KENVIRONS
Civil & Environmental Engineers

SPURLOCK STATION
PEGS HILL LANDFILL PHASE 1A CELL CONSTRUCTION

CCR RULE
POST CONSTRUCTION DESIGN CERTIFICATION

EAST KENTUCKY
POWER COOPERATIVE

EAST KENTUCKY POWER COOPERATIVE

COAL COMBUSTION RESIDUAL RULE COMPLIANCE

REV. 0 (09/15/23)

CERTIFICATION

EAST KENTUCKY POWER COOPERATIVE
SPURLOCK STATION – PEG HILL LANDFILL PHASE 1A CELL CONSTRUCTION
CCR RULE POST-CONSTRUCTION DESIGN CERTIFICATION

CERTIFICATION

I hereby certify, as a Professional Engineer in the Commonwealth of Kentucky, that the composite liner and leachate collection and removal system has been constructed in accordance with the requirements of 40 CFR 257.70. The information in this document was assembled under my direct supervisory control. This report is not intended or represented to be suitable for reuse by East Kentucky Power Cooperative or others without specific verification or adaptation by the Engineer.

S. Tim Oakes, P.E. [21483] – Kenvirons

Date: 9/15/23

STATE OF KENTUCKY
SAMUEL T.
OAKES
21483
LICENSED
PROFESSIONAL ENGINEER

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1.0 INTRODUCTION

On April 17, 2015, the Environmental Protection Agency (EPA) issued the final version of the federal Coal Combustion Residual Rule (CCR Rule) to regulate the disposal of coal combustion residual (CCR) materials generated at coal-fired units. The rule is administered as part of the Resource Conservation and Recovery Act [RCRA, 42 United States Code (U.S.C.) §6901 et seq.], under Subtitle D.

East Kentucky Power Cooperative (EKPC) is subject to the CCR Rule and as such will demonstrate compliance with 40 Code of Federal Regulations (CFR) §257.70(f). Pegs Hill Landfill Phase 1 has been broken up into subphases based on estimated production and disposal of CCR and maintaining the integrity of the leachate collection system materials. Therefore, this document serves as EKPC's post-construction verification for the first subphase designated as Pegs Hill Landfill Phase 1A. This lateral expansion at Pegs Hill Landfill was constructed in accordance with the project's design plans and specifications (composite liner system and leachate collection system) in accordance with the regulations of 40 CFR §257.70. The landfill expansion for Pegs Hill Landfill Phase 1A was designed by Kenvirons and the construction quality assurance (CQA) for cell construction was certified by Kenvirons. Record drawings for the composite liner system and leachate collection system can be found in Attachment 1.

TABLE 1-1 POST-CONSTRUCTION CERTIFICATION SUMMARY

CONSTRUCTION CRITERIA			
Unit: Phase 1A Cell Construction			
DESCRIPTION	**CCR RULE COMPLIANCE**		
	YES	**NO**	**REPORT REFERENCE**
Composite Liner System	☒	☐	See Section 2.0
Leachate Collection & Removal System	☒	☐	See Section 3.0

2.0 COMPOSITE LINER SYSTEM

The constructed composite liner system consists of three components: an upper component consisting of a 60-mil HDPE textured geomembrane followed in descending order by a Geosynthetic Clay Liner (GCL), an 8-inch GCL Base compacted soil layer with a laboratory hydraulic conductivity of no more than $1x10^{-7}$ centimeters per second (cm/sec) placed over subgrade construction. The constructed composite liner system meets or exceeds the requirements of 40 CFR §257.70(b).

2.1 Subgrade

Shot rock and soil structural fill was taken from excavation activities within and adjacent to the cell to achieve subgrade elevations. Soil materials containing a large percentage of rock/gravel particles were proof roll tested as lifts were placed and compacted. Soil materials that didn't contain a large percentage of rock/gravel particles were density tested using a nuclear moisture/density gauge. Most of the earthwork consisted of excavating earthen materials from the valley slopes and placing this material in the lower elevations of the natural valley drains to achieve subgrade elevations. Structural fill was placed in 12-inch maximum lifts. All materials were bladed into place with a dozer and compacted with a sheepsfoot compactor. Once proper grades were achieved, the cell subgrade was proof rolled utilizing a loaded Volvo A45G articulated dump truck. The proof roll exercise consisted of running the loaded dump truck across the subgrade surface. The ground surface was observed for indication of pumping or rutting. If signs of pumping or rutting were exhibited, the failed areas were reworked and proof roll tested until a passing test was observed. Once complete, the area tested was approved by the certifying Engineer for placement of the eight-inch GCL Base compacted soil layer.

An underdrain system consisting of pipe and gravel was installed beneath final subgrade elevations to intercept discontinuous seeps from underneath Pegs Hill Landfill Phase 1A composite liner system. The underdrain discharges intercepted flow to the sediment pond located east of the landfill.

2.2 Eight-Inch GCL Base Compacted Soil Layer

The source of the compacted soil liner material was the soil borrow area located on EKPC property northwest of the landfill on South Ripley Road, approximately 0.27 miles north of the facility's construction entrance. Processed material with particle sizes of ¾ inch or less for the 8-inch portion was used in the compacted soil layer. Samples of the compacted soil layer material were obtained, and testing was performed to assure the material can achieve a laboratory hydraulic conductivity of no more than $1x10^{-7}$ cm/sec. Standard Proctor density and optimum moisture content laboratory testing was performed to determine the construction testing parameters. One soil type, Soil L-1 was utilized from the borrow area. The minimum field compaction for the soil liner layer was 92% of standard Proctor density for Soil. The target moisture content ranged from 15.6% to 21.6% for the GCL Base soil layer.

The GCL Base soil layer was placed on top of completed subgrade and is a minimum 8-inches thick throughout the cell. The soil liner material was spread into one (1) compacted lift using GPS-guided dozers to achieve proper grading. The lift was compacted using a vibratory sheepsfoot compactor. After compacting, the surface was rolled with a smooth drum vibratory roller. Moisture/density tests were taken on the lift using a nuclear density gauge at a frequency of no less than nine (9) tests per acre per lift.

If tested areas did not meet the minimum project requirements, that area was reworked and retested as necessary until retest results indicated compliance with project requirements. The lift was scarified by tracking with dozers and water was added to meet project specifications. When the lift was to grade, a smooth-drum, vibratory roller was used to prepare the compacted soil layer for geosynthetic installation. Prior to installation of geosynthetics, the GCL Base soil layer was inspected and approved by the certifying Engineer.

2.3 60-mil HDPE Textured Geomembrane

Geomembrane deployment was monitored by Kenvirons to ensure that no damage was done to either the material or the soil liner and to ensure construction of the liner system was performed in accordance with the design and specifications for the project. The geomembrane material was deployed such that the panels and seams were approximately perpendicular to the contours of the slope. The panel alignment was adjusted by the Installer to provide orientation perpendicular to the contours and proper shingled overlap. In all cases, the Flexible Membrane Liner (FML) panels were seamed on the day they were placed using a double hot-wedge, fusion welder. Each seam was observed by Kenvirons CQA monitor, with seam defects such as burn-throughs being marked for repair. All patches were heat tacked in place, ground for cleaning and to promote sufficient adhesion and then extrusion welded. Prior to seaming of the FML and again after approximately 4-hours of run time, trial welds were created per welding machine per welder operator each day. The trial seams were tested for peel and shear strength. For 60-mil Textured High Density Polyethylene (HDPE), the minimum peel strength for a fusion weld is 91 pounds per inch and 78 pounds per inch for extrusion welds. The minimum sheer strength for both extrusion and fusion welds is 120 pounds per inch. No panels were welded without the welder passing trial seam testing.

Non-destructive testing was performed on all fusion and extrusion welded panel seams and repairs. Air Pressure testing was conducted on fusion welded seams and vacuum box testing was performed on all extrusion welded seams including panel seaming and repair patches. Destructive samples were taken at selected locations for both fusion and extrusion welded seams. These samples were divided for testing on-site by the installation crew and the remaining sample sent out for independent laboratory testing. Before the geomembrane layer was accepted as complete, the material and all testing described above was verified to have passing results.

3.0 LEACHATE COLLECTION & REMOVAL SYSTEM

The leachate collection system consists of a geocomposite drainage layer material, collection pipes, No. 57 peagravel drainage media and Geotex Coal Drain geotextile. The leachate collection and removal system must be designed, constructed, operated, and maintained to collect and remove leachate from the landfill during the active life and post closure care period as per 40 CFR §257.70(d). Per 40 CFR §257.70(d), the leachate collection and removal system must be designed and operated as follows:

- Maintain less than thirty centimeters depth of leachate over the composite liner;
- Constructed of materials that are chemically resistant to the CCR waste and the expected leachate expected to be generated;
- Sufficient strength and thickness to prevent collapse under the pressures exerted by overlying waste, waste cover materials, and equipment used at the CCR unit;
- Designed and operated to minimize clogging during the active life and post closure care period.

3.1 Geocomposite Drainage Layer

The geocomposite was placed to provide sufficient overlap (approximately six inches) to tie the geonet and geotextile components together for each panel. The geonet component was joined via the installation of plastic pull ties placed a maximum of five feet apart on the longitudinal seams and a maximum of one foot apart on the cross seams. The top geotextile component was then fusion welded, sewn or heat bonded together. Additional geotextile material was heat bonded to the geocomposite to seal up all exposed geonet.

