

October 7, 2016

Tennessee Valley Authority
1101 Market Street
Chattanooga, Tennessee 37402

**Existing Liner Assessment
Bottom Ash Pond
EPA Final CCR Rule
TVA Gallatin Fossil Plant
Sumner County, Tennessee**

1.0 PURPOSE

This letter documents AECOM's certification of the existing liner assessment for the TVA Gallatin Fossil Plant's Bottom Ash Pond.

2.0 EXISTING LINER ASSESSMENT

As required in 40 CFR 257.71, an existing surface impoundment must be evaluated as to whether or not it was constructed with a liner as described in 40 CFR 257.71(a)(1)(i)-(iii).

3.0 SUMMARY OF FINDINGS

The attached report presents the analysis for the existing liner assessment. The results demonstrate that the Ash Pond Complex does have naturally occurring clay soils with thickness ranging from 0.3 foot to 45.9 feet with an average thickness of 15.8 feet. Furthermore, the clay thickness at 80% of the sampled locations varies in thickness from 2.8 feet to 29.5 feet. The permeability of the clay soils varies from 3.01×10^{-7} cm/sec to 1.16×10^{-8} cm/sec. However, the impoundment was not constructed with one of the liner systems described in 40 CFR 257.71(a)(1). Additional information regarding the naturally occurring clay soils is described in the attached report.

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4.0 QUALIFIED PROFESSIONAL ENGINEER CERTIFICATION

I, Gabriel W. Lang, being a Professional Engineer in good standing in the State of Tennessee, do hereby certify, to the best of my knowledge, information, and belief:

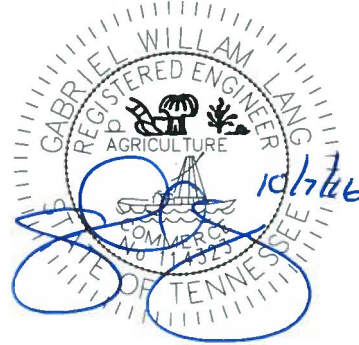
1. that the information contained in this certification is prepared in accordance with the accepted practice of engineering;
2. that the information contained herein is accurate as of the date of my signature below; and
3. that the TVA Gallatin Fossil Plant's Bottom Ash Pond is considered an unlined CCR surface impoundment as described in 40 CFR 257.71(a)(3).

SIGNATURE  DATE 10/7/2016

ADDRESS: AECOM
1600 Perimeter Park Dr. Ste. 400
Morrisville, NC 27560

TELEPHONE: (919) 461 1100

ATTACHMENTS: Liner Design Demonstration (40 CFR §257.71) for Coal Combustion Residuals (CCR)



COAL COMBUSTION PRODUCT DISPOSAL PROGRAM

TENNESSEE VALLEY AUTHORITY – BOTTOM ASH POND
SUMNER COUNTY, TENNESSEE

LINER DESIGN DEMONSTRATION (40 CFR §257.71) FOR COAL COMBUSTION RESIDUALS (CCR) EXISTING SURFACE IMPOUNDMENTS- GALLATIN FOSSIL PLANT

Prepared for



Tennessee Valley Authority
1101 Market Street
Chattanooga, TN 37402-2801

October 7, 2016 – Rev0

Prepared by





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Appendix A Historical Drawings

1.0 BACKGROUND

1.1 INTRODUCTION

On April 17, 2015 the Disposal of Coal Combustion Residuals (CCR) from Electric Utilities (EPA Final CCR Rule) was published in the Federal Register. AECOM was contracted by the Tennessee Valley Authority (TVA) to demonstrate liner design criteria for the Gallatin Fossil Plant (GAF) Bottom Ash Pond, which is an existing CCR surface impoundment, and evaluate compliance relative to §257.71 of the EPA Final CCR Rule.

The GAF facility is located at 1499 Steam Plant Road in Sumner County, Tennessee on the north bank of the Cumberland River, approximately four miles southeast of the center of the City of Gallatin. The property occupies approximately 1,730 acres of land along the Cumberland River (Old Hickory Lake). Plant facilities are located on the south portion of the peninsula.

1.2 OBJECTIVE

The objective of this demonstration is to evaluate compliance related to §257.71, specifically whether Bottom Ash Pond was constructed with one of the following:

- A liner consisting of a minimum of two feet of compacted soil with a hydraulic conductivity of no greater than 1×10^{-7} cm/sec;
- A composite liner that meets the requirements of § 257.70(b); or
- An alternative composite liner that meets the requirements of § 257.70(c).

The Rule was clarified by the EPA during a presentation on April 15, 2015 titled, “Top 20 Questions on EPA’s CCR Final Rule”. First, an existing natural clay layer, regardless of its hydraulic conductivity, does not meet the Rule as an acceptable clay liner. Second, “compacted soil” means soil that is mechanically compacted in lifts.

1.3 SUMMARY OF HISTORICAL INFORMATION

Construction of Ash Disposal Area No. 3, known today as the Ash Complex, began with the construction of Dike C in 1953. Dike C was built to create a point of access to the future barge unloading area, Drawing 10N500 R2, which can be found in **Appendix A**, shows the construction plan for Dike C.

In 1969, dikes A, B, and D, which are shown in 10W271 Rev 7 and 10N240 R0, were constructed to an elevation of 460 feet to create the early stages of Ash Disposal No. 3 storage area (the current Ash Pond Complex). TVA Drawings 10N200 and 10W271 R7 can also be found in **Appendix A**.

In 1978, divider dikes were constructed that created the Pond Complex which consists of Ash Pond A, Middle Pond A, Bottom Ash Pond, Fly Ash Pond E. Historical drawing 10W271 Rev 7 shows the location of the divider dikes that were constructed in 1978.

2.0 FIELD INVESTIGATION

Historical field investigations indicate the thickness of the native soils above bedrock at the Ash Pond Complex range from approximately 0.3 foot to 45.9 feet with an average thickness of 15.8 feet. Furthermore, the clay thickness at 80% of the sampled locations varies in thickness from 2.8 feet to 29.5 feet. The permeability of the clay soils varies from 3.01×10^{-7} cm/sec to 1.16×10^{-8} cm/sec. Additional field explorations were not conducted as part of this evaluation.

