

Calculation Cover Sheet



Contract No. 5025-16

Discipline ENV. UMTA

Calc. No. 05-505-03-01

No. of Sheets 46 of 47

Project

UMTRA - GRAND JUNCTION

Feature

EMBANKMENT DESIGN

Item

AVAILABILITY AND SUITABILITY OF MATERIALS

Sources of Data

SEE SHEET L

Sources of Formulae & References

SEE SHEET L

Preliminary Calc. ☐

Final Calc. ☐

Supersedes Calc. No. 05-618-03

01	GRAND JUNCTION SWALE	H. LUBIS	1/16/91	P. S. S. S.	1/23/91	P. S. S. S.	1/11/91
			7/31/91		7/31/91	SE P. S. S. S.	7/3/90
Rev No.	Revision	Calculation By	Date	Checked By	Date	Approved By	Date

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PDR WASTE
WM-54

JO
JR



MORRISON-KNUDSEN ENGINEERS, INC.

A MORRISON KNUDSEN COMPANY

Project UTRA - GRAND JUNCTION

Feature EMBANKMENT DESIGN

Item AVAILABILITY AND COST.

Contract No. 5025-16

Designed H. L.

Checked LH

Sheet 1

File No.

Date 1/22/90

Date 7-3-90

REFERENCES

1. QUANTITY ESTIMATE SUMMARY - PHASE II CONSTRUCTION
MKE CALC. NO. 05-667-04-02/04
2. "SUBCONTRACT DOCUMENTS PHASE II, REV. 0, FINAL
DESIGN FOR CONSTRUCTION", MKE DOC. NO. 5025-
SRJ-R-01-0201-00
3. "ROCK QUALITY FOR THE EROSION PROTECTION -
CHENEY DISPOSAL SITE", MKE CALC. NO.
05-505-02-00
4. "EROSION PROTECTION - TOP AND SIDESLOPES OF TAILING
EMBANKMENT", MKE CALC. NO. 05-504-01-00
5. "RIPRAP TOE PROTECTION", MKE CALC. NO. 05-504-05.
6. "EMBANKMENT DESIGN - MATERIAL PROPERTIES"
MKE CALC. NO. 05-67-05-01
7. "PERMANENT SITE DRAINAGE - OFF-FILE DRAINAGE
SWALE", MKE CALC. NO. 05-504-02-02

071





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Project

Feature

Item

AREA - C-12

EMBANKMENT SECTION

Area Calculated

Contract No. 325-

Designed H.L.

Checked C.W.

Sheet

11

File No.

Date

Date

13190

7390

TABLE OF CONTENTS

Sheet

I. Background and Purpose	1
II. Summary of Availability and Suitability of Materials	2
III. Site Soil Conditions and Planned Usage	3
IV. Calculations Performed	4
V. Computation Procedure and Results	5





Project

Feature

Item

LMTRA-GRT

Embankment Design

Availability and Suitability of Matls.

Contract No. 5025-16

Designed P.S.

Checked H.L.

Sheet

File No.

Date 1/17/90

Date 7/2/90

I. BACKGROUND AND PURPOSE

Approximately 3 million cubic yards of soil will be excavated for the proposed tailings embankment foundation at the Cheney Reservoir Disposal Site (Reference 1). The present plans, as noted in the Specifications (Reference 2) are to obtain the erosion protection rip rap, radon barrier, Manco Protection Barrier and hot back soil (1 needed) from the excavated materials, to the maximum extent possible. In addition, plans are to use excess excavated material from the disposal site for the restoration of the excavation at the processing site.

Soil borings and test pits in the area of the excavation have shown the existence of rock material along for potential radon barrier material and gravel is available in region. The materials will have to be selectively excavated, and for the erosion protection materials, appropriately processed and then stockpiled for later use.

The purpose of these calculations is to investigate whether the volumes of available materials are satisfactory, with sufficient safety margin. A summary of the findings and conclusions is presented in Sheet 2.





Project

JMT 114 - 52

Contract No.

3535-24

Sheet

2

Feature

Embarkment - 100'

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File No.

116/91

Item

Availability and Suitability

Checked

P.S.

Date

1/20/01

REV. 1

II. Summary of Availability and Suitability of Materials

The Availability of Materials

The Required Materials (From Ref. 1)

A Top Soil

223,367 cy (Sh. 6)

B Gravelly Layer

727,467 cy (Sh. 7)

Gravel: 1"-4": 140,000 cy

4"-9": 70,000 cy

5"-11": 19,000 cy

11" + : 21,000 cy

B Foundation Protection

176,379 cy

Type A: 109,293 cy

Type B: 33,457 cy

Type C: 14,191 cy

Type D: 10,624 cy

Type E: 8,814 cy

C Clayey Layer

348,763 cy (Sh. 8)

C Roadway Barrier

262,359 cy

D Gravelly Layer

1" Material comes out of gravelly layer
400,000 cy (Sh. 9)

D Life-Save Fills above ground

444,414 cy

E Mancos Shale

1,164,185 cy (Sh. 10)

E Low-Fill Fills Below Ground

283,500 cy





Project

UMTRA-GRJ

Contract No. 5025-16

Sheet 3

Feature

EMBANKMENT DESIGN

Designed

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File No.

Item

AVAILABILITY AND SUITABILITY

Checked

H.L.

Date 1/19/90

Date 7/02/90

III. SITE SOIL CONDITIONS AND PLANNED USAGE

Site soils in the area of the excavation consist of Mancos Shale bedrock overlain by an average of 20 feet of alluvium/colluvium overburden soils. A fence diagram showing the several different soil types is presented on Sheet 11. Major soil zones are indicated on the fence diagram.

Present plans are to use:

(i) Processed (selectively excavated and sized) granitic soil layers (Layer no. 2) for erosion protection rock

(ii) Selectively excavated clays from Layer 3 for radon barrier. The clays pinch out in the Northwest part of the site.

(iii) The top 1 foot ^{initially} for the entire length of the excavation. ~~The top 1 foot of the excavation will be used for the radon barrier.~~
REVISED: the alluvium under the top 1 foot of the excavation will be used for the radon barrier.

(iv) Ideally, the rest of the soils indiscriminately as general fill for (a) processing site restoration, (b) clean fill dikes at disposal site, and (c) disposal site restoration (excess overage material, not usable as general fill will be disposed in Area A (see Sheet 12), and (d) geodesic barrier.

However, (1) there is some question as to whether Mancos Shale will be permitted for use in processing site restoration, (2) the strength requirements for side slopes of the clean fill dikes may render

Mancos Shale unsuitable - maybe - 1" material after riving for erosion protection in (i) will be required, (3) a short 6" in radon barrier material in (ii) may be made up by the - 1" material or very weathered





Project

UNTRA-GRJ

Contract No. 5025-16

Sheet 4

Feature

Designed PS

File No. 1/24/96

Item

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Date 7.3.90

Mancos Shale, and (d) only some materials may be usable as geochemical barrier.

II CALCULATIONS PERFORMED

Calculations were performed for computing the volumes of available materials as follows:

- (a) Topsoil (Sheet 6)
- (b) Erosion Protection Rock (Sheets 7 through 7A)
- (c) Radon Barrier Material (Sheet 8)
- (d) Minus 1-inch material (Sheet 9)
- (e) Mancos Shale
 - (i) Total (Sheet 10)
 - (ii) Very Weathered (Sheet 10)

A summary of the available quantities is presented in Sheet 2. Also included in Sheet 2 is the volume of the quantities of each type of material required.





Project UMTRA-623
Feature Embankment Design
Item Availability and Suitability of Mats.

Contract No. 5025-16
Designed P.S.
Checked H.L.

Sheet 5
File No. _____
Date 5-26-90
Date 7/3/90

V. COMPUTATION PROCEDURES AND RESULTS

General

The excavation plan is presented on sheet 12. The stockpile plan from INDUSTRIAL CONST. (Subcontractor) is presented on Sh. 13. Presented on Sheets 14 through 26 are sections through the excavation area in both directions. The sections show the boring log locations along and near the sections and the soils noted in the boring logs. The sections also note the zones of (a) gravelly soils from which the erosion protection material will be processed, and (b) clays judged suitable for use as radon barrier. These sections have been of great help during the ongoing excavations. It should be noted that consistent with the instructions given to the Subcontractors during excavation, material within 3 feet of the surface was not included for use as radon barrier or erosion protection material.

Topsoil volume was computed as the volume of 1-ft of Topsoil stripped over the entire fenced area (see Sheet 12).

Detailed calculations and results for each of the soil categories is presented in the following sheets.





MORRISON-KNUDSEN ENGINEERS, INC.

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Project

UMTRA-GRO

Contract No.

5025 16

Sheet

6

Feature

Embarkment Design

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P.S.

Date

5-26-90

Item

Availability & Suitability of Materials

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H.L.

Date

7-3-90

(a) Topsoil

Total Fenced Area = 6,165,912 sq. ft.

Depth of Topsoil = 1 ft

∴ Volume of Topsoil Stripped = 6,165,912 ft³

= 228,367 cy

~~Volume of Topsoil Required = 173,370 cy~~

~~(from Reference 1, for Zoning Soil)~~

REV. 1

HL 1/16/91





Project

Feature

Item

UMTRA-GES

Contract No.

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3885-24

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H.L.

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File No.

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7/3/90

(B) Erosion Protection Material

① Presented in Sheets 27 and 30 are the gradations required for each type of erosion protection material, as calculated from References 4 and 5.

② The volume of gravelly material to be stockpiled from the excavation for subsequent processing for erosion protection material is computed in Sheet 30. The volume is based on geologic sections on Sh. 14-26, described earlier. The total volume of the gravelly soils available as source of the erosion protection materials is 727,467 cy. (Use 700,000 c.y., See Sh. 39)

③ Grain size distribution data for the gravelly materials are presented in Sh. 27-29. There are 2 classes of data:

(a) 5 samples tested from combined test pit samples tested prior to start of construction (Sh. 27 and 28)

(b) Additional 20 samples tested from the gravelly soil stockpile during excavation. (Sheet 29)

An examination is made of the 2 sets of data. They appear to be generally similar. See sheets 27-28 and 29. Only, there appears to be some discrepancy in the 1' to 3' range. It should be noted that the second data set has a maximum grain size of 14", and does not have as many sieve sizes. Thus, for further analysis, only the





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Project Gravel - GRT
 Feature Gravel - riprap Design
 Item Gravel - riprap

Contract No. 5-25-10
 Designed H.L.
 Checked HL

Sheet 7A
 File No. 1210
 Date 7-3-90

first data set was used, since it appeared that for Type B materials between 4" and 9", and for Type C, materials between 5" and 11" will yield the required gradations on Sh. 36 and 37. Data for 4" and 9" is not available for the second set

Presented on Sheet 39 are the conservatively estimated percentages and volumes available, based on 700,000 cy of stockpiled gravelly soil (this is slightly less than the computed 727,467 cy, since only 14-inch material is stockpiled.)

