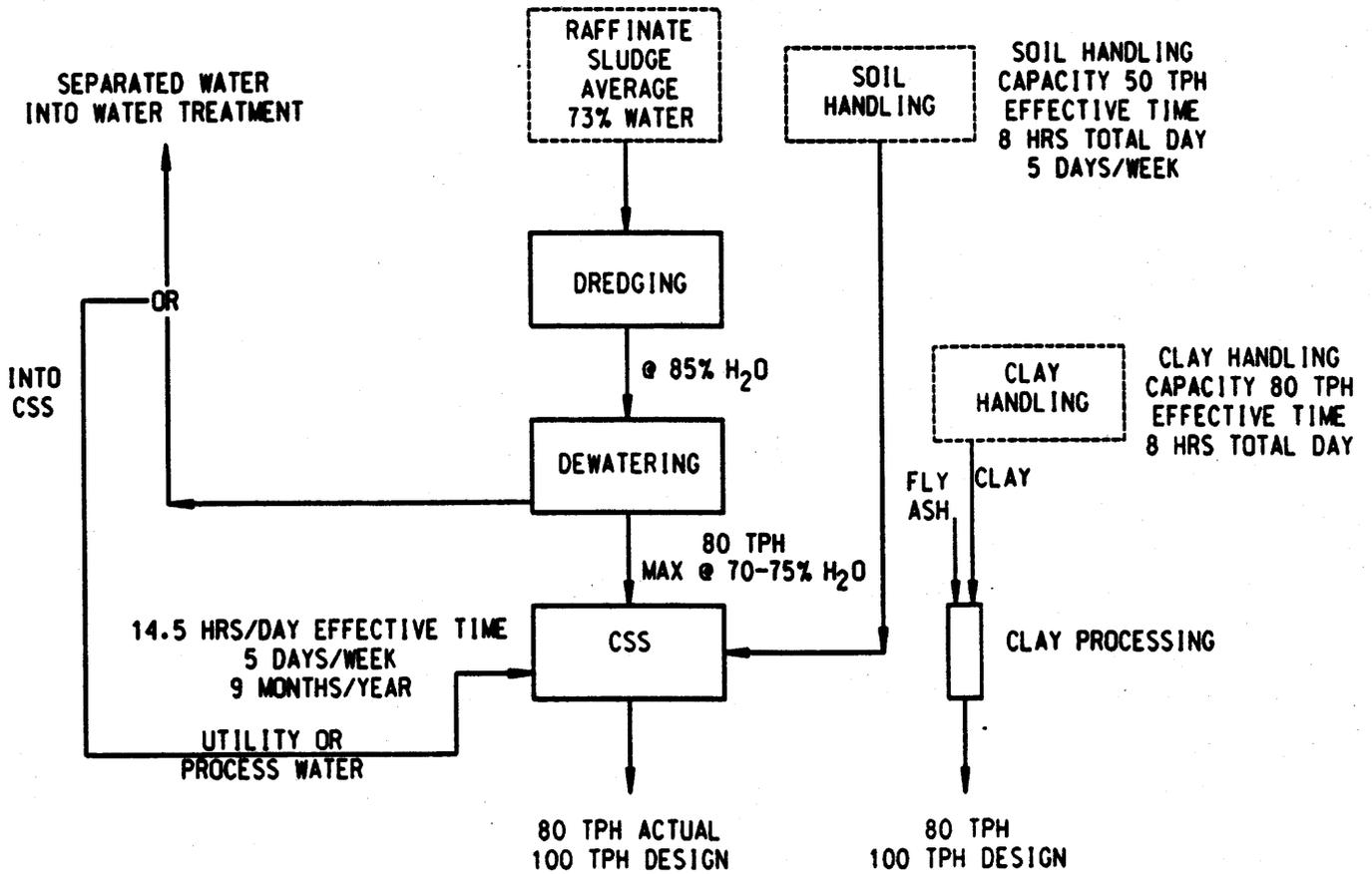
THIS DIAGRAM DEPICTS THE PRODUCTION
 OF A SOIL-LIKE PRODUCT BASED ON THE
 RAFFINATE + SOIL + BINDER MIX.
 TWO-STEP MIXING IS RECOMMENDED.
 NO ADDITIONAL WATER REQUIRED.

NOTE: BASED ON WTG MATERIAL BALANCE

MATERIAL BALANCE
SOIL-LIKE PRODUCT

FIGURE 5.3.2-2

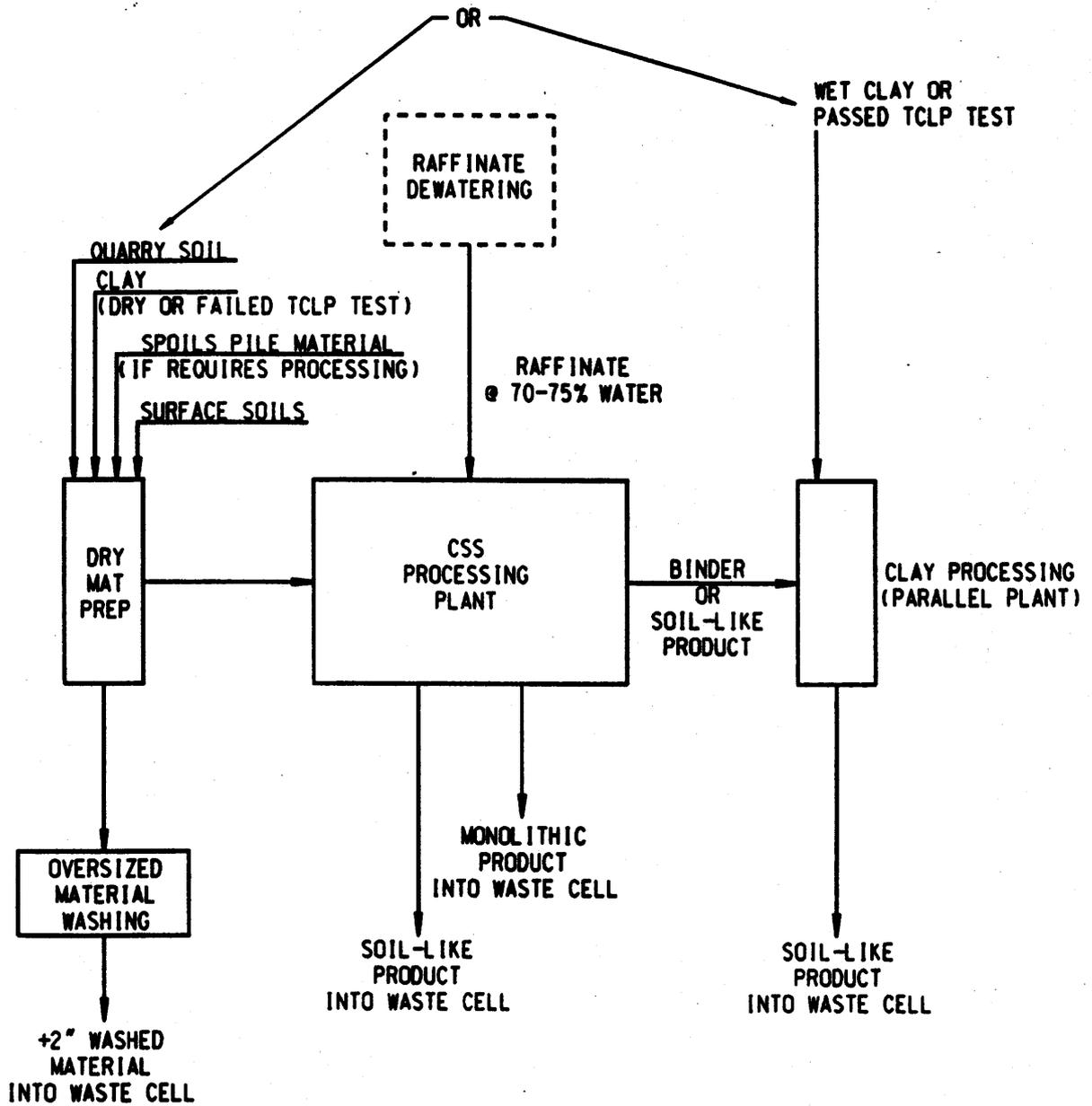
REPORT NO:	DOE/OR/21548-411	DRAWING NO:	
ORIGINATOR:	DRAWING BY:	DATE:	05/28/93



CSS - RELATED PROCESS CAPACITIES AND TIMING

FIGURE 5.3.2-3

REPORT NO.	DOE/OR/21548-411	DRAWING NO.	
OPERATOR		DRAWN BY	
			DATE

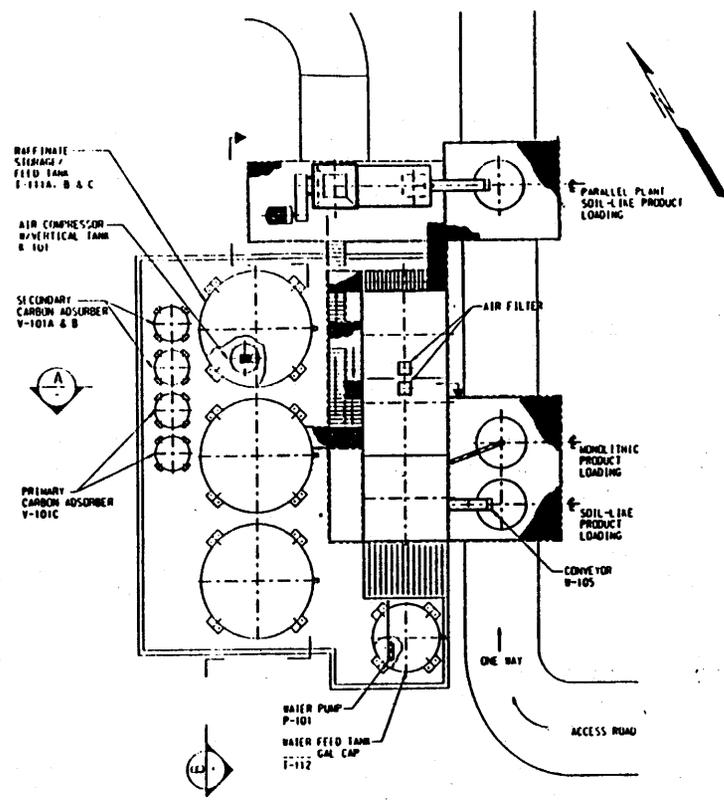
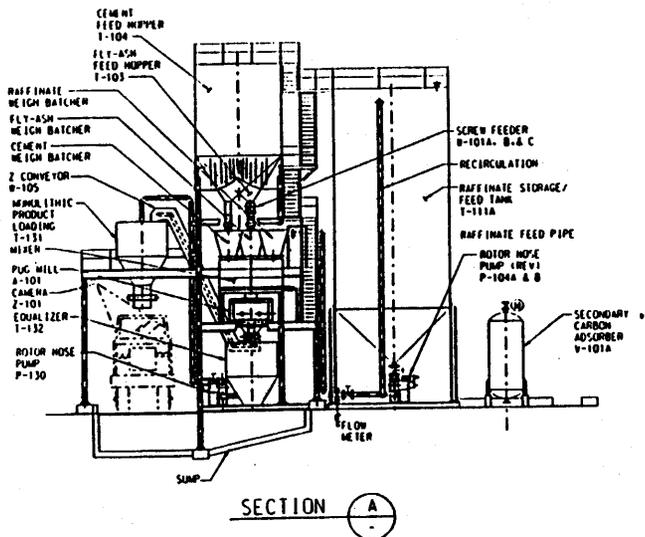
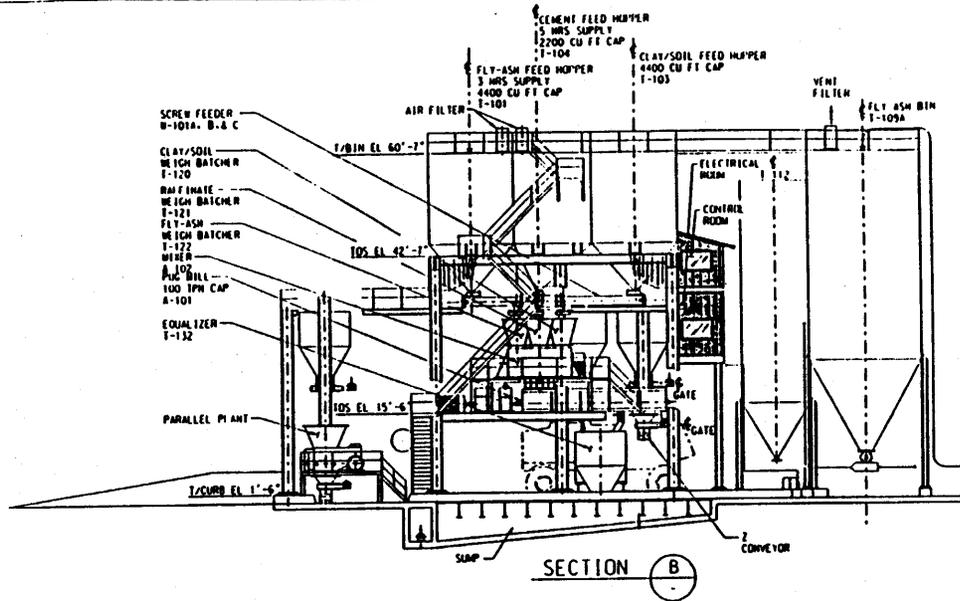


PROPOSED OVERALL CSS PROCESS

FIGURE 5.3.2-4

REPORT NO.	DOE/OR/21548-411	DRAWING NO.	
ORIGINATOR		DRAWN BY	
		DATE	

CONCEPTUAL DESIGN CHEMICAL STABILIZATION/SOLIDIFICATION MATERIAL PREPARATION GENERAL ARRANGEMENT



PLAN

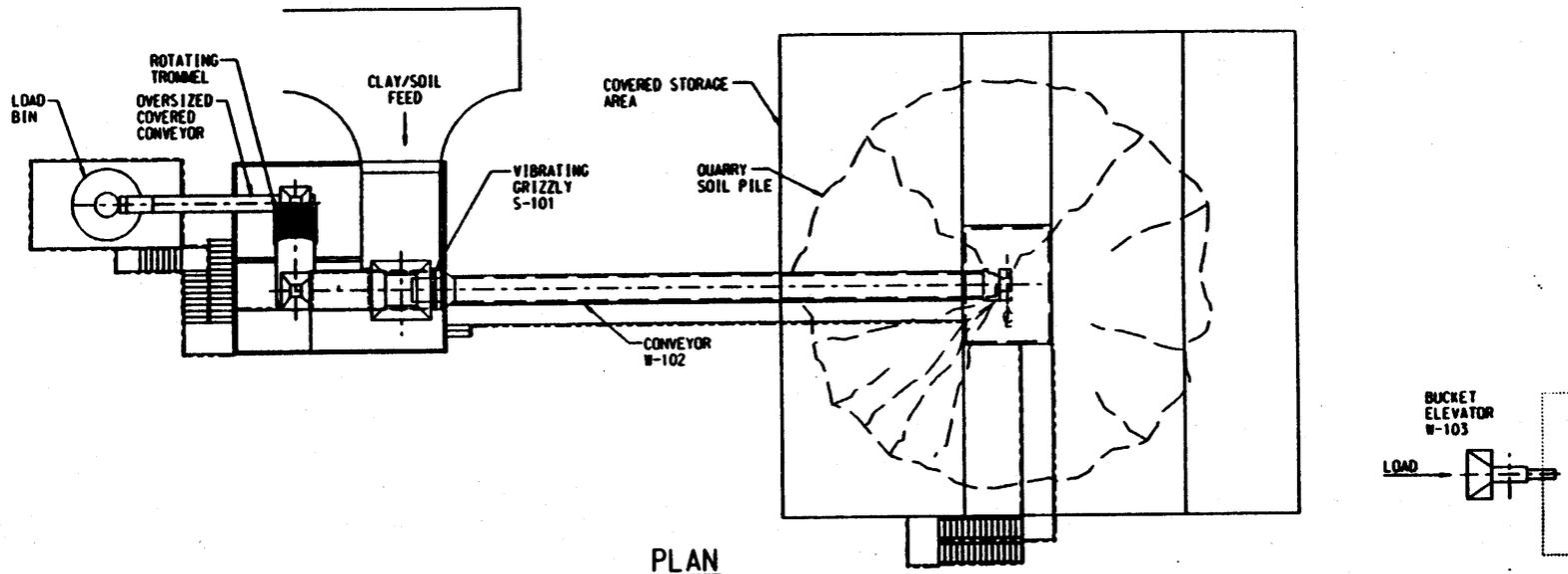
0' 10' 20' 40' 60' FT

DATE: 04.94
FILE NAME: W03810131502.DWG

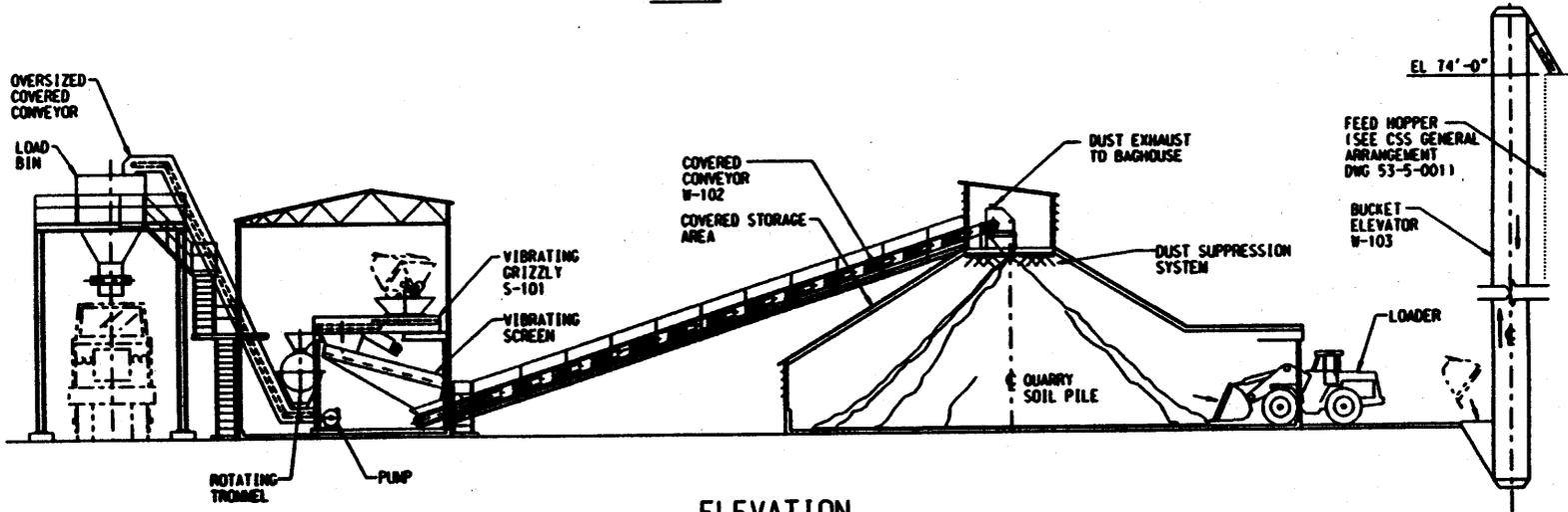
U.S. DEPARTMENT OF ENERGY OAK RIDGE, TENNESSEE	
DESIGNED: J. B. BROWN DRAWN: J. BROWN CHECKED: J. BROWN APPROVED: J. BROWN	CONCEPTUAL DESIGN CHEMICAL STABILIZATION/SOLIDIFICATION GENERAL ARRANGEMENT DOE/OR/21548-411
PROJECT NO: DE-AC05-86OR21548 FIGURE 5.3.2-5	

NO.	DATE	REVISION	BY	CHK	DES	DRG	APP	DATE

MORRISON KNUDSEN CORPORATION
 10000 W. 10th Ave., Suite 1000
 Denver, CO 80202
 TEL: 303.750.1000 FAX: 303.750.1001



PLAN

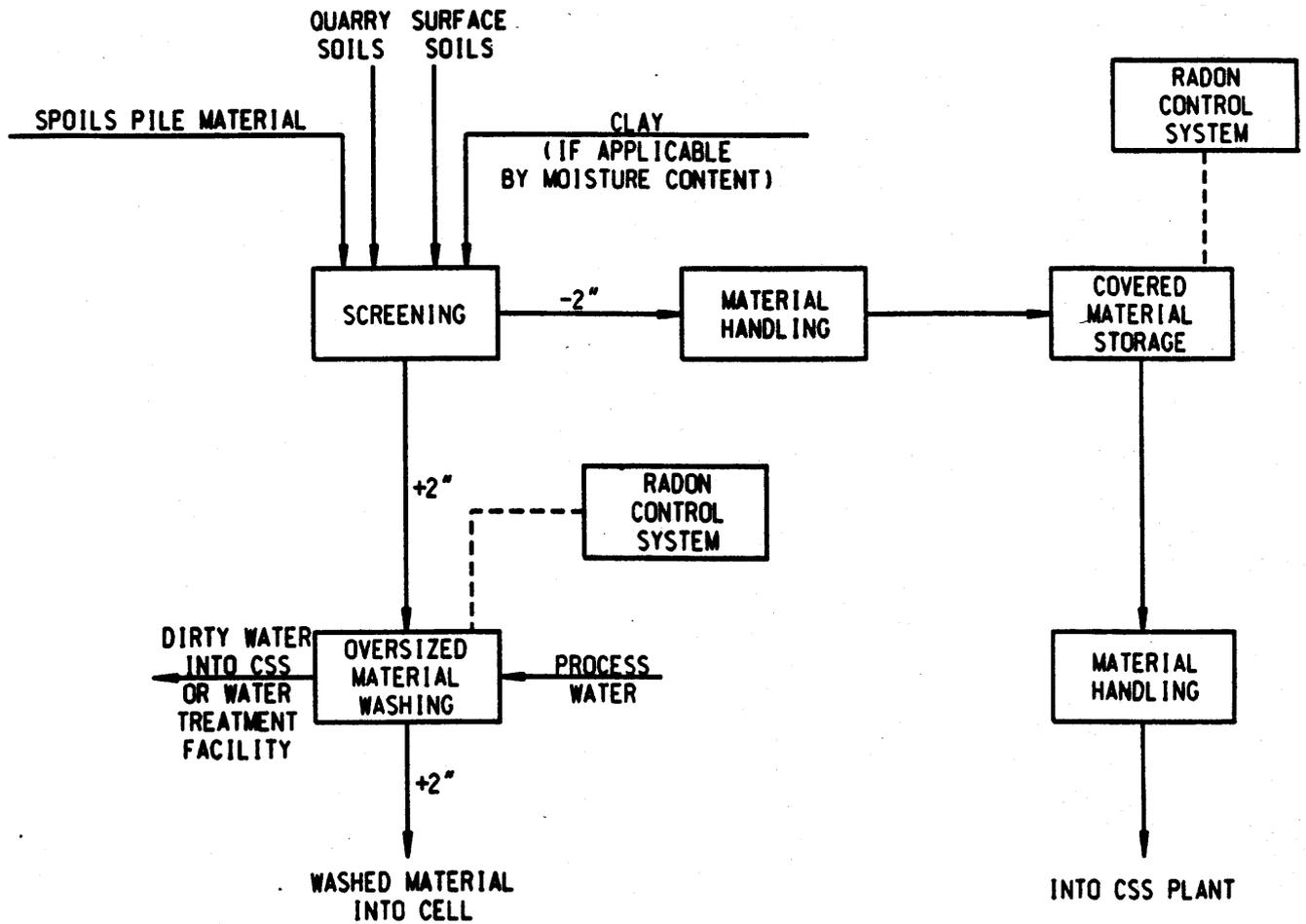


ELEVATION

CONCEPTUAL DESIGN
 CHEMICAL STABILIZATION/SOLIDIFICATION
 MATERIAL PREPARATION
 GENERAL ARRANGEMENT

FIGURE 5.3.2-6

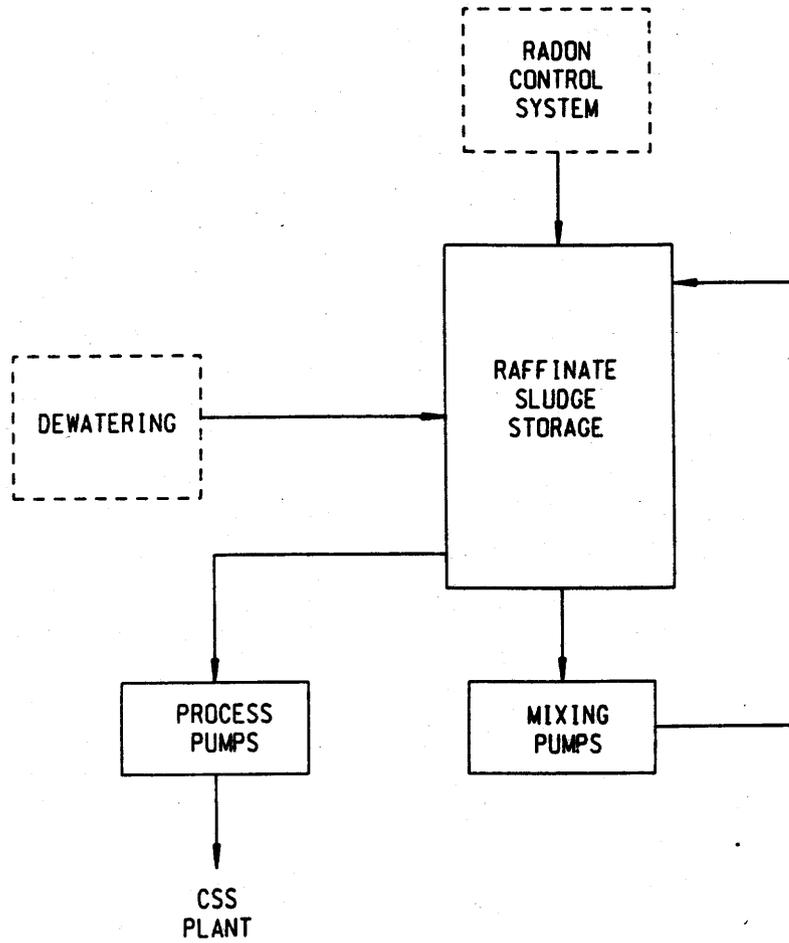
REPORT NO.	DOE/OR/21548-411	DRAWING NO.	
ORIGINATOR	DESIGNED BY	DATE	



SOLID MATERIAL PREPARATION
(SOIL-LIKE PRODUCT)

FIGURE 5.3.2-7

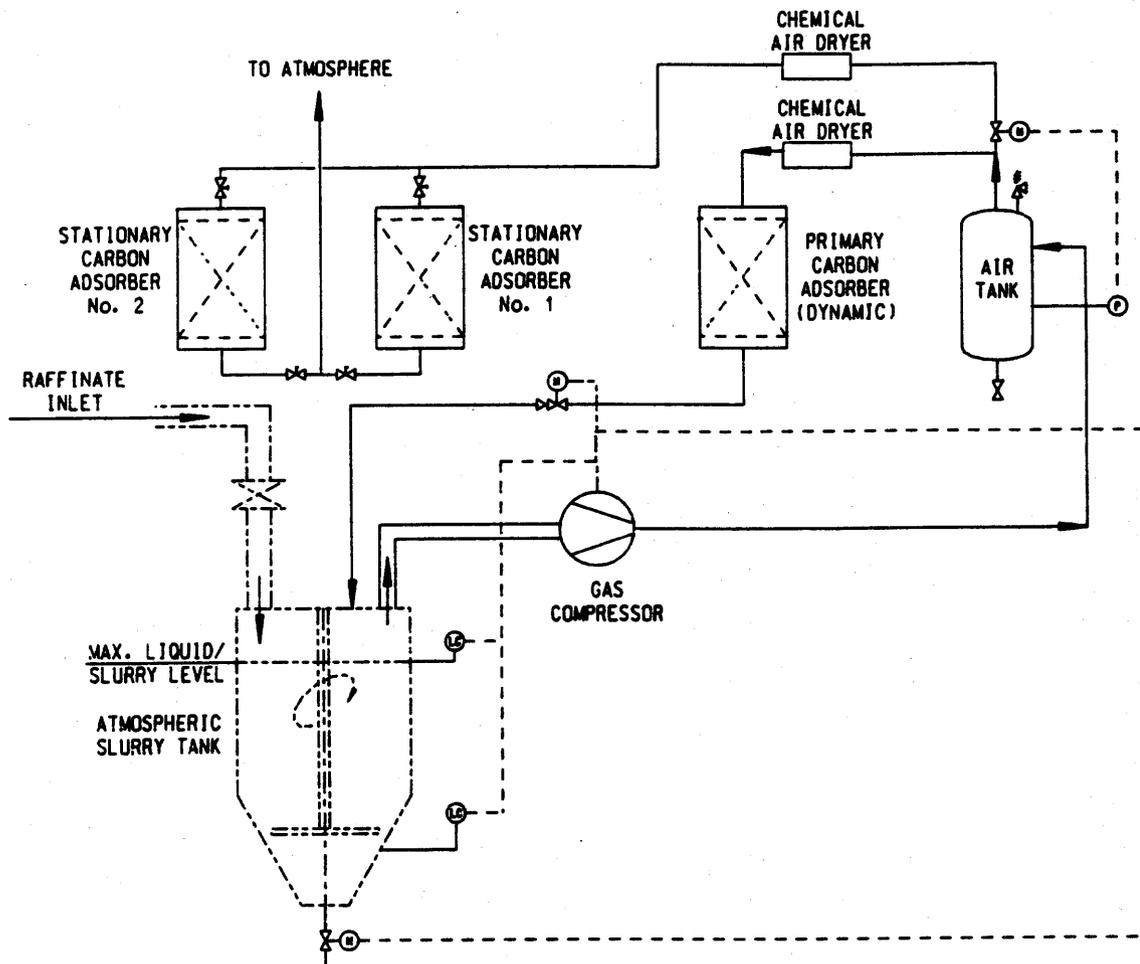
REPORT NO.	DOE/OR/21548-411	DRAWING NO.	
ORIGINATOR		DRAWN BY	
		DATE	



LIQUID MATERIAL PREPARATION
(GROUT-LIKE PRODUCT)

FIGURE 5.3.2-8

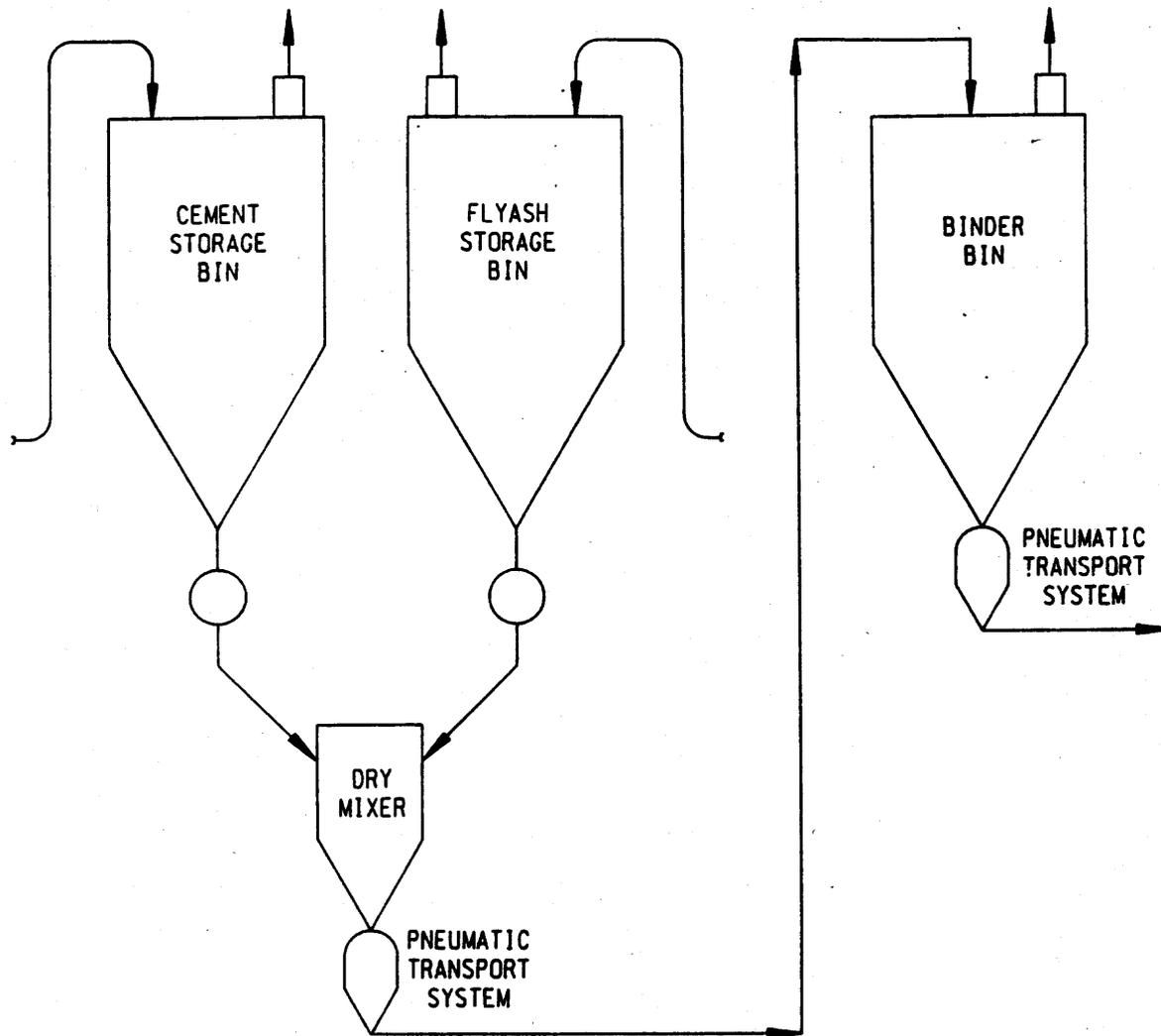
REPORT NO:	DOE/OR/21548-411	DRAWING NO:	
ORIGINATOR:		DRAWING BY:	
		DATE:	05/28/93



RADON EMISSION CONTROL
(FUNCTIONAL DIAGRAM)

FIGURE 5.3.2-9

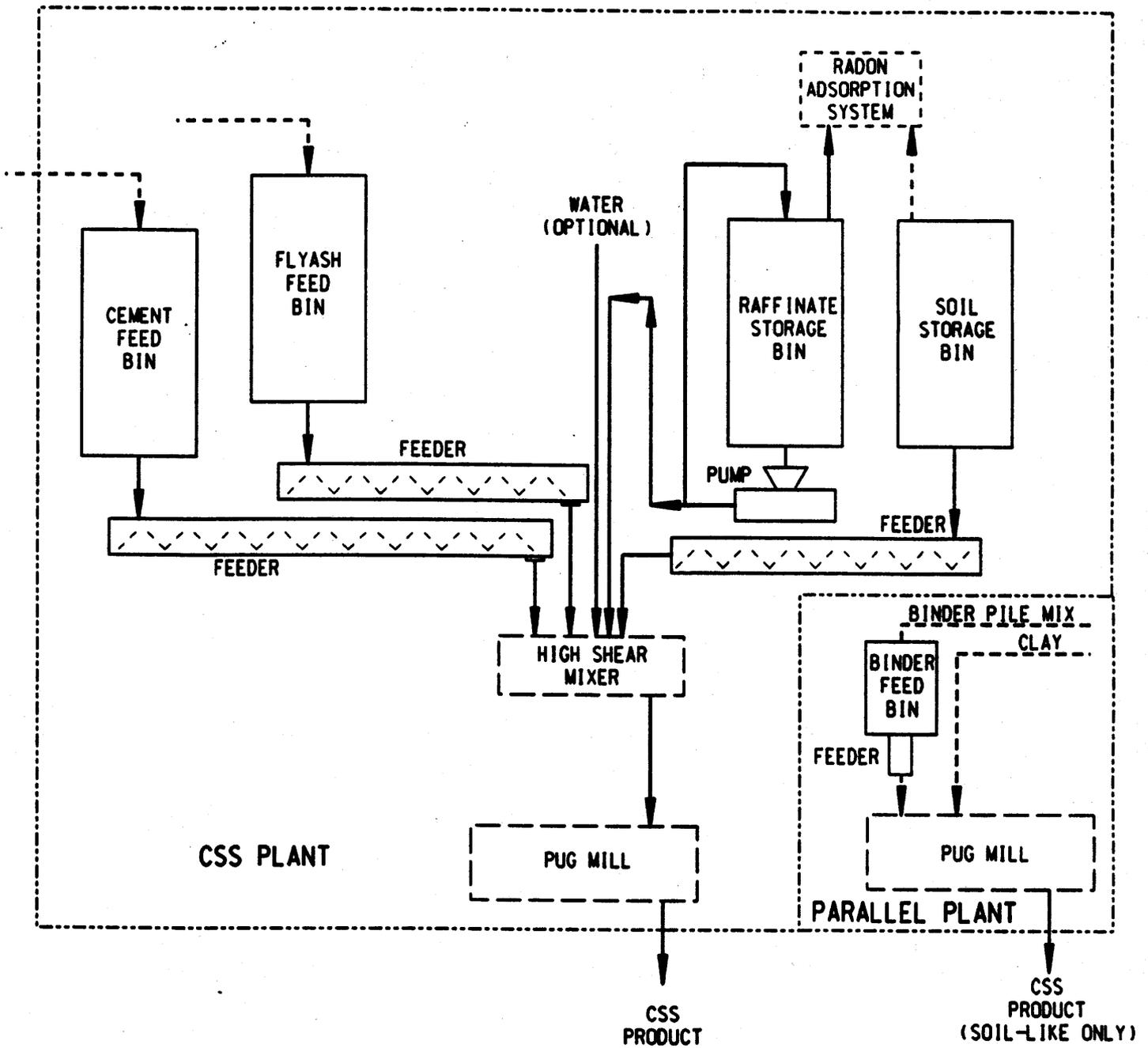
REPORT NO:	DOE/OR/21548-411	DRAWING NO:	
ORIGINATOR:		DRAWING BY:	
		DATE:	05/28/93



PRODUCT STORAGE SYSTEM
(FUNCTIONAL DIAGRAM)