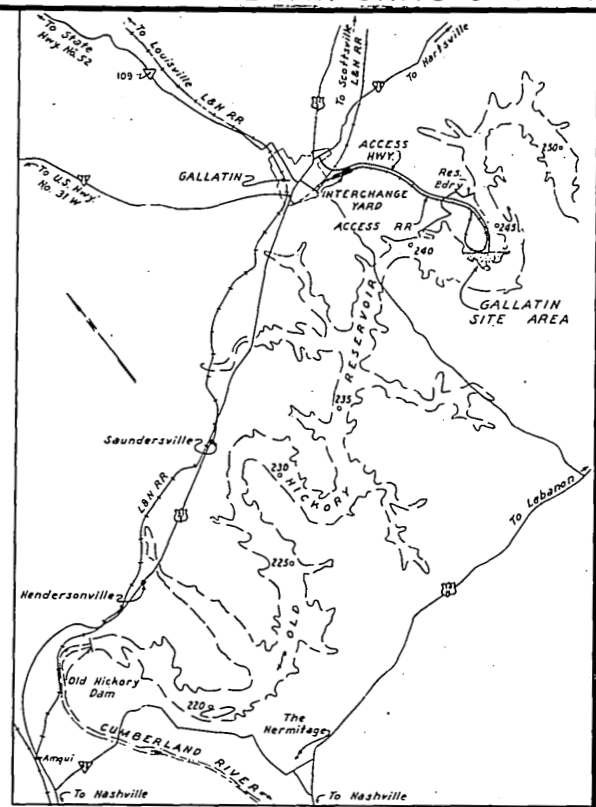
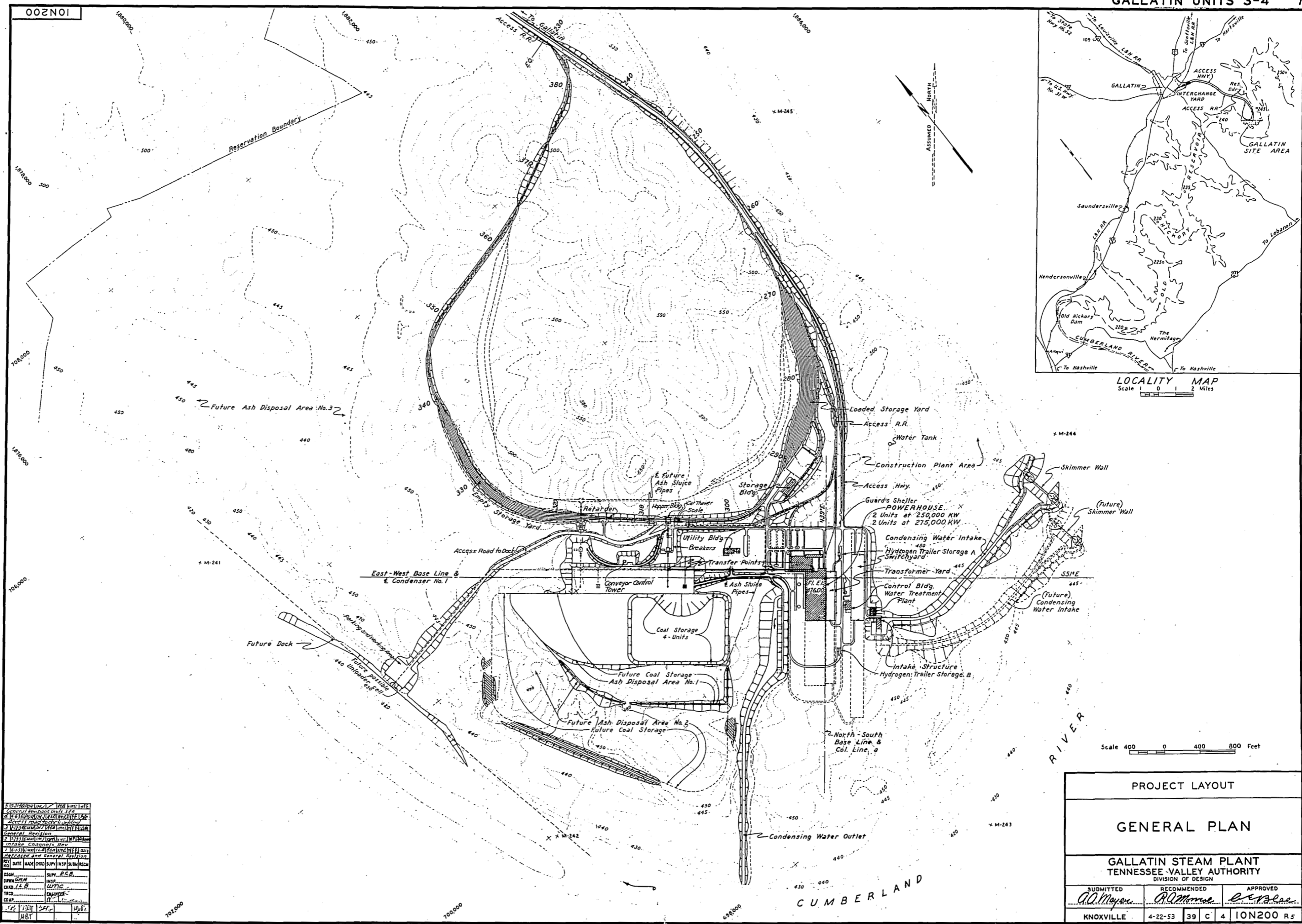
3.0 CONCLUSION

Historical construction documents were reviewed in order to evaluate status relative to the EPA Final CCR Rule criteria. Based on our review natural clay soils do exist with a thickness ranging from 0.3 to 45.9 feet and permeability ranging from 3.01×10^{-7} cm/sec to 1.16×10^{-8} cm/sec. However, Bottom Ash Pond at Gallatin Fossil Plant was not constructed with a liner that complies with the requirements of §257.71 of the EPA Final CCR Rule. This unit is therefore an unlined surface impoundment in accordance to the EPA Final CCR Rule and is allowed to remain in operation in compliance with the requirements of §257.101(a).

4.0 REFERENCES

URS (2012). Ash Pond A and E Dikes. Geotechnical Site Evaluation Report. Gallatin Fossil Plant. Sumner County, Tennessee. Prepared for Tennessee Valley Authority, December 20, 2012.