REV. 1 HL 1/16/91

④ Presented in Sheets 35, 36, 37, 37A, 37B are the grain size distribution curves that will be obtained by selected sieving, to produce Type A, Type B, Type C, Type D, Type E riprap materials, respectively. Presented also are the gradation limits required.

REV. 1
HL 1/16/91

~~The backup calculations are presented in Sheet 38 through~~

⑤ It is recommended that, to make the best use of the situation, approximately 250,000 cy should be sieved for 5" to 11" material, and the remaining sand for 4" to 9" material.

REV. 1

HL 1/16/91

NOTE: The remaining sieved will also be used for Type E riprap with size range 5" to 19"





Project

UMTRA-GRT

Feature

Final design - 1st & 2nd

Item

Area under study

Contract No.

5021

Designed

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H. L.

Sheet

9

File No.

Date

5-24-77

Date

11/2/92

Radon Barrier Clay

Volume of available Radon Barrier Clay is computed from the geologic sections on Sh. 14 - 26. The computations are presented in Sheet 40. The computations indicate an approximate volume of radon barrier clay = 248,763 cy
Volume of radon barrier clay required (from Ref. 1) = 295,630 cy





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Project UMTA - 106
Feature Embankment Design
Item Available - 1" material

Contract No. 5-75-16

Designed HL for PS

Checked HL

Sheet 9

File No.

Date 7/3/90

Date 7/3/90

(d) Minus 1-inch Material

From Sheet 39, a conservative value of 60 pit is chosen for the available minus 1-inch material.

Using 700,000 cy,

Available - 1" material: $420,000 \text{ cy} \approx 400,000 \text{ cy}$





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Project

UMTA-82

Contract No.

3525-24

Sheet

10

Feature

Foundation Design

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HL

File No.

Date

11/6/91

Item

Availability and Sustainability

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Date

REV. 1

(2)

MANCOS SHALE

From sheet 41 the available mancos shale from excavation is approximately 1,164,185 cy. Assumed one fourth of 1,164,185 cy was very weathered shale,

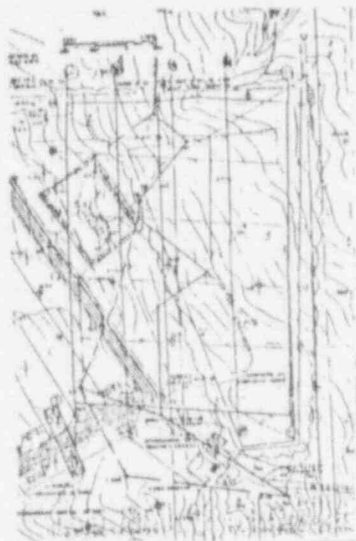
Total Mancos Shale = 1,164,185 cy

Very weathered shale = $\frac{1}{4} \times 1,164,185 \text{ cy}$
 = 532,093 cy



325-10
Inadequacy of some labor saving

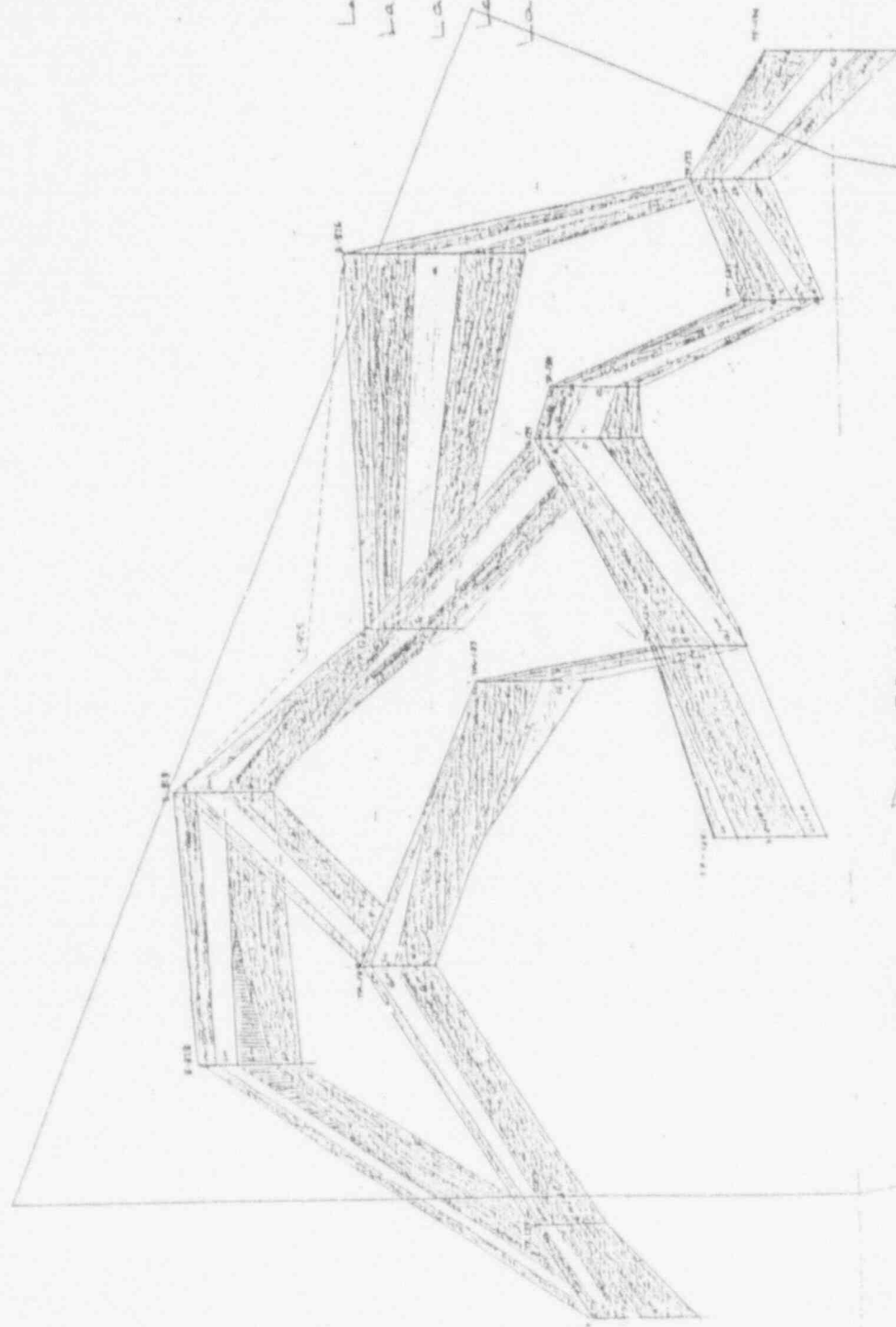
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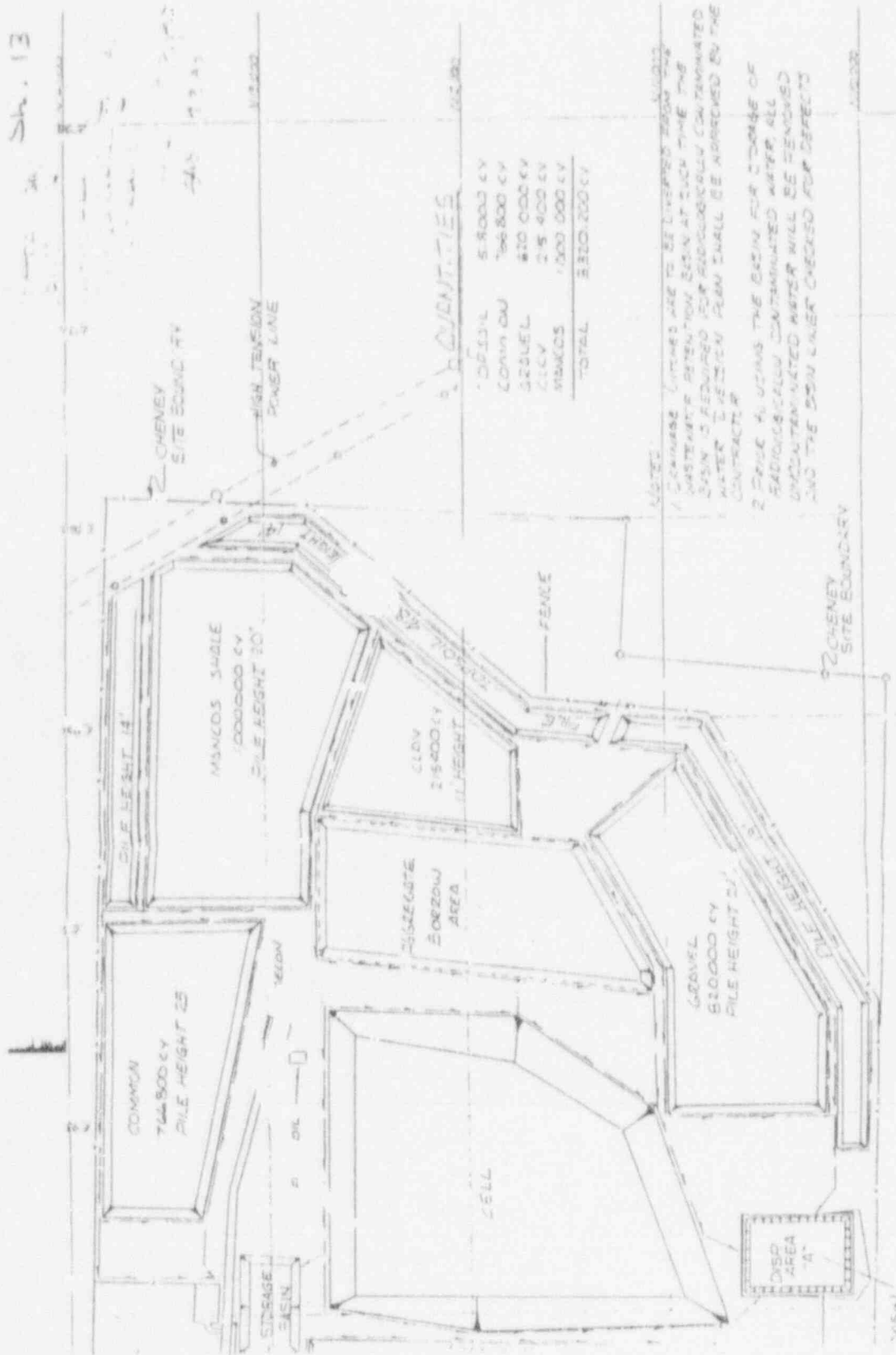
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FENCE DIAGRAM

