DELAWARE FISH AND WILDLIFE

LANG IMPOUNDMENT REHABILITATION PROJECT

2016

DELAWARE CERTIFICATE OF AUTHORIZATION

GBA ENGINEERS ★ SURVEYORS
9909 Yellow Brick Rd.
Unit 3
Baltimore, MD 21237
Phone (410) 682-5595
#637

Designed by: CFB	Date: MAR 2017
Dwn by: ECC	Ckd by: JB
Drawing Name: G001-G003	Rev.
Reviewed by: DLB	
Submitted by: DCU	Scale: AS SHOWN
	Plot scale: 1 = 1

Mark	Description	Date	Appr.

DELAWARE FISH AND WILDLIFE
LANG IMPOUNDMENT REHABILITATION PROJECT
2016

LANG IMPOUNDMENT
COVER

DANIEL C. UNDERWOOD
LICENSE NO. 19341
DELAWARE
PROFESSIONAL ENGINEER

I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed Professional Engineer under the laws of the State of Delaware.

License No. _____

Expiration Date: _____

SHEET REFERENCE NUMBER

G-001

SHEET 1 OF 19

P:\2015 DNREC FW Impoundments\Delaware Impoundments\Lang_impoundments\100%_PLANS\G001-G003.dwg

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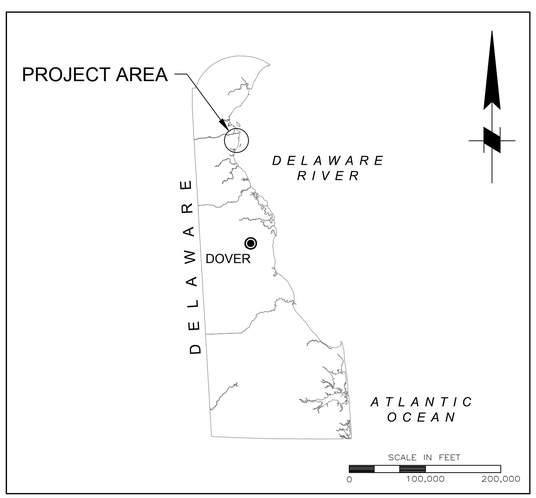
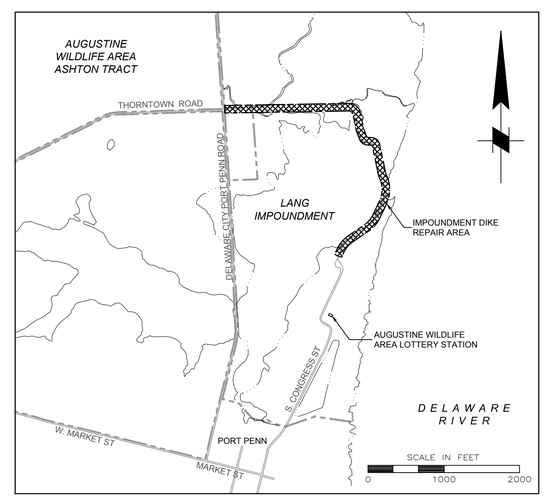


LANG IMPOUNDMENT
VICINITY MAP



LANG IMPOUNDMENT
LOCATION MAP

Mark	Description	Date	Appr.

Designed by: CFB
Dwn by: ECC
Ckd by: JB
Reviewed by: DLB
Submitted by: DCU
Date: MAR 2017
Drawing Name: G001–G003
Rev:
Scale: AS SHOWN
Plot scale: 1 = 1

DELAWARE CERTIFICATE OF AUTHORIZATION
GBA ENGINEERS ★ SURVEYORS
9008 Yellow Brick Rd. Unit 3
Baltimore, MD. 21237
Phone (410) 682-5595
#637

DELAWARE FISH AND WILDLIFE
LANG IMPOUNDMENT REHABILITATION PROJECT
2016

LANG IMPOUNDMENT LOCATION MAP AND INDEX

DENNIS C. UNGO
LICENSE
No. 19396
DELAWARE
PROFESSIONAL ENGINEER

I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed Professional Engineer under the laws of the State of Delaware.

License No. _____

Expiration Date: _____

SHEET REFERENCE NUMBER
G-002
SHEET 2 OF 19

P:\2015 DNREC FW Impoundments\Delaware Impoundments\Long_impoundments\100%_PLANS\G001-G003.dwg

GENERAL NOTES

1. GEOTECHNICAL INVESTIGATIONS WERE PREFORMED BY GAHAGAN & BRYANT ASSOCIATES (GBA) AND GEO–TECHNOLOGY ASSOCIATES, INC IN APRIL 2016. SOIL BORING LOGS ARE INCLUDED IN AN APPENDIX TO THE SPECIFICATIONS.
2. HORIZONTAL DATUM IS DELAWARE STATE PLANE NAD 83 (ZONE 700) U.S. SURVEY FEET.
3. ELEVATIONS ON THESE DRAWINGS ARE REFERENCED TO NORTH AMERICAN VERTICAL DATUM 1988 (NAVD 88).
4. EXISTING SHORELINE, EXISTING ROADWAYS, AND EXISTING RIPRAP SLOPE PROTECTION SHOWN ON THESE DRAWINGS WERE DIGITIZED FROM SATELLITE IMAGERY DATED 2015 (GOOGLE.COM/MAPS).
5. SURVEY CONTROL MONUMENT:
   855 1910 K TIPAL. PID AJ 6316
   N: 562,836.23 E 610,112.57 FT.
   ELEV. 5.34 FT NAVD 88
   DESCRIPTION: NOS TIDAL STATION MARK, A PUNCH MARK ON TOP OF A STAINLESS STEEL ROD ENCASED IN CONCRETE.
   RECOVERED 2013 IN GOOD CONDITION.
6. TIDAL INFORMATION OBTAINED FROM NATIONAL OCEANOGRAPHIC AND ATMOSPHERIC ADMINISTRATION (NOAA) NATIONAL OCEAN SERVICE TIDAL BENCHMARK 855 1910 K REEDY POINT, C&D CANAL. ELEVATIONS ARE BASED ON 1983–2001 EPOCH.

HIGHEST OBSERVED:	10/30/2012 6.77
	MHHW 3.04
	MHW 2.65
	NAVD88 0.00
	MSL –0.01
	MTL –0.07
	MLW –2.79
	MLLW –2.97
LOWEST OBSERVED:	3/6/2007 –6.28

7. EXISTING TOPOGRAPHY OBTAINED FROM NOAA LIDAR DATA COLLECTED 2014. HYDROGRAPHIC DATA IS A COMBINATION OF NOAA LIDAR DATA COLLECTED 2007 AND RTK SURVEY COLLECTED BY GBA IN MARCH 2016.
8. PROPERY LINES WERE OBTAINED FROM NEW CASTLE COUNTY, DELAWARE GEOGRAPHIC INFORMATION SYSTEM (GIS) PROPERTY PARCEL MAP (gis.nccde.org).
9. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND EXISTING CONDITIONS BEFORE STARTING WORK. DO NOT SCALE PROJECT DRAWINGS. REPORT ANY DISCREPANCIES IN THE DRAWINGS AND/OR SPECIFICATIONS TO THE ENGINEER FOR CLARIFICATION OR ADJUSTMENTS PRIOR TO COMMENCING WORK. THE CONTRACTOR SHALL NOT BEGIN DEMOLITION/CONSTRUCTION IN ANY SUCH EFFECTED AREA UNTIL THE DISCREPANCY HAS BEEN RESOLVED.
10. UNLESS OTHERWISE NOTED, THE CONTRACTOR SHALL REMOVE FROM THE SITE ANY DEBRIS RESULTING FROM DEMOLITION/CONSTRUCTION. DISPOSAL OF MATERIALS IS THE RESPONSIBILITY OF THE CONTRACTOR. ALL MATERIAL TO BE REMOVED SHALL BECOME THE PROPERTY OF THE CONTRACTOR UNLESS OTHERWISE NOTED, AND SHALL BE DISPOSED OF AS SPECIFIED. ALL DEBRIS SHALL BE PROPERLY DISPOSED OF IN A PERMITTED LANDFILL. THE CONTRACTOR SHALL KEEP RECORDS OF ALL MATERIALS REMOVED FROM THE SITE, INCLUDING DESCRIPTIONS QUANTITIES AND DISPOSAL LOCATION.
11. THE CONTRACTOR IS RESPONSIBLE FOR REPAIRING AT HIS OWN EXPENSE ANY AND ALL DAMAGES THAT MAY OCCUR OUTSIDE AND WITHIN THE LIMITS OF THE PROJECT AS A RESULT OF DEMOLITION/CONSTRUCTION.
12. LIMITED STAGING AREAS WILL BE PROVIDED ON SITE FOR CONTRACTORS' USE. THE CONTRACTOR SHALL CONFIRM THE EXTENTS OF STAGING AREAS WITH THE ENGINEER.
13. THE CONTRACTOR SHALL STAKEOUT ALL BASELINES OF CONSTRUCTION, THE LOCATION OF ALL NEW CONSTRUCTION, AND VERIFY ALL SETBACKS, OFFSETS, AND CLEARANCE PRIOR TO THE START OF WORK.
14. THE CONTRACTOR SHALL PLACE NO FILL MATERIAL ON EXISTING RIP RAP SHORE PROTECTION. ANY CUT OR FILL AREAS THAT ENCROACH ON EXISTING RIP RAP SHORE PROTECTION SHALL BE CONFIRMED WITH THE ENGINEER. ANY REQUIRED MODIFICATIONS TO THE RIP RAP SHORE PROTECTION SHALL BE PAOD UNDER OPTION 5. SEE SPECIFICATIONS SECTION 1.2.1 FOR DETAILS.

Mark	Description	Date	Appr.

Designed by: CFB
Dwn by: ECC
Ckd by: JB
Reviewed by: DLB
Submitted by: DCU
Date: MAR 2017
Drawing Name: G001–G003
Rev.
Scale: AS SHOWN
Plot scale: 1 = 1

DELAWARE CERTIFICATE OF AUTHORIZATION
GBA ENGINEERS ★ SURVEYORS
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Baltimore, MD 21237
Phone (410) 682-5595
#637

DELAWARE FISH AND WILDLIFE
LANG IMPOUNDMENT REHABILITATION PROJECT
2016

LANG IMPOUNDMENT
GENERAL NOTES

DENNIS C. LINDSTROM
No. 19938
DELAWARE
PROFESSIONAL ENGINEER

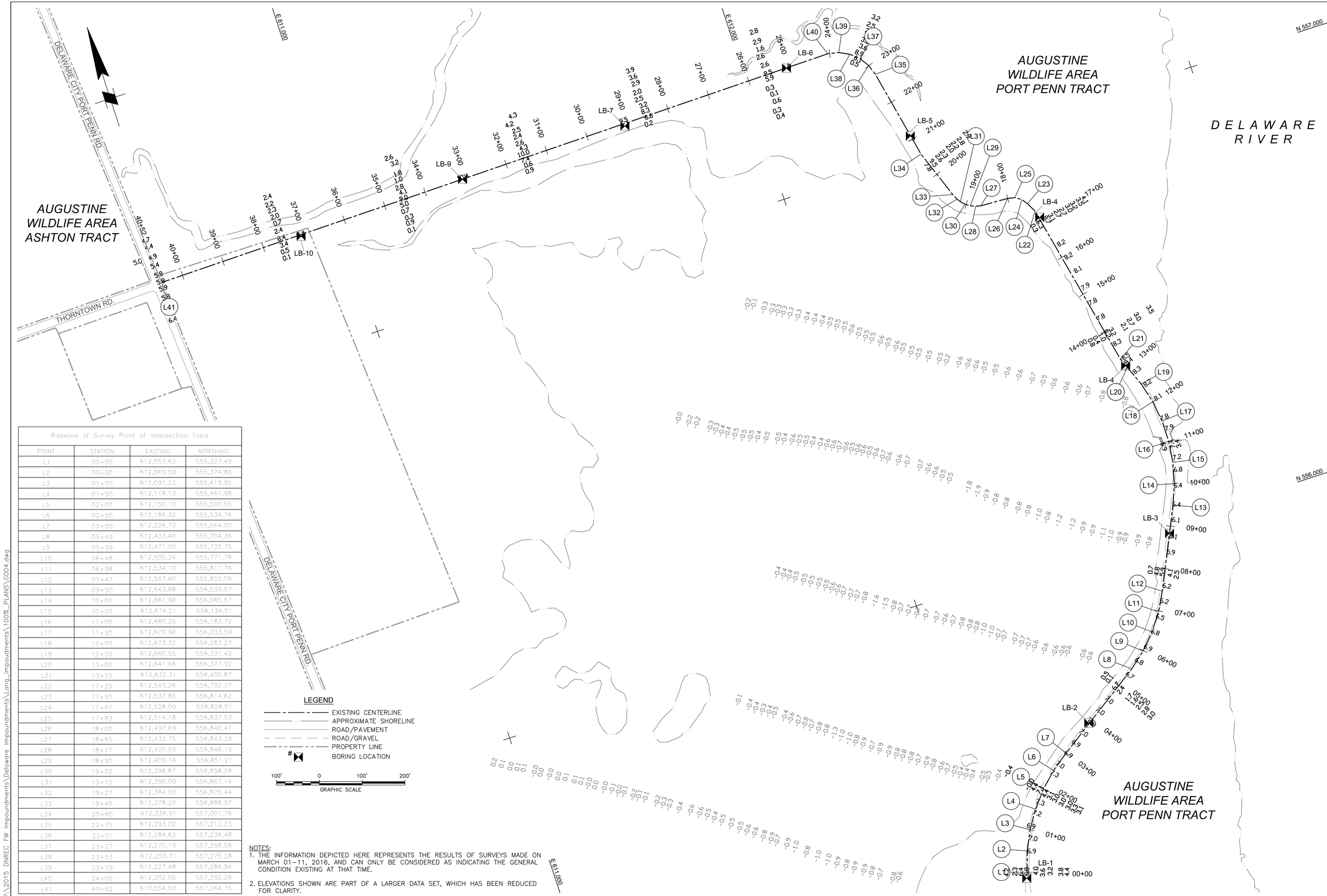
I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed Professional Engineer under the laws of the State of Delaware.

