APPENDIX H

ENGINEERING PERMIT DRAWINGS
(INCLUDED AS A SEPARATE 24-INCH BY 36-INCH ROLLED DRAWING SET)

APPENDIX I

MECHANICALLY STABILIZED EARTHEN BERM DESIGN AND DRAWINGS

Slide uses 2D limit equilibrium methods to determine the minimum FS. The auto-refine, non-circular search method with optimization was used utilizing Morgenstern-Price Method to calculate all FS. The General Limit Equilibrium (GLE) / Morgenstern-Price (MP) method of analysis was selected as the method since it satisfies all conditions of equilibrium, is applicable to any shape of slip surface, side force inclinations can be the same or can vary from slice to slice, side force inclinations are calculated in the process of solution so that all conditions of equilibrium are satisfied, and is considered an accurate method.

ReSlope was utilized to evaluate sliding and pullout failures considering both static and seismic scenarios for the critical cross section at approximately Station 19+47. ReSlope is an interactive, design-oriented, program for the design of geosynthetic-reinforced slopes, which also uses 2D limit equilibrium methods to determine the minimum FS. For a given problem including geosynthetic strength, reduction factors, and design safety factors, ReSlope produces the optimal layout (embedment length and spacing) of reinforcement layers.

GEOLOGY

According Reference 1, the proposed north perimeter berm for the Dunn C&D Landfill overlays glaciolacustrine silts and sands. Subsurface information determined that significant glaciofluvial deposits are present between existing ground surface and from depths ranging from 130 to 170 feet. The glaciofluvial deposits are underlain by glacial till and the glacial till is underlain by shale. Based on the web soil survey some alluvial soil is present near the northeast corner.

GEOMETRY

The proposed north perimeter berm will be mostly constructed in areas of fill in order to construct the proposed bottom liner of the northern cells. The berm will have a slope of 0.5H:1V (horizontal:vertical). The proposed northern pond in the northwest corner, located downslope of the proposed berm, will be constructed with 2H:1V slopes. The proposed waste slopes will be constructed no steeper than 3H:1V. There is a proposed perimeter access road at the top of the proposed berm.

MATERIAL PARAMETERS

The following table summarizes the parameters used in this analysis. All parameters excluding the new fill were based on the slope stability analysis performed by CEC for the proposed modification of the facility (Reference 3). The new fill (which includes reinforced fill) parameters are based on the remolded direct shear test results of on-site materials (Reference 4).

Material	Unit Weight (pcf)	Angle of Friction (degrees)	Cohesion (psf)	Reference
Subgrade	120	30	0	4
Bottom Liner/	118.5	17.4	67	3

Material	Unit Weight (pcf)	Angle of Friction (degrees)	Cohesion (psf)	Reference
Low Permeability Soil				
C&D Waste	60	Shear / Normal Function	Shear / Normal Function	3
Final Cover System	119.9	27	0	3
New Fill	120	30	100	3

SURCHARGE LOADING

Exact equipment and traffic loading was not provided by at the time of the calculation. Therefore CEC has assumed a surcharge of 250 psf for equipment and traffic surcharge based on our experience. This surcharge was applied to the top of the proposed berm for all scenarios.

GROUNDWATER

Based on Reference 1, the depth to static groundwater is in excess of 50 feet below existing ground surface and is not considered in this analysis.

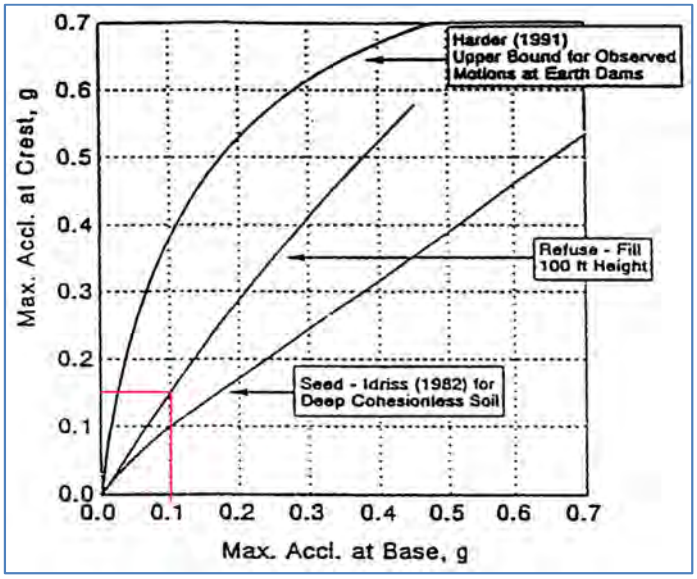
FACTOR OF SAFETY

Per 6 CCR-NY-363-4.3(c) and (d), the minimum acceptable FS for static slope stability is 1.5 and for seismic slope stability is 1.0. The minimum target FS for sliding of 1.5 for static and 1.0 for seismic were based on Reference 8.

SEISMIC ANALYSIS

Per 6 CRR-NY-363-4.3(d) any facility located in a seismic impact zone, must include a seismic stability analysis. A seismic impact zone, as defined in the RCRA Subtitle D regulations, is an area that has a 10% or greater probability that the peak ground acceleration (PGA) in lithified earth material (bedrock) expressed as a percentage of the earth's gravitational pull will exceed 0.10g (10 percent of gravity) in 250 years.

Values of PGA having a certain probability of exceedance (P_e) were determined from the United Stated Geologic Survey (USGS) Unified Hazard Tool. The USGS Unified Hazard Tool presents the PGA value for a seismic risk level of 2% probability that the PGA will be exceeded in 50 years (e.g. P_e = 2% in 50 years); however, a seismic risk level of P_e = 2% is equivalent to P_e = 10% in 250 years. Using the unified hazard tool with the Conterminous U.S. 2014 Edition, the PGA at Dunn C&D Landfill site corresponding to P_e = 2% in 50 years is 0.105g. The USGS hazard maps report PGA at the ground surface assuming 30 meters of soil with an average shear wave velocity of 760 m/s, which is conservative based on our review of the test borings previously drilled at the site. Therefore, 0.105g was considered the free field PGA for the site. To account for acceleration amplification during a seismic event from the free field PGA (at the base of the MSE berm) to the top of the MSE berm, the Refuse-Fill 100 ft Height curve presented on the following figure was used from Reference 6. This resulted in an amplified PGA/design PGA of 0.15g.



According to 6 CRR-NY-363-4.3(d)(1)(i) a pseudo-dynamic analysis shall demonstrate all long-term containment structures are designed to retain a minimum factory of safety of 1.0 using a seismic coefficient (expressed as a fraction of the acceleration of gravity) equal to one-half the free field peak ground acceleration at the site for the design earthquake. Therefore, the seismic coefficient used in the analysis was 0.075g (1/2 the design PGA).

GEOSYNTHETIC MATERIAL STREGNTH PROPERTIES

Geosynthetic material strength properties used in the analysis are listed in the table below. The long-term design strengths were input into slide and the reinforcements were modeled as an active support. The strengths used were based on the ultimate strength and reduction factors listed in Reference 7. The long term design strengths calculated in Attachment C were input into ReSlope with reduction factors of 1.0 to model a generic type of geogrid. It is assumed that the backfill material will be on-site material which generally consists of silty sand. Calculations are shown in spreadsheets in Attachment B. The interface friction between the geogrid and the reinforced fill/foundation soil was determined in accordance with Reference 8.

Geogrid Material	Interface Friction (°)	Ultimate Tensile Strength (lb/ft)
Type 1	21	1900
Type 2		3900
Type 3		8400

RESULTS AND CONCLUSIONS

The following tables summarize the calculated minimum global stability FS for each cross section and each scenario using Slide.

GLOBAL STATIC STABILITY RESULTS

Approximate Cross Section Station	Minimum Calculated FS	Minimum Target FS
00+27	1.59	1.50
00+60	1.53	
01+50	1.50	
03+30	1.81	
10+27	1.52	
15+01	1.71	
19+47	1.56	

GLOBAL SEISMIC STABILITY RESULTS

Cross Section	Minimum Calculated FS	Minimum Target FS
00+27	1.36	1.00
00+60	1.31	
01+50	1.31	
03+30	1.54	
10+27	1.30	
15+01	1.47	
19+47	1.32	

Direct sliding analysis was performed in ReSlope to check the minimum required length of the bottom geogrid at the critical cross section at Station 19+47. The minimum length required by ReSlope was 45 feet which is less than the length of 100 feet used in Slide.

Based on these results, CEC concludes that the proposed MSE berm will meet the requirements in 6 CCR-NY-363-4.3(c) and (d) if constructed in accordance with this design and the construction drawings.

OBJECTIVE

The objective of this analysis was to design the proposed mechanical stabilized earth (MSE) berm to meet the requirements in 6 CCR-NY-363-4.3(c) and (d).

REFERENCES

1. "Hydrogeological Report, Dunn Sand & Gravel Mined Land Use, Plan Modification/C&D Landfill" Prepared by C.T. Male Associates, P.C., Dated October 5, 2010, Revised June 14, 2011.
2. "Custom Soil Resource Report for Rensselaer County, New York", by United States Department of Agriculture, Natural Resources Conservation Service, Web Soil Survey.
3. S.A. Dunn C&D Landfill Footprint Modification Application Interim and Overall Slope Stability, Performed by Civil & Environmental Consultants, Inc. Dated August 2020.
4. Direct Shear Results, (500, 7,500, and 15,000 psf) for Sample SG-1 (Subgrade), Lab Log: 18-115, tested by RSA Geolab, LLC, Dated 5-16-18.
5. "Unified Hazard Tool", United States Geologic Survey, Access June 6, 2019.
6. "Seismic Response of Municipal Solid Waste Landfills", S. Singh,
7. Tencate – Determination of the Long-term Properties of Miragrid XT Geogrids.
8. FHWA. Design and Construction of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes (Volumes I and II). November 2009.

METHODOLOGY

Slope stability software Slide 9.0 and ReSlope Version 4.0 were used to calculate the minimum factor of safety (FS) in general accordance with Federal Highway Administration (FHWA) design methodology for reinforced soil slopes (RSSs) at the cross sections listed in the following table. According to Reference 8, inclinations of less than 70 degrees are considered slopes and inclinations of 70 degrees or greater are considered walls. These cross sections were chosen for analysis based on proposed berm height, proposed slope at toe of MSE berm, subsurface conditions, proposed waste height, and/or to optimize the design.

Analyzed Cross Sections Summary Table

Approximate MSE Berm Station	Approximate Proposed MSE Berm Height (ft)
0+27	18
0+60	20
1+50	24
3+30	30
10+27	54
15+01	28
19+47	48

ATTACHMENT A

DRAWINGS

LEGEND

- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- EXISTING FENCE
- EXISTING UNPAVED ROAD
- EXISTING TREE LINE
- EXISTING WATER MAIN
- EXISTING PROPERTY LINE
- CROSS SECTION LOCATION
- B-101 PROPOSED TEST BORING LOCATION (SEE NOTE 1)
- 0+00 1+00 MSE BERM ALIGNMENT AND STATIONING
- RSS DRAIN
- RSS DRAIN OUTLET

REFERENCE

1. EXISTING TOPOGRAPHY AND PROPERTY OWNER INFORMATION WAS COMPILED BY SOUTHERN RESOURCES MAPPING CORPORATION USING PHOTOGRAMMETRIC METHODS FROM PHOTOGRAPHY DATED APRIL 11, 2018.
2. PROPERTY LINE INFORMATION WAS TAKEN FROM A PLAN TITLED "ALTA/ASCM LAND TITLE BOUNDARY SURVEY, LANDS OF KELLY AND DUNN TO BE CONVEYED TO S.A. DUNN & COMPANY, LLC." PREPARED AND SEALED BY WILLIAM N. CURRAN, AND UPDATED AS NECESSARY BASED ON AVAILABLE TITLE INFORMATION.
3. CONTOURS SHOWN OUTSIDE THE PROPOSED LANDFILL PERIMETER LIMIT REPRESENT PROPOSED FINAL GRADES. CONTOURS SHOWN WITHIN THE PROPOSED LANDFILL PERIMETER LIMIT REPRESENT PROPOSED TOP OF FINAL COVER ELEVATIONS.

NOTES

1. A SUBSURFACE INVESTIGATION SHALL BE PERFORMED BY AN ENGINEER LICENSED IN THE STATE OF NEW YORK PRIOR TO CONSTRUCTION TO CONFIRM THE FOUNDATION SOIL DESIGN PARAMETERS THAT WERE ASSUMED AS PART OF THE MSE BERM DESIGN. THE SUBSURFACE INVESTIGATION SHALL INCLUDE THE FOLLOWING AT A MINIMUM.
   - TEST BORINGS AT THE APPROXIMATE LOCATIONS SHOWN ON DRAWING GT01.
   - STANDARD PENETRATION TESTING AT ALL LOCATIONS FROM THE GROUND SURFACE TO A MINIMUM DEPTH OF TWICE THE HEIGHT OF THE PROPOSED MSE BERM OR 35' WHICHEVER IS GREATER.
   - LABORATORY TESTING INCLUDING BUT NOT LIMITED TO GRAIN SIZE ANALYSIS, ATTERBURG LIMITS, MOISTURE CONTENT, AND SHEAR STRENGTH TESTING.

SCALE IN FEET
0 60 120

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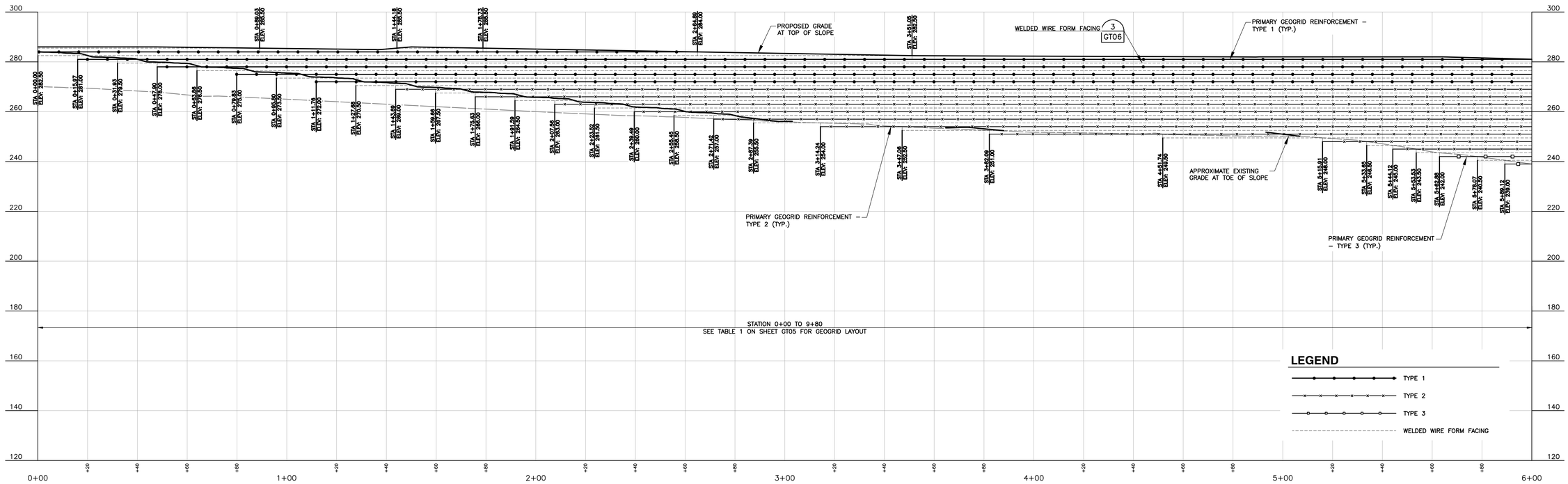

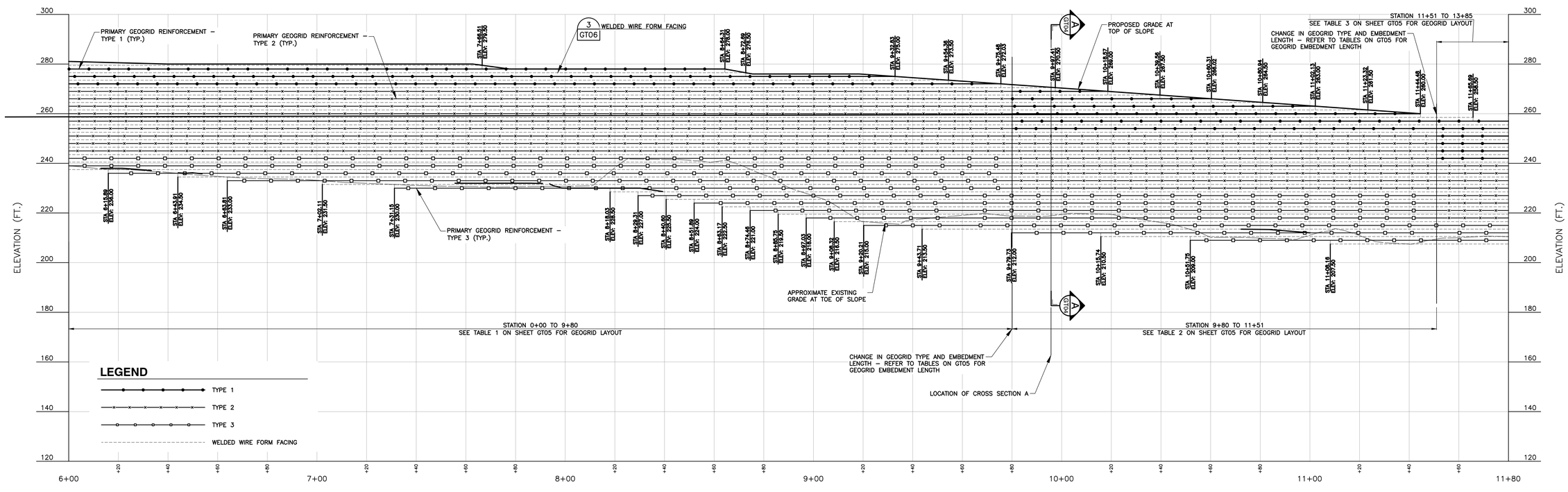

MSE BERM PROFILE

SCALE H:1"=20'; V:1"=20'

