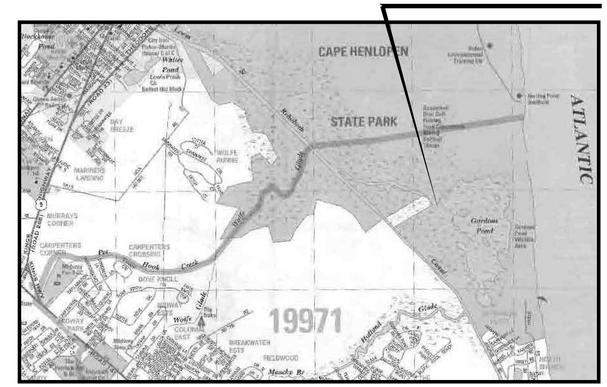
STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL
DIVISION OF PARKS & RECREATION

Cape Henlopen State Park
GORDONS POND TRAIL IMPROVEMENTS

PROJECT SITE



SITE MAP

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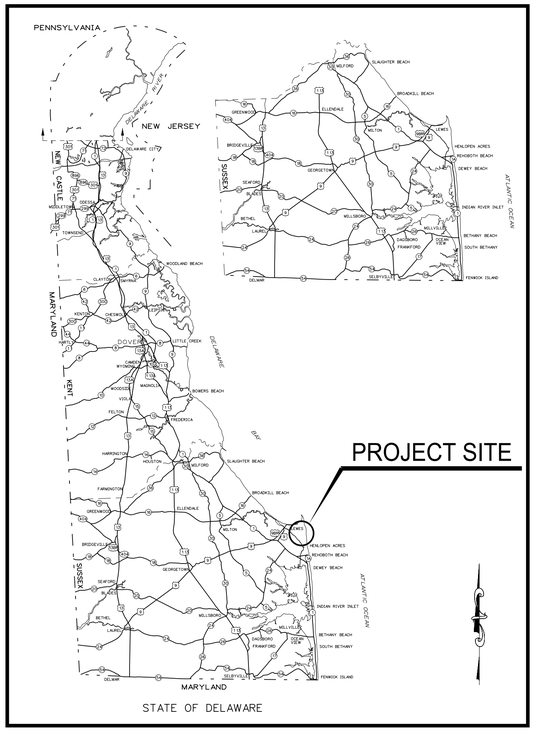
PERMITTED USE NUMBER 21003214
EXPIRATION DATE: 03/13/14

CONTRACT NO. 2013-CH-300

JULY 3, 2013



LOCATION MAP

LEGEND

- CONSTRUCTION PLAN
- EROSION AND SEDIMENT CONTROL PLAN
- STORMWATER MANAGEMENT PLAN

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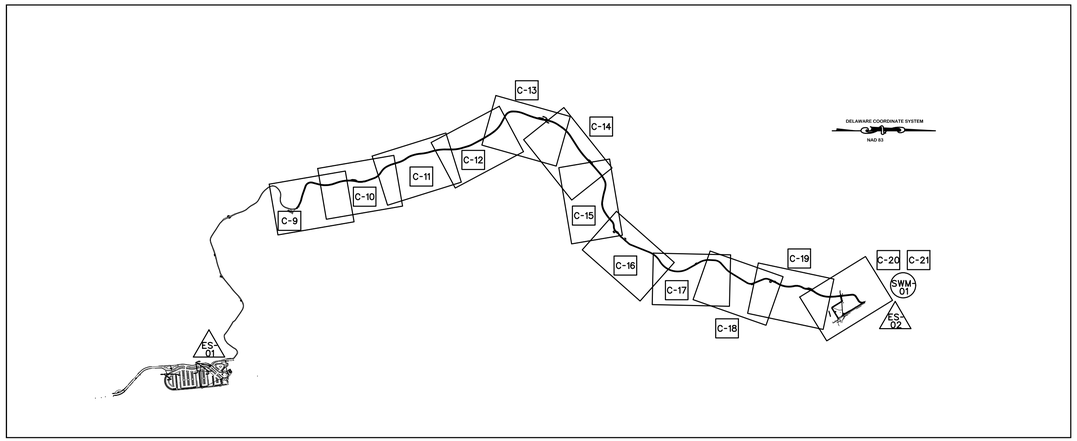

SHEET INDEX
SCALE: 1"=1000'

PREPARED BY
THE CONSULTING FIRM OF

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PARKS PROJECT NO. CH-41

DATE: JULY 3, 2013

GENERAL NOTES

1. BEFORE EXCAVATION IS STARTED IN AREAS OF UNDERGROUND UTILITIES, THE CONTRACTOR SHALL GIVE NOTIFICATION BY TELEPHONE, CALLING "MISS UTILITY", TEL. (800) 282-8555. THE CONTRACTOR IS ADVISED THAT MISS UTILITY HAS REFUSED TO LOCATE UTILITIES ON PARK PROPERTY IN SOME INSTANCES. THE CONTRACTOR SHALL VERIFY EXACT LOCATIONS OF ALL UTILITIES IN THE FIELD BY EMPLOYING A PROFESSIONAL UTILITY LOCATOR TO FIELD LOCATE EXISTING UTILITIES PRIOR TO ANY EXCAVATION. EXISTING UTILITIES ARE SHOWN ON THE DRAWINGS BASED ON THE BEST INFORMATION AVAILABLE, HOWEVER THIS INFORMATION HAS NOT BEEN FIELD VERIFIED AND IS NOT GUARANTEED. ALL EXISTING UTILITIES SHALL BE PROTECTED AND TEMPORARILY SUPPORTED OR RELOCATED AS NECESSARY TO COMPLETE THE WORK IN ACCORDANCE WITH THE PERTINENT UTILITY COMPANY REQUIREMENTS. ALL COSTS SHALL BE INCIDENTAL TO THE CONTRACT.
2. THE CONTRACTOR SHALL DESIGNATE A PERSON WHO SHALL BE RESPONSIBLE FOR IMPLEMENTING AND MAINTAINING THE EROSION AND SEDIMENT CONTROL PLANS, AND A PERSON WHO SHALL BE RESPONSIBLE FOR WORK SAFETY. THE PERSON RESPONSIBLE FOR IMPLEMENTING AND MAINTAINING THE EROSION AND SEDIMENT CONTROL PLANS SHALL BE CERTIFIED BY DNREC FOR EROSION AND SEDIMENT CONTROL RESPONSIBILITY (CERTIFIED CONSTRUCTION REVIEWER, CCR). THE CONTRACTOR SHALL PROVIDE CCR INSPECTION REPORTS CERTIFIED BY AN ENGINEER LICENSED IN THE STATE OF DELAWARE.
3. THE CONTRACTOR IS RESPONSIBLE FOR SECURING THE AREA WITHIN THE LIMITS OF DISTURBANCE TO PROHIBIT PUBLIC ACCESS UNTIL COMPLETION OF THE PROJECT. THE CONTRACTOR'S PROCEDURE/METHOD FOR LIMITING ACCESS SHALL BE REVIEWED BY, AND COORDINATED WITH THE OWNER PRIOR TO THE START OF WORK. THE COST SHALL BE INCLUDED IN THE CONTRACT.
4. THE LIMIT OF DISTURBANCE SHALL BE AS SHOWN ON THE PLANS. THE CONTRACTOR SHALL NOT WORK OR TRESPASS OUTSIDE OF THE LIMIT OF DISTURBANCE AS SHOWN ON THE PLANS UNLESS OTHERWISE APPROVED BY THE OWNER. THE CONTRACTOR SHALL DELINEATE THE LIMIT OF DISTURBANCE BY PLACING FLAGS AT 25' ON CENTER FROM STA. 160+00 TO STA. 203+88.29.
5. APPROVED COVERS TO PREVENT MATERIAL FROM LEAVING THE TRUCKS MUST BE INSTALLED OVER ALL LOADED TRUCKS HAULING BORROW, EXCAVATED MATERIALS, AND/OR FINE AGGREGATES TO OR FROM THE PROJECT SITE OVER STATE MAINTAINED ROADS. THE TRUCKS SHALL BE FULLY COVERED AND THE COVERS SHALL BE TIED ON THE REAR AND BOTH SIDES TO PREVENT MATERIAL FROM LEAVING THE TRUCK DURING HAULING.
6. IN CASE OF CONFLICT BETWEEN THE "MANUFACTURER'S RECOMMENDATIONS" FOR AN APPROVED MATERIAL AND THE GOVERNING "CONTRACT SPECIFICATIONS" FOR THE MATERIAL, THE MORE RESTRICTIVE OF THE TWO SHALL PREVAIL UNLESS OTHERWISE DIRECTED BY THE OWNER.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ESTABLISHING, BY SURVEY, ALL POINTS AND LIMIT OF DISTURBANCE LINES NECESSARY FOR CONSTRUCTION OF THE PROJECT. THE CONTRACTOR SHALL ENGAGE A PROFESSIONAL LAND SURVEYOR, REGISTERED IN THE STATE OF DELAWARE, TO PERFORM REQUIRED SURVEYING SERVICES. ALL SURVEY STAKEOUT WORK SHALL BE INCLUDED IN THE CONTRACT.
8. THE CONTRACTOR MUST SUBMIT A STAGING PLAN TO THE OWNER FOR APPROVAL PRIOR TO CONSTRUCTION OF THE PROJECT. THE STAGING PLAN SHALL INCLUDE SITE LOCATION, EROSION AND SEDIMENT CONTROLS, AND ALL OTHER INCIDENTALS, AS DIRECTED BY THE OWNER. ALL COSTS ASSOCIATED WITH PREPARING AND IMPLEMENTING THE STAGING PLAN SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
9. ALL CONSTRUCTION ACCESS SHALL USE THE STABILIZED CONSTRUCTION ENTRANCE. CONSTRUCTION, MAINTENANCE, CLEANING, RE-COMPACTING, REMOVAL AND REPLACEMENT OF THE BASE COURSE MATERIALS FOR THE STABILIZED CONSTRUCTION ENTRANCE SHALL BE IN ACCORDANCE WITH THE APPROVED EROSION AND SEDIMENT CONTROL PLAN AS DIRECTED BY THE CERTIFIED CONSTRUCTION REVIEWER AND THE OWNER. THE CONTRACTOR IS RESPONSIBLE FOR CLEANING THE ROAD AT THE CONSTRUCTION ENTRANCE AT THE END OF EACH WORKING DAY.
10. STAGING AREAS:
    PROPER EROSION AND SEDIMENT CONTROL MEASURES AS DETERMINED BY THE OWNER SHALL BE INSTALLED IN ALL STAGING AREAS. ALL AREAS USED BY THE CONTRACTOR FOR STAGING OPERATIONS SHALL BE FULLY RESTORED BY THE CONTRACTOR UPON COMPLETION OF THE PROJECT. IF THE STAGING AREA IS PAVED, IT SHALL BE RESTORED TO ITS ORIGINAL CONDITION. IF THE STAGING AREA IS UNPAVED, IT SHALL BE RE-GRADED, TOPSOILED, SEEDED AND MULCHED IN ACCORDANCE WITH THE DELAWARE EROSION AND SEDIMENT CONTROL HANDBOOK, CURRENT VERSION (HEREAFTER KNOWN AS THE HANDBOOK), TO THE SATISFACTION OF THE OWNER. THE SEED SHALL ADHERE TO THE SPECIFICATIONS OF PERMANENT SEED MIX •5 AS NOTED IN THE HANDBOOK. ALL COSTS ASSOCIATED WITH RESTORATION OF THE STAGING AREA SHALL BE AT THE CONTRACTOR'S EXPENSE. IF THE OWNER DETERMINES THAT A SATISFACTORY STAND OF GRASS DOES NOT EXIST AT THE TIME OF FINAL INSPECTION, ALL COSTS ASSOCIATED WITH RE-ESTABLISHING A SATISFACTORY STAND OF GRASS SHALL BE AT THE CONTRACTOR'S EXPENSE.
11. THE CONTRACTOR SHALL PROVIDE NECESSARY RESTROOM FACILITIES FOR WORKERS DURING CONSTRUCTION.
12. ALL EXISTING DRAINAGE SYSTEMS SHOWN ARE TO REMAIN OPERATIONAL UNLESS DENOTED FOR ABANDONMENT.
13. AT THE END OF THIS PROJECT'S CONSTRUCTION, ALL EXISTING DRAINAGE STRUCTURES AND PIPES WITHIN THE PROJECT LIMITS SHALL BE CLEANED OF ALL SEDIMENT AND DEBRIS IN COMPLIANCE WITH DNREC GUIDELINES AS DIRECTED BY THE OWNER. COST TO BE INCLUDED IN THE BID.
14. THE DATUM USED ON THIS PROJECT IS HORIZONTAL NAD 83/91 AND VERTICAL NAVD 88.
15. THE SLOPES OF THE TRAIL AND PEDESTRIAN BRIDGE SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE PLANS, HOWEVER IN NO CASE SHALL THE MAXIMUM SLOPE IN THE DIRECTION OF TRAVEL EXCEED 5% AT ANY LOCATION.
16. THE CONTRACTOR SHALL CLOSE THE ENTRANCE TO THE PROJECT SITE AT ALL TIMES WHEN WORK IS NOT IN PROGRESS TO PREVENT UNAUTHORIZED ENTRY INTO THE SITE. THE OWNER MUST HAVE EMERGENCY ACCESS AT ALL TIMES. PROPOSED METHOD OF ENTRANCE CLOSURE SHALL BE SUBMITTED FOR OWNER'S APPROVAL.
17. ALL CONSTRUCTION IS TO BE IN ACCORDANCE WITH THE LATEST DELDOT STANDARDS SPECIFICATIONS AND DETAILS, UNLESS OTHERWISE NOTED ON THE PLANS OR IN THE SPECIFICATIONS FOR THIS PROJECT AND AS FOLLOWS. FOR THIS PROJECT, DIVISION 100 GENERAL PROVISIONS IN THE DELDOT STANDARD SPECIFICATIONS DOES NOT APPLY. FOR GRADED AGGREGATE BASE COURSE, THE MATERIAL SHALL CONSIST OF CRUSHED STONE. CRUSHED SLAG FRAGMENTS OR PORTLAND CEMENT CONCRETE FRAGMENTS SHALL NOT BE USED AS GRADED AGGREGATE BASE COURSE. THERE WILL BE NO MEASUREMENT FOR PAYMENT EXCEPT WHERE SPECIFICALLY STATED IN THE PLANS AND SPECIFICATIONS FOR THIS PROJECT.
18. ALL WORK IN WETLANDS SHALL BE PERFORMED IN ACCORDANCE WITH PERMIT CONDITIONS AND AS FOLLOWS. IMPACTS FROM VEHICLES TRAVERSING WETLANDS SHALL BE REDUCED BY USING SUPPORT MATS, LOW IMPACT EQUIPMENT AND BY MINIMIZING VEHICULAR TRAFFIC. ALL VEHICLES OR EQUIPMENT TRAVERSING, OR OPERATED IN, WETLANDS SHALL BE ADEQUATELY SUPPORTED BY MATS AT ALL TIMES.
19. ALL WORK WITHIN THE SENSITIVE RESOURCE AREA IDENTIFIED ON THE DRAWINGS SHALL BE PERFORMED IN A MANNER TO MINIMIZE GROUND DISTURBANCE. IMPACTS FROM VEHICLES TRAVERSING THE SENSITIVE RESOURCE AREA SHALL BE REDUCED BY USING SUPPORT MATS, LOW IMPACT EQUIPMENT AND BY MINIMIZING VEHICULAR TRAFFIC. ALL VEHICLES OR EQUIPMENT TRAVERSING, OR OPERATED IN, THE SENSITIVE RESOURCE AREA SHALL BE ADEQUATELY SUPPORTED BY MATS AT ALL TIMES.
20. ALL TREES AND TREE LIMBS WITH A MINIMUM 4" DIAMETER, WITHIN THE LIMIT OF DISTURBANCE, TO BE REMOVED AS PART OF THIS PROJECT SHALL BE CUT INTO MANAGEABLE LENGTHS (MAX. 10 FEET), HAULED AND STOCKPILED AT AN AREA DESIGNATED BY THE OWNER NEAR THE PRIMITIVE CAMPING ROAD ON THE NORTH SIDE OF THE PARK. THE TREES ARE AND WILL REMAIN THE PROPERTY OF THE OWNER.

LEGEND

CONSTRUCTION

- PROPOSED TRAIL
- TEMPORARY TRAIL PULL OFF/ TRUCK TURN-AROUND AREA
- PROPOSED PEDESTRIAN BRIDGE
- PROPOSED PARKING LOT
- PROPOSED MILLINGS
- PROPOSED SAND
- 5 — PROPOSED CONTOURS (FEET)
- X 2.79 — SPOT ELEVATION
- 100+00 — PROPOSED CONSTRUCTION BASELINE
- LOD — LIMIT OF DISTURBANCE
- DRAINAGE PIPE
- FLARED END SECTION
- DITCH CENTERLINE
- RIPRAP
- SIGNS
- SPLIT RAIL FENCE
- DND — DO NOT DISTURB
- RM C — REMOVE BY CONTRACTOR
- FES XXX — FLARED END SECTION IDENTIFIER
- P XXX — PIPE IDENTIFIER

EROSION & SEDIMENT CONTROL

- FILTER STRIP
- SCE — STABILIZED CONSTRUCTION ENTRANCE
- TEMPORARY CHAIN LINK FENCE
- TYPE III BARRICADE
- SF — SILT FENCE
- SBB — STRAW BALE BARRIER
- TURBIDITY CURTAIN
- HvA — SOIL TYPE
- ROP-1 — RIP-RAP OUTLET PROTECTION- I
- SM-C — STABILIZATION MATTING - CHANNEL SSM-III: NORTH AMERICAN GREEN SC150BN

EXISTING DETAIL

- SURVEY TRAVERSE POINT
- POINT OF INTERSECTION - TANGENTS
- POINT OF TANGENCY & CURVATURE
- T.P. — SURVEY TIE POINT LOCATION
- CATCH BASIN
- EXISTING DRAINAGE PIPE AND FLOW ARROW
- TOP OF DITCH
- BOTTOM OF DITCH
- FLEXIBLE PAVEMENT EDGE
- RIGID PAVEMENT EDGE
- STREAM, DITCH OR POND BOUNDARY
- WL — USACE WETLANDS BOUNDARY
- STW — DNREC WETLANDS BOUNDARY
- MHW — MEAN HIGH WATER
- OHW — ORDINARY HIGH WATER
- 5.47 X — SPOT ELEVATION
- 9 — CONTOUR LINE
- SMALL BUSH OR ORNAMENTAL SHRUB
- CONIFEROUS TREE 6" AND LARGER
- DECIDUOUS TREE 6" AND LARGER
- HEDGEROW OR THICKET
- WOODS LINE
- SIGN
- STRAND OR WOVEN WIRE FENCE
- WOODEN FENCE
- WOOD POLE
- A-4(4) A-2(4) — SOIL BORING LOG - PROFILE VIEW
- SOIL BORING LOCATION - PLAN VIEW
- GnB2 / GnB3 — SOIL TYPE AND BOUNDARY LINE
- WOODEN POST
- E — ELECTRIC TRANSFORMER
- G — GAS MANHOLE
- SS — SANITARY SEWER MANHOLE
- T — TELEPHONE MANHOLE
- E — ELECTRIC MANHOLE
- F.H. — FIRE HYDRANT
- TELEPHONE BOOTH
- UTILITY POLE GUY WIRE ANCHOR
- G.V. — GAS VALVE
- W.V. — WATER VALVE
- WELL — MONITORING/OBSERVATION WELL
- LUMINAIRE SUPPORT POLE AND/OR BASE
- POLE MOUNTED LUMINAIRE
- W.M. — WATER METER

UTILITIES

- E-OH — ELECTRIC (OVERHEAD)
- E — ELECTRIC (UNDERGROUND)
- SAN. — SANITARY SEWER
- G — GAS
- T — TELECOMMUNICATIONS (UNDERGROUND)
- W — WATER
- SAN. FM. — SANITARY FORCE MAIN

NANCY RUTH BERGSTROM LICENSED PROFESSIONAL ENGINEER STATE OF DELAWARE

DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

GENERAL NOTES & LEGEND

STATE OF DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY: RKK
DRAWN BY: RKK
BUILDING NO.: N/A
DATE: 7/3/13
SCALE: NOT TO SCALE
SHEET NO.: C-1
PARKS PROJECT #: CH-41
CONTRACT #: 2013-CH-300

7/8/2013
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Circular Curve No. 1

	STATION	NORTHING	EASTING
Element: Circular			
PC	103+95.00	271437.3960	749467.1215
PI	104+21.39	271459.6048	749452.8617
CC		271383.3667	749382.9738
PT	104+46.61	271471.8842	749429.4996
Radius:	100.0000		
Delta:	29°34'09.9530" Left		
Degree of Curvature(Arc):	57°17'44.8062"		
Length:	51.6084		
Tangent:	26.3926		
Chord:	51.0376		
Middle Ordinate:	3.3109		
External:	3.4242		
Tangent Direction:	N 32°42'13.0977" W		
Radial Direction:	N 57°17'46.9023" E		
Chord Direction:	N 47°29'18.0742" W		
Radial Direction:	N 27°43'36.9493" E		
Tangent Direction:	N 62°16'23.0507" W		

Circular Curve No. 2

	STATION	NORTHING	EASTING
Element: Circular			
PC	104+85.96	271490.1922	749394.6677
PI	105+21.49	271506.7234	749363.2163
CC		271268.8985	749278.3532
PRC	105+56.55	271513.8370	749328.4043
Radius:	250.0000		
Delta:	16°10'40.7899" Left		
Degree of Curvature(Arc):	22°55'05.9225"		
Length:	70.5898		
Tangent:	35.5313		
Chord:	70.3556		
Middle Ordinate:	2.4873		
External:	2.5123		
Tangent Direction:	N 62°16'23.0507" W		
Radial Direction:	N 27°43'36.9493" E		
Chord Direction:	N 70°21'43.4457" W		
Radial Direction:	N 11°32'56.1593" E		
Tangent Direction:	N 78°27'03.8407" W		

Circular Curve No. 3

	STATION	NORTHING	EASTING
Element: Circular			
PRC	105+56.55	271513.8370	749328.4043
PI	105+88.98	271520.3301	749296.6285
CC		271979.6637	749423.5922
PT	106+21.31	271531.0782	749266.0287
Radius:	475.4527		
Delta:	7°48'16.7542" Right		
Degree of Curvature(Arc):	12°03'02.8215"		
Length:	64.7647		
Tangent:	32.4325		
Chord:	64.7146		
Middle Ordinate:	1.1023		
External:	1.1049		
Tangent Direction:	N 78°27'03.8407" W		
Radial Direction:	N 11°32'56.1593" E		
Chord Direction:	N 74°32'55.4635" W		
Radial Direction:	N 19°21'12.9136" E		
Tangent Direction:	N 70°38'47.0864" W		

Circular Curve No. 4

	STATION	NORTHING	EASTING
Element: Circular			
PC	107+38.88	271570.0382	749155.1090
PI	108+12.42	271594.4088	749085.7255
CC		271645.5175	749181.6207
PT	108+57.81	271665.5944	749104.1810
Radius:	80.0000		
Delta:	85°10'50.9998" Right		
Degree of Curvature(Arc):	71°37'11.0078"		
Length:	118.9349		
Tangent:	73.5391		
Chord:	108.2805		
Middle Ordinate:	21.1032		
External:	28.6646		
Tangent Direction:	N 70°38'47.0864" W		
Radial Direction:	N 19°21'12.9136" E		
Chord Direction:	N 28°03'21.5865" W		
Radial Direction:	S 75°27'56.0866" E		
Tangent Direction:	N 14°32'03.9134" E		

Circular Curve No. 5

	STATION	NORTHING	EASTING
Element: Circular			
PC	109+55.67	271760.3252	749128.7407
PI	110+61.66	271862.9151	749155.3381
CC		271848.1617	748789.9418
PT	111+61.49	271963.0268	749120.5564
Radius:	350.0000		
Delta:	33°41'35.2560" Left		
Degree of Curvature(Arc):	16°22'12.8018"		
Length:	205.8196		
Tangent:	105.9817		
Chord:	202.8668		
Middle Ordinate:	15.0205		
External:	15.6940		
Tangent Direction:	N 14°32'03.9134" E		
Radial Direction:	S 75°27'56.0866" E		
Chord Direction:	N 2°18'43.7146" W		
Radial Direction:	N 70°50'28.6574" E		
Tangent Direction:	N 19°09'31.3426" W		

Circular Curve No. 6

	STATION	NORTHING	EASTING
Element: Circular			
PC	112+16.84	272015.3111	749102.3913
PI	113+51.20	272142.2262	749058.2973
CC		272177.7631	749569.9748
PT	114+79.24	272274.0184	749084.4236
Radius:	495.0000		
Delta:	30°22'17.7535" Right		
Degree of Curvature(Arc):	11°34'29.6578"		
Length:	262.3918		
Tangent:	134.3568		
Chord:	259.3305		
Middle Ordinate:	17.2847		
External:	17.9101		
Tangent Direction:	N 19°09'31.3426" W		
Radial Direction:	N 70°50'28.6574" E		
Chord Direction:	N 3°58'22.4658" W		
Radial Direction:	S 78°47'13.5891" E		
Tangent Direction:	N 11°12'46.4109" E		

Circular Curve No. 7

	STATION	NORTHING	EASTING
Element: Circular			
PC	115+13.12	272307.2541	749091.0123
PI	115+40.50	272334.1163	749096.3374
CC		272336.4224	748943.8756
PT	115+67.29	272361.1272	749091.8272
Radius:	150.0000		
Delta:	20°41'33.4685" Left		
Degree of Curvature(Arc):	38°11'49.8708"		
Length:	54.1732		
Tangent:	27.3849		
Chord:	53.8792		
Middle Ordinate:	2.4390		
External:	2.4793		
Tangent Direction:	N 11°12'46.4109" E		
Radial Direction:	S 78°47'13.5891" E		
Chord Direction:	N 0°51'59.6767" E		
Radial Direction:	N 80°31'12.9424" E		
Tangent Direction:	N 9°28'47.0576" W		

Circular Curve No. 8

	STATION	NORTHING	EASTING
Element: Circular			
PC	116+07.23	272400.5187	749085.2496
PI	116+20.88	272413.9891	749083.0003
CC		272375.8138	748937.2980
PT	116+34.47	272426.8319	749078.3553
Radius:	150.0000		
Delta:	10°24'16.0947" Left		
Degree of Curvature(Arc):	38°11'49.8708"		
Length:	27.2388		
Tangent:	13.6570		
Chord:	27.2014		
Middle Ordinate:	0.6179		
External:	0.6204		
Tangent Direction:	N 9°28'47.0576" W		
Radial Direction:	N 80°31'12.9424" E		
Chord Direction:	N 14°40'55.1049" W		
Radial Direction:	N 70°06'56.8477" E		
Tangent Direction:	N 19°53'03.1523" W		

Circular Curve No. 9

	STATION	NORTHING	EASTING
Element: Circular			
PC	117+40.84	272526.8640	749042.1754
PI	117+98.86	272581.4226	749022.4425
CC		272465.6424	748872.9066
PT	118+53.09	272614.1884	748974.5632
Radius:	180.0000		
Delta:	35°43'48.8454" Left		
Degree of Curvature(Arc):	31°49'51.5590		
Length:	112.2498		
Tangent:	58.0174		
Chord:	110.4398		
Middle Ordinate:	8.6794		
External:	9.1191		
Tangent Direction:	N 19°53'03.1523" W		
Radial Direction:	N 70°06'56.8477" E		
Chord Direction:	N 37°44'57.5750" W		
Radial Direction:	N 34°23'08.0023" E		
Tangent Direction:	N 55°36'51.9977" W		

Circular Curve No. 10

	STATION	NORTHING	EASTING
Element: Circular			
PC	118+90.91	272635.5475	748943.3522
PI	119+39.16	272662.7960	748903.5353
CC		272800.5987	749056.3040
PCC	119+85.60	272705.2016	748880.5218
Radius:	200.0000		
Delta:	27°07'32.6372" Right		
Degree of Curvature(Arc):	28°38'52.4031"		
Length:	94.6867		
Tangent:	48.2479		
Chord:	93.8049		
Middle Ordinate:	5.5774		
External:	5.7374		
Tangent Direction:	N 55°36'51.9977" W		
Radial Direction:	N 34°23'08.0023" E		
Chord Direction:	N 42°03'05.6791" W		
Radial Direction:	N 61°30'40.6395" E		
Tangent Direction:	N 28°29'19.3605" W		

Circular Curve No. 11

	STATION	NORTHING	EASTING
Element: Circular			
PCC	119+85.60	272705.2016	748880.5218
PI	120+31.03	272745.1322	748858.8514
CC		272919.8451	749276.0318
PT	120+76.15	272788.5886	748845.5997
Radius:	450.0000		
Delta:	11°31'48.3065" Right		
Degree of Curvature(Arc):	12°43'56.6236"		
Length:	90.5571		
Tangent:	45.4320		
Chord:	90.4044		
Middle Ordinate:	2.2760		
External:	2.2876		
Tangent Direction:	N 28°29'19.3605" W		
Radial Direction:	N 61°30'40.6395" E		
Chord Direction:	N 22°43'25.2072" W		
Radial Direction:	N 73°02'28.9460" E		
Tangent Direction:	N 16°57'31.0540" W		

Circular Curve No. 12

	STATION	NORTHING	EASTING
Element: Circular			
PC	121+65.13	272873.6926	748819.6480
PI	122+20.43	272926.5917	748803.5169
CC		272771.6042	748484.8676
PT	122+74.83	272971.9399	748771.8616
Radius:	350.0000		
Delta:	17°57'29.8179" Left		
Degree of Curvature(Arc):	16°22'12.8018"		
Length:	109.7009		
Tangent:	55.3039		
Chord:	109.2524		
Middle Ordinate:	4.2892		
External:	4.3424		
Tangent Direction:	N 16°57'31.0540" W		
Radial Direction:	N 73°02'28.9460" E		
Chord Direction:	N 25°56'15.9629" W		
Radial Direction:	N 55°04'59.1281" E		
Tangent Direction:	N 34°55'00.8719" W		

DATE:	DESCRIPTION:	BY:
DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

HORIZONTAL STAKEOUT INFORMATION

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY: RKK

DRAWN BY: RKK

BUILDING NO.: N/A

DATE: 7/3/13

SCALE: NTS

SHEET NO.: C-2

PARKS PROJECT #: CH-41

CONTRACT #: 2013-CH-300

NAOMI RUTH BURGESS LICENSED DELAWARE PROFESSIONAL ENGINEER

6/27/2013
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Circular Curve No. 13

	STATION	NORTHING	EASTING
Element: Circular			
PC	123+03.06	272995.0870	748755.7038
PI	123+28.61	273016.0398	748741.0778
CC		273121.0124	748936.1001
PCC	123+53.93	273039.7872	748731.6436
Radius:	220.0000		
Delta:	13°15'01.0245" Right		
Degree of Curvature(Arc):	26°02'36.7301"		
Length:	50.8774		
Tangent:	25.5527		
Chord:	50.7641		
Middle Ordinate:	1.4691		
External:	1.4790		
Tangent Direction:	N 34°55'00.8719" W		
Radial Direction:	N 55°04'59.1281" E		
Chord Direction:	N 28°17'30.3596" W		
Radial Direction:	N 68°20'00.1527" E		
Tangent Direction:	N 21°39'59.8473" W		

Circular Curve No. 14

	STATION	NORTHING	EASTING
Element: Circular			
PCC	123+53.93	273039.7872	748731.6436
PI	124+23.76	273104.6845	748705.8616
CC		273212.3907	749166.1137
PRC	124+92.57	273174.2831	748700.1694
Radius:	467.5000		
Delta:	16°59'27.8074" Right		
Degree of Curvature(Arc):	12°15'20.8142"		
Length:	138.6371		
Tangent:	69.8310		
Chord:	138.1296		
Middle Ordinate:	5.1297		
External:	5.1866		
Tangent Direction:	N 21°39'59.8473" W		
Radial Direction:	N 68°20'00.1527" E		
Chord Direction:	N 13°10'15.9437" W		
Radial Direction:	N 85°19'27.9600" E		
Tangent Direction:	N 4°40'32.0400" W		

Circular Curve No. 15

	STATION	NORTHING	EASTING
Element: Circular			
PRC	124+92.57	273174.2831	748700.1694
PI	125+59.64	273241.1319	748694.7021
CC		273121.2994	748052.3324
PT	126+26.24	273305.4556	748675.6995
Radius:	650.0000		
Delta:	11°46'57.7919" Left		
Degree of Curvature(Arc):	8°48'53.0471"		
Length:	133.6707		
Tangent:	67.0719		
Chord:	133.4353		
Middle Ordinate:	3.4331		
External:	3.4513		
Tangent Direction:	N 4°40'32.0400" W		
Radial Direction:	N 85°19'27.9600" E		
Chord Direction:	N 10°34'00.9359" W		
Radial Direction:	N 7°3'32'30.1681" E		
Tangent Direction:	N 16°27'29.8319" W		

Circular Curve No. 16

	STATION	NORTHING	EASTING
Element: Circular			
PC	126+65.82	273343.4078	748664.4876
PI	127+54.70	273428.6500	748639.3052
CC		273513.3981	749239.9033
PT	128+42.30	273517.5321	748639.9176
Radius:	600.0000		
Delta:	16°51'11.0055" Right		
Degree of Curvature(Arc):	9°32'57.4677"		
Length:	176.4848		
Tangent:	88.8842		
Chord:	175.8493		
Middle Ordinate:	6.4772		
External:	6.5479		
Tangent Direction:	N 16°27'29.8319" W		
Radial Direction:	N 7°3'32'30.1681" E		
Chord Direction:	N 8°01'54.3291" W		
Radial Direction:	S 89°36'18.8264" E		
Tangent Direction:	N 0°23'41.1736" E		

Circular Curve No. 17

	STATION	NORTHING	EASTING
Element: Circular			
PC	129+37.77	273613.0034	748640.5754
PI	130+15.21	273690.4378	748641.1089
CC		273616.4484	748140.5873
PT	130+91.43	273764.4059	748618.1944
Radius:	500.0000		
Delta:	17°36'25.8508" Left		
Degree of Curvature(Arc):	11°27'32.9612"		
Length:	153.6516		
Tangent:	77.4362		
Chord:	153.0478		
Middle Ordinate:	5.8906		
External:	5.9608		
Tangent Direction:	N 0°23'41.1736" E		
Radial Direction:	S 89°36'18.8264" E		
Chord Direction:	N 8°24'31.7518" W		
Radial Direction:	N 72°47'15.3229" E		
Tangent Direction:	N 17°12'44.6771" W		

Circular Curve No. 18

	STATION	NORTHING	EASTING
Element: Circular			
PC	131+74.67	273843.9210	748593.5615
PI	132+07.85	273875.6182	748583.7421
CC		273740.3508	748259.2365
PT	132+40.84	273904.9052	748568.1407
Radius:	350.0000		
Delta:	10°49'55.1410" Left		
Degree of Curvature(Arc):	16°22'12.8018"		
Length:	66.1688		
Tangent:	33.1833		
Chord:	66.0703		
Middle Ordinate:	1.5625		
External:	1.5695		
Tangent Direction:	N 17°12'44.6771" W		
Radial Direction:	N 72°47'15.3229" E		
Chord Direction:	N 22°37'42.2476" W		
Radial Direction:	N 61°57'20.1819" E		
Tangent Direction:	N 28°02'39.8181" W		

Circular Curve No. 19

	STATION	NORTHING	EASTING
Element: Circular			
PC	133+89.81	274036.3884	748498.0992
PI	134+04.64	274049.4745	748491.1281
CC		273801.3106	748056.8074
PT	134+19.46	274062.1245	748483.3940
Radius:	500.0000		
Delta:	3°23'49.5984" Left		
Degree of Curvature(Arc):	11°27'32.9612"		
Length:	29.6454		
Tangent:	14.8270		
Chord:	29.6410		
Middle Ordinate:	0.2197		
External:	0.2198		
Tangent Direction:	N 28°02'39.8181" W		
Radial Direction:	N 61°57'20.1819" E		
Chord Direction:	N 29°44'34.6174" W		
Radial Direction:	N 58°33'30.5834" E		
Tangent Direction:	N 31°26'29.4166" W		

Circular Curve No. 20

	STATION	NORTHING	EASTING
Element: Circular			
PC	134+93.69	274125.4596	748444.6711
PI	135+25.13	274152.2842	748428.2706
CC		273708.1573	747762.1325
PT	135+56.54	274177.7389	748409.8155
Radius:	800.0000		
Delta:	4°30'04.5589" Left		
Degree of Curvature(Arc):	7°09'43.1008"		
Length:	62.8495		
Tangent:	31.4409		
Chord:	62.8334		
Middle Ordinate:	0.6171		
External:	0.6176		
Tangent Direction:	N 31°26'29.4166" W		
Radial Direction:	N 58°33'30.5834" E		
Chord Direction:	N 33°41'31.6960" W		
Radial Direction:	N 54°03'26.0245" E		
Tangent Direction:	N 35°56'33.9755" W		

Circular Curve No. 21

	STATION	NORTHING	EASTING
Element: Circular			
PC	135+82.58	274198.8217	748394.5301
PI	136+66.92	274267.0987	748345.0280
CC		273978.7054	748090.9287
PT	137+48.49	274307.6087	748271.0609
Radius:	375.0000		
Delta:	25°20'55.6529" Left		
Degree of Curvature(Arc):	15°16'43.9483"		
Length:	165.9075		
Tangent:	84.3338		
Chord:	164.5577		
Middle Ordinate:	9.1377		
External:	9.3660		
Tangent Direction:	N 35°56'33.9755" W		
Radial Direction:	N 54°03'26.0245" E		
Chord Direction:	N 48°37'01.8019" W		
Radial Direction:	N 28°42'30.3716" E		
Tangent Direction:	N 61°17'29.6284" W		

Circular Curve No. 22

	STATION	NORTHING	EASTING
Element: Circular			
PC	138+66.95	274364.5095	748167.1658
PI	139+27.68	274393.6820	748113.8997
CC		274460.9878	748220.0046
PCC	139+77.93	274454.3011	748110.2080
Radius:	110.0000		
Delta:	57°48'23.5076" Right		
Degree of Curvature(Arc):	52°05'13.4602"		
Length:	110.9806		
Tangent:	60.7314		
Chord:	106.3331		
Middle Ordinate:	13.7019		
External:	15.6515		
Tangent Direction:	N 61°17'29.6284" W		
Radial Direction:	N 28°42'30.3716" E		
Chord Direction:	N 32°23'17.8745" W		
Radial Direction:	N 86°30'53.8793" E		
Tangent Direction:	N 3°29'06.1207" W		

Circular Curve No. 23

	STATION	NORTHING	EASTING
Element: Circular			
PCC	139+77.93	274454.3011	748110.2080
PI	140+58.80	274535.0208	748105.2921
CC		274476.4887	748474.5330
PT	141+37.09	274610.2628	748134.9310
Radius:	365.0000		
Delta:	24°59'06.8370" Right		
Degree of Curvature(Arc):	15°41'50.9058"		
Length:	159.1672		
Tangent:	80.8692		
Chord:	157.9091		
Middle Ordinate:	8.6418		
External:	8.8513		
Tangent Direction:	N 3°29'06.1207" W		
Radial Direction:	N 86°30'53.8793" E		
Chord Direction:	N 9°00'27.2978" E		
Radial Direction:	S 68°29'59.2838" E		
Tangent Direction:	N 21°30'00.7162" E		

Circular Curve No. 24

	STATION	NORTHING	EASTING
Element: Circular			
PC	142+09.06	274677.2216	748161.3071
PI	143+16.29	274776.9888	748200.6068
CC		275117.0270	747044.8075
PT	144+22.95	274882.1431	748221.5954
Radius:	1200.0000		
Delta:	10°12'44.7994" Left		
Degree of Curvature(Arc):	4°46'28.7339"		
Length:	213.8889		
Tangent:	107.2285		
Chord:	213.6059		
Middle Ordinate:	4.7623		
External:	4.7813		
Tangent Direction:	N 21°30'00.7162" E		
Radial Direction:	S 68°29'59.2838" E		
Chord Direction:	N 16°23'38.3166" E		
Radial Direction:	S 78°42'44.0831" E		
Tangent Direction:	N 11°17'15.9169" E		

DATE:	DESCRIPTION:	BY:
DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

HORIZONTAL STAKEOUT INFORMATION

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY: RKK

DRAWN BY: RKK

BUILDING NO.: N/A

DATE: 7/3/13

SCALE: NTS

SHEET NO.: C-3

PARKS PROJECT #: CH-41

CONTRACT #: 2013-CH-300

NADIA RUTH BERRIGAN LICENSED PROFESSIONAL ENGINEER DELAWARE

6/26/2013
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Circular Curve No. 25

	STATION	NORTHING	EASTING
Element: Circular			
PC	145+11.13	274968.6140	748238.8547
PI	145+83.45	275039.5378	748253.0110
CC		274900.1062	748582.0845
PT	146+53.76	275099.0422	748294.1184
Radius:	350.0000		
Delta:	23°21'00.6102" Right		
Degree of Curvature(Arc):	16°22'12.8018"		
Length:	142.6381		
Tangent:	72.3228		
Chord:	141.6530		
Middle Ordinate:	7.2412		
External:	7.3942		
Tangent Direction:	N 11°17'15.9169" E		
Radial Direction:	S 78°42'44.0831" E		
Chord Direction:	N 22°57'46.2220" E		
Radial Direction:	S 55°21'43.4730" E		
Tangent Direction:	N 34°38'16.5270" E		

Circular Curve No. 26

	STATION	NORTHING	EASTING
Element: Circular			
PC	147+21.53	275154.7935	748332.6332
PI	148+06.63	275224.8160	748381.0069
CC		274910.3865	748686.4201
PT	148+89.57	275271.1326	748452.4068
Radius:	430.0000		
Delta:	22°23'27.2694" Right		
Degree of Curvature(Arc):	13°19'28.5596"		
Length:	168.0419		
Tangent:	85.1068		
Chord:	166.9746		
Middle Ordinate:	8.1827		
External:	8.3414		
Tangent Direction:	N 34°38'16.5270" E		
Radial Direction:	S 55°21'43.4730" E		
Chord Direction:	N 45°50'00.1617" E		
Radial Direction:	S 32°58'16.2036" E		
Tangent Direction:	N 57°01'43.7964" E		

Circular Curve No. 27

	STATION	NORTHING	EASTING
Element: Circular			
PC	150+76.90	275373.0797	748609.5647
PI	151+83.82	275431.2714	748699.2707
CC		276337.8659	747983.7152
PT	152+90.14	275505.0042	748776.7104
Radius:	1150.0000		
Delta:	10°37'27.1262" Left		
Degree of Curvature(Arc):	4°58'56.0701"		
Length:	213.2414		
Tangent:	106.9272		
Chord:	212.9360		
Middle Ordinate:	4.9391		
External:	4.9604		
Tangent Direction:	N 57°01'43.7964" E		
Radial Direction:	S 32°58'16.2036" E		
Chord Direction:	N 51°43'00.2333" E		
Radial Direction:	S 43°35'43.3298" E		
Tangent Direction:	N 46°24'16.6702" E		

Circular Curve No. 28

	STATION	NORTHING	EASTING
Element: Circular			
PC	154+09.86	275587.5635	748863.4202
PI	154+29.49	275601.0958	748877.6328
CC		275080.6042	749346.1129
PT	154+49.10	275613.8105	748892.5812
Radius:	700.0000		
Delta:	3°12'42.2079" Right		
Degree of Curvature(Arc):	8°11'06.4009"		
Length:	39.2386		
Tangent:	19.6244		
Chord:	39.2335		
Middle Ordinate:	0.2749		
External:	0.2750		
Tangent Direction:	N 46°24'16.6702" E		
Radial Direction:	S 43°35'43.3298" E		
Chord Direction:	N 48°00'37.7741" E		
Radial Direction:	S 40°23'01.1219" E		
Tangent Direction:	N 49°36'58.8781" E		

Circular Curve No. 29

	STATION	NORTHING	EASTING
Element: Circular			
PC	155+66.40	275689.8051	748981.9262
PI	156+25.86	275728.3312	749027.2204
CC		275373.6900	749250.8058
PCC	156+84.52	275752.5884	749081.5103
Radius:	415.0000		
Delta:	16°18'29.1399" Right		
Degree of Curvature(Arc):	13°48'22.3630"		
Length:	118.1214		
Tangent:	59.4627		
Chord:	117.7231		
Middle Ordinate:	4.1955		
External:	4.2384		
Tangent Direction:	N 49°36'58.8781" E		
Radial Direction:	S 40°23'01.1219" E		
Chord Direction:	N 57°46'13.4480" E		
Radial Direction:	S 24°04'31.9820" E		
Tangent Direction:	N 65°55'28.0180" E		

Circular Curve No. 30

	STATION	NORTHING	EASTING
Element: Circular			
PCC	156+84.52	275752.5884	749081.5103
PI	157+14.37	275764.7649	749108.7623
CC		275638.4624	749132.5029
PCC	157+43.12	275763.3148	749138.5757
Radius:	125.0000		
Delta:	26°51'36.7080" Right		
Degree of Curvature(Arc):	45°50'11.8450"		
Length:	58.5999		
Tangent:	29.8486		
Chord:	58.0647		
Middle Ordinate:	3.4182		
External:	3.5144		
Tangent Direction:	N 65°55'28.0180" E		
Radial Direction:	S 24°04'31.9820" E		
Chord Direction:	N 79°21'16.3720" E		
Radial Direction:	S 2°47'04.7260" W		
Tangent Direction:	S 87°12'55.2740" E		

Circular Curve No. 31

	STATION	NORTHING	EASTING
Element: Circular			
PCC	157+43.12	275763.3148	749138.5757
PI	157+78.94	275761.5746	749174.3518
CC		275443.6926	749123.0294
PT	158+14.46	275751.9677	749208.8578
Radius:	320.0000		
Delta:	12°46'24.0791" Right		
Degree of Curvature(Arc):	17°54'17.7520"		
Length:	71.3399		
Tangent:	35.8184		
Chord:	71.1922		
Middle Ordinate:	1.9860		
External:	1.9984		
Tangent Direction:	S 87°12'55.2740" E		
Radial Direction:	S 2°47'04.7260" W		
Chord Direction:	S 80°49'43.2344" E		
Radial Direction:	S 15°33'28.8051" W		
Tangent Direction:	S 74°26'31.1949" E		

Circular Curve No. 32

	STATION	NORTHING	EASTING
Element: Circular			
PC	158+37.98	275745.6598	749231.5140
PI	158+78.28	275734.8496	749270.3417
CC		276549.3614	749455.2766
PT	159+18.52	275727.8326	749310.0306
Radius:	834.2697		
Delta:	5°31'54.2463" Left		
Degree of Curvature(Arc):	6°52'03.9958"		
Length:	80.5462		
Tangent:	40.3044		
Chord:	80.5149		
Middle Ordinate:	0.9719		
External:	0.9730		
Tangent Direction:	S 74°26'31.1949" E		
Radial Direction:	S 15°33'28.8051" W		
Chord Direction:	S 77°12'28.3180" E		
Radial Direction:	S 10°01'34.5588" W		
Tangent Direction:	S 79°58'25.4412" E		

Circular Curve No. 33

	STATION	NORTHING	EASTING
Element: Circular			
PC	159+78.08	275717.4645	749368.6740
PI	159+96.62	275714.2354	749386.9381
CC		275865.1737	749394.7889
PCC	160+14.98	275715.5522	749405.4387
Radius:	150.0000		
Delta:	14°05'51.3872" Left		
Degree of Curvature(Arc):	38°11'49.8708"		
Length:	36.9075		
Tangent:	18.5474		
Chord:	36.8144		
Middle Ordinate:	1.1337		
External:	1.1423		
Tangent Direction:	S 79°58'25.4412" E		
Radial Direction:	S 10°01'34.5588" W		
Chord Direction:	S 87°01'21.1348" E		
Radial Direction:	S 4°04'16.8284" E		
Tangent Direction:	N 85°55'43.1716" E		