License No. _____

Expiration Date: _____

SHEET REFERENCE NUMBER
G-003
SHEET 3 OF 19

P:\2015 DNREC FW Impoundments\Delaware Impoundments\Lang_impoundments\100%_PLANS\G001–G003.dwg



Baseline of Survey Point of Intersection Table			
POINT	STATION	EASTING	NORTHING
L1	00+00	612,053.63	555,327.49
L2	00+50	612,069.59	555,374.85
L3	01+00	612,091.23	555,419.95
L4	01+50	612,118.13	555,461.98
L5	02+00	612,150.10	555,500.55
L6	02+50	612,186.32	555,534.76
L7	03+00	612,226.73	555,564.50
L8	05+49	612,433.40	555,704.26
L9	05+99	612,471.50	555,735.75
L10	06+48	612,505.24	555,771.78
L11	06+98	612,534.10	555,811.76
L12	07+47	612,557.60	555,855.06
L13	09+50	612,643.68	556,039.07
L14	10+00	612,661.96	556,085.57
L15	10+50	612,674.21	556,134.01
L16	11+00	612,680.25	556,183.72
L17	11+50	612,679.96	556,233.59
L18	12+00	612,673.32	556,283.27
L19	12+50	612,660.55	556,331.42
L20	13+00	612,641.66	556,377.92
L21	13+25	612,632.31	556,400.87
L22	17+25	612,549.26	556,792.37
L23	17+50	612,537.85	556,814.62
L24	17+67	612,528.09	556,828.01
L25	17+83	612,514.18	556,837.03
L26	18+00	612,497.69	556,840.47
L27	18+65	612,432.75	556,843.39
L28	18+77	612,420.59	556,846.19
L29	18+90	612,409.16	556,851.21
L30	19+02	612,398.87	556,858.28
L31	19+15	612,390.09	556,867.14
L32	19+27	612,384.50	556,875.44
L33	19+40	612,378.20	556,888.97
L34	20+60	612,336.91	557,001.76
L35	22+75	612,293.02	557,212.23
L36	23+01	612,284.63	557,236.48
L37	23+27	612,270.19	557,258.08
L38	23+53	612,250.71	557,275.28
L39	23+79	612,227.48	557,286.94
L40	24+05	612,202.05	557,292.28
L41	40+52	610,554.50	557,264.75

NOTES:
1. THE INFORMATION DEPICTED HERE REPRESENTS THE RESULTS OF SURVEYS MADE ON MARCH 01–11, 2016, AND CAN ONLY BE CONSIDERED AS INDICATING THE GENERAL CONDITION EXISTING AT THAT TIME.
2. ELEVATIONS SHOWN ARE PART OF A LARGER DATA SET, WHICH HAS BEEN REDUCED FOR CLARITY.

Mark	Description	Date	Appr.

Designed by: CFB
Dwn by: ECC
Ckd by: JB
Reviewed by: DLB
Submitted by: DCU
Date: MAR 2017
Drawing Name: G004
Rev:
Scale: AS SHOWN
Plot scale: 1 = 1

DELAWARE CERTIFICATE OF AUTHORIZATION
GBA
9208 Yellow Brick Rd.
Unit D
Baltimore, MD 21237
ENGINEERS ★ SURVEYORS Phone (410) 682-5595
#637

DELAWARE FISH AND WILDLIFE
LANG IMPOUNDMENT REHABILITATION PROJECT
2016

LANG IMPOUNDMENT AND DIKE SURVEY

DENNIS C. DUNN
LICENSE No. 19936
DELAWARE
PROFESSIONAL ENGINEER

I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed Professional Engineer under the laws of the State of Delaware.

License No. _____

Expiration Date: _____

SHEET REFERENCE NUMBER
G-004
SHEET 4 OF 19

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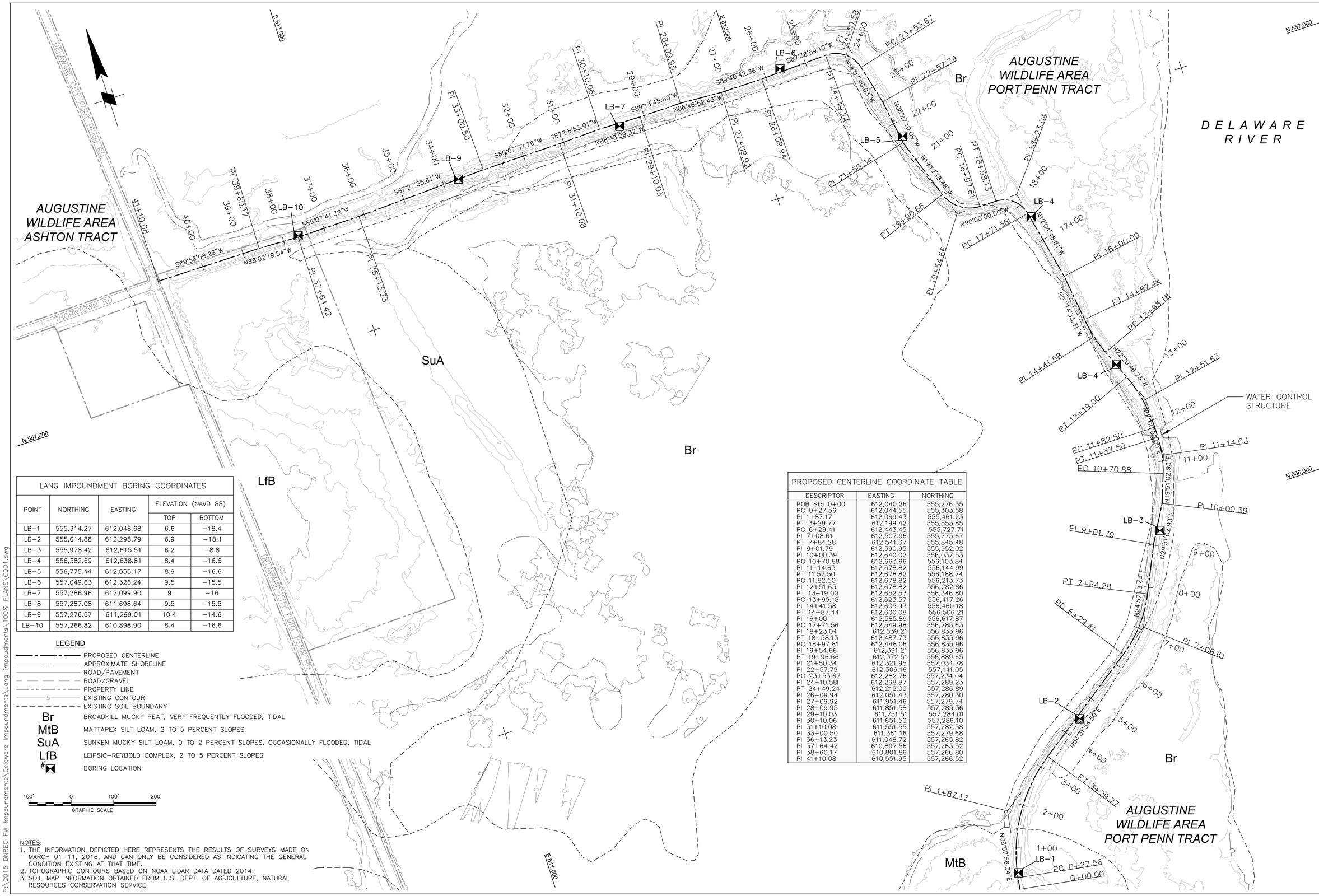


LANG IMPOUNDMENT BORING COORDINATES				
POINT	NORTHING	EASTING	ELEVATION (NAVD 88)	
			TOP	BOTTOM
LB–1	555,314.27	612,048.68	6.6	–18.4
LB–2	555,614.88	612,298.79	6.9	–18.1
LB–3	555,978.42	612,615.51	6.2	–8.8
LB–4	556,382.69	612,638.81	8.4	–16.6
LB–5	556,775.44	612,555.17	8.9	–16.6
LB–6	557,049.63	612,326.24	9.5	–15.5
LB–7	557,286.96	612,099.90	9	–16
LB–8	557,287.08	611,698.64	9.5	–15.5
LB–9	557,276.67	611,299.01	10.4	–14.6
LB–10	557,266.82	610,898.90	8.4	–16.6

PROPOSED CENTERLINE COORDINATE TABLE		
DESCRIPTOR	EASTING	NORTHING
POB Sta. 0+00	612,040.26	555,276.35
PC 0+27.56	612,044.55	555,303.58
PI 1+87.17	612,069.43	555,461.23
PT 3+29.77	612,199.42	555,553.85
PC 6+29.41	612,443.45	555,727.71
PI 7+08.61	612,507.96	555,773.67
PT 7+84.28	612,541.37	555,845.48
PI 9+01.79	612,590.95	555,952.02
PI 10+00.39	612,640.02	556,037.53
PC 10+70.88	612,663.96	556,103.84
PI 11+14.63	612,678.82	556,144.99
PT 11.57.50	612,678.82	556,188.74
PC 11.82.50	612,678.82	556,213.73
PI 12+51.63	612,678.82	556,282.86
PT 13+19.00	612,652.53	556,346.80
PC 13+95.18	612,623.57	556,417.26
PI 14+41.58	612,605.93	556,460.18
PT 14+87.44	612,600.08	556,506.21
PI 16+00	612,585.89	556,617.87
PC 17+71.56	612,549.98	556,785.63
PI 18+23.04	612,539.21	556,835.96
PT 18+58.13	612,487.73	556,835.96
PC 18+97.81	612,448.06	556,835.96
PI 19+54.66	612,391.21	556,835.96
PT 19+96.66	612,372.51	556,889.65
PI 21+50.34	612,321.95	557,034.78
PI 22+57.79	612,306.16	557,141.05
PC 23+53.67	612,282.76	557,234.04
PI 24+10.581	612,268.87	557,289.23
PT 24+49.24	612,212.00	557,286.89
PI 26+09.94	612,051.43	557,280.30
PI 27+09.92	611,951.46	557,279.74
PI 28+09.95	611,851.58	557,285.36
PI 29+10.03	611,751.51	557,284.01
PI 30+10.06	611,651.50	557,286.10
PI 31+10.08	611,551.55	557,282.58
PI 33+00.50	611,361.16	557,279.68
PI 36+13.23	611,048.72	557,265.82
PI 37+64.42	610,897.56	557,263.52
PI 38+60.17	610,801.86	557,266.80
PI 41+10.08	610,551.95	557,266.52

LEGEND

- PROPOSED CENTERLINE
- APPROXIMATE SHORELINE
- ROAD/PAVEMENT
- ROAD/GRAVEL
- PROPERTY LINE
- 5 EXISTING CONTOUR
- EXISTING SOIL BOUNDARY
- Br BROADKILL MUCKY PEAT, VERY FREQUENTLY FLOODED, TIDAL
- MtB MATTAPEX SILT LOAM, 2 TO 5 PERCENT SLOPES
- SuA SUNKEN MUCKY SILT LOAM, 0 TO 2 PERCENT SLOPES, OCCASIONALLY FLOODED, TIDAL
- LfB LEIPSIC–REYBOLD COMPLEX, 2 TO 5 PERCENT SLOPES
- # BORING LOCATION

100' 0 100' 200'
GRAPHIC SCALE

NOTES:
1. THE INFORMATION DEPICTED HERE REPRESENTS THE RESULTS OF SURVEYS MADE ON MARCH 01–11, 2016, AND CAN ONLY BE CONSIDERED AS INDICATING THE GENERAL CONDITION EXISTING AT THAT TIME.
2. TOPOGRAPHIC CONTOURS BASED ON NOAA LIDAR DATA DATED 2014.
3. SOIL MAP INFORMATION OBTAINED FROM U.S. DEPT. OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICE.

P:\2015 DNREC FW Impoundments\Delaware Impoundments\Lang_impoundments\100%_PLANS\C001.dwg

Mark	Description	Date	Appr.

Designed by: CFB | Date: MAR 2017 | Rev:
Dwn by: DCM | Ckd by: JB | Drawing Name: C001
Reviewed by: DLB | Scale: AS SHOWN
Submitted by: DCU | Plot scale: 1 = 1

DELAWARE CERTIFICATE OF AUTHORIZATION
GBA ENGINEERS ★ SURVEYORS
9908 Yellow Brick Rd. Unit D Baltimore, MD 21237 Phone (410) 682-5595
#637

DELAWARE FISH AND WILDLIFE
LANG IMPOUNDMENT REHABILITATION PROJECT
2016

LANG IMPOUNDMENT SITE LAYOUT

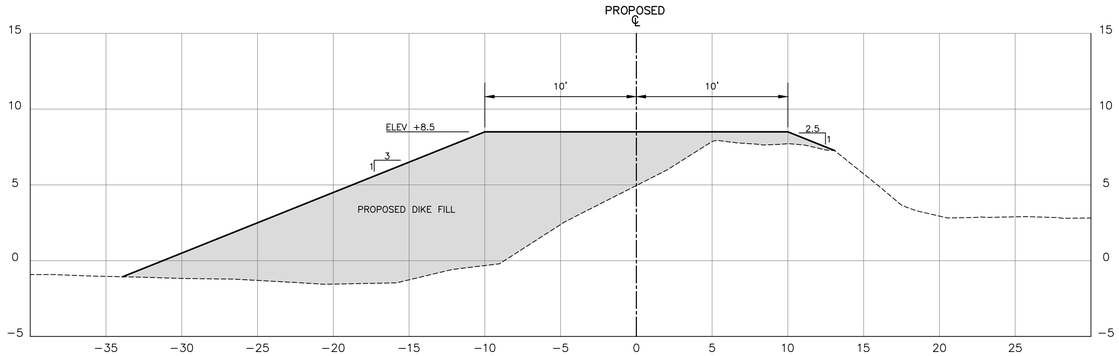
DANIEL C. UHSO LICENSE NO. 13930 STATE OF DELAWARE PROFESSIONAL ENGINEER

I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed Professional Engineer under the laws of the State of Delaware.

