CONSTRUCTION PLANS

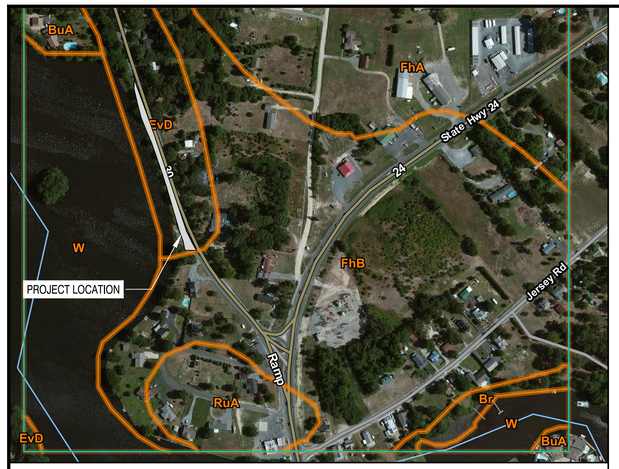
FOR

DELAWARE DIVISION OF FISH & WILDLIFE MILLSBORO BOAT RAMP

T.P. 234-32.00-7.00

GRAVEL HILL ROAD (SR30) MILLSBORO, DELAWARE

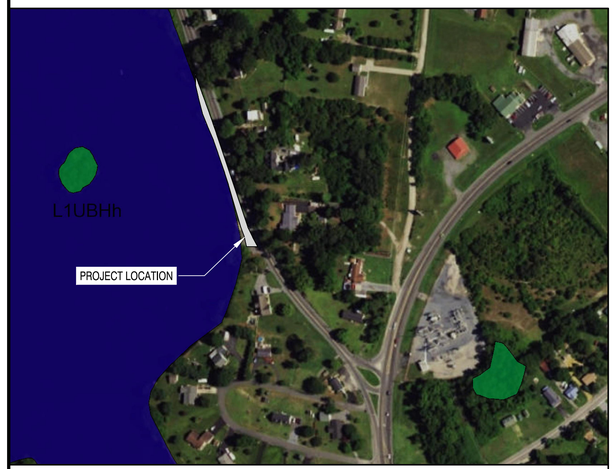
INDIAN RIVER HUNDRED, SUSSEX COUNTY, DELAWARE



SOIL MAP SCALE: 1" = 300'

SOIL LEGEND

EvD = EVESBORO LOAMY SAND, 5 TO 15 PERCENT SLOPE, SOIL GROUP A



WETLAND MAP SCALE: 1" = 300'

WETLAND LEGEND

L1UBH5 = LACUSTRINE SYSTEM, LIMNETIC SUBSYSTEM, WITH UNCONSOLIDATED BOTTOM, PERMANENTLY FLOODED DUE TO DOWNSTREAM IMPOUNDMENT.

LOCATION MAP

0' 300' 600' 900'

SCALE: 1" = 300'

DATA COLUMN

1. TAX PARCEL NUMBER: 2-34-32.00-7.00
2. SUSSEX COUNTY FILE NUMBER: _____
3. ADDRESS OF SITE: GRAVEL HILL ROAD (SR30), MILLSBORO, DE 19966
4. ZONING: AR-1: AGRICULTURE RESIDENTIAL
5. SOURCE OF TITLE: D.B. 1245-74 (DATED 02-23-1984, AMENDED 12-03-2018)
6. NUMBER OF LOTS: 1
7. SETBACK LINES:

	ORDINANCE	REQUIRED	PROPOSED
FRONT YARD:	115-25 (C)	40'	N/A
SIDE YARD:	115-25 (C)	15'	N/A
REAR YARD:	115-25 (C)	20'	N/A
MIN LOT WIDTH:	115-25 (C)	100'	435.11'

8. LOT AREA: 1.15± ACRES (BASED ON SUSSEX COUNTY GIS MAPPING)
9. EXISTING USE: BOAT RAMP
10. PROPOSED USE: BOAT RAMP
11. TOTAL NUMBER OF LOTS: 1 (NO NEW BUILDING LOTS OR OR DWELLINGS PROPOSED BY THIS PLAN)
12. PROPOSED BUILDING SQUARE FOOTAGE: 0 SF
13. MONUMENTS:
    EXISTING: 2 (CONCRETE MONUMENTS)
    PROPOSED: NONE
14. ELECTRIC PROVIDER: DELAWARE ELECTRIC COOPERATIVE
15. SEWER PROVIDER: NO SEWER PROPOSED FOR SITE
16. WATER PROVIDER: NO ON-SITE WELL PROPOSED FOR SITE
17. PARKING:
    REQUIRED: N/A
    PROPOSED: 7
18. SITE BREAKDOWN (WITHIN PROJECT LOC):

EXISTING SITE	AR-1 ZONING
CONCRETE:	456± S.F.
PAVEMENT:	3,772± S.F.
WATER:	5,269± S.F.
OPEN SPACE:	2,239± S.F.
OVERALL TOTAL:	11,736± S.F.

PROPOSED SITE	AR-1 ZONING
CONCRETE:	661± S.F.
PAVEMENT:	7,213± S.F.
WATER:	2,346± S.F.
OPEN SPACE:	1,516± S.F.
OVERALL TOTAL:	11,736± S.F.

    % PROPOSED IMPERVIOUS COVERAGE:
    7,874± S.F./11,736± S.F. = 67.1%
19. WETLANDS:
    A WETLANDS INVESTIGATION HAS BEEN PERFORMED ON THE SUBJECT PROPERTY BY CENTURY ENGINEERING, INC. IN JUNE, 2017.
20. FLOODPLAIN:
    ACCORDING TO FIRM NO. 10005C0456K, DATED MARCH 16, 2015, PORTIONS OF THE SUBJECT PARCEL IS DETERMINED TO BE WITHIN ZONE AE. (BASE FLOOD ELEVATION DETERMINED: ELEV. 8.3 FEET).
21. GROWTH ZONE:
    THE SUBJECT PARCEL LIES OUTSIDE THE DESIGNATED GROWTH ZONE.
22. BOUNDARY:
    RIGHT OF WAY, LOCATIONS, PROPERTY LINES PROVIDED BY DELAWARE DIVISION OF FISH & WILDLIFE. CENTURY ENGINEERING, INC. TAKES NO RESPONSIBILITY FOR THEIR ACCURACY.
23. TOPOGRAPHY:
    TOPOGRAPHY SHOWN TAKEN FROM A SURVEY PERFORMED BY CENTURY ENGINEERING, INC. IN JUNE 2017.
24. HORIZONTAL DATUM: NAD83
    VERTICAL DATUM: NAVD88
25. TOTAL LOD OF SITE: 2,777 SF (NO SEDIMENT & STORMWATER MANAGEMENT APPROVAL REQUIRED)
26. SITE BENCHMARK:
27. OWNER/APPLICANT:
    STATE OF DELAWARE
    DIVISION OF FISH & WILDLIFE
    89 KINGS HIGHWAY
    DOVER, DE 19901
    JOHN CLARK
    (302) 739-9914