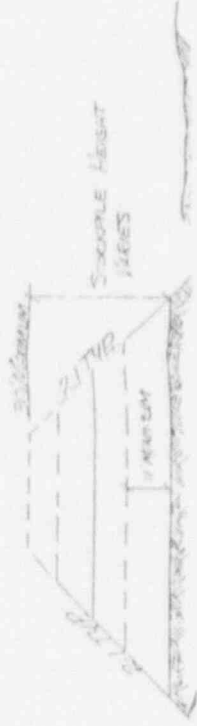


QUANTITIES

DESIGN	5,000 CY
CONV. ON	76,800 CY
GRAVEL	420,000 CY
CLAY	250,000 CY
MANCOS	1,000,000 CY
TOTAL	3,320,000 CY

- NOTES:
1. CHANGE LINES ARE TO BE LINED FROM THE EXISTING RETENTION BASIN AT SUCH TIME THE SYSTEM IS REQUIRED FOR HYDROLOGICALLY CONTAMINATED WATER. THE DESIGN SHALL BE APPROVED BY THE CONTRACTOR.
 2. PRIOR TO USING THE BASIN FOR STORAGE OF RADIOLOGICALLY CONTAMINATED WATER, ALL UNCONTAMINATED WATER WILL BE REMOVED AND THE BASIN LATER CHECKED FOR DEFECTS.

STOCKPILE PLAN	DATE	SCALE
UNITED	1-400	ONE
INDUSTRIAL CONSTRUCTORS		



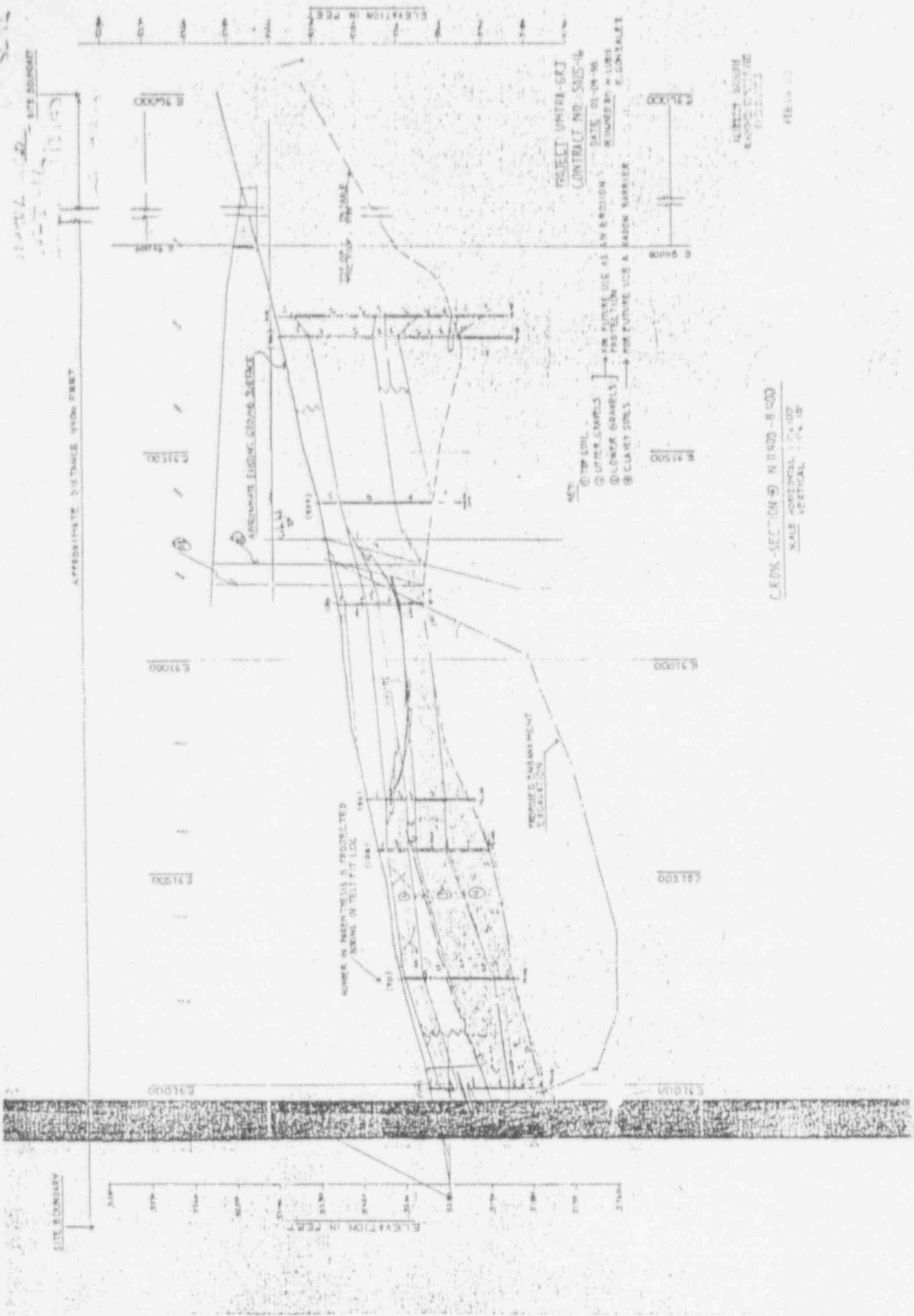
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APPROXIMATE DISTANCE 300 FT



CROSS-SECTION @ N 11.000 - 11.000

SCALE: HORIZ. 1" = 100'
 VERT. 1" = 10'



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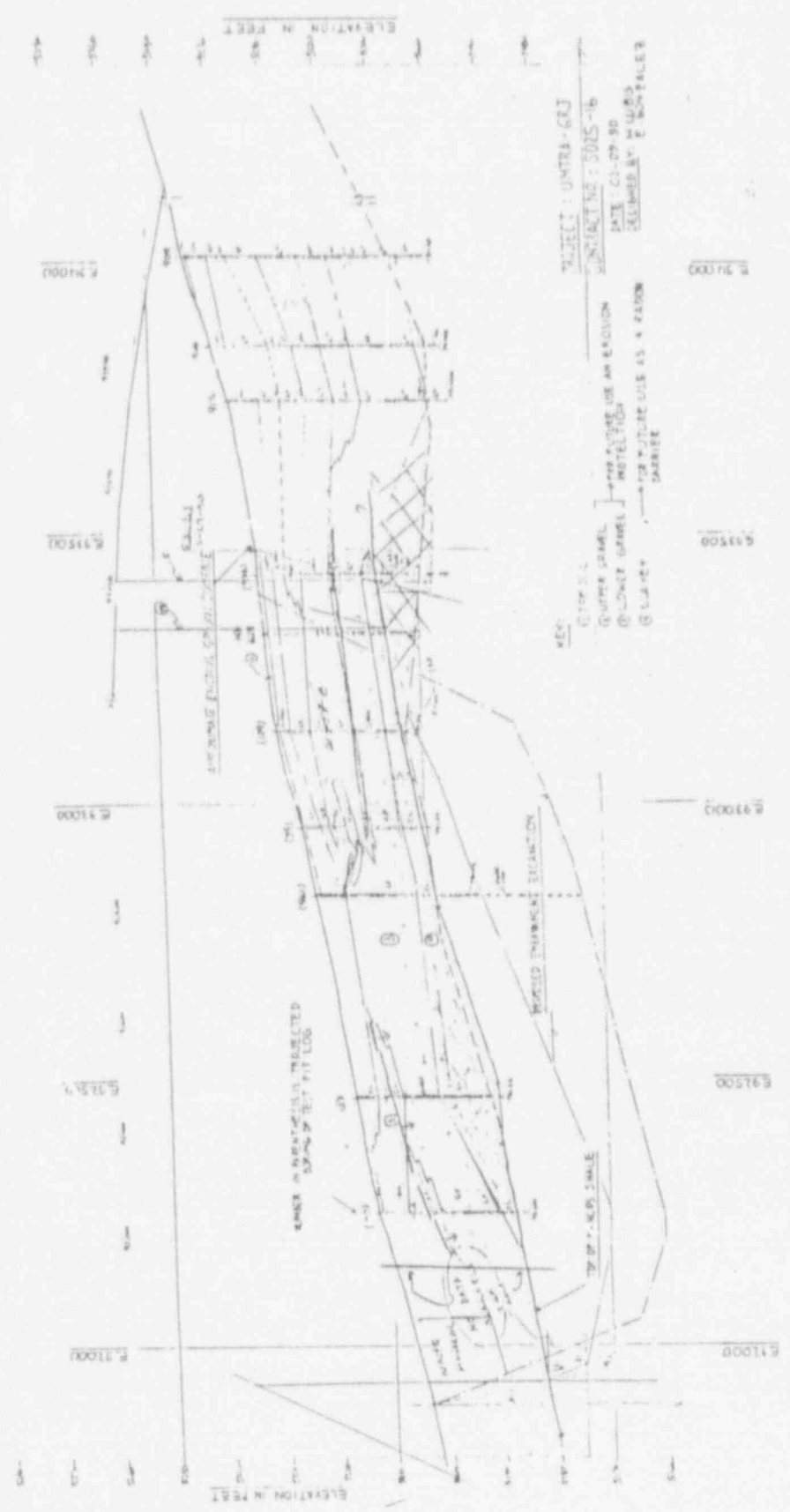
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SITE BOUNDARY

ROAD AND DISTANCE MARKS



SUBJECT: UNTRA-GRJ
 CONTRACT NO: 5015-16
 DATE: 03-07-80
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 CHECKED BY: M. J. B. S.

