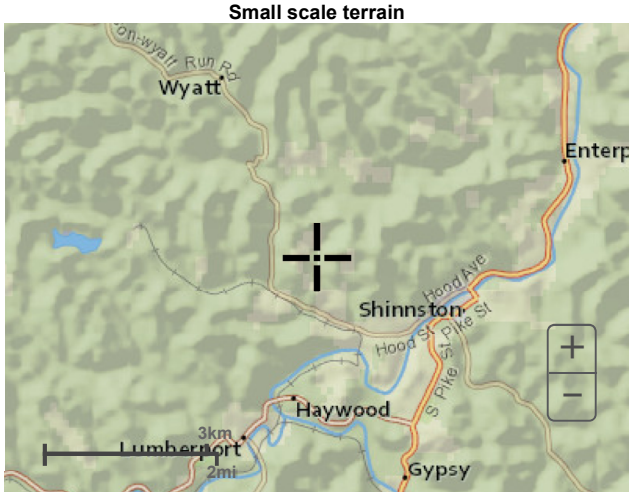
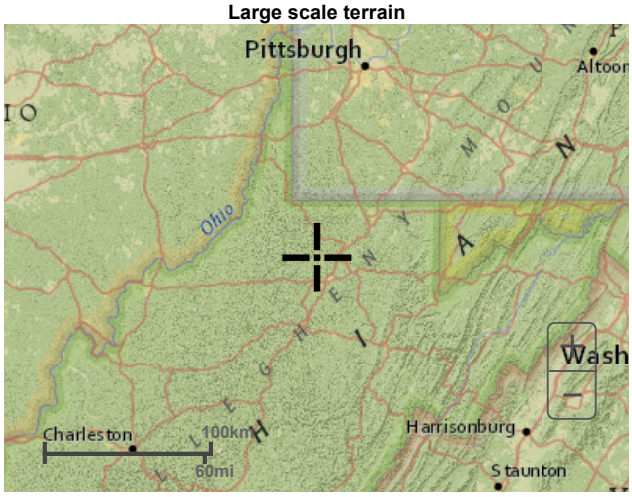
Maps & aerials

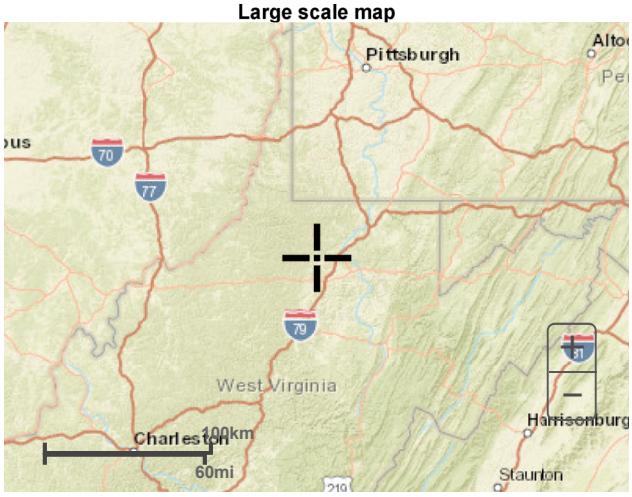
Small scale terrain



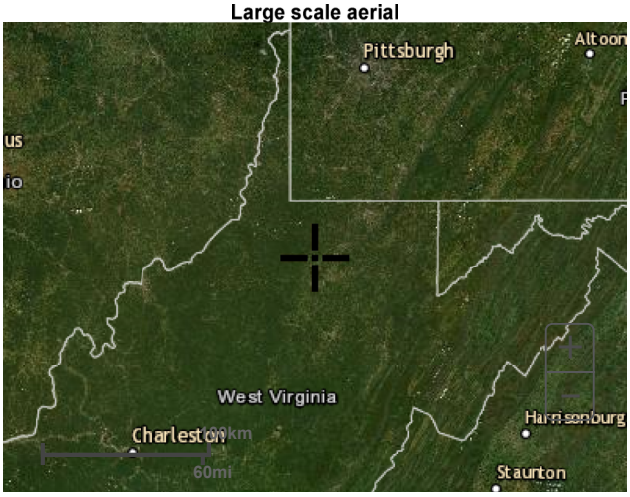
Large scale terrain



Large scale map



Large scale aerial



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National Weather Service
National Water Center
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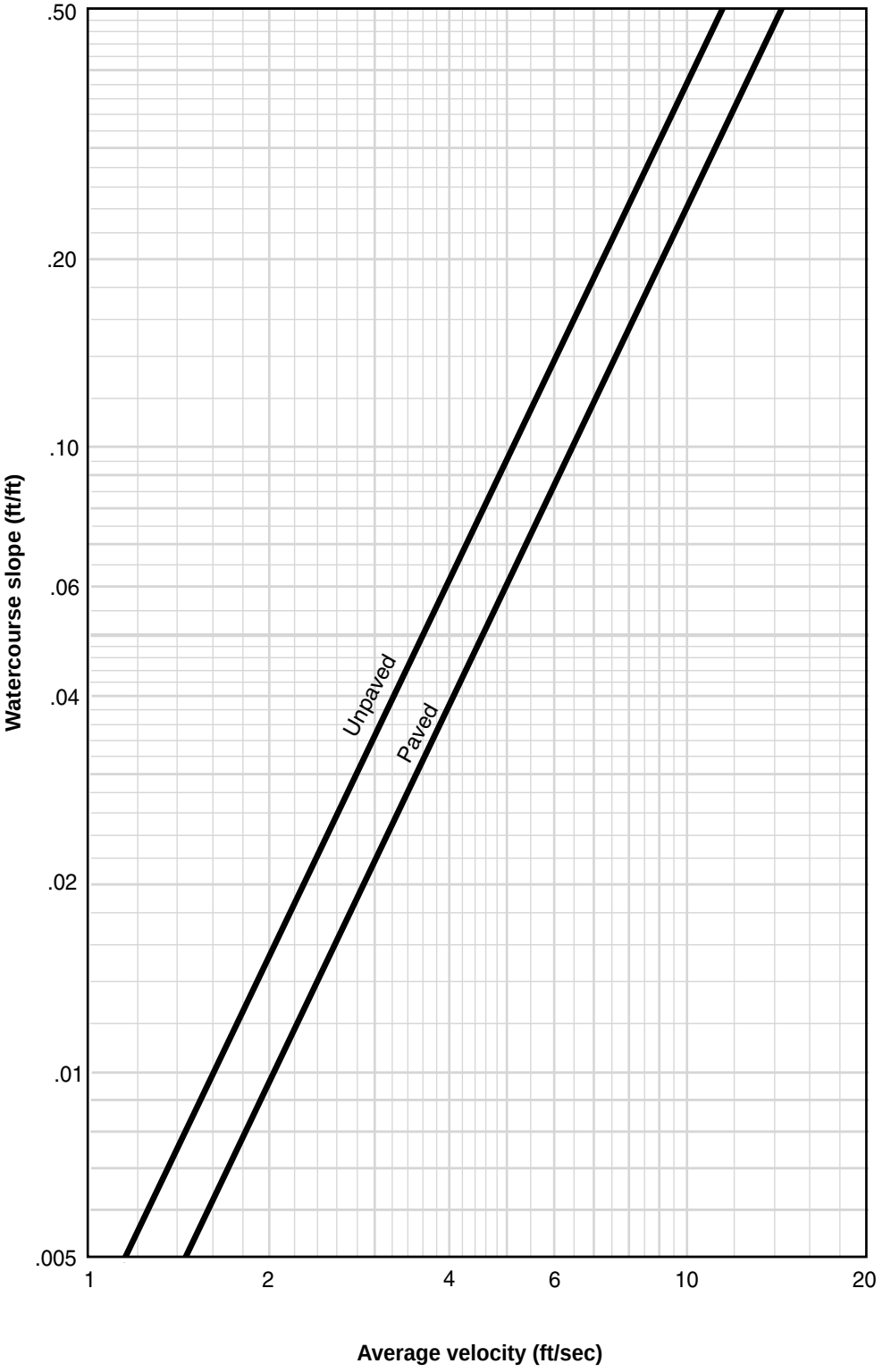
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

ATTACHMENT B

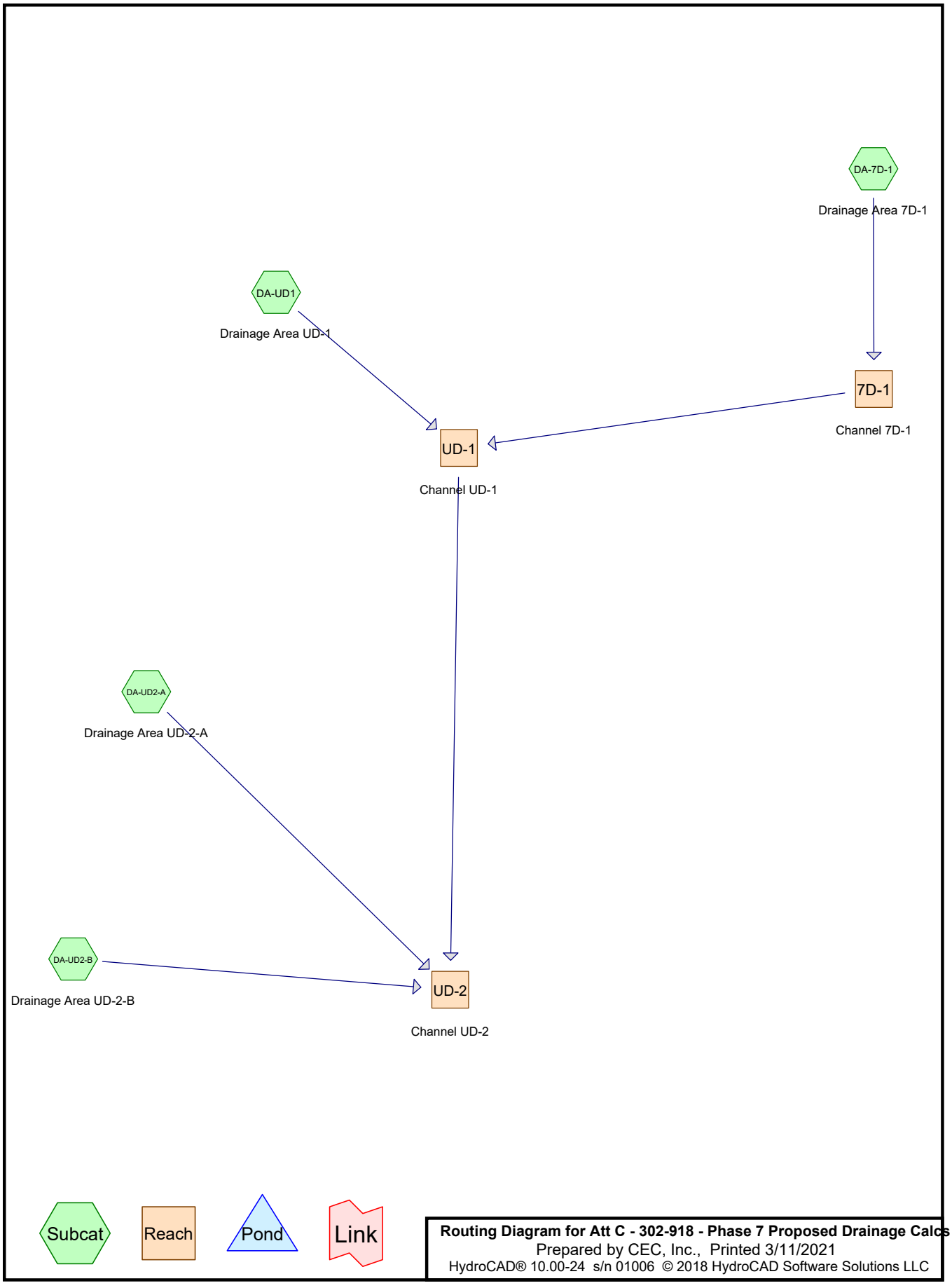
TR-55 FIGURE 3-1

Figure 3-1 Average velocities for estimating travel time for shallow concentrated flow



ATTACHMENT C

HYDROCAD OUTPUT FILES



Routing Diagram for Att C - 302-918 - Phase 7 Proposed Drainage Calcs
Prepared by CEC, Inc., Printed 3/11/2021
HydroCAD® 10.00-24 s/n 01006 © 2018 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
24.100	70	Existing fields/undisturbed woods (DA-7D-1, DA-UD1, DA-UD2-A, DA-UD2-B)
24.100	**70**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
24.100	Other	DA-7D-1, DA-UD1, DA-UD2-A, DA-UD2-B
24.100		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchmen Numbers
0.000	0.000	0.000	0.000	24.100	24.100	Existing fields/undisturbed woods	
0.000	**0.000**	**0.000**	**0.000**	**24.100**	**24.100**	**TOTAL AREA**	

Time span=1.00-96.00 hrs, dt=0.05 hrs, 1901 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment DA-7D-1: Drainage Area 7D-1 Runoff Area=2.500 ac 0.00% Impervious Runoff Depth=1.40"
Flow Length=422' Tc=14.2 min CN=70 Runoff=4.47 cfs 0.291 af

Subcatchment DA-UD1: Drainage Area UD-1 Runoff Area=2.800 ac 0.00% Impervious Runoff Depth=1.40"
Flow Length=665' Tc=18.3 min CN=70 Runoff=4.37 cfs 0.326 af

Subcatchment DA-UD2-A: Drainage Area Runoff Area=2.200 ac 0.00% Impervious Runoff Depth=1.40"
Flow Length=455' Tc=11.8 min CN=70 Runoff=4.29 cfs 0.256 af

Subcatchment DA-UD2-B: Drainage Area Runoff Area=16.600 ac 0.00% Impervious Runoff Depth=1.40"
Flow Length=590' Tc=11.8 min CN=70 Runoff=32.40 cfs 1.932 af

Reach 7D-1: Channel 7D-1 Avg. Flow Depth=0.56' Max Vel=4.74 fps Inflow=4.47 cfs 0.291 af
n=0.045 L=680.0' S=0.1015 '/' Capacity=16.63 cfs Outflow=4.25 cfs 0.291 af

Reach UD-1: Channel UD-1 Avg. Flow Depth=0.59' Max Vel=6.41 fps Inflow=8.56 cfs 0.617 af
n=0.015 L=900.0' S=0.0167 '/' Capacity=64.93 cfs Outflow=8.26 cfs 0.617 af

Reach UD-2: Channel UD-2 Avg. Flow Depth=0.90' Max Vel=11.86 fps Inflow=40.84 cfs 2.805 af
n=0.015 L=3,840.0' S=0.0328 '/' Capacity=204.34 cfs Outflow=35.15 cfs 2.805 af

Total Runoff Area = 24.100 ac Runoff Volume = 2.805 af Average Runoff Depth = 1.40"
100.00% Pervious = 24.100 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment DA-7D-1: Drainage Area 7D-1

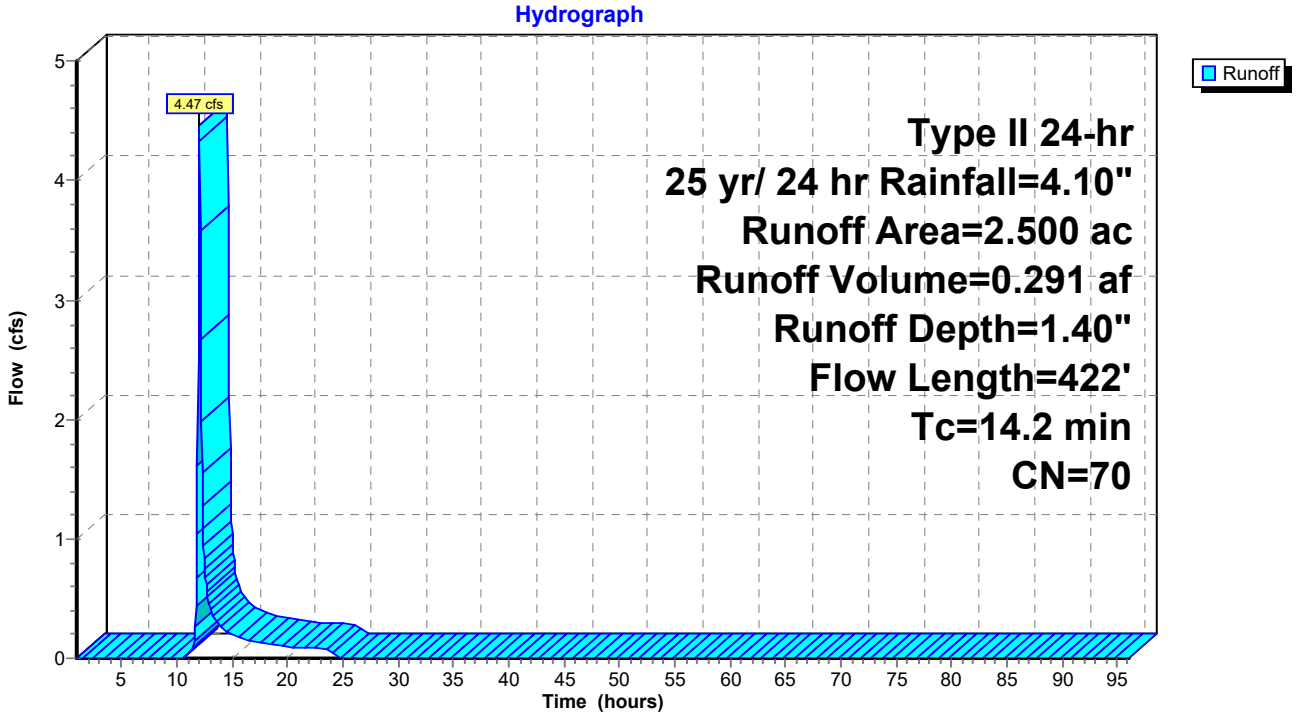
Runoff = 4.47 cfs @ 12.07 hrs, Volume= 0.291 af, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-96.00 hrs, dt= 0.05 hrs
Type II 24-hr 25 yr/ 24 hr Rainfall=4.10"

	Area (ac)	CN	Description
*	2.500	70	Existing fields/undisturbed woods
	2.500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	100	0.0900	0.13		**Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 2.52"
0.7	202	0.1000	5.09		**Shallow Concentrated Flow, Shallow 1** Unpaved Kv= 16.1 fps
0.2	120	0.3500	9.52		**Shallow Concentrated Flow, Shallow 2** Unpaved Kv= 16.1 fps
14.2	422	Total			

Subcatchment DA-7D-1: Drainage Area 7D-1



Summary for Subcatchment DA-UD1: Drainage Area UD-1

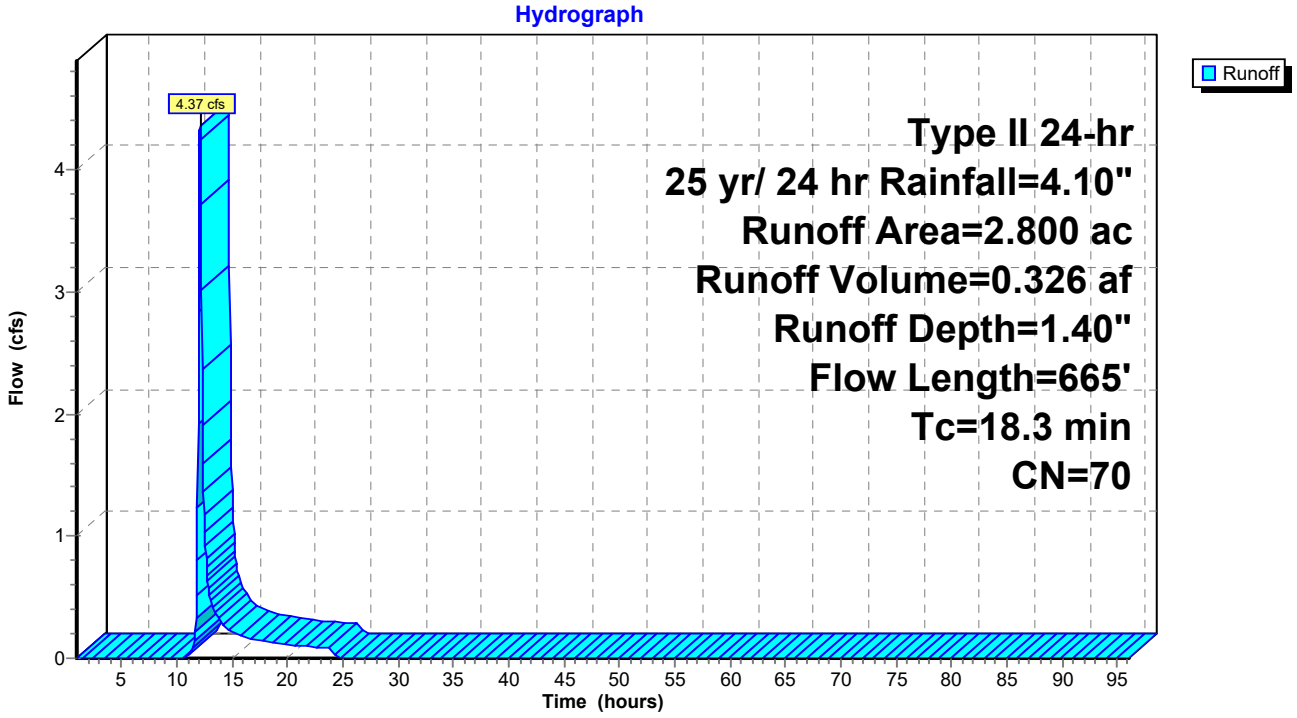
Runoff = 4.37 cfs @ 12.12 hrs, Volume= 0.326 af, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-96.00 hrs, dt= 0.05 hrs
Type II 24-hr 25 yr/ 24 hr Rainfall=4.10"

	Area (ac)	CN	Description
*	2.800	70	Existing fields/undisturbed woods
	2.800		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.6	100	0.0600	0.11		**Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 2.52"
2.6	500	0.0400	3.22		**Shallow Concentrated Flow, Shallow 1** Unpaved Kv= 16.1 fps
0.1	65	0.2500	8.05		**Shallow Concentrated Flow, Shallow 2** Unpaved Kv= 16.1 fps
18.3	665	Total			

Subcatchment DA-UD1: Drainage Area UD-1



Summary for Subcatchment DA-UD2-A: Drainage Area UD-2-A

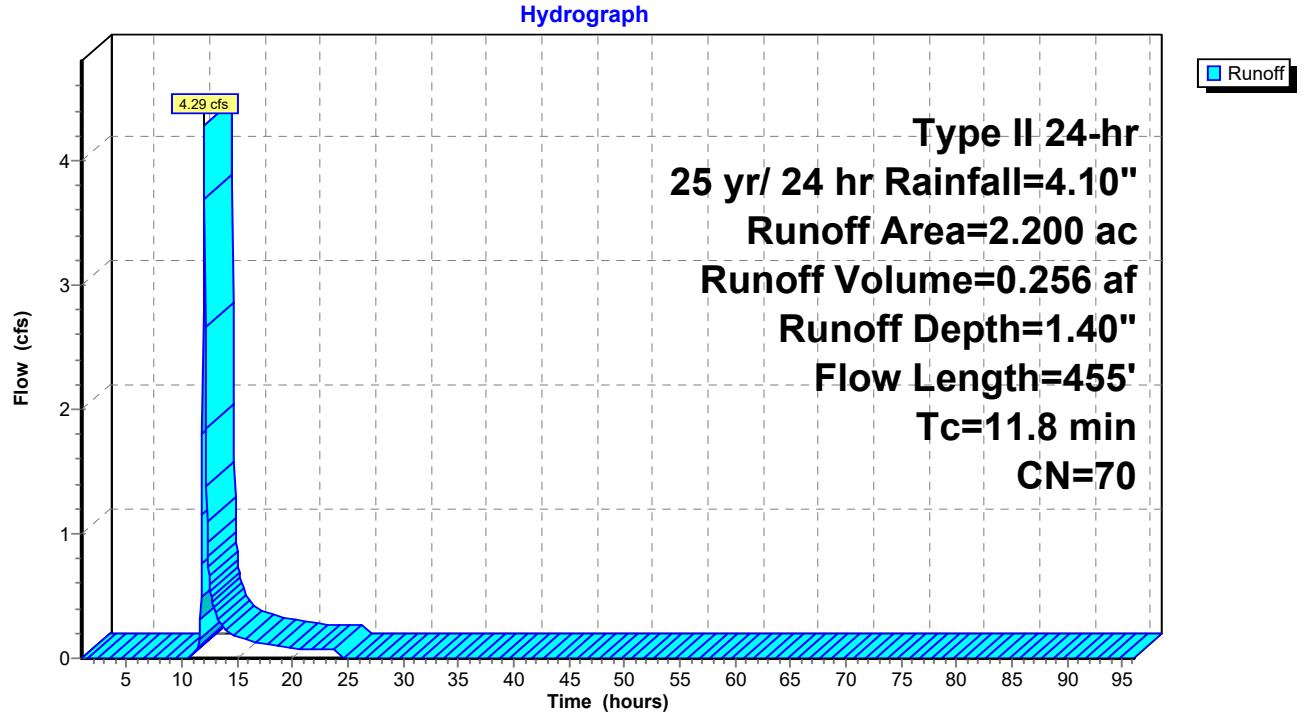
Runoff = 4.29 cfs @ 12.05 hrs, Volume= 0.256 af, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-96.00 hrs, dt= 0.05 hrs
Type II 24-hr 25 yr/ 24 hr Rainfall=4.10"

	Area (ac)	CN	Description
*	2.200	70	Existing fields/undisturbed woods
	2.200		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.1	100	0.1400	0.15		**Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 2.52"
0.5	245	0.2500	8.05		**Shallow Concentrated Flow, Shallow 1** Unpaved Kv= 16.1 fps
0.2	110	0.3200	9.11		**Shallow Concentrated Flow, Shallow 2** Unpaved Kv= 16.1 fps
11.8	455	Total			