Circular Curve No. 34

	STATION	NORTHING	EASTING
Element: Circular			
PCC	160+14.98	275715.5522	749405.4387
PI	160+69.65	275719.4334	749459.9658
CC		275949.9592	749388.7540
PCC	161+22.40	275746.9817	749507.1818
Radius:	235.0000		
Delta:	26°11'24.7310" Left		
Degree of Curvature(Arc):	24°22'52.2580"		
Length:	107.4197		
Tangent:	54.6650		
Chord:	106.4870		
Middle Ordinate:	6.1111		
External:	6.2743		
Tangent Direction:	N 85°55'43.1716" E		
Radial Direction:	S 4°04'16.8284" E		
Chord Direction:	N 7°2'50'00.806" E		
Radial Direction:	S 30°15'41.5594" E		
Tangent Direction:	N 59°44'18.4406" E		

Circular Curve No. 35

	STATION	NORTHING	EASTING
Element: Circular			
PCC	161+22.40	275746.9817	749507.1818
PI	162+08.20	275790.2174	749581.2850
CC		276342.9582	749159.4577
PRC	162+93.11	275850.2839	749642.5437
Radius:	690.0000		
Delta:	14°10'31.6641" Left		
Degree of Curvature(Arc):	8°18'13.4502"		
Length:	170.7119		
Tangent:	85.7940		
Chord:	170.2768		
Middle Ordinate:	5.2727		
External:	5.3133		
Tangent Direction:	N 59°44'18.4406" E		
Radial Direction:	S 30°15'41.5594" E		
Chord Direction:	N 52°39'02.6085" E		
Radial Direction:	S 44°26'13.2236" E		
Tangent Direction:	N 45°33'46.7764" E		

Circular Curve No. 36

	STATION	NORTHING	EASTING
Element: Circular			
PRC	162+93.11	275850.2839	749642.5437
PI	163+35.18	275879.7361	749672.5804
CC		275778.8819	749712.5562
PRC	163+72.75	275878.8602	749714.6383
Radius:	100.0000		
Delta:	45°37'48.1983" Right		
Degree of Curvature(Arc):	57°17'44.8062"		
Length:	79.6395		
Tangent:	42.0670		
Chord:	77.5515		
Middle Ordinate:	7.8239		
External:	8.4879		
Tangent Direction:	N 45°33'46.7764" E		
Radial Direction:	S 44°26'13.2236" E		
Chord Direction:	N 68°22'40.8756" E		
Radial Direction:	S 11°11'34.9747" W		
Tangent Direction:	S 88°48'25.0253" E		

DATE:	DESCRIPTION:	BY:
DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

HORIZONTAL STAKEOUT INFORMATION

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY: RKK
DRAWN BY: RKK
BUILDING NO.: N/A
DATE: 7/3/13
SCALE: NTS
SHEET NO.: C-4
PARKS PROJECT #: CH-41
CONTRACT #: 2013-CH-300

NANCY RUTH BENGER LICENSED PROFESSIONAL ENGINEER DELAWARE

6/26/2013
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Circular Curve No. 37

	STATION	NORTHING	EASTING
Element: Circular			
PRC	163+72.75	275878.8602	749714.6383
PI	164+27.60	275877.7181	749769.4775
CC		275978.8385	749716.7204
PRC	164+73.09	275923.3504	749799.9134
Radius:	100.0000		
Delta:	57°29'25.8552" Left		
Degree of Curvature(Arc):	57°17'44.8062"		
Length:	100.3399		
Tangent:	54.8511		
Chord:	96.1832		
Middle Ordinate:	12.3233		
External:	14.0554		
Tangent Direction:	S 88°48'25.0253" E		
Radial Direction:	S 1°11'34.9747" W		
Chord Direction:	N 62°26'52.0471" E		
Radial Direction:	S 56°17'50.8805" E		
Tangent Direction:	N 33°42'09.1195" E		

Circular Curve No. 38

	STATION	NORTHING	EASTING
Element: Circular			
PRC	164+73.09	275923.3504	749799.9134
PI	164+95.01	275941.5828	749812.0740
CC		275867.8623	749883.1063
PRC	165+16.24	275953.0581	749830.7454
Radius:	100.0000		
Delta:	24°43'22.0289" Right		
Degree of Curvature(Arc):	57°17'44.8062"		
Length:	43.1494		
Tangent:	21.9158		
Chord:	42.8154		
Middle Ordinate:	2.3183		
External:	2.3733		
Tangent Direction:	N 33°42'09.1195" E		
Radial Direction:	S 56°17'50.8805" E		
Chord Direction:	N 46°03'50.1340" E		
Radial Direction:	S 31°34'28.8516" E		
Tangent Direction:	N 58°25'31.1484" E		

Circular Curve No. 39

	STATION	NORTHING	EASTING
Element: Circular			
PRC	165+16.24	275953.0581	749830.7454
PI	165+31.08	275960.8283	749843.3881
CC		276038.2540	749778.3844
PT	165+45.71	275971.9350	749853.2295
Radius:	100.0000		
Delta:	16°52'54.1280" Left		
Degree of Curvature(Arc):	57°17'44.8062"		
Length:	29.4641		
Tangent:	14.8396		
Chord:	29.3577		
Middle Ordinate:	1.0832		
External:	1.0951		
Tangent Direction:	N 58°25'31.1484" E		
Radial Direction:	S 31°34'28.8516" E		
Chord Direction:	N 49°59'04.0844" E		
Radial Direction:	S 48°27'22.9795" E		
Tangent Direction:	N 41°32'37.0205" E		

Circular Curve No. 40

	STATION	NORTHING	EASTING
Element: Circular			
PC	166+97.75	276085.7349	749954.0658
PI	167+15.15	276098.7540	749965.6017
CC		276152.0539	749879.2207
PT	167+32.20	276114.9037	749972.0639
Radius:	100.0000		
Delta:	19°44'07.0899" Left		
Degree of Curvature(Arc):	57°17'44.8062"		
Length:	34.4446		
Tangent:	17.3946		
Chord:	34.2746		
Middle Ordinate:	1.4794		
External:	1.5016		
Tangent Direction:	N 41°32'37.0205" E		
Radial Direction:	S 48°27'22.9795" E		
Chord Direction:	N 31°40'33.4755" E		
Radial Direction:	S 68°11'30.0694" E		
Tangent Direction:	N 21°48'29.9306" E		

Circular Curve No. 41

	STATION	NORTHING	EASTING
Element: Circular			
PC	170+11.97	276374.6488	750075.9982
PI	171+14.54	276469.8849	750114.1060
CC		276263.1980	750354.5278
PRC	172+09.64	276521.8513	750202.5460
Radius:	300.0000		
Delta:	37°45'13.1854" Right		
Degree of Curvature(Arc):	19°05'54.9354"		
Length:	197.6777		
Tangent:	102.5774		
Chord:	194.1209		
Middle Ordinate:	16.1351		
External:	17.0523		
Tangent Direction:	N 21°48'29.9306" E		
Radial Direction:	S 68°11'30.0694" E		
Chord Direction:	N 40°41'06.5233" E		
Radial Direction:	S 30°26'16.8840" E		
Tangent Direction:	N 59°33'43.1160" E		

Circular Curve No. 42

	STATION	NORTHING	EASTING
Element: Circular			
PRC	172+09.64	276521.8513	750202.5460
PI	174+93.14	276665.4736	750446.9725
CC		276771.8828	750055.6302
PT	176+58.60	276913.0930	750308.9278
Radius:	290.0000		
Delta:	88°42'03.9247" Left		
Degree of Curvature(Arc):	19°45'25.7953"		
Length:	448.9566		
Tangent:	283.4990		
Chord:	405.4469		
Middle Ordinate:	82.6279		
External:	115.5511		
Tangent Direction:	N 59°33'43.1160" E		
Radial Direction:	S 30°26'16.8840" E		
Chord Direction:	N 15°12'41.1537" E		
Radial Direction:	N 60°51'39.1913" E		
Tangent Direction:	N 29°08'20.8087" W		

Circular Curve No. 43

	STATION	NORTHING	EASTING
Element: Circular			
PC	178+51.56	277081.6310	750214.9701
PI	179+21.70	277142.8980	750180.8145
CC		277198.4946	750424.5957
PT	179+88.05	277212.9157	750185.0293
Radius:	240.0000		
Delta:	32°35'02.3116" Right		
Degree of Curvature(Arc):	23°52'23.6693"		
Length:	136.4874		
Tangent:	70.1445		
Chord:	134.6556		
Middle Ordinate:	9.6373		
External:	10.0405		
Tangent Direction:	N 29°08'20.8087" W		
Radial Direction:	N 60°51'39.1913" E		
Chord Direction:	N 12°50'49.6529" W		
Radial Direction:	S 86°33'18.4971" E		
Tangent Direction:	N 3°26'41.5029" E		

Circular Curve No. 44

	STATION	NORTHING	EASTING
Element: Circular			
PC	180+65.19	277289.9191	750189.6647
PI	181+15.88	277340.5149	750192.7104
CC		277282.4081	750314.4388
PT	181+61.50	277374.7001	750230.1348
Radius:	125.0000		
Delta:	44°08'42.1938" Right		
Degree of Curvature(Arc):	45°50'11.8450"		
Length:	96.3096		
Tangent:	50.6874		
Chord:	93.9450		
Middle Ordinate:	9.1614		
External:	9.8859		
Tangent Direction:	N 3°26'41.5029" E		
Radial Direction:	S 86°33'18.4971" E		
Chord Direction:	N 25°31'02.5998" E		
Radial Direction:	S 42°24'36.3033" E		
Tangent Direction:	N 47°35'23.6967" E		

Circular Curve No. 45

	STATION	NORTHING	EASTING
Element: Circular			
PC	182+78.63	277453.6970	750316.6168
PI	183+13.75	277477.3839	750342.5481
CC		277638.2811	750148.0087
PT	183+48.42	277507.2990	750360.9492
Radius:	250.0000		
Delta:	15°59'37.5794" Left		
Degree of Curvature(Arc):	22°55'05.9225"		
Length:	69.7860		
Tangent:	35.1214		
Chord:	69.5596		
Middle Ordinate:	2.4311		
External:	2.4550		
Tangent Direction:	N 47°35'23.6967" E		
Radial Direction:	S 42°24'36.3033" E		
Chord Direction:	N 39°35'34.9070" E		
Radial Direction:	S 58°24'13.8827" E		
Tangent Direction:	N 31°35'46.1173" E		

Circular Curve No. 46

	STATION	NORTHING	EASTING
Element: Circular			
PC	186+21.55	277739.9413	750504.0502
PI	186+72.17	277783.0646	750530.5758
CC		277792.3342	750418.8739
PT	187+15.28	277829.9703	750511.5213
Radius:	100.0000		
Delta:	53°42'16.5644" Left		
Degree of Curvature(Arc):	57°17'44.8062"		
Length:	93.7322		
Tangent:	50.6283		
Chord:	90.3384		
Middle Ordinate:	10.7826		
External:	12.0858		
Tangent Direction:	N 31°35'46.1173" E		
Radial Direction:	S 58°24'13.8827" E		
Chord Direction:	N 4°44'37.8351" E		
Radial Direction:	N 67°53'29.5529" E		
Tangent Direction:	N 22°06'30.4471" W		

Circular Curve No. 47

	STATION	NORTHING	EASTING
Element: Circular			
PC	188+66.76	277970.3165	750454.5085
PI	189+10.22	278010.5734	750438.1549
CC		278007.9526	750547.1558
PT	189+48.74	278049.9979	750456.4243
Radius:	100.0000		
Delta:	46°58'18.0323" Right		
Degree of Curvature(Arc):	57°17'44.8062"		
Length:	81.9810		
Tangent:	43.4518		
Chord:	79.7045		
Middle Ordinate:	8.2841		
External:	9.0324		
Tangent Direction:	N 22°06'30.4471" W		
Radial Direction:	N 67°53'29.5529" E		
Chord Direction:	N 1°22'38.5691" E		
Radial Direction:	S 65°08'12.4148" E		
Tangent Direction:	N 24°51'47.5852" E		

Circular Curve No. 48

	STATION	NORTHING	EASTING
Element: Circular			
PC	190+19.30	278114.0154	750486.0904
PI	190+56.75	278147.9960	750501.8371
CC		277693.5620	751393.4045
PRC	190+94.17	278180.7036	750520.0815
Radius:	1000.0000		
Delta:	4°17'22.7874" Right		
Degree of Curvature(Arc):	5°43'46.4806"		
Length:	74.8687		
Tangent:	37.4519		
Chord:	74.8513		
Middle Ordinate:	0.7006		
External:	0.7011		
Tangent Direction:	N 24°51'47.5852" E		
Radial Direction:	S 65°08'12.4148" E		
Chord Direction:	N 27°00'28.9789" E		
Radial Direction:	S 60°50'49.6274" E		
Tangent Direction:	N 29°09'10.3726" E		

DATE:	DESCRIPTION:	BY:
DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

HORIZONTAL STAKEOUT INFORMATION

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY: RKK

DRAWN BY: RKK

BUILDING NO.: N/A

DATE: 7/3/13

SCALE: NTS

SHEET NO.: C-5

PARKS PROJECT #: CH-41

CONTRACT #: 2013-CH-300

NANCY RUTH BENGER LICENSED PROFESSIONAL ENGINEER DELAWARE

6/26/2013
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GORDONS POND TRAIL- CONNECTOR

Circular Curve No. 49

	STATION	NORTHING	EASTING
Element: Circular			
PRC	190+94.17	278180.7036	750520.0815
PI	192+10.93	278282.6694	750576.9582
CC		278326.8461	750258.0846
PRC	193+16.86	278396.2574	750549.9443
Radius:	300.0000		
Delta:	42°31'50.4321" Left		
Degree of Curvature(Arc):	19°05'54.9354"		
Length:	222.6901		
Tangent:	116.7561		
Chord:	217.6125		
Middle Ordinate:	20.4268		
External:	21.9192		
Tangent Direction:	N 29°09'10.3726" E		
Radial Direction:	S 60°50'49.6274" E		
Chord Direction:	N 7°53'15.1566" E		
Radial Direction:	N 76°37'19.9405" E		
Tangent Direction:	N 13°22'40.0595" W		

Circular Curve No. 50

	STATION	NORTHING	EASTING
Element: Circular			
PRC	193+16.86	278396.2574	750549.9443
PI	193+84.25	278461.8205	750534.3518
CC		278432.1199	750700.7385
PRC	194+44.00	278517.9397	750571.6650
Radius:	155.0000		
Delta:	46°59'50.5902" Right		
Degree of Curvature(Arc):	36°57'54.0685"		
Length:	127.1402		
Tangent:	67.3917		
Chord:	123.6057		
Middle Ordinate:	12.8543		
External:	14.0167		
Tangent Direction:	N 13°22'40.0595" W		
Radial Direction:	N 76°37'19.9405" E		
Chord Direction:	N 10°07'15.2356" E		
Radial Direction:	S 56°22'49.4693" E		
Tangent Direction:	N 33°37'10.5307" E		

Circular Curve No. 51

	STATION	NORTHING	EASTING
Element: Circular			
PRC	194+44.00	278517.9397	750571.6650
PI	194+69.49	278539.1695	750585.7805
CC		278573.3073	750488.3918
PRC	194+93.93	278564.5662	750588.0090
Radius:	100.0000		
Delta:	28°36'17.6135" Left		
Degree of Curvature(Arc):	57°17'44.8062"		
Length:	49.9250		
Tangent:	25.4942		
Chord:	49.4081		
Middle Ordinate:	3.0995		
External:	3.1986		
Tangent Direction:	N 33°37'10.5307" E		
Radial Direction:	S 56°22'49.4693" E		
Chord Direction:	N 19°19'01.7240" E		
Radial Direction:	S 84°59'07.0828" E		
Tangent Direction:	N 5°00'52.9172" E		

Circular Curve No. 52

	STATION	NORTHING	EASTING
Element: Circular			
PRC	194+93.93	278564.5662	750588.0090
PI	195+63.29	278633.6686	750594.0726
CC		278542.7134	750837.0521
PRC	196+29.26	278689.7668	750634.8757
Radius:	250.0000		
Delta:	31°00'56.3226" Right		
Degree of Curvature(Arc):	22°55'05.9225"		
Length:	135.3313		
Tangent:	69.3679		
Chord:	133.6850		
Middle Ordinate:	9.1015		
External:	9.4454		
Tangent Direction:	N 5°00'52.9172" E		
Radial Direction:	S 84°59'07.0828" E		
Chord Direction:	N 20°31'21.0785" E		
Radial Direction:	S 53°58'10.7602" E		
Tangent Direction:	N 36°01'49.2398" E		

Circular Curve No. 53

	STATION	NORTHING	EASTING
Element: Circular			
PRC	196+29.26	278689.7668	750634.8757
PI	197+40.65	278779.8493	750700.3974
CC		278889.7594	750359.9158
PCC	198+44.54	278891.2392	750699.9126
Radius:	340.0000		
Delta:	36°16'46.9989" Left		
Degree of Curvature(Arc):	16°51'06.1195"		
Length:	215.2882		
Tangent:	111.3910		
Chord:	211.7096		
Middle Ordinate:	16.8982		
External:	17.7820		
Tangent Direction:	N 36°01'49.2398" E		
Radial Direction:	S 53°58'10.7602" E		
Chord Direction:	N 17°53'25.7404" E		
Radial Direction:	N 89°45'02.2409" E		
Tangent Direction:	N 0°14'57.7591" W		

Circular Curve No. 54

	STATION	NORTHING	EASTING
Element: Circular			
PCC	198+44.54	278891.2392	750699.9126
PI	198+87.29	278933.9840	750699.7265
CC		278887.5397	749849.9206
PT	199+29.96	278976.4943	750695.2532
Radius:	850.0000		
Delta:	5°45'27.9820" Left		
Degree of Curvature(Arc):	6°44'26.4478"		
Length:	85.4183		
Tangent:	42.7451		
Chord:	85.3823		
Middle Ordinate:	1.0728		
External:	1.0741		
Tangent Direction:	N 0°14'57.7591" W		
Radial Direction:	N 89°45'02.2409" E		
Chord Direction:	N 3°07'41.7501" W		
Radial Direction:	N 83°59'34.2589" E		
Tangent Direction:	N 6°00'25.7411" W		

Circular Curve No. 55

	STATION	NORTHING	EASTING
Element: Circular			
PC	201+62.37	279207.6299	750670.9307
PI	202+00.12	279245.1705	750666.9803
CC		279213.9090	750730.6012
PT	202+29.76	279264.9816	750699.1116
Radius:	60.0000		
Delta:	64°21'02.1591" Right		
Degree of Curvature(Arc):	95°29'34.6771"		
Length:	67.3878		
Tangent:	37.7479		
Chord:	63.9014		
Middle Ordinate:	9.2146		
External:	10.8866		
Tangent Direction:	N 6°00'25.7411" W		
Radial Direction:	N 83°59'34.2589" E		
Chord Direction:	N 26°10'05.3385" E		
Radial Direction:	S 31°39'23.5819" E		
Tangent Direction:	N 58°20'36.4181" E		

Circular Curve No. 56

	STATION	NORTHING	EASTING
Element: Circular			
PC	202+93.82	279298.6030	750753.6418
PI	203+54.04	279330.2072	750804.9003
CC		279349.6756	750722.1522
PT	203+88.29	279381.3505	750773.1101
Radius:	60.0000		
Delta:	90°12'29.3189" Left		
Degree of Curvature(Arc):	95°29'34.6771"		
Length:	94.4657		
Tangent:	60.2184		
Chord:	85.0068		
Middle Ordinate:	17.6507		
External:	25.0074		
Tangent Direction:	N 58°20'36.4181" E		
Radial Direction:	S 31°39'23.5819" E		
Chord Direction:	N 13°14'21.7586" E		
Radial Direction:	N 58°08'07.0991" E		
Tangent Direction:	N 31°51'52.9009" W		

Circular Curve No. 57

	STATION	NORTHING	EASTING
Element: Circular			
PC	301+09.71	279063.0935	750745.9484
PI	301+16.99	279064.4848	750753.1014
CC		279102.3576	750738.3112
PT	301+24.12	279068.3092	750759.3042
Radius:	40.0000		
Delta:	20°38'57.8409" Left		
Degree of Curvature(Arc):	143°14'22.0156"		
Length:	14.4160		
Tangent:	7.2870		
Chord:	14.3381		
Middle Ordinate:	0.6477		
External:	0.6583		
Tangent Direction:	N 78°59'34.2589" E		
Radial Direction:	S 11°00'25.7411" E		
Chord Direction:	N 68°40'05.3385" E		
Radial Direction:	S 31°39'23.5819" E		
Tangent Direction:	N 58°20'36.4181" E		

TRAVERSE POINT DATA

POINT	NORTHING	EASTING	ELEVATION
1	271478.97310	749431.79420	2.37
3	272472.65900	749071.16160	2.87
4	273244.18250	748696.83760	3.01
5	273887.33300	748585.98180	3.39
6	274631.30110	748137.29010	4.13
7	275411.55650	748682.16670	2.94
8	275744.26360	749209.65090	2.91
200	271545.95351	749209.86865	3.06
201	271627.27424	749095.15525	2.91
203	271997.53908	749115.85196	3.37
205	272807.95294	748846.52609	2.39
207	278501.23769	750599.00242	7.09
208	278157.92518	750563.49869	6.99
209	277838.86534	750657.67151	9.19
210	274913.25502	748237.40543	3.15
212	275556.67548	748837.93808	3.62
213	275726.55618	749033.15962	3.87
215	275710.62010	749425.88064	3.55
216	275777.70351	749566.36780	3.30
300	271332.53773	749482.39494	4.12
301	271286.57187	749458.29528	3.39
302	270963.43841	749238.14409	3.36
303	270905.86904	749370.80288	4.06
304	270769.03297	749460.22296	4.37
305	270701.35923	749497.52245	3.66
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307	270404.02594	749628.28428	3.98
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309	270300.98690	750068.40494	3.52
310	270355.92928	750265.90668	3.74
311	270403.45354	750432.33332	3.15
312	270522.06546	750553.14436	3.34
313	270704.28776	750791.59433	3.19
314	270601.05748	751017.22462	3.20

DATE: DESCRIPTION: BY:

DATE: DESCRIPTION: BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

HORIZONTAL STAKEOUT INFORMATION

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIROMENTAL CONTROL

DESIGNED BY: RKK

DRAWN BY: RKK

BUILDING NO.: N/A

DATE: 7/3/13

SCALE: NTS

SHEET NO.: C-6

PARKS PROJECT #: CH-41

CONTRACT #: 2013-CH-300

NANCY RUTH BERGER LICENSE NO. 14374 STATE OF DELAWARE PROFESSIONAL ENGINEER

6/26/2013
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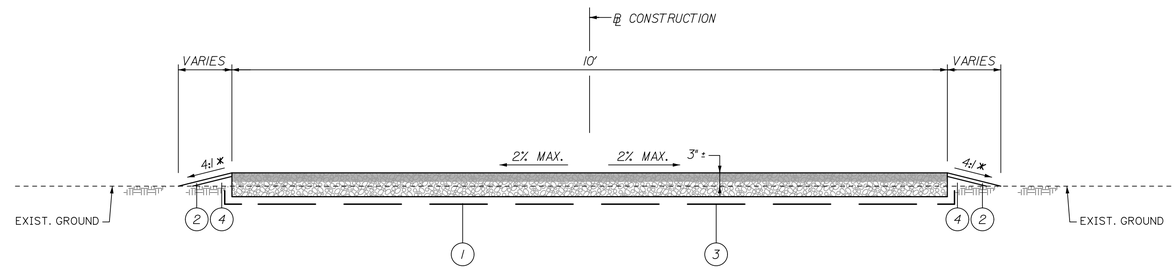
LEGEND

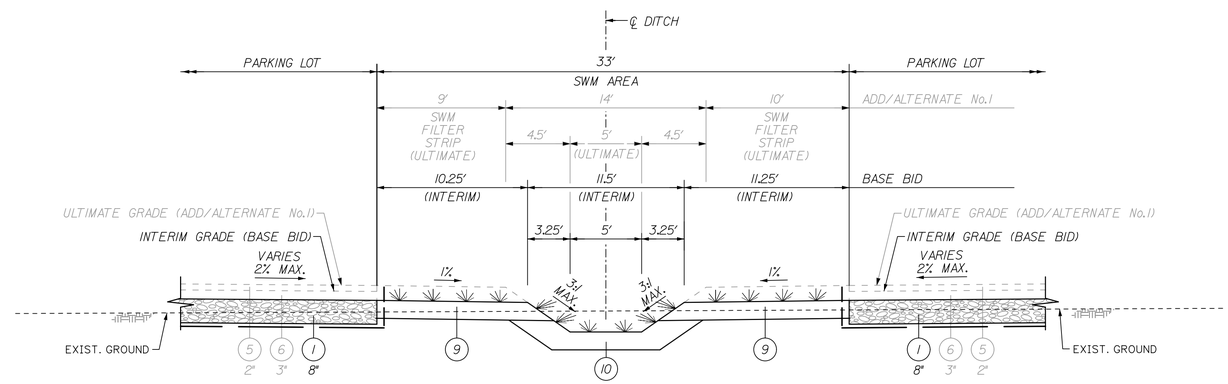
1. 8" DELDOT-GRADED AGGREGATE BASE COURSE (TYPE B), TOPPED AND CHOKED WITH 1-1/2" STONE DUST ROLLED INTO GRADED AGGREGATE
2. STABILIZATION OF FILLED, REGRADED, OR OTHERWISE DISTURBED AREAS SHALL BE CONSISTENT WITH PRECONSTRUCTION GROUND COVER AS DIRECTED BY THE OWNER AND AS FOLLOWS:

   -AT THE SOUTHERN SEGMENT OF THE TRAIL ALONG THE DIKE AT THE PERIMETER OF GORDONS POND, STABILIZATION SHALL CONSIST OF TEMPORARY SEEDING AS REQUIRED AND PERMANENT SEEDING MIX NO. 5 IN ACCORDANCE WITH THE DELAWARE EROSION & SEDIMENT CONTROL HANDBOOK (CURRENT VERSION).
   -IN WOODED AREAS, STABILIZATION SHALL CONSIST OF PINE NEEDLES AND DEAD LEAVES SALVAGED AND STOCKPILED, PRIOR TO DISTURBANCE, FOR REUSE AS MULCH.
   -IN THE SANDY DUNE AREAS, SAND SHALL BE REGRADED TO CONFORM TO EXISTING GRADES OR AS OTHERWISE INDICATED, AND ALLOWED TO NATURALLY REVEGETATE.
   -IN WETLANDS, DISTURBANCE SHALL BE MINIMIZED BY USING SUPPORT MATS, LOW IMPACT EQUIPMENT AND BY MINIMIZING VEHICULAR TRAFFIC AND THE AREA SHALL BE ALLOWED TO NATURALLY REVEGETATE.
3. GEOTEXTILE SEPARATION FABRIC (AASHTO M 288, CLASS 2)
4. FILL WITH EXCAVATED MATERIAL
5. SUPERPAVE, TYPE C HOT-MIX, 160 GYRATIONS, PG 64-22 (ADD/ALTERNATE No.1)
6. SUPERPAVE, TYPE B HOT-MIX, 160 GYRATIONS, PG 64-22 (ADD/ALTERNATE No.1)
7. REMOVE EXISTING MILLINGS, REFILL WITH SAND
8. EXISTING MILLINGS
9. 6" TOPSOIL, PERMANENT SEED MIX NO. 6 & SOIL STABILIZATION MATTING, SSM-III (NORTH AMERICAN GREEN SC150BN)
10. 6" TOPSOIL, PERMANENT SEED MIX NO. 10 & SOIL STABILIZATION MATTING, SSM-III (NORTH AMERICAN GREEN SC150BN)
11. 6" REFILL WITH EXISTING MILLINGS
12. P.C.C. PARKING BUMPER
13. SPLIT RAIL FENCE



* UNLESS OTHERWISE NOTED OR SHOWN ON PLANS

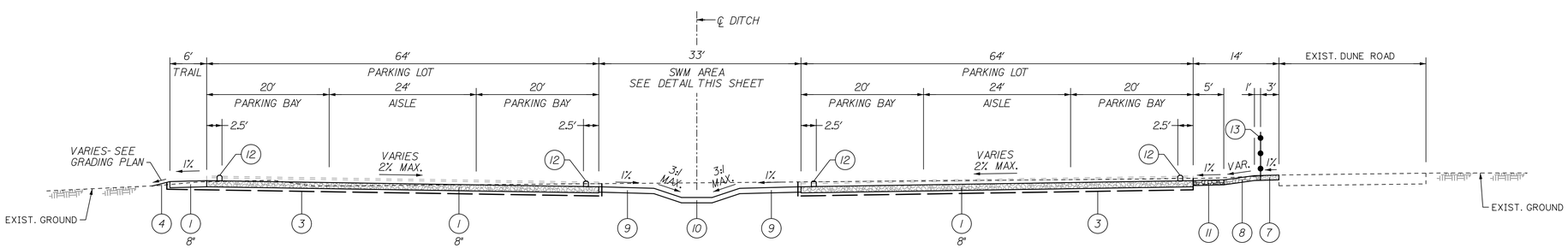
TYPICAL SECTION - AT-GRADE TRAIL
N.T.S.



SWM AREA DETAIL
(LOOKING NORTH)
N.T.S.

NOTES:

1. THE PARKING LOT PAVEMENT SECTION REPRESENTS THE ULTIMATE PAVING SECTION TO BE CONSTRUCTED IN ADD/ALTERNATE No. 1. THE BASE BID SHALL INCLUDE CONSTRUCTION OF GRADED AGGREGATE BASE COURSE, 6' WIDE TRAIL ADJACENT TO THE SOUTH AND WESTERN EDGE OF THE LOT, STORMWATER MANAGEMENT AREA (SHOWN TO THE INTERIM LIMITS) AND THE SPLIT RAIL FENCE. THE PARKING LOT GRADES AND CONTOURS SHOWN ON THE CONTRACT DOCUMENTS REPRESENT THE ULTIMATE GRADES (TOP OF HOT-MIX). PARKING LOT GRADES CONSTRUCTED IN THE BASE BID ARE 5" BELOW THE ULTIMATE GRADES AND CONTOURS THAT ARE SHOWN IN THE PLANS.
2. FOR PEDESTRIAN BRIDGE TYPICAL SECTION, SEE SHEET S-7.



TYPICAL SECTION - PARKING LOT
(LOOKING NORTH)
N.T.S.

SEE NOTE 1

DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

TYPICAL SECTIONS

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY:	RKK
DRAWN BY:	RKK
BUILDING NO.:	N/A
DATE:	7/3/13
SCALE:	AS NOTED
SHEET NO.:	C-7
PARKS PROJECT #:	CH-41
CONTRACT #:	2013-CH-300

NANCY RUTH BERGER LICENSED PROFESSIONAL ENGINEER DELAWARE

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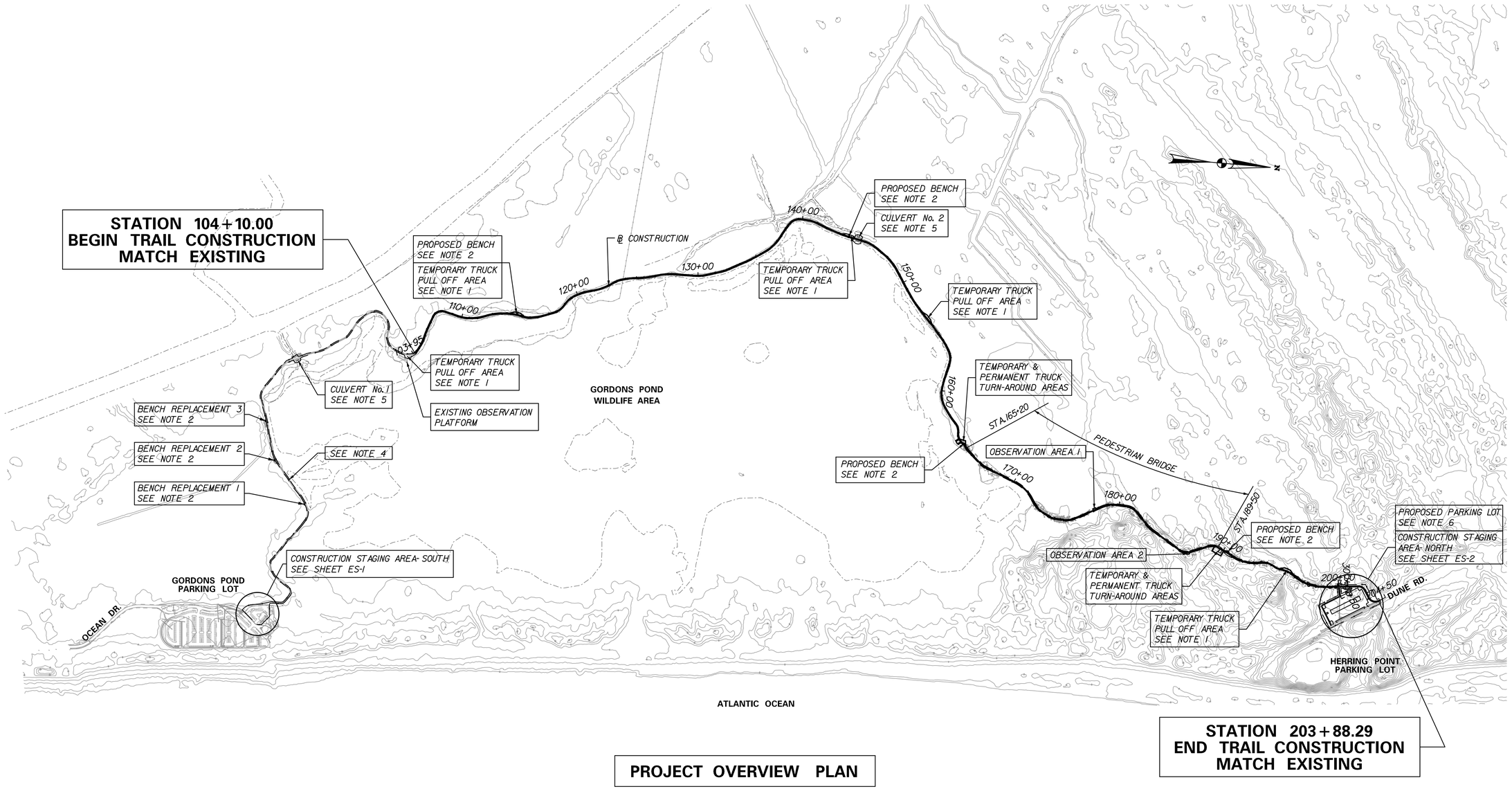

STATION 203+88.29
END TRAIL CONSTRUCTION
MATCH EXISTING

PROJECT OVERVIEW PLAN

NOTES:

1. FOR TEMPORARY TRUCK PULL OFF DETAILS, SEE SHEET C-22.
2. FOR PROPOSED BENCH DETAILS, SEE SHEET C-22. ALL EXISTING BENCHES SHALL BE DISPOSED OF OFFSITE. FOR EXISTING BENCH REPLACEMENT DETAILS, SEE SHEET C-30.
3. FOR PEDESTRIAN BRIDGE AND OBSERVATION AREA DETAILS, SEE SHEETS S-1 THROUGH S-13.
4. AFTER COMPLETION OF THE PROPOSED TRAIL, THE CONTRACTOR SHALL REPAIR AND RESHAPE THE EXISTING STONE TRAIL FROM THE GORDONS POND PARKING LOT TO STATION 104+10.00 (10-FOOT WIDTH). THESE REPAIRS SHALL INCLUDE PLACEMENT OF NEW GRADED AGGREGATE BASE COURSE AT ERODED, RUTTED OR OTHERWISE DEPRESSED AREAS, REGRADING GABC, AND TOPPING WITH 1-1/2 INCH OF STONE DUST ROLLED INTO GABC.
5. FOR CULVERT REPAIR DETAILS, SEE SHEETS C-25 THROUGH C-27.
6. FOR PARKING LOT DETAILS, SEE SHEETS C-28 THROUGH C-29.

DATE:	DESCRIPTION:	BY:
DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

PROJECT OVERVIEW PLAN

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY: RKK
DRAWN BY: RKK
BUILDING NO.: N/A
DATE: 7/3/13
SCALE: 1" = 400'
SHEET NO.: C-8
PARKS PROJECT #: CH-41
CONTRACT #: 2013-CH-300

NANCY RUTH BERGER LICENSED PROFESSIONAL ENGINEER STATE OF DELAWARE

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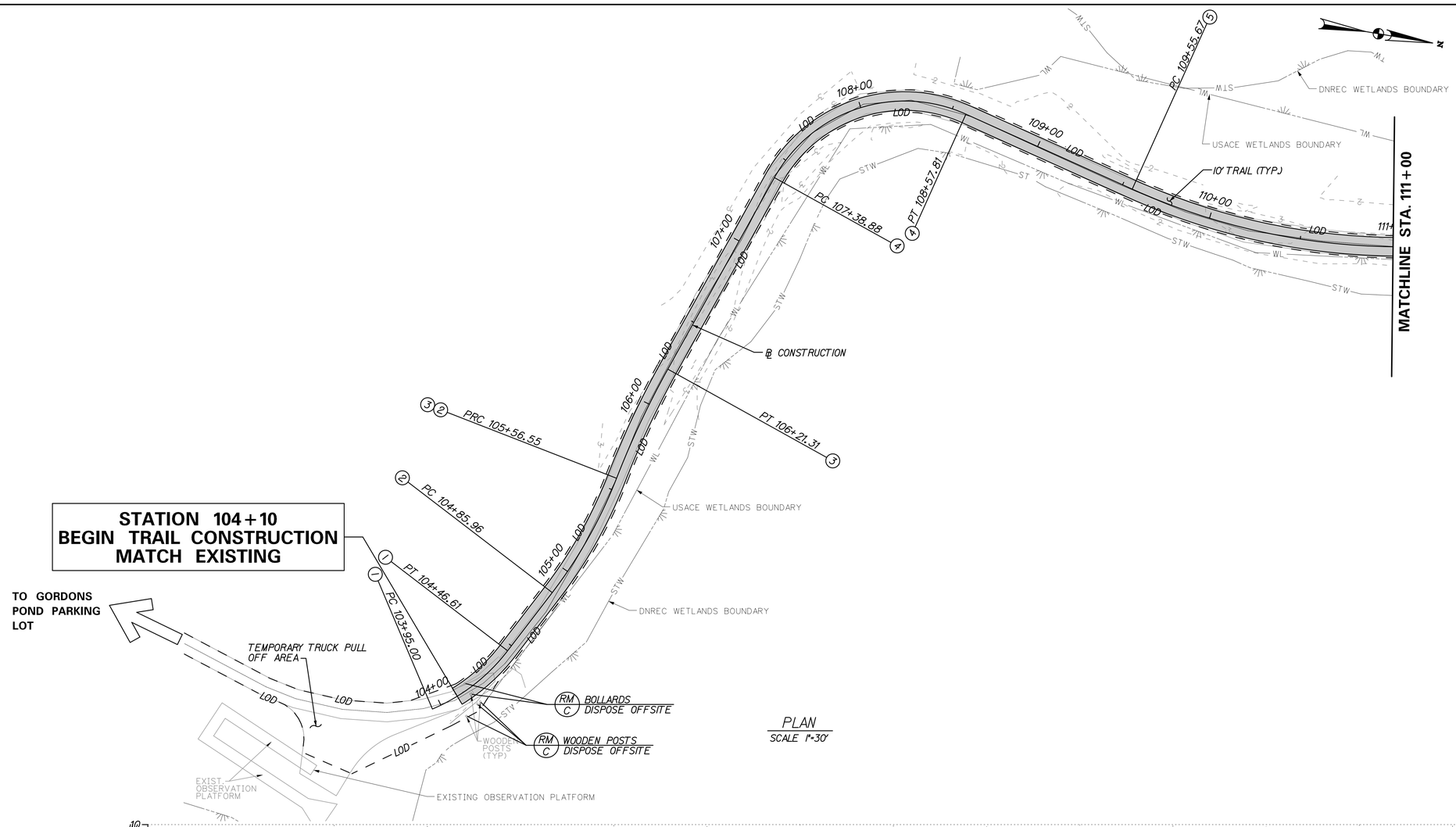

PLAN
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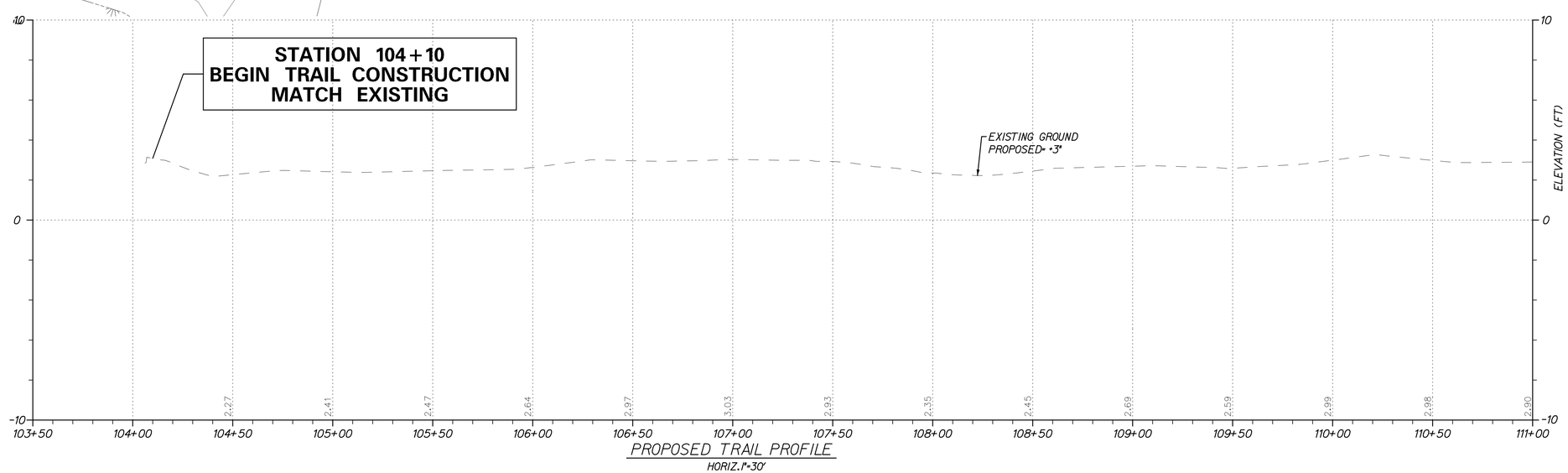

PROPOSED TRAIL PROFILE
HORIZ. 1"=30'
VERT. 1"=3'

DATE: DESCRIPTION: BY:

DATE: DESCRIPTION: BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

CONSTRUCTION PLANS & PROFILES

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY:	RKK
DRAWN BY:	RKK
BUILDING NO.:	N/A
DATE:	7/3/13
SCALE:	AS NOTED
SHEET NO.:	C-9
PARKS PROJECT #:	CH-41
CONTRACT #:	2013-CH-300

NANCY RUTH BERGER LICENSED PROFESSIONAL ENGINEER STATE OF DELAWARE

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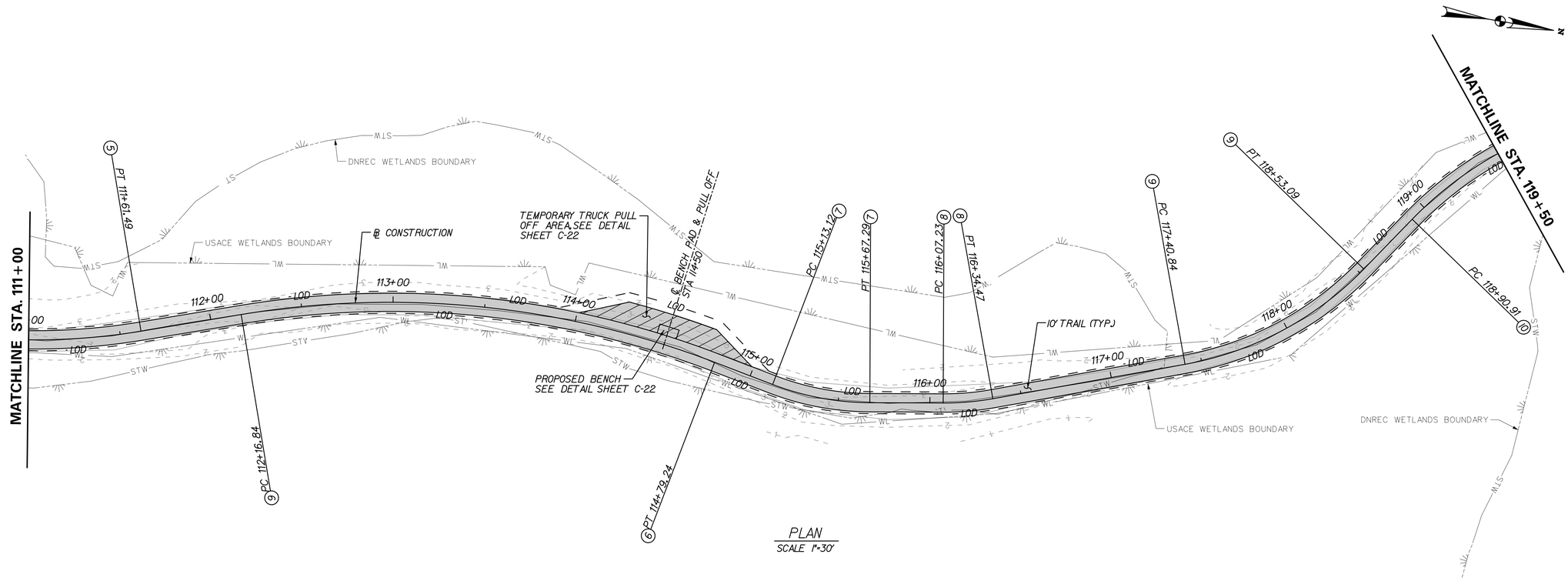

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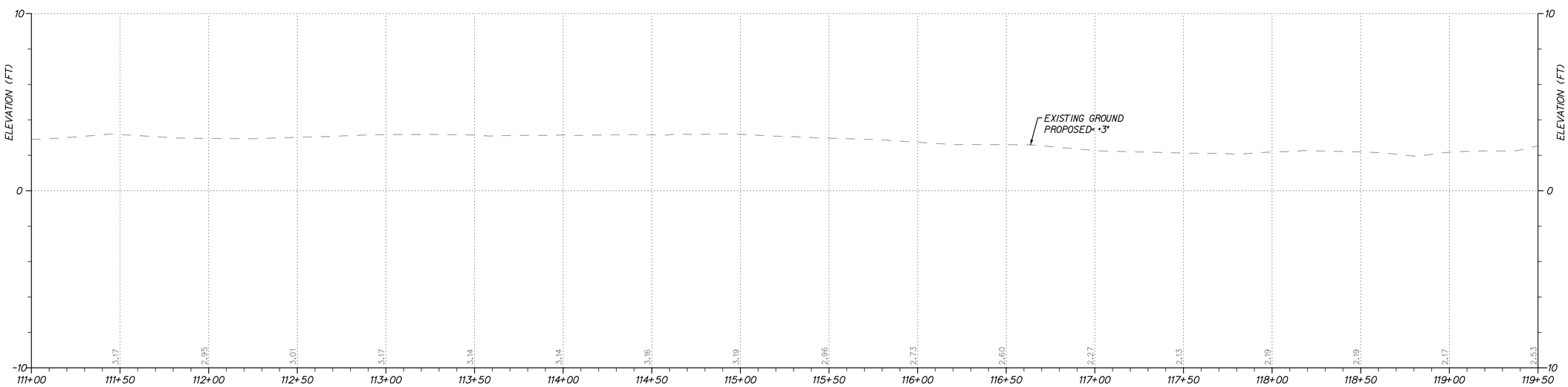

PROPOSED TRAIL PROFILE
HORIZ. 1"=30'
VERT. 1"=3'