APPENDIX A – HISTORICAL DRAWINGS



DESIGNED BY	DATE	BY	DATE
CHECKED BY	DATE	BY	DATE
APPROVED BY	DATE	BY	DATE
DATE	BY	DATE	BY

PROJECT LAYOUT

GENERAL PLAN

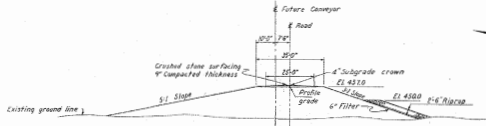
GALLATIN STEAM PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF DESIGN

SUBMITTED	RECOMMENDED	APPROVED
<i>A. D. Meyer</i>	<i>R. A. Moore</i>	<i>E. C. Blease</i>

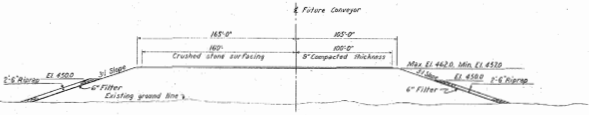
KNOXVILLE 4-22-53 39 C 4 10N200 R5

RECORD DRAWING AS CONSTRUCTED

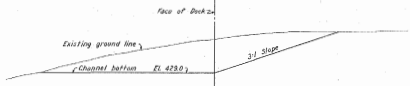
00501



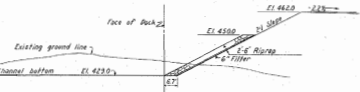
SECTION D-D
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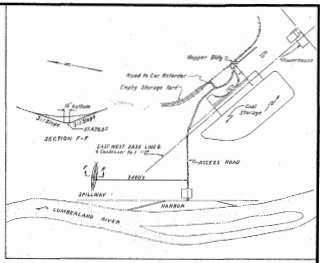
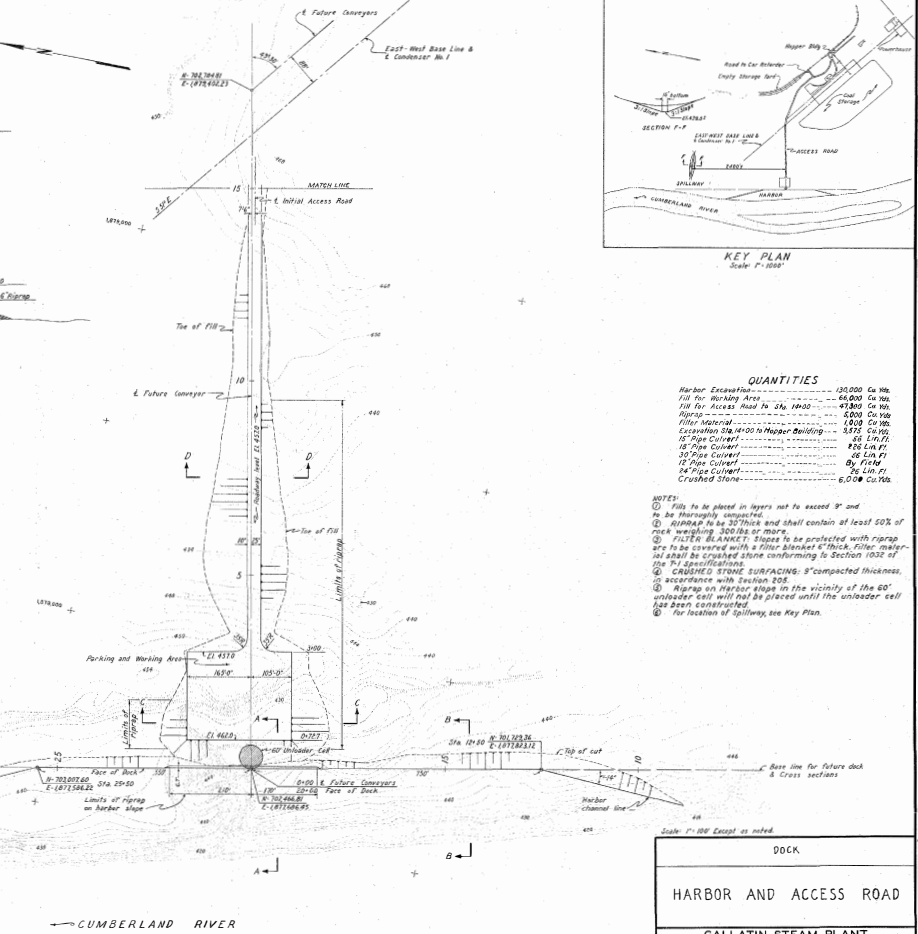
SECTION C-C
Scale 1"=40'



SECTION B-B
Scale 1"=20'



SECTION A-A
Scale 1"=20'



KEY PLAN
Scale 1"=1000'

QUANTITIES

Harbor Excavation	10000 Cu Yds.
Fill for Working Area	6000 Cu Yds.
Fill for Access Road to Sta. 10+00	4700 Cu Yds.
Riprap	5000 Cu Yds.
Filter Material	1000 Cu Yds.
Excavation on Riprap on Harbor Bankings	3500 Cu Yds.
18" Pipe Culvert	30 Lin. Ft.
18" Stone Culvert	30 Lin. Ft.
18" Pipe Culvert	25 Lin. Ft.
18" Stone Culvert	25 Lin. Ft.
24" Pipe Culvert	25 Lin. Ft.
Crushed Stone	6,000 Cu Yds.

NOTES:

1. Fills to be placed in layers not to exceed 9" and to be thoroughly compacted.
2. Riprap to be 30" thick and shall contain at least 50% of rock weighing 300 lbs. or more.
3. FILTER BLANKETS: Slopes to be protected with riprap are to be covered with a filter blanket 6" thick. Filter material shall be crushed stone conforming to Section 1032 of the P.I. Specifications.
4. CRUSHED STONE SURFACING: 9" compacted thickness, in accordance with Section 1035.
5. Sharp on interior slope in the vicinity of the 60" unloader cell will not be placed until the unloader cell has been constructed.
6. For location of spillway, see Key Plan.

DESIGNED BY	CHAS. E. COOPER
CHECKED BY	W. H. COOPER
DATE	10-27-25
SCALE	AS SHOWN
PROJECT	PORT OF GALLATIN
DRAWING NO.	10N520-525, 530, 533

Scale 1"=100' except as noted.