FIGURE 5.3.2-10

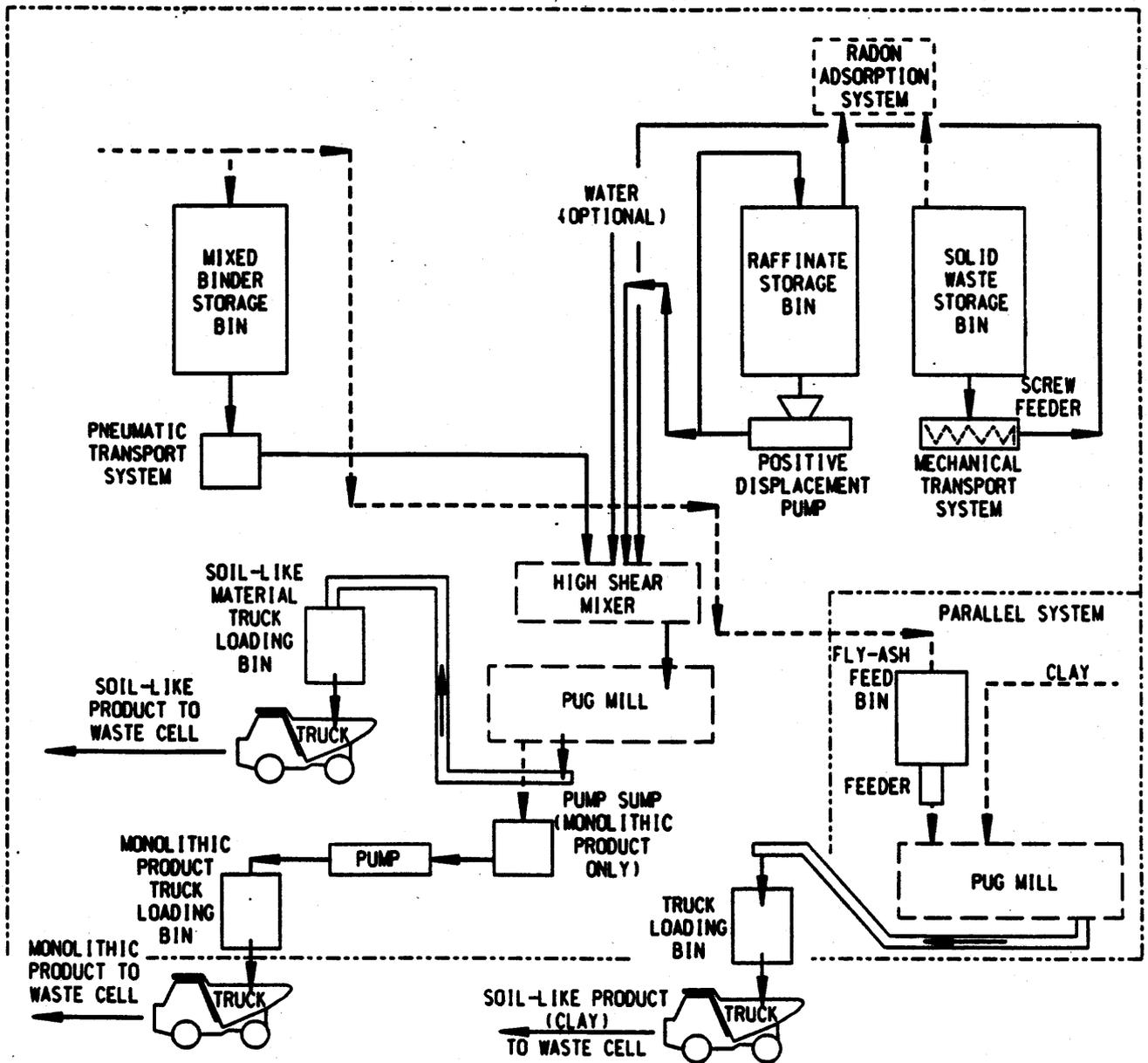
REPORT NO:	DOE/OR/21548-411	DRAWING NO:	
ORIGINATOR:		DRAWING BY:	
		DATE:	05/28/93



MECHANICAL FEED SYSTEM (FUNCTIONAL DIAGRAM)

FIGURE 5.3.2-11

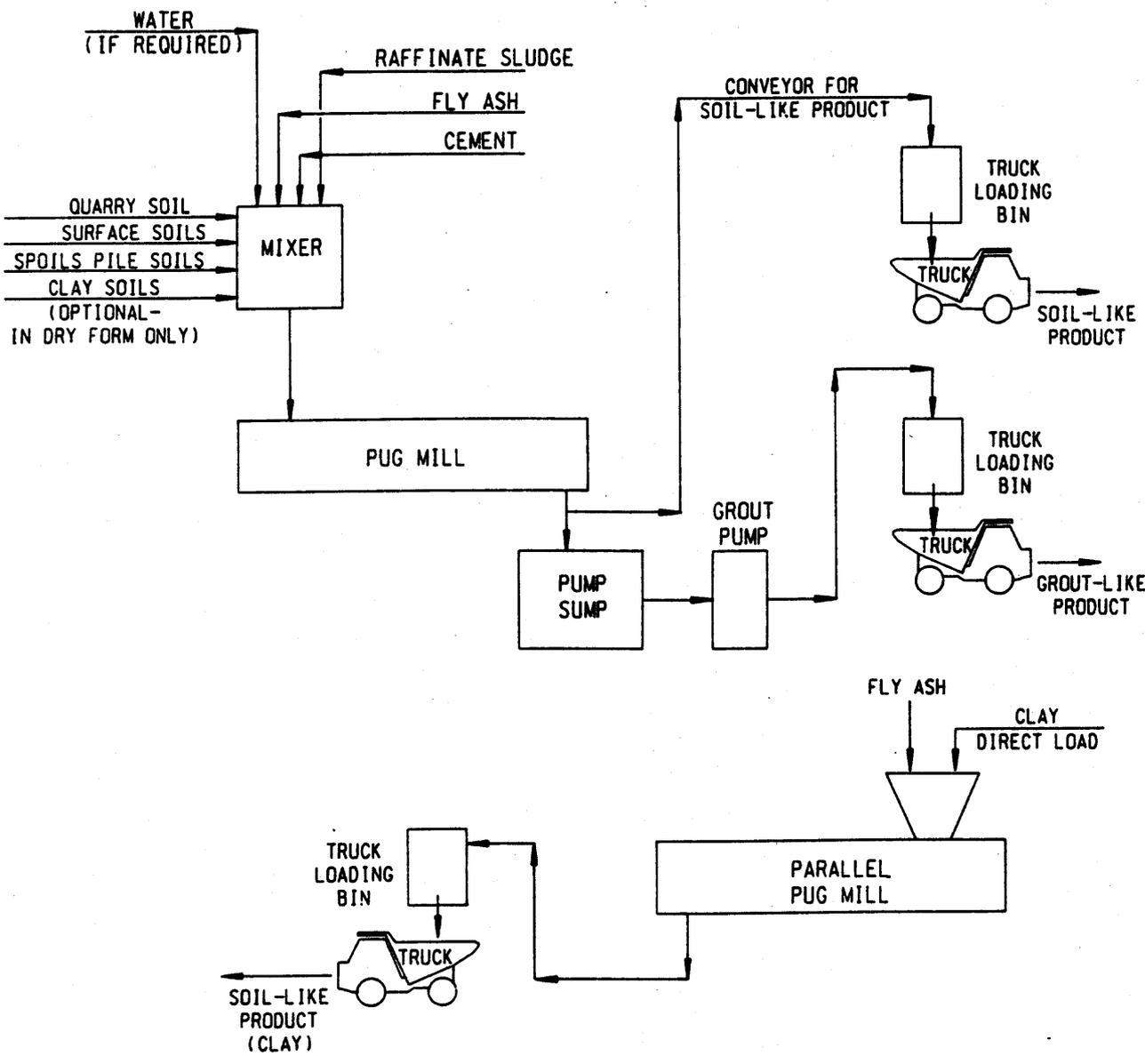
REPORT NO. DOE/OR/21548-411	DRAWING NO.
ORIGINATOR	DATE
DRAWN BY	



PNEUMATIC BINDER FEED SYSTEM
COMBINATION W/MECHANICAL SYSTEM
(FUNCTIONAL DIAGRAM)

FIGURE 5.3.2-12

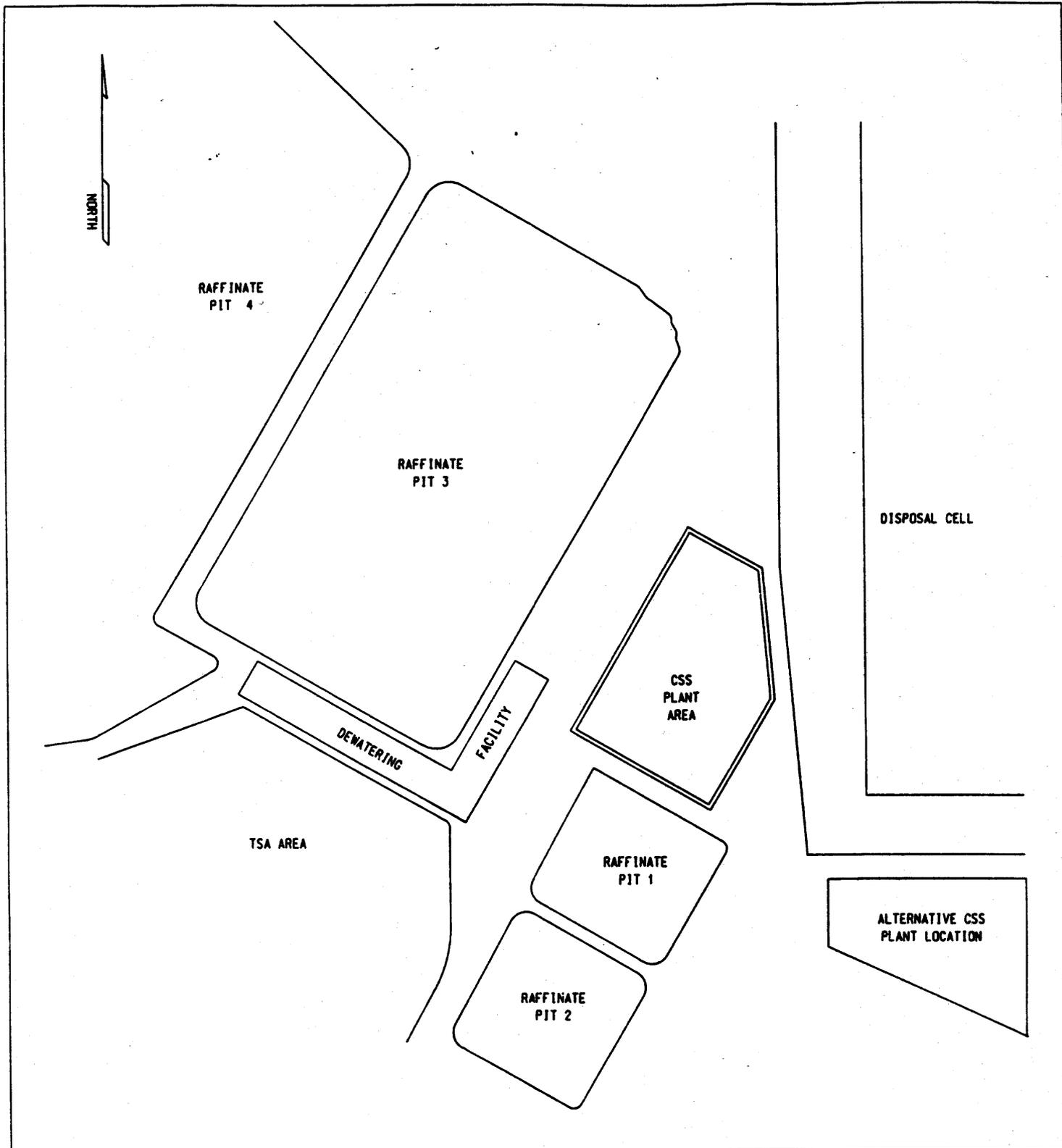
REPORT NO.	DOE/OR/21548-411	DRAWING NO.
ORIGINATOR	DRAWN BY	DATE



MIXING SYSTEM
(FUNCTIONAL DIAGRAM)

FIGURE 5.3.2-13

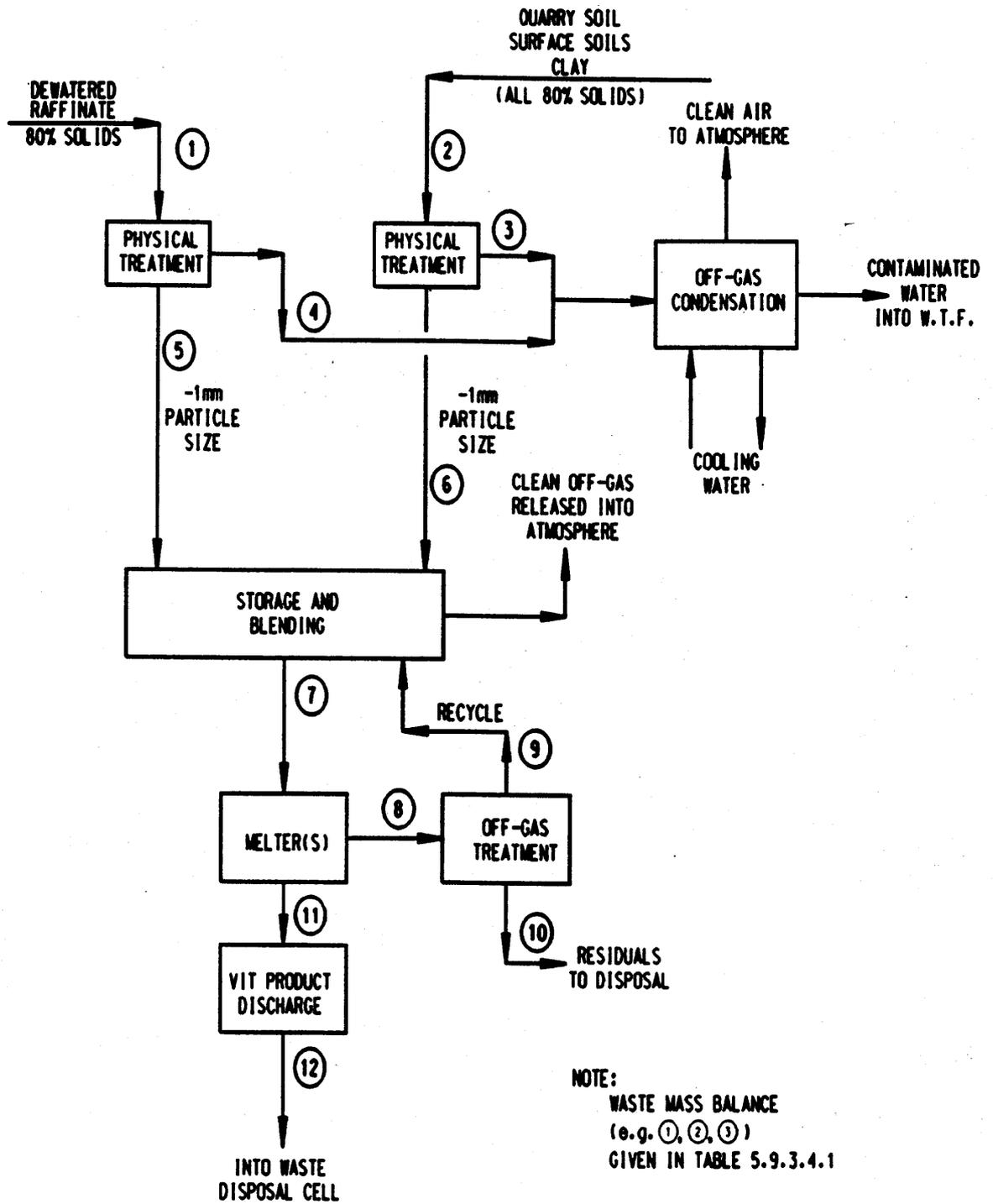
REPORT NO:	DOE/OR/21548-411	DRAWING NO:	
ORIGINATOR:		DRAWING BY:	
		DATE:	05/28/93



LOCATION OF CSS PLANT
AND DEWATERING FACILITY

FIGURE 5.3.2-14

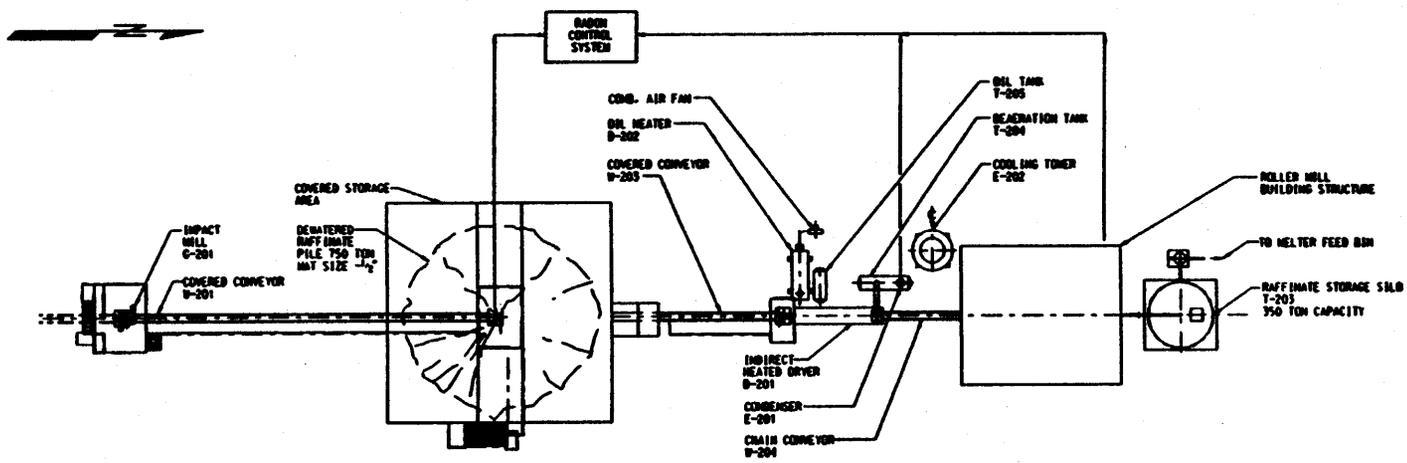
REPORT NO:	DOE/OR/21548-411	DRAWING NO:	
ORIGINATOR:		DRAWING BY:	
		DATE:	05/28/93



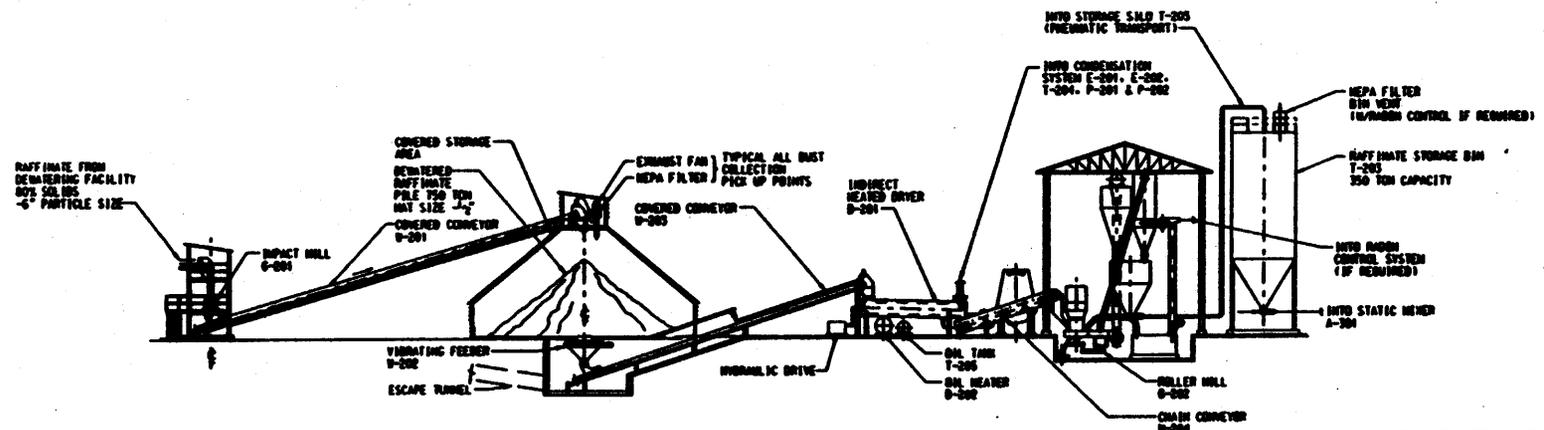
CONCEPTUAL FLOW CHART
FOR VITRIFICATION
TREATMENT SYSTEM

FIGURE 5.3.3-1

REPORT NO.	DOE/OR/21548-411	DRAWING NO.
DESIGNED BY	DRAWN BY	DATE



PLAN - RAFFINATE MATERIAL PREPARATION
SCALE: 1/8" = 1'-0"



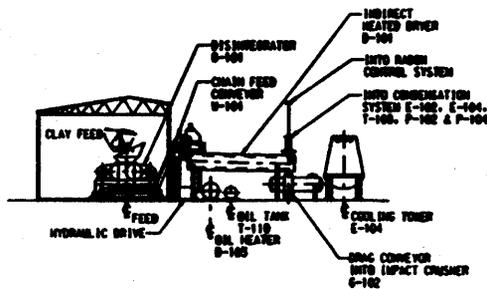
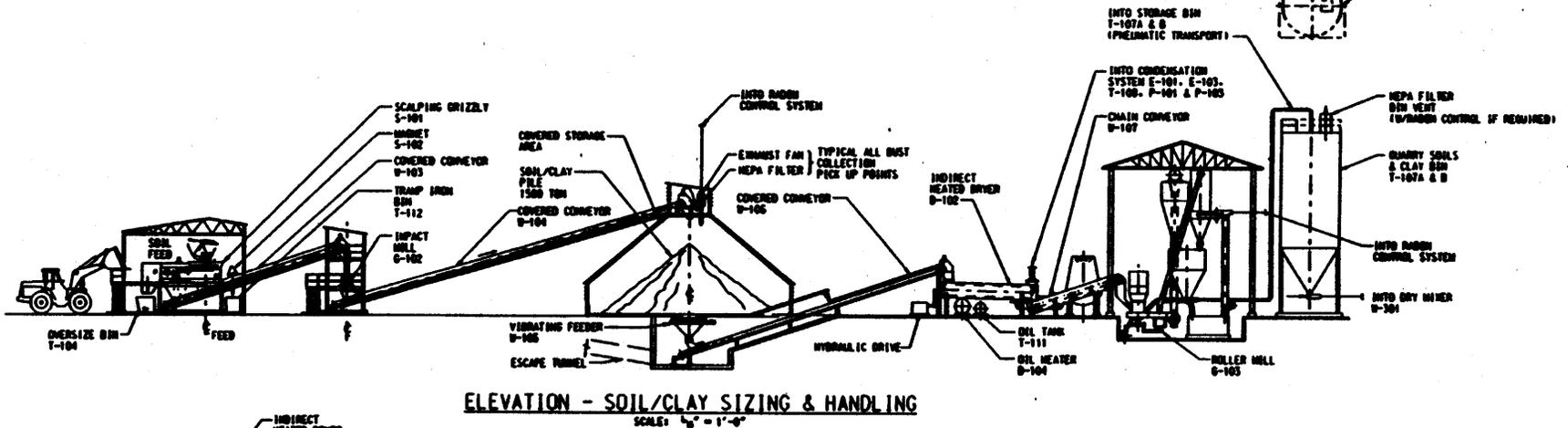
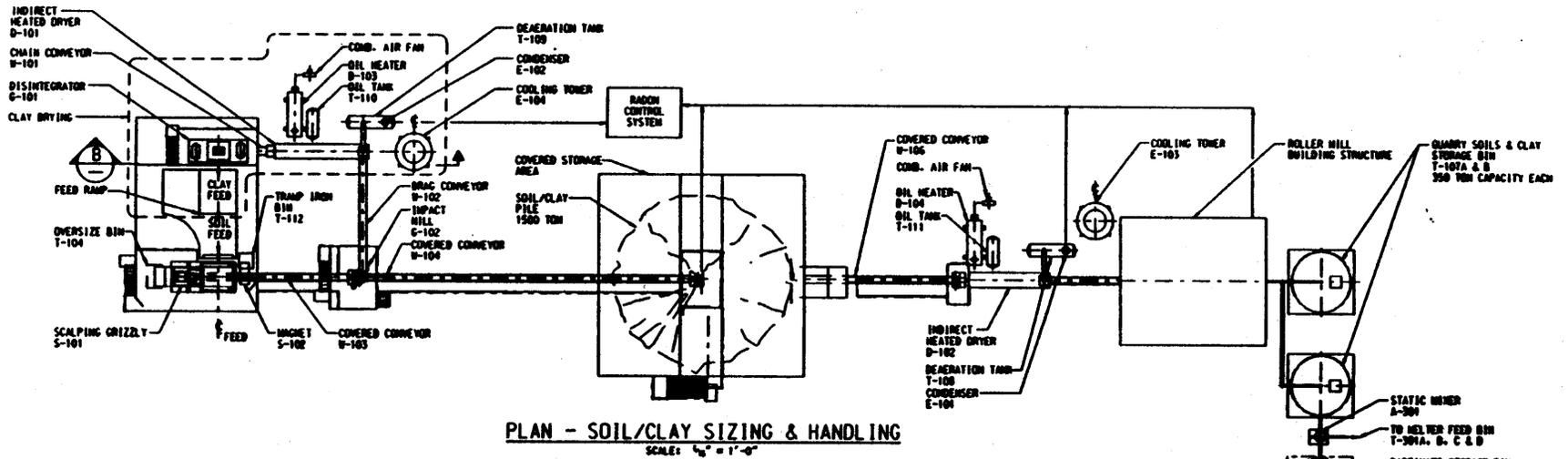
ELEVATION - RAFFINATE MATERIAL PREPARATION
SCALE: 1/8" = 1'-0"

NOTE: DESIGN OF MATERIAL HANDLING SYSTEM IS SHOWN IN ONE LINE FOR CLARITY

**GENERAL ARRANGEMENT OF
RAFFINATE PRETREATMENT CIRCUITS
(PREFERRED DESIGN)**

FIGURE 5.3.3-2

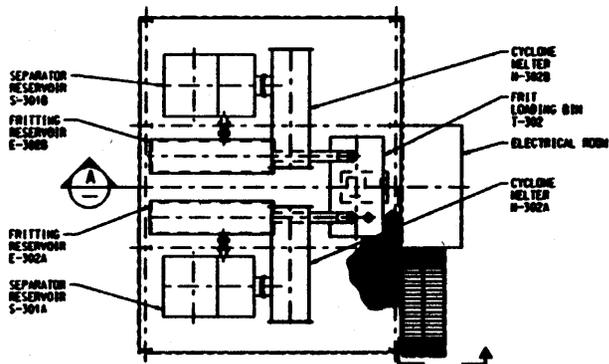
REPORT NO. DOE/OR/21548-411	DRAWING NO.
ORIGINATOR	DATE
DRAWN BY	



GENERAL ARRANGEMENT OF
SOIL/CLAY PRETREATMENT CIRCUITS
(PREFERRED DESIGN)

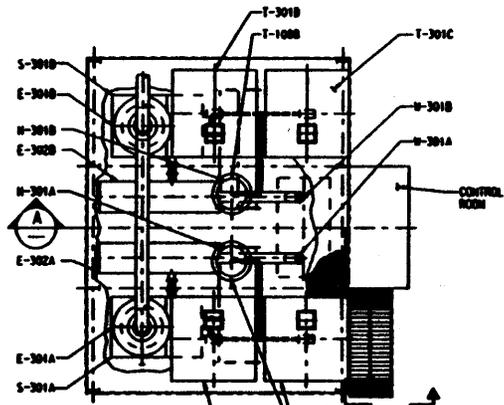
FIGURE 5.3.3-3

REPORT NO.	DOE/OR/21548-411	DRAWING NO.	
ORIGINATOR		DRAWN BY	
		DATE	

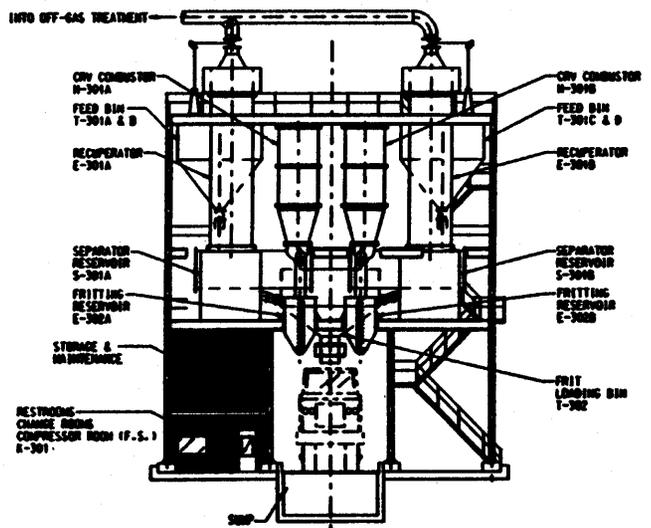


PLAN @ EL 23'-6"
SCALE: 1/4" = 1'-0"

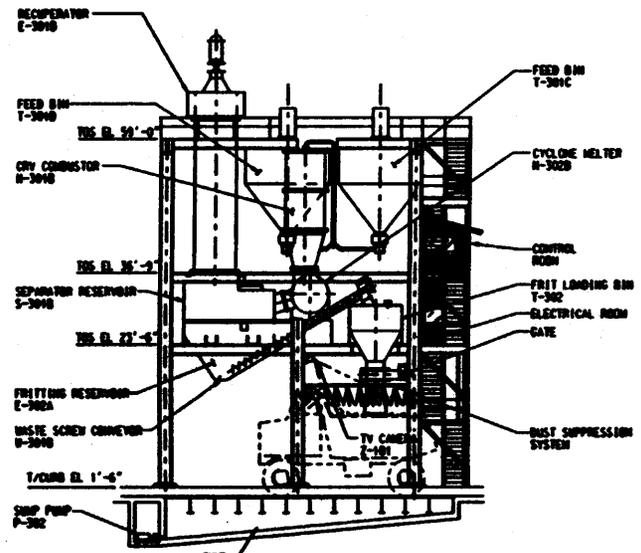
VIEW "V" →



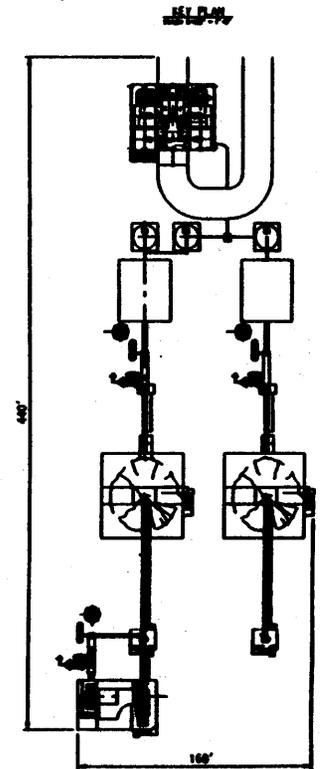
PLAN @ EL 59'-0"
SCALE: 1/4" = 1'-0"



VIEW "V"
SCALE: 1/4" = 1'-0"



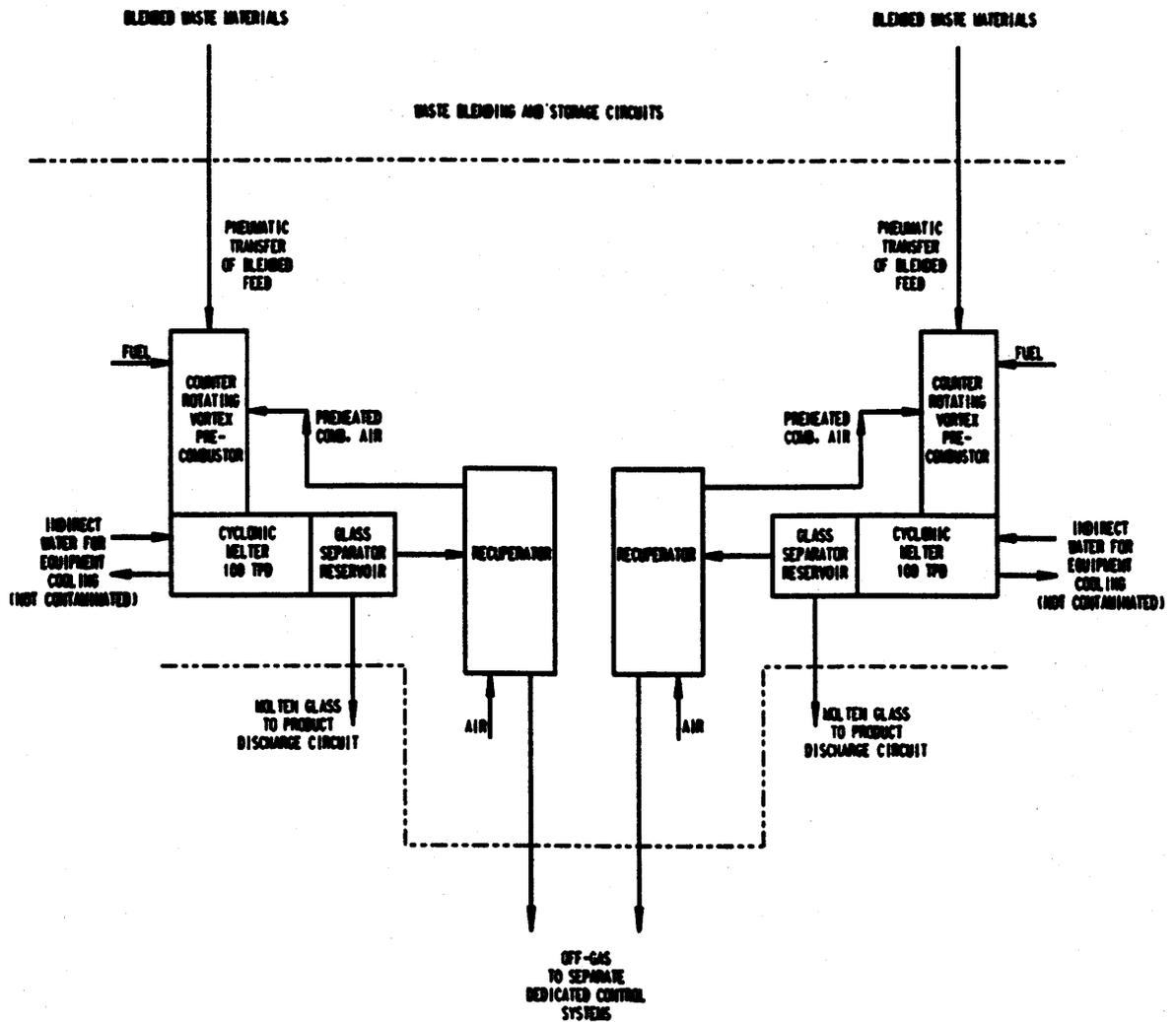
SECTION A
SCALE: 1/4" = 1'-0"



GENERAL ARRANGEMENT OF
WASTE STORAGE, MIXING, FEEDING, MELTING
AND PRODUCT DISCHARGE CIRCUITS
(PREFERRED DESIGN)