DATE:	DESCRIPTION:	BY:
DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

CONSTRUCTION PLANS & PROFILES

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY: RKK
DRAWN BY: RKK
BUILDING NO.: N/A
DATE: 7/3/13
SCALE: AS NOTED
SHEET NO.: C-10
PARKS PROJECT #: CH-41
CONTRACT #: 2013-CH-300

NAOMI RUTH BERGER LICENSE NO. 24794 STATE OF DELAWARE PROFESSIONAL ENGINEER

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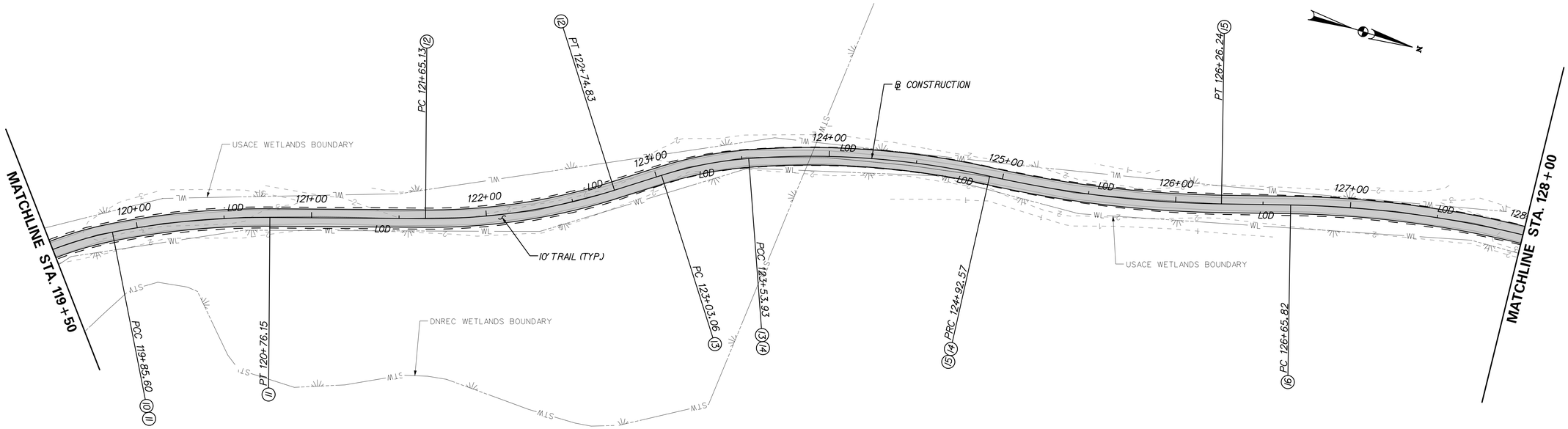

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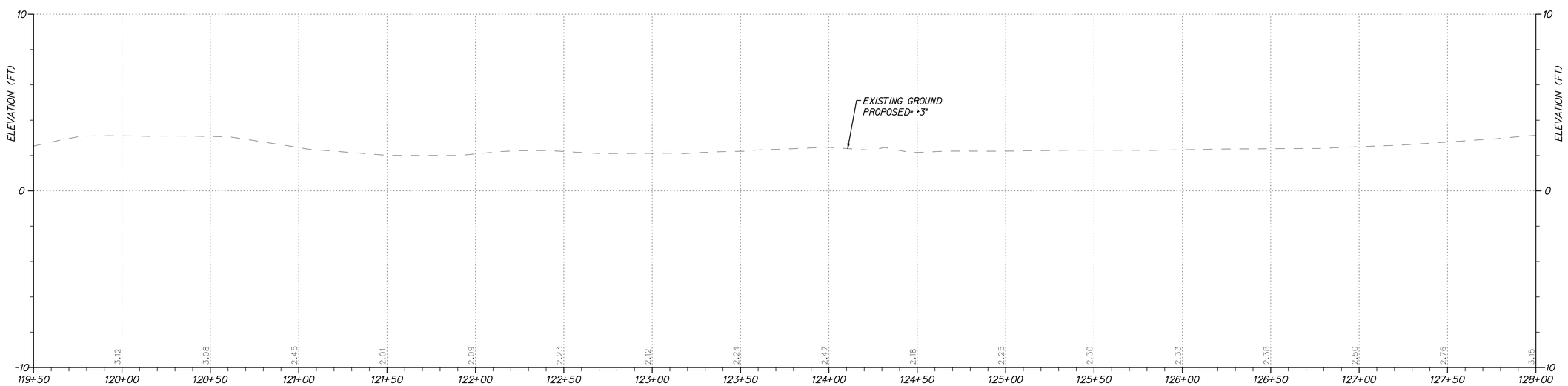

PROPOSED TRAIL PROFILE
HORIZ. 1"=30'
VERT. 1"=3'

DATE: DESCRIPTION: BY:

DATE: DESCRIPTION: BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

CONSTRUCTION PLANS & PROFILES

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY:	RKK
DRAWN BY:	RKK
BUILDING NO.:	N/A
DATE:	7/3/13
SCALE:	AS NOTED
SHEET NO.:	C-11
PARKS PROJECT #:	CH-41
CONTRACT #:	2013-CH-300

NANCY RUTH BERNARD LICENSED PROFESSIONAL ENGINEER DELAWARE

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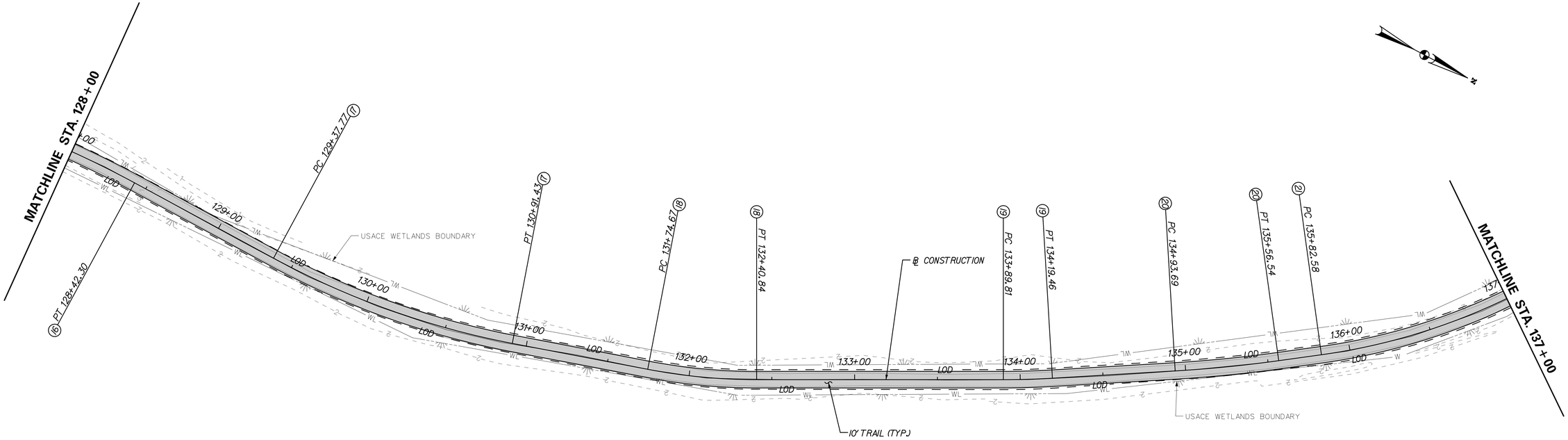

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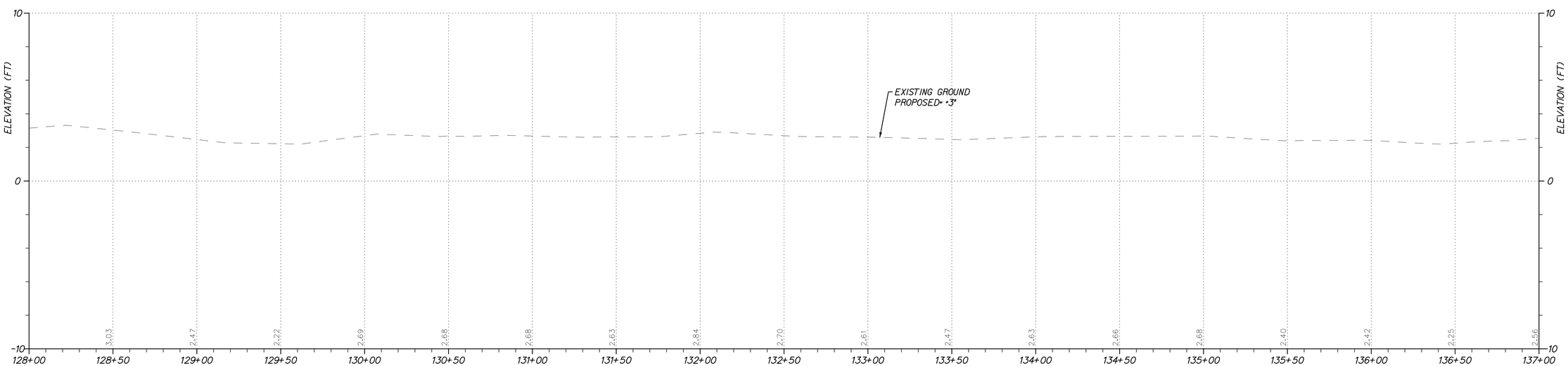

PROPOSED TRAIL PROFILE
HORIZ.1"=30'
VERT.1"=3'

DATE:	DESCRIPTION:	BY:
DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

CONSTRUCTION PLANS & PROFILES

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY: RKK
DRAWN BY: RKK
BUILDING NO.: N/A
DATE: 7/3/13
SCALE: AS NOTED
SHEET NO.: C-12
PARKS PROJECT #: CH-41
CONTRACT #: 2013-CH-300

NAOMI RUTH BERRYMAN LICENSE NO. 14736 STATE OF DELAWARE PROFESSIONAL ENGINEER

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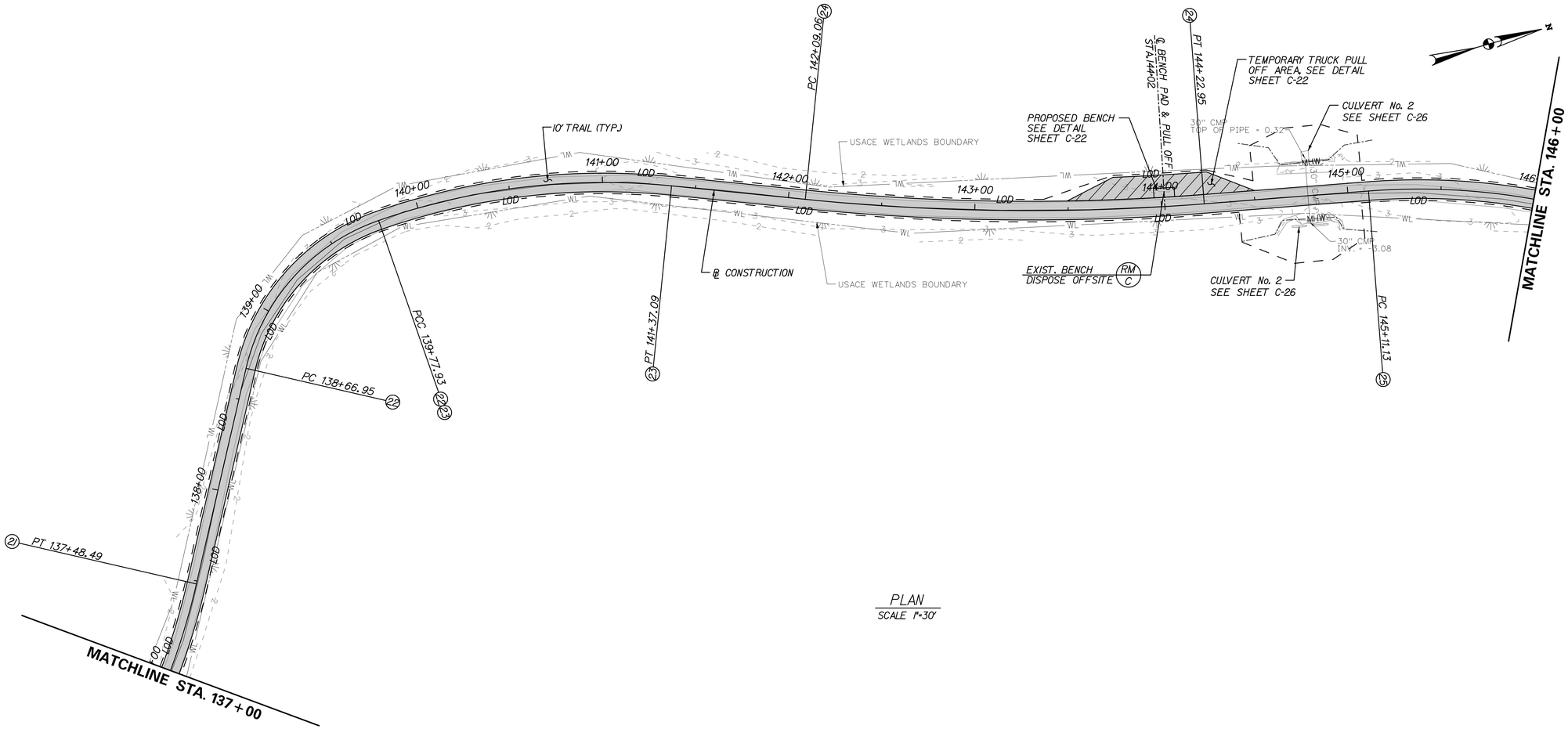

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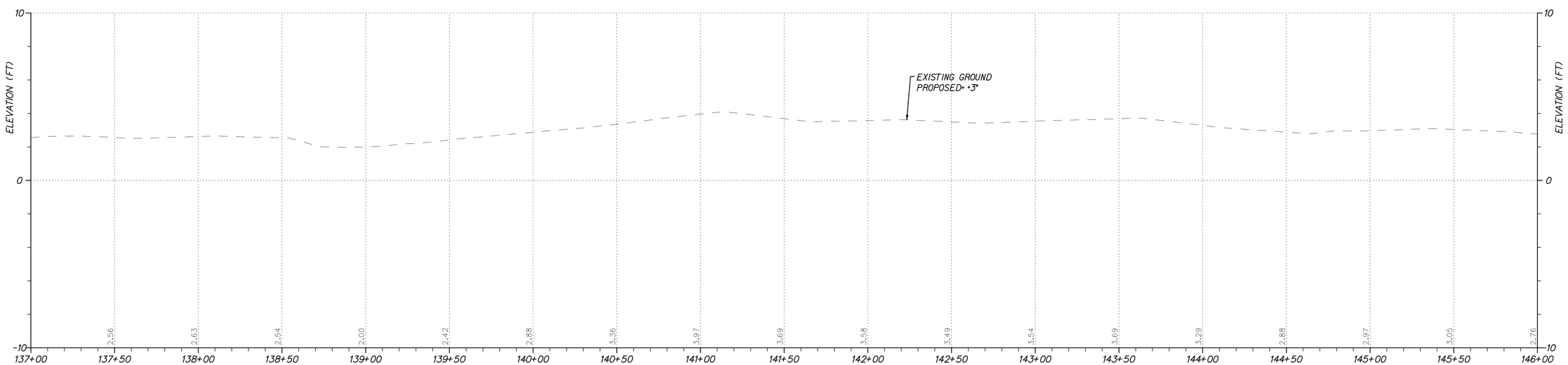

PROPOSED TRAIL PROFILE
HORIZ. 1"=30'
VERT. 1"=3'

DATE:	DESCRIPTION:	BY:
DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

CONSTRUCTION PLANS & PROFILES

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY: RKK
DRAWN BY: RKK
BUILDING NO.: N/A
DATE: 7/3/13
SCALE: AS NOTED
SHEET NO.: C-13
PARKS PROJECT #: CH-41
CONTRACT #: 2013-CH-300

NAOMI RUTH BERGER LICENSED PROFESSIONAL ENGINEER DELAWARE

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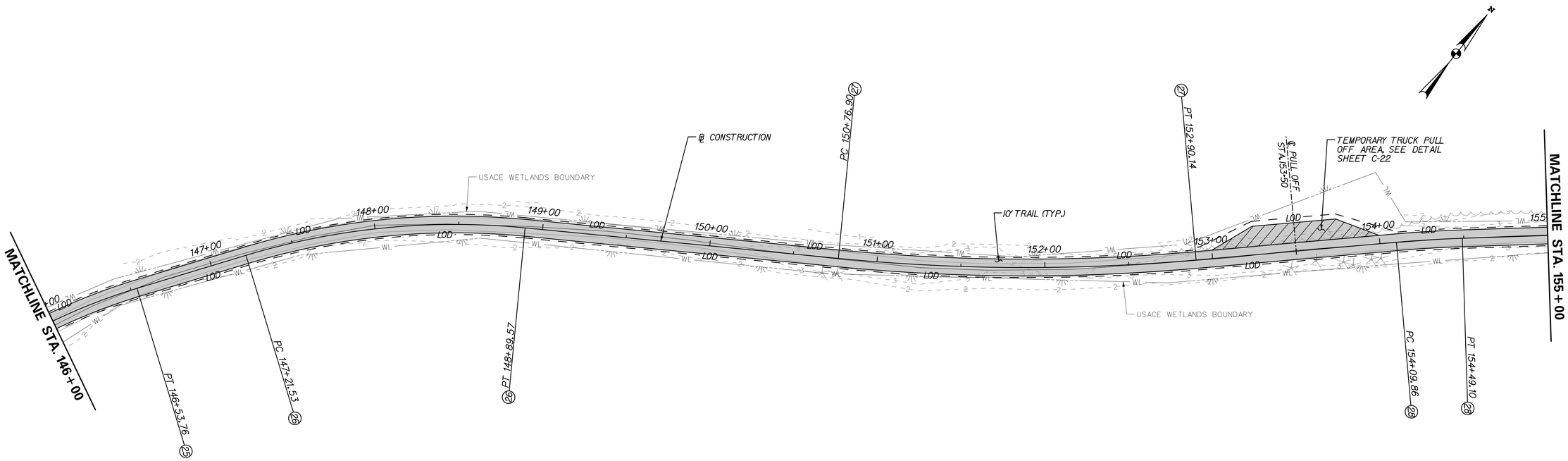

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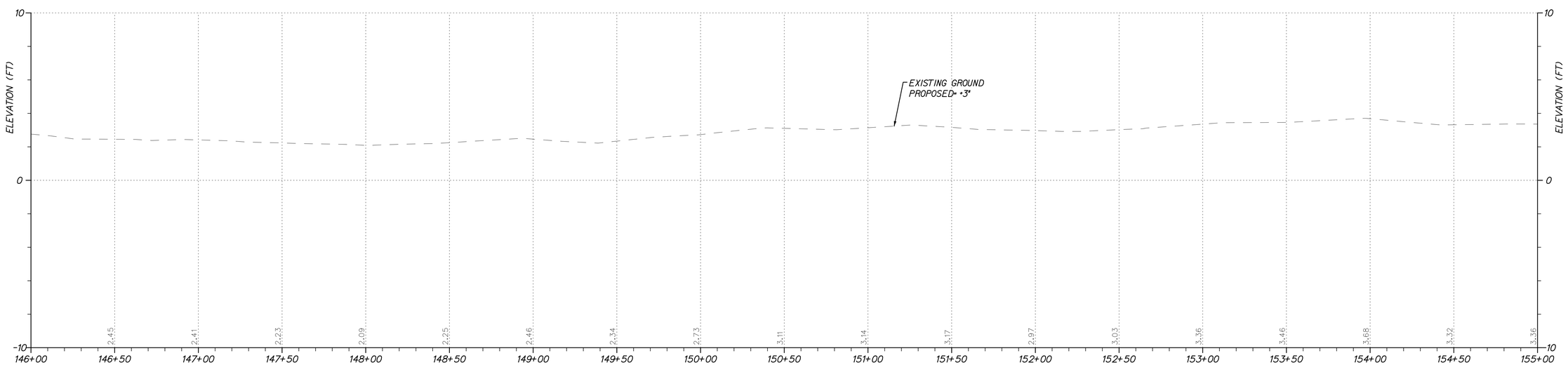

PROPOSED TRAIL PROFILE
HORIZ.1"=30'
VERT.1"=3'

DATE: DESCRIPTION: BY:

DATE: DESCRIPTION: BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

CONSTRUCTION PLANS & PROFILES

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY: RKK

DRAWN BY: RKK

BUILDING NO.: N/A

DATE: 7/3/13

SCALE: AS NOTED

SHEET NO.: C-14

PARKS PROJECT #: CH-41

CONTRACT #: 2013-CH-300

NAOMI RUTH BERRY LICENSED PROFESSIONAL ENGINEER DELAWARE

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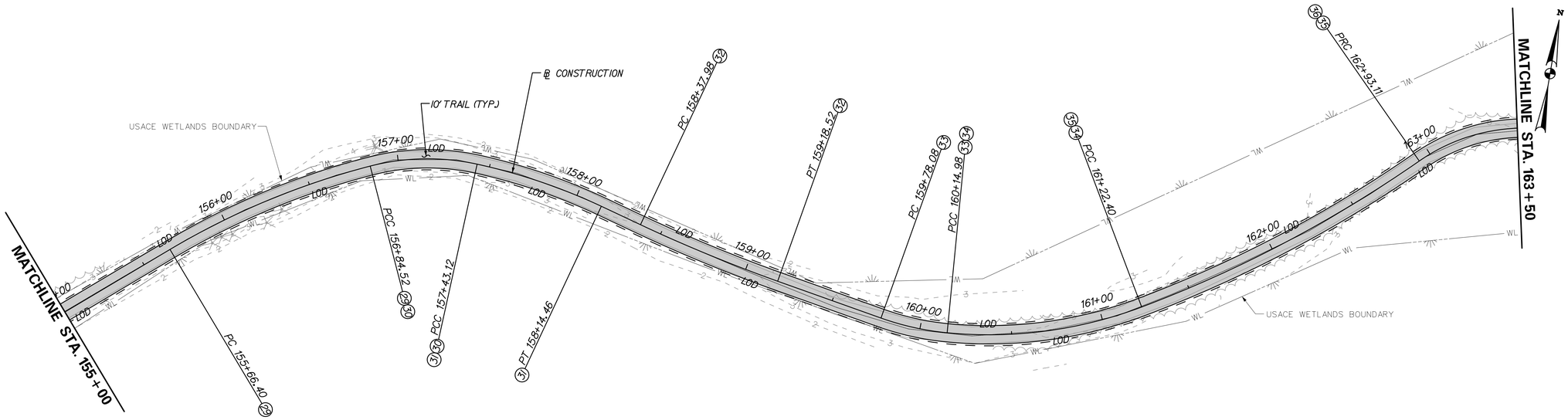

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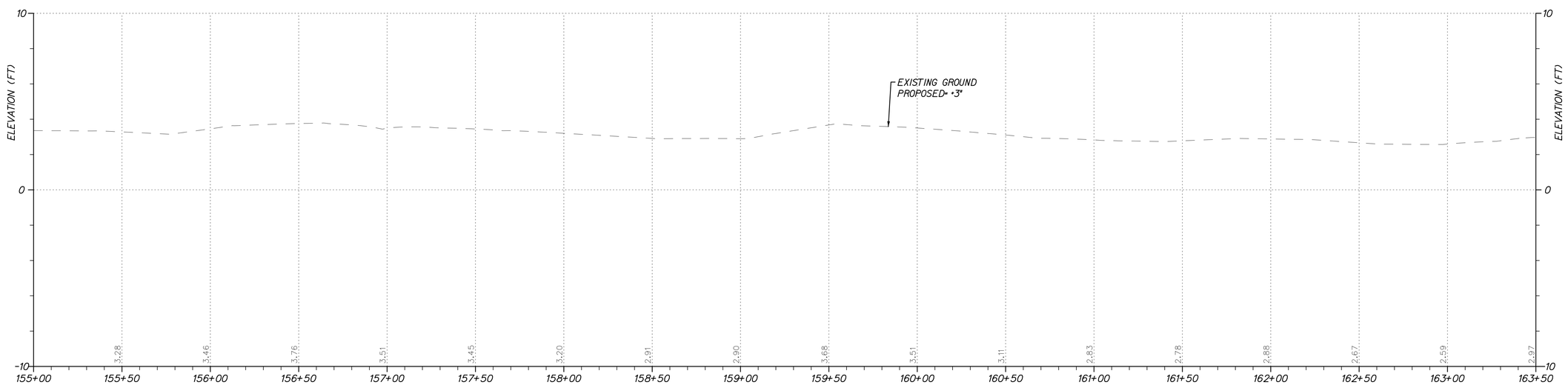

PROPOSED TRAIL PROFILE
HORIZ. 1"=30'
VERT. 1"=3'

DATE:	DESCRIPTION:	BY:
DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

CONSTRUCTION PLANS & PROFILES

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY: RKK
DRAWN BY: RKK
BUILDING NO.: N/A
DATE: 7/3/13
SCALE: AS NOTED
SHEET NO.: C-15
PARKS PROJECT #: CH-41
CONTRACT #: 2013-CH-300

NANCY RUTH BERNARD LICENSED PROFESSIONAL ENGINEER DELAWARE

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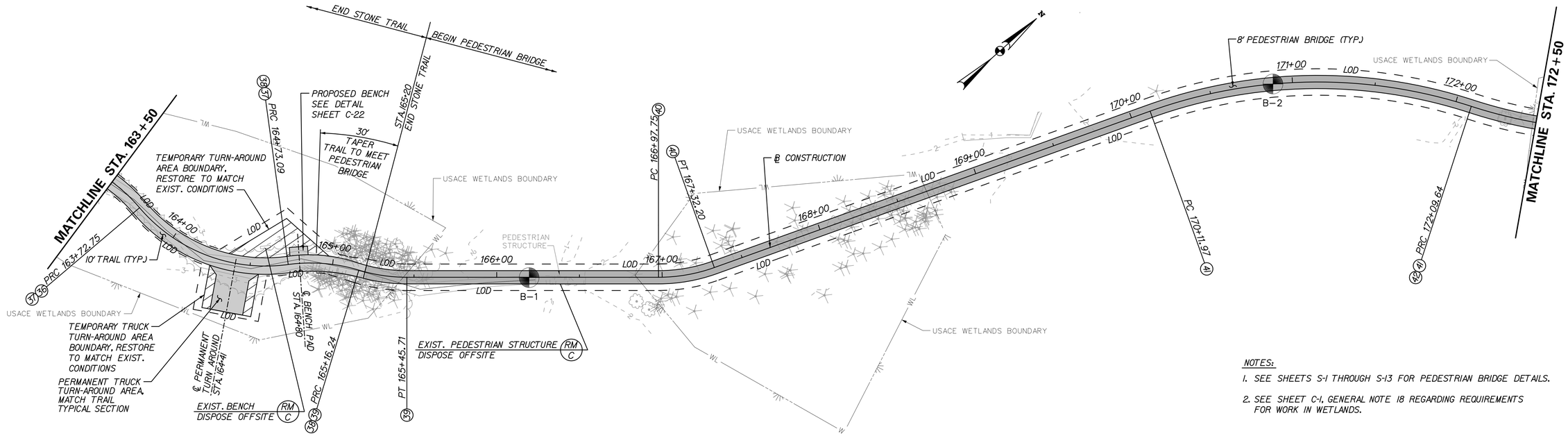

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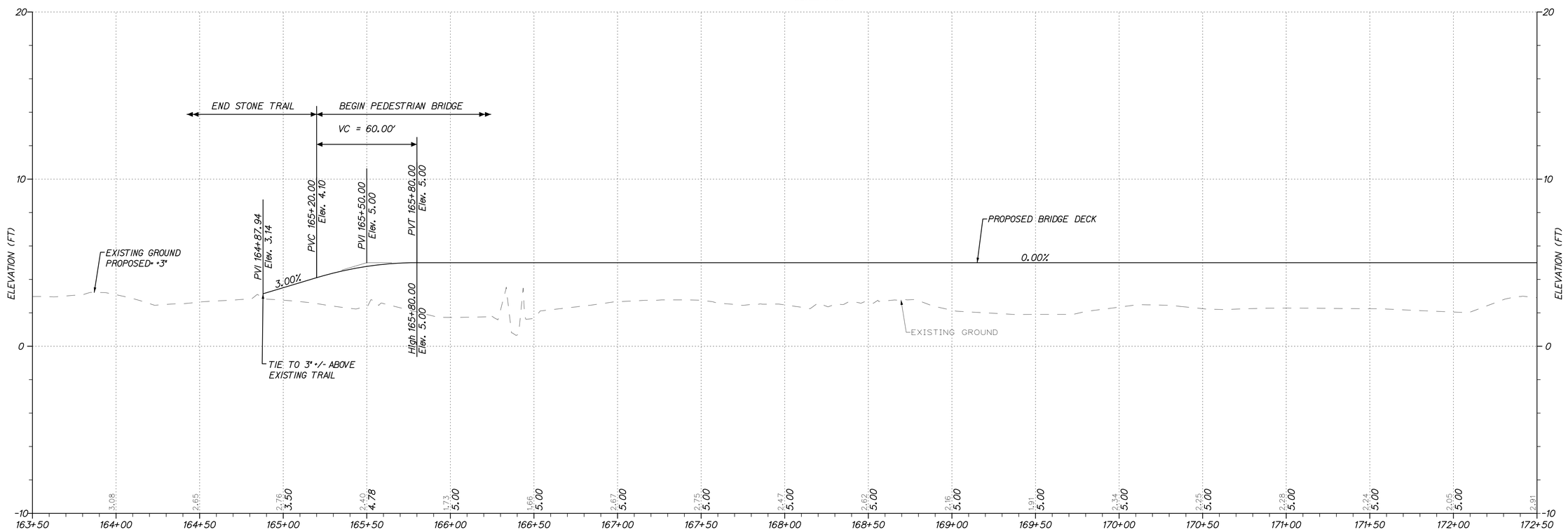

PROPOSED TRAIL PROFILE
HORIZ. 1"=30'
VERT. 1"=3'

DATE: DESCRIPTION: BY:

DATE: DESCRIPTION: BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

CONSTRUCTION PLANS & PROFILES

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY: RKK

DRAWN BY: RKK

BUILDING NO.: N/A

DATE: 7/3/13

SCALE: AS NOTED

SHEET NO.: C-16

PARKS PROJECT #: CH-41

CONTRACT #: 2013-CH-300

NANCY RUTH BERGER LICENSED PROFESSIONAL ENGINEER STATE OF DELAWARE

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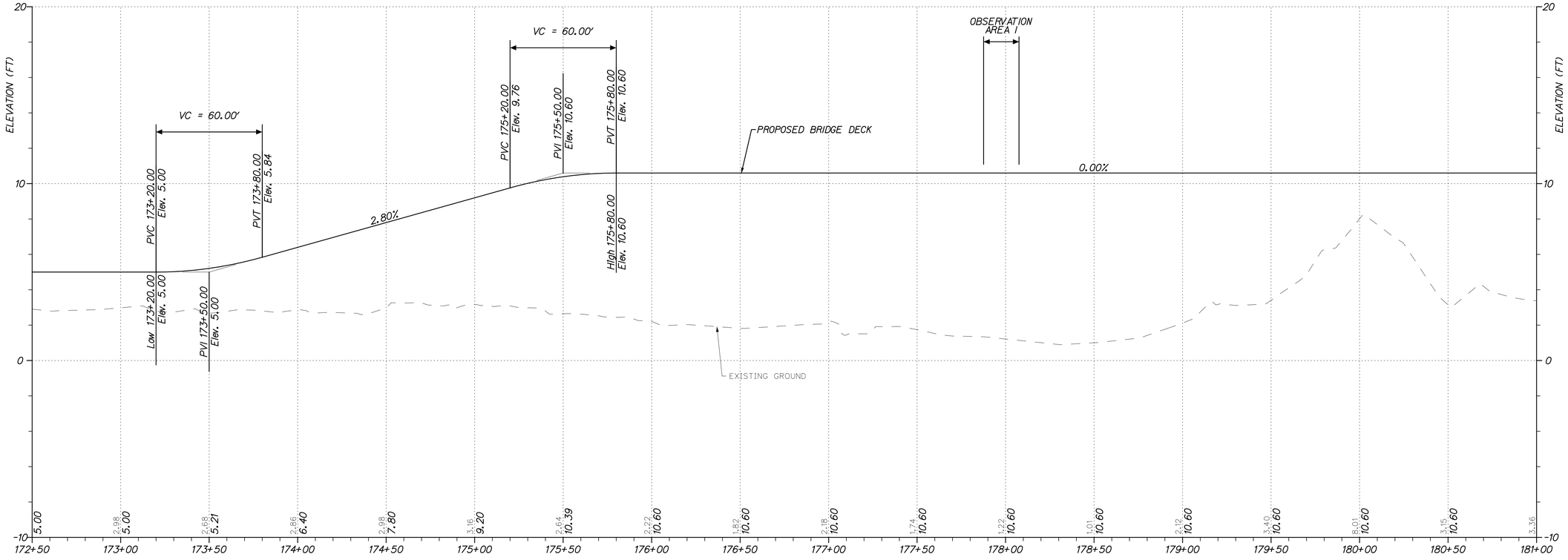
PLAN
SCALE 1"=30'

NOTES:

1. SEE SHEETS S-1 THROUGH S-13 FOR PEDESTRIAN BRIDGE AND OBSERVATION AREA DETAILS.
2. SEE SHEET C-1, GENERAL NOTE 18 REGARDING REQUIREMENTS FOR WORK IN WETLANDS.
3. SEE SHEET C-1, GENERAL NOTE 19 REGARDING REQUIREMENTS FOR RESTRICTIONS IN THE SENSITIVE RESOURCE AREA.



PROPOSED TRAIL PROFILE
HORIZ. 1"=30'
VERT. 1"=3'

DATE:	DESCRIPTION:	BY:
DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

CONSTRUCTION PLANS & PROFILES

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY: RKK
DRAWN BY: RKK
BUILDING NO.: N/A
DATE: 7/3/13
SCALE: AS NOTED
SHEET NO.: C-17
PARKS PROJECT #: CH-41
CONTRACT #: 2013-CH-300

MARY RUTH BERGER LICENSED PROFESSIONAL ENGINEER STATE OF DELAWARE

6/26/2013
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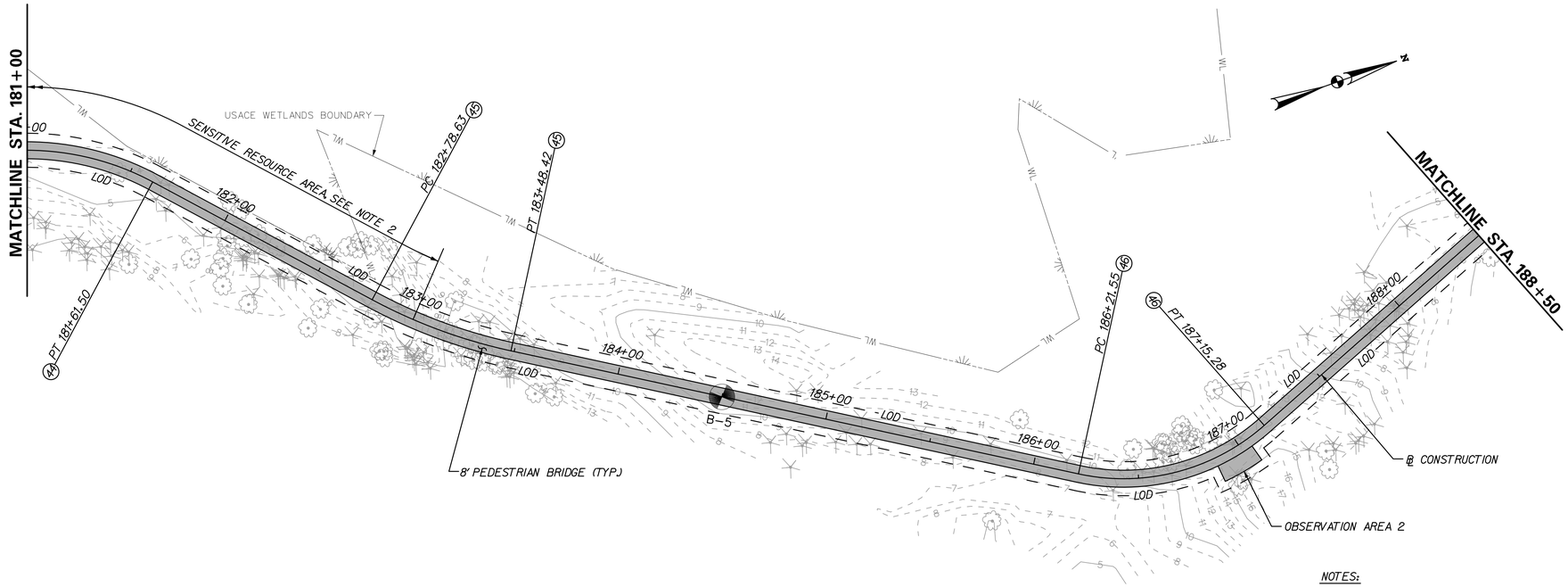
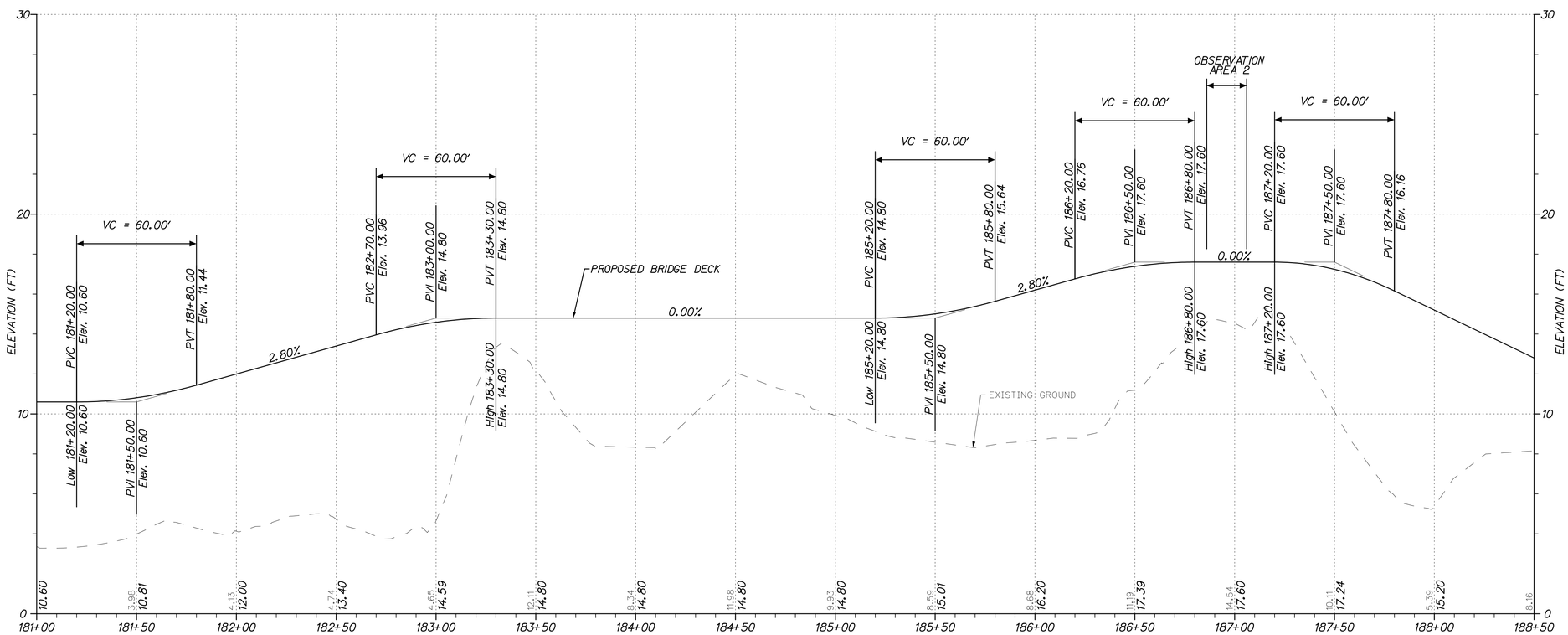


PLAN
SCALE 1"=30'

NOTES:

1. SEE SHEETS S-1 THROUGH S-13 FOR PEDESTRIAN BRIDGE AND OBSERVATION AREA DETAILS.
2. SEE SHEET C-1, GENERAL NOTE 19 REGARDING REQUIREMENTS FOR RESTRICTIONS IN THE SENSITIVE RESOURCE AREA.



PROPOSED TRAIL PROFILE
HORIZ. 1"=30'
VERT. 1"=3'

DATE:	DESCRIPTION:	BY:
DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

CONSTRUCTION PLANS & PROFILES

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY: RKK
DRAWN BY: RKK
BUILDING NO.: N/A
DATE: 7/3/13
SCALE: AS NOTED
SHEET NO.: C-18
PARKS PROJECT #: CH-41
CONTRACT #: 2013-CH-300

NANCY RUTH BERGER
LICENSE NO. 14730
STATE OF DELAWARE
PROFESSIONAL ENGINEER

6/26/2013
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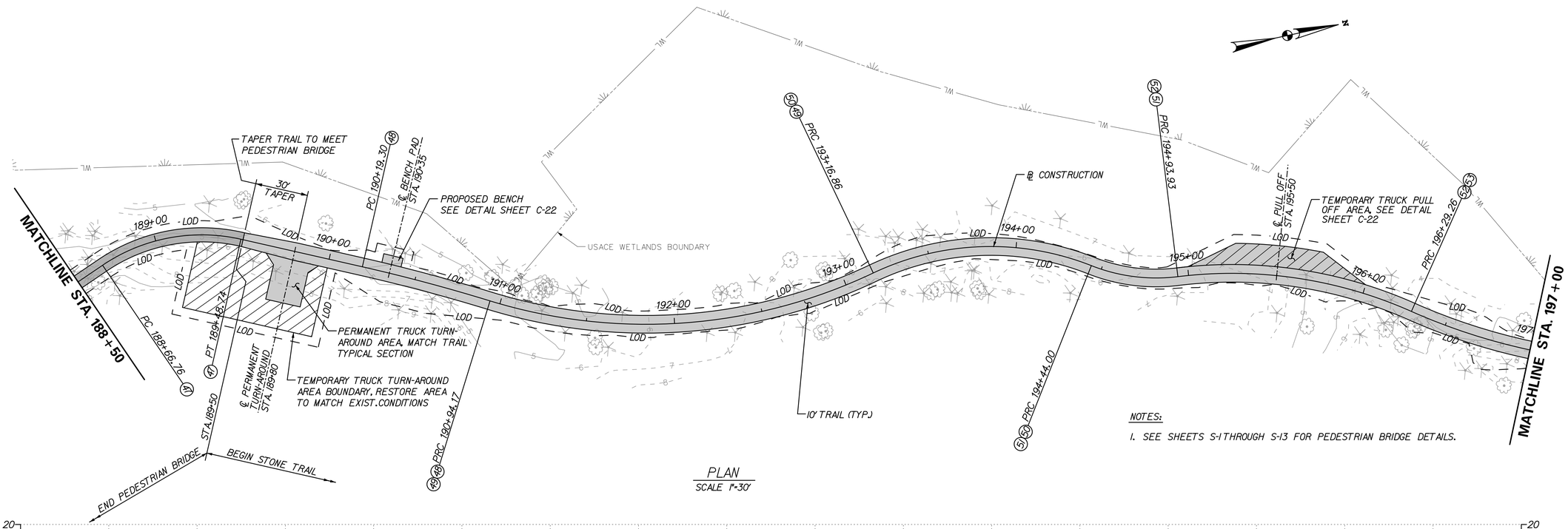
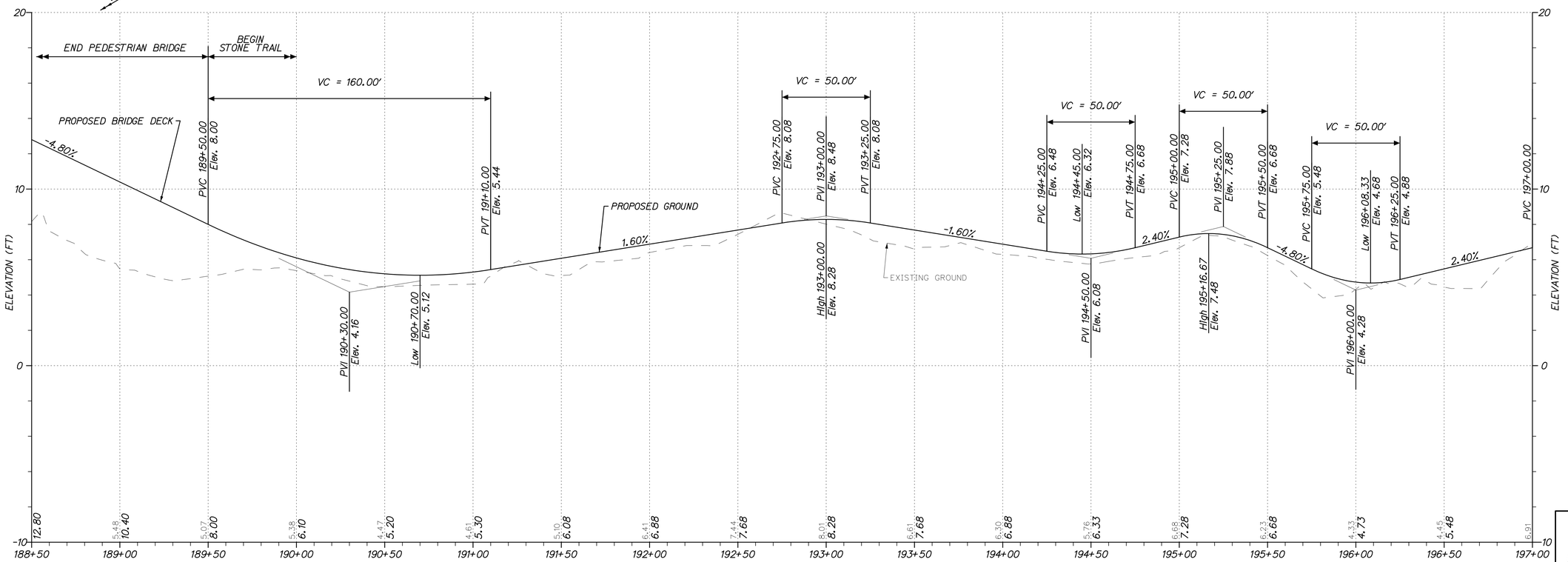


PLAN
SCALE 1"=30'

NOTES:

1. SEE SHEETS S-1 THROUGH S-13 FOR PEDESTRIAN BRIDGE DETAILS.



PROPOSED TRAIL PROFILE
HORIZ. 1"=30'
VERT. 1"=3'

DATE:	DESCRIPTION:	BY:
DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

CONSTRUCTION PLANS & PROFILES

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY: RKK
DRAWN BY: RKK
BUILDING NO.: N/A
DATE: 7/3/13
SCALE: AS NOTED
SHEET NO.: C-19
PARKS PROJECT #: CH-41
CONTRACT #: 2013-CH-300

MARK RUTH BURGESS LICENSED DELAWARE PROFESSIONAL ENGINEER

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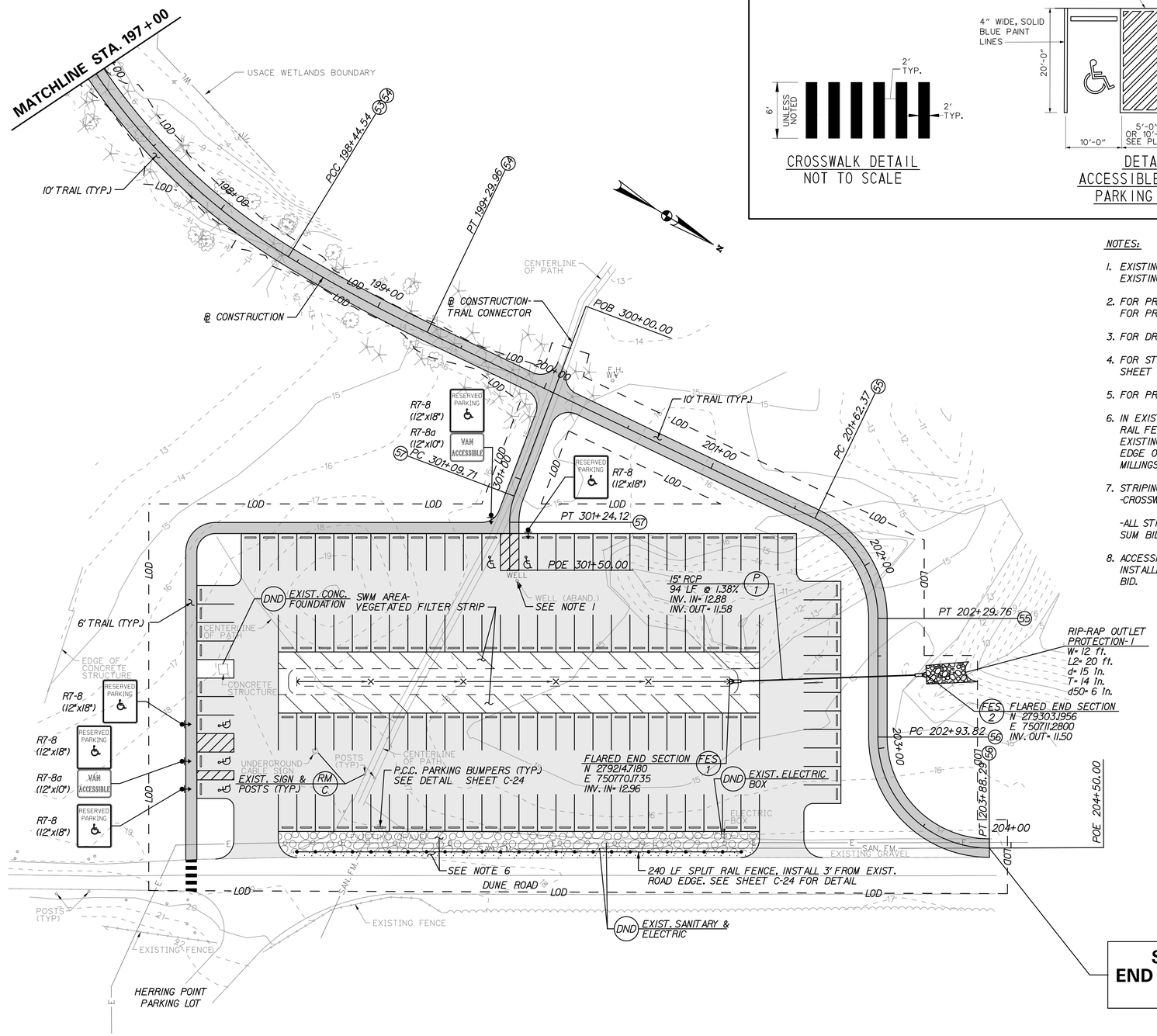

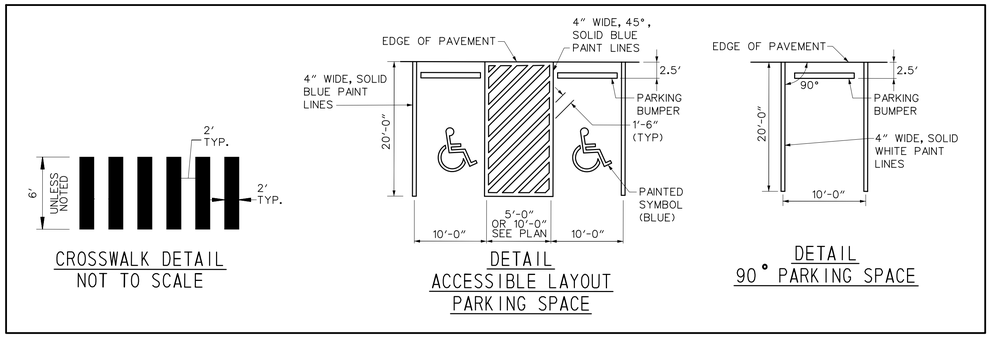

NOTES:

1. EXISTING OBSERVATION/MONITORING WELL ABANDONED TO A DEPTH 4' BELOW EXISTING GROUND UNDER SEPARATE CONTRACT.
2. FOR PROPOSED PARKING LOT GRADING AND DETAILS, SEE SHEET C-28. FOR PROPOSED PARKING LOT STAKEOUT, SEE SHEET C-29.
3. FOR DRAINAGE DETAILS, SEE SHEET C-24.
4. FOR STORMWATER MANAGEMENT AREA DETAILS AND INFORMATION, SEE SHEET SWM-1.
5. FOR PROPOSED TRAIL PROFILE, SEE SHEET C-21.
6. IN EXISTING SHOULDER AREA BETWEEN DUNE ROAD AND PROPOSED SPLIT RAIL FENCE, REMOVE EXISTING MILLINGS AND FILL AREA WITH SAND. IN EXISTING SHOULDER AREA BETWEEN PROPOSED SPLIT RAIL FENCE AND EDGE OF PROPOSED PARKING LOT, SUPPLEMENT EXISTING MILLINGS WITH MILLINGS REMOVED FROM SHOULDER.
7. STRIPING:
   -CROSSWALK STRIPING SHALL BE INCLUDED IN THE BASE BID.
   -ALL STRIPING WITHIN THE PARKING LOT SHALL BE INCLUDED IN THE LUMP SUM BID FOR ADD/ALTERNATE NO. 1.
8. ACCESSIBLE SIGNS AND PARKING BUMPERS SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR AND SHALL BE INCLUDED IN THE BASE BID.