SCALE IN FEET

0 20 40

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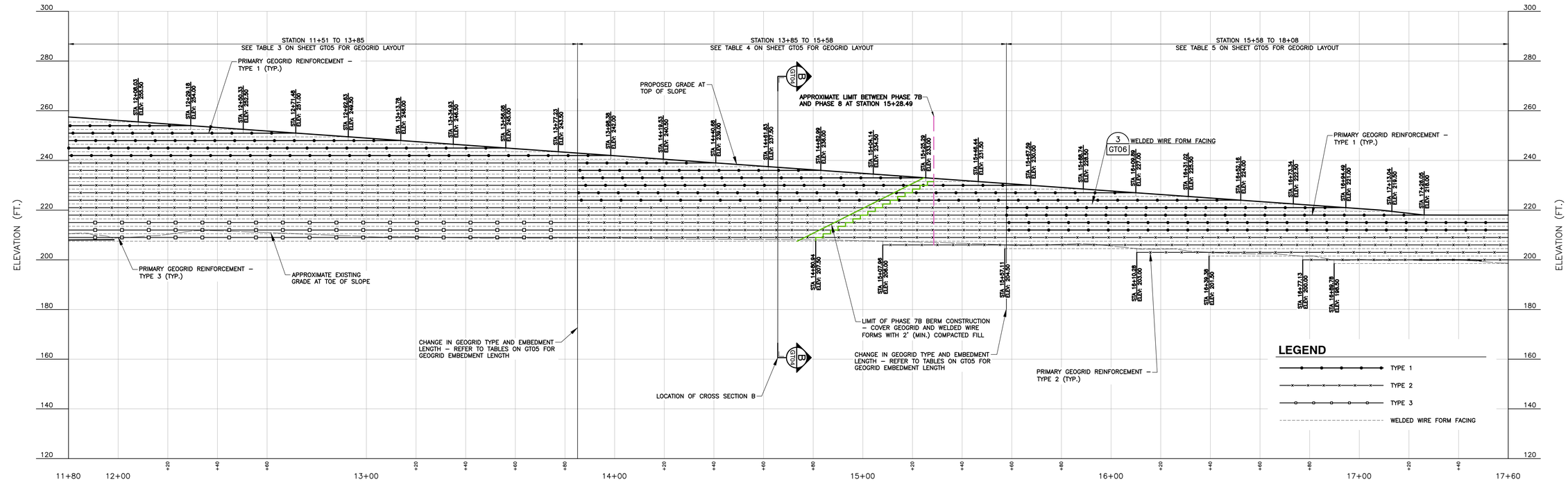

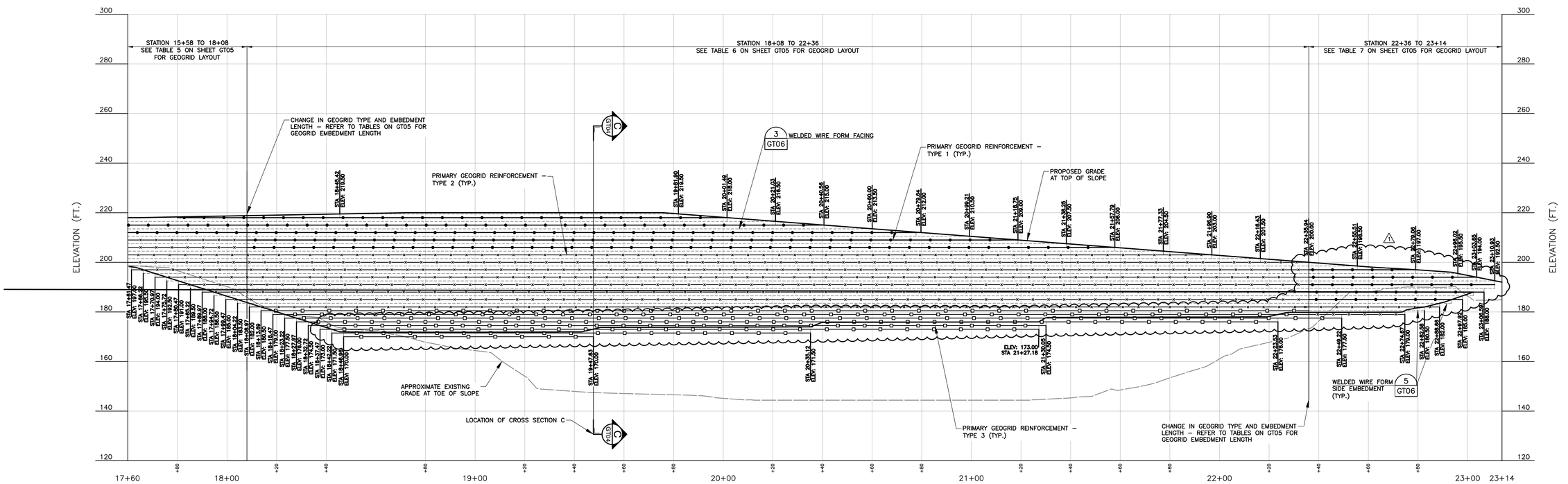

MSE BERM PROFILE

SCALE H:1"=20'; V:1"=20'

SCALE IN FEET

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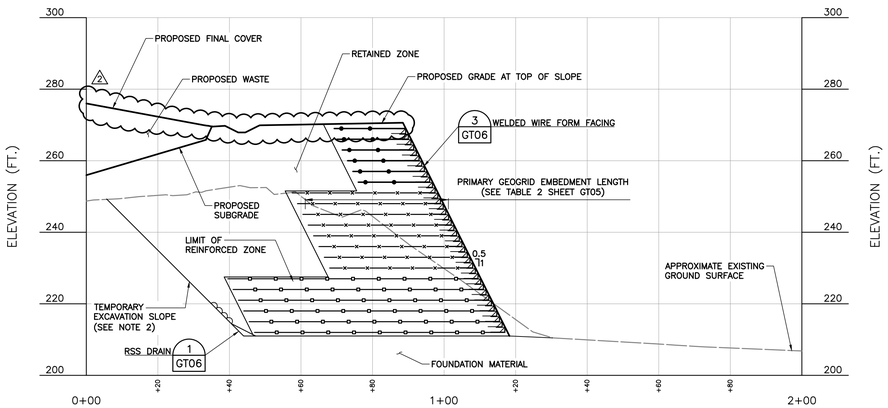

CROSS SECTION A-A - STA. 9+95

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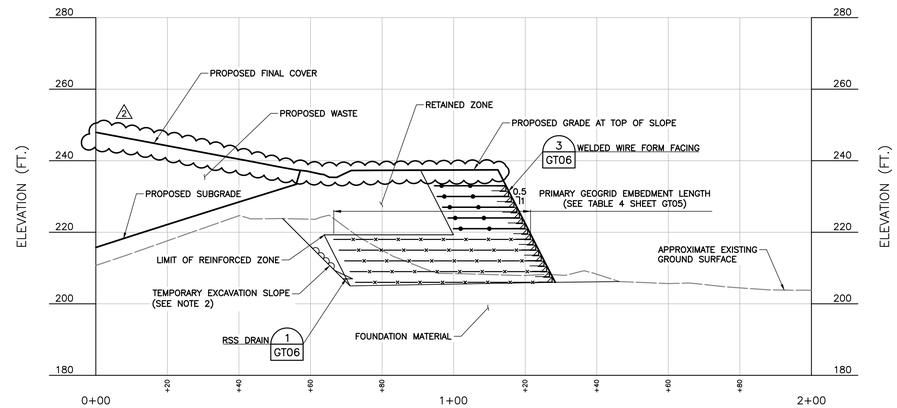

CROSS SECTION B-B - STA. 14+69

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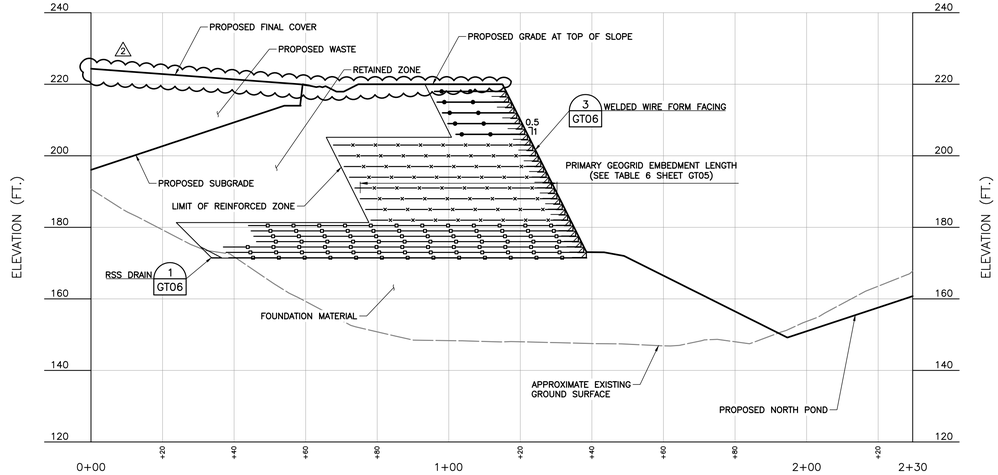

CROSS SECTION C-C - STA. 19+47

SCALE H:1"=20''; V:1"=20''

LEGEND

- TYPE 1
- TYPE 2
- TYPE 3

NOTES

1. SEE GT05 FOR SUMMARY OF GEOGRID ELEVATION, TYPE, AND EMBEDMENT LENGTH.
2. ALL EXCAVATIONS SHALL BE PERFORMED IN ACCORDANCE WITH OSHA REGULATIONS. CONTRACTOR IS RESPONSIBLE FOR STABILITY OF TEMPORARY EXCAVATIONS.

SCALE IN FEET

0 20 40

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TABLE 1
GEOGRID LAYOUT
STATIONS 0+00 TO 9+80

ELEV.	STARTING STATION	ENDING STATION	GEOGRID TYPE	EMBEDMENT LENGTH (FT)
284	0+00	2+64.89	Type 1	21
281	0+15.97	6+00	Type 1	21
278	0+49.90	7+66.51	Type 1	21
275	0+79.83	9+32.83	Type 1	21
272	1+11.76	9+75.48	Type 1	21
269	1+43.69	9+80	Type 2	40
266	1+75.63	9+80	Type 2	40
263	2+07.56	9+80	Type 2	40
260	2+39.49	9+80	Type 2	40
257	2+71.42	9+80	Type 2	40
254	3+14.24	9+80	Type 2	40
251	3+82.09	9+80	Type 2	40
248	5+15.91	9+80	Type 2	40
245	5+44.12	9+80	Type 2	40
242	5+62.88	9+80	Type 3	70
239	5+89.12	9+80	Type 3	70
236	6+15.89	9+80	Type 3	70
233	6+63.81	9+80	Type 3	70
230	7+31.15	9+80	Type 3	70
227	8+29.31	9+80	Type 3	70
224	8+51.89	9+80	Type 3	70
221	8+74.46	9+80	Type 3	70
218	8+97.03	9+80	Type 3	70
215	9+20.21	9+80	Type 3	70

TABLE 2
GEOGRID LAYOUT
STATIONS 9+80 TO 11+51

ELEV.	STARTING STATION	ENDING STATION	GEOGRID TYPE	EMBEDMENT LENGTH (FT)
269	9+80	10+18.57	Type 1	20
266	9+80	10+60.31	Type 1	20
263	9+80	11+02.13	Type 1	20
260	9+80	11+44.48	Type 1	20
257	9+80	11+51	Type 1	20
254	9+80	11+51	Type 1	20
251	9+80	11+51	Type 2	40
248	9+80	11+51	Type 2	40
245	9+80	11+51	Type 2	40
242	9+80	11+51	Type 2	40
239	9+80	11+51	Type 2	40
236	9+80	11+51	Type 2	40
233	9+80	11+51	Type 2	40
230	9+80	11+51	Type 2	40
227	9+80	11+51	Type 3	70
224	9+80	11+51	Type 3	70
221	9+80	11+51	Type 3	70
218	9+80	11+51	Type 3	70
215	9+80	11+51	Type 3	70
212	9+80	11+51	Type 3	70
209	10+51.75	11+51	Type 3	70

TABLE 3
GEOGRID LAYOUT
STATIONS 11+51 TO 13+85

ELEV.	STARTING STATION	ENDING STATION	GEOGRID TYPE	EMBEDMENT LENGTH (FT)
257	11+51	11+80	Type 1	20
254	11+51	12+29.18	Type 1	20
251	11+51	12+71.48	Type 1	20
248	11+51	13+13.78	Type 1	20
245	11+51	13+56.08	Type 1	20
242	11+51	13+85	Type 1	20
239	11+51	13+85	Type 2	40
236	11+51	13+85	Type 2	40
233	11+51	13+85	Type 2	40
230	11+51	13+85	Type 2	40
227	11+51	13+85	Type 2	40
224	11+51	13+85	Type 2	40
221	11+51	13+85	Type 2	40
218	11+51	13+85	Type 2	40
215	11+51	13+85	Type 3	70
212	11+51	13+85	Type 3	70
209	11+51	13+85	Type 3	70

TABLE 4
GEOGRID LAYOUT
STATIONS 13+85 TO 15+58

ELEV.	STARTING STATION	ENDING STATION	GEOGRID TYPE	EMBEDMENT LENGTH (FT)
242	13+85	13+98.38	Type 1	20
239	13+85	14+40.68	Type 1	20
236	13+85	14+82.99	Type 1	20
233	13+85	15+25.29	Type 1	20
230	13+85	15+58	Type 1	20
227	13+85	15+58	Type 1	20
224	13+85	15+58	Type 1	20
221	13+85	15+58	Type 2	40
218	13+85	15+58	Type 2	40
215	13+85	15+58	Type 2	40
212	13+85	15+58	Type 2	40
209	13+85	15+58	Type 2	40
206	15.07.96	15+58	Type 2	40

TABLE 5
GEOGRID LAYOUT
STATIONS 15+58 TO 18+08

ELEV.	STARTING STATION	ENDING STATION	GEOGRID TYPE	EMBEDMENT LENGTH (FT)
230	15+58	15+67.59	Type 1	20
227	15+58	16+09.89	Type 1	20
224	15+58	16+52.16	Type 1	20
221	15+58	16+94.49	Type 1	20
218	15+58	17+26.05	Type 1	20
215	15+58	18+08	Type 1	20
212	15+58	18+08	Type 1	20
209	15+58	18+08	Type 2	40
206	15+58	18+08	Type 2	40
203	16+10.28	18+08	Type 2	40
200	16+77.13	18+08	Type 2	40
197	17+61.47	18+08	Type 2	40
194	17+70.97	18+08	Type 2	40
191	17+80.47	18+08	Type 2	40
188	17+89.97	18+08	Type 2	40
185	17+99.47	18+08	Type 2	40

TABLE 6
GEOGRID LAYOUT
STATIONS 18+08 TO 22+36

ELEV.	STARTING STATION	ENDING STATION	GEOGRID TYPE	EMBEDMENT LENGTH (FT)
218	18+08	20+01.49	Type 1	20
215	18+08	20+40.56	Type 1	20
212	18+08	20+79.64	Type 1	20
209	18+08	21+18.75	Type 1	20
206	18+08	21+57.79	Type 1	20
203	18+08	21+96.90	Type 2	55
200	18+08	22+35.94	Type 2	55
197	18+08	22+36	Type 2	55
194	18+08	22+36	Type 2	55
191	18+08	22+36	Type 2	55
188	18+08	22+36	Type 2	55
185	18+08	22+36	Type 2	55
182	18+08.97	22+36	Type 2	55
180.5	18+13.69	22+36	Type 3	90
179	18+18.47	22+36	Type 3	90
177.5	18+23.22	22+36	Type 3	90
176	18+27.97	22+23.53	Type 3	90
174.5	18+32.72	21+30.05	Type 3	100
173	18+37.47	21+27.18	Type 3	100
171.5	18+42.22	20+35.12	Type 3	100
170	18+46.96	19+47.63	Type 3	100

TABLE 7
GEOGRID LAYOUT
STATIONS 22+36 TO 23+14

ELEV.	STARTING STATION	ENDING STATION	GEOGRID TYPE	EMBEDMENT LENGTH (FT)
197	22+36	22+79.06	Type 1	20
194	22+36	23+03.65	Type 1	20
191	22+36	23+10.93	Type 1	20
188	22+36	23+06.59	Type 1	20
185	22+36	22+97.92	Type 1	20
182	22+36	22+88.66	Type 2	40
179	22+36	22+74.76	Type 2	40
177.5	22+36	22+49.22	Type 3	40

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NORTH BERM MODIFICATION

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RENSSELAER, NEW YORK

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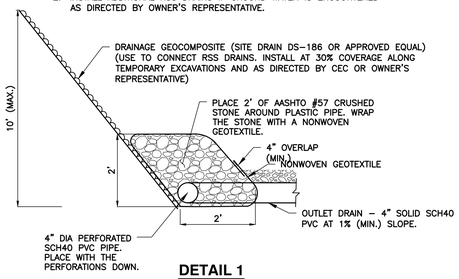
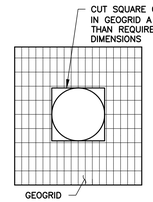
NOTES:

1. INSTALL RSS DRAINS AT BASE/REAR OF TEMPORARY EXCAVATION AS SHOWN ON CROSS SECTIONS.
2. INSTALL ADDITIONAL RSS DRAINS IF GROUND WATER IS ENCOUNTERED AS DIRECTED BY OWNER'S REPRESENTATIVE.