    ** THE OWNER OF THE PARCEL IS THE TOWN OF MILLSBORO (302-934-8171). PER EASEMENT AGREEMENT 1266, (DATED FEB. 23, 1984, BOOK 1245, ON PAGE 74; AMENDED DECEMBER 3, 2018) THE DELAWARE DIVISION OF FISH AND WILDLIFE IS GRANTED A PERMANENT EASEMENT FOR THE PURPOSE OF INSTALLING AND MAINTAINING A PUBLIC LAUNCHING SITE FOR BOATS AND A PARKING AREA ON THE PREMISES. **
28. ENGINEER:
    CENTURY ENGINEERING, INC.
    4134 N. DUPONT HIGHWAY
    DOVER, DE 19901
    ALEXANDER SCHMIDT, P.E.
    (302) 734-9188

INDEX OF SHEETS

C100-C116 CONSTRUCTION PLANS

WETLANDS PERMITTING

A NATIONWIDE PERMIT 36 (PERMIT NUMBER: CENAP-OP-R-2018-403-85) FROM THE UNITED STATES ARMY CORPS OF ENGINEERS HAS BEEN OBTAINED TO PERMIT THE DISTURBANCES TO EXISTING FEDERALLY REGULATED WATERS OF THE UNITED STATES. SUBAQUEOUS LANDS PERMIT SP-182/18 AND MARINA PERMIT MP-182/18 FROM THE DNREC WETLANDS AND SUBAQUEOUS LANDS SECTION ARE GRANTED FOR IMPACTS TO THE EXISTING STATE SUBAQUEOUS LANDS.

CERTIFICATION OF OWNERSHIP

I, JOHN CLARK, HEREBY CERTIFY THAT DELAWARE DIVISION OF FISH & WILDLIFE IS THE OWNER OF THE PROPERTY DESCRIBED AND SHOWN ON THIS PLAN, THAT THE PLAN WAS MADE AT MY DIRECTION, AND THAT I ACKNOWLEDGE THE SAME TO ME BY ACT AND DESIRE THE PLAN TO BE DEVELOPED AS SHOWN IN ACCORDANCE WITH ALL APPLICABLE LAWS AND REGULATIONS.

2/1/2019

JOHN CLARK – FISHERIES SECTION ADMINISTRATOR — DATE
DELAWARE DIVISION OF FISH & WILDLIFE
89 KINGS HIGHWAY
DOVER, DE 19901
PHONE: (302) 739-9914

CERTIFICATION OF PLAN ACCURACY

I, HEREBY CERTIFY THAT THIS PLAN HAS BEEN PREPARED UNDER MY SUPERVISION AND TO THE BEST OF MY KNOWLEDGE COMPLIES WITH THE APPLICABLE STATE AND LOCAL REGULATIONS AND ORDINANCES.

ALEXANDER E. SCHMIDT PROFESSIONAL ENGINEER No. 16139 DELAWARE

2/1/2019

ALEXANDER E. SCHMIDT, P.E., DE NO. 16139 — DATE
CENTURY ENGINEERING, INC.
4134 NORTH DUPONT HIGHWAY
DOVER, DELAWARE 19901
PHONE: (302) 734-9188 / FAX: (302) 734-4589

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CENTURY ENGINEERING
CONSULTING ENGINEERS ■ SURVEYORS
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WEBSITE: www.centuryeng.com
EMAIL: cei@centuryeng.com

REVISIONS

ADDENDUM

DESCRIPTION	DATE

PROJECT: CONSTRUCTION PLANS FOR DELAWARE DIVISION OF FISH & WILDLIFE MILLSBORO BOAT RAMP GRAVEL HILL ROAD (SR30) MILLSBORO, DELAWARE INDIAN RIVER HUNDRED, SUSSEX COUNTY, DELAWARE

SHEET TITLE: COVER SHEET

DIV. OF FISH AND WILDLIFE
100% SUBMISSION
FEBRUARY, 2019

DRAWN: JSW / MDS
CHK'D/DESIGNER: AES
SCALE: AS NOTED
SHEET NO.: C100
PROJECT NO. 155001.04

G:\PROJECTS\155001.00 DNREC Fish and Wildlife\155001.04 (Reconstruction of the Millsboro Boating Access Facility)\CADD FILES\Sheets\Construction Plans\C100_CoverSheet.dwg, 1/31/2019 11:15 AM

LEGEND

	EXISTING	PROPOSED
PROPERTY LINE		N/A
PERMANENT EASEMENT	PE PE	N/A
RIGHT OF WAY	R/W R/W	N/A
CENTER LINE OF ROAD		N/A
CONTOUR	10	10
OVERHEAD UTILITY	OH	N/A
WETLAND LINE	W W	N/A
ORDINARY HIGH WATER MARK	OHW OHW	N/A
FENCE		N/A
ADJOINER PROPERTY LINE	PL PL PL	N/A
SIGN		
SITE LIGHTING	N/A	
CONCRETE MONUMENT	C.M.	C.M.
UTILITY POLE		N/A
MAILBOX	MB	N/A
PAVEMENT		
MILL & OVERLAY PAVEMENT	N/A	
WOODEN BOLLARD		N/A
REMOVABLE BOLLARD	N/A	
CONCRETE AREA		
DOCK/PIER	N/A	
UNDERGROUND ELECTRIC	N/A	UG-E
TIMBER SUPPORT PILE	N/A	
SHEET PILE	N/A	
TURBIDITY CURTAIN	N/A	TC
LIMITS OF CONSTRUCTION	N/A	LOC LOC
GRADE BREAKLINE		N/A
GUY WIRE		N/A
TREE		N/A
TOP OF BANK	TOB	N/A
BOTTOM OF BANK	BOB	N/A
SAWCUT	N/A	SAW
100-YR FLOOD PLAIN	FP	N/A
CAPPED REBAR	I.P.	N/A

HIERARCHY OF CONTRACT DOCUMENTS

ELEMENTS UNDER THIS CONTRACT SHALL BE CONSTRUCTED UTILIZING THE FOLLOWING INFORMATION IN THE HIERARCHY LISTED BELOW:

1. CONTRACT AGREEMENT BETWEEN OWNER AND CONTRACTOR.
2. APPROVED PLANS.
3. PROJECT MANUAL AND ENCLOSED TECHNICAL SPECIFICATIONS.
4. STATE OF DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL EROSION AND SEDIMENT CONTROL HANDBOOK, APRIL 2014 OR MOST CURRENT AT DATE OF ADVERTISEMENT.
5. DELAWARE DEPARTMENT OF TRANSPORTATION STANDARD CONSTRUCTION DETAILS, 2017, OR MOST CURRENT AT ADVERTISEMENT.
6. DELAWARE DEPARTMENT OF TRANSPORTATION STANDARDS AND SPECIFICATIONS FOR BRIDGE AND ROAD CONSTRUCTION, 2016, OR MOST CURRENT AT DATE OF ADVERTISEMENT.