DATE: DESCRIPTION: BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

CONSTRUCTION PLANS & PROFILES

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY:	RKK
DRAWN BY:	RKK
BUILDING NO.:	N/A
DATE:	7/3/13
SCALE:	1"=30'
SHEET NO.:	C-20
PARKS PROJECT #:	CH-41
CONTRACT #:	2013-CH-300

NANCY RUTH BERGER LICENSED PROFESSIONAL ENGINEER DELAWARE

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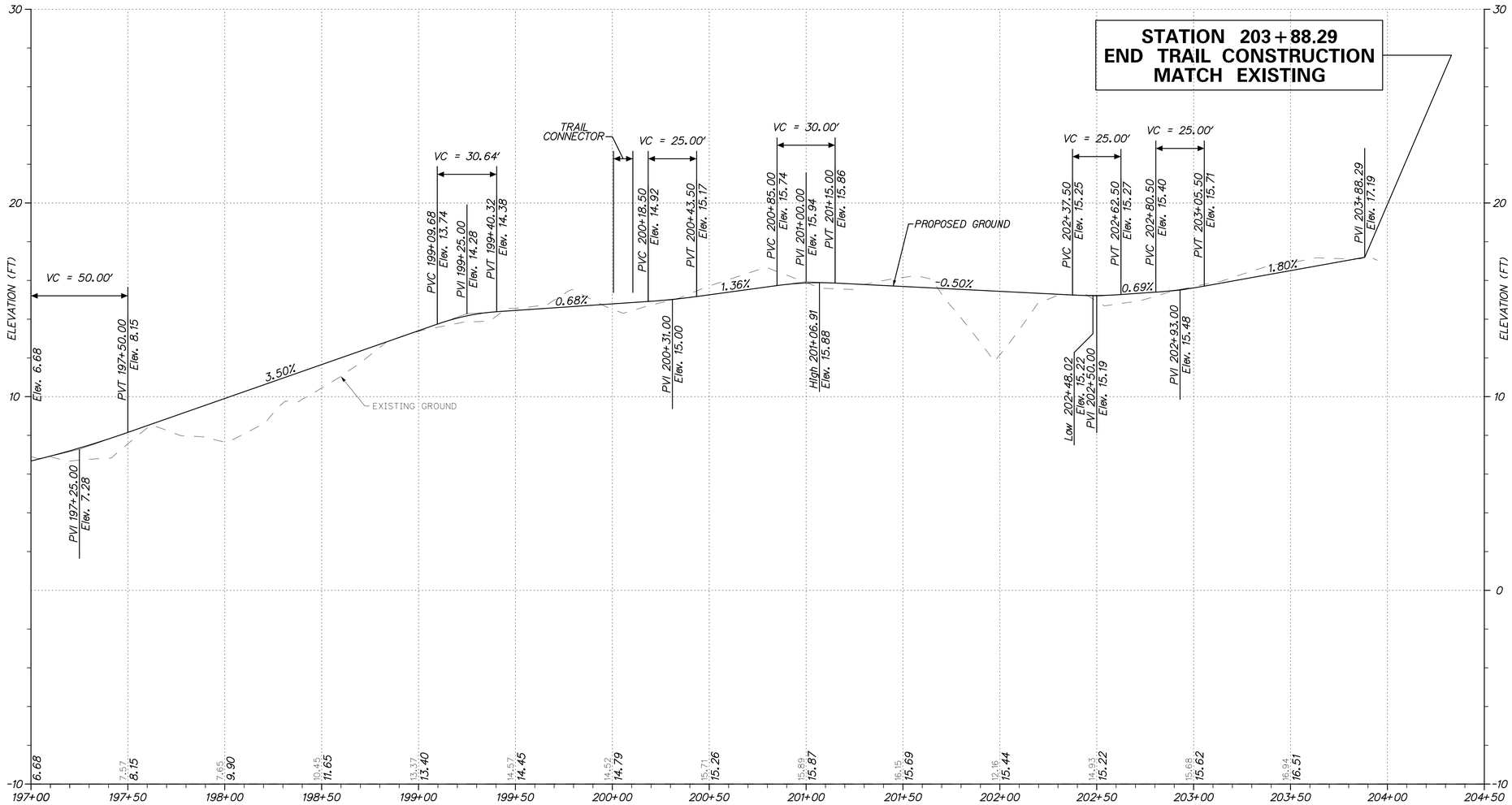

PROPOSED TRAIL PROFILE

HORIZ. 1"=30'
VERT. 1"=3'

DATE:	DESCRIPTION:	BY:
DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

CONSTRUCTION PLANS & PROFILES

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY:	RKK
DRAWN BY:	RKK
BUILDING NO.:	N/A
DATE:	7/3/13
SCALE:	AS NOTED
SHEET NO.:	C-21
PARKS PROJECT #:	CH-41
CONTRACT #:	2013-CH-300

NANCY RUTH BERGER
LICENSED
No. 24736
STATE OF DELAWARE
PROFESSIONAL ENGINEER

6/26/2013
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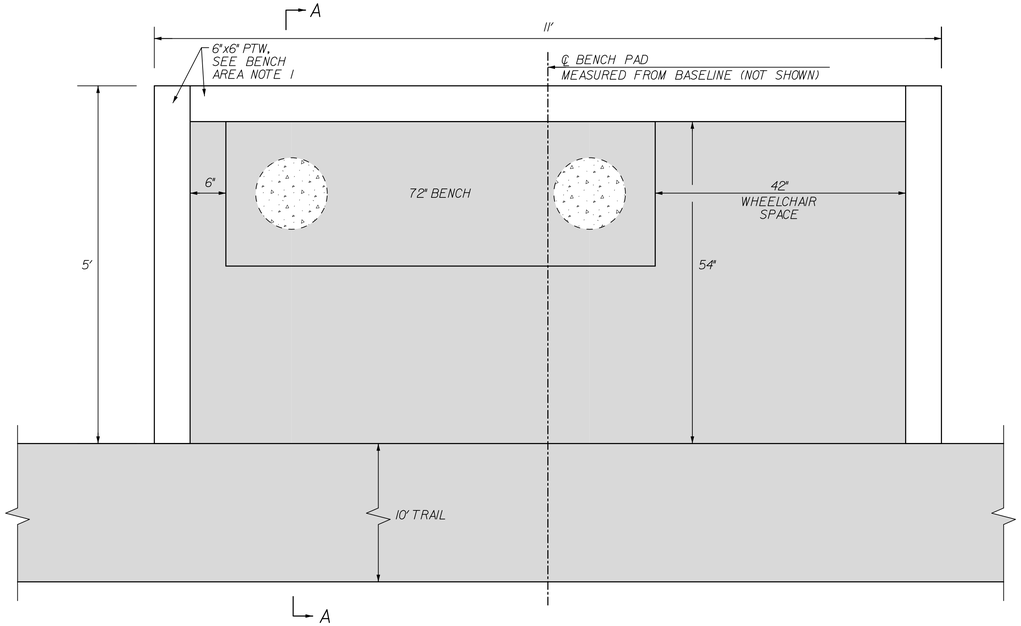
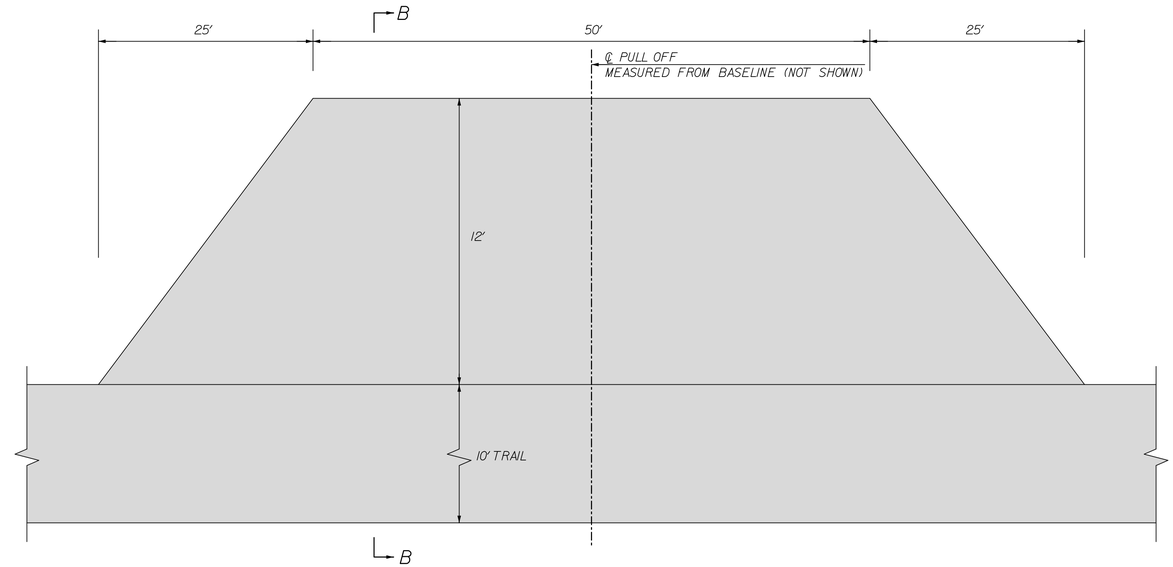
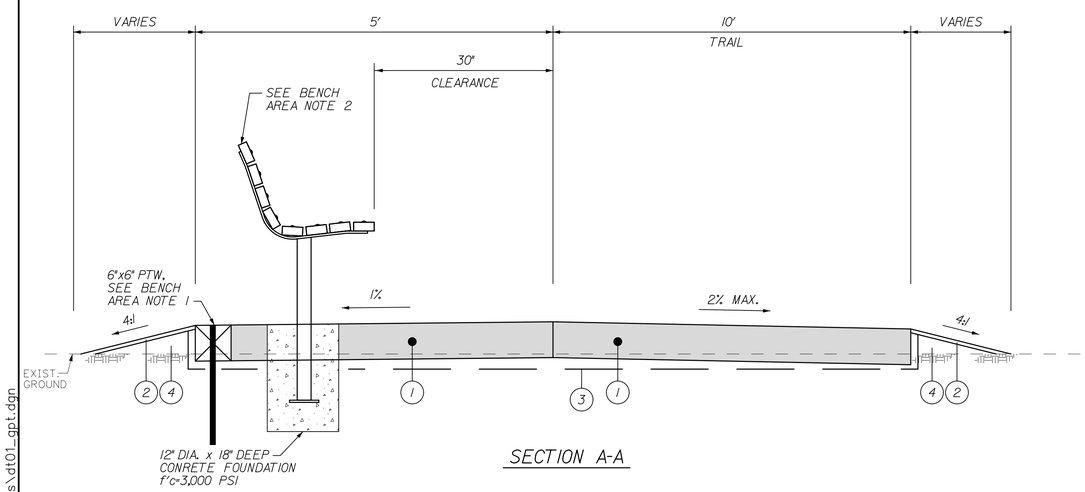


PLAN



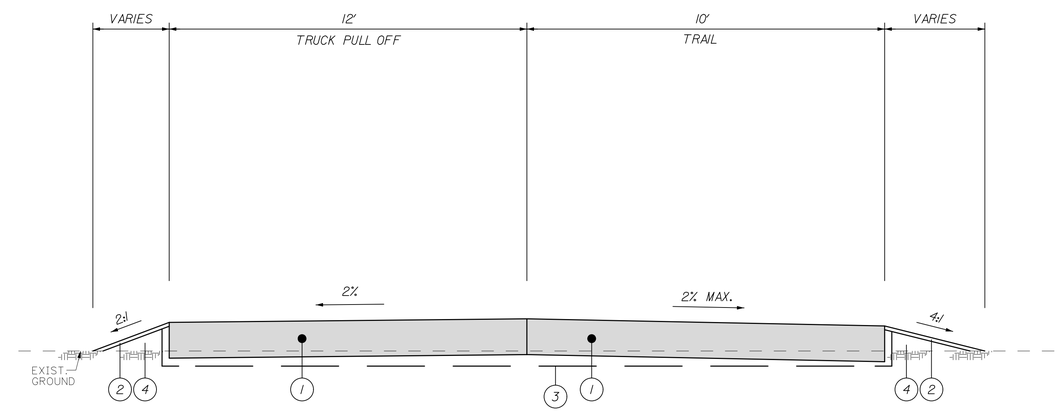
PLAN



SECTION A-A

PROPOSED BENCH AREA

NTS



SECTION B-B

TEMPORARY TRUCK PULL OFF AREA

NTS

BENCH AREA NOTES:

1. 6"X6" TIMBER SHALL BE PRESSURE TREATED WOOD WITH CHROMATED COPPER ARSENATE (CCA) TREATMENT. MINIMUM RETENTION OF 2.5 PCF. TIMBERS SHALL BE INSTALLED WITH 2-#4 REBARS, 24" LONG ANCHOR PINS SET FLUSH WITH TOP OF TIMBER. A MINIMUM OF 2 REBAR PINS SHALL BE INSTALLED PER TIMBER, LOCATED 12" FROM EACH END.
2. BENCHES SHALL BE HOMESTEAD SERIES, MODEL # 8, 6' LENGTH, IN-GROUND MOUNTED. SLATS: 2ND SITE SYSTEMS REINFORCED RECYCLED PLASTIC, COLOR GRAY. STEEL LEGS AND BRACES COLOR BRONZE (HOT-DIP GALVANIZE BEFORE POWDER COATING). MANUFACTURED BY VICTOR STANLEY, INC. TELEPHONE: 301-855-8300.
3. THE CONTRACTOR SHALL FIELD STAKEOUT LOCATION OF EACH BENCH FOR OWNER'S APPROVAL PRIOR TO INSTALLATION.
4. THE DETAILS SHOWN ON THIS SHEET APPLY ONLY TO THE BENCHES LOCATED INSIDE OF THE TRAIL CONSTRUCTION (STA.104+00.00 TO STA.203+88.29).

TEMPORARY TRUCK PULL-OFF AREA NOTES:

1. AT COMPLETION OF PROJECT, TEMPORARY TRUCK PULL OFF AREAS SHALL BE REMOVED.
2. DISTURBED AREAS SHALL BE RESTORED TO CONFORM TO THE SURROUNDING AREA TO THE SATISFACTION OF THE OWNER.

LEGEND

1. DELDOT-GRADED AGGREGATE BASE COURSE (TYPE B), TOPPED AND CHOKED WITH 1-1/2" STONE DUST ROLLED INTO GRADED AGGREGATE
2. STABILIZATION OF FILLED, REGRADED, OR OTHERWISE DISTURBED AREAS SHALL BE CONSISTENT WITH PRECONSTRUCTION GROUND COVER AS DIRECTED BY THE OWNER. SEE SHEET C-7 FOR STABILIZATION METHODS.
3. GEOTEXTILE SEPARATION FABRIC (AASHTO M 288, CLASS 2)
4. FILL WITH EXCAVATED MATERIAL

DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

CONSTRUCTION DETAILS

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY:	RKK
DRAWN BY:	RKK
BUILDING NO.:	N/A
DATE:	7/3/13
SCALE:	AS NOTED
SHEET NO.:	C-22
PARKS PROJECT #:	CH-41
CONTRACT #:	2013-CH-300

NANCY RUTH BERGER LICENSED PROFESSIONAL ENGINEER DELAWARE

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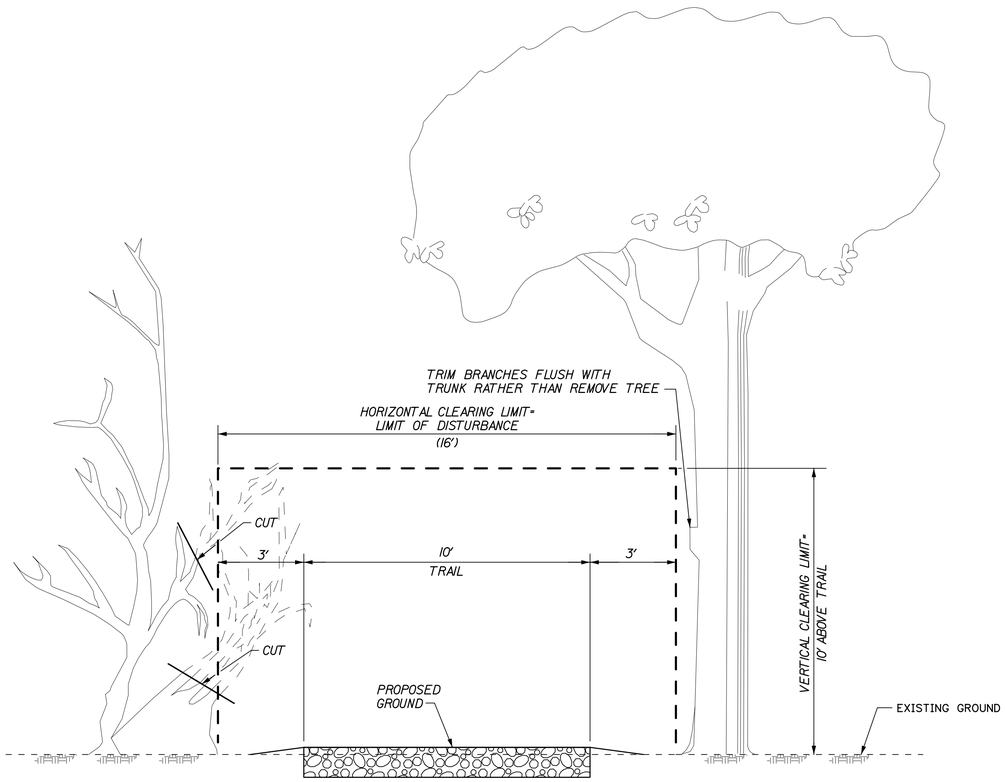
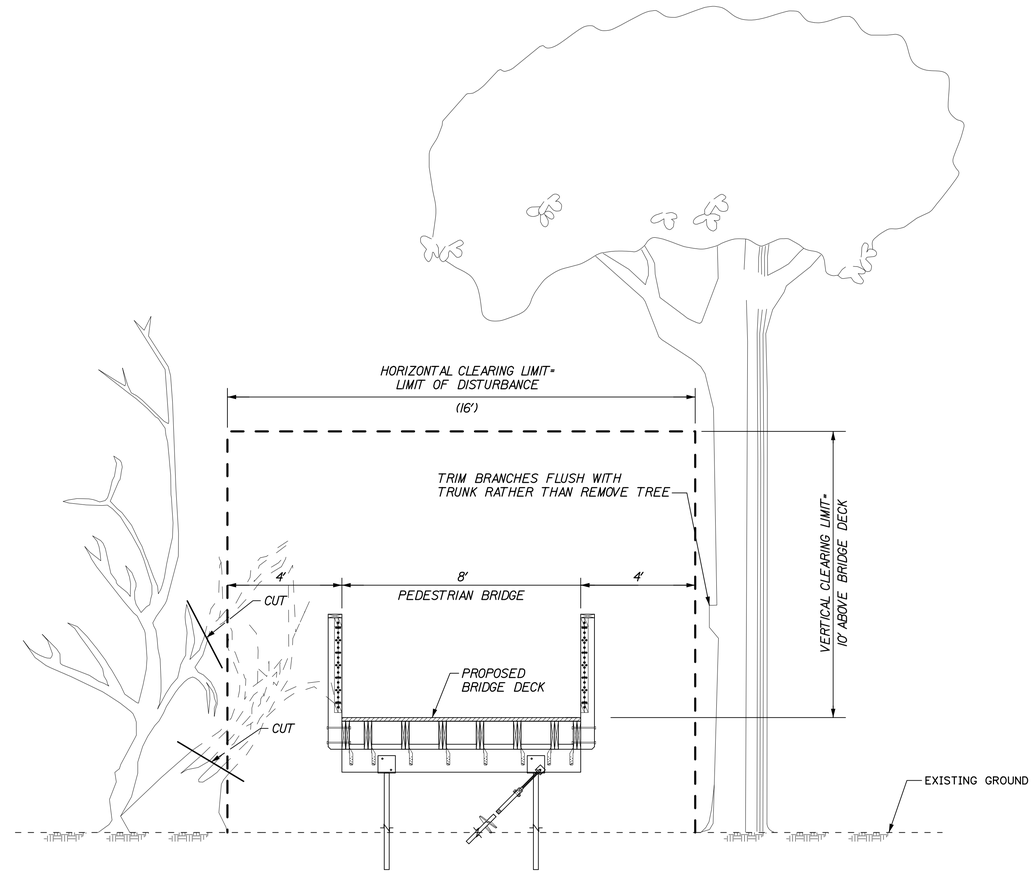


AT-GRADE TRAIL



PEDESTRIAN BRIDGE

NOTE:
WITHIN THE LIMIT OF THE PEDESTRIAN BRIDGE, THE CONTRACTOR SHALL REMOVE LARGE SHRUBS AND YOUNG PINES WITHIN THE CLEARING LIMITS TO ELIMINATE POTENTIAL FIRE HAZARD.

CLEARING LIMITS

CLEARING AND PRUNING NOTES:

1. IN AREAS WHERE TREES AND/OR SHRUBS WILL BE OVERHANGING OR ENCROACHING ON THE PROPOSED TRAIL OR PEDESTRIAN BRIDGE, PRUNING MAY BE NECESSARY TO ACHIEVE A VERTICAL AND/OR HORIZONTAL CLEAR SPACE AS SHOWN ON THE DETAILS ON THIS SHEET. THE CONTRACTOR SHALL PRUNE EXISTING TREE AND SHRUB BRANCHES IN ACCORDANCE WITH THE INTERNATIONAL SOCIETY OF ARBORCULTURE (I.S.A) STANDARDS. THE INTENT OF THIS WORK IS TO NOT REMOVE LARGE TREES. THE CONTRACTOR SHALL COORDINATE AN ON-SITE MEETING WITH THE OWNER A MINIMUM OF 7 DAYS PRIOR TO THE PRUNING OPERATION. THE OWNER AND CONTRACTOR SHALL IDENTIFY AND CLEARLY MARK ANY TREE TO BE REMOVED AND REVIEW PRUNING PROCEDURES. IF IN THE OPINION OF THE OWNER, THE INDICATED PRUNING WILL BE EXCESSIVE AND HAVE AN UNACCEPTABLE IMPACT ON THE APPEARANCE OR VIABILITY OF THE TREE, THE OWNER MAY DIRECT THE CONTRACTOR TO REMOVE AND DISPOSE OF THE TREE, IN LIEU OF PRUNING, AT NO ADDITIONAL COST TO THE OWNER.

2. CLEARING OPERATIONS SHALL NOT INCLUDE GRUBBING. CLEARED VEGETATION SHALL BE CUT FLUSH WITH THE GROUND AND THERE SHALL BE NO DISTURBANCE OF THE ROOT MAT.

3. ALL MATERIAL RESULTING FROM PRUNING AND REMOVAL OF TREES, SHRUBS, AND OTHER VEGETATION SHALL BE DISPOSED OF OFFSITE BY THE CONTRACTOR.

4. ALL TREE REMOVAL AND PRUNING NECESSARY FOR CONSTRUCTION, AS DIRECTED BY THE OWNER, SHALL BE CONSIDERED INCIDENTAL TO THE CONTRACT AND SHALL BE DONE AT NO ADDITIONAL COST TO THE OWNER.

5. THE LIMITS OF CLEARING AND DISTURBANCE SHOWN ARE NOT INTENDED TO RESTRICT OR OBSTRUCT PROPER PRUNING PROCEDURES IN ACCORDANCE WITH THE STANDARDS REFERENCED IN NOTE 1.

DATE:	DESCRIPTION:	BY:
DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

CONSTRUCTION DETAILS

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY: RKK
DRAWN BY: RKK
BUILDING NO.: N/A
DATE: 7/3/13
SCALE: NOT TO SCALE
SHEET NO.: C-23
PARKS PROJECT #: CH-41
CONTRACT #: 2013-CH-300

NANCY RUTH BERGERON LICENSED DELAWARE PROFESSIONAL ENGINEER

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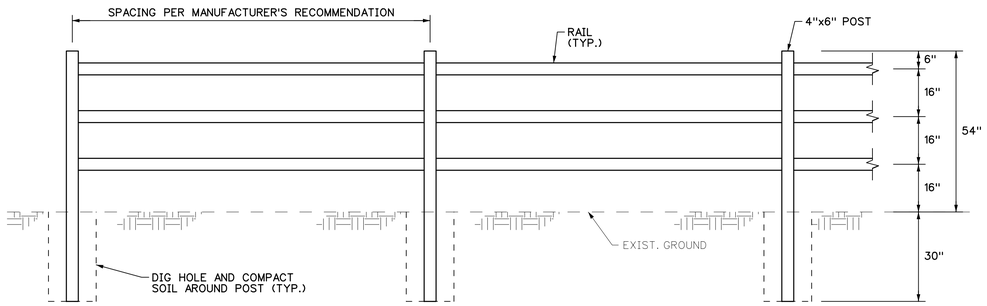


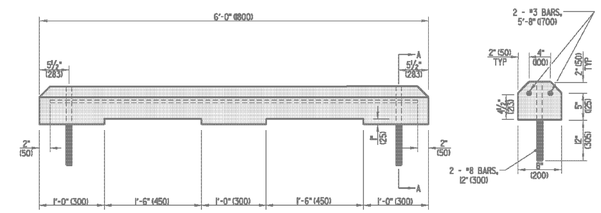
SPLIT RAIL FENCE NOTES:

1. SPLIT RAIL FENCE SHALL BE A 3 RAIL SYSTEM.
2. ALL WOOD SHALL BE PRESSURE TREATED WOOD WITH ACQ TREATMENT:
   - POST SHALL HAVE A MINIMUM RETENTION OF 0.40 PCF
   - RAIL SHALL HAVE A MINIMUM RETENTION OF 0.25 PCF
3. POST DIMENSIONS SHALL BE APPROXIMATELY 4"x6"x84".
4. RAILS SHALL BE TRIANGULAR WITH AN AVERAGE GIRTH OF 12-13".
5. POSTS SHALL BE EMBEDDED 30". THE HOLE SHALL BE BACKFILLED WITH THE ORIGINAL SOIL AND FIRMLY COMPACTED AROUND THE POST.

SPLIT RAIL FENCE

N.T.S.

SCALE : N.T.S.

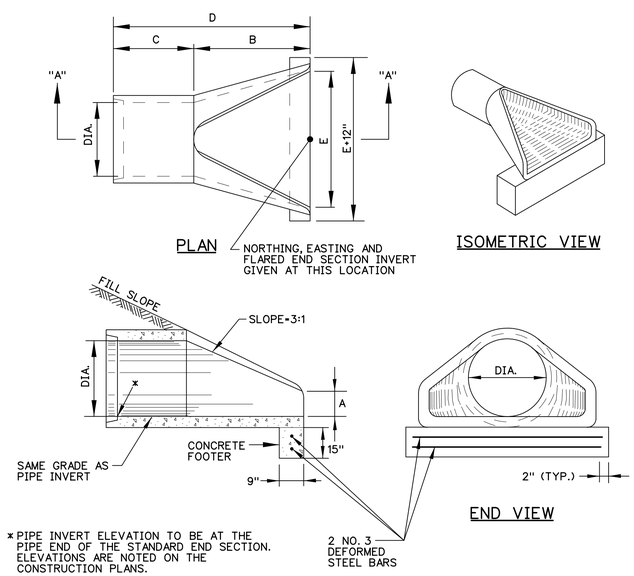


ELEVATION

SECTION A-A

DELAWARE DEPARTMENT OF TRANSPORTATION	P.C.C. PARKING BUMPER			APPROVED CHIEF ENGINEER 10/24/07 DATE
	STANDARD NO. M-8 (2007)	SHT. 1 OF 1		RECOMMENDED DESIGN ENGINEER 10/23/07 DATE

08/01/2007



SECTION A-A

DIAMETER	A	B	C	D	E
15"	6"	2'-3"	3'-10"	6'-1"	2'-6"
18"	9"	2'-3"	3'-10"	6'-1"	3'-0"

CONCRETE FLARED END SECTION

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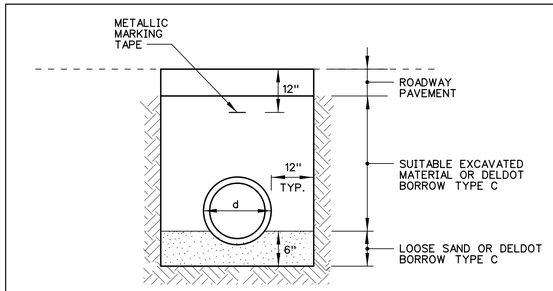

PIPE TRENCH NOTES:

1. EXCAVATION AND BACKFILL SHALL BE IN ACCORDANCE WITH SECTION 208.
2. THE ENGINEER SHALL DETERMINE WHAT PORTION, IF ANY, OF THE EXCAVATED MATERIAL IS SUITABLE FOR BORROW TYPE C OR TYPE F.
3. COMPACTION WITHIN EXISTING OR PROPOSED PAVEMENT AND SHOULDER AREAS SHALL MEET OR EXCEED 95%. ALL OTHER AREAS SHALL BE 90% OR MORE.
4. ALL DIMENSIONS ARE TO THE OUTSIDE WALL OF PIPES.
5. WHERE A STEEL PLATE IS USED WITH A PIPE TRENCH DETAIL, THE LIMITS OF HOT-MIX, TYPE C, PATCHING SHALL BE MODIFIED AS SHOWN ON THE STEEL PLATE DETAIL.
6. FOR INSTALLATION OF SPARE LIGHTING CONDUIT FOR FUTURE USE, INSTALL MARKING TAPE A MINIMUM OF 12" BENEATH FINISHED GRADE. PAYMENT TO BE INCIDENTAL TO THE LIGHTING CONDUIT ITEM BEING INSTALLED.

PIPE TRENCH DETAIL FOR PAVEMENT AREAS

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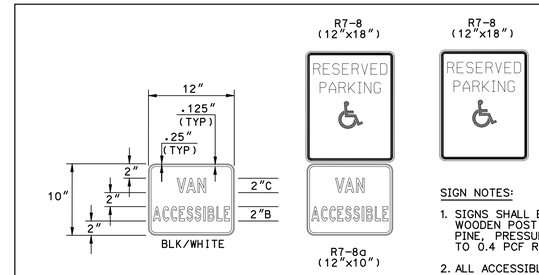

SIGN NOTES:

1. SIGNS SHALL BE MOUNTED ON 4"x4" WOODEN POST OF SOUTHERN YELLOW PINE, PRESSURE TREATED WITH ACQ TO 0.4 PCF RETENTION.
2. ALL ACCESSIBLE SIGNS SHALL BE 60" MINIMUM ABOVE THE GROUND SURFACE MEASURED TO THE BOTTOM OF THE SIGN.

ACCESSIBLE SPACE SIGNING

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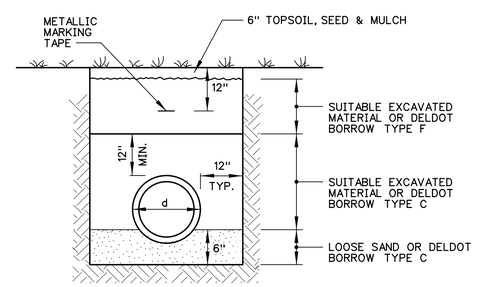

PIPE TRENCH DETAIL FOR GRADED AREAS

N.T.S.

DATE:	DESCRIPTION:	BY:
DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK GORDONS POND TRAIL IMPROVEMENTS

CONSTRUCTION DETAILS

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY:	RKK
DRAWN BY:	RKK
BUILDING NO.:	N/A
DATE:	7/3/13
SCALE:	NOT TO SCALE
SHEET NO.:	C-24
PARKS PROJECT #:	CH-41
CONTRACT #:	2013-CH-300

NANCY RUTH BERGER LICENSED PROFESSIONAL ENGINEER STATE OF DELAWARE

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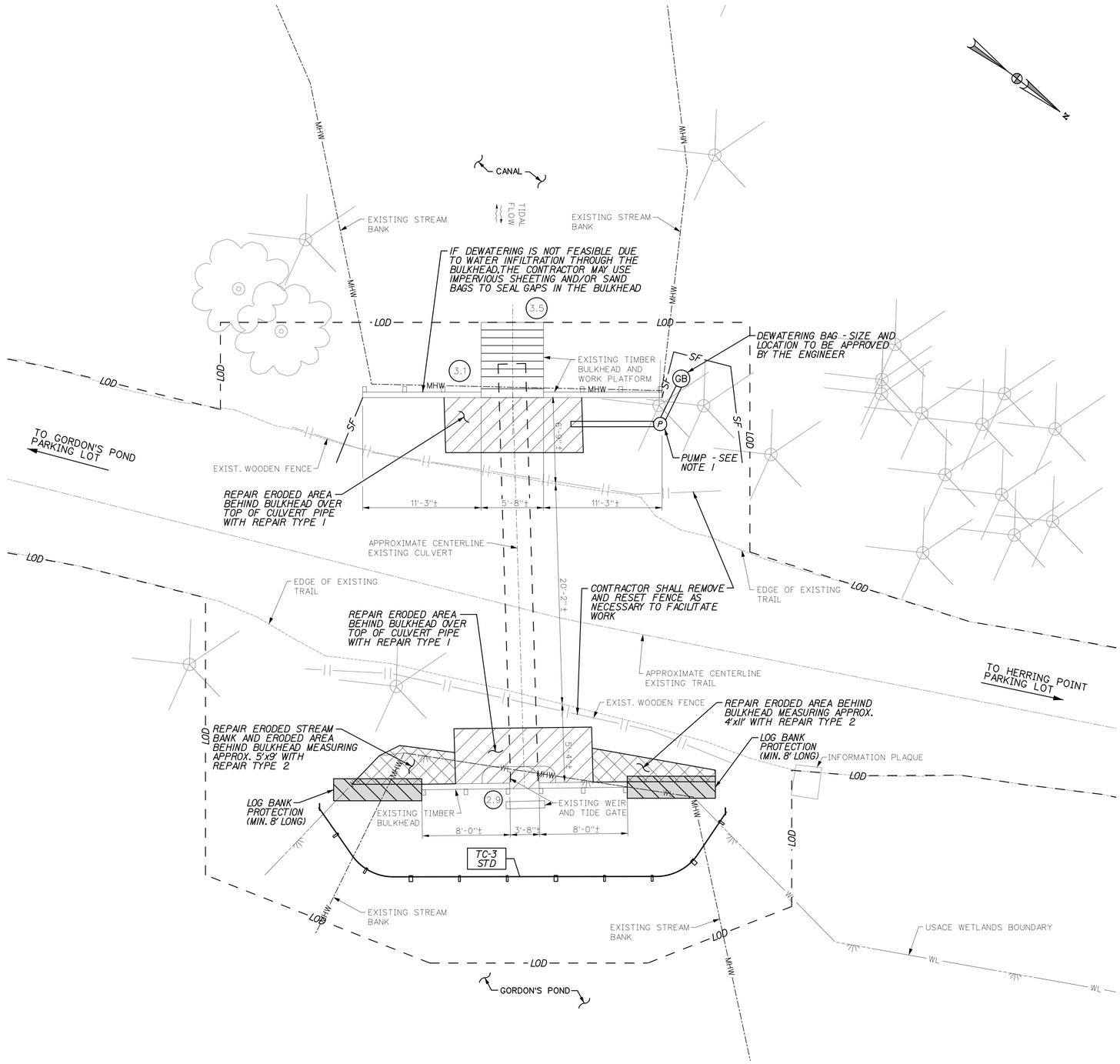

LEGEND

	REPAIR TYPE 1	5.4	STREAM DEPTH (FT.) AS MEASURED IN FIELD ON OCTOBER 17, 2012.
	REPAIR TYPE 2		LOG BANK PROTECTION
— LOD —	LIMIT OF DISTURBANCE	TC-3 STD	TURBIDITY CURTAIN
WL	USACE WETLAND BOUNDARY	GB	GEOTEXTILE DEWATERING BAG
MHW	MEAN HIGH WATER	P	PUMP

NOTES:

1. SIZE AND LOCATION OF THE WATER PUMP TO BE DETERMINED BY THE CONTRACTOR.
2. THE DISCHARGE FROM ANY CONSTRUCTION DEWATERING AREA SHALL BE PASSED THROUGH AN APPROVED SEDIMENT CONTROL DEVICE. THIS DEVICE MAY BE BYPASSED IF THE WATER BEING PUMPED IS CLEAR AND THERE IS A STABILIZED OUTFALL. THE ENGINEER SHALL BE THE SOLE JUDGE IF THE SEDIMENT CONTROL DEVICE CAN BE BYPASSED.
3. NO HEAVY EQUIPMENT SHALL BE USED WITHIN THE AREA OF THE STREAM OR FLOODPLAIN DUE TO THE PRESENCE OF ADJACENT WETLANDS.
4. THESE PLANS ARE BASED ON INSPECTION OF THE STRUCTURE ON OCTOBER 17, 2012 AND FIELD SURVEY CONDUCTED ON JANUARY 9, 2013. THE EXTENT OF DEFECTS TO BE REPAIRED MAY HAVE INCREASED SINCE THAT TIME. THE CONTRACTOR SHALL VERIFY THE EXTENT OF REPAIR REQUIRED IN THE FIELD PRIOR TO BID.
5. FOR REPAIR AND LOG BANK PROTECTION DETAILS, SEE SHEET C-27.
6. CONTRACTOR SHALL MINIMIZE DISTURBANCE TO ADJACENT CHANNEL BANKS DURING TRENCHING OPERATION FOR INSTALLATION OF LOG BANK PROTECTION.
7. DISTURBED AREAS IN FRONT OF LOG BANK PROTECTION SHALL BE BACKFILLED WITH NATURAL MATERIAL AND COMPACTED TO PRE-EXISTING CONTOURS. DISTURBED AREA SHALL BE SEEDED AND COVERED WITH SOIL STABILIZATION MATTING SSM-III (NORTH AMERICAN GREEN SC150BN OR APPROVED EQUAL).
8. CONTRACTOR MAY COMPLETE PHASED WORK IN CONCURRENT OR REVERSE ORDER.

SEQUENCE OF CONSTRUCTION:

1. NOTIFY DNREC SEDIMENT & STORMWATER MANAGEMENT PROGRAM FIVE (5) DAYS PRIOR TO COMMENCING WORK.

PHASE I - CANAL SIDE

2. INSTALL SILT FENCE.
3. INSTALL DEWATERING DEVICES AT LOCATIONS SPECIFIED BY THE ENGINEER.
4. THE CONTRACTOR SHALL ENSURE THAT A REASONABLY DRY WORK AREA IS CONTINUOUSLY MAINTAINED DURING CONSTRUCTION OF THE PROJECT OR THAT EXCESS SEDIMENT IS CONTAINED WITHIN THE LIMIT OF DISTURBANCE.
5. PLACE PUMP, HOSE AND DEWATERING BAG AT PROPER LOCATIONS AND INITIATE PUMPING. ENSURE DISCHARGE FROM DEWATERING BAG DOES NOT CAUSE EROSIVE CONDITIONS AS IT FLOWS BACK INTO THE CHANNEL.
6. EXECUTE REPAIRS AS INDICATED ON THE PLANS.
7. STABILIZE ALL DISTURBED AREAS.
8. ALL SEDIMENT AND EROSION CONTROL DEVICES ARE TO REMAIN IN PLACE UNTIL AUTHORIZED FOR REMOVAL BY DNREC SEDIMENT & STORMWATER MANAGEMENT PROGRAM.

PHASE II - POND SIDE

9. INSTALL TURBIDITY CURTAIN.
10. EXECUTE REPAIRS AS INDICATED ON THE PLANS.
11. STABILIZE ALL DISTURBED AREAS.
12. ALL SEDIMENT AND EROSION CONTROL DEVICES ARE TO REMAIN IN PLACE UNTIL AUTHORIZED FOR REMOVAL BY DNREC SEDIMENT & STORMWATER MANAGEMENT PROGRAM.