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CROSS-SECTION @ N 400 - R 400
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54. PRELIM

SITE BOUNDARY

SITE BOUNDARY

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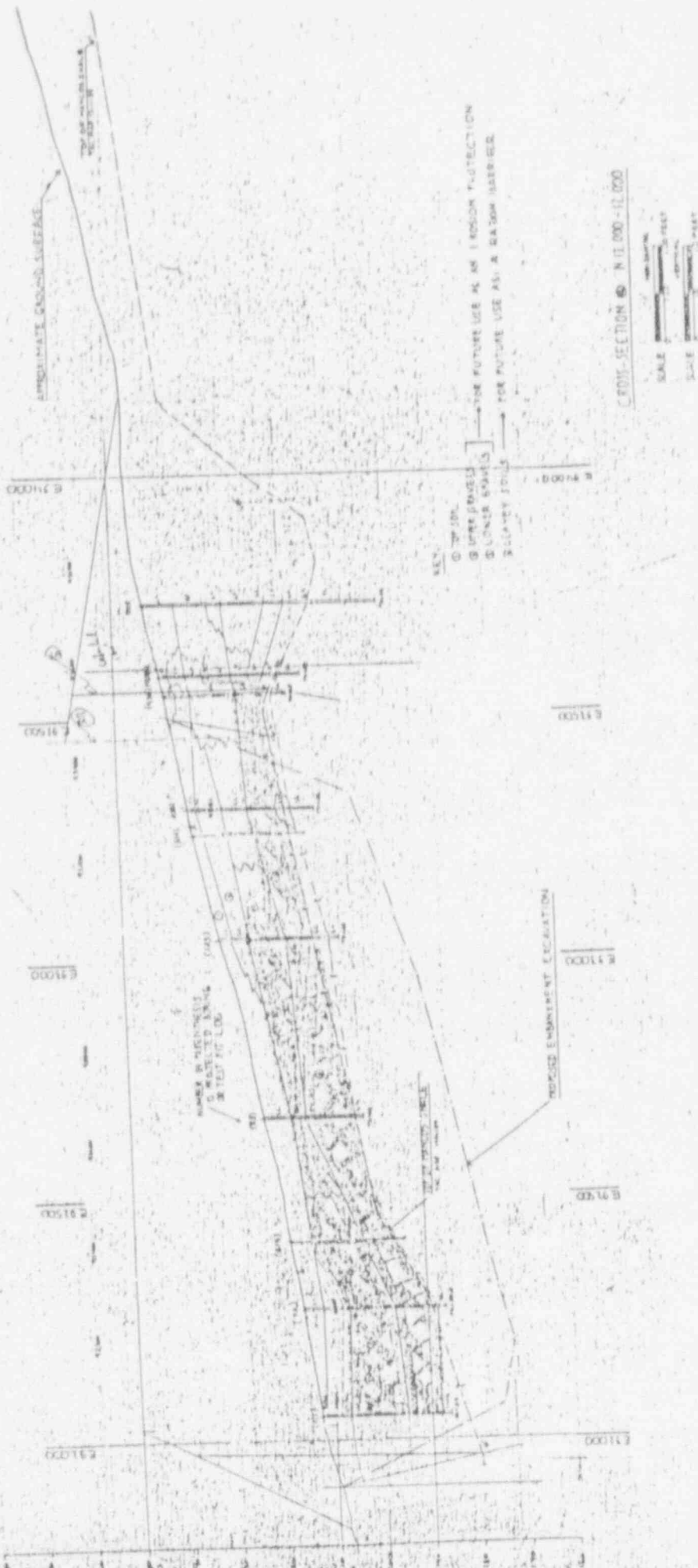
APPROXIMATE DISTANCE - 100 FEET

PROJECT: JINTRA-62J
CONTRACT NO. 5025-46
DATE: 1-8-40

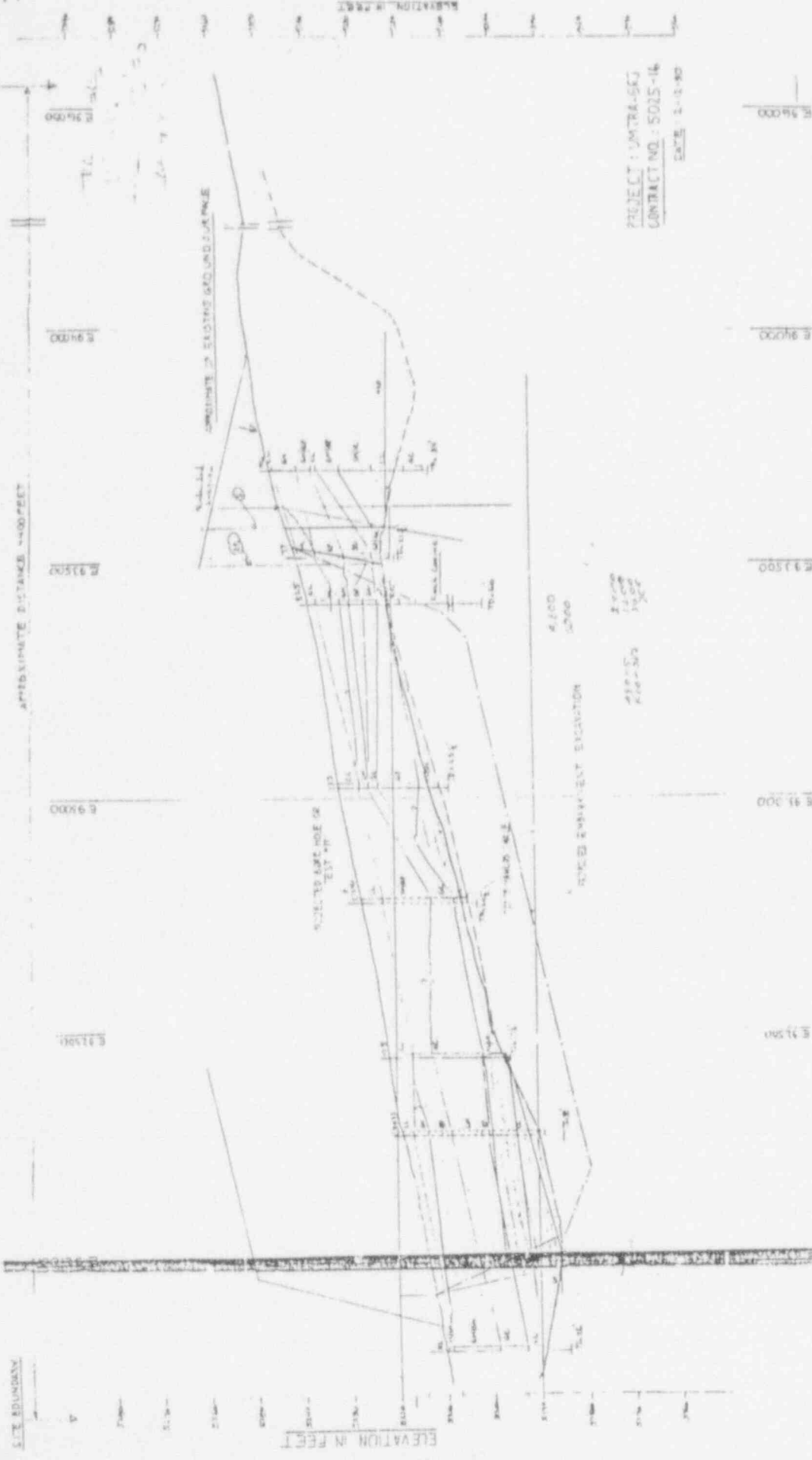
CROSS-SECTION @ M. 11.43 - 11.500
SCALE: HORIZONTAL 1" = 100'
VERTICAL 1" = 10'

7-11-40
JINTRA-62J
CONTRACT NO. 5025-46
DATE: 1-8-40

ACQUAINTANCE



5.10



CROSS-SECTION @ N H 203 - 12,200
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DISTANCE IN FEET

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April 19, 2004

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APPENDIX: DISCUSSION

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PROJECT: WATER-GUT
CONTRACT NO. 5025-14
DATE: 02-08-90
DESIGNED BY: H-LU