GENERAL NOTES

1. UNLESS A COFFERDAM PREVENTING FISH FROM ENTERING THE PROJECT AREA FOR NEST BUILDING IS INSTALLED PRIOR TO APRIL 1, NO IN-WATER WORK SHALL BE COMPLETED BETWEEN APRIL 1–JULY 15 PER THE REQUEST OF DNREC FISHERIES. THE CONTRACTOR SHALL NOTIFY DNREC FISHERIES DIVISION AT (302) 735-8654 SEVEN (7) DAYS PRIOR TO ANY CONSTRUCTION SO THAT FISHERIES CAN PREPARE APPROPRIATE PRESS RELEASES.
2. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PLACE A MINIMUM OF TWO SIGNS INFORMING THE PUBLIC OF UPCOMING CONSTRUCTION ACTIVITIES AND AREA CLOSURE. THE SIGNS SHALL BE A MINIMUM OF 8.5"x11" LAMINATED PAPER AND SHALL SAY "NOTICE TO THE PUBLIC: THIS AREA WILL BE CLOSED FROM (INSERT DATE) TO (INSERT DATE) DUE TO CONSTRUCTION ACTIVITIES. PLEASE CALL THE DIVISION OF FISH & WILDLIFE FISHERIES SECTION AT 302-739-9914 WITH ANY QUESTIONS." SIGNS SHALL BE POSTED A MINIMUM OF TWO WEEKS BEFORE THE CONSTRUCTION CLOSURE. SIGN LOCATIONS SHALL BE COORDINATED WITH THE FISHERIES PROJECT MANAGER.
3. CONTRACTOR SHALL CONTACT MISS UTILITY OF DELMARVA AT 1-800-282-8555 48 HOURS PRIOR TO ANY EXCAVATION ACTIVITIES.
4. CONTRACTOR SHALL COORDINATE ALL CONSTRUCTION WITH WORKING DRAWINGS PROVIDED BY THE DOCK MANUFACTURER.
5. THE CONTRACTOR SHALL CONTACT THE OWNER AND THE ENGINEER AT LEAST 48 HOURS PRIOR TO SHEET PILE AND/OR SUPPORT PILE INSTALLATION AND FOR ALL MEETINGS, INCLUDING PRE-CONSTRUCTION MEETINGS, AS REQUIRED IN THE CONSTRUCTION SPECIFICATIONS.
6. CONTRACTOR SHALL LOAD TEST ALL SUBGRADE SOIL PRIOR TO THE PLACEMENT OF THE SUBBASE COURSE. ALL UNSUITABLE MATERIAL FOUND SHALL BE EXCAVATED TO THE DEPTH OF STABLE SOIL AND BACKFILLED WITH APPROVED MATERIAL. THE CONTRACTOR SHALL COMPACT ALL MATERIALS TO MEET THE DELDOT STANDARD SPECIFICATIONS.
7. BORROW, TYPE B, SHALL BE UTILIZED FOR ALL UNDERCUT LOCATIONS AS DIRECTED BY ENGINEER IN THE FIELD.
8. IMPACTS TO SUBAQUEOUS LANDS HAVE BEEN PERMITTED WITHIN THE LOC LINE SHOWN. WORK BEYOND THE LOC IS STRICTLY PROHIBITED.
9. ALL FIXED DOCKS, HANDRAILS, ALUMINUM HEADER SUPPORT CHANNELS, AND ANCILLARY ITEMS TO BE PROVIDED BY OWNER AND INSTALLED BY THE CONTRACTOR PER MANUFACTURERS' SPECIFICATIONS AND RECOMMENDATIONS.
10. ALUMINUM SHEET PILES, PILE CAPS, AND TIE-BACK SYSTEM SHALL BE PROVIDED AND INSTALLED BY THE CONTRACTOR.
11. THESE DRAWINGS DO NOT INCLUDE NECESSARY ELEMENTS OF CONSTRUCTION SAFETY. ALL CONSTRUCTION, INCLUDING EXCAVATION, MUST BE COMPLETED IN ACCORDANCE WITH THE RULES AND REGULATIONS OF THE OCCUPATIONAL SAFETY AND HEALTH ACT, AND ALL FEDERAL, STATE AND LOCAL REQUIREMENTS. CONTRACTOR IS SOLELY RESPONSIBLE FOR ALL SITE SAFETY.
12. PER EASEMENT AGREEMENT #1266 (DATED FEBRUARY 23, 1984 BOOK 1245, PAGE 74; AMENDED DECEMBER 3, 2018) THE TOWN OF MILLSBORO GRANTS A PERMANENT EASEMENT TO THE DIVISION OF FISH AND WILDLIFE "FOR THE PURPOSE OF INSTALLING AND MAINTAINING A PUBLIC LAUNCHING SITE FOR BOATS, AND A PARKING AREA ON THE PREMISES" OF THIS LAND.
13. ORDINARY HIGH WATER MARK (OHW) ELEVATION SURVEYED BY CENTURY ENGINEERING, INC. IN JUNE 2017.
14. RIGHT OF WAY, LOCATIONS, PROPERTY LINES PROVIDED BY DELAWARE DIVISION OF FISH & WILDLIFE. CENTURY ENGINEERING, INC. TAKES NO RESPONSIBILITY FOR THEIR ACCURACY.
15. SEE STRUCTURAL DETAIL SHEETS FOR STRUCTURAL SPECIFICATIONS AND CONCRETE NOTES.