FIGURE 5.3.3-4

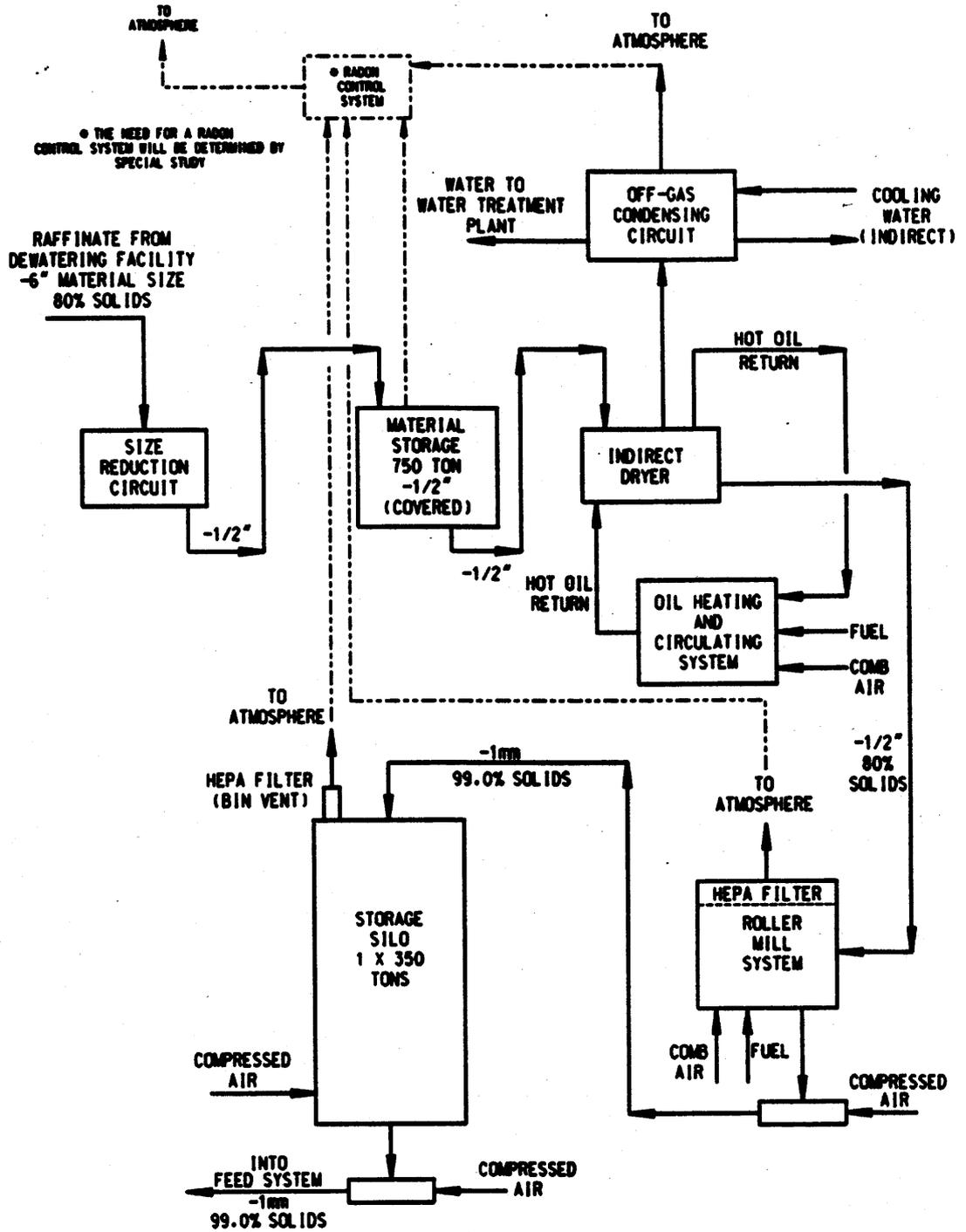
REPORT NO. DOE/OR/21548-411	DRAWING NO.
ORIGINATOR	DATE
DRAWN BY	



GENERAL FLOW DIAGRAM OF MELTER CIRCUITS

FIGURE 5.3.3-5

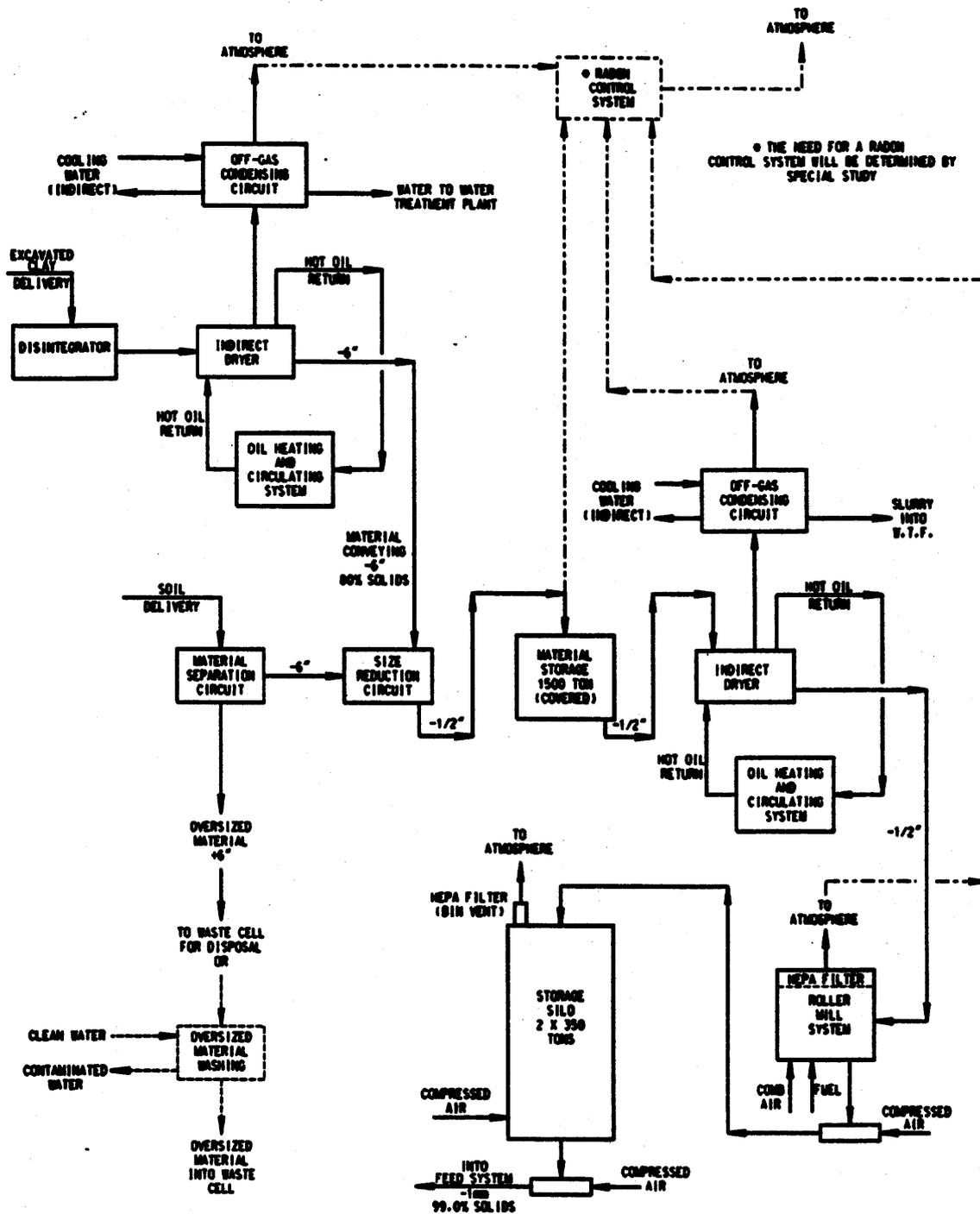
REPORT NO.	DOE/OR/21548-411	DRAWING NO.
ORIGINATOR	DRAWN BY	DATE



GENERAL FLOW DIAGRAM
OF RAFFINATE
PRETREATMENT CIRCUITS

FIGURE 5.3.3-6

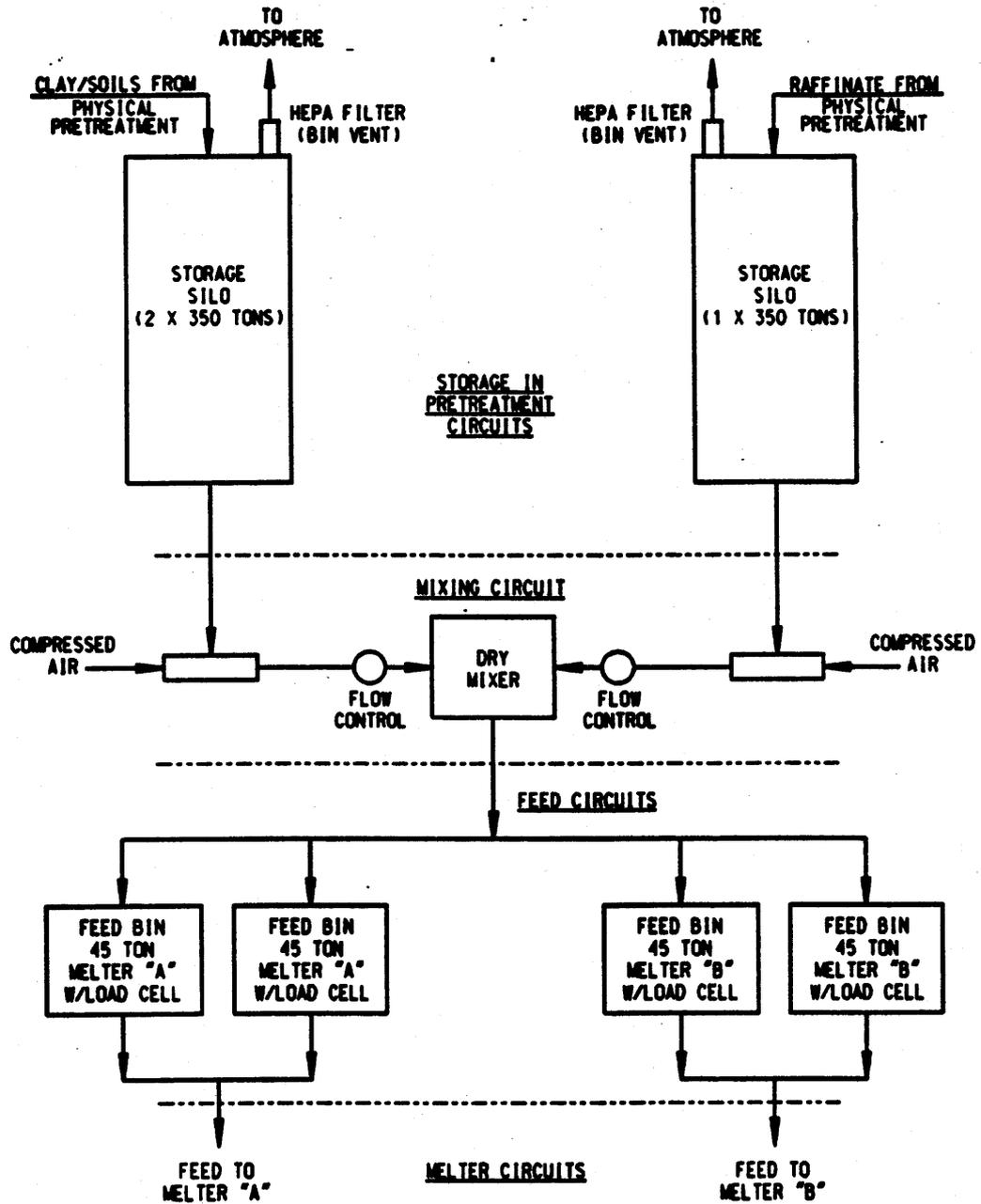
REPORT NO. DOE/OR/21548-411	DRAWING NO.
DESIGNED BY	DATE
DRAWN BY	DATE



GENERAL FLOW DIAGRAM
OF SOIL/CLAY
PRETREATMENT CIRCUIT

FIGURE 5.3.3-7

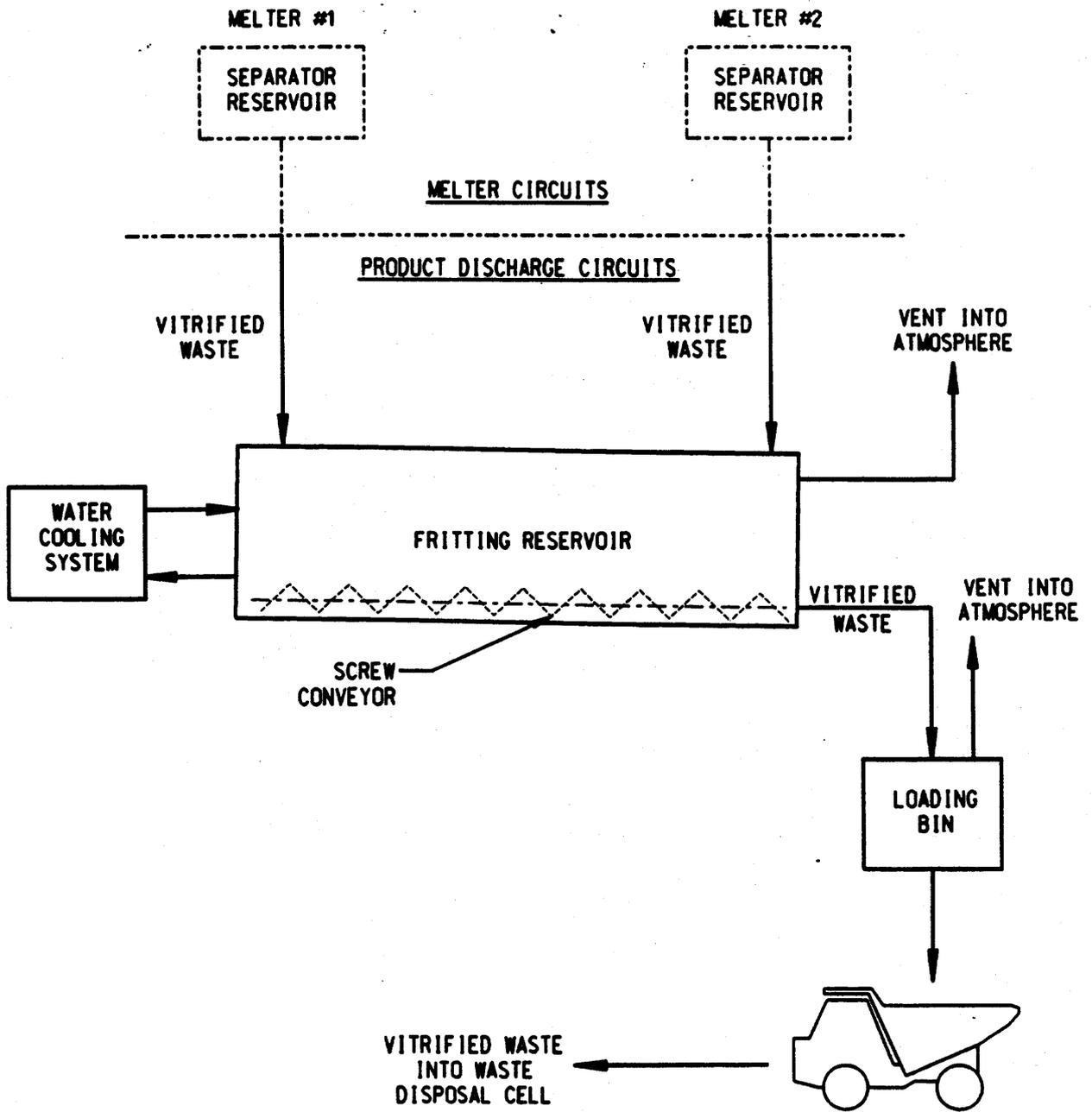
REPORT NO. DOE/OR/21548-411	DRAWING NO.
ORIGINATOR	DATE
DRAWN BY	



GENERAL FLOW DIAGRAM
OF WASTE STORAGE, MIXING
AND FEEDING CIRCUITS

FIGURE 5.3.3-8

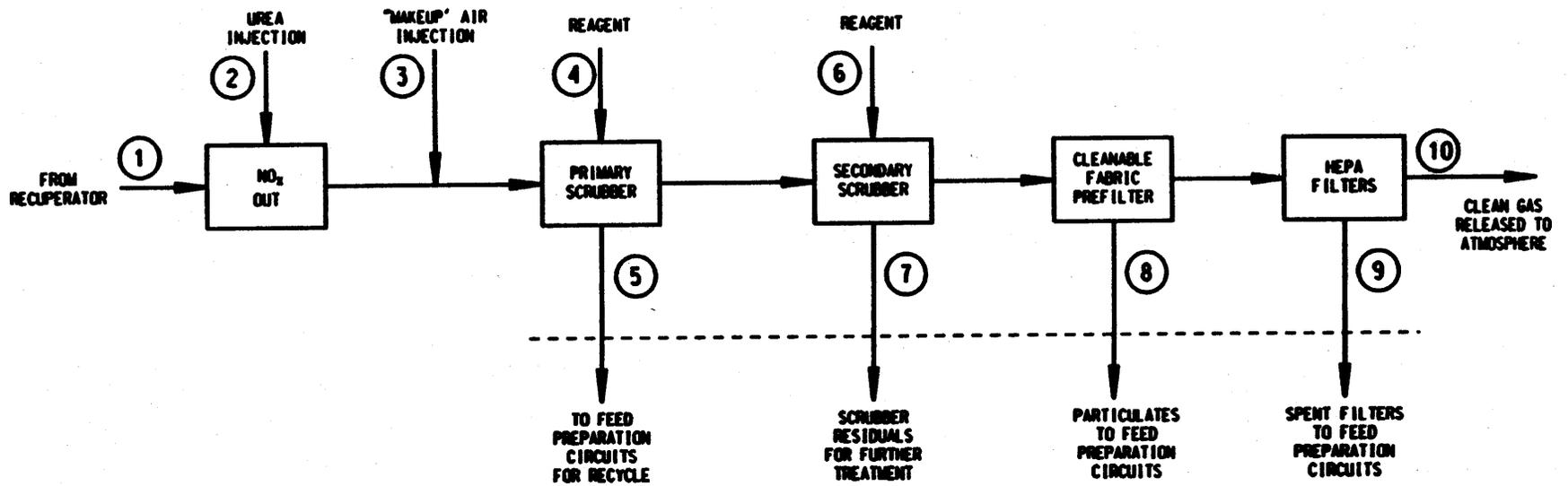
REPORT NO. DOE/OR/21548-411	DRAWING NO.
OPERATOR	DATE
DRAWN BY	



GENERAL FLOW DIAGRAM
OF
PRODUCT DISCHARGE CIRCUIT

FIGURE 5.3.3-9

REPORT NO. DOE/OR/21548-411	DRAWING NO.
ORIGINATOR	DATE
DRAWN BY	



GENERAL FLOW DIAGRAM
FOR OFF-GAS
TREATMENT CIRCUITS

FIGURE 5.3.3-10

REPORT NO. DOE/OR/21548-411	DRAWING NO.
DESIGNED BY	DATE

N

RAFFINATE
PIT 4

RAFFINATE
PIT 3

DISPOSAL CELL

CSS
PLANT
AREA

DEWATERING
FACILITY

TSA AREA

RAFFINATE
PIT 1

ALTERNATIVE LOCATION
FOR VITRIFICATION
PLANT

RAFFINATE
PIT 2

LOCATION OF VITRIFICATION FACILITY

FIGURE 5.3.3-11

REPORT NO: DOE/OR/21548-411

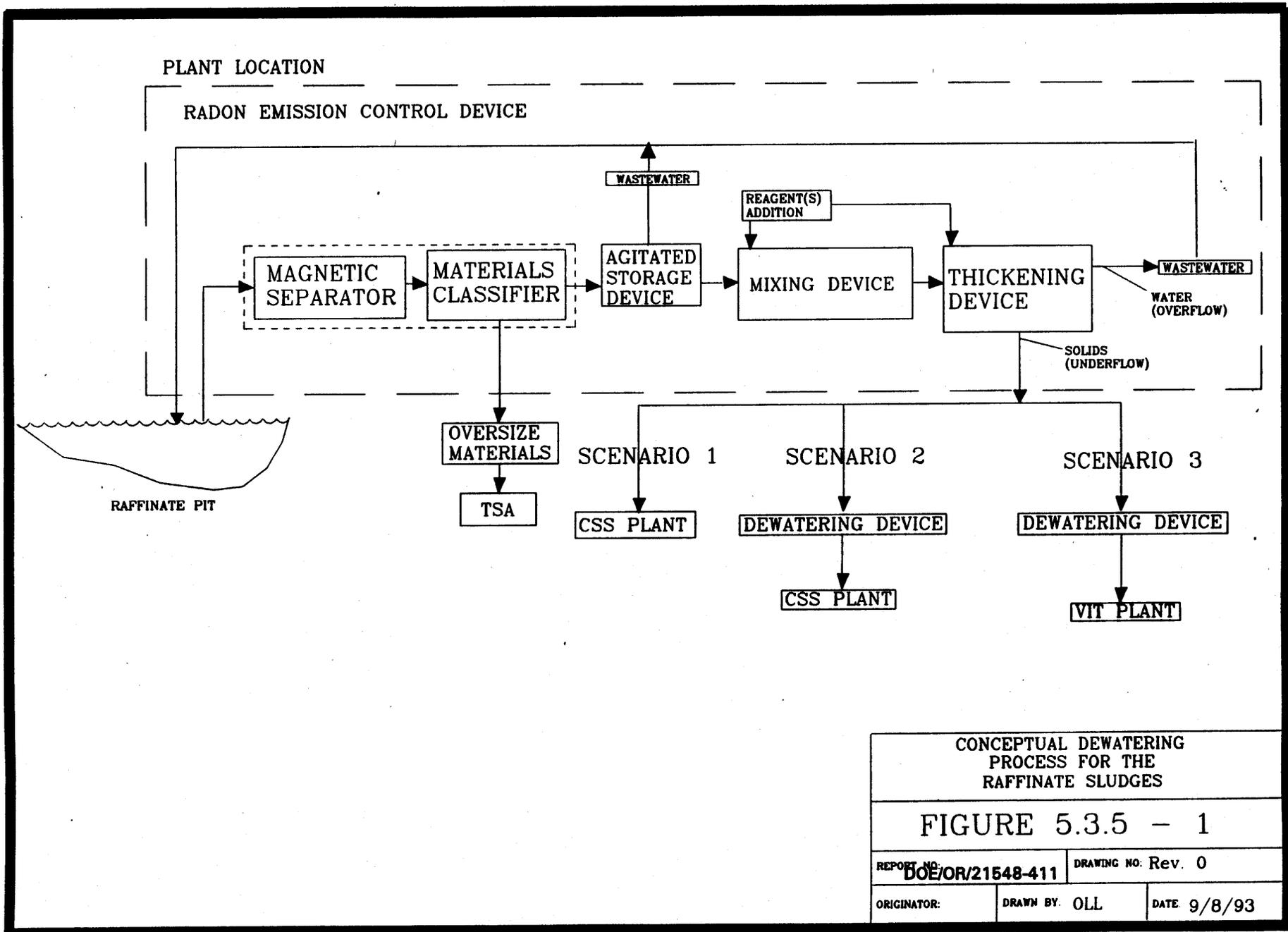
DRAWING NO:

ORIGINATOR:

DRAWING BY:

DATE:

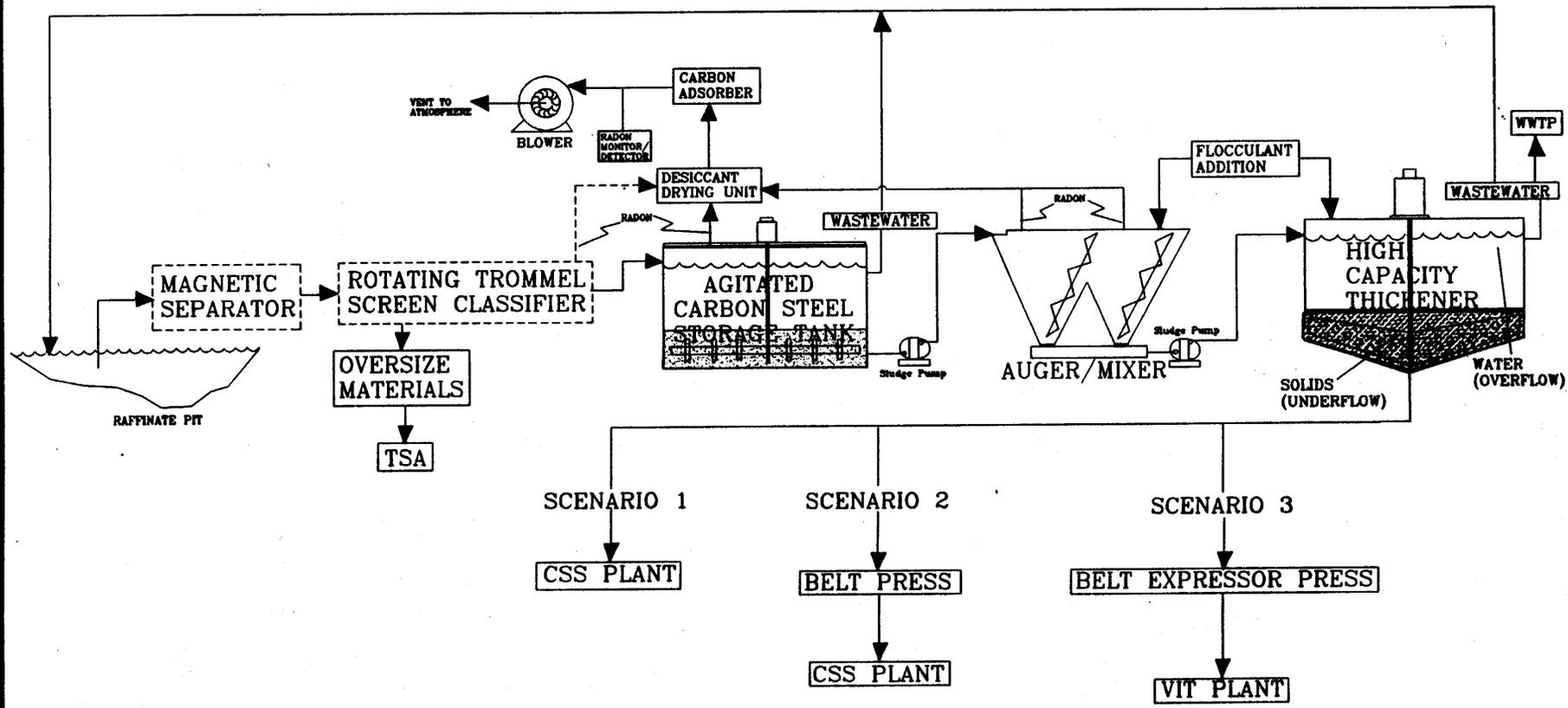
05/28/93



CONCEPTUAL DEWATERING
PROCESS FOR THE
RAFFINATE SLUDGES

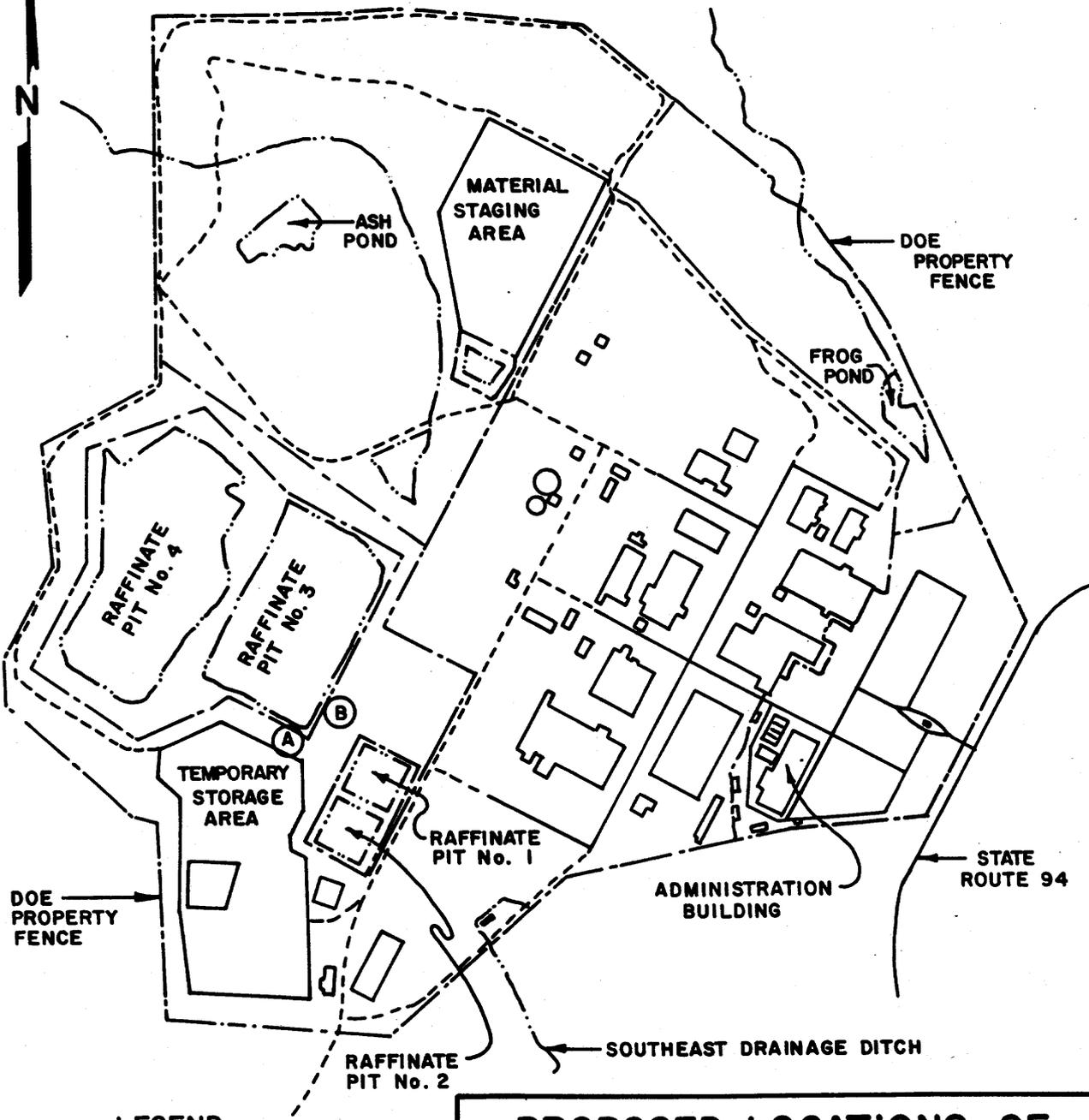
FIGURE 5.3.5 - 1

REPORT NO: DOE/OR/21548-411	DRAWING NO: Rev. 0
ORIGINATOR:	DRAWN BY: OLL
	DATE: 9/8/93



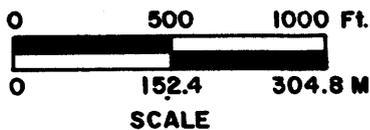
CONCEPTUAL SELECTION OF
 DEWATERING PROCESSING
 EQUIPMENT FOR
 RAFFINATE SLUDGES
 FIGURE 5.3.5 - 2
 REPORT NO. DOE/OR/21548-411 DRAWING NO: Rev. 0
 ORIGINATOR: DRAWN BY: OLL DATE: 9/8/93

WELDON SPRING SITE



LEGEND

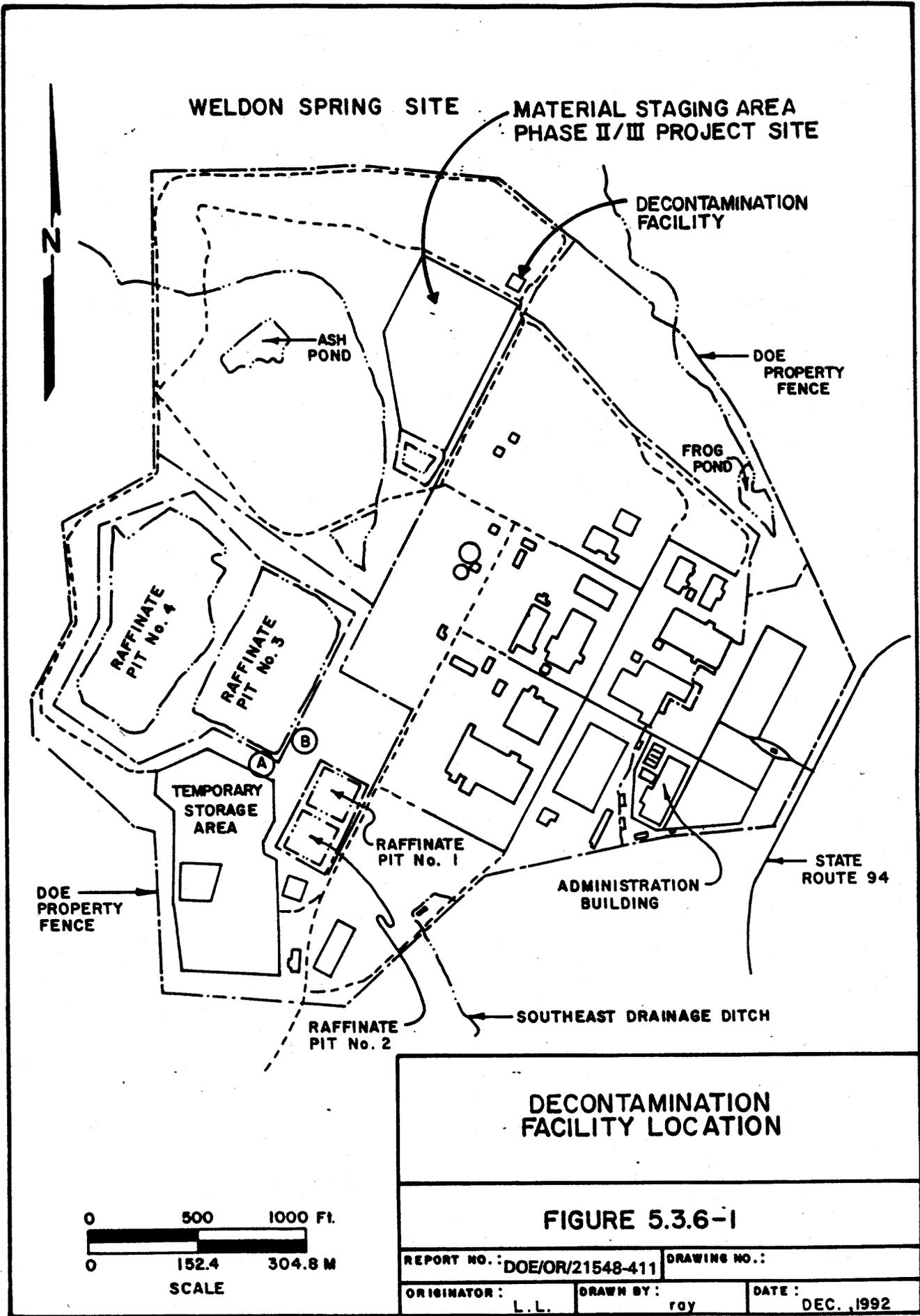
- (A) (B) PROPOSED LOCATIONS RAFFINATE SLUDGE DEWATERING PLANTS



PROPOSED LOCATIONS OF RAFFINATE SLUDGE DEWATERING PLANT

FIGURE 5.3.5 - 3

REPORT NO.: DOE/OR/21548-411		DRAWING NO.:
ORIGINATOR: L.L.	DRAWN BY: ray	DATE: DEC. 1992



WELDON SPRING SITE

MATERIAL STAGING AREA
PHASE II/III PROJECT SITE

DECONTAMINATION FACILITY

ASH POND

DOE PROPERTY FENCE

FROG POND

RAFFINATE PIT No. 4

RAFFINATE PIT No. 3

TEMPORARY STORAGE AREA

RAFFINATE PIT No. 1

ADMINISTRATION BUILDING

STATE ROUTE 94

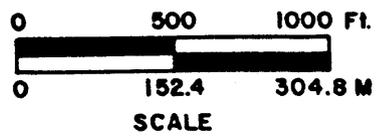
DOE PROPERTY FENCE

RAFFINATE PIT No. 2

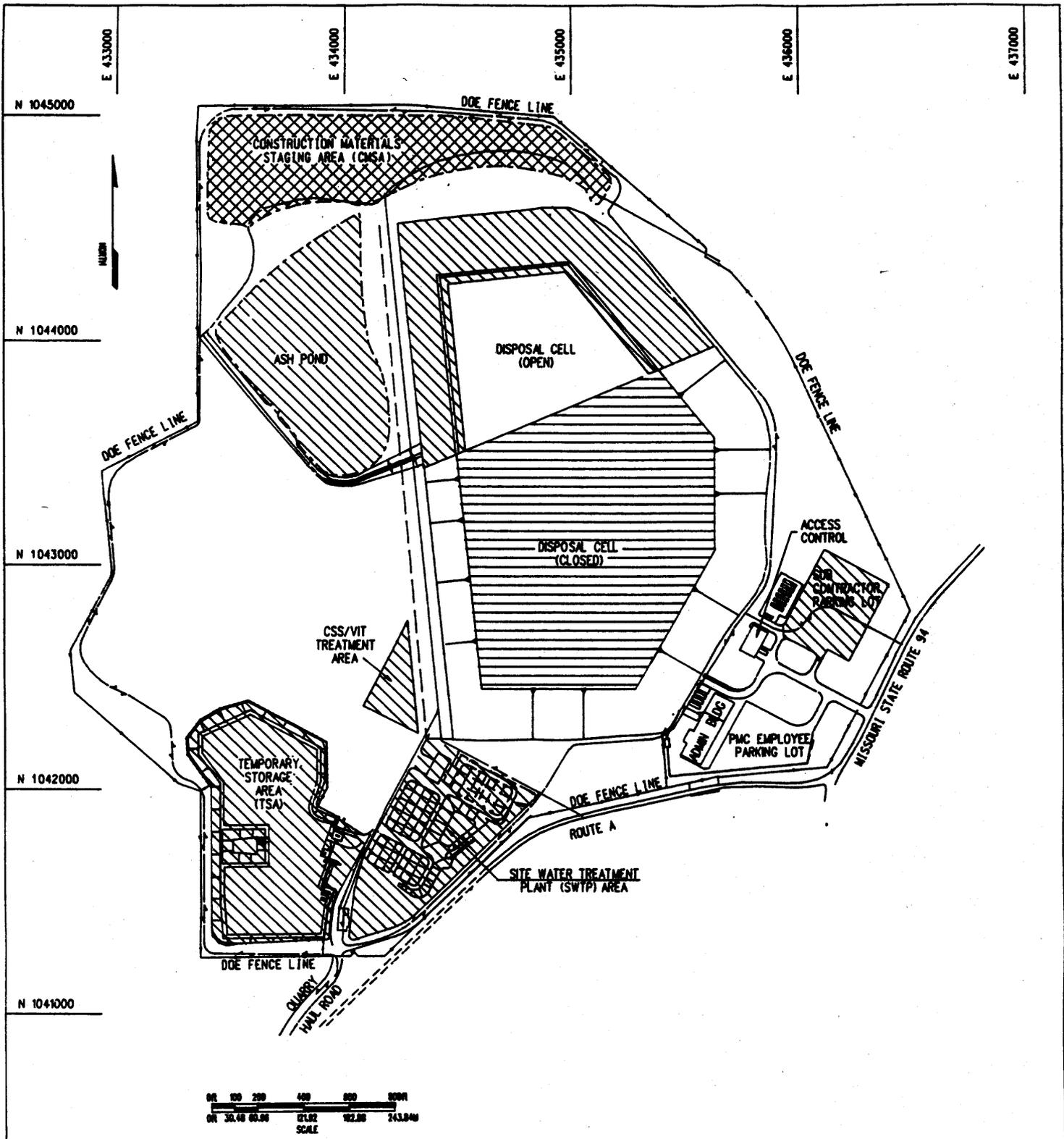
SOUTHEAST DRAINAGE DITCH

DECONTAMINATION FACILITY LOCATION

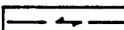
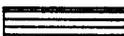
FIGURE 5.3.6-1



REPORT NO.: DOE/OR/21548-411		DRAWING NO.:
ORIGINATOR: L.L.	DRAWN BY: roy	DATE: DEC. 1992



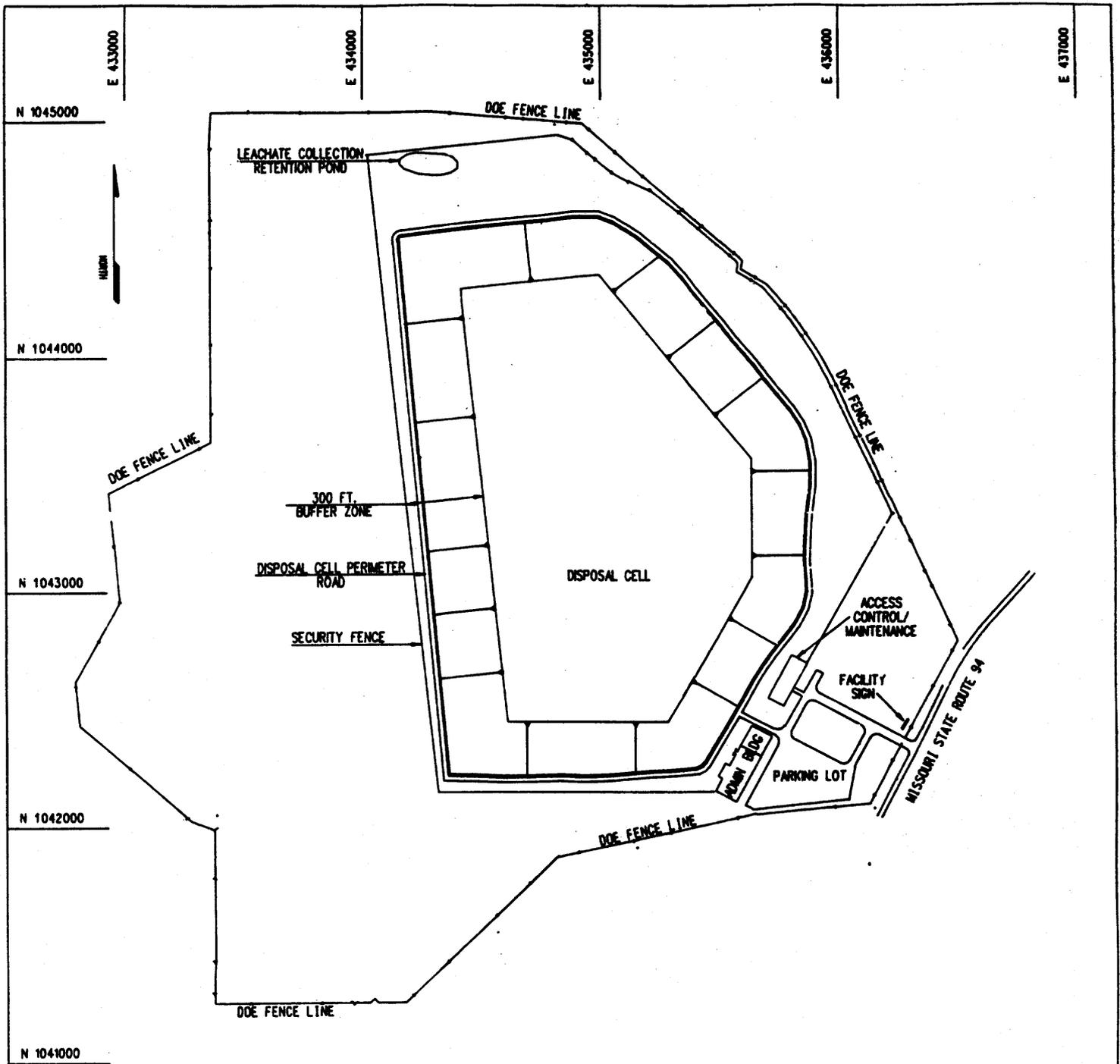
LEGEND

-  ROADS
-  CLEAN MATERIAL (MAY BE USED AS SITE RESTORATION MATERIAL)
-  CONTAMINATED MATERIAL THAT MUST BE REMOVED PRIOR TO SITE CLOSURE
-  COVER OF DISPOSAL FACILITY (CELL)