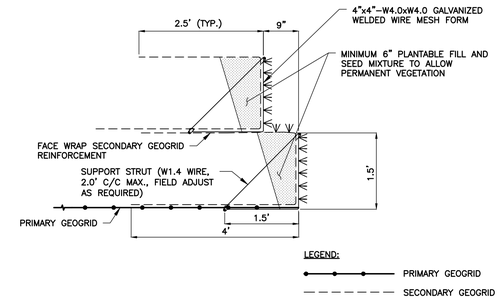
DETAIL 1
RSS DRAIN
N.T.S



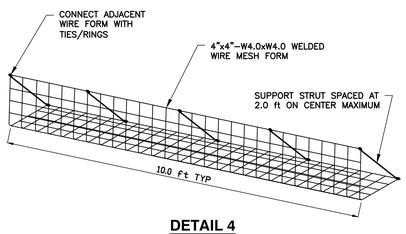
NOTES:

1. THIS DETAIL SHALL BE USED FOR GEOGRID PENETRATIONS FOR FENCE POSTS, GUIDERAIL, AND ANY OTHER REQUIRED PENETRATION THROUGH THE GEOGRID IN THE REINFORCED BACKFILL.
2. AS AN ALTERNATIVE, POSTS MAY BE DRIVEN THROUGH THE GRID. DO NOT DRILL USING AUGERS ONCE THE GEOGRID IS INSTALLED.
3. CONTRACTOR SHALL COORDINATE INSTALLATION OF THE GUIDERAIL AND ANY OTHER ITEMS WITH CONSTRUCTION OF THE REINFORCED BACKFILL AND INSTALLATION OF GEOGRIDS REQUIRING THE PENETRATIONS.

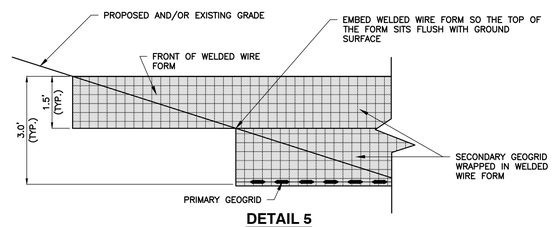
DETAIL 2
GEOGRID PENETRATION
N.T.S



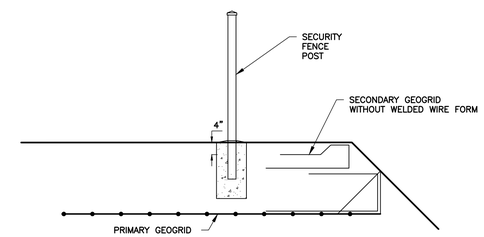
DETAIL 3
WELDED WIRE FORM FACING
N.T.S



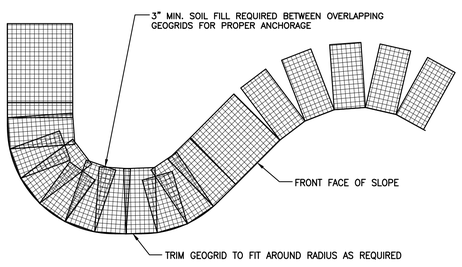
DETAIL 4
WELDED WIRE FORM
N.T.S



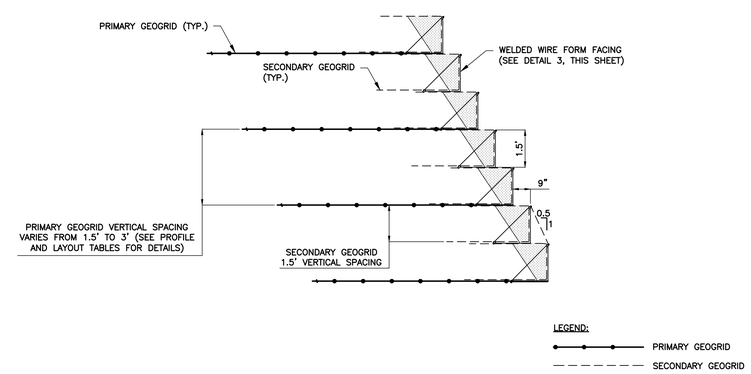
DETAIL 5
WELDED WIRE FORM SIDE EMBEDMENT
N.T.S



DETAIL 6
GEOGRID AT TOP OF SLOPE
N.T.S



DETAIL 7
GEOGRID PLACEMENT ON CURVES
N.T.S



DETAIL 8
TYPICAL MSE BERM CROSS SECTION
N.T.S

Civil & Environmental Engineering, Landscape Architecture and Land Surveying PLLC

NORTH BERM MODIFICATION
S.A.DUNN & COMPANY, LLC
RENSSELAER, NEW YORK

\\svr-boston\projects\2018\02-4421-0400\Dwg\C701 - MSE Wall\R24442-C701-MSE Details.dwg\C701E1 LS(1/19/2021 - khampton) - LP: 5/19/2021 11:29 AM

PART 1– GENERAL

1.1 SUMMARY

A. DESCRIPTION OF WORK: THE WORK SHALL CONSIST OF THE CONSTRUCTION OF A REINFORCED SOIL SLOPE (RSS) AS PART OF EARTHWORK CONSTRUCTION FOR THE PROJECT. WORK CONSISTS OF:

1. FURNISHING PRIMARY GEOGRID REINFORCEMENT, SECONDARY GEOGRID REINFORCEMENT, WELDED WIRE MESH FORMS, DRAINAGE GEOCOMPOSITE, EROSION CONTROL, AND OTHER DRAINAGE MATERIALS AS SHOWN ON THE DRAWINGS AND PRESENTED HEREIN.
2. STORING, CUTTING, AND PLACING PRIMARY GEOGRID REINFORCEMENT, SECONDARY GEOGRID REINFORCEMENT, WELDED WIRE MESH FORMS, AND INSTALLING DRAINAGE MATERIALS AS SPECIFIED HEREIN AND AS SHOWN ON THE DRAWINGS.
3. PLACEMENT AND COMPACTION OF BACKFILL MATERIAL AND EXCAVATION AS SPECIFIED HEREIN AND AS SHOWN ON THE DRAWINGS.
4. PLACEMENT OF PERMANENT SEEDING AND EROSION CONTROL TO ESTABLISH LONG–TERM VEGETATION ON THE RSS FACE.

1.2 REFERENCES

A. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

1. D4759–92 – PRACTICE FOR DETERMINING THE SPECIFICATION CONFORMANCE OF GEOSYNTHETICS
2. D5262–97 – STANDARD TEST METHOD FOR EVALUATING UNCONFINED TENSILE CREEP BEHAVIOR OF GEOSYNTHETICS
3. D5818–95 – PRACTICE FOR OBTAINING SAMPLES OF GEOSYNTHETICS FROM A TEST SECTION FOR ASSESSMENT OF INSTALLATION DAMAGE
4. F904–91 – STANDARD TEST METHOD FOR COMPARISON OF BOND STRENGTH OR PLY ADHESION OF SIMILAR LAMINATES MADE FROM FLEXIBLE MATERIAL
5. D698 – LABORATORY COMPACTION CHARACTERISTICS OF SOIL USING STANDARD EFFORT
6. D5321 – TEST METHOD FOR INTERFACE FRICTION BY DIRECT SHEAR (GEOSYNTHETICS TO SOILS)
7. D3080 – DIRECT SHEAR TEST OF SOILS UNDER CONSOLIDATED DRAINED CONDITIONS
8. D4318 – LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
9. D422 – MECHANICAL SIEVE
10. D2487 – CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES (UNIFIED SOIL CLASSIFICATION SYSTEM)
11. D6637–01 – STANDARD TEST METHOD FOR DETERMINING TENSILE PROPERTIES OF GEOGRIDS BY THE SINGLE OR MULTI–RIB TENSILE METHOD
12. D4355 – STANDARD TEST METHOD FOR DETERIORATION OF GEOTEXTILES BY EXPOSURE TO LIGHT, MOISTURE AND HEAT IN A XENON ARC=TYPE APPARATUS.

B. GEOSYNTHETIC RESEARCH INSTITUTE (GRI)

1. GG1–87 – STANDARD TEST METHOD FOR GEOGRID RIB TENSILE STRENGTH
2. GG2–87 – STANDARD TEST METHOD FOR GEOGRID JUNCTION STRENGTH
3. GG4–91 – DETERMINATION OF THE LONG–TERM DESIGN STRENGTH OF GEOGRIDS
4. GG5–91 – STANDARD TEST METHOD FOR GEOGRID PULLOUT
5. GG7 – STANDARD TEST METHOD FOR CARBOXYL END GROUP CONTENT OF POLY ETHYLENE TEREPHTHALATE (PET) YARNS
6. GG8 – DETERMINATION OF THE NUMBER AVERAGE MOLECULAR WEIGHT OF POLY ETHYLENE TEREPHTHALATE (PET) YARNS BASED ON A RELATIVE VISCOSITY VALUE

C. U.S. FEDERAL HIGHWAY ADMINISTRATION (FHWA)

1. FHWA–NHI–10–024 – MECHANICALLY STABILIZED EARTH WALLS AND REINFORCED SOIL SLOPE DESIGN AND CONSTRUCTION GUIDELINES (NOVEMBER 2009)
2. SA–96–072 – CORROSION/DEGRADATION OF SOIL REINFORCEMENTS FOR MECHANICALLY STABILIZED EARTH WALLS AND REINFORCED SOIL SLOPES.

1.3 DEFINITIONS

A. PRIMARY GEOGRID – A STRUCTURAL GEOGRID IS FORMED BY A REGULAR NETWORK OF INTEGRALLY CONNECTED TENSILE ELEMENTS WITH APERTURES OF SUFFICIENT SIZE TO ALLOW INTERLOCKING WITH SURROUNDING SOIL, ROCK, OR EARTH; STRUCTURAL GEOGRIDS FUNCTION PRIMARILY AS REINFORCEMENT.

B. SECONDARY GEOGRID – AN OPEN MESH BIAXIAL GEOGRID DESIGNED SPECIFICALLY TO BE A FACE WRAP MATERIAL FOR STEEPENED SLOPE APPLICATIONS. IT PROVIDES SECONDARY REINFORCEMENT.

C. WELDED WIRE FORMS – STEEL MESH FOR FORMING AND SUPPORTING SLOPE FACING AS SHOWN ON THE PLANS.

D. DRAINAGE GEOCOMPOSITE – A GEOCOMPOSITE CONSISTING OF A HIGH COMPRESSIVE STRENGTH GEONET CORE WITH A NON–WOVEN FILTER GEOTEXTILE BONDED TO BOTH SIDES. THE GEOCOMPOSITE IS PLACED AGAINST THE BACK SLOPE OF THE EXCAVATION MADE TO ALLOW FOR INSTALLATION OF THE RSS. THE GEOCOMPOSITE PROVIDES A DRAINAGE PATH FOR ANY WATER SEEPING FROM THE EXCAVATED SURFACE AFTER CONSTRUCTION OF THE RSS.

E. REINFORCED SOIL – COMPACTED SOIL THAT IS WITHIN THE REINFORCED ZONE AS SHOWN ON THE DRAWINGS.

F. RETAINED MATERIAL – SOIL OR BEDROCK THAT IS RETAINED BEHIND THE REINFORCED SOIL.

G. FOUNDATION MATERIAL – RESIDUAL SOIL, NEW FILL, OR BEDROCK COMPRISING THE SUBGRADE BELOW THE REINFORCED SOIL.

H. PLANTABLE FILL – SOILS PLACED IN THE FRONT OF THE WELDED WIRE FORMS TO PROMOTE VEGETATION GROWTH.

I. TESTING AGENCY – THE GEOTECHNICAL ENGINEERING FIRM RETAINED BY THE OWNER TO PROVIDE QUALITY ASSURANCE OVERSIGHT AND TESTING DURING RSS CONSTRUCTION. THE FIRM SHALL HAVE DEMONSTRATED EXPERIENCE PROVIDING OVERSIGHT OF RSS CONSTRUCTION AND PERFORMING GEOTECHNICAL TESTING. PERFORM ALL TESTING UNDER THE DIRECTION OF THE GEOTECHNICAL ENGINEER OF RECORD.

J. DESIGN ENGINEER – DESIGNER OF THE RSS DETAILED IN THESE PLANS AND SPECIFICATIONS (CEC).

1.4 SUBMITTALS

A. TESTING AGENCY: THE TESTING AGENCY, SHALL BE AN EXPERIENCED GEOTECHNICAL ENGINEER LICENSED IN THE STATE OF NEW YORK AND MAINTAIN A MINIMUM OF $1.0 MILLION PROFESSIONAL LIABILITY COVERAGE.

B. CERTIFICATE OF COMPLETION: WITHIN TWO WEEKS AFTER COMPLETION OF RSS CONSTRUCTION, FURNISH TO THE OWNER A CERTIFICATE OF COMPLETION PREPARED BY THE TESTING AGENCY CERTIFYING THE RSS WAS CONSTRUCTED IN ACCORDANCE WITH THESE PLANS AND SPECIFICATIONS. THE CERTIFICATE SHALL BE ACCOMPANIED BY THE FOLLOWING INFORMATION IN A REPORT FORMAT:

1. PERFORM PRE–CONSTRUCTION TESTING IN ACCORDANCE WITH SECTION 1.6.B ON THIS SHEET.
2. ALL ADDITIONAL LABORATORY TEST RESULTS PERFORMED DURING CONSTRUCTION.
3. FIELD REPORTS. THE FIELD REPORTS SHALL BE SIGNED AND DATED AND INCLUDE THE FOLLOWING:
   - DOCUMENTATION APPROVING RSS FOUNDATION SOILS AND SUBGRADE.
   - NUCLEAR DENSITY TEST RESULTS FOR REINFORCED SOIL (TEST RESULTS SHALL INDICATE APPROXIMATE LOCATION AND APPROXIMATE ELEVATION OF ALL TESTS).
   - DOCUMENTATION STATING CORRECT GEOGRID WAS INSTALLED PROPERLY AND IN ACCORDANCE WITH DESIGN DRAWINGS.
   - DOCUMENTATION STATING THE SUBSURFACE DRAINAGE WAS PROPERLY INSTALLED AND IN ACCORDANCE WITH THE DESIGN DRAWINGS.

C. CONTRACTOR SHALL SUBMIT EXAMPLES OF PREVIOUS RSS CONSTRUCTION EXPERIENCE FOR THE OWNER AND CEC TO REVIEW PRIOR TO BEGINNING WORK.

1.5 SPECIAL PROVISIONS

A. THE DESIGN OF THE RSS IS BASED ON ANTICIPATED SOIL PARAMETERS AND FOUNDATION CONDITIONS. AN ASSUMED VALUE OF 250 POUNDS PER SQUARE FOOT (PSF) WAS USED IN THE DESIGN TO ACCOUNT FOR TRAFFIC LOADING.

B. THE DESIGN ENGINEER ASSUMES NO LIABILITY FOR VARIATIONS IN, OR UNKNOWN SUBSURFACE SOIL, ROCK, OR GROUNDWATER CONDITIONS.

C. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLYING WITH ALL FEDERAL, STATE, AND LOCAL REQUIREMENTS FOR EXECUTION OF THE WORK, INCLUDING LOCAL BUILDING AND CURRENT OSHA EXCAVATION REGULATIONS.

D. A SUBSURFACE INVESTIGATION SHALL BE PERFORMED BY AN ENGINEER LICENSED IN THE STATE OF NEW YORK PRIOR TO CONSTRUCTION TO CONFIRM THE FOUNDATION SOIL DESIGN PARAMETERS THAT WERE ASSUMED AS PART OF THE RSS DESIGN. THE SUBSURFACE INVESTIGATION SHALL INCLUDE THE FOLLOWING AT A MINIMUM.

1. TEST BORINGS AT THE APPROXIMATE LOCATIONS SHOWN ON DRAWING GT01.
2. STANDARD PENETRATION TESTING AT ALL LOCATIONS FROM THE GROUND SURFACE TO A MINIMUM DEPTH OF TWICE THE HEIGHT OF THE PROPOSED RSS OR 35' WHICHEVER IS GREATER.
3. PROPER LABORATORY TESTING INCLUDING BUT NOT LIMITED TO GRAIN SIZE ANALYSIS, ATTERBURG LIMITS, MOISTURE CONTENT, AND SHEAR STRENGTH TESTING.

1.6 QUALITY ASSURANCE

A. PRE–CONSTRUCTION MEETING – PRIOR TO THE CONSTRUCTION OF THE RSS, THE CONTRACTOR SHALL ARRANGE A MEETING AT THE SITE WITH THE TESTING AGENCY, CEC, THE GEOGRID INSTALLER, AND THE OWNER.

B. LABORATORY TEST RESULTS – PERFORM A MINIMUM OF ONE GRAIN SIZE DISTRIBUTION AND LABORATORY STANDARD PROCTOR COMPACTION TEST (ASTM D698), ON EACH SOIL BACKFILL TYPE PRIOR TO STARTING CONSTRUCTION. SUBMIT THE TEST RESULTS TO CEC FOR REVIEW A MINIMUM OF FIVE DAYS PRIOR TO CONSTRUCTION. PERFORM A MINIMUM OF ONE ADDITIONAL GRAIN SIZE DISTRIBUTION AND STANDARD PROCTOR COMPACTION TEST DURING CONSTRUCTION FOR ANY CHANGES NOTED IN THE MATERIAL USED AS FILL. ADDITIONAL LABORATORY TESTING SHALL BE PERFORMED AS DIRECTED BY CEC. SAMPLES OF THE RETAINED AND REINFORCED FILL MATERIAL SHALL BE COLLECTED BY THE CONTRACTOR AS NEEDED IN THE FIELD AS DIRECTED BY CEC.