LEGEND

1. SUPERPAVE TYPE C, PG 64-22, (ITEM NO. 401005)
2. SUPERPAVE TYPE B, PG 64-22, (ITEM NO. 401014)
3. GRADED AGGREGATE BASE COURSE, TYPE B, (ITEM NO. 301001)
4. BORROW, TYPE B, MAXIMUM 8" LIFTS, COMPACTION: 95% OF MAXIMUM DENSITY PER MODIFIED PROCTOR TEST (ITEM NO. 209008)
5. GEOTEXTILE, SEPARATION (ITEM NO. 708002)

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C100	COVER SHEET
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C103	CONSTRUCTION LAYOUT PLAN
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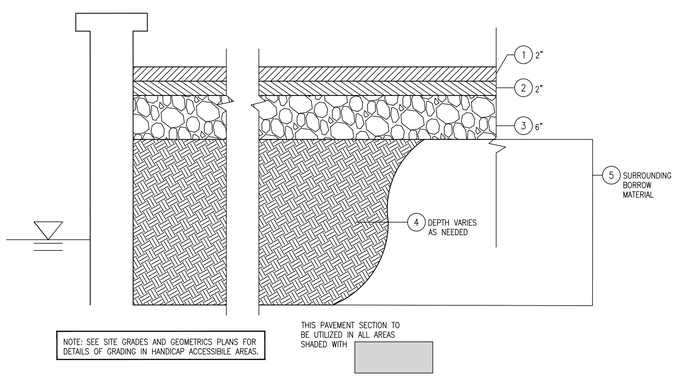
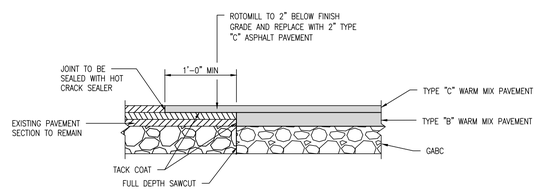
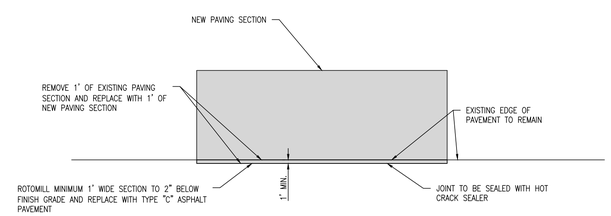
C105	SIGNING AND STRIPING PLAN
C106	FIRE MARSHAL PLAN
C107	SITE LIGHTING PLAN
C108	CROSS SECTION - FIXED DOCK
C109	CROSS SECTION - BOAT RAMP
C110	CONSTRUCTION DETAILS
C111	STRUCTURAL DETAILS
C112	SOIL BORING LOGS
C113	EROSION & SEDIMENT CONTROL DETAILS
C114	EROSION & SEDIMENT CONTROL DETAILS
C115	EROSION & SEDIMENT CONTROL DETAILS
C116	EROSION & SEDIMENT CONTROL DETAILS



TYPICAL SECTION - PAVEMENT
NOT TO SCALE



PAVEMENT TIE-IN DETAIL
NOT TO SCALE
NOTE: SEE TYPICAL SECTION FOR NEW PAVEMENT SECTION.



SAWCUT DETAIL EXISTING PAVEMENT
NOT TO SCALE

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REVISIONS

ADDENDUM

DESCRIPTION	DATE

PROJECT
CONSTRUCTION PLANS
FOR
DELAWARE DIVISION OF FISH & WILDLIFE
MILLSBORO BOAT RAMP
GRAVEL HILL ROAD (SR30) MILLSBORO, DELAWARE
INDIAN RIVER HUNDRED, SUSSEX COUNTY, DELAWARE

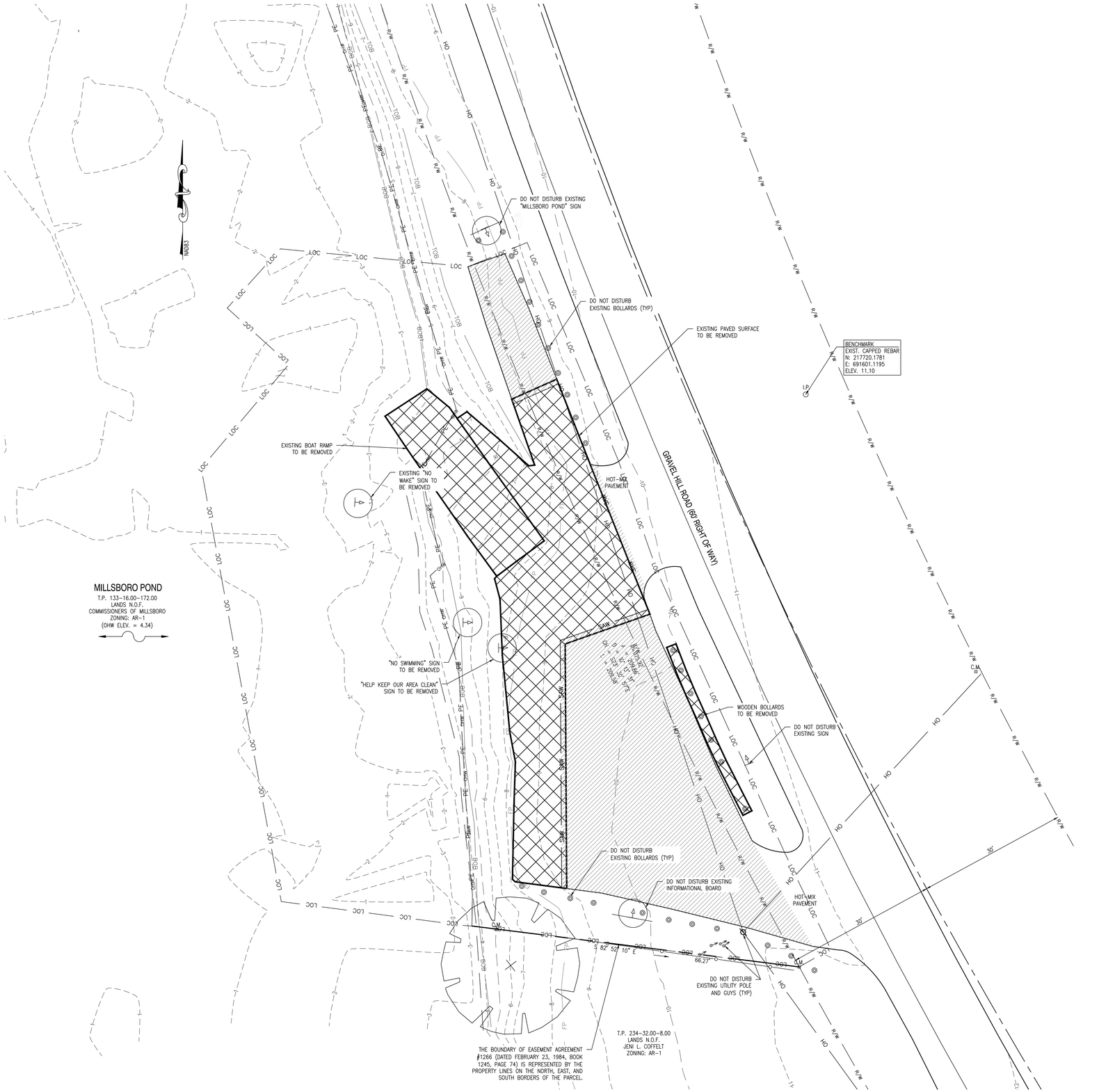
SHEET TITLE
LEGEND, PROJECT NOTES & TYPICAL SECTIONS

DIV. OF FISH AND WILDLIFE
100% SUBMISSION
FEBRUARY, 2019

DRAWN	CHK'D/DESIGNER
JSW / MDS	AES
SCALE	SHEET NO.
AS NOTED	C101

PROJECT NO. 155001.04

G:\PROJECTS\155001.00 DNREC Fish and Wildlife\155001.04 (Reconstruction of the Millsboro Boating Access Facility)\CADD FILES\Sheets\Construction Plans\C101 Legend-ProjectNotes-TypiSections.dwg, 1/31/2019 11:15 AM