Subcatchment DA-UD2-A: Drainage Area UD-2-A



Summary for Subcatchment DA-UD2-B: Drainage Area UD-2-B

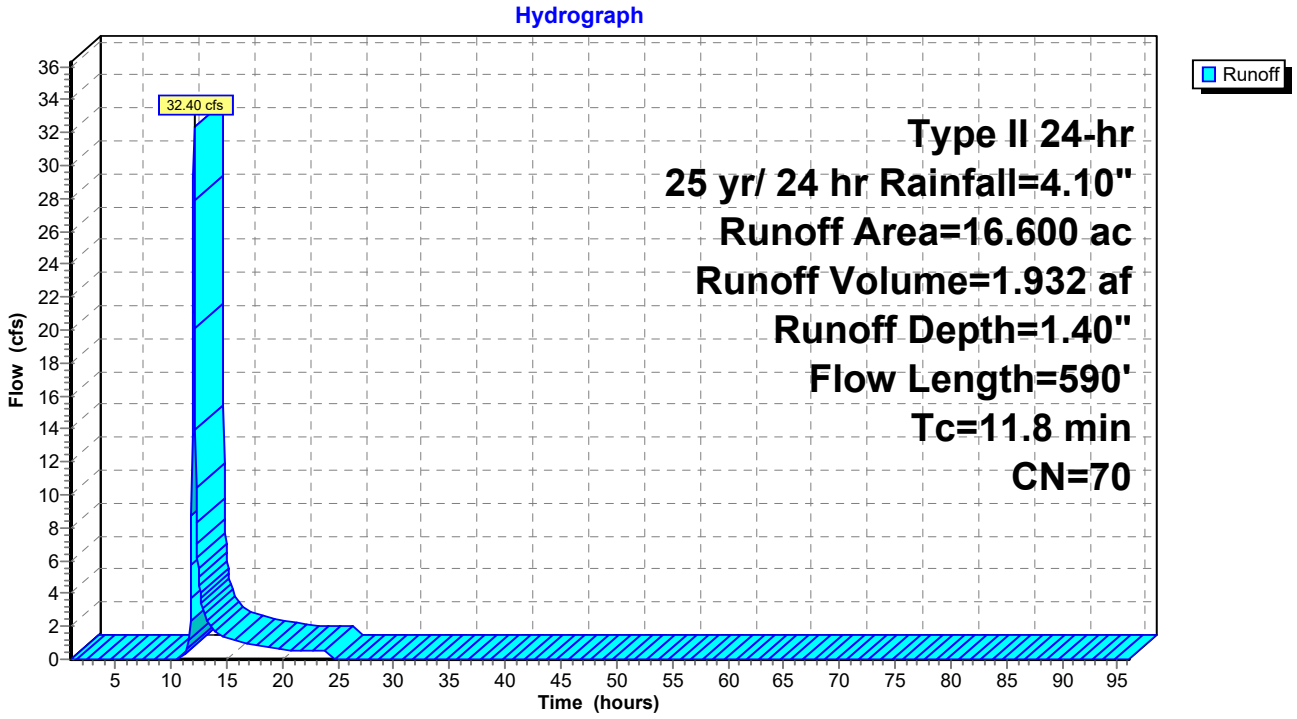
Runoff = 32.40 cfs @ 12.05 hrs, Volume= 1.932 af, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-96.00 hrs, dt= 0.05 hrs
Type II 24-hr 25 yr/ 24 hr Rainfall=4.10"

	Area (ac)	CN	Description
*	16.600	70	Existing fields/undisturbed woods
	16.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	100	0.1600	0.16		**Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 2.52"
1.3	490	0.1500	6.24		**Shallow Concentrated Flow, Shallow 1** Unpaved Kv= 16.1 fps
11.8	590	Total			

Subcatchment DA-UD2-B: Drainage Area UD-2-B



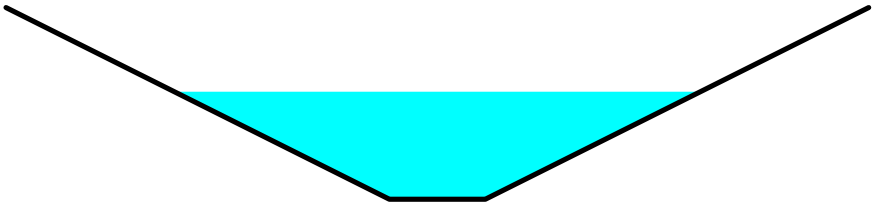
Summary for Reach 7D-1: Channel 7D-1

Inflow Area = 2.500 ac, 0.00% Impervious, Inflow Depth = 1.40" for 25 yr/ 24 hr event
Inflow = 4.47 cfs @ 12.07 hrs, Volume= 0.291 af
Outflow = 4.25 cfs @ 12.15 hrs, Volume= 0.291 af, Atten= 5%, Lag= 4.4 min

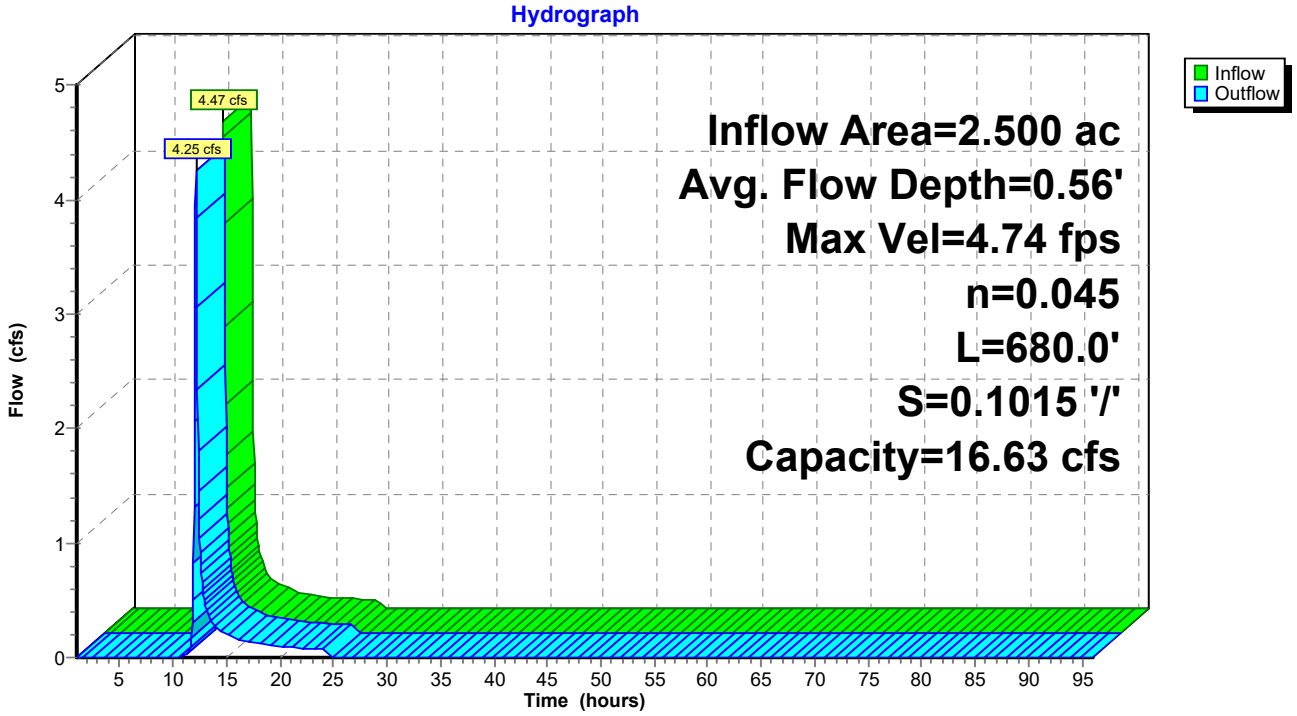
Routing by Stor-Ind+Trans method, Time Span= 1.00-96.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.74 fps, Min. Travel Time= 2.4 min
Avg. Velocity = 1.75 fps, Avg. Travel Time= 6.5 min

Peak Storage= 619 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.56'
Bank-Full Depth= 1.00' Flow Area= 2.5 sf, Capacity= 16.63 cfs

0.50' x 1.00' deep channel, n= 0.045 Vegetated
Side Slope Z-value= 2.0 '/' Top Width= 4.50'
Length= 680.0' Slope= 0.1015 '/'
Inlet Invert= 1,414.00', Outlet Invert= 1,345.00'



Reach 7D-1: Channel 7D-1



Summary for Reach UD-1: Channel UD-1

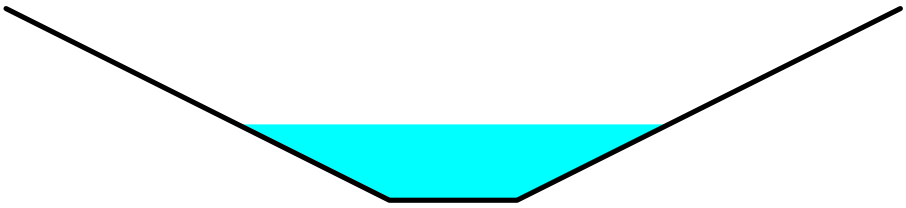
[62] Hint: Exceeded Reach 7D-1 OUTLET depth by 0.11' @ 12.25 hrs

Inflow Area = 5.300 ac, 0.00% Impervious, Inflow Depth = 1.40" for 25 yr/ 24 hr event
Inflow = 8.56 cfs @ 12.13 hrs, Volume= 0.617 af
Outflow = 8.26 cfs @ 12.21 hrs, Volume= 0.617 af, Atten= 4%, Lag= 4.2 min

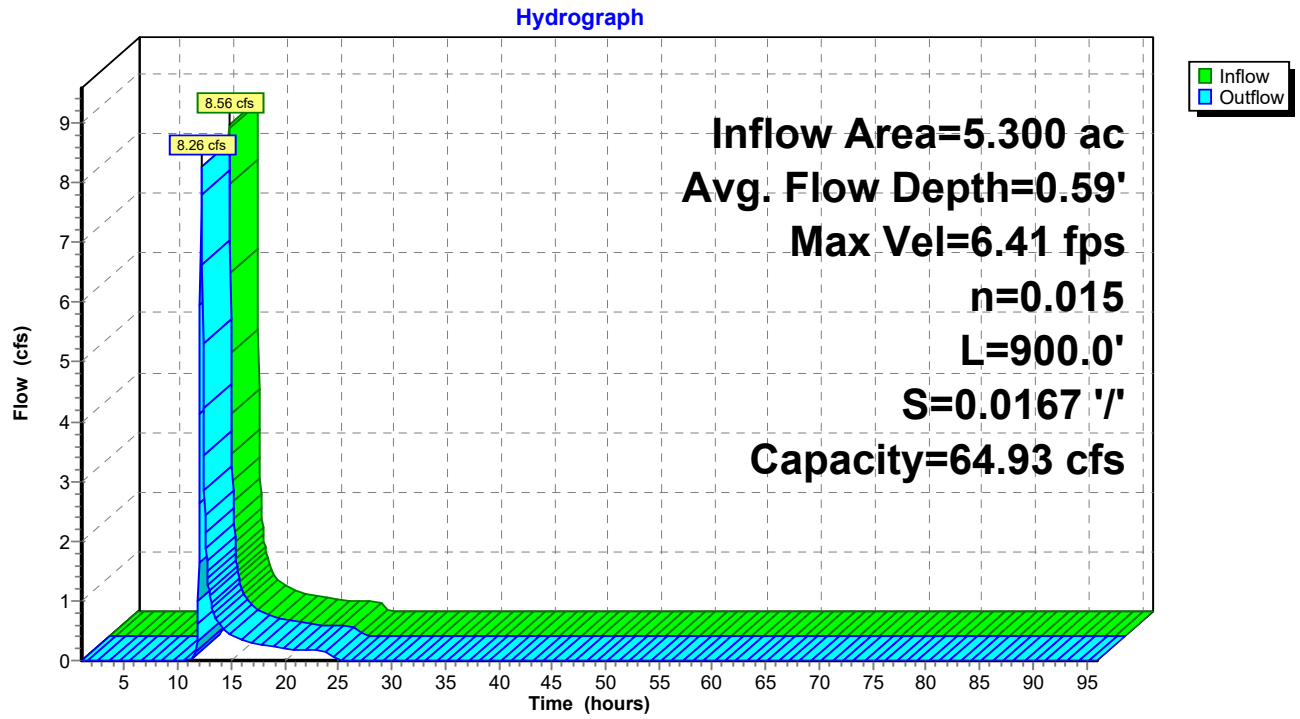
Routing by Stor-Ind+Trans method, Time Span= 1.00-96.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.41 fps, Min. Travel Time= 2.3 min
Avg. Velocity = 2.26 fps, Avg. Travel Time= 6.6 min

Peak Storage= 1,172 cf @ 12.16 hrs
Average Depth at Peak Storage= 0.59'
Bank-Full Depth= 1.50' Flow Area= 6.0 sf, Capacity= 64.93 cfs

1.00' x 1.50' deep channel, n= 0.015 Concrete
Side Slope Z-value= 2.0 '/' Top Width= 7.00'
Length= 900.0' Slope= 0.0167 '/'
Inlet Invert= 1,345.00', Outlet Invert= 1,330.00'



Reach UD-1: Channel UD-1



Summary for Reach UD-2: Channel UD-2

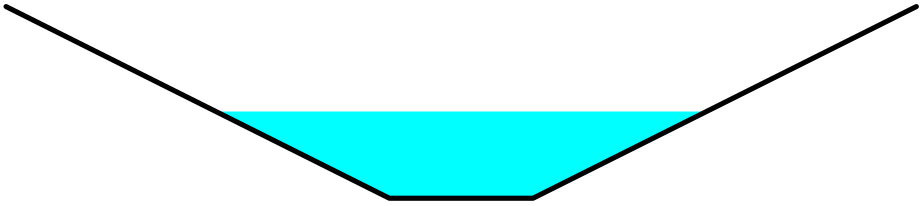
[62] Hint: Exceeded Reach UD-1 OUTLET depth by 0.35' @ 12.05 hrs

Inflow Area = 24.100 ac, 0.00% Impervious, Inflow Depth = 1.40" for 25 yr/ 24 hr event
Inflow = 40.84 cfs @ 12.06 hrs, Volume= 2.805 af
Outflow = 35.15 cfs @ 12.21 hrs, Volume= 2.805 af, Atten= 14%, Lag= 9.4 min

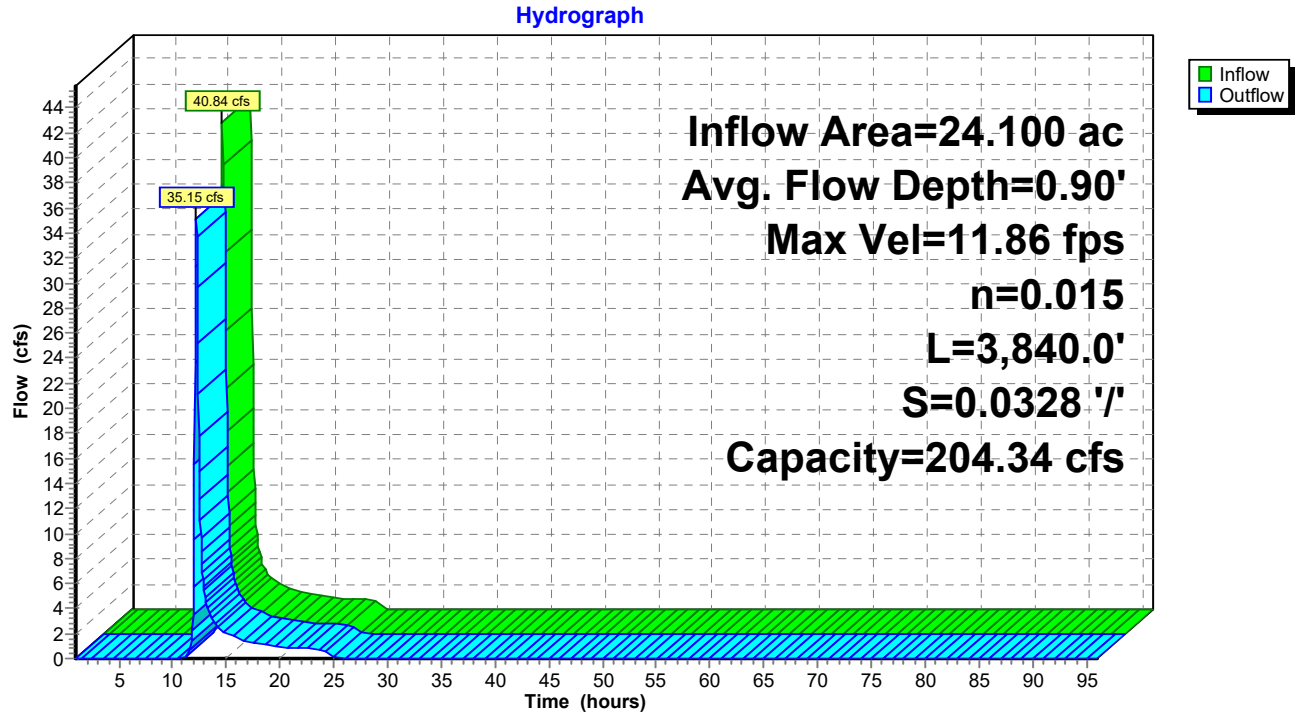
Routing by Stor-Ind+Trans method, Time Span= 1.00-96.00 hrs, dt= 0.05 hrs
Max. Velocity= 11.86 fps, Min. Travel Time= 5.4 min
Avg. Velocity = 3.78 fps, Avg. Travel Time= 17.0 min

Peak Storage= 11,475 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.90'
Bank-Full Depth= 2.00' Flow Area= 11.0 sf, Capacity= 204.34 cfs

1.50' x 2.00' deep channel, n= 0.015 Concrete
Side Slope Z-value= 2.0 '/' Top Width= 9.50'
Length= 3,840.0' Slope= 0.0328 '/'
Inlet Invert= 1,330.00', Outlet Invert= 1,204.00'



Reach UD-2: Channel UD-2



APPENDIX E
LINER SYSTEM CALCULATIONS

ANCHOR TRENCH

OBJECTIVE

Analyze the proposed anchor trench design for the Phase 7 expansion to determine if it provides adequate short term pull-out resistance for the proposed 3.0H:1V baseliner slope.

The West Virginia Title 33 Legislative Rule Series 1 (§33-1) requires that the geomembrane;

> 4.5.d.5.B.9 *Be designed to withstand the calculated tensile forces acting upon the synthetic materials when installed on slopes greater than twenty-five percent (25%);*
>
> and
>
> 4.5.d.5.B.9 *Be anchored a minimum of twenty-four (24) inches horizontally back from the edge of the top of the slope. The liner must be anchored by cutting a trench twelve (12) to sixteen (16) inches in depth, laying the liner across the soil perimeter of the trench, backfilling the trench, and compacting the backfill material.*

A separate anchor trench calculation was performed by GAI for the Phase 6A proposed 3H:1V baseliner slopes and includes an anchor trench design the a 3-foot long berm runout and a 1-foot long anchor runout.

REFERENCES

1. Koerner, Robert. Designing with Geosynthetics, Second Edition, Prentice Hall, 1990.
2. Harrison Power Station, Phase 6A Expansion Area, Bottom Liner Anchor Trench Design Calculations, GAI Consultants, 2017

ALLOWABLE STRENGTH

The allowable short-term pull-out resistance is based on the maximum linear tension of the proposed geosynthetic liner. From GRI GM 13, 60-mil HDPE textured geomembrane liner should have a minimum yield strength of 126 lbs/inch and minimum break strength of 90 lbs/inch.

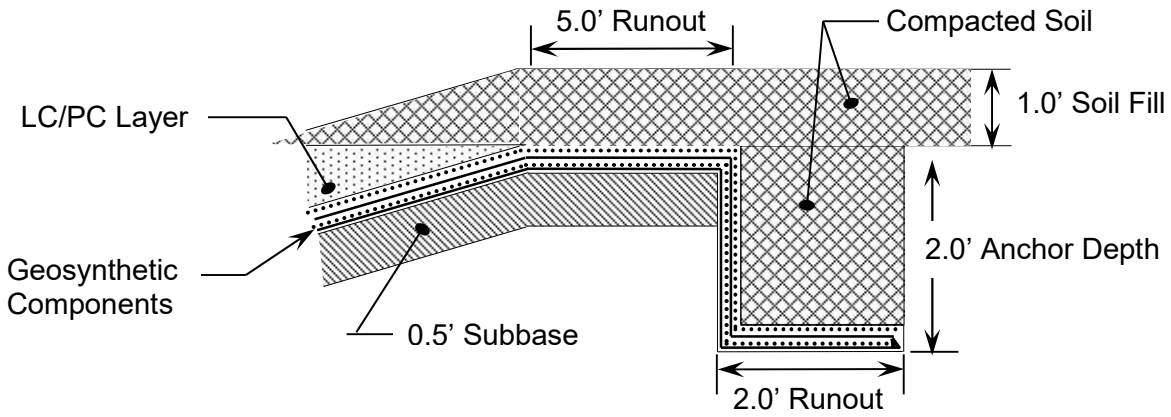
T_{allow} = (126 lb/in)/2.5 = 50.4 lb/in = 605 lb/ft

ANALYSIS

The proposed Phase 7 liner and leachate collection system consists of the following components (from bottom to top):

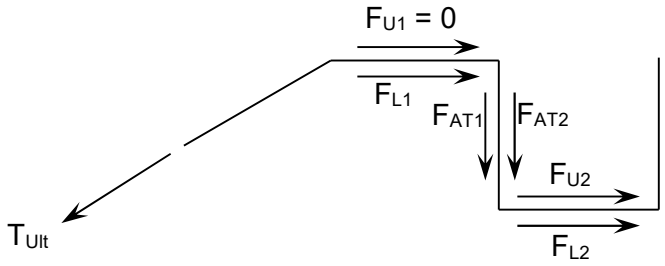
1. 6-inch thick Subbase Layer;
2. Double Sided Geocomposite Drainage Net (GDN) Leachate Detection Zone;
3. Geosynthetic Clay Liner (GCL);
4. 60-mil HDPE Textured Geomembrane Liner;
5. 16 oz/sy Cushion Geotextile;
6. 12-inch thick Leachate Collection Zone consisting of Granular Bottom Ash material (or sand); and
7. 12-inch thick Protective Cover Layer consisting of CCB material.

The proposed anchor trench design is shown below:



d_{sc} = 1.0' (soil fill depth)
γ_{sc} = 120 pcf (cover soil unit weight)
φ_{SB} = 25.5 º (subbase soil internal friction angle)
γ_{SB} = 115 pcf (subbase soil unit weight)
δ_1 = 18.4º (slope angle beneath the geomembrane, 3.0H:1V)
δ_2 = 27º (interface friction angle)
L_{RO1} = 5.0' (berm runout)
L_{RO2} = 2.0' (trench runout)
d_{AT} = 2.0' (trench depth)
$d_{AT'}$ = 3.0' (effective depth)

The frictional resistance mobilized by the anchor trench geometry shown above is resolved as follows:



$F_{L1} = \gamma_{SC}\, d_{SC} \tan \delta_1\, L_{RO1}$
$F_{AT1} = (1\text{-}\sin \varphi_{SB})\, \gamma_{SB}\, H_{Avg} \tan \delta_1\, d_{AT}$
$F_{AT2} = (1\text{-}\sin \varphi_{SB})\, \gamma_{SB}\, H_{Avg} \tan \delta_2\, d_{AT}$
$F_{U1} = 0$ (soil will crack and move with the liner)
$F_{U2} = \gamma_{SC}\, d_{AT'} \tan \delta_2\, L_{RO2}$
$F_{L2} = \gamma_{SC}\, d_{AT'} \tan \delta_1\, L_{RO2}$

H_{Avg} = Average Anchor Trench Depth = (2'+1')/2 = 1.5 feet

Thus, for static equilibrium conditions:

$T_{Ult} = F_{L1} + F_{AT1} + F_{AT2} + F_{U2} + F_{L2}$

$= \gamma_{SC}\, d_{SC} \tan \delta_1\, L_{RO1}$
$+ (1\text{-}\sin \varphi_{SB})\, \gamma_{SB}\, H_{Avg} \tan \delta_1\, d_{AT}$
$+ (1\text{-}\sin \varphi_{SB})\, \gamma_{SB}\, H_{Avg} \tan \delta_2\, d_{AT}$
$+ 0$
$+ \gamma_{SC}\, d_{AT'} \tan \delta_2\, L_{RO2}$
$+ \gamma_{SC}\, d_{AT'} \tan \delta_1\, L_{RO2}$

$= (120 \text{ pcf} * 1.0' * \tan 18.4^o * 5.0')$
$+ [(1\text{-}\sin 25.5^o) * 115 \text{ pcf} * 1.5' * \tan 18.4^o * 2.0']$
$+ [(1\text{-}\sin 25.5^o) * 115 \text{ pcf} * 1.5' * \tan 27^o * 2.0']$
$+ (120 \text{ pcf} * 3.0' * \tan 27^o * 2.0')$
$+ (120 \text{ pcf} * 3.0' * \tan 18.4^o * 2.0')$

$= 200 \text{ lb/ft} + 65 \text{ lb/ft} + 100 \text{ lb/ft} + 367 \text{ lb/ft} + 240 \text{ lb/ft} = 972 \text{ lb/ft}$

$T_{allow} \leq T_{Ult}$
605 ppf ≤ 972 ppf OK

CONCLUSION

The proposed anchor trench will provide sufficient frictional resistance to avoid pull-out at an applied force of 972 lb/ft for the proposed liner system.

PERMEABILITY EQUIVALENCY CALCULATION - GDN

OBJECTIVE

The objective of this analysis is to specify the transmissivity of the geocomposite for the landfill baseliner system. The West Virginia Title 33 Legislative Rule Series 1 (§33-1) requires in Rule 4.5.d.4 that the leachate detection zone must create a flow zone between the subbase and the composite liner system more permeable that $1x10^{-3}$ cm/sec. The leachate detection zone must be at least 12-inches thick.