C. FIELD QUALITY ASSURANCE:

1. THE TESTING AGENCY SHALL BE ON SITE FULL–TIME DURING RSS CONSTRUCTION TO OBSERVE PLACEMENT AND PERFORM FIELD DENSITY TESTING OF REINFORCED SOIL CONDUCT DENSITY TESTING AT A FREQUENCY OF ONE TEST PER EVERY 10,000 SQUARE FEET OF FILL PLACED WITH A MINIMUM OF ONE TEST PER LIFT.

1.7 DELIVERY, STORAGE, AND HANDLING

A. STORAGE AND PROTECTION

1. PREVENT MUD, WET CONCRETE, EPOXY, OR OTHER DELETERIOUS MATERIALS FROM COMING IN CONTACT WITH AND AFFIXING TO THE GEOSYNTHETIC MATERIALS.
2. PREVENT EXPOSURE OF THE GEOSYNTHETICS TO SUNLIGHT IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS
3. STORE AT TEMPERATURES ABOVE –20 DEGREES F (–29 DEGREES C) AND BELOW 140 DEGREES F.
4. ROLLED MATERIALS MAY BE LAID FLAT OR STOOD ON END.

PART 2–MATERIALS

2.1 GEOSYNTHETIC PRODUCTS

A. PRIMARY GEOGRID–THE PRIMARY GEOGRID SHALL CONSIST OF AN INTEGRALLY FORMED GRID STRUCTURE MANUFACTURED OF POLYESTER WHICH IMPART: (A) HIGH RESISTANCE TO LOSS OF LOAD CAPACITY OR STRUCTURAL INTEGRITY WHEN THE GEOGRID IS SUBJECTED TO MECHANICAL STRESS IN INSTALLATION; (B) HIGH RESISTANCE TO DEFORMATION WHEN THE GEOGRID IS SUBJECTED TO APPLIED FORCE IN USE; AND (C) HIGH RESISTANCE TO LOSS OF LOAD CAPACITY OR STRUCTURAL INTEGRITY WHEN THE GEOGRID IS SUBJECTED TO LONG–TERM ENVIRONMENTAL STRESS. THE PRIMARY GEOGRIDS, SHALL MEET THE FOLLOWING MINIMUM AVERAGE PHYSICAL PROPERTY REQUIREMENTS AS DETERMINED BY GEOSYNTHETIC RESEARCH INSTITUTE TEST METHOD GG4–91.

TABLE 1

GEOGRID PROPERTIES

MATERIAL	LONG–TERM DESIGN TENSILE STRENGTH (LBS/FT)
TYPE 1	1,900
TYPE 2	3,900
TYPE 3	8,400

B. SECONDARY GEOGRID–USE OPEN MESH BIAXIAL GEOGRID CONSISTING WOVEN MONOFILAMENT POLYPROPYLENE YARNS THAT HAVE AN ULTIMATE TENSILE STRENGTH OF 1,400 LBS/FT OR GREATER, A MINIMUM APERTURE SIZE OF 2MM, AND A 500 HOUR UV RESISTANCE OF 99% IN ACCORDANCE WITH ASTM D4355.

C. DRAINAGE GEOCOMPOSITE – USE SITE DRAIN DS–186 DRAINAGE GEOCOMPOSITE OR APPROVED EQUAL CONSISTING OF A GEONET CORE WITH A NON–WOVEN FILTER GEOTEXTILE BONDED TO BOTH SIDES.

2.2 WELDED WIRE FORMS

A. USE 4" X 4" – W4.0 x W4.0 WELDED WIRE FABRIC, OR EQUIVALENT. BLACK STEEL WELDED WIRE MESH MEETING THE REQUIREMENTS OF AASHTO M 55, AS INDICATED IN THESE SPECIFICATIONS, AND AS FOLLOWS:

- FORMED TO A 90 DEGREE "L" SHAPE WITH 18" X 18" SIDES
- MINIMUM LENGTH OF 10 FEET
- MAXIMUM 4–INCH BY 4–INCH MESH OPENING
- MINIMUM WIRE SIZE NUMBER W4.0;

B. SUPPORT STRUTS – STEEL WIRE FORMED TO INTERLOCK WITH MESH LONGITUDINAL WIRES, MEETING THE REQUIREMENTS OF AASHTO M 32, AS INDICATED IN THESE SPECIFICATIONS, AND AS FOLLOWS:

- MINIMUM WIRE SIZE NUMBER W4.0

2.3 EARTHEN MATERIALS

A. DRAINAGE FILL – DRAINAGE FILL SHALL BE HARD AND DURABLE AND SHALL MEET THE REQUIREMENTS OF AASHTO #57 COARSE AGGREGATE AND SHALL BE PLACED IN THE RSS DRAINS AS SHOWN ON THE CONSTRUCTION DRAWINGS.

B. REINFORCED SOIL – SOIL WITH A pH RANGE OF 3 TO 9, A USCS CLASSIFICATION OF GM, GP, SM, SP, OR SW, AND A MAXIMUM PARTICLE SIZE OF 4 INCHES. REINFORCED SOIL SHALL BE FREE OF EXCESS MOISTURE, ROOTS, OR FROZEN MATERIAL. THE REINFORCED SOIL SHALL BE COMPACTED TO AT LEAST 95% OF ITS MAXIMUM DRY DENSITY AS DETERMINED BY THE STANDARD PROCTOR TEST (ASTM D 698) AND BE WITHIN 3% OF THE OPTIMUM MOISTURE CONTENT. REINFORCED SOIL PLACED AND COMPACTED IN ACCORDANCE WITH THESE RECOMMENDATIONS SHALL HAVE AN EFFECTIVE ANGLE OF FRICTION OF AT LEAST 30 DEGREES AND AN EFFECTIVE COHESION OF AT LEAST 100 PSF (OR EQUIVALENT SHEAR STRENGTH).

C. RETAINED MATERIAL – IN–STILL SOIL OR BEDROCK, OR COMPACTED SOIL OR ROCK FILL PER THE PROJECT SPECIFICATIONS.

D. FOUNDATION MATERIAL – SHALL CONSIST OF RESIDUAL SOIL, NEW FILL, OR UNDISTURBED BEDROCK.

E. PLANTABLE FILL – TOPSOIL WITH A MINIMUM OF 4% ORGANIC MATERIAL.

2.4 SEED – SEED SHALL CONTAIN THE FOLLOWING VARIETIES:

- 50% TALL AND CREEPING RED FESCUE
- 25% ANNUAL RYE
- 20% PERENNIAL RYE
- 5% WHITE CLOVER OR BIRDSFOOT TREFOIL

PART 3–EXECUTION

3.1 EXAMINATION

A. THE CONTRACTOR SHALL CHECK ALL MATERIALS UPON DELIVERY TO VERIFY THAT THE PROPER MATERIALS HAVE BEEN RECEIVED. THE MATERIALS SHALL BE INSPECTED BY THE CONTRACTOR TO BE FREE OF FLAWS OR DAMAGE OCCURRING DURING MANUFACTURING, SHIPPING, OR HANDLING.

3.2 PREPARATION

A. EXCAVATE THE FOUNDATION SUBGRADE TO THE LINES AND GRADES AS SHOWN ON THE DRAWINGS OR AS DIRECTED BY THE TESTING AGENCY.

B. THE FOUNDATION MATERIAL SHALL CONSIST OF UNDISTURBED SOIL OR NEW FILL. REMOVE UNSUITABLE SUBGRADE MATERIAL. BACKFILL ANY OVER–EXCAVATIONS WITH PROPERLY COMPACTED FILL. THE BACKFILL MATERIAL SHALL BE PLACED IN MAXIMUM LOOSE LIFTS OF 10 INCHES AND SHALL BE COMPACTED TO A MINIMUM OF 95 PERCENT OF ITS MAXIMUM DRY DENSITY AT PLUS OR MINUS 3% OF THE OPTIMUM MOISTURE CONTENT AS DETERMINED BY ASTM D698.

C. INSTALL THE RSS DRAINS AS SHOWN ON THE DRAWINGS. CONNECT THE DRAINS USING PROPER FITTINGS AND OUTLET USING THE DETAILS ON DRAWING GT06.

3.3 GEOGRID INSTALLATION

A. GEOGRID OF THE SPECIFIED TYPE SHALL BE LAID AT THE PROPER ELEVATION, EMBEDMENT, AND ORIENTATION (ROLL DIRECTION) AS SHOWN ON THE DRAWINGS. ORIENT UNIAXIAL PRIMARY GEOGRIDS WITH THE ROLL DIRECTION PERPENDICULAR TO THE SLOPE FACE. CORRECT ORIENTATION OF THE GEOGRID SHALL BE VERIFIED BY THE TESTING AGENCY. GEOGRIDS SHALL BE CUT AND PLACED SO THAT A TRANSVERSE BAR IS EXTENDED TO THE SLOPE FACE. SLACK IN THE GEOGRID SHALL BE REMOVED BY PULLING THE GRID TAUT AWAY FROM THE SLOPE FACE. THE GEOGRID SHALL BE TEMPORARILY SECURED IN PLACE WITH STAPLES, PINS, SAND BAGS, OR BACKFILL AS REQUIRED BASED ON FILL PROPERTIES, FILL PLACEMENT PROCEDURES, OR WEATHER CONDITIONS; OR AS DIRECTED BY THE TESTING AGENCY.

B. EACH GEOGRID SHALL BE INSTALLED WITHIN ±3 INCHES OF THE ELEVATIONS SPECIFIED ON THE DRAWINGS. PROPER SURVEY CONTROL MEASURES SHALL BE ESTABLISHED TO VERIFY THAT EACH LAYER OF GEOGRID IS INSTALLED AT THE CORRECT ELEVATION.

C. PIECES OF GEOGRID REINFORCEMENT SHALL NOT BE CONNECTED OR SPLICED.

3.4 REPAIR

A. ANY GEOGRID DAMAGED DURING INSTALLATION SHALL BE REPLACED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.

B. COATED GEOGRIDS SHALL NOT BE USED IF THE COATING IS TORN, SHREDDING, CRACKED, PUNCTURED, FLAWED OR CUT, UNLESS A REPAIR PROCEDURE IS CARRIED OUT AS APPROVED BY THE TESTING AGENCY. THE REPAIR PROCEDURE SHALL INCLUDE PLACING A SUITABLE PATCH OVER THE DEFECTIVE AREA OR APPLYING A COATING SOLUTION IDENTICAL TO THE ORIGINAL COATING.

3.5 PROTECTION

A. FOLLOW THE MANUFACTURER'S RECOMMENDATIONS REGARDING PROTECTION FROM EXPOSURE TO SUNLIGHT.

3.6 FILL PLACEMENT OVER GEOGRID

A. REINFORCED SOIL SHALL BE PLACED IN LIFTS AND COMPACTED AS SPECIFIED HEREIN. THE REINFORCED SOIL SHALL BE PLACED, SPREAD, AND COMPACTED IN SUCH A MANNER THAT MINIMIZES THE DEVELOPMENT OF WRINKLES IN AND/OR MOVEMENT OF THE GEOGRID. SOIL MATERIALS SHALL BE PLACED FROM THE MIDDLE OF THE REINFORCED ZONE TOWARD THE END OF THE GEOGRID, AWAY FROM THE SLOPE FACE, TO ENSURE FURTHER TENSIONING.

B. CONSTRUCTION EQUIPMENT SHALL NOT BE OPERATED DIRECTLY ON THE GEOGRID. A MINIMUM FILL THICKNESS OF 6 INCHES IS REQUIRED PRIOR TO OPERATION OF VEHICLES OR EQUIPMENT OVER THE GEOGRID. TURNING OF VEHICLES OR EQUIPMENT SHALL BE KEPT TO A MINIMUM TO PREVENT TRACKS OR TIRES FROM DISPLACING THE FILL AND DAMAGING THE GEOGRID. SUDDEN BRAKING AND SHARP TURNING SHALL BE AVOIDED.

C. COMPACT REINFORCED SOIL USING HEAVY COMPACTION EQUIPMENT EXCEPT WITHIN AT LEAST 3 FEET OF THE BERM FACE. COMPACT THE REINFORCED SOIL WITHIN AT LEAST 3 FEET OF THE BERM FACE USING LIGHTWEIGHT, HAND OPERATED COMPACTION EQUIPMENT.

D. THE REINFORCED SOIL SHALL BE PLACED IN MAXIMUM 10–INCH THICK LOOSE LIFTS AND COMPACTED TO A MINIMUM OF 95 PERCENT OF THE MAXIMUM DRY DENSITY AT PLUS OR MINUS 3% OF THE OPTIMUM MOISTURE CONTENT AS DETERMINED BY ASTM D698. LIFT THICKNESS MAY NEED TO BE REDUCED TO ACHIEVE PROPER COMPACTION WHEN USING HAND OPERATED COMPACTION EQUIPMENT.

E. AT THE END OF EACH WORK DAY, THE REINFORCED SOIL AND RETAINED SOIL SURFACE SHALL BE COMPACTED WITH A SMOOTH–DRUM ROLLER TO MINIMIZE THE EFFECTS OF PRECIPITATION.

F. PROVIDE AT LEAST 4 INCHES OF COMPACTED FILL BETWEEN OVERLAPPING GEOGRIDS.

3.7 STRUCTURE PENETRATIONS

A. INSTALL FENCE POSTS AND OTHER PENETRATIONS IN ACCORDANCE WITH THE DRAWING DETAILS.

B. NO UTILITY OR OTHER TRENCHES SHALL BE EXCAVATED WITHIN THE REINFORCED SOIL. TRENCHES EXCAVATED BEYOND THE LIMITS OF THE REINFORCED SOIL MUST BE BACKFILLED WITH THE MATERIALS AND METHODS PRESENTED HEREIN.

C. IT IS THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE AND DETERMINE THE LOCATIONS OF ALL PENETRATIONS PRIOR TO CONSTRUCTION. GEOGRIDS DAMAGED AFTER PLACEMENT SHALL BE REPAIRED OR REPLACED IN A MANNER SATISFACTORY TO THE TESTING AGENCY OR THE OWNER AT NO ADDITIONAL COST TO THE OWNER.

3.8 WELDED WIRE FORM INSTALLATION

A. INSTALL WELDED WIRE FORMS TO CREATE A SLOPE AS SHOWN ON THE PLANS. CARE SHALL BE TAKEN NOT TO DAMAGE OR BULGE FORMS DURING PLACEMENT.

B. PLACE SECONDARY GEOGRID ALONG THE FILL SURFACE AND WITHIN THE FORM, AS SHOWN ON THE PLANS. POSITION THE GEOGRID TO ALLOW FOR A SUFFICIENT WRAPPED LENGTH AT THE TOP AND BOTTOM OF THE FORM AS SHOWN ON THE DRAWINGS.

C. WELDED WIRE FORMS SHALL BE ERECTED AND MAINTAINED DURING CONSTRUCTION TO THE BATTER AS SHOWN ON THE DRAWINGS. INDIVIDUAL WIRE FORM DEFORMATIONS SHALL BE LIMITED TO 2.5 INCHES AT THE TOP AND A BULGE OF 2 INCHES, MEASURED FROM THE BASE OF THE WIRE FORM. THE CONTRACTOR SHALL PROVIDE ALIGNMENT CONTROL FOR EACH COURSE OF WELDED WIRE FORMS AND MAKE ALIGNMENT CORRECTIONS AS NECESSARY.

D. IF EXCESSIVE DEFORMATION OCCURS, COMPACTION PROCEDURES SHOULD BE MODIFIED TO ALLOW/PROVIDE MAXIMUM ALLOWABLE COMPACTION AT THE SLOPE FACE. ALSO, ADDITIONAL STRUTS MAY BE REQUIRED TO STIFFEN THE WIRE FACE.

E. WELDED WIRE FORMS SHALL BE INSTALLED USING THE CORRECT ANGLE SHOWN ON THE DRAWINGS. THE WELDED WIRE FORM JOINTS SHALL BE STAGGERED VERTICALLY WITH A MINIMUM OVERLAP OF 2 INCHES AT EACH ABUTTING FORM. ANY PROTRUDING WIRES SHALL BE BENT OR CUT OFF.

3.9 PLANTABLE FILL AND VEGETATION

A. MIX SEED WITH PLANTABLE FILL AT A RATE RECOMMENDED BY SEED SUPPLIER (MIN 1.5 LBS/1000 SF OF FACE). PROVIDE LIME AND/OR FERTILIZER AS NEEDED.

B. PLACE AND HAND TAMP PLANTABLE FILL AND SEED MIXTURE IN FACE WRAP.

C. MONITOR AND IRRIGATE FACE AS NECESSARY TO ESTABLISH VEGETATION.

D. SEEDING AND VEGETATION WILL BE CONSIDERED ACCEPTABLE WHEN THE BERM FACE EXHIBITS A MINIMUM OF 90% SURFACE AREA COVERAGE NO MORE THAN 90 DAYS AFTER INSTALLATION.