License No. _____

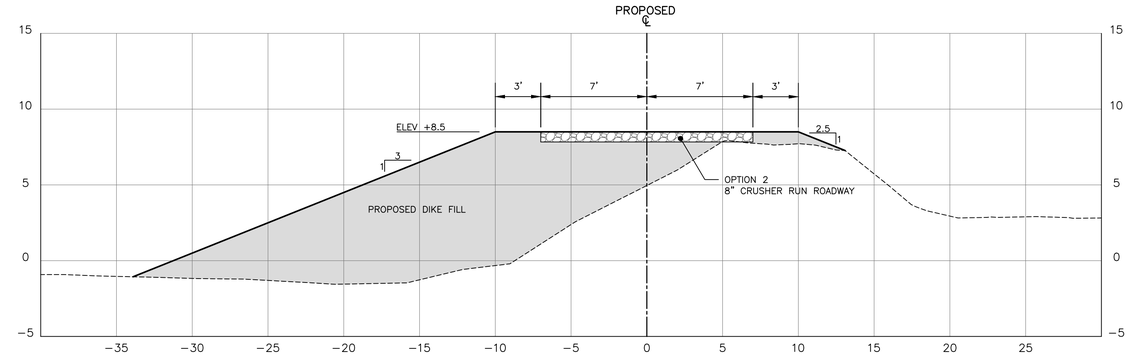
Expiration Date: _____

SHEET REFERENCE NUMBER
C-001
SHEET 5 OF 19



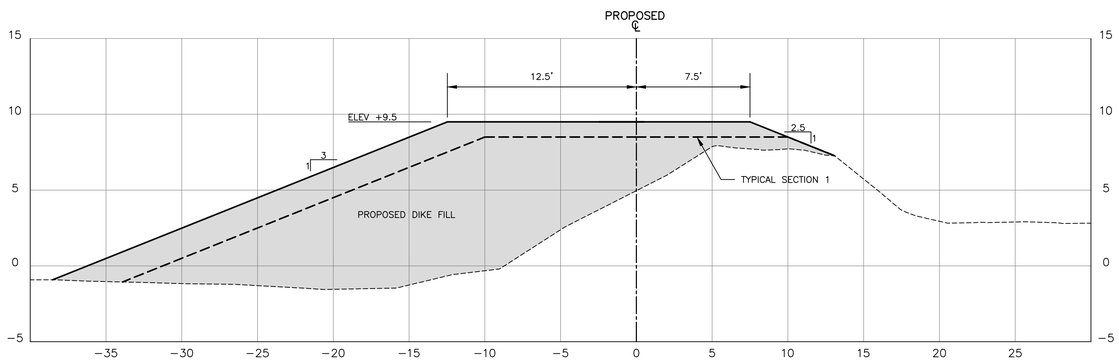
TYPICAL SECTION 1 – BASE DIKE TO ELEVATION +8.5' STATION 0+00 TO 25+00

SCALE: 1"=5'



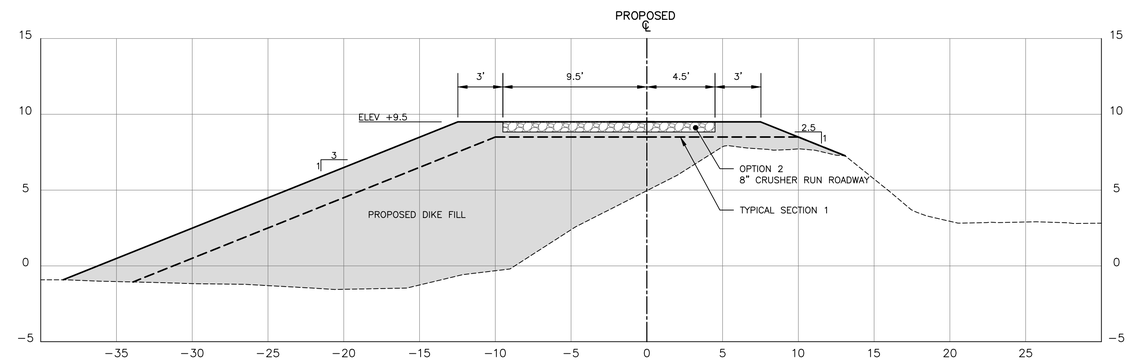
TYPICAL SECTION 1 (OPTION 2) – BASE DIKE TO ELEVATION +8.5'STATION 0+00 TO 25+00

SCALE: 1"=5'



TYPICAL SECTION 2 (OPTION 1) – DIKE TO ELEVATION +9.5' STATION 0+00 TO 11+13.44 & 12+02.03 TO 25+00

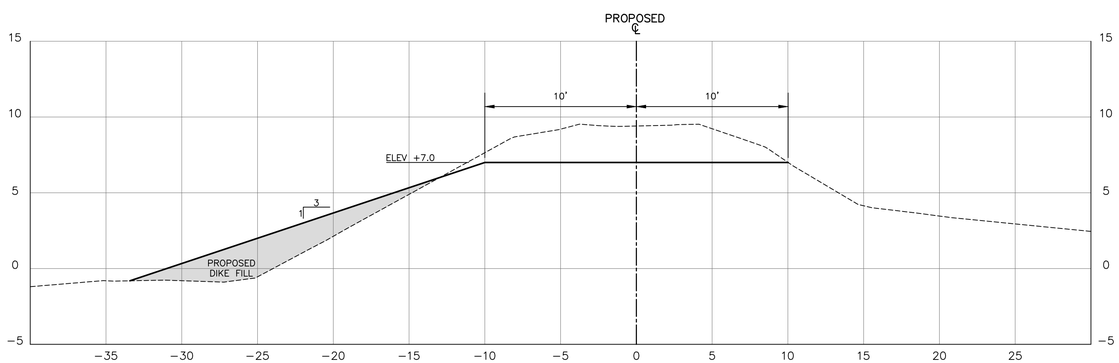
SCALE: 1"=5'



TYPICAL SECTION 2 (OPTION 2) – DIKE TO ELEVATION +9.5' STATION 0+00 TO 11+13.44 & 12+02.03 TO 25+00

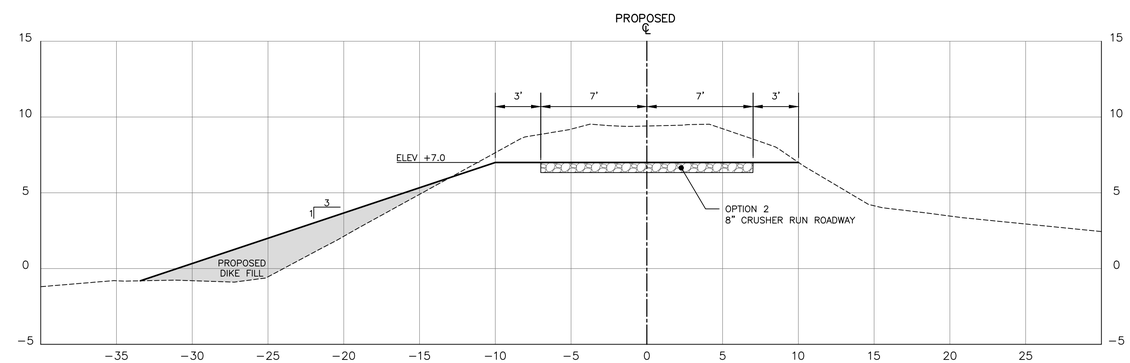
SCALE: 1"=5'

*SEE SHEET C–009 & C–010 FOR ELEV. +9.5 DIKE GEOMETRY AT WATER CONTROL STRUCTURE.



TYPICAL SECTION 3 – BASE DIKE TO ELEVATION +7.0' STATION 27+00 TO 40+50

SCALE: 1"=5'



TYPICAL SECTION 3 (OPTION 2) – BASE DIKE TO ELEVATION +7.0' STATION 27+00 TO 40+50

SCALE: 1"=5'

Mark	Description	Date	Appr.

Date: MAR 2017 | Rev.
Drawing Name: C001A–C007
Designed by: CFB
Dwn by: DCM | Ckd by: JB
Reviewed by: DLB
Submitted by: DCU
Scale: AS SHOWN
Plot scale: 1 = 1

DELAWARE CERTIFICATE OF AUTHORIZATION
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Baltimore, MD 21237
Phone (410) 682-5595
#637

DELAWARE FISH AND WILDLIFE
LANG IMPOUNDMENT REHABILITATION PROJECT
2016

LANG IMPOUNDMENT
TYPICAL SECTIONS

I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed Professional Engineer under the laws of the State of Delaware.

License No. _____

Expiration Date: _____

SHEET REFERENCE NUMBER

C-001A

SHEET 6 OF 19

P:\2015 DNREC FW Impoundments\Delaware Impoundments\Long_impoundments\100%_PLANS\C001A–C007.dwg

MATCHLINE - SEE SHEET C-003

6+00

5+00

4+00

3+00

2+00

1+00

0+00.00

LB-2

LB-1

PT 3+29.77

PI 1+87.17

PC 0+27.56

N 555,500

E 612,000

N 555,500

E 612,500

E 612,500

N 555,250

Δ c=	45°33'58.16"
Rc=	380.00
Tc=	159.61
A=	302.21

AUGUSTINE WILDLIFE AREA PORT PENN TRACT

DELAWARE RIVER

STA 0+50 BEGIN TYPICAL SECTION
SEE SHEET C-001A

STA 0+00 MATCH EXISTING GRADE

CONTRACTORS STAGING AREA
REPAIR ANY DAMAGE TO PARKING AREA DURING CONSTRUCTION WITH CRUSHER RUN, GRADE TO DRAIN AND COMPACT.

STABILIZED CONSTRUCTION ENTRANCE
SEE DETAIL SHEET C-008

LEGEND

- PROPOSED CENTERLINE
- APPROXIMATE SHORELINE
- TC-2 TURBIDITY CURTAIN
- EDGE OF CROWN
- PROPERTY LINE
- 5 EXISTING CONTOUR
- # BORING LOCATION
- EXISTING RIPRAP
- FILL

30' 0 30' 60'
GRAPHIC SCALE

Mark	Description	Date	Appr.

Designed by: CFB
Dwn by: DCM
Ckd by: JB
Reviewed by: DLB
Submitted by: DCU
Date: MAR 2017
Drawing Name: C001A-C007
Rev.
Scale: AS SHOWN
Plot scale: 1 = 1

DELAWARE CERTIFICATE OF AUTHORIZATION
GBA ENGINEERS ★ SURVEYORS
9908 Yellow Brick Rd. Unit D
Baltimore, MD 21237
Phone (410) 682-5595
#637

DELAWARE FISH AND WILDLIFE
LANG IMPOUNDMENT REHABILITATION PROJECT
2016

DIKE FILL, EROSION & SEDIMENT CONTROL PLAN SHEET 1 OF 6

I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed Professional Engineer under the laws of the State of Delaware.

License No. _____

Expiration Date: _____

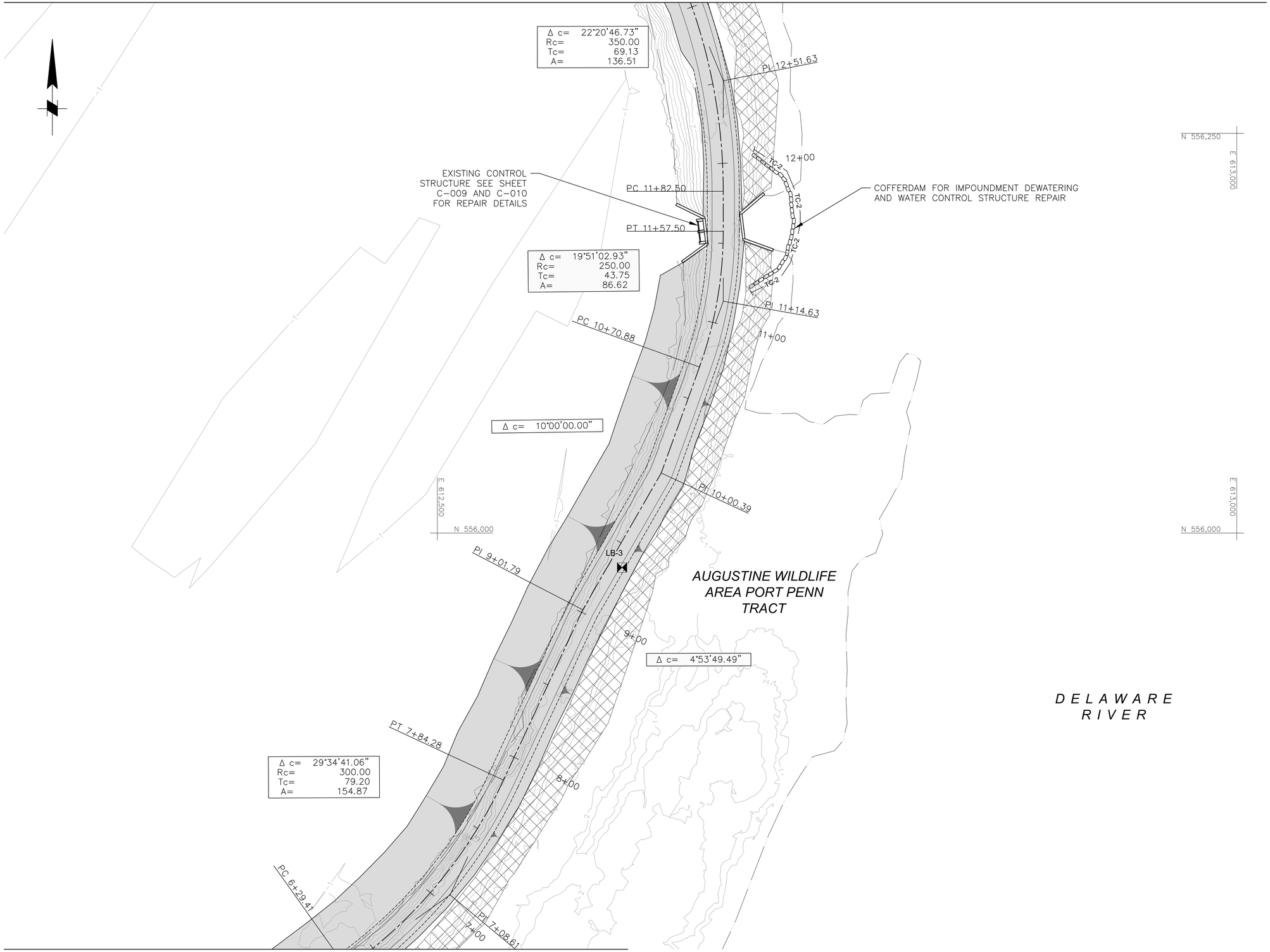
SHEET REFERENCE NUMBER

C-002

SHEET 7 OF 19

P:\2015 DNREC FW Impoundments\Delaware Impoundments\Lang_impoundments\100%_PLANS\C001A-C007.dwg