DATE:	DESCRIPTION:	BY:
DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

CULVERT REPAIR PLAN
CULVERT NO. 1 (SOUTH)

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY:	RKK
DRAWN BY:	RKK
BUILDING NO.:	N/A
DATE:	7/3/13
SCALE:	1"=5'
SHEET NO.:	C-25
PARKS PROJECT #:	CH-41
CONTRACT #:	2013-CH-300

NANCY RUTH BERGMAN LICENSED PROFESSIONAL ENGINEER STATE OF DELAWARE

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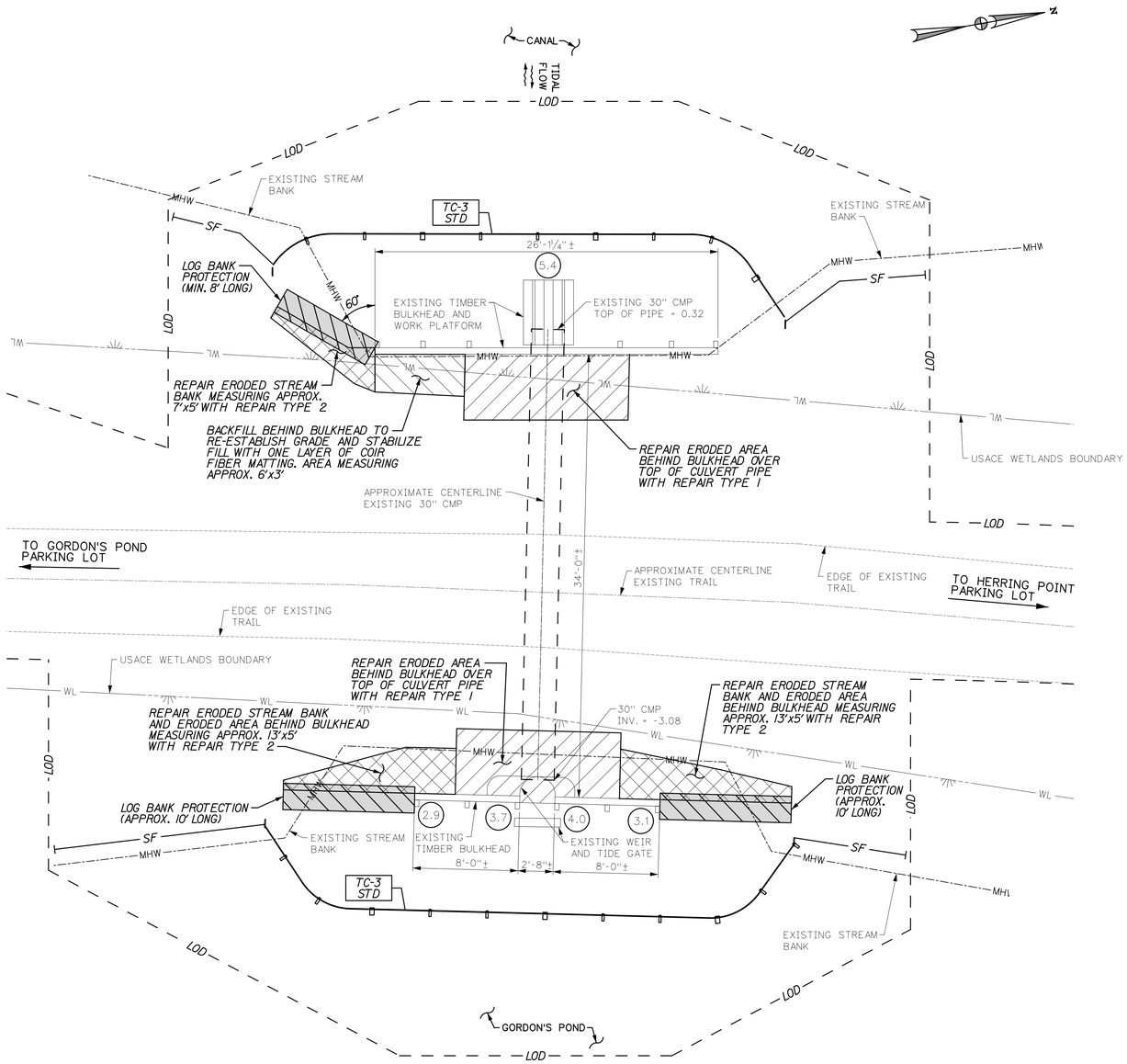

LEGEND

	REPAIR TYPE 1	5.4	STREAM DEPTH (FT.) AS MEASURED IN FIELD ON OCTOBER 17, 2012.
	REPAIR TYPE 2		LOG BANK PROTECTION
— LOD —	LIMIT OF DISTURBANCE	TC-3 STD	TURBIDITY CURTAIN
WL	USACE WETLAND BOUNDARY	GB	GEOTEXTILE DEWATERING BAG
MHW	MEAN HIGH WATER	P	PUMP

NOTES:

1. THE DISCHARGE FROM ANY CONSTRUCTION DEWATERING AREA SHALL BE PASSED THROUGH AN APPROVED SEDIMENT CONTROL DEVICE. THIS DEVICE MAY BE BYPASSED IF THE WATER BEING PUMPED IS CLEAR AND THERE IS A STABILIZED OUTFALL. THE ENGINEER SHALL BE THE SOLE JUDGE IF THE SEDIMENT CONTROL DEVICE CAN BE BYPASSED.
2. NO HEAVY EQUIPMENT SHALL BE USED WITHIN THE AREA OF THE STREAM OR FLOODPLAIN DUE TO THE PRESENCE OF ADJACENT WETLANDS.
3. THESE PLANS ARE BASED ON INSPECTION OF THE STRUCTURE ON OCTOBER 17, 2012 AND FIELD SURVEY CONDUCTED ON JANUARY 9, 2013. THE EXTENT OF DEFECTS TO BE REPAIRED MAY HAVE INCREASED SINCE THAT TIME. THE CONTRACTOR SHALL VERIFY THE EXTENT OF REPAIR REQUIRED IN THE FIELD PRIOR TO BID.
4. FOR REPAIR AND LOG BANK PROTECTION DETAILS, SEE SHEET C-27.
5. CONTRACTOR SHALL MINIMIZE DISTURBANCE TO ADJACENT CHANNEL BANKS DURING TRENCHING OPERATION FOR INSTALLATION OF LOG BANK PROTECTION.
6. DISTURBED AREAS IN FRONT OF LOG BANK PROTECTION SHALL BE BACKFILLED WITH NATURAL MATERIAL AND COMPACTED TO PRE-EXISTING CONTOURS. DISTURBED AREA SHALL BE SEEDED AND COVERED WITH SOIL STABILIZATION MATTING SSM-III (NORTH AMERICAN GREEN SC150BN OR APPROVED EQUAL).
7. CONTRACTOR MAY COMPLETE PHASED WORK IN CONCURRENT OR REVERSE ORDER.

SEQUENCE OF CONSTRUCTION:

1. NOTIFY DNREC SEDIMENT & STORMWATER MANAGEMENT PROGRAM FIVE (5) DAYS PRIOR TO COMMENCING WORK.

PHASE III - CANAL SIDE

2. INSTALL TURBIDITY CURTAIN AND SILT FENCE.
3. THE CONTRACTOR SHALL ENSURE THAT A REASONABLY DRY WORK AREA BEHIND THE BULKHEAD IS CONTINUOUSLY MAINTAINED DURING CONSTRUCTION OF THE PROJECT OR THAT EXCESS SEDIMENT IS CONTAINED WITHIN THE LIMIT OF DISTURBANCE.
4. IF REQUIRED, PLACE PUMP, HOSE AND DEWATERING BAG AT PROPER LOCATIONS AND INITIATE PUMPING. ENSURE DISCHARGE FROM DEWATERING BAG DOES NOT CAUSE EROSIVE CONDITIONS AS IT FLOWS BACK INTO THE CHANNEL.
5. EXECUTE REPAIRS AS INDICATED ON THE PLANS.
6. STABILIZE ALL DISTURBED AREAS.
7. ALL SEDIMENT AND EROSION CONTROL DEVICES ARE TO REMAIN IN PLACE UNTIL AUTHORIZED FOR REMOVAL BY DNREC SEDIMENT & STORMWATER MANAGEMENT PROGRAM.

PHASE IV - POND SIDE

8. INSTALL TURBIDITY CURTAIN AND SILT FENCE.
9. THE CONTRACTOR SHALL ENSURE THAT A REASONABLY DRY WORK AREA BEHIND THE BULKHEAD IS CONTINUOUSLY MAINTAINED DURING CONSTRUCTION OF THE PROJECT OR THAT EXCESS SEDIMENT IS CONTAINED WITHIN THE LIMIT OF DISTURBANCE.
10. IF REQUIRED, PLACE PUMP, HOSE AND DEWATERING BAG AT PROPER LOCATIONS AND INITIATE PUMPING. ENSURE DISCHARGE FROM DEWATERING BAG DOES NOT CAUSE EROSIVE CONDITIONS AS IT FLOWS BACK INTO THE CHANNEL.
11. EXECUTE REPAIRS AS INDICATED ON THE PLANS.
12. STABILIZE ALL DISTURBED AREAS.
13. ALL SEDIMENT AND EROSION CONTROL DEVICES ARE TO REMAIN IN PLACE UNTIL AUTHORIZED FOR REMOVAL BY DNREC SEDIMENT & STORMWATER MANAGEMENT PROGRAM.

DATE:	DESCRIPTION:	BY:
DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

CULVERT REPAIR PLAN
CULVERT NO. 2 (NORTH)

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY:	RKK
DRAWN BY:	RKK
BUILDING NO.:	N/A
DATE:	7/3/13
SCALE:	1"=5'
SHEET NO.:	C-26
PARKS PROJECT #:	CH-41
CONTRACT #:	2013-CH-300

NANCY RUTH BERGER LICENSED DELAWARE PROFESSIONAL ENGINEER

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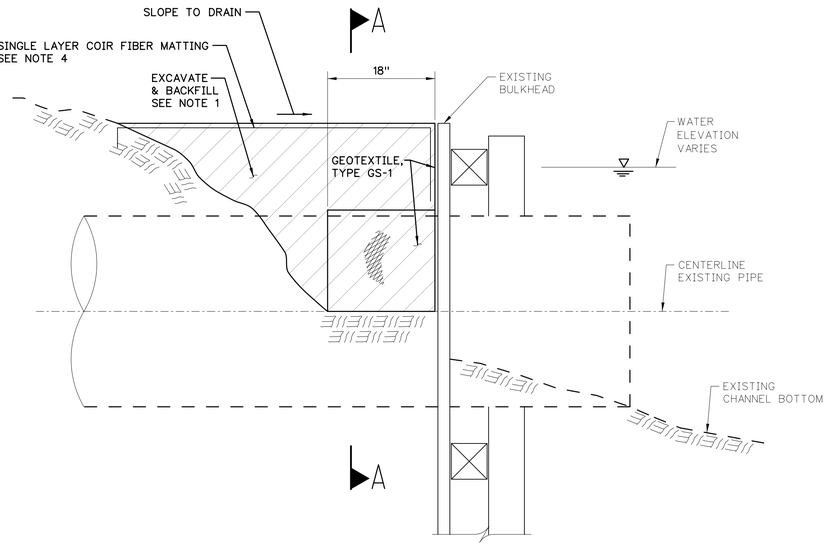
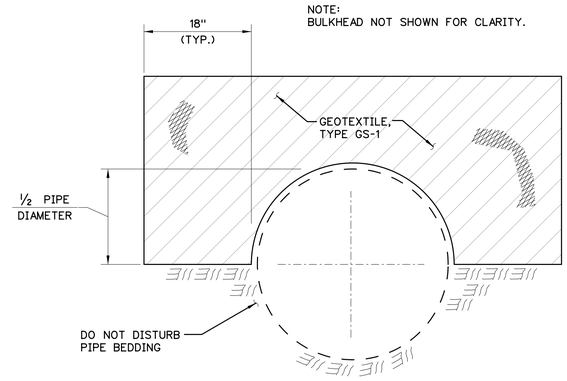


DETAIL



SECTION A-A

NOTES:

1. REPAIR TYPE 1:
   EXCAVATE IN THE DESIGNATED AREAS TO EXPOSE HALF THE HEIGHT OF THE CULVERT PIPE, TAKING CARE TO NOT DISTURB THE PIPE BEDDING. INSTALL GEOTEXTILE, TYPE GS-1, AGAINST THE BACK FACE OF THE BULKHEAD EXTENDING 18" BEYOND EITHER SIDE OF THE PIPE. EXTEND GEOTEXTILE BACK AWAY FROM THE BULKHEAD INTO THE FILL 18" AND WRAP THE GEOTEXTILE AROUND THE EXPOSED HEIGHT OF THE PIPE. BACKFILL WITH COMPACTED DELDOT BORROW TYPE C. THE TOP 4" OF BACKFILL SHALL BE TOPSOIL.
2. PROVIDE SIMILAR TREATMENT AT CULVERTS WITH WEIR RISER IN LINE WITH BULKHEAD.
3. PLACE PERMANENT SEED MIX #5 PRIOR TO COVERING WITH MATTING.
4. STABILIZE DISTURBED AREA WITH COIR FIBER STABILIZATION MATTING TYPE SSM-IV (NORTH AMERICAN GREEN C125 OR APPROVED EQUAL) PER THE DELAWARE EROSION AND SEDIMENT CONTROL HANDBOOK SECTION 3.4.6 AND THE MANUFACTURER'S RECOMMENDATIONS.

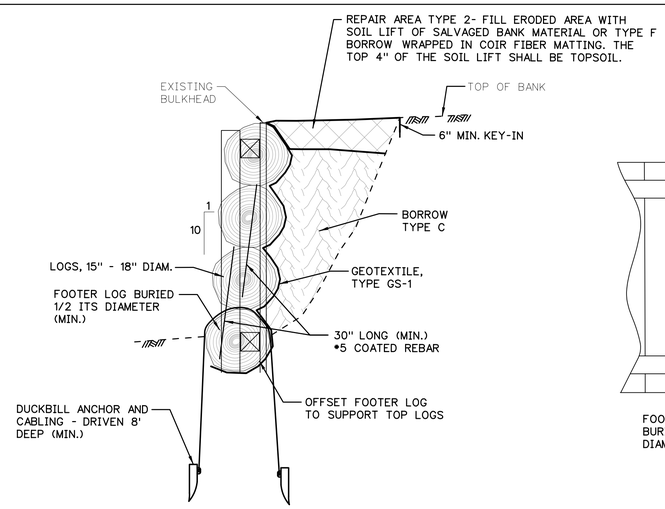
REPAIR TYPE 1

BUILDING INSTRUCTIONS FOR LOG BANK PROTECTION STRUCTURES

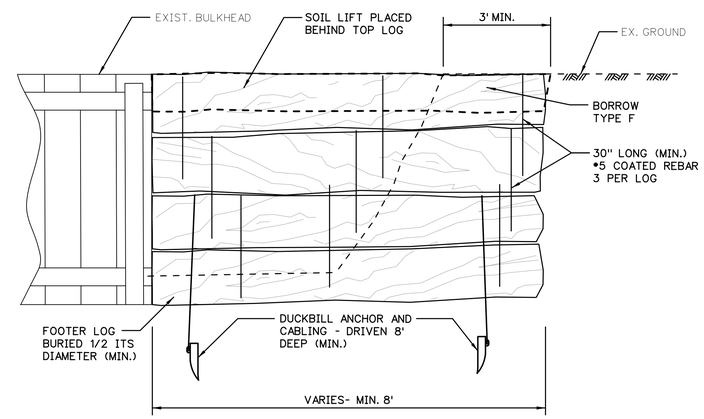
1. LOGS SHALL CONSIST OF CEDAR OR A HARDWOOD SPECIES.
2. CUT A TRENCH FOR THE FOOTER LOG. THE TRENCH IS TO BE DUG FROM THE BULKHEAD TO A MINIMUM OF 3 FEET INTO THE BANK TO BE PROTECTED AND SHALL BE TO A DEPTH SUFFICIENT TO BURY 1/2 THE FOOTER LOG.
3. LOG(S) SHALL BE PLACED ON TOP OF THE FOOTER LOG WITH A SLIGHT BATTER AND WITH GAPS NO GREATER THAN 1" BETWEEN THE LOGS. THE FINISHED HEIGHT OF THE LOG WALL SHOULD BE THE ELEVATION OF THE EXISTING TIMBER BULKHEAD. A SOIL LIFT SHALL BE PLACED BEHIND THE TOP LOG TO THE HEIGHT REQUIRED TO REACH THE TOP ELEVATION OF THE CHANNEL BANK.
4. THE LOGS SHALL BE PLACED AGAINST THE BULKHEAD SUCH THAT THERE IS NO GAP BETWEEN THE BULKHEAD AND THE LOGS. THE OTHER END OF THE LOGS SHALL BE BURIED WITHIN THE CHANNEL BANKS SO THAT WATER CANNOT FLOW BEHIND THE LOGS.
5. THE FOOTER LOG IS TO BE ANCHORED WITH DUCKBILL ANCHORS AND CABLING OR ANOTHER METHOD APPROVED BY THE ENGINEER. THE CABLING SHALL WRAP AROUND THE LOGS AND BE FASTENED TO THE DUCKBILL ANCHORS DRIVEN INTO THE CHANNEL BED OR BANK. THERE SHALL A MINIMUM OF TWO ANCHOR POINTS PER LOG. THE TOP LOGS ARE TO BE SECURED TOGETHER WITH REBAR.
6. THE DUCKBILL ANCHORS SHALL BE MODEL 68-DB-1 DUCKBILL EARTH ANCHOR OR APPROVED EQUAL. THE CABLING SHALL BE FLEXIBLE 3/8" HIGH STRENGTH GALVANIZED STEEL. A FLEXIBLE NYLON HOSE SHALL BE PLACED AROUND THE CABLE WHERE THE CABLE WRAPS AROUND THE LOG.
7. STAPLE GEOTEXTILE FABRIC TO THE BACKSIDE OF THE LOGS. THE GEOTEXTILE SHALL BE PLACED ACROSS THE INTERFACE BETWEEN THE EXISTING TIMBER BULKHEAD AND LOGS WITH A MINIMUM OVERLAP OF 12". LOG STRUCTURES MAY THEN BE BACKFILLED WITH FILL MATERIAL AND COMPACTED.
8. DISTURBED AREAS IN FRONT OF LOG TOE PROTECTION SHALL BE BACKFILLED WITH NATURAL MATERIAL AND COMPACTED TO PRE-EXISTING CONTOURS. DISTURBED AREA SHALL BE SEEDED AND COVERED WITH SOIL STABILIZATION MATTING SSM-III (NORTH AMERICAN GREEN S150 OR APPROVED EQUAL).

REPAIR TYPE 2 NOTES:

1. BACKFILL ERODED AREA AND STABILIZE WITH COIR FIBER STABILIZATION MATTING TYPE SSM-IV (NORTH AMERICAN GREEN C125 OR APPROVED EQUAL) PER THE DELAWARE EROSION AND SEDIMENT CONTROL HANDBOOK SECTION 3.4.6 AND THE MANUFACTURER'S RECOMMENDATIONS.
2. SOIL LIFT SHALL NOT EXCEED 1' IN HEIGHT.
3. PLACE PERMANENT SEED MIX #5 PRIOR TO COVERING WITH MATTING.



SECTION



FRONT VIEW

LOG BANK PROTECTION

DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

CULVERT REPAIR DETAILS

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY:	RKK
DRAWN BY:	RKK
BUILDING NO.:	N/A
DATE:	7/3/13
SCALE:	NOT TO SCALE
SHEET NO.:	C-27
PARKS PROJECT #:	CH-41
CONTRACT #:	2013-CH-300

MARY RUTH BENGAR LICENSE NO. 14676 STATE OF DELAWARE PROFESSIONAL ENGINEER

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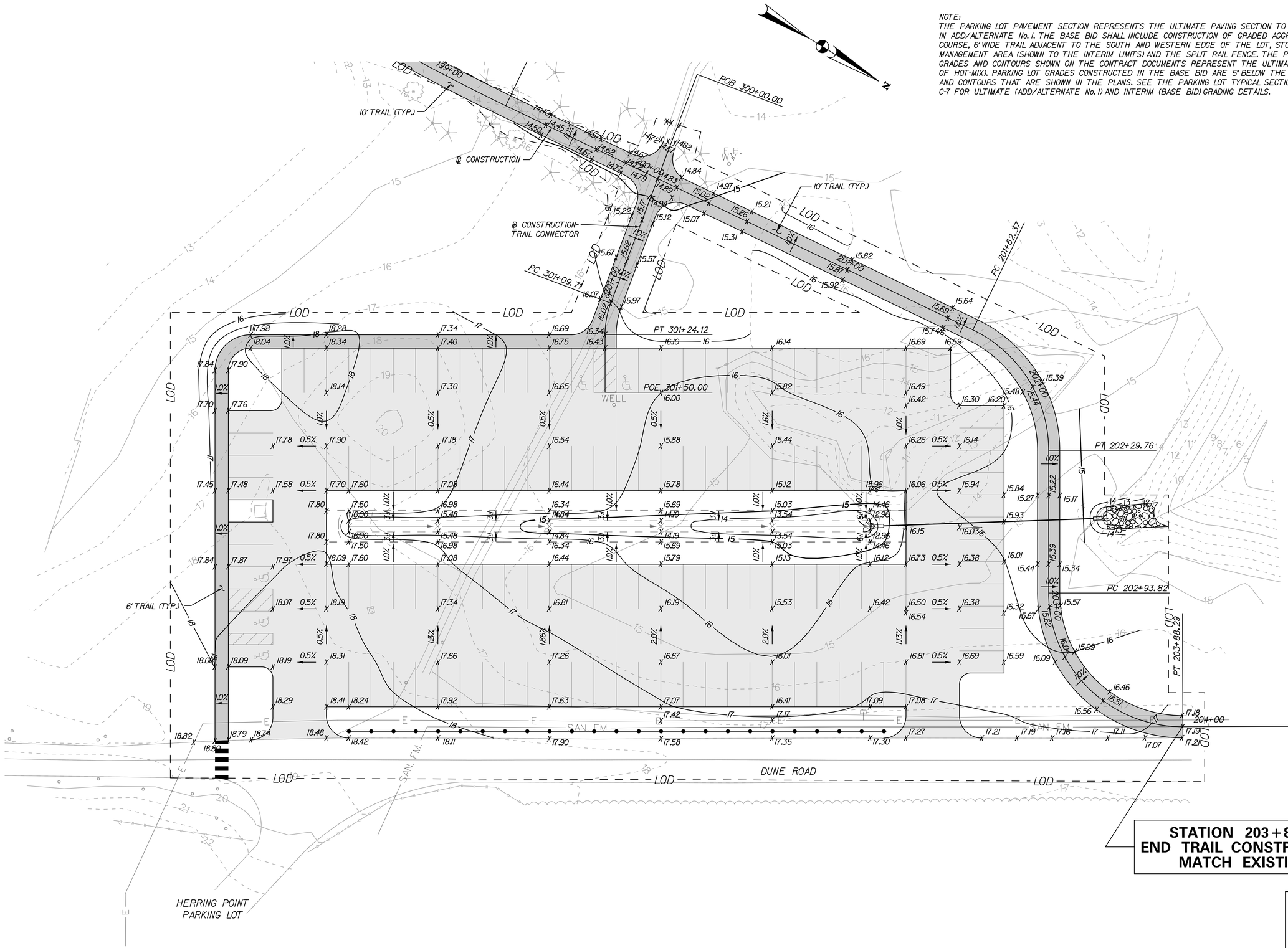
NOTE:
THE PARKING LOT PAVEMENT SECTION REPRESENTS THE ULTIMATE PAVING SECTION TO BE CONSTRUCTED IN ADD/ALTERNATE No. 1. THE BASE BID SHALL INCLUDE CONSTRUCTION OF GRADED AGGREGATE BASE COURSE, 6' WIDE TRAIL ADJACENT TO THE SOUTH AND WESTERN EDGE OF THE LOT, STORMWATER MANAGEMENT AREA (SHOWN TO THE INTERIM LIMITS) AND THE SPLIT RAIL FENCE. THE PARKING LOT GRADES AND CONTOURS SHOWN ON THE CONTRACT DOCUMENTS REPRESENT THE ULTIMATE GRADES (TOP OF HOT-MIX). PARKING LOT GRADES CONSTRUCTED IN THE BASE BID ARE 5" BELOW THE ULTIMATE GRADES AND CONTOURS THAT ARE SHOWN IN THE PLANS. SEE THE PARKING LOT TYPICAL SECTION ON SHEET C-7 FOR ULTIMATE (ADD/ALTERNATE No. 1) AND INTERIM (BASE BID) GRADING DETAILS.



STATION 203+88.29
END TRAIL CONSTRUCTION
MATCH EXISTING

DATE:	DESCRIPTION:	BY:
DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

PARKING LOT GRADING PLAN

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY: RKK
DRAWN BY: RKK
BUILDING NO.: N/A
DATE: 7/3/13
SCALE: 1"=20'
SHEET NO.: C-28
PARKS PROJECT #: CH-41
CONTRACT #: 2013-CH-300

MANDY RUTH BERGER
LICENSED
No. 24776
STATE OF DELAWARE
PROFESSIONAL ENGINEER

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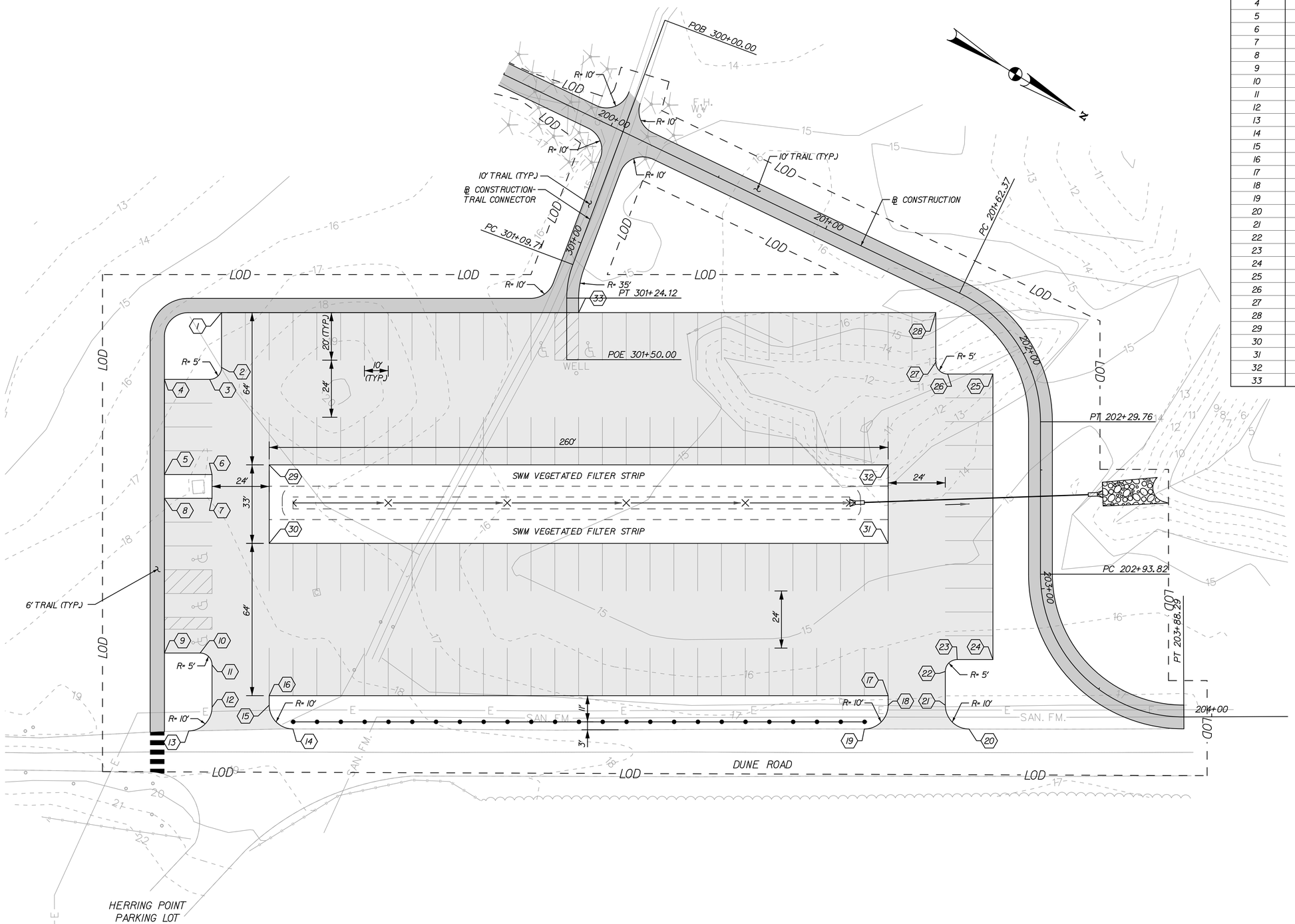

COORDINATE LIST			
POINT NO.	NORTHING	EASTING	ELEVATION
1	278948.0807	750840.5889	18.16
2	278960.1900	750860.2289	17.97
3	278958.5581	750867.1091	17.90
4	278942.3851	750877.0808	17.76
5	278963.3782	750911.1292	17.53
6	278980.4024	750900.6326	17.63
7	278985.6506	750909.1447	17.75
8	278968.6265	750919.6413	17.64
9	279002.7402	750974.9699	18.09
10	279015.5083	750967.0975	18.16
11	279022.3885	750968.7294	18.22
12	279031.7205	750983.8649	18.41
13	279028.6422	750997.5080	18.74
14	279065.4584	750973.8095	18.42
15	279051.7020	750970.5432	18.43
16	279049.6019	750967.1371	18.41
17	279270.9164	750830.6823	17.08
18	279273.0276	750834.1065	17.13
19	279269.7603	750847.8690	17.29
20	279307.2217	750824.7974	17.21
21	279293.4682	750821.5294	17.08
22	279286.0063	750809.4271	16.85
23	279287.6383	750802.5470	16.75
24	279300.4064	750794.6746	16.68
25	279237.4272	750692.5294	16.20
26	279221.2543	750702.5011	16.30
27	279214.3741	750700.8692	16.37
28	279203.4435	750683.1410	16.59
29	278998.6938	750884.5698	17.70
30	279016.0130	750912.6597	18.09
31	279237.3275	750776.2049	16.73
32	279220.0082	750748.1150	16.06
33	279075.7621	750761.8650	16.36

DATE: DESCRIPTION: BY:

DATE: DESCRIPTION: BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

PARKING LOT STAKEOUT PLAN

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY: RKK

DRAWN BY: RKK

BUILDING NO.: N/A

DATE: 7/3/13

SCALE: 1"=20'

SHEET NO.: C-29

PARKS PROJECT #: CH-41

CONTRACT #: 2013-CH-300

NANCY RUTH BERGERON LICENSED PROFESSIONAL ENGINEER DELAWARE

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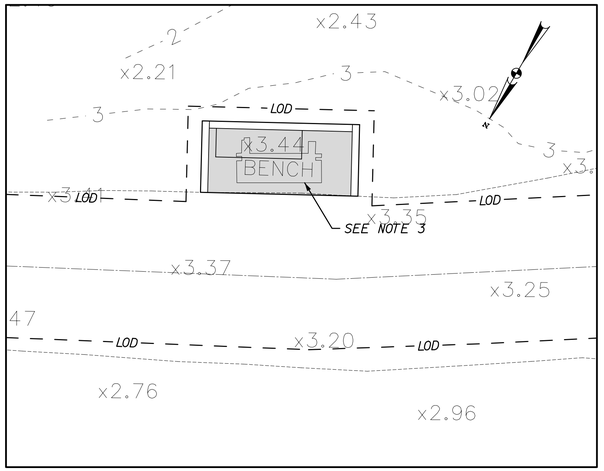
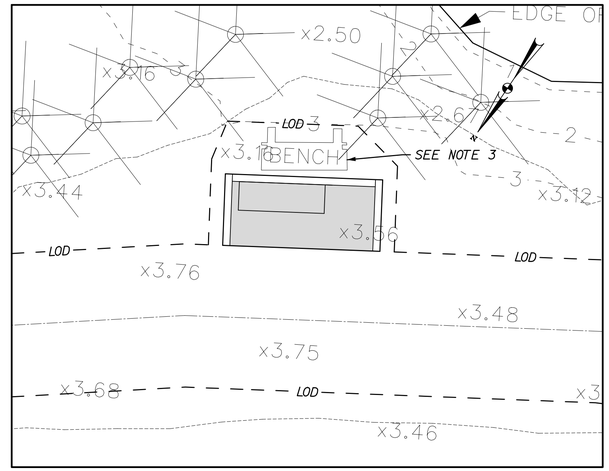
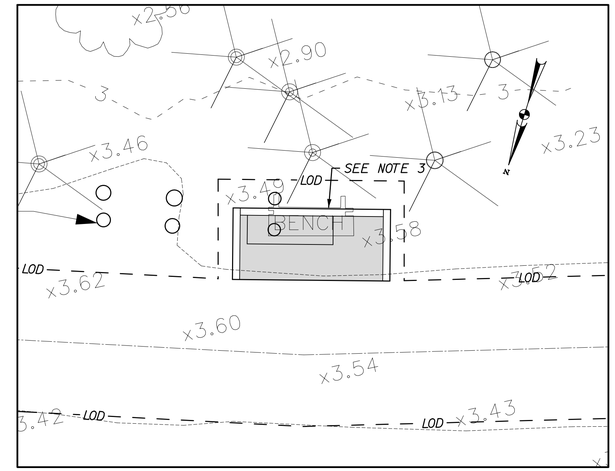


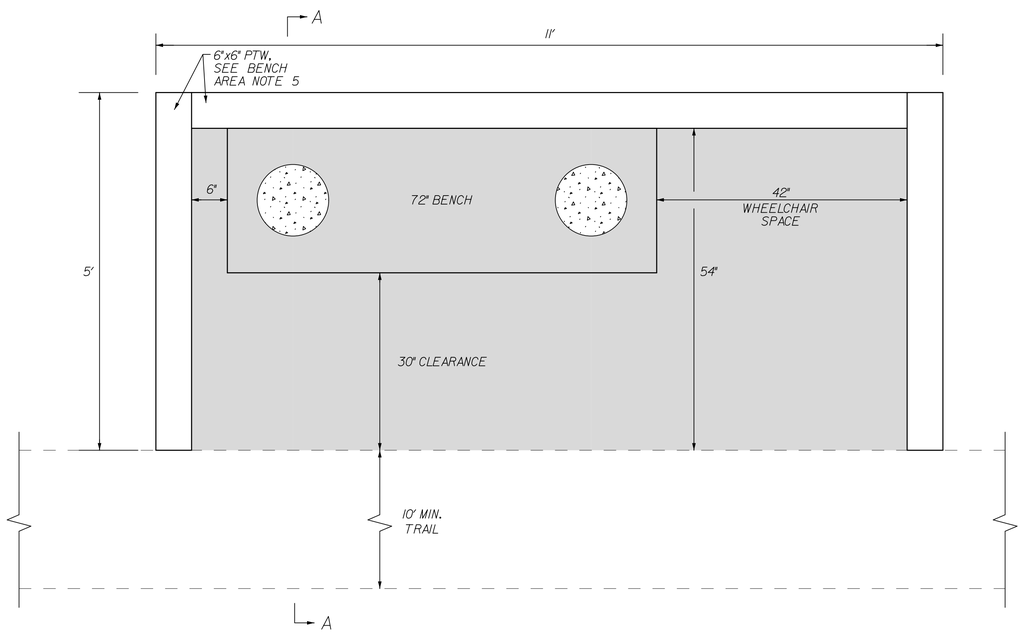
BENCH REPLACEMENT 1



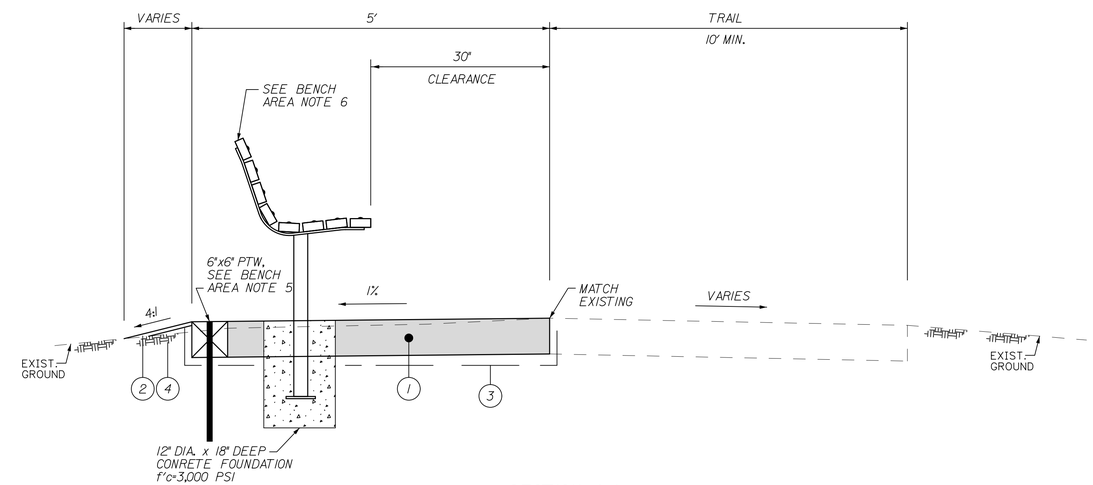
BENCH REPLACEMENT 2



BENCH REPLACEMENT 3



PLAN



SECTION A-A

LEGEND

1. DELDOT-GRADED AGGREGATE BASE COURSE (TYPE B), TOPPED AND CHOKED WITH 1-1/2" STONE DUST ROLLED INTO GRADED AGGREGATE
2. STABILIZATION OF FILLED, REGRADED, OR OTHERWISE DISTURBED AREAS SHALL BE CONSISTENT WITH PRECONSTRUCTION GROUND COVER AS DIRECTED BY THE OWNER. SEE SHEET C-7 FOR STABILIZATION METHODS.
3. GEOTEXTILE SEPARATION FABRIC (AASHTO M 288, CLASS 2)
4. FILL WITH EXCAVATED MATERIAL

BENCH REPLACEMENT DETAIL

NTS

BENCH REPLACEMENT NOTES:

1. THE DETAILS SHOWN ON THIS SHEET APPLY ONLY TO THE EXISTING BENCHES LOCATED OUTSIDE OF THE TRAIL CONSTRUCTION (STA.104+00.00 TO STA.203+88.29) FOR ALL OTHER EXISTING BENCHES TO BE REPLACED WITHIN THE PROJECT AREA, SEE THE DETAIL ON C-22.
2. SEE SHEET C-8 FOR BENCH REPLACEMENT LOCATIONS.
3. THE CONTRACTOR SHALL REMOVE EXISTING BENCHES AND DISPOSE OFFSITE.
4. GRADES WITHIN THE BENCH AREA SHALL NOT EXCEED 2% IN ANY DIRECTION.
5. THE CONTRACTOR SHALL FIELD STAKEOUT LOCATION OF EACH BENCH FOR OWNER'S APPROVAL PRIOR TO INSTALLATION.
6. 6"X6" TIMBER SHALL BE PRESSURE TREATED WOOD WITH CHROMATED COPPER ARSENATE (CCA) TREATMENT. MINIMUM RETENTION OF 2.5 PCF. TIMBERS SHALL BE INSTALLED WITH 2-#4 REBARS, 24" LONG ANCHOR PINS SET FLUSH WITH TOP OF TIMBER. A MINIMUM OF 2 REBAR PINS SHALL BE INSTALLED PER TIMBER, LOCATED 12" FROM EACH END.
7. BENCHES SHALL BE HOMESTEAD SERIES, MODEL # 8, 6' LENGTH, IN-GROUND MOUNTED. SLATS: 2ND SITE SYSTEMS REINFORCED RECYCLED PLASTIC, COLOR GRAY. STEEL LEGS AND BRACES COLOR BRONZE (HOT-DIP GALVANIZE BEFORE POWDER COATING). MANUFACTURED BY VICTOR STANLEY, INC. TELEPHONE: 301-855-8300.

NANCY RUTH BERGERON
LICENSED
PROFESSIONAL ENGINEER
DELAWARE

DATE:	DESCRIPTION:	BY:
DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

BENCH REPLACEMENT PLAN & DETAIL

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY: RKK
DRAWN BY: RKK
BUILDING NO.: N/A
DATE: 7/3/13
SCALE: 1"=5'
SHEET NO.: C-30
PARKS PROJECT #: CH-41
CONTRACT #: 2013-CH-300

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STRUCTURAL GENERAL NOTES

DESIGN METHOD

AASHTO GUIDE SPECIFICATIONS FOR THE DESIGN OF PEDESTRIAN BRIDGES, 2ND EDITION DATED 2009
AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, DATED 2010
NATIONAL DESIGN SPECIFICATION (NDS) FOR WOOD CONSTRUCTION, 2005 EDITION

LOADS

RAILING LOADS = GREATER OF 50 LBS/LF OR 200 LBS PER INTERNATIONAL BUILDING CODE, 2009

PEDESTRIAN LIVE LOAD = 90 PSF.

VEHICLE LIVE LOAD: H5 TRUCK

THE PRECEEDING LOADS SHALL NOT BE EXCEEDED AT ANY TIME DURING CONSTURCTION.

MATERIALS

WOOD FRAMING

ALL MEMBERS SHALL BE FRAMED, ANCHORED, TIED AND BRACED IN ACCORDANCE WITH GOOD CONSTRUCTION PRACTICE AND APPLICABLE CODES.

ALL WOOD FRAMING, INCLUDING PILE CAPS, JOISTS, AND BLOCKING, SHALL BE SOUTHERN YELLOW PINE, NO. 2 OR BETTER. REFER TO WOOD PRESERVATIVE TREATMENT REQUIREMENTS BELOW.

NAILED CONNECTIONS WILL BE PERMITTED EXCEPT WHERE NOTED OTHERWISE.

WOOD DECKING – TRANSITION BOARDS AND STAIR TREADS.

ALL WOOD DECKING SHALL BE SOUTHERN YELLOW PINE, NO. 1 DENSE OR BETTER, 2X6s AND 2x12s S4S. LAY DECKING CONTINUOUS EDGE TO EDGE UNLESS KILN DRIED AFTER PRESERVATIVE TREATMENT. PLACE WITH ?" GAP IF KILN DRIED.

REFER TO WOOD PRESERVATIVE TREATMENT REQUIREMENTS BELOW.

CONNECTIONS SHALL BE #10 X 3.5" LONG TYPE 316 STAINLESS STEEL SCREWS INSTALLED FLUSH WITH THE SURFACE OF THE DECKING. PREDRILL FOR SCREWS TO AVOID SPLITTING.

WOOD PRESERVATIVE TREATMENT

ALL TIMBER MEMBERS SHALL BE PRESSURE TREATED WITH A WATERBORNE PRESERVATIVE. THE PRESERVATIVE MAY BE EITHER AWPA APPROVED OR APPROVED VIA THE INTERNATIONAL CODE COUNCIL – EVALUATION SERVICE (ICC–ES). TREATMENT SHALL INCLUDE A WATER REPELLANT ADDITIVE.

PIER CAPS SHALL BE TREATED WITH CHROMATED COPPER ARSENATE (CCA). MINIMUM RETENTION SHALL BE 2.5 PCF.

STRINGERS AND BLOCKING SHALL BE TREATED WITH CHROMATED COPPER ARSENATE (CCA). MINIMUM RETENTION SHALL BE 1.5 PCF.

DECKING, RAILING AND CURB COMPONENTS SHALL BE TREATED WITH ALKALINE COPPER QUATERNARY (ACQ) MINIMUM RETENTION 0.40 PCF, MICRONIZED COPPER AZOLE (MCA) MINIMUM RETENTION 0.16 PCF, OR COPPER AZOLE (CA–C) MINIMUM RETENTION 0.15 PCF.

COMPONENTS SUBJECT TO FREQUENT HUMAN CONTACT, INCLUDING DECKING AND RAILING COMPONENTS, SHALL NOT BE TREATED WITH PRESERVATIVES CONTAINING ARSENIC OR CHROMIUM.

THE CONTRACTOR SHALL SUBMIT THE PRESERVATIVE MATERIALS INTENDED FOR USE FOR REVIEW AND APPROVAL. THE SUBMITTAL SHALL INCLUDE THE RETENTION LEVEL AND DOCUMENTATION OF AWPA OR ICC APPROVAL.

ALL HOLES, CUTS, AND INJURIES SUCH AS ABRASIONS OR HOLES FROM REMOVAL OF NAILS AND SPIKES WHICH MAY PENETRATE THE TREATED ZONE SHALL BE FIELD TREATED. AN AWPA ACCEPTED COMPATIBLE PRESERVATIVE SYSTEM SHALL BE USED FOR TREATMENT. FIELD TREATMENT PRESERVATIVES SHALL BE APPLIED IN ACCORDANCE WITH THE PRODUCT LABEL. THE APPLICATION METHOD SHALL COAT ANY SURFACE THAT IS EXPOSED BY DAMAGE OR FIELD FABRICATION WHILE NOT USING EXCESSIVE PRESERVATIVE. ANY EXCESS PRESERVATIVE NOT ABSORBED BY THE WOOD PRODUCT SHALL BE CLEANED FROM THE SURFACE PRIOR TO USE OF THE PRODUCT. CAREFUL ATTENTION SHOULD BE GIVEN TO MATERIALS PLACED INTO AQUATIC ENVIRONMENTS. THESE MATERIALS SHALL NOT BE USED UNLESS THE FIELD TREATED SURFACE IS CLEAN, DRY, AND FREE OF EXCESS PRESERVATIVE.

STRUCTURAL STEEL AND MISCELLANEOUS METALS

STEEL FOR MISCELLANEOUS SHAPES, PLATES, AND ASSEMBLIES SHALL BE ASTM A36.

ELECTRODES FOR FIELD AND SHOP WELDING SHALL BE E70.

ALL BOLTS SHALL BE ASTM A307.

ALL STEEL, BOLTS, SPIKES, NAILS, AND OTHER HARDWARE SHALL BE HOT DIP GALVANIZED PER ASTM A123 AND A153 UNLESS NOTED OTHERWISE.

COMPOSITE RAILING BOARD

COMPOSITE RAILING BOARD SHALL BE SELECTED FROM THE FOLLOWING APPROVED LIST:
- ACT COMPOSITE TIMBER, INC., COMMACK, NY
- RENEW PLASTICS TRIMAX STRUCTURAL LUMBER, LUXEMBURG, WI
- TANGENT TECHNOLOGIES, LLC POLYFORCE STRUCTURAL PLASTIC LUMBER, AURORA, IL

COMPOSITE RAILING BOARD SHALL BE IN "WEATHERED WOOD" COLOR.

PULTRUDED FIBERGLASS I–BAR GRATING

I–BAR GRATING SHALL BE SELECTED FROM THE FOLLOWING APPROVED LIST:
- STRONGWELL DURAGRID I–4000 1? INCH
- VERSA GRATE I–4015 1? INCH
- AMERISPAN I 15–40 1? INCH

GRATING PANELS SHALL BE MADE OF 1? INCH DEEP PULTRUDED I–BARS SPACED AT 1 INCH ON CENTER. THE CROSS–RODS SHALL BE SPACED A MAXIMUM OF 12". RESIN SHALL BE POLYESTER. THE TOP OF THE PANELS SHALL BE COVERED WITH A BONDED GRIT ANTI SKID SURFACE WITH A UV RESISTANT URETHANE TOP COAT. COLOR SHALL BE MANUFACTURER'S STANDARD GRAY. INSERT HOLD DOWN FASTENERS PER MANUFACTURER'S RECOMMENDATIONS. ALL FASTENERS SHALL BE TYPE 316 STAINLESS STEEL.

CONTRACTOR SHALL SUBMIT THE I–BAR GRATING LAYOUT AND MANUFACTURER'S SAMPLE FOR REVIEW AND APPROVAL. I–BAR GRATING PANELS SHALL HAVE CONTINUOUS BEARING BARS ACROSS THE ENTIRE 8'–0" WIDTH OF THE BRIDGE STRUCTURE. LONGITUDINAL JOINTS IN THE I–BAR PANELS WILL NOT BE ALLOWED ON THE BRIDGE STRUCTURE.

STRAPS AND HANGERS

STRAPS AND HANGERS SHALL BE ZMAX COATING HOT DIP GALVANIZED. INSTALL PER MANUFACTURER'S RECOMMENDATIONS. ALL FASTENERS SHALL BE HOT DIP GALVANIZED. SIZE AND NUMBER PER MANUFACTURER'S RECOMMENDATIONS. SIMPSON PRODUCTS CALLED OUT ON THE PLANS MAY BE REPLACED WITH APPROVED EQUAL, SUBJECT TO THE REQUIREMENTS BELOW ENTITLED "GENERAL".

CONCRETE AND REINFORCING STEEL

CONCRETE SHALL BE DELDOT CLASS A ($f'c$ = 4500 psi).
REINFORCING STEEL SHALL CONFORM TO ASTM A615 GRADE 60.

GENERAL

FOR AN ITEM TO BE AN APPROVED EQUAL, IT MUST BE SUBMITTED BY THE BIDDER AND APPROVED BY THE OWNER PRIOR TO BID OPENING IN ACCORDANCE WITH SECTION 01600, 6.3 SUBSTITUTIONS.

FOUNDATION

THE BRIDGE AND OBSERVATION DECKS SHALL BE SUPPORTED BY HELICAL PILES. THE PILES SHALL BE IN ACCORDANCE WITH SPECIAL PROVISIONS T–618500. THE HELICAL PILES SHALL PROVIDE MINIMUM SERVICE AXIAL CAPACITIES AS SHOWN IN THE CHART BELOW.

AT A MINIMUM, ONE PILE BATTERED IN THE TRANSVERSE DIRECTION RELATIVE TO THE BASELINE SHALL BE INSTALLED AT EVERY PIER AND ONE PILE BATTERED IN THE LONGITUDINAL DIRECTION RELATIVE TO THE BASELINE SHALL BE INSTALLED AT EVERY FOURTH PIER. DIRECTION OF BATTER SHALL ALTERNATE. THE CONTRACTOR SHALL EVALUATE THE NEED FOR ADDITIONAL BATTERED PILES AND THE NEED FOR BRACING OF THE PILE FREE LENGTH BASED ON THE PILE SECTION CHOSEN. ALL PILES AND PILE COMPONENTS SHALL BE HOT DIP GALVANIZED IN ACCORDANCE WITH THE STRUCTURAL STEEL AND MISCELLANEOUS METALS SECTION OF THESE STRUCTURAL GENERAL NOTES.