REFERENCES

1. Harrison Power Station, Phase 6A Expansion Area, Slope Stability Analysis, GAI Consultants, 2017
2. Harrison Power Station, Phase 6 Expansion Area, Slope Stability Analysis, GAI Consultants, 2015
3. Harrison Power Station, Phase 5 Expansion Area, Slope Stability Analysis, GAI Consultants, 2011
4. United States Environmental Protection Agency (USEPA), 2015. 40 CFR Parts 257 and 261 Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule. April 17, 2015.
5. USEPA, 1988. Guide to Technical Resources for the Design of Land Disposal Facilities. Document No. EPA/625/6-88-018. December 1988.
6. GRI Standard – GC8, Determination of the Allowable Flow Rate of a Drainage Geocomposite, January 9, 2013, Geosynthetic Research Institute (GRI).

METHODOLOGY

GRI Standard – GC8, Determination of the Allowable Flow Rate of a Drainage Geocomposite

This paper presents the methodology for application of reduction factors in the specification of required transmissivity of a geocomposite.

PROPOSED BASELINER

The proposed Phase 7 liner and leachate collection system consists of the following components (from bottom to top):

- 6-inch thick Subbase Layer;
- Double Sided Geocomposite Drainage Net (GDN) Leachate Detection Zone;

- Geosynthetic Clay Liner (GCL);
- 60-mil HDPE Textured Geomembrane Liner;
- 16 oz/sy Cushion Geotextile;
- 12-inch thick Leachate Collection Layer consisting of Granular Bottom Ash material (or sand); and
- 12-inch thick Protective Cover Layer consisting of CCB material.

CALCULATIONS

Required Transmissivity

The West Virginia Title 33 Legislative Rule Series 1 (§33-1) requires in Rule 4.5.d.4 that the leachate detection zone have a minimum permeability of $1x10^{-3}$ cm/sec and have a minimum thickness of 12 inches. The required long term transmissivity is calculated as follows:

$\theta_{lt} = k*t$

Where :

θ_{lt}= Long-term transmissivity of the drainage layer
k = Permeability of the drainage layer
t = Thickness of the drainage layer

$$\theta_{lt} = 1x10^{-3}\frac{cm}{sec}(12\ in)\left(2.54\ \frac{cm}{in}\right)\left(\frac{1\ m^2}{10{,}000\ cm^2}\right) = 3.048x10^{-6}\frac{m^2}{sec}$$

Using the minimum leachate collection thickness and permeability, an equivalent long-term transmissivity of 3.048 x 10^{-6} m^2/sec was calculated.

Specified Transmissivity

To meet this required long-term transmissivity, the specified value of transmissivity for the geocomposite at the time of testing must be higher than the long-term transmissivity to account for clogging and creep that will occur during long-term conditions.

From Koerner, 1998, "If the test setup does not model site specific conditions adequately, then adjustments to the laboratory value must be made." Since this transmissivity was determined for field conditions, the use of reduction factors is necessary. These reduction factors will be applied to calculate a transmissivity specification value to be used in laboratory quality assurance testing.

To account for the reduction in transmissivity over the long term, this transmissivity will be increased using reduction factors considering GRI Standard – GC8 to develop the transmissivity specification at the time of installation.

$Transmissivity_{act} = \theta_{lt} * FS_D * (RF_{IN} * RF_{CR} * RF_{CC} * RF_{BC})$

Where :

FS_D = Overall factor of safety for drainage
RF_{IN} = Reduction Factor for geotextile intrusion;
RF_{CR} = Reduction Factor for creep deformation;
RF_{CC} = Reduction Factor for chemical clogging (1.1 to 1.5); and
RF_{BC} = Reduction Factor for biological clogging (1.1 to 1.3).

The reduction factors for the flow capacity of geocomposites having a geonet core used in landfill leachate detection zone are described below:

- The ultimate transmissivity (θ_{ult}) is calculated to achieve an overall drainage factor of safety of 2 ($FS_D = 2$).
- Since the laboratory testing will be performed using site-specific boundary conditions, the reduction factor for intrusion of the geotextile into the geonet will be ignored ($RF_{IN} = 1.0$).
- The reduction factor for creep was conservatively assumed for a total reduction factor of 20 ($RF_{CR} = 5.13$).
- The reduction factor for chemical clogging is based on ranges provided by Keorner in GRI Guide GC8 ($RF_{CC} = 1.5$).
- The reduction factor for biological clogging is based on ranges provided by Keorner in GRI Guide GC8 ($RF_{BC} = 1.3$).

The resulting actual specified transmissivity is calculated as shown below:

$Transmissivity_{act} = 3.048 * 10^{-6}\ m^2/sec * 2 * (1.0 * 5.13 * 1.5 * 1.3) = 6.1 \times 10^{-5}\ m^2/sec.$

Geocomposite Permeability

The equivalent permeability of geocomposite is calculated as follows:

$k_{act} = \theta_{act}/t$

Where :

K_{act} = Permeability of geocomposite
θ_{act}= Transmissivity of the geocomposite at time of installation
t = Thickness of the geocomposite

$$K_{act} = \frac{6.1x10^{-5}\,\frac{m^2}{sec}}{(250\ mil)\left(\frac{1in}{1000\ mil}\right)\left(\frac{2.54\ cm}{in}\right)} x \frac{10{,}000\ cm^2}{1\ m^2} = 0.960\,\frac{cm}{sec}$$

Testing Parameters

To accurately model field conditions, the selected geocomposite shall be tested at specified normal load as described below and in Table 6-1 of the CQA/QC Plan.

Testing shall be performed using deaired water, project geosynthetic clay liner for substrate, and project subbase soil compacted to 95% D698 maximum dry density at 3% to 5% wet of optimum moisture content for superstratum. Testing shall be performed at a hydraulic gradient of 0.33 ft/ft with the site specific boundary conditions of the baseliner system. For the West Liner area, a normal stress of 8,500 lb/ft^2 shall be applied with a seating period of 100 hours. If GDN is proposed in the East Liner area, a normal stress of 32,000 lb/ft^2 shall be applied with a seating period of 100 hours.

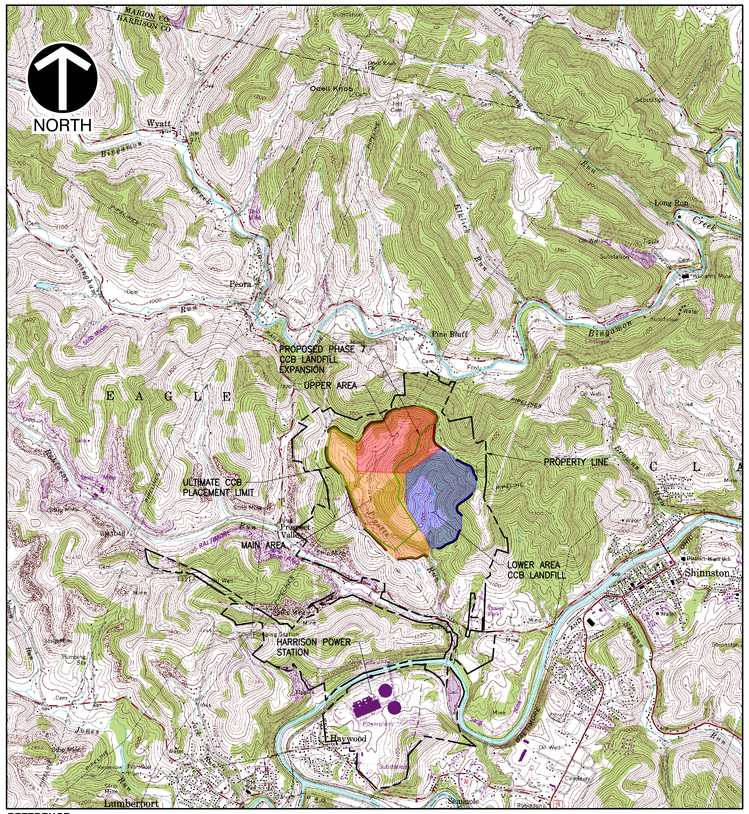
CONCLUSIONS

Geocomposite Requirements

The results of the geocomposite transmissivity calculation indicate that a transmissivity of **6.1 x 10^{-5} m^2/sec** is required. This value is specified for the Phase 7 Expansion areas.

DRAWING

MONONGAHELA POWER, A FIRSTENERGY COMPANY
HARRISON POWER STATION
PHASE 7 CCB LANDFILL EXPANSION
HARRISON COUNTY, WEST VIRGINIA
MARCH 2021



VICINITY MAP

REFERENCE

1. U.S.G.S. 7.5' TOPOGRAPHIC MAP, SHINNSTON QUADRANGLE, WEST VIRGINIA DATED: 1960, PHOTOREVISED: 1977.

LEGEND

- PROPOSED PHASE 7 EXPANSION
- UPPER AREA
- LOWER AREA
- MAIN AREA

DRAWING INDEX		
DRAWING NO.	DRAWING TITLE	REVISION NO.
C89509681	TITLE SHEET AND VICINITY MAP	
C89509682	LEGEND AND GENERAL NOTES	
C89509683	EXISTING CONDITION/SITE OVERALL PLAN	
C89509684	PHASE LIMITS	
C89509685	2021 SUBGRADE CONSTRUCTION GRADING PLAN	
C89509686	2022-2025 SUBGRADE CONSTRUCTION GRADING PLAN	
C89509687	LINER AND LEACHATE COLLECTION PIPING PLAN	
C89509688	DRAINAGE AREA PLAN	
C89509689	PHASE 7 PILE DEVELOPMENT - MAX TOP OF WASTE 1280	
C89509690	SUBGRADE CROSS SECTIONS	
C89509691	SUBGRADE AND LINER DETAILS (SHEET 1)	
C89509692	SUBGRADE AND LINER DETAILS (SHEET 2)	
C89509693	PIPING AND CHANNEL DETAILS	
C89509694	EROSION AND SEDIMENTATION CONTROL DETAILS	
C89509695	ULTIMATE DEVELOPMENT PLAN	

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DANIEL M. TOLLEY — REGISTERED — P3162 — STATE OF WEST VIRGINIA — PROFESSIONAL ENGINEER
3/12/2021

*HAND SIGNATURE ON FILE

FUNCTIONAL LOCATION NO. _____
Last .Net editor version: 1.1.2.0

INITIAL PROJECT #

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REVISION	DR	CHKD	APPD	DATE

PROJECT NUMBER

REFERENCE DRAWINGS	
DWG. NO.	TITLE

ENGINEERING	DATE
DR JML	03/12/2021
CHKD MRF	03/12/2021
APPD DMT*	03/12/2021
SCALE	

PHASE 7 CCB LANDFILL EXPANSION
TITLE SHEET AND VICINITY MAP

FACILITY HARRISON UNIT COMMON

MonPower — A FirstEnergy Company

DWG. NO. C89509681 REV.

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13	12	11	10	9	8	7	6	5	4	3	2	1

GENERAL:

1. THE SELLER IS RESPONSIBLE FOR FURNISHING AND INSTALLING EROSION AND SEDIMENTATION (E&S) CONTROLS FOR CONSTRUCTION. BEST MANAGEMENT PRACTICES (BMPS) SHALL BE INSTALLED IN ACCORDANCE WITH THE DETAILS AND MANUFACTURER'S RECOMMENDATIONS.

2. THROUGHOUT CONSTRUCTION THE SELLER IS RESPONSIBLE FOR LOCATING AND PROTECTING PROPERTY CORNERS, UNDERGROUND UTILITIES, AND ABOVE GROUND UTILITIES. THE PROVIDED LOCATIONS OF UNDERGROUND UTILITIES ARE APPROXIMATE. THE SELLER IS RESPONSIBLE FOR CONTACTING UTILITY LOCATION SERVICES (MISS UTILITY OR WEST VIRGINIA 811) AND DETERMINING EXACT LOCATION OF UNDERGROUND UTILITIES. OTHER UNDERGROUND UTILITIES, NOT SHOWN ON PLANS, MAY BE PRESENT.

3. THE SELLER SHALL CLEAR AND GRUB THE WORK AREA TO PROVIDE SUFFICIENT CLEARANCE FOR COMPLETING WORK. CLEARING AND GRUBBING IS THE REMOVAL OF TREES, BRUSH, STUMPS AND ROOTS GREATER THAN ONE-HALF INCH IN DIAMETER. CLEARING AND GRUBBING SHALL BE PERFORMED PRIOR TO EXCAVATION OR FILL PLACEMENT. STUMPS, ROOTS, LOGS, STICKS AND OTHER PERISHABLE MATERIALS SHALL BE REMOVED TO A DEPTH OF AT LEAST 6 INCHES BELOW GROUND SURFACE. LARGE STUMPS MAY BE REMOVED DURING GRADING OPERATIONS, SUBJECT TO THE APPROVAL OF THE BUYERS AGENT. PREFERRED METHODS OF DISPOSAL IS ON-SITE PROCESSING WITH A TUB GRINDER OR BY PROVIDING MATERIAL FOR PULP WOOD HARVESTING.

4. BURNING OF CLEARED MATERIAL IS NOT PERMITTED.

5. AREAS WHERE SPRINGS, SOFT, OR POTENTIALLY UNSUITABLE SUBGRADE IS DETECTED SHALL BE BROUGHT TO THE BUYER'S REPRESENTATIVE'S ATTENTION IMMEDIATELY. THE BUYER'S REPRESENTATIVE IS THE SOLE JUDGE OF SUITABILITY OF SUBGRADE MATERIAL. THE SELLER SHALL CONTROL GROUNDWATER AND SEEPAGE FOR EXCAVATION OPERATIONS, SUBBASE AND SUBGRADE PREPARATION, AND LINER PLACEMENT.

6. THE SELLER SHALL MAINTAIN ON-SITE ROADWAYS USED FOR HAULING. MAINTENANCE INCLUDES WATERING, GRADING, LEVELING, REPLACEMENT, AND COMPACTION OF ROAD BASE REQUIRED TO REPAIR DAMAGE OF ROADWAYS.

7. THE MAP GRID SHOWN IS BASED ON THE WEST VIRGINIA COORDINATE SYSTEM, NORTH ZONE, 1983 NORTH AMERICAN DATUM.

EARTHWORK:

8. THE SELLER SHALL PROVIDE AND MAINTAIN DUST CONTROL DURING THE CONSTRUCTION. DUST CONTROL SHALL BE BY MEANS OF WETTING VIA WATER TRUCK.

9. PRIOR TO CONSTRUCTION, THE BUYER'S REPRESENTATIVE WILL SAMPLE AND TEST SUBBASE SOIL TO ESTABLISH THE MOISTURE/DENSITY RELATIONSHIPS NECESSARY TO ATTAIN THE REQUIRED IN-PLACE (COMPACTED) PERMEABILITIES. DURING CONSTRUCTION, TO EVALUATE COMPLIANCE WITH THE REQUIREMENTS, THE BUYER'S REPRESENTATIVE WILL SAMPLE SUBBASE SOIL AS IT IS PLACED IN ACCORDANCE WITH THE CONSTRUCTION QUALITY ASSURANCE AND QUALITY CONTROL PLAN.

10. THE SELLER SHALL STRIP TOPSOIL FROM EXCAVATION AND FILL AREAS TO FULL DEPTH, AND SHALL STOCKPILE STRIPPED TOPSOIL AS DIRECTED BY BUYER'S AGENT. ROOTS LARGER THAN ONE-HALF INCH IN DIAMETER SHALL BE REMOVED. TOPSOIL SHALL BE SEGREGATED FROM OTHER STOCKPILED SOILS AS DIRECTED BY THE BUYER'S AGENT. TOPSOIL THICKNESS MAY VARY. THE SELLER IS RESPONSIBLE FOR DETERMINING THE AMOUNT TO BE STRIPPED. REMOVE STONES, BRUSH, RUBBISH AND UNSUITABLE MATERIALS FROM TOPSOIL BEFORE STOCKPILING.

11. THE SELLER SHALL COMPLETE EXCAVATION AND FILLS TO THE LINES AND GRADES SHOWN ON THE DRAWINGS. FILL SLOPES SHALL BE OVER BUILT AND TRIMMED SO THE SLOPED SURFACE CONSISTS OF PROPERLY COMPACTED SOIL. EXCAVATED MATERIALS MAY INCLUDE SOIL, ROCK, ASH, ASH-SOIL MIXTURES, COAL, COAL CONTAMINATED SOILS, CARBONACEOUS SHALE, SURFACE MINE BACKFILL, DEEP MINE BACKFILL, EXCESS UNCONTAMINATED SOIL, EXCESS ROCK AND EXCAVATED COAL MAY BE USED BY THE BUYER AND SHALL BE STOCKPILED AS DIRECTED BY BUYER'S AGENT. THE BUYER'S REPRESENTATIVE SHALL DETERMINE THE CLASSIFICATION OF THE EXCAVATION. AREAS EXCAVATED BELOW DESIGN SUBGRADE ELEVATIONS BY THE SELLER, UNLESS REQUESTED BY THE BUYER'S REPRESENTATIVE, SHALL BE BROUGHT BACK TO DESIGN ELEVATIONS AT NO COST TO THE BUYER.

12. THE SELLER SHALL SMOOTH ROLL EXCAVATION AND FILL SURFACES AND BRING THE SURFACE TO WITHIN 0.2 FEET OF THE SPECIFIED GRADE. UNDER CONCRETE STRUCTURES, CHANNELS AND HAUL ROADS, THE SURFACE SHALL BE WITHIN 0.1 FEET OF THE SPECIFIED GRADE. AVOID CREATING LOW SPOTS WHICH COULD POND WATER. AREAS TO RECEIVE SEEDING SHALL BE TRACKED IN UP AND DOWN SLOPES WITH EQUIPMENT WITH CLEATED TRACKS, SEE TRACKING SLOPES DETAIL.

13. THE SELLER SHALL GRADE RESTORED BORROW AREAS, SOIL DISPOSAL PILES AND STOCKPILES NO STEEPER THAN 2H:1V (OR AS SHOWN ON THE DRAWINGS). GRADING SHALL AVOID IMPOUNDING WATER. STOCKPILES SHALL BE BENCHED EVERY 20 FEET IN ELEVATION. BENCHES SHALL BE A MINIMUM 20 FEET WIDE AND SHALL SLOPE TO PILE AT A MINIMUM 1 PERCENT SLOPE AND MAXIMUM 3 PERCENT SLOPE. STOCKPILES DISTURBED DURING CONSTRUCTION SHALL BE REGRADED UPON COMPLETING EARTHMOVING ACTIVITIES

14. GRANULAR FILL SHALL BE PLACED IN UNIFORM HORIZONTAL LIFTS HAVING A MAXIMUM THICKNESS OF 12 INCHES. COMPACTION OF GRANULAR FILL SHALL ACHIEVED BY TRACKING THE MATERIAL IN PLACE TO VISUALLY OBSERVED NON-MOVEMENT.

15. FILL (STRUCTURAL FILL, GENERAL FILL, AND SUBBASE) SHALL COME FROM SITE GRADING OR DESIGNATED BORROW AREAS. PROCESSING (REMOVAL/CRUSHING OF ROCKS, SCREENING, OR MOISTURE CONTENT MODIFICATION) OF MATERIAL SHALL BE PERFORMED AT THE BORROW AREA. TOPSOIL AND SOIL UNFIT FOR USE SHALL BE REMOVED AND STOCKPILED.

16. FILL SHALL BE PLACED IN UNIFORM HOTIZONTAL LIFTS. MATERIAL SHALL BE SCARIFIED BETWEEN LIFTS. DENSITY COMPACTION TESTING IS REQUIRED FOR EVERY LIFT (REGARDLESS OF THICKNESS) AT THE MINIMUM FREQUENCIES LISTED IN THE CONSTRUCTION QUALITY ASSURANCE AND QUALITY CONTROL PLAN. CORRECTIONS FOR UNIT WEIGHT AND WATER CONTENT OF SOILS CONTAINING OVERSIZED PARTICLES SHALL BE IN ACCORDANCE WITH ASTM D4718. COMPACTED SURFACES SHALL MEET SPECIFIED DENSITY AND MOISTURE CRITERIA IMMEDIATELY PRIOR TO PLACEMENT OF THE NEXT LIFT.

17. BEFORE PLACEMENT OF THE LIFT, SUBGRADE AND AREAS TO RECEIVE FILL SHALL BE PROOF ROLLED. THE BUYER'S REPRESENTATIVE SHALL BE PRESENT FOR COMPACTION. LIFT SHALL BE COMPACTED TO 95% OF THE ASTM D698 MAXIMUM DRY DENSITY.

18. FILL WITHIN THREE FEET OF STRUCTURES, PIPES, AND IN AREAS WHERE LARGER EQUIPMENT CAN NOT BE OPERATED SHALL BE COMPACTED WITH HAND DIRECTED POWER EQUIPMENT. WHERE HAND-DIRECTED EQUIPMENT IS USED, THE MAXIMUM ALLOWABLE LIFT THICKNESS SHALL BE FOUR INCHES AND MAXIMUM ALLOWABLE ROCK FRAGMENT SIZE SHALL BE THREE INCHES).

19. THE COMPACTION TESTER SHALL IMMEDIATELY BACKFILL HOLES FROM TESTING IN SUBBASE, SUBGRADE OR CLAY LINER. HOLES SHALL BE BACKFILLED WITH POWDERED BENTONITE AND TAMPED WITH A ROD IN 12 INCH MAXIMUM LIFTS TO WITHIN 1 INCH OF THE SURFACE. WATER SHALL THEN BE ADDED TO THE UPPER 1 INCH OF THE HOLE.

20. IN AREAS WHERE COMPACTION CRITERIA CANNOT BE MET DUE TO MOISTURE FROM SPRINGS, THE SUBGRADE DRAINAGE/LEACHATE DETECTION SYSTEM SHALL BE EXTENDED TO INTERCEPT THESE SPRINGS AS DIRECTED BY AND IN THE PRESENCE OF THE BUYER'S REPRESENTATIVE.

21. IN AREAS WHERE "PUMPING" OF THE SOIL IS OBSERVED BY BUYERS REPRESENTATIVE, UNSUITABLE MATERIAL MAY BE OVER EXCAVATED AND REPLACED AS DIRECTED BY AND IN THE PRESENCE OF THE BUYER'S REPRESENTATIVE.

22. SOIL FOR GENERAL AND SUBGRADE FILL CONSTRUCTION SHALL MEET THE FOLLOWING REQUIREMENTS:
    - A. BE CLASSIFIED AS SM, SC, ML, MH, CH, CL, OR CL-ML USING THE UNIFIED SOIL CLASSIFICATION SYSTEM.
    - B. HAVE A MAXIMUM PARTICLE SIZE OF THREE (3)-INCHES (STRUCTURAL FILL) OR NINE (9)-INCHES (GENERAL FILL).
    - C. BE PLACED IN SIX (6)-INCH (SUBGRADE FILL) OR TWELVE (12)-INCH (GENERAL FILL) MAXIMUM COMPACTED LIFTS.
    - D. BE PLACED AT MINUS 4% TO PLUS 4% OF THE ASTM D698 OPTIMUM MOISTURE CONTENT.
    - E. BE COMPACTED TO 95% OF THE ASTM D698 MAXIMUM DRY DENSITY.

23. SOIL FOR LINER SYSTEM SUBBASE CONSTRUCTION SHALL MEET THE FOLLOWING REQUIREMENTS:
    - A. HAVE A MAXIMUM PARTICLE SIZE OF TWO (2) INCHES.
    - B. BE PLACED IN SIX (6)-INCH MAXIMUM COMPACTED LIFTS.
    - C. BE PLACED AT PLUS 3 % TO PLUS 5% OF THE ASTM D698 OPTIMUM MOISTURE CONTENT.
    - D. BE COMPACTED TO 95% OF THE ASTM D698 MAXIMUM DRY DENSITY.
    - E. HAVE AN IN-PLACE (COMPACTED) PERMEABILITY NO MORE THAN 1×10^{-6} CM/SEC.

24. "NON-RESISTANT ROCK" FILLS MAY BE PLACED AS APPROVED BY THE BUYER'S REPRESENTATIVE.
    - A. THE TERM "NON-RESISTANT ROCK" IS DEFINED AS MATERIAL WHICH CAN BE BROKEN DOWN AND DISINTEGRATED DURING NORMAL COMPACTION WITH MECHANICAL EQUIPMENT AND INCLUDES SOFT TO MEDIUM SOFT WEATHERED ROCKS SUCH AS CLAYSTONES AND SOME SHALES.
    - B. NON-RESISTANT ROCK FILL SHALL BE CRUSHED AND BROKEN BY THE ACTION OF A 20 TON SHEEPSFOOT ROLLER TOWED BY A D-9 BULLDOZER (OR AN APPROVED EQUAL). IF, IN THE OPINION OF THE BUYER'S AGENT, THE ABOVE SPECIFIED EQUIPMENT IS NOT CAPABLE OF SATISFACTORILY CRUSHING AND DISINTEGRATING ROCK, A CATERPILLAR 825 C COMPACTOR OR A 30-TON DISC WITH A BLADE DIAMETER OF AT LEAST 18 INCHES SHALL BE USED. AFTER THE NON-RESISTANT ROCK HAS BEEN SATISFACTORILY DISINTEGRATED TO A COHESIVE FILL MATERIAL, IT SHALL BE COMPACTED TO NON-MOVEMENT BY VISUAL INSPECTION.
    - C. THE TERM "RESISTANT ROCK", IS DEFINED AS MATERIAL OF SUCH HARDNESS AS CANNOT PRACTICALLY BE BROKEN DOWN AND DISINTEGRATED DURING NORMAL COMPACTION AND WHICH IS RESISTANT TO WEATHERING AND DECOMPOSITION. THIS INCLUDES MEDIUM HARD AND HARD SANDY SHALE, SANDSTONE, SILTSTONE AND LIMESTONE. RESISTANT ROCK FILL SHALL PLACED ONLY WHERE APPROVED BY THE BUYER'S REPRESENTATIVE.
    - D. THE RESISTANT ROCK FILL SHALL BE WELL GRADED AND THE LIFT THICKNESS LIMITED TO 3 FEET. AS RESISTANT ROCK IS PLACED, IT SHALL BE SPREAD AND WORKED INTO A STABLE ARRANGEMENT SO THAT THE INDIVIDUAL BOULDERS AND FRAGMENTS DO NOT REORIENT THEMSELVES UNDER THE WEIGHT OF OVERLYING MATERIAL. REWORKING OF EACH LIFT SHALL BE CONDUCTED TO OBTAIN THE GREATEST AMOUNT OF DENSIFICATION PRACTICAL.
    - E. DURING FILL PLACEMENT OR REWORKING PROCESS THE VOID SPACES BETWEEN LARGE BOULDERS SHOULD BE FILLED WITH SMALLER SIZED ROCKS. THE DESIRED RESULTS IN A ROCK FILL IS TO PRODUCE A REASONABLY WELL-GRADED GRANULAR FILL WITH NO LARGE VOIDS OR OBJECTIONABLE POCKETS OF SMALL ROCKS OR CLUSTERS OF LARGE ROCKS.
    - F. RESISANT ROCK FILLS SHALL NOT BE PLACED FOR SUPPORTING OF STRUCTURES IF, INDIVIDUAL ROCK OR ROCKS INTERFERE WITH PROPER AND SMOOTH COMPACTION, THE ROCK SHOULD BE REMOVED FROM THE LIFT BY THE SELLER AND DISPOSED OF AS APPROVED BY THE BUYER'S AGENT.
    - G. EACH LIFT OF RESISTANT ROCK FILL SHALL HAVE A MAXIMUM PARTICLE SIZE OF 24 INCHES AND SHALL BE SUBJECTED TO A MINIMUM OF 4 PASSES OF A VIBRATORY ROLLER HAVING A MINIMUM IMPACT FORCE OF 30 TONS OR 8 PASSES OF A VIBRATORY ROLLER HAVING A MINIMUM IMPACT FORCE OF 15 TONS. THE FREQUENCY OF VIBRATION DURING OPERATION SHOULD BE BETWEEN 1100 AND 1500 VIBRATIONS PER MINUTE. THE ROLLER SHOULD BE OPERATED AT A SPEED NOT TO EXCEED 3 MILES PER HOUR. WHERE TOWED ROLLERS ARE USED, THEY SHOULD BE TOWED BY A CRAWLER TYPE TRACTOR OR BULLDOZER IN A FORWARD MOTION ONLY. SUCCESSIVE PASSES OF ROLLERS SHOULD OVERLAP.