LEGEND:

- MILLED PAVEMENT AREA
- FULL DEPTH PAVEMENT REMOVAL AREAS

GENERAL NOTES:

1. ORDINARY HIGH WATER MARK ELEVATION WAS SURVEYED BY CENTURY ENGINEERING, INC. IN JUNE, 2017.
2. ALL DEMOLISHED MATERIAL (INCLUDING SIGNS IDENTIFIED ON THIS SHEET) NOT INTENDED FOR RECYCLING IS TO BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE LEGALLY DISPOSED OF OFF SITE.
3. SEE CONSTRUCTION LAYOUT PLAN FOR SEQUENCE OF CONSTRUCTION AND EROSION & SEDIMENT CONTROL DEVICES.
4. WATERSIDE EXISTING EASEMENT BOUNDARY CORRESPONDS WITH OHW LINE.
5. NORTHERN AND SOUTHERN EXISTING EASEMENT BOUNDARY CORRESPONDS WITH ADJACENT PROPERTY LINES.

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FOR
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MILLSBORO BOAT RAMP
GRAVEL HILL ROAD (SR30) MILLSBORO, DELAWARE
INDIAN RIVER HUNDRED, SUSSEX COUNTY, DELAWARE

SHEET TITLE

EXISTING CONDITIONS & DEMOLITION PLAN

DIV. OF FISH AND WILDLIFE
100% SUBMISSION
FEBRUARY, 2019

DRAWN	CHK'D/DESIGNER
JSW / MDS	AES
SCALE	SHEET NO.
1" = 10'	C102
PROJECT NO. 155001.04	

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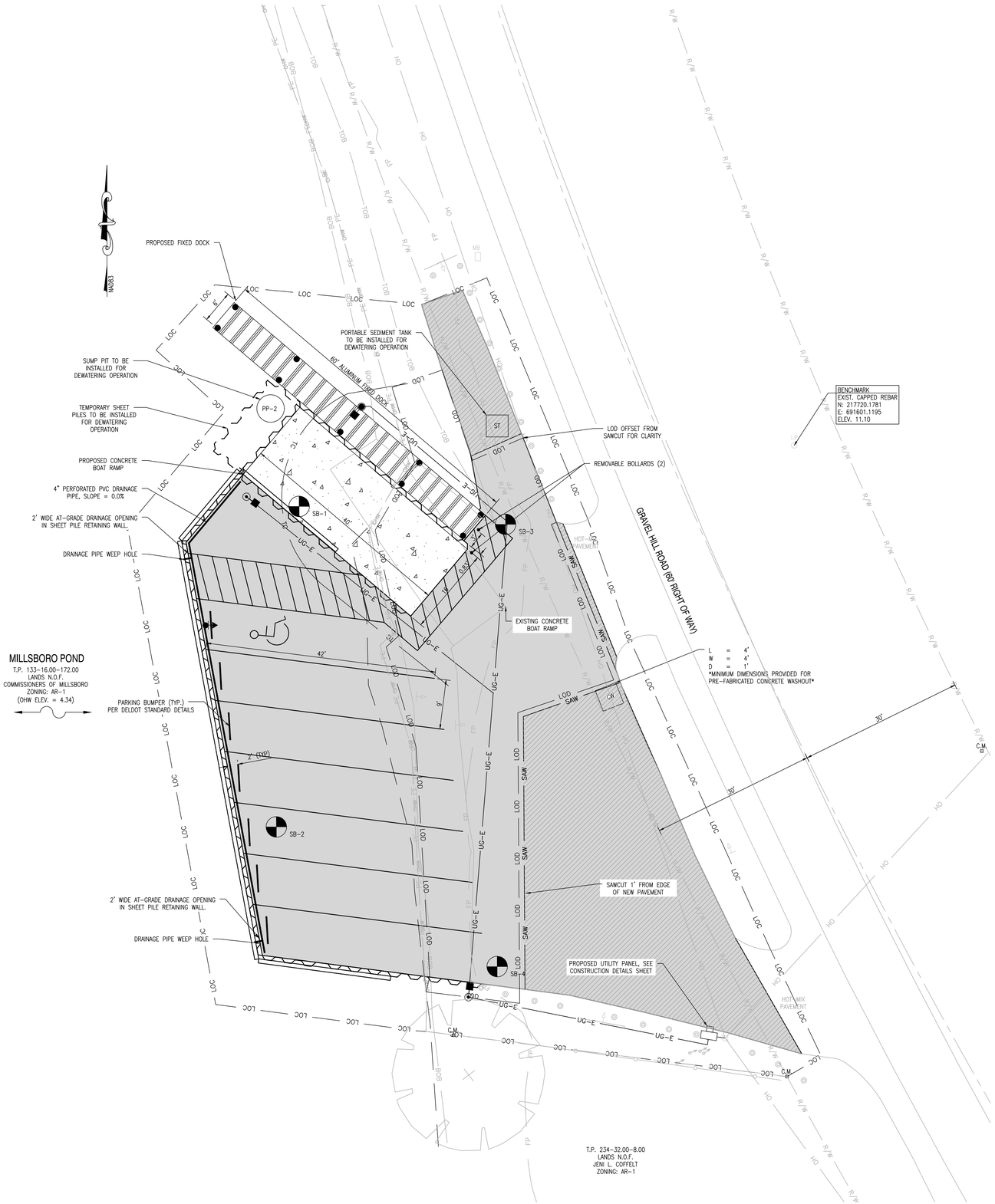