DOCK

HARBOR AND ACCESS ROAD

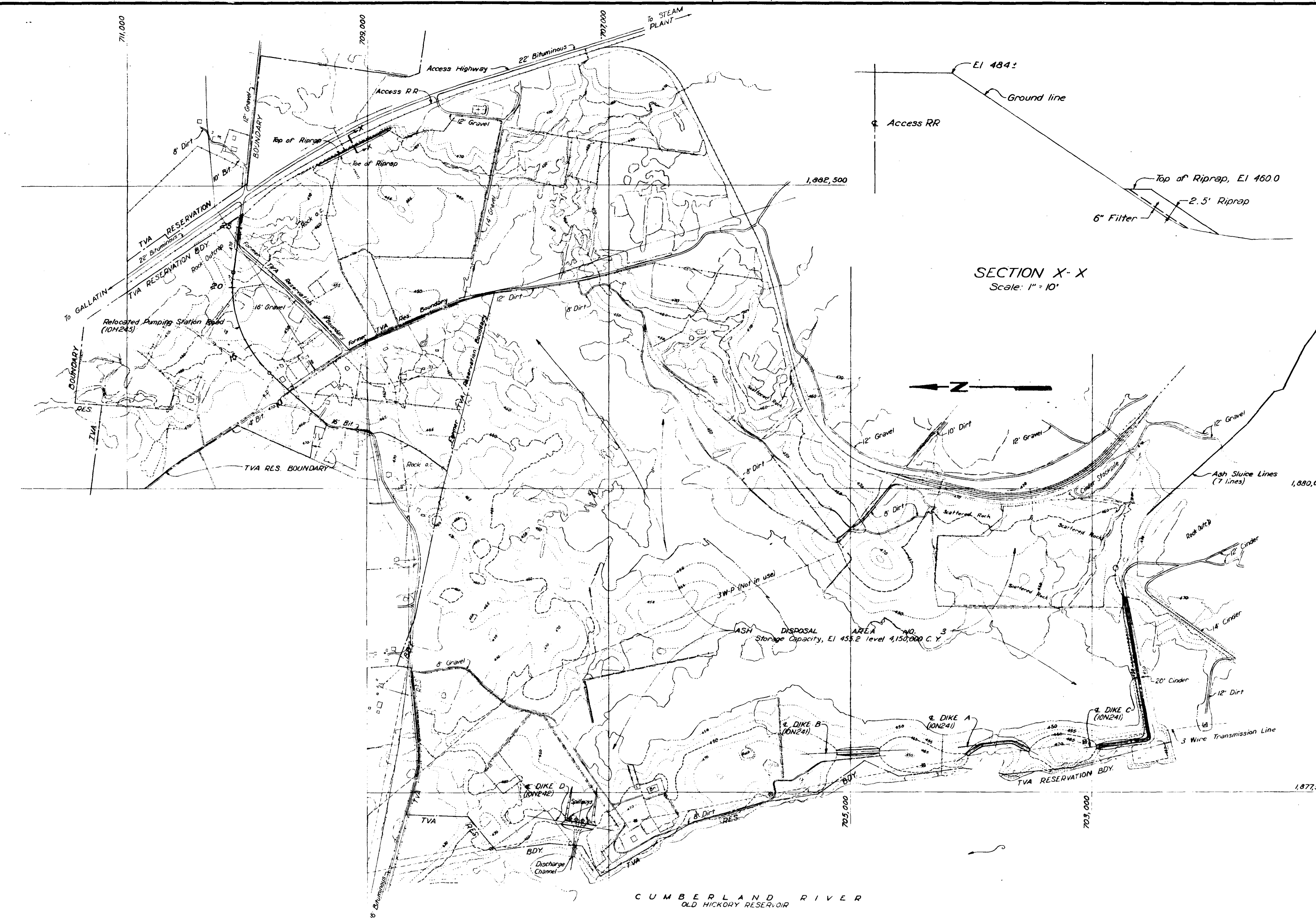
GALLATIN STEAM PLANT
TENNESSEE VALLEY AUTHORITY

DIVISION OF DESIGN

SUBMITTED	RECOMMENDED	REVISED	APPROVED
W. H. COOPER	W. H. COOPER	W. H. COOPER	W. H. COOPER
KNOXVILLE	10-27-25	39	C 4 10N500R1

RECORD DRAWING AS INDICATED

Printed at the University of Tennessee Press, Knoxville, Tennessee



SECTION X-X
Scale: 1" = 10'

- NOTES:
- 1-All work shall be in accordance with T-1 Specifications except as noted.
 - 2-For general soils information, see Soils Exploration Report in memorandum, J. C. McCraw to F. P. Lacy dated September 24, 1969.
 - 3-Cut slopes adjacent to Proposed Dikes shall not be excavated steeper than 3:1 and top of cut shall be a minimum of 25' from the toe of the dike.
 - 4-Dike foundations shall have all weak surface soils removed to material that will easily bear the weight of loaded rubber-tired earth hauling equipment.
 - 5-Earth fill compaction shall be done with sheepfoot rollers and shall be at least 95% of Standard Proctor maximum density (ASTM D698) as established by the Materials Laboratory. Compaction shall be checked by at least one density-moisture test per day. Fill moisture shall be controlled to achieve optimum compaction.
 - 6-With the exception of the useable material from the discharge channel, all borrow shall come from inside the Proposed Ash Disposal Area and below EI 450, if possible. Borrow Areas are outlined in The Soil Report.
 - 7-Dike "A" is to be constructed last. Rockfill cofferdikes are to be built at toes of dike as shown in SECTION A-A (ION241), compacted with tractors, compaction beginning at lowest practical elevation for the operation of equipment. Area between cofferdikes is to be pumped free of water for construction of earth dike.
 - 8-RIPRAP shall be placed at locations as shown. At least 50 percent of the riprap shall consist of stone of a weight equal to or greater than 375 lbs. for Dike "C" and along the existing railroad and 270 lbs. for Dike "A" and Dike "D". Riprap shall conform to Section 830.
 - 9-FILTER BLANKET shall be 6" thick and in accordance with Section 836.

SUMMARY OF QUANTITIES		
ITEM NO.	DESCRIPTION	QUANTITY
101	Clearing	79 Ac.
120	Unclassified Excavation (shown arrow)	3,600 C.Y.
	Channel Excavation - Earth	5,350 C.Y.
	Channel Excavation - Rock (to be used & DIKE "A" IN COFFERDICES)	900 C.Y.
	Rock Excavation - Borrow	1,000 C.Y.
123	Earth Borrow	8,500 C.Y.
129	Excavation for Structures	400 C.Y.
130 & 132	Seeding & Mulching	8,000 S.Y.
	Surfacing (Ash, Slop, Gravel or Crushed Stone)	720 Tons
810	Steel Beam-Type Guardrail	575 L.F.
830	Riprap	2,500 C.Y.
836	Filter Blanket	750 Tons

Scale: 1" = 400'
Except as noted

MAIN PLANT

PLAN

ASH DISPOSAL AREA NO. 3

GALLATIN STEAM PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

SUBMITTED	RECOMMENDED	APPROVED
<i>J.M. Lantz</i>	<i>W. J. Calvert</i>	<i>F.P. Lacy</i>
KNOXVILLE	11-1-69	39 C 4 ION240 R O