MATCHLINE - SEE SHEET C-004



MATCHLINE - SEE SHEET C-002

LEGEND

- PROPOSED CENTERLINE
- APPROXIMATE SHORELINE
- TC-2 TURBIDITY CURTAIN
- EDGE OF CROWN
- PROPERTY LINE
- 5 EXISTING CONTOUR
- # BORING LOCATION
- EXISTING RIPRAP
- FILL
- CUT

30' 0 30' 60'
GRAPHIC SCALE

Mark	Description	Date	Appr.

Designed by: CFB
Dwn by: DCM
Ckd by: JB
Reviewed by: DLB
Submitted by: DCU
Date: MAR 2017
Drawing Name: C001A-C007
Rev.
Scale: AS SHOWN
Plot scale: 1 = 1

DELAWARE CERTIFICATE OF AUTHORIZATION
GBA ENGINEERS ★ SURVEYORS
9909 Yellow Brick Rd. Unit D
Baltimore, MD 21237
Phone (410) 682-5595
#637

DELAWARE FISH AND WILDLIFE
LANG IMPOUNDMENT REHABILITATION PROJECT
2016

DIKE FILL, EROSION & SEDIMENT CONTROL PLAN SHEET 2 OF 6

I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed Professional Engineer under the laws of the State of Delaware.

License No. _____

Expiration Date: _____

SHEET REFERENCE NUMBER

C-003

SHEET 8 OF 19

P:\2015 DNREC FW Impoundments\Delaware Impoundments\Lang_impoudments\100%_PLANS\C001A-C007.dwg

MATCHLINE - SEE SHEET C-005

Δ c= 70°47'41.52"
Rc= 80.00
Tc= 56.85
A= 98.85

PT 19+96.66

PC 18+97.81

PI 18+23.04

18+00

PI 19+54.66

PC 17+71.56

LB-4

Δ c= 77°55'11.39"
Rc= 63.66
Tc= 51.48
A= 86.57

PT 18+58.13

17+00

AUGUSTINE WILDLIFE
AREA PORT PENN
TRACT

N 556,750

E 613,000

Δ c= 4°50'15.30"

PI 16+00.00

DELAWARE
RIVER

E 612,500

N 556,500

15+00

PT 14+87.44

Δ c= 15°06'13.42"
Rc= 350.00
Tc= 46.40
A= 92.26

PI 14+41.58

PC 13+95.18

LB-4

PT 13+19.00

13+00

E 613,000

N 556,500

MATCHLINE - SEE SHEET C-003

LEGEND

- PROPOSED CENTERLINE
- APPROXIMATE SHORELINE
- TC-2 TURBIDITY CURTAIN
- EDGE OF CROWN
- PROPERTY LINE
- 5 EXISTING CONTOUR
- # BORING LOCATION
- EXISTING RIPRAP
- FILL
- CUT

30' 0 30' 60'
GRAPHIC SCALE

Mark	Description	Date	Appr.

Designed by: CFB
Dwn by: DCM
Ckd by: JB
Reviewed by: DLB
Submitted by: DCU
Date: MAR 2017
Drawing Name: C001A-C007
Rev.
Scale: AS SHOWN
Plot scale: 1 = 1

DELAWARE CERTIFICATE OF AUTHORIZATION
GBA
ENGINEERS ★ SURVEYORS
9908 Yellow Brick Rd.
Unit D
Baltimore, MD 21237
Phone (410) 682-5595
#637

DELAWARE FISH AND WILDLIFE
LANG IMPOUNDMENT REHABILITATION PROJECT
2016

DIKE FILL, EROSION & SEDIMENT CONTROL PLAN SHEET 3 OF 6

DENNIS C. DUNN
LICENSE NO. 19681
DELAWARE
PROFESSIONAL ENGINEER

I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed Professional Engineer under the laws of the State of Delaware.

License No. _____

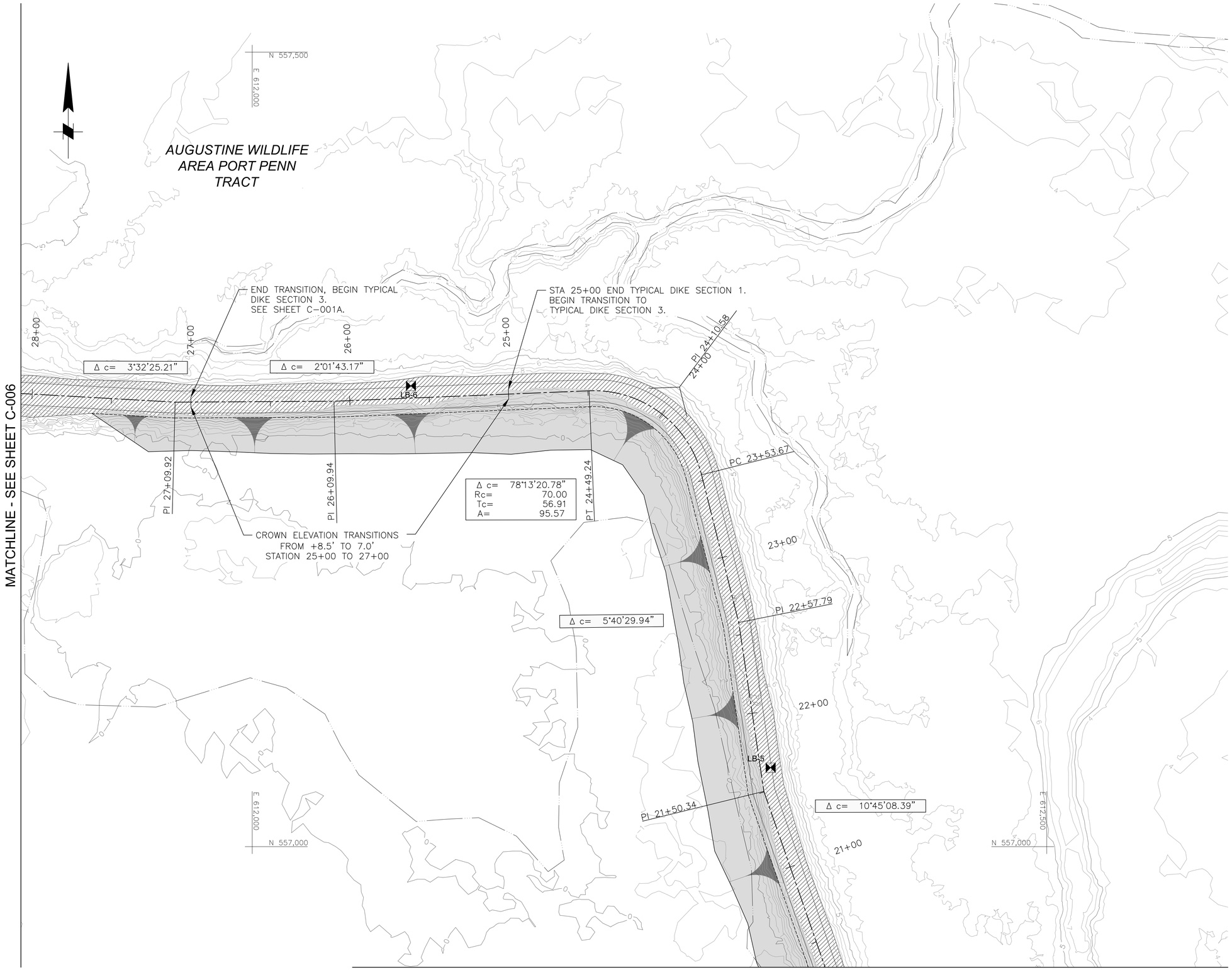
Expiration Date: _____

SHEET REFERENCE NUMBER

C-004

SHEET 9 OF 19

P:\2015 DNREC FW Impoundments\Delaware Impoundments\Lang_impoundments\100%_PLANS\C001A-C007.dwg



LEGEND

- PROPOSED CENTERLINE
- APPROXIMATE SHORELINE
- TC-2 TURBIDITY CURTAIN
- EDGE OF CROWN
- PROPERTY LINE
- 5 EXISTING CONTOUR
- # BORING LOCATION
- FILL
- CUT

30' 0 30' 60'
GRAPHIC SCALE

Mark	Description	Date	Appr.

Designed by: CFB
Dwn by: DCM
Ckd by: JB
Reviewed by: DLB
Submitted by: DCU
Date: MAR 2017
Rev.
Drawing Name: C001A-C007
Scale: AS SHOWN
Plot scale: 1 = 1

DELAWARE CERTIFICATE OF AUTHORIZATION
GBA ENGINEERS ★ SURVEYORS
9908 Yellow Brick Rd. Unit 3
Baltimore, MD 21237
Phone (410) 682-5595
#637

DELAWARE FISH AND WILDLIFE
LANG IMPOUNDMENT REHABILITATION PROJECT
2016

DIKE FILL, EROSION & SEDIMENT CONTROL PLAN SHEET 4 OF 6

DENNIS L. DUNN LICENSE NO. 18961 PROFESSIONAL ENGINEER STATE OF DELAWARE

I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed Professional Engineer under the laws of the State of Delaware.

