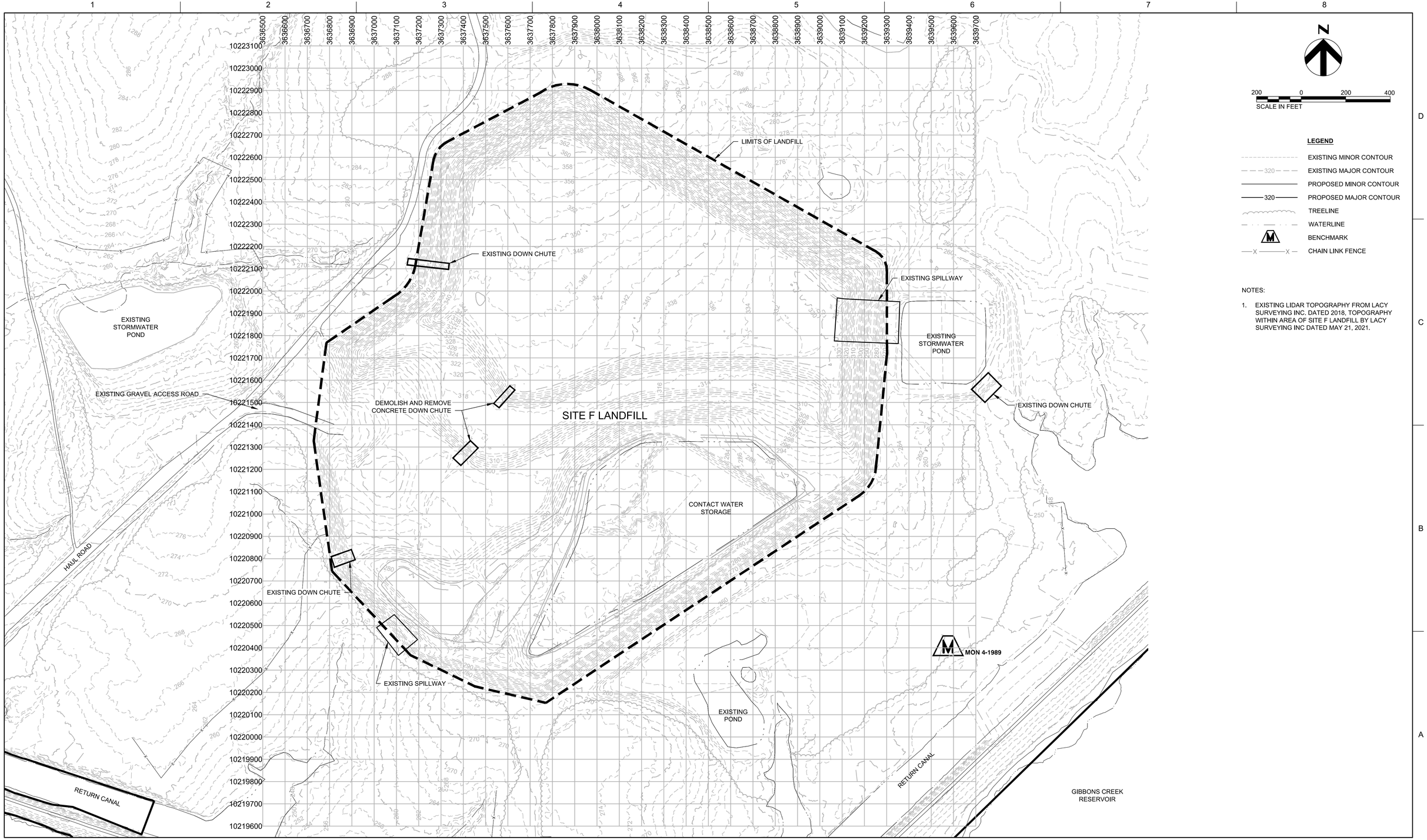

NOTES:

1. EXISTING LIDAR TOPOGRAPHY FROM LACY SURVEYING INC. DATED 2018, TOPOGRAPHY WITHIN AREA OF SITE F LANDFILL BY LACY SURVEYING INC DATED MAY 21, 2021.

ISSUED FOR CONSTRUCTION

HDR
Firm Registration No. F-754

17111 Preston Road, Suite 300
Dallas, Texas 75248-1229
972.960.4400

ISSUE	DATE	DESCRIPTION

PROJECT MANAGER	D. VOGT, P.E.
PROJECT NUMBER	10290148

STATE OF TEXAS
DAVID C. VOGT
93905
LICENSED
PROFESSIONAL ENGINEER
8-2-21
1357

Gibbons Creek Environmental Redevelopment Group, LLC

SITE F LANDFILL CLOSURE
Anderson, Texas

SURVEY GRID

0 1" 2"

FILENAME	00C-01.dwg
SCALE	1"=200'

SHEET **00C-01**

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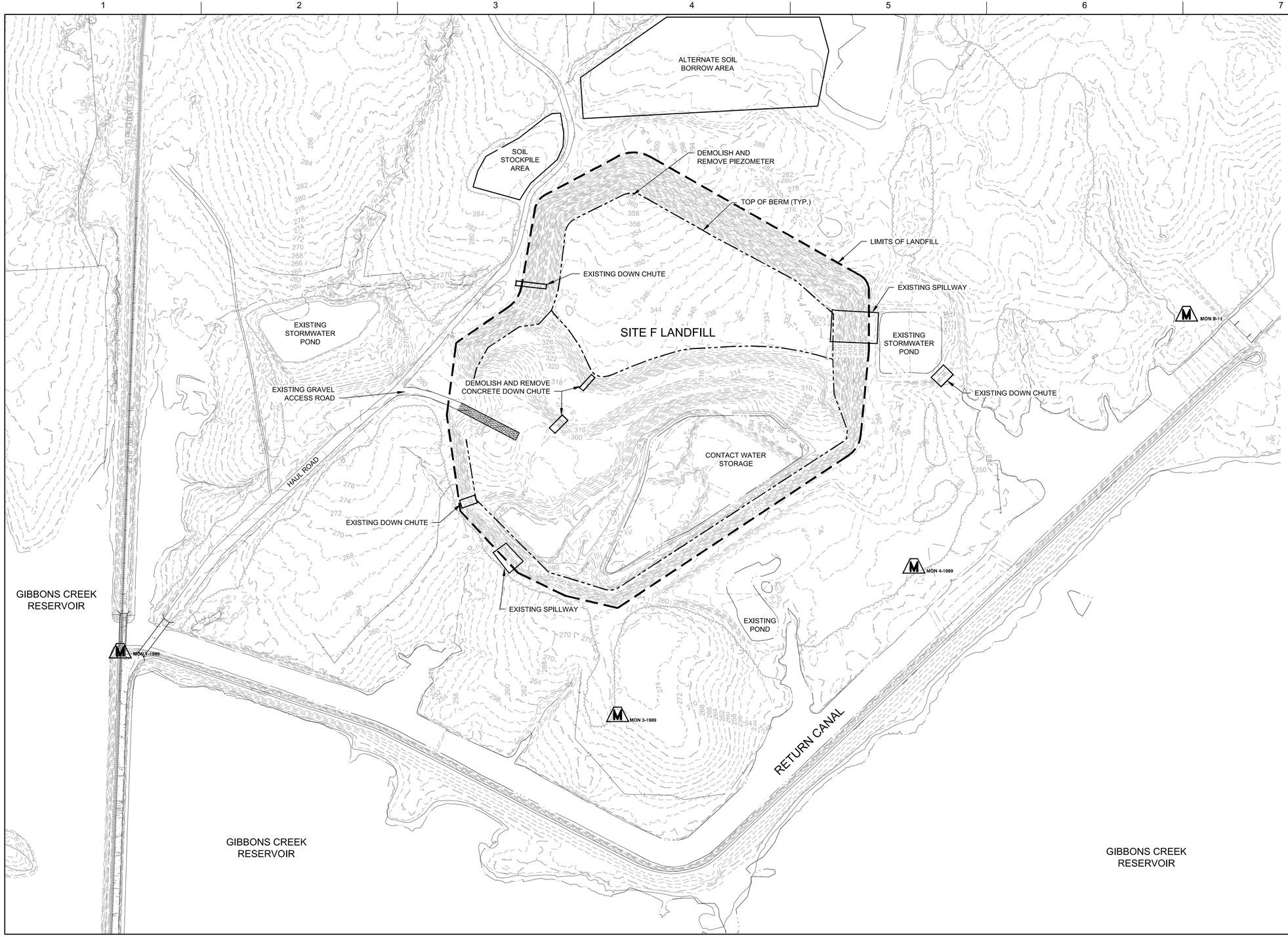

N

300 0 300 600

SCALE IN FEET

LEGEND

- EXISTING MINOR CONTOUR
- 320 EXISTING MAJOR CONTOUR
- TREELINE
- WATERLINE
- BENCHMARK
- CHAIN LINK FENCE

NOTES:

1. EXISTING LIDAR TOPOGRAPHY FROM LACY SURVEYING INC. DATED 2018, TOPOGRAPHY WITHIN AREA OF SITE F LANDFILL BY LACY SURVEYING INC DATED MAY 21, 2021.

ISSUED FOR CONSTRUCTION

HDR
Firm Registration No. F-754

17111 Preston Road, Suite 300
Dallas, Texas 75248-1229
972.960.4400

ISSUE	DATE	DESCRIPTION

PROJECT MANAGER D. VOGT, P.E.

PROJECT NUMBER 10290148

STATE OF TEXAS
DAVID C. VOGT
93905
LICENSED
PROFESSIONAL ENGINEER
8-2-21
1358

Gibbons Creek Environmental Redevelopment Group, LLC

SITE F LANDFILL CLOSURE
Anderson, Texas

EXISTING CONDITIONS

0 1" 2"

FILENAME 00C-02.dwg
SCALE 1"=300'

SHEET 00C-02

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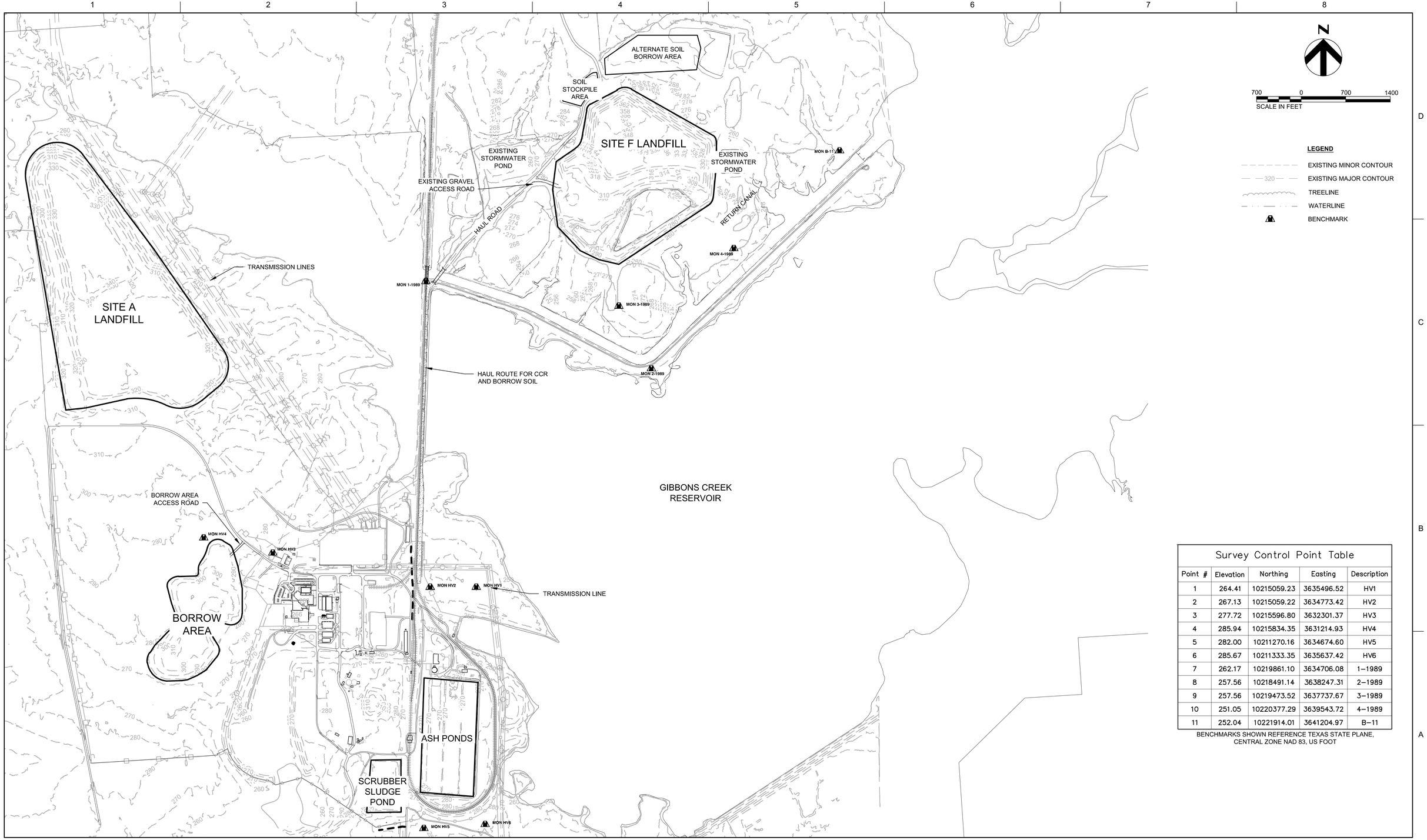

Survey Control Point Table				
Point #	Elevation	Northing	Easting	Description
1	264.41	10215059.23	3635496.52	HV1
2	267.13	10215059.22	3634773.42	HV2
3	277.72	10215596.80	3632301.37	HV3
4	285.94	10215834.35	3631214.93	HV4
5	282.00	10211270.16	3634674.60	HV5
6	285.67	10211333.35	3635637.42	HV6
7	262.17	10219861.10	3634706.08	1–1989
8	257.56	10218491.14	3638247.31	2–1989
9	257.56	10219473.52	3637737.67	3–1989
10	251.05	10220377.29	3639543.72	4–1989
11	252.04	10221914.01	3641204.97	B–11

BENCHMARKS SHOWN REFERENCE TEXAS STATE PLANE, CENTRAL ZONE NAD 83, US FOOT

ISSUED FOR CONSTRUCTION

HDR
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17111 Preston Road, Suite 300
Dallas, Texas 75248-1229
972.960.4400

ISSUE	DATE	DESCRIPTION

PROJECT MANAGER	D. VOGT, P.E.
PROJECT NUMBER	10290148

STATE OF TEXAS
DAVID C. VOGT
93905
LICENSED
PROFESSIONAL ENGINEER
8-2-21
1359

Gibbons Creek Environmental Redevelopment Group, LLC

SITE F LANDFILL CLOSURE
Anderson, Texas

SITE PLAN

0 1" 2"

FILENAME	00C-03.dwg
SCALE	1"=700'

SHEET **00C-03**

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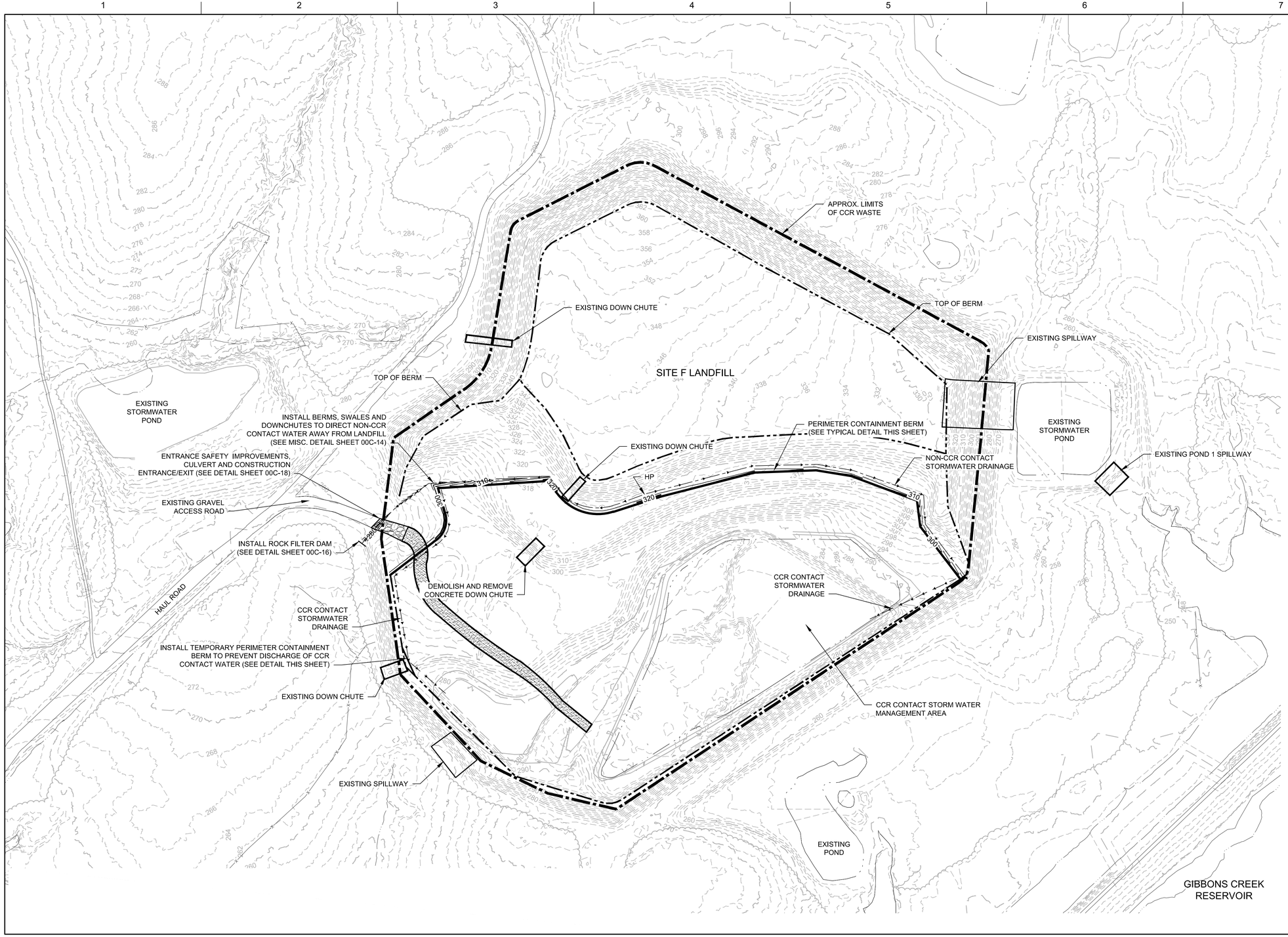


N

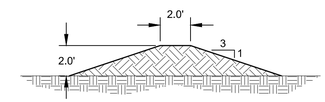
200 0 200 400
SCALE IN FEET

LEGEND

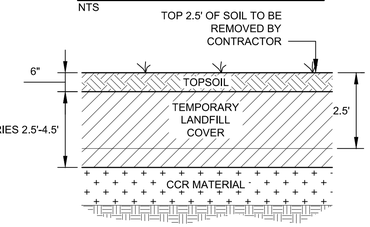
- EXISTING MINOR CONTOUR
- 320 EXISTING MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- 320 PROPOSED MAJOR CONTOUR

NOTES:

1. EXISTING LIDAR TOPOGRAPHY FROM LACY SURVEYING INC. DATED 2018, TOPOGRAPHY WITHIN AREA OF SITE F LANDFILL BY LACY SURVEYING INC DATED MAY 21, 2021.
2. WASTE MATERIAL FROM THE SCRUBBER SLUDGE POND, ASH PONDS, COAL PILE STORAGE AREA, PLANT COLLECTION POND, SAL LEACHATE PONDS AND DRAINAGE AREAS WILL BE PLACED IN THE ACTIVE WASTE DISPOSAL AREA.
3. PRIOR TO WASTE PLACEMENT, CONTRACTOR TO EXCAVATE AND REMOVE THE TOP 2.5 FEET OF SOILS FROM THE TEMPORARY COVER IN THE ACTIVE DISPOSAL AREA. TOPSOIL SHALL BE SEGREGATED AND STOCKPILED SEPARATELY FROM THE REMAINING EXCAVATED SOILS.
4. SOIL EXCAVATED AND STOCKPILED SHALL BE FREE OF CCR MATERIAL. SOILS MATERIAL CONTAINING CCR MATERIAL WILL BE CONSIDERED AS WASTE MATERIAL AND DISPOSED IN THE ACTIVE DISPOSAL AREA.
5. CONTRACTOR TO INSTALL PERIMETER CONTAINMENT BERM TO SEGREGATE CCR CONTACT STORMWATER FROM THE NON-CCR CONTACT STORMWATER. BERMS, SWALES AND OTHER CONVETANCES AS NECESSARY SHALL BE INSTALLED AS WASTE IS DEPOSITED TO SEGREGATE CCR CONTACT STORMWATER FROM NON-CCR CONTACT STORMWATER.
6. CONTRACTOR TO DETERMINE AND INSTALL APPROPRIATE STORMWATER POLLUTION PREVENTION BMP'S IN ACCORDANCE WITH THE STORMWATER POLLUTION PREVENTION PLAN. ANY STORMWATER THAT CONTACTS CCR MATERIAL MUST BE TREATED AS CONTACT WATER AND CONVEYED PER THE PROJECT WATER MANAGEMENT PLAN AND DISCHARGED IN COMPLIANCE WITH THE TPDES PERMIT.
7. PLACEMENT OF APPROVED DEMOLISHED MATERIAL FROM APS, SSP, SAL AND/OR SFL WILL BE IN AREAS DESIGNATED BY OWNER. CONTRACTOR SHALL RECORD TYPE OF WASTE MATERIAL DISPOSED AT EACH DESIGNATED AREA. CONTRACTOR WILL RECORD THE LIMITS OF THE DISPOSAL AREA (COORDINATES AND ELEVATIONS) AT THE BASE OF THE DESIGNATED DISPOSAL AREA AND THE TOP OF THE WASTE. FOR CO-MINGLED DEMO WASTE, CONTRACTOR TO SEPARATE OUT NON-CCR MATERIAL FROM CCR WASTE AS MUCH AS PRACTICAL AND DISPOSE IT IN IT'S DESIGNATED AREA.
8. CONTRACTOR TO PLACE SSP MATERIAL MINIMUM OF 50 FEET FROM THE PERIMETER CONTAINMENT BERM AND MIX WITH BOTTOM ASH AT A RATIO OF 1:1. MIXING BY BLADING, DISCING OR OTHER APPROVED METHOD.



PERIMETER CONTAINMENT BERM
NTS



ACTIVE DISPOSAL AREA SOILS EXCAVATION
NTS

ISSUED FOR CONSTRUCTION

HDR
Firm Registration No. F-754

17111 Preston Road, Suite 300
Dallas, Texas 75248-1229
972.960.4400

ISSUE	DATE	DESCRIPTION

PROJECT MANAGER D. VOGT, P.E.

PROJECT NUMBER 10290148

STATE OF TEXAS
DAVID C. VOGT
93905
LICENSED
PROFESSIONAL ENGINEER
8-2-21

1360

Gibbons Creek Environmental Redevelopment Group, LLC

SITE F LANDFILL CLOSURE
Anderson, Texas

ACTIVE WASTE DISPOSAL AREA SITE PREPARATION

0 1" 2"

FILENAME 00C-04.dwg
SCALE 1"=200'

SHEET 00C-04

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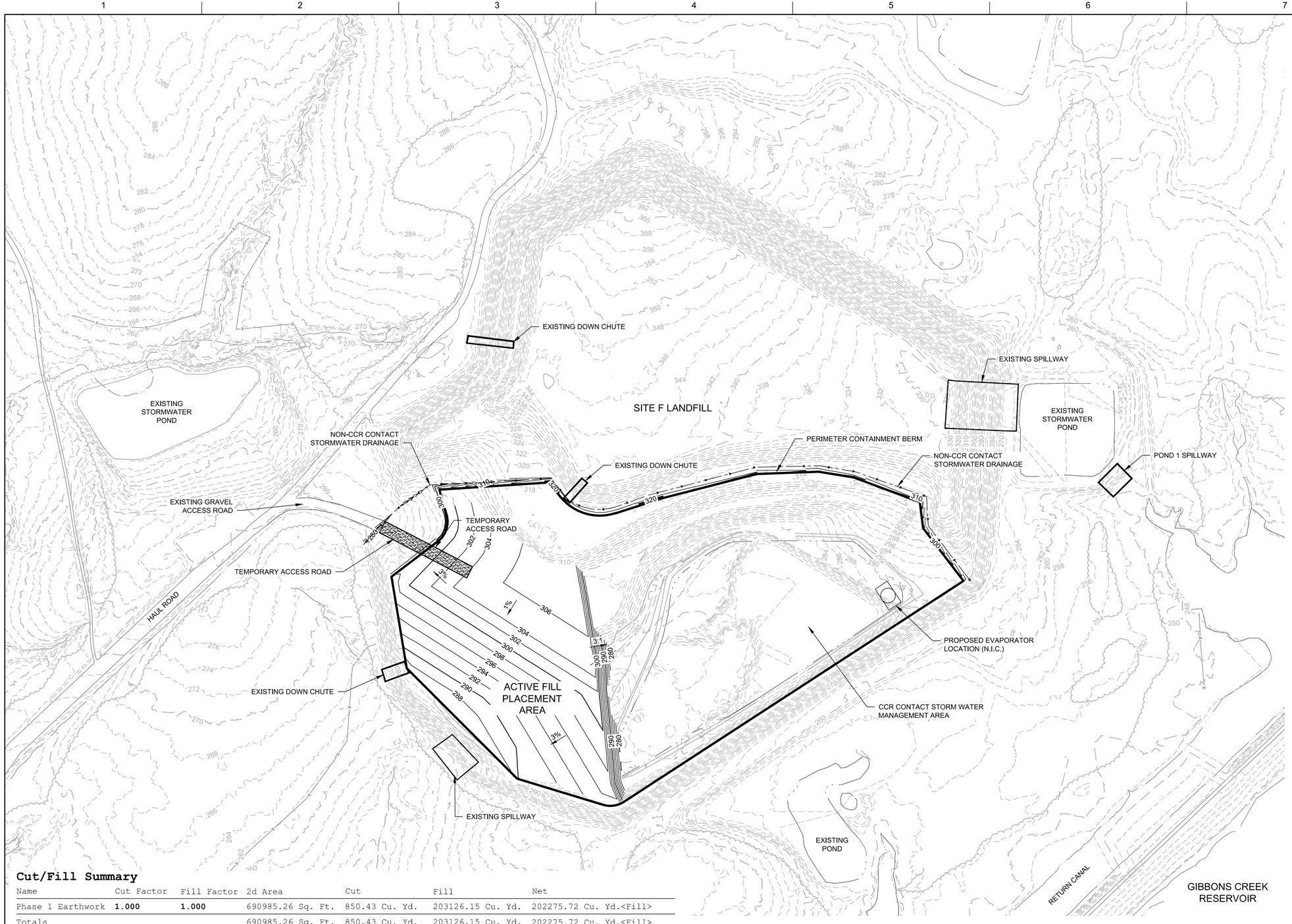

200 0 200 400
SCALE IN FEET

LEGEND

- EXISTING MINOR CONTOUR
- 320 EXISTING MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- 320 PROPOSED MAJOR CONTOUR

NOTES:

1. EXISTING LIDAR TOPOGRAPHY FROM LACY SURVEYING INC. DATED 2018, TOPOGRAPHY WITHIN AREA OF SITE F LANDFILL BY LACY SURVEYING INC DATED MAY 21, 2021.
2. WASTE MATERIAL FROM THE SCRUBBER SLUDGE POND, ASH PONDS, COAL PILE STORAGE AREA, PLANT COLLECTION POND, SAL LEACHATE PONDS AND DRAINAGE AREAS WILL BE PLACED IN THE ACTIVE WASTE DISPOSAL AREA.
3. CONTRACTOR SHALL INSTALL BERMS, SWALES AND OTHER CONVEYANCES AS NECESSARY TO SEGREGATE CCR CONTACT STORMWATER FROM NON-CCR CONTACT STORMWATER.
4. CONTRACTOR TO INSTALL INTERMEDIATE COVER UTILIZING A 1-FOOT THICK LAYER OF GENERAL FILL MATERIAL OVER WASTE MATERIAL PLACED TO ITS FINAL GRADE.
5. CONTRACTOR TO DETERMINE AND INSTALL APPROPRIATE STORMWATER POLLUTION PREVENTION BMP'S IN ACCORDANCE WITH THE STORMWATER POLLUTION PREVENTION PLAN. ANY STORMWATER THAT CONTACTS CCR MATERIAL MUST BE TREATED AS CONTACT WATER AND CONVEYED PER THE PROJECT WATER MANAGEMENT PLAN AND DISCHARGED IN COMPLIANCE WITH THE TPDES PERMIT.
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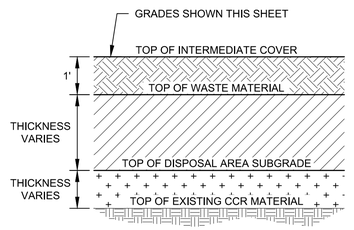
8. CONTRACTOR TO PLACE SSP MATERIAL MINIMUM OF 50 FEET FROM THE PERIMETER CONTAINMENT BERM AND MIX WITH BOTTOM ASH AT A RATIO OF 1:1. MIXING BY BLADING, DISCING OR OTHER APPROVED METHOD.



ACTIVE DISPOSAL AREA WASTE PLACEMENT AND INTERMEDIATE COVER
NTS

Cut/Fill Summary

Name	Cut Factor	Fill Factor	2d Area	Cut	Fill	Net
Phase 1 Earthwork	1.000	1.000	690985.26 Sq. Ft.	850.43 Cu. Yd.	203126.15 Cu. Yd.	202275.72 Cu. Yd.<Fill>
Totals			690985.26 Sq. Ft.	850.43 Cu. Yd.	203126.15 Cu. Yd.	202275.72 Cu. Yd.<Fill>

ISSUED FOR CONSTRUCTION

HDR
Firm Registration No. F-754

17111 Preston Road, Suite 300
Dallas, Texas 75248-1229
972.960.4400

ISSUE	DATE	DESCRIPTION

PROJECT MANAGER D. VOGT, P.E.