**WELDON SPRING SITE
(PRIOR TO SITE CLOSURE ACTIVITIES)**

FIGURE 5.4-1

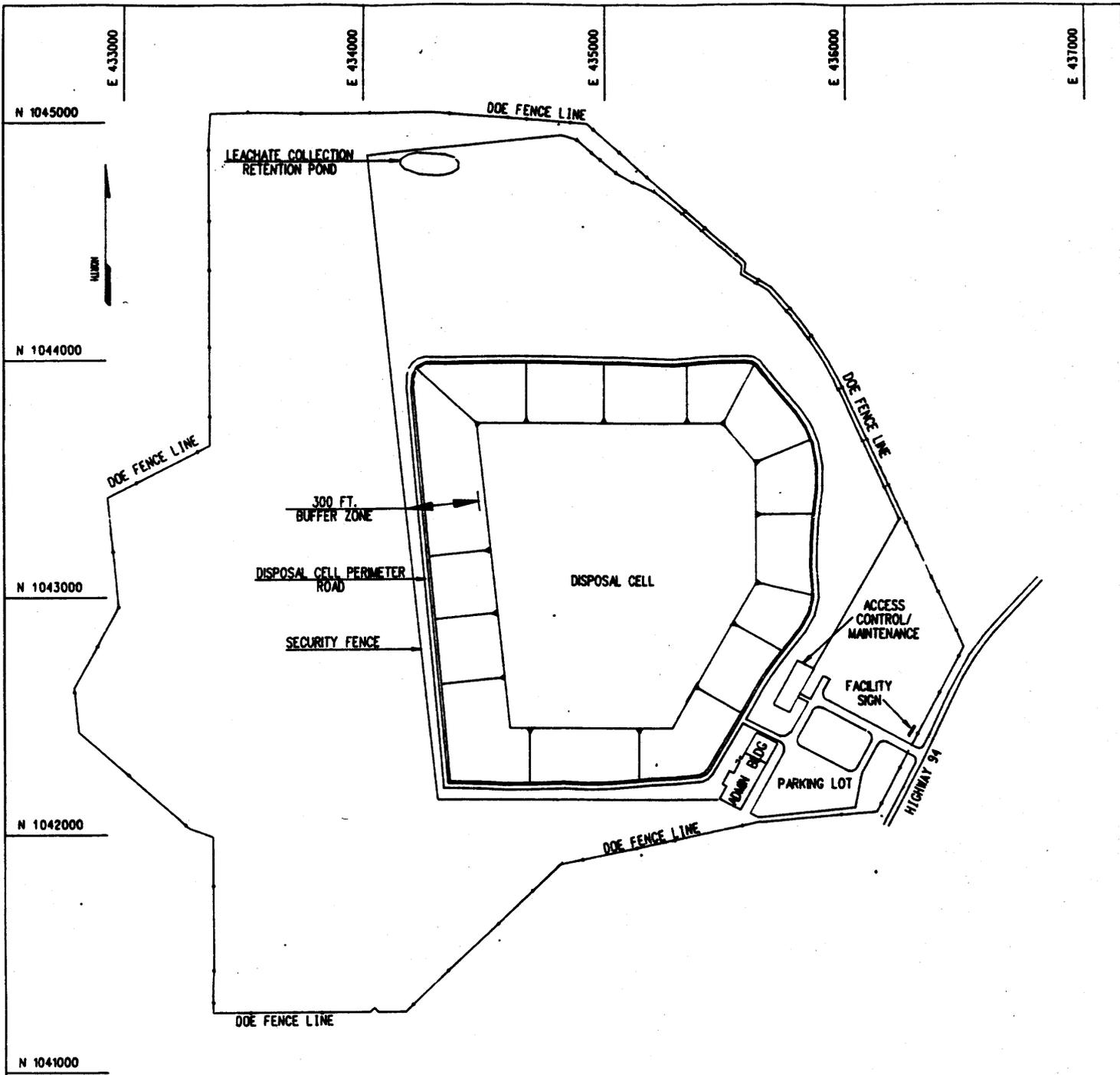
REPORT NO: DOE/OR/21548-411	DRAWING NO: 384001/ULRICH.DGN
ORIGINATOR: UC	DATE: 11/24/92
DRAWING BY: CWF	



**WELDON SPRING SITE
 FINAL LAYOUT
 (CSS CELL - 1.5 MILLION C.Y. WASTE)**

FIGURE 5.4-2

REPORT NO: DOE/OR/21548-411	DRAWING NO:
ORIGINATOR: UC	DRAWING BY: CWF
	DATE: 11/24/92



E 433000
E 434000
E 435000
E 436000
E 437000

N 1045000
N 1044000
N 1043000
N 1042000
N 1041000

DOE FENCE LINE

LEACHATE COLLECTION RETENTION POND

300 FT. BUFFER ZONE

DISPOSAL CELL PERIMETER ROAD

SECURITY FENCE

DISPOSAL CELL

ACCESS CONTROL/ MAINTENANCE

FACILITY SIGN

DOE BLDG

PARKING LOT

HIGHWAY 94

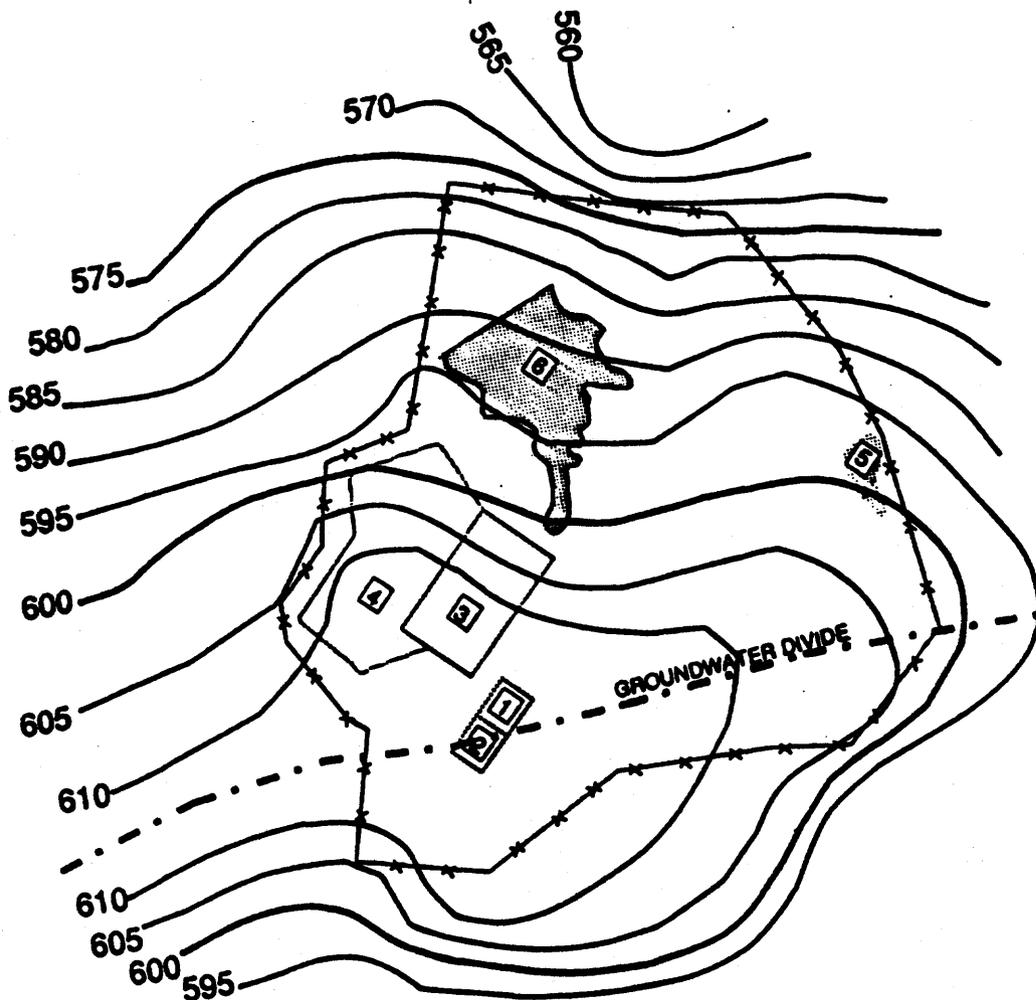
DOE FENCE LINE



**WELDON SPRING SITE
FINAL LAYOUT
(MT CELL - 1.0 MILLION C.Y. WASTE)**

FIGURE 5.4-3

REPORT NO:	DOE/OR/21548-411	DRAWING NO:	
ORIGINATOR:	UC	DRAWING BY:	CWF
		DATE:	11/30/92



NOT TO SCALE

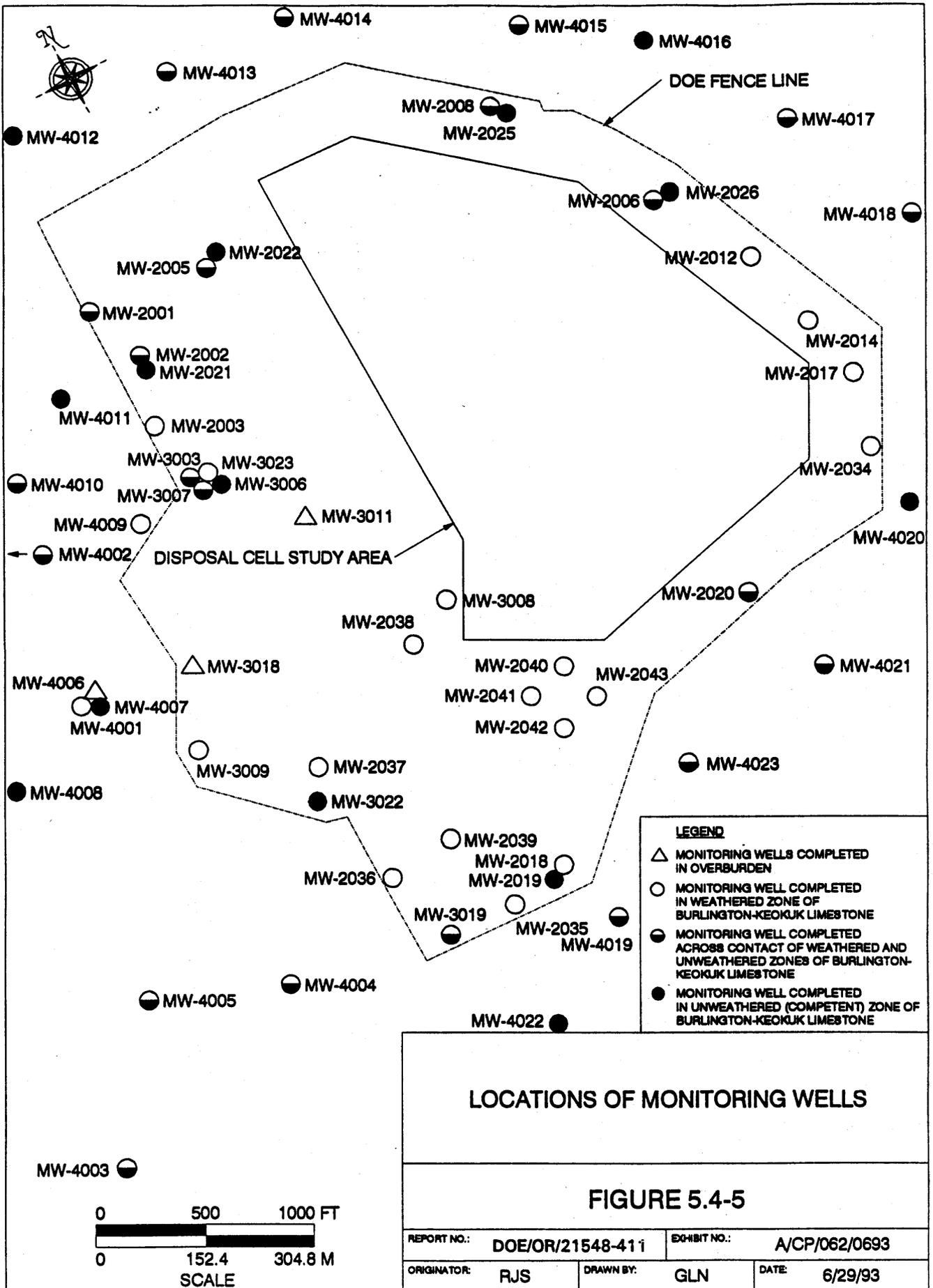
LEGEND

- 1 RAFFINATE PIT 1
 - 2 RAFFINATE PIT 2
 - 3 RAFFINATE PIT 3
 - 4 RAFFINATE PIT 4
 - 5 FROG POND
 - 6 ASH POND
 - . - GROUNDWATER DIVIDE
 - x - x - FENCE
- (from Supporting Study 4B)

**SURFACE OF THE SHALLOW
GROUNDWATER TABLE**

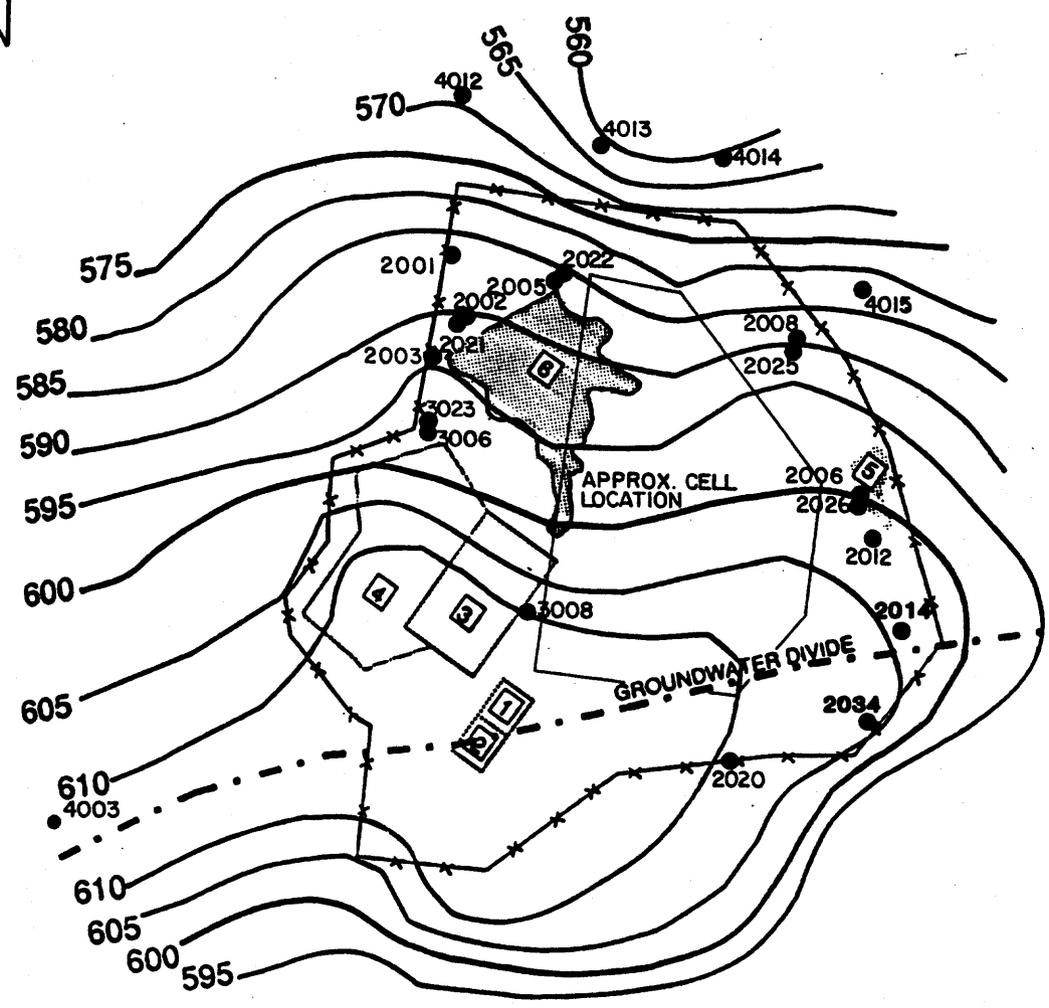
FIGURE 5.4-4

REPORT NO.: DOE/OR/21548-411	DRAWING NO.:	
ORIGINATOR: U.C.	DRAWN BY: K.W.	DATE: NOV., 1992



LOCATIONS OF MONITORING WELLS

FIGURE 5.4-5



NOT TO SCALE

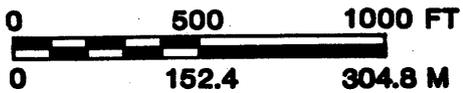
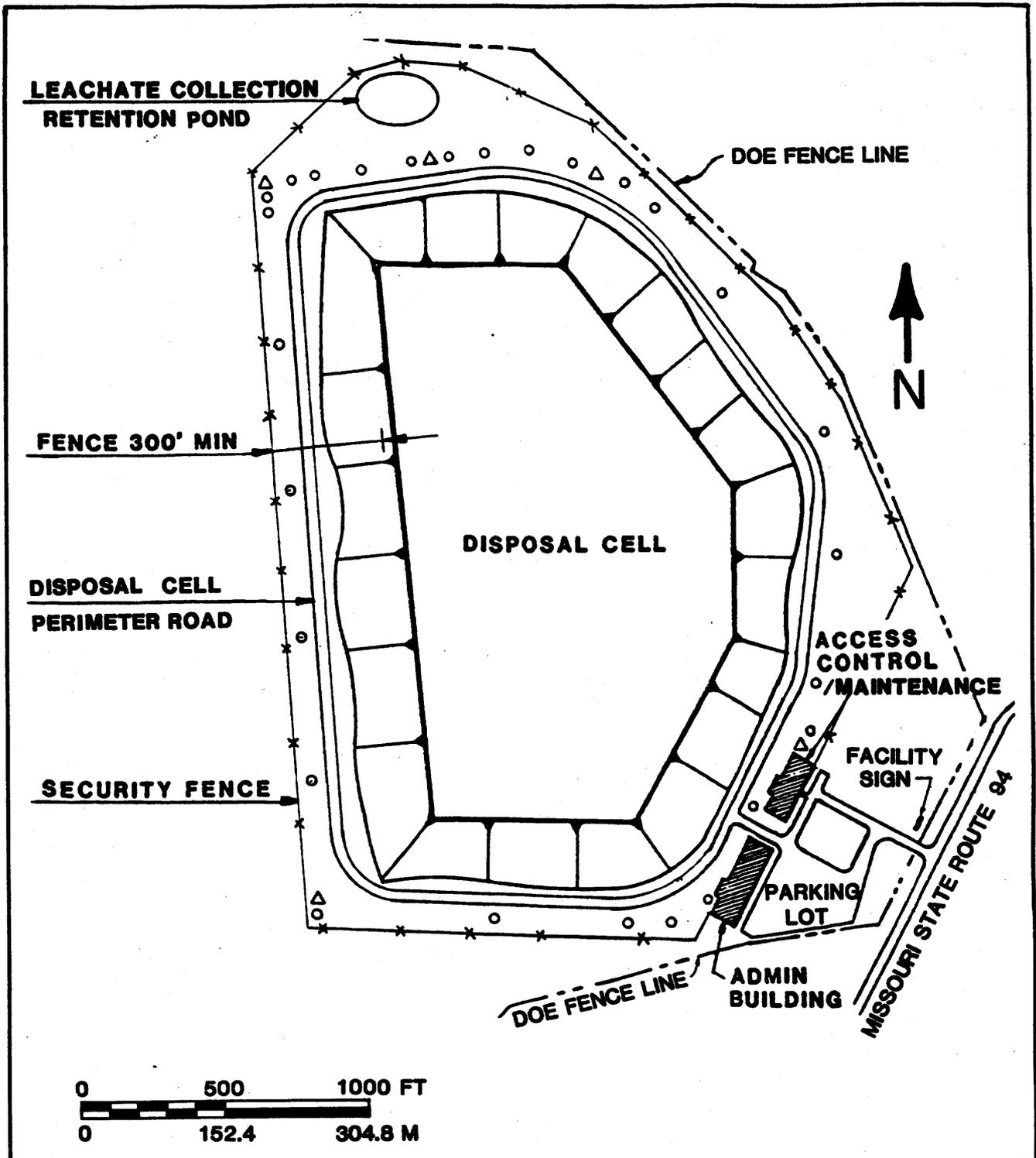
LEGEND

- 1 RAFFINATE PIT 1 ● MONITORING WELL
- 2 RAFFINATE PIT 2
- 3 RAFFINATE PIT 3 605- POTENTIOMETRIC SURFACE
- 4 RAFFINATE PIT 4
- 5 FROG POND
- 6 ASH POND
- - - GROUNDWATER DIVIDE
- x - x - x - DOE FENCE LINE

**LOCATION OF MONITORING WELLS TO
REMAIN FOR POST-CLOSURE MONITORING**

FIGURE 5.4-6

REPORT NO.: DOE/OR/21548-411		DRAWING NO.:	
ORIGINATOR:	U.C.	DRAWN BY:	K.W.
		DATE:	NOV., 1992



SCALE

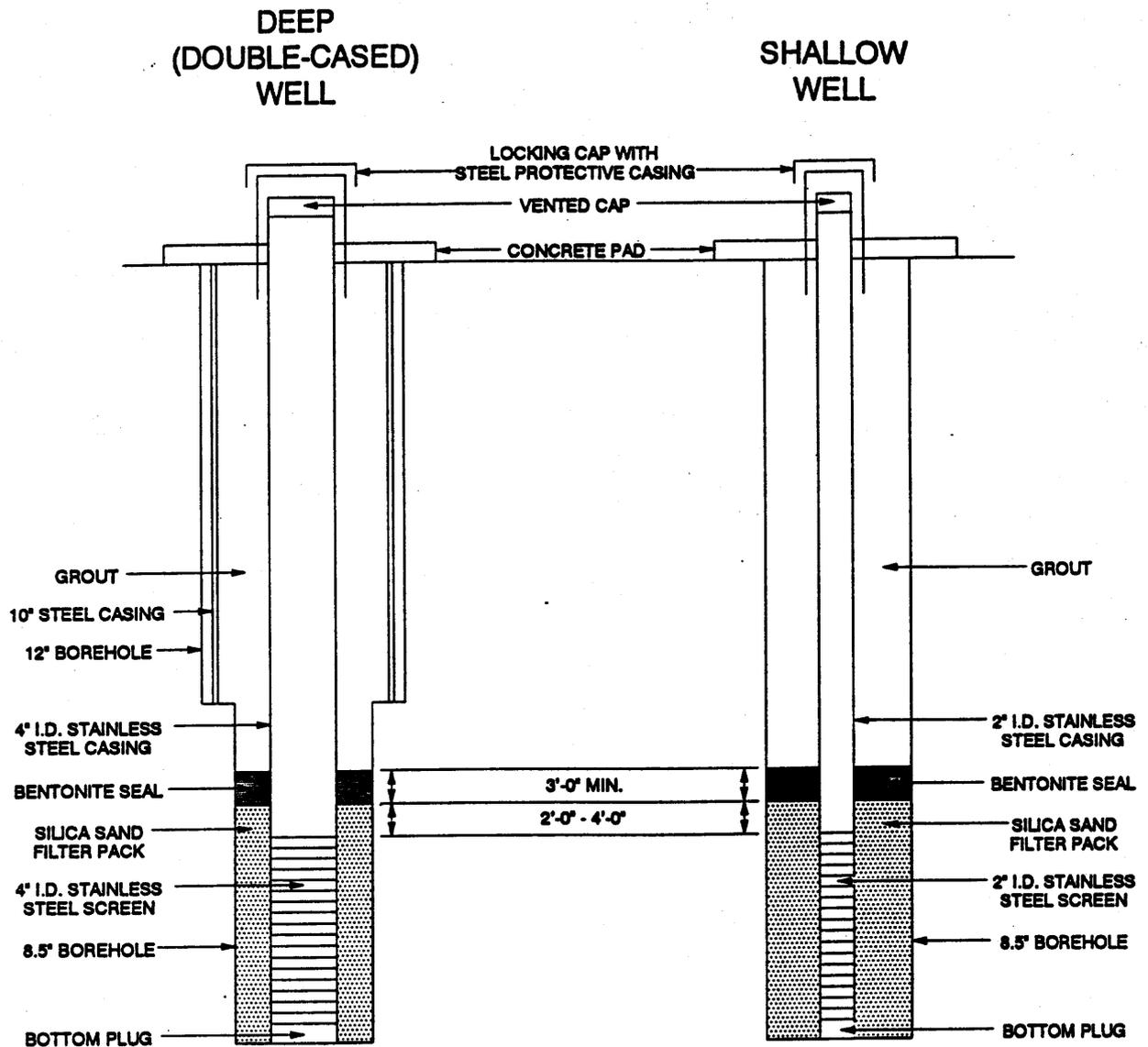
LEGEND

- MONITORING WELL IN WEATHERED ZONE OF SHALLOW BEDROCK AQUIFER
- △ MONITORING WELL IN WEATHERED ZONE OF SHALLOW BEDROCK AQUIFER

LOCATIONS OF ADDITIONAL POST-CLOSURE MONITORING WELLS

FIGURE 5.4-7

REPORT NO.:	DOE/OR/21548-411	DRAWING NO.:	
ORIGINATOR:	U. C.	DRAWN BY:	K. W.
		DATE:	NOV., 1992



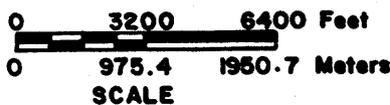
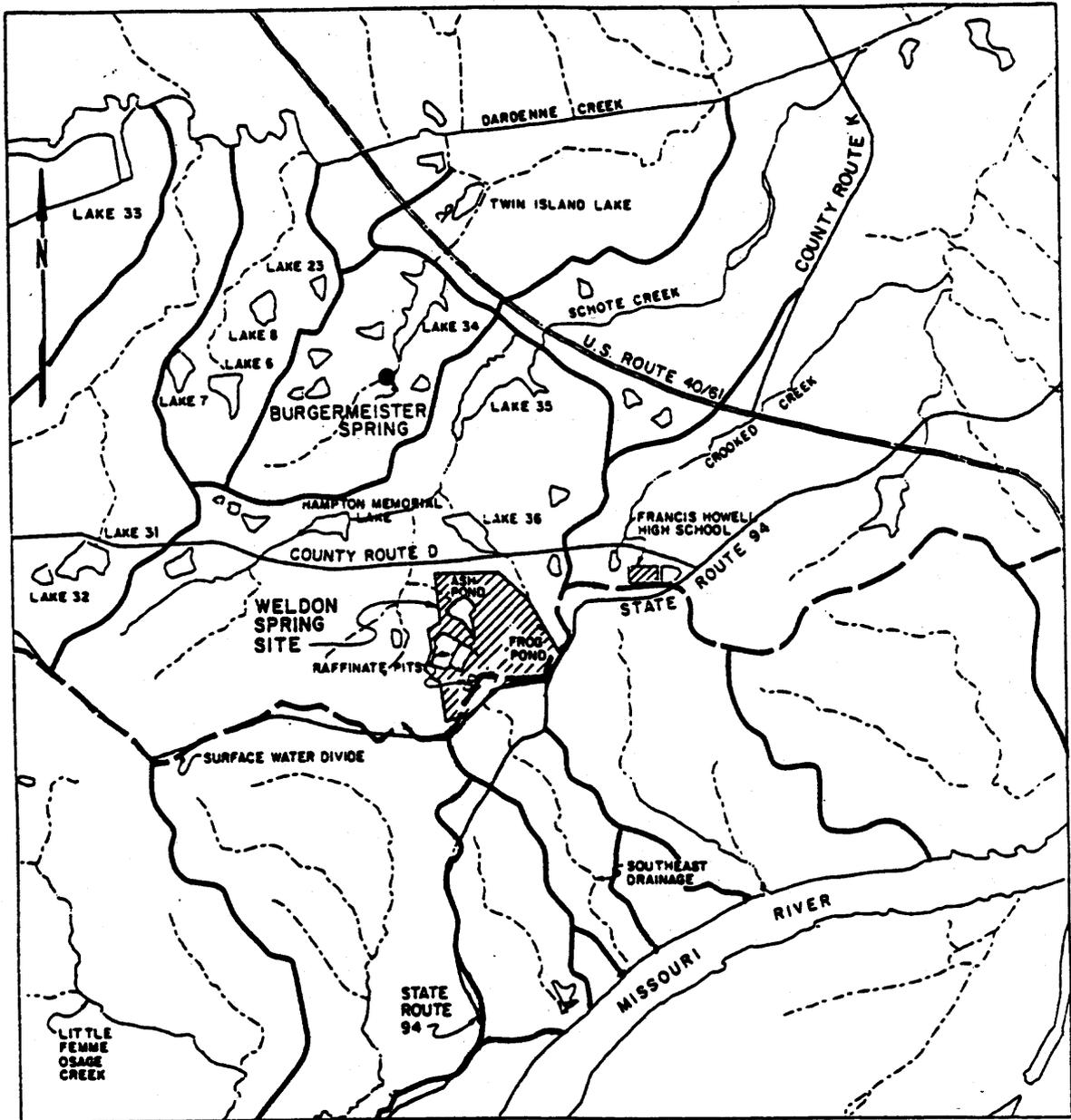
NOT TO SCALE

SOURCE : (MKF AND JEG, 1988)

TYPICAL MONITORING WELL CONSTRUCTION

FIGURE 5.4- 8

REPORT NO.:	DOE/OR/21548-411	EXHIBIT NO.:	A/PI/094/0693
ORIGINATOR:	RJS	DRAWN BY:	GLN
		DATE:	6/28/93



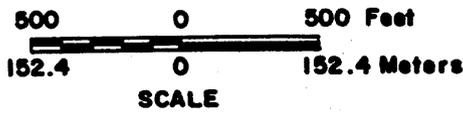
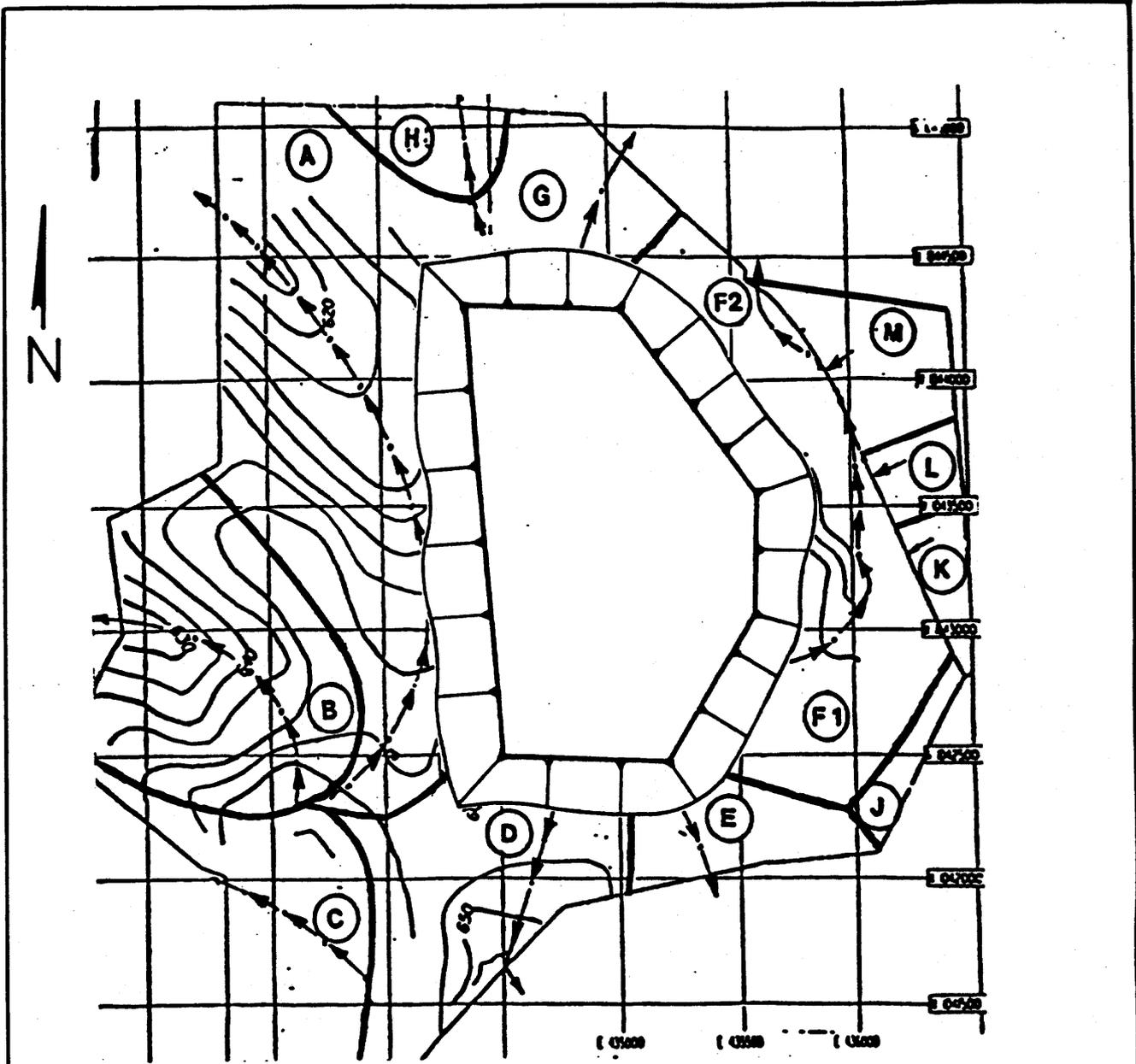
LEGEND:

- SURFACE WATER DIVIDE BETWEEN MISSISSIPPI RIVER AND MISSOURI RIVER
- DRAINAGE BOUNDARY
- - - CREEK OR SURFACE DRAINAGE
- ◡ POND OR LAKE

SURFACE WATER FEATURES AND DRAINAGES NEAR THE WSS

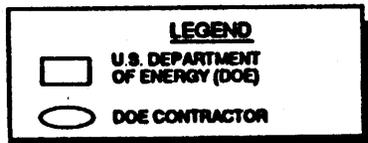
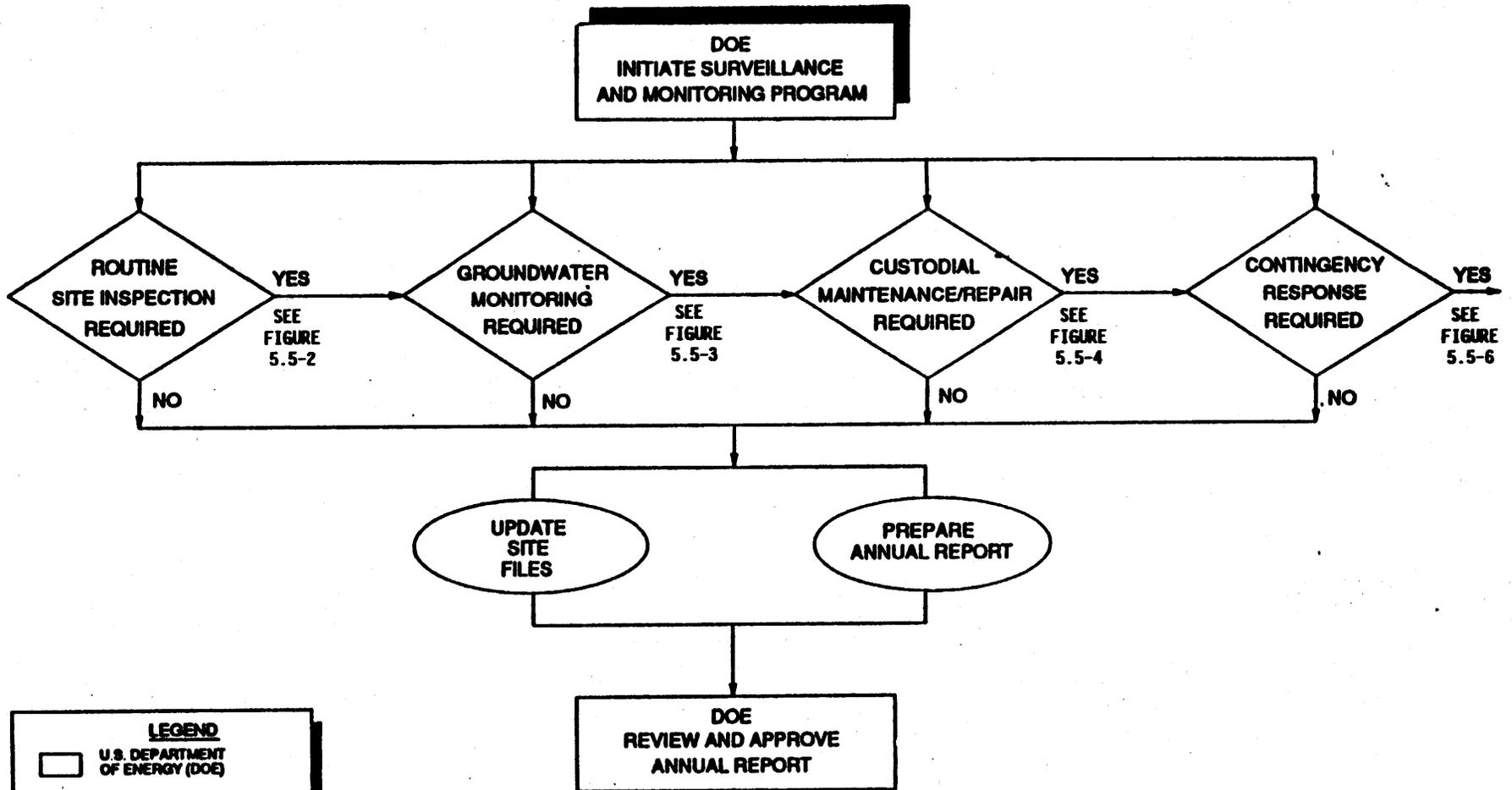
FIGURE 5.4-9

REPORT NO.: DOE/OR/21548-411		DRAWING NO.:	
ORIGINATOR: U.C.	DRAWN BY: K.W.	DATE: NOV., 1992	

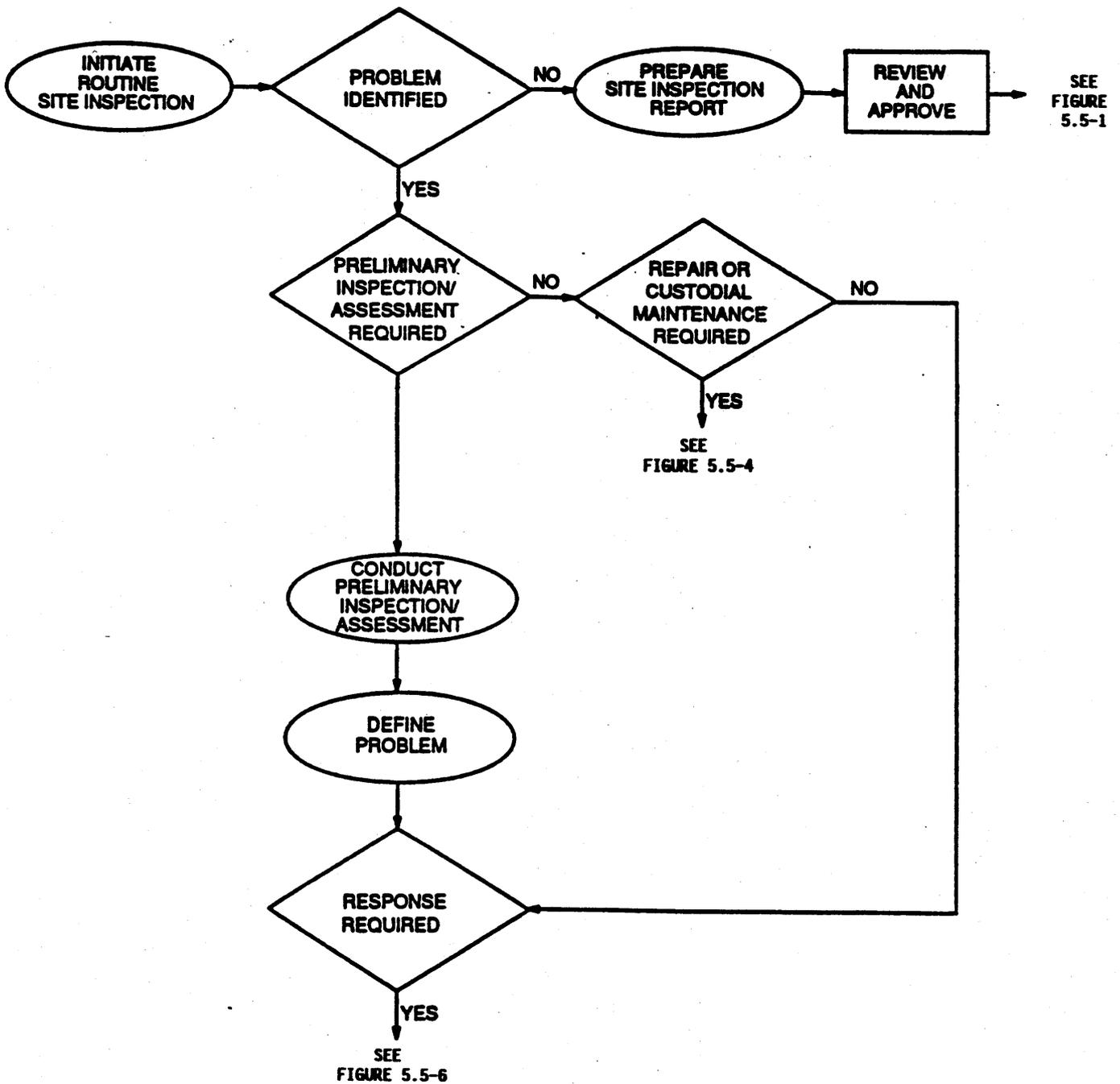


LEGEND
 — DRAINAGE BOUNDARY
 - - - LONGEST FLOW PATH
 (A) DRAINAGE AREA

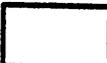
SURFACE RUNOFF DRAINAGE PLAN		
FIGURE 5.4- 10		
REPORT NO.: DOE/OR/21548-411		DRAWING NO.:
ORIGINATOR: U.C.	DRAWN BY: K.W.	DATE: NOV., 1992