License No. _____

Expiration Date: _____

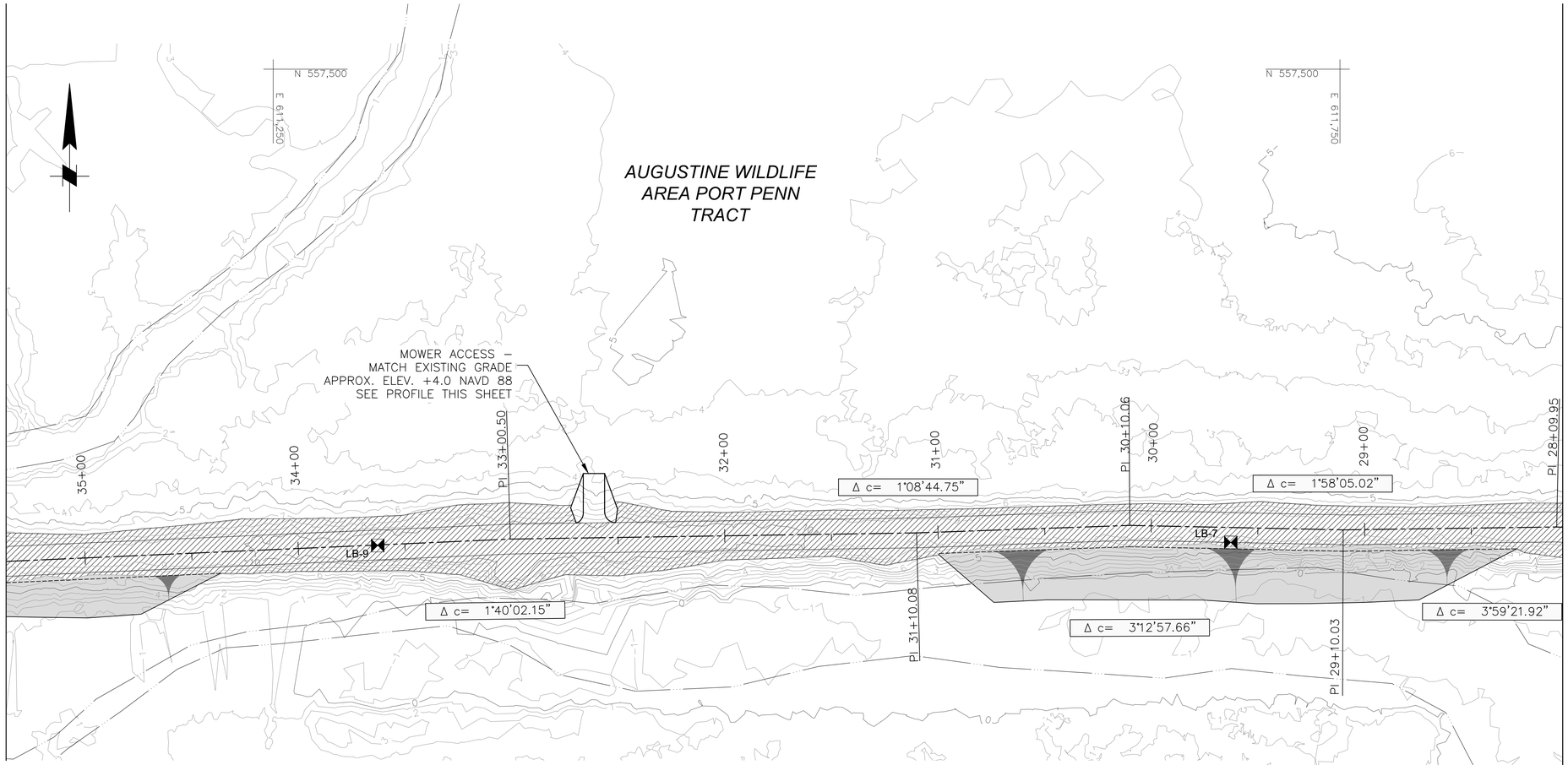
SHEET REFERENCE NUMBER

C-005

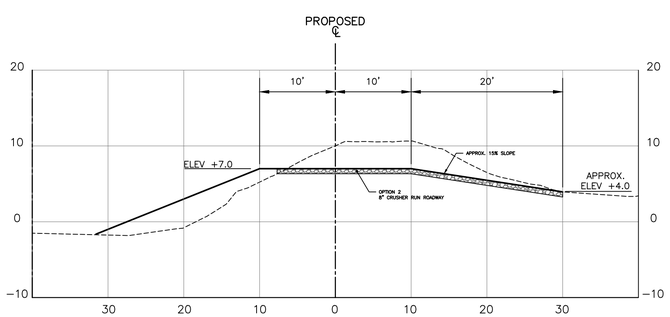
SHEET 10 OF 19

P:\2015 DNREC FW Impoundments\Delaware Impoundments\Lang_impoundments\100%_PLANS\C001A-C007.dwg

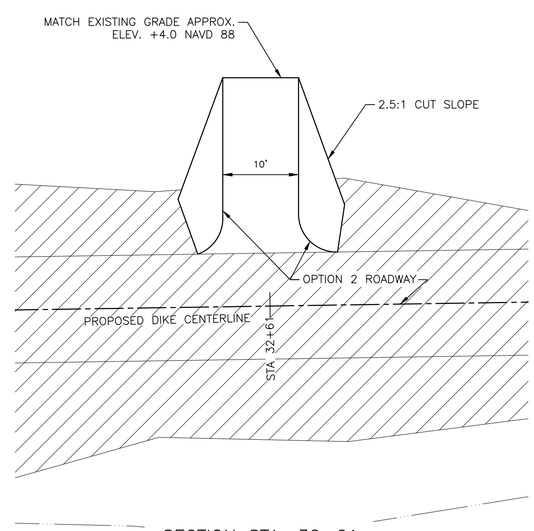
MATCHLINE - SEE SHEET C-007



MATCHLINE - SEE SHEET C-005



SECTION STA. 32+61
MOWER ACCESS PROFILE
SCALE: 1"=10'



SECTION STA. 32+61
MOWER ACCESS PLAN
SCALE: 1"=10'

LEGEND

- PROPOSED CENTERLINE
- APPROXIMATE SHORELINE
- TC-2 TURBIDITY CURTAIN
- EDGE OF CROWN
- PROPERTY LINE
- 5 EXISTING CONTOUR
- # BORING LOCATION
- FILL
- CUT

30' 0 30' 60'
GRAPHIC SCALE

Mark	Description	Date	Appr.

Designed by: CFB
Dwn by: DCM
Ckd by: JB
Reviewed by: DLB
Submitted by: DCU
Date: MAR 2017
Drawing Name: C001A–C007
Rev.
Scale: AS SHOWN
Plot scale: 1 = 1

DELAWARE CERTIFICATE OF AUTHORIZATION
GBA
ENGINEERS ★ SURVEYORS
9909 Yellow Brick Rd.
Unit G
Baltimore, MD 21237
Phone (410) 682-5595
#637

DELAWARE FISH AND WILDLIFE
LANG IMPOUNDMENT REHABILITATION PROJECT
2016

DIKE FILL, EROSION & SEDIMENT CONTROL PLAN SHEET 5 OF 6

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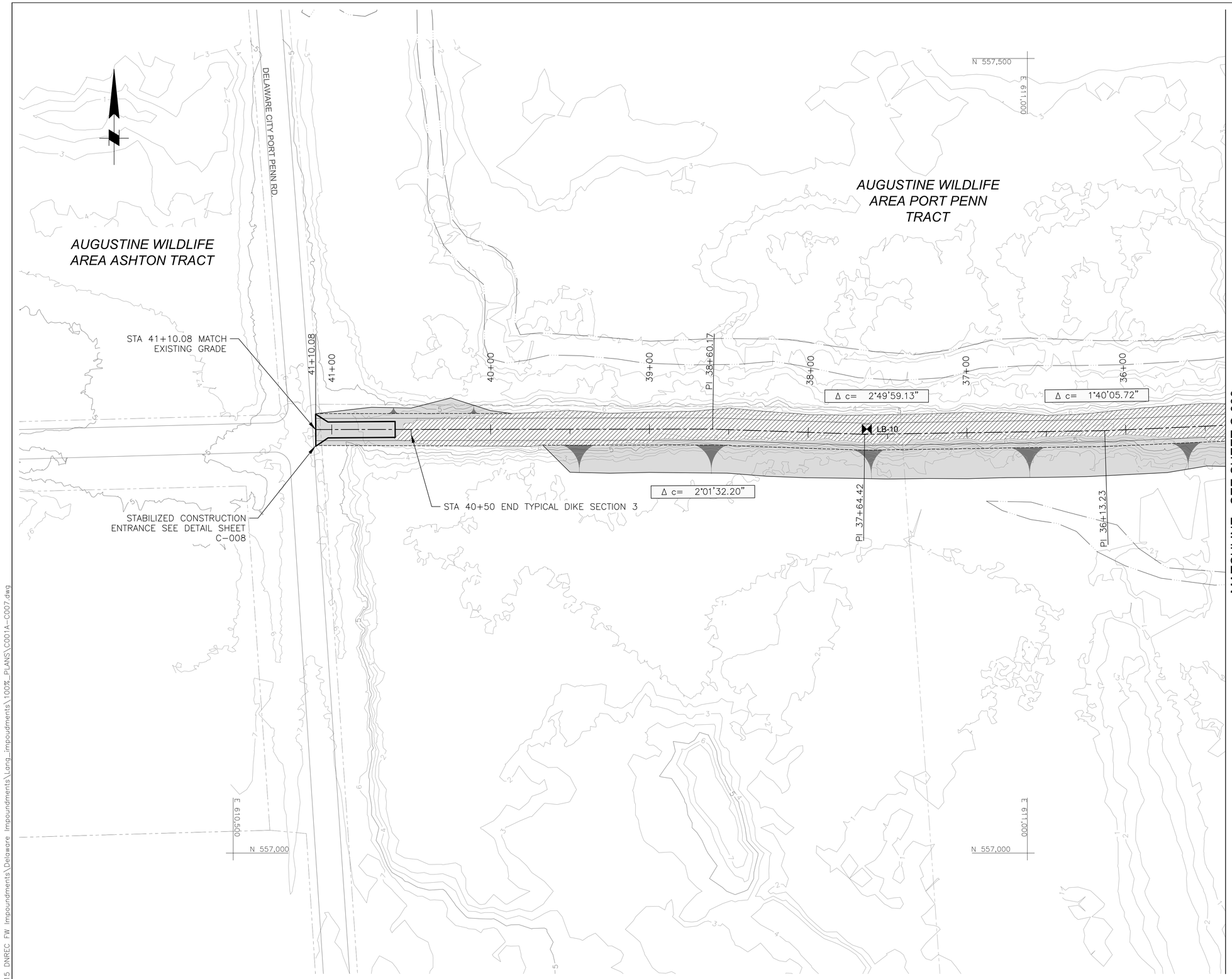
License No. _____

Expiration Date: _____

SHEET REFERENCE NUMBER
C-006
SHEET 11 OF 19

P:\2015 DNREC FW Impoundments\Delaware Impoundments\Lang_impoundments\100%_PLANS\C001A–C007.dwg



LEGEND

- PROPOSED CENTERLINE
- APPROXIMATE SHORELINE
- TC-2 TURBIDITY CURTAIN
- EDGE OF CROWN
- PROPERTY LINE
- 5 EXISTING CONTOUR
- # BORING LOCATION
- FILL
- CUT

30' 0 30' 60'
GRAPHIC SCALE

Mark	Description	Date	Appr.

Designed by: CFB
Dwn by: DCM
Ckd by: JB
Reviewed by: DLB
Submitted by: DCU
Date: MAR 2017
Drawing Name: C001A-C007
Rev.
Scale: AS SHOWN
Plot scale: 1 = 1

DELAWARE CERTIFICATE OF AUTHORIZATION
GBA
9908 Yellow Brick Rd.
Unit 9
Baltimore, MD 21237
ENGINEERS ★ SURVEYORS Phone (410) 682-5595
#637

DELAWARE FISH AND WILDLIFE
LANG IMPOUNDMENT REHABILITATION PROJECT
2016

DIKE FILL, EROSION & SEDIMENT CONTROL PLAN SHEET 6 OF 6

DANIEL C. UNSER
LICENSE NO. 13938
DELAWARE
PROFESSIONAL ENGINEER

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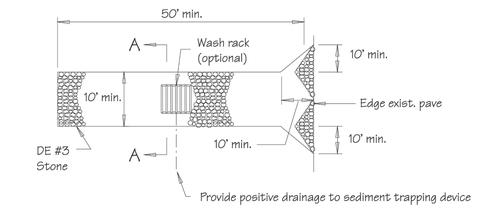
License No. _____

Expiration Date: _____

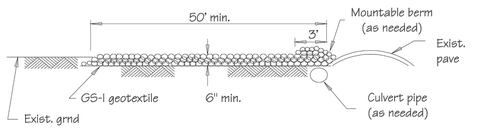
SHEET REFERENCE NUMBER
C-007
SHEET 12 OF 19

P:\2015 DNREC FW Impoundments\Delaware Impoundments\Lang_impoundments\100%_PLANS\C001A-C007.dwg

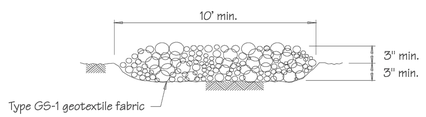
Standard Detail & Specifications
Stabilized Construct. Entrance



Plan



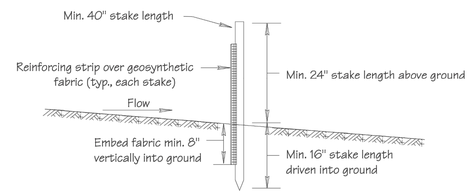
Profile



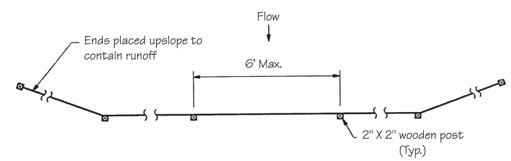
Section A-A (Std.)

Source:	Symbol:	Detail No.
Adapted from VA ESC Handbook	SCE	DE-ESC-3.4.7 Sheet 1 of 2 Date: 12/03

Standard Detail & Specifications
Silt Fence



Section

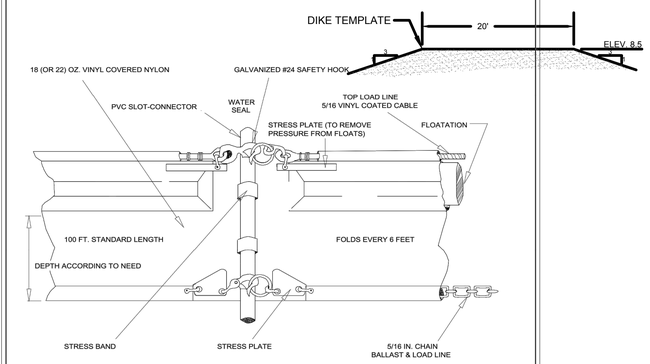


Plan

DATA
Max. controlled slope

Source:	Symbol:	Detail No.
Adapted form MD Stds. & Specs. for ESC	SF	DE-ESC-3.1.2.1 Sheet 1 of 2 Date: 6/05

Standard Detail & Specifications
Turbidity Curtain



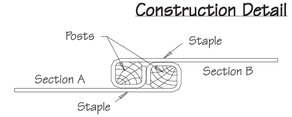
Typical Section - Type 2

DATA
Curtain type (1, 2, or 3)
Layout (Std. or Alt.)

Source:	Symbol:	Detail No.
Adapt. from Amer. Boom and Barrier Corp.	TC-(1/2/3) (Std/Alt)	DE-ESC-3.5.3 Sheet 2 of 8 Date: 12/03

Standard Detail & Specifications
Silt Fence

Construction Detail



Top

Method for joining continuous sections

Construction Notes:

1. Geosynthetic fabric to be fastened securely to fence posts with wire ties or staples.
2. When two sections of filter cloth adjoin each other they shall be overlapped by six inches and folded.
3. Maintenance shall be performed as needed and material removed when "bulges" develop in the silt fence.