PROJECT NUMBER 10290148

STATE OF TEXAS · DAVID C. VOGT · 93905 · LICENSED · PROFESSIONAL ENGINEER · 8-2-21

1361

Gibbons Creek Environmental Redevelopment Group, LLC

SITE F LANDFILL CLOSURE
Anderson, Texas

ACTIVE WASTE DISPOSAL AREA PHASE 1 FILL PLACEMENT AREA

0 1" 2"

FILENAME 00C-05.dwg
SCALE 1"=200'

SHEET
00C-05

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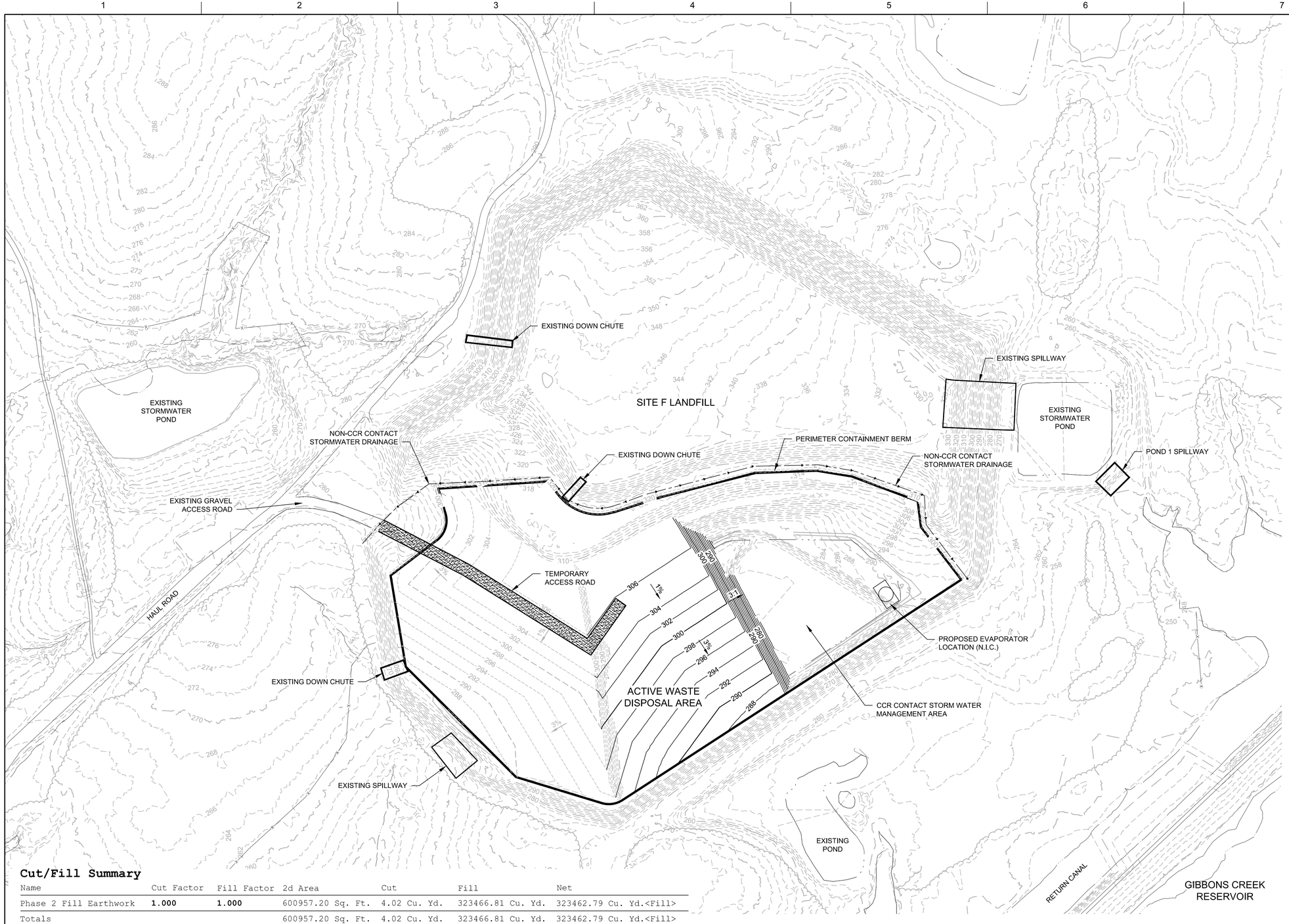

NOTES:

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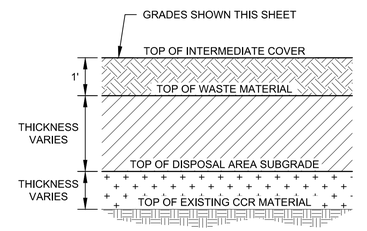
Cut/Fill Summary

Name	Cut Factor	Fill Factor	2d Area	Cut	Fill	Net
Phase 2 Fill Earthwork	**1.000**	**1.000**	600957.20 Sq. Ft.	4.02 Cu. Yd.	323466.81 Cu. Yd.	323462.79 Cu. Yd.<Fill>
Totals			600957.20 Sq. Ft.	4.02 Cu. Yd.	323466.81 Cu. Yd.	323462.79 Cu. Yd.<Fill>



ACTIVE DISPOSAL AREA WASTE PLACEMENT AND INTERMEDIATE COVER
NTS

HDR
Firm Registration No. F-754

17111 Preston Road, Suite 300
Dallas, Texas 75248-1229
972.960.4400

ISSUED FOR CONSTRUCTION

ISSUE	DATE	DESCRIPTION

PROJECT MANAGER D. VOGT, P.E.

PROJECT NUMBER 10290148

STATE OF TEXAS
DAVID C. VOGT
93905
LICENSED
PROFESSIONAL ENGINEER
8-2-21

1362

Gibbons Creek Environmental Redevelopment Group, LLC

SITE F LANDFILL CLOSURE
Anderson, Texas

ACTIVE WASTE DISPOSAL AREA PHASE 2 FILL PLACEMENT AREA

0 1" 2"

FILENAME 00C-06.dwg
SCALE 1"=200'

SHEET 00C-06

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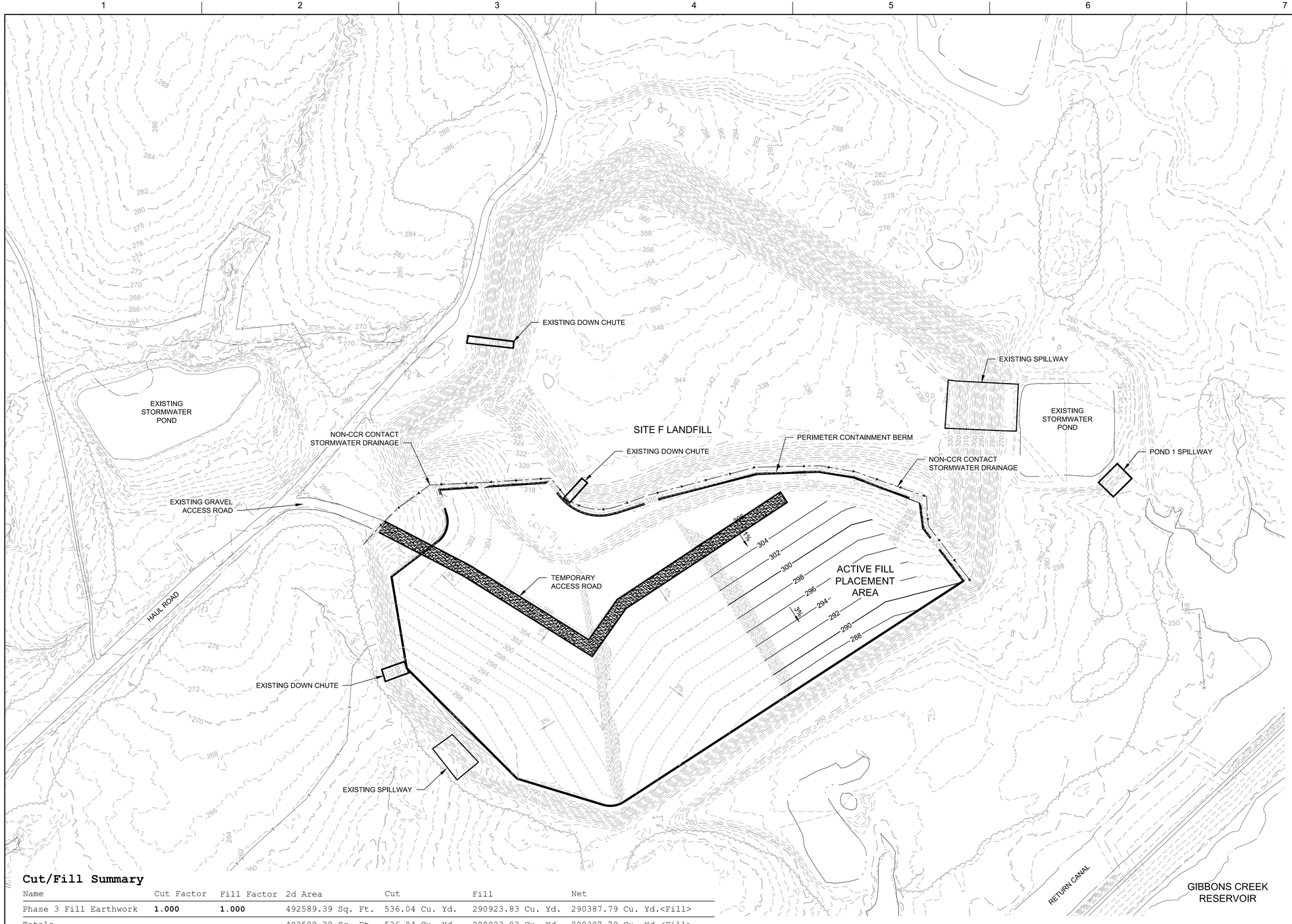

NOTES:

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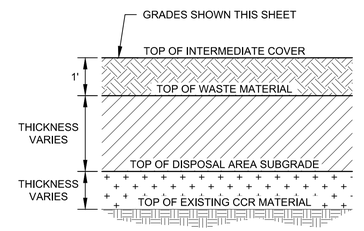

ACTIVE DISPOSAL AREA WASTE PLACEMENT AND INTERMEDIATE COVER
NTS

Cut/Fill Summary

Name	Cut Factor	Fill Factor	2d Area	Cut	Fill	Net
Phase 3 Fill Earthwork	1.000	1.000	492589.39 Sq. Ft.	536.04 Cu. Yd.	290923.83 Cu. Yd.	290387.79 Cu. Yd.<Fill>
Totals			492589.39 Sq. Ft.	536.04 Cu. Yd.	290923.83 Cu. Yd.	290387.79 Cu. Yd.<Fill>

ISSUED FOR CONSTRUCTION

HDR
Firm Registration No. F-754

17111 Preston Road, Suite 300
Dallas, Texas 75248-1229
972.960.4400

ISSUE	DATE	DESCRIPTION

PROJECT MANAGER D. VOGT, P.E.

PROJECT NUMBER 10290148

STATE OF TEXAS
DAVID C. VOGT
93905
LICENSED
PROFESSIONAL ENGINEER
8-2-21

1363

Gibbons Creek Environmental Redevelopment Group, LLC

SITE F LANDFILL CLOSURE
Anderson, Texas

ACTIVE WASTE DISPOSAL AREA PHASE 3 FILL PLACEMENT AREA

0 1" 2"

FILENAME 00C-07.dwg
SCALE 1"=200'

SHEET
00C-07

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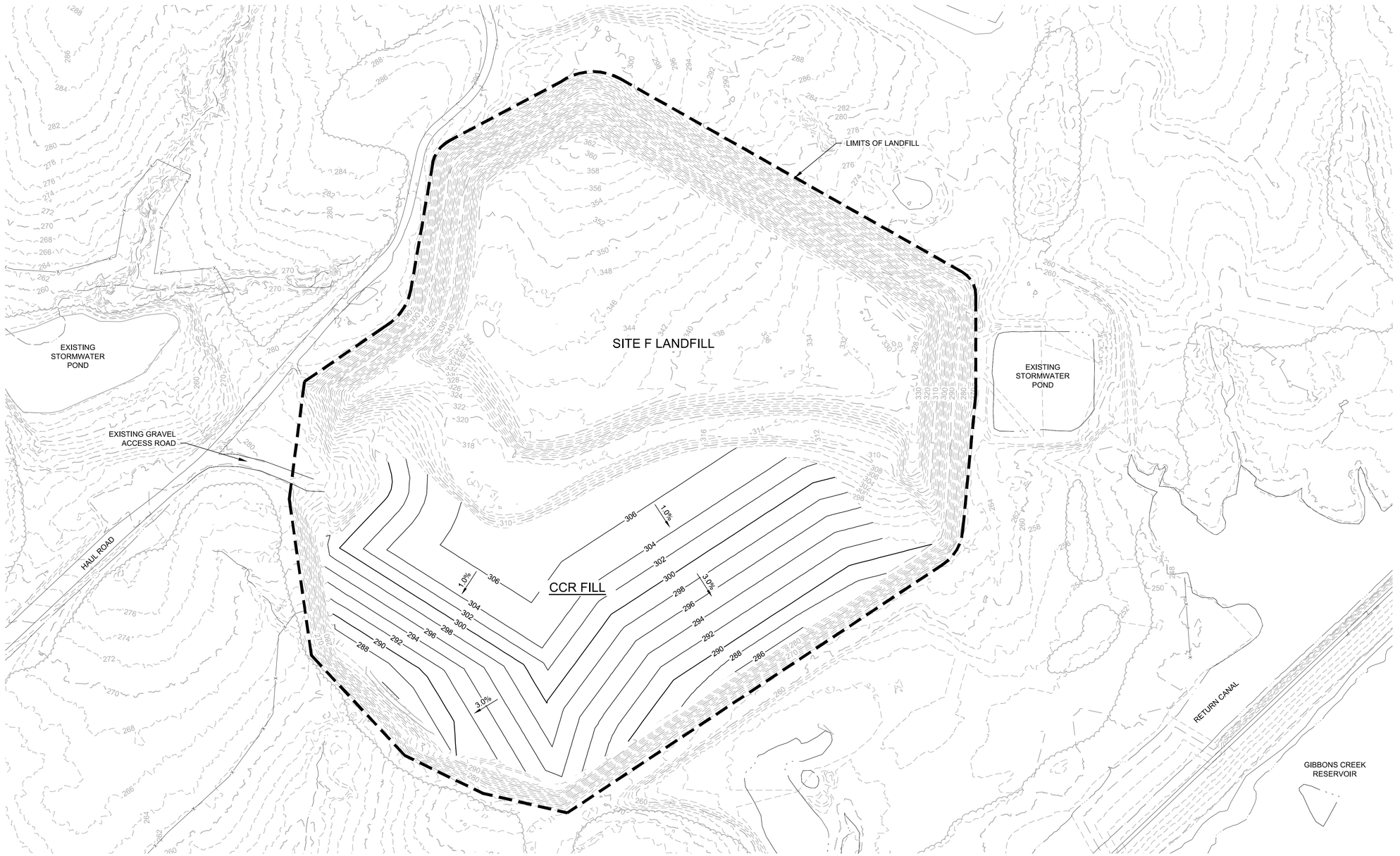

N

200 0 200 400
SCALE IN FEET

LEGEND

- EXISTING MINOR CONTOUR
- 320 EXISTING MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- 320 PROPOSED MAJOR CONTOUR
- TREELINE
- WATERLINE

NOTES:

1. EXISTING LIDAR TOPOGRAPHY FROM LACY SURVEYING INC. DATED 2018, TOPOGRAPHY WITHIN AREA OF SITE F LANDFILL BY LACY SURVEYING INC DATED MAY 21, 2021.
2. PROPOSED CONTOURS REPRESENT TOP OF CCR AND WASTE MATERIAL.
3. FINAL GRADES TO BE DETERMINED BY THE VOLUME OF CCR MATERIAL TRANSPORTED FROM THE CCR IMPOUNDMENTS FOR DISPOSAL. GRADING WILL CONFORM TO THE SLOPES AND GRADES SHOWN HEREON.
4. CONTRACTOR TO DETERMINE AND INSTALL APPROPRIATE STORMWATER POLLUTION PREVENTION BMP'S IN ACCORDANCE WITH THE STORMWATER POLLUTION PREVENTION PLAN. ANY STORMWATER THAT CONTACTS CCR MATERIAL MUST BE TREATED AS CONTACT WATER AND CONVEYED PER THE PROJECT WATER MANAGEMENT PLAN AND DISCHARGED IN COMPLIANCE WITH THE TPDES PERMIT.

Cut/Fill Summary

Name	Cut Factor	Fill Factor	2d Area	Fill
CCR Final Airspace	1.000	1.000	1688804.74 Sq. Ft.	783755.86 Cu. Yd.
Totals			1688804.74 Sq. Ft.	783755.86 Cu. Yd.

ISSUED FOR CONSTRUCTION

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ISSUE	DATE	DESCRIPTION

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PROJECT NUMBER	10290148

STATE OF TEXAS
DAVID C. VOGT
93905
LICENSED
PROFESSIONAL ENGINEER
8-2-21
1364

Gibbons Creek Environmental Redevelopment Group, LLC

SITE F LANDFILL CLOSURE
Anderson, Texas

Closure Grading Top of CCR

0 1" 2"

FILENAME	00C-08.dwg
SCALE	1"=200'

SHEET **00C-08**

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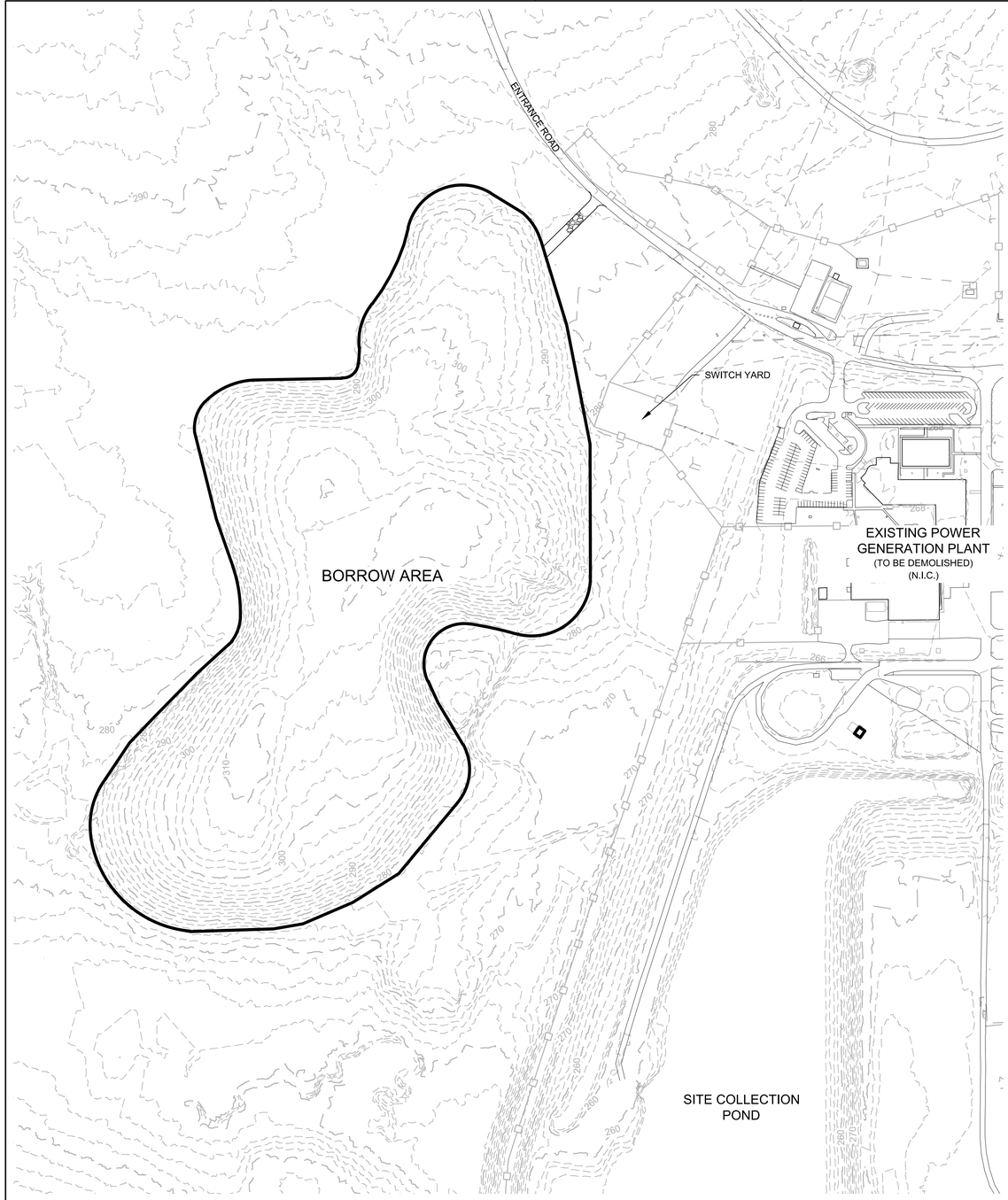

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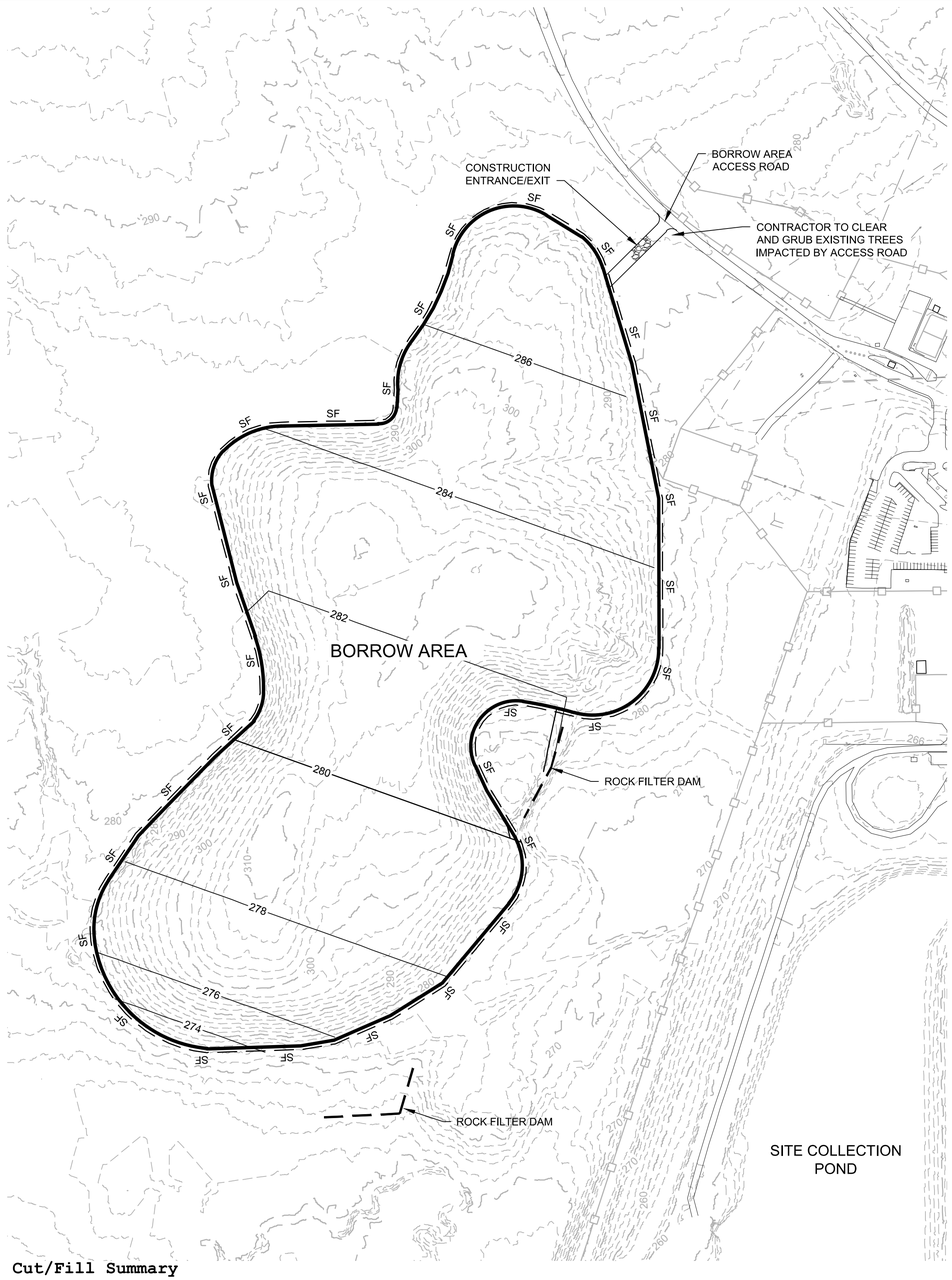


PROPOSED GRADING

N

300 0 300 600
SCALE IN FEET

LEGEND

- EXISTING MINOR CONTOUR
- 320 EXISTING MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- 320 PROPOSED MAJOR CONTOUR
- SF SILT FENCE

NOTES:

1. EXISTING LIDAR TOPOGRAPHY FROM LACY SURVEYING INC. DATED 2018, TOPOGRAPHY WITHIN AREA OF SITE F LANDFILL BY LACY SURVEYING INC DATED MAY 21, 2021.
2. CONTRACTOR TO REMOVE VEGETATION PRIOR TO EXCAVATION.
3. SOILS USED FOR COMPACTED CLAY LINER OR GENERAL FILL MATERIAL SHALL NOT CONTAIN TOPSOIL.
4. FINAL GRADING CONTOURS REPRESENT TOPOGRAPHY OF BORROW AREA AFTER TOTAL SOIL MATERIAL REMOVED FOR BOTH SITE F LANDFILL CLOSURE AND SITE A LANDFILL CLOSURE PROJECTS. CONTRACTOR SHALL STAGE SOILS REMOVAL ACCORDING TO THEIR CONSTRUCTION NEEDS AND INSTALL AND MAINTAIN APPROPRIATE EROSION AND SEDIMENT CONTROLS ACCORDING TO THEIR EXCAVATION PLAN.
5. CONTRACTOR TO DETERMINE AND INSTALL APPROPRIATE STORMWATER POLLUTION PREVENTION BMP'S IN ACCORDANCE WITH THE STORMWATER POLLUTION PREVENTION PLAN. ANY STORMWATER THAT CONTACTS CCR MATERIAL MUST BE TREATED AS CONTACT WATER AND CONVEYED PER THE PROJECT WATER MANAGEMENT PLAN AND DISCHARGED IN COMPLIANCE WITH THE TPDES PERMIT.

Cut/Fill Summary

Name	Cut Factor	Fill Factor	2d Area	Cut	Fill	Net
BORROW	1.000	1.000	1861711.71 Sq. Ft.	1132156.61 Cu. Yd.	2898.51 Cu. Yd.	1129258.10 Cu. Yd.<Cut>
Totals			1861711.71 Sq. Ft.	1132156.61 Cu. Yd.	2898.51 Cu. Yd.	1129258.10 Cu. Yd.<Cut>

ISSUED FOR CONSTRUCTION

HDR
Firm Registration No. F-754

17111 Preston Road, Suite 300
Dallas, Texas 75248-1229
972.960.4400

ISSUE	DATE	DESCRIPTION

PROJECT MANAGER D. VOGT, P.E.

PROJECT NUMBER 10290148

STATE OF TEXAS
DAVID C. VOGT
93905
LICENSED
PROFESSIONAL ENGINEER
8-2-21
1365

Gibbons Creek Environmental Redevelopment Group, LLC

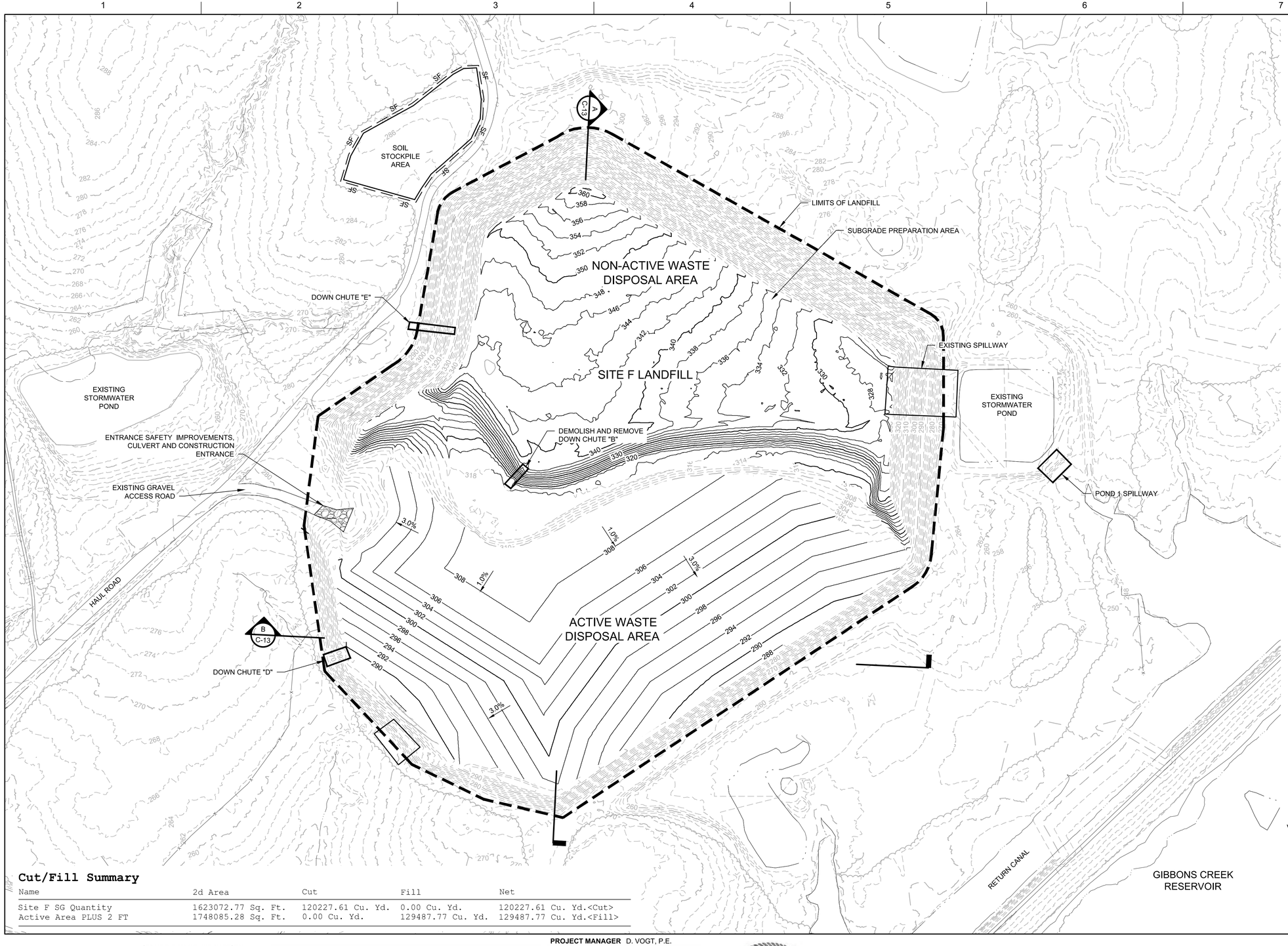
SITE F LANDFILL CLOSURE
Anderson, Texas

BORROW AREA EXCAVATION PLAN

0 1" 2"

FILENAME 00C-09.dwg
SCALE 1"=200'

SHEET 00C-09



N

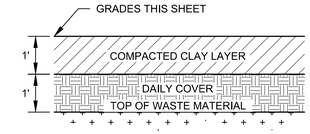
200 0 200 400
SCALE IN FEET

LEGEND

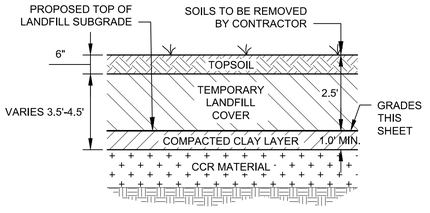
- EXISTING MINOR CONTOUR
- 320 EXISTING MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- 320 PROPOSED MAJOR CONTOUR

NOTES:

1. EXISTING LIDAR TOPOGRAPHY FROM LACY SURVEYING INC. DATED 2018, TOPOGRAPHY WITHIN AREA OF SITE F LANDFILL BY LACY SURVEYING INC DATED MAY 21, 2021.
2. THE TOP OF THE LANDFILL, OUTSIDE THE ACTIVE WASTE DISPOSAL AREA HAS A TEMPORARY LANDFILL COVER CONSISTING OF A COMPACTED CLAY LAYER OVERLAIN WITH GENERAL FILL MATERIAL AND TOPSOIL. THE THICKNESS OF THE COMPACTED CLAY LAYER, GENERAL FILL MATERIAL AND TOPSOIL VARIES BETWEEN 4' AND 6' IN TOTAL THICKNESS.
3. THE CONTRACTOR TO REMOVE THE TOP 2.5' OF SOIL MATERIAL FROM THE TOP OF THE LANDFILL AND STOCKPILE THIS MATERIAL AT A LOCATION DIRECTED BY OWNER.
4. TOPSOIL MATERIAL SHALL BE SEGREGATED FROM GENERAL FILL MATERIAL AND STOCKPILED SEPARATELY.
5. CONTRACTOR SHALL CONDITION THE TOP 1-FOOT OF REMAINING COMPACTED CLAY LAYER BY HYDRATING AND COMPACTING THE MATERIAL IN ACCORDANCE WITH THE SPECIFICATIONS AND CQA REQUIREMENTS.
6. A 1' THICK COMPACTED CLAY LAYER SHALL BE INSTALLED ON TOP OF THE INTERMEDIATE COVER IN THE ACTIVE DISPOSAL AREA.



SUBGRADE PREPARATION
ACTIVE WASTE DISPOSAL AREAS
NTS



SUBGRADE PREPARATION
NON-ACTIVE WASTE DISPOSAL AREAS
NTS

Cut/Fill Summary

Name	2d Area	Cut	Fill	Net
Site F SG Quantity	1623072.77 Sq. Ft.	120227.61 Cu. Yd.	0.00 Cu. Yd.	120227.61 Cu. Yd.<Cut>
Active Area PLUS 2 FT	1748085.28 Sq. Ft.	0.00 Cu. Yd.	129487.77 Cu. Yd.	129487.77 Cu. Yd.<Fill>

ISSUED FOR CONSTRUCTION

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Dallas, Texas 75248-1229
972.960.4400

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PROJECT MANAGER D. VOGT, P.E.