PROJECT SURVEILLANCE AND MONITORING PROGRAM		
FIGURE 5.5-1		
REPORT NO. DOE/OR/21548-411	DRAWING NO.	
ORIGINATOR	DRAWN BY	DATE



LEGEND

 U. S. DEPARTMENT OF ENERGY (DOE)

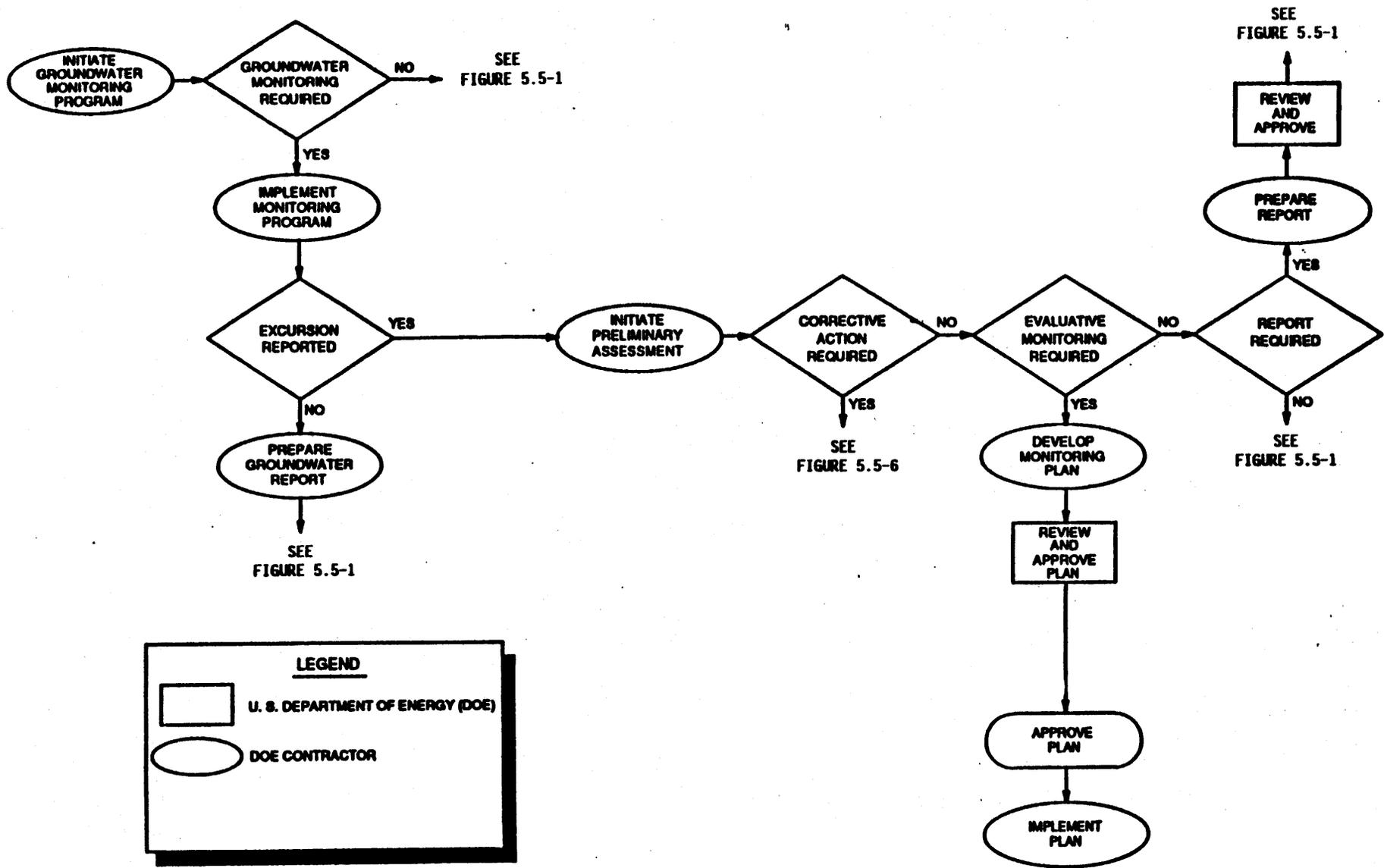
 DOE CONTRACTOR

SURVEILLANCE AND MONITORING:

ROUTINE SITE INSPECTION

FIGURE 5.5-2

REPORT NO. DOE/OR/21548-411	DRAWING NO.
ORIGINATOR	DATE
DRAWN BY	



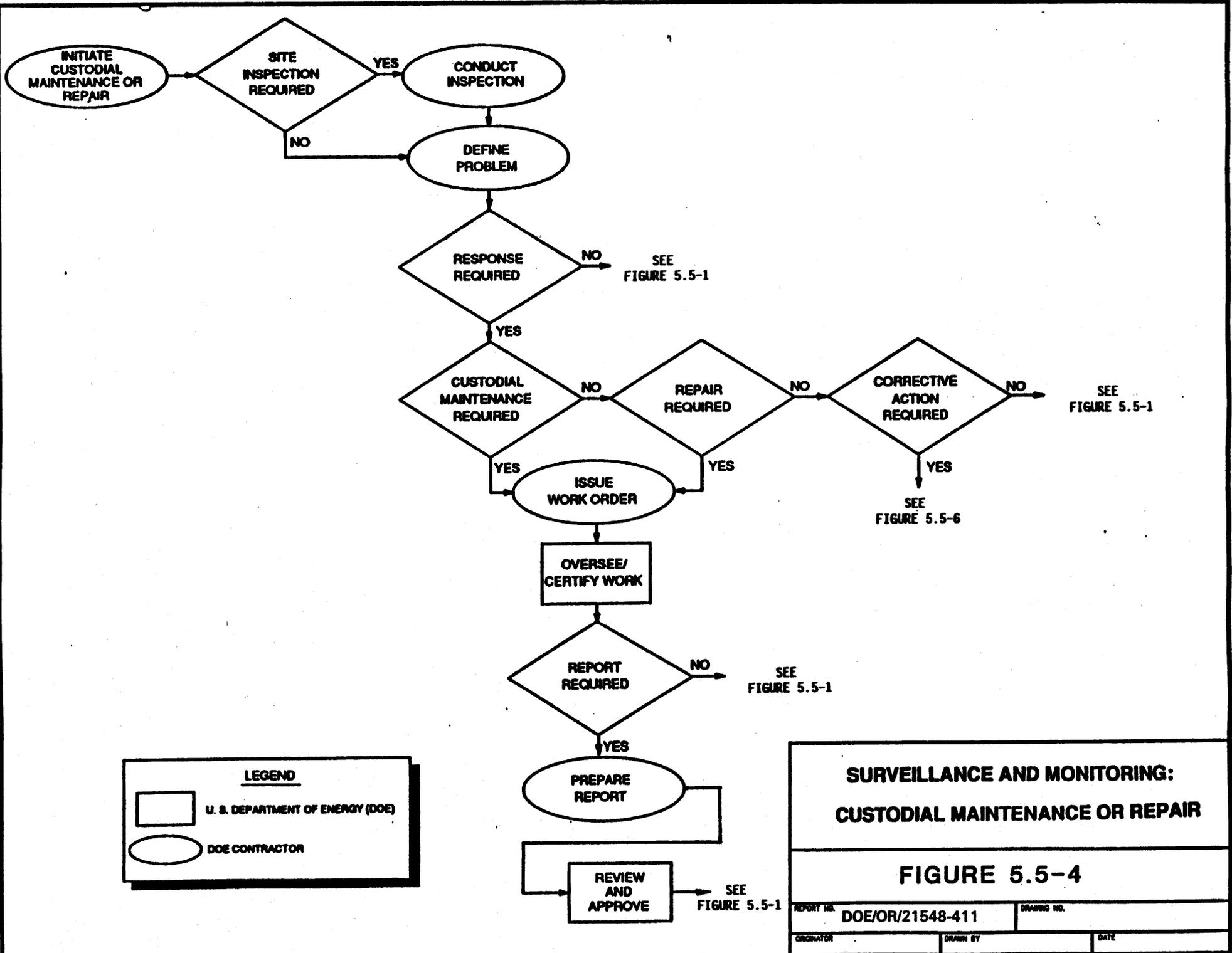
LEGEND

U. S. DEPARTMENT OF ENERGY (DOE)
 DOE CONTRACTOR

**SURVEILLANCE AND MONITORING:
GROUNDWATER MONITORING PROGRAM**

FIGURE 5.5-3

<small>REPORT NO.</small>	DOE/OR/21548-411	<small>DRAWING NO.</small>
<small>ORIGINATOR</small>	<small>DRAWN BY</small>	<small>DATE</small>



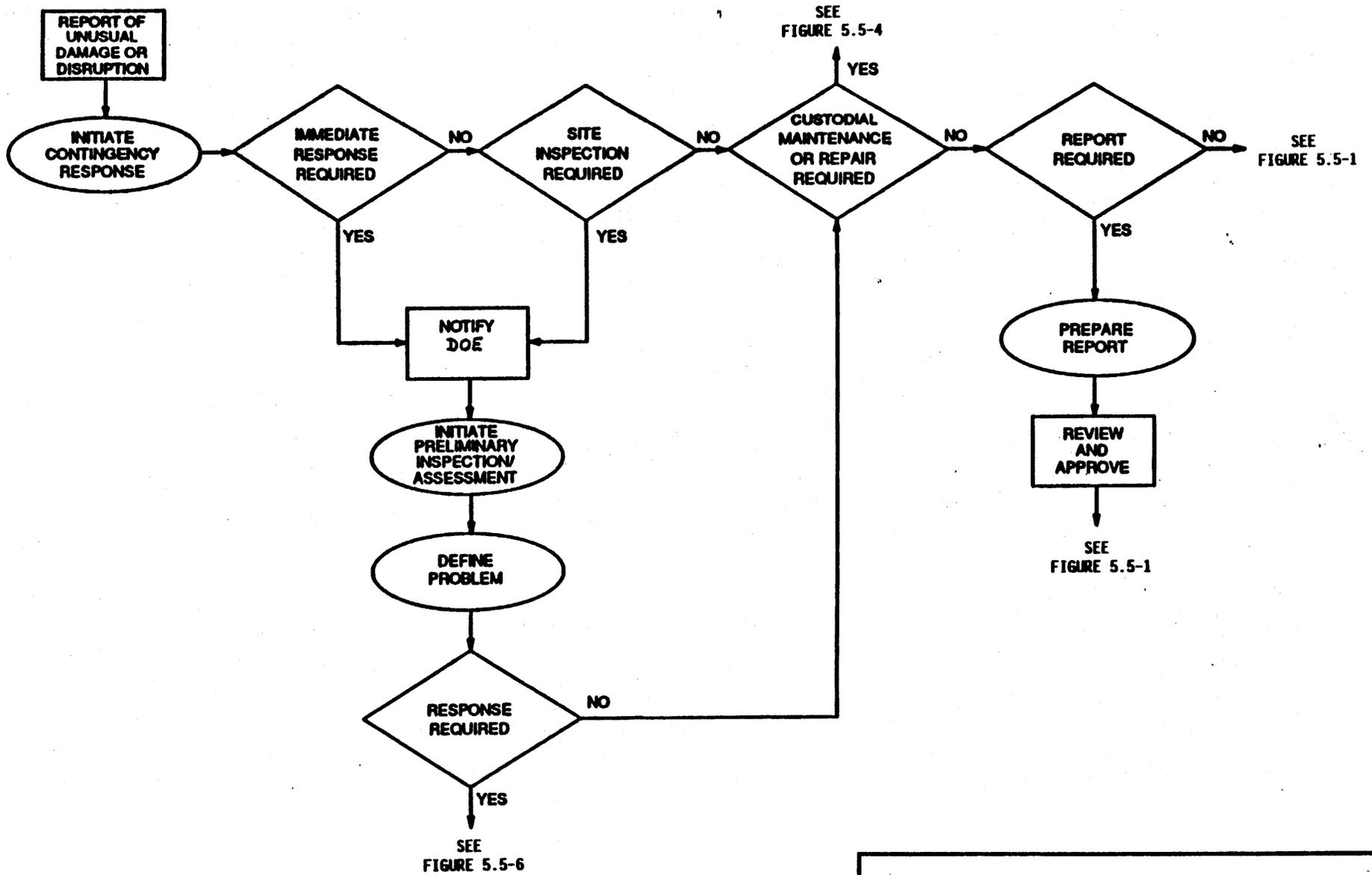
LEGEND

U. S. DEPARTMENT OF ENERGY (DOE)
 DOE CONTRACTOR

**SURVEILLANCE AND MONITORING:
CUSTODIAL MAINTENANCE OR REPAIR**

FIGURE 5.5-4

<small>REPORT NO.</small> DOE/OR/21548-411	<small>DRAWING NO.</small>
<small>ORIGINATOR</small>	<small>DATE</small>
<small>DRAWN BY</small>	



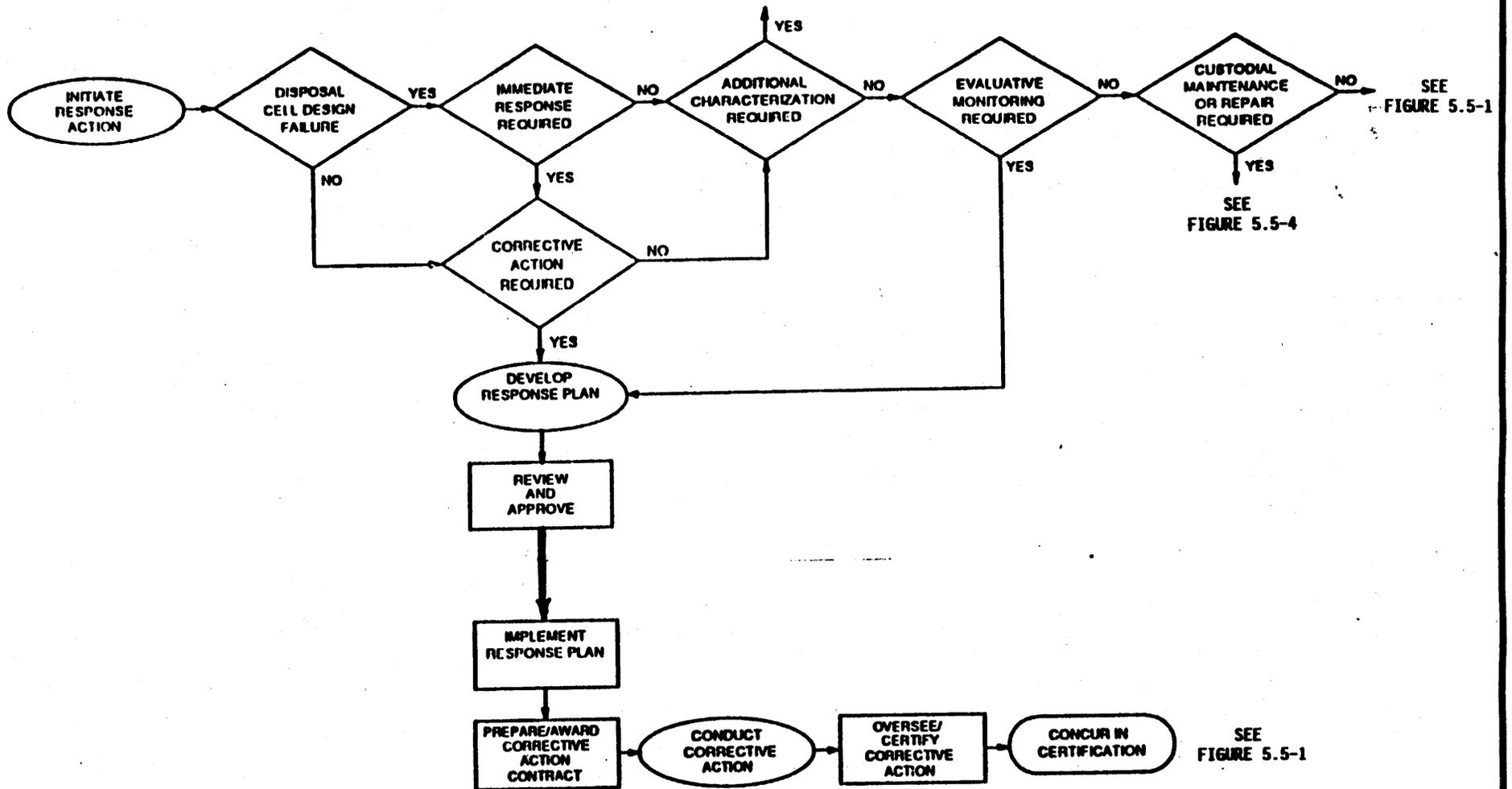
LEGEND

 U. S. DEPARTMENT OF ENERGY (DOE)
 DOE CONTRACTOR

**SURVEILLANCE AND MONITORING:
CONTINGENCY RESPONSE**

FIGURE 5.5-5

REPORT NO. DOE/OR/21548-411	DRAWING NO.
ORIGINATOR	DRAWN BY
	DATE



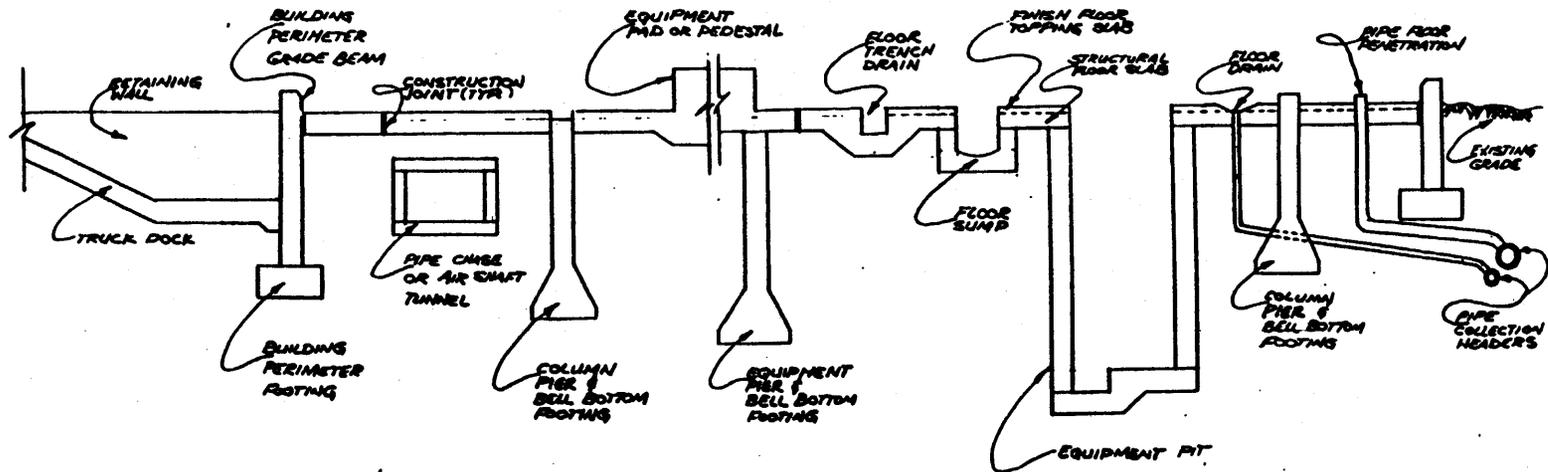
LEGEND

 U. S. DEPARTMENT OF ENERGY (DOE)
 DOE CONTRACTOR

**SURVEILLANCE AND MONITORING:
CORRECTIVE ACTION**

FIGURE 5.5-6

REPORT NO.	DOE/OR/21548-411	DRAWING NO.	
OPERATOR	DRAWN BY	DATE	



TYPICAL FOUNDATIONS

FIGURE 6.1.2-1

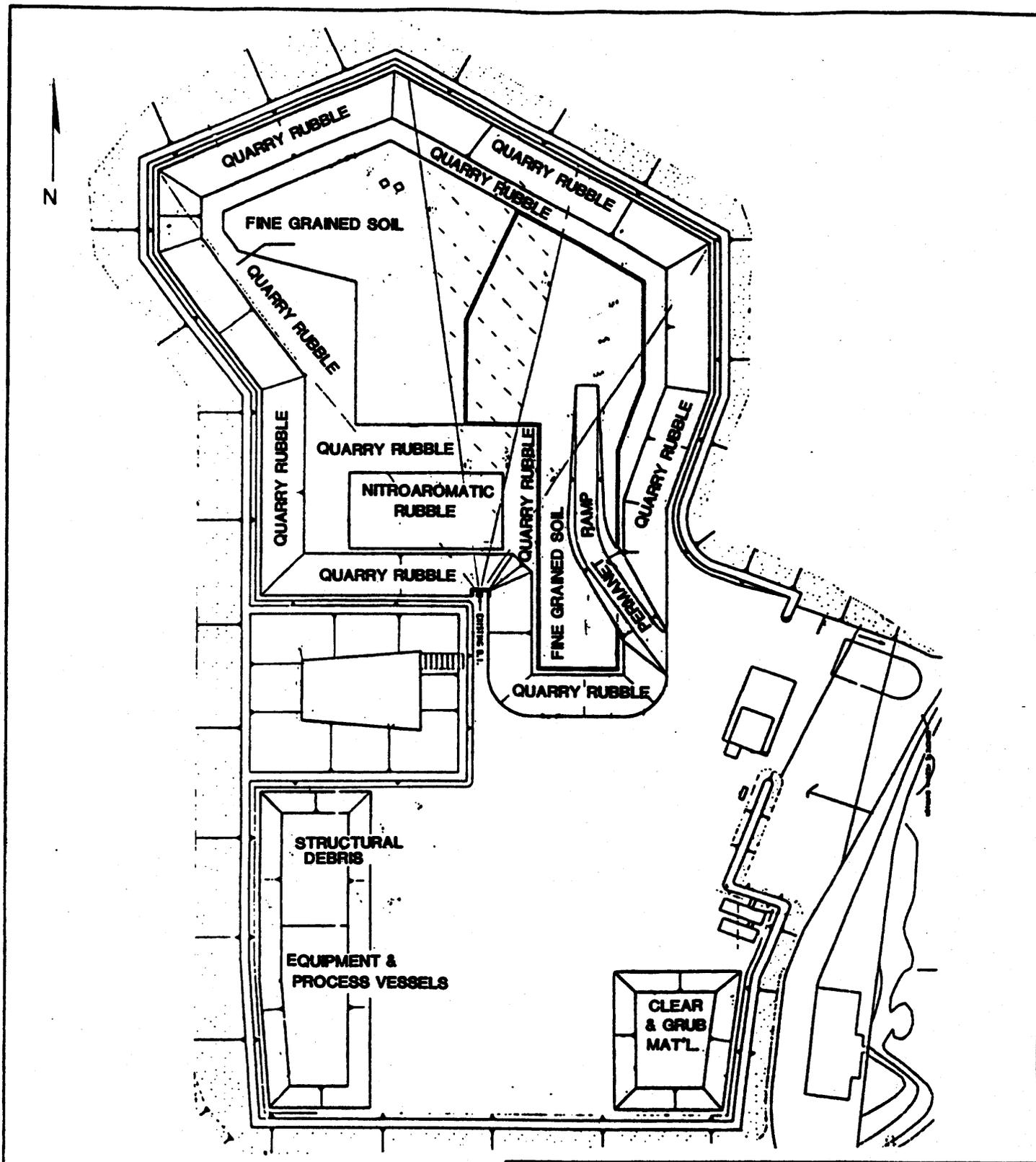
REPORT NO: DOE/OR/21548-411

DRAWING NO:

ORIGINATOR:

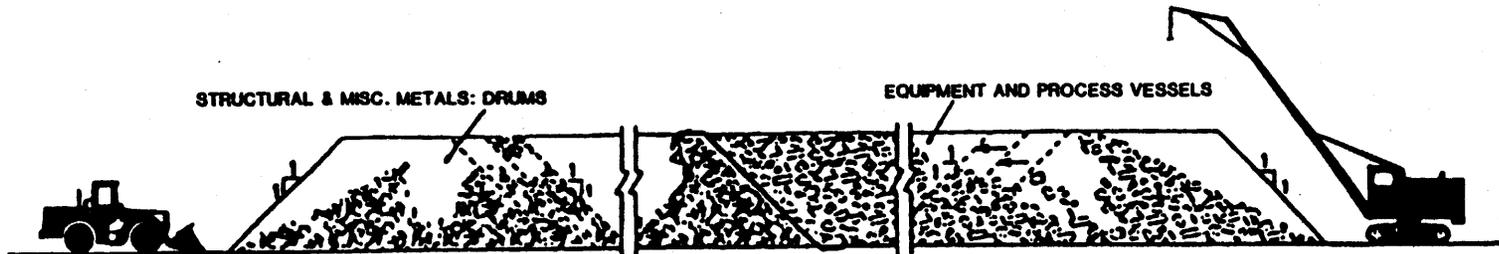
DRAWING BY:

DATE:

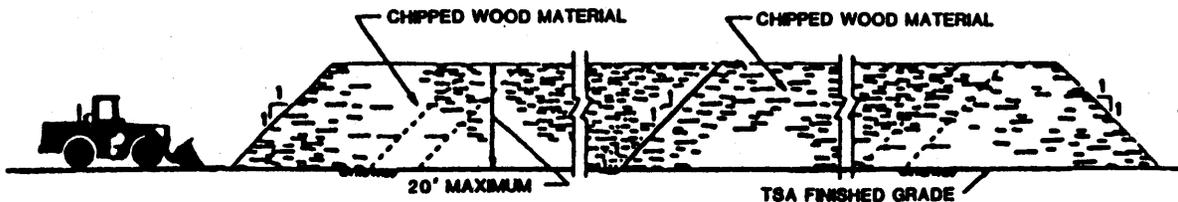


NO SCALE

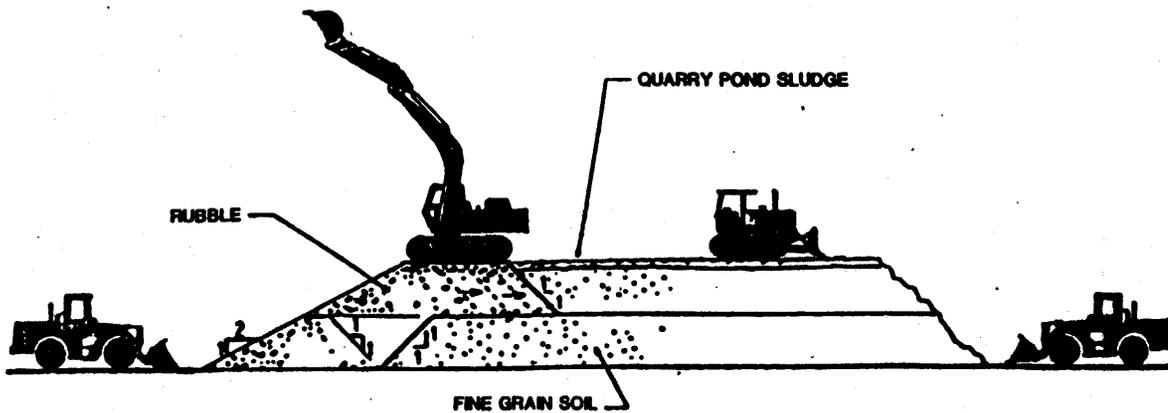
<p>TEMPORARY STORAGE AREA STOCKPILE PLAN VIEW</p>		
<p>FIGURE 6.1.2-2</p>		
REPORT NO	DOE/OR/21548-411	DRAWING NO
ORIGINATOR	DRAWING BY	DATE



SCENARIO 1



SCENARIO 2

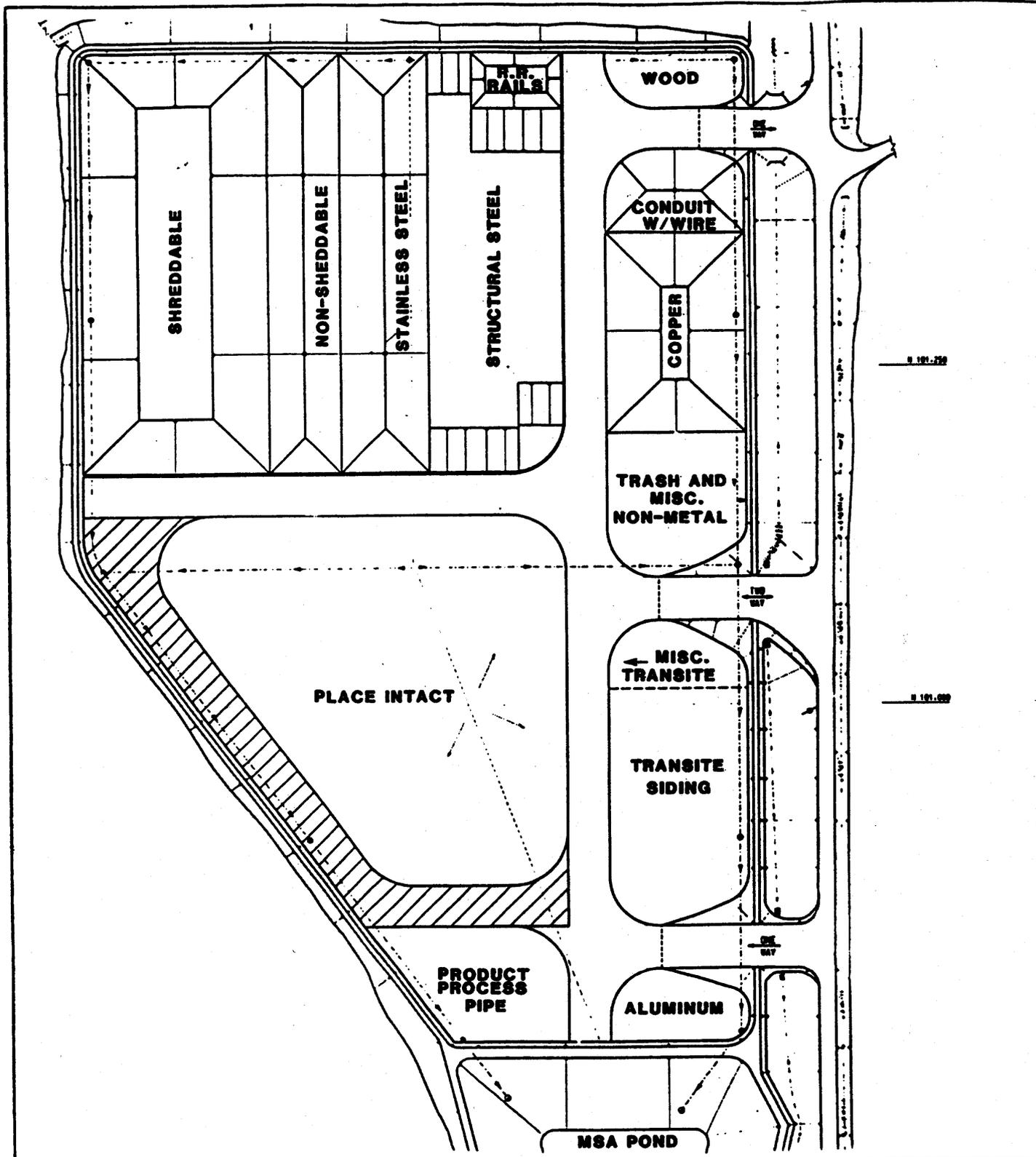


SCENARIO 3

TEMPORARY STORAGE AREA
STOCKPILE REMOVAL SCENARIOS

FIGURE 6.1.2-3

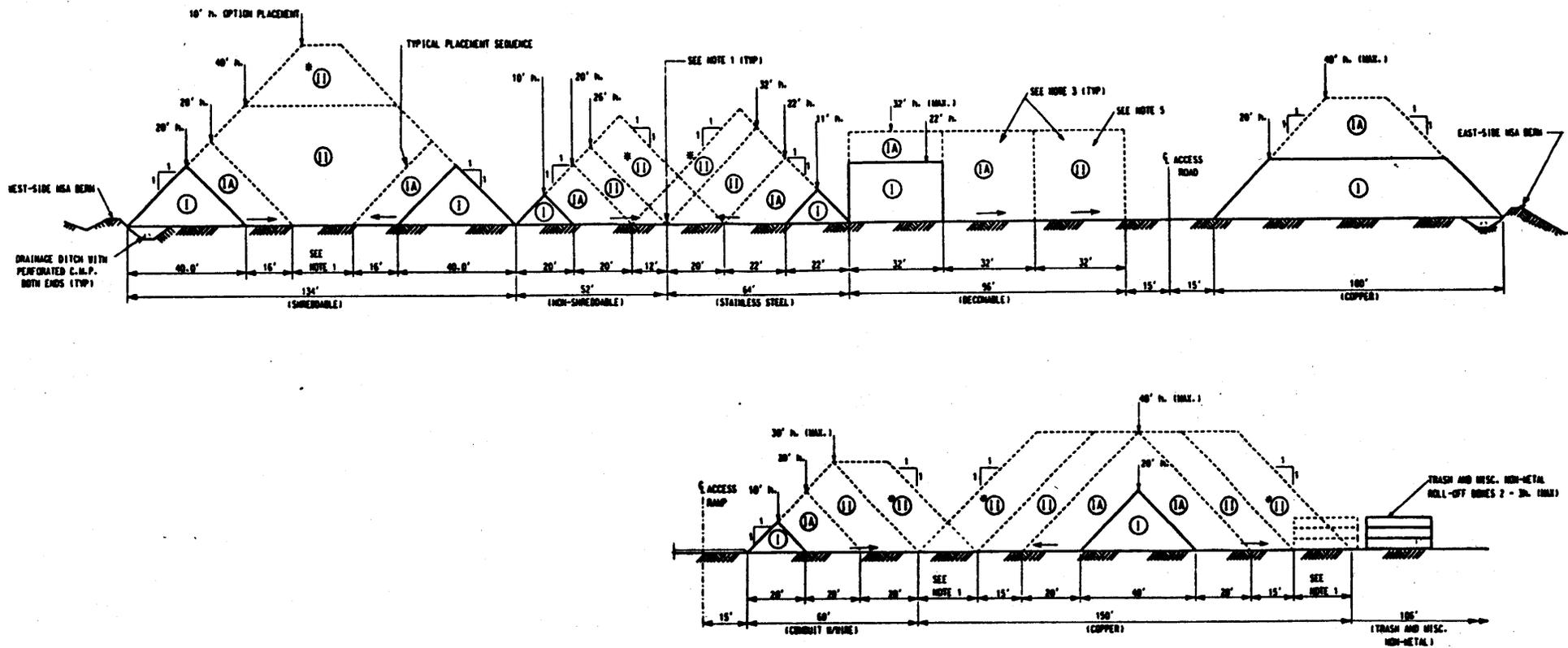
REPORT NO:	DOE/OR/21548-411	DRAWING NO:	
ORIGINATOR:		DRAWING BY:	
		DATE:	



MSA STOCKPILE ARRANGEMENT

FIGURE 6.1.2-4

REPORT NO:	DOE/OR/21548-411	DRAWING NO:	
ORIGINATOR:		DRAWN BY:	
		DATE:	



NOTES

1. WHEN THE MATERIAL STORAGE AISLE WIDTH IS REDUCED TO 20 FEET, THE PMC WILL EVALUATE MATERIAL QUANTITIES TO BE PLACED. A DECISION WILL BE MADE WHETHER TO PLACE THE REMAINING MATERIAL USING THE PHASE II OR THE OPTIONAL PHASE II CONFIGURATION AS SHOWN IN SECTION A AND B.
3. PHASE IA AND II CONFIGURATIONS TO BE USED IF REQUIRED AFTER EVALUATION OF MATERIAL QUANTITIES TO BE PLACED.
5. IF PHASE II IS NOT NEEDED FOR PLACING DECONABLE MATERIAL, PMC WILL DETERMINE MATERIAL TYPE TO BE PLACED HERE, IF ANY.