25. AT THE END OF EACH DAY, OR WHEN WORK IS STOPPED COMPACTED EARTH FILL AND NON-RESISTANT ROCK FILL SURFACES SHALL BE SMOOTH-ROLLED AND EXPOSED ENDS OF AGGREGATE SHALL BE COVERED BY FOLDING GEOTEXTILE FROM THE LOWER LIFT OVER THE EDGE. THE INTENT IS TO MINIMIZE EROSION, PONDING, AND INFILTRATION OF WATER.

26. BLASTING MAY BE ALLOWED, SUBJECT TO PRIOR APPROVAL BY THE BUYER'S AGENT. BLASTING SHALL CONFORM TO GOVERNMENTAL AGENCY REGULATIONS AND STANDARDS. THE SELLER SHALL SUBMIT A PROPOSED BLASTING PROGRAM TO THE BUYER FOR REVIEW A MINIMUM OF 2 WEEKS PRIOR TO THE START OF BLASTING. REVIEW DOES NOT REMOVE ANY LIABILITY FROM THE SELLER. THE SELLER SHALL COORDINATE BLASTING WITH THE BUYER'S AGENT. IF IN THE OPINION OF THE BUYER'S AGENT OR BUYER'S REPRESENTATIVE THE PROPOSED CHARGES APPEAR EXCESSIVE, THE SELLER MAY BE REQUIRED TO PERFORM BLAST MONITORING AT LOCATIONS DETERMINED BY THE BUYER'S AGENT AT NO ADDITIONAL COST TO THE BUYER. DAMAGE TO STRUCTURES CAUSED BY BLASTING OPERATION SHALL BE REPAIRED BY THE SELLER AT NO ADDITIONAL COST TO THE BUYER OR BUYERS REPRESENTATIVE. THE SELLER SHALL NOT BE PAID FOR ANY ROCK BREAKAGE BEYOND THE NEAT LINE OF THE EXCAVATION AND SHALL REMOVE ANY LOOSE MATERIAL AND BACKFILL ANY OVERBREAK AREAS WITH SUBGRADE MATERIAL MEETING THE SPECIFICATIONS. THE COST FOR THE BLASTING, IS TO BE INCLUDED WITH THE COST FOR EXCAVATION.

PIPING:

27. THE LEACHATE DETECTION AND LEACHATE COLLECTION PIPE SYSTEMS SHALL BE HIGH DENSITY POLYETHYLENE (HDPE) PERFORATED PIPE HOLE SIZES AND LOCATIONS ARE SHOWN ON THE DRAWINGS. PIPE SHALL BE JOINED BY BUTT FUSION, ELECTRIC FUSION COLLARS, OR BUYER APPROVED COUPLERS. FABRICATED FITTINGS SHALL BE REQUIRED FOR FITTINGS AND CHANGES IN DIRECTION OR GRADE BEYOND THE MANUFACTURER'S RECOMMENDED PRACTICE. THE SELLER SHALL FURNISH "AS-BUILT" SURVEYED COORDINATES AND ELEVATIONS FOR PIPE TERMINATIONS AND FITTING LOCATIONS.

28. PIPE EXTENSIONS THROUGH PHASE 7 SHALL BE CONSTRUCTED USING HDPE PIPE.

29. CLEAN-OUTS SHALL BE INSTALLED ON LEACHATE COLLECTION, LEACHATE DETECTION, AND UNDERDRAIN PIPE EXTENSIONS AT LOCATIONS TWO (2) FEET BEYOND THE LIMITS OF THE LINER SYSTEM. PIPE IDENTIFICATION TAGS SHALL BE PERMANENTLY ATTACHED NEAR THE PIPE END.

30. AGGREGATES FOR TRENCH AND PIPE BACKFILL SHALL CONFORM TO WVDOH SECTIONS 702 AND 703, UNLESS OTHERWISE NOTED.

31. GEOTEXTILES SHALL CONFORM TO THE REQUIREMENTS OF THE PROJECT SPECIFICATIONS AND DRAWINGS.

    ACCEPTABLE GEOTEXTILE PRODUCTS:

    A. SEPARATOR (WOVEN OR NON-WOVEN) LINQ GTF-400E/250EX, US 400 BY US FABRICS OR APPROVED EQUIVALENT.

    B. 8 0Z./SY CUSHION GEOTEXTILE MAY BE AGRUTEX 081 OR APPROVED EQUIVALENT.

    C. 16 OZ./SY CUSHION GEOTEXTILE MAY BE AGRUTEX 161 OR APPROVED EQUIVALENT.

    IF BOTTOM ASH IS 1/2" OR LESS IN MAXIMUM PARTICLE SIZE, A 8 OZ. CUSHION GEOTEXTILE MAY BE USED IN PLACE OF THE 16 OZ. CUSHION GEOTEXTILE WITH APPROVAL OF THE OWNER'S ENGINEER.

32. STORMWATER DRAINAGE PIPE USED FOR THE RISER AND BARREL SYSTEM DRAINING ACTIVE AREAS OF THE LANDFILL SHALL BE CORRUGATED POLYETHYLENE PIPE WITH SMOOTH INTERIOR, MEETING THE REQUIREMENTS OF AASHTO M252, TYPE S. PROVIDE RUBBER GASKETS OF POLYISOPRENE CONFORMING TO ASTM F477. HDPE PIPE SHALL BE PLACED AND JOINED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. CULVERT PIPES UNDER THE HAUL ROAD SHALL BE SOLID WALL HDPE PIPE.

CHANNELS:

33. EXISTING DRAINAGE CHANNELS AT THE PERIMETER OF THE EXISTING CCB LANDFILL SHALL BE REMOVED AS NECESSARY TO CONNECT THE PHASE 7 EXPANSION LINER TO THE EXISTING CCB LANDFILL AREA.

34. CONCRETE WORK SHALL MEET THE REQUIREMENTS OF ASTM C-94.

35. CONCRETE SHALL HAVE 7% +/- 2.5% AIR ENTRAINMENT AND DEVELOP A MINIMUM UNCONFINED COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS, UNLESS OTHERWISE STATED.

36. AREAS TO RECEIVE CONCRETE CHANNELS SHALL HAVE OBSTRUCTIONS SUCH AS ROOTS AND PROJECTING STONES REMOVED. PRIOR TO PLACING THE FORM WORK, THE PREPARED AREA SHALL BE INSPECTED BY THE BUYER'S AGENT. NO FORMS SHALL BE PLACED UNTIL THE AREA HAS BEEN APPROVED.

LINER.

37. IN ADDITION TO THE REQUIREMENTS FOR LINER MATERIALS OUTLINED IN THE TECHNICAL SPECIFICATION AND CQC/CQA PLAN, THE SELLER IS RESPONSIBLE FOR THE FOLLOWING:
    - A. THE SELLER TO LOCATE THE LIMITS OF EXISTING LINER PRIOR TO EXCAVATION. EXCAVATION MAY INCLUDE REMOVAL OF MATERIALS ABOVE CLAY OR ENHANCED FGD LINER SYSTEMS, CARE SHALL BE TAKEN TO NOT DAMAGE EXISTING CLAY OR ENHANCED FGD LINER SYSTEMS.
    - B. THE SELLER SHALL PRESERVE THE EXISTING LINER LIMIT AND WILL BE RESPONSIBLE FOR REPAIRING DAMAGE CAUSED BY THE CONTRACTOR TO EXISTING LINER SYSTEMS.
    - C. THE CONTRACTOR SHALL SEE THAT THE SUBBASE MEETS THE FOLLOWING REQUIREMENTS
        - A MINIMUM THICKNESS OF 6 INCHES
        - PREVIOUSLY DEFINED SUBBASE MATERIAL REQUIEMENTS
    - D. BOTTOM ASH AND FGD MATERIAL TO BE USED IN THE LINER SYSTEM SHALL BE PROVIDED BY MONONGAHELA POWER. THE SELLER TO COORDINATE WITH MONONGAHELA POWER TO DETERMINE WHETHER BOTTOM ASH AND FGD MATERIALS ARE TO BE STOCKPILED OR DELIVERED TO WORK AREA.
    - E. AT THE END OF EACH WORKDAY EXPOSED EDGES OF LINER SHALL BE PROTECTED BY USE OF GEOTEXTILE OVER THE EXPOSED EDGE, HELD DOWN BY SANDBAG OR OTHER BALLASTING METHOD.
    - F. THE CONTRACTOR IS RESPONSIBLE FOR MEETING THE REQUIREMENTS FOR GEOSYNTHETIC DRAINAGE NET (GDN) WHICH ARE OUTLINED IN THE TECHNICAL SPECIFICATIONS AND CQA/QC PLAN.
    - G. THE CONTRACTOR IS RESPONSIBLE FOR MEETING THE REQUIREMENTS FOR GEOSYNTHETIC CLAY LINER (GCL) WHICH ARE OUTLINED IN THE TECHNICAL SPECIFICATIONS AND CQA/QC PLAN

AGGREGATES.

38. PURCHASED AGGREGATE SHALL CONFORM TO WEST VIRGINIA DIVISION OF HIGHWAYS SPECIFICATIONS OF QUALITY AND GRADATION. THE SELLER SHALL SUPPLY THE BUYER WITH THE SOURCE OF MATERIAL, GRAIN-SIZE ANALYSIS, PERMEABILITY TESTING RESULTS, AND MATERIAL CERTIFICATION FOR BUYER REVIEW PRIOR TO MATERIAL PURCHASE OR DELIVERY TO THE SITE. BUYER REVIEW BASED ON INITIAL SAMPLING, DOES NOT ELIMINATE THE SELLER'S REQUIREMENT TO FURNISH MATERIAL THAT MEETS SPECIFICATION. ON-SITE MATERIALS SHALL BE OBTAINED FROM PRE-QUALIFIED STOCKPILES.

39. AASHTO NO. 57 STONE SHALL BE ROUNDED AND NON-CALCAREOUS UNLESS OTHERWISE SPECIFIED.

40. IN ADDITION TO THE REQUIREMENTS FOR COARSE AND FINE AGGREGATES OUTLINED IN THE TECHNICAL SPECIFICATIONS AND CQC/CQA PLAN THE CONTRACTOR IS RESPONSIBLE FOR THE FOLLOWING REQUIREMENTS:
    - A. FOR SAND MATERIALS:
        - SAND FOR THE LEACHATE DETECTION LAYER SHALL MEET THE QUALITY REQUIREMENTS OF SECTION 702.1 OF WVDOH STANDARD SPECIFICATION FOR ROADS AND BRIDGES, ADOPTED 2017.
        - SAND GRADATION REQUIREMENTS ARE:

SIEVE SIZE	PERCENT PASSING BY WEIGHT
3/8 IN. (9.5 MM)	100
NO. 4 (4.75 MM)	95 - 100
NO. 16 (1.18 MM)	45 - 73
NO. 50 (300 µM)	10 - 30
NO. 100 (150 µM)	2 - 10

        - SAND SHALL HAVE A MINIMUM PERMEABILITY OF $1X10^{-3}$ CM/SEC AS DETERMINED AT 70% RELATIVE DENSITY. MINIMUM OF ONE TEST PER EVERY TWO ACRES OF PLACEMENT.
        - SAND SHALL BE PLACED IN A SINGLE LIFT AND COMPACTED BY TRACKING THE MATERIAL IN PLACE TO VISUALLY OBSERVED NON-MOVEMENT.
        - SAND SHALL BE NON-CALCAREOUS AND FROM A NATURALLY OCCURRING SOURCE.
    - B. FOR BOTTOM ASH MATERIALS:

      THE BUYER SHALL FURNISH BOTTOM ASH FOR THE LEACHATE COLLECTION LAYER. THE LEACHATE COLLECTION LAYER SHALL:
        - BE PLACED IN LIFTS CONSISTING OF TWELVE (12)-INCH TO FOURTEEN (14)-INCH LOOSE THICKNESS AND COMPACTED TO AT LEAST 65% OF RELATIVE DENSITY. CREATING LIFT BY END-DUMPING AND PUSHING INTO PLACE USING A LOW GROUND PRESSURE (MAXIMUM 6 PSI) DOZER OR APPROVED EQUAL. LIMIT VEHICULAR TRAFFIC ON THE BOTTOM ASH TO MINIMIZE COMPACTION AND GRAIN SIZE DEGRADATION.
        - CONSIST OF BOTTOM ASH CONTAINING PARTICLES NO LARGER THAN 3/4".
        - HAVE AN IN-PLACE MINIMUM PERMEABILITY OF $1 X 10^{-2}$ CM/SEC

MISC.

39. THE SELLER SHALL PROVIDE SEEDING, LIMING, FERTILIZING AND MULCHING AS REQUIRED TO REVEGETATE DISTURBED AREAS. THE REQUIRED SEED MIXES, LIMING RATES, FERTILIZING RATES AND MULCHING RATES ARE AS FOLLOWS:

PERMANENT SEED MIXTURE		
OPTION 1 - GENERAL USE SEED MIXTURE (A)		
SEED TYPE	APPLICATION RATE LBS/ACRE	SEEDING DATES
RED FESCUE	50	4-15 TO 8-15
RED TOP	2	4-15 TO 9-15
"POTOMAC" ORCHARDGRASS	20	4-15 TO 9-15
"TIOGA" DEERTONGUE GRASS	6	4-15 TO 9-15
BIRDSFOOT TREFOIL WITH LEGUME INNOCULANT (B)	20	4-15 TO 9-15
SPRING OATS (C)(D)	30	4-15 TO 8-15
OR WINTER RYE (C)(D)	30	4-15 TO 9-15
OR "AROOSTOOK" WINTER RYE (B)(C)(D)	112	9-15 TO 4-15
OPTION 2A - NATIVE SEED MIXTURE (POLLINATOR MIX) (A)		
SEED TYPE	APPLICATION RATE LBS/ACRE	SEEDING DATES
ERNMX-111	20-40	4-15 TO 6-1 OR AFTER 11/15, DORMANT SEEDING INTO SMALL GRAIN STUBBLE AT 2X RATE
SPRING OATS (C)(D)	30	4-15 TO 8-15
OR WINTER RYE (C)(D)	30	4-15 TO 9-15
OR "AROOSTOOK" WINTER RYE (B)(C)(D)	112	9-15 TO 4-15
OPTION 2B - NATIVE SEED MIXTURE (POLLINATOR MIX) (A)		
SEED TYPE	APPLICATION RATE LBS/ACRE	SEEDING DATES
ERNMX-105	20	4-15 TO 6-1 OR AFTER 11/15, DORMANT SEEDING INTO SMALL GRAIN STUBBLE AT 2X RATE
SPRING OATS (C)(D)	30	4-15 TO 8-15
OR WINTER RYE (C)(D)	30	4-15 TO 9-15
OR "AROOSTOOK" WINTER RYE (B)(C)(D)	112	9-15 TO 4-15

NOTES:
- A) SEED MIXTURE FOR PERMANENT SEEDING OF SOIL COVERED AREAS AND DISTURBED SOILS.
- B) LEGUME INOCULANT SHOULD BE SPECIFIC TO THE SPECIES BEING SOWN, AND UNLESS SEED IS PRE-INOCULATED, SHOULD BE APPLIED AT FIVE (5) TIMES THE MANUFACTURER'S RECOMMENDED RATE.
- C) IF DRILL SEEDING OR FROST SEEDING, THESE CROPS ARE NOT REQUIRED.
- D) DEPENDING ON SEED AVAILABILITY AND THE ANTICIPATED SEEDING DATE, ONLY ONE OF THE SEED TYPES IDENTIFIED NEEDS APPLIED WITH THE PERMANENT SEED MIXTURE OPTIONS PROVIDED.

TEMPORARY SEED MIXTURE		
SEED TYPE	APPLICATION RATE LBS/ACRE*	SEEDING DATES
SPRING OATS	64	4-15 TO 8-15
OR WINTER RYE	112	4-15 TO 9-15
OR "AROOSTOOK" VARIETY WINTER RYE	168	9-15 TO 4-15

LIMING AND FERTILIZER	
SEED TYPE	APPLICATION RATE LBS/ACRE*
LIME	IF NEEDED
FERTILIZER (N)120LB, (P_2O_5) 150LB,- (K_20) - 150LB (OR EQUIVALENT)	DETERMINED BY TEST RESULTS

*AT LEAST 80LBS OF THE 120 POUNDS PER ACRE OF NITROGEN (N) SHALL BE IN A SLOW RELEASE FORM.

MULCHING	
SEED TYPE	APPLICATION RATE LBS/ACRE*
STRAW	4,000 TO 6,000
WOOD FIBER / WOOD CELLULOSE	3,000

THE SEEDING MIXES PROVIDED HERE CONFORM TO THE PROVISIONS IN THE WVDOH SPECIFICATION, THE WVDEP BEST MANAGEMENT PRACTICES MANUAL, AND THE WEST VIRGINIA SEED LAW. FOR HYDROSEEDING, SEEDING SHALL BE ON A STILL DAY AND ONLY WITH THE APPROVAL OF THE BUYER'S AGENT.

LEGEND

SYMBOL	DESCRIPTION
	PROPERTY BOUNDARY
870	EXISTING MAJOR CONTOUR
	EXISTING MINOR CONTOUR
E — E — E	EXISTING ELECTRIC LINE
UG-E — UG-E	EXISTING UNDERGROUND ELECTRIC LINE
G — G	EXISTING GAS LINE
T — T	EXISTING TELEPHONE LINE
AUT — AUT	EXISTING AUXILIARY TELECOMMUNICATIONS
X — X — X	EXISTING FENCE
	EXISTING TREE LINE
	PREVIOUSLY PERMITTED & CONSTRUCTED LIMIT OF LINER
	PREVIOUSLY PERMITTED PHASE 6 LINER LIMIT (NOT CONSTRUCTED)
	EXISTING LIMIT OF WASTE PLACEMENT
SW — SW	EXISTING STORMWATER PIPE
UD — UD	EXISTING UNDERDRAIN PIPE
LC — LC	EXISTING LEACHATE COLLECTION PIPE
LC\LD	EXISTING LEACHATE COLLECTION/DETECTION PIPE
LCP — LCP	EXISTING LEACHATE CONVEYANCE PIPE
ST — ST	EXISTING STORMWATER PIPE
NVSW — NVSW	EXISTING STORMWATER PIPE NOT VERIFIED
	PERMITTED COLLECTION CHANNEL
	PERMITTED DIVERSION CHANNEL
	EXISTING CULVERT
	EXISTING MONITORING WELL
	SURVEY CONTROL MONUMENT
870	PROPOSED MAJOR CONTOUR
	PROPOSED MINOR CONTOUR
	ULTIMATE CCB PLACEMENT LIMIT
	PROPOSED LIMIT OF PHASE 7 LINER EXPANSION
	PROPOSED LIMIT OF PHASE 7 WASTE PLACEMENT
	PREVIOUSLY PERMITTED PHASE 6 LIMIT OF WASTE PLACEMENT (NOT CONSTRUCTED)
	PROPOSED COLLECTION CHANNEL
	PROPOSED DIVERSION CHANNEL
LOD — LOD	PROPOSED LIMIT OF DISTURBANCE
UD — UD	PROPOSED UNDERDRAIN
LC/LD — LC/LD	PROPOSED LEACHATE COLLECTION/DETECTION PIPE
LC — LC	PROPOSED LEACHATE COLLECTION PIPE
SW — SW	PROPOSED STORMWATER PIPE
SF — SF	PROPOSED SILT FENCE
FB — FB	FACILITY BOUNDARY
	EROSION CONTROL BLANKET
	PROPOSED CLEANOUT
	PROPOSED CULVERT

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DR JML	03/12/2021
CHKD MRF	03/12/2021
APPD DMT*	03/12/2021
SCALE	

PHASE 7 CCB LANDFILL EXPANSION
LEGEND AND GENERAL NOTES

FACILITY HARRISON UNIT COMMON

MonPower A FirstEnergy Company

DWG. NO. C89509682 REV.

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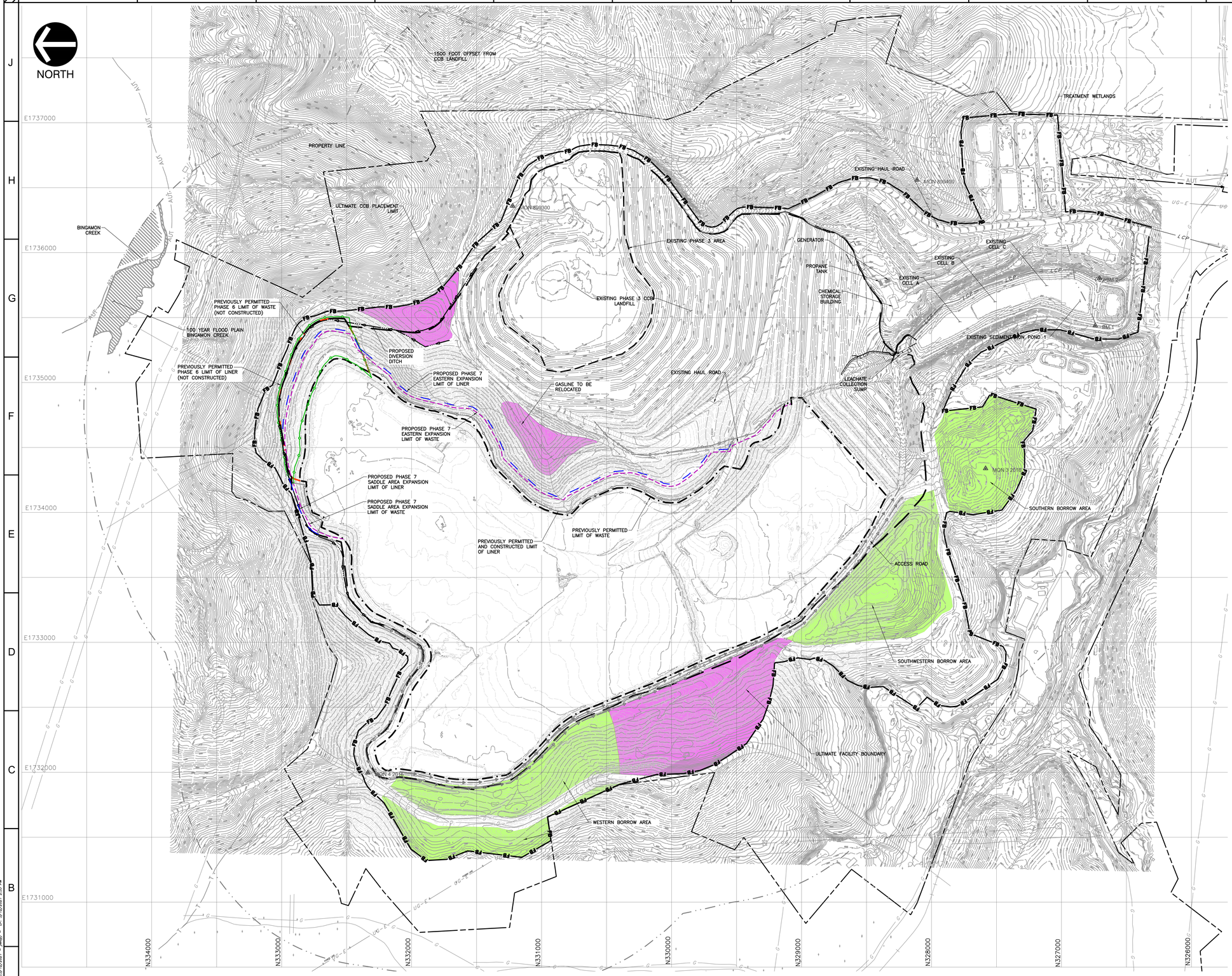

SURVEY CONTROL MONUMENT POINTS

POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION	DETAIL
1	326740.19	1735438.40	964.89	BM 1	METAL SURVEY MARKER
2	326708.00	1735801.80	963.95	BM 2	METAL SURVEY MARKER
3	327583.72	1734338.23	1172.26	MON 3 2016	ALUMINUM MONUMENT
4	332336.97	1731996.05	1246.89	MON 4 2016	ALUMINUM MONUMENT
899300	331221.80	1736358.36	1467.31	MON 899300	ALUMINUM MONUMENT
899400	328111.23	1736559.63	1220.24	MON 899400	ALUMINUM MONUMENT

LEGEND

- PROPERTY LINE
- PROPOSED COLLECTION CHANNEL
- PROPOSED DIVERSION CHANNEL
- PERMITTED COLLECTION CHANNEL
- PERMITTED DIVERSION CHANNEL
- PREVIOUSLY PERMITTED & CONSTRUCTED LIMIT OF LINER
- FACILITY BOUNDARY
- 1500 FOOT OFFSET FROM CCB LANDFILL
- ULTIMATE CCB PLACEMENT LIMIT
- PREVIOUSLY PERMITTED ACTIVE LIMIT OF WASTE PLACEMENT
- PREVIOUSLY PERMITTED PHASE 6 LIMIT OF WASTE PLACEMENT (NOT CONSTRUCTED)
- PREVIOUSLY PERMITTED PHASE 6 LINER LIMIT (NOT CONSTRUCTED)
- PROPOSED LIMIT OF PHASE 7 LINER EXPANSION
- PROPOSED LIMIT OF PHASE 7 WASTE PLACEMENT
- EXISTING LEACHATE CONVEYANCE PIPE
- EXISTING GASLINE
- EXISTING UNDERGROUND ELECTRIC LINE
- EXISTING TELEPHONE
- EXISTING AUXILIARY TELECOMMUNICATIONS
- BORROW AREA
- POTENTIAL BORROW AREA

REFERENCE

1. THE GRID SHOWN ON THIS DRAWING IS APPROXIMATE AND IS BASED ON THE WEST VIRGINIA STATE PLANE COORDINATE SYSTEM, NORTH ZONE, 1983 NORTH AMERICAN DATUM.
2. EXISTING TOPOGRAPHY PROVIDED BY FIRST ENERGY, DATED MARCH 13, 2020.