3.2 Leachate Collection Pipes

Leachate collection pipes consist of perforated 4-inch and 8-inch diameter HDPE, DR-11 pipes surrounded with No. 57 sized, low calcium carbonate content, washed peagravel and enclosed within a 14-oz/sy CCR compatible geotextile (Geotex Coal Drain). The 4-inch and 8-inch pipes placed in the cell flow lines are perforated. Cleanout risers for the collection pipes are located along the constructed waste limits to the north and west. Leachate gravity flows into the grout-mat lined ditch east of the cell and finally into Pond 2A.

3.3 Geotextile

The 14 oz/sy geotextile (Coal Drain) encasing the leachate collection piping and gravel was deployed with enough overlap (at least 6-inches) to connect the textile panels together by heat bonding or with zip ties. Geotextile patches were heat bonded where necessary to repair any cuts or tears in the geotextile.

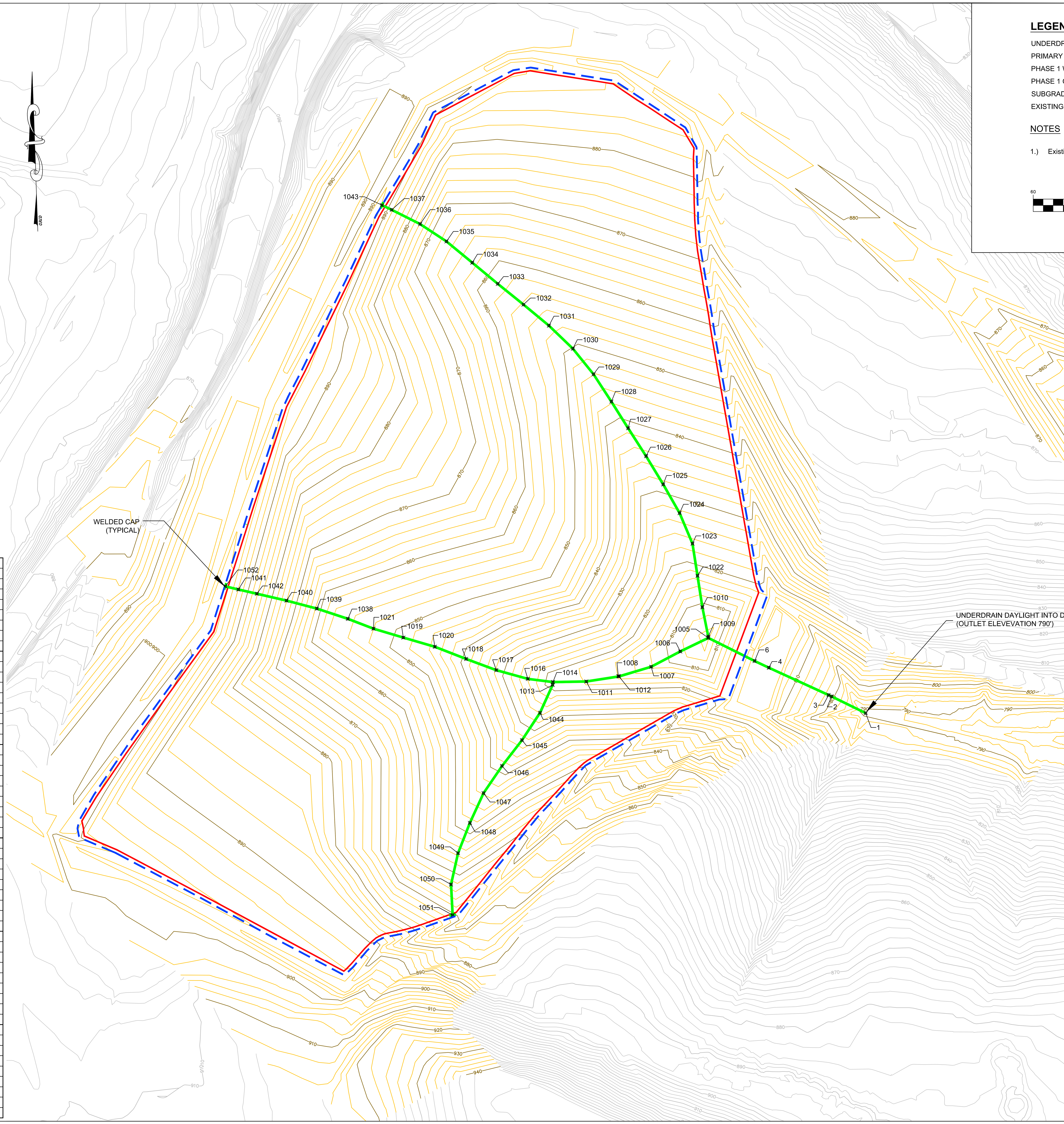
4.0 REPORT LIMITATIONS

This report is based on data collected and observations made during construction that could be visually seen. Review of design documents and survey information provided by EKPC as well as CQA work performed by Kenvirons design of Pegs Hill Landfill Phase 1A. This post-construction design certification is based on Kenvirons' understanding of the design plans for the lateral expansion and EKPC's plant operations, maintenance, storm water and CCR handling procedures for the newly constructed lateral expansion. Changes in any of these operations or procedures may result in deviation from the intended design and operation of Pegs Hill Landfill Phase 1A.

The post-construction certification is based on established engineering principles and provided in a manner consistent with the level of care and skill ordinarily exercised by the engineering consultants under similar circumstances. No other representation is intended.

ATTACHMENT 1

RECORD DRAWINGS



LEGEND

UNDERDRAIN SURVEY POINT	× 2000
PRIMARY UNDERDRAIN	
PHASE 1 WASTE LIMITS (11.56 AC.)	
PHASE 1 CLAY LIMITS (11.86 AC.)	
SUBGRADE CONTOURS	
EXISTING GROUND CONTOURS	

NOTES

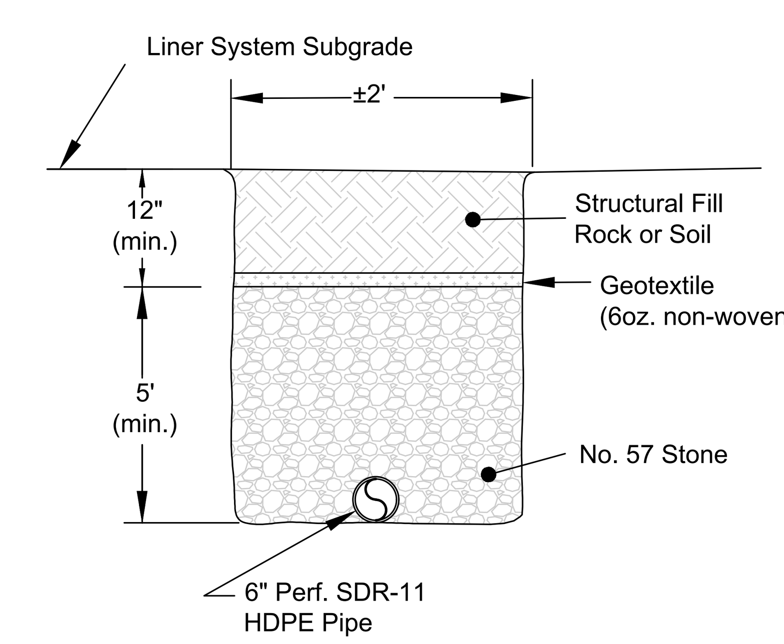
1.) Existing topography shown is the 2018 aerial topo by GRW.

GRAPHIC SCALE

60 0 30 60 120 240

(IN FEET)
1 inch = 60 ft.