LEGEND

	EXISTING	PROPOSED
PROPERTY LINE		N/A
PERMANENT EASEMENT	PE PE	N/A
RIGHT OF WAY	R/W R/W	N/A
CENTER LINE OF ROAD		N/A
CONTOUR	10	10
OVERHEAD UTILITY	OH	N/A
WETLAND LINE		N/A
ORDINARY HIGH WATER MARK	OHW OHW	N/A
FENCE		N/A
ADJOINER PROPERTY LINE	RL RL RL	N/A
SIGN		
SITE LIGHTING	N/A	
CONCRETE MONUMENT	C.M.	C.M.
UTILITY POLE		N/A
MAILBOX	MB	N/A
PAVEMENT		
MILL & OVERLAY PAVEMENT	N/A	
WOODEN BOLLARD		N/A
REMOVABLE BOLLARD	N/A	
CONCRETE AREA		
DOCK/PIER	N/A	
UNDERGROUND ELECTRIC	N/A	UG-E
TIMBER SUPPORT PILE	N/A	
SHEET PILE	N/A	
TURBIDITY CURTAIN	N/A	TC
LIMITS OF CONSTRUCTION	N/A	LOC LOC
GRADE BREAKLINE		N/A
GUY WIRE		N/A
TREE		N/A
TOP OF BANK	TOB	N/A
BOTTOM OF BANK	BOB	N/A
SAWCUT	N/A	SAW
100-YR FLOOD PLAIN	FP	N/A
CAPPED REBAR	I.P.	N/A

SEQUENCE OF CONSTRUCTION

1. PRIOR TO ANY CLEARING, INSTALLATION OF SEDIMENT CONTROL MEASURES, OR GRADING, A PRE-CONSTRUCTION MEETING MUST BE SCHEDULED AND CONDUCTED. THE LANDOWNER/DEVELOPER AND CONTRACTOR ARE REQUIRED TO BE IN ATTENDANCE AT THE PRE-CONSTRUCTION MEETING; THE DESIGNER IS RECOMMENDED TO ATTEND.
2. THE CONTRACTOR SHALL AT ALL TIMES PROTECT AGAINST SEDIMENT OR DEBRIS LADEN RUNOFF OR WIND FROM LEAVING THE SITE. PERIMETER CONTROLS SHOULD BE CHECKED DAILY AND ADJUSTED AND/OR REPAIRED TO FULLY CONTAIN AND CONTROL SEDIMENTATION ON THE SITE. ACCUMULATED SEDIMENT SHALL BE REMOVED WHEN IT HAS REACHED HALF OF THE EFFECTIVE CAPACITY OF THE CONTROL. IN ADDITION, THE CONTRACTOR MAY NEED TO ADJUST OR REPAIR MEASURES IN TIMES OF ADVERSE WEATHER CONDITIONS, OR AS DIRECTED BY THE AGENCY CONSTRUCTION SITE REVIEWER.
3. BEFORE BEGINNING SITE WORK, THE CONTRACTOR SHALL CONTACT THE ADJACENT LAND OWNER (TAX PARCEL 234-32.00-8.00) TO COORDINATE TRIMMING OF TREE LIMBS EXTENDING ON TO THE PROJECT PARCEL.
4. INSTALL TURBIDITY CURTAIN. REMOVE EXISTING CONCRETE BOAT RAMP. REMOVE TURBIDITY CURTAIN.
5. INSTALL ALL PERMANENT SHEET PILES AND TIMBER SUPPORT PILES FOR THE FIXED DOCK.
6. INSTALL SITE POLLUTION PREVENTION DEVICES PER DNREC STANDARD DETAILS & SPECIFICATIONS, INCLUDING CONCRETE WASHOUT.
7. CLEAR AREAS WITHIN LOC.
8. SAW CUT EXISTING PAVEMENT AS SHOWN ON THE EXISTING CONDITIONS AND DEMOLITION PLAN AND REMOVE PAVEMENT WITHIN THE AREAS SHOWN.
9. INSTALL SUMP PIT AND PORTABLE SEDIMENT TANK FOR DEWATERING OPERATION AT THE BOAT RAMP.
10. PERFORM ROUGH GRADING AT THE PROPOSED BOAT RAMP AND PARKING AREA.
11. INSTALL UNDERGROUND ELECTRIC.
12. PLACE STONE FOUNDATION FOR ALL AREAS TO PAVED.
13. PLACE CONCRETE FOR BOAT RAMP AND LIGHT POLE BASES.
14. INSTALL HEADER KITS ON TIMBER PILES.
15. PAVE ALL AREAS TO BE PAVED INCLUDING PARKING AREAS AND DRIVE AISLES.
16. PLACE ALUMINUM FIXED DOCK AND ALL ASSOCIATED COMPONENTS.
17. INSTALL SITE LIGHTING AND STRIPE ALL PAVED AREAS.
18. STABILIZE ALL UNPAVED DISTURBED AREAS WITH MINIMUM 6" TOPSOIL, DNREC APPROVED SEED MIX, AND MULCHING.

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REVISIONS

ADDENDUM

DESCRIPTION	DATE

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CONSTRUCTION PLANS
FOR
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MILLSBORO BOAT RAMP
GRAVEL HILL ROAD (SR30) MILLSBORO, DELAWARE
INDIAN RIVER HUNDRED, SUSSEX COUNTY, DELAWARE