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0 300 600

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PHASE 7 CCB LANDFILL EXPANSION
EXISTING CONDITION/SITE OVERALL PLAN

FACILITY HARRISON UNIT COMMON

MonPower — DWG. NO. C89509683 — REV.

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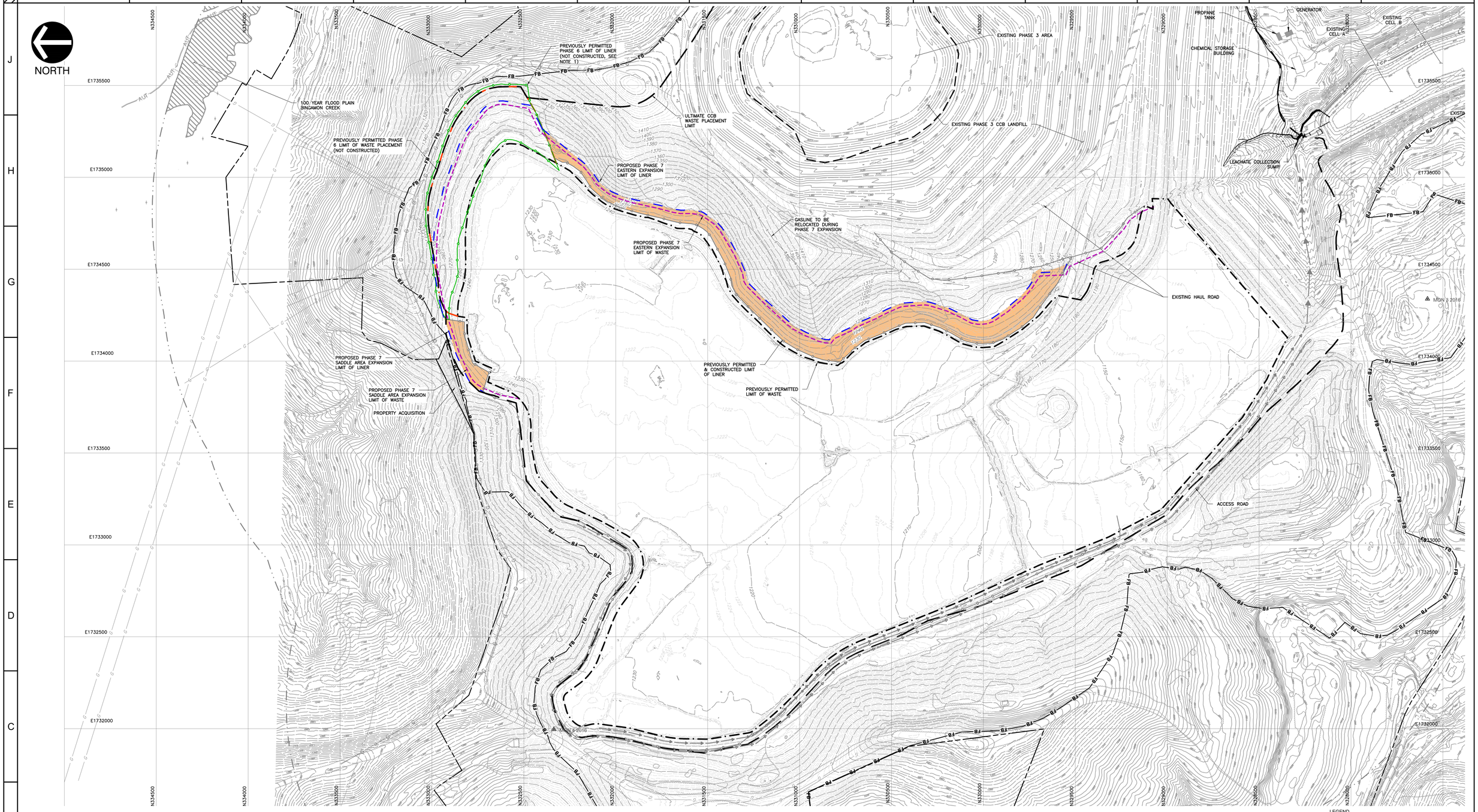

LEGEND

- PROPOSED COLLECTION CHANNEL
- PROPOSED DIVERSION CHANNEL
- PERMITTED COLLECTION CHANNEL
- PERMITTED DIVERSION CHANNEL
- PREVIOUSLY PERMITTED & CONSTRUCTED LIMIT OF LINER
- FB — FACILITY BOUNDARY
- 1500 FOOT OFFSET FROM CCB LANDFILL
- ULTIMATE CCB PLACEMENT LIMIT
- PREVIOUSLY PERMITTED ACTIVE LIMIT OF WASTE PLACEMENT
- PREVIOUSLY PERMITTED PHASE 6 LINER LIMIT (NOT CONSTRUCTED)
- PREVIOUSLY PERMITTED PHASE 6 LIMIT OF WASTE PLACEMENT (NOT CONSTRUCTED)
- PROPOSED LIMIT OF PHASE 7 LINER EXPANSION
- PROPOSED LIMIT OF PHASE 7 WASTE PLACEMENT
- PROPOSED PHASE 7 EXPANSION LIMITS
- L C P — EXISTING LEACHATE CONVEYANCE PIPE

REFERENCE

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2. EXISTING TOPOGRAPHY PROVIDED BY FIRST ENERGY, DATED MARCH 13, 2020.

NOTE

1. THE PHASE 6 EXPANSION WAS PERMITTED ON SEPTEMBER 19, 2016 AND INCLUDED THE LIMIT OF LINER AND THE LIMIT OF WASTE PLACEMENT SHOWN. THE PERMITTED PHASE 6 LINER AREA HAS NOT BEEN CONSTRUCTED. PREVIOUSLY PERMITTED PHASE 6 LINER AREA WILL BE DEVELOPED DURING THE PROPOSED 2022-2025 SITE DEVELOPMENT.

SCALE IN FEET
0 200 400

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APPD DMT*	03/12/2021
SCALE	

PHASE 7 CCB LANDFILL EXPANSION
PHASE 7 LIMITS

FACILITY HARRISON UNIT COMMON

MonPower — AN ENERGY COMPANY

DWG. NO. C89509684

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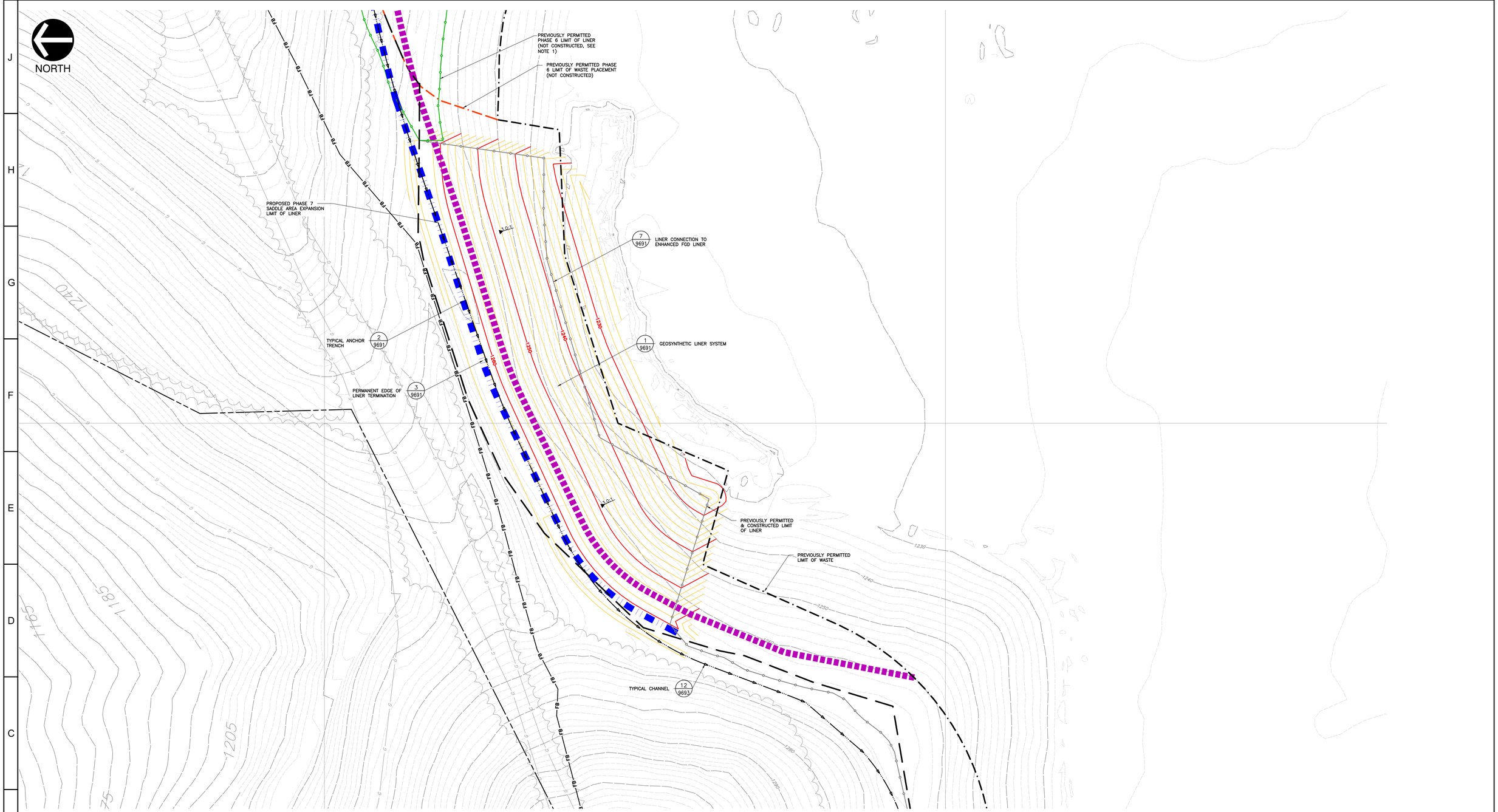

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SCALE IN FEET
0 30 60

LEGEND

- PROPOSED COLLECTION CHANNEL
- PROPOSED DIVERSION CHANNEL
- PERMITTED COLLECTION CHANNEL
- PERMITTED DIVERSION CHANNEL
- PREVIOUSLY PERMITTED & CONSTRUCTED LIMIT OF LINER
- FB FACILITY BOUNDARY
- 1500 FOOT OFFSET FROM CCB LANDFILL
- ULTIMATE CCB PLACEMENT LIMIT
- PREVIOUSLY PERMITTED ACTIVE LIMIT OF WASTE PLACEMENT
- PREVIOUSLY PERMITTED PHASE 6 LINER LIMIT (NOT CONSTRUCTED)
- PREVIOUSLY PERMITTED PHASE 6 LIMIT OF WASTE PLACEMENT (NOT CONSTRUCTED)
- PROPOSED LIMIT OF PHASE 7 LINER EXPANSION
- PROPOSED LIMIT OF PHASE 7 WASTE PLACEMENT
- 1250 PROPOSED SUBGRADE INDEX CONTOUR
- PROPOSED SUBGRADE INTERMEDIATE CONTOUR

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CHKD MRF	03/12/2021
APPD DMT*	03/12/2021
SCALE	

PHASE 7 CCB LANDFILL EXPANSION
PROPOSED 2021 SUBGRADE CONSTRUCTION GRADING PLAN
(SADDLE AREA EXPANSION)

FACILITY HARRISON UNIT COMMON

MonPower

DWG. NO. C89509685 REV.

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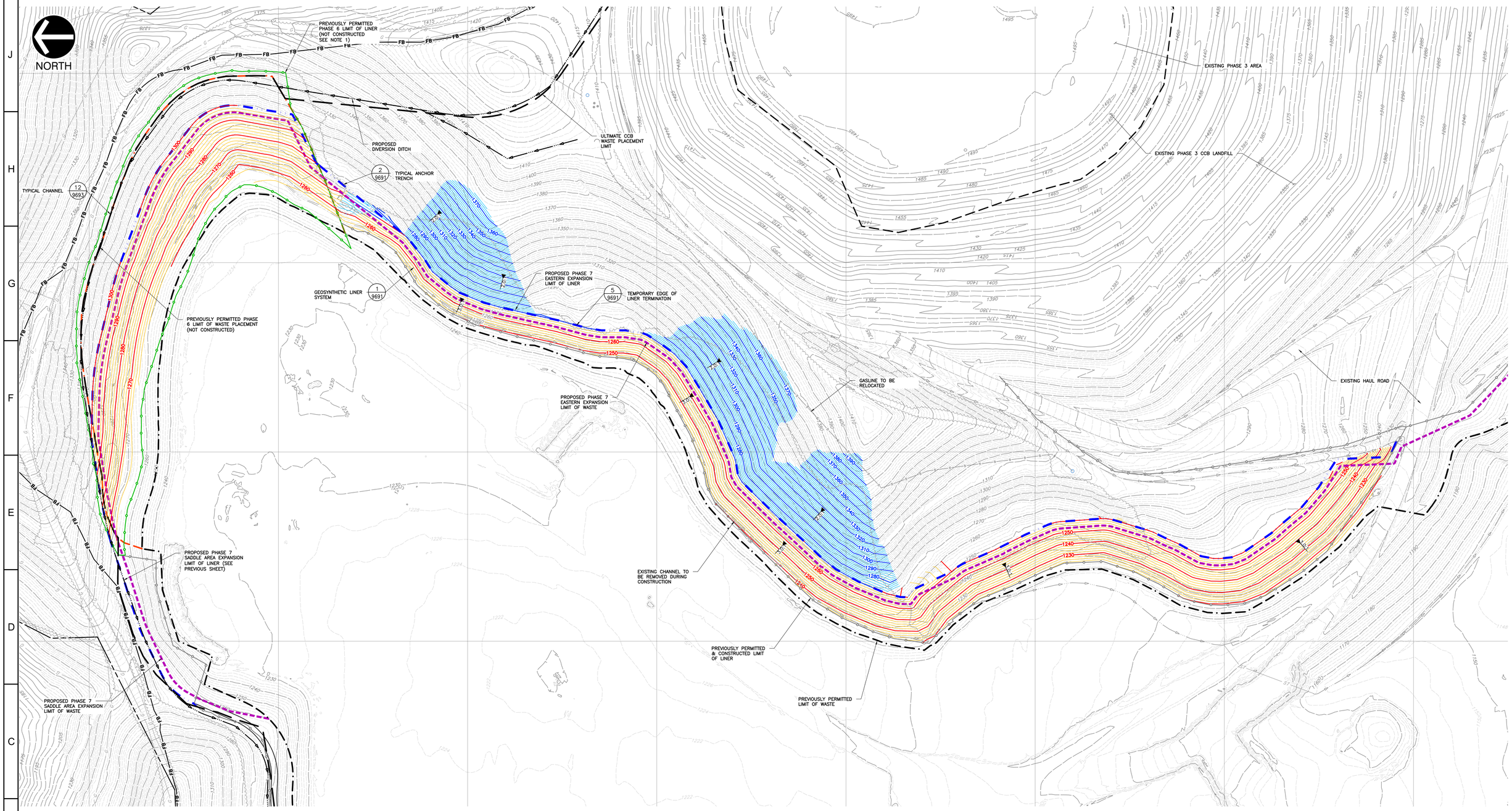

REFERENCE

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2. EXISTING TOPOGRAPHY PROVIDED BY FIRST ENERGY, DATED MARCH 13, 2020.

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SCALE IN FEET
0 100 200

LEGEND

- PROPOSED COLLECTION CHANNEL
- PROPOSED DIVERSION CHANNEL
- PERMITTED COLLECTION CHANNEL
- PERMITTED DIVERSION CHANNEL
- PREVIOUSLY PERMITTED & CONSTRUCTED LIMIT OF LINER
- FB FACILITY BOUNDARY
- 1500 FOOT OFFSET FROM CCB LANDFILL
- ULTIMATE CCB PLACEMENT LIMIT
- PREVIOUSLY PERMITTED ACTIVE LIMIT OF WASTE PLACEMENT
- PREVIOUSLY PERMITTED PHASE 6 LINER LIMIT (NOT CONSTRUCTED)
- PREVIOUSLY PERMITTED PHASE 6 LIMIT OF WASTE PLACEMENT (NOT CONSTRUCTED)
- PROPOSED LIMIT OF PHASE 7 LINER EXPANSION
- PROPOSED LIMIT OF PHASE 7 WASTE PLACEMENT
- 1300 PROPOSED EXCAVATION INDEX CONTOUR
- PROPOSED EXCAVATION INTERMEDIATE CONTOUR
- 1250 PROPOSED SUBGRADE INDEX CONTOUR
- PROPOSED SUBGRADE INTERMEDIATE CONTOUR

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APPD DMT*	03/12/2021
SCALE	

PHASE 7 CCB LANDFILL EXPANSION
PROPOSED 2022-2025 SUBGRADE CONSTRUCTION GRADING PLAN

FACILITY HARRISON *UNIT* COMMON

MonPower — AFirstEnergy Company

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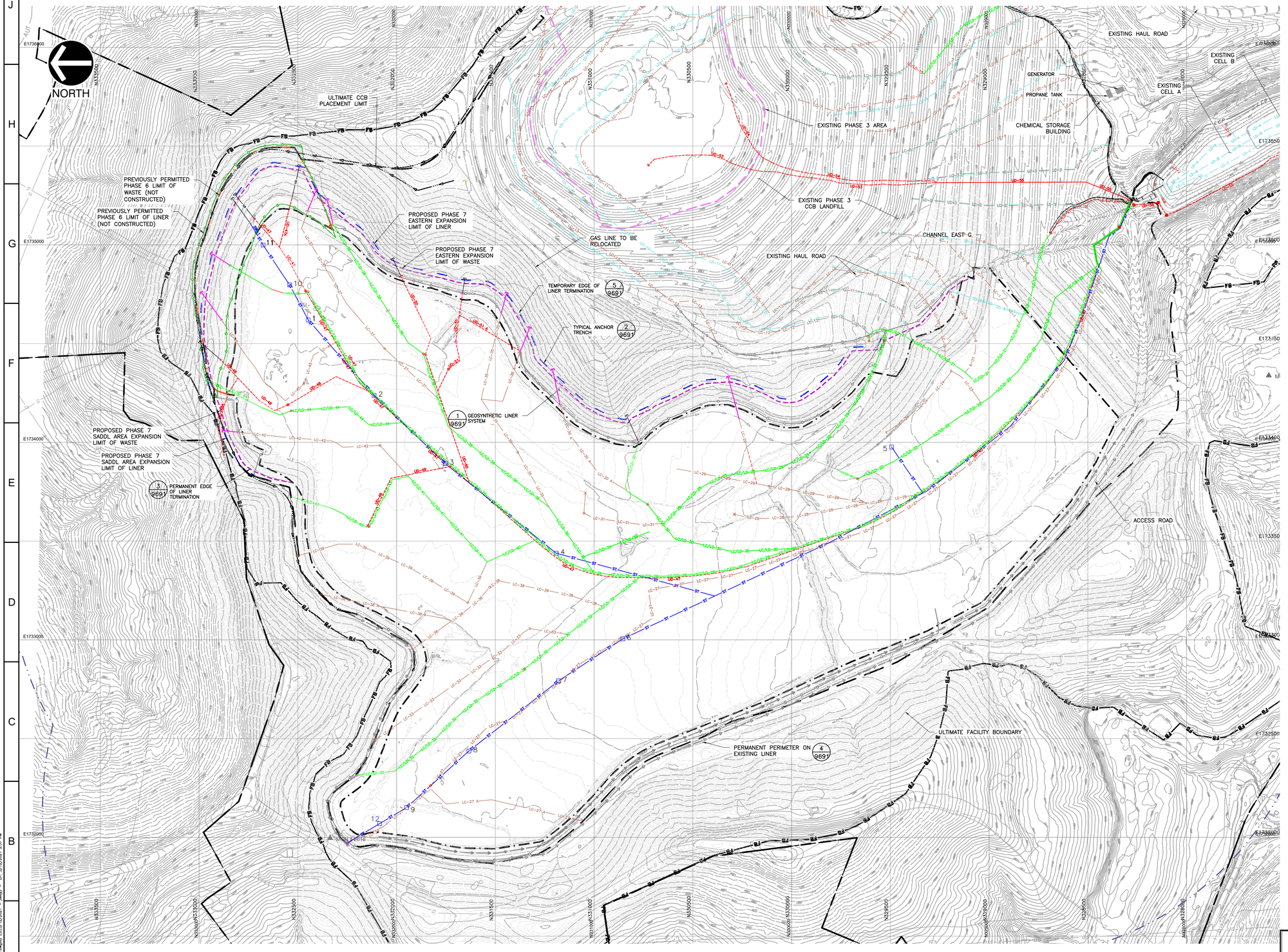

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2. EXISTING TOPOGRAPHY PROVIDED BY FIRST ENERGY, DATED MARCH 13, 2020.

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0 200 400

NOTES

1. EXTEND EXISTING PIPES THROUGH NEW LINER AREAS FOR CLEANING AND MAINTAINING PIPES.
2. CONNECT NEW LINER SYSTEM LEACHATE COLLECTION PIPING TO NEAREST INTERSECTION WITH EXISTING LEACHATE COLLECTION PIPE.
3. DISCHARGE EAST LINER SYSTEM LEACHATE COLLECTION PIPING TO COLLECTION CHANNEL.

LEGEND

- PROPOSED COLLECTION CHANNEL
- PROPOSED DIVERSION CHANNEL
- PERMITTED COLLECTION CHANNEL
- PERMITTED DIVERSION CHANNEL
- PREVIOUSLY PERMITTED & CONSTRUCTED LIMIT OF LINER
- PREVIOUSLY PERMITTED PHASE 6 LINER LIMIT (NOT CONSTRUCTED)
- FACILITY BOUNDARY
- 1500 FOOT OFFSET FROM CCB LANDFILL
- ULTIMATE CCB PLACEMENT LIMIT
- PREVIOUSLY PERMITTED ACTIVE LIMIT OF WASTE PLACEMENT
- PREVIOUSLY PERMITTED PHASE 6 LIMIT OF WASTE PLACEMENT (NOT CONSTRUCTED)
- PROPOSED LIMIT OF PHASE 7 LINER EXPANSION
- PROPOSED LIMIT OF PHASE 7 WASTE PLACEMENT
- OH-E EXISTING ELECTRIC LINE
- G EXISTING GAS LINE
- LC-1 EXISTING LEACHATE COLLECTION PIPE
- LC/LD-15 EXISTING LEACHATE COLLECTION/DETECTION PIPE
- LD EXISTING LEACHATE DETECTION PIPE
- ST EXISTING STORM PIPE
- UD EXISTING UNDERDRAIN PIPE
- LCP PROPOSED LEACHATE COLLECTION PIPE
- LD PROPOSED LEACHATE COLLECTION/DETECTION PIPE
- UD PROPOSED UNDERDRAIN
- LCP EXISTING LEACHATE CONVEYANCE PIPE

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ENGINEERING	DATE
DR: JML	03/12/2021
CHKD: MRF	03/12/2021
APPD: DMT*	03/12/2021
SCALE	

PHASE 7 CCB LANDFILL EXPANSION
LINER AND LEACHATE COLLECTION PIPING PLAN

FACILITY HARRISON UNIT COMMON

MonPower — DWG. NO. C89509687 — REV.