THE MINIMUM TOP OF HELIX DEPTH BELOW THE EXISTING GROUND SURFACE SHALL BE 20 FEET. HOWEVER, BASED ON THE SOIL BORINGS, THE CONTRACTOR MAY ANTICIPATE THAT DEPTHS OF 45 FEET OR MORE MAY BE REQUIRED TO ACHIEVE THE REQUIRED CAPACITY IN SOME LOCATIONS. THE QUANTITIES IN THE BID ASSUME 45 FOOT DEPTH FROM STATION 165+20 TO STATION 179+00 AND 20 FOOT DEPTH FROM STATION 179+00 TO STATION 189+50.

PILE DESIGN LOADS (SERVICE)	
CONDITION	LOAD (KIPS/PILE)
VERTICAL PILE – COMPRESSION	7.5
VERTICAL PILE – TENSION (DUE TO UPLIFT)	1.5
BATTERED PILE, TRANSVERSE TO THE BASELINE – TENSION	8.0
BATTERED PILE, LONGITUDINAL TO THE BASELINE – TENSION	8.0

NOTE: BATTERED PILE LOADS HAVE BEEN RESOLVED TO ACT ALONG THE SHAFT OF THE PILE AT 2V:1H BATTER.

DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

STRUCTURAL GENERAL NOTES

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY: RKK
DRAWN BY: RKK
BUILDING NO.: N/A
DATE: 7/3/13
SCALE: NOT TO SCALE
SHEET NO.: S-1
PARKS PROJECT #: CH–41
CONTRACT #: 2013–CH–300

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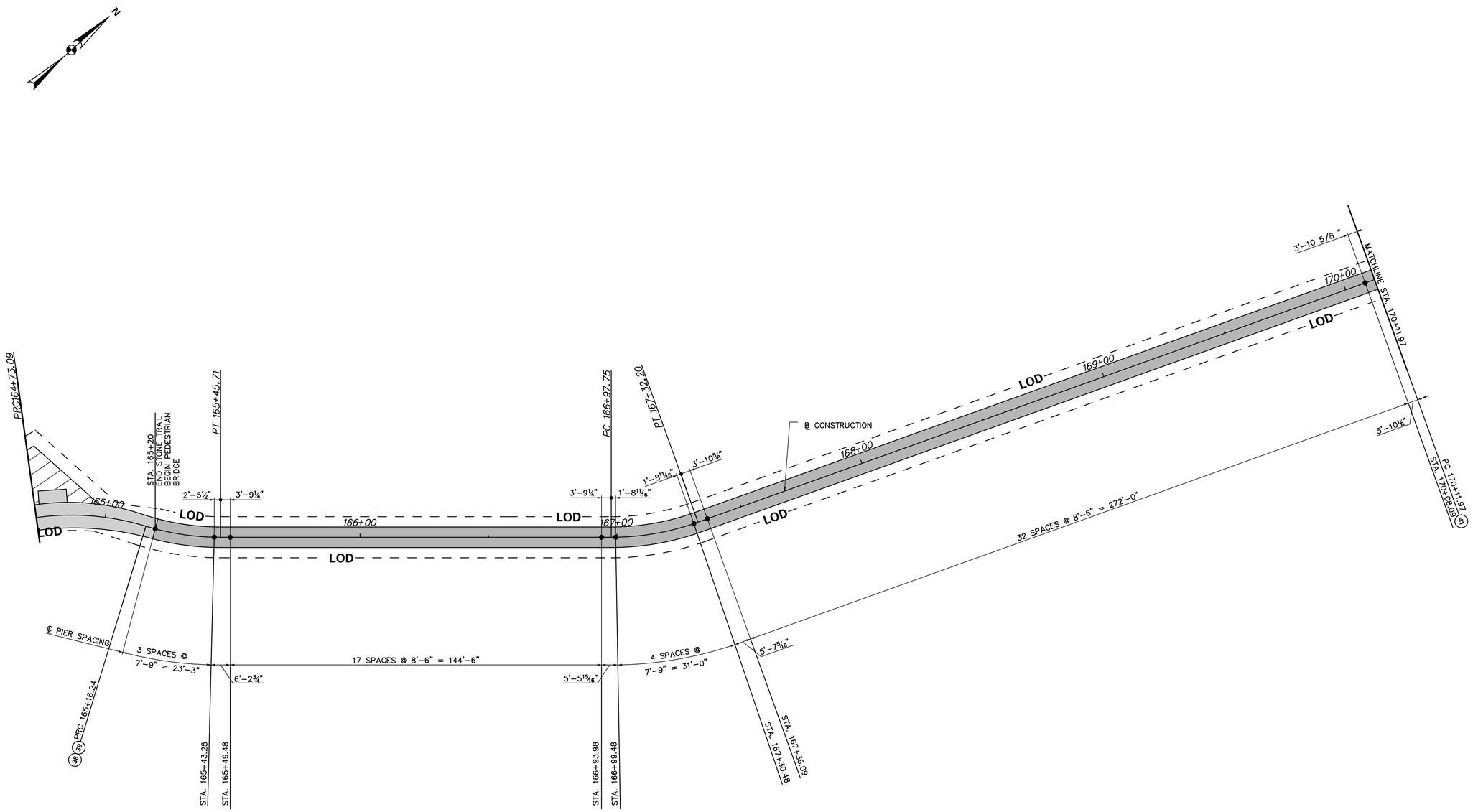

PIER LAYOUT
SCALE 1"=20'

NOTES:
1. ALL DIMENSIONS MEASURED ALONG ℄ CONSTRUCTION.
2. "SPACES" INDICATES SPANS BETWEEN PIERS.
3. ALL PIERS SHALL BE PERPENDICULAR/RADIAL TO THE BASELINE.

DATE:	DESCRIPTION:	BY:
DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

PEDESTRIAN BRIDGE
PIER LAYOUT PLAN

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY: RKK
DRAWN BY: RKK
BUILDING NO.: N/A
DATE: 7/3/13
SCALE: AS NOTED
SHEET NO.: S-2
PARKS PROJECT #: CH-41
CONTRACT #: 2013-CH-300

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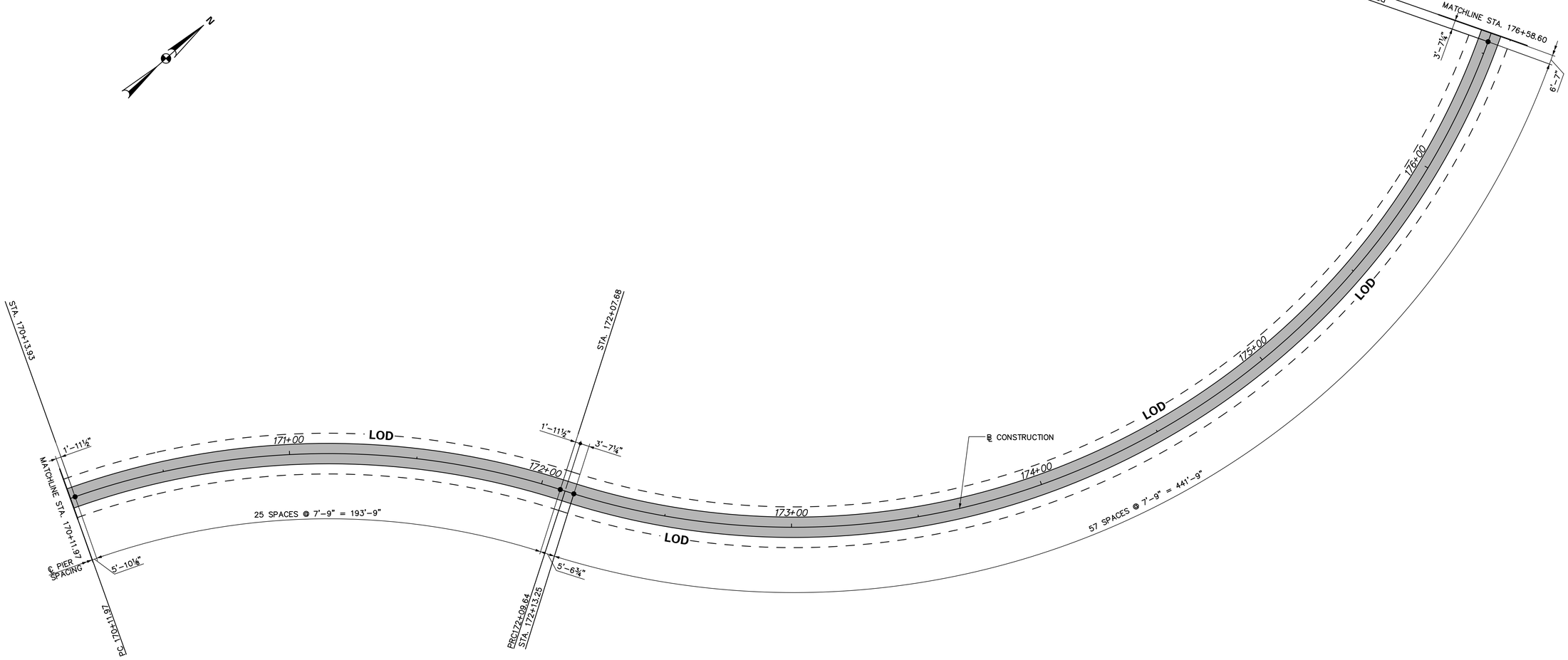

PIER LAYOUT
SCALE 1"=20'

NOTES:
1. ALL DIMENSIONS MEASURED ALONG ℄ CONSTRUCTION.
2. "SPACES" INDICATES SPANS BETWEEN PIERS.
3. ALL PIERS SHALL BE PERPENDICULAR/RADIAL TO THE BASELINE.

DATE:	DESCRIPTION:	BY:
DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

PEDESTRIAN BRIDGE PIER LAYOUT PLAN

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY: RKK
DRAWN BY: RKK
BUILDING NO.: N/A
DATE: 7/3/13
SCALE: AS NOTED
SHEET NO.: S-3
PARKS PROJECT #: CH-41
CONTRACT #: 2013-CH-300

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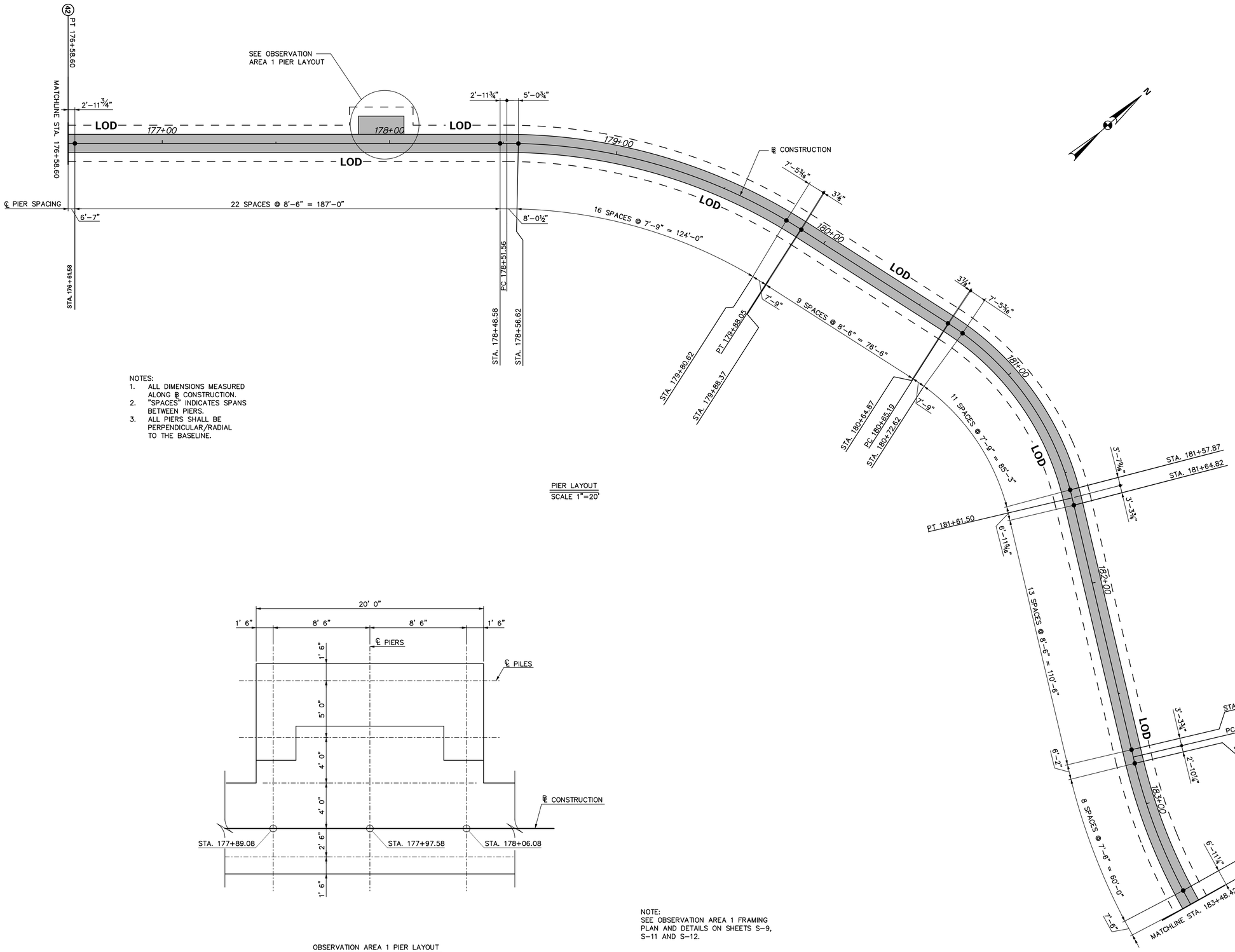

NOTES:
1. ALL DIMENSIONS MEASURED ALONG ℄ CONSTRUCTION.
2. "SPACES" INDICATES SPANS BETWEEN PIERS.
3. ALL PIERS SHALL BE PERPENDICULAR/RADIAL TO THE BASELINE.

PIER LAYOUT
SCALE 1"=20'

OBSERVATION AREA 1 PIER LAYOUT
NTS

NOTE:
SEE OBSERVATION AREA 1 FRAMING PLAN AND DETAILS ON SHEETS S-9, S-11 AND S-12.

DATE:	DESCRIPTION:	BY:
DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

PEDESTRIAN BRIDGE AND OBSERVATION AREA PIER LAYOUT PLAN

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY: RKK
DRAWN BY: RKK
BUILDING NO.: N/A
DATE: 7/3/13
SCALE: AS NOTED
SHEET NO.: S-4
PARKS PROJECT #: CH-41
CONTRACT #: 2013-CH-300

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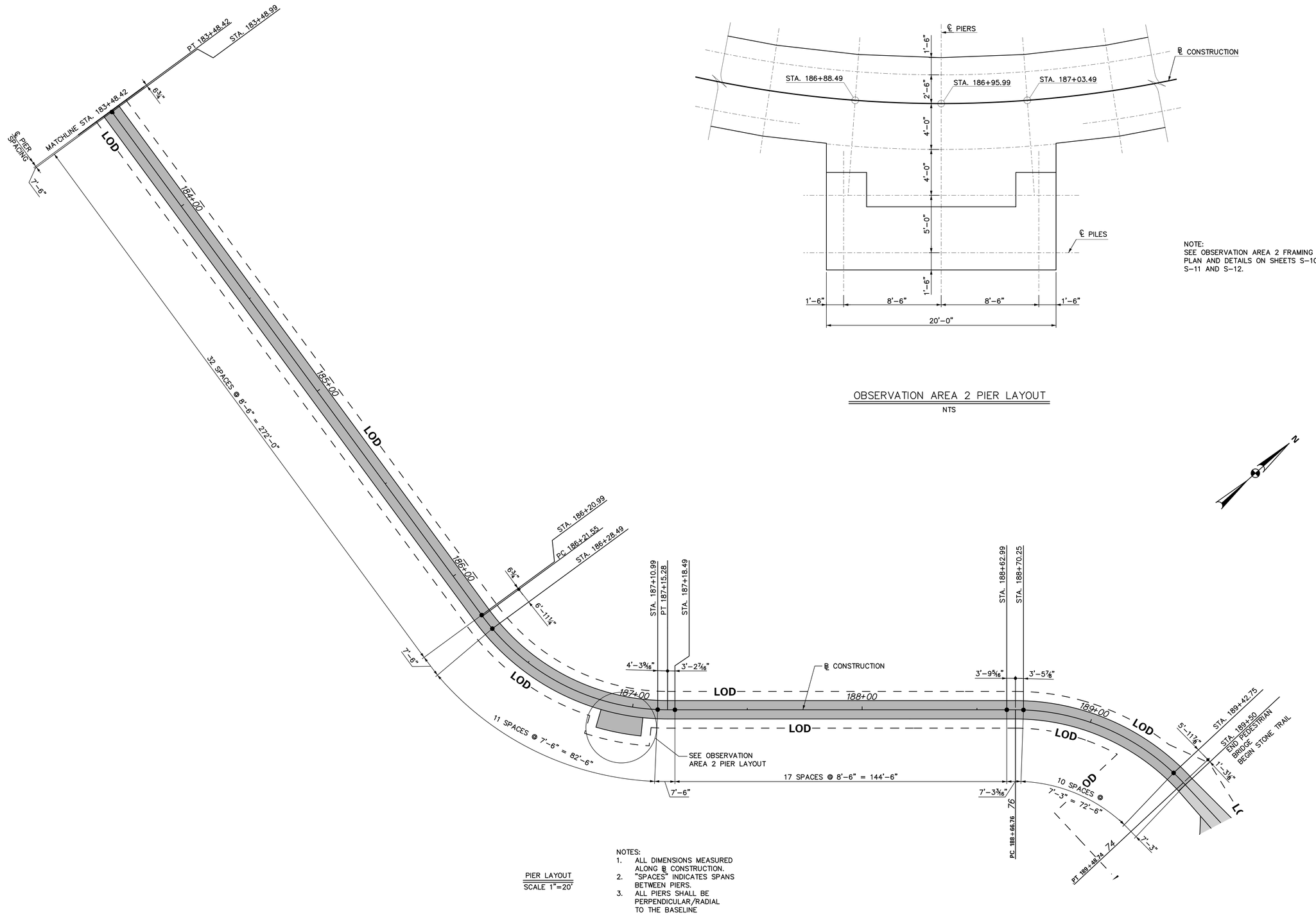

NOTE:
SEE OBSERVATION AREA 2 FRAMING PLAN AND DETAILS ON SHEETS S-10, S-11 AND S-12.

OBSERVATION AREA 2 PIER LAYOUT
NTS

PIER LAYOUT
SCALE 1"=20'

NOTES:
1. ALL DIMENSIONS MEASURED ALONG ℄ CONSTRUCTION.
2. "SPACES" INDICATES SPANS BETWEEN PIERS.
3. ALL PIERS SHALL BE PERPENDICULAR/RADIAL TO THE BASELINE

DATE:	DESCRIPTION:	BY:
DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

PEDESTRIAN BRIDGE AND OBSERVATION AREA PIER LAYOUT PLAN

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY: RKK
DRAWN BY: RKK
BUILDING NO.: N/A
DATE: 7/3/13
SCALE: AS NOTED
SHEET NO.: S-5
PARKS PROJECT #: CH-41
CONTRACT #: 2013-CH-300

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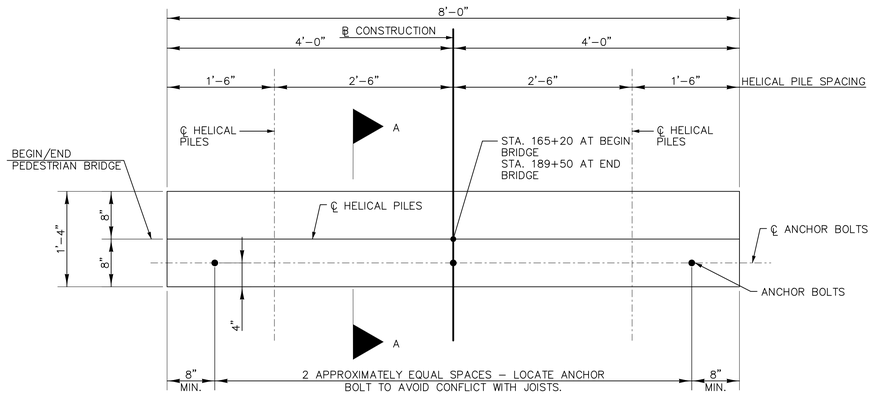
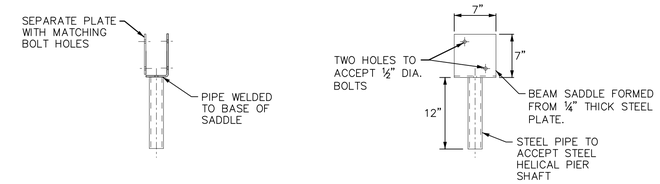
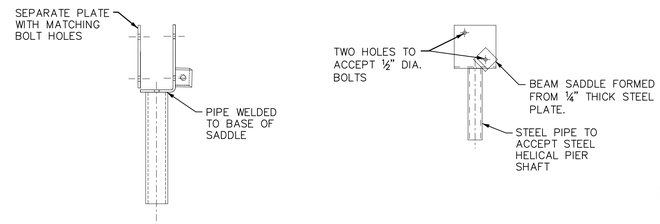


ABUTMENT PLAN
SCALE: 1" = 1'



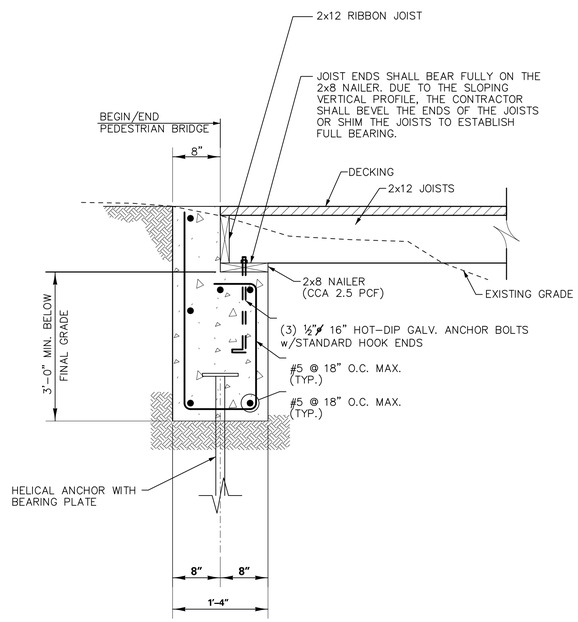
STANDARD BEAM BRACKET



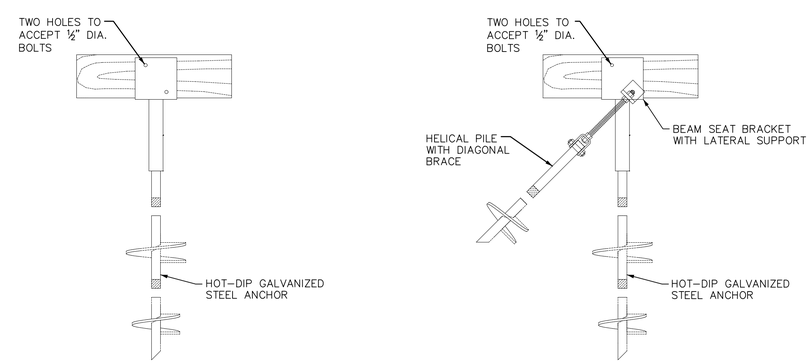
NOTES:

DIAGONAL ASSEMBLY INCLUDES:
- 1 LOOSE ANGLE
- 1 EA. ALL THREAD BOLT
- 4 EA. HH NUTS
- 1 EA. YOKE ASSEMBLY & HARDWARE
- ALL ELEMENTS SIZED BY HELICAL PILE MANUFACTURER

BEAM SEAT BRACKET AT DIAGONAL CONNECTION



ABUTMENT SECTION A–A
SCALE: 1" = 1'



TYPICAL PILE AND BEAM SEAT BRACKET

PILE WITH DIAGONAL BRACE AND BEAM SEAT BRACKET

CONNECTION BRACKET DETAILS
SCALE: 1" = 1'

NOTE:

THE BRACKET DETAILS SHOWN ABOVE ARE SCHEMATIC IN NATURE. THE CONTRACTOR IS RESPONSIBLE FOR DESIGN OF THE CONNECTION FROM THE PILE CAP TO THE PILES. SEE THE HELICAL ANCHOR SPECIAL PROVISION FOR DETAILS.

DATE:	DESCRIPTION:	BY:
DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

PEDESTRIAN BRIDGE DETAILS

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY: RKK
DRAWN BY: RKK
BUILDING NO.: N/A
DATE: 7/3/13
SCALE: 1"=1'
SHEET NO.: S-6
PARKS PROJECT #: CH-41
CONTRACT #: 2013-CH-300

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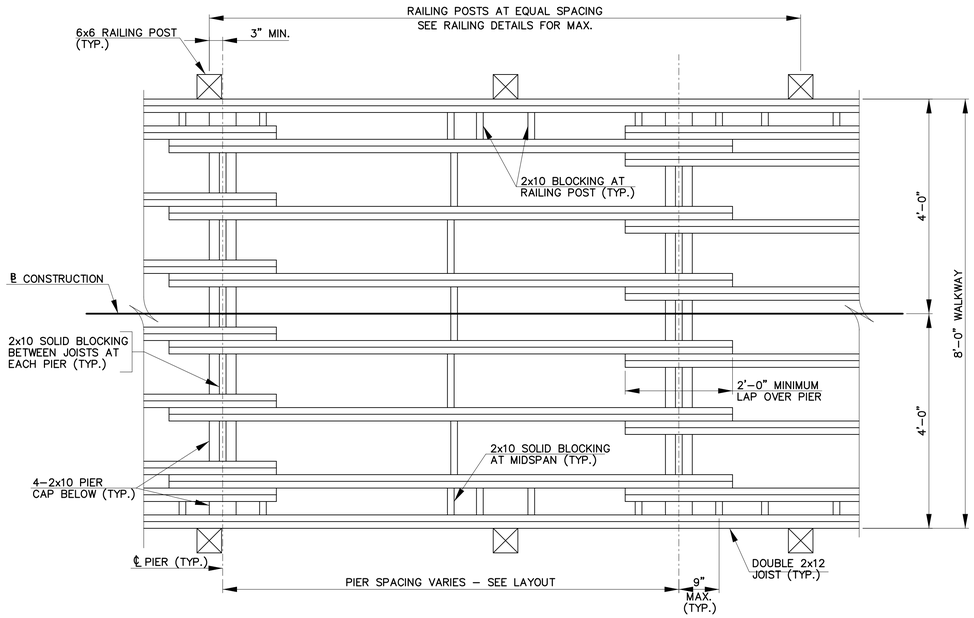
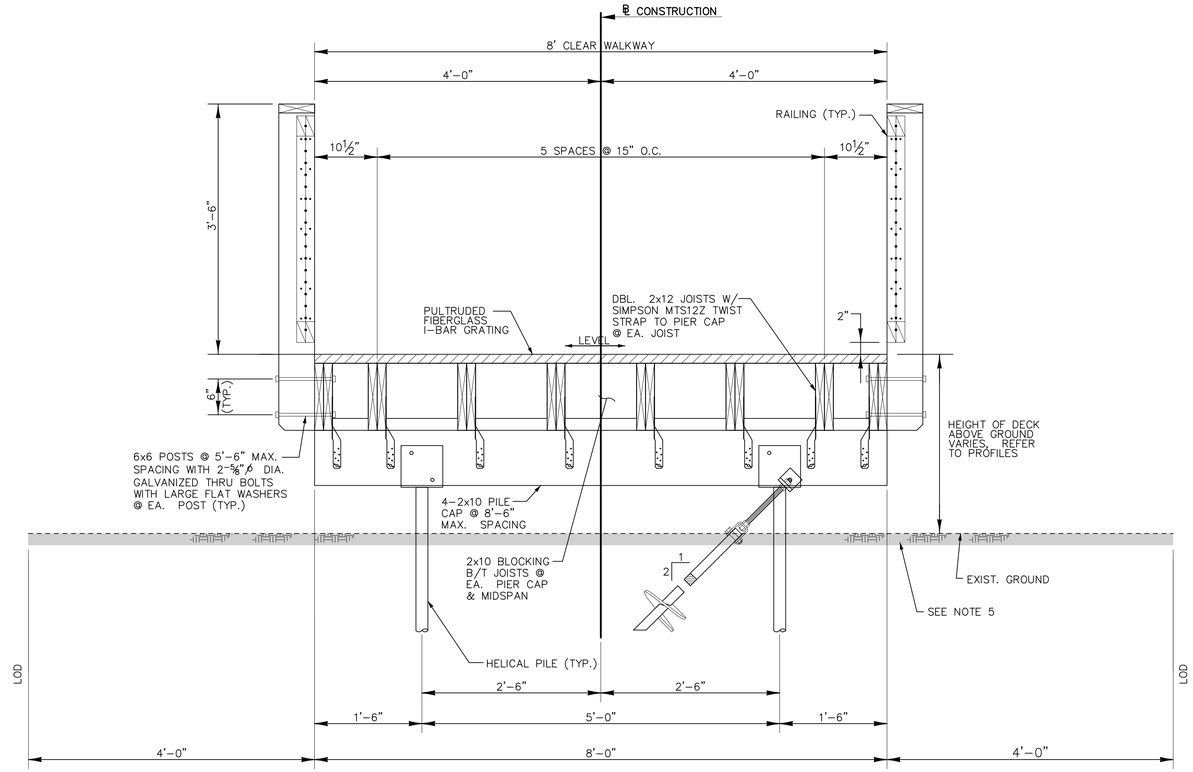


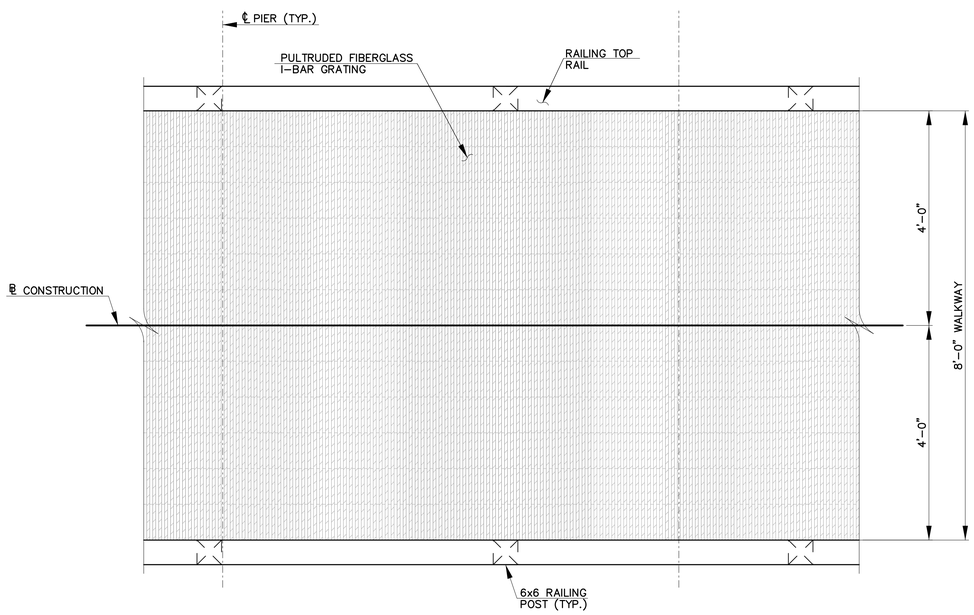
FRAMING PLAN

SCALE: ¾"=1'-0"



TYPICAL SECTION

SCALE: 1"=1'-0"



DECKING PLAN

SCALE: ¾"=1'-0"

NOTES:

1. BATTERED PILES SHALL BE INSTALLED IN THE TRANSVERSE DIRECTION AT EVERY PIER. BATTERED PILES SHALL BE INSTALLED IN THE LONGITUDINAL DIRECTION AT EVERY FOURTH PIER. ALTERNATE PILE DIRECTION.
2. HELICAL PILES SHALL BE IN ACCORDANCE WITH SPECIAL PROVISION T-618500.
3. TWIST STRAPS TO BE 16-GAUGE, Z-MAX. GALVANIZED, INSTALLED WITH 14 HOT-DIP GALVANIZED 10D 1½" NAILS PER MANUFACTURER'S RECOMMENDATIONS.
4. GAPS BETWEEN ADJACENT DECKING SECTIONS SHALL NOT EXCEED ½" AT ANY LOCATION.
5. UNLESS SHOWN OTHERWISE RESTORE AREA TO ORIGINAL GRADE. SANDY DUNE AREAS SHALL BE ALLOWED TO NATURALLY REVEGETATE. WETLANDS SHALL BE MINIMALLY DISTURBED BY USING SUPPORT MATS, LOW IMPACT EQUIPMENT, AND BY MINIMIZING VEHICULAR TRAFFIC AND ALLOWED TO NATURALLY REVEGETATE.
6. JOISTS MAY BE LAPPED OVER PILE CAPS IN TANGANT SECTIONS. SEE TANGENT SECTION FRAMING PLAN.

DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

PEDESTRIAN BRIDGE
TANGENT SECTION DETAILS

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY: RKK

DRAWN BY: RKK

BUILDING NO.: N/A

DATE: 7/3/13

SCALE: AS NOTED

SHEET NO.: S-7

PARKS PROJECT #: CH-41

CONTRACT #: 2013-CH-300

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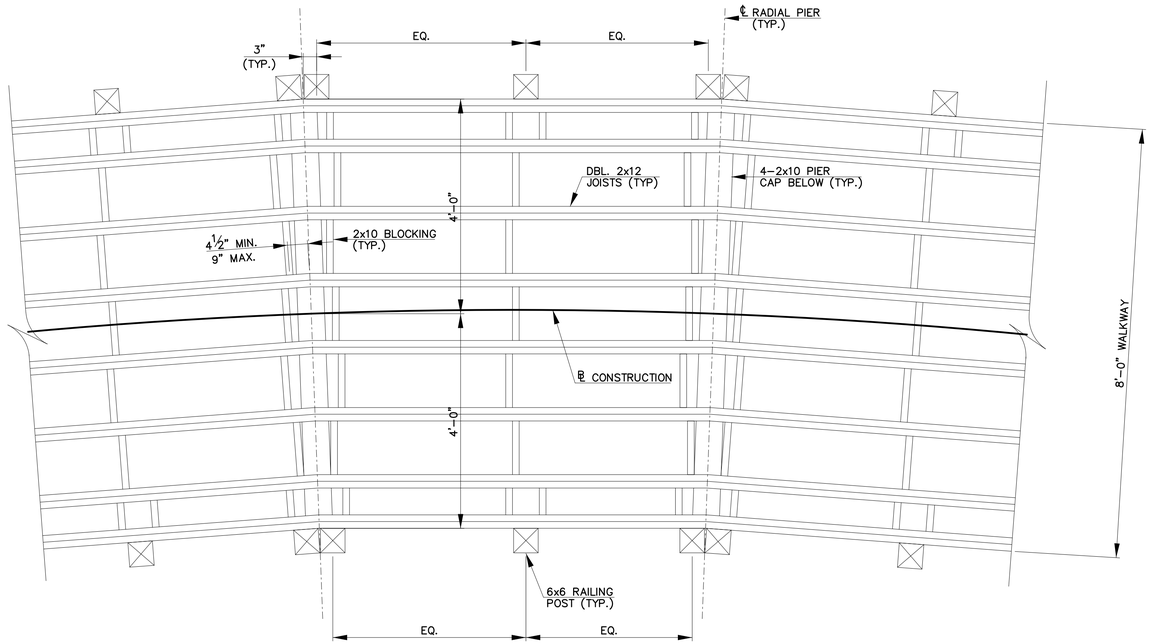
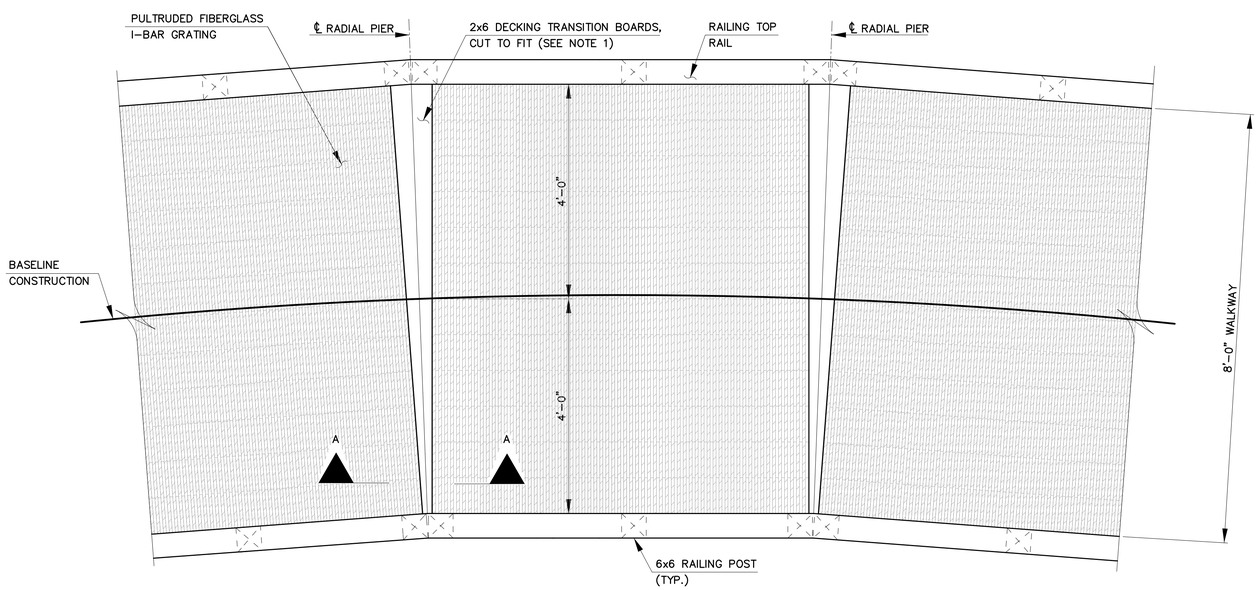


FRAMING PLAN

SCALE: ¾"=1'–0"

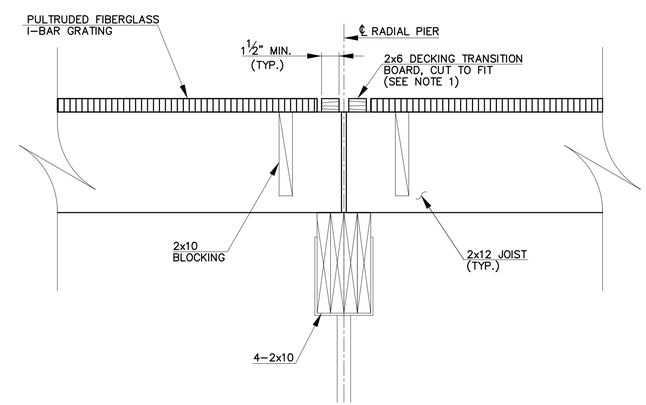


DECKING PLAN

SCALE: ¾"=1'–0"

NOTES:

1. CUT LONGITUDINAL EDGES OF 2x6 DECKING PARALLEL TO LENGTH OF ADJACENT GRATING. SIZE SUCH THAT GAP BETWEEN GRATING AND 2x6 DECKING IS NO GREATER THAN ½" AFTER SHRINKAGE. DECKING SHALL NOT BE CUT NARROWER THAN 1½".
2. 100' RADIUS ON BASELINE SHOWN, OTHER RADII SIMILAR.
3. CONTRACTOR SHALL SUBMIT THE I–BAR AND 2x6 DECKING LAYOUT FOR REVIEW AND APPROVAL.
4. ALL PIERS (PILES AND PILE CAPS) IN CURVED SECTIONS SHALL BE RADIAL TO THE BASELINE.
5. FOR TYPICAL SECTION, SEE SHEET S–7.



SECTION A–A

SCALE: 1½"=1'–0"

DATE:	DESCRIPTION:	BY:
DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK GORDONS POND TRAIL IMPROVEMENTS

PEDESTRIAN BRIDGE RADIAL SECTION DETAILS

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY: RKK

DRAWN BY: RKK

BUILDING NO.: N/A

DATE: 7/3/13

SCALE: AS NOTED

SHEET NO.: S-8

PARKS PROJECT #: CH–41

CONTRACT #: 2013–CH–300

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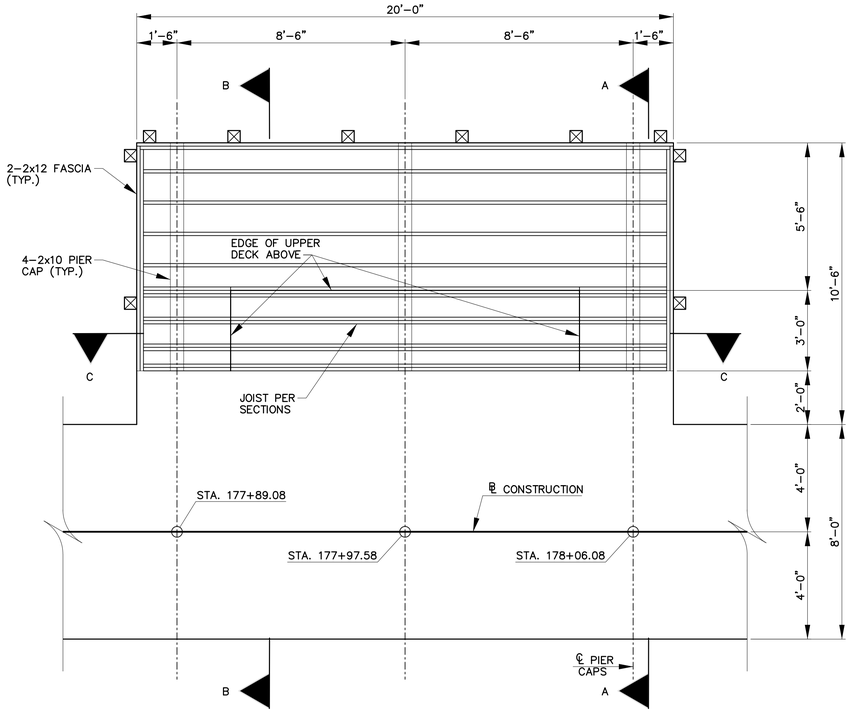
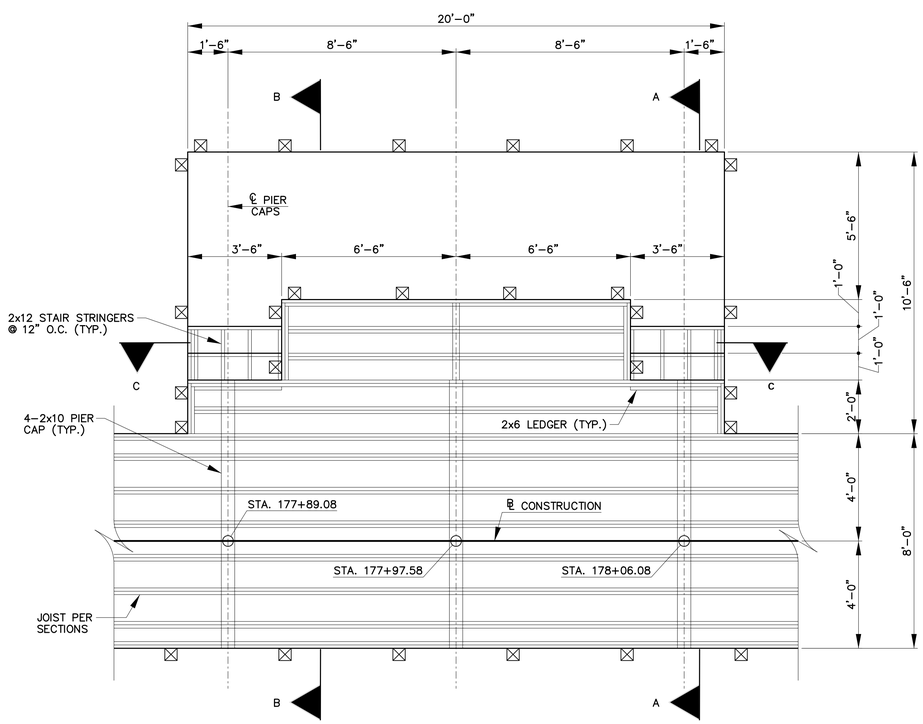


LOWER FRAMING PLAN

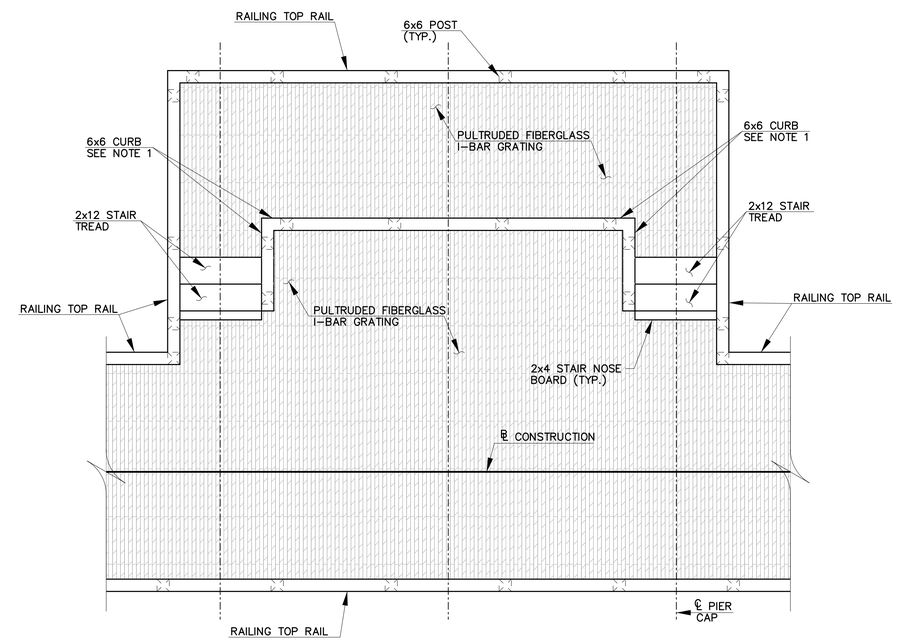
SCALE: 3/8"=1'-0"



UPPER FRAMING PLAN

SCALE: 3/8"=1'-0"

NOTE:
1. FOR SECTIONS A, B AND C, SEE SHEETS S-11 AND S-12.
2. BLOCKING NOT SHOWN FOR CLARITY.



OBSERVATION AREA 1 DECKING PLAN

SCALE: 3/8"=1'-0"

NOTE:
1. I-BAR GRATING AND 2x12 STAIR TREADS EXTEND BELOW 6x6 CURB TO UPPER LEVEL FACIA BEAMS. SEE DETAILS ON SHEET S-11.