STATE OF NEW YORK
KENNETH RICHARD WEBER
090870
LICENSED PROFESSIONAL ENGINEER

Civil & Environmental Engineering,
Landscape Architecture and
Land Surveying PLLC

NORTH BERM MODIFICATION

S.A.DUNN & COMPANY, LLC
RENSSELAER, NEW YORK

\\sen-boston\projects\2018\182-4421-CADD\Dwg\GT01 - MSE Wall\182442-GT01-MSE Specifications.dwg[GT07] LS(1/19/2021 - khampton) - LP: 5/19/2021 11:30 AM

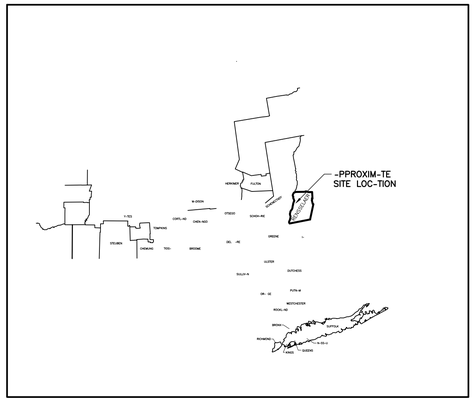
ATTACHMENT B

SLOPE STABILITY OUTPUT

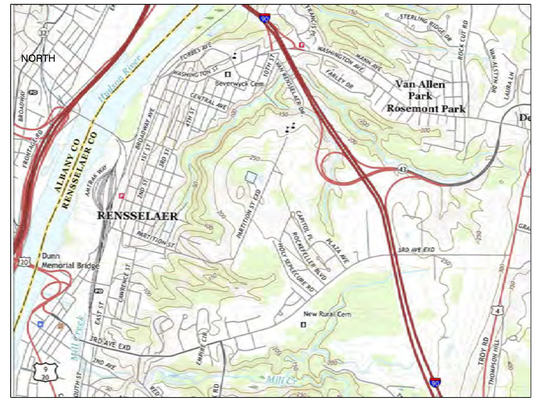
PERMIT PLANS
MSE BERM MODIFICATION
DUNN MINE AND C&D FACILITY

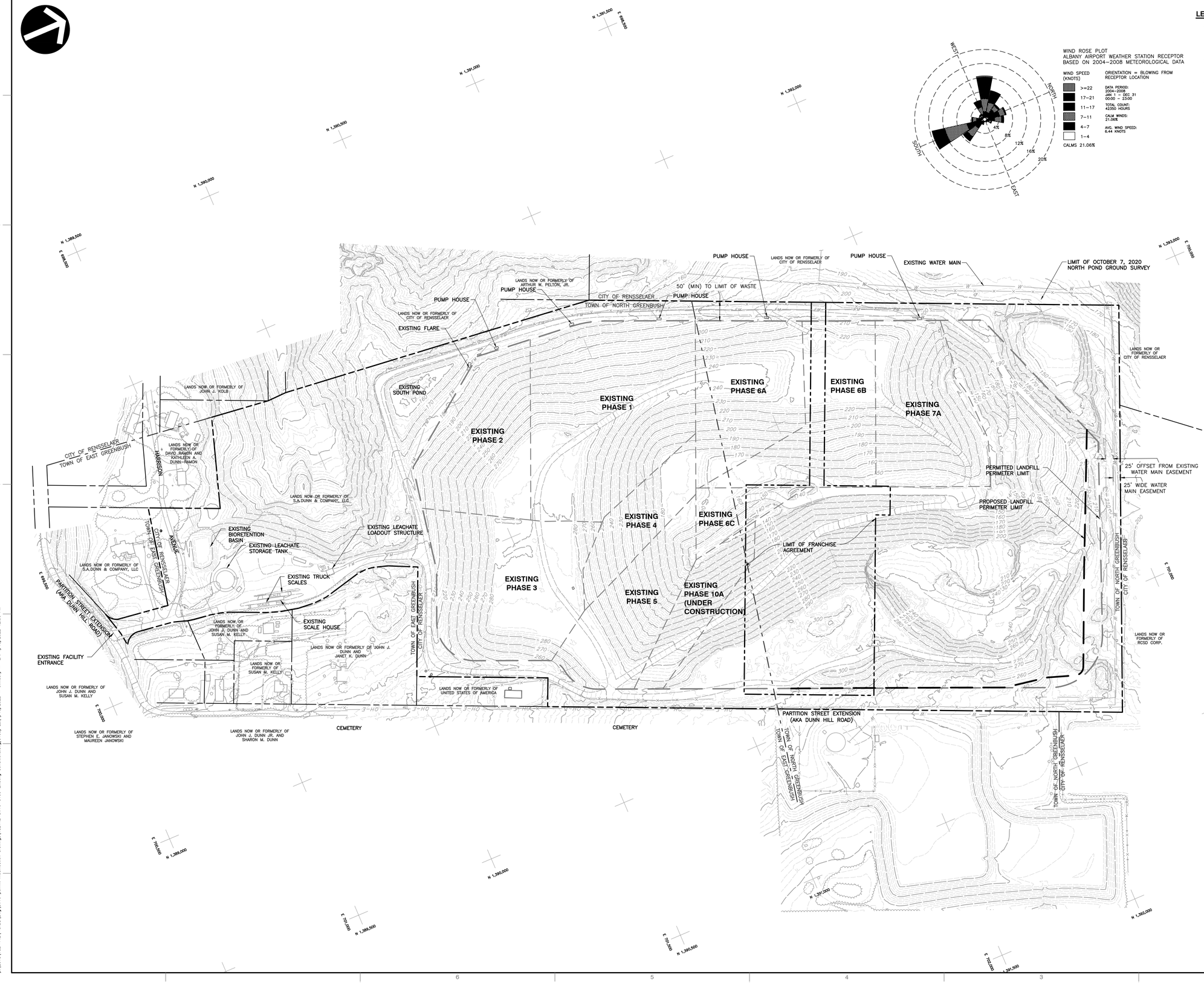
PREPARED FOR:

S.A. DUNN & COMPANY, LLC
209 PARTITION STREET EXTENSION, RENSSELAER, NY 12144



LOCATION OF SITE IN NEW YORK
SCALE: 1"= 400,000'


NORTH
Van Allen Park
Rosemont Park
ALBANY CO
RENSSELAER CO
RENSSELAER
Dunn Memorial Bridge
Hudson River
Poestenkill
Sycaway Cem
New Rural Cem
Thompson Hill
Tiffany Pk
Carter Pl
Plaza Ave
Partition St
Central Rd
Washington Ave
Sterling Ridge Rd
Fox Cut Rd
Tiffany Rd
Tiffany Ln
Laura Ln
Tiffany Ln
Tiffany Rd
Holy Rosary Cem
Rochester Blvd
Holy Rosary Ln
Tiffany Ln
Tiffany Rd
Tiffany Hill
Tiffany Ln
Tiffany Rd
Tiffany Hill
Tiffany Ln
Tiffany Rd
Tiffany Hill



LEGEND

- EXISTING PROPERTY LINE
- EXISTING ADJACENT PROPERTY LINE
- EXISTING TOWN LINE
- EXISTING LIMIT OF FRANCHISE AGREEMENT
- EXISTING WATER MAIN EASEMENT
- PERMITTED LANDFILL PERIMETER LIMIT
- EXISTING LANDFILL PHASE LIMIT
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- EXISTING FENCE
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING TREE LINE
- EXISTING STRUCTURE
- EXISTING WATER MAIN
- EXISTING FORCE MAIN

REFERENCE

1. UNLESS NOTED OTHERWISE, EXISTING TOPOGRAPHY WAS COMPILED BY SOUTHERN RESOURCES MAPPING CORPORATION USING PHOTOGRAMMETRIC METHODS FROM PHOTOGRAPHY DATED MARCH 16, 2021, AND SUPPLEMENTED WITH TOPOGRAPHY FROM OCTOBER 7, 2020 AND NOVEMBER 4, 2020. SURVEY CONTROL DATA WAS PROVIDED BY WASTE CONNECTIONS, INC.
2. GRID COORDINATES ARE BASED ON NEW YORK STATE PLANE, NAD83. UNITS ARE U.S. SURVEY FEET.
3. PROPERTY LINE INFORMATION WAS TAKEN FROM A PLAN TITLED "ALTA/ASCM LAND TITLE BOUNDARY SURVEY, LANDS OF KELLY AND DUNN TO BE CONVEYED TO S.A. DUNN & COMPANY, LLC." PREPARED AND SEALED BY WILLIAM N. CURRAN, AND UPDATED AS NECESSARY BASED ON AVAILABLE TITLE INFORMATION.
4. LOCATION OF WATER MAIN SHOWN EXTENDING SOUTHWARD TO THE EAST OF THE PROPERTY BOUNDARY, AND SHOWN EXTENDING WESTWARD ON THE WEST SIDE OF THE PROPERTY, OBTAINED FROM PDF TITLED "PLAT OF SURVEY, CITY OF RENSSELAER, PROPOSED 14" WATERMAIN,"REPLACEMENT WATER STORAGE & TRANSMISSION PLAN"," BY THE CITY OF RENSSELAER, DATED JULY 13, 2015.

UNAUTHORIZED ALTERATION OR ADDITION TO THIS PLAN BEARING A LICENSED PROFESSIONAL'S SEAL IS A VIOLATION OF SECTION 7209, SUB-DIVISION 2, OF THE NEW YORK STATE EDUCATION LAW.

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STATE OF NEW YORK · AMY J. KNIGHT · 078341 · LICENSED PROFESSIONAL ENGINEER

1/12/2022

REVISION RECORD		
NO	DATE	DESCRIPTION

Civil & Environmental Engineering,
Landscape Architecture and Land Surveying, PLLC
31 Bellows Road
Raynham, MA 02767

MSE BERM MODIFICATION
DUNN MINE AND C&D FACILITY
S.A.DUNN & COMPANY, LLC
RENSSELAER, NEW YORK

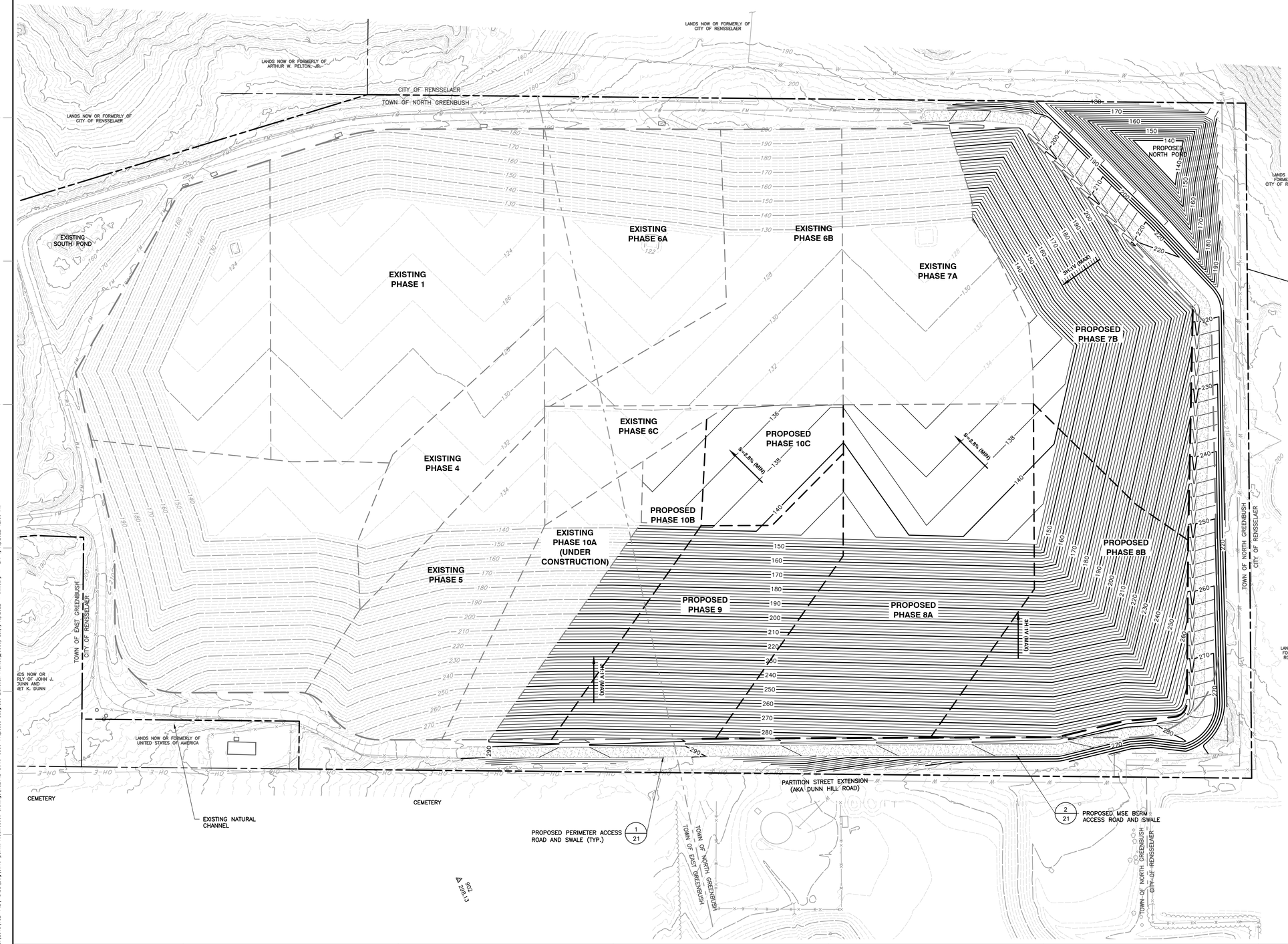
EXISTING CONDITIONS PLAN

DATE:	JANUARY 2022	DRAWN BY:	TLG
DWG SCALE:	1" = 150'	CHECKED BY:	EMW
PROJECT NO:			182-442
APPROVED BY:			AJK

DRAWING NO.: C100

SHEET 2 OF 23

P:\2018\182-442\-CADD\Dwg\sw-16-permit modification drawings\182442-SW16-C100-Existing Conditions.dwg[C100] LS(1/13/2022 - ewilson) - LP: 1/13/2022 12:38 PM

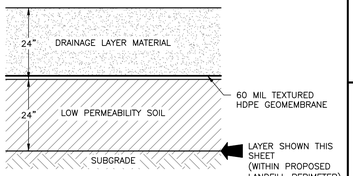


LEGEND

- EXISTING PROPERTY LINE
- EXISTING ADJACENT PROPERTY LINE
- EXISTING TOWN LINE
- EXISTING WATER MAIN EASEMENT
- PERMITTED LANDFILL PERIMETER LIMIT
- EXISTING LANDFILL PHASE LIMIT
- 200 EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- EXISTING FENCE
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING TREE LINE
- EXISTING STRUCTURE
- W EXISTING WATER MAIN
- FM EXISTING FORCE MAIN
- PROPOSED LANDFILL PERIMETER LIMIT
- PROPOSED LANDFILL PHASE LIMIT
- 200 PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- PROPOSED ACCESS ROAD

REFERENCE

1. REFER TO DRAWING C100 FOR GENERAL NOTES.
2. CONTOURS SHOWN WITHIN EXISTING PHASE 1 REPRESENT AS-BUILT TOP OF SUBGRADE ELEVATIONS COMPLETED WITH GROUND SURVEY BY KUBRICKY CONSTRUCTION CORPORATION, FROM A PLAN TITLED "FINAL SUBGRADE TOPOGRAPHY" DATED SEPTEMBER 22, 2014 AND SEALED BY WILLIAM N. CURRAN.
3. CONTOURS SHOWN WITHIN EXISTING PHASE 2 REPRESENT AS-BUILT TOP OF SUBGRADE ELEVATIONS COMPLETED WITH GROUND SURVEY BY KUBRICKY CONSTRUCTION CORPORATION, FROM A PLAN TITLED "FINAL SUBGRADE TOPOGRAPHY" DATED AUGUST 1, 2015 AND SEALED BY WILLIAM M. CURRAN.
4. CONTOURS SHOWN WITHIN EXISTING PHASE 3 REPRESENT AS-BUILT TOP OF SUBGRADE ELEVATIONS COMPLETED WITH GROUND SURVEY BY KUBRICKY CONSTRUCTION CORPORATION, FROM A PLAN TITLED "FINAL SUBGRADE TOPOGRAPHY" DATED AUGUST 1, 2015 AND SEALED BY WILLIAM M. CURRAN.
5. CONTOURS SHOWN WITHIN EXISTING PHASE 4 REPRESENT AS-BUILT TOP OF SUBGRADE ELEVATIONS COMPLETED WITH GROUND SURVEY BY KUBRICKY CONSTRUCTION CORPORATION, FROM A PLAN TITLED "FINAL SUBGRADE TOPOGRAPHY" DATED AUGUST 1, 2015 AND SEALED BY WILLIAM M. CURRAN.
6. CONTOURS SHOWN WITHIN EXISTING PHASE 5 REPRESENT AS-BUILT TOP OF SUBGRADE ELEVATIONS COMPLETED WITH GROUND SURVEY BY KUBRICKY CONSTRUCTION CORPORATION, FROM A PLAN TITLED "FINAL SUBGRADE TOPOGRAPHY" DATED AUGUST 1, 2015 AND SEALED BY WILLIAM M. CURRAN.
7. CONTOURS SHOWN WITHIN EXISTING PHASE 6 REPRESENT AS-BUILT TOP OF SUBGRADE ELEVATIONS COMPLETED WITH GROUND SURVEY BY KUBRICKY CONSTRUCTION CORPORATION, FROM PLANS TITLED "FINAL SUBGRADE TOPOGRAPHY" DATED MAY 31, 2018 FOR PHASE 6A, AUGUST 19, 2018 FOR PHASE 6B, AND SEPTEMBER 11, 2020 FOR PHASE 6C.
8. CONTOURS SHOWN WITHIN EXISTING PHASE 7A REPRESENT AS-BUILT TOP OF SUBGRADE ELEVATIONS COMPLETED WITH GROUND SURVEY BY KUBRICKY CONSTRUCTION CORPORATION, FROM PLANS TITLED "FINAL SUBGRADE TOPOGRAPHY" DATED AUGUST 28, 2019 FOR PHASE 7A1 AND OCTOBER 24, 2019 FOR PHASE 7A2.
9. CONTOURS SHOWN WITHIN EXISTING PHASE 10A REPRESENT PERMITTED TOP OF SUBGRADE ELEVATIONS.
10. CONTOURS SHOWN OUTSIDE THE PROPOSED LANDFILL PERIMETER LIMIT REPRESENT PROPOSED FINAL GRADES.
11. INTERCELL BERM SHALL BE CONSTRUCTED WITHIN FUTURE CELLS AT LOCATIONS AS DIRECTED BY OWNER TO FACILITATE OPERATIONS.