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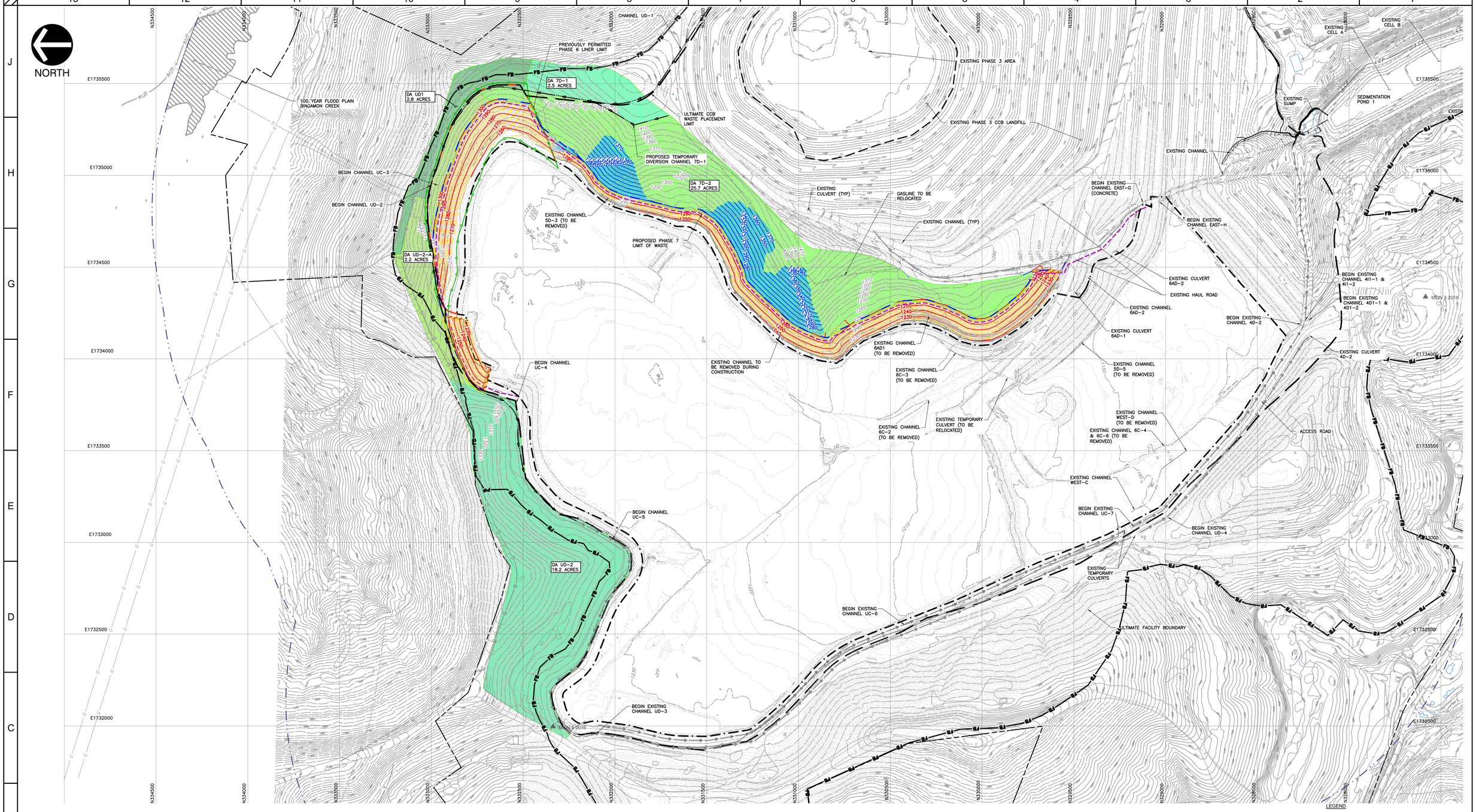

REFERENCE

1. THE GRID SHOWN ON THIS DRAWING IS APPROXIMATE AND IS BASED ON THE WEST VIRGINIA STATE PLANE COORDINATE SYSTEM, NORTH ZONE, 1983 NORTH AMERICAN DATUM.
2. EXISTING TOPOGRAPHY PROVIDED BY FIRST ENERGY, DATED MARCH 13, 2020.

LEGEND

- PROPOSED COLLECTION CHANNEL
- PROPOSED DIVERSION CHANNEL
- EXISTING COLLECTION CHANNEL
- EXISTING DIVERSION CHANNEL
- PREVIOUSLY PERMITTED & CONSTRUCTED LIMIT OF LINER
- FACILITY BOUNDARY
- 1500 FOOT OFFSET FROM CCB LANDFILL
- ULTIMATE CCB PLACEMENT LIMIT
- PREVIOUSLY PERMITTED ACTIVE LIMIT OF WASTE PLACEMENT
- PREVIOUSLY PERMITTED PHASE 6 LINER LIMIT (NOT CONSTRUCTED)
- PREVIOUSLY PERMITTED PHASE 6 LIMIT OF WASTE PLACEMENT (NOT CONSTRUCTED)
- PROPOSED LIMIT OF PHASE 7 LINER EXPANSION
- PROPOSED LIMIT OF PHASE 7 WASTE PLACEMENT
- 1300 PROPOSED EXCAVATION INDEX CONTOUR
- PROPOSED EXCAVATION INTERMEDIATE CONTOUR
- 1250 PROPOSED SUBGRADE INDEX CONTOUR
- PROPOSED SUBGRADE INTERMEDIATE CONTOUR

SCALE IN FEET
0 200 400

*HAND SIGNATURE ON FILE

FUNCTIONAL LOCATION NO. _____

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ENGINEERING	DATE
DR JML	03/12/2021
CHKD MRF	03/12/2021
APPD DMT*	03/12/2021
SCALE	

INITIAL PROJECT #

PHASE 7 CCB LANDFILL EXPANSION
DRAINAGE AREA PLAN

FACILITY HARRISON UNIT COMMON

MonPower | DWG. NO. C89509688 | REV.

REVISION	DR	CHKD	APPD	DATE

PROJECT NUMBER

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NORTH

PREVIOUSLY PERMITTED PHASE 6 LIMIT OF LINER (NOT CONSTRUCTED, SEE NOTE 1)

ULTIMATE CCB WASTE PLACEMENT LIMIT

EXISTING PHASE 3 AREA

EXISTING PHASE 3 CCB LANDFILL

CHEMICAL STORAGE BUILDING

CELL A

LEACHATE COLLECTION SUMP

PREVIOUSLY PERMITTED PHASE 6 LIMIT OF WASTE (NOT CONSTRUCTED)

PROPOSED PHASE 7 EASTERN EXPANSION LIMIT OF LINER

PROPOSED PHASE 7 EASTERN EXPANSION LIMIT OF WASTE

GASLINE TO BE RELOCATED

EXISTING HAUL ROAD

PROPOSED PHASE 7 SADDLE AREA EXPANSION LIMIT OF LINER

PROPOSED PHASE 7 SADDLE AREA EXPANSION LIMIT OF WASTE

PREVIOUSLY PERMITTED & CONSTRUCTED LIMIT OF LINER

PREVIOUSLY PERMITTED LIMIT OF WASTE

ACCESS ROAD

ULTIMATE FACILITY BOUNDARY

LEGEND

- PROPOSED COLLECTION CHANNEL
- PROPOSED DIVERSION CHANNEL
- PERMITTED COLLECTION CHANNEL
- PERMITTED DIVERSION CHANNEL
- PREVIOUSLY PERMITTED & CONSTRUCTED LIMIT OF LINER
- FACILITY BOUNDARY
- 1500 FOOT OFFSET FROM CCB LANDFILL
- ULTIMATE CCB PLACEMENT LIMIT
- PREVIOUSLY PERMITTED ACTIVE LIMIT OF WASTE PLACEMENT
- PREVIOUSLY PERMITTED PHASE 6 LINER LIMIT (NOT CONSTRUCTED)
- PREVIOUSLY PERMITTED PHASE 6 LIMIT OF WASTE PLACEMENT (NOT CONSTRUCTED)
- PROPOSED LIMIT OF PHASE 7 LINER EXPANSION
- PROPOSED LIMIT OF PHASE 7 WASTE PLACEMENT
- 1250 PROPOSED WASTE INDEX CONTOUR
- PROPOSED WASTE INTERMEDIATE CONTOUR

FUNCTIONAL LOCATION NO. _____

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PROPOSED PHASE 7
SADDLE AND EASTERN EXPANSION AREA,
MAX TOP OF WASTE 1280
~16,600,000 CY AVAILABLE AIRSPACE

SCALE IN FEET
0 150 300

REFERENCE

1. THE GRID SHOWN ON THIS DRAWING IS APPROXIMATE AND IS BASED ON THE WEST VIRGINIA STATE PLANE COORDINATE SYSTEM, NORTH ZONE, 1983 NORTH AMERICAN DATUM.
2. EXISTING TOPOGRAPHY PROVIDED BY FIRST ENERGY, DATED MARCH 13, 2020.

NOTE

1. THE PHASE 6 EXPANSION WAS PERMITTED ON SEPTEMBER 19, 2016 AND INCLUDED THE LIMIT OF LINER AND THE LIMIT OF WASTE PLACEMENT SHOWN. THE PERMITTED PHASE 6 LINER AREA HAS NOT BEEN CONSTRUCTED. PREVIOUSLY PERMITTED PHASE 6 LINER AREA WILL BE DEVELOPED DURING THE PROPOSED 2022–2025 SITE DEVELOPMENT.

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DR JML	03/12/2021
CHKD MRF	03/12/2021
APPD DMT*	03/12/2021
SCALE	

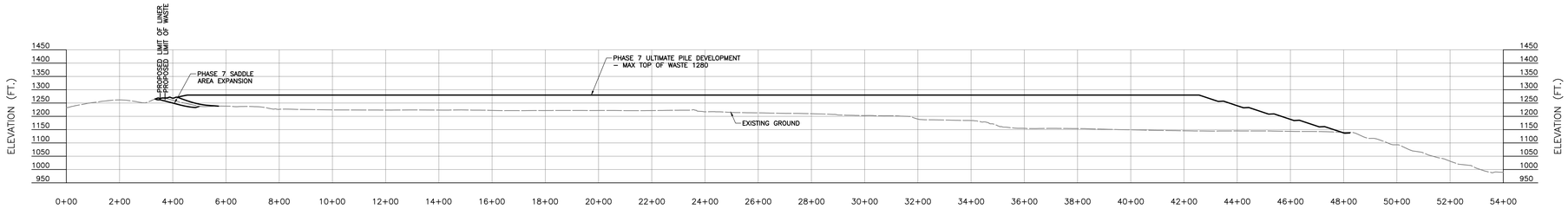
PHASE 7 CCB LANDFILL EXPANSION
PHASE 7 PILE DEVELOPMENT - MAX TOP OF WASTE 1280

FACILITY HARRISON UNIT COMMON

MonPower — An Energy Company

DWG. NO. C89509689

REV.

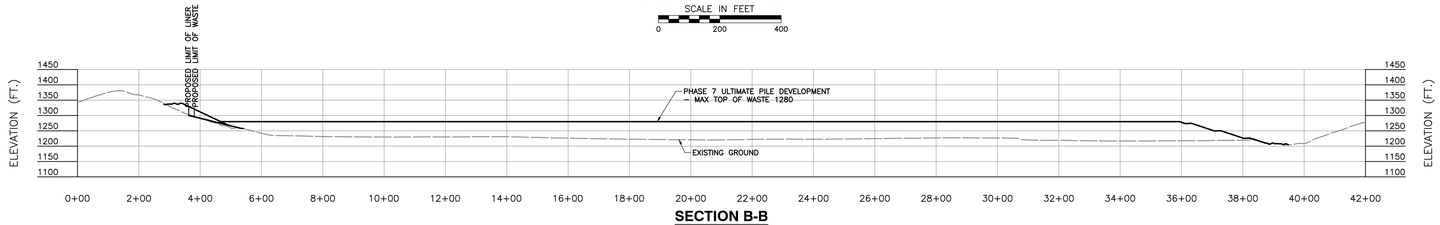


SECTION A-A

SCALE H:1"=200'; V:1"=200'

SCALE IN FEET

0 200 400

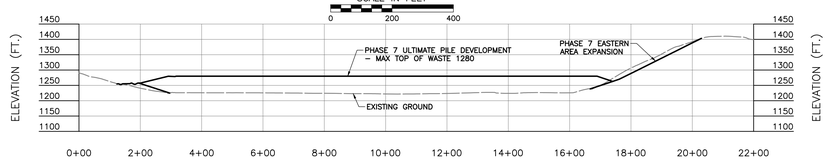


SECTION B-B

SCALE H:1"=200'; V:1"=200'

SCALE IN FEET

0 200 400

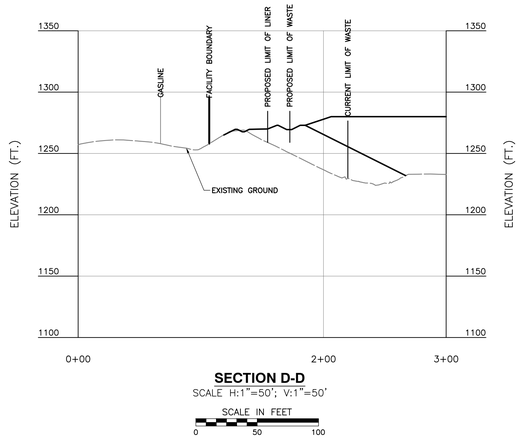


SECTION C-C

SCALE H:1"=200'; V:1"=200'

SCALE IN FEET

0 200 400

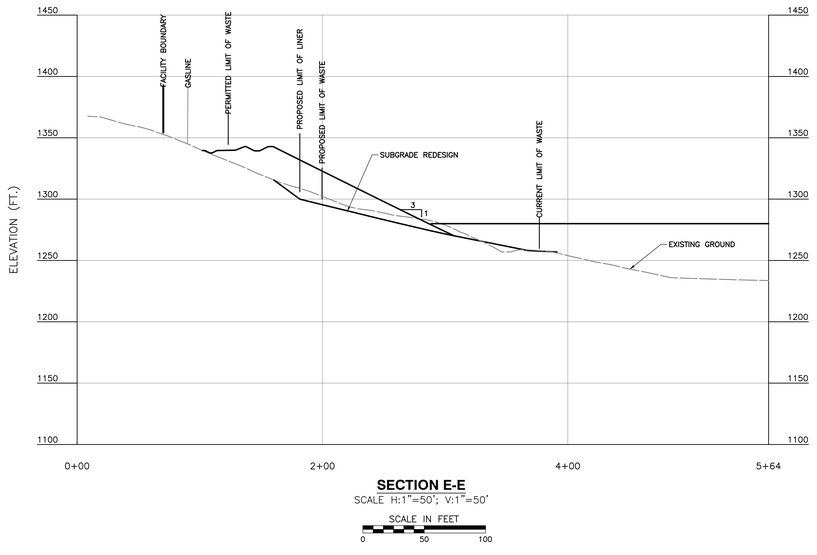


SECTION D-D

SCALE H:1"=50'; V:1"=50'

SCALE IN FEET

0 50 100

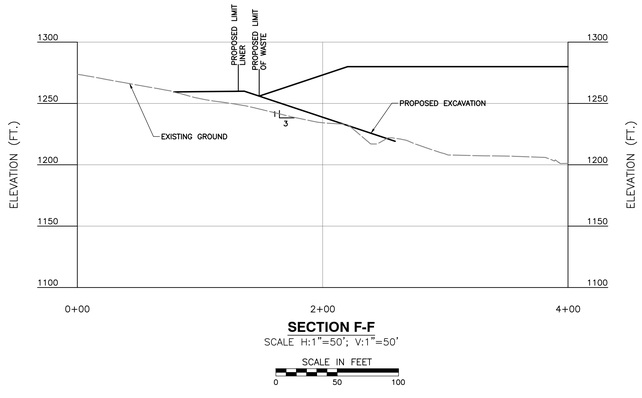


SECTION E-E

SCALE H:1"=50'; V:1"=50'

SCALE IN FEET

0 50 100



SECTION F-F

SCALE H:1"=50'; V:1"=50'

SCALE IN FEET

0 50 100

LEGEND

APPROXIMATE EXISTING GROUND

PROPOSED GROUND

REFERENCE

1. THE GRID SHOWN ON THIS DRAWING IS APPROXIMATE AND IS BASED ON THE WEST VIRGINIA STATE PLANE COORDINATE SYSTEM, NORTH ZONE, 1983 NORTH AMERICAN DATUM.
2. EXISTING TOPOGRAPHY PROVIDED BY FIRST ENERGY, DATED MARCH 13, 2020.

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ENGINEERING	DATE
DR JML	03/12/2021
CHKD MRF	03/12/2021
APPD DMT*	03/12/2021
SCALE	

PHASE 7 CCB LANDFILL EXPANSION
SUBGRADE CROSS SECTIONS

FACILITY HARRISON UNIT COMMON

MonPower

DWG. NO. C89509690

REV.

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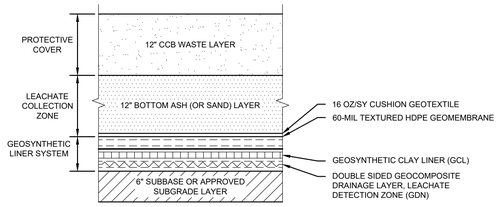
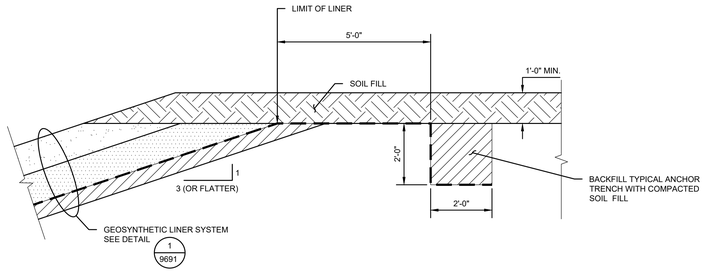
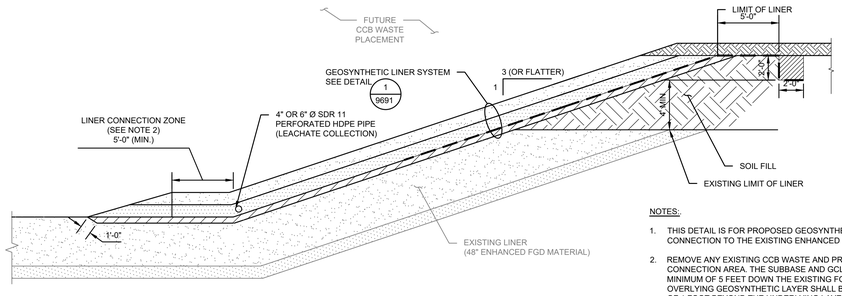


GEOSYNTHETIC LINER SYSTEM
N.T.S.
1 / 9691



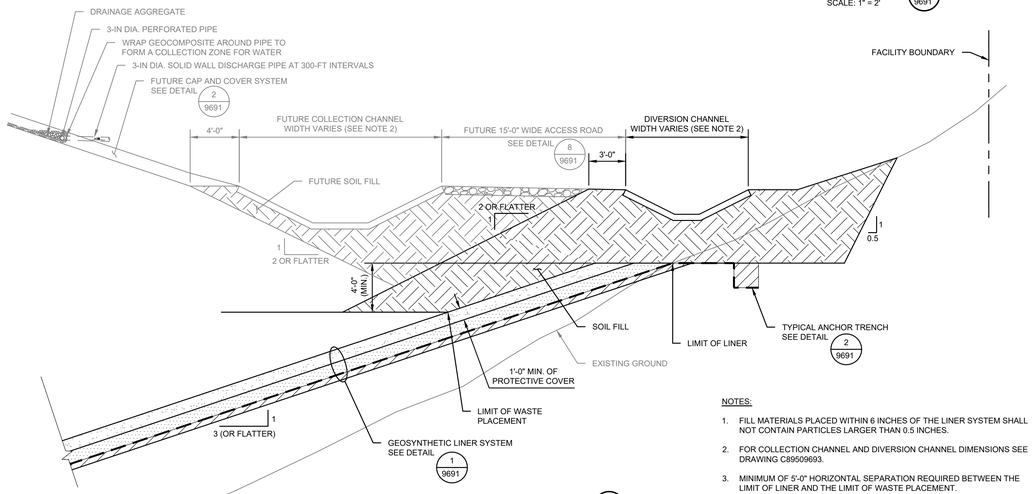
TYPICAL ANCHOR TRENCH
SCALE: 1" = 2'
2 / 9691



NOTES:

1. THIS DETAIL IS FOR PROPOSED GEOSYNTHETIC LINER SYSTEM CONNECTION TO THE EXISTING ENHANCED FGD LINER SYSTEM.
2. REMOVE ANY EXISTING CCB WASTE AND PROTECTIVE COVER IN THE CONNECTION AREA. THE SUBBASE AND GCL LAYER SHALL EXTEND A MINIMUM OF 5 FEET DOWN THE EXISTING FGD LINE AND EACH OVERLYING GEOSYNTHETIC LAYER SHALL BE STAGGERED A MINIMUM OF 1 FOOT BEYOND THE UNDERLYING LAYER.

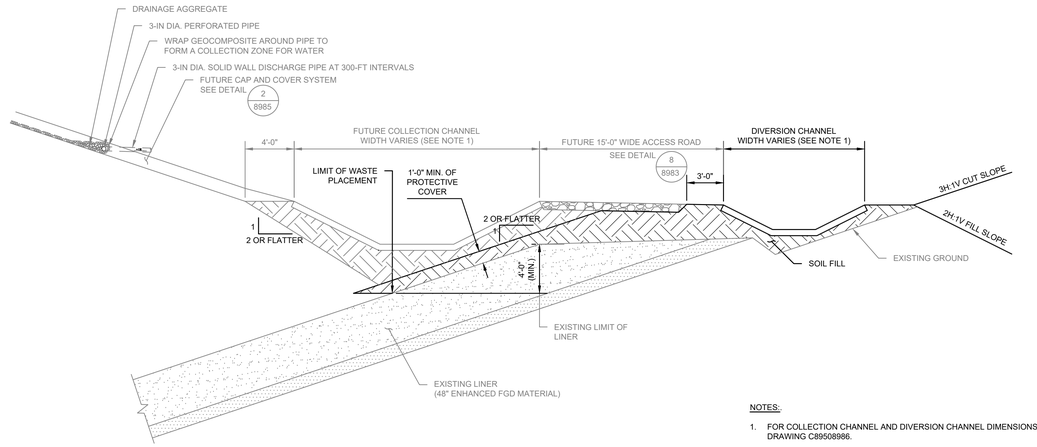
EXPANSION LINER AREA - CONNECTION TO ENHANCED FGD LINER
SCALE: 1" = 5'
6 / 9691



NOTES:

1. FILL MATERIALS PLACED WITHIN 6 INCHES OF THE LINER SYSTEM SHALL NOT CONTAIN PARTICLES LARGER THAN 0.5 INCHES.
2. FOR COLLECTION CHANNEL AND DIVERSION CHANNEL DIMENSIONS SEE DRAWING C89509693.
3. MINIMUM OF 5'-0" HORIZONTAL SEPARATION REQUIRED BETWEEN THE LIMIT OF LINER AND THE LIMIT OF WASTE PLACEMENT.

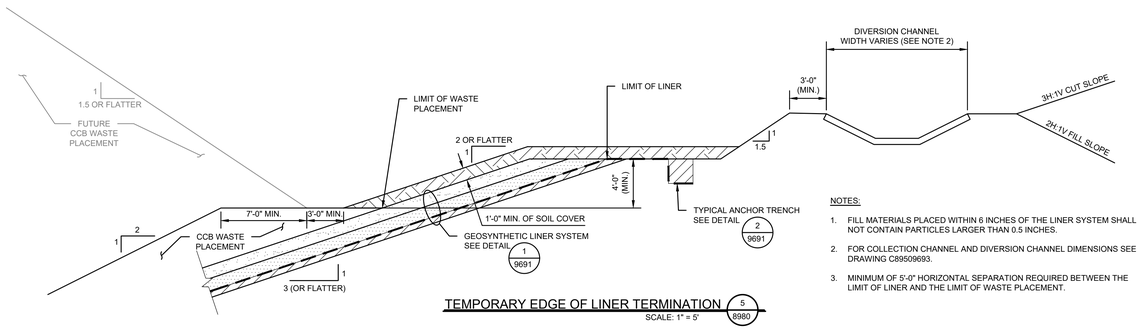
PERMANENT EDGE OF LINER TERMINATION
SCALE: 1" = 5'
3 / 9691



NOTES:

1. FOR COLLECTION CHANNEL AND DIVERSION CHANNEL DIMENSIONS SEE DRAWING C89508986.
2. FOR COLLECTION CHANNEL AND DIVERSION CHANNEL DIMENSIONS SEE DRAWING C89509691.
3. MINIMUM OF 5'-0" HORIZONTAL SEPARATION REQUIRED BETWEEN THE LIMIT OF LINER AND THE LIMIT OF WASTE PLACEMENT.

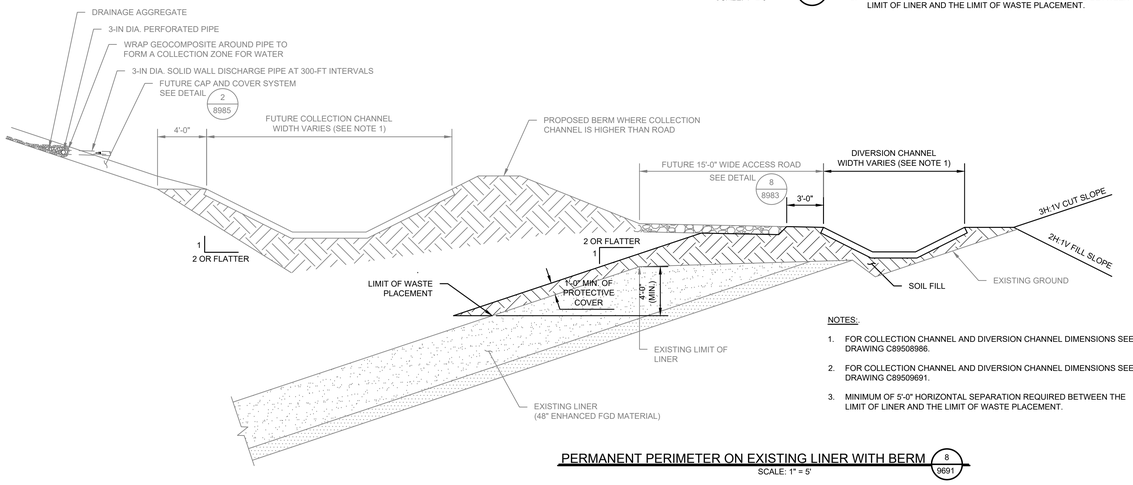
PERMANENT PERIMETER ON EXISTING LINER
SCALE: 1" = 5'
4 / 9691



NOTES:

1. FILL MATERIALS PLACED WITHIN 6 INCHES OF THE LINER SYSTEM SHALL NOT CONTAIN PARTICLES LARGER THAN 0.5 INCHES.
2. FOR COLLECTION CHANNEL AND DIVERSION CHANNEL DIMENSIONS SEE DRAWING C89509693.
3. MINIMUM OF 5'-0" HORIZONTAL SEPARATION REQUIRED BETWEEN THE LIMIT OF LINER AND THE LIMIT OF WASTE PLACEMENT.