DATE:	DESCRIPTION:	BY:
DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

PEDESTRIAN BRIDGE
OBSERVATION AREA 1 DETAILS

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY:	RKK
DRAWN BY:	RKK
BUILDING NO.:	N/A
DATE:	7/3/13
SCALE:	AS NOTED
SHEET NO.:	S-9
PARKS PROJECT #:	CH-41
CONTRACT #:	2013-CH-300

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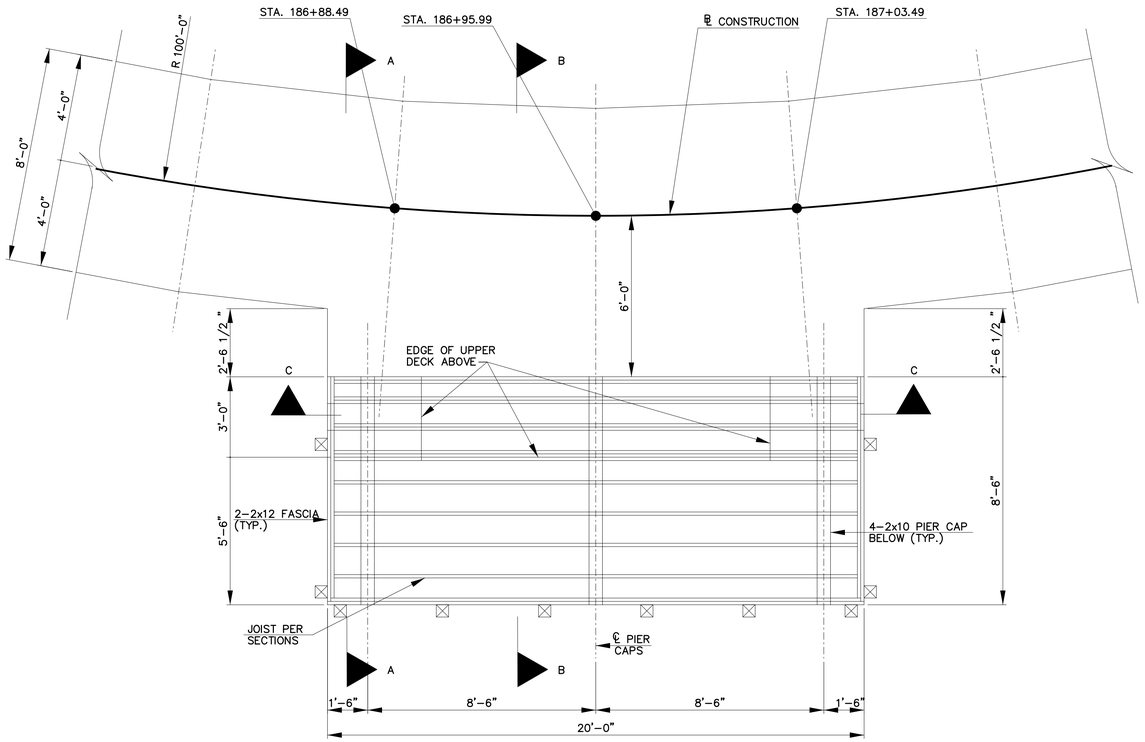
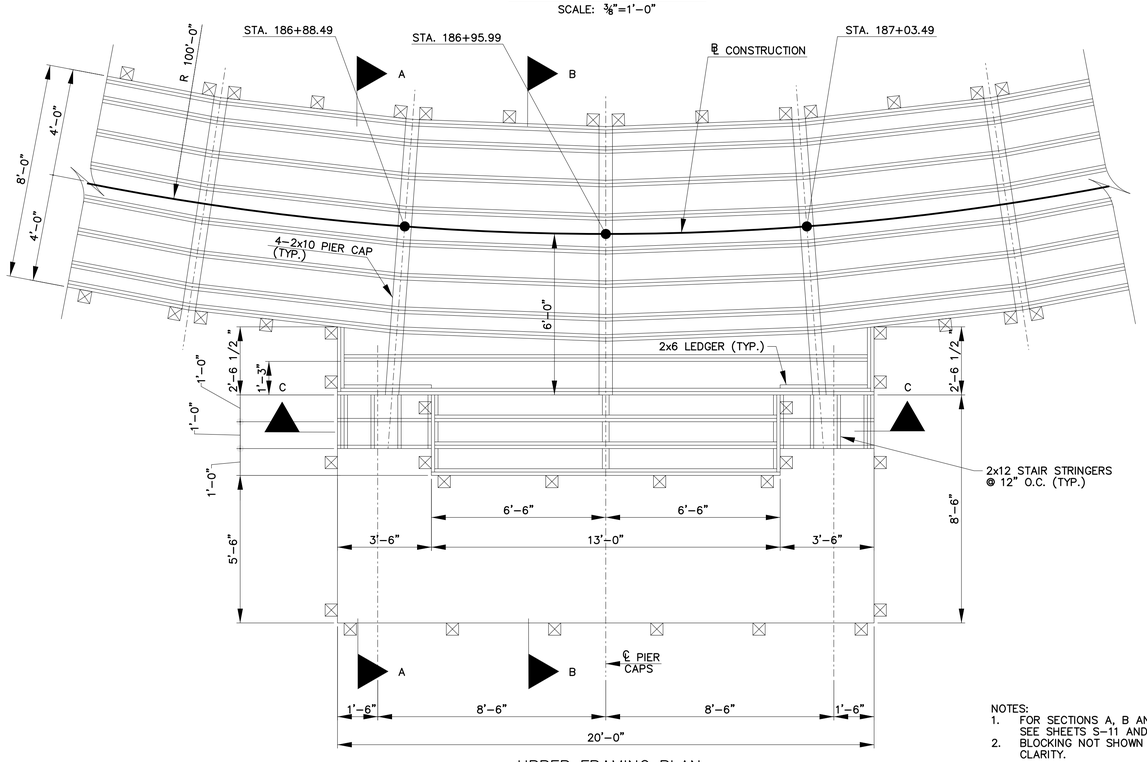


LOWER FRAMING PLAN

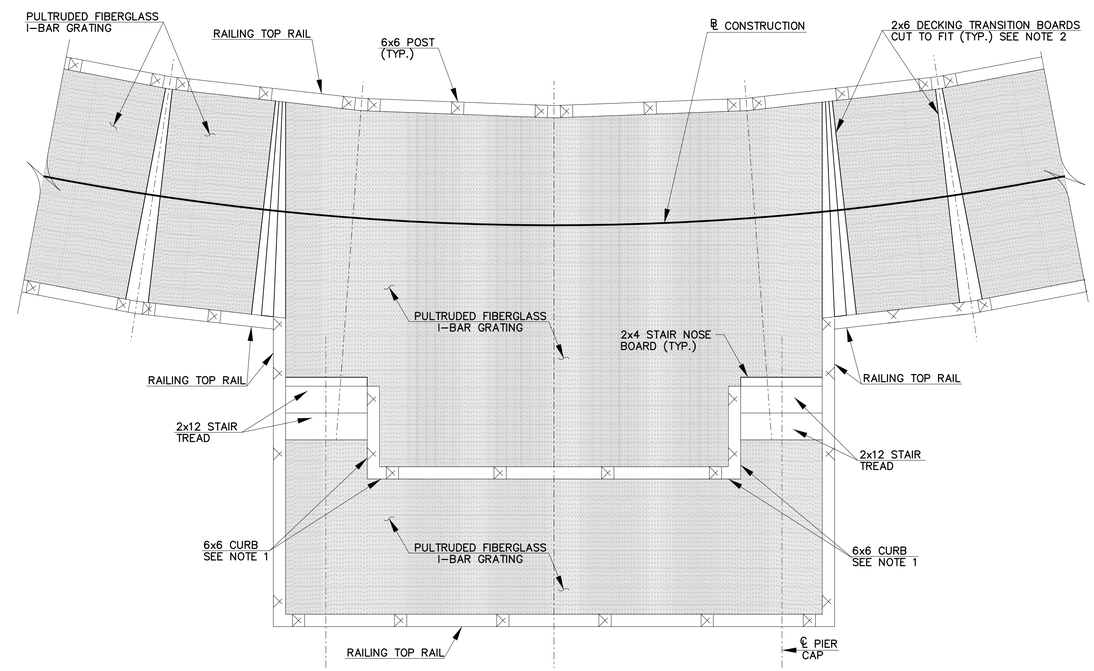
SCALE: ⅜"=1'-0"



UPPER FRAMING PLAN

SCALE: ⅜"=1'-0"

NOTES:
1. FOR SECTIONS A, B AND C, SEE SHEETS S-11 AND S-12.
2. BLOCKING NOT SHOWN FOR CLARITY.



OBSERVATION AREA 2 DECKING PLAN

SCALE: ⅜"=1'-0"

NOTES:
1. I-BAR GRATING AND 2x12 STAIR TREADS EXTEND BELOW 6x6 CURB TO UPPER LEVEL FACIA BEAMS. SEE DETAILS ON SHEET S-11.
2. CUT LONGITUDINAL EDGES OF 2x6 DECKING PARALLEL TO LENGTH OF ADJACENT GRATING. SIZE SUCH THAT GAP BETWEEN GRATING AND 2x6 DECKING IS NO GREATER THAN ½" AFTER SHRINKAGE. DECKING SHALL NOT BE CUT NARROWER THAN 1½".

DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

PEDESTRIAN BRIDGE OBSERVATION AREA 2 DETAILS

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY: RKK

DRAWN BY: RKK

BUILDING NO.: N/A

DATE: 7/3/13

SCALE: AS NOTED

SHEET NO.: S-10

PARKS PROJECT #: CH-41

CONTRACT #: 2013-CH-300

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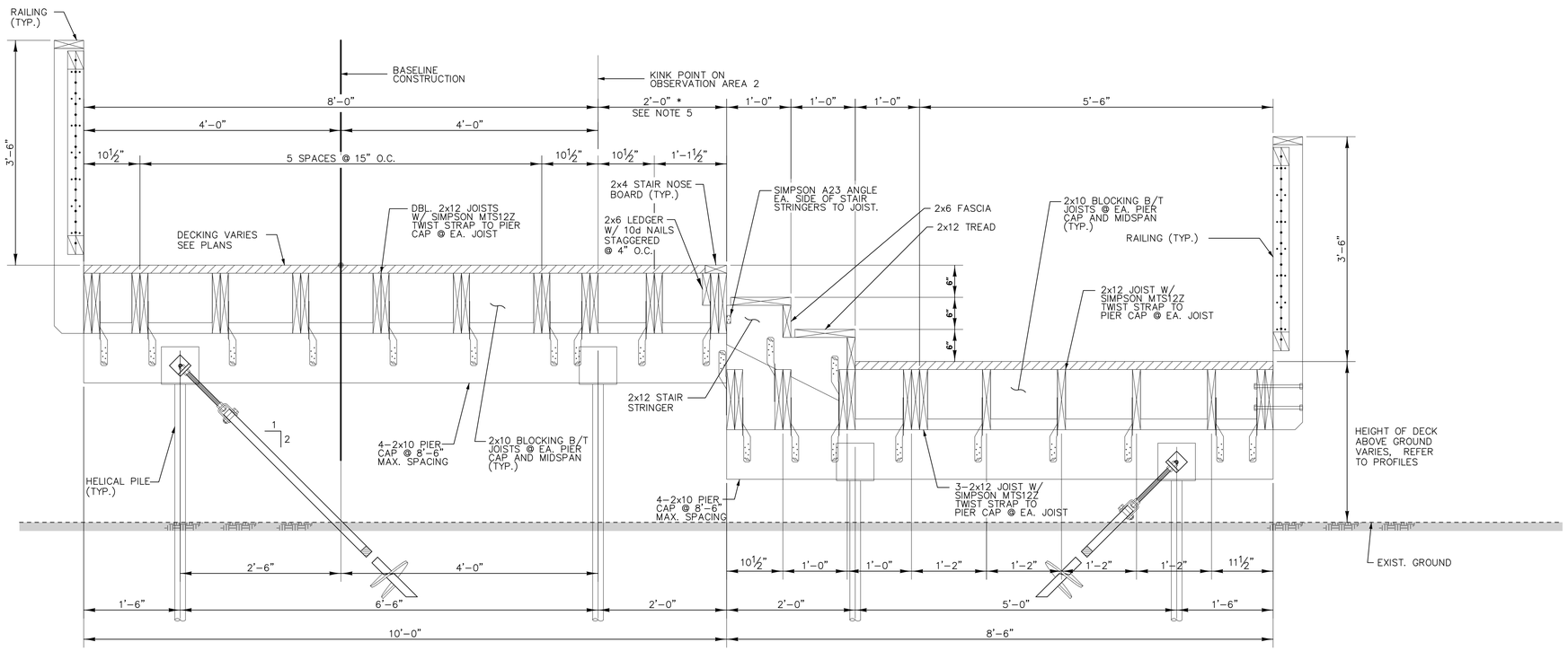
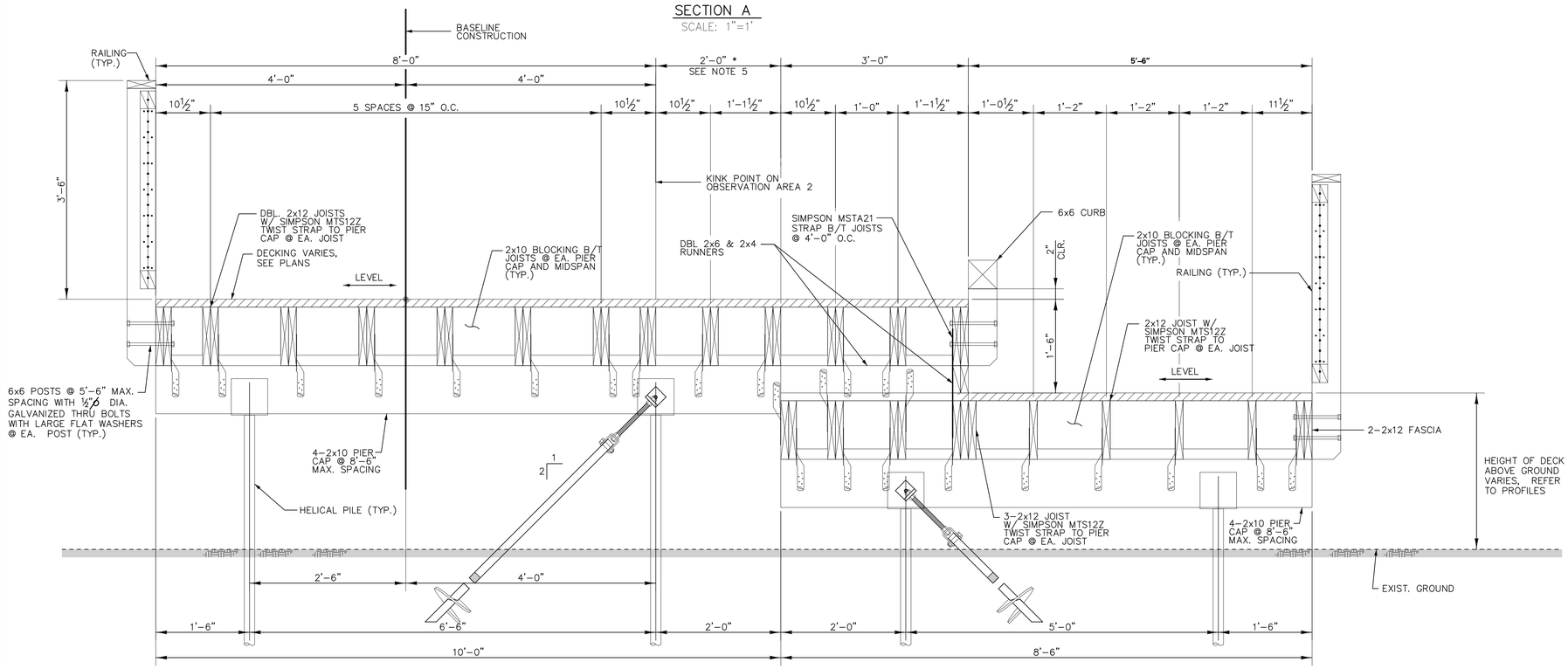


SECTION A

SCALE: 1"=1'



SECTION B

SCALE: 1"=1'

NOTES:

1. FOR UPPER PIER CAPS, BATTERED PILES SHALL BE INSTALLED IN ACCORDANCE WITH THE TYPICAL SECTION PER NOTE 1 ON SHEET S-7.
2. FOR LOWER PIER CAPS, BATTERED PILES SHALL BE INSTALLED IN THE TRANSVERSE DIRECTION AT EVERY PIER. ALTERNATE PILE DIRECTION.
3. BATTERED PILES SHALL BE INSTALLED IN THE LONGITUDINAL DIRECTION AT EXTERIOR LOWER PIER CAPS AIMED TOWARD CENTER OF OBSERVATION AREA.
4. NOTES 2 THRU 5 ON SHEET S-7 APPLY FOR OBSERVATION AREA FRAMING.
5. DIMENSION VARIES AT OBSERVATION AREA 2. MIN. 2'-0" MAX. 2'-6½"

DATE:	DESCRIPTION:	BY:
DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

PEDESTRIAN BRIDGE AND OBSERVATION AREA TYPICAL SECTIONS

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY: RKK

DRAWN BY: RKK

BUILDING NO.: N/A

DATE: 7/3/13

SCALE: 1"=1'

SHEET NO.: S-11

PARKS PROJECT #: CH-41

CONTRACT #: 2013-CH-300

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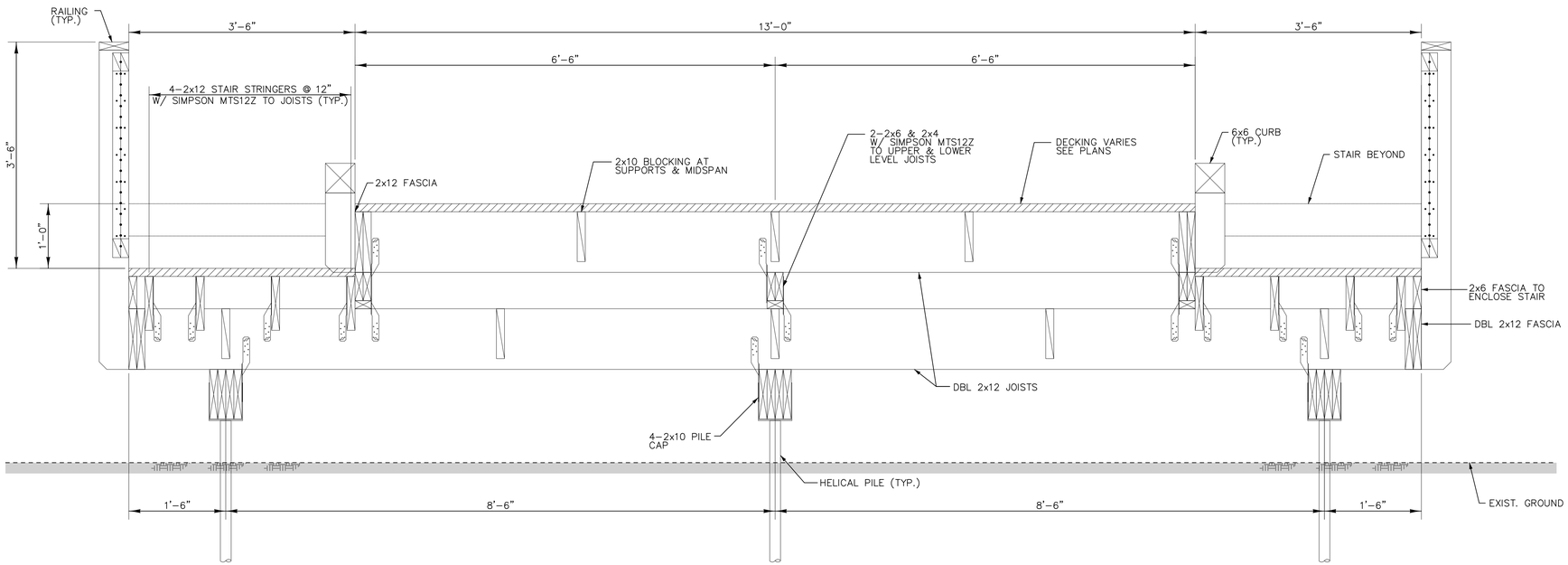

SECTION C
SCALE: 1"=1'

DATE:	DESCRIPTION:	BY:
DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

PEDESTRIAN BRIDGE AND OBSERVATION AREA
TYPICAL SECTIONS

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY: RKK
DRAWN BY: RKK
BUILDING NO.: N/A
DATE: 7/3/13
SCALE: 1"=1'
SHEET NO.: S-12
PARKS PROJECT #: CH-41
CONTRACT #: 2013-CH-300

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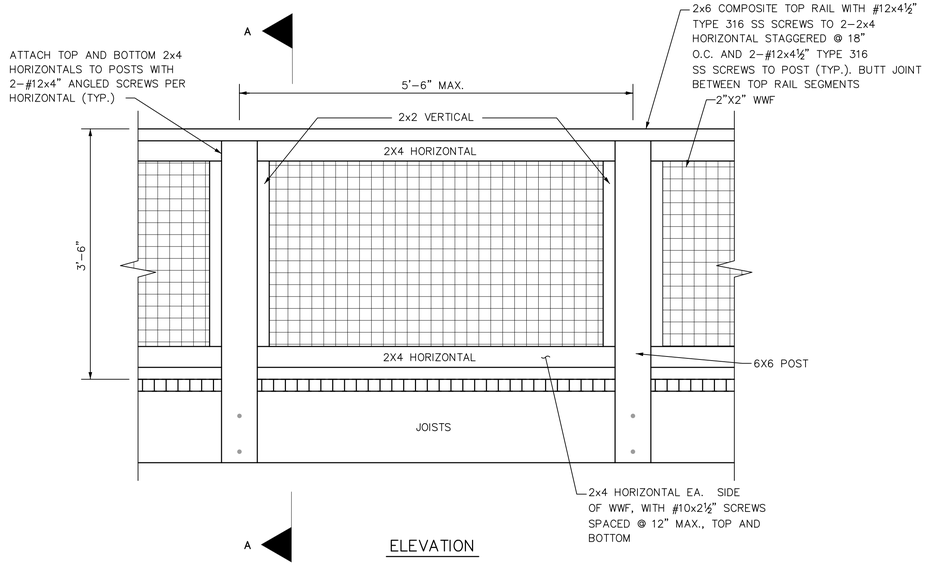
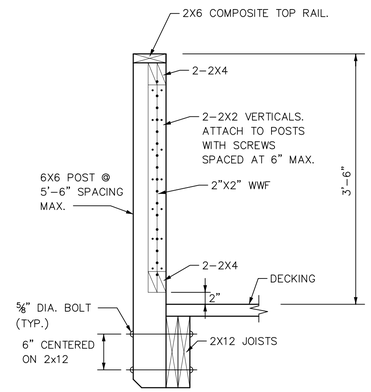


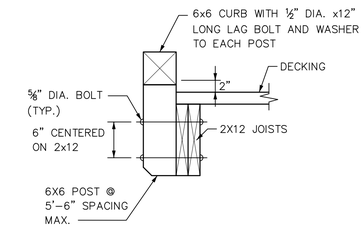
ELEVATION



SECTION A–A

RAILING NOTES:

1. THE WIRE MESH SHALL BE 2"x2" WWF WITH 0.12 WIRE DIAMETER AND SHALL BE HOT–DIP GALVANIZED. 2"X2" WWF TO EXTEND TO OUTER EDGES OF HORIZONTALS AND VERTICALS TO ENGAGE SCREWS.
2. THE WIRE MESH SHALL BE ATTACHED TO THE HORIZONTAL 2x4 TOP AND BOTTOM WITH HOT–DIP GALVANIZED 18 GAUGE WIRE STAPLES WITH MINIMUM ½" LEGS AT 12" CENTER TO CENTER.



TYPICAL CURB DETAIL

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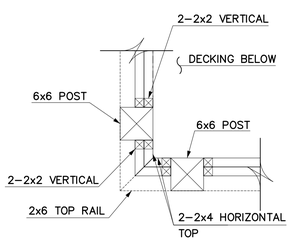
TYPICAL RAILING DETAIL

NTS



RAILING CORNER DETAIL

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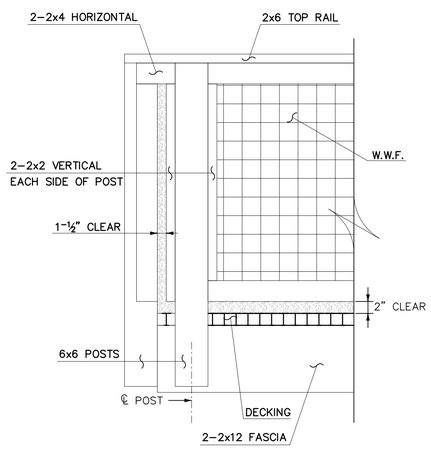

RAILING CORNER ELEVATION

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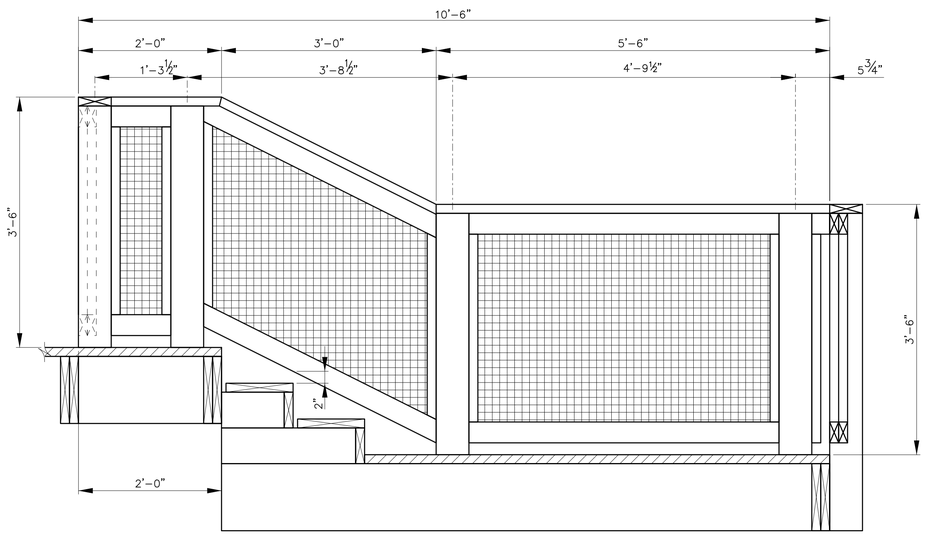

RAILING DETAIL AT STAIR

NTS

NOTE:

OBSERVATION AREA 1 SHOWN. OPBERSERVATION AREA 2 SIMILAR.

DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

PEDESTRIAN BRIDGE RAILING DETAILS

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY: RKK
DRAWN BY: RKK
BUILDING NO.: N/A
DATE: 7/3/13
SCALE: AS NOTED
SHEET NO.: S-13
PARKS PROJECT #: CH–41
CONTRACT #: 2013–CH–300

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EROSION AND SEDIMENT CONTROL NOTES:

1. THE DNREC SEDIMENT AND STORMWATER MANAGEMENT PROGRAM MUST BE NOTIFIED IN WRITING FIVE (5) DAYS PRIOR TO COMMENCING WITH CONSTRUCTION. FAILURE TO DO SO CONSTITUTES A VIOLATION OF THE APPROVED SEDIMENT AND STORMWATER MANAGEMENT PLAN.
2. REVIEW AND APPROVAL OF THE SEDIMENT AND STORMWATER MANAGEMENT PLAN SHALL NOT RELIEVE THE CONTRACTOR FROM HIS OR HER RESPONSIBILITIES FOR COMPLIANCE WITH THE REQUIREMENTS OF THE SEDIMENT AND STORMWATER MANAGEMENT REGULATIONS, NOR SHALL IT RELIEVE THE CONTRACTOR FROM ERRORS OR OMISSIONS IN THE APPROVED PLAN.
3. IF THE APPROVED PLAN NEEDS TO BE MODIFIED, ADDITIONAL SEDIMENT AND STORMWATER MEASURES MAY BE REQUIRED AS DEEMED NECESSARY BY DNREC.
4. FOLLOWING SOIL DISTURBANCE OR REDISTURBANCE OF THE STAGING AREA, PERMANENT OR TEMPORARY STABILIZATION SHALL BE COMPLETED WITHIN FOURTEEN (14) CALENDAR DAY AS TO THE SURFACE OF ALL PERIMETER SEDIMENT CONTROLS AND SOIL STOCKPILES. IN ALL OTHER AREAS OF THE PROJECT SITE, THE CONTRACTOR SHALL NOT DISTURB MORE AREA THAN CAN BE STABILIZED WITHIN THE SAME DAY. DURING CONSTRUCTION OF THE TRAIL, THE CONTRACTOR IS TO "STABILIZE AS YOU GO" BY PLACING STONE IMMEDIATELY AFTER SOIL DISTURBANCE AS A CONTINUOUS OPERATION.
5. UPON COMPLETION OF CONSTRUCTION AND APPROVAL BY DNREC'S SEDIMENT & STORMWATER PROGRAM, THE OWNER SHALL BE RESPONSIBLE FOR FUTURE MAINTENANCE OF THE PERMANENT STORMWATER MANAGEMENT FACILITIES.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTENANCE AND REPAIR OF ALL EROSION AND SEDIMENT CONTROL DEVICES AND STORMWATER MANAGEMENT PRACTICES DURING ALL CONSTRUCTION ACTIVITIES.
7. DUST IS TO BE CONTROLLED EXCLUSIVELY THROUGH THE USE OF WATER. COSTS ASSOCIATED WITH THE FURNISHING AND APPLICATION OF WATER FOR DUST CONTROL SHALL BE INCLUDED IN THE BID.
8. IT IS INTENDED THAT MUD TRACKING BE ELIMINATED ON ALL ROADWAYS AND PARKING LOTS ADJOINING THE PROJECT. EACH POINT OF INGRESS AND EGRESS FROM THE PROJECT SHALL HAVE INSTALLED A STABILIZED CONSTRUCTION ENTRANCE (SCE). ALL PAVED SURFACES ADJOINING THE PROJECT LIMITS SHALL BE LEFT IN A BROOM CLEAN CONDITION AT THE END OF EACH WORKDAY. STABILIZED CONSTRUCTION ENTRANCES SHALL BE TOP DRESSED WITH TWO (2) INCHES OF CLEAN DE NO. 3 STONES WHEN THE VOIDS BECOME CLOGGED OR AS DIRECTED BY THE OWNER. IN THE EVENT THAT IT IS DETERMINED THAT VEHICLES ARE TRANSPORTING SEDIMENT FROM THE SITE, A WHEEL WASH SHALL BE INSTALLED TO CLEAN VEHICLES PRIOR TO THEIR EGRESS FROM THE SITE AT NO ADDITIONAL COST. THIS DETERMINATION SHALL BE MADE BY THE ON SITE CERTIFIED CONSTRUCTION REVIEWER (CCR) AND/OR BY THE OWNER.
9. TOTAL DISTURBED AREA: 7.6 ACRES. TOTAL VOLUME OF SPOILS: APPROX. 1,752 C.Y.
10. THE SUSSEX COUNTY SOIL SURVEY STATES THAT THE PROJECT AREA IS COMPRISED OF SOIL IN THE ACQUANGO - BEACHES COMPLEX, HYDROLOGICAL SOIL GROUP D, BROADKILL MUCKY PEAT, HYDROLOGICAL SOIL GROUP D, BROCKATONORTON -URBAN LAND COMPLEX, HYDROLOGICAL SOIL GROUP D, PURNELL PEAT, HYDROLOGICAL SOIL GROUP D, SALTPOND MUCKY SAND, HYDROLOGICAL SOILS GROUP D AND TRANSQUAKING AND MISPILLION SOILS, HYDROLOGICAL SOIL GROUP D.
11. THE ENTIRE PROJECT SITE IS LOCATED WITHIN THE 100-YEAR FLOODPLAIN.
12. FOR THE COMPLETE LIMIT OF DISTURBANCE AREA, REFER TO THE CONSTRUCTION PLANS, SHEETS C-9 THROUGH C-21.
13. FOR EROSION AND SEDIMENT CONTROLS, SEE SHEETS ES-1 AND ES-2.

GENERAL SEQUENCE OF CONSTRUCTION:

1. THE DNREC SEDIMENT AND STORMWATER MANAGEMENT PROGRAM MUST BE NOTIFIED IN WRITING FIVE (5) DAYS PRIOR TO COMMENCING WITH CONSTRUCTION. FAILURE TO DO SO CONSTITUTES A VIOLATION OF THE APPROVED SEDIMENT AND STORMWATER MANAGEMENT PLAN.
2. AS A FIRST ORDER OF WORK, THE CONTRACTOR SHALL INSTALL STABILIZED CONSTRUCTION ENTRANCE AND ALL OTHER EROSION AND SEDIMENT CONTROL DEVICES AS SHOWN ON THE PLANS.
3. INSTALL TRAIL CLOSURE SIGNS AS SHOWN ON PLANS.
4. THE CONTRACTOR SHALL COORDINATE AN ON-SITE MEETING WITH THE OWNER A MINIMUM OF 7 DAYS PRIOR TO ANY TREE REMOVAL/ PRUNING ACTIVITIES. THE OWNER AND CONTRACTOR SHALL IDENTIFY AND CLEARLY MARK ANY TREE TO BE REMOVED AND REVIEW PRUNING PROCEDURES.
5. THE CONTRACTOR SHALL INSTALL TEMPORARY CHAIN LINK FENCE AND TEMPORARY GATE, ESTABLISHING THE SOUTH CONSTRUCTION STAGING AREA AS SHOWN ON THE PLAN.
6. THE CONTRACTOR SHALL CLEAR AND GRUB, ROUGH GRADE, CONSTRUCT GRADED AGGREGATE BASE COURSE, GRADE SWALE, TEMPORARY STABILIZATION, INSTALL DRAINAGE APPURTENANCES AND INSTALL TEMPORARY CHAIN LINK FENCE AND TEMPORARY GATES, ESTABLISHING THE NORTH CONSTRUCTION STAGING AREA AS SHOWN ON PLANS.
7. THE CONTRACTOR SHALL BEGIN CONSTRUCTION OF THE AT-GRADE TRAIL STARTING AT THE EXISTING OBSERVATION PLATFORM ON THE SOUTH SIDE AND DUNE ROAD ON THE NORTH SIDE WORKING NORTH AND SOUTH TO THE LOCATION OF THE PEDESTRIAN BRIDGE. THE CONTRACTOR SHALL EXCAVATE ONLY AS MUCH OF THE TRAIL AS CAN BE CONSTRUCTED AND STABILIZED BY THE END OF THE WORK DAY. NO DISTURBED AREA SHALL BE LEFT UNSTABILIZED AT THE END OF THE WORK DAY. THE CONTRACTOR WILL PLACE ONLY THE 8" OF TYPE B GRADED AGGREGATE BASE COURSE AT THIS TIME. THE INTENT IS TO UTILIZE THE TRAIL AS A HAUL ROAD DURING CONSTRUCTION.
8. CONSTRUCT THE PEDESTRIAN BRIDGE AND OBSERVATION AREAS.
9. THE CONTRACTOR SHALL PROVIDE TEMPORARY PROTECTIVE SHEETING TO PROTECT THE FINISHED DECKING MATERIAL DURING CONSTRUCTION. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR THE SHEETING TO THE OWNER FOR REVIEW AND APPROVAL. ANY DAMAGE TO THE FINISHED SURFACE PANELS SHALL BE REPLACED BY THE CONTRACTOR AT THE CONTRACTOR'S EXPENSE.
10. ANY DAMAGE TO THE HANDRAIL SHALL BE REPLACED BY THE CONTRACTOR AT THE CONTRACTOR'S EXPENSE.
11. UPON COMPLETION OF THE OBSERVATION AREAS AND PEDESTRIAN BRIDGE, THE CONTRACTOR SHALL FINALIZE CONSTRUCTION OF THE AT-GRADE TRAIL. THE CONTRACTOR SHALL DRESS THE GRADED AGGREGATE AND PROVIDE ADDITIONAL GRADED AGGREGATE AS NECESSARY TO REMOVE ALL RUTS CREATED DURING CONSTRUCTION PRIOR TO CHOKING GRADED AGGREGATE BASE COURSE WITH 1-1/2" STONE DUST. THE CONTRACTOR SHALL BEGIN AT THE PEDESTRIAN BRIDGE AND WORK TOWARD THE CONSTRUCTION STAGING AREAS. THE INTENT IS TO MINIMIZE CONSTRUCTION EQUIPMENT ON THE TRAIL AFTER STONE DUST HAS BEEN ROLLED INTO THE GRADED AGGREGATE BASE COURSE.
12. THE CONTRACTOR SHALL REPAIR AND RESHAPE THE STONE TRAIL FROM THE GORDONS POND PARKING LOT TO THE LIMITS OF THE PROPOSED TRAIL. THE REPAIRS SHALL INCLUDE REPLACING EXISTING BENCHES, REGRADING THE EXISTING TRAIL AND BENCH AREAS, PROVIDING ADDITIONAL GRADED AGGREGATE AS NECESSARY TO REMOVE ALL RUTS AND A STONE DUST RESURFACING OF THE EXISTING STONE TRAIL.
13. UPON COMPLETION OF TRAIL CONSTRUCTION, REMOVE TEMPORARY CHAIN LINK FENCE FROM THE SOUTH CONSTRUCTION STAGING AREA. RESTORE THE SOUTH STAGING AREA TO IT'S ORIGINAL CONDITION. THE CONTRACTOR SHALL DRESS THE GRADED AGGREGATE IN THE NORTH STAGING AREA AND PROVIDE ADDITIONAL GRADED AGGREGATE AS NECESSARY TO REMOVE ALL RUTS CREATED DURING CONSTRUCTION PRIOR TO CHOKING GRADED AGGREGATE BASE COURSE WITH 1-1/2" STONE DUST. INSTALL SPLIT RAIL FENCE AND PERMANENT STABILIZATION. SEE GENERAL NOTE 10 ON SHEET C-1.
14. REMOVE ALL SEDIMENT CONTROL DEVICES AFTER APPROVAL BY DNREC'S SEDIMENT AND STORMWATER PROGRAM.

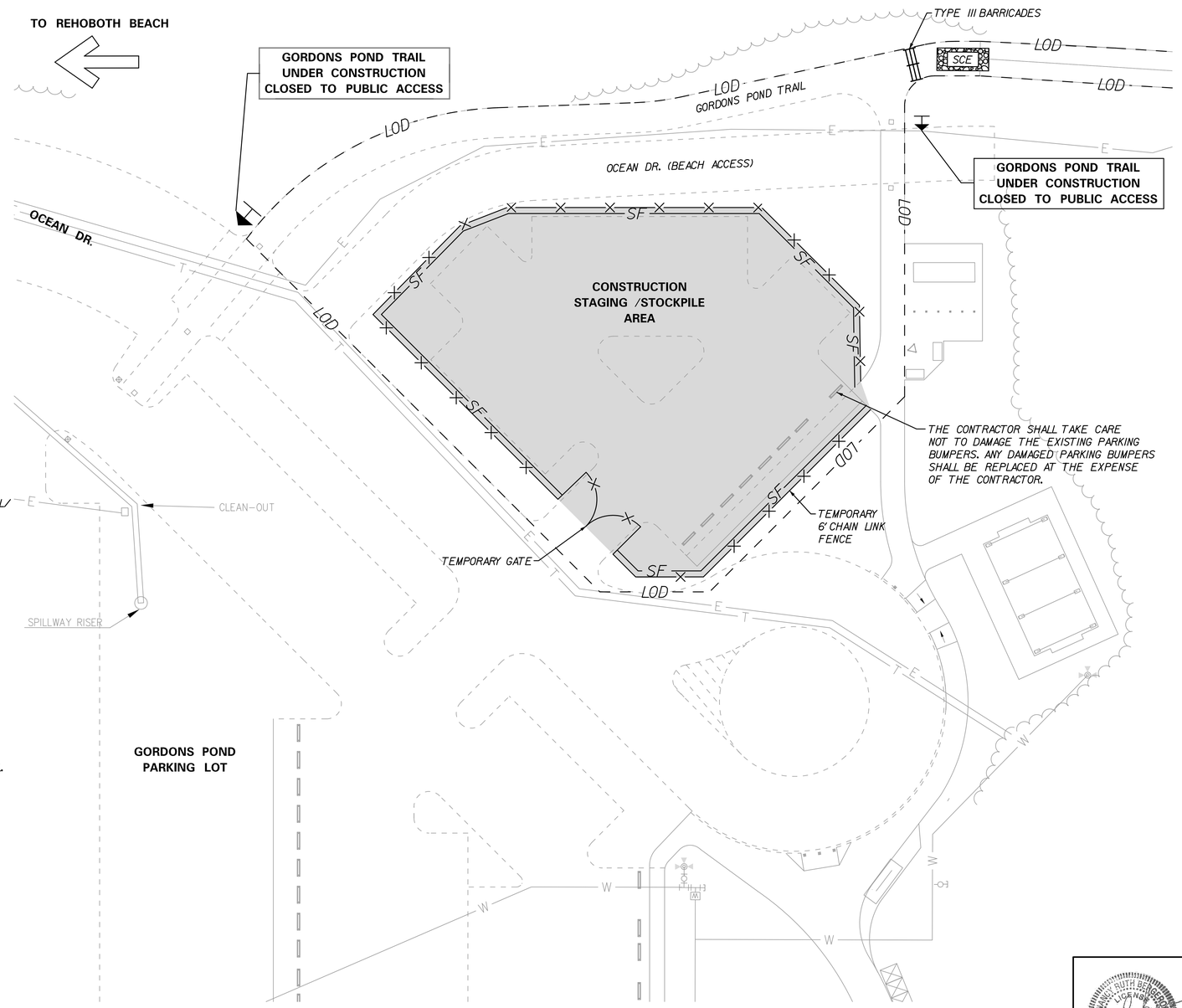
OWNER'S CERTIFICATION

I, _____, HEREBY CERTIFY THAT ALL LAND CLEARING, CONSTRUCTION AND DEVELOPMENT SHALL BE PURSUANT TO THE APPROVED PLAN AND RESPONSIBLE PERSONS INVOLVED WILL HAVE A CERTIFICATE OF TRAINING FROM THE DEPARTMENT OF NATURAL RESOURCES (DNREC). DNREC PERSONNEL SHALL HAVE THE RIGHT TO CONDUCT ON-SITE INSPECTIONS.

DATE _____ SIGNATURE _____

LEGEND

- - LOD - -	LIMIT OF DISTURBANCE
SCE	STABILIZED CONSTRUCTION ENTRANCE
—SF—	SILT FENCE
	COMPOST FILTER LOG
ROP-1	RIP-RAP OUTLET PROTECTION- I
SM-C	STABILIZATION MATTING - CHANNEL SSM-III: NORTH AMERICAN GREEN SC150BN



SOUTH CONSTRUCTION STAGING/STOCKPILE AREA
(GORDONS POND PARKING LOT)

DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS
EROSION AND SEDIMENT CONTROL PLAN

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY:	RKK
DRAWN BY:	RKK
BUILDING NO.:	N/A
DATE:	7/3/13
SCALE:	1" = 20'
SHEET NO.:	ES-1
PARKS PROJECT #:	CH-41
CONTRACT #:	2013-CH-300

NANCY RUTH BERGER LICENSED PROFESSIONAL ENGINEER DELAWARE

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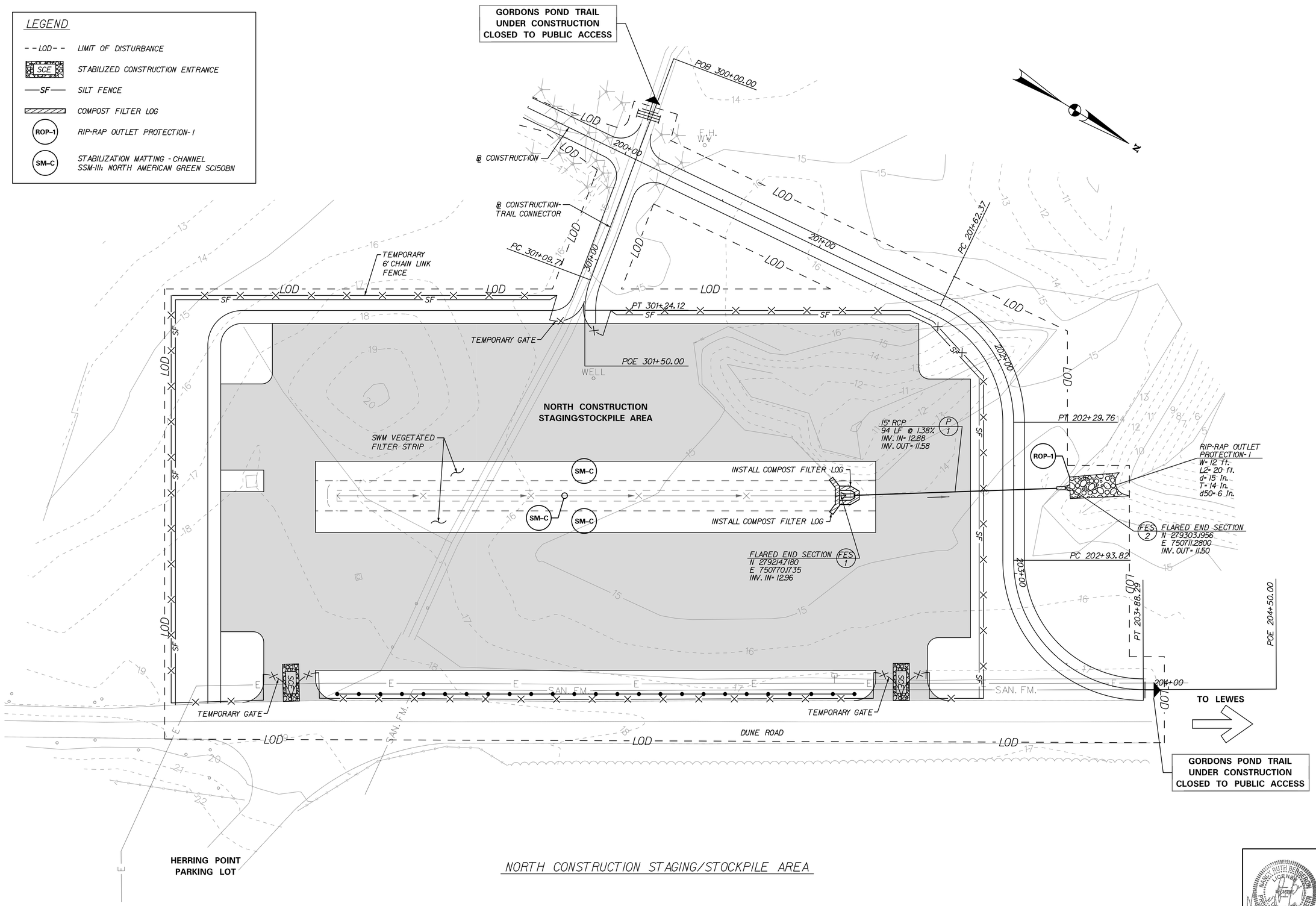

DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

EROSION AND SEDIMENT CONTROL PLAN

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY:	RKK
DRAWN BY:	RKK
BUILDING NO.:	N/A
DATE:	7/3/13
SCALE:	1"=20'
SHEET NO.:	ES-2
PARKS PROJECT #:	CH-41
CONTRACT #:	2013-CH-300

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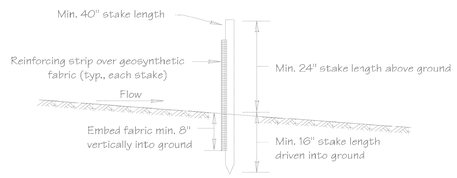
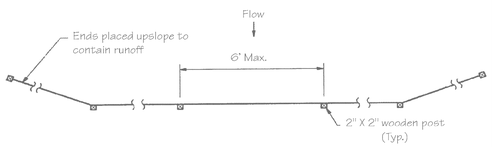
Standard Detail & Specifications
Silt Fence



Section



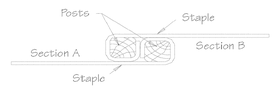
DATA
Max. controlled slope

Plan

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
Silt Fence

Construction Detail



Top

Method for joining continuous sections

Construction Notes:

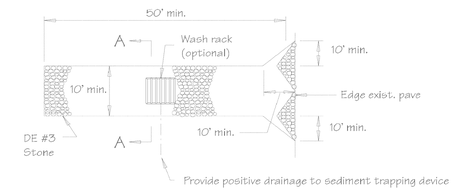
1. Geosynthetic fabric to be fastened securely to fence posts with wire ties or staples.
2. When two sections of filter cloth adjoin each other they shall be overlapped by six inches and folded.
3. Maintenance shall be performed as needed and material removed when "bulges" develop in the silt fence.

Materials:

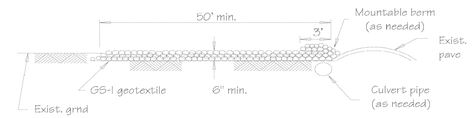
1. Stakes: Steel (either T or U) or 2" x 2" hardwood
2. Geosynthetic Fabric: Type GD-I
3. Reinforcing strip: Wooden lath, plastic strip or other approved equivalent
4. Prefabricated Unit: Geofab, Envirofence, or approved equivalent

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
Stabilized Construct. Entrance



Plan



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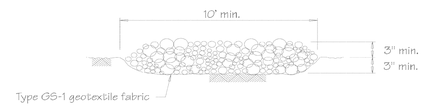
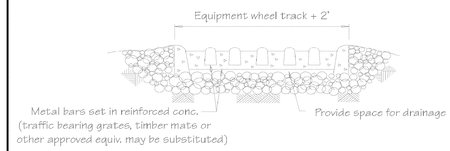


Section A-A (Std.)