PROJECT NUMBER 10290148

STATE OF TEXAS
DAVID C. VOGT
93905
LICENSED
PROFESSIONAL ENGINEER
8-2-21

1366

Gibbons Creek Environmental Redevelopment Group, LLC

SITE F LANDFILL CLOSURE
Anderson, Texas

SUBGRADE PLAN
TOP OF COMPACTED CLAY LAYER
(INTERIM CCR COVER)

0 1" 2"

FILENAME 00C-10.dwg
SCALE 1"=200'

SHEET
00C-10

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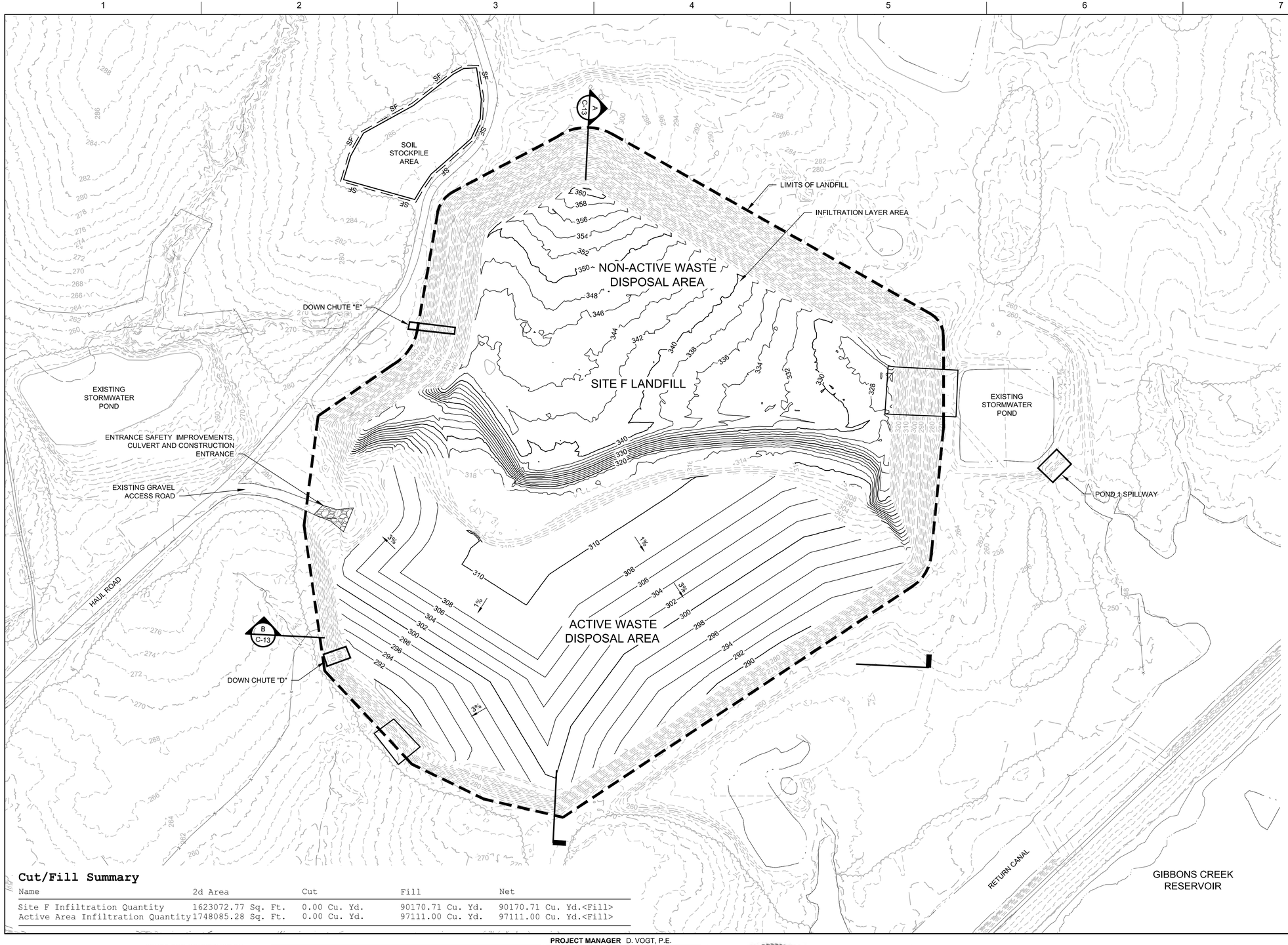
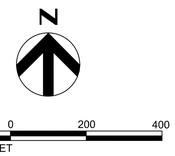


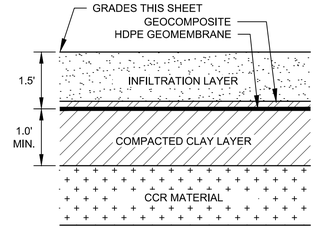


LEGEND

- EXISTING MINOR CONTOUR
- EXISTING MAJOR CONTOUR (320)
- PROPOSED MINOR CONTOUR
- PROPOSED MAJOR CONTOUR (320)

NOTES:

1. EXISTING LIDAR TOPOGRAPHY FROM LACY SURVEYING INC. DATED 2018, TOPOGRAPHY WITHIN AREA OF SITE F LANDFILL BY LACY SURVEYING INC DATED MAY 21, 2021.
2. THE CONTRACTOR TO INSTALL THE HDPE GEOMEMBRANE ON TOP OF THE COMPACTED CLAY LAYER IN ACCORDANCE WITH THE PLANS, SPECIFICATIONS AND CQA PLAN.
3. CONTRACTOR TO INSTALL A 18" THICK INFILTRATION LAYER CONSISTING OF GENERAL FILL SOILS MATERIAL IN ACCORDANCE WITH THE PLANS, SPECIFICATIONS AND CQA PLAN.



INFILTRATION LAYER OVER TOP OF LANDFILL
NTS

Cut/Fill Summary

Name	2d Area	Cut	Fill	Net
Site F Infiltration Quantity	1623072.77 Sq. Ft.	0.00 Cu. Yd.	90170.71 Cu. Yd.	90170.71 Cu. Yd.<Fill>
Active Area Infiltration Quantity	1748085.28 Sq. Ft.	0.00 Cu. Yd.	97111.00 Cu. Yd.	97111.00 Cu. Yd.<Fill>

HDR
Firm Registration No. F-754

17111 Preston Road, Suite 300
Dallas, Texas 75248-1229
972.960.4400

ISSUED FOR CONSTRUCTION

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PROJECT MANAGER D. VOGT, P.E.

PROJECT NUMBER 10290148

STATE OF TEXAS
DAVID C. VOGT
93905
LICENSED
PROFESSIONAL ENGINEER
8-2-21
1367

Gibbons Creek Environmental Redevelopment Group, LLC

SITE F LANDFILL CLOSURE
Anderson, Texas

INFILTRATION LAYER PLAN

0 1" 2"

FILENAME 00C-11.dwg
SCALE 1"=200'

SHEET **00C-11**

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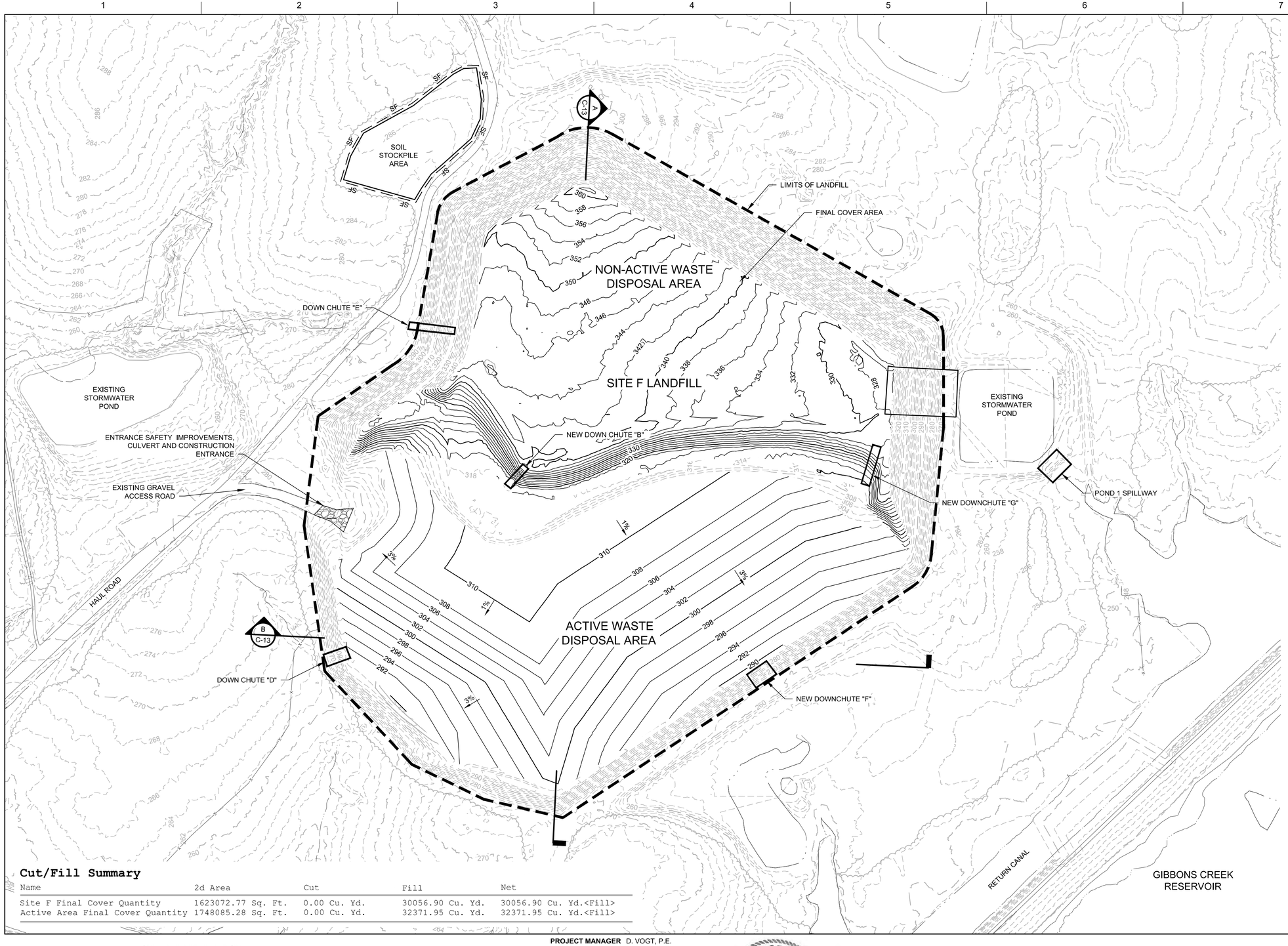
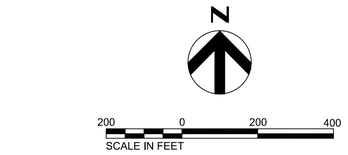


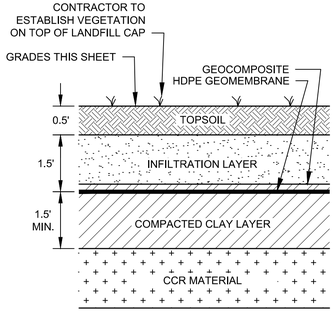


LEGEND

- EXISTING MINOR CONTOUR
- 320 EXISTING MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- 320 PROPOSED MAJOR CONTOUR

NOTES:

1. EXISTING LIDAR TOPOGRAPHY FROM LACY SURVEYING INC. DATED 2018, TOPOGRAPHY WITHIN AREA OF SITE F LANDFILL BY LACY SURVEYING INC DATED MAY 21, 2021.



PROPOSED FINAL COVER OVER TOP OF LANDFILL
NTS

Cut/Fill Summary

Name	2d Area	Cut	Fill	Net
Site F Final Cover Quantity	1623072.77 Sq. Ft.	0.00 Cu. Yd.	30056.90 Cu. Yd.	30056.90 Cu. Yd.<Fill>
Active Area Final Cover Quantity	1748085.28 Sq. Ft.	0.00 Cu. Yd.	32371.95 Cu. Yd.	32371.95 Cu. Yd.<Fill>

ISSUED FOR CONSTRUCTION

HDR
Firm Registration No. F-754

17111 Preston Road, Suite 300
Dallas, Texas 75248-1229
972.960.4400

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PROJECT MANAGER D. VOGT, P.E.

PROJECT NUMBER 10290148

STATE OF TEXAS
DAVID C. VOGT
93905
LICENSED
PROFESSIONAL ENGINEER
8-2-21

1368

Gibbons Creek Environmental Redevelopment Group, LLC

SITE F LANDFILL CLOSURE
Anderson, Texas

FINAL COVER PLAN

0 1" 2"

FILENAME 00C-12.dwg
SCALE 1"=200'

SHEET **00C-12**

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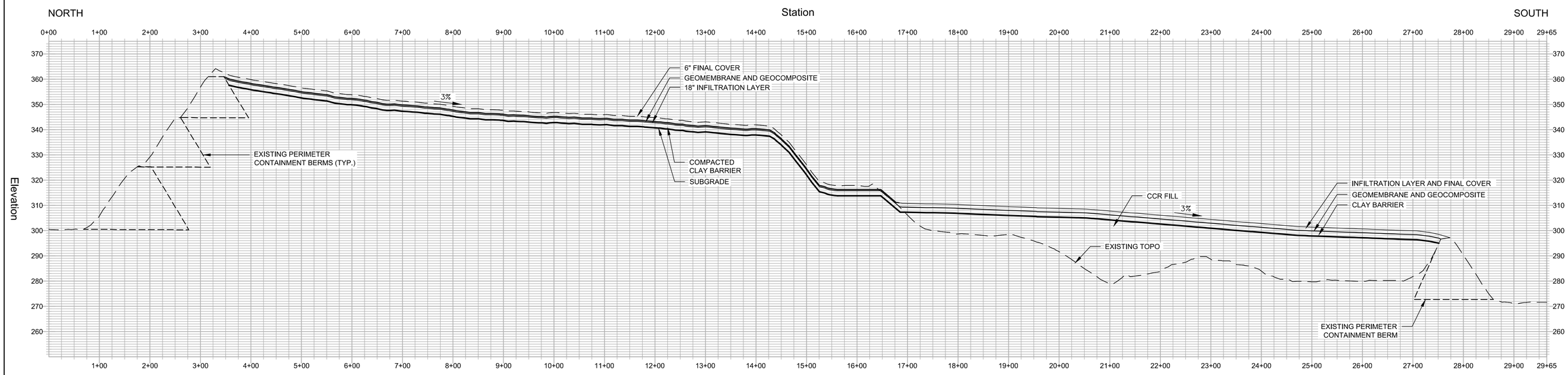
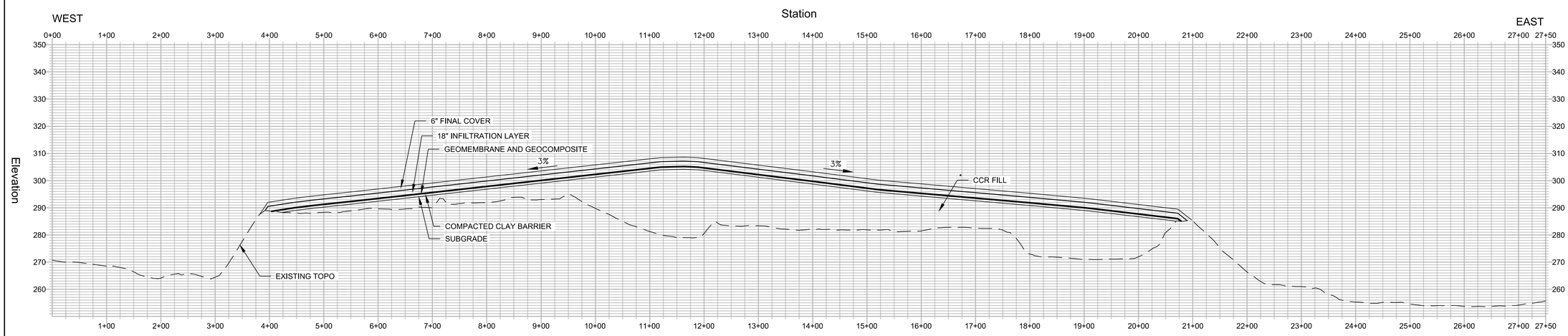


NORTH TO SOUTH

HORIZ. 1"=100', VERT. 1"=20'

A



WEST TO EAST

HORIZ. 1"=100', VERT. 1"=20'

B

ISSUED FOR CONSTRUCTION

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17111 Preston Road, Suite 300
Dallas, Texas 75248-1229
972.960.4400

ISSUE	DATE	DESCRIPTION

PROJECT MANAGER D. VOGT, P.E.

PROJECT NUMBER 10290148

STATE OF TEXAS
DAVID C. VOGT
93905
LICENSED
PROFESSIONAL ENGINEER
8-2-21

1369

Gibbons Creek Environmental Redevelopment Group, LLC

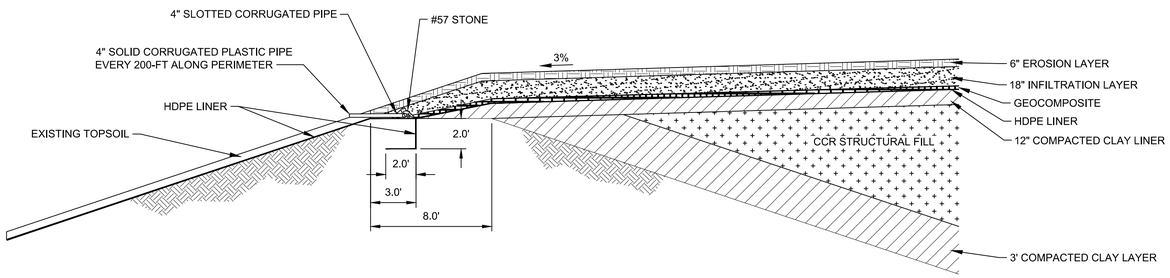
SITE F LANDFILL CLOSURE
Anderson, Texas

PROPOSED CROSS SECTIONS

0 1" 2"

FILENAME 00C-13.dwg
SCALE AS SHOWN

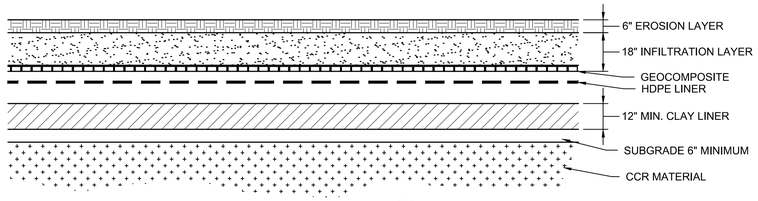
SHEET 00C-13



PERIMETER BERM CLOSURE CONSTRUCTION

1"=5'

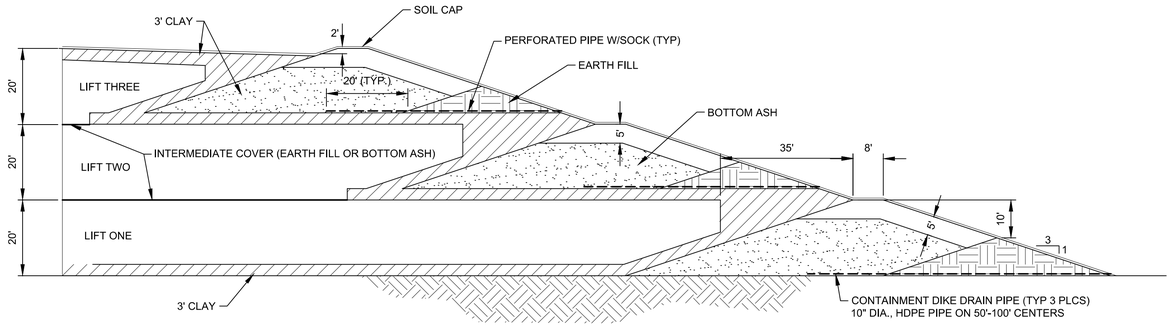
1



LINER DETAIL

NOT TO SCALE

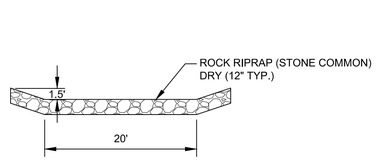
2



EXISTING CONTAINMENT DIKE

NOT TO SCALE

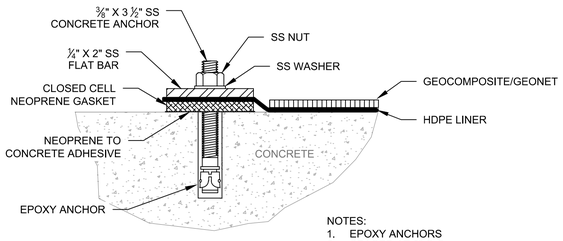
3



RIPRAP CHANNEL

NOT TO SCALE

5

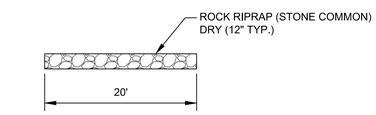


NOTES:
1. EPOXY ANCHORS
2. SPACED AT 6" O.C.

MECHANICAL ATTACHMENT TO CONCRETE

NOT TO SCALE

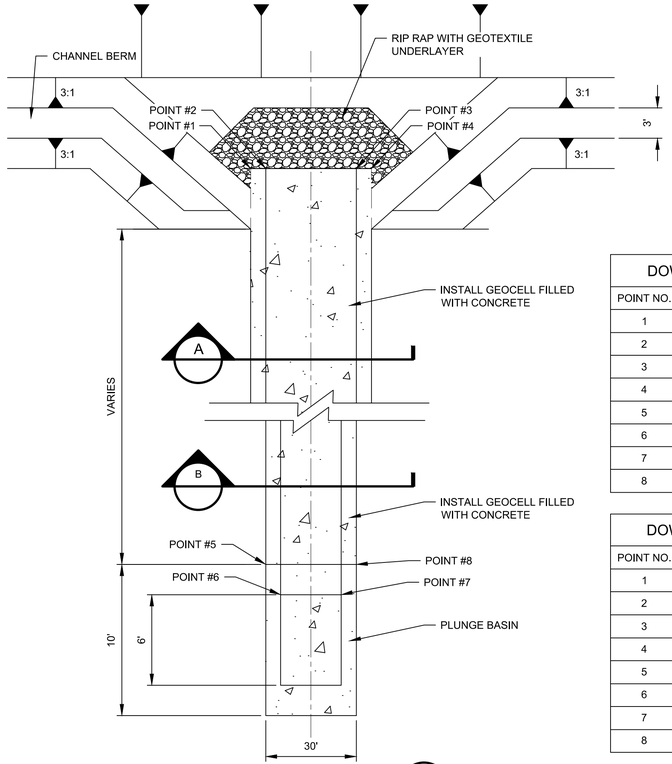
4



RIPRAP CHANNEL

NOT TO SCALE

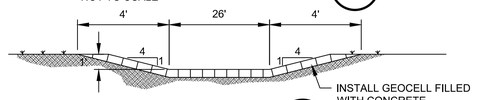
6



DOWN CHUTE "B" & "G"

NOT TO SCALE

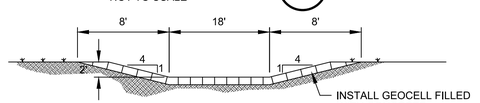
7



SECTION

NOT TO SCALE

A



SECTION

NOT TO SCALE

B

DOWNCHUTE "B" POINT TABLE			
POINT NO.	NORTHING	EASTING	ELEVATION
1	10221576.98	3637607.93	338.11
2	10221573.86	3637610.50	337.93
3	10221556.83	3637630.15	337.00
4	10221554.14	3637633.12	338.01
5	10221497.88	3637536.19	316.76
6	10221489.55	3637539.42	314.70
7	10221477.45	3637552.76	315.01
8	10221475.04	3637561.37	317.10

DOWNCHUTE "G" POINT TABLE			
POINT NO.	NORTHING	EASTING	ELEVATION
1	10221653.02	3639017.31	327.97
2	10221651.87	3639021.14	326.88
3	10221644.38	3639046.04	326.74
4	10221643.23	3639049.87	327.74
5	10221496.73	3638970.34	309.18
6	10221490.60	3638976.85	307.12
7	10221485.41	3638994.09	307.65
8	10221486.94	3639002.90	310.00

HDR
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972.960.4400

ISSUED FOR CONSTRUCTION

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PROJECT MANAGER D. VOGT, P.E.

PROJECT NUMBER 10290148

STATE OF TEXAS
DAVID C. VOGT
93905
LICENSED
PROFESSIONAL ENGINEER
8-2-21

1370

Gibbons Creek Environmental Redevelopment Group, LLC

SITE F LANDFILL CLOSURE
Anderson, Texas

MISCELLANEOUS DETAILS

0 1" 2"

FILENAME 00C-14.dwg
SCALE AS SHOWN

SHEET 00C-14

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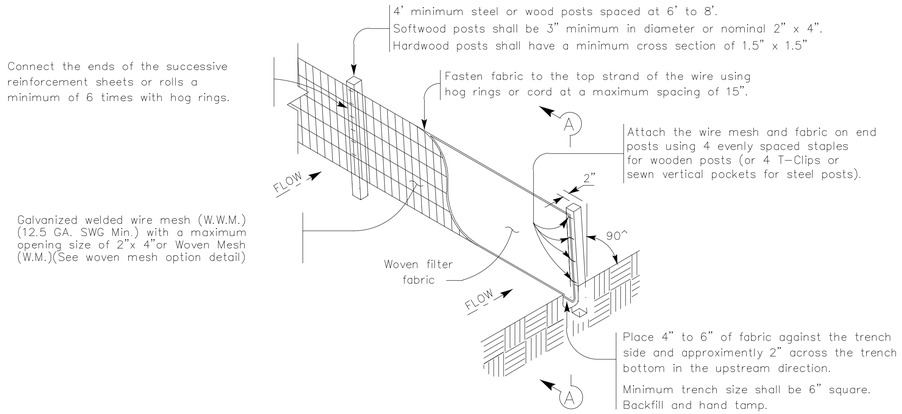
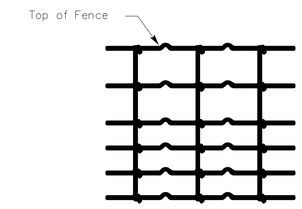
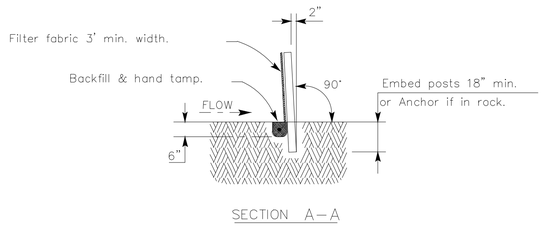


TEMPORARY SEDIMENT CONTROL FENCE



HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.



SECTION A–A

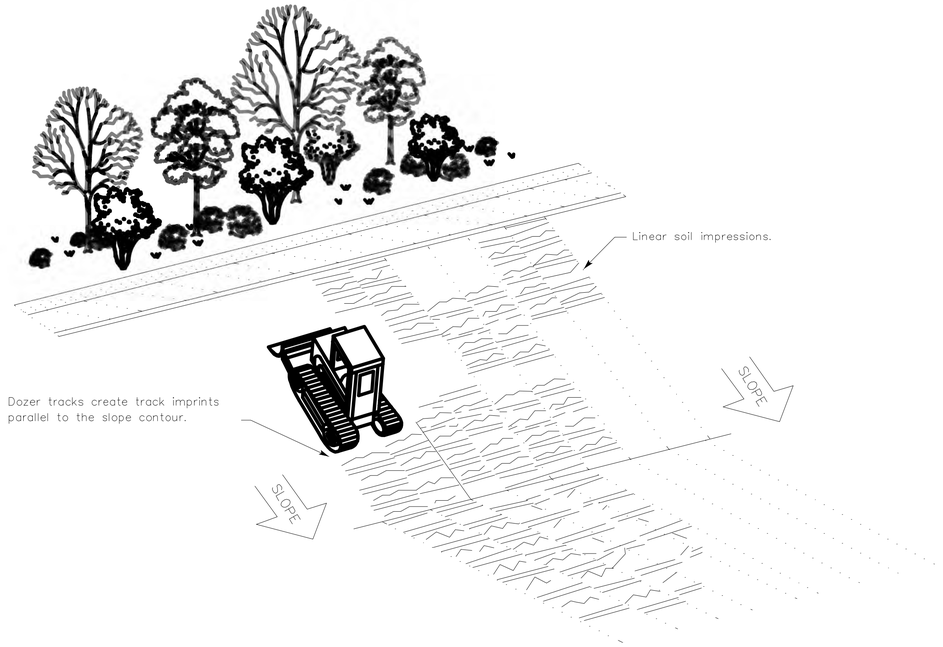
SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT . ^{2}Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS				
	DIST	COUNTY		SHEET NO.

HDR

ISSUED FOR CONSTRUCTION

HDR
Firm Registration No. F-754

17111 Preston Road, Suite 300
Dallas, Texas 75248-1229
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ISSUE	DATE	DESCRIPTION

PROJECT MANAGER D. VOGT, P.E.

PROJECT NUMBER 10290148

STATE OF TEXAS · DAVID C. VOGT · 93905 · LICENSED PROFESSIONAL ENGINEER · 8-2-21

1371

GCERG

Gibbons Creek Environmental Redevelopment Group, LLC

SITE F LANDFILL CLOSURE
Anderson, Texas

EROSION CONTROL DETAILS SILT FENCE

0 1" 2"

FILENAME 00C-15.dwg

SCALE AS SHOWN

SHEET 00C-15

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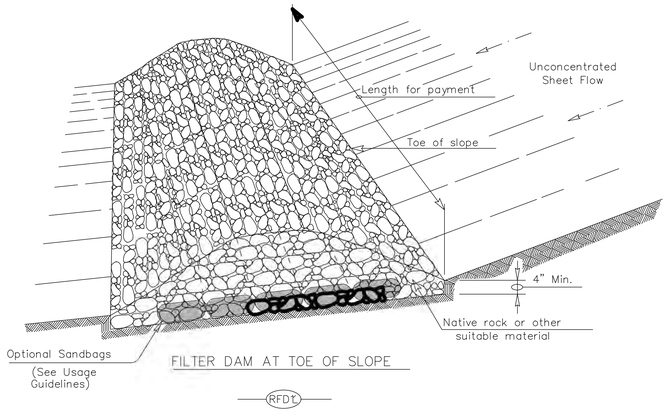
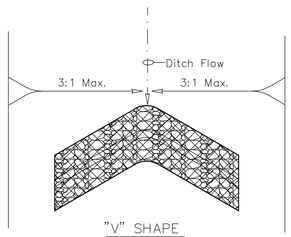
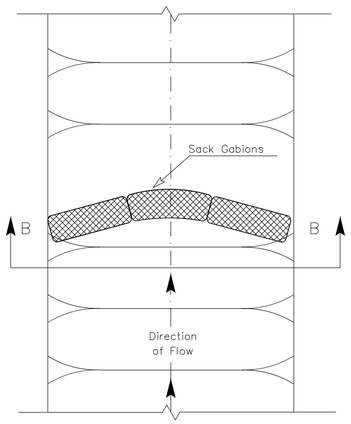


FILTER DAM AT TOE OF SLOPE

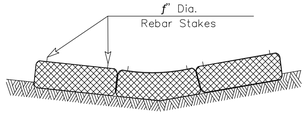
RFD1



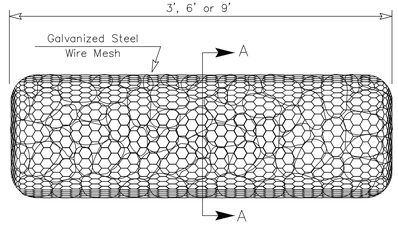
"V" SHAPE
PLAN VIEW



PLAN VIEW

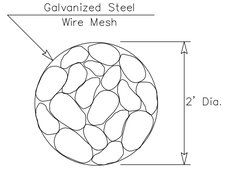


SECTION B–B

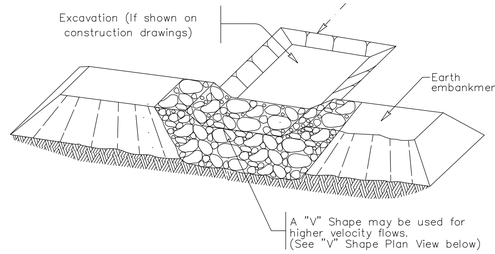


TYPE 4 (SACK GABIONS)

RFD4

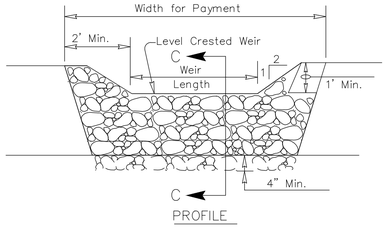


SECTION A–A

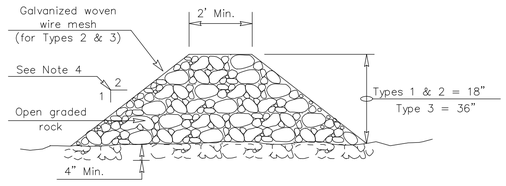


FILTER DAM AT SEDIMENT TRAP

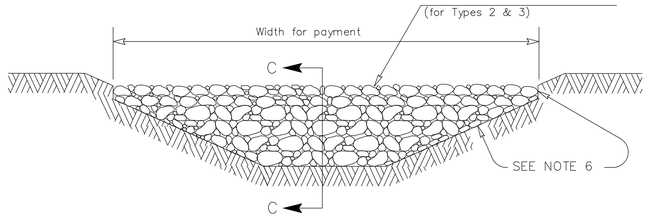
RFD1 OR RFD2



PROFILE



SECTION C–C



FILTER DAM AT CHANNEL SECTIONS

RFD1 OR RFD2 OR RFD3

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with f' dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 " x 3 ."
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/SQR FOOT of cross sectional area. A 2 year storm frequency may be used to calculate flow rate.