Record Underdrain Survey Points				
Point No.	Northing	Easting	Elevation	Desc.
1	4146469.107	5466937.069	790	UNDERDRAIN OUTLET
2	4146489.245	5466896.011	792.584	Joints
3	4146490.871	5466892.465	792.841	Joints1
4	4146523.716	5466820.645	796.876	StakedPt1_stk
6	4146531.808	5466803.509	797.382	Joints2
1005	4146559.579	5466747.888	800.436	Joints3
1006	4146543.283	5466714.177	802.93	Joints4
1007	4146524.874	5466679.138	807.646	Joints5
1008	4146513.604	5466639.666	810.613	Joints6
1009	4146561.078	5466747.809	800.524	Joints7
1010	4146596.427	5466740.704	804.052	Joints8
1011	4146507.152	5466601.19	812.468	Joints9
1012	4146513.266	5466640.507	810.628	Joints10
1013	4146503.078	5466560.727	814.165	Joints11
1014	4146506.504	5466561.084	814.183	Joints12
1016	4146510.333	5466530.91	818.659	Joints14
1017	4146520.836	5466492.948	826.394	Joints15
1018	4146534.25	5466456.735	834.095	Joints16
1019	4146559.957	5466381.227	843.701	Joints17
1020	4146548.904	5466419.142	840.06	Joints18
1021	4146570.642	5466345.373	846.455	Joints19
1022	4146634.253	5466734.886	811.815	Joints20
1023	4146672.975	5466728.846	817.759	Joints21
1024	4146709.696	5466713.319	822.184	Joints22
1025	4146744.175	5466693.677	826.11	Joints23
1026	4146778.146	5466673.038	829.648	Joints24
1027	4146811.741	5466651.46	833.417	Joints25
1028	4146843.714	5466631.341	837.153	Joints26
1029	4146876.632	5466609.889	840.759	Joints27
1030	4146907.398	5466585.093	844.468	Joints28
1031	4146935.047	5466556.267	847.497	Joints29
1032	4146960.401	5466525.715	850.38	Joints30
1033	4146985.33	5466494.816	853.156	Joints31
1034	4147010.79	5466464.097	857.116	Joints32
1035	4147036.346	5466433.079	861.075	Joints33
1036	4147057.226	5466401.36	870.251	Joints34
1037	4147074.351	5466367.322	882.849	Joints35
1038	4146582.505	5466314.603	849.301	Joints36
1039	4146594.807	5466277.277	856.202	Joints37
1040	4146604.408	5466240.799	868.695	Joints38
1041	4146617.806	5466182.919	888.539	Joints50
1042	4146612.665	5466205.215	880.912	Joints40
1043	4147079.926	5466355.611	886.918	Joints41
1044	4146469.526	5466545.53	820.388	Joints42
1045	4146436.641	5466523.866	827.683	Joints43
1046	4146405.52	5466499.877	833.437	Joints44
1047	4146372.961	5466477.696	838.548	Joints45
1048	4146337.145	5466461.232	843.13	Joints46
1049	4146300.709	5466446.969	848.587	Joints47
1050	4146263.111	5466438.563	857.347	Joints48
1051	4146226.259	5466440.484	865.066	Joints49
1052	4146621.559	5466167.179	892.812	Joints51



PRIMARY UNDERDRAIN TRENCH DETAIL

NTS

UNDERDRAIN PLAN

EAST KENTUCKY
POWER COOPERATIVE

PEGS HILL LANDFILL

MASON COUNTY, KENTUCKY
PERMIT NO. 081-00005
PHASE 1A
RECORD DRAWINGS

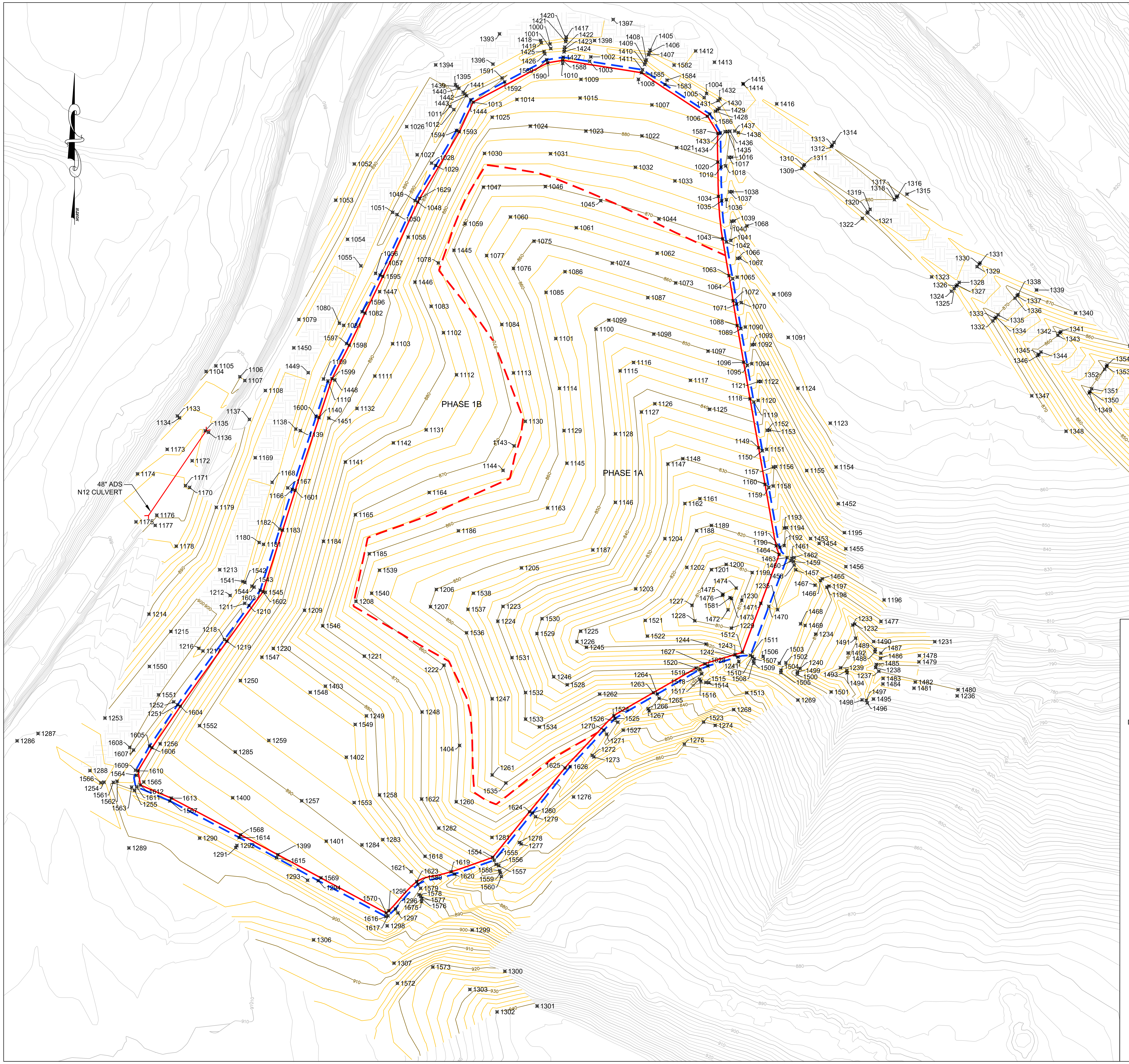
STATE OF KENTUCKY
SAMUEL T. OAKES
21483
9/18/23
LICENSED PROFESSIONAL ENGINEER

DRAWN BY: MEL
CHECKED BY:
CHECKED BY: STO
DATE: SEPT 2023
SCALE: AS NOTED
REVISIONS

KENVIRONS
Civil & Environmental Engineers

PROJECT NO.
2022045

SHEET NO.
1 of 6



LEGEND

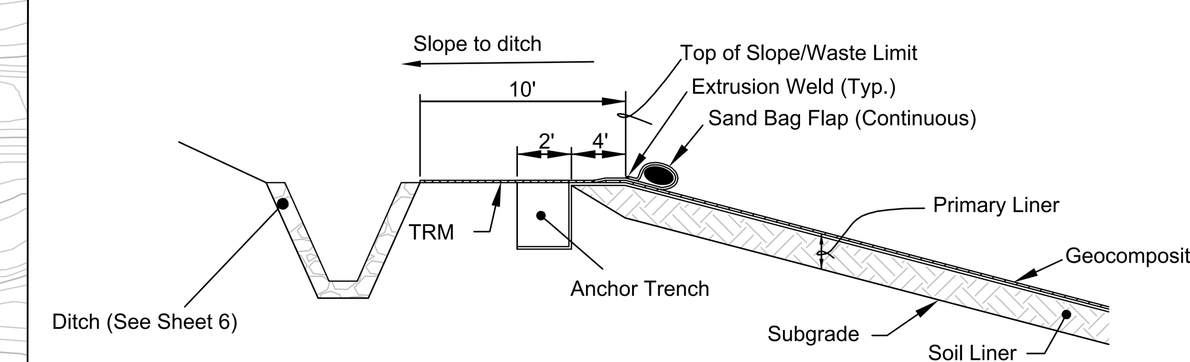
RECORD SUBGRADE STAKING POINT	2000
PHASE 1 WASTE LIMITS (11.56 AC.)	
PHASE 1 CLAY LIMITS (11.86 AC.)	
RECORD SUBGRADE CONTOURS	900
EXISTING GROUND CONTOURS	900
PHASE 1A WASTE LIMITS (5.76 AC.)	

NOTES

1.) Existing topography shown is the 2018 aerial topo by GRW.

GRAPHIC SCALE

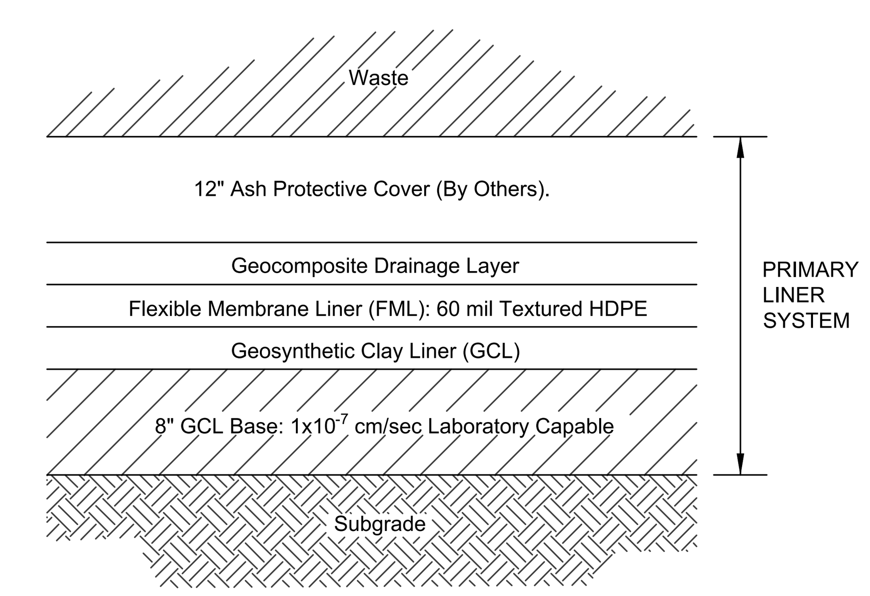
(IN FEET)
1 inch = 60 ft.