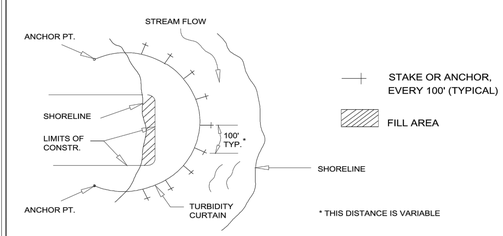
Materials:

1. Stakes: Steel (either T or U) or 2" x 2" hardwood
2. Geosynthetic Fabric: Type GD-I
3. Reinforcing strip: Wooden lath, plastic strip or other approved equivalent
4. Prefabricated Unit: Geofab, Envirofence, or approved equivalent

Source:	Symbol:	Detail No.
Adapted from MD Stds. & Specs. for ESC	SF	DE-ESC-3.1.2.1 Sheet 2 of 2 Date: 6/05

Standard Detail & Specifications
Turbidity Curtain

NOTE: The standard layout shown is intended for use in streams, ponds and other non-tidal waters



Plan - Std. Layout

Source:	Symbol:	Detail No.
Adapt. from Amer. Boom and Barrier Corp.	TC-(1/2/3) (Std/Alt)	DE-ESC-3.5.3 Sheet 4 of 8 Date: 12/03

Mark	Description	Date	Appr.

Designed by: CFB | Date: MAR 2017 | Rev.
Dwn by: ECC | Ckd by: JB | Drawing Name: C008
Reviewed by: DLB | Scale: AS SHOWN
Submitted by: DCU | Plot scale: 1 = 1

DELAWARE CERTIFICATE OF AUTHORIZATION
GBA ENGINEERS ★ SURVEYORS
9908 Yellow Brick Rd. Unit D Baltimore, MD 21237 Phone (410) 682-5595
#637

DELAWARE FISH AND WILDLIFE
LANG IMPOUNDMENT REHABILITATION PROJECT
2016

LANG IMPOUNDMENT
EROSION & SEDIMENT CONTROL DETAIL

DENIS C. URSO LICENSE 19964 PROFESSIONAL ENGINEER

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License No. _____

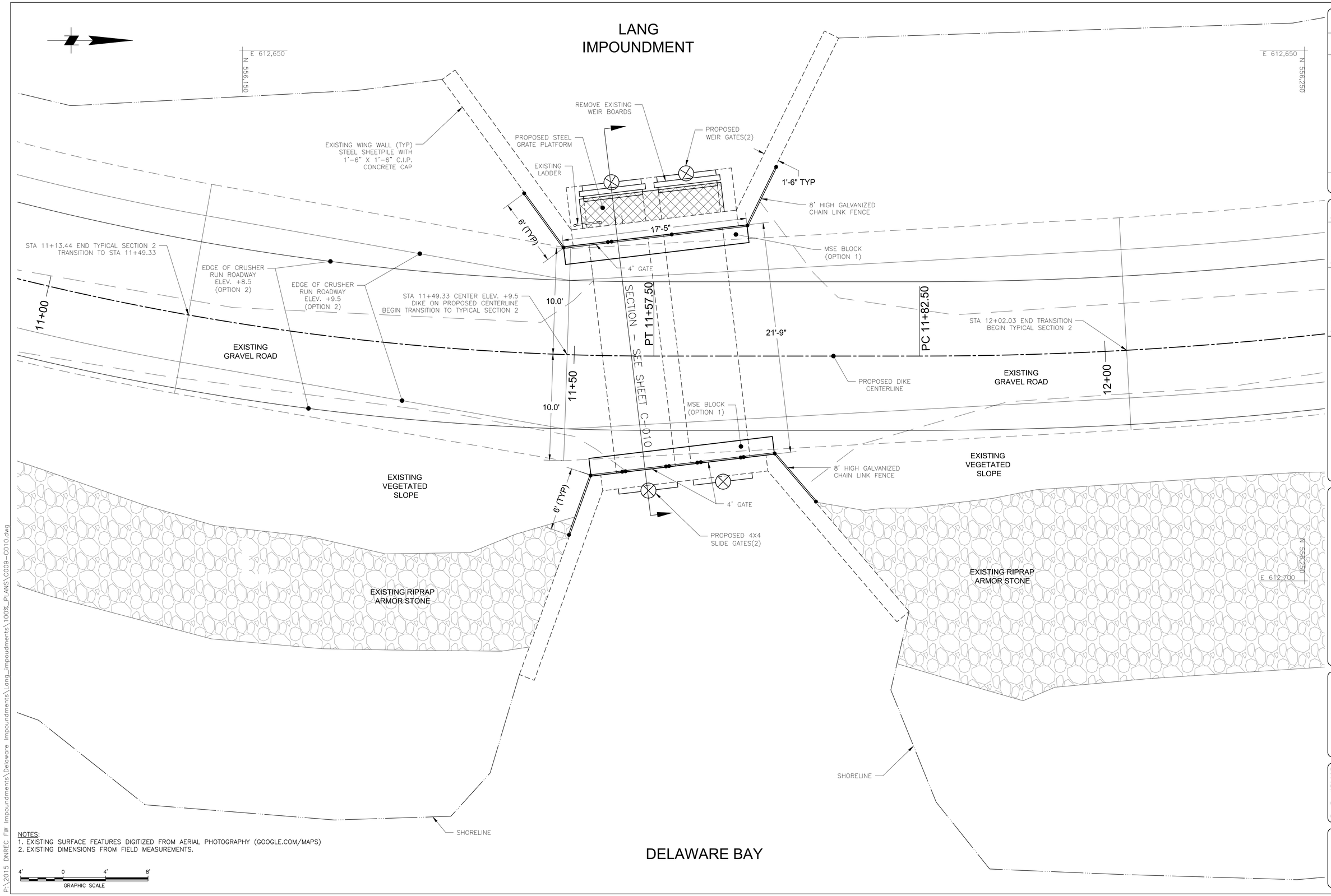
Expiration Date: _____

SHEET REFERENCE NUMBER
C-008

SHEET 13 OF 19

P:\2015 DNREC FW Impoundments\Delaware Impoundments\Lang_impoundments\100%_PLANS\C008.dwg

LANG IMPOUNDMENT



NOTES:
1. EXISTING SURFACE FEATURES DIGITIZED FROM AERIAL PHOTOGRAPHY (GOOGLE.COM/MAPS)
2. EXISTING DIMENSIONS FROM FIELD MEASUREMENTS.

Mark	Description	Date	Appr.

Designed by: CFB
Dwn by: ECC
Ckd by: JB
Reviewed by: DLB
Submitted by: DCU
Date: MAR 2017
Drawing Name: C009-C010
Rev.
Scale: AS SHOWN
Plot scale: 1 = 1

DELAWARE CERTIFICATE OF AUTHORIZATION

GBA ENGINEERS ★ SURVEYORS
9908 Yellow Brick Rd.
Unit 3
Baltimore, MD 21237
Phone (410) 682-5595
#637

DELAWARE FISH AND WILDLIFE
LANG IMPOUNDMENT REHABILITATION PROJECT
2016

LANG IMPOUNDMENT
WATER CONTROL STRUCTURE PLAN

I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed Professional Engineer under the laws of the State of Delaware.

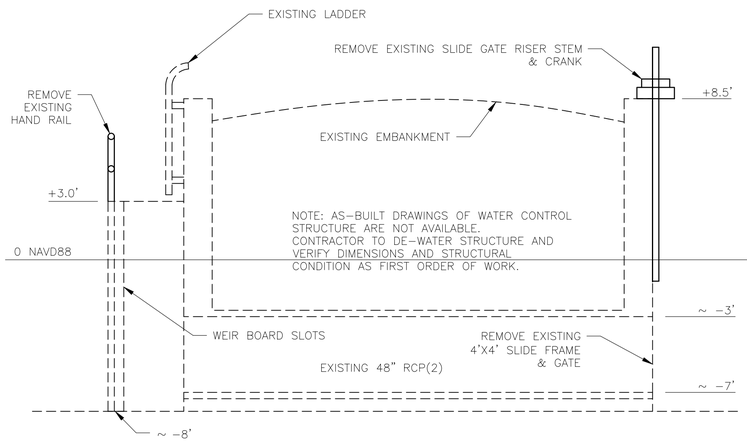
License No. _____

Expiration Date: _____

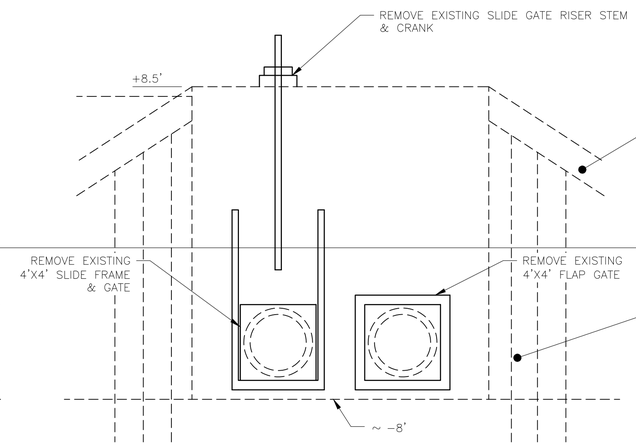
SHEET REFERENCE NUMBER
C-009
SHEET 14 OF 19

P:\2015 DNREC FW Impoundments\Delaware Impoundments\Lang_impoundments\100%_PLANS\C009-C010.dwg

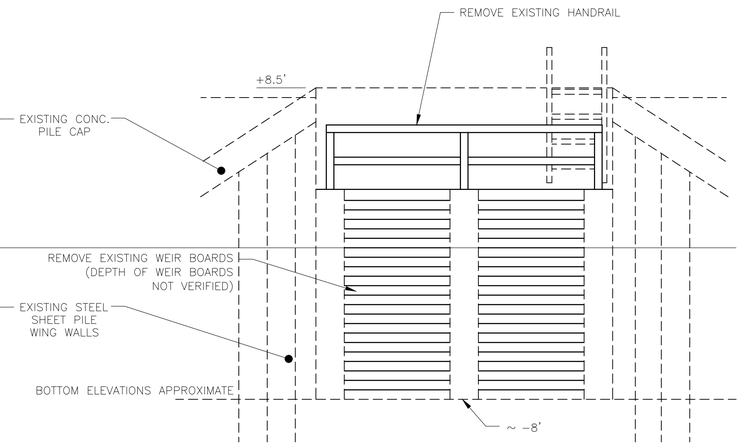
WATER CONTROL STRUCTURE - EXISTING CONDITIONS & DEMOLITION PLAN



SECTION

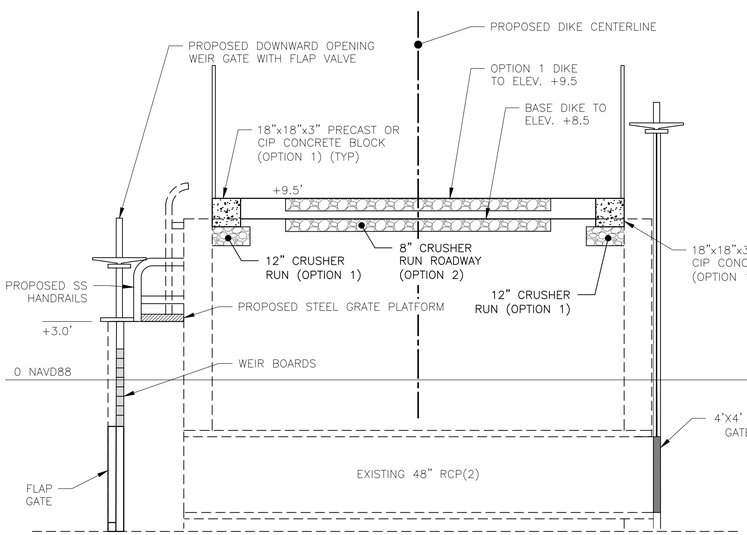


RIVER SIDE ELEVATION

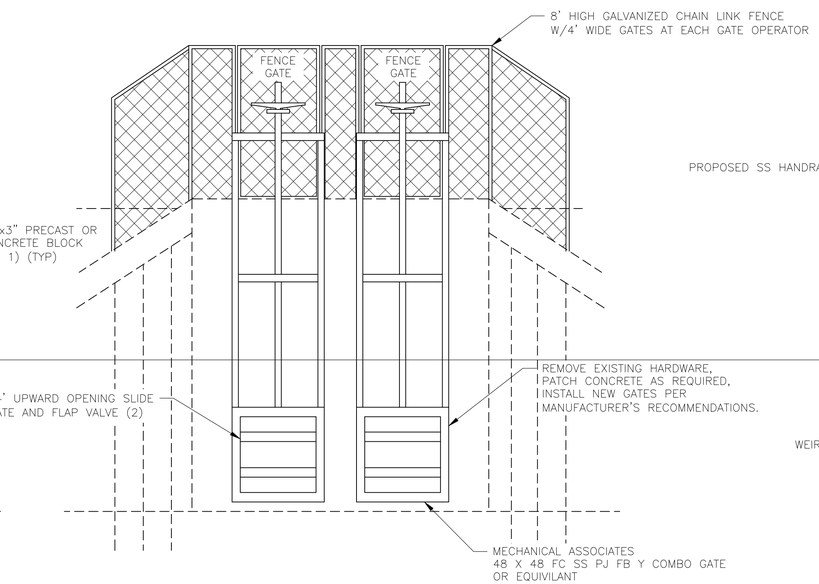


IMPOUNDMENT SIDE ELEVATION

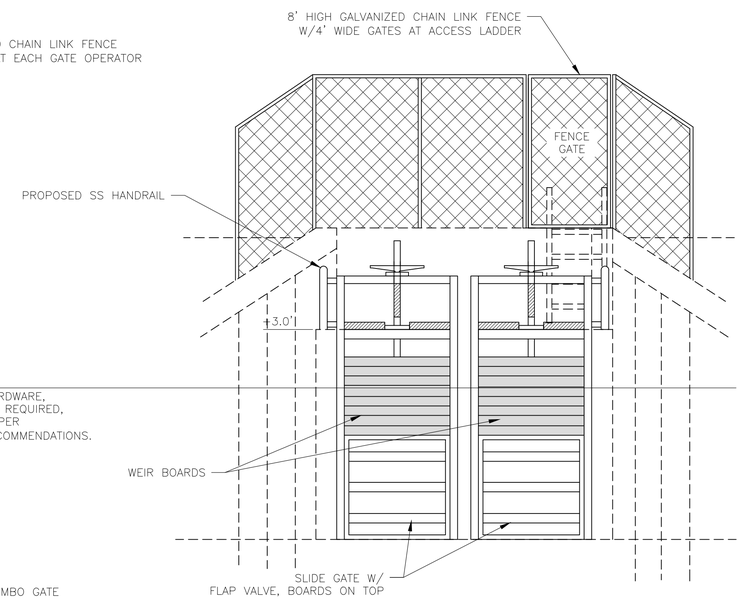
WATER CONTROL STRUCTURE - PROPOSED IMPROVEMENTS



SECTION



RIVER SIDE ELEVATION



IMPOUNDMENT SIDE ELEVATION

4' 0 4' 8'
GRAPHIC SCALE

Mark	Description	Date	Appr.