LINER SYSTEM SECTION

NOT TO SCALE

SCALE IN FEET

0 100 200

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STATE OF NEW YORK · AMY J. KNIGHT · 079941 · LICENSED PROFESSIONAL ENGINEER

1/12/2022

REVISION RECORD

NO	DATE	DESCRIPTION

Civil & Environmental Engineering,
Landscape Architecture and Land Surveying, PLLC
31 Bellows Road
Raynham, MA 02767

MSE BERM MODIFICATION
DUNN MINE AND C&D FACILITY
S.A.DUNN & COMPANY, LLC
RENSSELAER, NEW YORK

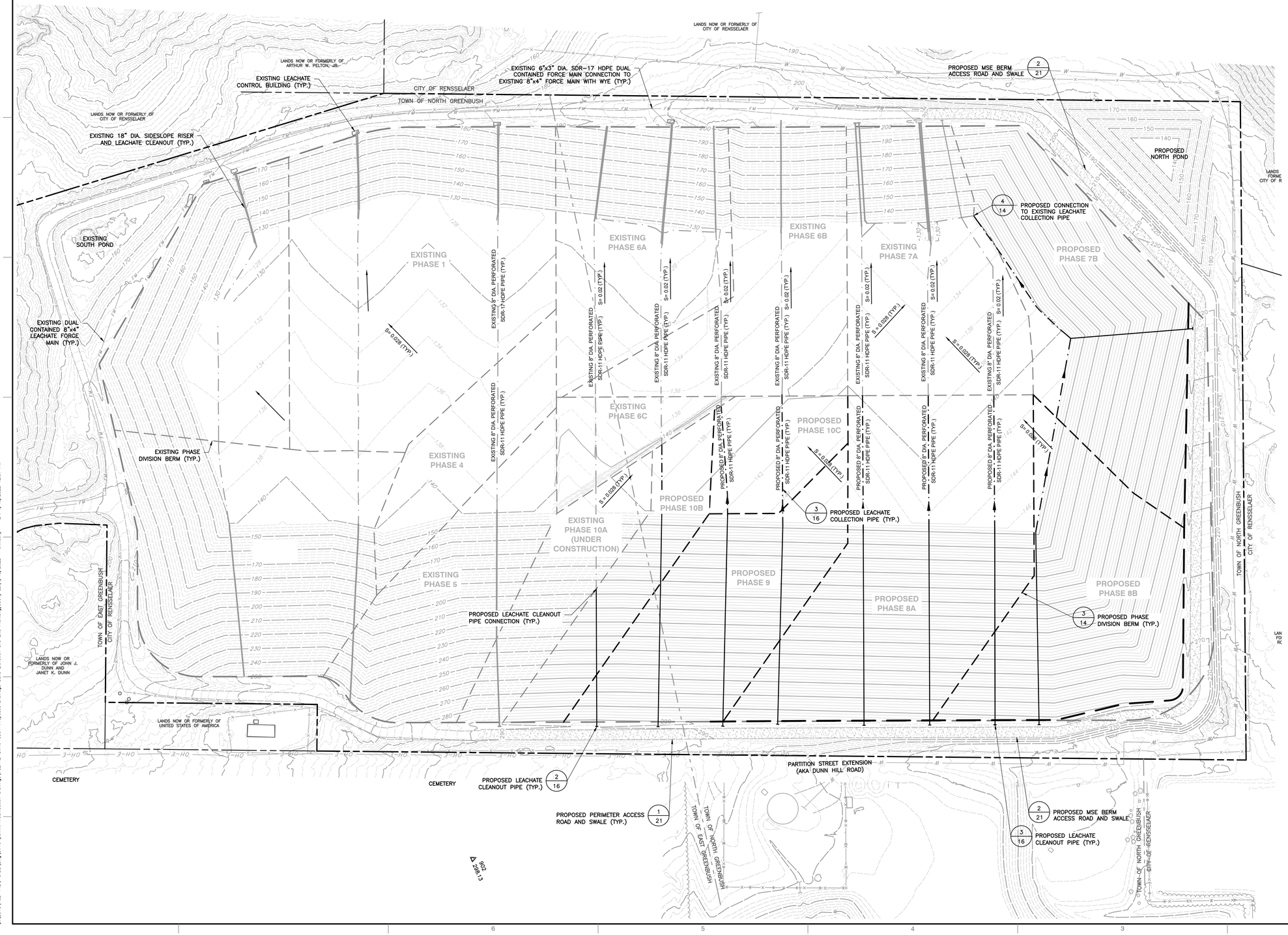
PROPOSED SUBGRADE ELEVATION PLAN

DATE: JANUARY 2022	DRAWN BY: TLG
DWG SCALE: 1"=100'	CHECKED BY: EMW
PROJECT NO:	182-442
APPROVED BY:	AJK

DRAWING NO.: C300

SHEET 3 OF 23

p:\2018\182-442\-CADD\Dwg\sw16-permit modification drawings\182442-SW16-C300-Proposed Subgrade Elevation Plan.dwg(C300) LS:(1/13/2022 - wellman) - LP: 1/13/2022 12:36 PM

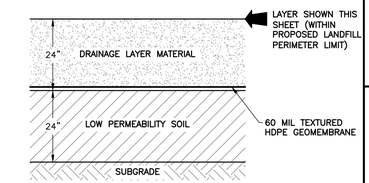


LEGEND

- EXISTING PROPERTY LINE
- EXISTING ADJACENT PROPERTY LINE
- EXISTING TOWN LINE
- EXISTING WATER MAIN EASEMENT
- PERMITTED LANDFILL PERIMETER LIMIT
- EXISTING LANDFILL PHASE LIMIT
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- EXISTING FENCE
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING TREE LINE
- EXISTING STRUCTURE
- EXISTING WATER MAIN
- EXISTING FORCE MAIN
- EXISTING LEACHATE COLLECTION PIPE
- PROPOSED LANDFILL PERIMETER LIMIT
- PROPOSED LANDFILL PHASE LIMIT
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- PROPOSED ACCESS ROAD
- PROPOSED LEACHATE COLLECTION PIPE
- PROPOSED LEACHATE CLEANOUT

REFERENCE

1. REFER TO DRAWING C100 FOR GENERAL NOTES.
2. CONTOURS AND PIPING SHOWN WITHIN EXISTING PHASE 1 REPRESENT AS-BUILT TOP OF DRAINAGE SAND ELEVATIONS AND LEACHATE PIPE LOCATIONS COMPLETED WITH GROUND SURVEY BY KUBRICKY CONSTRUCTION CORPORATION, FROM A PLAN TITLED "FINAL LEACHATE COLLECTION SYSTEM," DATED NOVEMBER 7, 2014 AND SEALED BY WILLIAM N. CURRAN.
3. CONTOURS AND PIPING SHOWN WITHIN EXISTING PHASE 2 REPRESENT AS-BUILT TOP OF DRAINAGE SAND ELEVATIONS AND LEACHATE PIPE LOCATIONS COMPLETED WITH GROUND SURVEY BY KUBRICKY CONSTRUCTION CORPORATION, FROM A PLAN TITLED "FINAL LEACHATE COLLECTION SYSTEM" DATED SEPTEMBER 8, 2015 AND SEALED BY WILLIAM M. CURRAN.
4. CONTOURS AND PIPING SHOWN WITHIN EXISTING PHASE 3 REPRESENT AS-BUILT TOP OF DRAINAGE SAND ELEVATIONS AND LEACHATE PIPE LOCATIONS COMPLETED WITH GROUND SURVEY BY KUBRICKY CONSTRUCTION CORPORATION, FROM A PLAN TITLED "FINAL LEACHATE COLLECTION SYSTEM" DATED MAY 27, 2016 AND SEPTEMBER 12, 2016 AND SEALED BY WILLIAM M. CURRAN.
5. CONTOURS AND PIPING SHOWN WITHIN EXISTING PHASE 4 REPRESENT AS-BUILT TOP OF DRAINAGE SAND ELEVATIONS AND LEACHATE PIPE LOCATIONS COMPLETED WITH GROUND SURVEY BY KUBRICKY CONSTRUCTION CORPORATION, FROM A PLAN TITLED "FINAL LEACHATE COLLECTION SYSTEM" DATED DECEMBER 1, 2016 AND SEALED BY WILLIAM M. CURRAN.
6. CONTOURS AND PIPING SHOWN WITHIN EXISTING PHASE 5 REPRESENT AS-BUILT TOP OF DRAINAGE SAND ELEVATIONS AND LEACHATE PIPE LOCATIONS COMPLETED WITH GROUND SURVEY BY KUBRICKY CONSTRUCTION CORPORATION, FROM A PLAN TITLED "FINAL LEACHATE COLLECTION SYSTEM" DATED SEPTEMBER 29, 2017 AND SEALED BY WILLIAM M. CURRAN.
7. CONTOURS AND PIPING SHOWN WITHIN EXISTING PHASE 6 REPRESENT AS-BUILT TOP OF DRAINAGE SAND ELEVATIONS AND LEACHATE PIPE LOCATIONS COMPLETED WITH GROUND SURVEY BY KUBRICKY CONSTRUCTION CORPORATION, FROM PLANS TITLED "FINAL LEACHATE COLLECTION SYSTEM" SEALED BY WILLIAM M. CURRAN, AND DATED AUGUST 15, 2018 FOR PHASE 6A, FEBRUARY 20, 2019 FOR PHASE 6B, AND OCTOBER 23, 2020 FOR PHASE 6C.
8. CONTOURS AND PIPING SHOWN WITHIN EXISTING PHASE 7A REPRESENT AS-BUILT TOP OF DRAINAGE SAND ELEVATIONS AND PIPE LOCATIONS COMPLETED WITH GROUND SURVEY BY KUBRICKY CONSTRUCTION CORPORATION, FROM PLANS TITLED "FINAL LEACHATE COLLECTION SYSTEM." DATED JANUARY 7, 2020 SEALED BY WILLIAM M. CURRAN.
9. CONTOURS SHOWN WITHIN EXISTING PHASE 10A REPRESENT PERMITTED TOP OF DRAINAGE MATERIAL ELEVATIONS.
10. FADED SOLID CONTOURS SHOWN WITHIN THE PROPOSED LANDFILL PERIMETER LIMIT REPRESENT PROPOSED TOP OF DRAINAGE SAND LAYER ELEVATIONS WHICH WILL BE REVISED FROM THE PREVIOUSLY APPROVED PERMITTED GRADES. FADED CONTOURS SHOWN WITHIN THE PROPOSED LANDFILL PERIMETER LIMIT REPRESENT PREVIOUSLY PERMITTED OR RECORD DRAINAGE SAND LAYER ELEVATIONS.
11. CONTOURS SHOWN OUTSIDE THE PROPOSED LANDFILL PERIMETER LIMIT REPRESENT PROPOSED FINAL GRADES.



LINER SYSTEM SECTION

NOT TO SCALE

SCALE IN FEET

0 100 200

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STATE OF NEW YORK · AMY J. KNIGHT · 079341 · LICENSED PROFESSIONAL ENGINEER

1/12/2022

REVISION RECORD

NO	DATE	DESCRIPTION

Civil & Environmental Engineering, Landscape Architecture and Land Surveying, PLLC
31 Bellows Road
Raynham, MA 02767

MSE BERM MODIFICATION
DUNN MINE AND C&D FACILITY
S.A.DUNN & COMPANY, LLC
RENSSELAER, NEW YORK

PROPOSED DRAINAGE LAYER ELEVATION AND LEACHATE MANAGEMENT SYSTEM PLAN

DATE: JANUARY 2022	DRAWN BY: TLG
DWG SCALE: 1"=100'	CHECKED BY: EMW
PROJECT NO: 182-442	
APPROVED BY: AJK	

DRAWING NO.: C301

SHEET 4 OF 23

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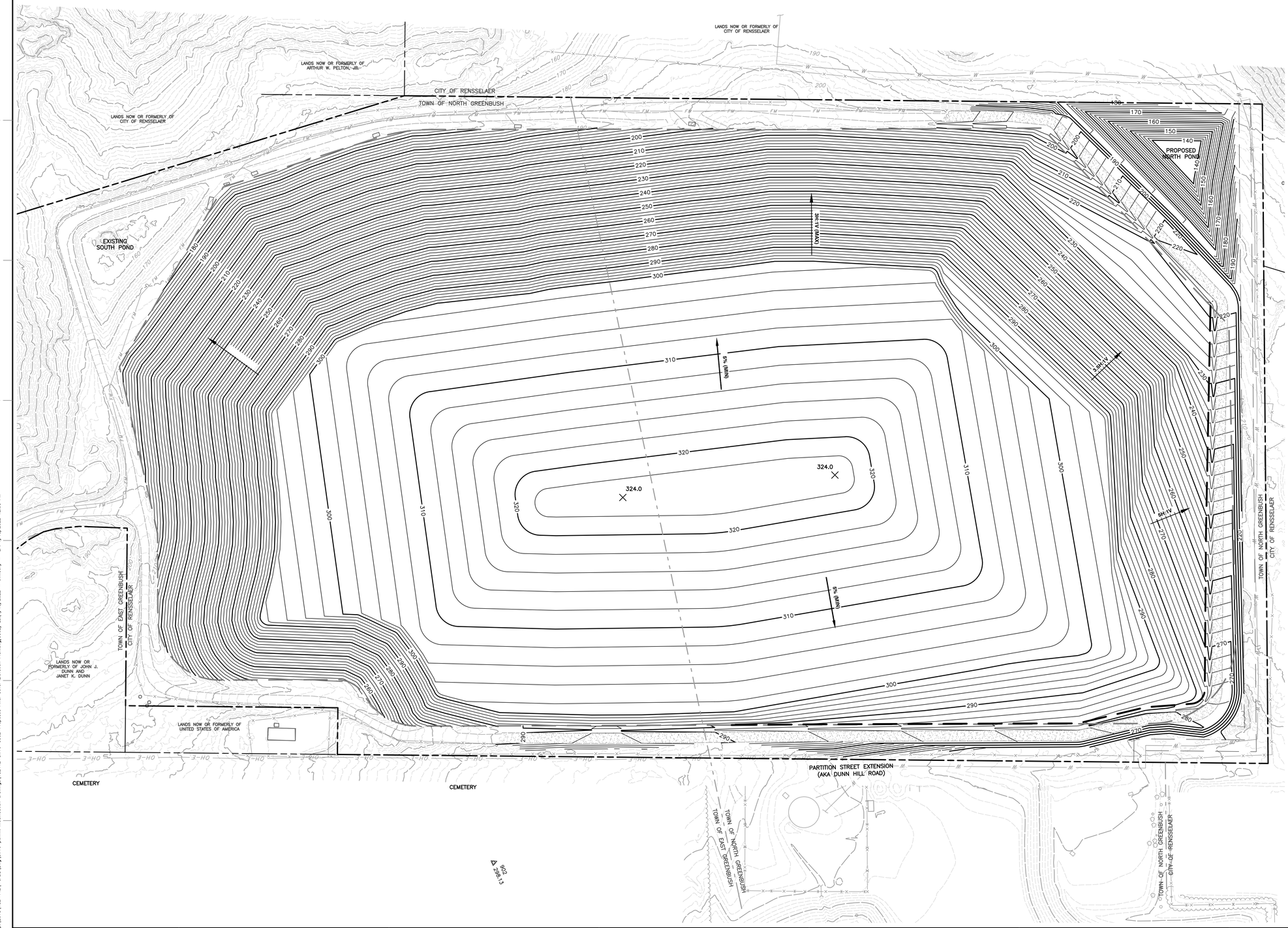
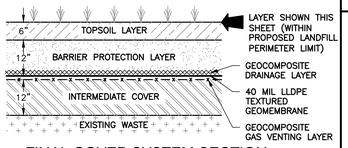


LEGEND

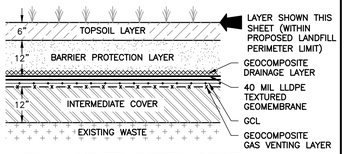
- EXISTING PROPERTY LINE
- EXISTING ADJACENT PROPERTY LINE
- EXISTING TOWN LINE
- EXISTING WATER MAIN EASEMENT
- PERMITTED LANDFILL PERIMETER LIMIT
- 200 EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- EXISTING FENCE
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING TREE LINE
- EXISTING STRUCTURE
- W EXISTING WATER MAIN
- FM EXISTING FORCE MAIN
- PROPOSED LANDFILL PERIMETER LIMIT
- 200 PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- PROPOSED ACCESS ROAD

REFERENCE

1. REFER TO DRAWING C100 FOR GENERAL NOTES.
2. LANDFILL ACCESS ROAD WILL BE LOCATED ON LANDFILL BASED ON OPERATIONAL NEEDS.
3. CONTOURS SHOWN OUTSIDE THE PROPOSED LANDFILL PERIMETER LIMIT REPRESENT PROPOSED FINAL GRADES. CONTOURS SHOWN WITHIN THE PROPOSED LANDFILL PERIMETER LIMIT REPRESENT PROPOSED TOP OF FINAL COVER ELEVATIONS.



FINAL COVER SYSTEM SECTION
≥25% SLOPE
NOT TO SCALE



FINAL COVER SYSTEM SECTION
<25% SLOPE
NOT TO SCALE

SCALE IN FEET
0 100 200

UNAUTHORIZED ALTERATION OR ADDITION TO THIS PLAN BEARING A LICENSED PROFESSIONAL'S SEAL IS A VIOLATION OF SECTION 7209, SUB-DIVISION 2, OF THE NEW YORK STATE EDUCATION LAW.