Type 1 (18" high with no wire mesh)(3" to 6" aggregate):
Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximately 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh)(3" to 6" aggregate):
Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh)(4" to 8" aggregate):
Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions)(3" to 6" aggregate):
Type 4 may be used in ditches and smaller channels to form an erosion control dam.

Type 5: Profide rock filter dams as shown on plans.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam	RFD1
Type 1 Rock Filter Dam	RFD2
Type 1 Rock Filter Dam	RFD3
Type 1 Rock Filter Dam	RFD4

Texas Department of Transportation — Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS				
	DIST	COUNTY		SHEET NO.

HDR
Firm Registration No. F-754

17111 Preston Road, Suite 300
Dallas, Texas 75248-1229
972.960.4400

ISSUED FOR CONSTRUCTION

ISSUE	DATE	DESCRIPTION

PROJECT MANAGER D. VOGT, P.E.

PROJECT NUMBER 10290148

STATE OF TEXAS · DAVID C. VOGT · 93905 · LICENSED · PROFESSIONAL ENGINEER · 8-2-21

1372

Gibbons Creek Environmental Redevelopment Group, LLC

SITE F LANDFILL CLOSURE
Anderson, Texas

EROSION CONTROL DETAILS
ROCK FILTER DAM

0 1" 2"

FILENAME 00C-16.dwg
SCALE AS SHOWN

SHEET 00C-16

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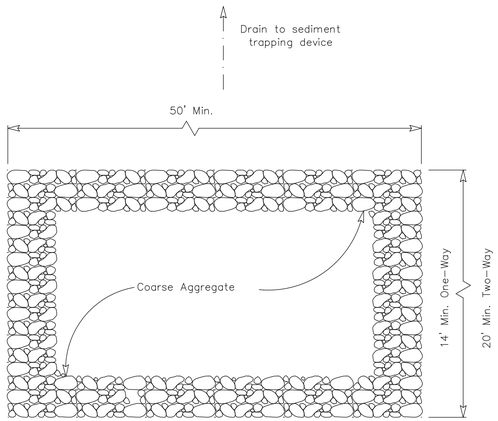
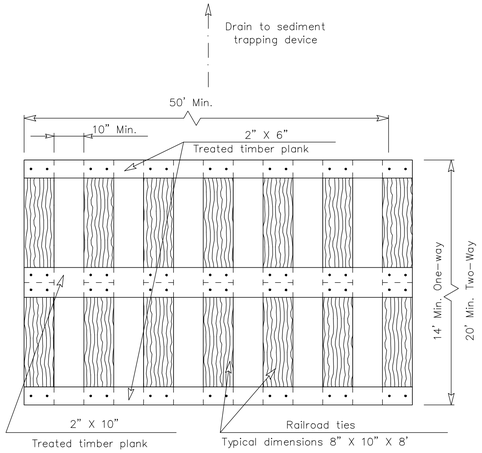
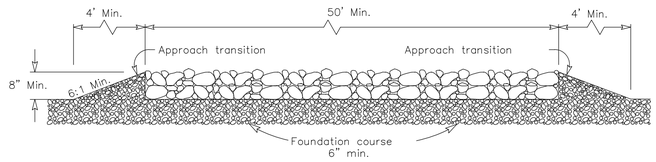


PLAN VIEW



PLAN VIEW



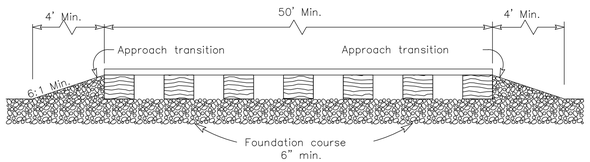
ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50'.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.



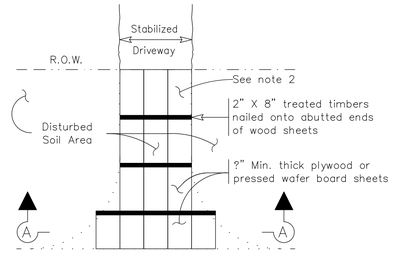
ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

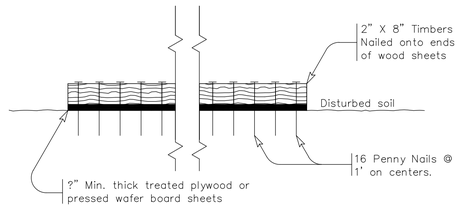
TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50'.
2. The treated timber planks shall be attached to the railroad ties with 9" x 6" min. lag bolts. Other fasteners may be used as approved by the engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown heron are suggestion only and may
8. be modified by the Engineer.
9. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.



PLAN VIEW



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

SHORT TERM

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

EC(3)-16

FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	C	S	J	HWY
	DIST	COUNTY		SHEET NO.
	DST	CTY	$EC(3A-1	

ISSUED FOR CONSTRUCTION

HDR
Firm Registration No. F-754

17111 Preston Road, Suite 300
Dallas, Texas 75248-1229
972.960.4400

ISSUE	DATE	DESCRIPTION

PROJECT MANAGER D. VOGT, P.E.

PROJECT NUMBER 10290148

STATE OF TEXAS
DAVID C. VOGT
93905
LICENSED
PROFESSIONAL ENGINEER
8-2-21

1373

Gibbons Creek Environmental Redevelopment Group, LLC

SITE F LANDFILL CLOSURE
Anderson, Texas

EROSION CONTROL DETAILS CONSTRUCTION EXITS

0 1" 2"

FILENAME 00C-17.dwg

SCALE AS SHOWN

SHEET 00C-17

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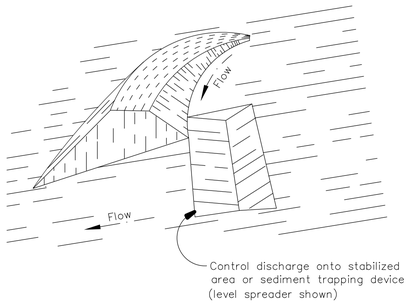
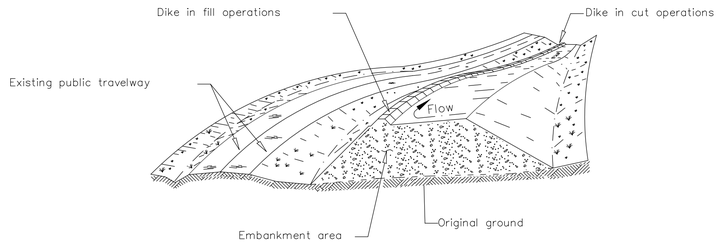
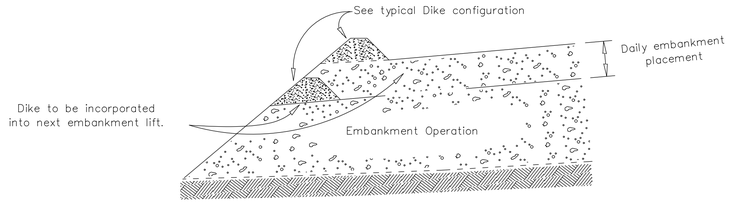


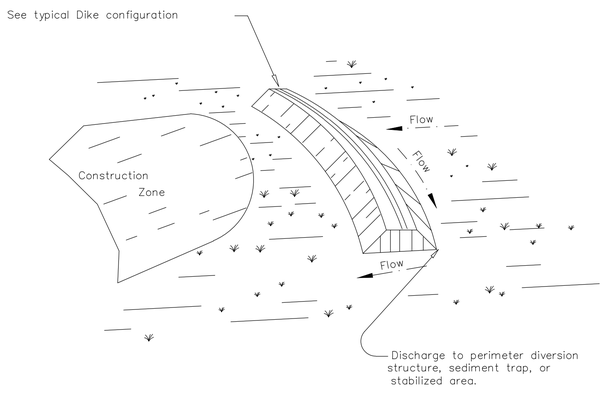
PERIMETER DIKE



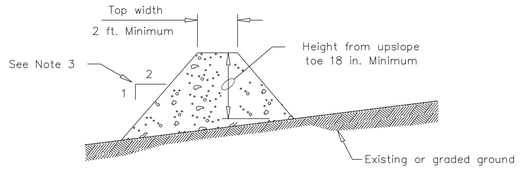
DIVERSION DIKE



EMBANKMENT SECTION – DIVERSION DIKE



INTERCEPTOR DIKE



TYPICAL DIKE CONFIGURATION

GENERAL NOTE

1. Soil used in dike construction shall be machine compacted.
2. Top width and height of dike may be modified with prior approval of the Engineer.
3. Side slopes within the safety clear zone of a roadway shall be 6:1 or flatter.
4. Grading shall be shown elsewhere in the plans or as directed by the Engineer.
5. The Engineer reserves the right to modify the dimensions shown for the dike dependent on runoff volume characteristics.
6. Dikes that are in place for more than 14 calendar days should be stabilized to prevent sediment runoff.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Remove sediment and debris when accumulation affects the performance of the devices, after a rain and when directed by the engineer.

DIKE USAGE GUIDELINES

A Dike may be used to intercept runoff and divert it around unstabilized areas or to divert sediment laden runoff to an erosion control device (sediment basin or trap, rock filter dam, etc.).

The drainage area contributing runoff to a dike should not exceed 5 acres. The spacing of dikes should be as follows:

Slope of disturbed areas above dike	greater than 10%	5 – 10%	less than 5%
Maximum distance between dikes	100'	200'	300'

Intercepted runoff flowing along a dike should outlet to a stabilized area (vegetation, rock, etc.).

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES DIKES (EARTHWORK FOR EROSION CONTROL)

EC(4)-16

FILE: ec416	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.

HDR
Firm Registration No. F-754
17111 Preston Road, Suite 300
Dallas, Texas 75248-1229
972.960.4400

ISSUED FOR CONSTRUCTION

ISSUE	DATE	DESCRIPTION

PROJECT MANAGER D. VOGT, P.E.

PROJECT NUMBER 10290148

STATE OF TEXAS
DAVID C. VOGT
93905
LICENSED
PROFESSIONAL ENGINEER
8-2-21
1374

Gibbons Creek Environmental Redevelopment Group, LLC

SITE F LANDFILL CLOSURE
Anderson, Texas

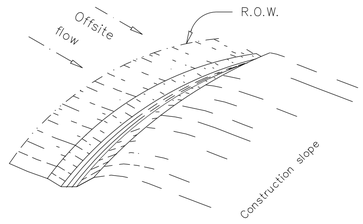
EROSION CONTROL DETAILS
DIKES

0 1" 2"

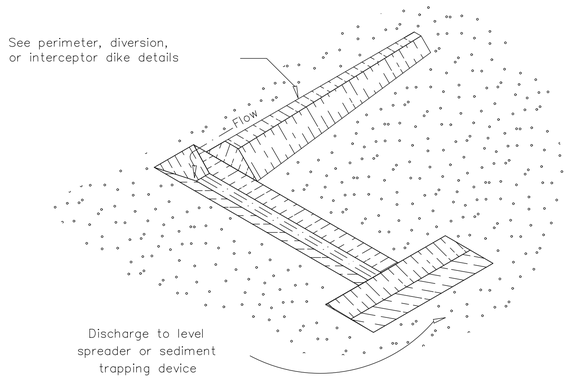
FILENAME 00C-18.dwg

SCALE AS SHOWN

SHEET 00C-18



PERIMETER SWALE



DIVERSION SWALE

GENERAL NOTE

1. Dimensions of swale may be modified with prior approval of the Engineer.
2. Side slopes within the safety clear zone of a roadway shall be 6:1 or flatter.
3. Grading shall be shown elsewhere on the plans or as directed by the Engineer.
4. The Engineer reserves the right to modify the dimensions shown for the swale dependent on runoff volume characteristics.
5. Swales that are in place for more than 14 calender days should be stabilized through seeding or other measures to control sediment runoff.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Remove sediment and debris when accumulation affects the performance of the devices, after a rain and when directed by the Engineer.

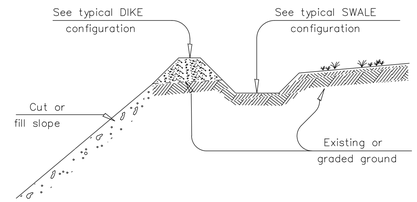
SWALE AND DIKE/SWALE USAGE GUIDELINES

A swale or dike/swale may be used to intercept runoff and divert it around unstabilized areas or to divert sediment laden runoff to an erosion control device (sediment basin or trap, rock filter dam, etc.).

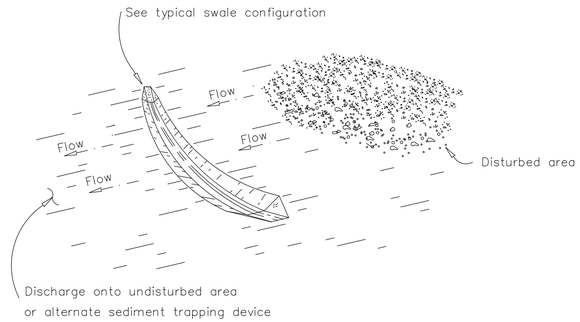
The drainage area contributing runoff to a swale or dike/swale should not exceed 5 acres. The spacing of swales and dike/swales should be as follows:

Slope of disturbed areas above dike	greater than 10%	5 – 10%	less than 5%
Maximum distance between dikes	100'	200'	300'

Intercepted runoff flowing in a swale or dike/swale should outlet to a stabilized area (vegetation, rock, etc.).



DIVERSION DIKE WITH SWALE

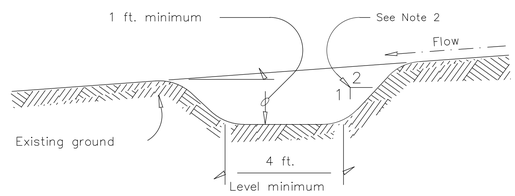


INTERCEPTOR SWALE

PLAN SHEET LEGEND

SWALE — S

DIKE — D



TYPICAL SWALE CONFIGURATION

Texas Department of Transportation — Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
SWALES
(EARTHWORK FOR EROSION CONTROL)

EC(5)-16

FILE: ec516	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS				
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ISSUED FOR CONSTRUCTION

HDR
Firm Registration No. F-754

17111 Preston Road, Suite 300
Dallas, Texas 75248-1229
972.960.4400

ISSUE	DATE	DESCRIPTION

PROJECT MANAGER D. VOGT, P.E.

PROJECT NUMBER 10290148

STATE OF TEXAS — DAVID C. VOGT — 93905 — LICENSED PROFESSIONAL ENGINEER — 8-2-21

1375

Gibbons Creek Environmental Redevelopment Group, LLC

SITE F LANDFILL CLOSURE
Anderson, Texas

EROSION CONTROL DETAILS
SWALES

0 1" 2"

FILENAME 00C-19.dwg

SCALE AS SHOWN

SHEET **00C-19**

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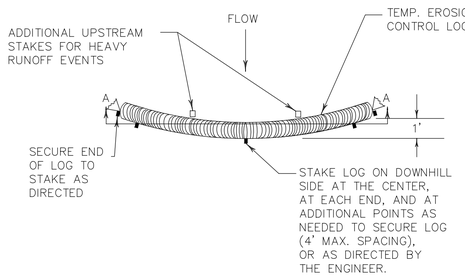
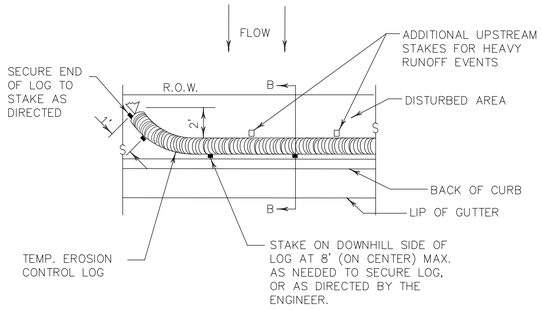
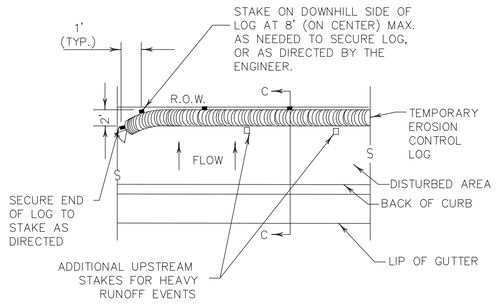


PLAN VIEW



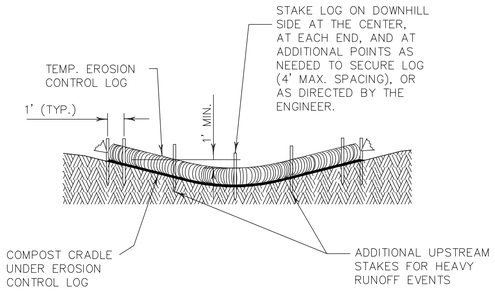
PLAN VIEW



PLAN VIEW

GENERAL NOTES:

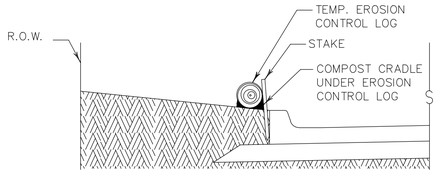
1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.



SECTION A–A

EROSION CONTROL LOG DAM

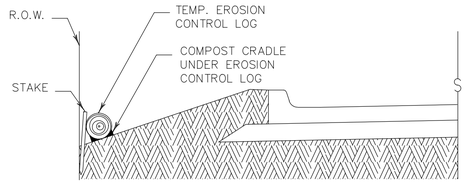
CL–D



SECTION B–B

EROSION CONTROL LOG AT BACK OF CURB

CL–BOC



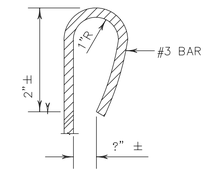
SECTION C–C

EROSION CONTROL LOG AT EDGE OF RIGHT–OF–WAY

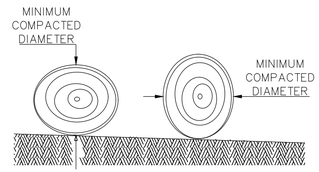
CL–ROW

LEGEND

- CL–D — EROSION CONTROL LOG DAM
- CL–BOC — EROSION CONTROL LOG AT BACK OF CURB
- CL–ROW — EROSION CONTROL LOG AT EDGE OF RIGHT–OF–WAY
- CL–SST — EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
- CL–SSL — EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
- CL–DI — EROSION CONTROL LOG AT DROP INLET
- CL–CI — EROSION CONTROL LOG AT CURB INLET
- CL–GI — EROSION CONTROL LOG AT CURB & GRATE INLET



REBAR STAKE DETAIL



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

SEDIMENT BASIN & TRAP USAGE GUIDELINES

An erosion control log sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.

Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:
1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage leaves the right of way
4. Just before the drainage leaves the construction limits where drainage flows away from the project.

The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.

Cleaning and removal of accumulated sediment deposits is indidental and will not be paid for separately.

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS				
	DIST	COUNTY		SHEET NO.

ISSUED FOR CONSTRUCTION

HDR
Firm Registration No. F-754

17111 Preston Road, Suite 300
Dallas, Texas 75248-1229
972.960.4400

ISSUE	DATE	DESCRIPTION

PROJECT MANAGER	D. VOGT, P.E.
PROJECT NUMBER	10290148

STATE OF TEXAS
DAVID C. VOGT
93905
LICENSED
PROFESSIONAL ENGINEER
8-2-21

1376

Gibbons Creek Environmental Redevelopment Group, LLC

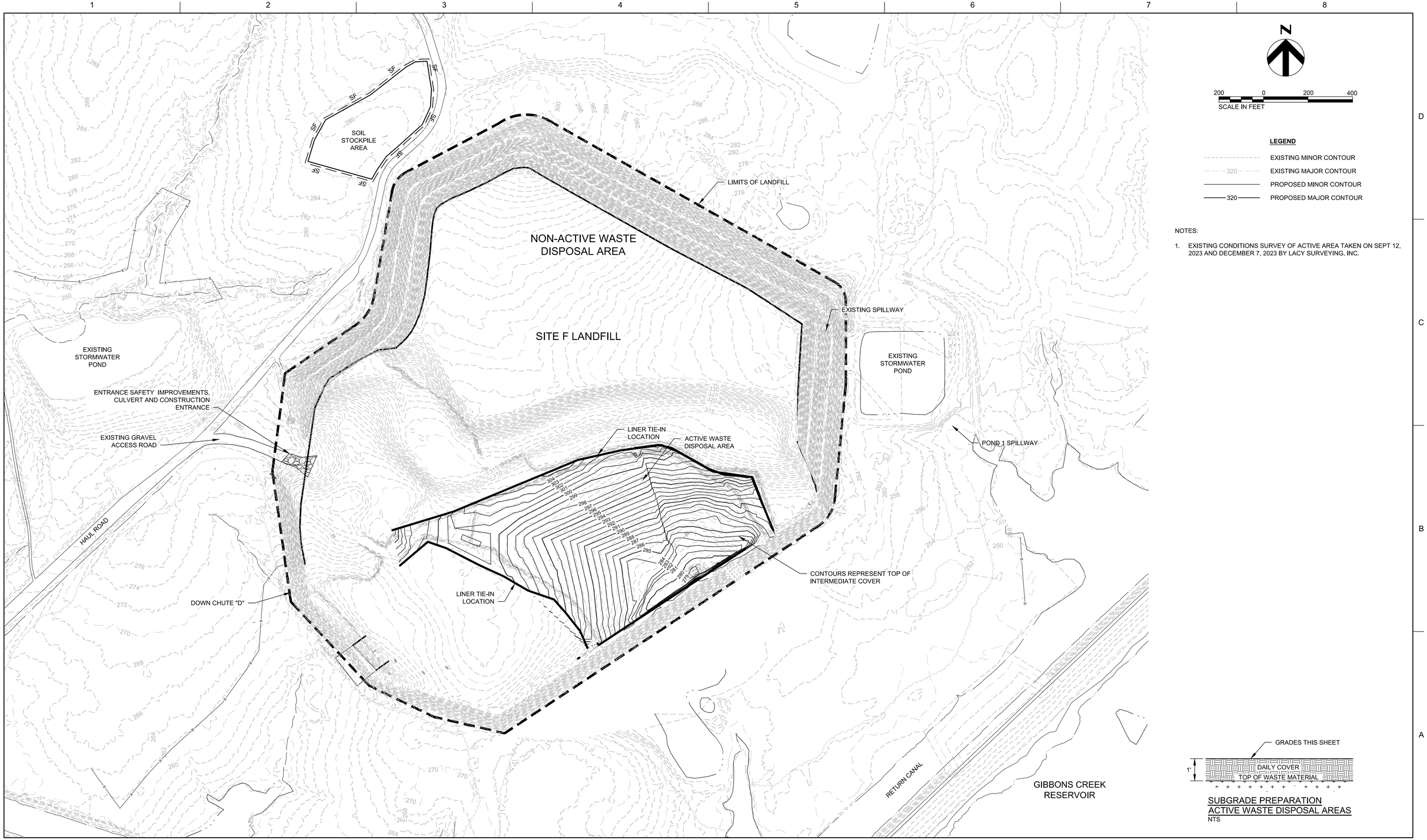
SITE F LANDFILL CLOSURE
Anderson, Texas

EROSION CONTROL DETAILS
EROSION CONTROL LOG

0 1" 2"

FILENAME 00C-20.dwg
SCALE AS SHOWN

SHEET 00C-20



NOTES:

1. EXISTING CONDITIONS SURVEY OF ACTIVE AREA TAKEN ON SEPT 12, 2023 AND DECEMBER 7, 2023 BY LACY SURVEYING, INC.

HDR
Firm Registration No. F-754

17111 Preston Road, Suite 300
Dallas, Texas 75248-1229
972.960.4400

ISSUE	DATE	DESCRIPTION
2	12/5/2023	REVISED PER FINAL CCR GRADING
1	09/18/2023	POND 1-4 FINAL CLOSURE QUANTITY
0	08/17/2023	ISSUED FOR CONSTRUCTION

PROJECT MANAGER D. VOGT, P.E.

PROJECT NUMBER 10290148

STATE OF TEXAS
DAVID C. VOGT
93905
LICENSED
PROFESSIONAL ENGINEER
12/5/2023
1377

Gibbons Creek Environmental Redevelopment Group, LLC

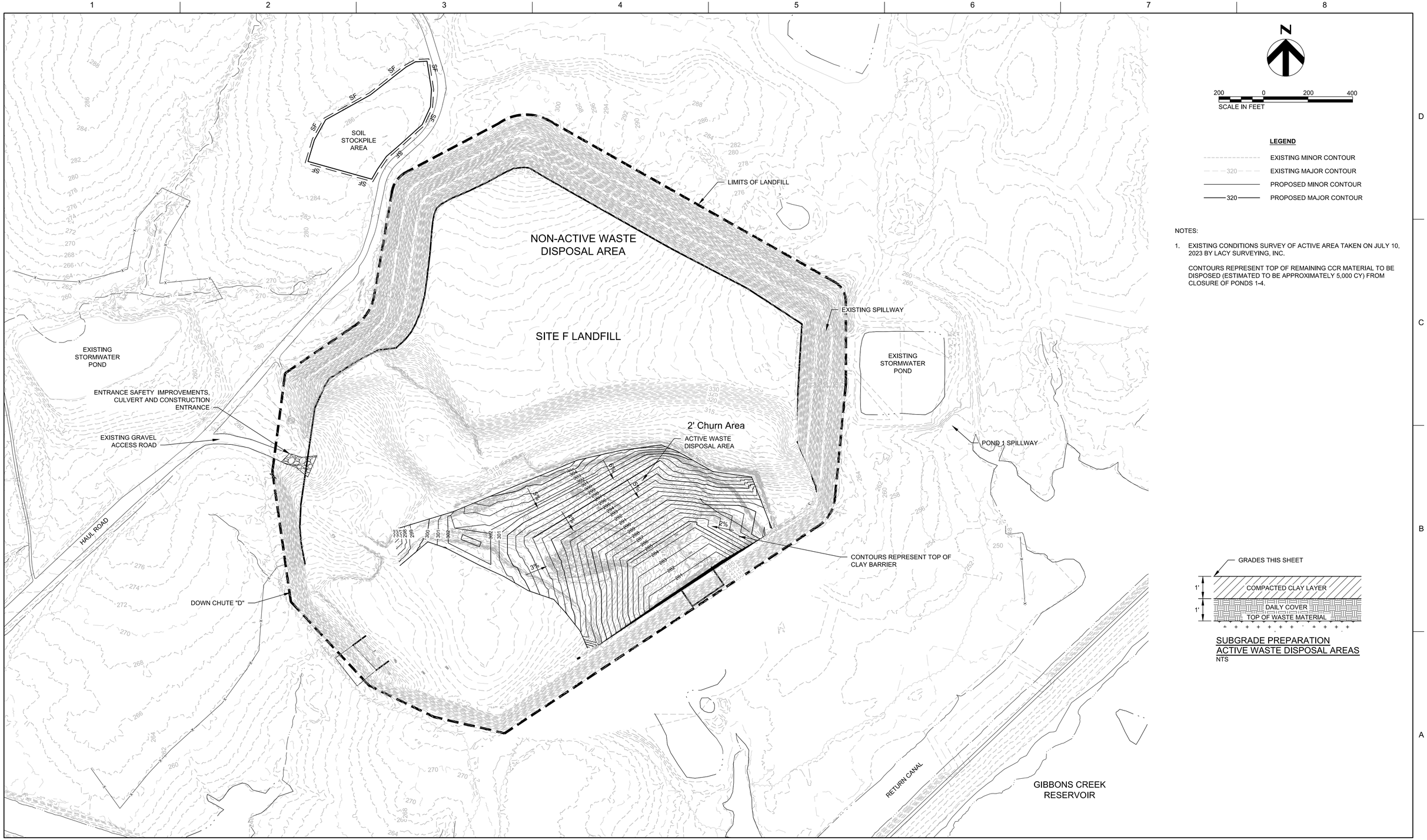
SITE F LANDFILL CLOSURE
Anderson, Texas

CCR PLACEMENT
ACTIVE AREA-TOP OF INTERMEDIATE COVER

0 1" 2"

FILENAME 00C-10E2.dwg
SCALE 1"=200'

SHEET
00C-10E2



NOTES:

1. EXISTING CONDITIONS SURVEY OF ACTIVE AREA TAKEN ON JULY 10, 2023 BY LACY SURVEYING, INC.

   CONTOURS REPRESENT TOP OF REMAINING CCR MATERIAL TO BE DISPOSED (ESTIMATED TO BE APPROXIMATELY 5,000 CY) FROM CLOSURE OF PONDS 1-4.

HDR
Firm Registration No. F-754

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ISSUE	DATE	DESCRIPTION
0	8/17/2023	ISSUED FOR CONSTRUCTION

PROJECT MANAGER D. VOGT, P.E.

PROJECT NUMBER 10290148

STATE OF TEXAS
DAVID C. VOGT
93905
LICENSED
PROFESSIONAL ENGINEER

8/17/2023

1378

Gibbons Creek Environmental Redevelopment Group, LLC

SITE F LANDFILL CLOSURE
Anderson, Texas

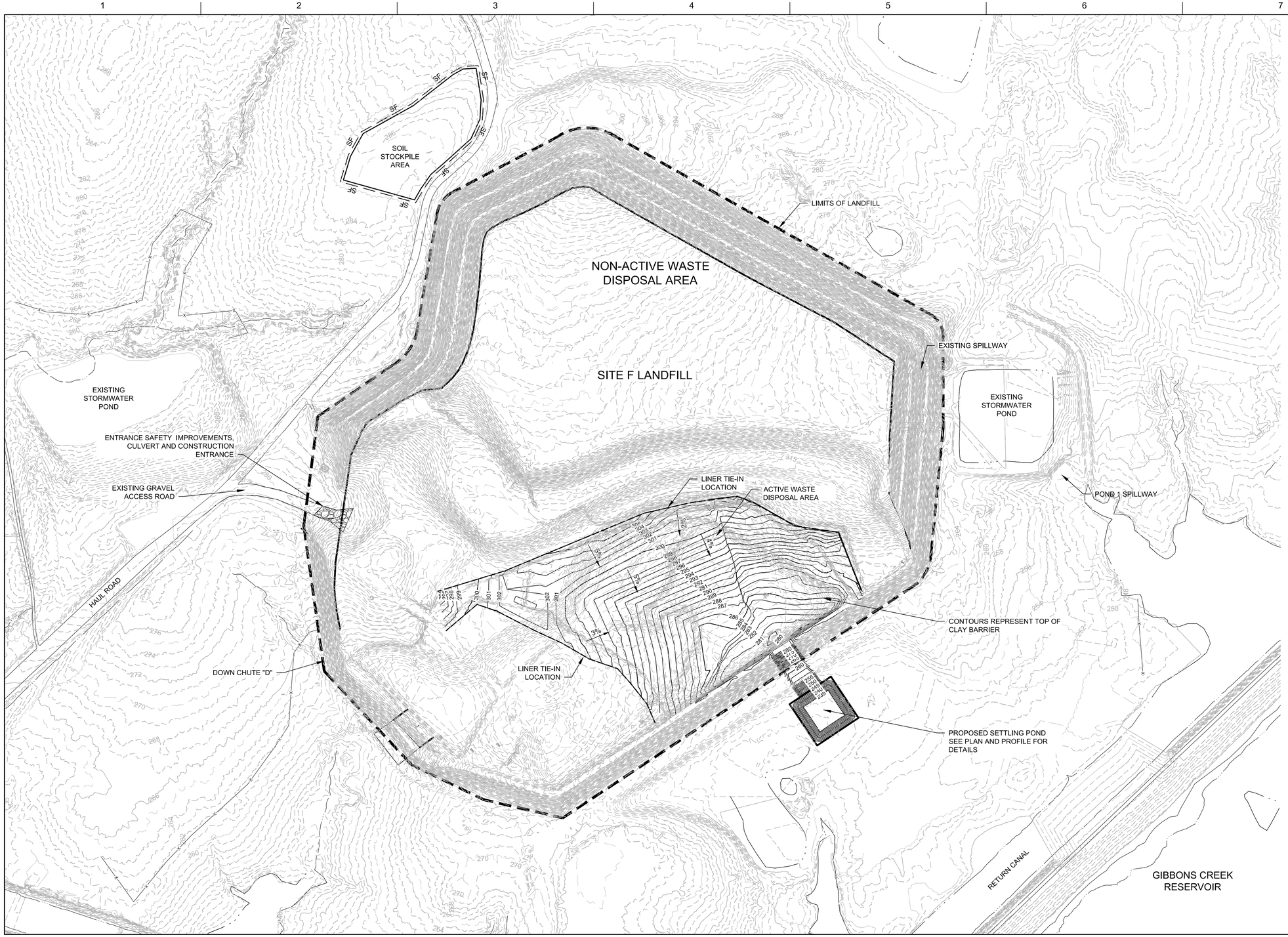
CCR PLACEMENT
ACTIVE AREA-TOP OF CLAY BARRIER

0 1" 2"

FILENAME 00C-10E3.dwg

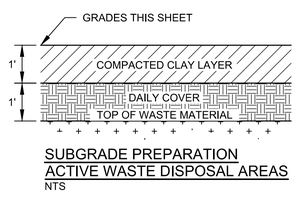
SCALE 1"=200'

SHEET **00C-10E3**



NOTES:

1. EXISTING CONDITIONS SURVEY OF ACTIVE AREA TAKEN ON SEPT 12, 2023 AND DECEMBER 7, 2023 BY LACY SURVEYING, INC.



SUBGRADE PREPARATION
ACTIVE WASTE DISPOSAL AREAS
NTS

HDR
Firm Registration No. F-754

17111 Preston Road, Suite 300
Dallas, Texas 75248-1229
972.960.4400

ISSUE	DATE	DESCRIPTION
2	12/5/2023	REVISED PER FINAL CCR GRADING
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0	08/17/2023	ISSUED FOR CONSTRUCTION

PROJECT MANAGER D. VOGT, P.E.