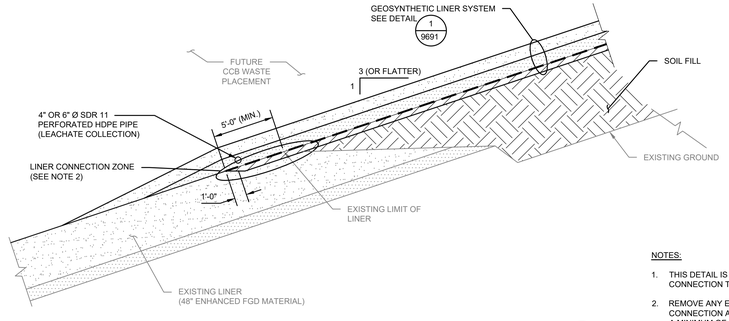
TEMPORARY EDGE OF LINER TERMINATION
SCALE: 1" = 5'
5 / 8980



NOTES:

1. FOR COLLECTION CHANNEL AND DIVERSION CHANNEL DIMENSIONS SEE DRAWING C89508986.
2. FOR COLLECTION CHANNEL AND DIVERSION CHANNEL DIMENSIONS SEE DRAWING C89509691.
3. MINIMUM OF 5'-0" HORIZONTAL SEPARATION REQUIRED BETWEEN THE LIMIT OF LINER AND THE LIMIT OF WASTE PLACEMENT.

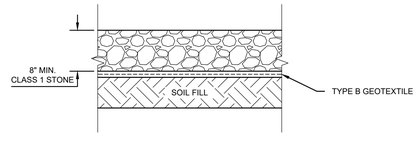
PERMANENT PERIMETER ON EXISTING LINER WITH BERM
SCALE: 1" = 5'
8 / 9691



NOTES:

1. THIS DETAIL IS FOR PROPOSED GEOSYNTHETIC LINER SYSTEM CONNECTION TO THE EXISTING ENHANCED FGD LINER SYSTEM.
2. REMOVE ANY EXISTING CCB WASTE AND PROTECTIVE COVER IN THE CONNECTION AREA. THE SUBBASE AND GCL LAYER SHALL EXTEND A MINIMUM OF 5 FEET DOWN THE EXISTING FGD LINE AND EACH OVERLYING GEOSYNTHETIC LAYER SHALL BE STAGGERED A MINIMUM OF 1 FOOT BEYOND THE UNDERLYING LAYER.

LINER CONNECTION TO ENHANCED FGD LINER
SCALE: 1" = 5'
7 / 9691



ACCESS ROAD
N.T.S.
9 / 8983

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03/12/2021

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ENGINEERING	DATE
DR JML	03/12/2021
CHKD MRF	03/12/2021
APPD DMT*	03/12/2021
SCALE	

PHASE 7 CCB LANDFILL EXPANSION
SUBGRADE AND LINER DETAILS (SHEET 1)

FACILITY HARRISON UNIT COMMON

MonPower

DWG. NO. C89509691 REV.

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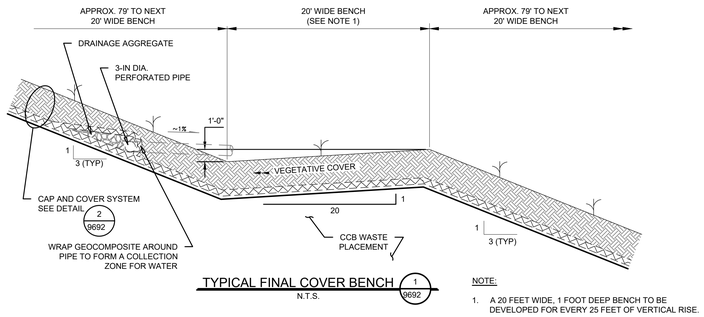
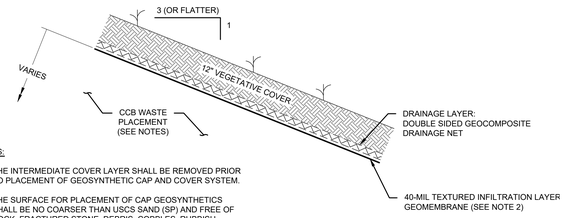


TYPICAL FINAL COVER BENCH 1 9692
N.T.S.

NOTE:

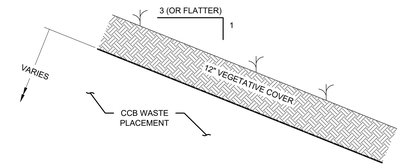
1. A 20 FEET WIDE, 1 FOOT DEEP BENCH TO BE DEVELOPED FOR EVERY 25 FEET OF VERTICAL RISE.



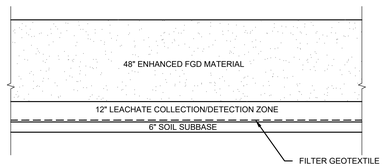
NOTES:

1. THE INTERMEDIATE COVER LAYER SHALL BE REMOVED PRIOR TO PLACEMENT OF GEOSYNTHETIC CAP AND COVER SYSTEM.
2. THE SURFACE FOR PLACEMENT OF CAP GEOSYNTHETICS SHALL BE NO COARSER THAN USCS SAND (SP) AND FREE OF ROCK, FRACTURED STONE, DEBRIS, COBBLES, RUBBISH, ROOTS, AND SUDDEN CHANGES IN SLOPE. THIS MATERIAL MAY BE CCB WASTE PLACEMENT IF GRADATION REQUIREMENTS ARE MET.

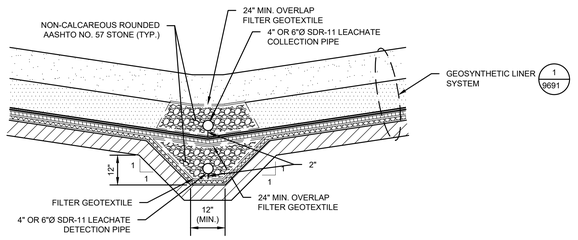
CAP AND COVER SYSTEM 2 9692
N.T.S.



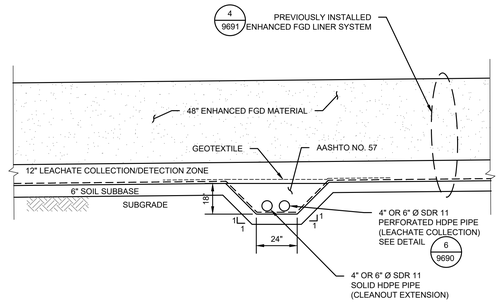
INTERMEDIATE COVER 3 9692
N.T.S.



PREVIOUSLY INSTALLED ENHANCED FGD LINER SYSTEM 4 9692
SCALE: 1" = 1'



LEACHATE COLLECTION AND LEACHATE DETECTION PIPE TRENCH 5 9692
N.T.S.



TYPICAL LINER SYSTEM CROSS-SECTION OF LEACHATE COLLECTION/DETECTION PIPE IN COMMON LOCATION 6 9692
SCALE: 1" = 1'

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3/12/2021

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APPD: DMT*	03/12/2021
SCALE:	

PHASE 7 CCB LANDFILL EXPANSION
SUBGRADE AND LINER DETAILS (SHEET 2)

FACILITY HARRISON UNIT COMMON

MonPower

DWG. NO. C89509692

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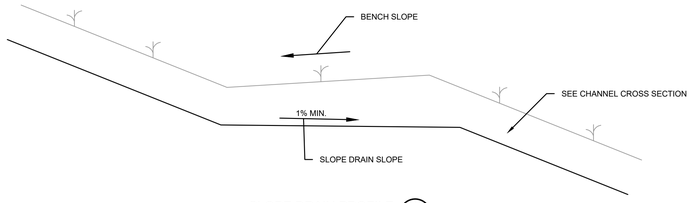
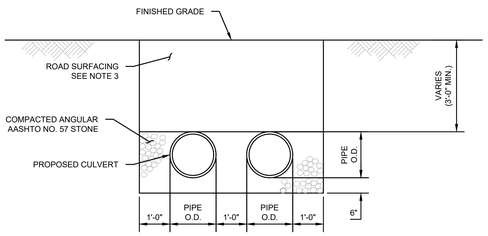


SLOPE DRAIN PROFILE 1 9693
N.T.S.

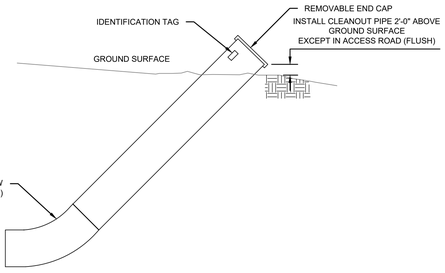


EXISTING CULVERTS							
CULVERT ID	DIAMETER (IN)	MATERIAL	NO OF BARRELS	LENGTH (FT)	INLET INVERT ELEVATION (FT)	OUTLET INVERT ELEVATION (FT)	ROAD ELEVTION (FT)
4D-2	36	POLYETHYLENE	2	80	1118.0	1113.0	1125.0
6AD1	36	HDPE SDR 17	2	121	1207.0	1205.1	1216.0

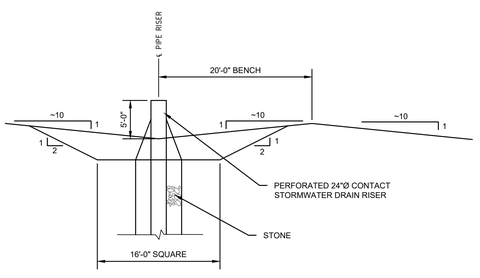
NOTES:

1. AT DISCHARGE END OF CULVERT ADD BEND IN PIPES TO DIRECT FLOW PARALLEL TO RECEIVING CHANNEL.
2. INSTALLATION OF CULVERT CROSSING THE HAUL ROAD AND ACCESS ROADS MUST BE SCHEDULED WITH OPERATIONS CONTRACTOR AND STATION PERSONNEL. INSTALLATION OF CULVERTS MAY NOT IMPEDE OPERATIONS AT POWER PLANT.
3. ROAD SURFACING TO BE REPLACED IN KIND. AREA BETWEEN PROPOSED CULVERT AND ROAD SURFACE MATERIAL MAY BE COMPACTED STONE OR COMPACTED GENERAL FILL.

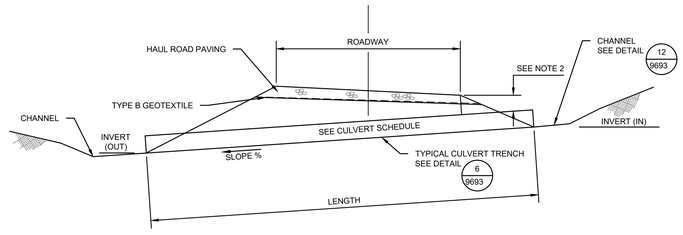
TYPICAL CULVERT TRENCH 5 9693
N.T.S.



CLEANOUT 7 9693
SCALE: 1" = 10'



CONTACT STORMWATER DRAIN RISER 9 9693
SCALE: 1" = 3'

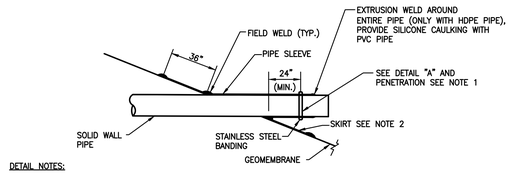


NOTES:

1. CHANNEL TRANSITIONS SO TOP OF CHANNEL IS 1 FOOT ABOVE TOP OF CULVERT. TRANSITION TO START A MINIMUM OF 25 FEET UPSTREAM OF CULVERT ENTRANCE.
2. MINIMUM COVER REQUIRED TO ROADWAY SURFACE IS 2.0'.

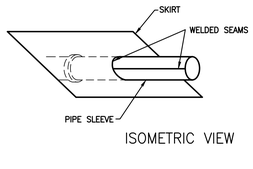
EXISTING CULVERTS							
CULVERT ID	DIAMETER (IN)	MATERIAL	NO OF BARRELS	LENGTH (FT)	INLET INVERT ELEVATION (FT)	OUTLET INVERT ELEVATION (FT)	ROAD ELEVATION (FT)
4D-2	36	POLYETHYLENE	2	80	1118.0	1113.0	1125.0
6AD1	36	HDPE SDR 17	2	121	1207.0	1205.1	1216.0

TYPICAL CULVERT 2 9693
N.T.S.

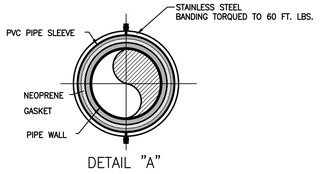


DETAIL NOTES:

1. USE TWO STAINLESS STEEL BAND PER PIPE PENETRATION SEAL.
2. SKIRT IS TO EXTEND 36 INCHES BEYOND PIPE IN ALL DIRECTIONS.

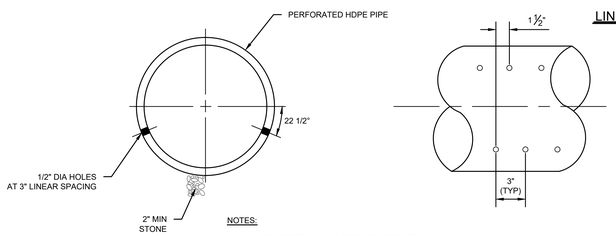


ISOMETRIC VIEW



DETAIL "A"

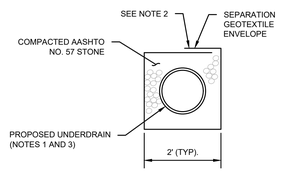
LINER PIPE PENETRATION SEAL 6 9693
N.T.S.



NOTES:

1. VIEW ROTATED 90°, HOLES TO BE ORIENTED DOWN.
2. PERFORATION ROWS TO BE STAGGERED FROM ADJACENT PERFORATIONS.
3. DETAIL REFERRING TO 12" SDR 11 HDPE PIPE (LEACHATE COLLECTION HEADER) 4" AND 6" SDR 11 HDPE PIPE (LEACHATE COLLECTION, LEACHATE DETECTION).

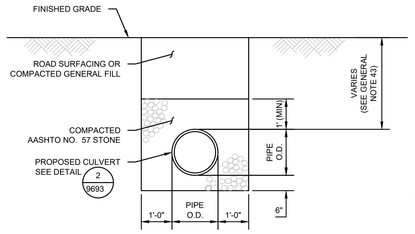
PIPE PERFORATIONS 8 9693
SCALE: N.T.S.



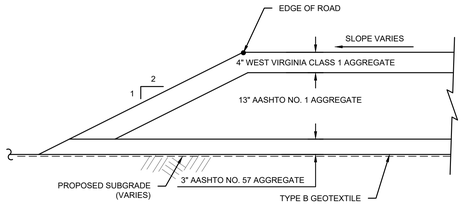
TYPICAL UNDERDRAIN 11 9693
N.T.S.

DETAIL NOTES:

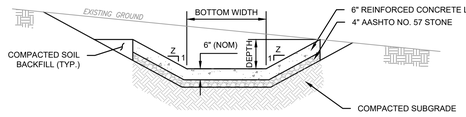
1. IF UNDERDRAIN IS NEEDED TIE INTO LEACHATE DETECTION PIPING AT CLOSEST PIPE INTERSECTION.
2. GEOTEXTILE TO OVERLAP MINIMUM OF 12".
3. PIPE SHALL BE SAME SIZE AND TYPE AS LEACHATE DETECTION PIPE BEING TIED INTO.



TYPICAL CULVERT TRENCH 3 9693
N.T.S.



HAUL ROAD 4 9693
N.T.S.



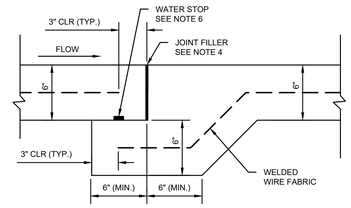
CONCRETE CHANNEL
N.T.S.

DETAIL NOTES:

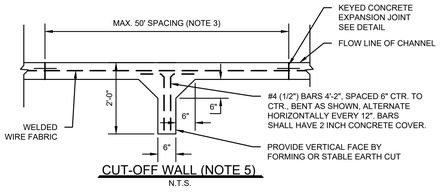
1. CONCRETE CHANNEL AND CUT-OFF WALLS TO BE IN ACCORDANCE WITH WVDOH SPECIFICATIONS (SECTION 633 AND RELATED SECTIONS) UNLESS DETAILED DIFFERENTLY IN THESE DRAWINGS AND CONTRACT DOCUMENTS.
2. REINFORCEMENT TO BE WELDED WIRE FABRIC 6X6 - W2.9XW2.9 SHEETS, FORM AT END FACE.
3. EXPANSION JOINTS TO BE PLACED AT INTERVALS NOT TO EXCEED 50 FEET UNLESS OTHERWISE SHOWN.
4. EXPANSION JOINTS TO HAVE 5/8 INCH FLEXIBLE SPONGE RUBBER JOINT MATERIAL BY J&K FOAM FABRICATING, INC. OR APPROVED EQUIVALENT. JOINT FILLER SHALL BE INSTALLED FLUSH WITH THE EXPOSED SURFACE.
5. CUT OFF WALLS ARE REQUIRED WHERE SLOPE OF CHANNEL RANGES FROM 5 TO 25 PERCENT AT 150 FEET INTERVALS AND WHERE SLOPES EXCEED 25 PERCENT AT 30 FEET INTERVALS.
6. WATERSTOP SHALL BE PLACED AT ALL EXPANSION JOINTS AND WHERE PROPOSED CHANNEL CONNECTS TO EXISTING CHANNEL. WATER STOP TO BE SIKA HYDROTITE CJ-0725-3K OF APPROVED EQUIVALENT.

GENERAL NOTES:

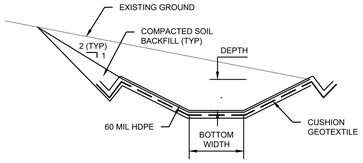
1. CONTRACTION JOINTS MINIMUM OF 1-3/4" DEPTH, NOMINALLY 5/8 INCH WIDTH TO BE PLACED AT INTERVALS OF APPROXIMATELY 12-1/2 FEET UNLESS OTHERWISE SHOWN.
2. CURING SHALL BE PERFORMED BY WETTING FOR 3 DAYS AFTER PLACEMENT OR CURED BY CURING COMPOUND. CURING COMPOUND TO BE MASTER KURE BY BASF OR APPROVED EQUIVALENT.



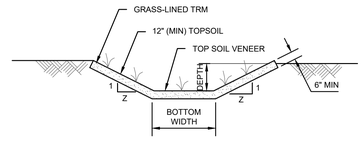
KEYED CONCRETE EXPANSION JOINT
N.T.S.



CUT-OFF WALL (NOTE 5)
N.T.S.



PLASTIC LINED CHANNEL
N.T.S.



VEGETATED CHANNEL
N.T.S.

PROPOSED TEMPORARY DIVERSION CHANNELS				
CHANNEL ID	LINING TYPE	BOTTOM WIDTH (FT)	DEPTH (FT)	SIDESLOPES ZH:1V
7D-1	Grass	0.5	1.0	2.0

PROPOSED DIVERSION CHANNELS				
CHANNEL ID	LINING TYPE	BOTTOM WIDTH (FT)	DEPTH (FT)	SIDESLOPES ZH:1V
UD-1	CONCRETE	1.5	2.00	2.0
UD-2	CONCRETE	1.5	2.00	2.0

PROPOSED COLLECTION CHANNELS				
CHANNEL ID	LINING TYPE	BOTTOM WIDTH (FT)	DEPTH (FT)	SIDESLOPES ZH:1V
UC-1	CONCRETE	3.0	2.50	2.0
UC-2	CONCRETE	3.5	2.50	2.0
UC-3	CONCRETE	4.0	3.50	2.0
UC-4	CONCRETE	4.0	3.50	2.0
UC-5	CONCRETE	4.0	3.50	2.0

NOTES:
1) SEE PHASE IV PLAN VIEW DRAWINGS FO THE LOCATION OF THE DEPTH CHANGE
2) THE NEW CHANNEL SECTION REPLACED PREVIOUS CHANNEL EAST-G BETWEEN CHANNEL SD-4 AND EAST H.

PROPOSED SLOPE DRAINS				
CHANNEL ID	LINING TYPE	BOTTOM WIDTH (FT)	DEPTH (FT)	SIDESLOPES ZH:1V
USD-1	3" UNIFORM SECTION MAT	1.0	1.25	2.0
USD-2	4" UNIFORM SECTION MAT	1.5	1.50	2.0
USD-3	3" UNIFORM SECTION MAT	1.5	1.50	2.0
USD-4	4" UNIFORM SECTION MAT	2.0	1.50	2.0
USD-5	3" UNIFORM SECTION MAT	1.0	1.25	2.0
USD-6	3" UNIFORM SECTION MAT	1.0	1.25	2.0
USD-7	4" UNIFORM SECTION MAT	2.5	1.75	2.0
USD-8	3" UNIFORM SECTION MAT	1.5	1.25	2.0
USD-9	3" UNIFORM SECTION MAT	1.5	1.25	2.0
USD-10	3" UNIFORM SECTION MAT	1.0	1.00	2.0

EXISTING COLLECTION AND DIVERSION CHANNELS				
CHANNEL ID	LINING TYPE	BOTTOM WIDTH (FT)	DEPTH (FT)	SIDESLOPES ZH:1V
4D1-1	FABRIC FORMED CONCRETE (8" & 10" FILTERPOINT)	3.0	1.50	2.0
4D1-2	FABRIC FORMED CONCRETE (8" FILTERPOINT)	3.0	1.75	2.0
4D2	FABRIC FORMED CONCRETE (10" FILTERPOINT)	3.0	2.25	2.0
EAST-G (NOTE 1)	CONCRETE	3.0	2.00	2.0
WEST C	TENSAR VMAX P550 TRM	3.0	3.00	3.0
WEST D	FABRIC FORMED CONCRETE (5" FILTERPOINT)	1.0	2.25	3.0
EAST-H	FABRIC FORMED CONCRETE (10" FILTERPOINT W/ ANCHORS)	3.0	3.50	2.0
4E1-1	FABRIC FORMED CONCRETE (6" UNIFORM SECTION MAT)	10.0	2.25	2.0
4E1-2 (NOTE 2)	FABRIC FORMED CONCRETE (4" UNIFORM SECTION MAT)	10.0	2.25	2.0
UD-3	CONCRETE	2.5	2.00	2.0
UD-4	CONCRETE	2.5	2.00	2.0
6AD-2	PLASTIC LINER	3.0	1.75	2.0
UC-6	CONCRETE	4.0	3.75	2.0
UC-7	CONCRETE	4.0	3.75	2.0

TYPICAL CHANNEL 12 9693
N.T.S.

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DANIEL M. TOLLIVER 033162 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER
3/12/2021

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FUNCTIONAL LOCATION NO. _____

Last .Net editor version: 1.1.2.0

INITIAL PROJECT #

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REVISION	DR	CHKD	APPD	DATE
PROJECT NUMBER				

REFERENCE DRAWINGS	
DWG. NO.	TITLE

ENGINEERING	DATE
DR JML	03/12/2021
CHKD MRF	03/12/2021
APPD DMT*	03/12/2021
SCALE	

PHASE 7 CCB LANDFILL EXPANSION
PIPING AND CHANNEL DETAILS

FACILITY HARRISON UNIT COMMON

MonPower

DWG. NO. C89509693 REV.

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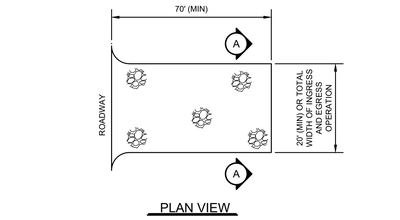
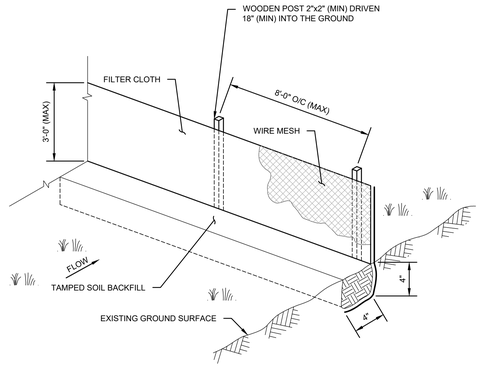


NOTE:

1. STABILIZED CONSTRUCTION ENTRANCE MATERIAL, INSTALLATION, AND MAINTENANCE SHALL BE IN ACCORDANCE WITH SECTION 3.02 OF THE WVDEP E&S CONTROL BEST MANAGEMENT PRACTICE MANUAL, LATEST EDITION.

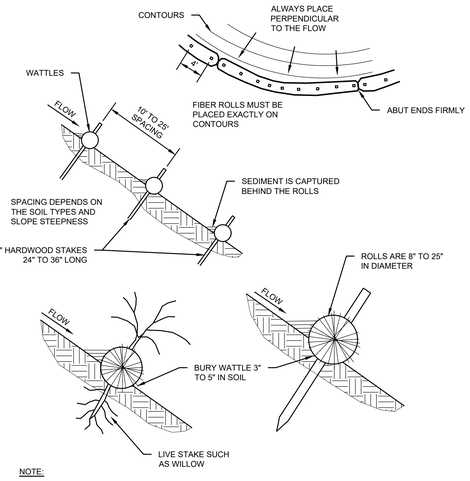
STABILIZED CONSTRUCTION ENTRANCE (1 / 9694)
N.T.S.



NOTES:

1. SILT FENCE MATERIAL, INSTALLATION, AND MAINTENANCE SHALL BE IN ACCORDANCE WITH SECTION 3.27 OF THE WVDEP E&S CONTROL BEST MANAGEMENT PRACTICE MANUAL, LATEST EDITION.
2. SILT FENCE MAY BE SUBSTITUTED WITH WATTLES. SEE DETAIL 3 ON THIS SHEET.