Designed by: CFB | Date: MAR 2017 | Rev:
Dwn by: ECC | Ckd by: JB | Drawing Name: C009-C010
Reviewed by: DLB | Scale: AS SHOWN
Submitted by: DCU | Plot scale: 1 = 1

DELAWARE CERTIFICATE OF AUTHORIZATION
GBA ENGINEERS ★ SURVEYORS
9908 Yellow Brick Rd. Unit D Baltimore, MD 21237 Phone (410) 682-5595
#637

DELAWARE FISH AND WILDLIFE
LANG IMPOUNDMENT REHABILITATION PROJECT
2016

LANG IMPOUNDMENT
WATER CONTROL STRUCTURE
ELEVATIONS

DANIEL C. UNSO LICENSE No. 13930 DELAWARE PROFESSIONAL ENGINEER

I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed Professional Engineer under the laws of the State of Delaware.

License No. _____

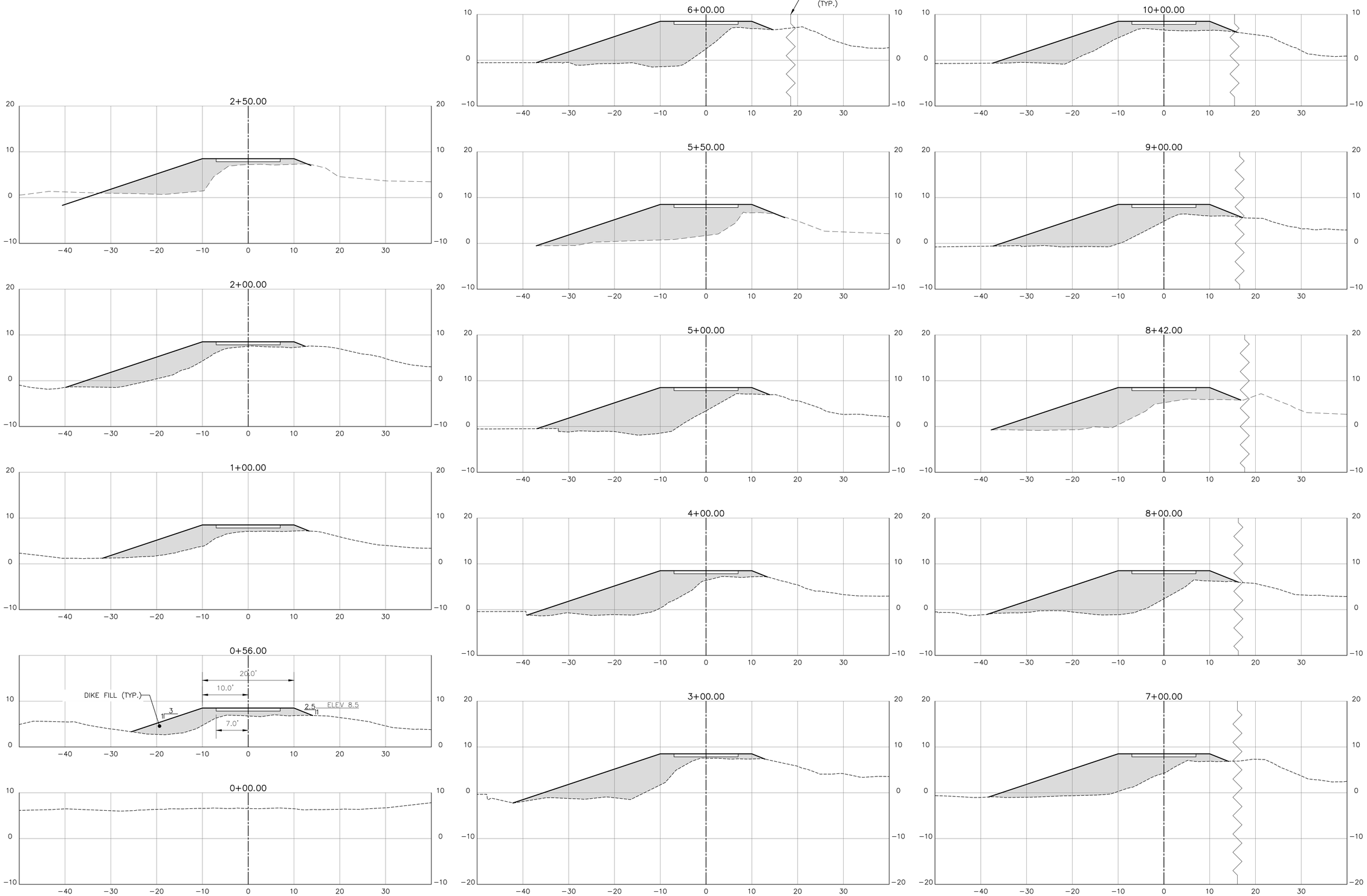
Expiration Date: _____

SHEET REFERENCE NUMBER
C-010
SHEET 15 OF 19

P:\2015 DNREC FW Impoundments\Delaware Impoundments\Long_impoundments\100%_PLANS\C009-C010.dwg

LEGEND

- LIDAR SURVEY 2014
- GBA SURVEY 2016
- PROPOSED DIKE
- PROPOSED CENTERLINE



Mark	Description	Date	Appr.

Designed by: CFB
Dwn by: DCM
Ckd by: JB
Reviewed by: DLB
Submitted by: DCU
Date: MAR 2017
Drawing Name: X001-X004
Rev.:
Scale: 1"=10'
Plot scale: 1 = 1

DELAWARE CERTIFICATE OF AUTHORIZATION
GBA ENGINEERS ★ SURVEYORS
9908 Yellow Brick Rd. Unit G Baltimore, MD 21237 Phone (410) 682-5595
#637

DELAWARE FISH AND WILDLIFE
LANG IMPOUNDMENT REHABILITATION PROJECT
2016

LANG IMPOUNDMENT
DIKE SECTIONS SHEET 1 OF 4

I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed Professional Engineer under the laws of the State of Delaware.

License No. _____

Expiration Date: _____

SHEET REFERENCE NUMBER

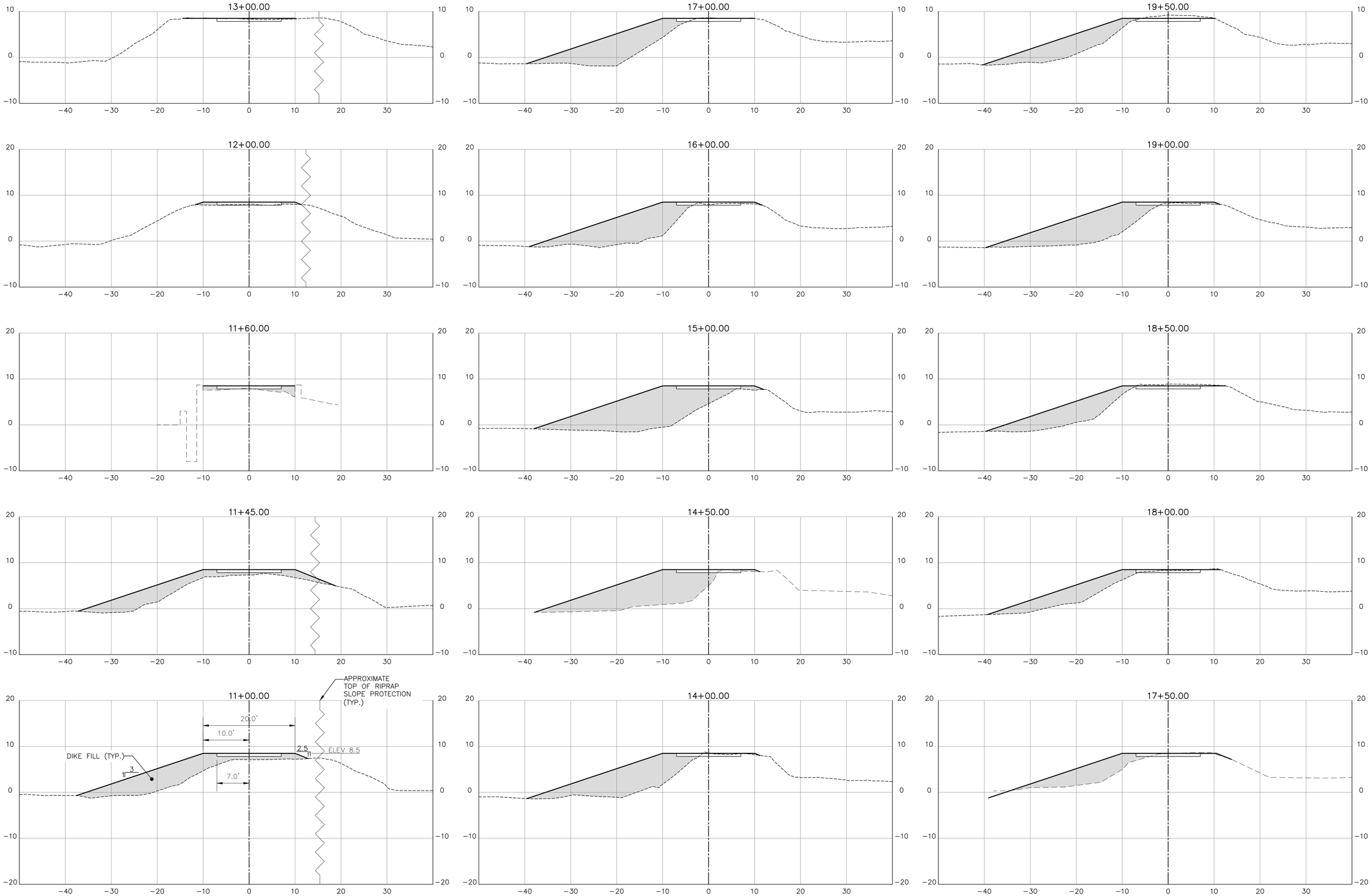
X-001

SHEET 16 OF 19

P:\2015 DNREC FW Impoundments\Delaware Impoundments\Lang_impoundments\100%_PLANS\X001-X004.dwg

LEGEND

- LIDAR SURVEY 2014
- GBA SURVEY 2016
- PROPOSED DIKE
- PROPOSED CENTERLINE



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Designed by: CFB
Dwn by: DCM
Ckd by: JB
Reviewed by: DLB
Submitted by: DCU
Date: MAR 2017
Drawing Name: X001-X004
Rev.:
Scale: 1"=10'
Plot scale: 1 = 1

DELAWARE CERTIFICATE OF AUTHORIZATION
GBA ENGINEERS ★ SURVEYORS
9908 Yellow Brick Rd.
Unit 9
Baltimore, MD 21237
Phone (410) 682-5595
#637

DELAWARE FISH AND WILDLIFE
LANG IMPOUNDMENT REHABILITATION PROJECT
2016

LANG IMPOUNDMENT
DIKE SECTIONS SHEET 2 OF 4

I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed Professional Engineer under the laws of the State of Delaware.