RECORD DRAWING AS CONSTRUCTED

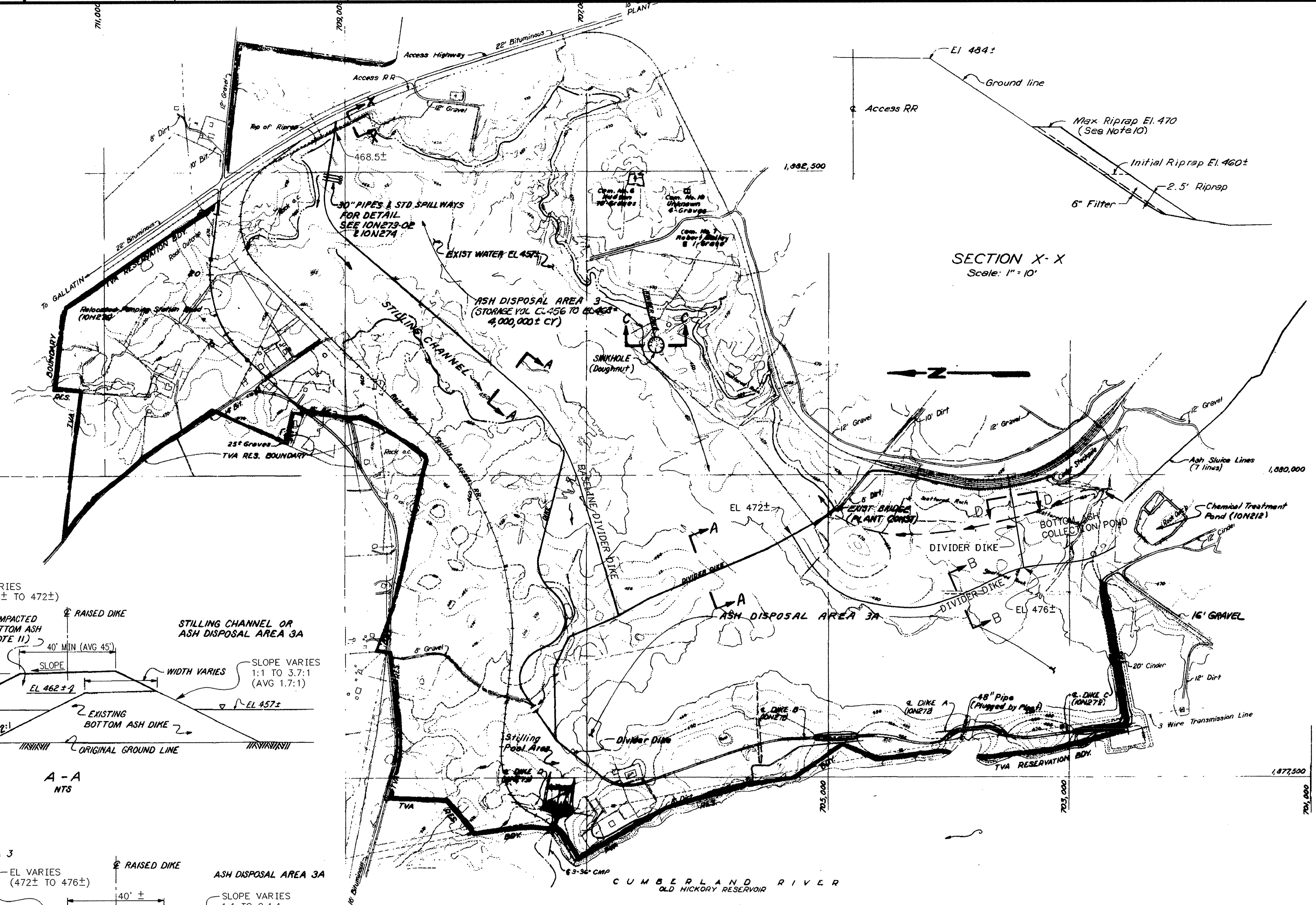
COMPANION DRAWINGS: 10N241 thru 243 & 10H244

DATE	MADE	CHKD	SUPV	INSP	RECM

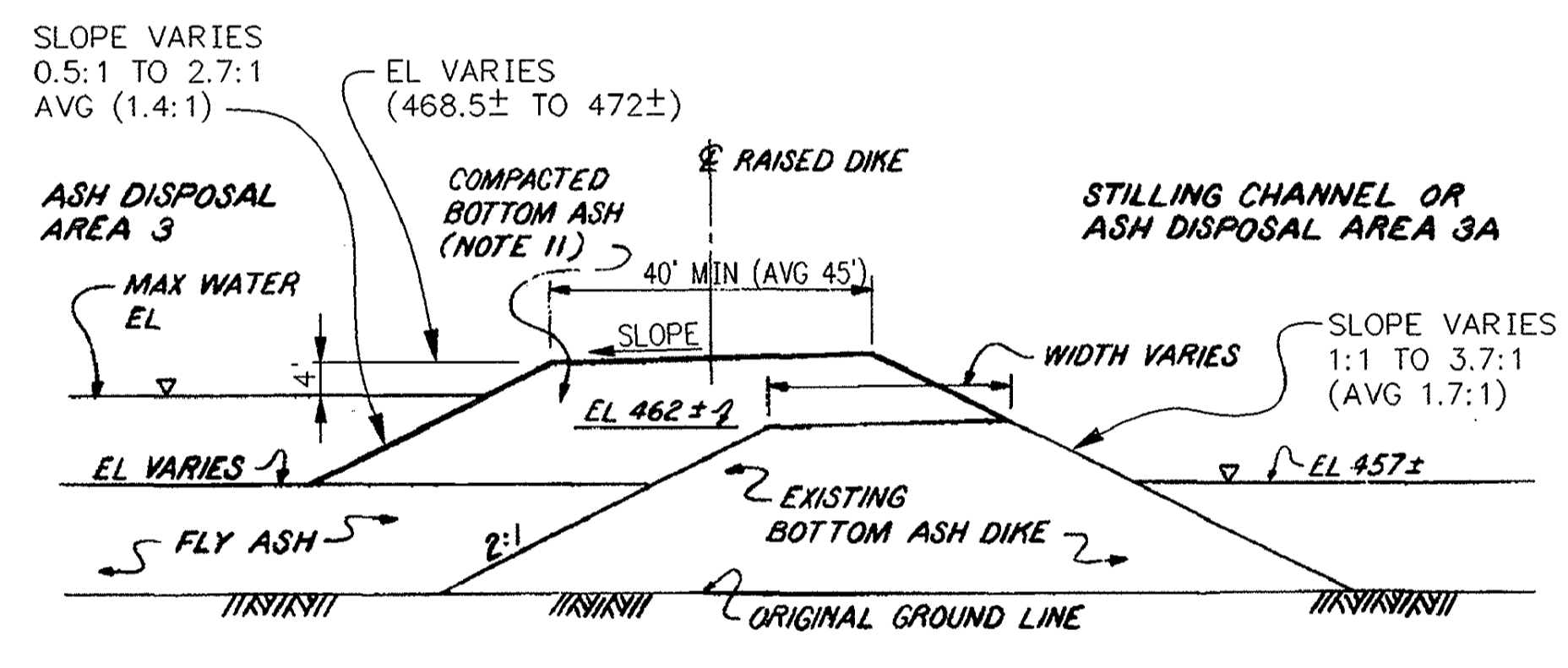
DESIGNED: W.L.G.
 DRAWN: W.L.G.
 CHECKED: W.L.G.
 ENGINEER: W.L.G.
 SUPV: P.H.S.
 INSP: W.S.
 RECM: W.L.G.