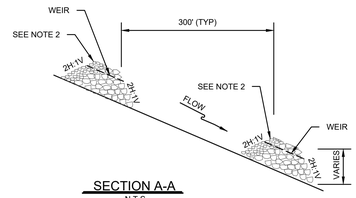
SILT FENCE (2 / 9694)
N.T.S.



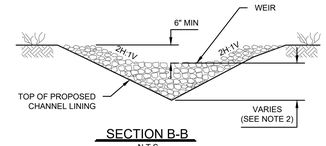
NOTE:

1. WATTLE MATERIAL, INSTALLATION, AND MAINTENANCE SHALL BE IN ACCORDANCE WITH SECTION 3.06 OF THE WVDEP E&S CONTROL BEST MANAGEMENT PRACTICE MANUAL, LATEST EDITION.

WATTLES (3 / 9694)
N.T.S.



SECTION A-A
N.T.S.



SECTION B-B
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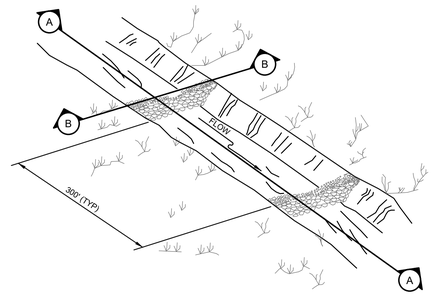
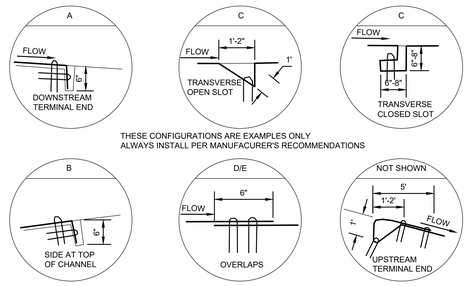


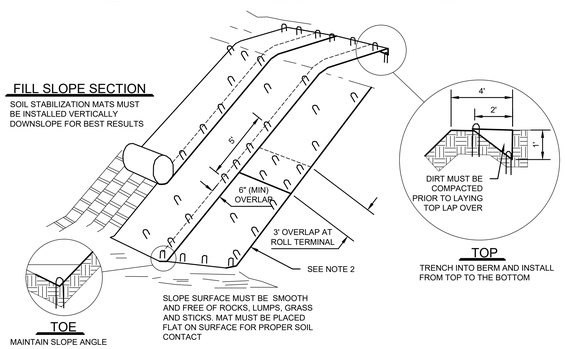
NOTES:

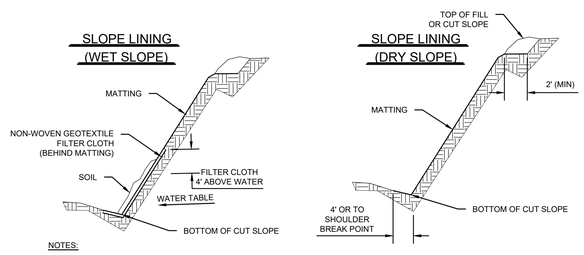
1. ROCK CHECK DAM MATERIAL, INSTALLATION, AND MAINTENANCE SHALL BE IN ACCORDANCE WITH SECTION 3.05 OF THE WVDEP E&S CONTROL BEST MANAGEMENT PRACTICE MANUAL, LATEST EDITION.
2. ROCK CHECK DAM TO BE CONSTRUCTED USING AASHTO NO. 357 STONE OR AASHTO NO.1 WITH 6 INCHES OF AASHTO NO.57 ON THE UPSTREAM FACE.
3. DIMENSIONS OF ROCK CHECK DAMS SHALL BE FIELD FIT BASED ON CHANNEL DIMENSIONS AND/OR SITE PLACEMENT.

ROCK CHECK DAM (4 / 9694)
N.T.S.



THESE CONFIGURATIONS ARE EXAMPLES ONLY
ALWAYS INSTALL PER MANUFACURER'S RECOMMENDATIONS

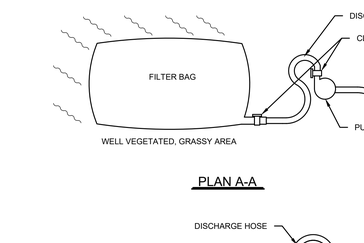




NOTES:

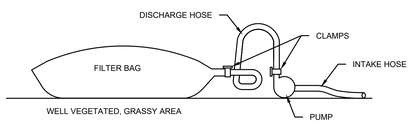
1. EROSION CONTROL BLANKET (ECB) MATERIAL, INSTALLATION, AND MAINTENANCE SHALL BE IN ACCORDANCE WITH SECTION 3.13 OF THE WVDEP E&S CONTROL BEST MANAGEMENT PRACTICE MANUAL, LATEST EDITION.
2. DISTURBED SLOPES OUTSIDE THE CCB DISPOSAL AREA THAT ARE 2H:1V OR STEEPER SHALL RECEIVE LANDLOK CS2 ECB OR APPROVED EQUIVALENT INSTALLED PER MANUFACTURER'S RECOMMENDATIONS, UNLESS OTHERWISE NOTED.

EROSION CONTROL BLANKET (6 / 9694)
N.T.S.



TRACKING SLOPES (5 / 9694)
N.T.S.

PLAN A-A

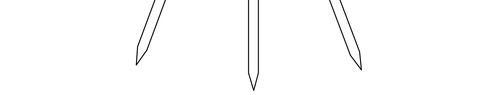


ELEVATION VIEW

NOTES:

1. PUMPED WATER FILTER BAG SHALL BE USED AS DIRECTED BY OWNER'S REPRESENTATIVE WHEN NOT DISCHARGING SEDIMENT LADEN WATER DIRECTLY TO A CHANNEL WITH CONVEYANCE TO SEDIMENTATION BASIN NO. 1.
2. PUMPED WATER FILTER BAG MATERIAL, INSTALLATION, AND MAINTENANCE SHALL BE IN ACCORDANCE WITH SECTION 3.22 OF THE WVDEP E&S CONTROL BEST MANAGEMENT PRACTICE MANUAL, LATEST EDITION.
3. FILTER BAG SHALL BE MADE FROM NON-WOVEN GEOTEXTILE MATERIAL SEWN WITH HIGH STRENGTH, DOUBLE STITCHED "J" TYPE SEAMS. THEY SHALL BE CAPABLE OF TRAPPING PARTICLES LARGER THEN 150 MICRONS.
4. A SUITABLE MEANS OF ACCESSING THE BAG WITH MACHINERY REQUIRED FOR DISPOSAL PURPOSES MUST BE PROVIDED. FILTER BAGS SHALL BE REPLACED WHEN THEY BECOME 1/2 FULL. SPARE BAGS SHALL BE KEPT AVAILABLE FOR REPLACEMENT OF THOSE THAT HAVE FAILED OR ARE FILLED.
5. BAGS SHALL BE LOCATED IN WELL-VEGETATED (GRASSY) AREA, AND DISCHARGE ONTO STABLE, EROSION RESISTANT AREAS. WHERE THIS IS NOT POSSIBLE, A GEOTEXTILE FLOW PATH SHALL BE PROVIDED. BAGS SHALL NOT BE PLACED ON SLOPES STEEPER THAN 5%.
6. THE PUMP DISCHARGE HOSE SHALL BE INSERTED INTO THE BAGS IN THE MANNER SPECIFIED BY THE MANUFACTURER AND SECURELY CLAMPED.
7. THE PUMPING RATE SHALL BE NO GREATER THAN 750 GPM OR 1/2 THE MAXIMUM SPECIFIED BY THE MANUFACTURER, WHICHEVER IS LESS. PUMP INTAKES SHOULD BE FLOATING AND SCREENED.

PUMPED WATER FILTER BAG (7 / 9694)
N.T.S.



ELEVATION VIEW

NOTES:

1. STAW WATTLE DITCH MATERIAL, INSTALLATION, AND MAINTENANCE SHALL BE IN ACCORDANCE WITH SECTION 3.06 OF THE WVDEP E&S CONTROL BEST MANAGEMENT PRACTICE MANUAL, LATEST EDITION.

STRAW WATTLE DITCH CHECK (8 / 9694)
N.T.S.

NOTES:

1. E&S CONTROL DETAILS ARE PROVIDED ON AN AS NECESSARY BASIS.
2. SEEDING & MULCHING SHALL COVER WITHIN 7 DAYS OF COMPLETION OF GRADING. TEMPORARY SEEDING WITHIN 7 DAYS IF ARE IS TO BE LEFT UNTOUCHED FOR MORE THAN 21 DAYS.

Civil & Environmental Consultants, Inc.
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www.cecinc.com

DANIEL M. TOMKO — REGISTERED — 23162 — STATE OF WEST VIRGINIA — PROFESSIONAL ENGINEER — 3/12/2021

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REVISION	DR	CHKD	APPD	DATE

PROJECT NUMBER

REFERENCE DRAWINGS

DWG. NO.	TITLE

ENGINEERING	DATE
DR JML	03/12/2021
CHKD MRF	03/12/2021
APPD DMT*	03/12/2021
SCALE	

PHASE 7 CCB LANDFILL EXPANSION
EROSION AND SEDIMENTATION CONTROL DETAILS

FACILITY HARRISON UNIT COMMON

MonPower

DWG. NO. C89509694 REV.

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NORTH

PROPERTY LINE

BEGIN CHANNEL UD-1

BEGIN CHANNEL UC-1

ULTIMATE CCB WASTE PLACEMENT LIMIT

CHANNEL USD-1 (SLOPE DRAIN)

BEGIN CHANNEL UC-2

100 YEAR FLOOD PLAIN BINGAMON CREEK

PREVIOUSLY PERMITTED PHASE 6 LIMIT OF WASTE PLACEMENT (NOT CONSTRUCTED)

CHANNEL USD-2 (SLOPE DRAIN)

BEGIN CHANNEL UC-3

BEGIN CHANNEL UD-2

CHANNEL USD-3 (SLOPE DRAIN)

PROPOSED PHASE 7 SADDLE AREA EXPANSION LIMIT OF LINER

CHANNEL USD-4 (SLOPE DRAIN)

PROPOSED PHASE 7 SADDLE AREA EXPANSION LIMIT OF WASTE

BEGIN CHANNEL UC-4

BEGIN CHANNEL UC-5

CHANNEL USD-5 (SLOPE DRAIN)

BEGIN CHANNEL UD-3

EXISTING PHASE 3 CCB LANDFILL

FUTURE CHANNEL (SLOPE DRAIN)

FUTURE HAUL ROAD CHANNEL

CHANNEL USD-6 (SLOPE DRAIN)

CHANNEL USD-7 (SLOPE DRAIN)

BEGIN CHANNEL UC-6

CHANNEL USD-8 (SLOPE DRAIN)

BEGIN CHANNEL UC-7

BEGIN CHANNEL UD-4

CHANNEL USD-9 (SLOPE DRAIN)

BEGIN CHANNEL UC-8

CHANNEL USD-10 (SLOPE DRAIN)

HAUL ROAD

ACCESS ROAD

ULTIMATE FACILITY BOUNDARY

EXISTING HAUL ROAD

EXISTING HAUL ROAD

PROPANE TANK

GENERATOR

STORAGE CHEMICAL BUILDING

LEACHATE COLLECTION SUMP

EXISTING CELL A

EXISTING CELL B

EXISTING CELL C

EXISTING SEDIMENTATION POND 1

TO HARRISON POWER STATION

MON 899400

MON 3 2016

BM 1

BM 2

N332500 N332000 N331500 N331000 N330500 N330000 N329500 N329000 N328500 N328000

E1736000 E1735500 E1735000 E1734500 E1734000 E1733500 E1733000 E1732500 E1732000

APPROXIMATE CCB WASTE PLACEMENT: 54.4 M CU. YD.

INTERMEDIATE SOIL COVER VOLUME: 0.46 M CU. YD.

(VOLUME IS CALCULATED AGAINST THE MARCH 2020 TOPOGRAPHY SURVEY)

NOTES

1. THIS DRAWING REPPLACES THE PHASE 6 CCB LANDFILL EXPANSION PROJECTED ULTIMATE LANDFILL DEVELOPMENT (DWG. C89508993)

LEGEND

- PROPOSED COLLECTION CHANNEL
- PROPOSED DIVERSION CHANNEL
- PROPOSED SLOPE DRAIN
- EXISTING LIMIT OF LINER
- FB — FACILITY BOUNDARY
- 1500 FOOT OFFSET FROM CCB LANDFILL
- ULTIMATE CCB PLACEMENT LIMIT
- LCP — EXISTING LEACHATE CONVEYANCE PIPE
- 1250 — PROPOSED WASTE INDEX CONTOUR
- PROPOSED WASTE INTERMEDIATE CONTOUR

REFERENCE

1. THE GRID SHOWN ON THIS DRAWING IS APPROXIMATE AND IS BASED ON THE WEST VIRGINIA STATE PLANE COORDINATE SYSTEM, NORTH ZONE, 1983 NORTH AMERICAN DATUM.
2. EXISTING TOPOGRAPHY PROVIDED BY FIRST ENERGY, DATED MARCH 13, 2020.

SCALE IN FEET
0 200 400

Civil & Environmental Consultants, Inc.
333 Baldwin Road · Pittsburgh, PA 15205
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DANIEL M. TOMPKINS — REGISTERED — 23162 — PROFESSIONAL ENGINEER — STATE OF WEST VIRGINIA
Signature
3/12/2021

*HAND SIGNATURE ON FILE

FUNCTIONAL LOCATION NO. _____

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INITIAL PROJECT # — THIS IS AN AutoCAD DRAWING - DO NOT MANUALLY REVISE

REVISION	DR	CHKD	APPD	DATE

PROJECT NUMBER

REFERENCE DRAWINGS

DWG. NO.	TITLE

ENGINEERING	DATE
DR: JML	03/12/2021
CHKD: MRF	03/12/2021
APPD: DMT*	03/12/2021
SCALE	

PHASE 7 CCB LANDFILL EXPANSION
ULTIMATE DEVELOPMENT PLAN

FACILITY HARRISON — UNIT COMMON

MonPower — DWG. NO. C89509695 — REV.

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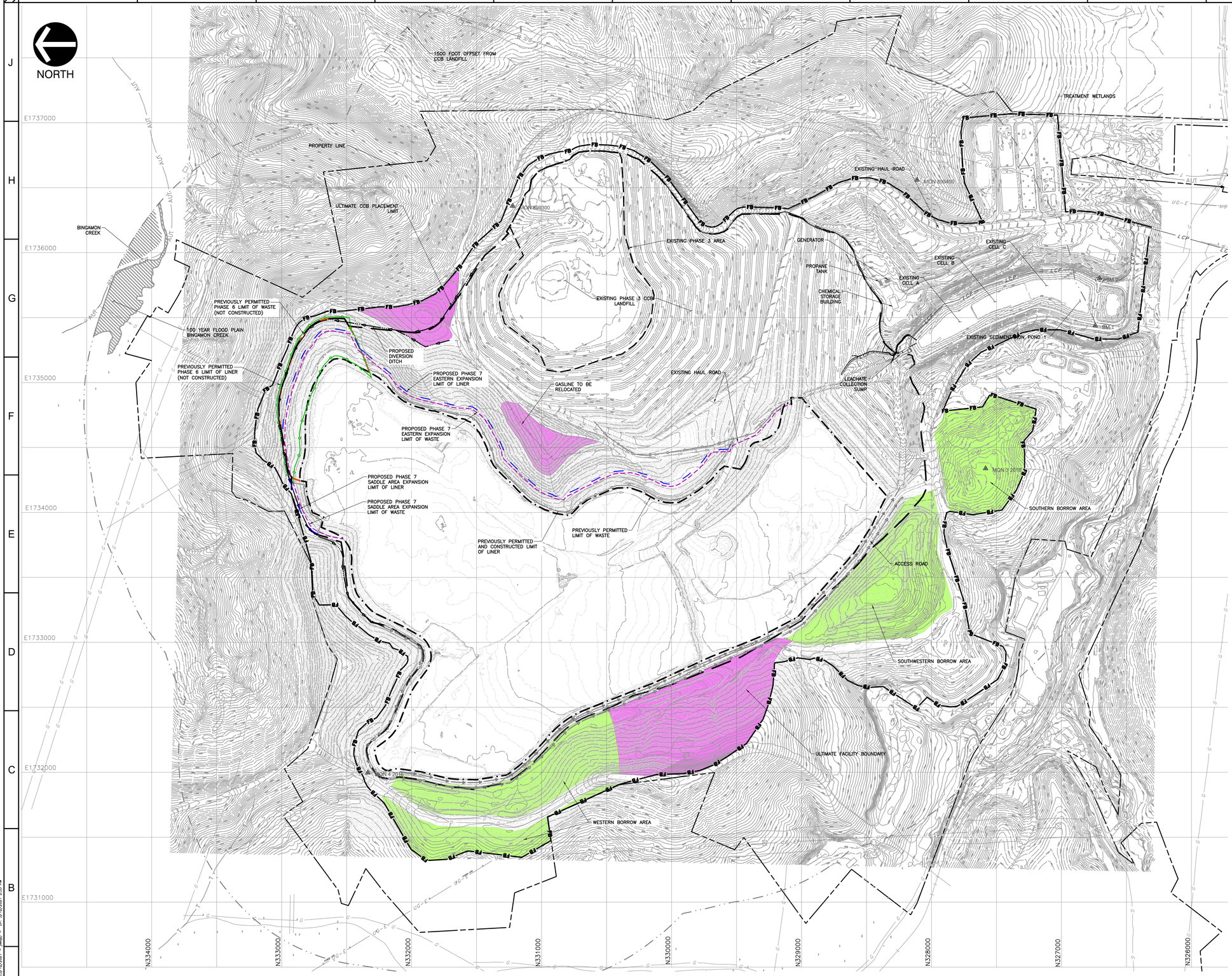

SURVEY CONTROL MONUMENT POINTS					
POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION	DETAIL
1	326740.19	1735438.40	964.89	BM 1	METAL SURVEY MARKER
2	326708.00	1735801.80	963.95	BM 2	METAL SURVEY MARKER
3	327583.72	1734338.23	1172.26	MON 3 2016	ALUMINUM MONUMENT
4	332336.97	1731996.05	1246.89	MON 4 2016	ALUMINUM MONUMENT
899300	331221.80	1736358.36	1467.31	MON 899300	ALUMINUM MONUMENT
899400	328111.23	1736559.63	1220.24	MON 899400	ALUMINUM MONUMENT

LEGEND

- PROPERTY LINE
- PROPOSED COLLECTION CHANNEL
- PROPOSED DIVERSION CHANNEL
- PERMITTED COLLECTION CHANNEL
- PERMITTED DIVERSION CHANNEL
- PREVIOUSLY PERMITTED & CONSTRUCTED LIMIT OF LINER
- FB FACILITY BOUNDARY
- 1500 FOOT OFFSET FROM CCB LANDFILL
- ULTIMATE CCB PLACEMENT LIMIT
- PREVIOUSLY PERMITTED ACTIVE LIMIT OF WASTE PLACEMENT
- PREVIOUSLY PERMITTED PHASE 6 LIMIT OF WASTE PLACEMENT (NOT CONSTRUCTED)
- PREVIOUSLY PERMITTED PHASE 6 LINER LIMIT (NOT CONSTRUCTED)
- PROPOSED LIMIT OF PHASE 7 LINER EXPANSION
- PROPOSED LIMIT OF PHASE 7 WASTE PLACEMENT
- LCP EXISTING LEACHATE CONVEYANCE PIPE
- G EXISTING GASLINE
- UG-E EXISTING UNDERGROUND ELECTRIC LINE
- T EXISTING TELEPHONE
- AUT EXISTING AUXILIARY TELECOMMUNICATIONS
- BORROW AREA
- POTENTIAL BORROW AREA

REFERENCE

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2. EXISTING TOPOGRAPHY PROVIDED BY FIRST ENERGY, DATED MARCH 13, 2020.

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INITIAL PROJECT #

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REVISION	DR	CHKD	APPD	DATE

PROJECT NUMBER

REFERENCE DRAWINGS

DWG. NO.	TITLE

ENGINEERING	DATE
DR JML	03/12/2021
CHKD MRF	03/12/2021
APPD DMT*	03/12/2021
SCALE	

PHASE 7 CCB LANDFILL EXPANSION
EXISTING CONDITION/SITE OVERALL PLAN

FACILITY HARRISON UNIT COMMON

MonPower — DWG. NO. C89509683 — REV.

1585

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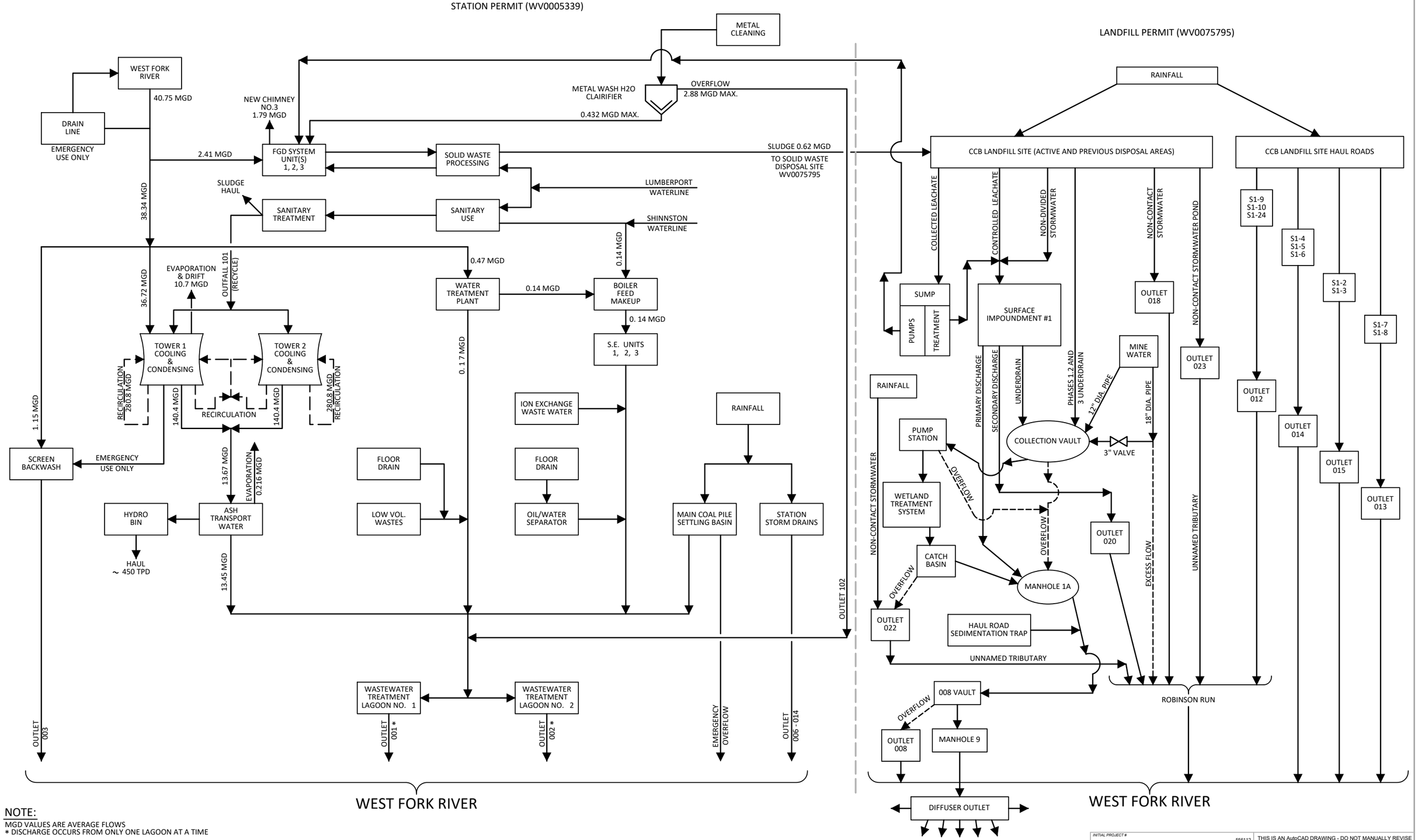
WATER FLOW LINE DIAGRAM

STATION PERMIT (WV0005339)

LANDFILL PERMIT (WV0075795)



NOTE:

MGD VALUES ARE AVERAGE FLOWS

* DISCHARGE OCCURS FROM ONLY ONE LAGOON AT A TIME

REVISION	DR	CHKD	APPD.	DATE	DESCRIPTION	PROJECT NUMBER
2				01/23/2015	ADDED CLARIFIER & DRAIN LINE	
3				01/23/2015	ADDED LANDFILL PERMIT INFO	
D				01/23/2015	REVISED PER NEW METAL WASH PROCEDURE	
E	RDC 02/01/2016	WC 02/01/2016	WC	02/01/2016	REVISED OUTFALL 016 FROM THE WEST FORK LANDFILL STORM DRAINS	
F	MK 03/04/2021	MRF 03/04/2021	DMT 03/04/2021	03/04/2021	REVISED LANDFILL AND STATION PERMIT LINE DIAGRAM	

1586

REFERENCE DRAWINGS

DWG. NO.	TITLE

	ENGINEERING	DATE
DR	L.HUNTER	03/23/2015
CHKD	J. CENKNER	01/23/1994
APPD		
SCALE	NONE	

INITIAL PROJECT # 556112

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NPDES
WATER FLOW LINE DIAGRAM

LOCATION HARRISON UNIT COMMON

MonPower

DWG. NO. 105-781

REV. F

Applicant:	MONONGAHELA POWER COMPANY	Type:	Reissue NPDES Industrial
Reference ID:	WV0075795 Harrison P.S. CCR L.F. Renewal (12/04/2020)	Permit ID:	WV0075795
Section XII: Certification			
Status	New	Printed:	Mar. 17, 2021 2:58 PM

XII. CERTIFICATION (see instructions)

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based upon my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

A. NAME Gary J. Dinzeo

OFFICIAL TITLE Director, Harrison Power Station

B. SIGNATURE 

C. DATE SIGNED 3/17/2021

Please Print, Sign, Scan and attach this document rather than mailing as a wet ink signature is no longer required.