NOTES

1. See sheet 6 for Temporary Waste Limit Liner End Treatment.

PERMANENT WASTE LIMIT - LINER END TREATMENT
N.T.S.



LINER SYSTEM DESIGN
N.T.S.

RECORD SUBGRADE

EAST KENTUCKY POWER COOPERATIVE

PEGS HILL LANDFILL
MASON COUNTY, KENTUCKY
PERMIT NO. 081-00005
PHASE 1A
RECORD DRAWINGS

STATE OF KENTUCKY
SAMUEL T. OAKES
21483
LICENSED PROFESSIONAL ENGINEER
9/18/23

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DATE: SEPT 2023
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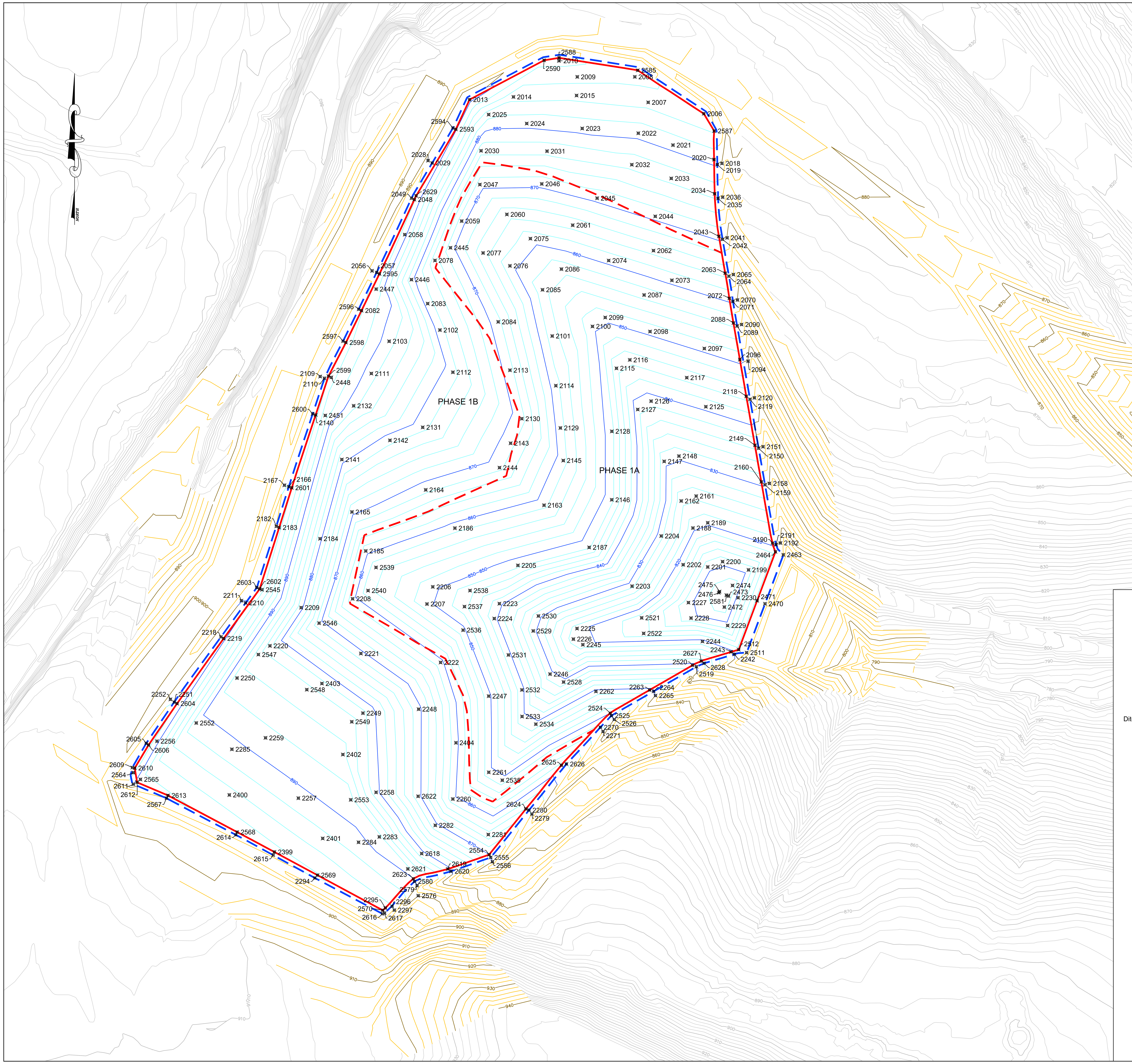
Civil & Environmental Engineers

PROJECT NO.
2022045

SHEET NO.
2 of 6



LEGEND

RECORD SOIL LINER STAKING POINT	✖ 2000
PHASE 1 WASTE LIMITS (11.56 AC.)	
PHASE 1A WASTE LIMITS (5.76 AC.)	
PHASE 1 CLAY LIMITS (11.86 AC.)	
RECORD SUBGRADE CONTOURS	900
EXISTING GROUND CONTOURS	900

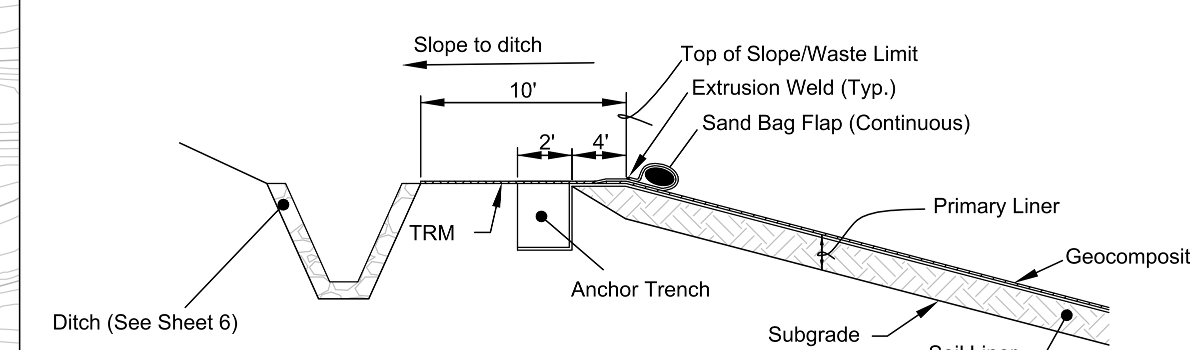
NOTES

1.) Existing topography shown is the 2018 aerial topo by GRW.

GRAPHIC SCALE

60 0 30 60 120 240

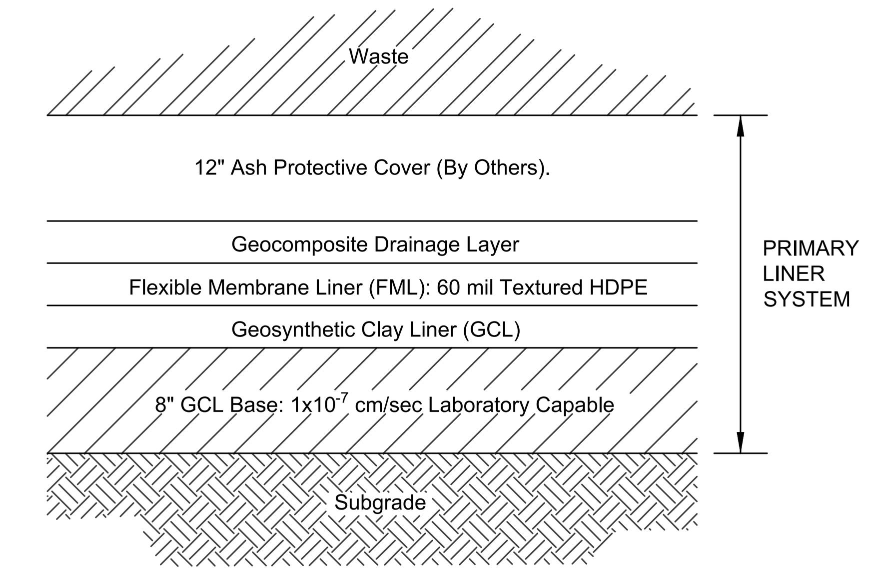
(IN FEET)
1 inch = 60 ft.



NOTES

1. See sheet 6 for Temporary Waste Limit Liner End Treatment.

PERMANENT WASTE LIMIT - LINER END TREATMENT
N.T.S.



LINER SYSTEM DESIGN
N.T.S.