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
Stabilized Construct. Entrance



Section A-A (Opt.)

Construction Notes:

1. Stone size - Use DE #3 stone.
2. Length - As required, but not less than 50 feet (except on a single residence lot where a 30 foot minimum length would apply).
3. Thickness - Not less than size (6) inches.
4. Width - Ten (10) foot minimum, but not less than the full width at points where ingress or egress occurs.
5. Geotextile - Type GS-I; placed over the entire area prior to placing of stone.
6. Surface Water - All surface water flowing or diverted toward construction entrances shall be piped across the entrance. If piping is impractical, a mountable berm with 5:1 slopes will be permitted.
7. Maintenance - The entrance shall be maintained in a condition which will prevent tracking or flowing of sediment onto public rights-of-way. This may require periodic top dressing with additional stone as conditions demand and repair and/or cleanout of any measures used to trap sediment. All sediment spilled, dropped, washed or tracked onto public rights-of-way must be removed immediately.
8. Washing - Vehicle wheels shall be cleaned to remove sediment prior to entrance onto public rights-of-way. When washing is required, it shall be done on an area stabilized with stone and which drains into an approved sediment trapping device.
9. Inspection - Periodic inspection and needed maintenance shall be provided after each rain.

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

Standard Detail & Specifications
Site Pollution Prevention

Notes:

The Construction Site Pollution Prevention Plan should include the following elements:

1. Material Inventory

Document the storage and use of the following materials:

a. Concrete
b. Detergents
c. Paints (enamel and latex)
d. Cleaning solvents
e. Pesticides
f. Wood scraps
g. Fertilizers
h. Petroleum based products

2. Good housekeeping practices

a. Store only enough product required to do the job.
b. All materials shall be stored in a neat, orderly manner in their original labeled containers and covered.
c. Substances shall not be mixed.
d. When possible, all of a product shall be used up prior to disposal of the container.
e. Manufacturers' instructions for disposal shall be strictly adhered to.
f. The site foreman shall designate someone to inspect all BMPs daily.

3. Waste management practices

a. All waste materials shall be collected and stored in securely lidded dumpsters in a location that does not drain to a waterbody.
b. Waste materials shall be salvaged and/or recycled whenever possible.
c. The dumpsters shall be emptied a minimum of twice per week, or more if necessary. The licensed trash hauler is responsible for cleaning out dumpsters.

Source:	Symbol:	Detail No.
Adapted from USEPA Pub. 840-B-92-002		DE-ESC-3.6.1 Sheet 1 of 3 Date: 6/05

Standard Detail & Specifications
Site Pollution Prevention

Notes (cont.)

d. Trash shall be disposed of in accordance with all applicable Delaware laws.
e. Trash cans shall be placed at all lunch spots and littering is strictly prohibited. Recycle bins shall be placed near the construction trailer.
f. If fertilizer bags can not be stored in a weather-proof location, they shall be kept on a pallet and covered with plastic sheeting which is overlapped and anchored.

4. Equipment maintenance practices

a. If possible, equipment should be taken to off-site commercial facilities for washing and maintenance.
b. If performed on-site, vehicles shall be washed with high-pressure water spray without detergents in an area contained by an impervious berm.
c. Drip pans shall be used for all equipment maintenance.
d. Equipment shall be inspected for leaks on a daily basis.
e. Washout from concrete trucks shall be disposed of in a temporary pit for hardening and proper disposal.
f. Fuel nozzles shall be equipped with automatic shut-off valves.
g. All used products such as oil, antifreeze, solvents and tires shall be disposed of in accordance with manufacturers' recommendations and local, state and federal laws and regulations.

5. Spill prevention practices

a. Potential spill areas shall be identified and contained in covered areas with no connection to the storm drain system.
b. Warning signs shall be posted in hazardous material storage areas.
c. Preventive maintenance shall be performed on all tanks, valves, pumps, pipes and other equipment as necessary.
d. Low or non-toxic substances shall be prioritized for use.

Source:	Symbol:	Detail No.
Adapted from USEPA Pub. 840-B-92-002		DE-ESC-3.6.1 Sheet 2 of 3 Date: 6/05

Standard Detail & Specifications
Site Pollution Prevention

Notes (cont.)

e. Contact information for reporting spills through the DNREC 24-Hour Toll Free Number shall be prominently posted.

6. Education

a. Best management practices for construction site pollution control shall be a part of regular progress meetings.
b. Information regarding waste management, equipment maintenance and spill prevention shall be prominently posted in the construction trailer.

CONTACT INFORMATION

DNREC 24-Hour Toll Free Number	**800-662-8802**
DNREC Solid & Hazardous Waste Branch	**302-739-9403**

Source:	Symbol:	Detail No.
Adapted from USEPA Pub. 840-B-92-002		DE-ESC-3.6.1 Sheet 3 of 3 Date: 6/05

DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

EROSION AND SEDIMENT CONTROL DETAILS

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY: RKK
DRAWN BY: RKK
BUILDING NO.: N/A
DATE: 7/3/13
SCALE: AS NOTED
SHEET NO.: ES-3
PARKS PROJECT #: CH-41
CONTRACT #: 2013-CH-300

NANCY RUTH BERGER LICENSED PROFESSIONAL ENGINEER DELAWARE

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Standard Detail & Specifications

Topsoiling

Construction Notes:

1. **Site Preparation** (Where Topsoil is to be added)

Note: When topsoiling, maintain needed erosion and sediment control practices such as diversions, grade stabilization structures, berms, dikes, waterways and sediment basins.

a. Grading - Grades on the areas to be topsoiled which have been previously established shall be maintained.

b. Liming - Where the topsoil is either highly acid or composed of heavy clays, ground limestone shall be spread at the rate of 4-8 tons/acre (200-400 pounds per 1,000 square feet). Lime shall be distributed uniformly over designated areas and worked into the soil in conjunction with tillage operations as described in the following procedures.

c. Tilling - After the areas to be topsoiled have been brought to grade, and immediately prior to dumping and spreading the topsoil, the subgrade shall be loosened by discing or by scarifying to a depth of a least 3 inches to permit bonding of the topsoil to the subsoil. Pack by passing a bulldozer up and down over the entire surface area of the slope to create horizontal erosion check slots to prevent topsoil from sliding down the slope.

2. **Topsoil Material and Application**

Note:Topsoil salvaged from the existing site may often be used but it should meet the same standards as set forth in these specifications. The depth of topsoil to be salvaged shall be no more than the depth described as a representative profile for that particular soil type as described in the soil survey published by USDA-SCS in cooperation with Delaware Agricultural Experimental Station.

Source:	Symbol:	Detail No.
USDA - NRCS		DE-ESC-3.4.1 Sheet 1 of 2 Date: 12/03

Standard Detail & Specifications

Topsoiling

Construction Notes (cont.)

a. Materials - Topsoil shall be a loam, sandy loam, clay loam, silt loam, sandy clay loam, loamy sand or other soil as approved by an agronomist or soil scientist. It shall not have a mixture of contrasting textured subsoil and contain no more than 5 percent by volume of cinders, stones, slag, coarse fragment, gravel, sticks, roots, trash or other extraneous materials larger than 1-1/2 inches in diameter. Topsoil must be free of plants or plant parts of bermudagrass, quackgrass, Johnsongrass, nutsedge, poison ivy, thistles, or others as specified. All topsoil shall be tested by a reputable laboratory for organic matter content, pH and soluble salts. A pH of 6.0 to 7.5 and an organic content of not less than 1.5 percent by weight is required. If pH value is less than 6.0 lime shall be applied and incorporated with the topsoil to adjust the pH to 6.5 or higher. Topsoil containing soluble salts greater than 500 parts per million shall not be used.

Note: No sod or seed shall be placed on soil which has been treated with soil sterilants or chemicals used for weed control until sufficient time has elapsed to permit dissipation of toxic materials.

b. Grading - The topsoil shall be uniformly distributed and compacted to a minimum of four (4) inches. Spreading shall be performed in such a manner that sodding or seeding can proceed with a minimum of additional soil preparation and tillage. Any irregularities in the surface resulting from topsoiling or other operations shall be corrected in order to prevent the formation of depressions or water pockets. Topsoil shall not be placed while in a frozen or muddy condition, when the subgrade is excessively wet, or in a condition that may otherwise be detrimental to proper grading and seedbed preparation.

Note:Topsoil substitutes or amendments as approved by a qualified agronomist or soil scientist, may be used in lieu of natural topsoil.

Source:	Symbol:	Detail No.
USDA - NRCS		DE-ESC-3.4.1 Sheet 2 of 2 Date: 12/03

Standard Detail & Specifications

Vegetative Stabilization

TEMPORARY SEEDING BY RATES, DEPTHS AND DATES

Mix #	Species[6]	Seeding Rate		Optimum Seeding Dates [1] O = Optimum Planting Period; A = Acceptable Planting Period							Planting Depth[3]
				Coastal Plain			Piedmont			All	
	Certified Seed	lb/Ac[5]	lb/1000 sq.ft.	2/1-4/30	[2] 5/1-8/14	8/15-10/31	3/1-4/30	[2] 5/1-7/31	8/1-10/31	10/31-2/1	
1	Barley	125	4	O	A	O	O	A	O		1-2 inches 2-3" sandy soils
2	Oats	125	4	O	A	A	O	A	A		1-2 inches 2-3" sandy soils
3	Rye	125	4	O	A	O	O	A	O	A	1-2 inches 2-3" sandy soils
4	Perennial Ryegrass	125	4	O	A	O	O	A	O		0.5 inches 1-2" sandy soils
5	Annual Ryegrass	125	4	O	A	O	O	A	O	A	0.5 inches 1-2" sandy soils
6	Winter Wheat	125	4	O	A	O	O	A	O	A	1-2 inches 2-3" sandy soils
7	Foxtail Millet	30 PLS	0.7		O			O			0.5 inches 1-2" sandy soils
8	Pearl Millet	20 PLS	0.5		O			O			0.5 inches 1-2" sandy soils

1. Winter seeding requires 3 tons per acre of straw mulch for proper stabilization.
2. May be planted throughout summer if soil moisture is adequate or seeded area can be irrigated.
3. Applicable on slopes 3:1 or less.
4. Fifty pounds per acre of Annual Lespedeza may be added to 1/2 the seeding rate of any of the above species.
5. Use varieties currently recommended for Delaware. Contact a County Extension Office for information.
6. Warm season grasses such as Millet or Weeping Lovegrass may be used between 5/1 and 9/1 if desired. Seed at 3-5 lbs. per acre. Good on low fertility and acid areas. Seed after frost through summer at a depth of 0.5".

Source:	Symbol:	Detail No.
Delaware ESC Handbook		DE-ESC-3.4.3 Sheet 1 of 4 Date: 12/03

Standard Detail & Specifications

Vegetative Stabilization

PERMANENT SEEDING AND SEEDING DATES

Mix No.	Seeding Mixtures: Certified Seed[2] / Well Drained Soils	Seeding Rate[1] lb/Ac	lb/1000 sq ft	Optimum Seeding Dates [2] O = Optimum Planting Period A = Acceptable Planting Period: Coastal Plain 2/1-4/30	Coastal Plain 5/1-8/14	Coastal Plain 8/15-10/31	Piedmont 3/1-4/30	Piedmont 5/1-7/31	Piedmont 8/1-10/31	All[3] 10/31-2/1	Remarks
1	Tall Fescue Weeping Lovegrass	140 10	3.2 0.23	A	O	A	A	O	A	Add 100 lbs./ac Winter Rye	Good erosion control mix. Tolerant of low fertility soils. Lovegrass very difficult to mow. Germinates only in hot weather.
2	Deertongue Sheep Fescue Common Lespedeza[4] Inoculated	30 30 15	0.69 0.69 0.35	A	O	A	A	O	A	Add 100 lbs./ac Winter Rye	Good erosion control mix. Tolerant of low fertility soils. Good wildlife cover and food.
3	Tall Fescue (Turf-type) or Strong Creeping Red Fescue or Perennial Ryegrass plus Flatpea[5]	50 50 50 15	1.15 1.15 1.15 0.34	O	A	O	O	A	O	Add 100 lbs./ac. Winter Rye	Good erosion control mix. Tall Fescue for droughty conditions. Creeping Red Fescue for heavy shade. Flatpea to suppress woody vegetation.
4	Strong Creeping Red Fescue Kentucky Bluegrass Perennial Ryegrass or Redtop plus White Clover[5]	100 70 15 5 3	2.3 1.63 0.35 0.11 0.07	O	A	O	O	A	O	Add 100 lbs./ac. Winter Rye	Suitable waterway mix. Canada Bluegrass more drought tolerant. Use Redtop for increased drought tolerance.
5	Switchgrass[6] or Coastal Panicgrass Big Bluestem Little Bluestem Indian Grass	10 10 5 5 5	0.23 0.23 0.11 0.11 0.11		O			O			Native warm-season mixture. Tolerant of low fertility soils. Drought tolerant. Poor shade tolerance. N fertilizer discouraged - weeds.
6	Tall Fescue (turf-type) (Blend of 3 cultivars)	150	3.5	O	A	O	O	A	O		Managed filter strip for nutrient uptake.
7	Tall Fescue Ky. Bluegrass (Blend) Perennial Ryegrass	150 20 20	3.5 0.46 0.46	O	A	O	O	A	O		Three cultivars of Kentucky Bluegrass. Traffic tolerant.
8	Big Bluestem[7] Indian Grass[7] Little Bluestem[7] Creeping Red Fescue plus one of: Partridge Pea Bush Clover Wild Indigo Showy Tick-Trefoil	10 10 8 30 5 3 3 2	0.23 0.23 0.18 0.69 0.11 0.07 0.07 0.05	O	A		O	A			All species are native. Indian Grass and Bluestem have fluffy seeds. Plant with a specialized native seed drill. Creeping Red Fescue will provide erosion protection while the warm season grasses get established.

NOTE: SEE PLANS FOR LOCATIONS OF PERMANENT SEED MIX TYPES 5, 6, AND 10.

Source:	Symbol:	Detail No.
Delaware ESC Handbook		DE-ESC-3.4.3 Sheet 2 of 4 Date: 12/03

Standard Detail & Specifications

Vegetative Stabilization

PERMANENT SEEDING AND SEEDING DATES (cont.)

Mix No.	Seeding Mixtures: Certified Seed[2] / Poorly Drained Soils	Seeding Rate[1] lb/Ac	lb/1000 sq ft	Optimum Seeding Dates [2] O = Optimum Planting Period A = Acceptable Planting Period: Coastal Plain 2/1-4/30	Coastal Plain 5/1-8/14	Coastal Plain 8/15-10/31	Piedmont 3/1-4/30	Piedmont 5/1-7/31	Piedmont 8/1-10/31	All[3] 10/31-2/1	Remarks
9	Redtop Creeping Bentgrass Sheep Fescue Rough Bluegrass	75 35 30 40	1.72 0.8 0.69 0.9	O	A	O	O	A	O	Add 100 lbs./ac. Winter Rye	Quick stabilization of disturbed sites and waterways
10	Reed Canarygrass[6]	10	0.23	A		O	A		O		Good erosion control, wildlife cover and wetland revegetation.
	Residential Lawns										
11	Tall Fescue Perennial Ryegrass Kentucky Bluegrass Blend	100 25 30	2.3 0.57 0.69	O	A	O	O	A	O		High value, high maintenance, light traffic, irrigation necessary. Well drained soils, full sun.
12	Tall Fescue Perennial Ryegrass Sheep Fescue	100 25 25	2.3 0.57 0.57	O	A	O	O	A	O		Moderate value, low maintenance, traffic tolerant.
13	Creeping Red Fescue Chewings Fescue Rough Bluegrass Kentucky Bluegrass	50 50 20 20	1.15 1.15 0.4 0.4	O	A	O	O	A	O		Shade tolerant, moderate traffic tolerance, moderate maintenance.
14	Creeping Red Fescue Rough Bluegrass or Chewings Fescue	50 90	1.15 2.1	O	A	O	O	A	O		Shade tolerant, moisture tolerant.
15	K-31 Tall Fescue	150	3.5	O	A	O	O	A	O		Monoculture, but performs well alone in lawns. Discouraged.

1. When hydroseeding is the chosen method of application, the total rate of seed should be increased by 25%.
2. Winter seeding requires 3 tons per acre of straw mulch. Planting dates listed above are average for Delaware. These dates may require adjustment to reflect local conditions.
3. All seed shall meet the minimum purity and minimum germination percentages recommended by the Delaware Department of Agriculture. The maximum % of weed seeds shall be in accordance with Section 1, Chapter 24, Title 3 of the Delaware Code.
4. Cool season species may be planted throughout summer if soil moisture is adequate or seeded area can be irrigated.
5. All leguminous seed must be inoculated.
6. Warm season grass mix and Reed Canary Grass cannot be mowed more than 4 times per year.
7. Warm season grasses require a soil temperature of at least 50 degrees in order to germinate, and will remain dormant until then.

Source:	Symbol:	Detail No.
Delaware ESC Handbook		DE-ESC-3.4.3 Sheet 3 of 4 Date: 12/03

NOTE: SEE PLANS FOR LOCATIONS OF PERMANENT SEED MIX TYPES 5, 6, AND 10.

Standard Detail & Specifications

Vegetative Stabilization

Construction Notes:

1. Site Preparation

a. Prior to seeding, install needed erosion and sediment control practices such as diversions, grade stabilization structures, berms, dikes, grassed waterways, and sediment basins.

b. Final grading and shaping is not necessary for temporary seedings.

2. Seedbed Preparation

It is important to prepare a good seedbed to insure the success of establishing vegetation. The seedbed should be well prepared, loose, uniform, and free of large clods, rocks, and other objectionable material. The soil surface should not be compacted or crusted.

3. Soil Amendments

a. Lime - Apply liming materials based on the recommendations of a **soil test** in accordance with the approved nutrient management plan. If a nutrient management plan is not required, apply dolomitic limestone at the rate of 1 to 2 tons per acre. Apply limestone uniformly and incorporate into the top 4 to 6 inches of soil.

b. Fertilizer - Apply fertilizer based on the recommendations of a **soil test** in accordance with the approved nutrient management plan. If a nutrient management plan is not required, apply a formulation of 10-10-10 at the rate of 600 pounds per acre. Apply fertilizer uniformly and incorporate into the top 4 to 6 inches of soils.

4. Seeding

a. For **temporary stabilization**, select a mixture from **Sheet 1 .** For a **permanent stabilization**, select a mixture from **Sheet 2** or **Sheet 3** depending on the conditions.

b. Apply seed uniformly with a broadcast seeder, drill, cultipacker seeder or hydroseeder. All seed will be applied at the recommended rate and planting depth.

c. Seed that has been broadcast should be covered by raking or dragging and then lightly tamped into place using a roller or cultipacker. If hydroseeding is used and the seed and fertilizer is mixed, they will be mixed on site and the seeding shall be done immediately and without interruption.

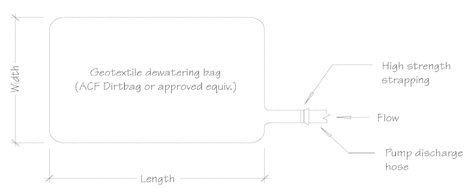
5. Mulching

All mulching shall be done in accordance with detail **DE-ESC-3.4.5**.

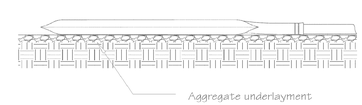
Source:	Symbol:	Detail No.
Delaware ESC Handbook		DE-ESC-3.4.3 Sheet 4 of 4 Date: 12/03

Standard Detail & Specifications

Geotextile Dewatering Bag



Plan



Profile

Source:	Symbol:	Detail No.
Adapted from ACF Products, Inc.	GB	DE-ESC-3.2.1.2 Sheet 1 of 2 Date: 12/03

Standard Detail & Specifications

Geotextile Dewatering Bag

Construction Notes:

1. The dewatering bag should be placed so the incoming water flows into and through the bag, and then flow off the site without creating more erosion. The neck should be tied off tightly to stop the water from flowing out of the bag without going through the walls. The dewatering bag should be placed on a gravel bed to allow water to flow in all directions.

2. The dewatering bag is considered full and should be disposed when it is impractical for the bag to filter the sediment out at a reasonable flow rate. At this point, it should be replaced with a new bag.

3. Disposal may be accomplished as directed by the construction reviewer. If the site allows, the bag may be buried on site and seeded, visible fabric removed and seeded or removed from site to a proper disposal area.

Materials:

1. The geotextile fabric shall be a Type GD-IV.

2. The dewatering bag shall be sewn with a double needle machine using high strength thread. All structural seams will be sewn with high strength, double stitched "J" type. Seam strength test will have the following minimum average roll values:

Type	TEST METHOD	TEST RESULT
Heavy duty	ASTM D-4884	100 lb / in

3. The dewatering bag shall have an opening large enough to accommodate a four (4) inch discharge hose with attached strap to tie off the hose to prevent the pumped water from escaping from the bag without being filtered.

Source:	Symbol:	Detail No.
Adapted from ACF Products, Inc.	GB	DE-ESC-3.2.1.2 Sheet 2 of 2 Date: 12/03

DATE: DESCRIPTION: BY:

DATE: DESCRIPTION: BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

EROSION AND SEDIMENT CONTROL DETAILS

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY:	RKK
DRAWN BY:	RKK
BUILDING NO.:	N/A
DATE:	7/3/13
SCALE:	AS NOTED
SHEET NO.:	ES-4
PARKS PROJECT #:	CH-41
CONTRACT #:	2013-CH-300

MARY RUTH REGISTER LICENSED PROFESSIONAL ENGINEER DELAWARE No. 24720

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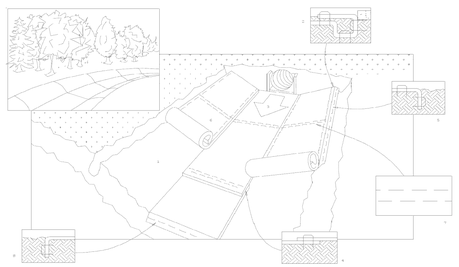
Standard Detail & Specifications

Stabilization Matting - Channel



Perspective

CRITICAL POINTS

A. Overlaps and seams
B. Projected waterline
C. Channel bottom/side slope vertices

Note: Horizontal staple spacing should be altered if necessary to allow staples to secure the critical points along the channel surface.

Use manufacturer's recommendations for stapling patterns for channel installations.

Source:	Symbol:	Detail No.
Adapted from North American Green, Inc.	SM-C	DE-ESC-3.4.6.2 Sheet 1 of 3 Date: 6/05

Standard Detail & Specifications

Stabilization Matting - Channel

Construction Notes:

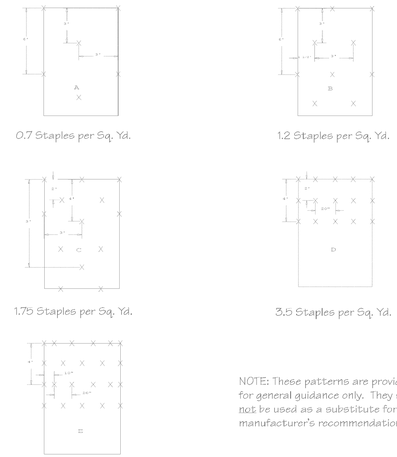
1. Prepare soil before installing matting, including application of lime, fertilizer, and seed.
2. Begin at the top of the channel by anchoring the mat in a 6" deep X 6" wide trench. Backfill and compact the trench after stapling.
3. Roll center mat in direction of water flow on bottom of channel.
4. Place mats end over end (shingle style) with a 6" overlap, use a double row of staggered staples 4" apart to secure mats.
5. * Full Length edge of mats at top of side slopes must be anchored in 6" deep X 6" wide trench; backfill and compact the trench after stapling.
6. Mats on side slopes must be overlapped 4" over the center mat and stapled.
7. In high flow channel applications, a staple check slot is recommended at 30 to 40 foot intervals. Use a row of staples 4" apart over entire width of the channel. Place a second row 4" below the first row in a staggered pattern.
8. * The terminal end of the mats must be anchored in a 6" X 6" wide trench. Backfill and compact the trench after stapling.

* MATS SHALL BE ANCHORED INTO INTERIM GRADES PER DETAIL ON SHEET SWM-01 TO ENSURE MATTING WILL STAY IN PLACE.

Source:	Symbol:	Detail No.
Adapted from North American Green, Inc.	SM-C	DE-ESC-3.4.6.2 Sheet 2 of 3 Date: 6/05

Standard Detail & Specifications

Stabilization Matting - Channel



NOTE: These patterns are provided for general guidance only. They shall not be used as a substitute for manufacturer's recommendations.

Stapling Patterns

Source:	Symbol:	Detail No.
Adapted from North American Green, Inc.	SM-C	DE-ESC-3.4.6.2 Sheet 3 of 3 Date: 6/05

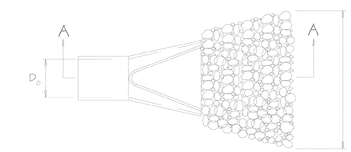
SOIL STABILIZATION MATTING NOTES:

SOIL STABILIZATION MATTING SHALL BE COMPOSED ENTIRELY OF 100% BIODEGRADABLE MATERIAL. NETTING SHALL BE COMPOSED OF 100% BIODEGRADABLE, NATURAL, ORGANIC FIBER. PHOTODEGRADABLE PLASTIC NETTING IS NOT ACCEPTABLE. MATRIX MATERIAL (FIBER) SHALL BE 100% BIODEGRADABLE. POLYPROPYLENE FIBER IS NOT ACCEPTABLE.

SOIL STABILIZATION MATTING SHALL BE:
SSM-III: NORTH AMERICAN GREEN SC150BN

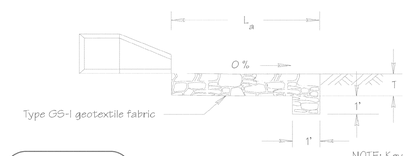
Standard Detail & Specifications

Riprap Outlet Protection - 1



Plan

NOTE: Depress centerline of apron slightly to prevent edge-cutting



NOTE: Key into exist. gnd

DATA

Pipe diameter (D_o)
Apron length (L_a)
Apron width (W)
Riprap size (R No.)
Riprap thickness (T)

Section A-A

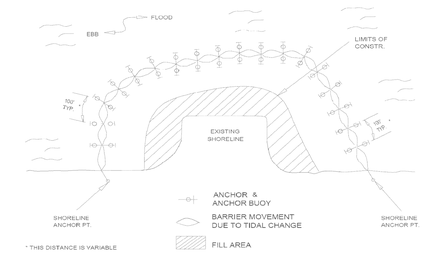
$T_w < 0.5\ D_o$

Source:	Symbol:	Detail No.
Adapted from MD Stds. & Specs. for ESC	ROP-1	DE-ESC-3.3.10.1 Sheet 1 of 2 Date: 6/05

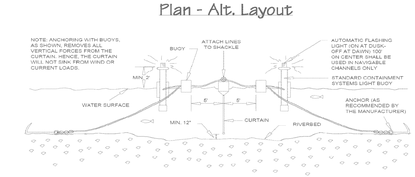
Standard Detail & Specifications

Turbidity Curtain

NOTE: The alternative layout shown is intended for tidal waters and/or heavy wind and wave action



Plan - Alt. Layout



Additional Requirements for Navigable Waters

Source:	Symbol:	Detail No.
Adapt. from Amer. Boom and Barrier Corp.	TC-(1/2/3) (Std/Alt)	DE-ESC-3.5.3 Sheet 5 of 8 Date: 12/03

Standard Detail & Specifications

Riprap Outlet Protection - 1

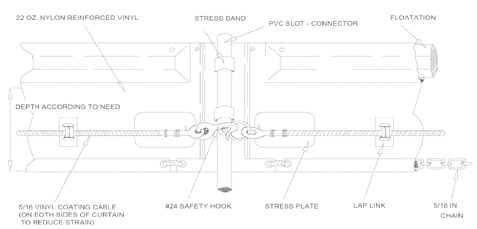
Construction Notes:

1. The subgrade for the riprap shall be prepared to the required lines and grades as shown on the plan. Any fill required in the subgrade shall be compacted to a density of approximately that of the surrounding undisturbed material.
2. The riprap shall conform to the grading limits as shown on the plan.
3. Filter cloth shall be protected from punching, cutting or tearing. Any damage other than an occasional small hole shall be repaired by placing another piece of cloth over the damaged area. All connecting joints should overlap a minimum of 1 ft. If the damage is extensive, replace the entire filter cloth.
4. Stone for the riprap or gabion outlets may be placed by equipment. Riprap shall be placed in a manner to prevent damage to the filter cloth. Hand placement will be required to the extent necessary to prevent damage to the conduits, structures, etc.

Source:	Symbol:	Detail No.
Adapted from MD Stds. & Specs. for ESC	ROP-1	DE-ESC-3.3.10.1 Sheet 2 of 2 Date: 6/05

Standard Detail & Specifications

Turbidity Curtain



Typical Section - Type 3

DATA

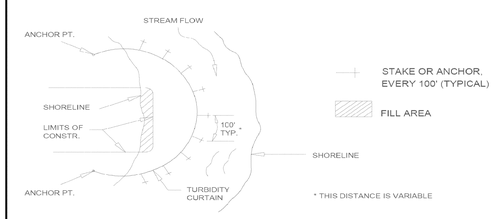
Curtain type (1, 2, or 3)
Layout (Std. or Alt.)

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

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

DATE:	DESCRIPTION:	BY:
DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

EROSION AND SEDIMENT CONTROL DETAILS

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY:	RKK
DRAWN BY:	RKK
BUILDING NO.:	N/A
DATE:	7/3/13
SCALE:	AS NOTED
SHEET NO.:	ES-5
PARKS PROJECT #:	CH-41
CONTRACT #:	2013-CH-300

NANCY RUTH BERGERON LICENSE NO. 14278 STATE OF DELAWARE PROFESSIONAL ENGINEER

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DELAWARE EROSION & SEDIMENT CONTROL HANDBOOK

Standard Detail & Specifications
Turbidity Curtain

Construction Notes:

1. **Materials**
   a. Barriers should be a bright color (yellow or "international" orange are recommended) that will attract the attention of nearby boaters.
   b. The curtain fabric shall meet manufacturer's recommendations for the application.
   c. Seams in the fabric shall be either vulcanized welded or sewn and shall develop the full strength of the fabric.
   d. Floatation devices shall be flexible, buoyant units contained in an individual floatation sleeve or collar attached to the curtain. Buoyancy provided by the floatation units shall be sufficient to support the weight of the curtain and maintain a freeboard of at least 3 inches above the water surface level.
   e. Load lines must be fabricated into the bottom of all floating turbidity curtains. Type II and Type III must have load lines also fabricated into the top of the fabric. The top load line shall consist of woven webbing or vinyl-sheathed steel cable and shall have a break strength in excess of 10,000 pounds. The supplemental (bottom) load line shall consist of a chain incorporated into the bottom hem of the curtain of sufficient weight to serve as ballast to hold the curtain in a vertical position. Additional anchorage shall be provided as necessary. The load lines shall have suitable connecting devices which develop the full breaking strength for connection to load lines in adjacent sections as shown in the detail.
   f. External anchors may consist of wooden or metal stakes (2- x 4-inch or 2-1/2-inch minimum diameter wood or 1.33 lbs/linear foot steel) when Type I installation is used; when Type II or Type III installations are used, bottom anchors should be used.
   g. Bottom anchors must be sufficient to hold the curtain in the same position relative to the bottom of the watercourse without interfering withthe action of the curtain. The anchor may dig into the bottom (grappling hook, plow or fluke-type) or may be weighted (mushroom type) and should be attached to a floating anchor buoy via an anchor line. The anchor line should then run from the buoy to the to load line of the curtain. When used with Type III installations, these lines must contain enough slack to allow the buoy and curtain to float freely with tidal changes without pulling the buoy or curtain down and must be checked regularly to make sure they do not become entangled with debris. As previously noted, anchor spacing will vary with current velocity and potential wind and wave action; manufacturer's recommendations should be followed. See detail for orientation of external anchors and anchor buoys for tidal installations.

Source:	Symbol:	Detail No.
Adapt. from Amer. Boom and Barrier Corp.	TC-(1/2/3) (Std/Alt)	DE-ESC-3.5.3 Sheet 6 of 8 Date: 12/03

DELAWARE EROSION & SEDIMENT CONTROL HANDBOOK

Standard Detail & Specifications
Turbidity Curtain

Construction Notes (cont.)

2. **Installation**
   a. In the calm water of lakes or ponds (Type I installation) it is usually sufficient to set the curtain end stakes or anchor points (using anchor buoys if bottom anchors are employed), then tow the curtain in the furled condition out and attach it to the stakes or anchor points. Following this, any additional stakes or buoyed anchors required to maintain the desired location of the curtain may be set and these anchor points made fast to the curtain. Only then shall the furling lines be cut to allow the curtain skirt to drop.
   b. In rivers or in other moving waters (Type II and Type III installations) it is important to set all curtain anchor points. Care must be taken to ensure that anchor points are of sufficient holding power to retain the curtain under the existing current conditions, prior to putting the furled curtain into the water. Anchor buoys should be employed on all anchors to prevent the current from submerging the flotation at the anchor points. If the curtain is being installed into tidal areas which would be subject to currents in both directions, anchors should be provided on both sides of the curtain. This will minimize curtain movement and prevent the curtain from overrunning the anchors during tide reversals. After the anchors have been secured, the furled curtain should be secured to the upstream anchor point and then sequentially attached to each next downstream anchor point until the entire curtain is in position. Before unfurling, the "lay" of the curtain should be assessed and any necessary adjustments made to the anchors. Once the location has been deemed adequate, the furling lines may be cut to allow the skirt to drop.
   c. Anchor lines should be attached to the flotation device, not to the bottom of the curtain. The anchoring line attached to the flotation device on the downstream side will provide support for the curtain. Attaching the anchors to the bottom of the curtain could cause premature failure of the curtain due to the stresses imparted on the middle section of the curtain.
   d. Turbidity curtain shall not be installed across channel flows unless there is a danger of causing sediment deposition to occur in the middle of a watercourse, thereby blocking access or creating a sand bar. In such situations, the curtain may be installed so as to form a long-sided, sharp "V" to deflect clean water around a work site, confining most of the silt-laden water to the work area inside the "V" and directing it to the shoreline. In no case shall the curtain be installed perpendicular to the channel flow.

Source:	Symbol:	Detail No.
Adapt. from Amer. Boom and Barrier Corp.	TC-(1/2/3) (Std/Alt)	DE-ESC-3.5.3 Sheet 7 of 8 Date: 12/03

DELAWARE EROSION & SEDIMENT CONTROL HANDBOOK

Standard Detail & Specifications
Turbidity Curtain

Construction Notes (cont.)

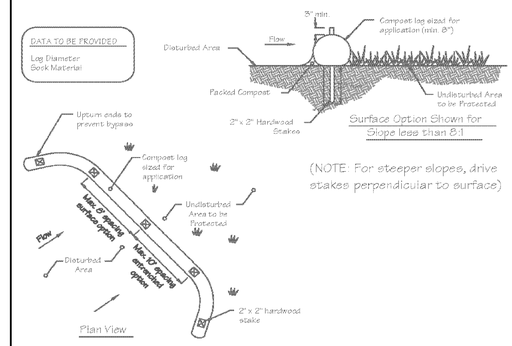
3. **Maintenance**
   a. The individual(s) identified on the plan as responsible for maintenance of the curtain shall do so for the duration of the project in order to ensure the continuous protection of the watercourse.
   b. Should repairs to the geotextile fabric become necessary, repair kits are generally available from the manufacturer. The manufacturer's instructions must be followed to ensure the adequacy of the repair.
   c. When the curtain is no longer required as determined by the inspector, the curtain and related components shall be removed in such a manner as to minimize turbidity. Remaining sediment shall be sufficiently settled before removing the curtain. Sediment may be removed and the original depth (or plan elevation) restored. Any spoils must be taken to an approved upland disposal area and stabilized in accordance with the approved plan.

4. **Removal**
   a. Care shall be taken to protect the skirt from damage as the turbidity curtain is dragged from the watercourse.
   b. The site selected to bring the curtain ashore should be free of sharp rocks, broken cement, debris, etc. so as to minimize damage when hauling the curtain over the area.
   c. If the curtain has a deep skirt, it can be further protected by running a small boat along its length with a crew installing furling lines before attempting to remove the curtain from the water.

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

DELAWARE EROSION & SEDIMENT CONTROL HANDBOOK

Standard Detail & Specifications
Compost Filter Log



Source:	Symbol:	Detail No.
Adapted from MD Stds & Specs for ESC & Filtrexx™ International	CFL	DE-ESC-3.1.7 Sheet 1 of 2 Date: 03/13

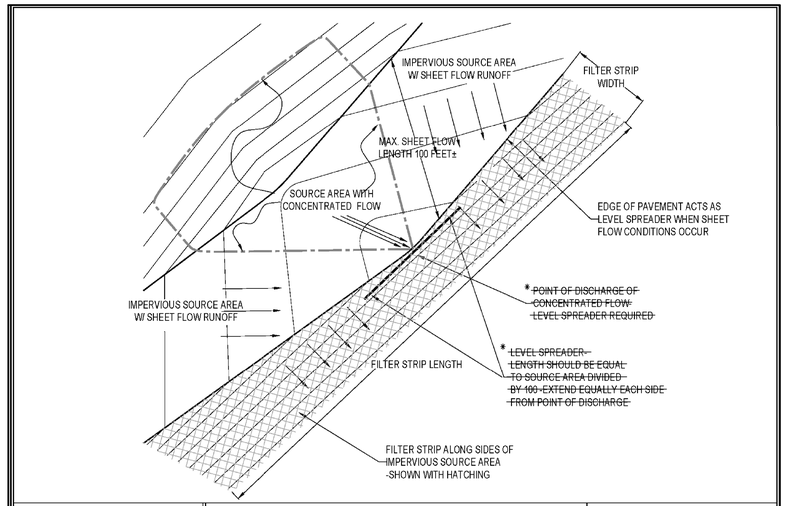
DELAWARE EROSION & SEDIMENT CONTROL HANDBOOK

Standard Detail & Specifications
Compost Filter Log

Construction Notes:

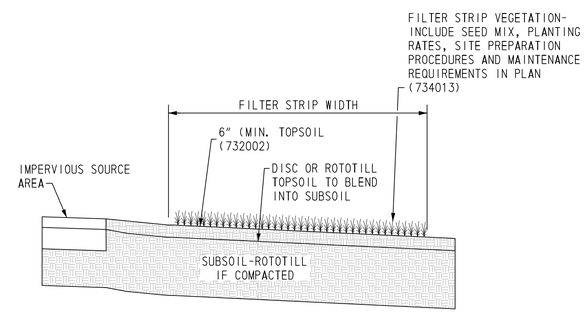
1. Prior to installation, clear bedding area of obstructions including rocks or debris larger than 1 inch and fill in any sharp depression areas.
2. Fill the sock fabric using a pneumatic blower so that the logs are rigid and do not deform. Terminate at the desired length.
3. For trenched applications, excavate 2 to 4 inches below grade along the width and length of the compost filter log.
4. Install the compost filter logs perpendicular to the flow direction and parallel to the slope with the beginning and end of the installation pointing up the slope a minimum of 1 foot elevation difference. On sites where this is not possible, upturn at a minimum length of 10' at a 30 degree angle to prevent runoff bypass.
5. For untrenched applications, blow or hand pack soil, mulch, or compost on the upslope side of the log, filling the bottom void area.
6. Stake the filled log every 10 feet maximum through the center of the sock for trenched applications, or every 8 feet for untrenched. The stake shall be a 2" by 2" hardwood. It should extend 12" below grade and protrude at least 3" above the top of the sock. If located on a slope greater than 8:1, the stake shall be angled downslope at a 45 degree angle to prevent the force of the water from dislodging to log.
7. When the length of the compost filter log needed exceeds the available compost filter sock length, the next sock shall be overlapped a minimum of 12" before being filled, and a stake placed through both socks at the overlap.
8. Remove accumulated sediment when it has reached half of the effective height of the log.
9. Inspect weekly and after rain event. If sock is degrading or the sock is failing, vegetate to secure the compost, replace the log, or reinforce with an additional log. If the log has been crushed due to construction equipment, it can be "fluffed" back to its effective height. If the effective height can no longer be restored, the log shall be replaced or reinforced with an additional compost filter log.

Source:	Symbol:	Detail No.
Adapted from MD Stds & Specs for ESC & Filtrexx™ International	CFL	DE-ESC-3.1.7 Sheet 2 of 2 Date: 03/13



GREEN TECHNOLOGY: THE DELAWARE URBAN RUNOFF MANAGEMENT APPROACH	TYPICAL DETAIL FILTER STRIP DESIGN CRITERIA (N.T.S.)	DETAIL NUMBER: 2.3.1 DATE: JUNE 2005

*LEVEL SPREADER TO BE ELIMINATED



TYPICAL DETAIL
FILTER STRIP SECTION

DATE: DESCRIPTION: BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

EROSION AND SEDIMENT CONTROL DETAILS

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY:	RKK
DRAWN BY:	RKK
BUILDING NO.:	N/A
DATE:	7/3/13
SCALE:	AS NOTED
SHEET NO.:	ES-6
PARKS PROJECT #:	CH-41
CONTRACT #:	2013-CH-300

MARY RUTH BERRY LICENSED PROFESSIONAL ENGINEER STATE OF DELAWARE

7/12/2013
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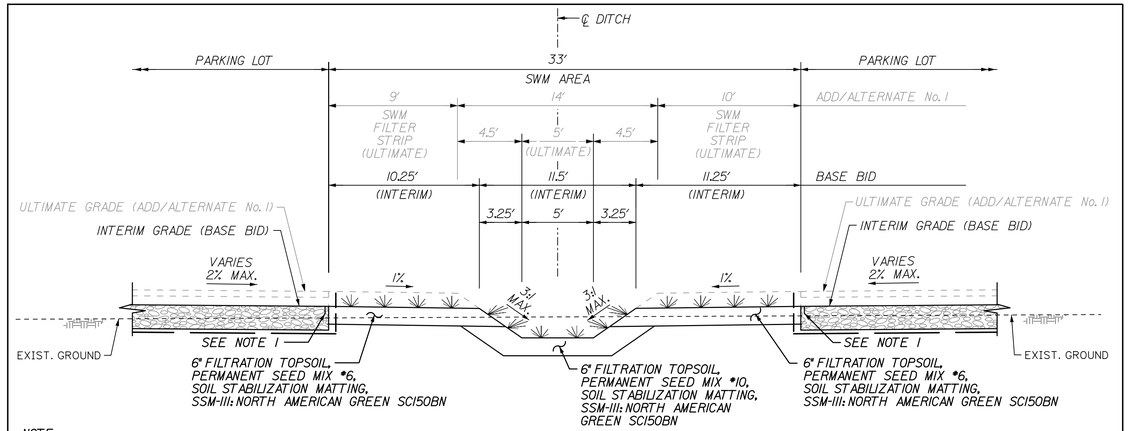
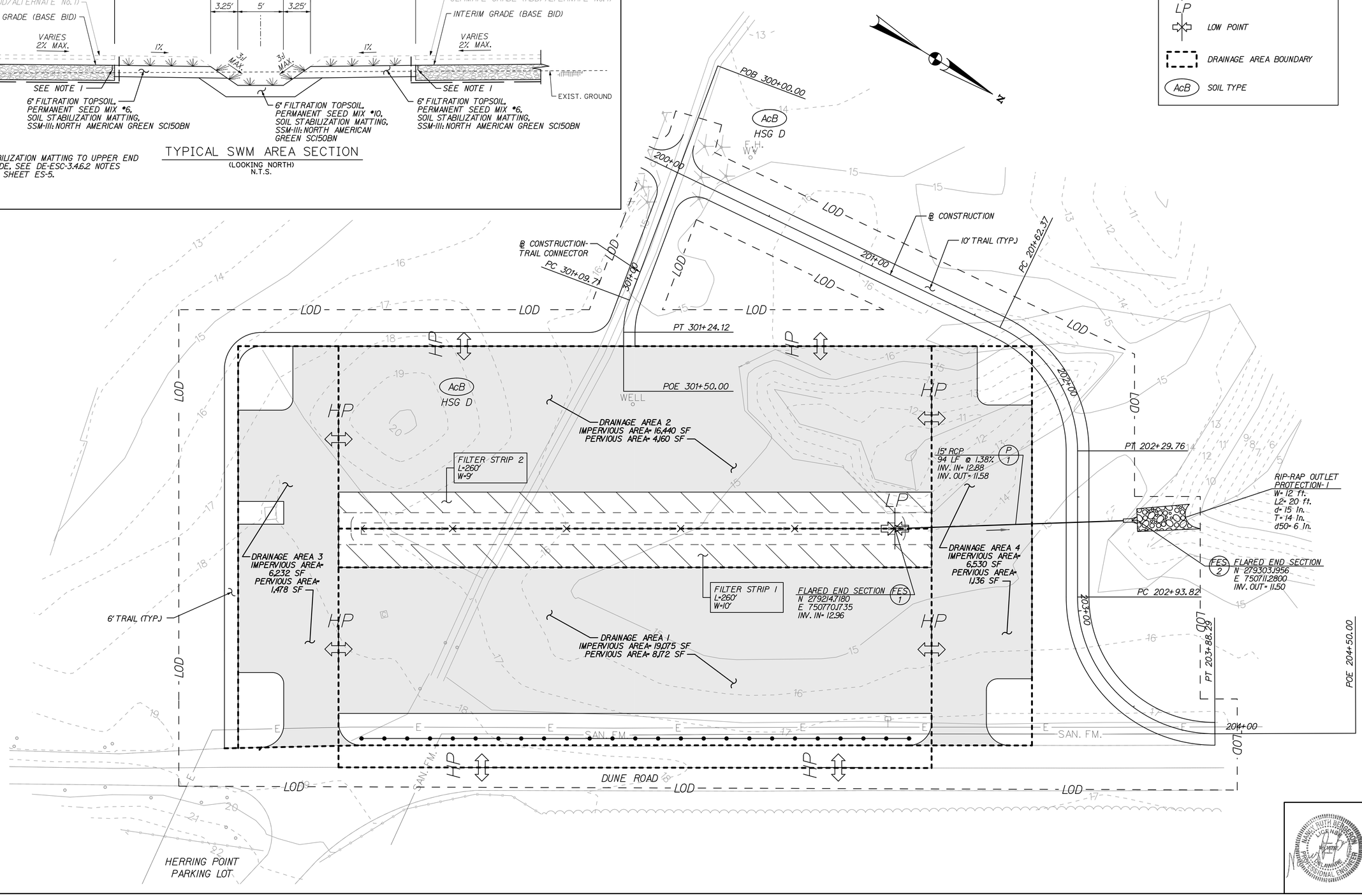


NOTE:
1. KEY-IN SOIL STABILIZATION MATTING TO UPPER END OF INTERIM GRADE, SEE DE-ESC-3.46.2 NOTES AND DETAILS ON SHEET ES-5.

TYPICAL SWM AREA SECTION
(LOOKING NORTH)
N.T.S.



DATE:	DESCRIPTION:	BY:

CAPE HENLOPEN STATE PARK
GORDONS POND TRAIL IMPROVEMENTS

STORMWATER MANAGEMENT PLAN
PARKING LOT

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DESIGNED BY: RKK
DRAWN BY: RKK
BUILDING NO.: N/A
DATE: 7/3/13
SCALE: 1"=20'
SHEET NO.: SWM-01
PARKS PROJECT #: CH-41
CONTRACT #: 2013-CH-300

MARK RUTH BENGARD LICENSED PROFESSIONAL ENGINEER DELAWARE

7/18/2013
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