ME 70

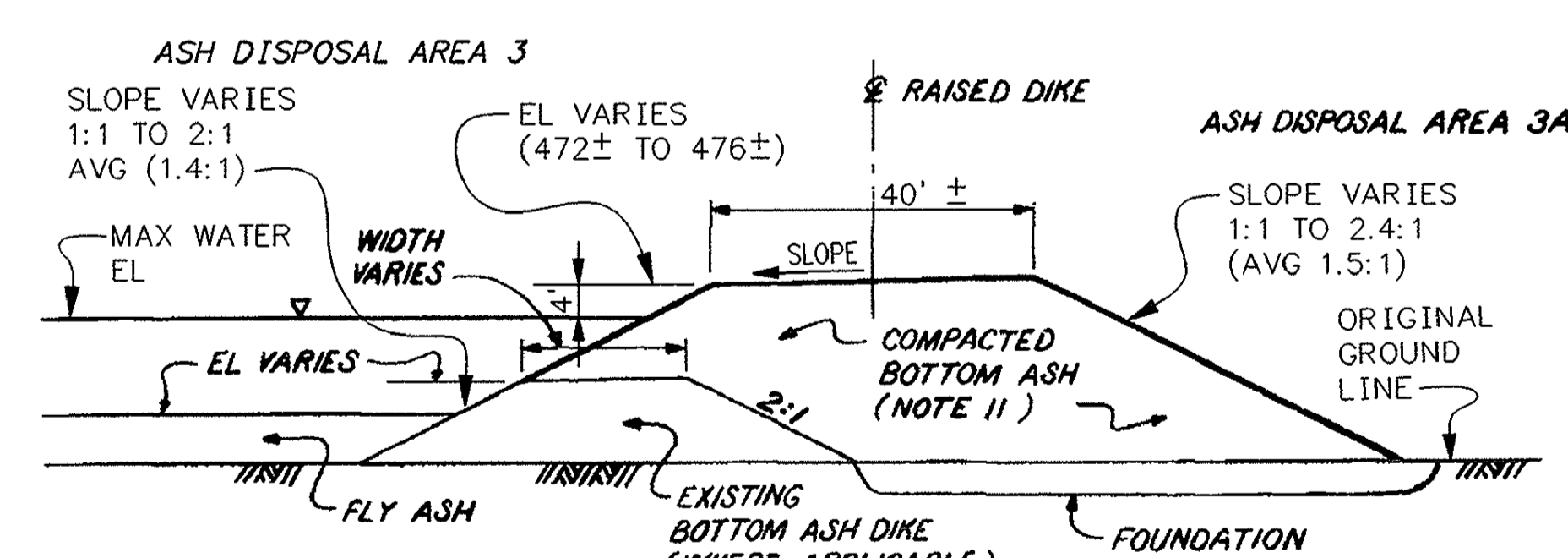
A
B
C
D
E
F
G
H



SECTION X-X
Scale: 1" = 10'