PROJECT NUMBER 10290148

STATE OF TEXAS
DAVID C. VOGT
93905
LICENSED
PROFESSIONAL ENGINEER
12/5/2023
1379

Gibbons Creek Environmental Redevelopment Group, LLC

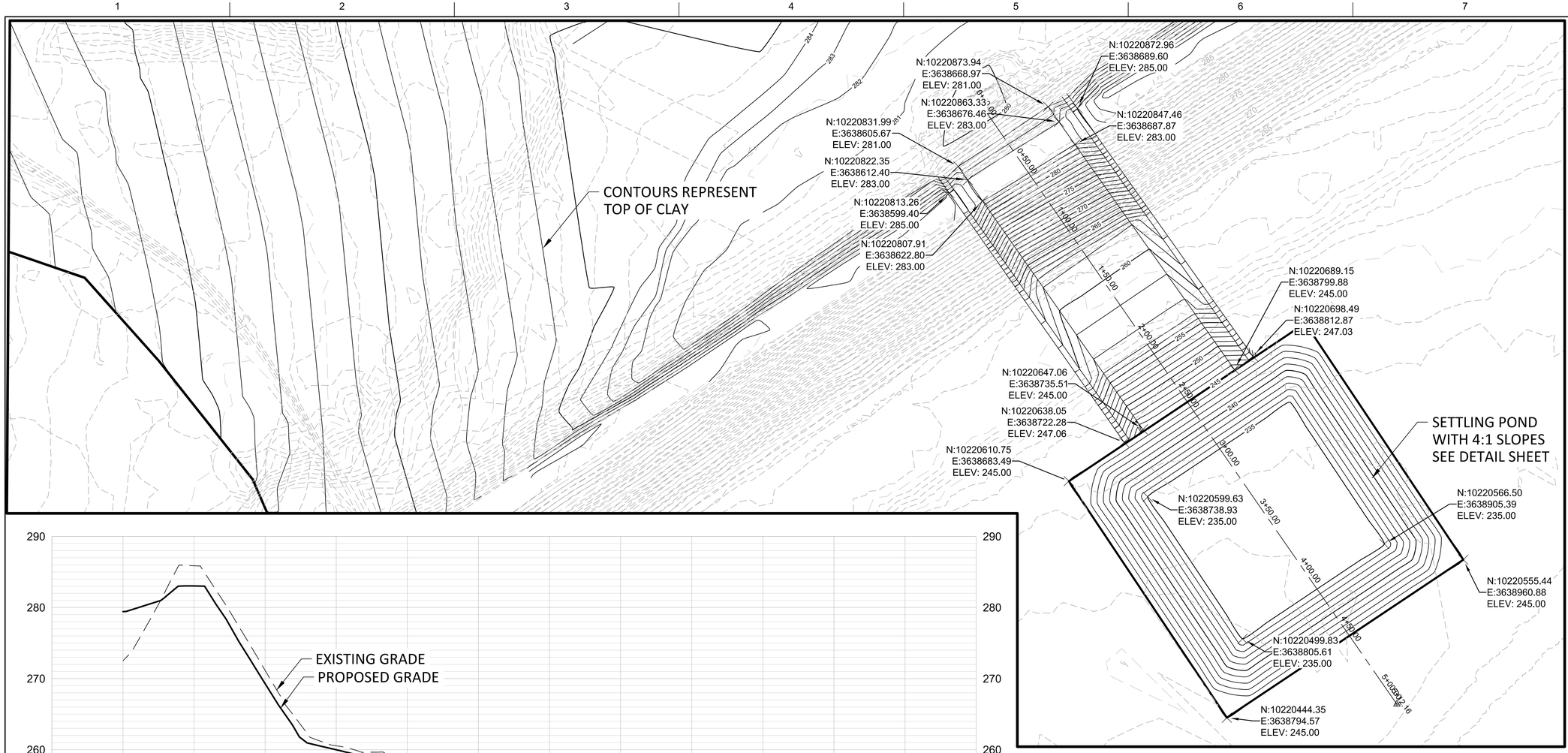
SITE F LANDFILL CLOSURE
Anderson, Texas

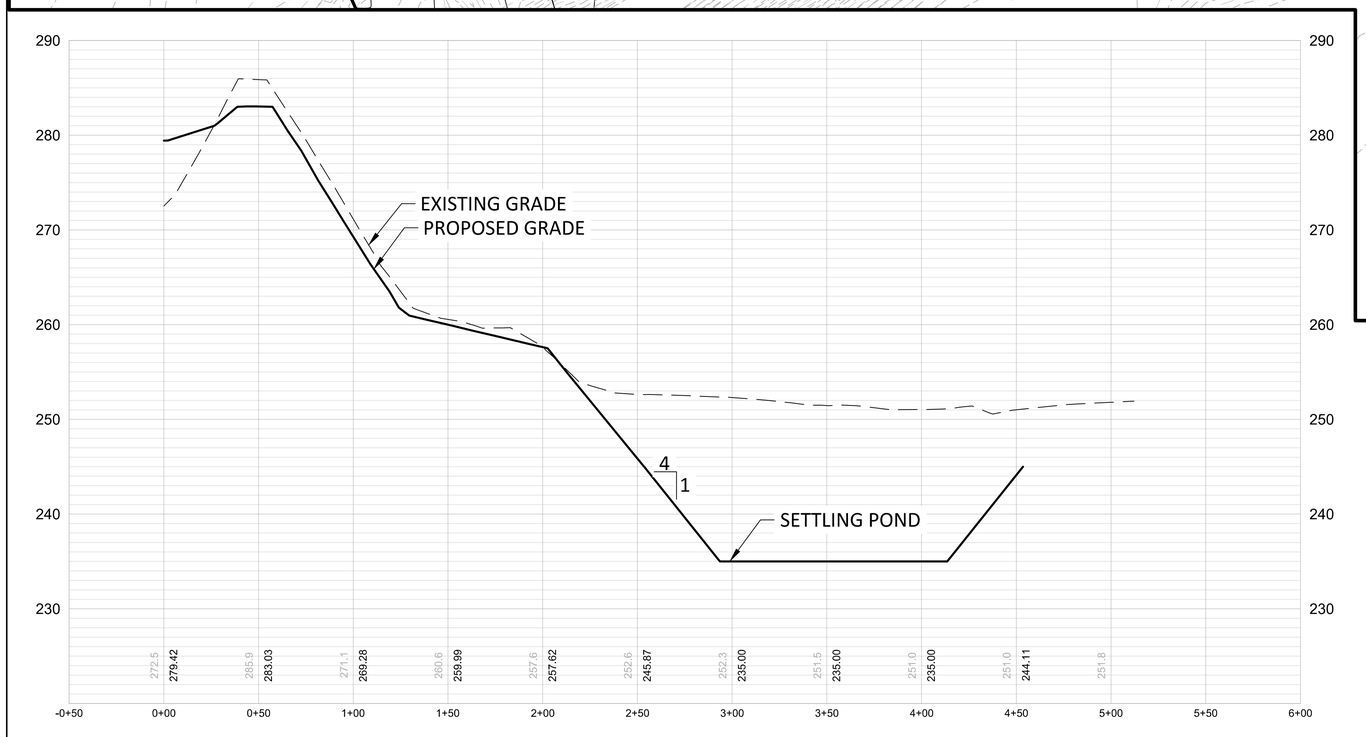
CCR PLACEMENT
ACTIVE AREA-TOP OF CLAY BARRIER

0 1" 2"

FILENAME 00C-10E3.dwg
SCALE 1"=200'

SHEET
00C-10E3





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17111 Preston Road, Suite 300
Dallas, Texas 75248-1229
972.960.4400

ISSUE	DATE	DESCRIPTION
0	12/14/2023	ISSUED FOR CONSTRUCTION

PROJECT MANAGER D. VOGT, P.E.
PROJECT NUMBER 10290148

STATE OF TEXAS
DAVID C. VOGT
93905
LICENSED
PROFESSIONAL ENGINEER
12/14/2023

1380

GCERG

Gibbons Creek Environmental Redevelopment Group, LLC

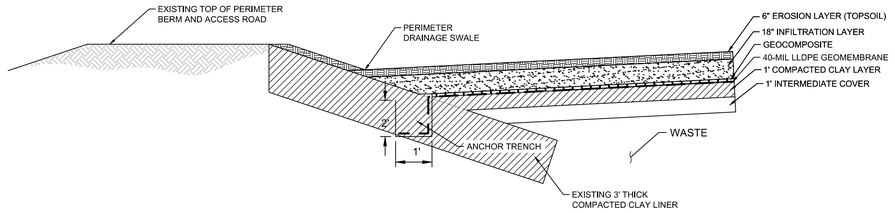
SITE F LANDFILL CLOSURE
Anderson, Texas

MISCELLANEOUS DETAILS SHEET 2

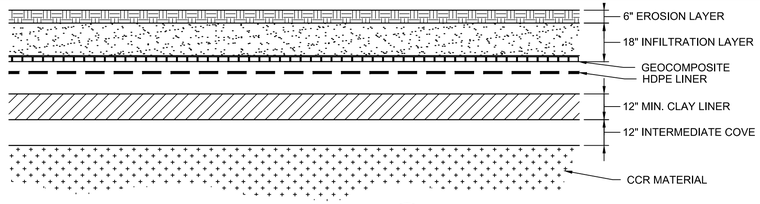
0 1" 2"

FILENAME 00C-14.dwg
SCALE AS SHOWN

SHEET
00C-14

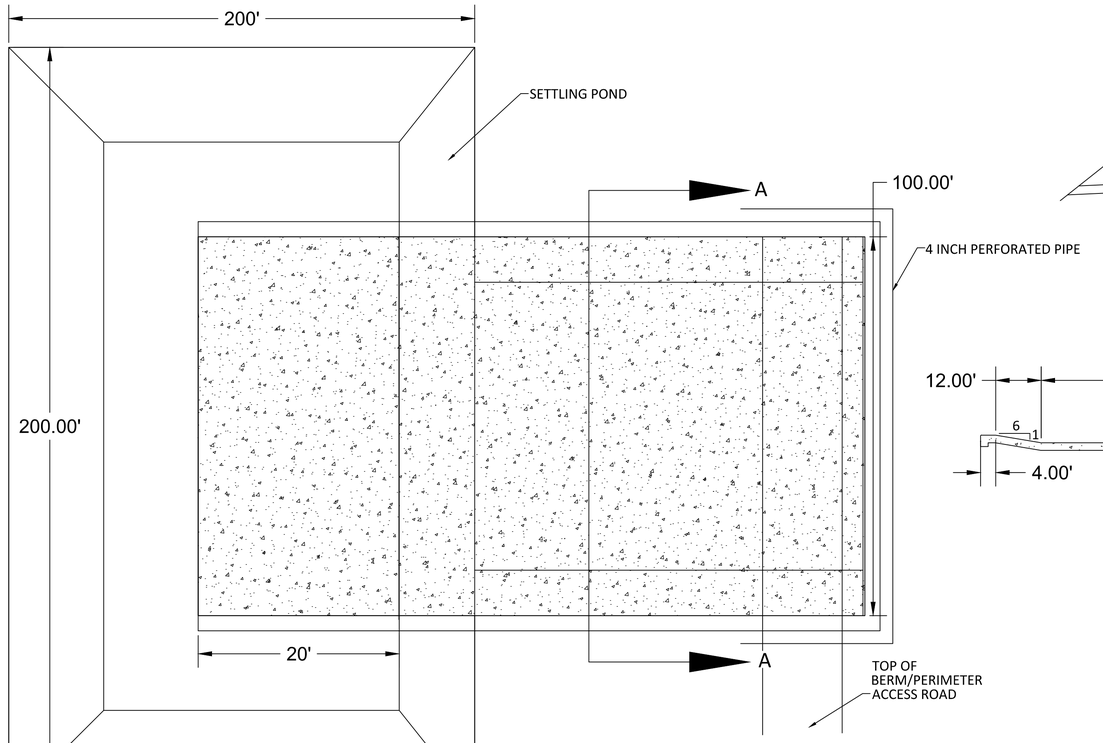


PERIMETER BERM CLOSURE CONSTRUCTION (1)
NOT TO SCALE

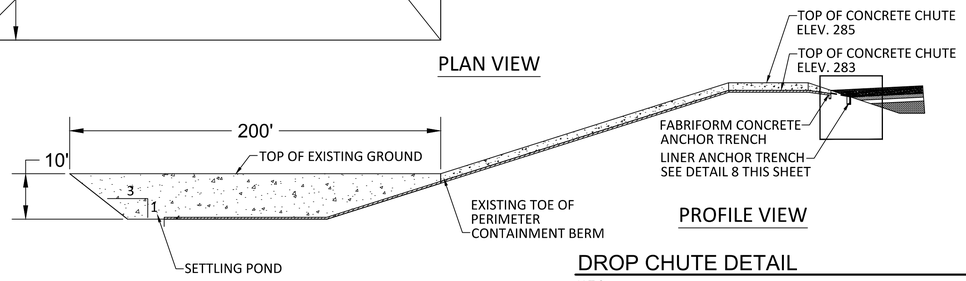


LINER DETAIL (2)
NOT TO SCALE

NOTES:
1. EXISTING TOPOGRAPHY FROM LACY LIDAR SURVEY DATED OCTOBER, 2023, AND DECEMBER 7, 2023.

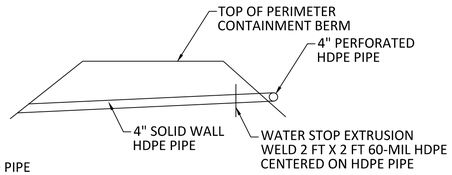


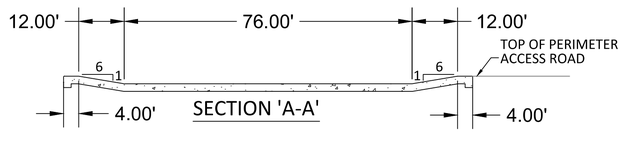
PLAN VIEW

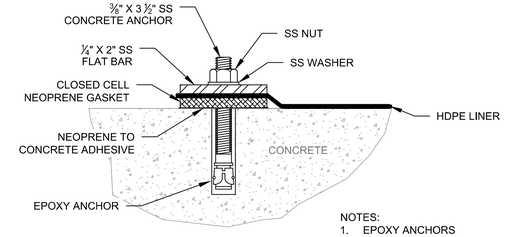


PROFILE VIEW

DROP CHUTE DETAIL (3)
N.T.S.

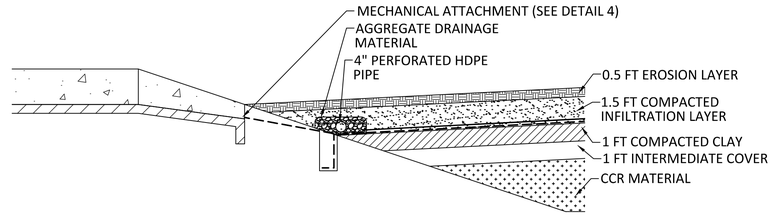






NOTES:
1. EPOXY ANCHORS
2. SPACED AT 6" O.C.

MECHANICAL ATTACHMENT TO CONCRETE (4)
NOT TO SCALE



DOWN CHUTE ANCHOR TRENCH DETAIL (8)
N.T.S.

HDR
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ISSUE	DATE	DESCRIPTION
0	12/14/2023	ISSUED FOR CONSTRUCTION

PROJECT MANAGER D. VOGT, P.E.
PROJECT NUMBER 10290148

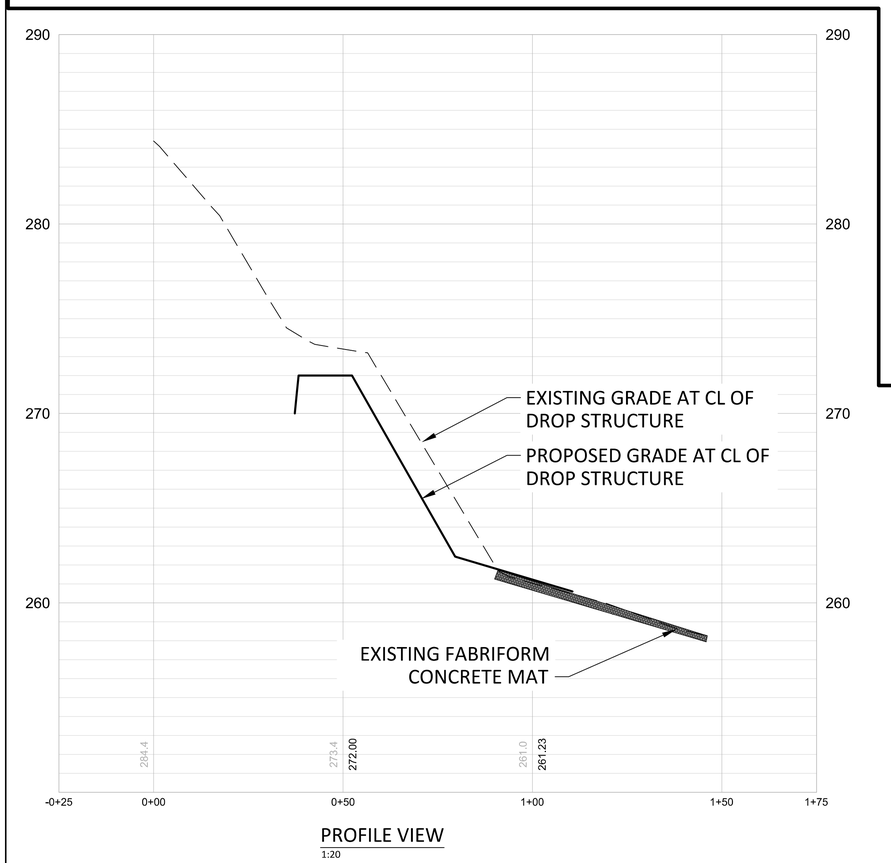
STATE OF TEXAS
DAVID C. VOGT
93905
LICENSED
PROFESSIONAL ENGINEER
1381
12/14/2023

Gibbons Creek Environmental Redevelopment Group, LLC

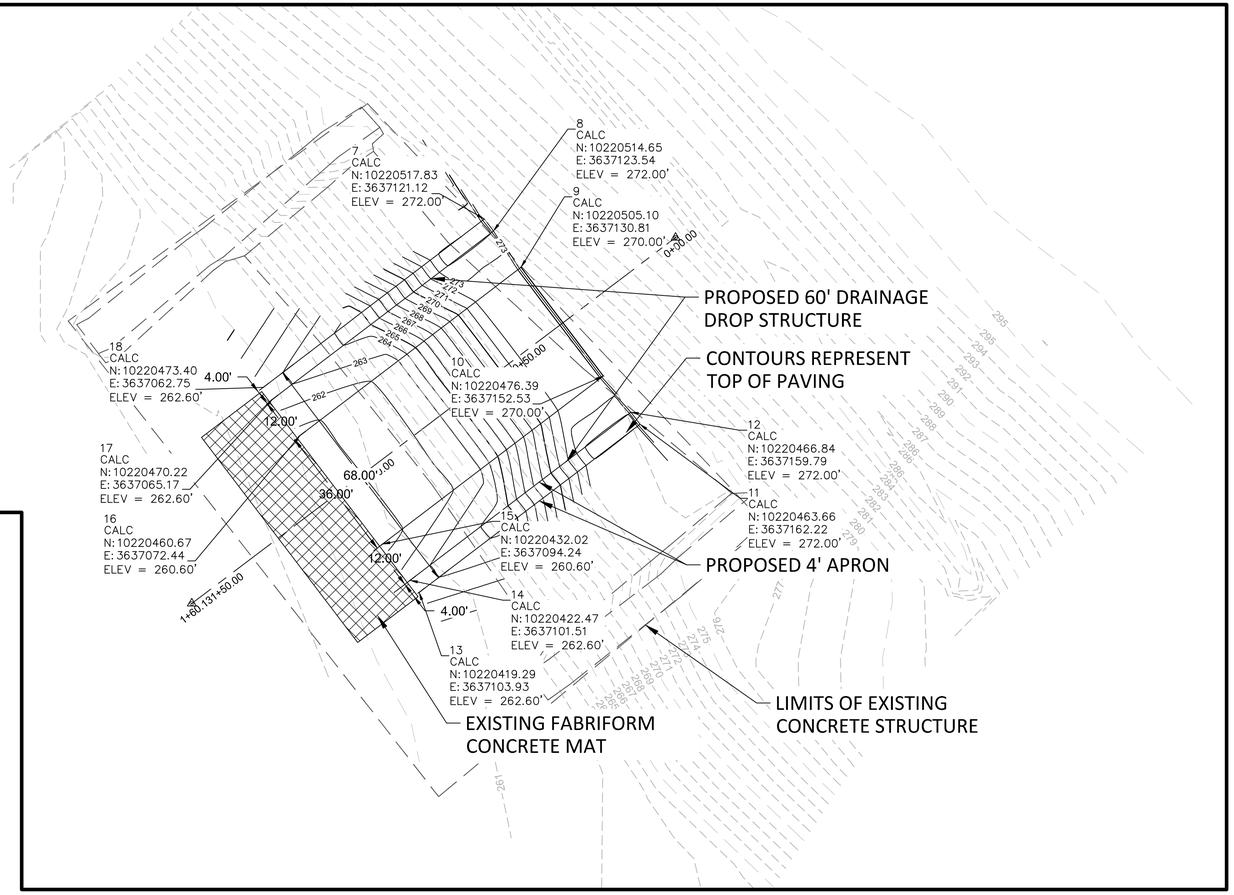
SITE F LANDFILL CLOSURE
Anderson, Texas

MISCELLANEOUS DETAILS SHEET 1

0 1" 2"
FILENAME 00C-14.dwg
SCALE AS SHOWN
SHEET 00C-14



PROFILE VIEW
1:20



PLAN VIEW
1:20

			PROJECT MANAGER D. VOGT, P.E.
0	02/16/2024	ISSUE FOR CONSTRUCTION	
ISSUE	DATE	DESCRIPTION	PROJECT NUMBER 10290148

STATE OF TEXAS
DAVID C. VOGT
93905
LICENSED
PROFESSIONAL ENGINEER
1382
02/16/2024

HDR
Firm Registration No. F-754

17111 Preston Road, Suite 300
Dallas, Texas 75248-1229
972.960.4400

Gibbons Creek Environmental Redevelopment Group, LLC

SITE F LANDFILL CLOSURE
Anderson, Texas

BARNEY POND DOWN CHUTE

0 1" 2"

FILENAME WEST DROP.dwg
SCALE 1:20

SHEET
WEST DROP

Gibbons Creek Environmental Redevelopment Group, LLC

Site A and Site F Landfill Closure

Construction Documents
Project Manual

Issued for Construction

August 2, 2021

Prepared by HDR

HDR Project No. 10290148
Texas Firm Registration No. F-754

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The following specifications were prepared under my direction:

Division 01, Division 31, Division 32 and Division 33.

David C. Vogt, P.E.
HDR ENGINEERING, INC.
TEXAS REGISTERED ENGINEERING FIRM F-754

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01 33 00 - SUBMITTALS
01 35 05 - ENVIRONMENTAL PROTECTION AND SPECIAL CONTROLS
01 50 00 - TEMPORARY FACILITIES AND CONTROLS
01 65 50 - PRODUCT DELIVERY, STORAGE, AND HANDLING

DIVISION 31 — EARTHWORK
31 10 00 - SITE CLEARING
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33 40 00 - STORM DRAINAGE SYSTEM

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SECTION 01 30 00
SPECIAL CONDITIONS

PART 1 - GENERAL

1.1 CONDITIONS SPECIFIC TO THIS PROJECT

A. DANGER – A concentration of H_2S poisonous gas may be present near discharge drains, leachate equipment or low-lying areas. Detection equipment is required when working in areas where H_2S may be present.

B. DANGER – Some leachate and/or CCR contact water may be acidic. Contractor to take any necessary precautions while working with leachate water.

C. CQC/CQA Duties: The CQA Consultant may conduct all required testing and certify the project. If utilized, the CQC Consultant will provide all documentation to the CQA Consultant for review and inclusion in the certification to TCEQ. Refer to the CQA Plan.

D. The CONTRACTOR is responsible for construction/maintenance of any additional access/haul roads as approved by the OWNER.

E. The CONTRACTOR is responsible for maintaining the Erosion and Sediment Control measures.

F. CONTRACTOR is to obtain all soil material from on-site. Stockpiling of soil material shall be as indicated or as approved by Engineer and Owner.

G. Hours of Construction shall be as agreed by the OWNER. Construction may occur on Legal Holidays with permission from the OWNER. The OWNER may allow the CONTRACTOR to extend the Hours of Construction provided there are not complaints from the community and the OWNER approves of the extension. If the OWNER receives any complaints, then the OWNER may revoke the extended hours of construction.

H. Testing:
   1. CQA Consultant will be responsible for Soil and Concrete Testing:
   2. The Contractor will be responsible for payment of failed soils and concrete tests and any corrective actions necessary to get passing results.
   3. Other testing: Required testing, testing procedures, reports, certificates, and costs associated with all phases of securing required satisfactory test information which may be required by individual sections of Specifications or Drawings are the full responsibility of the Contractor.
   4. Testing results: Contractor shall provide Owner and Engineer copies of all test results.
      a. Test results may be submitted to Owner and Engineer in electronic pdf format.

1.2 DEFINITIONS

The following terms and definitions shall be used unless defined differently in other specifications.

- Engineer – Consultant responsible for design of specific portions of project.
- CQA Consultant – Engineer hired by Owner to provide construction materials testing.
- Owner – Gibbons Creek Environmental Redevelopment Group (GCERG)
- GCSES – Gibbons Creek Steam Electric Station
- APs – Ash Ponds (A, B, and C)
- CoY – Coal Yard
- FGD Complex – Flue Gas Desulfurization Complex
- PCP – Plant Collection Pond
- SSP – Scrubber Sludge Pond
- SFL – Site F Landfill
- SAL – Site A Landfill

1.3 PROJECT MEETINGS

A. A preconstruction conference shall be held at the site with the ENGINEER, CONTRACTOR's Project Manager and Project Superintendent and CONTRACTOR's Subcontractor Representatives. The purpose is to review sequence of work and communication procedures.

B. Pre-Installation Conferences:
   1. Coordinate and schedule with Resident Project Representative and ENGINEER for each material, product or system specified. Conferences to be held prior to initiating installation, but not more than two (2) weeks before scheduled initiation of installation.
      a. Conferences may be combined if installation schedule of multiple components occurs within the same two (2) week interval.
      b. Review manufacturers recommendations and Contract Documents Specifications.
   2. CONTRACTOR's Superintendent and individual who will actually act as foreman of the installation crew (installer), if other than the Superintendent, shall attend.

C. Construction Meetings:
   1. The ENGINEER will conduct construction meetings involving:
      a. CONTRACTOR's project manager.
      b. CONTRACTOR's project superintendent.
      c. OWNER's designated representative(s).
      d. ENGINEER's designated representative(s).
      e. CONTRACTOR's subcontractors as appropriate to the work in progress.
      f. ENGINEER'S Construction Quality Consultant(s).
   2. Frequency of meetings to be as agreed upon at the Pre-Construction Meeting.
   3. The ENGINEER will take meeting minutes and submit copies of meeting minutes to participants and designated recipients identified at the Preconstruction Conference. Corrections, additions or deletions to the minutes shall be noted and addressed at the following meeting.
   4. The CONTRACTOR shall have available at each meeting up-to-date record drawings

1.4 DATA AND MEASUREMENTS

A. The data given in the Specifications and shown on the Drawings is believed to be accurate but the accuracy is not guaranteed. The Contractor must take all levels, locations, measurements, and verify all dimensions of the job site prior to construction and must adapt his work into the exact construction. Larger scale Drawings take precedence over smaller scale Drawings, and approved shop drawings take precedence over all others.

B. All surveys shall be sealed by a Texas registered land surveyor and submitted to the Engineer. The Contractor shall provide the Engineer with an electronic version of the sealed survey in AutoCAD readable format. Provide unique layers for 1 FT contours, index contours, text, water, vegetation, buildings, roads, etc. Utilize Texas State Plane coordinate system (Central Zone, NAD 83) and locate all features in x, y, and z dimensions.

C. Initial survey shall include the following:
   1. Topography of the Scrubber Sludge Pond, Ash Ponds, Site A Landfill, Site F Landfill, and Soil Borrow Area(s).
   2. Topography of the stockpile areas.
   3. Topography within limits of construction including:
      a. Topography of all leachate collection and storm water ponds.
      b. Location of existing channels.
      c. Location of structures.
      d. Inverts of pipe, size, and pipe location.

D. Final as-built survey shall include the following, for example:
   1. Topography of the entire area within limits of construction.
   2. Limits of landfill cap placement.

3. Topography of the stockpile areas and all other disturbed areas.
4. Location of roads.
5. Location of channels.
6. Topography of all stormwater control enhancements and associated outlet structures.
7. Culverts (invert, size, locations).
8. Other areas or items that were a part of the Work as directed by the Engineer.
9. Locations of leachate pipes, toe drain pipes, down chutes, valves, sumps, and ponds.

E. During construction, the contractor shall submit to the Engineer for review preliminary surveys that depict thickness verification of the soil layers.

F. Thickness verification may be done with a table or by electronic comparison of drawing files. The method shall be agreed to by the CQA and ENGINEER prior to construction. If the table method is selected, the same point on each soil layer must be used. The thickness is to be measured perpendicular to the slope. Refer to the soil specifications for frequency of points.

G. Contractor shall preserve and protect all reference points and pay for replacement of any destroyed referenced points.

H. Additional requirements are set forth in the CQA Plan.

1.5 SPECIAL CONSIDERATIONS

A. CONTRACTOR shall be responsible for negotiations of any waivers or alternate arrangements required to enable transportation of materials to the site.

B. Maintain conditions of access road to site such that access is not hindered as the result of construction related deterioration.

C. Safety:
1. The CONTRACTOR alone shall be solely and completely responsible for conditions of the job site in connection with his work, including safety of all personas and property, preparatory to and during performance of the work. This requirement shall apply continuously and not be limited to normal working hours.
2. The Construction Documents and the construction hereby contemplated, are to be governed, at all times, by applicable provisions of local and state laws and regulations, and federal laws, including, but not limited to, the latest amendments of the following: Department of Labor, Bureau of Labor Standards Safety and Health Regulations for Construction, and Williams and Steiger Occupational Safety and Health Act of 1970, including rules and regulations pursuant thereto, applicable to the Work and performance of the Contract. (OSHA).
3. The duty of the ENGINEER to conduct construction review of the CONTRACTOR's performance is not intended to include review of the adequacy of the CONTRACTOR's safety measures in, on, or near the construction site.
4. No explosives are permitted for this project.