0077-0071 N 64 400-1160
DATE MADE: 11/10
FRTAL: 11/10

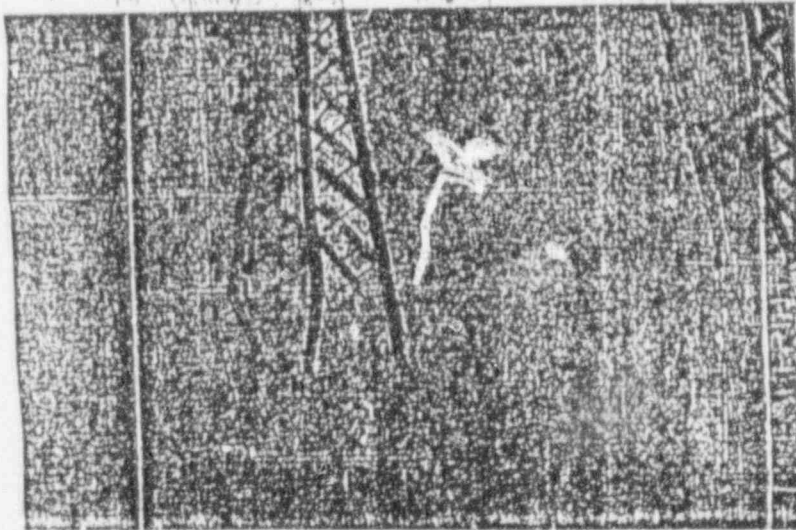
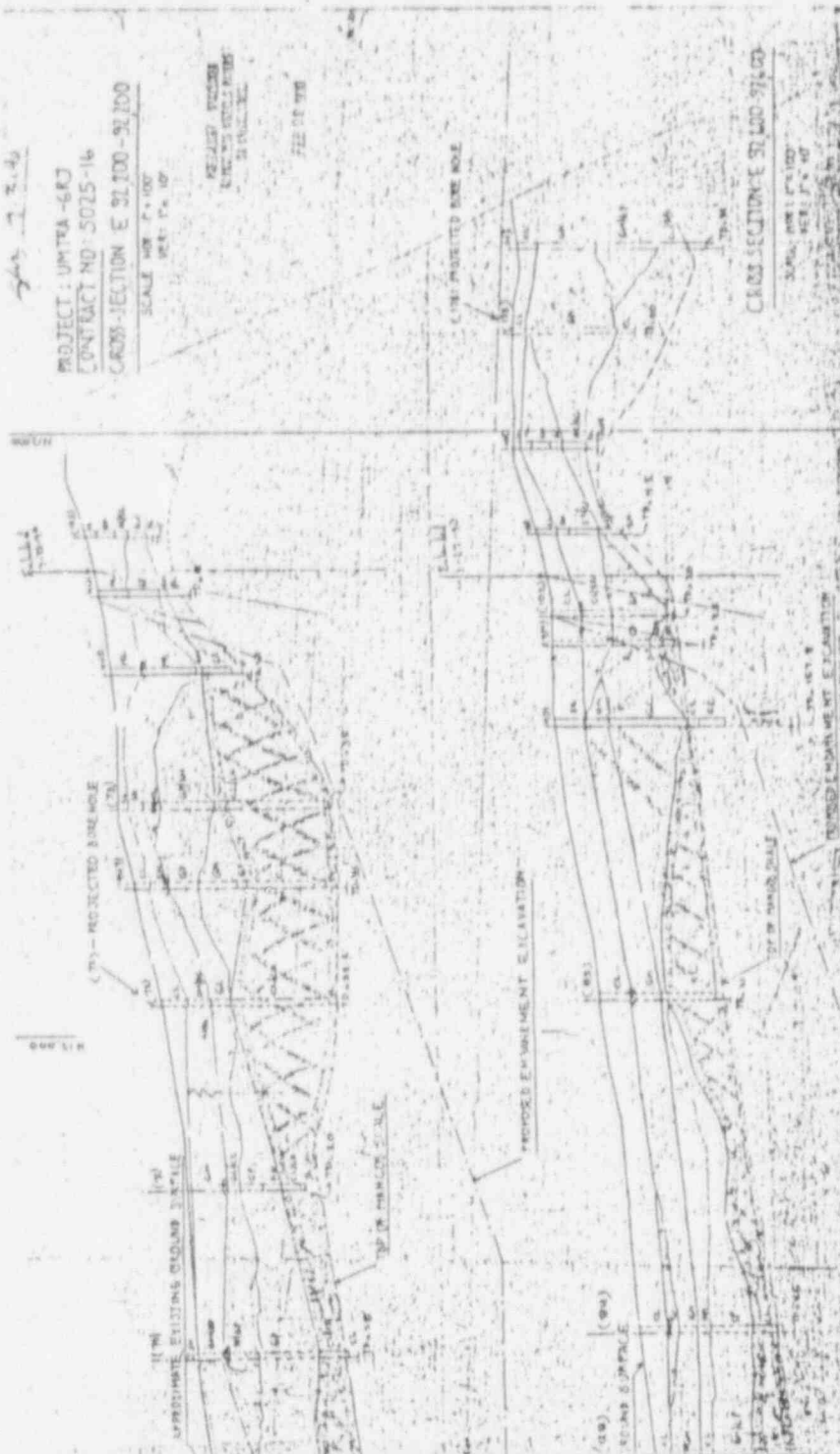
10000 - 10000
 10000 - 10000
 10000 - 10000

PROJECT : UMTRA-6RJ
CONTRACT NO : 5025-16
CROSS-SECTION E 92100-92100

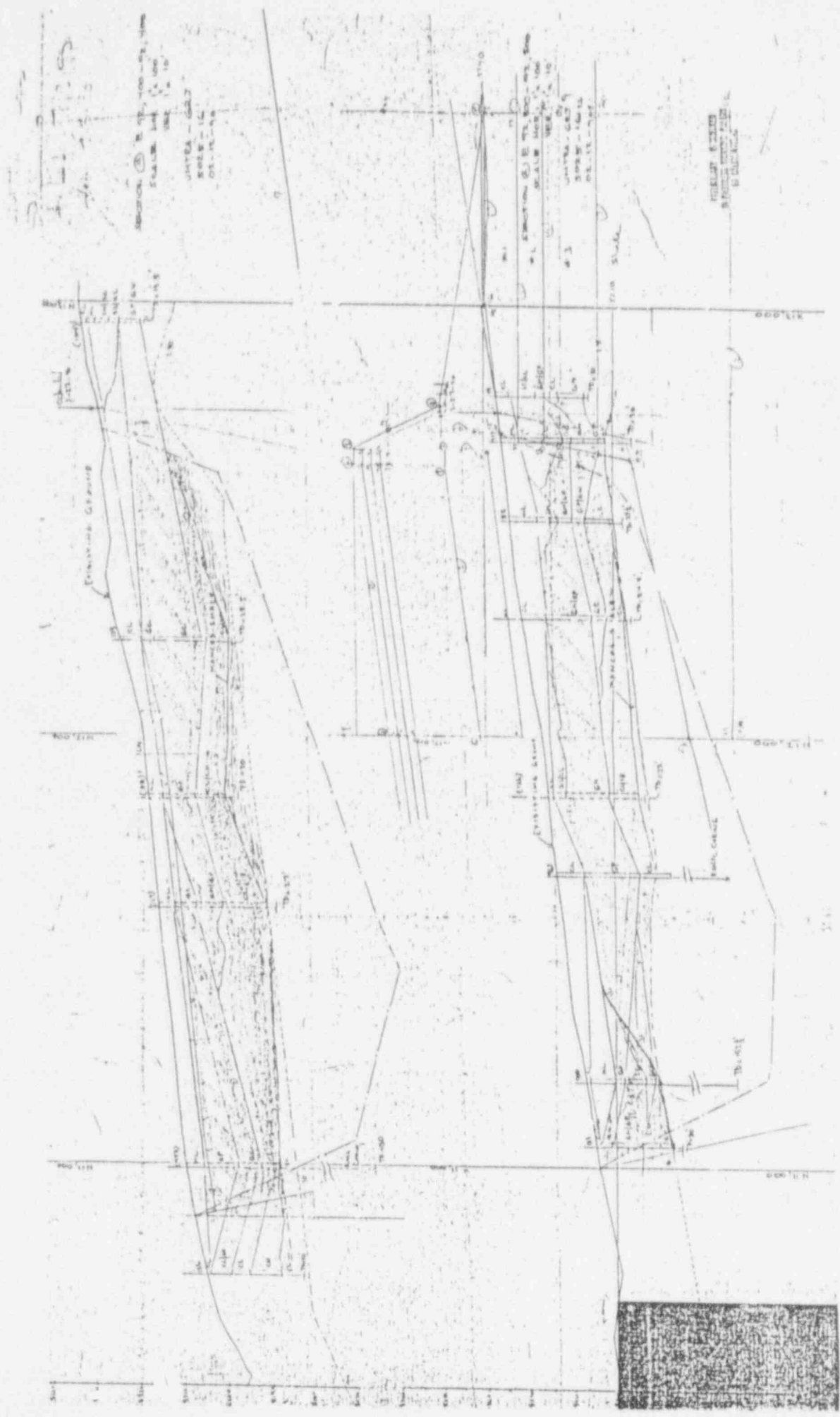
SCALE 100% 1" = 100'

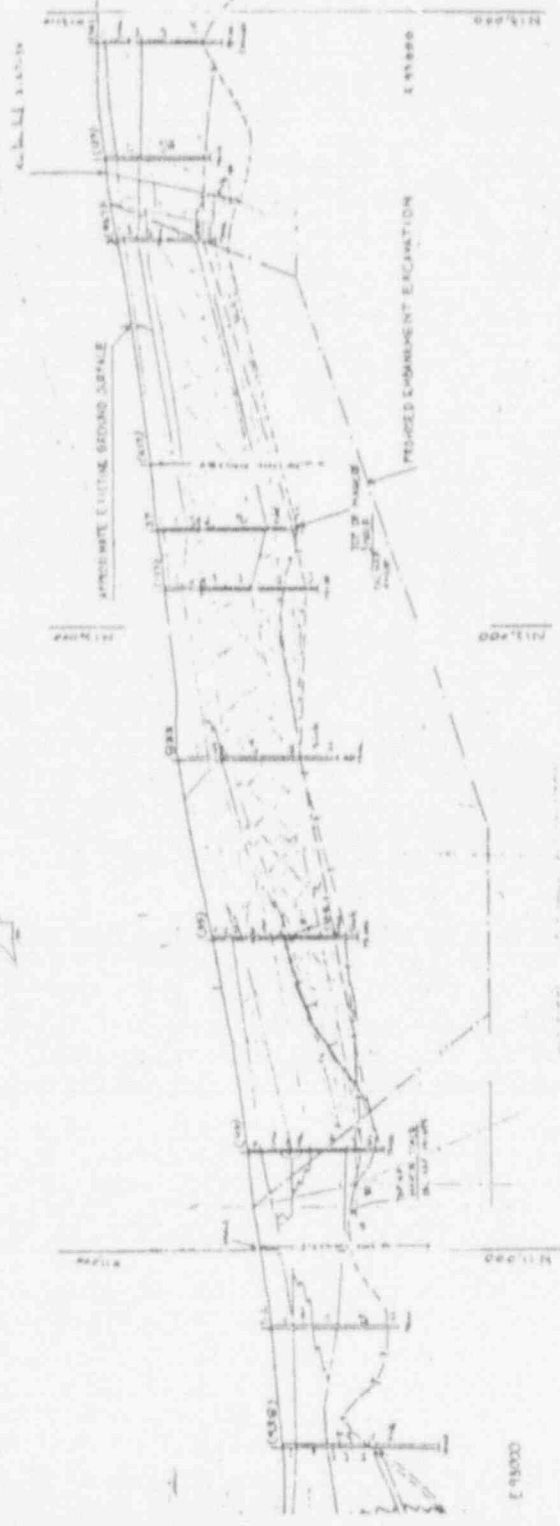
[illegible]