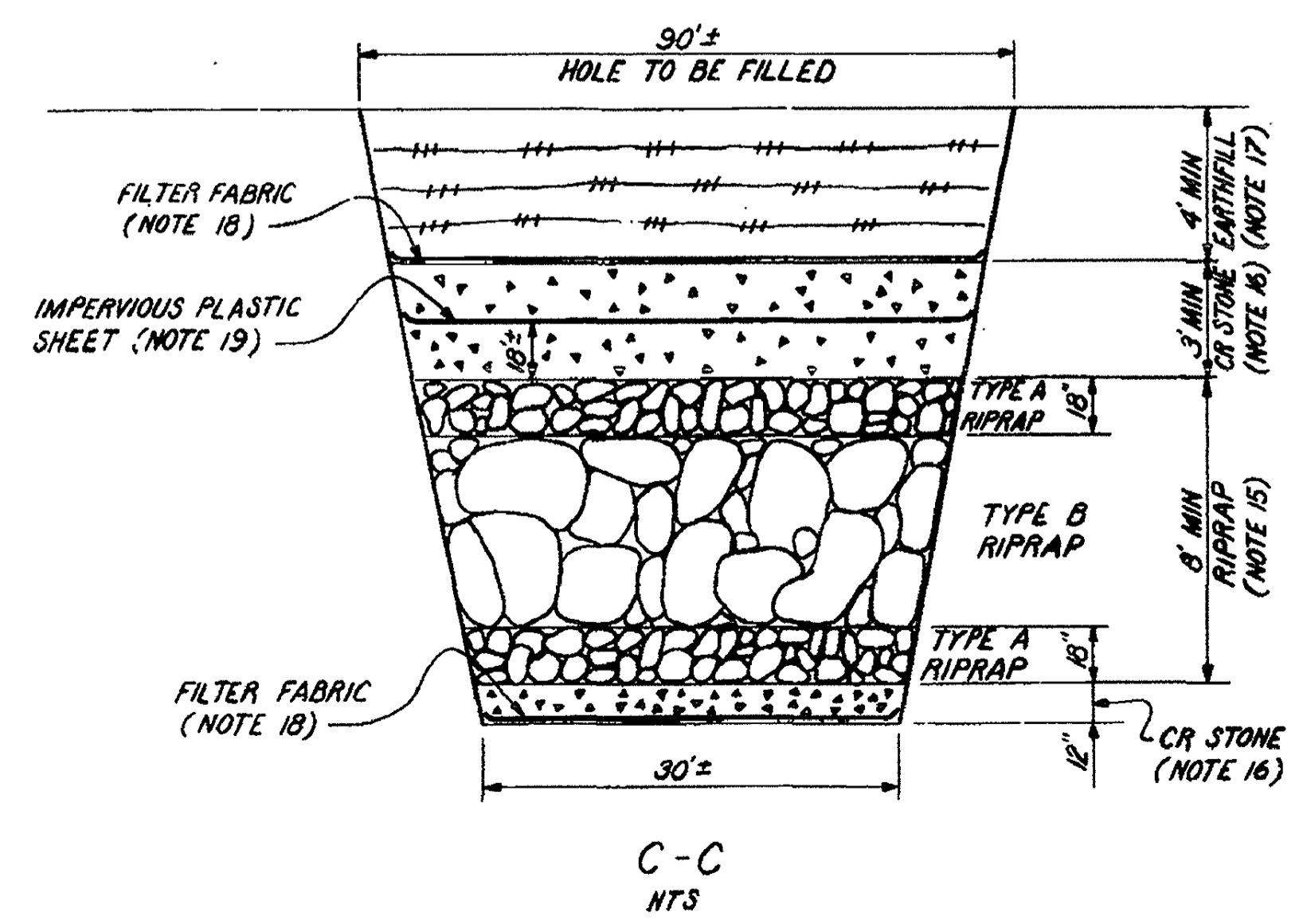


A - A
NTS



B - B
NTS

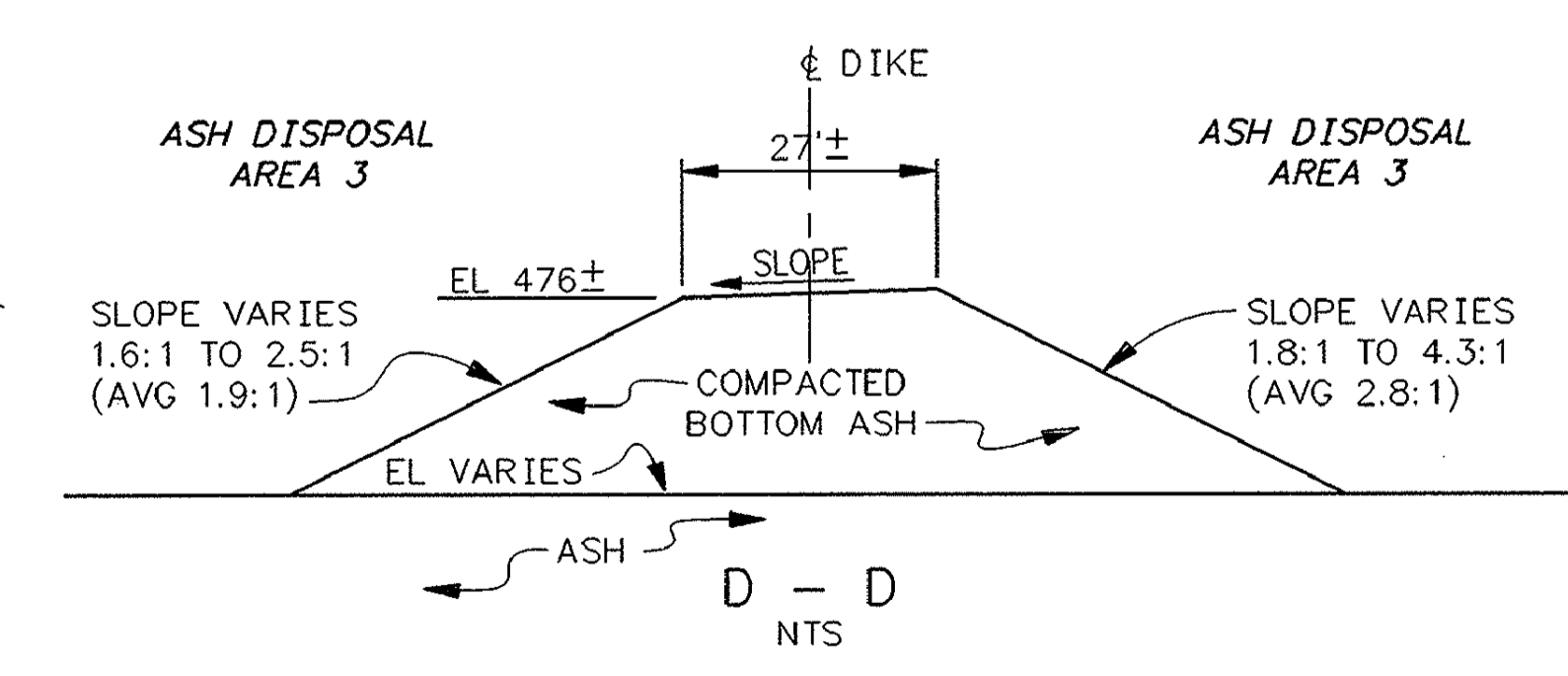
PERCENT PASSING BY WEIGHT	MIN		MAX	
	15"	12"	90	100
12"	75	95		
6"	55	80		
3"	30	55		
1 1/2"	10	22		
3/8"	0	15		



C - C
NTS

* FOR 1986 CONSTRUCTION SEE 10N273-2 & 274

ITEM NO.	DESCRIPTION	QUANTITY
101	Clearing	79 AC.
120	Unfinished Excavation (any area)	3,800 C.Y.
	Channel Excavation - Earth	5,650 C.Y.
	Channel Excavation - Rock (to be used @ 10% MIN. CORRELATION)	300 C.Y.
	Rock Excavation - Borrow	1,000 C.Y.
123	Earth Borrow	3,500 C.Y.
129	Excavation for Structures	350 C.Y.
130 & 132	Seeding & Mulching	8,080 S.Y.
	Subbase/Slag, Gravel or Crushed Stone	780 Tons
310	Steel Beam-Type Guardrail	573 L.F.
330	Riprap	2,570 C.Y.
335	Filter Blanket	750 Tons
602	48" Reinf. Conc. Pipe - Class III - O.R. Gaskets	136 L.F.
	Ash Fill - For Raising Divider Dikes	360,000 CY