License No. _____

Expiration Date: _____

SHEET REFERENCE NUMBER

X-002

SHEET 17 OF 19

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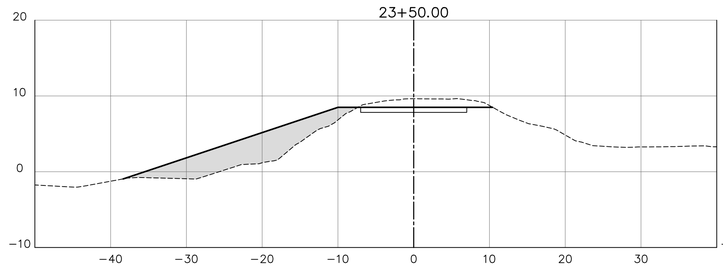
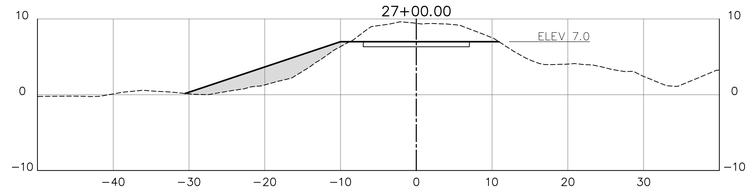
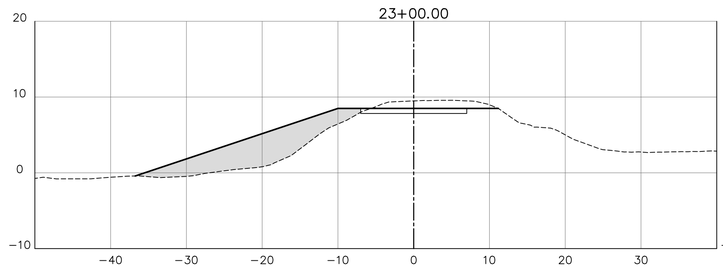
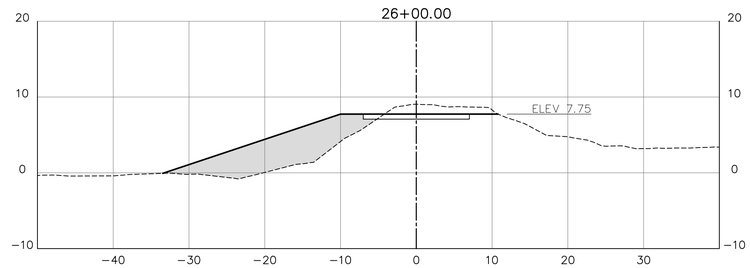
LEGEND

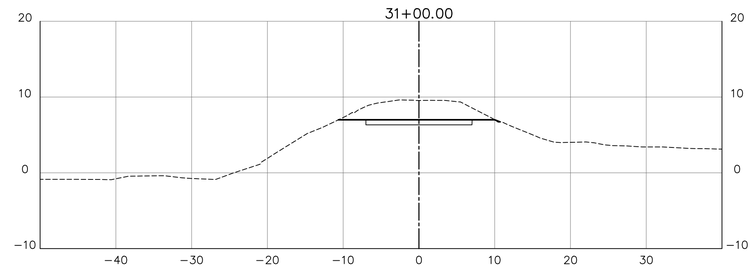
- LIDAR SURVEY 2014
- GBA SURVEY 2016
- PROPOSED DIKE
- PROPOSED CENTERLINE

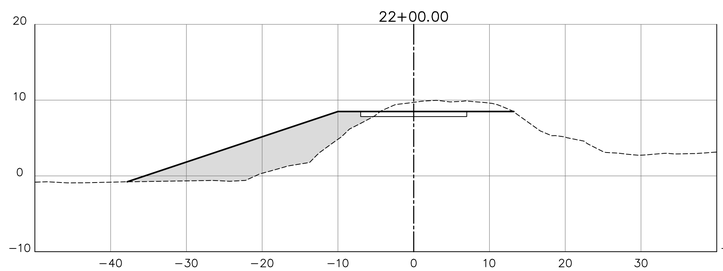


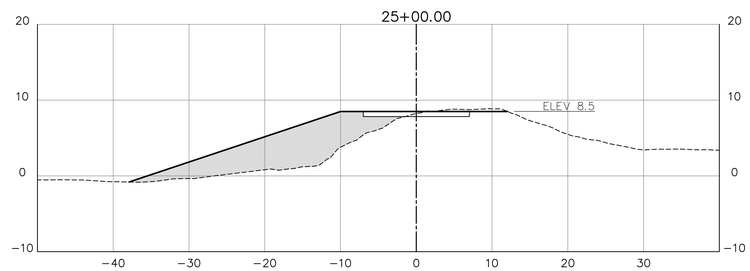


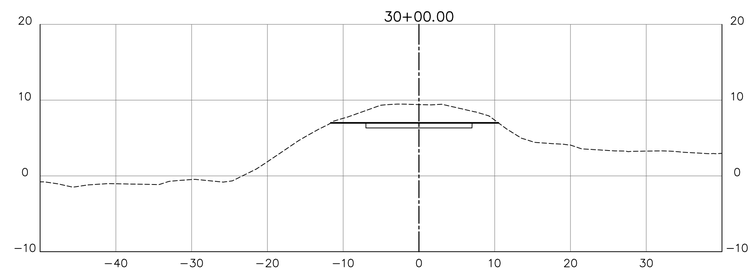


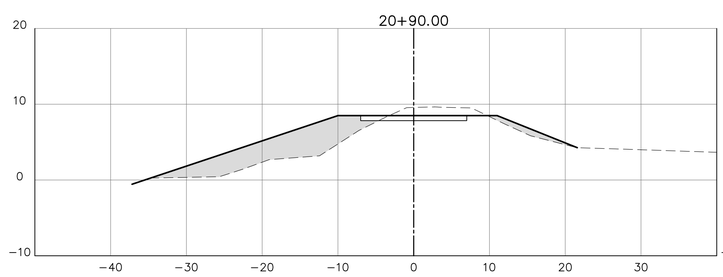


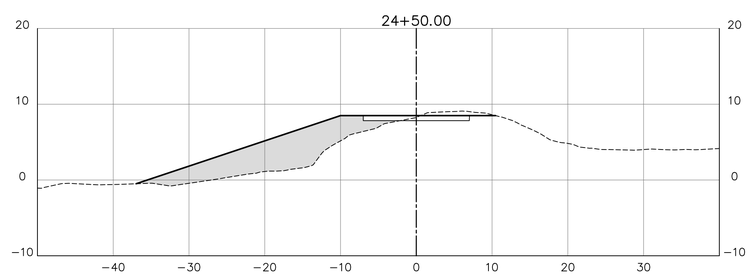


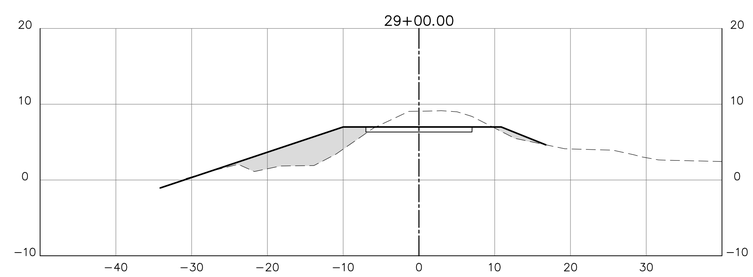


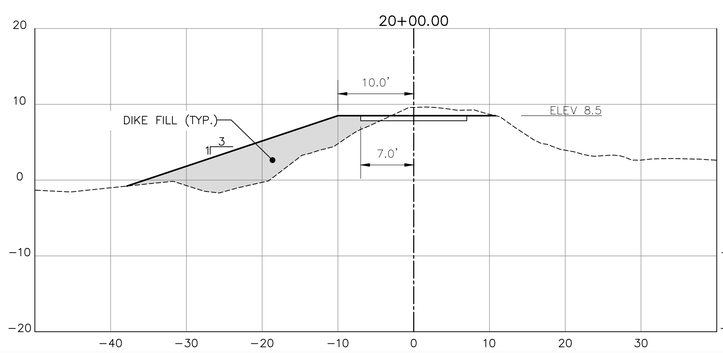


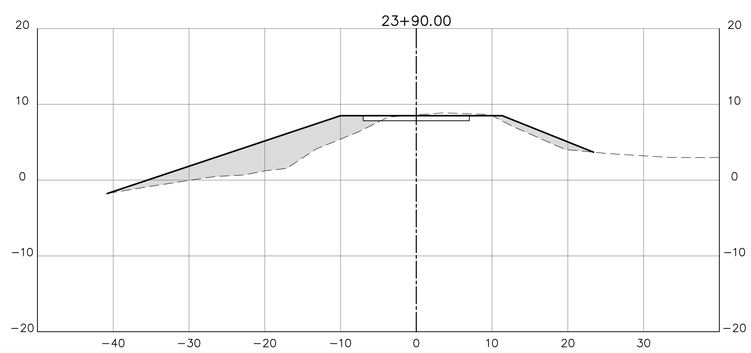


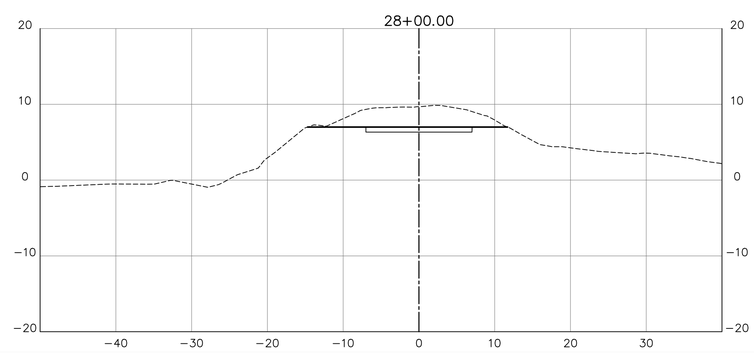












Mark	Description	Date	Appr.

Designed by: CFB
Dwn by: DCM
Ckd by: JB
Reviewed by: DLB
Submitted by: DCU
Date: MAR 2017
Drawing Name: X001-X004
Rev.
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Plot scale: 1 = 1

DELAWARE CERTIFICATE OF AUTHORIZATION
GBA ENGINEERS ★ SURVEYORS
9909 Yellow Brick Rd.
Unit 3
Baltimore, MD 21237
Phone (410) 682-5595
#637

DELAWARE FISH AND WILDLIFE
LANG IMPOUNDMENT REHABILITATION PROJECT
2016

LANG IMPOUNDMENT
DIKE SECTIONS SHEET 3 OF 4

I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed Professional Engineer under the laws of the State of Delaware.

License No. _____

Expiration Date: _____

SHEET REFERENCE NUMBER

X-003

SHEET 18 OF 19

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LEGEND

- LIDAR SURVEY 2014
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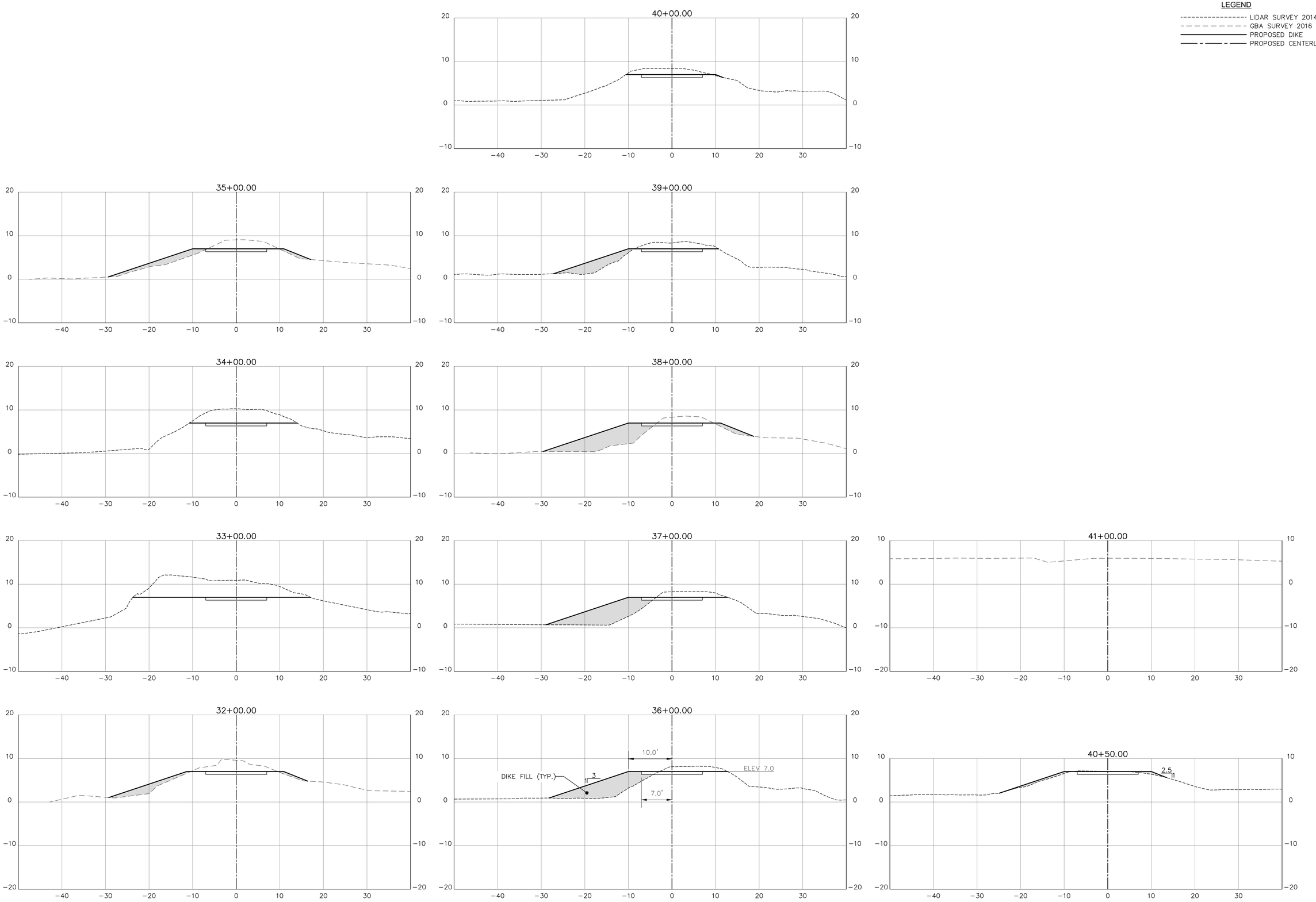

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DELAWARE CERTIFICATE OF AUTHORIZATION
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DELAWARE FISH AND WILDLIFE
LANG IMPOUNDMENT REHABILITATION PROJECT
2016

LANG IMPOUNDMENT
DIKE SECTIONS SHEET 4 OF 4

DENNIS C. UNSER
LICENSE NO. 19938
DELAWARE
PROFESSIONAL ENGINEER

I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed Professional Engineer under the laws of the State of Delaware.

License No. _____

Expiration Date: _____

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SHEET 19 OF 19

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