1994



5-1-4





SL 216

ADDITIONAL INFORMATION TO THE GENERAL SPECIFICATIONS

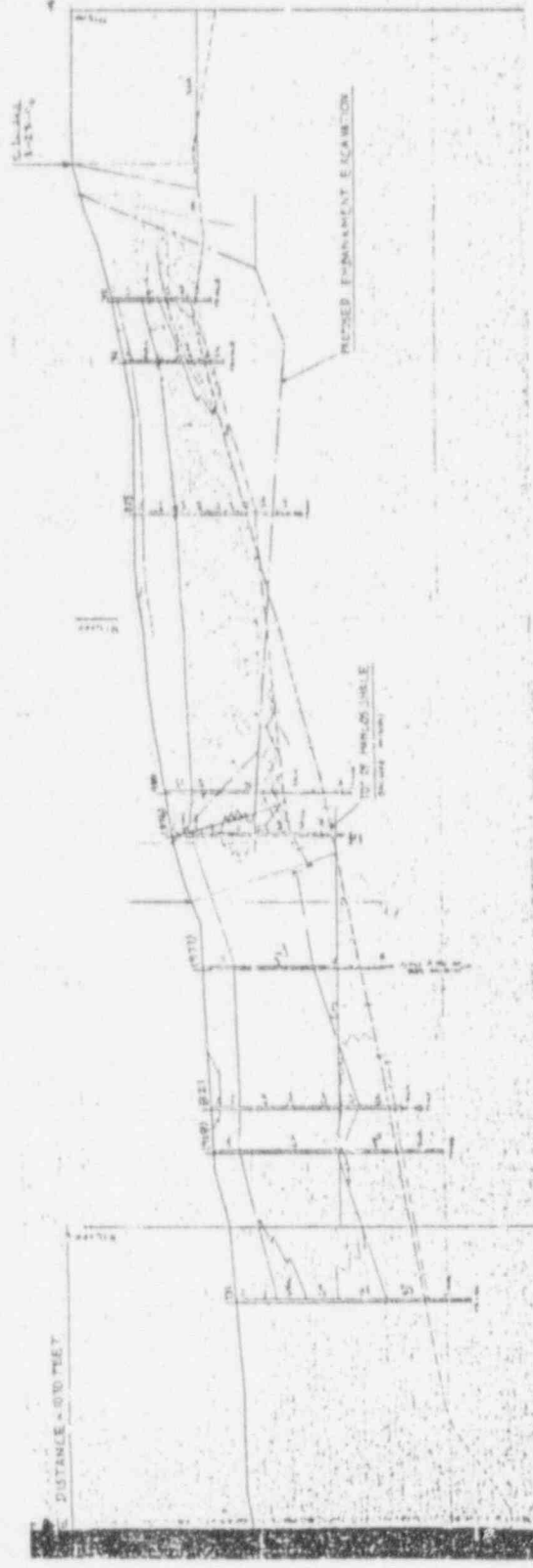
Job 13812
1" = 10' (H)
1" = 10' (V)
1" = 10' (H)
1" = 10' (V)

CROSS SECTION E 93400-93400

Project: UNITED STATES
Contract No. 15025-1

PROPOSED ELEVATIONS
15025-1
15025-1

FEB 25 1964



SEE PREVIOUS CALCULATION

DATA FROM: REF. 3

GRADUAL PASSING (%)

	(1)	3"	6"	9"	12"
SAMPLE 1	(96.34)	93.29	83.48	80.88	(89.7)
SAMPLE 2	(90.30)	90.33	87.19	80.31	(91.2)
SAMPLE 3	(91.20)	88.64	84.61	82.50	(93.1)
SAMPLE 4	(95.2)	93.35	90.21	86.64	(96.6)
SAMPLE 5	(95.2)	92.76	91.34	89.64	(96.3)

CONVERTED PASSING (%)

	(1")	(1 1/2")	3"	6"	9"	12"
SAMPLE 1	(100)	(96.6)	92	91.4	90.5	89.1
SAMPLE 2	(100)	(99.6)	99	95.6	88.6	11
SAMPLE 3	(100)	(93)	95.3	90.9	88.6	9.4
SAMPLE 4	(100)	(93.6)	96.6	91.4	89.7	8.9
SAMPLE 5	(100)	(93.3)	96	94.4	91.6	8.7
GAUGE	100	96.6	92	90.9	88.6	8.7
MEAN	100	98.2	95.3	93.5	90	8.22
S.D.	0	1.09	2.33	1.73	1.66	2.26
MEAN ± SD	100	99.29	98.35	95.23	91.66	10.48
MEAN - SEM	100	97.11	93.87	91.77	88.34	5.96
		97.71	94.27	92.73	89.26	7.21

SEM = 0.472 x S.D.



Project ULTRA - GRT Contract No. 5025-14 File No. _____
Feature CHENEY DISPOSAL SITE Designed W.L. Date 5-82-9
Item GRADATIONS Checked W.L. Date 7-2-82

PROPOSED GRADATION (DATA FROM REF. 3)
(4" - 9")

SAMPLE

SIEVE
SIZE

% RETAINED RETAINED PERCENT. PASSING PERCENTAGE

9"	0	0	100
3"	7.33	46*	54**
S-1 6"	1.81	12	42
5"	2.60	16	26
1"	<u>1.12</u>	26	0
	$\Sigma = 15.86$		

9"	0	0	100
3"	1.2	3	72
S-2 6"	3.14	20	72
5"	6.38	42	30
1"	<u>1.59</u>	30	0
	$\Sigma = 15.31$		

9"	0	0	100
S-3 3"	6.38	41	59
6"	4.08	26	33
5"	2.11	13	20
1"	<u>3.16</u>	20	0
	$\Sigma = 15.73$		

KEY:

* $\frac{7.33}{15.86} \times 100\% = 46\% \rightarrow \% \text{ RETAIN}$

** $\% \text{ PASSING} = 100 - 46 = 54\%$





MORRISON-KNUDSEN ENGINEERS, INC.

A MORRISON KNUDSEN COMPANY

Project INTRA - 227Contract No. 5025-16Sheet 31Feature CHEWY DISPOSAL SITEDesigned H. L.File No. Item GRADATIONSChecked S. L.Date 5-02-9Date 7-3-49

SAMPLE	SIZE	% RETAINED	RETAINED PERCENT	PASSING PERCENTAGE
	9"	0	0	100
	8"	4.65	28	72
(S-4)	6"	3.14	19	53
	5"	3.57	21	32
	4"	5.36	32	0
		<u>16.72</u>		
	9"	0	0	100
	8"	5.53	44	56
(S-5)	6"	1.62	13	43
	5"	1.70	14	29
	4"	3.64	29	0
		<u>12.54</u>		

PROPOSED GRADATION

(5" - 11")

SAMPLE	SIZE	% RETAINED	RETAINED PERCENT	PASSING PERCENTAGE
	11"	0	0	100
(S-1)	8"	7.33	63	37
	6"	1.81	15	22
	5"	2.6	22	0
		<u>11.74</u>		
	11"	0	0	100
	8"	1.2	11	39
(S-2)	6"	3.14	29	60
	5"	6.38	60	0
		<u>10.72</u>		





MORRISON-KNUDSEN ENGINEERS, INC.

A MORRISON KNUDSEN COMPANY

Project INTRA - 221Contract No. 5025-16

Sheet

32Feature CHENEY DISPOSAL SITEDesigned H. L.

File No.

Date 5-2-90Item GRADATIONSChecked ---Date 7.3.90

SAMPLE

5" - 11" CONT'D

SIZE	% RETAINED	RETAINED PERCENT	PASSING PERCENTAGE
------	------------	------------------	--------------------

11"	0	0	100
8"	6.38	51	49
6"	4.08	32	17
5"	2.11	17	0
Σ	12.57		

11"	0	0	100
8"	4.65	41	59
6"	3.14	28	31
5"	3.57	31	0
Σ	11.36		

11"	0	0	100
8"	5.58	63	37
6"	1.62	18	19
5"	1.70	19	0
Σ	8.90		



Project UNTER-GRJContract No 5025-16File No. Feature CHENEY DISPOSAL SITEDesigned H.L.Date 5-3-90Item GRADATIONSChecked K.L.Date 3-90PROPOSED GRADATION

(1" - 4")

SAMPLE

SIEVE
SIZE% RETAINEDRETAINED PERCENTPASSING PERCENTAGE

S-1	4"	0	0	100
	3"	4.56	19	81
	2"	8	33	48
	1"	11.75	48	0
		$\Sigma = 24.31$		

S-2	4"	0	0	100
	3"	4.95	28	72
	2"	4.64	26	46
	1"	3.24	46	0
		$\Sigma = 17.83$		

S-3	4"	0	0	100
	3"	3.34	18	82
	2"	7.16	38	44
	1"	8.46	44	0
		$\Sigma = 18.96$		

J-1	4"	0	0	100
	3"	4.81	17	83
	2"	10.37	36	47
	1"	13.68	47	0
		$\Sigma = 28.86$		





MORRISON-KNUDSEN ENGINEERS, INC.
A MORRISON-KNUDSEN COMPANY

Project DMTIA - GRT

Contract No. 5025-16

Sheet 34

Feature CHEWY SITE

Designed H. L.