D - D
NTS

- NOTES:
- ALL WORK SHALL BE IN ACCORDANCE WITH T-1 SPECIFICATIONS EXCEPT AS NOTED.
 - FOR GENERAL SOILS INFORMATION SEE SOILS EXPLORATION REPORT IN MEMORANDUM; J.C.McCRAW TO F.P.LACEY DATED SEPTEMBER 24, 1969.
 - CUT SLOPES ADJACENT TO PROPOSED DIKES SHALL NOT BE EXCAVATED STEEPER THAN 3:1 AND TOPE OF CUT SHALL BE A MINIMUM OF 25 FEET FROM THE TOE OF THE DIKE.
 - DIKE FOUNDATIONS SHALL HAVE ALL WEAK SURFACE SOILS REMOVED TO MATERIAL THAT WILL EASILY BEAR THE WEIGHT OF LOADED RUBBER-TIRED EARTH HAULING EQUIPMENT.
 - EARTH FILL COMPACTION SHALL BE DONE WITH SHEEPSFOOT ROLLERS AND SHALL BE AT LEAST 95% OF STANDARD PROCTOR MAXIMUM DENSITY (ASTM D698) AS ESTABLISHED BY THE MATERIALS LABORATORY. COMPACTION SHALL BE CHECKED BY AT LEAST ONE DENSITY-MOISTURE TEST PER DAY. FILL MOISTURE SHALL BE CONTROLLED TO ACHIEVE OPTIMUM COMPACTION.
 - WITH THE EXCEPTION OF THE USEABLE MATERIAL FROM THE DISCHARGE CHANNEL, ALL BORROW SHALL COME FROM INSIDE THE PROPOSED ASH DISPOSAL AREA AND BELOW EL 456 IF POSSIBLE. BORROW AREAS ARE OUTLINED IN THE SOIL REPORT.
 - DIKE "A" IS TO BE CONSTRUCTED LAST. ROCKFILL COFFERDIKES ARE TO BE BUILT AT TOES OF DIKE AS SHOWN IN SECTION A-A (10N272), COMPACTION WITH TRACTORS, COMPACTION BEGINNING AT LOWEST PRACTICAL ELEVATION FOR THE EQUIPMENT. AREA BETWEEN COFFERDIKES IS TO BE PUMPED FREE OF WATER FOR CONSTRUCTION OF EARTH DIKES.
 - RIPRAP SHALL BE PLACED AT LOCATIONS AS SHOWN. AT LEAST 50 PERCENT OF THE RIPRAP SHALL CONSIST OF STONE OF A WEIGHT EQUAL TO OR GREATER THAN 375 LBS. FOR DIKE "C" AND ALONG THE EXISTING RAILROAD AND 270 LBS. FOR DIKE "A" AND DIKE "D". RIPRAP SHALL CONFORM TO SECTION 830.
 - FILTER BLANKET SHALL BE 6" THICK AND IN ACCORDANCE WITH SECTION 836.
 - AS THE ASH POND WATER LEVEL IS RAISED, PLANT PERSONNEL SHALL MAINTAIN THE TOP OF RIPRAP ELEVATION A MINIMUM OF TWO FEET ABOVE THE POND WATER ELEVATION (SEE SECT. X-X)

- NOTES FOR RAISING DIVIDER DIKE:
- EXISTING DIVIDER DIKES SHALL BE RAISED AS SHOWN WITH HEAVY BOTTOM ASH FILL PLACED IN 9-INCH MAXIMUM THICKNESS LOOSE LIFTS AND THOROUGHLY COMPACTIONED WITH LOADED RUBBER TIED EARTH HAULING EQUIPMENT MAKING A MINIMUM OF 6 PASSES OVER EACH LAYER.
 - FOR SOILS INFORMATION SEE SINGLETON MATERIALS ENGINEERING LABORATORY REPORT SME-501-88-017 IN MEMORANDUM B46 880908 004.
 - FOUNDATIONS FOR RAISING DIVIDER DIKES IN AREAS NOT INUNDATED WITH WATER SHALL HAVE ALL WEAK SURFACE SOILS REMOVED TO MATERIAL THAT WILL BEAR THE WEIGHT OF LOADED RUBBER-TIRED EARTH HAULING EQUIPMENT WITHOUT HEAVING.
 - PRIOR TO RAISING THE WATER LEVEL OF ASH DISPOSAL AREA 3 ABOVE ITS PRESENT ELEVATION OF 457±, PROVISIONS MUST BE MADE TO HANDLE STORM DRAINAGE FOR THOSE AREAS INSIDE THE RAILROAD LOOP THAT ARE PRESENTLY DISCHARGING INTO THE ASH DISPOSAL AREA AT AN ELEVATION LOWER THAN 468.0.

- NOTES FOR SEALING SINKHOLE:
- BOTH TYPE A AND TYPE B RIPRAP SHALL BE IN ACCORDANCE WITH SECTION 575. THE GRADATION AND SIZE REQUIREMENTS FOR TYPE A RIPRAP ARE SHOWN IN TABLE A. TYPE B RIPRAP SHALL BE WELL GRADED ROCK WITH SIZES RANGING FROM 36 INCHES TO 6 INCHES.
 - CRUSHED STONE SHALL BE IN ACCORDANCE WITH SECTION 1032. CRUSHED STONE SHALL BE PLACED IN 12 INCH MAXIMUM THICKNESS LOOSE LIFTS AND COMPACTIONED WITH A MINIMUM OF 5 PASSES WITH A SMALL VIBRATORY ROLLER OR HAND-HELD VIBRATORY COMPACTOR.
 - EARTH FILL SHALL BE A FINE-GRAINED, COHESIVE CLAY SOIL. EARTH FILL SHALL BE PLACED IN 9 INCH MAXIMUM THICKNESS LOOSE LIFTS AND COMPACTIONED WITH A MINIMUM OF 6 PASSES WITH A TAMPING (SHEEPSFOOT) ROLLER. FILL MOISTURE SHALL BE CONTROLLED TO ACHIEVE OPTIMUM COMPACTION.
 - FILTER FABRIC SHALL BE CLASS B NONWOVEN, NEEDLE PUNCHED POLYESTER OR POLYETHYLENE IN ACCORDANCE WITH SECTION 571.
 - IMPERVIOUS PLASTIC SHEET BE 10 MILS MINIMUM THICKNESS AND SHALL BE PLACED WITH A MINIMUM OF 2 FEET OF OVERLAP.
 - AREA INSIDE ASH FILL TO BE CLEANED OUT TO THE EXTENT PRACTICAL BEFORE PLACEMENT OF RIPRAP.

PROJECT REVISION HISTORY

REV.	DATE	BY	DESCRIPTION
R6	6-6-90	CLM	SUPERSEDED BY 10W271 R7
R5	6-6-90	CLM	ADD SECT C-C AND NOTES 15 THRU 20 AND TABLE A.
R4	11-7-89	CLM	GENERAL REVISIONS FOR RAISING DIVIDER DIKES & ADDED SECTS A-A & B-B.

SCALE: 1" = 400'
EXCEPT AS NOTED

MAIN PLANT
PLAN
ASH DISPOSAL AREA NO. 3

DESIGNED BY: JLG
DRAWN BY: JLH
CHECKED BY: JPHS
SUPERVISED BY: MCB
REVIEWED BY: J.M. JOHNSTON
APPROVED BY: W.N. CALVERT
ISSUED BY: F.P. LACEY

GALLATIN FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

AUTOCAD R12 DATE 39 C 10W271 R 7

COMPANION DRAWINGS: 10N272 THRU 274 & 10H275

PA 2624
WO 82-31546