D. Inspections by Federal and State Agencies: Authorized representative and agents of the state and federal government shall be permitted to inspect all work, materials, records of personnel, invoices of materials, and other relevant data and records.

E. Water:
1. CONTRACTOR is responsible for all water necessary for the completion of the Work. Water used on the project shall be fresh and of drinkable quality. The CONTRACTOR shall make arrangements to obtain fresh water for his drinking.
2. Water for other uses such as dust control and moisture control of fill may be obtained from storm water basins as approved by the Engineer/CQA Consultant and Owner. The CONTRACTOR shall obtain any required permits.
3. CONTRACTOR is responsible for coordinating use of, and all costs associated with use of, water from local sources.

F. The CONTRACTOR shall provide sanitary facilities during construction.

G. Order of Construction: The CONTRACTOR will schedule construction operations to allow the other contractors access to the site.

1.6 HISTORICAL AND ARCHAEOLOGICAL

A. If during the course of construction, evidence of deposits of historical or archeological interest is found, the CONTRACTOR shall cease operations affecting the find and shall notify OWNER. No further disturbance of the deposits shall ensue until the CONTRACTOR has been notified by OWNER that CONTRACTOR may proceed. OWNER will issue a notice to proceed after appropriate authorities have surveyed the find and made a determination to OWNER. Compensation to the CONTRACTOR, if any, for lost time or changes in construction resulting from the find, shall be determined in accordance with changed or extra work provisions of the Contract Documents. The site has been previously investigated and has no known history of historical or archaeological finds.

1.7 DRAWINGS AND CONTRACT DOCUMENTS FOR CONTRACTOR USE

A. Contractor shall be provided electronic copies in pdf format of the construction plans and specifications for their reproduction and use.

1.8 ORDER OF CONSTRUCTION AND CONSTRUCTION SCHEDULE

A. At no time shall Contractor or his employees modify operation of the existing facilities or start construction modifications without approval of the Owner except in an emergency to prevent or minimize damage.

B. Submit a critical path type schedule for approval. Account for schedule of Subcontracts. Include proper sequence of construction, various crafts, purchasing time, shop drawing approval, material delivery, equipment fabrication, startup, demonstration, and similar time consuming factors. Show on schedule at a minimum, earliest starting, earliest completion, latest starting, latest finish, and free and total float for each task or item.

C. Evaluate schedule no less than once every two weeks. Update, correct, and rerun schedule and submit to Engineer in triplicate with pay application to show rescheduling necessary to reflect true job conditions. When shortening of various time intervals is necessary to correct for behind schedule conditions, indicate actions to implement to accomplish work in shorter duration. Information shall be submitted before implementation to Engineer in writing with revised schedule.

D. If Contractor does not take necessary action to accomplish work according to schedule, Contractor may be ordered by Owner in writing to take necessary and timely action to improve work progress. Order may require increased work forces, extra equipment, extra shifts or other action as necessary. Should Contractor refuse or neglect to take such action authorized, under provisions of this contract, Owner may take necessary actions including, but not necessarily limited to, withholding of payment and termination of contract.

E. Upon receipt of approved "Work Schedule," within 10 days, submit to Engineer an estimated payment schedule by each month of project duration. Include a composite curve to show estimated value of work complete and stored materials less specified retainage. During the course of work, update with new composite curves at key months or whenever variation is expected to be more than plus or minus 10 percent.

1.9 SPECIAL CONSIDERATIONS

A. Contractor, Contractor's employees and Subcontractors must abide by Owner's site rules and regulations at all times. Owner's safety training will be required of all Contractor, Subcontractors and employees who will be working on site on this project. Contractor and his Sub-contractor's activities must not interfere with other decommissioning activities at the GCSES. Owner's Site Representative must be contacted in advance when impending

interference with Owner's decommissioning activities is anticipated by Contractor or his Subcontractors.

B. Contractor shall be responsible for negotiations of any waivers or alternate arrangements required to enable transportation of materials to the site and at the contractor's expense.

C. Maintain conditions of access road to site such that access is not hindered as the result of construction related deterioration.

1.10 CONTRACTOR'S FIELD OFFICE

A. Establish at the Site the Contractor's field office, structurally sound and in accordance with Laws and Regulations, sufficient for Contractor's needs at the Site.

B. Equipment: Telephone, copier/scanner, and (as deemed necessary by Contractor) appropriate computer equipment.

C. Contractor's personnel will be reasonably present at Contractor's office during working days.

D. At Contractor's field office, maintain complete file of the Contract Documents, Submittals approved or accepted (as applicable) by Engineer, interpretations and clarifications issued by Engineer, copies of Contractor's daily field reports, all necessary and required safety data sheets, copies of documents comprising Contractor's safety program, record documents required by the Contract Documents and other files of field operations deemed appropriate by Contractor and as required by the Contract Documents.

E. Remove field office from Site following Substantial Completion of all the Work and prior to final inspection of the completed Work.

1.11 PROJECT PHOTOGRAPHIC DOCUMENTATION

A. Contractor shall furnish photographic documentation as required and as directed by Engineer or Construction Manager. Required under this Article is "still" photographs only.

B. Construction Photography - General:
   1. Obtain required photographic documentation using a digital camera of not less than 16 megapixel resolution.
   2. Photographs shall be digital and submitted to Engineer electronically with the monthly application for payment. Each photograph shall be JPG, TIFF, or PNG files. Each electronic file of a photograph shall be titled with the date and brief description of the view; for example: "2021-10-25 – SSP Geomembrane Excavation..jpg".
   3. All photographs shall be in color, properly lit and illuminated, and adequately framed to fully illustrate the subject of the photograph.
   4. Schedule and coordinate photographer with Engineer, Construction Manager, or Owner, as applicable. Locations at which photographs are taken and view shall be mutually agreeable to Contractor and Engineer, Construction Manager, or Owner as applicable.

1.12 ADJACENT PROPERTIES AND FACILITIES

A. Contractor shall be obtain and pay for any and all waivers or alternate arrangements necessary for transporting materials and equipment to the Site.

B. Access, Traffic Control, and Parking:
   1. Maintain conditions of access road to site such that access is not hindered as the result of construction related deterioration.
   2. Do not permit driving across or transporting materials or equipment across areas outside the construction limits shown on the Drawings.
   3. Provide traffic control devices and personnel necessary to ensure a safe interface of construction traffic with traffic to and from adjacent sites.
   4. Provide access routes for emergency vehicles at all times.
   5. Provide daily sweeping of hard-surface roadways to remove soils tracked onto roadway.

6. Provide on-site parking for all staff to limit interference with adjacent properties and businesses.

C. Borrow Soil Area has been identified onsite as the Skinner Mountain area as depicted on the plans. Earthwork calculations indicate all required clay and topsoil needed for closure of the Site A and Site F Landfills will be supported by this borrow source.

PART 2 - PRODUCTS

2.1 INTERFACE FRICTION TESTS

A. Laboratory friction tests shall be conducted, on behalf of the OWNER by the CQA Consultant, with representative samples of the materials selected by the CONTRACTOR for use in the Work. The CQA Consultant must approve the testing laboratory used for these tests. The CONTRACTOR is responsible for shipping materials to the testing laboratory. The initial set of testing and subsequent conformance tests (if any) shall be paid for by the CQA Consultant. If any interface doesn't meet the requirements, or if the CONTRACTOR changes geosynthetic materials, then the additional cost to qualify those materials shall be borne by the CONTRACTOR.

B. Cap System
1. Testing will include the interfaces between the following adjacent materials with a minimum peak friction angle of 26 degrees and minimum peak adhesion of 100 psf is required for each interface.

MATERIAL	SPECIFICATION SECTION
Drainage Soil	N/A
Drainage Composite	31 32 18
60 Mil HDPE (textured)	31 35 26.17
Soil Barrier	31 38 40
Ash	---

C. Testing shall be performed in accordance with ASTM D6243. The cap system materials shall be tested at normal stressed of 500, 1,000, and 1,500 psf. Displacement rates shall be in accordance with ASTM D6243 Procedure A for geosynthetic to geosynthetic interfaces and Procedure B for soil to geosynthetic interfaces. Soil components shall be compacted to the same moisture-density requirements specified for full-scale field placement and saturated prior to shear for 24 hours. All geosynthetic interfaces shall be tested in a wet condition. Geosynthetics shall be oriented such that the shear force is parallel to the downslope orientation of these components in the field. The testing laboratory shall confirm these criteria with the CQA firm prior to performing the tests.

D. Report results in accordance with ASTM D6243 provide complete test data, including plots of shear force versus horizontal displacement and a plot of peak shear stress versus normal stress for the tests conducted. Test results must be satisfactory for material shop drawings to be approved.

END OF SECTION

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SECTION 01 33 00
SUBMITTALS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Mechanics and administration of the submittal process for:
      a. Shop Drawings.
      b. Samples.
      c. Informational submittals.
   2. General content requirements for Shop Drawings.

B. Related Specification Sections include but are not necessarily limited to:
   1. Division 00 - Procurement and Contracting Requirements.
   2. Division 01 - General Requirements.
   3. Technical Specification Sections identifying required submittals.

1.2 DEFINITIONS

A. Action Submittals:
   1. Action Submittals require an explicit, written approval or other appropriate action by Engineer before Contractor may release the associated item(s) for raw materials procurement, fabrication, production, and shipment.
   2. Unless otherwise indicated in the Contract Documents, Action Submittals include the following:
      a. Shop Drawings.
      b. Product data.
      c. Samples.
      d. Testing plans for quality control activities required by the Contract Documents.
      e. Delegated Designs: Design drawings, design specifications, calculations, reports, and other instruments of service sealed and signed by design professional retained by Contractor, Subcontractor, or Supplier for a portion of the completed Work as part of the completed Project. Engineer's approval or other appropriate action on such delegated design Submittals will be only for the limited purposes set forth in the General Conditions.

B. Informational Submittals:
   1. Informational Submittals are Submittals, other than Action Submittals, required by the Contract Documents. Explicit response from Engineer is not required when such Submittal is acceptable and Engineer's acceptance thereof will be indicated in the Engineer's Submittals log. When Informational Submittal does not indicate full compliance with the Contract Documents, Engineer will indicate the non-compliance in a written response to Contractor.
   2. Representative types of informational submittal items include but are not limited to:
      a. Concrete compressive strength and in-place moisture density soil test reports.
      b. Installed equipment and systems performance test reports.
      c. Manufacturer's installation instructions.
      d. Manufacturer's installation certification letters.
      e. Instrumentation and control commissioning reports.
      f. Warranties.
      g. Service agreements.
      h. Construction photographs.
      i. Survey data.
      j. Work plans.

k. Shop Drawings, product data, Samples, and testing plans, submitted as a requirement of for delegated designs, bearing the Submittal approval stamp of associated design professional retained by Contractor, Subcontractor, or Supplier.

3. For-Information-Only submittals upon which the Engineer is not expected to conduct review or take responsive action may be so identified in the Contract Documents.

1.3 SUBMITTAL SCHEDULE

A. Schedule of Shop Drawings:
   1. Submitted and approved within 20 days of receipt of Notice to Proceed.
   2. Account for multiple transmittals under any specification section where partial submittals will be transmitted.

B. Shop Drawings: Submittal and approval prior to 30 percent completion of project.

C. Informational Submittals:
   1. Reports and installation certifications submitted within seven days of conducting testing, installation, or examination.
   2. Submittals showing compliance with required qualifications submitted 20 days prior to any work beginning using the subject qualifications.

D. The submittal schedule shall include the following columns as a minimum:

Submittal Section	Submittal Description	Planned Submittal Date	Submittal Need Date	Actual Submittal Date	Actual Return Date	Disposition

1.4 PREPARATION OF SUBMITTALS

A. General:
   1. All submittals and all pages of all copies of a submittal shall be completely legible.
   2. Submittals which, in the Engineer's sole opinion, are illegible will be returned without review.
   3. Minimize extraneous information for equipment and products not relevant to the submittal.
   4. Contractors or vendors written comments on the submittal drawings shall be in green

B. Shop Drawings, Product Data, and Samples:
   1. Scope of any submittal and letter of transmittal:
      a. Limited to one Specification Section.
      b. Submittals with more than one Specification section included will be rejected.
      c. Do not submit under any Specification Section entitled (in part) "Basic Requirements" unless the product or material submitted is specified, in total, in a "Basic Requirements" Specification Section.
   2. Numbering letter of transmittal:
      a. Include as prefix the Specification Section number followed by a series number, "-xx", beginning with "01" and increasing sequentially with each additional transmittal for that Specification Section.
      b. If more than one submittal under any Specification Section, assign consecutive series numbers to subsequent transmittal letters.
   3. Describing transmittal contents:
      a. Provide listing of each component or item in submittal capable of receiving an independent review action.
      b. Identify for each item:
         1) Manufacturer and Manufacturer's Drawing or data number.
         2) Contract Document tag number(s).
         3) Unique page numbers for each page of each separate item.

c. When submitting "or-equal" items that are not the products of named manufacturers, include the words "or-equal" in the item description.

4. Contractor certification of review and approval:
   a. Contractor's review and approval certification stamp shall be applied either to the letter of transmittal or a separate sheet preceding each independent item in the submittal.
      1) Stamp may be either a wet ink stamp or electronically embedded.
      2) Clearly identify the person who reviewed the submittal and the date it was reviewed.
      3) Shop Drawing submittal stamp shall read "(Contractor's Name) has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval as stipulated in the General Conditions."
   b. Submittals containing multiple independent items shall be prepared with each item listed on the letter of transmittal or on an index sheet for all items listing the discrete page numbers for each page of each item, which shall be stamped with the Contractor's review and approval stamp.
      1) Each independent item shall have a cover sheet with the transmittal number and item number recorded.
         a) Provide clear space of 3 IN SQ for Engineer stamping.
      2) Individual pages or sheets of independent items shall be numbered in a manner that permits the entire contents of a particular item to be readily recognized and associated with Contractor's certification.
5. Resubmittals:
   a. Number with original Specification Section and series number with a suffix letter starting with "A" on a (new) duplicate transmittal form.
   b. Do not increase the scope of any prior transmittal.
   c. Provide cover letter indicating how each "B", "C", or "D" Action from previous submittal was addressed and where the correction is found in the resubmittal.
   d. Account for all components of prior transmittal.
      1) If items in prior transmittal received "A" or "B" Action code, list them and indicate "A" or "B" as appropriate.
         a) Do not include submittal information for items listed with prior "A" or "B" Action in resubmittal.
      2) Indicate "Outstanding-To Be Resubmitted At a Later Date" for any prior "C" or "D" Action item not included in resubmittal.
         a) Obtain Engineer's approval to exclude items.
6. For 8-1/2 x 11 IN, 8-1/2 x 14 IN, and 11 x 17 IN size sheets, provide five copies of each submittal for Engineer plus the number required by the Contractor.
   a. The number of copies required by the Contractor will be defined at the Preconstruction Conference, but shall not exceed three.
   b. All other size sheets:
      1) Submit one reproducible transparency or high resolution print and one additional print of each Drawing until approval is obtained.
      2) Utilize mailing tube; do not fold.
      3) The Engineer will mark and return the reproducible to the Contractor for reproduction and distribution.
7. Do not use red color for marks on transmittals.
   a. Duplicate all marks on all copies transmitted, and ensure marks are photocopy reproducible.
   b. Engineer will use red marks or enclose marks in a cloud.
8. Transmittal contents:
   a. Coordinate and identify Shop Drawing contents so that all items can be easily verified by the Engineer.
   b. Provide submittal information or marks defining specific equipment or materials utilized on the Project.

1) Generalized product information, not clearly defining specific equipment or materials to be provided, will be rejected.

c. Identify equipment or material project use, tag number, Drawing detail reference, weight, and other Project specific information.

d. Provide sufficient information together with technical cuts and technical data to allow an evaluation to be made to determine that the item submitted is in compliance with the Contract Documents.

e. Do not modify the manufacturer's documentation or data except as specified herein.

f. Submit items such as equipment brochures, cuts of fixtures, product data sheets or catalog sheets not exceeding 11 x 17 IN pages.

1) Indicate exact item or model and all options proposed by arrow and leader.

g. When a Shop Drawing submittal is called for in any Specification Section, include as appropriate, scaled details, sizes, dimensions, performance characteristics, capacities, test data, anchoring details, installation instructions, storage and handling instructions, color charts, layout Drawings, rough-in diagrams, wiring diagrams, controls, weights and other pertinent data in addition to information specifically stipulated in the Specification Section.

1) Arrange data and performance information in format similar to that provided in Contract Documents.

2) Provide, at minimum, the detail specified in the Contract Documents.

h. If proposed equipment or materials deviate from the Contract Drawings or Specifications in any way, clearly note the deviation and justify the said deviation in detail in a separate letter immediately following transmittal sheet. Any deviation from plans or specifications not depicted in the submittal or included but not clearly noted by the Contractor may not have been reviewed. Review by the Engineer shall not serve to relieve the Contractor of the contractual responsibility for any error or deviation from contract requirements.

9. Samples:

a. Identification:

1) Identify sample as to transmittal number, manufacturer, item, use, type, project designation, tag number, Specification Section or Drawing detail reference, color, range, texture, finish and other pertinent data.

2) If identifying information cannot be marked directly on sample without defacing or adversely altering samples, provide a durable tag with identifying information securely attached to the sample.

b. Include application specific brochures, and installation instructions.

c. Provide Contractor's review and approval certification stamp or Contractor's Submittal Certification form as indication of Contractor's checking and verification of dimensions and coordination with interrelated work.

d. Resubmit revised samples of rejected items.

C. Informational Submittals:

1. Prepare in the format and detail specified in Specification requiring the informational submittal.

1.5 TRANSMITTAL OF SUBMITTALS

A. Shop Drawings and Samples:

1. Transmit all submittals to:

HDR
17111 Preston Road
Suite 300
Dallas, TX 75248
Attn: Dave Vogt

2. Utilize two copies of attached Exhibit A to transmit all Shop Drawings and samples.
3. All submittals must be from Contractor.
    a. Submittals will not be received from or returned to subcontractors.

B. Informational Submittals:
1. Transmit under Contractor's standard letter of transmittal or letterhead.
2. Submit in triplicate or as specified in individual Specification Section.
3. Transmit to:

HDR
17111 Preston Road
Suite 300
Dallas, TX 75248
Attn: Dave Vogt

C. Electronic Transmission of Submittals:
1. Transmittals may be made electronically.
    a. Use email.
    b. Transmit to david.vogt@hdrinc.com
2. Provide documents in Adobe Acrobat Portable Document Format (PDF), latest version.
3. Do not password protect or lock the PDF document.
4. Drawings or other graphics must be converted to PDF file format from the original drawing file format and made part of the PDF document.
    a. Scanning of drawings is to be used only where actual file conversion is not possible and drawings must be scanned at a resolution of 300 DPI or greater.
    b. Required signatures may be applied prior to scanning for transmittal.
5. Electronic drawings shall be formatted to be at full-scale (or half-scale when printed to 11x17).
    a. Do not reduce drawings by more than 50 percent in size.
    b. Reduced drawings shall be clearly marked "HALF-SIZE" and shall scale accurately at that size.
6. Rotate sheets that are normally viewed in landscape mode so that when the PDF file is opened the sheet is in the appropriate position for viewing.
7. Create bookmarks in the bookmarks panel for the cover, the Table of Contents, and each major section of the document.
8. Using Adobe Acrobat Standard or Adobe Acrobat Professional, set the PDF document properties, initial view as follows:
    a. Select File →Properties→Initial View.
    b. Select the Navigation tab: Bookmarks Panel and Page.
    c. Select the Page layout: Single Page.
    d. Select the Magnification: Fit Page.
    e. Select Open to page: 1.
    f. Set the file to open to the cover page with bookmarks to the left, and the first bookmark linked to the cover page.
9. Set the PDF file "Fast Web View" option to open the first several pages of the document while the rest of the document continues to load.
    a. To do this:
        1) Select Edit→Preferences→ Documents→Save Settings.
        2) Check the Save As optimizes for Fast Web View box.
10. File naming conventions:
    a. File names shall use the convention (XXXXXX-YY-Z.PDF) where XXXXXX is the Specification Section number, YY is the Shop Drawing Root number and Z is an ID number used to designate the associated volume.
11. Labeling:
    a. As a minimum, include the following labeling on all electronic media:

1) Project Name.
2) Equipment Name and Project Tag Number.
3) Project Specification Section.
4) Manufacturer Name.
5) Vendor Name.

12. Binding:
    a. Include labeled electronic media in a protective case.
        1) Bind protective case in three-ring binder, inserted at the front of the Final paper copy submittal.
        2) Protective case(s) to have means for securing electronic media to prevent loss (e.g., zip case, flap and strap, or equivalent).

1.6 ENGINEER'S REVIEW ACTION

A. Shop Drawings and Samples:
1. Items within transmittals will be reviewed for overall design intent and will receive one of the following actions:
    a. A - FURNISH AS SUBMITTED.
    b. B - FURNISH AS NOTED (BY ENGINEER).
    c. C - REVISE AND RESUBMIT.
    d. D - REJECTED.
    e. E - ENGINEER'S REVIEW NOT REQUIRED.
2. Submittals received will be initially reviewed to ascertain inclusion of Contractor's approval stamp.
    a. Submittals not stamped by the Contractor or stamped with a stamp containing language other than that specified herein will not be reviewed for technical content and will be returned rejected.
3. In relying on the representation on the Contractor’s review and approval stamp, Owner and Engineer reserve the right to review and process poorly organized and poorly described submittals as follows:
    a. Submittals transmitted with a description identifying a single item and found to contain multiple independent items:
        1) Review and approval will be limited to the single item described on the transmittal letter.
        2) Other items identified in the submittal will:
            a) Not be logged as received by the Engineer.
            b) Be removed from the submittal package and returned without review and comment to the Contractor for coordination, description and stamping.
            c) Be submitted by the Contractor as a new series number, not as a re-submittal number.
    b. Engineer, at Engineer’s discretion, may revise the transmittal letter item list and descriptions, and conduct review.
        1) Unless Contractor notifies Engineer in writing that the Engineer’s revision of the transmittal letter item list and descriptions was in error, Contractor’s review and approval stamp will be deemed to have applied to the entire contents of the submittal package.
4. Submittals returned with Action "A" or "B" are considered ready for fabrication and installation.
    a. If for any reason a submittal that has an "A" or "B" Action is resubmitted, it must be accompanied by a letter defining the changes that have been made and the reason for the resubmittal.
    b. Destroy or conspicuously mark "SUPERSEDED" all documents having previously received "A" or "B" Action that are superseded by a resubmittal.
5. Submittals with Action "A" or "B" combined with Action "C" (Revise and Resubmit) or "D" (Rejected) will be individually analyzed giving consideration as follows:

a. The portion of the submittal given "C" or "D" will not be distributed (unless previously agreed to otherwise at the Preconstruction Conference).
    1) One copy or the one transparency of the "C" or "D" Drawings will be marked up and returned to the Contractor.
        a) Correct and resubmit items so marked.
b. Items marked "A" or "B" will be fully distributed.
c. If a portion of the items or system proposed are acceptable, however, the major part of the individual Drawings or documents are incomplete or require revision, the entire submittal may be given "C" or "D" Action.
    1) This is at the sole discretion of the Engineer.
    2) In this case, some Drawings may contain relatively few or no comments or the statement, "Resubmit to maintain a complete package."
    3) Distribution to the Owner and field will not be made (unless previously agreed to otherwise).

6. Failure to include any specific information specified under the submittal paragraphs of the Specifications will result in the submittal being returned to the Contractor with "C" or "D" Action.
7. Calculations required in individual Specification Sections will be received for information purposes only, as evidence calculations have been stamped by the professional as defined in the specifications and for limited purpose of checking conformance with given performance and design criteria. The Engineer is not responsible for checking the accuracy of the calculations and the calculations will be returned stamped "E. Engineer's Review Not Required" to acknowledge receipt.
8. Furnish required submittals with sufficient information and accuracy to obtain required approval of an item with no more than three submittals. Engineer will record Engineer's time for reviewing a fourth or subsequent submittal of a Shop Drawings, sample, or other item requiring approval, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges.
9. Transmittals of submittals which the Engineer considers as "Not Required" submittal information, which is supplemental to but not essential to prior submitted information, or items of information in a transmittal which have been reviewed and received "A" or "B" action in a prior submittal, will be returned with action "E. Engineer's Review Not Required."
10. Samples may be retained for comparison purposes.
    a. Remove samples when directed.
    b. Include in bid all costs of furnishing and removing samples.
11. Approved samples submitted or constructed, constitute criteria for judging completed work.
    a. Finished work or items not equal to samples will be rejected.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

EXHIBIT A

Shop Drawing Transmittal No. _____ - _____

(Spec Section) (Series)

Project Name:		Date Received:	
Project Owner:		Checked By:	
Contractor:	HDR Engineering, Inc.	Log Page:	
Address:	Address:	HDR No.:	
		Spec Section:	
		Drawing/Detail No.:	
Attn:	Attn:	1st. Sub	ReSub.
Date Transmitted:	Previous Transmittal Date:		

Item No.	No. Copies	Description	Manufacturer	Mfr/Vendor Dwg or Data No.	Action Taken*

Remarks:

* The Action designated above is in accordance with the following legend:

A - Furnish as Submitted

B - Furnish as Noted

C - Revise and Submit
1. Not enough information for review.
2. No reproducibles submitted.
3. Copies illegible.
4. Not enough copies submitted.
5. Wrong sequence number.
6. Wrong resubmittal number.
7. Wrong spec. section.
8. Wrong form used.
9. See comments.

D - Rejected

E - Engineer's review not required
1. Submittal not required.
2. Supplemental Information. Submittal retained for informational purposes only.
3. Information reviewed and approved on prior submittal.
4. See comments.

Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Any deviation from plans or specifications not depicted in the submittal or included but not clearly noted by the Contractor may not have been reviewed. Review by the Engineer shall not serve to relieve the Contractor of the contractual responsibility for any error or deviation from contract requirements.

Comments:

By Date

Distribution: Contractor | File | Field | Owner | Other

EXHIBIT AA

Contractor's Submittal Certification

Shop Drawing Transmittal No.: _____

Contract/Project Name: _____

_____

Company Name: _____

has

1. reviewed and coordinated this Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;

2. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;

3. determined and verified the suitability of all materials offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and

4. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.

☐ This Submittal **does not** contain any variations from the requirements of the Contract Documents.

☐ This Submittal **does** contain variations from the requirements of the Contract Documents. A separate description of said variations and a justification for them is provided in an attachment hereto identified as:

"Shop Drawing Transmittal No. _____Variation and Justification Documentation"

Insert picture file or electronic signature of Authorized Representative

_____ _____

Authorized Representative Date

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SECTION 01 35 05
ENVIRONMENTAL PROTECTION AND SPECIAL CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Minimizing the pollution of air, water, or land; control of noise, the disposal of solid waste materials, and protection of deposits of historical or archaeological interest.

B. Related Specification Sections include but are not necessarily limited to:
   1. Division 00 - Procurement and Contracting Requirements.
   2. Division 01 - General Requirements.

1.2 SUBMITTALS

A. Shop Drawings:
   1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
   2. Prior to the start of any construction activities submit:
      a. A detailed proposal of all methods of control and preventive measures to be utilized for environmental protection.
      b. A drawing of the work area, haul routes, storage areas, access routes and current land conditions including trees and vegetation.
      c. A copy of the NPDES permit for storm water discharges from construction activities.
      d. A copy of the approved pollution prevention plan.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 INSTALLATION

A. Employ and utilize environmental protection methods, obtain all necessary permits, and fully observe all local, state, and federal regulations.

B. Land Protection:
   1. Except for any work or storage area and access routes specifically assigned for the use of the Contractor, the land areas outside the limits of construction shall be preserved in their present condition.
      a. Confine construction activities to areas defined for work within the Contract Documents.
   2. Manage and control all borrow areas, work or storage areas, access routes and embankments to prevent sediment from entering nearby water or land adjacent to the work site.
   3. Restore all disturbed areas including borrow and haul areas and establish permanent type of locally adaptable vegetative cover.
   4. Unless earthwork is immediately paved or surfaced, protect all side slopes and backslopes immediately upon completion of final grading.
   5. Plan and execute earthwork in a manner to minimize duration of exposure of unprotected soils.
   6. Except for areas designated by the Contract Documents to be cleared and grubbed, do not deface, injure or destroy trees and vegetation, nor remove, cut, or disturb them without approval of the Engineer.

a. Any damage caused by the Contractor's equipment or operations shall be restored as nearly as possible to its original condition at no additional cost to the Owner.

C. Surface Water Protection:
   1. Prepare pollution prevention plan.
   2. Utilize, as necessary, erosion control methods to protect side and backslopes, minimize and the discharge of sediment to the surface water leaving the construction site as soon as rough grading is complete.
      a. These controls shall be maintained until the site is ready for final grading and landscaping or until they are no longer warranted and concurrence is received from the Engineer.
      b. Physically retard the rate and volume of run-on and runoff by:
         1) Implementing structural practices such as diversion swales, terraces, straw bales, silt fences, berms, storm drain inlet protection, rocked outlet protection, sediment traps and temporary basins.
         2) Implementing vegetative practices such as temporary seeding, permanent seeding, mulching, sod stabilization, vegetative buffers, hydroseeding, anchored erosion control blankets, sodding, vegetated swales or a combination of these methods.
         3) Providing Construction sites with graveled or rocked access entrance and exit drives and parking areas to reduce the tracking of sediment onto public or private roads.
   3. Discharges from the construction site shall not contain pollutants at concentrations that produce objectionable films, colors, turbidity, deposits or noxious odors in the receiving stream or waterway.

D. Solid Waste Disposal:
   1. Collect solid waste on a daily basis.
   2. Provide disposal of degradable solid waste to an approved solid waste disposal site.
   3. Provide disposal of nondegradable solid waste to an approved solid waste disposal site or in an alternate manner approved by Engineer and regulatory agencies.
   4. No building materials wastes or unused building materials shall be buried, dumped, or disposed of on the site.

E. CCR Waste Disposal
   1. Dispose CCR waste at the Site F Landfill’s Active Waste Disposal Area at a location pre-approved by the Owner.

F. Fuel and Chemical Handling:
   1. Store and dispose of chemical wastes in a manner approved by regulatory agencies.
   2. Take special measures to prevent chemicals, fuels, oils, greases, herbicides, and insecticides from entering drainage ways.
   3. Do not allow water used in onsite material processing, concrete curing, cleanup, and other waste waters to enter a drainage way(s) or stream.
   4. Provide containment around fueling and chemical storage areas to ensure that spills in these areas do not reach waters of the state.

G. Control of Dust:
   1. The control of dust shall mean that no construction activity shall take place without applying all such reasonable measures as may be required to prevent particulate matter from becoming airborne so that it remains visible beyond the limits of construction.
   2. Utilize methods and practices of construction to eliminate dust in full observance of agency regulations.
   3. The Engineer will determine the effectiveness of the dust control program and may request the Contractor to provide additional measures, at no additional cost to Owner.

H. Burning:
   1. Do not burn material on the site without Owner’s approval.

2. If the Contractor elects to dispose of waste materials by burning, make arrangements with Owner for an approved burning area and conform to all local and agency notification requirements and regulations.

I. Control of Noise:
   1. Control noise by fitting equipment with appropriate mufflers.

J. Completion of Work:
   1. Upon completion of work, leave area in a clean, natural looking condition.
   2. Ensure all signs of temporary construction and activities incidental to construction of required permanent work are removed.
   3. Grade, fill and seed all disturbed areas.

END OF SECTION

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SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish labor, materials, tools, equipment, and services for Construction Facilities, Temporary Controls and Utilities, as indicated, in accordance with provisions of Contract Documents.

B. Completely coordinate with work of other trades.

1.2 QUALITY ASSURANCE

A. Comply with industry standards and applicable laws and regulations of authorities having jurisdiction including, but not limited to following:
   1. NFPA 241 Standard for Safeguarding Construction, Alteration, and Demolition Operations.
   2. International Building Code, Chapter 33, Safeguards During Construction.
   3. Local building codes.
   4. Health and safety regulations.
   5. Utility company regulations.
   6. Police, fire and rescue rules.
   7. Environmental protection regulations.
   8. Local agencies requirements and regulations.

B. Maintain required exits, existing structural elements, fire protection devices and sanitary safeguards during remodeling, alterations, repairs or additions to any building or structure, except; make adequate substitute provisions when such required elements or devices are being remodeled, altered or repaired, or when existing building is not occupied.