SOIL LINER DRAWING

EAST KENTUCKY POWER COOPERATIVE

PEGS HILL LANDFILL
MASON COUNTY, KENTUCKY
PERMIT NO. 081-00005
PHASE 1A
RECORD DRAWINGS

STATE OF KENTUCKY
SAMUEL T. OAKES
21483
LICENSED PROFESSIONAL ENGINEER
9/18/23

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DATE: SEPT 2023
SCALE: AS NOTED
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KENVIRONS
Civil & Environmental Engineers

PROJECT NO.
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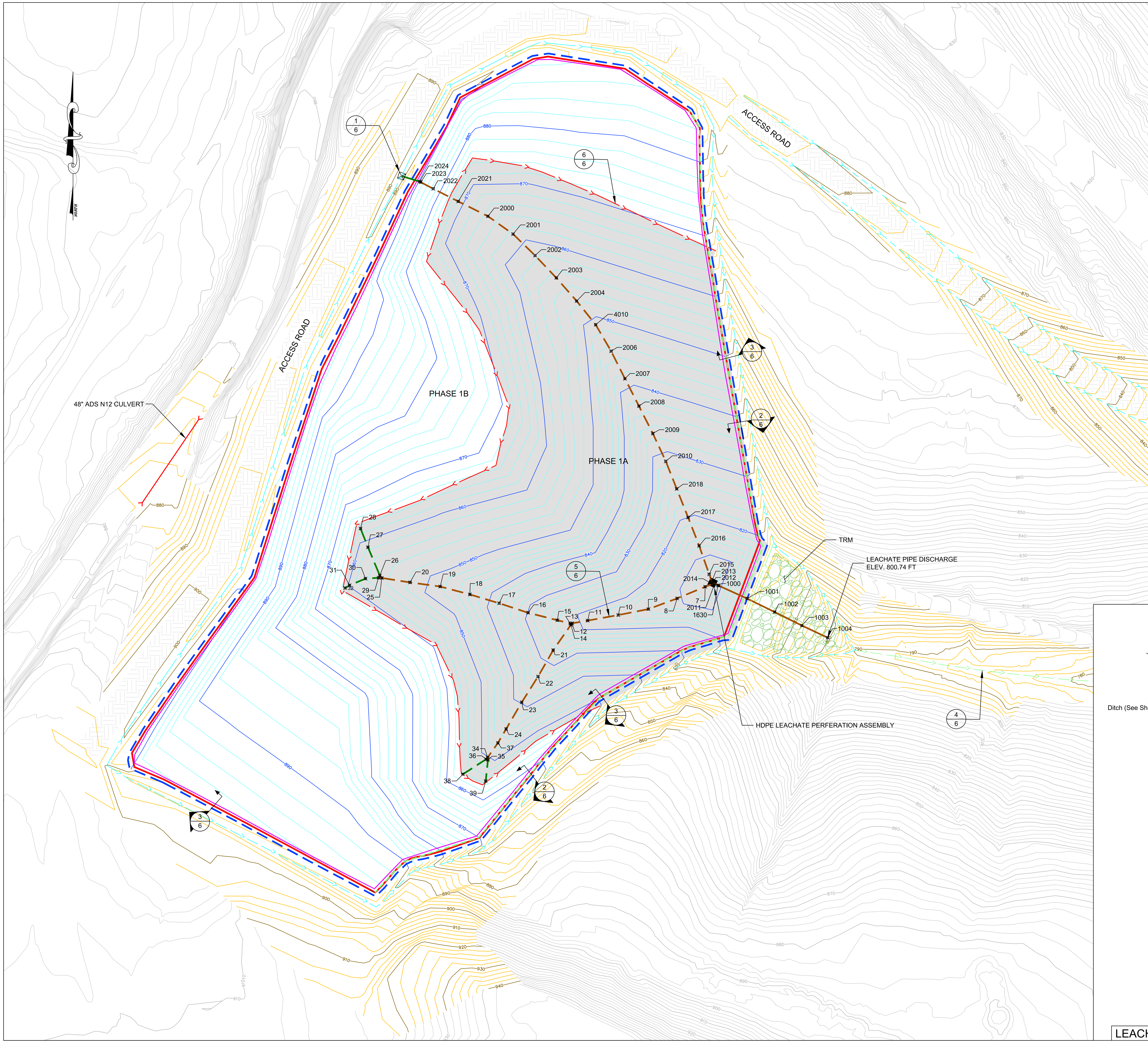
SHEET NO.
3 of 6

PEGS HILL LANDFILL
MASON COUNTY, KENTUCKY
PERMIT NO. 081-00005
PHASE 1A
RECORD DRAWINGS

EAST KENTUCKY POWER COOPERATIVE



LEGEND

- LEACHATE PIPE STAKING POINT — 2000
- LEACHATE PIPE CLEANOUT
- 4" LEACHATE COLLECTION PIPE — PERFORATED / SOLID
- 8" LEACHATE COLLECTION PIPE — PERFORATED / SOLID
- PHASE 1 WASTE LIMITS (11.56 AC.)
- PHASE 1 SOIL LINER LIMITS (11.87 AC.)
- SOIL LINER CONTOURS — 900
- SUBGRADE CONTOURS — 900
- EXISTING GROUND CONTOURS — 900
- 12" RAIN GUTTER
- CONTAINMENT FLAP
- SANDBAG FLAP
- DITCH TYPE 1
- DITCH TYPE 2
- DITCH TYPE 3
- DITCH TYPE 4
- DITCH TYPE 5
- COMPLETE LEACHATE COLLECTION AND PROTECTION COVER (5.76 AC)

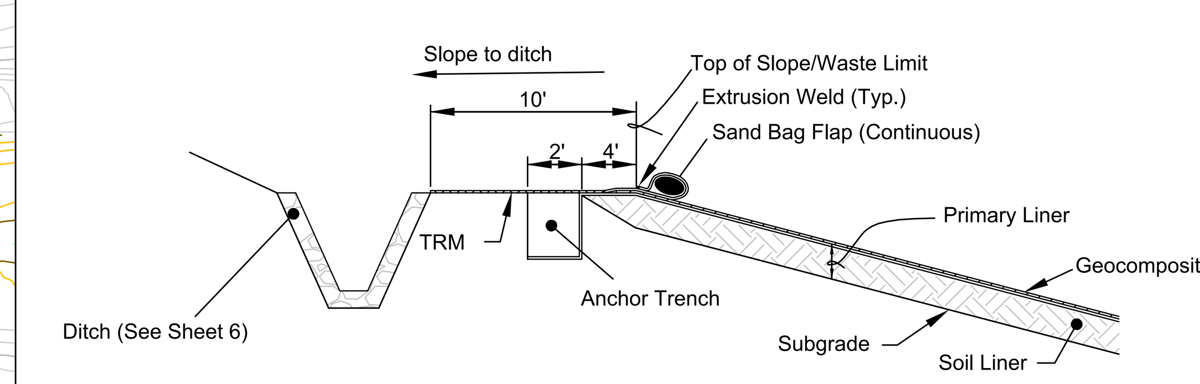
NOTES

1.) SEE SHEET 6 FOR DITCH DETAILS
2.) EXISTING TOPOGRAPHY SHOWN IS THE 2018 AERIAL TOPO BY GRW.

GRAPHIC SCALE

60 0 30 60 120 240

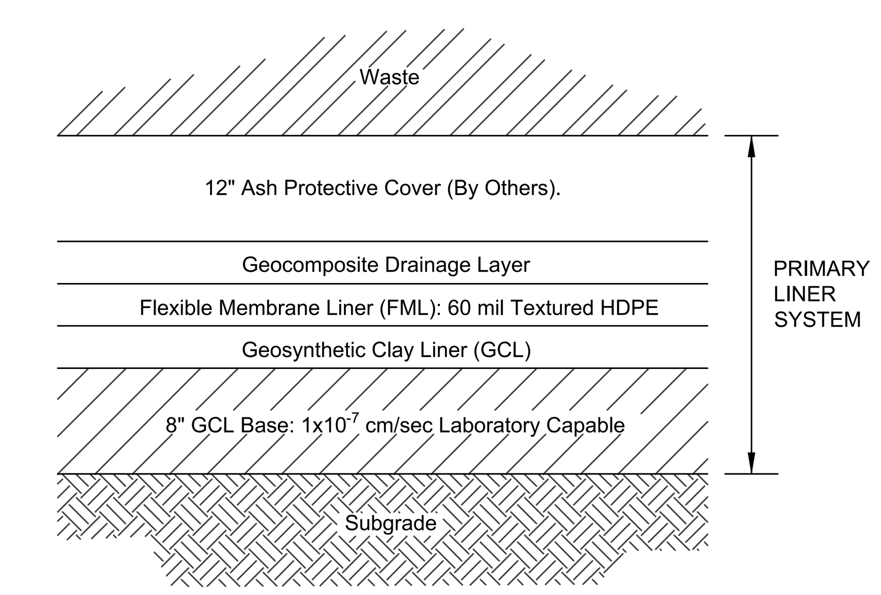
(IN FEET)
1 inch = 60 ft.



NOTES

1. See Sheet 6 for Temporary Waste Limit Linear End Treatment.

PERMANENT WASTE LIMIT - LINER END TREATMENT
N.T.S.