File No. _____

Item GRADATIONS

Checked [Signature]

Date 7/3/90

Gradation 1" - 4" Continued

27447

(5-5)

sieve size	% RETAINED	RETAINED PERCENT.	PASSING PER
4"	0	0	100
3"	4.41	21	79
2"	6.26	30	49
1"	10.53	49	0
	$\Sigma = 21.2$		

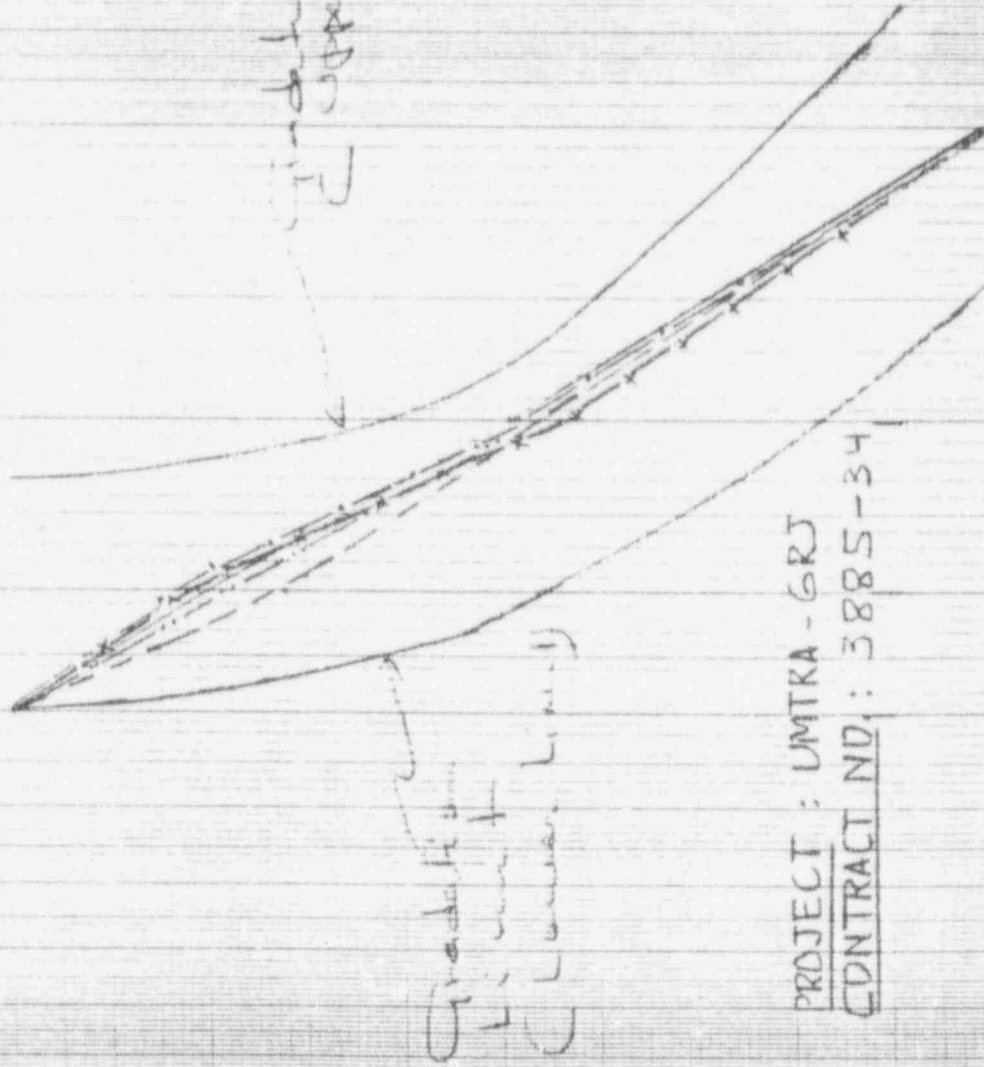


TYPE A RIPRAP

GRADATION RANGE: 1"-4"

KEY:

- S-1
- S-2
- S-3
- S-4
- S-5



PROJECT: UMTKA-6RJ

CONTRACT NO.: 3885-34

TYPE A

US STANDARD SIEVE SIZE
SQUARE OPENINGS

4" 3" 2" 1 1/2" 1"

PERCENT
PASSING
BY WEIGHT

100
45-100
17-60
0-100
0

SIEVE OPENING, INCHES

SEE 513

SEE 513

SEE 513

563.75
0 H.L. 7.1
3.3

% PASSING

100

60

45

20

TYPE B RIPRAP

GRADATIONS RANGE: 4"-9"

KEY:

- S-1
- S-2
- - - S-3
- ... S-4
- S-5

TYPE B

US STANDARD SIEVE SIZE
SQUARE OPENINGS

0"
0.075"
0.15"
0.3"
0.6"
1.18"
2.0"
4.75"
9.5"
19"
37.5"
75"
150"
300"

PERCENT
PASSING
BY WEIGHT

100
40-100
10-70
0-30
0-5

100
20
0
20
0
100

Sh. 3
H.L. 7.5
S. 7.0

PROJECT : UMTRA - GRJ
CONTRACT NO. : 3885-34
MAY 3, 1990

SIEVE OPENING, INCHES

10 05 00 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

46 5133

100 95 90 85 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0

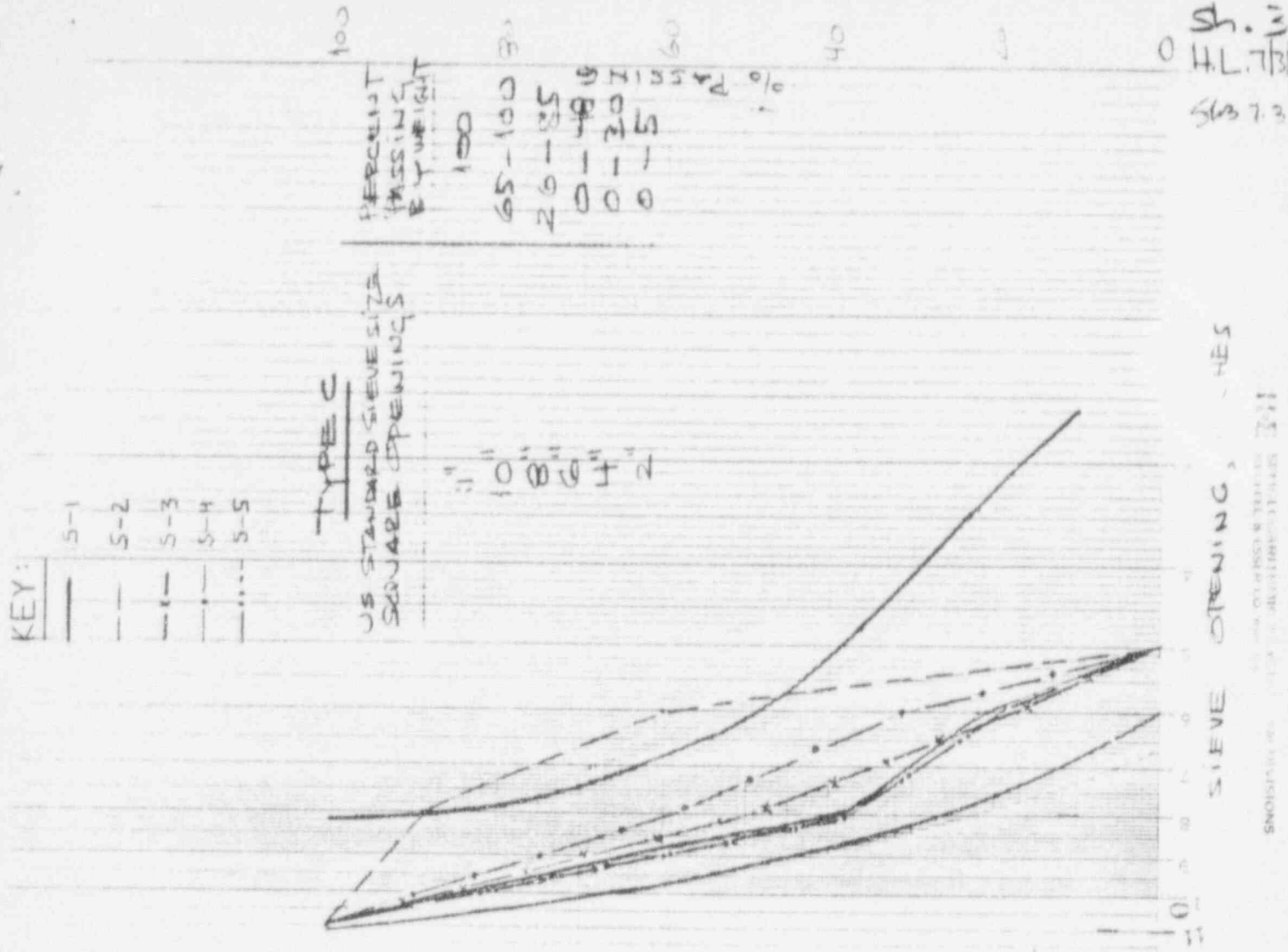
TYPE C RIPRAP

GRADATION RANGE: 5'-11"