C. Arrange for authorities having jurisdiction to inspect and test each temporary utility before use.

D. Obtain certifications, permits for temporary utilities, fees, labor and materials for necessary services.

E. Locate facilities to serve Project adequately and result in minimum interference with performance of Work.

F. Relocate and modify facilities as required.

1.3 TEMPORARY UTILITIES - GENERAL

A. Provide fees, labor, and materials, including temporary equipment and connection thereof, required to provide temporary utility services necessary for maintaining existing services and for execution of Work, and tests required in various sections of Specifications at Contractor's expense, except where otherwise specified.

B. Maintain temporary services and facilities clean and neat in appearance, including those furnished or provided by Owner for Contractor's use.

C. Coordinate with Owner to relocate temporary services and facilities as Work progresses.

D. Do not overload facilities or permit them to interfere with progress.

E. Take necessary fire prevention measures.

F. Preclude hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on site.

G. Prepare schedule indicating dates for implementation, shut downs, tie-ins and termination of each temporary utility and coordinate with Owner.

H. At earliest possible time, when acceptable to Owner, change over from use of temporary service to use of permanent service.

I. Remove temporary equipment and connections, and leave premises and existing permanent apparatus in an equivalent condition as existed prior to making temporary connections.
   1. Service utility connections shall be discontinued and capped in accordance with the approved rules and the requirements of the authority having jurisdiction.
   2. At completion of Work, remove and replace damaged parts of permanent systems.

J. Extend warranty or guarantee period on permanent systems used during construction period so they commence on date of Substantial Completion.

1.4 TEMPORARY ELECTRICITY AND LIGHTING

A. Provide equipment, poles, meter, wiring, switches, outlets, to provide 480V, 3 phase power and necessary step down transformers for 208V and 120V power for construction lighting and power requirements.
   1. Provide generator if no electrical service to site.
   2. Permanent building power distribution system may be used with Owner approval.
   3. Remove temporary electrical equipment when no longer needed.

B. Provide adequate lighting with local switching for safe access and egress, security, and for providing adequate illumination for construction operations.
   1. Turn off lighting in areas at end of work day to conserve energy.
   2. Re-lamp permanent light fixtures used during construction with new lamps at Substantial Completion.

C. Temporary electrical power used will be paid for by Contractor until Substantial Completion.

D. Provide own extension cords and electrical safety devices.

E. Provide any additional electrical power required for installer's operation, exceeding available power.

1.5 TEMPORARY WATER

A. Make arrangements; provide equipment, piping, and outlets for an adequate supply of clean water for construction purposes.
   1. Existing water distribution system may be used for temporary service.
   2. Provide temporary meters and pay costs of installation and use.
   3. Provide pressure backflow preventer at each connection.
   4. Disinfect temporary piping before use.

B. Contractor is responsible to pay for water used until Substantial Completion.

C. Furnish drinking water for those connected with the Work.

1.6 TEMPORARY SANITARY FACILITIES

A. Provide temporary sanitary facilities for use of construction workers during construction, remodeling or demolition activities.

B. Do not use existing toilet facilities in occupied areas or new toilet facilities in construction area without Owner's written consent.

C. Provide facilities complying with local, State and Federal sanitary laws and regulations.

D. Maintain and service in clean and sanitary condition.

E. Provide adequate supplies of toilet paper, cleaning and other required items.

1.7 CONTRACTOR'S FIELD OFFICE (OPTIONAL)

A. Provide field office for Contractor's use.

B. Telephone, Internet, and Copier:
   1. Provide telephones, answering machine telephone service in field office.
   2. Provide broadband service with wireless internet connection for use by Owner and Architect.
   3. Provide commercial grade photocopy machine with document scanning capability.
   4. Contractor pay service and use charges.

1.8 PROTECTION OF ADJOINING PROPERTY

A. Protect adjoining public and private property from damage during construction, remodeling and demolition work.
   1. Protect footings, foundations, party walls, chimneys, skylights and roofs.
   2. Control water runoff and erosion during construction or demolition activities.
   3. Provide written notice to owners of adjoining properties advising of construction plans and excavations to be undertaken10 days prior to the scheduled date of excavation.
   4. Minimize noise in construction operation, employing reasonable noise control measures during operations, in accordance with local ordinances or safety and health regulations.

1.9 TEMPORARY STORAGE AND STAGING AREAS

A. Store and place construction equipment and materials so as not to endanger public, workers or adjoining property for duration of Project.

B. Comply with provisions of authority having jurisdiction for temporary use of streets or public property for storage or handling of materials or of equipment required for construction or demolition, and the protection provided to the public.

C. Construction materials and equipment shall not be placed or stored so as to obstruct access to fire hydrants, standpipes, fire or police alarm boxes, catch basins or manholes, nor shall such material or equipment be located within 20 FT of a street intersection, or placed so as to obstruct normal observations of traffic signals or to hinder the use of public transit loading platforms.

D. Building materials, fences, sheds or obstruction of any kind shall not be placed so as to obstruct free approach to any fire hydrant, fire department connection, utility pole, manhole, fire alarm box or catch basin, or so as to interfere with the passage of water in gutter. Protection against damage shall be provided to such utility fixtures during the progress of Work, but sight of them shall not be obstructed.

E. Prior to start of Work, meet with installers to arrange and prepare plot plan defining staging, storage, field office and traffic areas.
   1. Obtain Owner's approval of plan.
   2. Except as specifically provided, working and storing outside these areas will not be permitted.
   3. Arrange and locate temporary structures and storage to avoid interfering with construction.

F. Within area designated for Contractor and Subcontractor's use, Contractor and Subcontractors provide suitable and sufficient enclosed and covered spaces, with raised flooring, to protect materials and equipment from damage by weather or construction work.
   1. Maintain storage and working areas in clean and orderly condition.

1.10 TEMPORARY FIRE EXTINGUISHERS

A. Structures under construction, alteration or demolition shall be provided with not less than one approved portable fire extinguisher and sized for not less than ordinary hazard as follows:
   1. At each storage, construction shed and temporary construction office.
   2. Provide additional portable fire extinguishers where special hazards exist, such as storage and use of flammable and combustible liquids.

B. Strictly observe provisions of codes to safeguard against fire hazards attendant upon construction operations.

1.11 TEMPORARY FENCES AND BARRICADES

A. Furnish, install and maintain temporary fences, barricades, trench and hole covers, warning lights and safety devices necessary to prevent injury to persons and damage to property.
   1. Provide padlocks manufactured by Knox keyed to the Fire Department keying system to the construction areas.
   2. Provide 24 FT wide gates to facilitate Fire Department access.
   3. Fire Department apparatus shall be able to turn into construction site in one turn.

B. Contractor is responsible to design construction barricades and fences with proper sizes of members and with adequate supports to protect public from injuries or accidents, arising from construction Work.

1.12 TEMPORARY ACCESS

A. Contractor's access to construction area will be permitted only through designated approaches in such a manner that traffic will not interfere with Owner's activities.

1.13 TEMPORARY PROTECTION

A. Protect Work in progress and adjoining materials in place, during handling and installation.

B. Supervise construction operation to assure that Work, completed or in progress, is not subject to harmful, dangerous, damaging or otherwise harmful exposure throughout construction period.
   1. Prevent accumulation of water on site:
      a. Remove standing water.
      b. Pump or direct away from site and adjoining property.
   2. Prevent accumulation of water on slabs, adjacent to building or foundations, or in utility trenches.
   3. Prevent damage to structural members.

C. Apply protective covering to assure protection of Work from damage or deterioration.
   1. Remove coverings at Substantial Completion.

D. Adjust, lubricate and maintain operable components to assure operability without damaging effects throughout construction period.

1.14 SECURITY

A. Provide security and facilities to protect Work and existing facilities and Owner's operations from unauthorized entry, vandalism or theft.

B. Coordinate with Owner's security program..

1.15 TEMPORARY ACCESS ROADS

A. Provide access on construction site as required to perform Work.

B. Maintain construction site access roads free of obstruction.

C. Clean up debris, materials, etc., that falls from vehicles in route to and from site.

D. Do not block access to Owner's facilities.

E. When this access is no longer required, restore to its original condition.

F. Provide means of removing mud from vehicle wheels before leaving site and entering public streets or Owner's roads.

1.16 TEMPORARY PARKING

A. Contractor Parking will be at the areas designated by Owner.

B. Provide transportation for Contractor's employees from parking area to job site.

1.17 TRAFFIC CONTROL

A. Provide traffic control necessary to effect smooth Owner operations.

B. Provide and maintain adequate traffic control and flagmen's services at points where transporting of equipment and materials engaged on Work, enters and exits from Project site and on site.

1.18 WASTE MANAGEMENT FACILITIES

A. Maintain facilities for separate collection of construction wastes and materials.

1.19 COMPLETION OF WORK

A. Upon completion of Work or as progress of work dictates or sooner if directed by Owner or Architect, remove temporary facilities, and return improvements on or about site and adjacent property which are not shown to be altered, removed or otherwise changed; to condition which existed previous to starting Work.

END OF SECTION

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SECTION 01 65 50
PRODUCT DELIVERY, STORAGE, AND HANDLING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Scheduling of product delivery.
   2. Packaging of products for delivery.
   3. Protection of products against damage from:
      a. Handling.
      b. Exposure to elements or harsh environments.

B. Related Specification Sections include but are not necessarily limited to:
   1. Division 00 - Procurement and Contracting Requirements.
   2. Division 01 - General Requirements.

C. Payment:
   1. No payment will be made to Contractor for equipment or materials not properly stored and insured or without approved Shop Drawings.
      a. Previous payments for items will be deducted from subsequent progress estimate(s) if proper storage procedures are not observed.

1.2 DELIVERY

A. Scheduling: Schedule delivery of products or equipment as required to allow timely installation and to avoid prolonged storage.

B. Packaging: Deliver products or equipment in manufacturer's original unbroken cartons or other containers designed and constructed to protect the contents from physical or environmental damage.

C. Identification: Clearly and fully mark and identify as to manufacturer, item, and installation location.

D. Protection and Handling: Provide manufacturer's instructions for storage and handling.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 PROTECTION, STORAGE AND HANDLING

A. Manufacturer's Instruction:
   1. Protect all products or equipment in accordance with manufacturer's written directions.
      a. Store products or equipment in location to avoid physical damage to items while in storage.
      b. Handle products or equipment in accordance with manufacturer's recommendations and instructions.
   2. Protect equipment from exposure to elements and keep thoroughly dry.
   3. When space heaters are provided in equipment, connect and operate heaters during storage until equipment is placed in service.

3.2 FIELD QUALITY CONTROL

A. Inspect Deliveries:
   1. Inspect all products or equipment delivered to the site prior to unloading.

a. Reject all products or equipment that are damaged, used, or in any other way unsatisfactory for use on Project.

B. Monitor Storage Area: Monitor storage area to ensure suitable temperature and moisture conditions are maintained as required by manufacturer or as appropriate for particular items.

END OF SECTION

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SECTION 31 10 00
SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Site clearing, tree protection, stripping topsoil and demolition.

B. Related Specification Sections include but are not necessarily limited to:
   1. Division 00 - Procurement and Contracting Requirements.
   2. Division 01 - General Requirements.
   3. Section 31 23 00 - Earthwork.
   4. Section 31 25 00 - Soil Erosion and Sediment Control.
   5. Section 32 91 13 - Topsoiling and Finished Grading.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect existing trees and other vegetation to remain against damage.
   1. Do not smother trees by stockpiling construction materials or excavated materials within drip line.
   2. Avoid foot or vehicular traffic or parking of vehicles within drip line.
   3. Provide temporary protection as required.

B. Repair or replace trees and vegetation damaged by construction operations.
   1. Repair to be performed by a qualified tree surgeon/licensed arborist.
   2. Remove trees which cannot be repaired and restored to full-growth status.
   3. Replace with new trees of minimum 4 IN caliper or as required by local tree ordinance.

C. Owner will obtain authority for removal and alteration work on adjoining property, as applicable.

3.2 SITE CLEARING

A. Topsoil Removal:
   1. Strip topsoil to depths encountered or as specified within the soils report, 4 IN minimum.
      a. Remove heavy growths of grass before stripping.
      b. Stop topsoil stripping sufficient distance from such trees to prevent damage to main root system.
      c. Separate from underlying subsoil or objectionable material.
   2. Stockpile topsoil where directed by Engineer.
      a. Construct storage piles to freely drain surface water.
      b. Seed or cover storage piles to prevent erosion.
   3. Do not strip topsoil in wooded areas where no change in grade occurs.
   4. Borrow topsoil: Reasonably free of subsoil, objects over 2 IN DIA, weeds and roots.

B. Clearing and Grubbing:
   1. Clear from within limits of construction all trees not marked to remain.
      a. Include shrubs, brush, downed timber, rotten wood, heavy growth of grass and weeds, vines, rubbish, structures and debris.

2. Grub (remove) from within limits of construction all stumps, roots, root mats, logs and debris encountered.

C. Disposal of Waste Materials:
   1. Do not burn combustible materials on site without Owner's approval.
   2. Remove all waste materials from site.
   3. Do not bury organic matter on site.

END OF SECTION

SECTION 31 23 00
EARTHWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Earthwork - excavation, backfilling, grading, compaction, disposal of waste and surplus materials, placing crushed stone, construction of berms, sheeting, bracing, dewatering and other Earthwork related work.

B. Related Specification Sections include but are not necessarily limited to:
   1. Division 00 - Procurement and Contracting Requirements.
   2. Division 01 - General Requirements.
   3. Section 31 23 33 - Trenching, Backfilling and Compacting for Utilities.
   4. Section 31 25 00 - Soil Erosion and Sediment Control.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. ASTM International (ASTM):
      a. C33/C33M, Standard Specification for Concrete Aggregates.
      b. D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 FT-LBF/FT^3).
      c. D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 FT-LBF/FT^3(2,700 kN-M/M^3)).
      d. D1586, Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils.
      e. D2487, Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
      f. D3786, Standard Test Method for Bursting Strength of Textile Fabrics--Diaphragm Bursting Strength Tester Method.
      g. D4253, Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
      h. D4254, Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.
      i. D4632, Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
   2. Occupational Safety and Health Administration (OSHA):
      a. 29 CFR Part 1926.650, Safety and Health Regulations for Construction - Excavations, referred to herein as OSHA Standards.

1.3 DEFINITIONS

A. Excavation:
   1. Consists of removal of material encountered to subgrade elevations required or indicated.
   2. Includes excavation of soils; pavements and other obstructions visible on surface; underground structures, utilities, and other items indicated to be demolished and removed; boulders; and rock.

B. Geotechnical Engineer: JBS Engineering and Environmental, Inc., an independent geotechnical specialist providing field quality control for the project.

C. Non-Structural Fill/Backfill: Soil materials placed and compacted to achieve finish grade elevations that do NOT support foundations, slabs, paving, or other flatwork.

D. Subgrade: The earth or soil layer immediately below the compacted clay barrier, foundation bearing elevation, subbase material, fill material, backfill material, or topsoil materials.

E. Unauthorized Excavation:
   1. Consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Engineer.
      a. Unauthorized excavation, as well as associated remedial work as directed by Engineer or Geotechnical Engineer, shall be at Contractor's expense.
   2. Unsuitable Soil Materials: Soil materials encountered at or below subgrade elevation of insufficient strength and stiffness to support construction as determined by the Geotechnical Engineer.

F. CCR Material:
   1. Material derived from the combustion of coal to generate power. This material is typically fly ash, bottom ash, economizer ash, scrubber sludge, and other by products of combustion.
   2. This material is considered as waste material. Care must be taken to prevent comingling of soils material used for subgrade material, clay barrier material, infiltration layer material, or topsoil with CCR material. CCR comingled soils material will be considered as waste and shall be disposed of in the landfill.

1.4 SUBMITTALS

A. Shop Drawings:
   1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
   2. Product technical data including:
      a. Acknowledgement that products submitted meet requirements of standards referenced.
      b. Manufacturer's installation instructions.
   3. Certifications.

B. Samples:
   1. Coordinate samples and testing for approval of off-site materials with the Geotechnical Engineer.
   2. Test reports.

1.5 PROJECT CONDITIONS

A. Salvageable Items: Carefully remove items to be salvaged, and store on Owner's premises unless otherwise directed.

B. Disposal of permitted waste materials shall be at the Site F Landfill. Dispose non-permitted waste materials, legally, off site.
   1. Burning, as a means of waste disposal, is not permitted without Owner's permission.

C. Site Information:
   1. Data in subsurface investigation reports was used for the basis of the design.
      a. Conditions are not intended as representations or warranties of accuracy or continuity between soil borings.
      b. The Owner or Engineer will not be responsible for interpretations or conclusions drawn from this data by Contractor.
   2. Additional test borings and other exploratory operations may be performed by Contractor, at the Contractor's option; however, no change in the Contract Sum will be authorized for such additional exploration.
   3. Site data provided is not contractual and shall be considered "for information only."

PART 2 - PRODUCTS

2.1 MATERIALS

A. Fill and Backfill:
   1. Selected material approved by Geotechnical Engineer from site excavation or from off site borrow.

2. Structural Fill:
    a. May be low volume change cohesive or granular soil at Contractor's option.
    b. Free of organic matter, frozen material and debris.
    c. Low volume change cohesive soil:
        1) ASTM D2487 classification: CL-ML or CL.
        2) Liquid limit: Less than 45.
        3) Maximum plasticity index: 20.
    d. Granular soil:
        1) ASTM D2487 classification: GW, GP, GM, GC, SW, SP, SM or SC.
3. Non-Structural Fill:
    a. ASTM D2487 classification: GW, GP, GM, GC, SC, SW, SP, SM, CL-ML or CL.
    b. Liquid limit: Less than 45.
    c. Maximum plasticity index: 20.

B. Granular Fill Under Equipment Pads (i.e., water treatment or evaporation):
1. Per equipment manufacturer's recommendation.
2. Absent recommendation, provide:
    a. Clean, granular material.
    b. Less than 5 PCT fines passing the No. 200 sieve.
    c. ASTM C33/C33M gradation size No. 67, 3/4 IN to No. 4 or other material acceptable to Geotechnical Engineer.

C. Drainage Course: Free draining stone such as #57 stone or #67 stone meeting the requirements of ASTM C33/C33M specifications.

PART 3 - EXECUTION

3.1 PROTECTION

A. Erosion Control:
1. See Specification Section 31 25 00.
2. Clean paved roadways daily of any spillage of dirt, rocks or debris from vehicles and equipment entering or leaving site.
3. Conduct work to minimize erosion of site. Remove eroded material washed off site.
    a. If necessary or requested by Engineer, construct stilling areas to settle and detain eroded material.

B. Protect existing surface and subsurface features on-site and adjacent to site as follows:
1. Provide barricades, coverings, or other types of protection necessary to prevent damage to existing items indicated to remain in place.
2. Protect and maintain bench marks, monuments or other established reference points and property corners.
    a. If disturbed or destroyed, replace at own expense to full satisfaction of Owner and controlling agency.
3. Verify location of utilities, toe drains, and leachate collection lines.
    a. Omission or inclusion of utility items does not constitute nonexistence or definite location.
    b. Secure and examine local utility records for location data.
    c. Take necessary precautions to protect existing utilities from damage due to any construction activity.
        1) If utilities are indicated to remain in place, provide adequate means of support and protection during earthwork operations.
        2) Do not interrupt existing utilities serving facilities occupied by Owner or others, during occupied hours, except when permitted in writing by Owner and then only after acceptable temporary utility services have been provided.
        3) Obtain Owner's approval prior to disconnecting any utility service.
    d. Repair damages to utility items at own expense.

e. In case of damage, notify Engineer at once so required protective measures may be taken.

4. Maintain free of damage, existing sidewalks, structures, and pavement, not indicated to be removed.
   a. Protect new and existing structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
   b. Any item known or unknown or not properly located that is inadvertently damaged shall be repaired to original condition.
   c. All repairs to be made and paid for by Contractor.
5. Provide full access to public and private premises, fire hydrants, street crossings, sidewalks and other points as designated by Owner to prevent serious interruption of travel.
6. Maintain stockpiles and excavations in such a manner to prevent inconvenience or damage to structures on-site or on adjoining property.
7. Avoid surcharge or excavation procedures which can result in heaving, caving, or slides.

3.2 SITE EXCAVATION AND GRADING

A. The site excavation and grading work includes the onsite disposal or offsite disposition of all material:
   1. That exceed quantities required for earthwork on the project.
   2. That the Geotechnical engineer classifies as unclassified excavation.
   3. That the Geotechnical engineer classifies as unacceptable.
   4. That the Geotechnical engineer classifies as potentially contaminated.

B. Excavation and Grading:
   1. Perform as required by the Contract Drawings.
   2. Contract Drawings may indicate both existing grade and finished grade required for construction of Project.
      a. Stake all units, structures, piping, and roads and establish their elevations.
      b. Perform other layout work required.
      c. Replace property corner markers to original location if disturbed or destroyed.
   3. Preparation of ground surface for embankments or fills:
      a. Before fill is started, scarify to a minimum depth of 6 IN in all proposed embankment and fill areas.
      b. Where ground surface is steeper than one vertical to four horizontal, plow surface in a manner to bench and break up surface so that fill material will bind with existing surface.
   4. Protection of finish grade:
      a. During construction, shape and drain embankment and excavations.
      b. Maintain ditches and drains to provide drainage at all times.
      c. Protect graded areas against action of elements prior to acceptance of work.
      d. Reestablish grade where settlement or erosion occurs.

C. Borrow:
   1. Provide necessary amount of approved fill compacted to density equal to that indicated in this Specification.
   2. Fill material to be approved by Geotechnical Engineer prior to placement.

D. Construct embankments and fills as required by the Contract Drawings:
   1. Construct embankments and fills at locations and to lines of grade indicated.
      a. Completed fill shall correspond to shape of typical cross section or contour indicated regardless of method used to show shape, size, and extent of line and grade of completed work.
   2. Provide approved fill material which is free from roots, organic matter, trash, frozen material, and stones having maximum dimension greater than 6 IN.
      a. Ensure that stones larger than 4 IN are not placed in upper 6 IN of fill or embankment.

b. Do not place material in layers greater than 8 IN loose thickness.
c. Place layers horizontally and compact each layer prior to placing additional fill.

3. Compact soils as required to obtain specified density. Selection of appropriate equipment is the Contractor's responsibility.
   a. In general, compact cohesive soils by sheepsfoot, and granular soils by pneumatic rollers, vibrators, or by other equipment as required to obtain specified density.
   b. Control moisture for each layer necessary to meet requirements of compaction.

E. Grading Tolerances: 0.1 FT.

3.3 USE OF EXPLOSIVES

A. Blasting with any type of explosive is prohibited.

3.4 COMPACTION DENSITY REQUIREMENTS

A. Obtain approval from Geotechnical Engineer with regard to suitability of soils and acceptable subgrade prior to subsequent operations.

B. Provide dewatering system necessary to successfully complete compaction and construction requirements.

C. Remove frozen, loose, wet, or soft material and replace with approved material as directed by Geotechnical Engineer.

D. Stabilize subgrade with well graded granular materials as directed by Geotechnical Engineer.

E. Assure by results of testing that compaction densities comply with the following requirements:
   1. Sitework:

LOCATION	COMPACTION DENSITY	MOISTURE CONTENT
Under Piping:		
Cohesive soils	95 PCT per ASTM D698	-2 to +3 PCT of optimum
Cohesionless soils	75 PCT relative density per ASTM D4253 and ASTM D4254	
Unpaved Areas:		
Cohesive soils	90 PCT of ASTM D698	-2 to +3 PCT of optimum
Cohesionless soils	65 PCT relative density per ASTM D4253 and ASTM D4254	

   2. Structures:

LOCATION	COMPACTION DENSITY	MOISTURE CONTENT
Under equipment support pads and scarified existing subgrade under fill material	98 PCT per ASTM D698	-2 to +3 PCT of optimum
Outside structures next to walls, piers, columns and any other structure exterior member	92 PCT per ASTM D698	-2 to +3 PCT of optimum

   3. Specific areas:

LOCATION	COMPACTION DENSITY	MOISTURE CONTENT
Subgrade, Infiltration Layer and Topsoil	95 PCT per ASTM D698	-2 to +3 PCT of optimum
CCR Material	Smooth Rolled and without unstable or soft spots as determined by geotechnical inspector.	

3.5 EXCAVATION, FILLING, AND BACKFILLING

A. General:
   1. In general, work includes, but is not necessarily limited to, excavation, removal of underground obstructions and undesirable material, backfilling, filling, and fill, backfill, and subgrade compaction.
   2. Obtain fill and backfill material necessary to produce grades required.
      a. Materials and source to be approved by Geotechnical Engineer.
      b. Excavated material approved by Geotechnical Engineer may also be used for fill and backfill.
   3. In the paragraphs of this Specification Section, the word "soil" also includes any type of rock subgrade that may be present at or below existing subgrade levels.

B. Excavation Requirements:
   1. General:
      a. Do not commence excavation for landfill cap until Geotechnical Engineer approves:
         1) The removal of topsoil and other unsuitable and undesirable material from existing subgrade.
         2) Density and moisture content of site area compacted fill material meets requirements of specifications.
         3) Site surcharge or mass fill material can be removed from entire construction site or portion thereof.
         4) Surcharge or mass fill material has been removed from construction area or portions thereof.
      b. Engineer grants approval to begin excavations.
   2. Dimensions:
      a. Excavate to elevations and dimensions indicated or specified.
      b. Allow additional space as required for construction operations and inspection.
      c. Slope sides of excavations to comply with local codes, ordinances, and requirements of agencies having jurisdiction.
      d. Maintain sides and slopes of excavations in safe condition until completion of backfilling.
   3. Removal of obstructions and undesirable materials in excavation includes, but is not necessarily limited to, removal of old foundations, existing construction, unsuitable subgrade soils, expansive type soils, CCR material, industrial waste, and any other materials which may be concealed beneath present grade, as required to execute work indicated on Contract Drawings.
      a. If undesirable material and obstructions are encountered during excavation, remove material and replace as directed by Geotechnical Engineer.
      b. When excavation has reached required subgrade elevations, notify Geotechnical Engineer, who will make an inspection of conditions.
   4. Proof-roll all subgrades to receive fill after subgrade has been scarified and compacted.
   5. Level off bottoms of excavations to receive equipment support pads or compacted fill.
      a. Remove loose materials and bring excavations into approved condition to receive concrete or fill material.

b. Where compacted fill material must be placed to bring subgrade elevation up to underside of construction, scarify existing subgrade upon which fill material is to be placed to a depth of 6 IN and then compact to density stated in this Specification Section before fill material can be placed thereon.
c. Do not carry excavations lower than shown for foundations except as directed by Geotechnical Engineer or Engineer.
d. If any part of excavations is carried below required depth without authorization, notify Engineer and correct unauthorized excavation as directed. Corrections may include:
    1) Backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Geotechnical Engineer.
    2) No extra compensation will be made to Contractor for correcting unauthorized excavations.

6. Make excavations large enough for working space, forms, dampproofing, waterproofing, and inspection.
7. Notify Geotechnical Engineer and Engineer as soon as excavation is completed in order that subgrades may be inspected.
    a. Do not commence further construction until subgrade under compacted clay barrier or geomembrane has been inspected and approved by the Geotechnical Engineer as being free of undesirable material, being of compaction density required by this specification, and being capable of supporting the landfill cap system.
    b. Contractor shall certify in writing the geomembrane's subgrade meets the manufacturer's requirements prior to geomembrane installation.
    c. Geotechnical Engineer shall be given the opportunity to inspect subgrade below fill material both prior to and after subgrade compaction.
    d. Before compacted clay barrier material or fill material is placed, protect approved subgrade from becoming loose, wet, frozen, or soft due to weather, construction operations, or other reasons.
8. Dewatering:
    a. Where groundwater is or is expected to be encountered during excavation, install a dewatering system to prevent softening and disturbance of subgrade to allow fill material to be placed in the dry and to maintain a stable excavation side slope.
    b. Groundwater shall be maintained at least 3 FT below the bottom of any excavation.
    c. Review Geotechnical investigation before beginning excavation and determine where groundwater is likely to be encountered during excavation.
    d. Employ dewatering specialist for selecting and operating dewatering system.
    e. Keep dewatering system in operation until dead load of final cap system exceeds possible buoyant uplift force on the system.
    f. Dispose of groundwater to an area which will not interfere with construction operations or damage existing construction.
        1) Install groundwater monitoring wells as necessary.
    g. Shut off dewatering system at such a rate to prevent a quick upsurge of water that might weaken the subgrade.
9. Subgrade stabilization:
    a. If subgrade under foundations, fill material, compacted clay barrier, geomembrane, or equipment support pads is in a frozen, loose, wet, or soft condition before construction is placed thereon, remove frozen, loose, wet, or soft material and replace with approved compacted material as directed by Geotechnical Engineer.
    b. Provide compaction density of replacement material as stated in this Specification Section.
    c. Loose, wet, or soft materials, when approved by Geotechnical Engineer, may be stabilized by a compacted working mat of well graded crushed stone.
    d. Compact stone mat thoroughly into subgrade to avoid future migration of fines into the stone voids.
    e. Remove and replace frozen materials as directed by Geotechnical Engineer.

f. Method of stabilization shall be performed as directed by Geotechnical Engineer.
g. Do not place further construction on the repaired subgrades, until the subgrades have been approved by the Geotechnical Engineer.

10. Protection of structures:
    a. Prevent new and existing structures from becoming damaged due to construction operations or other reasons.
    b. Prevent subgrade under new and existing foundations from becoming wet and undermined during construction due to presence of surface or subsurface water or due to construction operations.
11. Shoring:
    a. Shore, slope, or brace excavations as required to prevent them from collapsing.
    b. Remove shoring as backfilling progresses but only when banks are stable and safe from caving or collapse.
    c. Construct shoring that is required to retain water as part of the dewatering system, using non-permeable details such as interlock sealant for sheet piles.
12. Drainage:
    a. Control grading around structures so that ground is pitched to prevent water from running into excavated areas or damaging structures.
    b. Maintain excavations where equipment support pads or fill material are to be placed free of water.
    c. Provide pumping required to keep excavated spaces clear of water during construction.
    d. Should any water be encountered in the excavation, notify Engineer and Geotechnical Engineer.
    e. Provide free discharge of water by trenches, pumps, wells, well points, or other means as necessary and drain to point of disposal that will not damage existing or new construction or interfere with construction operations.
13. Frost protection:
    a. Do not place equipment support pads or fill material on frozen ground.
    b. When freezing temperatures may be expected, do not excavate to full depth indicated, unless equipment support pads or fill material can be placed immediately after excavation has been completed and approved.
    c. Protect excavation from frost if placing of concrete or fill is delayed.
    d. Where a concrete slab is a base slab-on-grade located under and within a structure that will not be heated, protect subgrade under the slab from becoming frozen until final acceptance of the Project by the Owner.
    e. Protect subgrade under foundations of a structure from becoming frozen until structure is completed and heated to a temperature of at least 50 DEGF.

C. Fill and Backfill Inside of Structure and Below Foundations, Equipment Support Pads and Piping:
1. General:
    a. Subgrade to receive fill or backfill shall be free of undesirable material as determined by Geotechnical Engineer and scarified to a depth of 6 IN and compacted to density specified herein.
    b. Surface may be stepped by at not more than 12 IN per step or may be sloped at not more than 2 PCT.
    c. Do not place any fill or backfill material until subgrade under fill or backfill has been inspected and approved by Geotechnical Engineer as being free of undesirable material and compacted to specified density.
2. Obtain approval of fill and backfill material and source from Geotechnical Engineer prior to placing the material.
3. Fill and backfill placement:
    a. Prior to placing fill and backfill material, optimum moisture and maximum density properties for proposed material shall be obtained from Geotechnical Engineer.
    b. Place fill and backfill material in 6 IN lifts.

c. Compact material by means of equipment of sufficient size and proper type to obtain specified density.
d. Use hand operated equipment for filling and backfilling within 5 FT of walls and less than 3 FT above pipes.
    1) Compaction equipment exceeding 3000 LBS dead weight shall not be used within 5 FT of the wall as a minimum
    2) Contractor is responsible for method of compaction so as not to damage wall.
e. Use hand operated equipment for filling and backfilling next to walls.
f. Do not place fill and backfill when the temperature is less than 40 DEGF and when subgrade to receive fill and backfill material is frozen, wet, loose, or soft.
g. Use vibratory equipment to compact granular material; do not use water.

4. Where fill material is required below foundations, place fill material, conforming to the required density and moisture content as required to fill the specified overexcavation to bottom of foundation.

3.6 FIELD QUALITY CONTROL

A. All excavation, trenching, and related sheeting, bracing, etc. shall comply with the requirements of OSHA Standards, and state requirements. Where conflict between OSHA and state regulations exists, the more stringent requirements shall apply.