SHEET TITLE
CONSTRUCTION LAYOUT PLAN

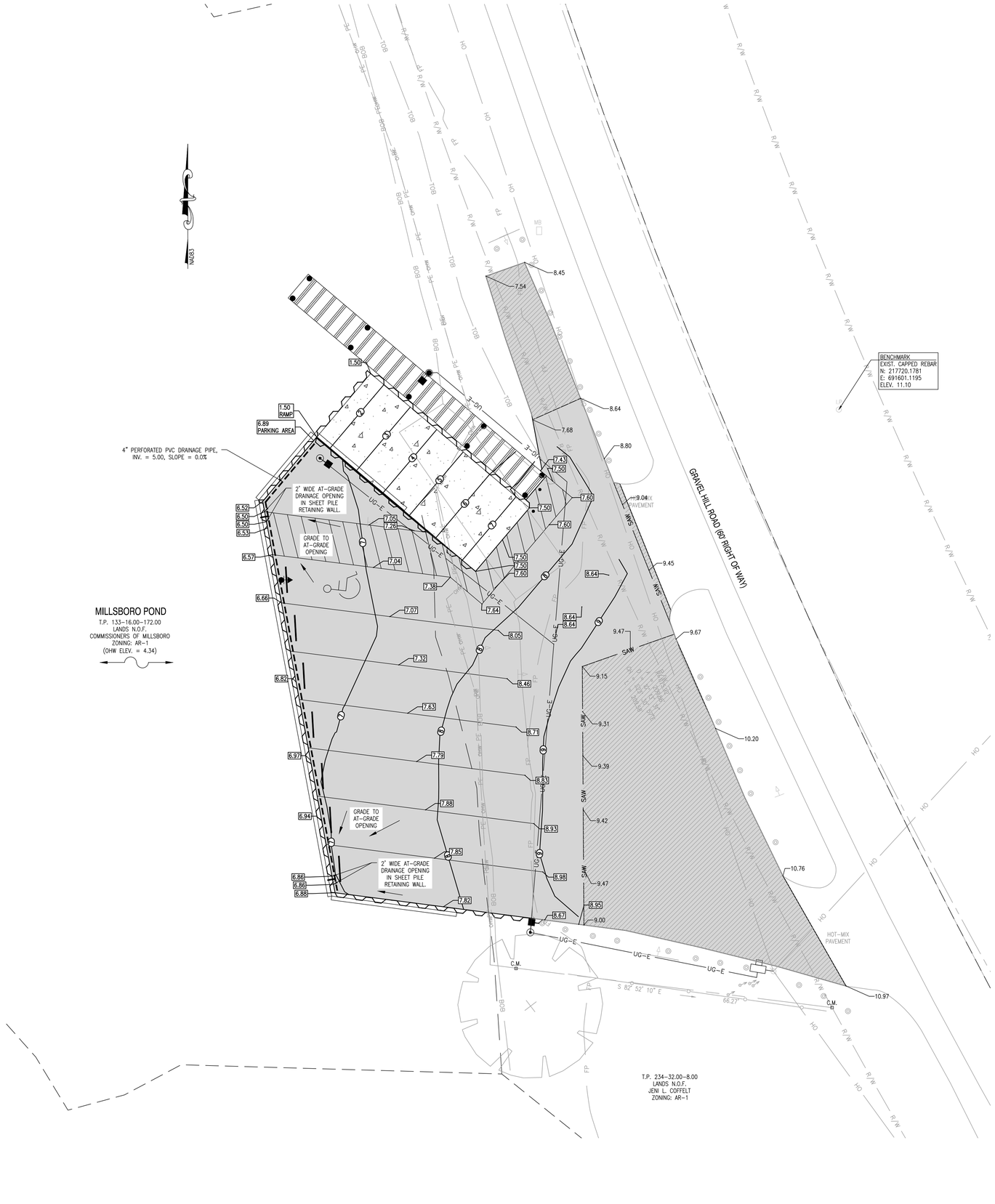
DIV. OF FISH AND WILDLIFE
100% SUBMISSION
FEBRUARY, 2019

DRAWN	CHK'D/DESIGNER
JSW / MDS	AES

SCALE	SHEET NO.
1" = 10'	C103

PROJECT NO. 155001.04

G:\PROJECTS\155001.00 DNREC Fish and Wildlife\155001.04 Reconstruction of the Millsboro Boating Access Facility\CADD FILES\Sheets\Construction Plans\C103 SitePlan.dwg, 1/31/2019 1:53 PM



LEGEND

	EXISTING	PROPOSED
PROPERTY LINE		N/A
PERMANENT EASEMENT		N/A
RIGHT OF WAY		N/A
CENTER LINE OF ROAD		N/A
CONTOUR	10	10
OVERHEAD UTILITY	OH	N/A
WETLAND LINE		N/A
ORDINARY HIGH WATER MARK	OHW OHW	N/A
FENCE		N/A
ADJOINER PROPERTY LINE	RL RL RL	N/A
SIGN		
SITE LIGHTING	N/A	
CONCRETE MONUMENT	C.M.	C.M.
UTILITY POLE		N/A
MAILBOX	MB	N/A
PAVEMENT		
MILL & OVERLAY PAVEMENT	N/A	
WOODEN BOLLARD		N/A
REMOVABLE BOLLARD	N/A	
CONCRETE AREA		
DOCK/PIER	N/A	
UNDERGROUND ELECTRIC	N/A	UG-E
TIMBER SUPPORT PILE	N/A	
SHEET PILE	N/A	
TURBIDITY CURTAIN	N/A	TC
LIMITS OF CONSTRUCTION	N/A	LOC LOC
GRADE BREAKLINE		N/A
GUY WIRE		N/A
TREE		N/A
TOP OF BANK	TOB	N/A
BOTTOM OF BANK	BOB	N/A
SAWCUT	N/A	SAW
100-YR FLOOD PLAIN	FP	N/A
CAPPED REBAR	I.P.	N/A

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DOVER, DE 19901
P: (302) 734-9188 F: (302) 734-6589
WEBSITE: www.centuryeng.com
EMAIL: cei@centuryeng.com

REVISIONS

ADDENDUM

DESCRIPTION	DATE

PROJECT

CONSTRUCTION PLANS
FOR
DELAWARE DIVISION OF FISH & WILDLIFE
MILLSBORO BOAT RAMP
GRAVEL HILL ROAD (SR30) MILLSBORO, DELAWARE
INDIAN RIVER HUNDRED, SUSSEX COUNTY, DELAWARE