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STATE OF NEW YORK · AMY J. KNIGHT · 078341 · LICENSED PROFESSIONAL ENGINEER

1/12/2022

REVISION RECORD

NO	DATE	DESCRIPTION

Civil & Environmental Engineering,
Landscape Architecture and Land Surveying, PLLC
31 Bellows Road
Raynham, MA 02767

MSE BERM MODIFICATION
DUNN MINE AND C&D FACILITY
S.A.DUNN & COMPANY, LLC
RENSSELAER, NEW YORK

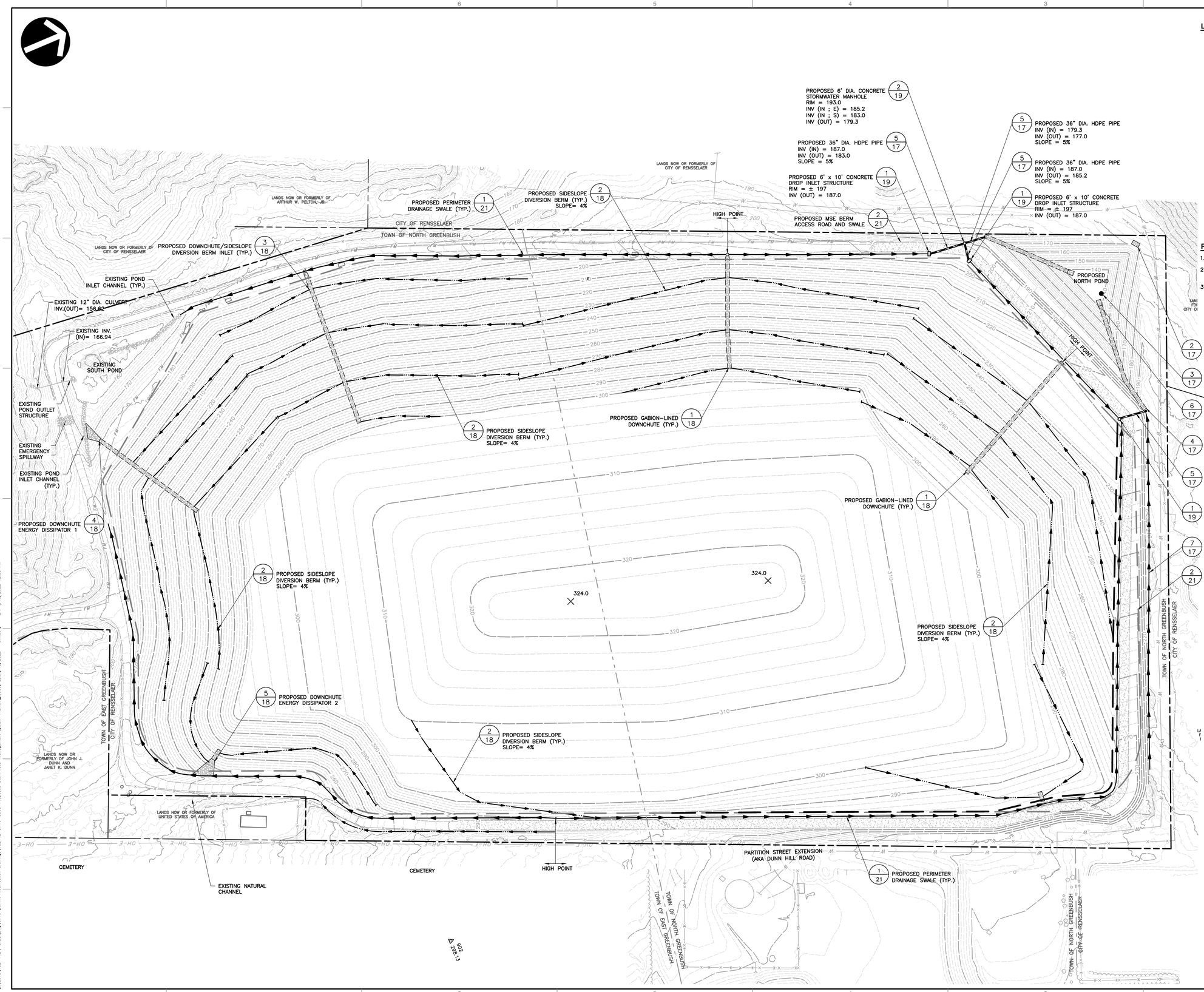
PROPOSED FINAL COVER ELEVATION PLAN

DATE:	JANUARY 2022
DRAWN BY:	TLG
DWG SCALE:	1"=100'
CHECKED BY:	EMW
PROJECT NO:	182-442
APPROVED BY:	AJK

DRAWING NO.: C302

SHEET 5 OF 23

A:\2018\182-442\-CADD\Dwg\w18-permit modification drawings\182442-SW18-C302-Proposed Final Cover Elevation Plan.dwg[C302] LS:(1/13/2022 - ewilliams) - LP: 1/13/2022 12:38 PM



LEGEND

- EXISTING PROPERTY LINE
- EXISTING ADJACENT PROPERTY LINE
- EXISTING TOWN LINE
- EXISTING WATER MAIN EASEMENT
- PERMITTED LANDFILL PERIMETER LIMIT
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- EXISTING FENCE
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING TREE LINE
- EXISTING STRUCTURE
- EXISTING WATER MAIN
- EXISTING FORCE MAIN
- PROPOSED LANDFILL PERIMETER LIMIT
- PROPOSED RIP-RAP
- PROPOSED SIDESLOPE DIVERSION BERM
- PROPOSED PERIMETER DRAINAGE SWALE

REFERENCE

1. REFER TO DRAWING C100 FOR GENERAL NOTES.
2. LANDFILL ACCESS ROAD WILL BE LOCATED ON LANDFILL BASED ON OPERATIONAL NEEDS.
3. CONTOURS SHOWN OUTSIDE THE PROPOSED LANDFILL PERIMETER LIMIT REPRESENT PROPOSED FINAL GRADES. CONTOURS SHOWN WITHIN THE PROPOSED LANDFILL PERIMETER LIMIT REPRESENT PROPOSED TOP OF FINAL COVER ELEVATIONS.

2/17 PROPOSED RIP-RAP EMERGENCY SPILLWAY (10' X 17')
ELEV. = 167.0

3/17 PROPOSED DRY WELL

6/17 PROPOSED POND INLET CHANNEL OUTLET PROTECTION

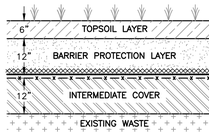
4/17 PROPOSED POND INLET CHANNEL (TYP.)

5/17 PROPOSED 36" DIA. HDPE PIPE
INV (IN) = 200.6
INV (OUT) = 200.0
S = 1%

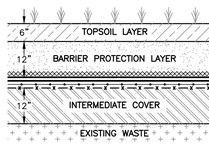
1/19 PROPOSED 6' x 10' CONCRETE DROP INLET STRUCTURE
RIM = ± 219
INV (OUT) = 200.6

7/17 NORTH PERIMETER SWALE

2/21 PROPOSED MSE BERM ACCESS ROAD AND SWALE



FINAL COVER SYSTEM SECTION
≥25% SLOPE
NOT TO SCALE



FINAL COVER SYSTEM SECTION
<25% SLOPE
NOT TO SCALE

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STATE OF NEW YORK · AMY J. KNIGHT · 078341 · LICENSED PROFESSIONAL ENGINEER

1/12/2022

REVISION RECORD

NO	DATE	DESCRIPTION

Civil & Environmental Engineering, Landscape Architecture and Land Surveying, PLLC
31 Bellows Road
Raynham, MA 02767

MSE BERM MODIFICATION
DUNN MINE AND C&D FACILITY
S.A.DUNN & COMPANY, LLC
RENSSELAER, NEW YORK

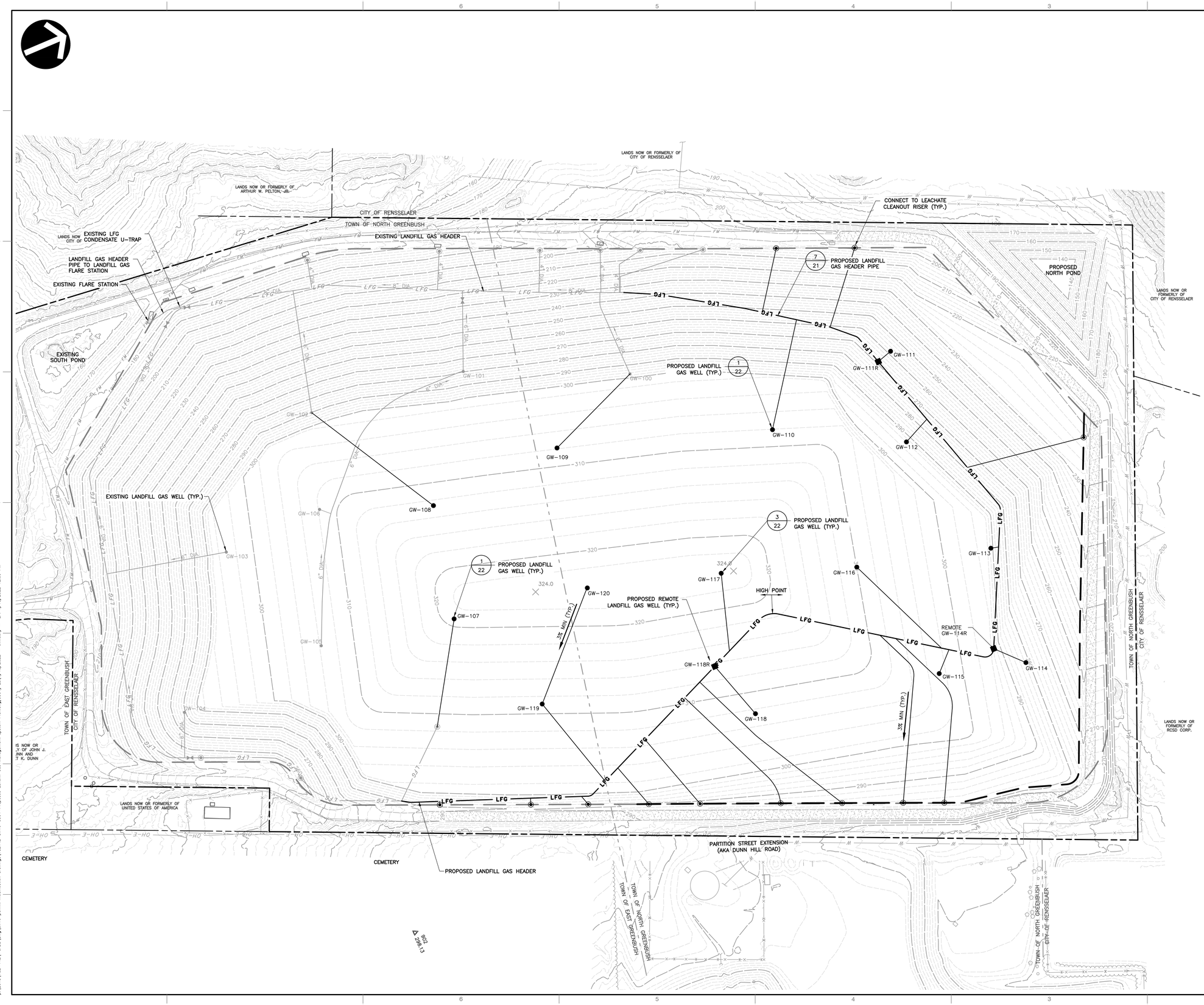
PROPOSED STORMWATER MANAGEMENT SYSTEM PLAN

DATE:	JANUARY 2022
DRAWN BY:	TLG
DWG SCALE:	1"=100'
CHECKED BY:	EMW
PROJECT NO:	182-442
APPROVED BY:	AJK

DRAWING NO.: C303

SHEET 6 OF 23

P:\2018\182-442\-CADD\Dwg\sw16-permit modification drawings\182442-SW16-C303-Proposed Stormwater Management System Plan.dwg(C303) LS:(1/12/2022 - ewilson) - LP: 1/12/2022 12:38 PM

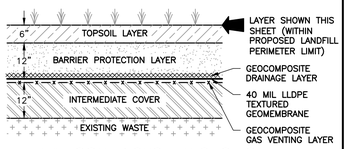


LEGEND

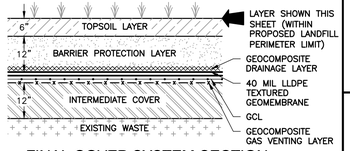
- EXISTING PROPERTY LINE
- EXISTING ADJACENT PROPERTY LINE
- EXISTING TOWN LINE
- EXISTING WATER MAIN EASEMENT
- PERMITTED LANDFILL PERIMETER LIMIT
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- EXISTING FENCE
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING TREE LINE
- EXISTING STRUCTURE
- EXISTING WATER MAIN
- EXISTING FORCE MAIN
- EXISTING LANDFILL GAS WELL
- EXISTING LANDFILL GAS WELL AT LEACHATE CLEANOUT RISER
- EXISTING LANDFILL GAS HEADER
- EXISTING LANDFILL GAS LATERAL PIPE
- PROPOSED LANDFILL PERIMETER LIMIT
- PROPOSED LANDFILL GAS WELL
- PROPOSED LANDFILL GAS WELL AT LEACHATE CLEANOUT RISER
- PROPOSED LANDFILL GAS REMOTE WELL
- PROPOSED LANDFILL GAS HEADER
- PROPOSED LANDFILL GAS LATERAL PIPE

REFERENCE

1. REFER TO DRAWING C100 FOR GENERAL NOTES.
2. LANDFILL ACCESS ROAD WILL BE LOCATED ON LANDFILL BASED ON OPERATIONAL NEEDS.
3. MINIMUM SLOPE OF LANDFILL GAS PIPES WITHIN WASTE IS 3% TOWARDS CONDENSATE MANAGEMENT STRUCTURE. MINIMUM SLOPE OUTSIDE LIMIT OF WASTE IS 1% TOWARDS CONDENSATE MANAGEMENT STRUCTURE.
4. CONTOURS SHOWN OUTSIDE THE PROPOSED LANDFILL PERIMETER LIMIT REPRESENT PROPOSED FINAL GRADES. CONTOURS SHOWN WITHIN THE PROPOSED LANDFILL PERIMETER LIMIT REPRESENT PROPOSED TOP OF FINAL COVER ELEVATIONS.



FINAL COVER SYSTEM SECTION
≥25% SLOPE
NOT TO SCALE



FINAL COVER SYSTEM SECTION
<25% SLOPE
NOT TO SCALE

SCALE IN FEET
0 100 200

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STATE OF NEW YORK · AMY J. KNIGHT · 075941 · LICENSED PROFESSIONAL ENGINEER
1/12/2022

REVISION RECORD

NO	DATE	DESCRIPTION

Civil & Environmental Engineering,
Landscape Architecture and Land Surveying, PLLC
31 Bellows Road
Raynham, MA 02767

MSE BERM MODIFICATION
DUNN MINE AND C&D FACILITY
S.A.DUNN & COMPANY, LLC
RENSSELAER, NEW YORK

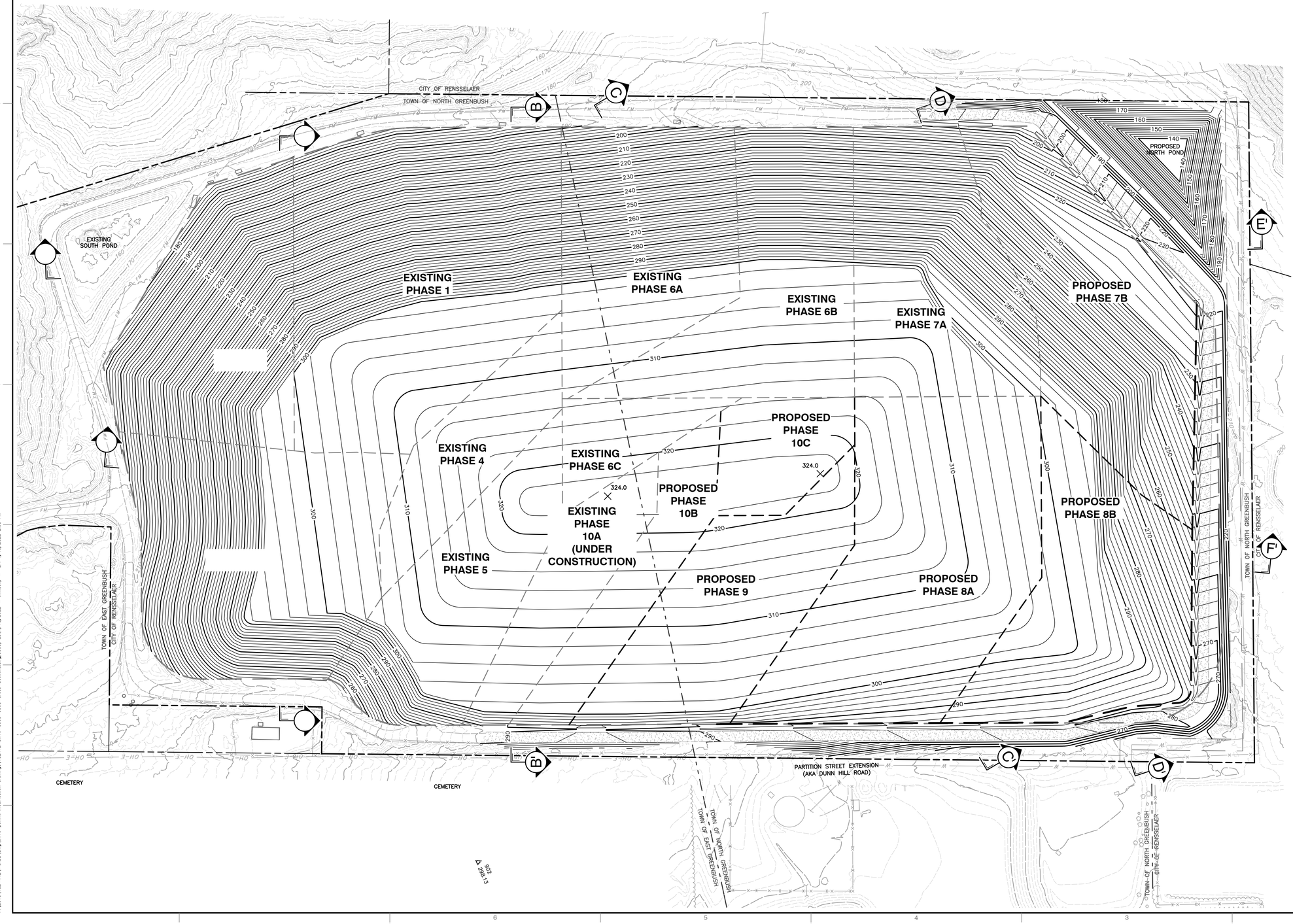
PROPOSED LANDFILL GAS MANAGEMENT SYSTEM PLAN

DATE:	JANUARY 2022	DRAWN BY:	TLG
DWG SCALE:	1"=100'	CHECKED BY:	EMW
PROJECT NO:			182-442
APPROVED BY:			AJK

DRAWING NO.: C304

SHEET 7 OF 23

p:\2018\182-442\-CADD\Dwg\sw16-permit modification drawings\182442-SW16-C204-Proposed Landfill Gas Management System Plan.dwg[C304] LS(1/13/2022 - ewilson) - LP: 1/13/2022 12:39 PM