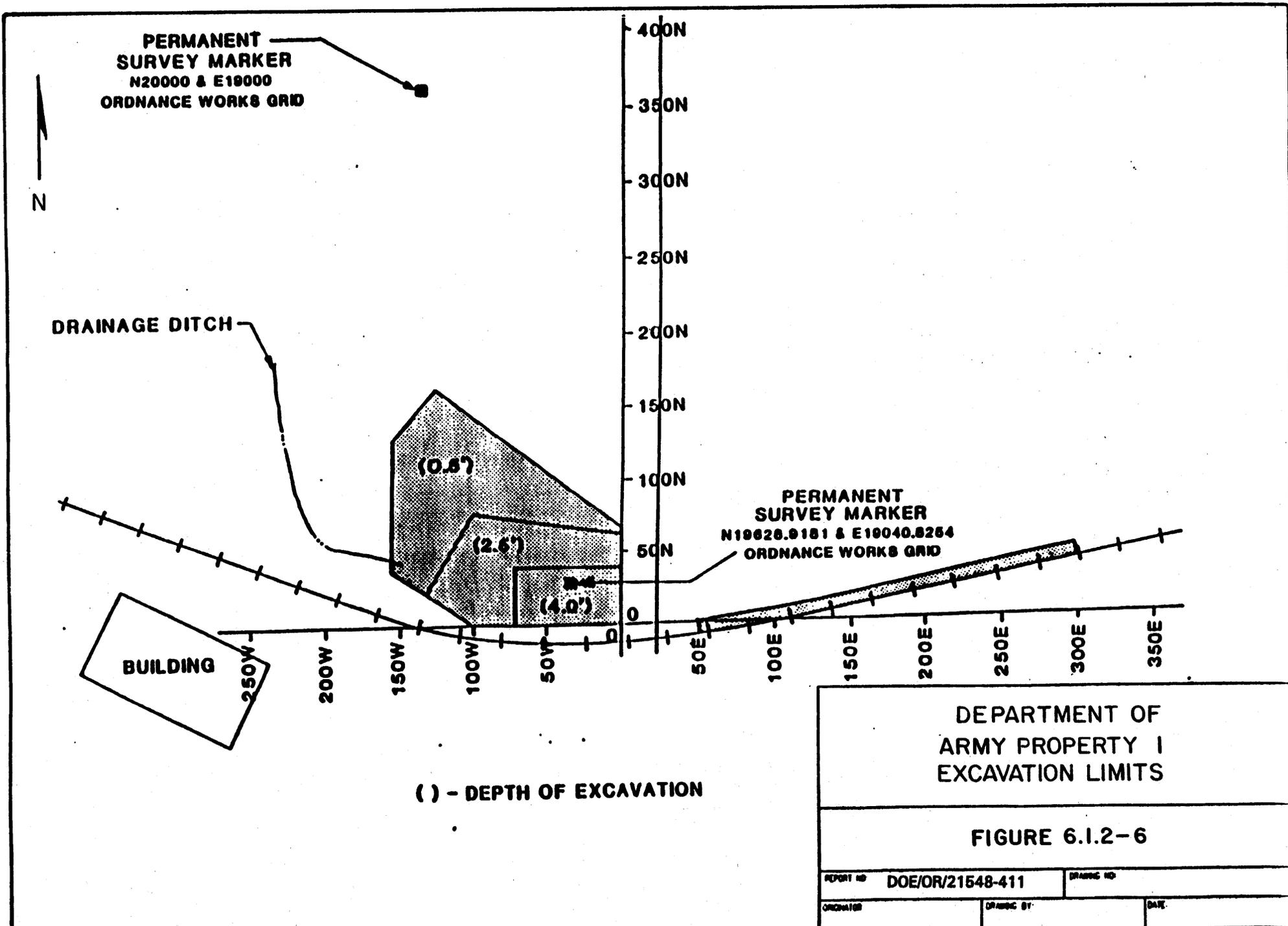
LEGEND

- ① PHASE I PLACEMENT
- ①A PHASE IA PLACEMENT
- ①II PHASE II PLACEMENT
- ①II PHASE II OPTION PLACEMENT

**MATERIAL STAGING AREA
STOCKPILE CROSS-SECTION VIEW**

FIGURE 6.1.2-5

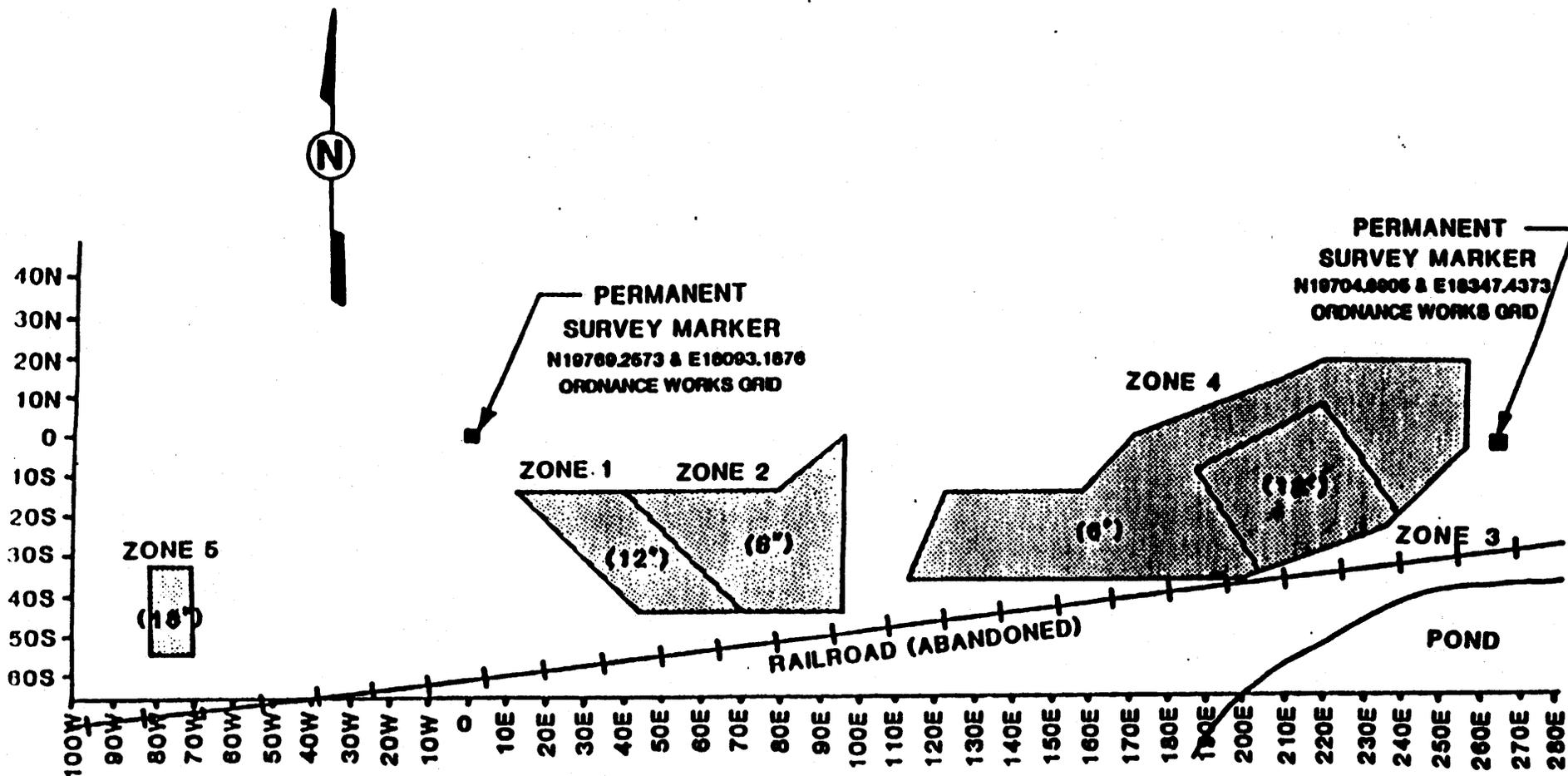
REPORT NO. DOE/OR/21548-411	DRAWING NO.
ORIGINATOR	DATE
DRAWN BY	



DEPARTMENT OF
ARMY PROPERTY I
EXCAVATION LIMITS

FIGURE 6.1.2-6

REPORT NO	DOE/OR/21548-411	GRAPHIC NO	
ORIGINATOR	GRAPHIC BY	DATE	

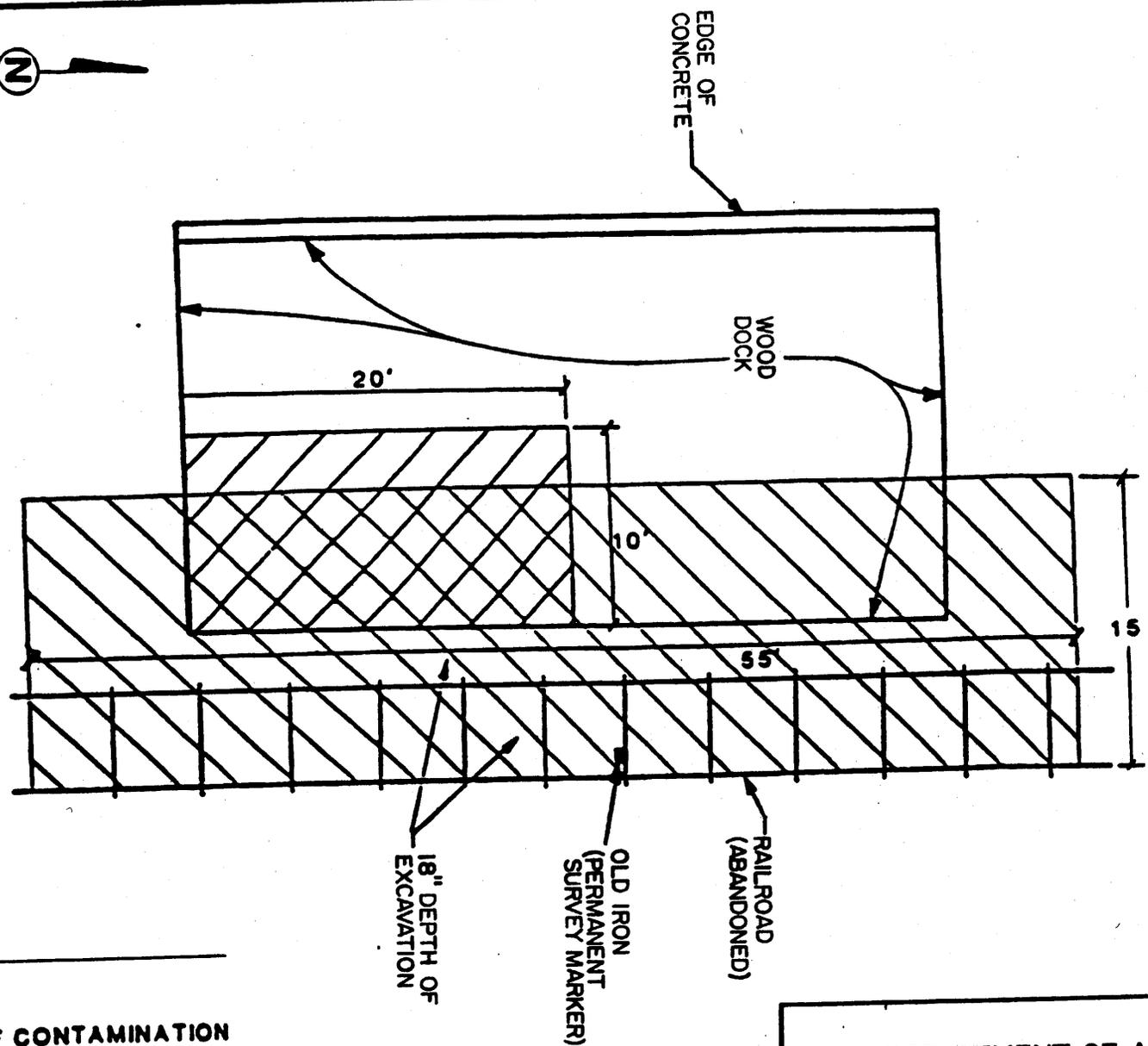


() - DEPTH OF EXCAVATION

DEPARTMENT OF ARMY PROPERTY 2
EXCAVATION LIMITS

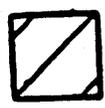
FIGURE 6.1.2-7

REPORT NO	DOE/OR/21548-411	DRAWING NO	
ORIGINATOR	DRAWING BY	DATE	

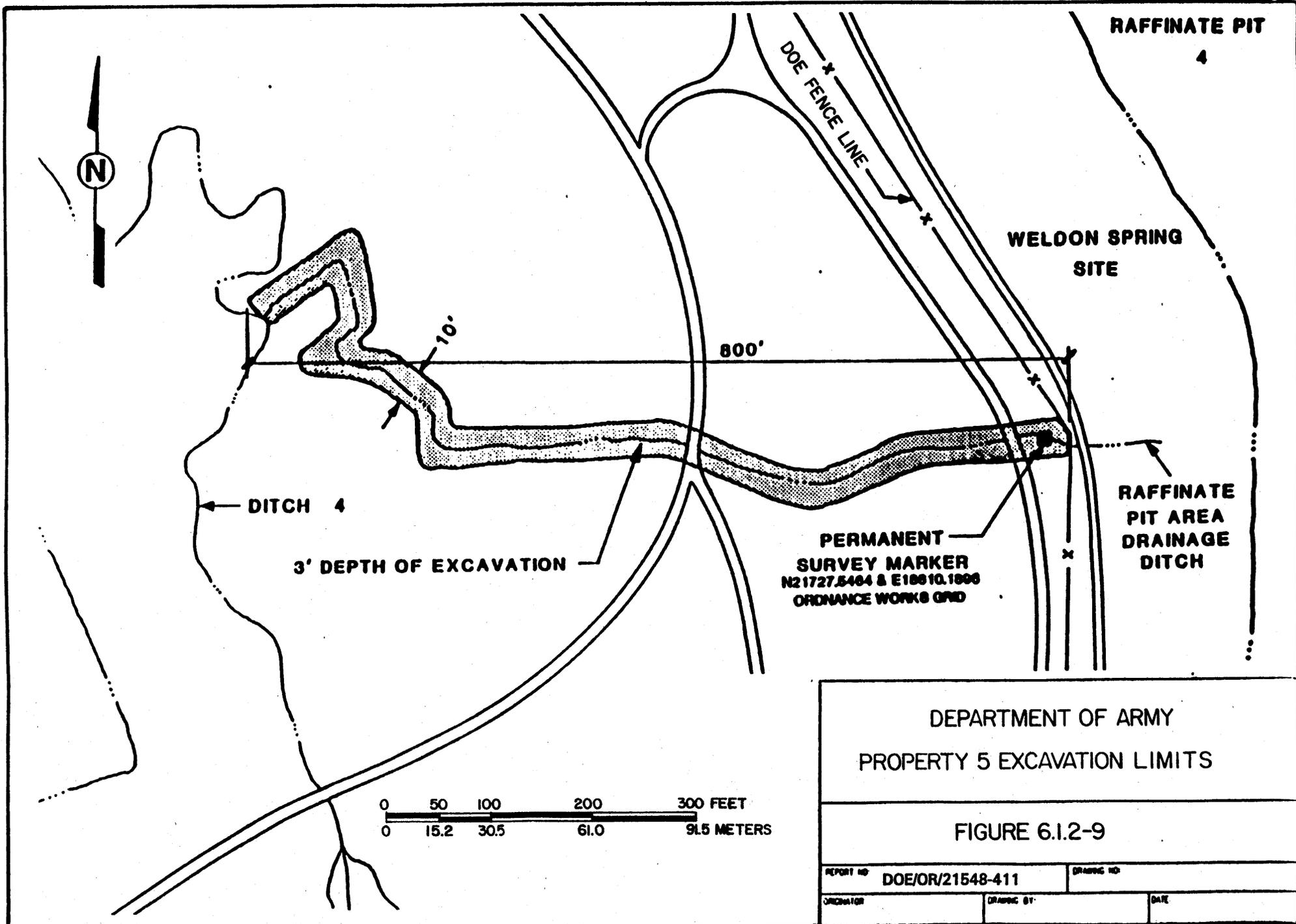


LEGEND

 - AREA OF CONTAMINATION BELOW DOCK

 - AREA OF CONTAMINATION ON DOCK FLOOR

DEPARTMENT OF ARMY PROPERTY 3 EXCAVATION LIMITS		
FIGURE 6.1.2-8		
REPORT NO.	DOE/OR/21548-411	DRAWING NO.
DATE	DRAWN BY	DATE





WELDON SPRING SITE

FENCELINE

650'

ASH POND
DRAINAGE
DITCH

10'

3' DEPTH OF EXCAVATION

PERMANENT
SURVEY MARKER
N23316.4228 & E18000.0813
ORDNANCE WORKS GRID



DEPARTMENT OF ARMY
PROPERTY 6 EXCAVATION LIMITS

FIGURE 6.1.2-10

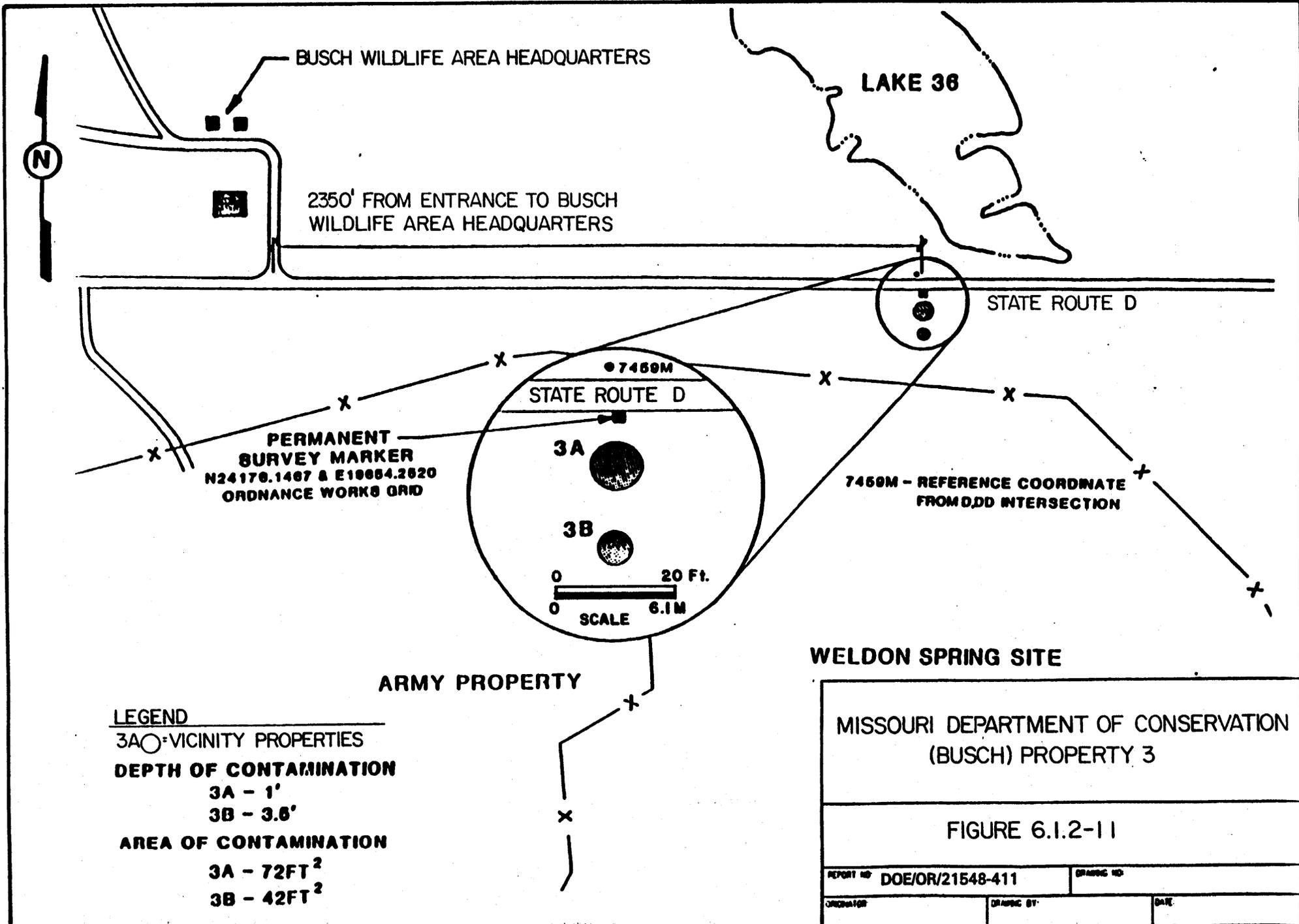
REPORT NO. DOE/OR/21548-411

DRAWING NO.

ORIGINATOR

DRAWN BY

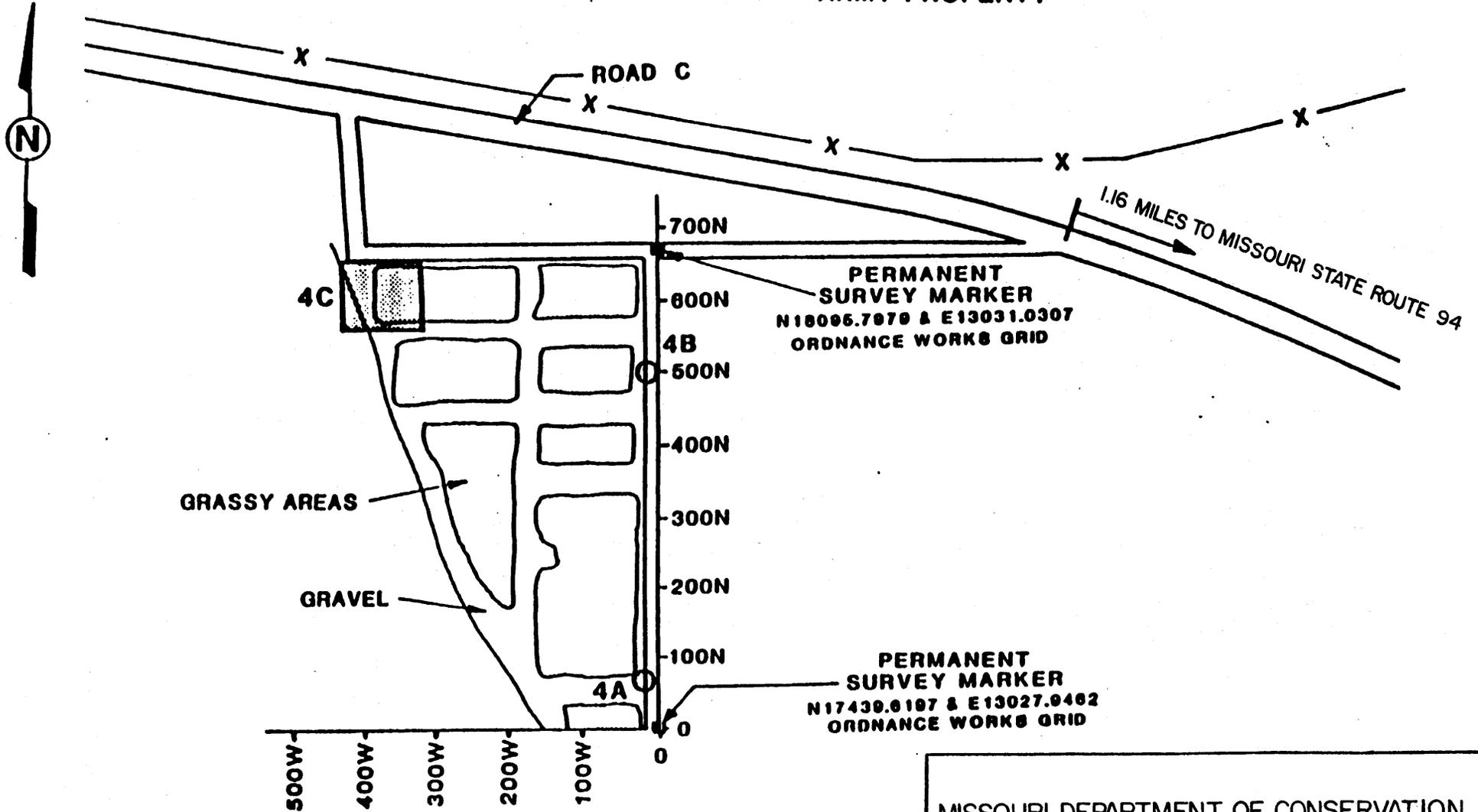
DATE



LEGEND

- 3A ○ VICINITY PROPERTIES
- DEPTH OF CONTAMINATION**
- 3A - 1'
- 3B - 3.6'
- AREA OF CONTAMINATION**
- 3A - 72FT²
- 3B - 42FT²

ARMY PROPERTY



LEGEND

DEPTH OF CONTAMINATION

4A=1.5'

4B=0.5'

4C=1.0'

AREA OF CONTAMINATION

4A = 168 sq. ft.

4B = 130 sq. ft.

4C = 6500 sq. ft.

MISSOURI DEPARTMENT OF CONSERVATION
(BUSCH) PROPERTY 4 EXCAVATION LIMITS

FIGURE 6.1.2-12

REPORT NO	DOE/OR/21548-411	DRAWING NO	
ORIGINATOR	DRAWING BY	DATE	



THE WELDON
SPRING SITE
.3 MI.

MISSOURI STATE ROUTE 94

GRAVEL PARKING AREA

0 MI.

GRAVEL ROAD

PERMANENT
SURVEY MARKER
N18428.6300 & E22677.2000
ORDNANCE WORKS GRID

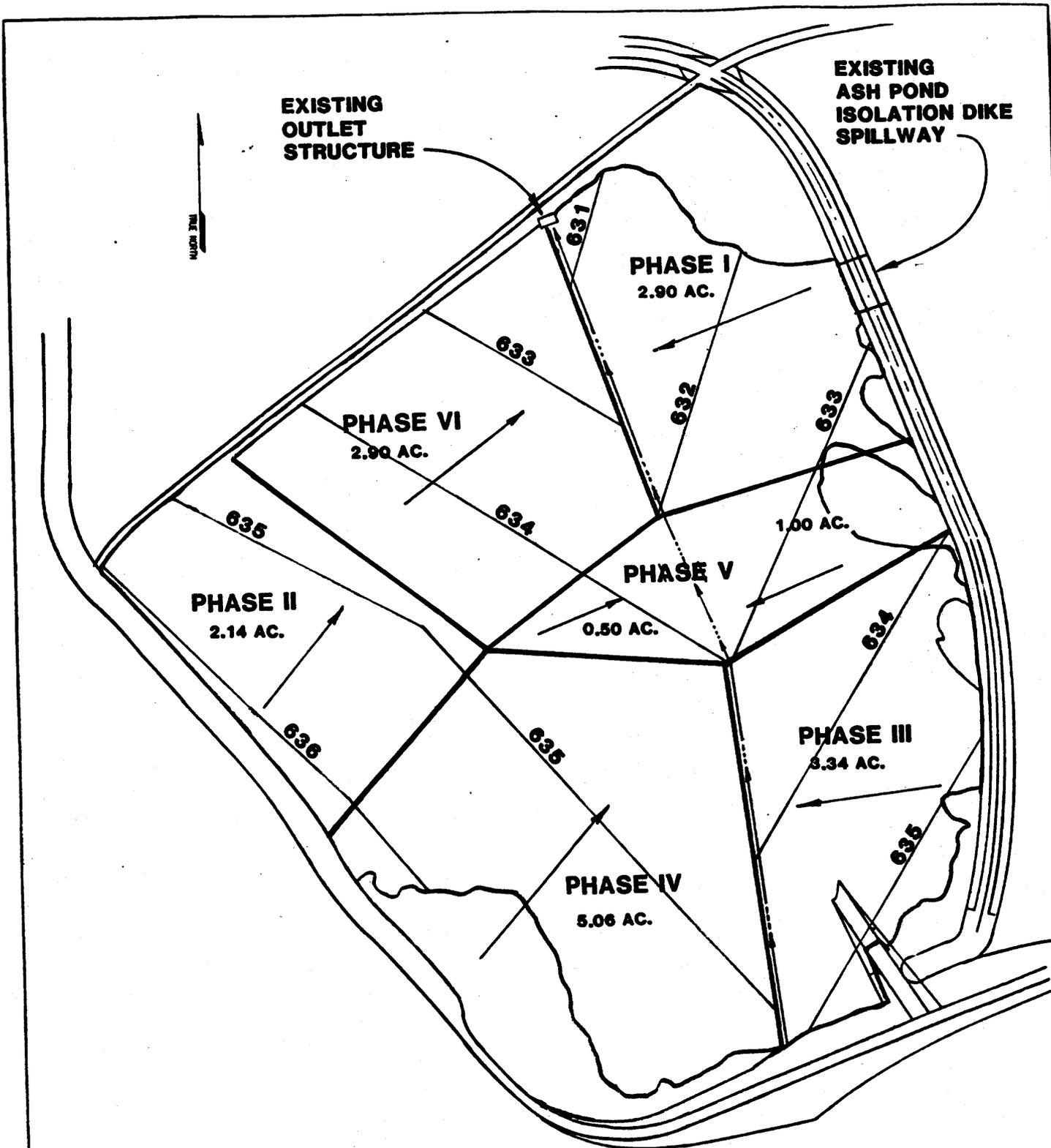
(DRUMS)

.29 MI.

MISSOURI DEPARTMENT OF CONSERVATION
(BUSCH) PROPERTY 5 EXCAVATION LIMITS

FIGURE 6.1.2-13

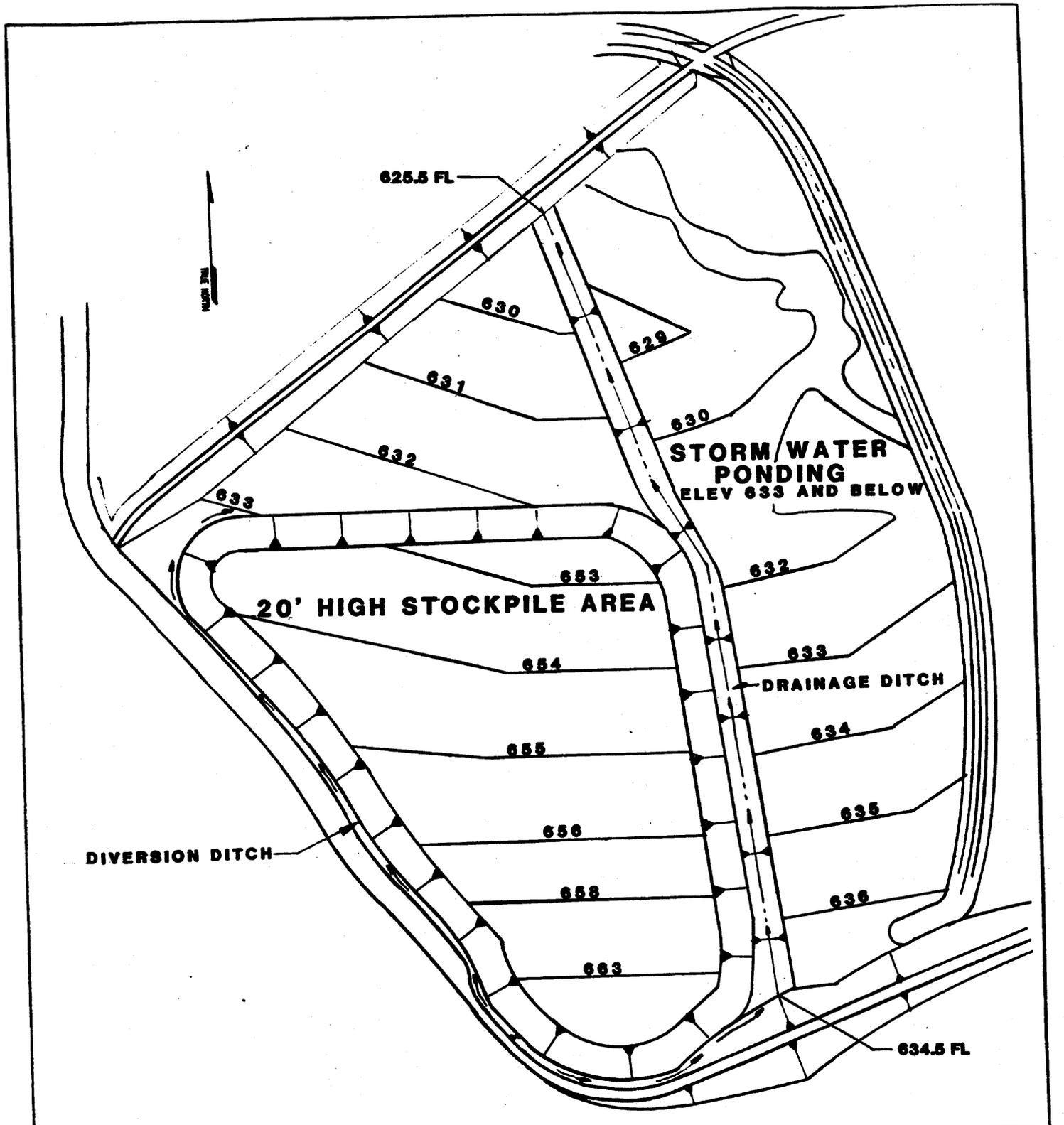
REPORT NO	DOE/OR/21548-411	DRAWING NO	
ORIGINATOR		DRAWING BY	
		DATE	



ASH POND SPOILS AREA
DEVELOPMENT SEQUENCE

FIGURE 6.1.2-14

REPORT NO	DOE/OR/21548-411	DRAWING NO:	
ORIGINATOR	DRAWING BY:	DATE	



ASH POND SPOILS AREA
ALTERNATE DEVELOPMENT SEQUENCE

FIGURE 6.1.2-15

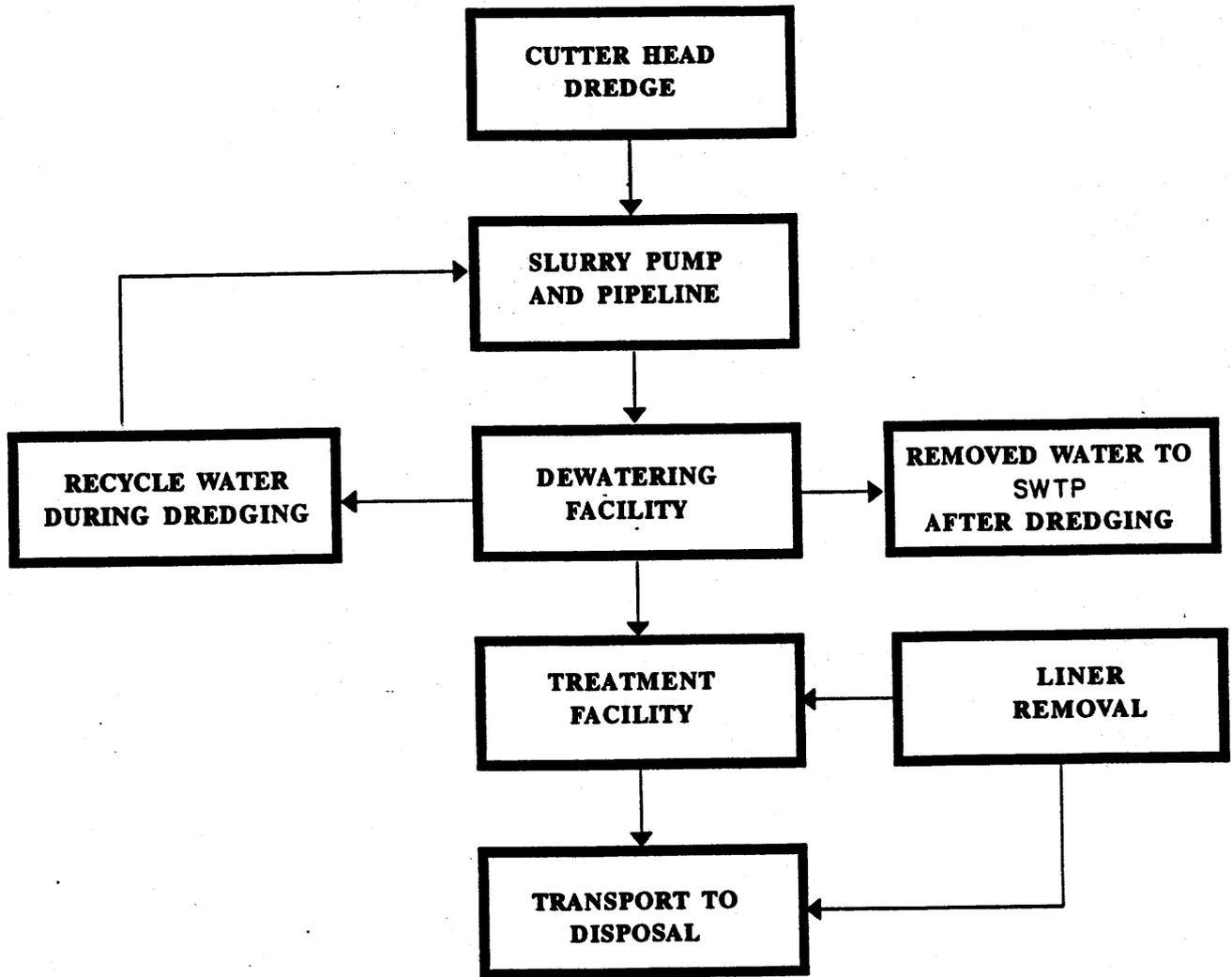
REPORT NO: DOE/OR/21548-411

DRAWING NO:

ORIGINATOR:

DRAWING BY:

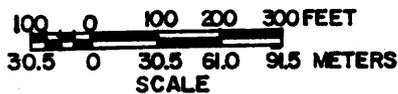
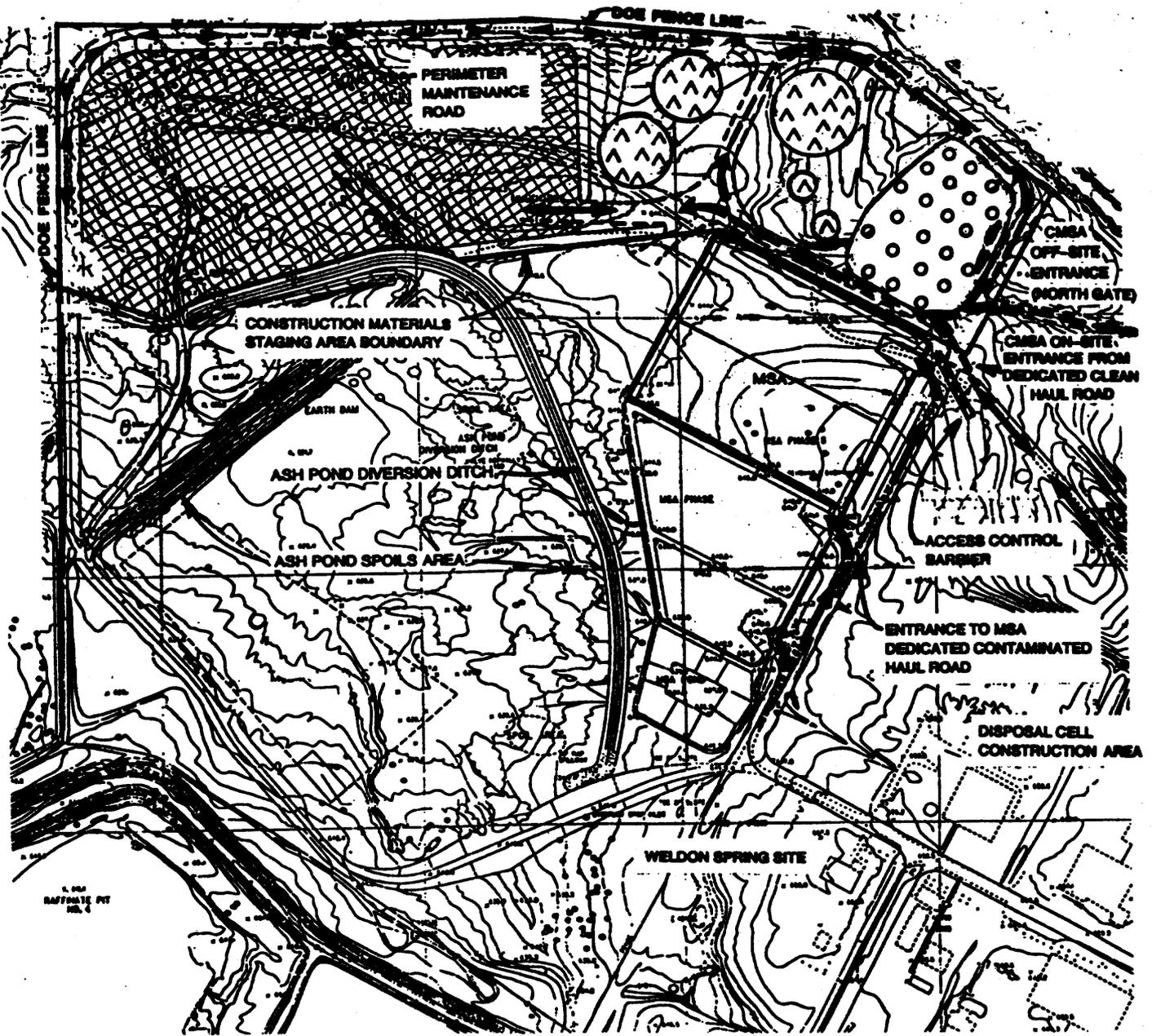
DATE:



**RAFFINATE PIT SLUDGE
FLOW DIAGRAM**

FIGURE 6.1.3-1

REPORT NO: DOE/OR/21548-411	DRAWING NO:	
ORIGINATOR:	DRAWING BY:	DATE:



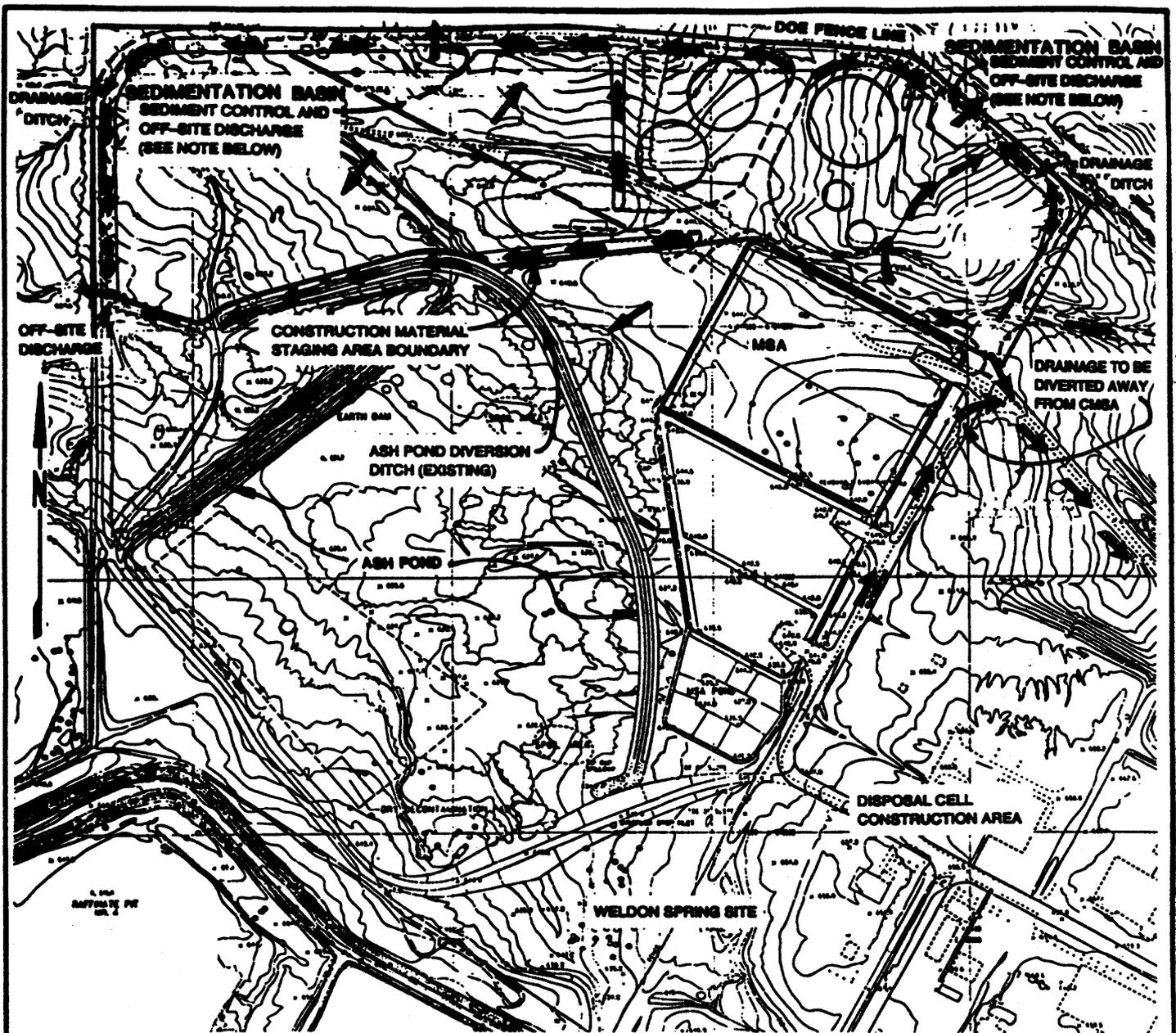
LEGEND

-  SYNTHETIC MATERIALS YARD
-  NATURAL MATERIALS STOCKPILE
-  ON-SITE BORROW STOCKPILE

**SKETCH OF
CONSTRUCTION MATERIALS STAGING
AREA TRAFFIC PATTERNS**

FIGURE 6.1.4-1

REPORT NO.	DOE/OR/21548-411	DRAWING NO.	
ORIGINATOR	MLB	DRAWN BY	HK
		DATE	NOV. 92



0 200 400 FT
 0 61.0 121.9 M

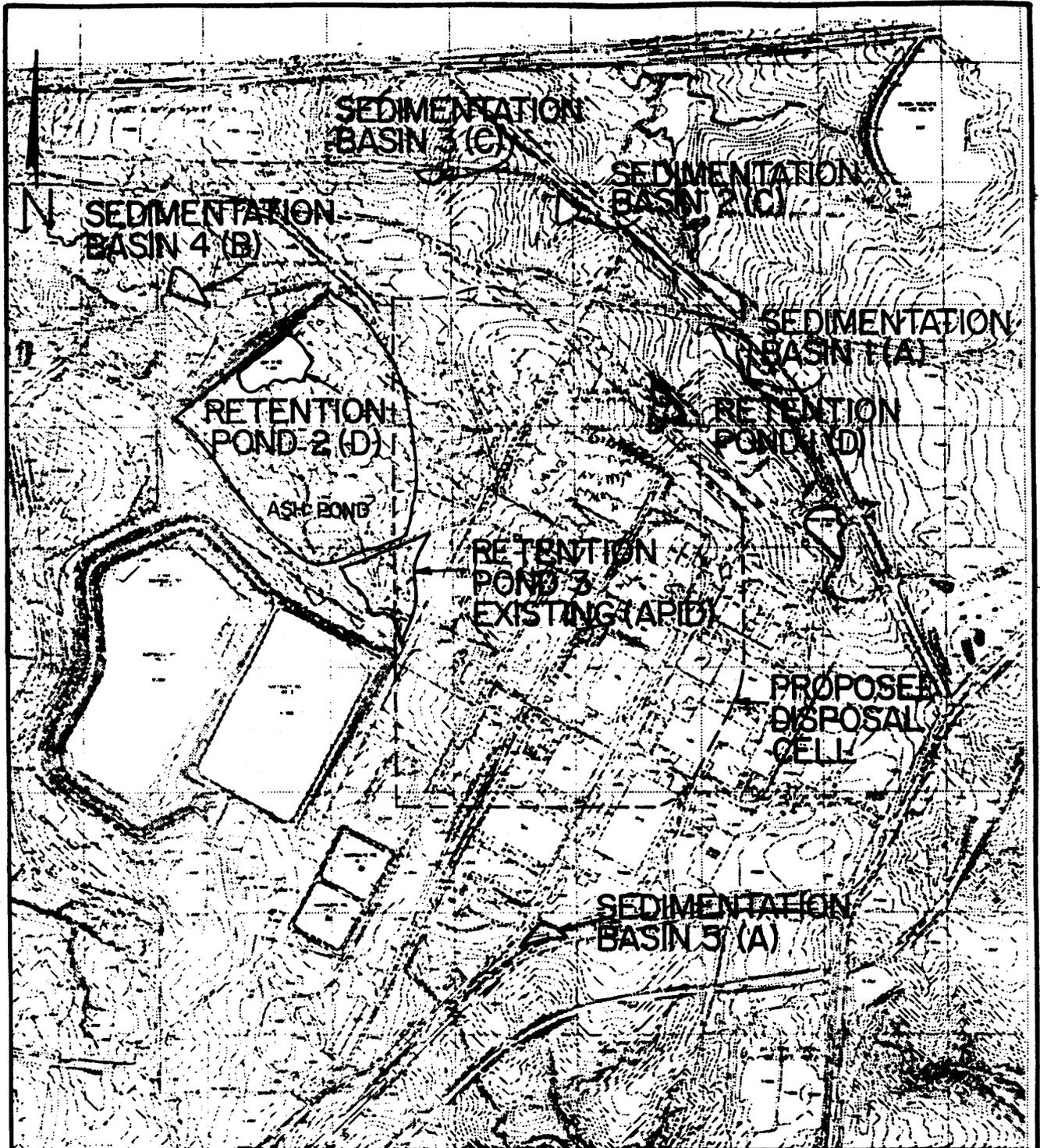
SCALE

NOTE: REMOVE ALL CONTAMINATED
 SOILS BEFORE CONSTRUCTION
 OF CMSA. CMSA OFF-SITE
 DISCHARGE TO THE NORTH
 WILL BE UNCONTAMINATED

SKETCH OF CONSTRUCTION MATERIALS
 STAGING AREA (CMSA) SITE LAYOUT
 RUN-OFF AND DRAINAGE

FIGURE 6.1.4-2

REPORT NO: DOE/OR/21548-411	DRAWING NO:
ORIGINATOR: MLB	DRAWN BY: HK
DATE: NOV. 92	



NOT TO SCALE

LEGEND

(A)-(D) ORDER OF CONSTRUCTION

ORDER OF CONSTRUCTION OF
SEDIMENTATION BASINS
AND RETENTION PONDS

FIGURE 6.1.6-1

REPORT NO.: DOE/OR/21548-411

DRAWING NO.:

ORIGINATOR:

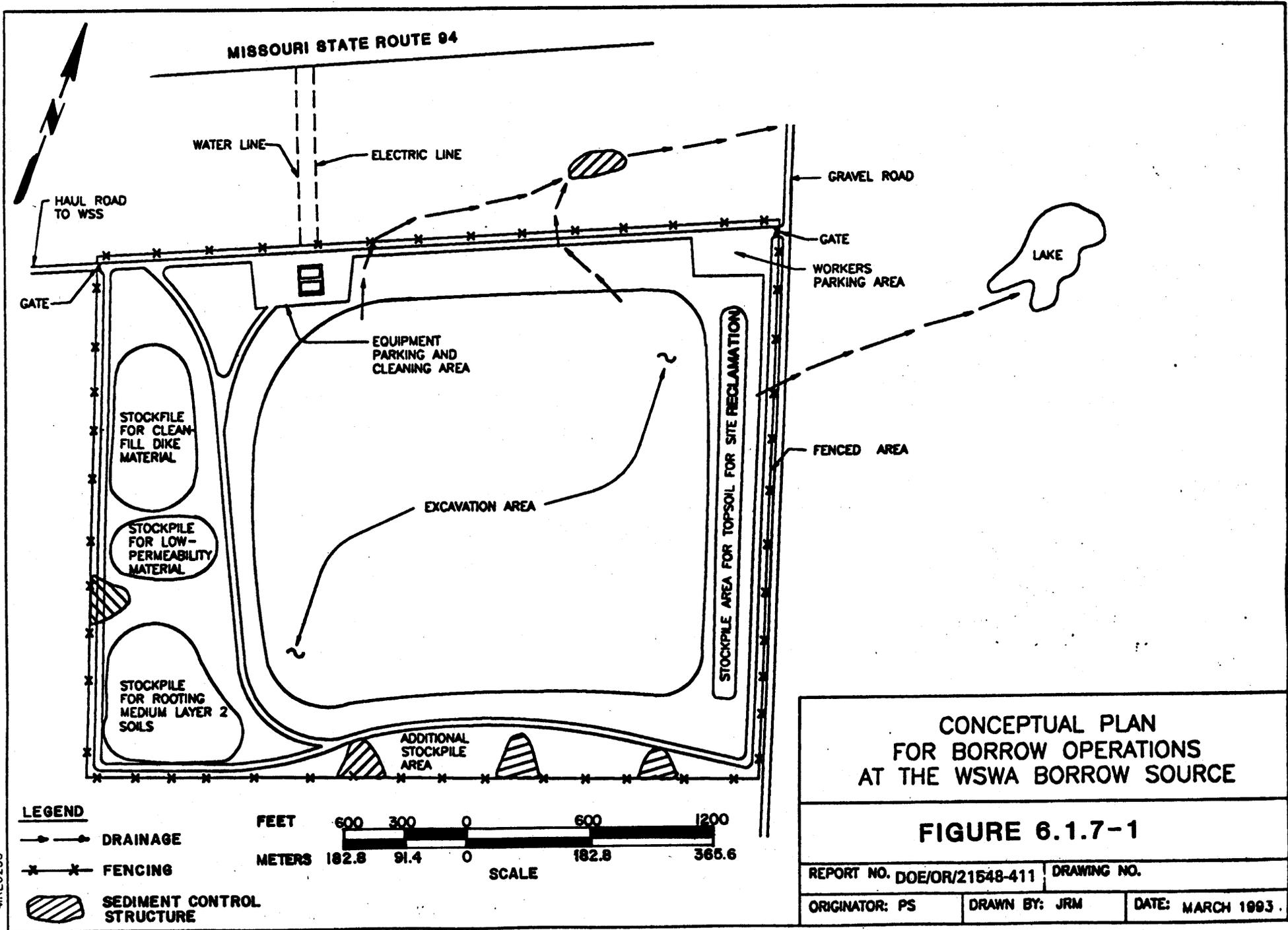
S.B.

DRAWN BY:

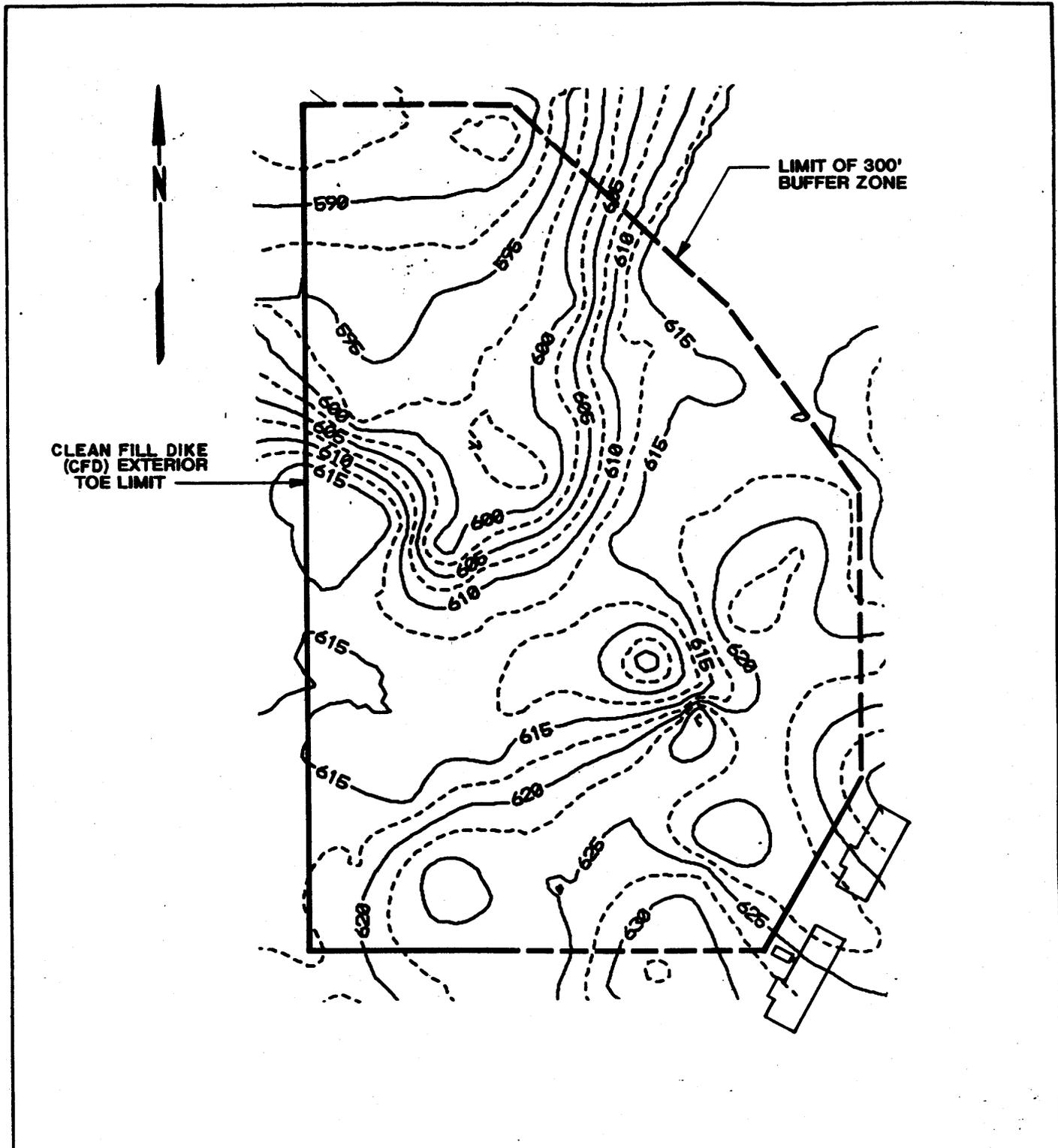
K.W.

DATE:

NOV., 1992

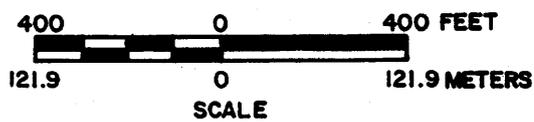


MKE0255



CLEAN FILL DIKE
(CFD) EXTERIOR
TOE LIMIT

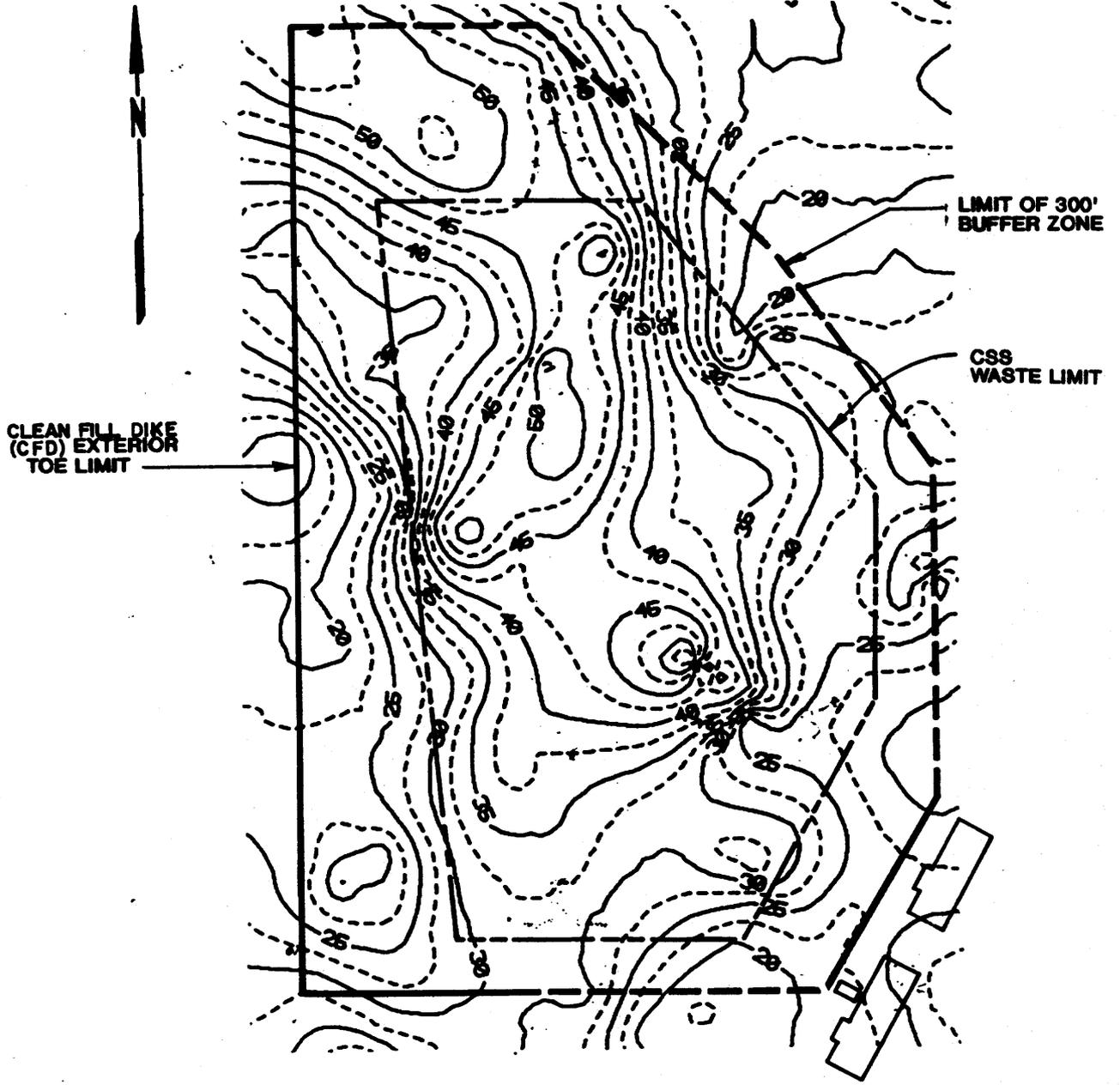
LIMIT OF 300'
BUFFER ZONE



TOP OF BEDROCK ELEVATION CONTOURS

FIGURE 6.2.3-1

REPORT NO: DOE/OR/21548-411		DRAWING NO:	
ORIGINATOR: KWL	DRAWN BY: AMA	DATE:	

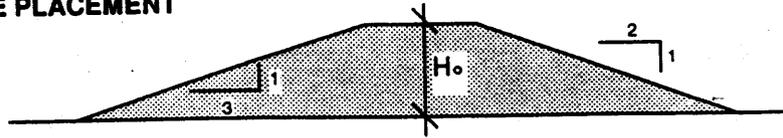


**ISOPACH MAP OF
FERRELVIEW CLAY TO BEDROCK**

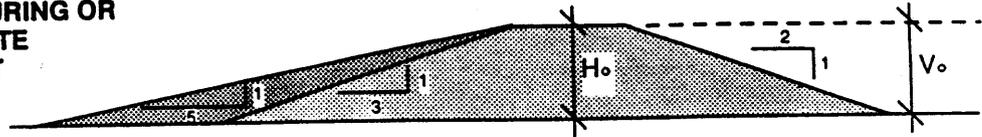
FIGURE 6.2.3-2

REPORT NO: DOE/OR/21548-411	DRAWING NO:
ORIGINATOR: KWL	DRAWN BY: AMA
DATE:	

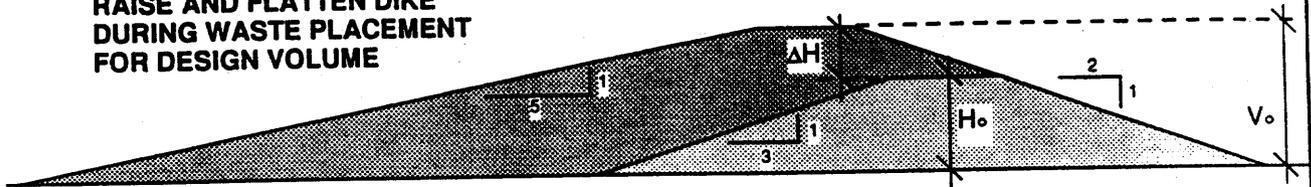
**PHASE A DIKE GEOMETRY
PROVIDE EARLY WASTE PLACEMENT
VOLUME**



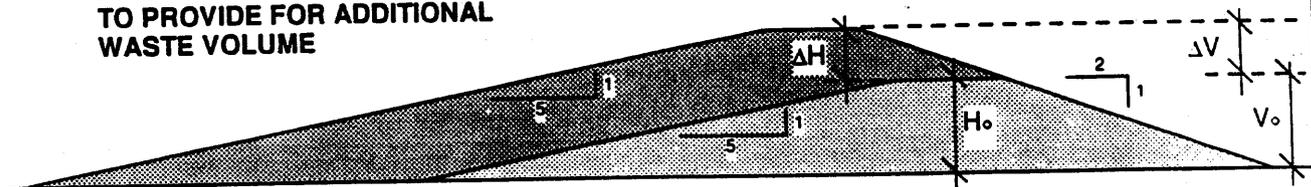
**PHASE B DIKE GEOMETRY
FLATTEN DURING OR
AFTER WASTE
PLACEMENT**



**PHASE C DIKE GEOMETRY
RAISE AND FLATTEN DIKE
DURING WASTE PLACEMENT
FOR DESIGN VOLUME**



**PHASE D DIKE GEOMETRY
RAISE AND EXTEND DIKE
TO PROVIDE FOR ADDITIONAL
WASTE VOLUME**



LEGEND

- H_0 - INITIAL DIKE HEIGHT
- ΔH - INCREASE IN DIKE HEIGHT
- V_0 - INITIAL CELL VOLUME
- ΔV - INCREASE IN CELL VOLUME

**CLEAN-FILL DIKE CONSTRUCTION:
ALTERNATIVE PHASES**

In order to provide for immediate waste volume, and possible increased waste volumes, the dike construction may be phased.

FIGURE 6.2.6-1

REPORT NO:

DOE/OR/21548-411

ORIGINATOR:

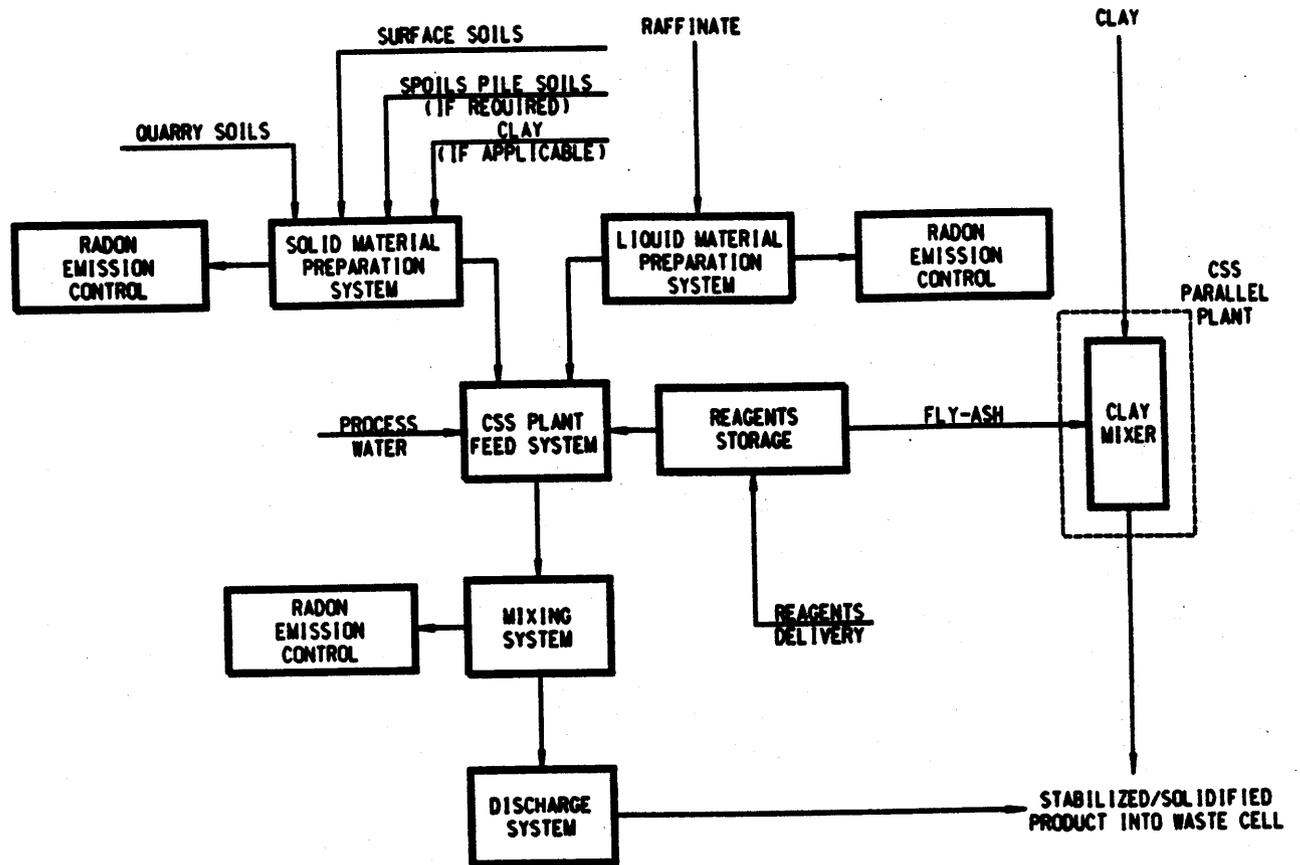
JC

DRAWN BY:

EBR

DATE:

05-17-93

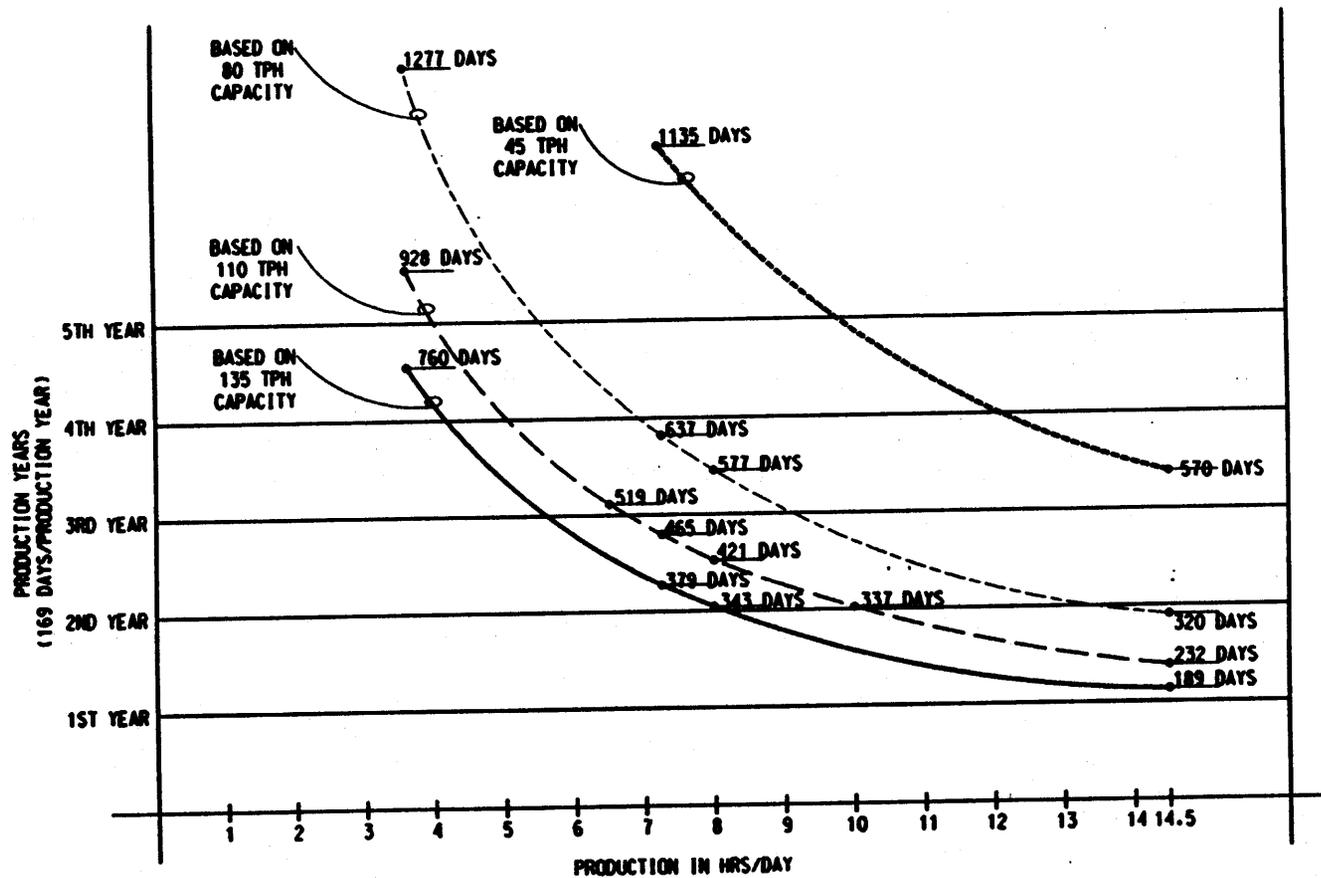


NOTE: RADON EMISSION CONTROL IS APPLICABLE ONLY AS DEVIATION OF CENTRAL RADON REMOVAL BEFORE DEWATERING PLANT

CSS PLANT OPERATIONS

FIGURE 6.3.2-1

REPORT NO.	DOE/OR/21548-411	DRAWING NO.	
ORIGINATOR	DRAWN BY	DATE	



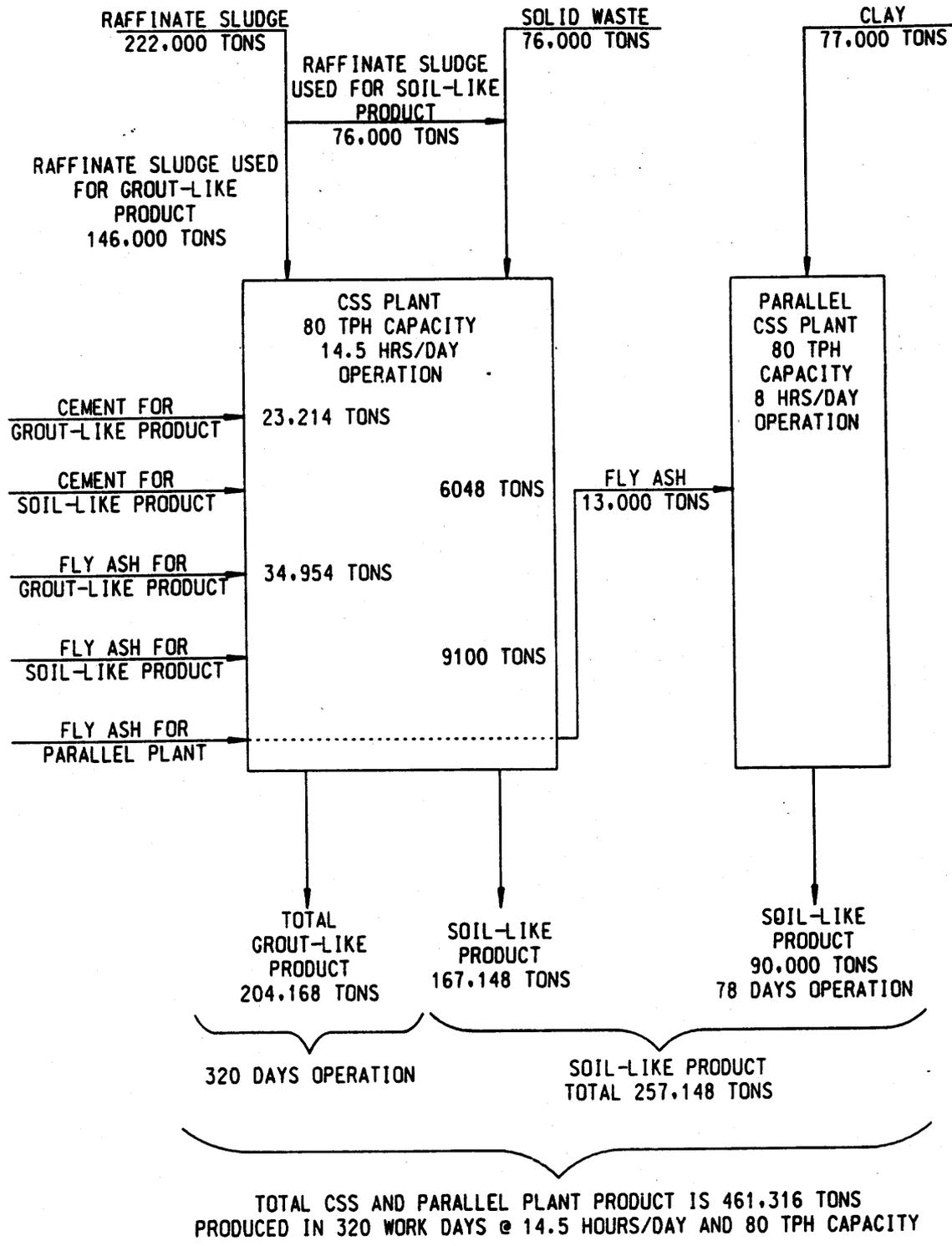
NOTE:
 MONOLITHIC PRODUCT 203,000 TONS
 SOIL-LIKE PRODUCT 167,000 TONS
 TOTAL 370,000 TONS

REF. ONLY PARALLEL PLANT
 SOIL-LIKE PRODUCT 90,000 TONS

CSS PLANT CAPACITY CHART (Parallel plant not included)

FIGURE 6.3.2-2

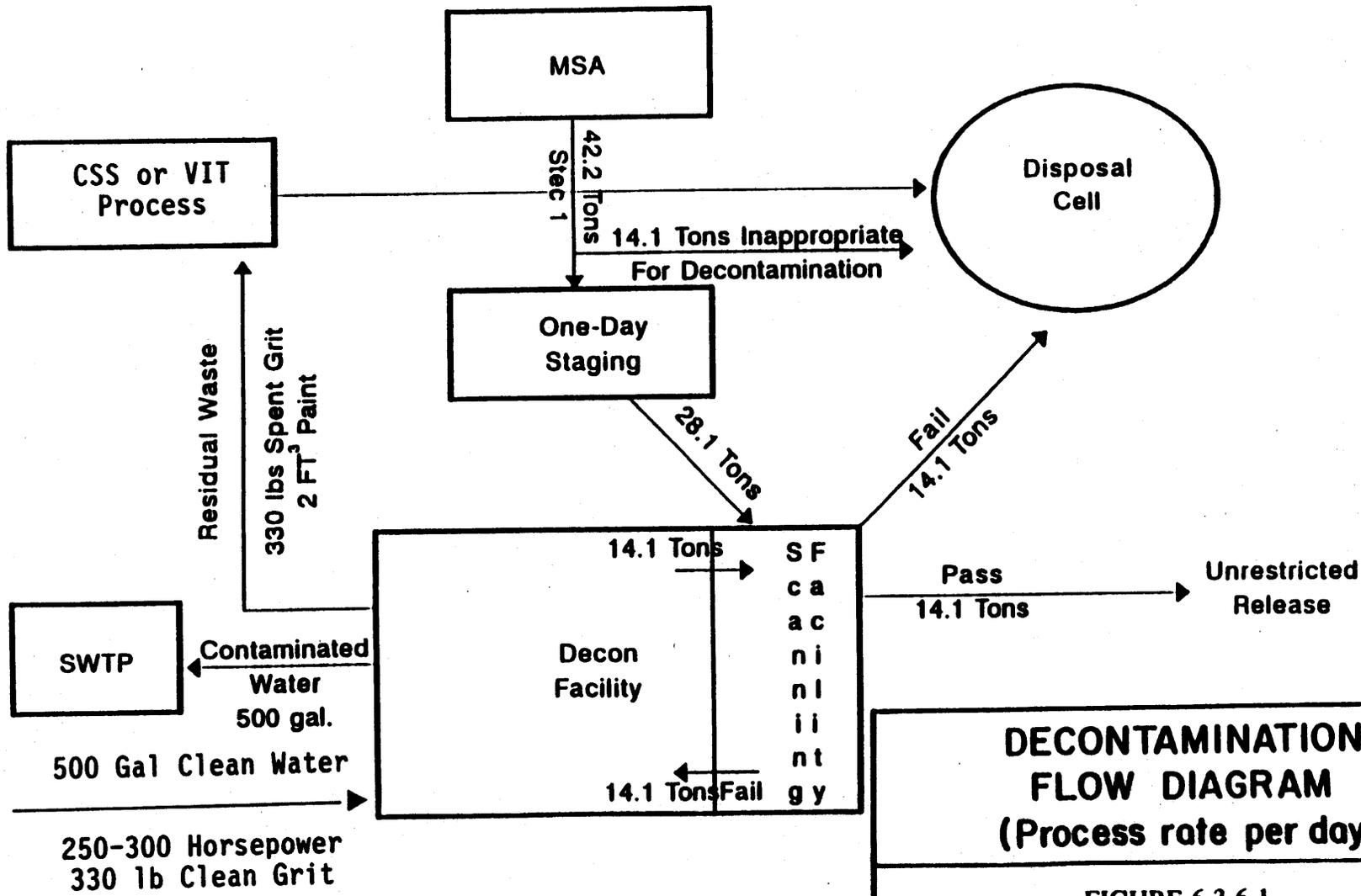
REPORT NO.	DOE/OR/21548-411	DRAWING NO.	
CREATED BY		DATE	



CSS MATERIAL BALANCE

FIGURE 6.3.2-3

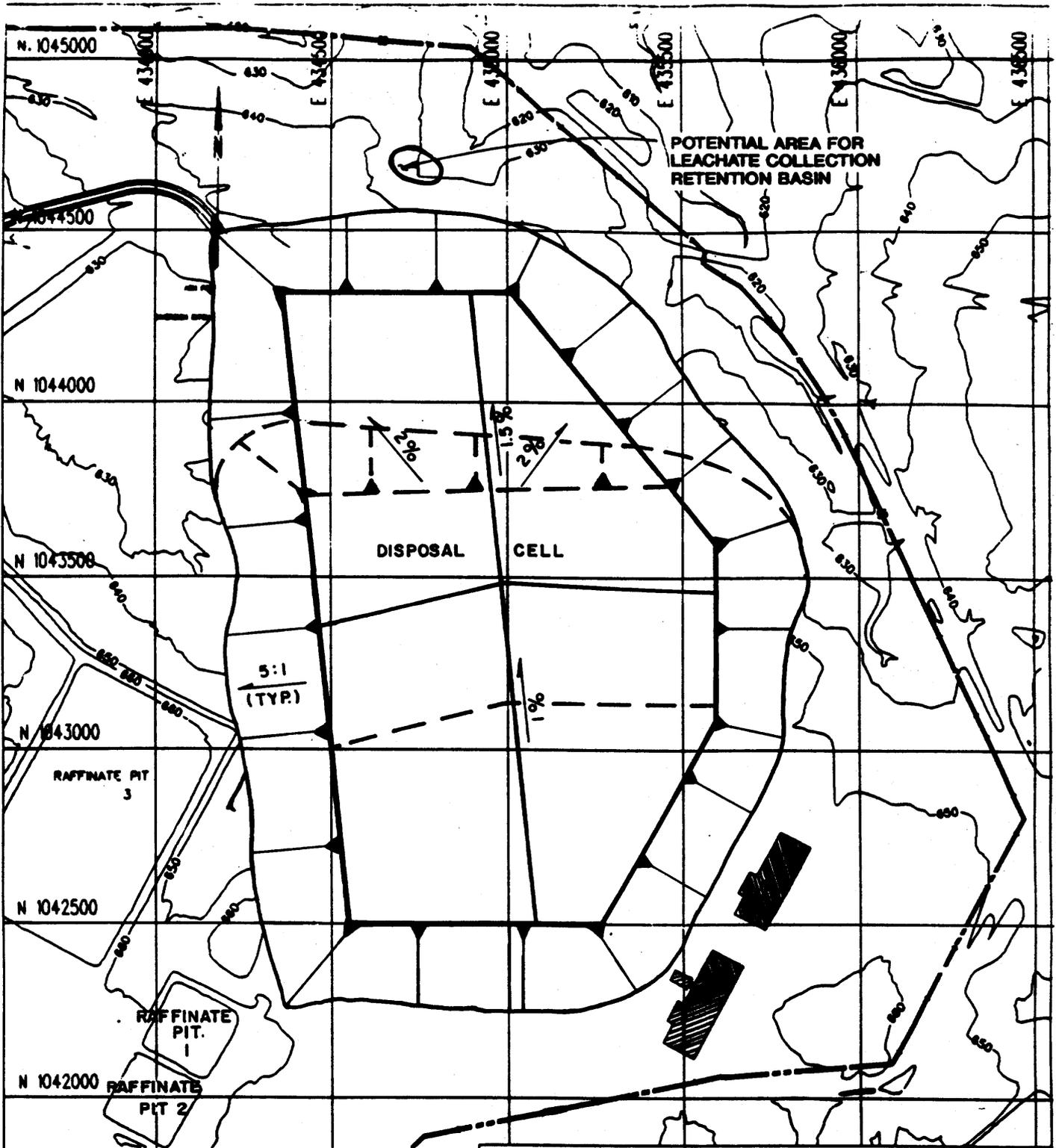
REPORT NO:	DOE/OR/21548-411	DRAWING NO:	
ORIGINATOR:	DRAWING BY:	DATE:	05/28/93



**DECONTAMINATION
FLOW DIAGRAM
(Process rate per day)**

FIGURE 6.3.6-1

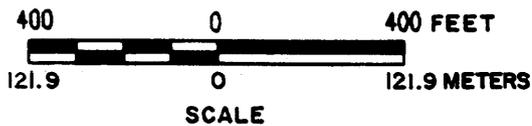
REPORT NO.: OR/DR 548-411	DRAWING NO.:
ORIGINATOR: J.W.	DRAWN BY: rey
DATE: JAN., 1993	



NOTE: CFD TOE LINE SHOWN HERE IS BASED ON EXISTING TOPOGRAPHY.