LINER SYSTEM DESIGN
N.T.S.

LEACHATE COLLECTION SYSTEM & GEOSYNTHETICS LAYOUT

STATE OF KENTUCKY SAMUEL T. OAKES 21483 LICENSED PROFESSIONAL ENGINEER 9/18/23

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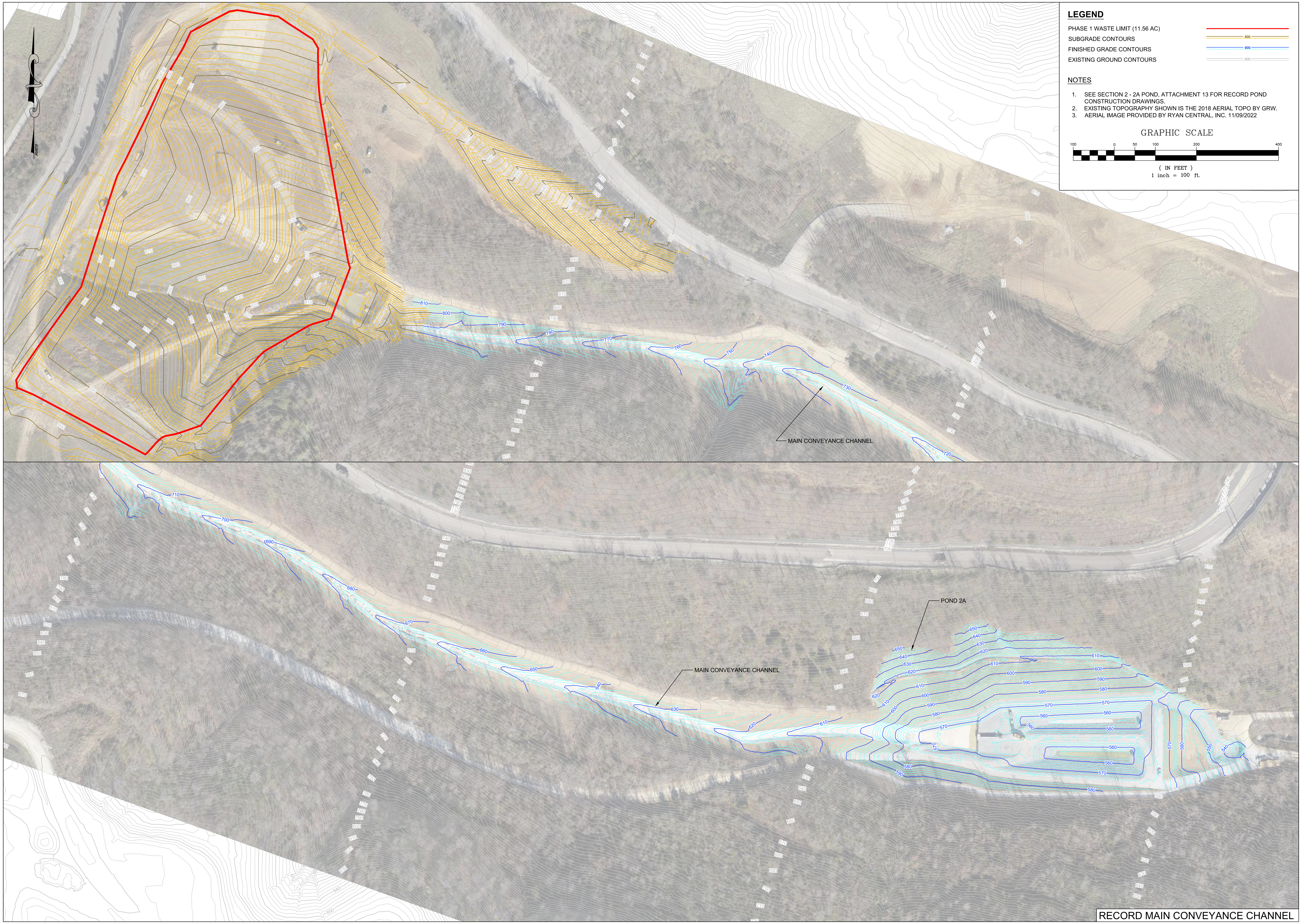
Civil & Environmental Engineers

PROJECT NO.
2022045

SHEET NO.
4 of 6



LEGEND

PHASE 1 WASTE LIMIT (11.56 AC)
SUBGRADE CONTOURS
FINISHED GRADE CONTOURS
EXISTING GROUND CONTOURS

NOTES

1. SEE SECTION 2 - 2A POND, ATTACHMENT 13 FOR RECORD POND CONSTRUCTION DRAWINGS.
2. EXISTING TOPOGRAPHY SHOWN IS THE 2018 AERIAL TOPO BY GRW.
3. AERIAL IMAGE PROVIDED BY RYAN CENTRAL, INC. 11/09/2022

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)
1 inch = 100 ft.