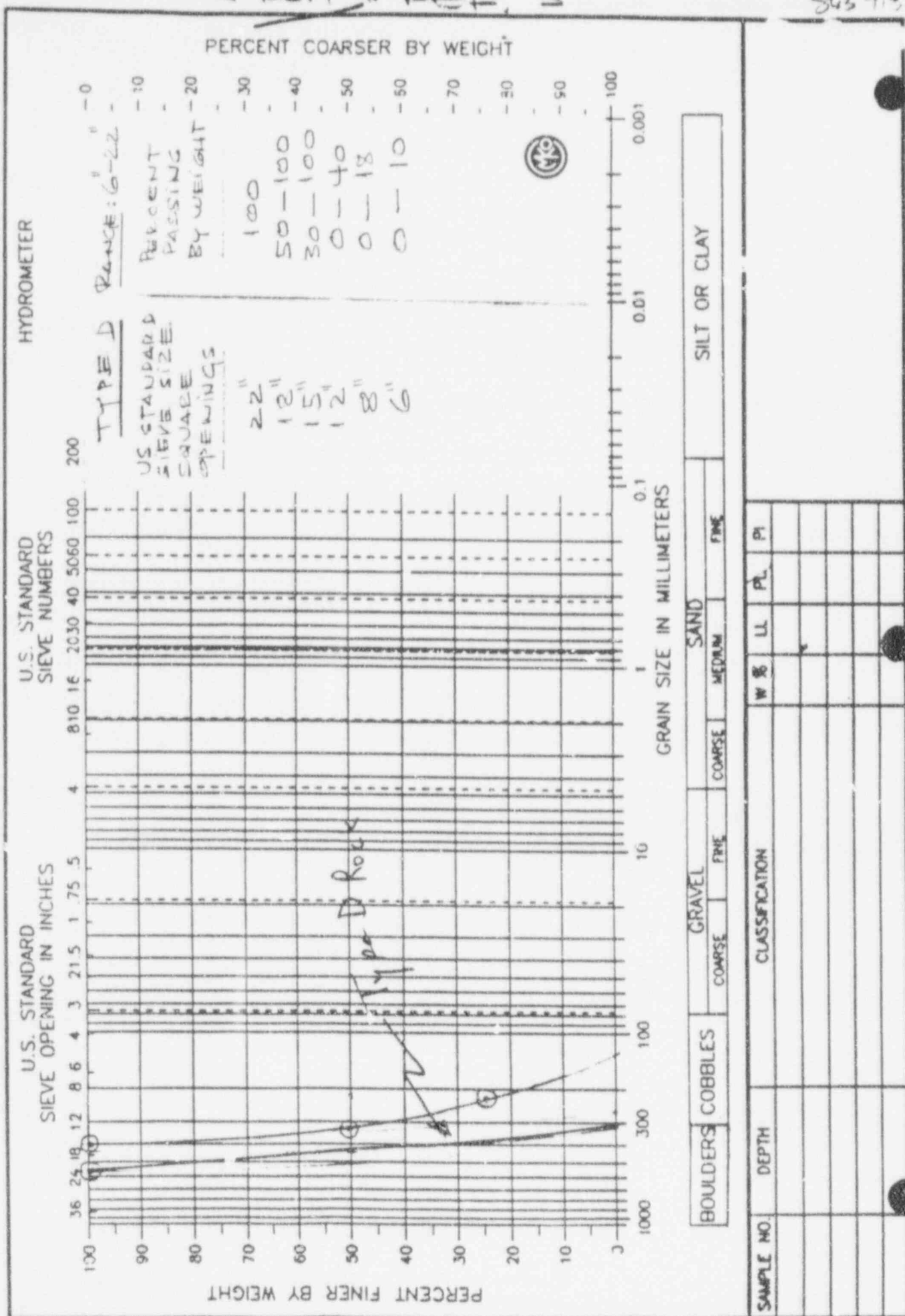
PROJECT : UMTRA - GRJ

CONTRACT NO. : 3885 - 34

MAY 3, 1990



Sh 37A H.L.71
543 713.0

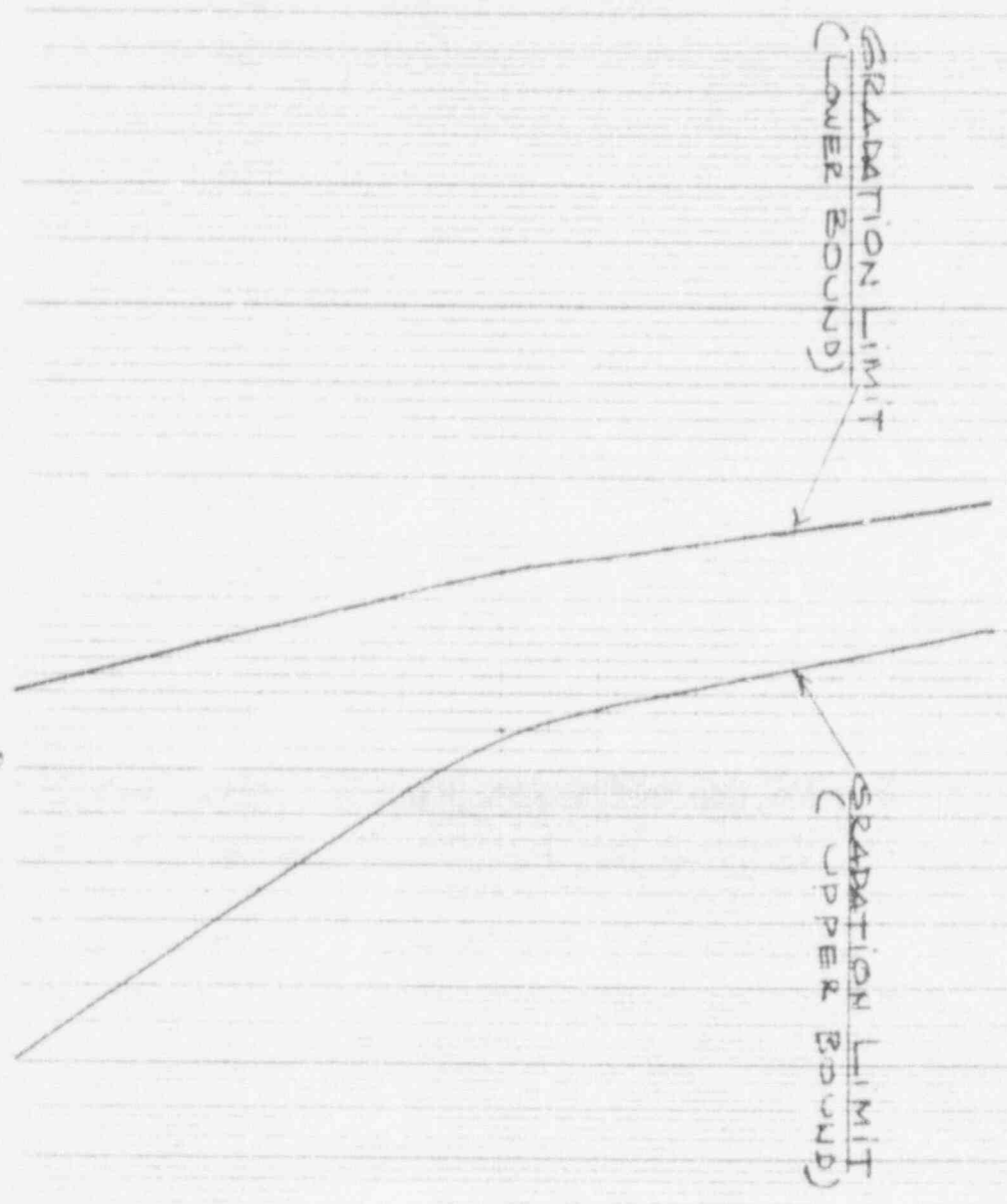


REV. 1

UMTR-GRJ
 8885-34
 HL 11/5/91

TYPE III RIPRAP
 (FROM REF. 7, SH. 48)

GRADATION RANGE: 5"-19"



TYPE III
 U.S. STANDARD SIEVE SIZE
 SQUARE OPENINGS

SIEVE SIZE	% PASSING
5"	100
9"	85-100
12"	39-100
15"	0-67
19"	0-37

PERCENT
 PASSING
 WEIGHT

% PASSING

SECTION 501.1.1.1

UNIT 1A RT
Y II SITE
VARIATION QUANTITY

Contract No. 5025-16
Designed SEA
Checked JAE

File No.
Date 5/4/90
Date 5/4/90

IN	AREA	AVE AREA	DISTANCE	VOLUME
	14585			
		16725	200	3345000
	16864			
		17337	200	3467400
	17809			
		15825	200	3165000
92800	13341			
		14345	200	2869000
93000	14849			
		16988	400	6795200
93400	19127			
				19641600 FT ³
CR				727467
11000	8602			
		7641	200	1528200
11200	6680			
		8413	200	1692600
11400	10245			
		9223	200	1844600
11600	8200			
		12377	200	2475400
11800	16554			
		15500	200	3100000
12000	14446			
		17670	200	3534000
12200	20894			
		18484	200	3696800
12400	16073			
		14609	200	2921800
12600	13144			

20793400 FT³

770,126 CY

CHANGE
SCALE



Project UMTRA-GRJ
Feature CHENEY DISPOSAL SITE
Item GRADATIONS

Contract No. 5025-16
Designed PS
Checked CLW

Sheet 39
File No. _____
Date 4/25/90
Date 7-3-90

Assume available volume of gravelly soil (upto 14-inch) = 700,000 cy

1'-3" - Use 14 pct ----- 98,000 cy
 ↳ (From Sh. 27, use 14% instead of 17%
 Due to discrepancy explained on Sh. 7)

3'-8" - Use 10 pct ----- 91,000 cy
 ↳ (From Sh. 27)

5'-12" - Use 8 pct ----- 56,000 cy
 ↳ (From Sh. 27)

1'-4" - Use 20 pct ----- 140,000 cy
 ↳ (From Sh. 27)

4'-9" - Use 10 pct ----- 70,000 c.y.
 ↳ (From Sh. 27, use 10% instead of 11%)

5'-11" - Use 7 pct ----- 49,000 c.y.
 ↳ (From Sh. 28)

11" ± - For Type I, Type E Riprap
 Assume 3% ----- 21,000 c.y.

REV. IHL 1/16/





MORRISON-KNUDSEN ENGINEERS, INC.

Project

Feature

Item

Contract No. 5025-11

Designed She

Checked Re

Sheet

File No.

Date 5/4/90

Date 5/4/90

LINE VOLUME

SECTION	AREA	AVE. AREA	DISTANCE	VOLUME
92200	19731	15749	200	3149600
92900	11764	10765	200	2153000
92600	9765	8587	200	1717400
2800	7409	5379	200	1075800
93000	3348	3302	400	1320800

Change
made

93400 13255

9416600 FT³

OR

348763 CY

11000	3673	4758	200	951600
11200	5843	6037	200	1207400
11400	6231	6092	200	1218400
11600	5952	5611	200	1122200
11800	5270	6890	200	1378000
12000	8509	7657	200	1531400
12200	6804	9517	200	1903400
12400	12230	7588	200	1517600
12600	2945			

10830000 FT³





MORRISON-KNUDSEN ENGINEERS, INC.
A MORRISON KNUDSEN COMPANY

Project UMTRA - GRJ
Feature QUANTITY ESTIMATE
Item _____

Contract No. 3125
Designed GAR
Checked (S.P.C.)
Sheet 41
File No. 212
Date 6-12-90
Date 6-13-90

I EXCAVATION OF MANCOS SHALE

FROM REF. 1

CONTINU	AREA (ft^2)	AUG. AREA	DEPTH (ft)	VOLUME (ft^3)
5165	58400	182960	5	914800
5170	307520	405800	5	2029000
5175	504080	548440	5	2742200
5180	592800	504800	10	5048000
5190	416800	416000	10	4160000
5190	415200	293800	10	2938000
5210	172400	125800	10	1258000
5220	79200			

$$\Sigma = 19,090,000 \text{ ft}^3$$

$$= 707,037 \text{ yd}^3$$

G Mancos deeper

REV. 3
H.L. 8/1/90
SMB 8.2.90

$$2,057,64 \left(\frac{G}{21} \right) = 457,148 \text{ CY}$$

$$\text{Total} = 707,037 + 457,148$$

$$= 1,164,185 \text{ CY}$$