CELL VOLUME = 1.5M CY

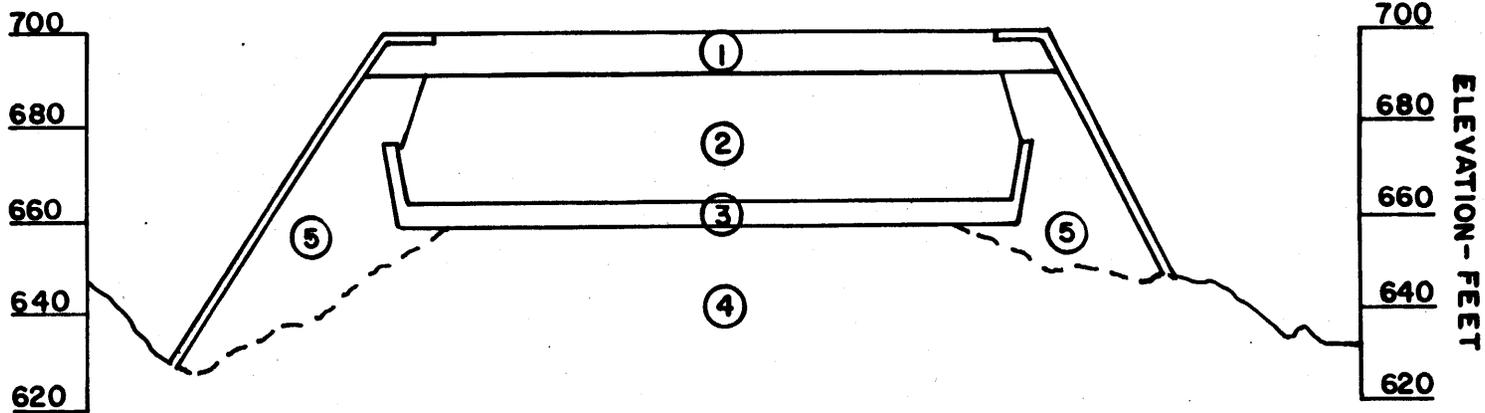
DASHED LINES SHOW NORTHERN LIMIT AND TOP COVER FOR 1.0 M CY



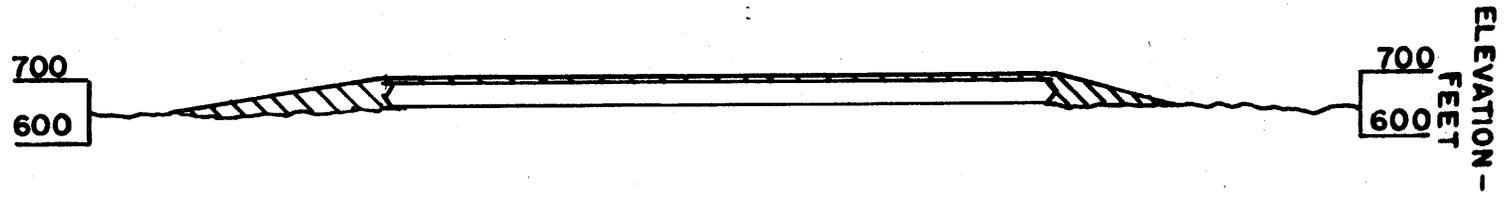
PLAN VIEW OF CSS CELL CONFIGURATION

FIGURE 8.1

REPORT NO.:	DOE/OR/21548-411	DRAWING NO.:	
ORIGINATOR:	KWL	DRAWN BY:	AMA
		DATE:	



DISPOSAL CELL SECTION
 SCALE: 1" = 40' VERT.
 1" = 300' HORIZ.

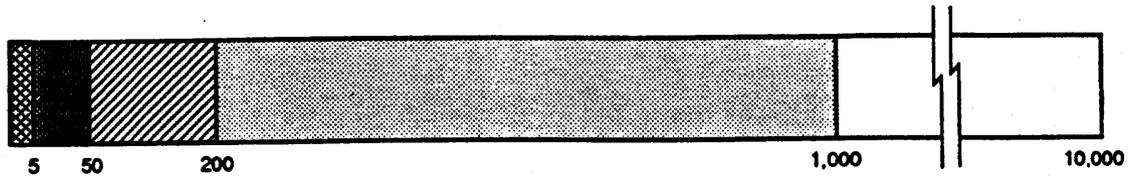


SCALE: 1" = 300'

LEGEND

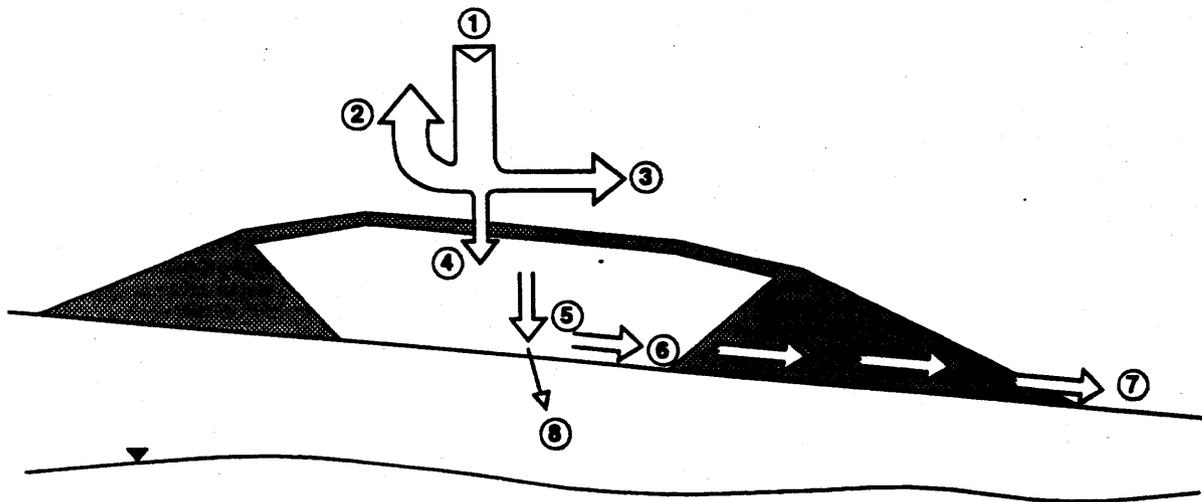
- ① COVER
- ② WASTE
- ③ LINER & LEACHATE COLLECTION REMOVAL SYSTEM
- ④ FOUNDATION
- ⑤ CLEAN-FILL DIKE

DISPOSAL CELL CONFIGURATION		
FIGURE 8-2		
REPORT NO. DOE/OR/21548-411		DRAWING NO.
ORIGINATOR	DRAWN BY	DATE



<u>YEARS</u>	<u>PERIOD</u>	<u>PERFORMANCE</u>
0 - 5	CONSTRUCTION	OPERATION AND ACTIVE MAINTENANCE
5 - 50	SHORT TERM	MONITORING AND PASSIVE MAINTENANCE
50 - 200	MEDIUM TERM	POSSIBLE MAINTENANCE
200 - 1,000	LONG TERM	IN EQUILIBRIUM WITH ENVIRONMENT
1,000 - 10,000	VERY LONG TERM	

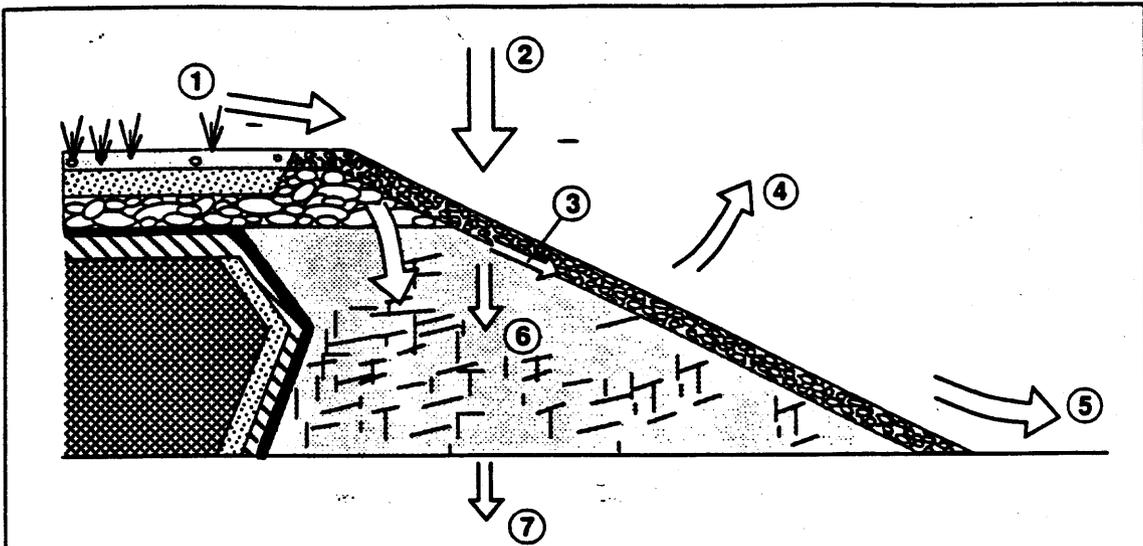
DISPOSAL FACILITY PERFORMANCE PERIODS		
The disposal facility is designed to perform for 1,000 years to the extent reasonably achievable.		
FIGURE 8-3		
REPORT NO: DCE/OR/21548-411		
ORIGINATOR: JC	DRAWN BY: MD/DJK	DATE: 06/03/93



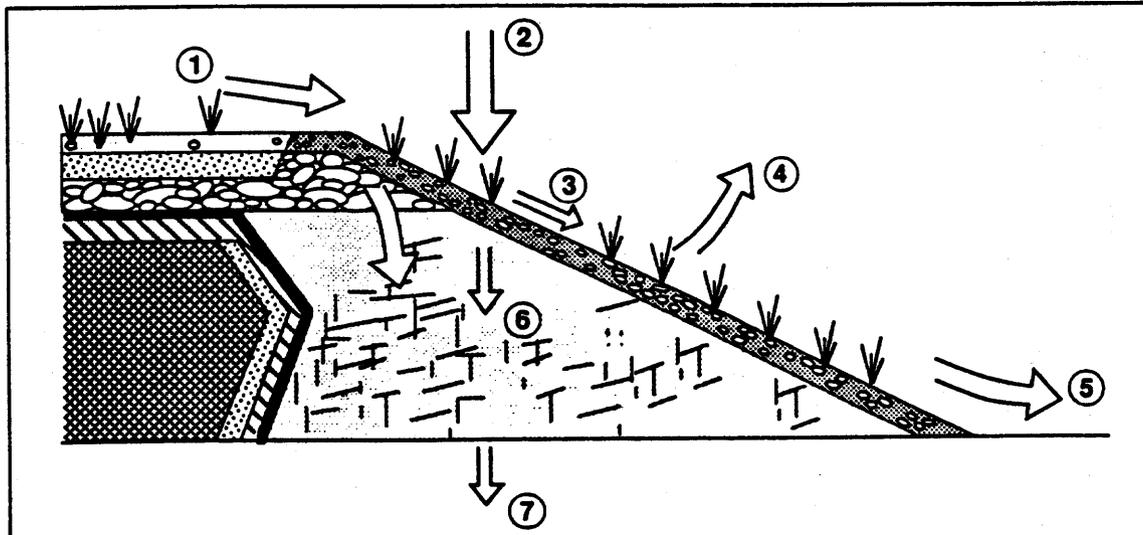
LEGEND	QUANTITIES (m ³ /yr)	
	AVG.	RANGE
① PRECIPITATION	x ₁	
② EVAPOTRANSPIRATION	x ₂	
③ RUNOFF	x ₃	
④ COVER INFILTRATION	x ₄	
⑤ SEEPAGE THROUGH WASTE	x ₅	
⑥ LEACHATE COLLECTION SYSTEM FLOW	x ₆	
⑦ SEEPAGE FROM CELL	3979 (2gpm)	
⑧ SEEPAGE THROUGH LINER	x ₈	

NOTE: Quantities refer only to the top cover

DISPOSAL CELL TOP COVER HYDROLOGIC MODEL A small fraction of precipitation infiltrates the top cover, and leaves the cell via drains.		
FIGURE 8-4 REV-B		
REPORT NO: DOE/OR/21548-411		
ORIGINATOR: JC	DRAWN BY: MD	DATE: 08/05/92



A) ROCK COVERED CLEAN-FILL DIKE SECTION WITH FLOW COMPONENTS

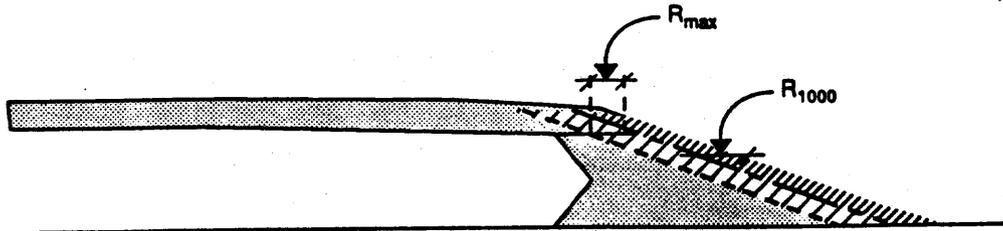


B) VEGETATED COVERED CLEAN-FILL DIKE SECTION WITH FLOW COMPONENTS

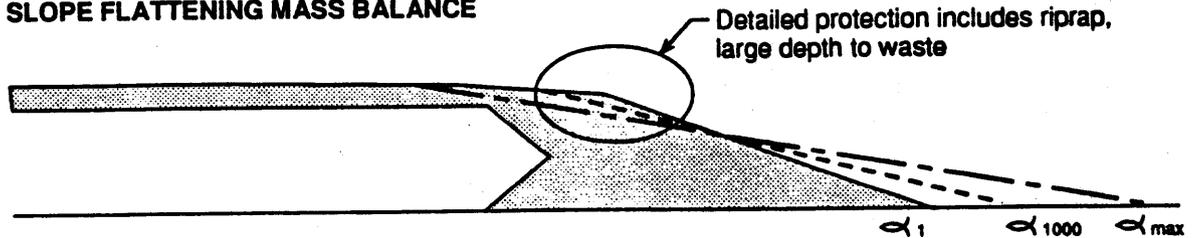
- | FLOW | |
|------|-----------------------------------|
| ① | TOP COVER RUNOFF |
| ② | SIDE SLOPE INCIDENT PRECIPITATION |
| ③ | SIDE SLOPE RUNOFF |
| ④ | SIDE SLOPE EVAPOTRANSPIRATION |
| ⑤ | TOTAL CELL RUNOFF |
| ⑥ | DIKE INFILTRATION |
| ⑦ | SEEPAGE TO VADOSE ZONE |

CLEAN-FILL DIKE WATER BALANCE MODEL FOR ROCK COVER		
Some incident precipitation on the dike runs off and some infiltrates and seeps to the groundwater.		
FIGURE 8-5		
REPORT NO DOE/OR/21548-411		
ORIGINATOR JC	DRAWN BY DJK	DATE 06/03/93

**SOIL SLOPE EROSION MODEL 1:
PARALLEL SLICE EROSION**



**SOIL SLOPE EROSION MODEL 2:
SLOPE FLATTENING MASS BALANCE**



LEGEND

- R_{1000} - SLOPE FACE RETREAT IN 1,000 YEARS
- R_{max} - MAXIMUM FACE RETREAT FOR WASTE EXPOSURE: TIME OF RETREAT >1,000 YEARS
- α_1 - INITIAL SLOPE ANGLE
- α_{1000} - SLOPE ANGLE AT 1,000 YEARS
- α_{max} - MAXIMUM SLOPE ANGLE FLATTENING FOR WASTE EXPOSURE: TIME >1,000 YEARS

SOIL CLEAN-FILL DIKE EROSION MODELS

Face retreat in slope flattening of soil dike may occur depending on surrounding area geomorphologic change.

FIGURE 8-6

REPORT NO:

DOE/OR/21548-411

ORIGINATOR:

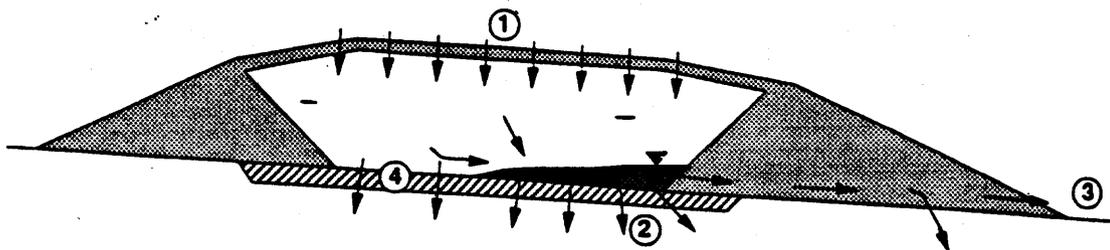
JC

DRAWN BY:

BR/DJK

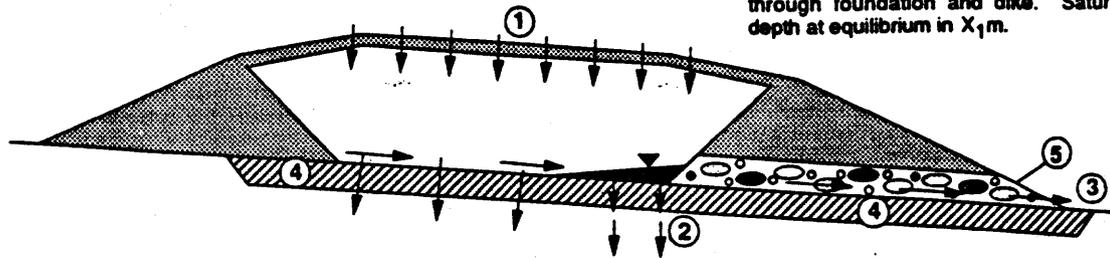
DATE:

06/02/93



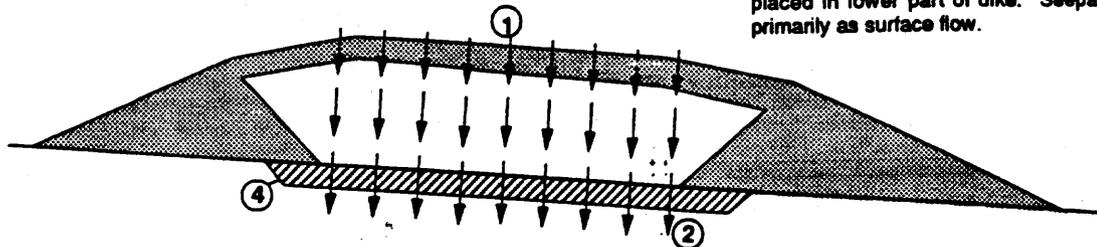
LONG-TERM THROUGH FLOW MODEL I

Cover infiltration exceeds basal liner seepage. Outlet drains blocked, liner system still intact. Saturated zone develops at cell low point. Increased hydraulic head increases seepage through foundation and dike. Saturated zone depth at equilibrium in X_1 m.



LONG-TERM THROUGH FLOW MODEL II

Cover infiltration exceeds basal liner seepage through slightly degraded FML. Small saturated zone develops at cell low point. Seepage occurs primarily through high-permeability materials placed in lower part of dike. Seepage emerges primarily as surface flow.



LONG-TERM THROUGH FLOW MODEL III

The potential seepage through the basal liner (degraded FML) equals or exceeds cover infiltration or seepage from the waste. Accordingly flow is essentially vertically downward through the cell.

LEGEND

- ① COVER INFILTRATION
- ② SEEPAGE THROUGH BASAL LINERS
- ③ SURFACE SEEPAGE FROM CELL
- ④ BASAL LINERS
- ⑤ HIGHLY POROUS ZONE AT LEACHATE COLLECTION PIPES

LONG-TERM THROUGH FLOW MODELS

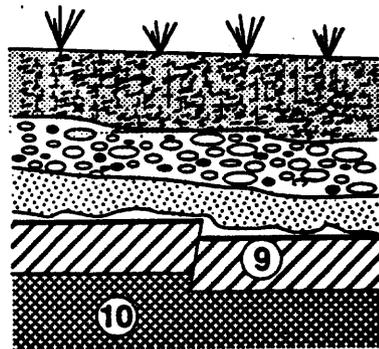
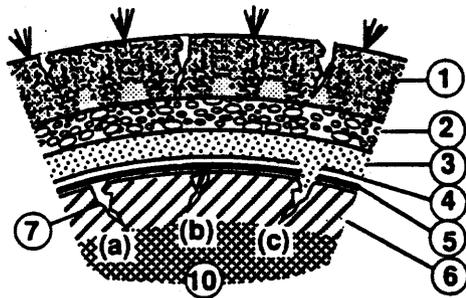
After cell abandonment, and possible failure of geomembranes and leachate collection system, the cover infiltration may flow to the groundwater or the surface, depending on cell layout features.

FIGURE 8-7

REPORT NO: DOE/OR/21548-411		
ORIGINATOR JC	DRAWN BY MD/DJK	DATE 06/03/93

FEATURES THAT PRECLUDE FAILURE

- Dense or compacted wastes
- Avoiding discontinuities in waste type
- Thick cover components
- Overburden stress on radon barrier to prevent crack opening
- Soil with higher plasticity in radon barrier



**FAILURE SCENARIO I:
CONVEX DEFORMATION**

Convex deformation induces cracking of radon barrier and:

- (a) FML and GCL bridge crack.
- (b) Bentonite falls into crack and seals it.
- (c) Sand falls into crack through breached FML and GCL.

Sands and cobbles do not crack.
Random soil cracks by heat and by soil movement process.

**FAILURE SCENARIO II:
CONCAVE DEFORMATION**

Concave deformation cracks bottom of radon barrier. Other soils placed into compression and do not crack. Increased radon flux through crack is stopped by GCL and FML layer.

**FAILURE SCENARIO III:
SHEAR DEFORMATION**

Shear crack develops. GCL is disrupted. FML stretches. Sands and cobbles deform. Minor potential additional radon and water flux through deformation plane.

LEGEND

- | | |
|---------------------------------|---------------------------|
| ① RANDOM SOIL | ⑨ SHEAR DEFORMATION CRACK |
| ② COBBLE BIOINTRUSION | ⑩ WASTE |
| ③ SAND DRAIN | |
| ④ FLEXIBLE MEMBRANE LINER (FML) | |
| ⑤ GEOSYNTHETIC CLAY LINER (GCL) | |
| ⑥ RADON BARRIER SILT/CLAY | |
| ⑦ CONVEX DEFORMATION CRACK | |
| ⑧ CONCAVE DEFORMATION CRACK | |

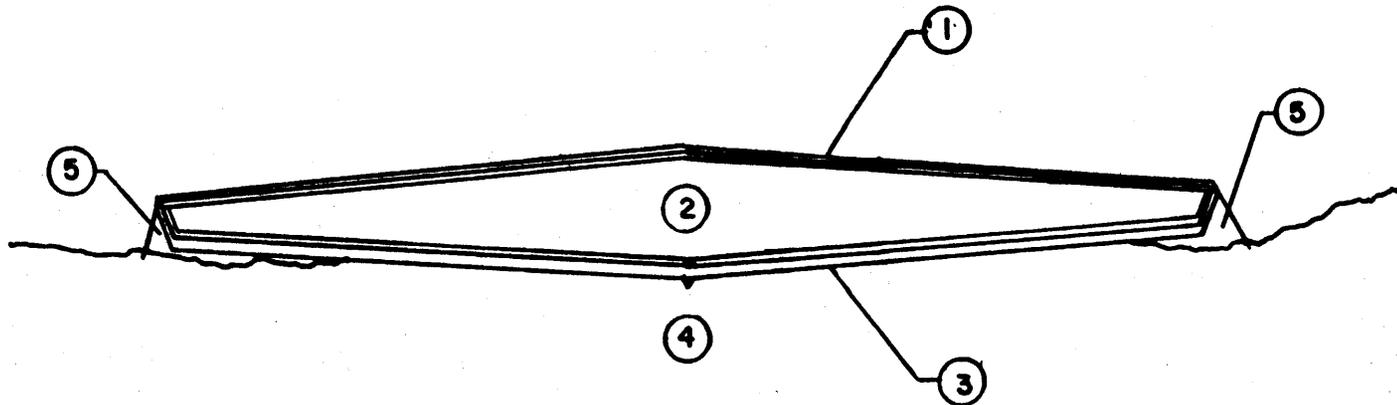
**DEFORMATION-INDUCED CRACKING OF THE
RADON BARRIER**

Uneven settlement of the cell foundation and waste could deform and crack the radon barrier.

FIGURE 8-8

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ORIGINATOR: JC	DRAWN BY: DJK/MD/EBR	DATE: 06/03/93
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NOTE: SEE FIGURE 8.7.2-2 FOR
COVER AND LINER DETAILS

SCALE: 1" = 100'

LEGEND

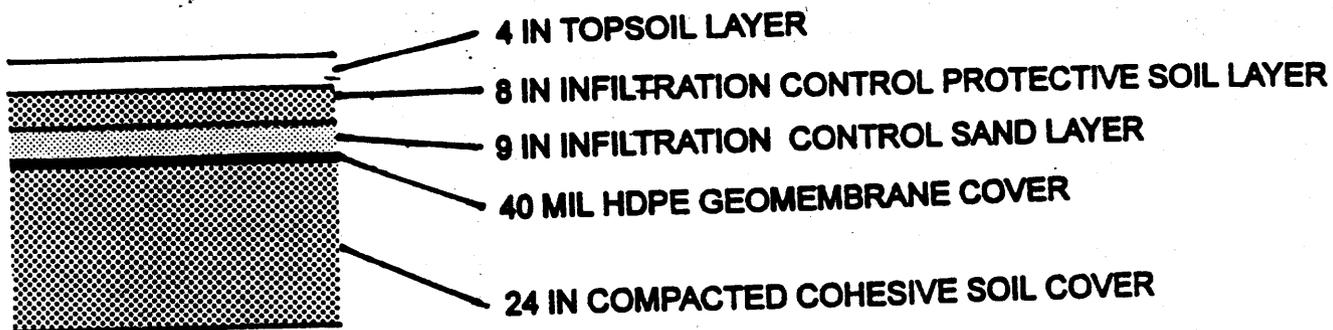
- ① COVER
- ② WASTE
- ③ LINER & LEACHATE COLLECTION REMOVAL SYSTEM
- ④ FOUNDATION
- ⑤ CLEAN-FILL DIKE

**NEIS DESIGN
DISPOSAL CELL SECTION**

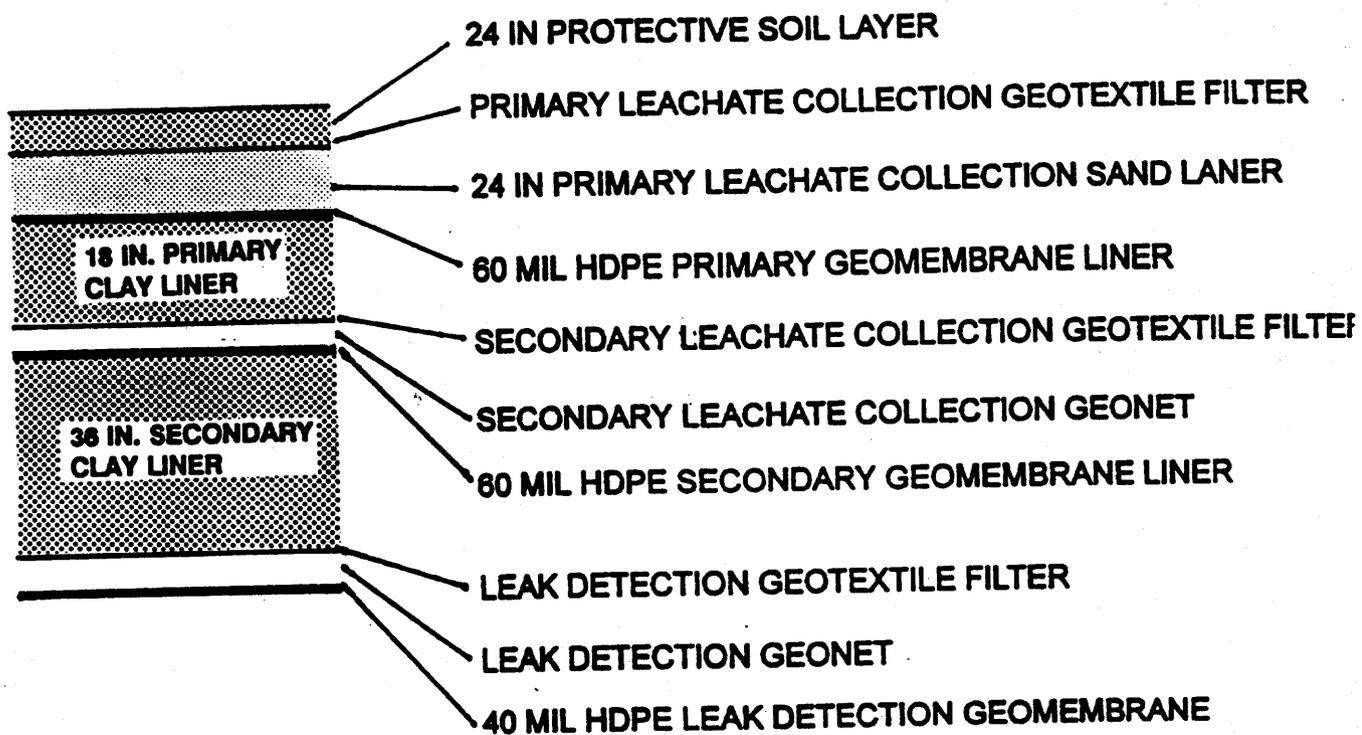
FIGURE 8-9

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COVER SYSTEM



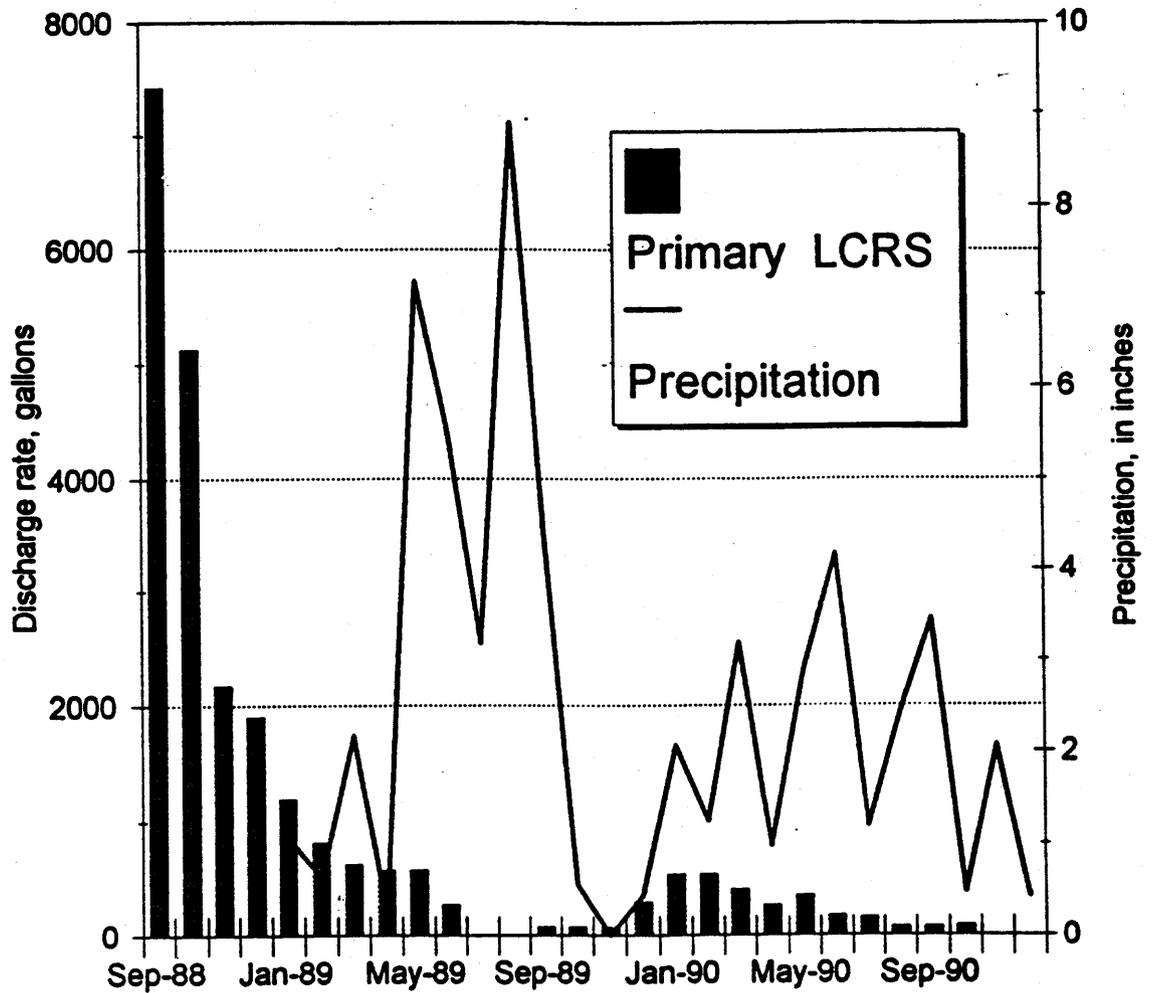
LINER SYSTEM



NEIS DESIGN-COVER AND LINER SYSTEM DETAILS

FIGURE 8-10

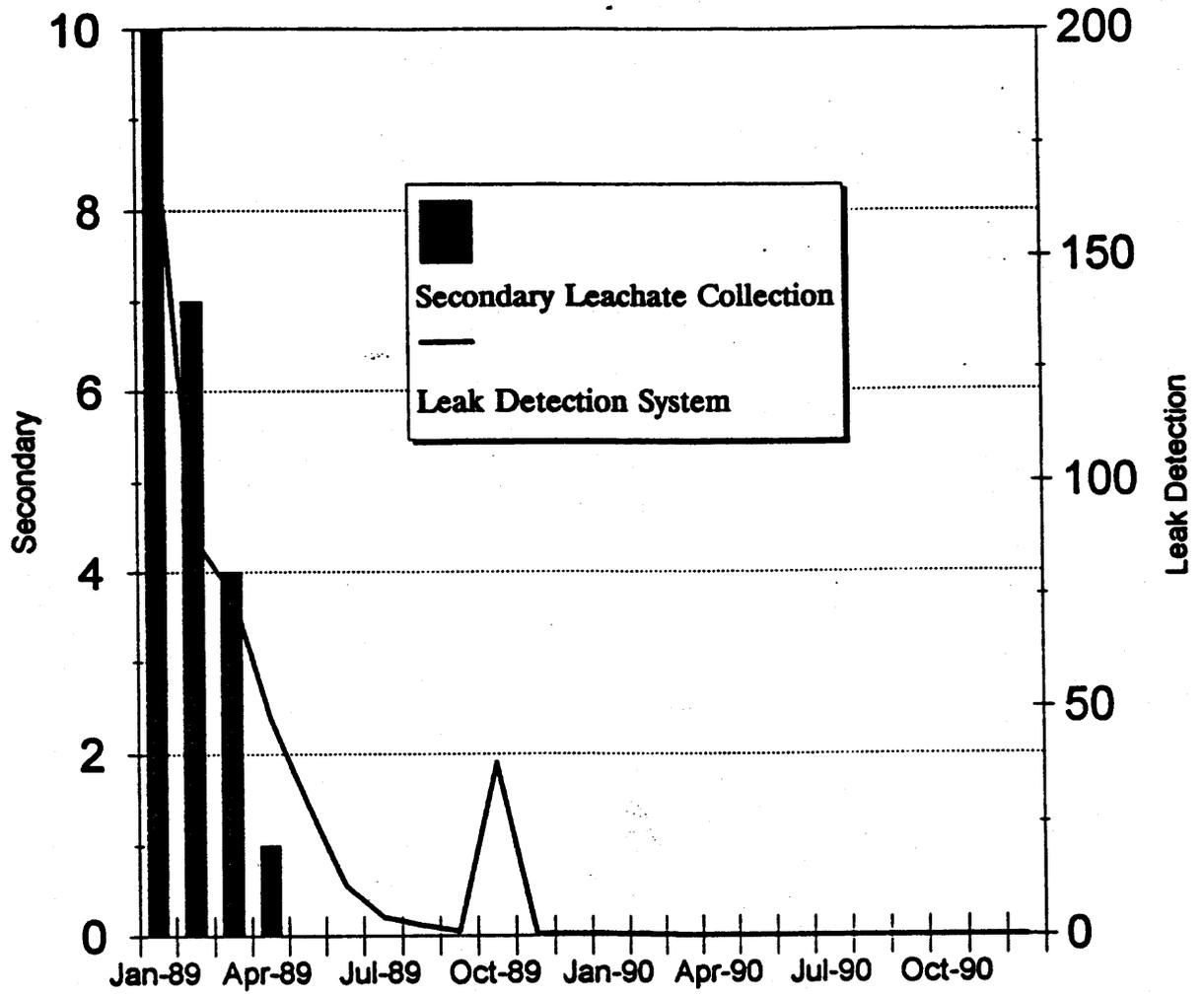
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**MOVING AVERAGE MONTHLY DISCHARGE
FROM
PRIMARY LEACHATE COLLECTION SYSTEM**

FIGURE 8-11

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		DATE	



**MONTHLY DISCHARGE FROM
NEIS LCRS, IN GALLONS**

FIGURE 8-12

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		DATE	