LEGEND

- EXISTING PROPERTY LINE
- EXISTING ADJACENT PROPERTY LINE
- EXISTING TOWN LINE
- EXISTING WATER MAIN EASEMENT
- PERMITTED LANDFILL PERIMETER LIMIT
- EXISTING LANDFILL PHASE LIMIT
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- EXISTING FENCE
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING TREE LINE
- EXISTING STRUCTURE
- EXISTING WATER MAIN
- EXISTING FORCE MAIN
- PROPOSED LANDFILL PERIMETER LIMIT
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- PROPOSED ACCESS ROAD

REFERENCE

1. REFER TO DRAWING C100 FOR GENERAL NOTES.
2. BOLD CONTOURS SHOWN WITHIN THE LIMIT OF WASTE REPRESENT PROPOSED FINAL COVER ELEVATIONS.
3. CROSS-SECTION DESIGNATION AND ALIGNMENTS TAKEN FROM PREVIOUSLY APPROVED PERMIT DRAWINGS TITLED "FOOTPRINT MODIFICATION PERMIT DRAWINGS", PREPARED BY CEE, DATED MARCH 2016 AND APPROVED BY THE NYSDEC IN SEPTEMBER 2016.
4. CROSS-SECTIONS C-C', D-D', E-E' AND F-F' HAVE BEEN PROJECTED ALONG THE ORIGINAL 2016 ALIGNMENTS TO FULLY PRESENT PROPOSED 2021 GRADING.

SCALE IN FEET
0 100 200

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STATE OF NEW YORK · AMY J. KNIGHT · 078341 · LICENSED PROFESSIONAL ENGINEER

1/13/2022

REVISION RECORD		
NO	DATE	DESCRIPTION

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Landscape Architecture and Land Surveying, PLLC
31 Bellows Road
Raynham, MA 02767

MSE BERM MODIFICATION
DUNN MINE AND C&D FACILITY
S.A.DUNN & COMPANY, LLC
RENSSELAER, NEW YORK

CROSS SECTION SITE PLAN

DATE:	JANUARY 2022	DRAWN BY:	CJJ
DWG SCALE:	1"=100'	CHECKED BY:	EMW
PROJECT NO:		182-442	
APPROVED BY:			AJK

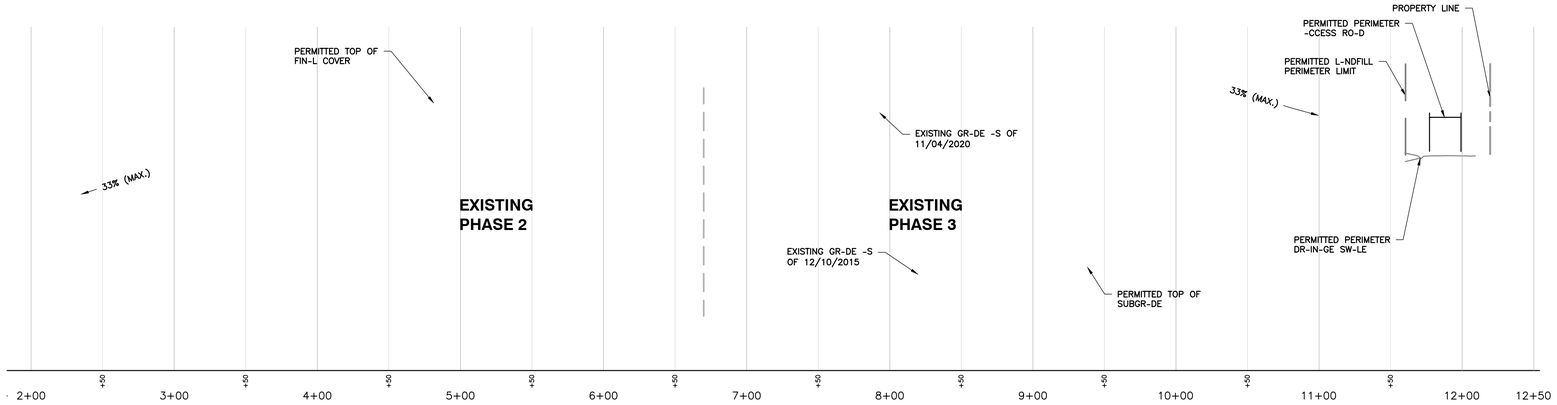
DRAWING NO.: **C305**

SHEET 8 OF 23

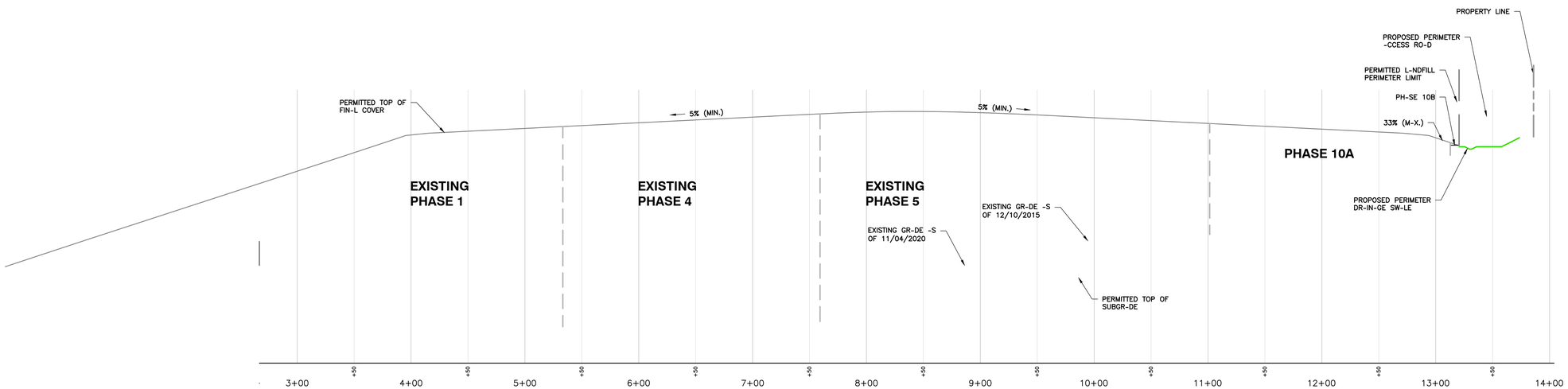
P:\2018\182-4421-2400\Dwg\w16-permit modification drawings\182442-SW16-C305-C308-Cross-Sections.dwg\C305\ LS:(1/13/2022 - ewilson) - LP: 1/13/2022 2:38 PM

NOTES:

1. REFER TO DR- ING C100 -ND C305 FOR GENER-L NOTES.
2. REFER TO DR- ING C305 FOR CROSS-SECTION LOC-TIONS.
3. EXISTING -ND PROPOSED SLOPES SHOWN ON THIS PL-N M-Y BE SKEWED IF THE CROSS-SECTION -LIGNMENT IS NOT PERPENDICUL-R TO THE SLOPE.



CROSS SECTION A-A'



CROSS SECTION B-B'

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1/24/2022

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31 Bellows Road
Raynham, MA 02767

MSE BERM MODIFICATION
DUNN MINE AND C&D FACILITY
S.A.DUNN & COMPANY, LLC
RENSSELAER, NEW YORK

CROSS SECTIONS
A-A' & B-B'

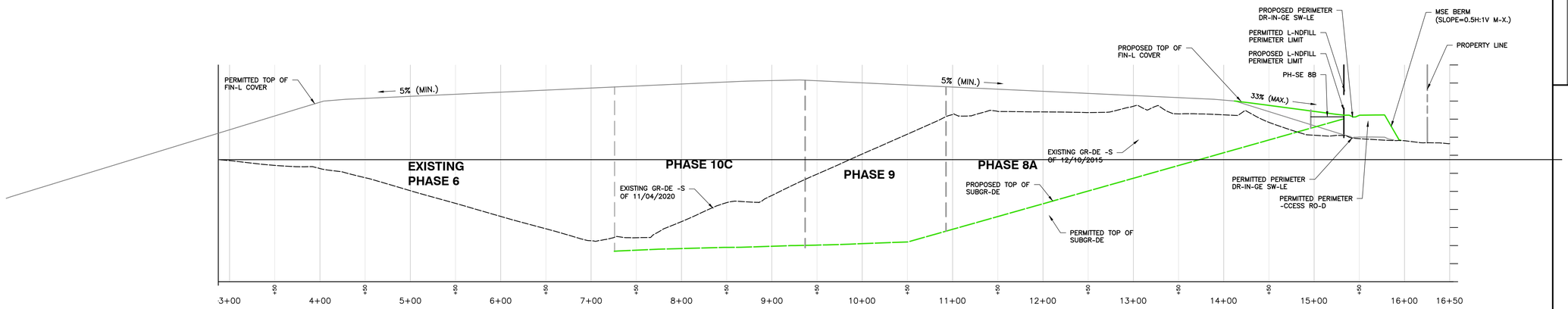
DATE:	JANUARY 2022
DRAWN BY:	CJJ
DWG SCALE:	AS SHOWN
CHECKED BY:	EMW
PROJECT NO:	182-442
APPROVED BY:	AJK

DRAWING NO.: C306

SHEET 9 OF 23

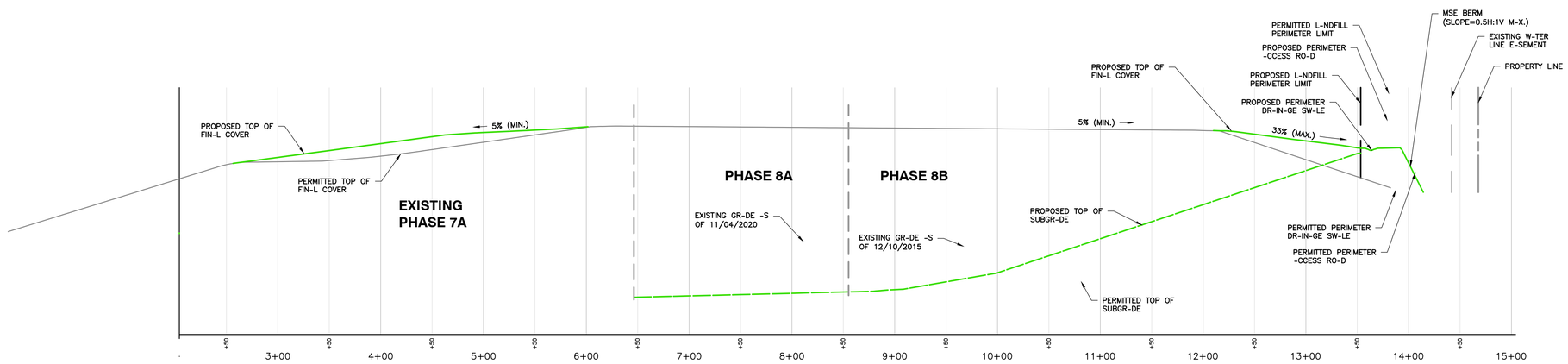
NOTES:

1. REFER TO DR- ING C100 -ND C305 FOR GENER-L NOTES.
2. REFER TO DR- ING C305 FOR CROSS-SECTION LOC-TIONS.
3. EXISTING -ND PROPOSED SLOPES SHOWN ON THIS PL-N M-Y BE SKEWED IF THE CROSS-SECTION -LIGNMENT IS NOT PERPENDICUL-R TO THE SLOPE.



CROSS SECTION C-C'

SCALE H:1"=100'; V:1"=100'



CROSS SECTION D-D'

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1/26/2022

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31 Bellows Road
Raynham, MA 02767

MSE BERM MODIFICATION
DUNN MINE AND C&D FACILITY
S.A.DUNN & COMPANY, LLC
RENSSELAER, NEW YORK

CROSS SECTIONS C-C' & D-D'

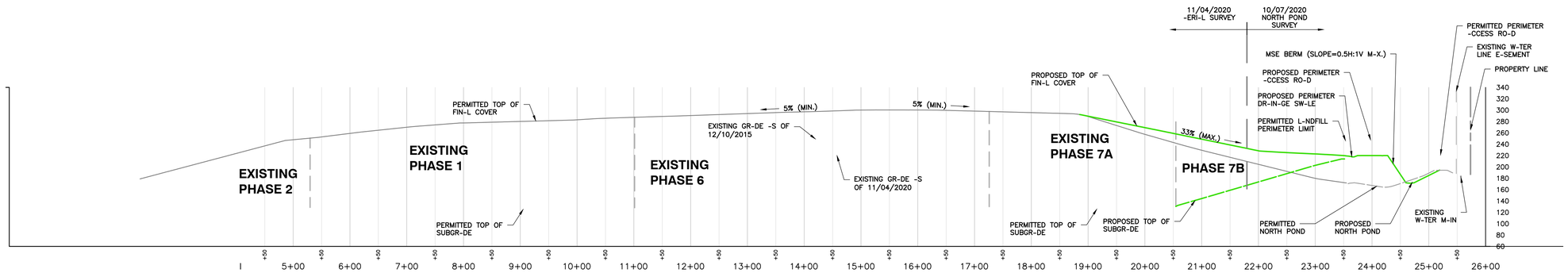
DATE:	JANUARY 2022
DRAWN BY:	CJJ
DWG SCALE:	AS SHOWN
CHECKED BY:	EMW
PROJECT NO:	182-442
APPROVED BY:	AJK

DRAWING NO.: **C307**

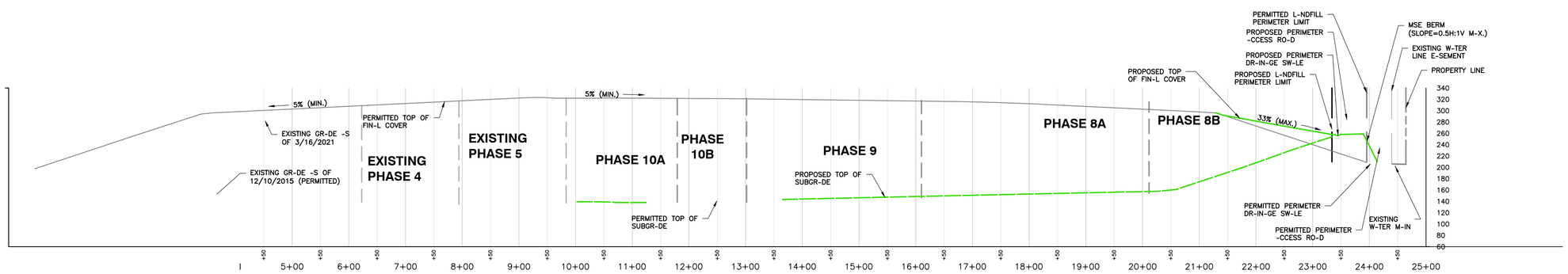
SHEET 10 OF 23

NOTES:

1. REFER TO DR- ING C100 -ND C305 FOR GENER-L NOTES.
2. REFER TO DR- ING C305 FOR CROSS-SECTION LOC-TIONS.
3. EXISTING -ND PROPOSED SLOPES SHOWN ON THIS PL-N M-Y BE SKEWED IF THE CROSS-SECTION -LIGNMENT IS NOT PERPENDICUL-R TO THE SLOPE.



CROSS SECTION E-E'



CROSS SECTION F-F'

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1/26/2022

REVISION RECORD

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Civil & Environmental Engineering,
Landscape Architecture and Land Surveying, PLLC
31 Bellows Road
Raynham, MA 02767

MSE BERM MODIFICATION
DUNN MINE AND C&D FACILITY
S.A.DUNN & COMPANY, LLC
RENSSELAER, NEW YORK

CROSS SECTIONS
E-E' & F-F'

DATE:	JANUARY 2022
DRAWN BY:	CJJ
DWG SCALE:	AS SHOWN
CHECKED BY:	EMW
PROJECT NO:	182-442
APPROVED BY:	AJK

DRAWING NO.: C308

SHEET 11 OF 23