RECORD MAIN CONVEYANCE CHANNEL

EAST KENTUCKY POWER COOPERATIVE

PEGS HILL LANDFILL
MASON COUNTY, KENTUCKY
PERMIT NO. 081-00005
PHASE 1A
RECORD DRAWINGS

STATE OF KENTUCKY
9/18/23
SAMUEL T. OAKES
21483
LICENSED PROFESSIONAL ENGINEER

DRAWN BY: RCH
CHECKED BY:
CHECKED BY: STO
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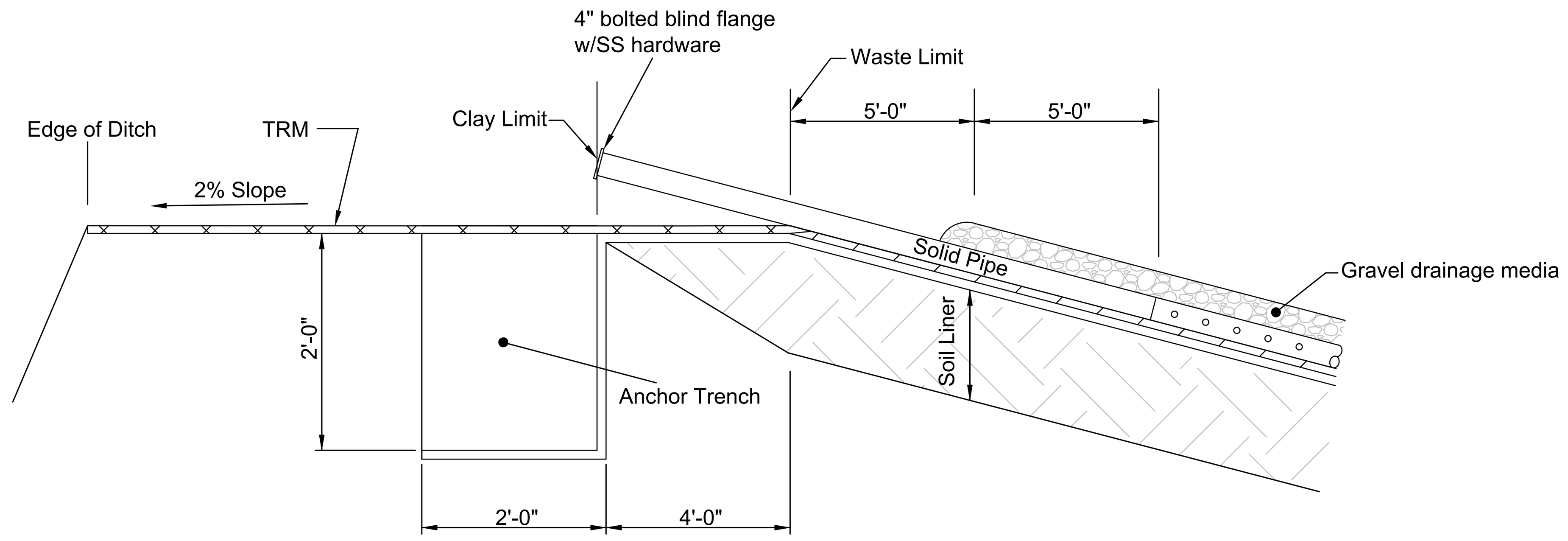
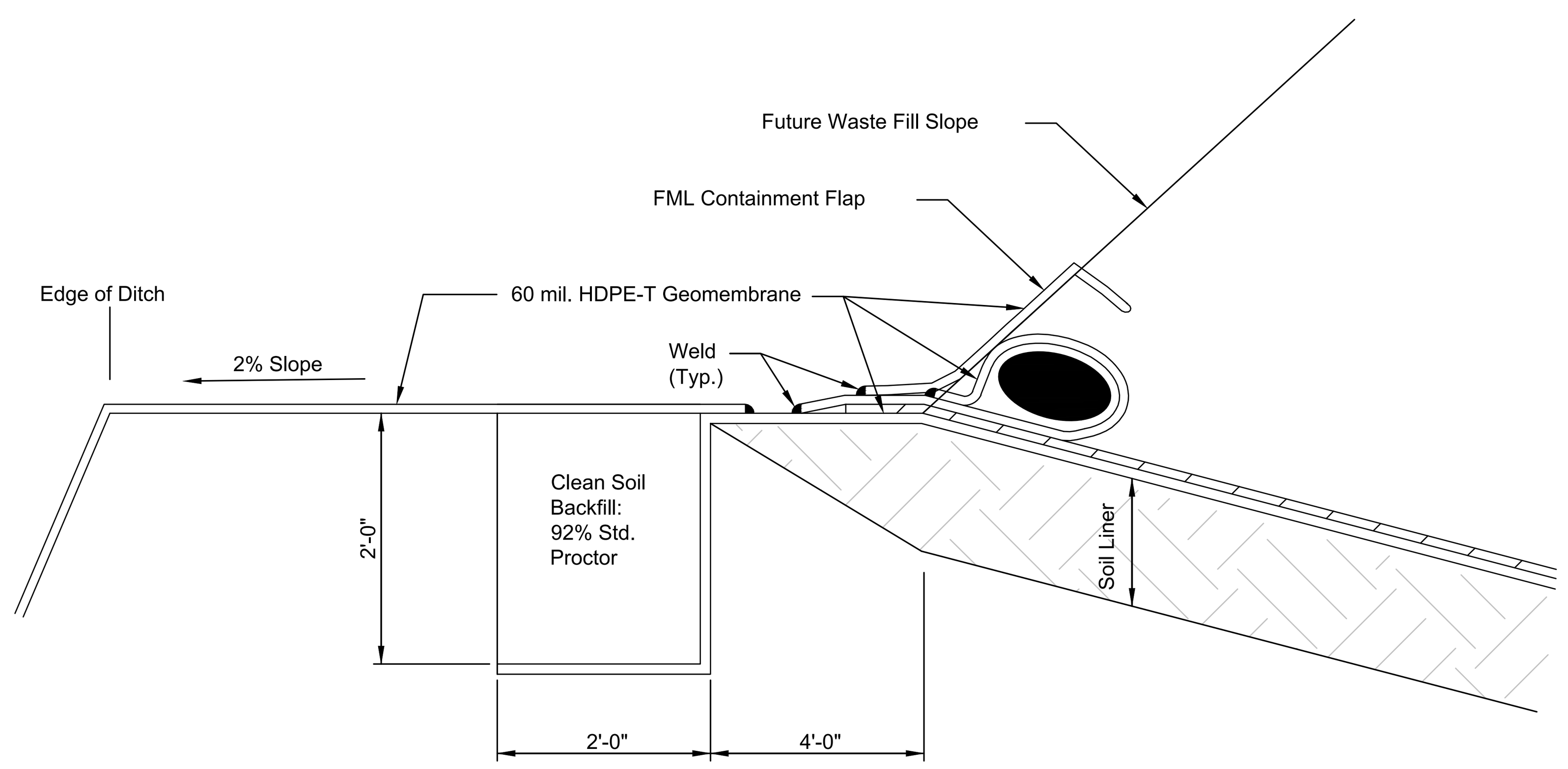
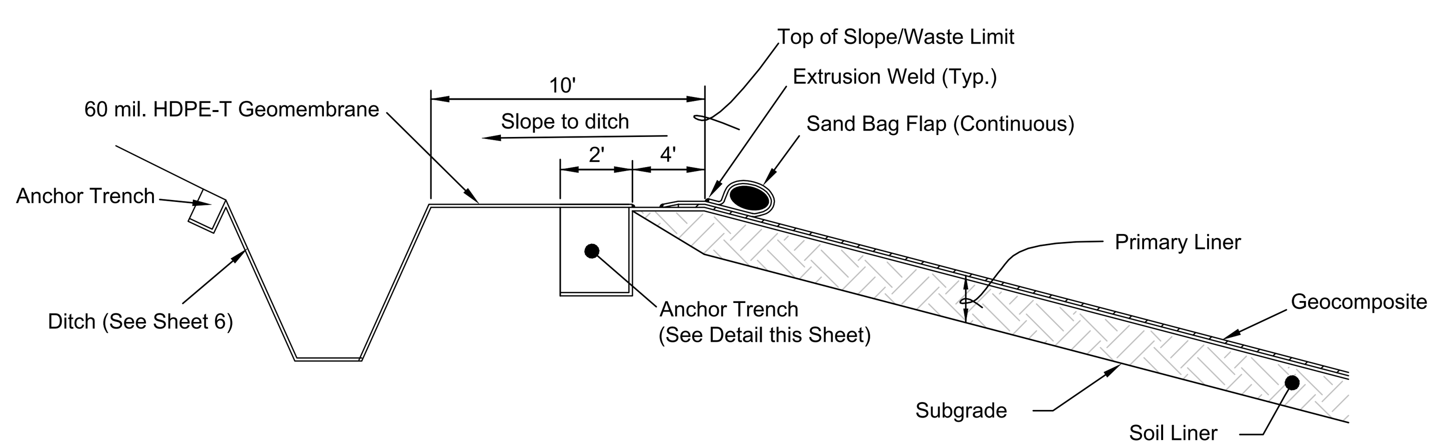
SHEET NO.
5 of 6



LEACHATE PIPE CLEANOUT DETAIL (1/6)
N.T.S.



CONTAINMENT FLAP DETAIL (2/6)
N.T.S.



TEMPORARY WASTE LIMIT LINER END TREATMENT (3/6)
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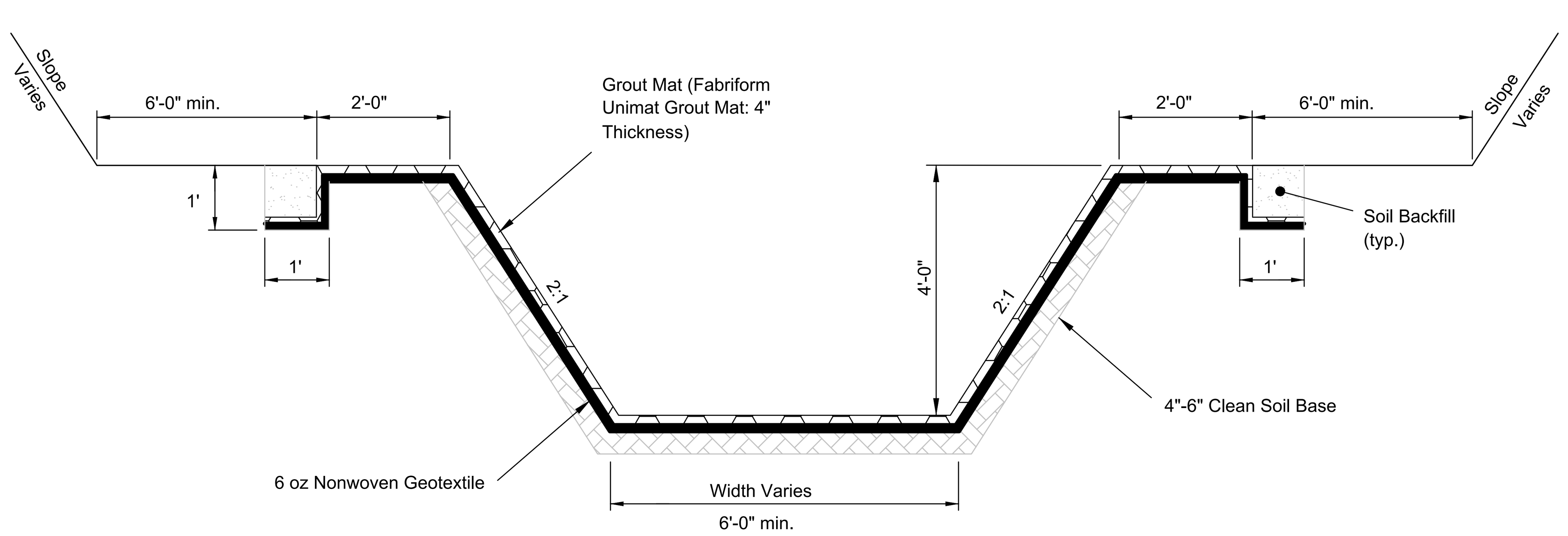