B. Contractor provides sufficient notification and access so inspection and testing can be accomplished.

C. Contractor pays for retesting of failed tests and for additional testing required when defects are discovered.

D. Responsibilities of CQA Inspector:
1. Review proposed materials for fill and backfill around structures.
2. All testing, observation and work indicated as being performed by the Geotechnical Engineer or CQC/CQA Consultant in the Final Cover Quality Control Plan and this specification.
3. Services will include verification and documentation of satisfactory soil materials, subgrade quality, sampling, placement, moisture conditioning, compaction and testing of proposed soil materials, and field testing for quality control.
4. Moisture density relations, to be established by the Geotechnical Engineer required for all materials to be compacted.
5. Extent of compaction testing will be as necessary to assure compliance with specifications.
6. Make at least one field density test on subgrade and each compacted fill layer for every 8,000 SQFT.
7. Make at least one field density test per every 8,000 SQFT, or less, of surface area of compacted clay barrier for each 6 inches of depth (but no less than 3 density tests per 6-inch lift). For horizontal lifts, one test will be conducted for each 100 lineal feet for each 12 inches of thickness. The test locations will be evenly distributed across each lift being tested. Any area appearing to be of questionable quality will be tested instead of, or in addition to, the area previously planned for testing.
8. Bulk samples will be collected for analysis to determine the Atterberg limits and the percent passing the No. 40 and No. 200 sieves for material used to construct the compacted clay barrier. For parallel lifts, a minimum of one test sample will be conducted for each 100,000 SQFT of surface per lift, or major fraction thereof, but no less than one test per 6 inch lift of parallel liner. For horizontal lifts, a minimum of one test will be conducted per 2,000 lineal feet per 12 inches of horizontal liner.
9. Make at least one permeability test per every 100,000 SQFT of surface per lift, or major fraction thereof, and no less than one test per 6-inch lift of compacted clay barrier. For horizontal lifts, a minimum of one test per 2,000 lineal feet per 12-inches horizontal liner will be performed.
10. Prepare and submit inspection and test reports to Engineer.

a. Coordinate such work with other CQA Inspectors.

11. Test reports to include the following:
    a. Report and certification of aggregate fill and drainage fill.
    b. Test reports on borrow material.
    c. Verification of suitability of each footing subgrade material, in accordance with specified requirements.
    d. Field reports; in-place soil density and moisture tests.
    e. One optimum moisture-maximum density curve for each type of soil encountered.
    f. Report of actual unconfined compressive strength and/or results of bearing tests of each strata tested.
    g. Other documentation necessary for Geotechnical Engineer to approve earthwork.
    h. Assist Engineer to determine corrective measures necessary for defective work.

E. Give minimum of 24 HR advance notice to Geotechnical Engineer when ready for compaction or subgrade testing and inspection.

F. Should any compaction density test or subgrade inspection fail to meet specification requirements, perform corrective work as necessary, at no additional expense to Owner.

G. Pay for all costs associated with corrective work and retesting resulting from failing compaction density tests.

H. Responsibilities of Testing Agency for Site Excavation and Grading:
    1. All testing, observation and work indicated as being performed by the Geotechnical Engineer in other than Article 3.6 of this Specification Section.
    2. Services will include verification and documentation of satisfactory soil materials, subgrade quality, sampling, placement, moisture conditioning, compaction and testing of proposed soil materials, and field testing for quality control.
    3. Moisture density relations, to be established by the Geotechnical Engineer required for all materials to be compacted.
    4. Extent of compaction testing will be as necessary to assure compliance with specifications.

I. Inspector shall not be a part of the geomembrane installation program and shall not serve as a substitute for performing the duties or certification required of the Fabricator and Installer.

END OF SECTION

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SECTION 31 23 33
TRENCHING, BACKFILLING, AND COMPACTING FOR UTILITIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Excavation, trenching, backfilling and compacting for all underground utilities.

B. Related Specification Sections include but are not necessarily limited to:
   1. Division 00 - Procurement and Contracting Requirements.
   2. Division 01 - General Requirements.
   3. Section 31 23 00 - Earthwork.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. ASTM International (ASTM):
      a. D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 FT-LBF/FT^3 (600 kN-M/M^3)).
      b. D4253, Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
      c. D4254, Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.

B. Qualifications: Hire an independent soils laboratory to conduct in-place moisture-density tests for backfilling to assure that all work complies with this Specification Section.

1.3 DEFINITIONS

A. Excavation: All excavation will be defined as unclassified.

1.4 SUBMITTALS

A. Shop Drawings:
   1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
   2. Product technical data including:
      a. Acknowledgement that products submitted meet requirements of standards referenced.
      b. Manufacturer's installation instructions.
   3. Submit respective pipe or conduit manufacturer's data regarding bedding methods of installation and general recommendations.
   4. Submit sieve analysis reports on all granular materials.

B. Informational Submittals:
   1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
   2. Trench shield (trench box) certification if employed:
      a. Specific to Project conditions.
      b. Re-certified if members become distressed.
      c. Certification by registered professional structural engineer, registered in the state where the Project is located.
      d. Engineer is not responsible to, and will not, review and approve.

1.5 SITE CONDITIONS

A. Avoid overloading or surcharge a sufficient distance back from edge of excavation to prevent slides or caving.

1. Maintain and trim excavated materials in such manner to be as little inconvenience as possible to public and adjoining property owners.

B. Provide full access to public and private premises and fire hydrants, at street crossings, sidewalks and other points as designated by Owner to prevent serious interruption of travel.

C. Protect and maintain bench marks, monuments or other established points and reference points and if disturbed or destroyed, replace items to full satisfaction of Owner and controlling agency.

D. Verify location of existing underground utilities

PART 2 - PRODUCTS

2.1 MATERIALS

A. Backfill Material:
   1. As approved by Engineer.
      a. Free of rock cobbles, roots, sod or other organic matter, and frozen material.
      b. Moisture content at time of placement: ±3 PCT of optimum moisture content as specified in accordance with ASTM D698.
   2. Gravel trench backfill materials:
      a. Uniformly graded 3/8 IN pea gravel.

B. Bedding Materials:
   1. As approved by the Geotechnical Engineer.
   2. Granular bedding materials:
      a. ASTM D2321 Class 1B.
         1) Well-graded crushed stone.
   3. Flowable fill:
      a. Description: Flowable fill shall be a mixture of cement, fly ash, fine sand, water, and air having a consistency which will flow under a very low head.
      b. Material characteristics:
         1) The approximate quantities of each component per cubic yard of mixed material shall be as follows:
            a) Cement (Type I or II): 50 LBS.
            b) Fly ash: 200 LBS.
            c) Fine sand: 2,700 LBS.
            d) Water: 420 LBS.
            e) Air content: 10 PCT.
         2) Actual quantities shall be adjusted to provide a yield of 1 cubic yard with the materials used.
         3) Approximate compressive strength should be 85 to 175 PSI.
         4) Fine sand shall be an evenly graded material having not less than 95 PCT passing the No. 4 sieve and not more than 5 PCT passing the No. 200 sieve.

PART 3 - EXECUTION

3.1 GENERAL

A. Remove and dispose of unsuitable materials as directed by Geotechnical Engineer to landfill.

3.2 EXCAVATION

A. Unclassified Excavation: Remove rock excavation, clay, silt, gravel, hard pan, loose shale, and loose stone as directed by Geotechnical Engineer.

B. Excavation for Appurtenances:
   1. 12 IN (minimum) clear distance between outer surface and embankment.

C. Groundwater Dewatering:
   1. Where groundwater is, or is expected to be, encountered during excavation, install a dewatering system to prevent softening and disturbance of subgrade to allow pipe, bedding and backfill material to be placed in the dry, and to maintain a stable trench wall or side slope.
   2. Groundwater shall be drawn down and maintained at least 2 FT below the bottom of any trench or manhole excavation prior to excavation.
   3. Review soils investigation before beginning excavation and determine where groundwater is likely to be encountered during excavation.
      a. Employ dewatering specialist for selecting and operating dewatering system.
   4. Keep dewatering system in operation until dead load of pipe, structure and backfill exceeds possible buoyant uplift force on pipe or structure.
   5. Dispose of groundwater to an area which will not interfere with construction operations or damage existing construction.
   6. Install groundwater monitoring wells as necessary.
   7. Shut off dewatering system at such a rate to prevent a quick upsurge of water that might weaken the subgrade.

D. Trench Excavation:
   1. Excavate trenches by open cut method to depth shown on Drawings and necessary to accommodate work.
      a. Support existing utility lines and yard piping where proposed work crosses at a lower elevation.
         1) Stabilize excavation to prevent undermining of existing utility and yard piping.
   2. Open trench outside buildings, units, landfill, and structures:
      a. No more than the distance between structures, units, or 300 LF, whichever is less.
      b. Field adjust limitations as weather conditions dictate.
   3. Trenching within landfill:
      a. No more than 100 LF at any one time.
   4. Any trench or portion of trench, which is opened and remains idle for seven calendar days, or longer, as determined by the Owner, may be directed to be immediately refilled, without completion of work, at no additional cost to Owner.
      a. Said trench may not be reopened until Owner is satisfied that work associated with trench will be prosecuted with dispatch.
   5. Observe following trenching criteria:
      a. Trench size:
         1) Excavate width to accommodate free working space.
         2) Maximum trench width at top of pipe or conduit may not exceed outside diameter of utility service by more than the following dimensions:

OVERALL DIAMETER OF UTILITY SERVICE	EXCESS DIMENSION
33 IN and less	18 IN
more than 33 IN	24 IN

         3) Cut trench walls vertically from bottom of trench to 1 FT above top of pipe, conduit, or utility service.
         4) Keep trenches free of surface water runoff.
            a) Include cost in Bid.
            b) No separate payment for surface water runoff pumping will be made.

E. Trenching for Electrical Installations:
   1. Observe the preceding Trench Excavation paragraph in PART 3 of this Specification Section.
   2. Modify for electrical installations as follows:

a. Open no more than 600 LF of trench in exterior locations for trenches more than 12 IN but not more than 30 IN wide.
b. Any length of trench may be opened in exterior locations for trenches which are 12 IN wide or less.
c. Do not over excavate trench.
d. Cut trenches for electrical runs with minimum 30 IN cover, unless otherwise specified or shown on Drawings.
e. See Division 26 for additional requirements.

F. Flowable Fill:
1. Flowable fill shall be:
a. Discharged from a mixer by any means acceptable to the Engineer into the area to be filled.
b. Placed in 4 FT maximum lifts to the elevations indicated.
1) Allow 12 HR set-up time before placing next lift or as approved by the Engineer.
2) Place flowable fill lifts in such a manner as to prevent flotation of the pipe.
2. Flowable fill shall not be placed on frozen ground.
3. Subgrade on which flowable fill is placed shall be free of disturbed or softened material and water.
4. Conform to appropriate requirements of Specification Section 31 23 00.
5. Flowable fill batching, mixing, and placing may be started if weather conditions are favorable, and the air temperature is 34 DEGF and rising.
6. At the time of placement, flowable fill must have a temperature of at least 40 DEGF.
7. Mixing and placing shall stop when the air temperature is 38 DEGF or less and falling.
8. Each filling stage shall be as continuous an operation as is practicable.
9. Prevent traffic contact with flowable fill for at least 24 HRS after placement or until flowable fill is hard enough to prevent rutting by construction equipment.
10. Flowable fill shall not be placed until water has been controlled or groundwater level has been lowered in conformance with the requirements of the preceding Groundwater Dewatering paragraph in PART 3 of this Specification Section.

3.3 PREPARATION OF FOUNDATION FOR PIPE LAYING

A. Over-Excavation:
1. Backfill and compact to 90 PCT of maximum dry density per ASTM D698.
2. Backfill with granular bedding material as option.

B. Rock Excavation:
1. Excavate minimum of 6 IN below bottom exterior surface of the pipe or conduit.
2. Backfill to grade with suitable earth or granular material.
3. Form bell holes in trench bottom.

C. Subgrade Stabilization:
1. Stabilize the subgrade when directed by the Owner.
2. Observe the following requirements when unstable trench bottom materials are encountered.
a. Notify Owner when unstable materials are encountered.
1) Define by drawing station locations and limits.
b. Remove unstable trench bottom caused by Contractor failure to dewater, rainfall, or Contractor operations.
1) Replace with subgrade stabilization with no additional compensation.

3.4 BACKFILLING METHODS

A. Do not backfill until tests to be performed on system show system is in full compliance with specified requirements.

B. Carefully Compacted Backfill:
1. Furnish where indicated on Drawings, specified for trench embedment conditions and for compacted backfill conditions up to 12 IN above top of pipe or conduit.

2. Comply with the following:
    a. Place backfill in lifts not exceeding 8 IN (loose thickness).
    b. Hand place, shovel slice, and pneumatically tamp all carefully compacted backfill.
    c. Observe specific manufacturer's recommendations regarding backfilling and compaction.
    d. Compact each lift to specified requirements.

C. Common Trench Backfill:
1. Perform in accordance with the following:
    a. Place backfill in lift thicknesses capable of being compacted to densities specified.
    b. Observe specific manufacturer's recommendations regarding backfilling and compaction.
    c. Avoid displacing joints and appurtenances or causing any horizontal or vertical misalignment, separation, or distortion.

D. Water flushing for consolidation is not permitted.

E. Backfilling for Electrical Installations:
1. Observe the preceding Carefully Compacted Backfill paragraph or Common Trench Backfill paragraph in PART 3 of this Specification Section or when approved by the Engineer.
2. Modify for electrical installation as follows:
    a. Observe notes and details on electrical drawings for fill in immediate vicinity of direct burial cables.

3.5 COMPACTION

A. General:
1. Place and assure bedding, backfill, and fill materials achieve an equal or higher degree of compaction than undisturbed materials adjacent to the work.
2. In no case shall degree of compaction below minimum compactions specified be accepted.

B. Compaction Requirements:
1. Unless noted otherwise on Drawings or more stringently by other Specification Sections, comply with following minimum trench compaction criteria.
    a. Bedding material:

LOCATION	SOIL TYPE	COMPACTION DENSITY
All locations	Cohesionless soils	75 PCT relative density by ASTM D4253 and ASTM D4254

    b. Carefully compacted backfill:

LOCATION	SOIL TYPE	COMPACTION DENSITY
All applicable areas	Cohesive soils	95 PCT of maximum dry density by ASTM D698
	Cohesionless soils	75 PCT relative density by ASTM D4253 and ASTM D4254

    c. Toe drain bedding and backfill:

LOCATION	SOIL TYPE	COMPACTION DENSITY
All locations	Cohesionless soils	60 PCT relative density by ASTM D4253 and ASTM D4254

    d. Common trench backfill:

LOCATION	SOIL TYPE	COMPACTION DENSITY
Under pavements, roadways, surfaces within highway right-of-ways	Cohesive soils	95 PCT of maximum dry density by ASTM D698
	Cohesionless soils	60 PCT of relative density by ASTM D4253 and ASTM D4254
Under turfed, sodded, plant seeded, nontraffic areas	Cohesive soils	85 PCT of maximum dry density by ATM D698
	Cohesionless soils	40 PCT of relative density by ASTM D4253 and ASTM D4254

3.6 FIELD QUALITY CONTROL

A. Testing:
   1. Perform in-place moisture-density tests as directed by the Owner.
   2. Perform tests through recognized testing laboratory approved by Owner.
   3. Costs of "Passing" tests paid by Owner.
   4. Perform additional tests as directed until compaction meets or exceeds requirements.
   5. Cost associated with "Failing" tests shall be paid by Contractor.
   6. Reference to Engineer in this Specification Section will imply Geotechnical Engineer when employed by Owner and directed by Engineer to undertake necessary inspections as approvals as necessary.
   7. Assure Owner has immediate access for testing of all soils related work.
   8. Ensure excavations are safe for testing personnel.

END OF SECTION

SECTION 31 25 00
EROSION AND SEDIMENTATION CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Soil erosion and sediment control.

B. Related Sections include but are not necessarily limited to:
   1. Division 01 - General Requirements.

1.2 QUALITY ASSURANCE

A. Reference Standards:
   1. American Association of State Highway and Transportation Officials (AASHTO):
      a. T88, Standard Specification for Particle Size Analysis of Soils.
      b. T180, Standard Specification for Moisture-Density Relations of Soils Using a 4.54 KG (10 LB) Rammer and a 457 MM (18 IN) Drop.
   2. American Concrete Institute (ACI):
      a. 301, Specifications for Structural Concrete.
   3. ASTM International (ASTM):
      a. C127, Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate.
      b. D698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 FT-LBF/FT^3 (600 kN-M/M^3)).
      c. D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 FT-LBF/FT^3 (2,700 kN-M/M^3)).
      d. D2922, Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
      e. D3017, Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
   4. Precast/Prestressed Concrete Institute (PCI):
      a. MNL-116S, Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products.

B. Perform Work in accordance with Texas Department of Transportation 2014 Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges.

1.3 SITE CONDITIONS

A. The Contractor shall protect all streams, creeks, and drainage features from sediment laden runoff.

B. All erosion and sediment control practices shall conform to the Gibbons Creek SES Storm Water Pollution Prevention Plan (SW3P), latest revision.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Stone for Stone Filter: Per TxDOT specifications.

B. Grass Seed: Refer to Section 32 92 00, Seeding.

C. Silt Fence: Premanufactured or constructed on site.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prior to Generally Stripping Topsoil, Tree Clearing, and Excavating:
   1. Install silt fence, ditches, and channels.
   2. Excavate and shape sediment basins and traps.
   3. Construct pipe spillways and install stone filter where required.
   4. Machine compact all berms, dikes, and embankments for basins and traps.
   5. Refer to the construction sequence on the plans for further detail.

B. Temporarily seed basin slopes and stockpiles:
   1. Rate: See Section 32 92 00 - Seeding.
   2. Reseed as required until good stand of grass is achieved.

3.2 DURING CONSTRUCTION PERIOD

A. Maintain Basins, Dikes, Traps, Stone Filters, Straw Bales, Etc.:
   1. Inspect regularly especially after rainstorms.
   2. Repair or replace damaged or missing items.

B. After rough grading, sow temporary grass cover over all exposed earth areas not draining into sediment basin or trap.

C. Provide necessary swales and dikes to direct all water towards and into sediment basins and traps.

D. Do not disturb existing vegetation (grass and trees).

E. Excavate sediment out of basins and traps when capacity has been reduced by 50 percent.

F. Topsoil and Fine Grade Slopes and Swales, Etc.:
   1. Seed and mulch as soon as areas become ready.

G. Clean streets and roads daily of any spillage of dirt, rocks, or debris from equipment entering or leaving the site.

3.3 NEAR COMPLETION OF CONSTRUCTION

A. Grade to finished or existing grades.

B. Fine grade all remaining earth areas, then seed and mulch.

END OF SECTION

SECTION 31 32 18
GEOCOMPOSITE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Bonded geotextile-geonet drainage composite.

B. Related Specification Sections include but are not necessarily limited to:
   1. Division 00 - Procurement and Contracting Requirements.
   2. Division 01 - General Requirements.
   3. Section 31 32 19 - Geotextiles.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. ASTM International (ASTM):
      a. D413, Standard Test Methods for Rubber Property - Adhesion to Flexible Substrate.
      b. D1238, Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer.
      c. D1505, Standard Test Method for Density of Plastics by the Density-Gradient Technique.
      d. D1603, Standard Test Method for Carbon Black in Olefin Plastics.
      e. D4873, Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples.

B. Qualifications:
   1. Each manufacturing and fabricating firm shall demonstrate five years continuous experience, including a minimum of 5,000,000 SQFT of drainage composite production in the past three years.
   2. Installer shall attend pre-installation conference.

1.3 DEFINITIONS

A. Manufacturer: Manufacturer producing drainage composites from geonet cores and geotextiles.

B. Installer: The Installers are the individuals actually performing the hands-on work in the field.

1.4 SUBMITTALS

A. Shop Drawings:
   1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
   2. Manufacturer's documentation that raw materials and roll materials comply with required drainage composite physical properties.
   3. Manufacturer and Installer quality control manuals.
   4. Original test results for resins and roll material at frequency specified in respective quality control manuals.
      a. Include or bracket the rolls delivered for use in the Work.
   5. Layout plan with proposed size, number, position and sequencing of drainage composite rolls and direction of all field seams.
   6. Proposed details of anchor trench if different than included in Contract Documents.

B. Informational Submittals:
   1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.

2. Qualification documentation specified in the QUALITY ASSURANCE Article in PART 1 of this Specification Section.

1.5 DELIVERY, STORAGE AND HANDLING

A. Label, handle, and store drainage composites in accordance with ASTM D4873 and as specified herein.

B. Wrap each roll in an opaque and waterproof layer of plastic during shipment and storage.
   1. Do not remove the plastic wrapping until deployment.

C. Label each roll with the manufacturer's name, drainage composite type, lot number, roll number, and roll dimensions (length, width, gross weight).

D. Repair or replace, as directed by the Engineer, drainage composite or plastic wrapping damaged as a result of storage or handling.

E. Do not expose drainage composite to temperatures in excess of 71 DEGC (160 DEGF) or below 0 DEGC (32 DEGF) unless recommended by the Manufacturer.

F. Do not use hooks, tongs or other sharp instruments for handling the drainage composite.

G. Do not lift rolls by use of cables or chains in contact with the drainage composite.

H. Do not drag drainage composite along the ground or across textured geomembranes.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
   1. National Seal Company.
   2. Tensar Earth Technologies.
   3. Fluid Systems.
   4. Solmax.

2.2 MATERIALS AND MANUFACTURE

A. Geonet Core:
   1. Use nonthermally degraded polyethylene polymer which is clean and free of any foreign contaminants.
   2. Manufactured geonet to conform to the property requirements listed in Table 1 and be free of defects including tears, nodules or other manufacturing defects which may affect its serviceability.

TABLE 1 - GEONET PROPERTIES		
PROPERTY	TEST METHOD	TEST VALUE
Polymer Density	ASTM D1505	>0.93 g/cc
Polymer Melt Index	ASTM D1238	<1.1 g/10 min.
Carbon Black Content	ASTM D1603	2-3 PCT

B. Geotextile:
   1. Cover geonet core on both sides with a geotextile complying with requirements specified in Specification Section 31 32 19, Type 2.

C. Drainage Composite:
   1. Create a composite by heat bonding geotextiles to the geonet.

a. The bond between the geotextile and the geonet shall exhibit a minimum peel strength of 1 LBS/IN when tested in accordance with ASTM D413.

2. Transmissivity equals 5 x 10-4 square meters per second.

2.3 SOURCE QUALITY CONTROL

A. Transmissivity Testing:
   1. Measure transmissivity using water at 68 DEGF with a maximum gradient of 0.10 under a normal pressure of 1,000 LBS/SQFT.
   2. Attach geotextiles to the geonet in the same configuration as will be used in the field for transmissivity testing.
   3. Sandwich the drainage net between rigid platens on the bottom and on the top.
   4. Use a minimum seating period of 15 minutes.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Prior to placement of the drainage composite, clean the surface of the geomembrane of all soil, rock, and other materials which could damage the composite.

3.2 INSTALLATION

A. Deploy the drainage composite ensuring that the drainage composite and underlying materials are not damaged.
   1. Replace or repair faulty or damaged drainage composite as directed by Engineer.

B. Unroll drainage composite downslope keeping in slight tension to minimize wrinkles and folds.

C. Maintain free of dirt, mud, or any other foreign materials at all times during construction.
   1. Clean or replace rolls which are contaminated.

D. Place adequate loading (e.g., sandbags) to prevent uplift by wind.

E. Overlap adjacent rolls a minimum of 6 IN.
   1. Overlap new drainage composite over existing as shown on the Drawings.

F. Use manufacturer's fasteners to join adjacent rolls.
   1. Metallic fasteners will not be allowed.
   2. Space fasteners a maximum of 5 FT along downslope roll overlaps and a maximum of 2 FT along cross slope roll overlaps.
   3. Use fasteners of contrasting color from the drainage composite to facilitate visual inspection.
   4. Do not weld drainage composite to geomembranes.

G. Heat tack overlap of the upper geotextile to the upper geotextile of the adjacent rolls.

H. Repairs holes or tears in the drainage composite by placing a patch of drainage composite extending a minimum of 2 FT beyond the edges of the hole or tear.
   1. Use approved fasteners, spaced every 6 IN around the patch, to fasten the patch to the original roll.

I. Penetration details shall be as recommended by the Manufacturer and as approved by the Engineer.

3.3 FIELD QUALITY CONTROL

A. Provide as-constructed drawing showing roll number; layout; joint locations; and repair and patch locations.

END OF SECTION

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SECTION 31 32 19
GEOTEXTILES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Nonwoven geotextile material.

B. Related Specification Sections include but are not necessarily limited to:
   1. Division 01 - General Requirements.
   2. Section 31 23 00 - Earthwork.
   3. Section 31 32 18 - Drainage Geocomposite.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. American Association of State Highway Transportation Officials (AASHTO):
      a. M288, Standard Specification for Geotextile Specification for Highway Applications.
   2. ASTM International (ASTM):
      a. D3786, Standard Test Method for Bursting Strength of Textile Fabrics-Diaphragm Bursting Strength Tester Method.
      b. D4355, Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus.
      c. D4491, Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
      d. D4533, Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
      e. D4632, Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
      f. D4751, Standard Test Method for Determining Apparent Opening Size of a Geotextile.
      g. D4759, Standard Practice for Determining the Specification Conformance of Geosynthetics.
      h. D4833, Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products.
      i. D4873, Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples.
      j. D5261, Standard Test Method for Measuring Mass per Unit Area of Geotextiles.

B. Qualifications:
   1. Each manufacturing, fabricating firm shall demonstrate five years continuous experience, including a minimum of 10,000,000 SQFT of geotextile installation in the past three years.
   2. Installing firm shall demonstrate that the site Superintendent or Foreman has had responsible charge for installation of a minimum of 1,000,000 SQFT of geotextile.
   3. Installer shall attend pre-installation conference.

1.3 DEFINITIONS

A. Manufacturer: Manufacturer producing geotextile sheets from resin and additives.

B. Installer: The Installers are the individuals actually performing the hands-on work in the field.

1.4 SUBMITTALS

A. Shop Drawings:
   1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
   2. Manufacturer's documentation that raw materials and roll materials comply with required geotextile physical properties.
   3. Manufacturer and Installer quality control manuals.

4. Original test results for resins, roll material and factory seam tests at frequency specified in respective quality control manuals.
    a. Results shall include or bracket the rolls delivered for use in the Work.
5. Geotextile layout plan with proposed size, number, position and sequencing of geotextile rolls and direction of all field seams.
6. Proposed details of anchoring and overlapping if different than included in Contract Documents.

B. Informational Submittals:
1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
2. For needle punched geotextiles, the manufacturer shall certify that the geotextile has been continuously inspected using permanent on-line full-width metal detectors and does not contain any needles which could damage other geosynthetic layers.
3. Qualification documentation specified in the QUALITY ASSURANCE Article in PART 1 of this Specification Section.

1.5 DELIVERY, STORAGE AND HANDLING

A. Label, handle, and store geotextiles in accordance with ASTM D4873 and as specified herein.

B. Wrap each roll in an opaque and waterproof layer of plastic during shipment and storage.
1. Do not remove the plastic wrapping until deployment.

C. Label each roll with the manufacturer's name, geotextile type, lot number, roll number, and roll dimensions (length, width, gross weight).

D. Repair or replace geotextile or plastic wrapping damaged as a result of storage or handling, as directed.

E. Do not expose geotextile to temperatures in excess of 71 DEGC (160 DEGF) or less than 0 DEGC (32 DEGF) unless recommended by the manufacturer.

F. Do not use hooks, tongs or other sharp instruments for handling geotextile.
1. Do not lift rolls lifted by use of cables or chains in contact with the geotextile.
2. Do not drag geotextile along the ground.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
1. Solmax.
2. Propex Geosynthetics.
3. SKAPS Industries.
4. TenCate Mirafi.
5. Tenax.

2.2 MATERIALS AND MANUFACTURE

A. Geotextile:
1. Nonwoven pervious sheet of polymeric material.
2. Geotextile fibers:
    a. Long-chain synthetic polymer composed of at least 85 PCT by weight polyolefins, polyesters, or polyamides.
    b. Filaments resistant to deterioration by ultraviolet light, oxidation, and heat exposure.
    c. Do not as reclaimed or recycled fibers or polymer to the formulation.
3. Form geotextile into a network such that the filaments or yarns retain dimensional stability relative to each other, including the selvages.

4. The geotextile physical properties shall equal or exceed the minimum average roll values listed below.
   a. Values shown are for the weaker principal direction.
   b. Acceptance of geotextile shall be in accordance with ASTM D4759.
   c. Type I Geotextile: AASHTO M288 Class 2, for use in demolition fill.

PROPERTY	TEST METHOD	MINIMUM AVERAGE ROLL VALUE
Mass per Unit Area, OZ/SY	ASTM D5261	=10
AOS, U.S. Standard Sieve	ASTM D4751	70-100
Permittivity, SEC-1	ASTM D4491	=0.5
Puncture, LBS	ASTM D4833	=90
Grab Tensile, LBS	ASTM D4632	=250
Trapezoidal Tear, LBS	ASTM D4533	=90
Burst Strength, PSI	ASTM D3786	=190
Ultraviolet Degradation % retained @ 500 HRS	ASTM D4355	=50
Sewn Seam Strength, LBS	ASTM D4632	=220

   d. Type 2 Geotextile: AASHTO M288 Class 2, for use in drainage composite and other areas shown on the Drawings.

PROPERTY	TEST METHOD	MINIMUM AVERAGE ROLL VALUE
Mass per Unit Area, OZ/SY	ASTM D5261	=8
AOS, U.S. Standard Sieve	ASTM D4751	70-100
Permittivity, SEC-1	ASTM D4491	=0.5
Puncture, LBS	ASTM D4833	=90
Grab Tensile, LBS	ASTM D4632	=250
Trapezoidal Tear, LBS	ASTM D4533	=90
Burst Strength, PSI	ASTM D3786	=190
Ultraviolet Degradation % retained @ 500 HRS	ASTM D4355	=50
Sewn Seam Strength, LBS	ASTM D4632	=220

B. Thread:
   1. High-strength polyester, nylon, or other approved thread type.
   2. Equivalent chemical compatibility and ultraviolet light stability as the geotextile.
   3. Contrasting color with the geotextile.

PART 3 - EXECUTION

3.1 PREPARATION

A. Construct the surface underlying the geotextiles smooth and free of ruts or protrusions which could damage the geotextiles.

3.2 INSTALLATION

A. Install geotextiles in accordance with manufacturer's written recommendations.

B. Hand place geotextile.
   1. No equipment will be permitted to traffic in direct contact with the geotextile.

C. Lay geotextile smooth so as to be free of tensile stresses, folds, and wrinkles.

D. Seam Construction:
   1. Sew all Type I geotextile seams.
   2. Broom clean existing geotextile and cut off to provide a clean area for seaming with the new geotextile.
   3. Sew seams continuously using an SSA flat seam with one row of a two-thread 401 chain stitch unless otherwise recommended by the manufacturer.
   4. Minimum distance from the geotextile edge to the stitch line nearest to that edge: 2 IN unless otherwise recommended by the manufacturer.
   5. Test seams at the frequency specified in the FIELD QUALITY CONTROL Article in PART 3 of this Specification Section.
   6. Tie off thread at the end of each seam to prevent unraveling.
   7. Construct seams on the top side of the geotextile to allow inspection.
   8. Sew skipped stitches or discontinuities with an extra line of stitching with 18 IN of overlap.
   9. Type 2 geotextile seams may be sewn or overlapped.
      a. Construct overlapped seams in accordance with manufacturer's recommendations or as shown on Drawings.

E. Heat tack the geotextile overlaps as shown on the Drawings.

F. Backfill anchor trenches in accordance with Specification Section 31 23 00.

G. Place cover soil in accordance with Specification Section 31 23 00.

H. Protect geotextiles from clogging, tears, and other damage during installation.

I. Geotextile Repair:
   1. Place a patch of the same type of geotextile which extends a minimum of 12 IN beyond the edge of the damage or defect.
   2. Fasten patches continuously using a sewn seam or other approved method.
   3. Align machine direction of the patch with the machine direction of the geotextile being repaired.
   4. Replace geotextile which cannot be repaired.

J. Use adequate ballast (e.g., sand bags) to prevent uplift by wind.

K. Do not use staples or pins to hold the geotextile in place.

L. Do not leave geotextile uncovered for more than 14 days.

3.3 FIELD QUALITY CONTROL

A. Conduct destructive seam testing at locations identified by Owner.
   1. Minimum testing will be at a frequency of one test per 2,000 linear feet of seam.

B. Provide as-constructed drawing showing roll number; layout; joint locations; and destructive sample repair, and patch locations.

END OF SECTION

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