TYPICAL MAIN CONVEYANCE CHANNEL SECTION (4/6)
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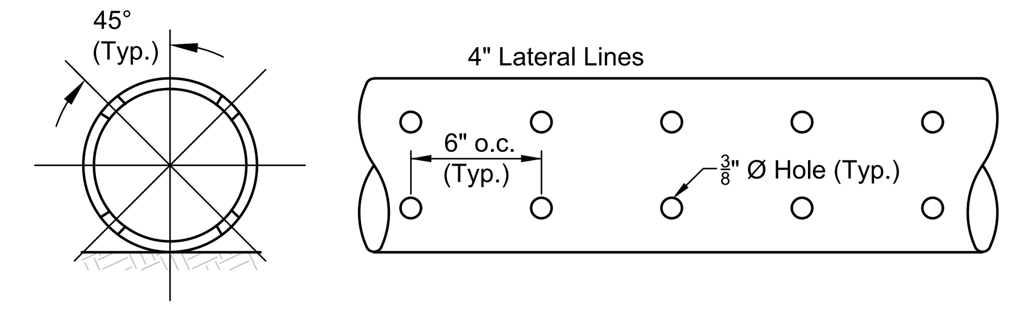
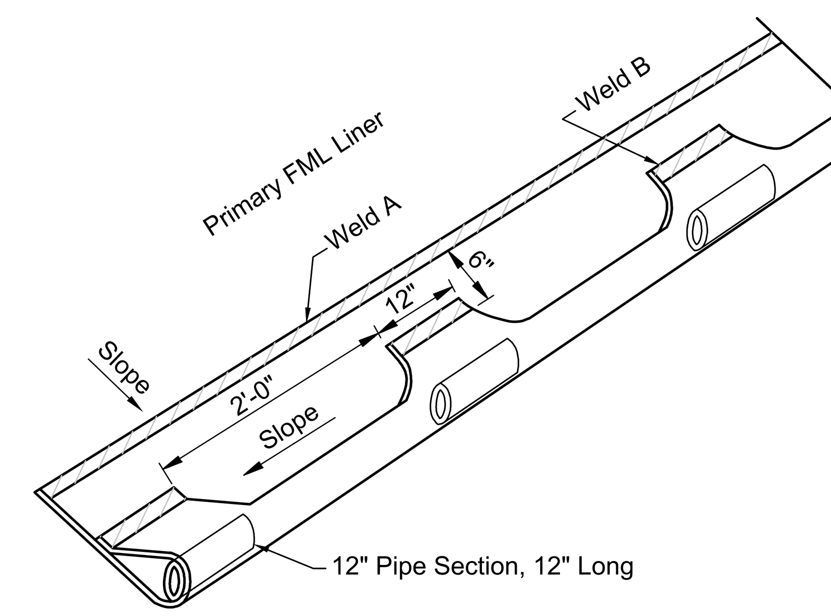
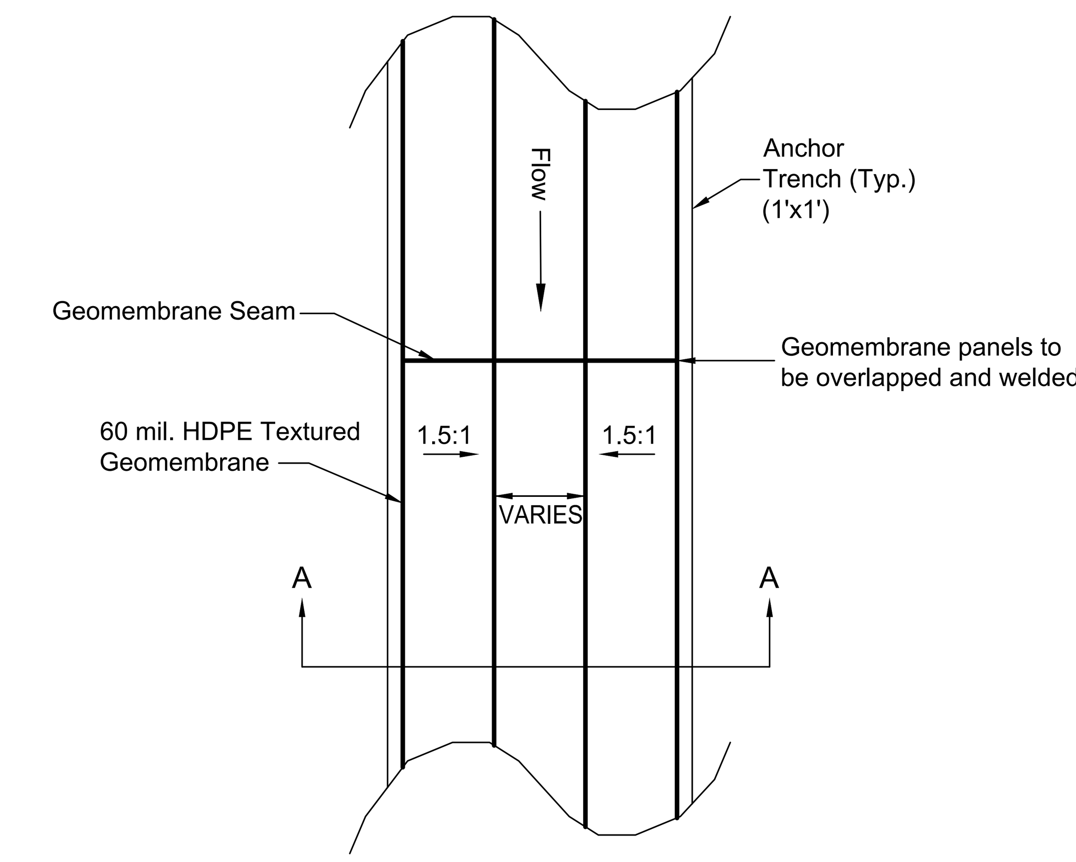


COLLECTION PIPE PERFORATION DETAIL (5/6)
N.T.S.



RAIN GUTTER SYSTEM DETAIL (6/6)
N.T.S.

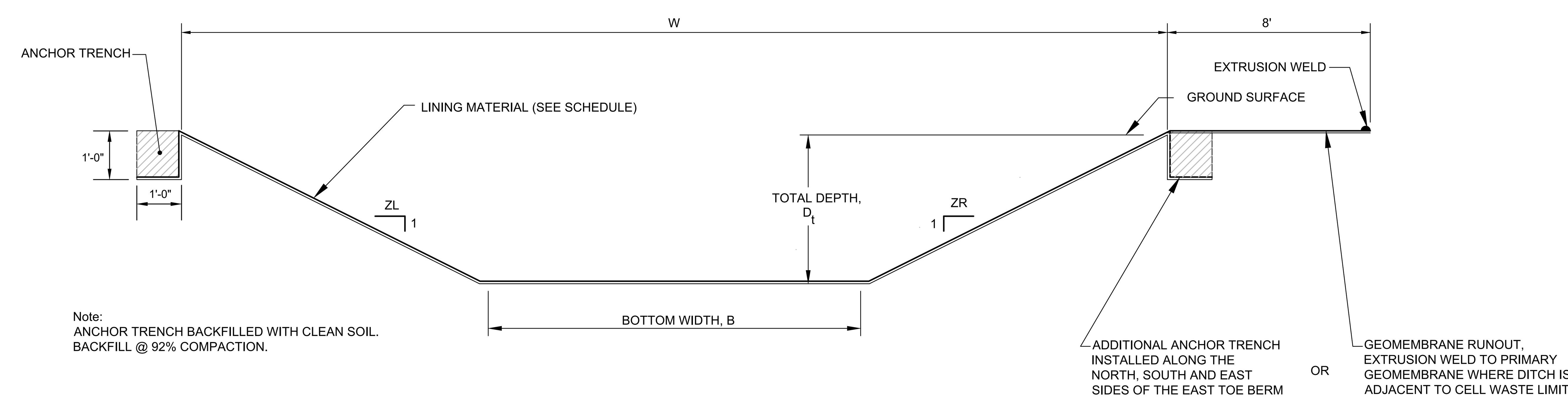


PLAN VIEW

DITCH SCHEDULE

CHANNEL DESCRIPTIONS	CHANNEL IDENTIFICATION	AVERAGE BOTTOM SLOPE FT/FT	TOTAL DEPTH (FT) Dt (MIN.)	BOTTOM WIDTH B(FT)	SIDE SLOPE ZL / ZR	LINING MATERIAL	DITCH WIDTH, W (FT.)
PERMANENT PERIMITER DITCH	DITCH TYPE 1	1.3%	3.0	6.0	1.5 / 1.5	GROUTMAT	15
PHASE 1 PERIMETER DITCH (TEMPORARY)	DITCH TYPE 2	VARIES	3.0	3.0	1.5 / 1.5	GEOMEMBRANE	12
TEMPORARY ACCESS ROAD DITCH (NORTH SIDE)	DITCH TYPE 3	14.3%	2.0	2.0	2 / 2	TRM*	10
PHASE 1 CONTAINMENT BERM DITCH	DITCH TYPE 4	1.0%	2.0	2.0	1.5 / 1.5	GEOMEMBRANE	8
MAIN CONVEYANCE CHANNEL	DITCH TYPE 5	6%	4.0	6-20	2 / 2	GROUTMAT	VARIES

1. TRM: (TURF REINFORCEMENT MATTING) SEMI-PERMANENT SYNTHETIC EROSION CONTROL MATTING WHICH GRASS WILL GROW THROUGH WITH MINIMUM LONG-TERM SHEAR STRESS 6-LB/SF.
2. TOTAL DEPTH OF DITCH (Dt) AND DITCH WIDTH (W) ARE MEASURED TO THE TOP SURFACE OF THE DITCH PROTECTION.



Note:
ANCHOR TRENCH BACKFILLED WITH CLEAN SOIL.
BACKFILL @ 92% COMPACTION.

SECTION VIEW A-A

TYPICAL SURFACE WATER DITCHES
N.T.S.

EAST KENTUCKY POWER COOPERATIVE

PEGS HILL LANDFILL
MASON COUNTY, KENTUCKY
PERMIT NO. 081-00005
PHASE 1A
RECORD DRAWINGS

STATE OF KENTUCKY — SAMUEL T. OAKES — 21463 — LICENSED PROFESSIONAL ENGINEER — 9/18/23

DRAWN BY: RCH
CHECKED BY:
CHECKED BY: STO
DATE: SEPT 2023
SCALE: AS NOTED
REVISIONS

KENVIRONS
Civil & Environmental Engineers

PROJECT NO.
2022045

SHEET NO.
6 of 6

DETAILS