SHEET TITLE

SITE GRADES AND GEOMETRICS PLAN

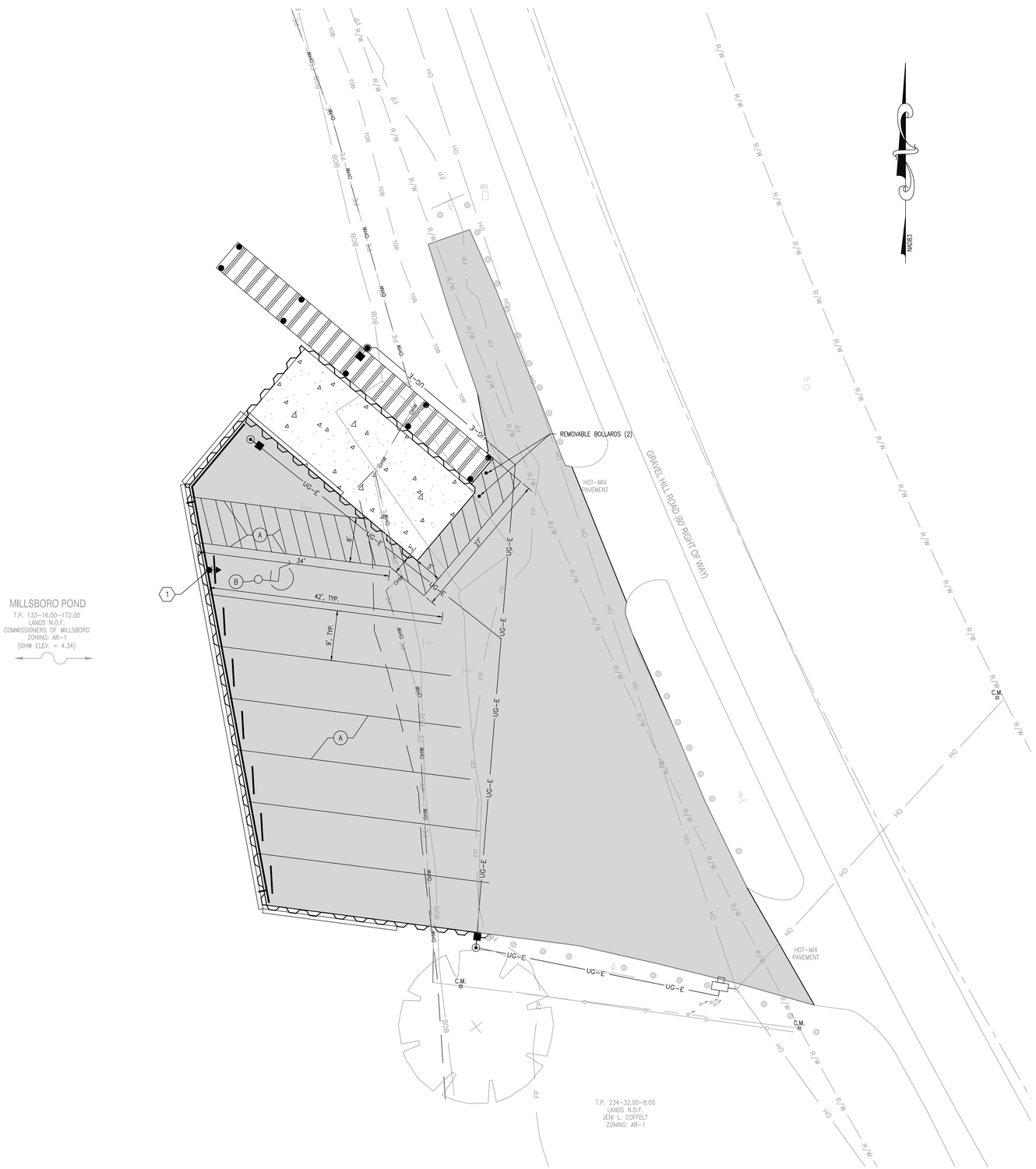
DIV. OF FISH AND WILDLIFE
100% SUBMISSION
FEBRUARY, 2019

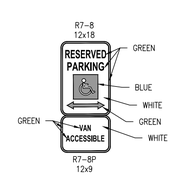
DRAWN	CHK'D/DESIGNER
JSW / MDS	AES

SCALE: 1" = 10'

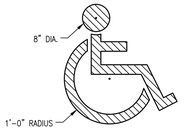
SHEET NO.: C104

PROJECT NO.: 155001.04





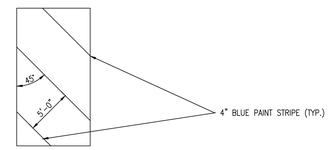
1 ACCESSIBLE PARKING SIGN DETAIL
NOT TO SCALE



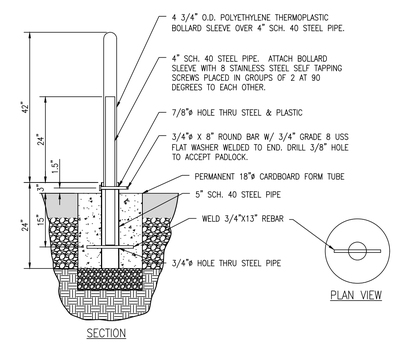
NOTES:
1. SYMBOL STRIPING SHALL BE 3" WIDE (MIN.) AND PAINTED ON EACH HANDICAPPED SPACE.
2. HANDICAPPED SPACES SHALL BE 8'-0" WIDE AT MINIMUM.

HANDICAPPED SYMBOL DETAIL
NOT TO SCALE

PAVEMENT MARKINGS LEGEND	
SYMBOL	ITEM
A	4" WHITE ALKYD PAVEMENT STRIPING
B	BLUE RETROFLECTIVE PREFORMED PATTERNED MARKINGS, SYMBOL/LEGEND



TYPICAL ACCESSIBLE WALKWAY STRIPIING DETAIL
NOT TO SCALE



REMOVABLE PIPE BOLLARD DETAIL
NOT TO SCALE

REMOVABLE BOLLARD NOTES:

1. ALL STEEL SHALL BE HOT DIPPED GALVANIZED AFTER FABRICATION.

0' 10' 20' 30'
SCALE: 1" = 10'

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REVISIONS

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DESCRIPTION	DATE

PROJECT
CONSTRUCTION PLANS
FOR
DELAWARE DIVISION OF FISH & WILDLIFE
MILLSBORO BOAT RAMP
GRAVEL HILL ROAD (SR30) MILLSBORO, DELAWARE
INDIAN RIVER HUNDRED, SUSSEX COUNTY, DELAWARE

SHEET TITLE
SIGNING AND STRIPING PLAN

DIV. OF FISH AND WILDLIFE
100% SUBMISSION
FEBRUARY, 2019

DRAWN	CHK'D/DESIGNER
JSW / MDS	AES
SCALE	SHEET NO.
1" = 10'	C105
PROJECT NO. 155001.04	

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GENERAL NOTES - ELECTRICAL WORK

1. THE ELECTRICAL CONTRACTOR SHALL COORDINATE HIS WORK WITH THAT OF ALL OTHER TRADES. ALL OTHER TRADE'S DRAWINGS AND SPECIFICATIONS SHALL BE CONSULTED AND COORDINATED WITH PRIOR TO ROUGH-IN.
2. WHEREVER POSSIBLE, THE CONTRACTOR SHALL OBTAIN ACTUAL ROUGH-IN DRAWINGS FOR THE ACTUAL ITEM OF EQUIPMENT TO BE INSTALLED PRIOR TO ROUGH-IN. THIS SHALL APPLY TO ALL EQUIPMENT, WHETHER IT IS TO BE INSTALLED BY THE CONTRACTOR OR BY THE OWNER.
3. PROVIDE TYPED CIRCUIT DIRECTORIES FOR ALL PANELBOARDS TO INDICATE TYPE OF LOAD SERVED AND AREA SERVED (E.G. RV POWER POST A1).
4. UNLESS NOTED OTHERWISE, EVERY CONDUIT CONTAINING 120V OR GREATER WIRING SHALL CONTAIN A SEPARATE INSULATED GROUND WIRE RATED FOR 600V.
5. PROVIDE SEPARATE UNSHARED NEUTRAL CONDUCTOR(S) FOR ALL FEEDERS REQUIRING A NEUTRAL (I.E. 1 PHASE – 3 WIRE). SHARING OF NEUTRAL CONDUCTORS BETWEEN ANY CIRCUIT (FEEDER) IS NOT PERMITTED. MULTIWIRE FEEDER CIRCUITS ARE NOT PERMITTED.
6. CONFIRM ALL EQUIPMENT LOCATIONS PRIOR TO INSTALLATION.
7. PROVIDE WARNING LABELS FOR ALL PANELBOARDS AND METER SOCKET ENCLOSURES. WARNING LABELS SHALL READ AS FOLLOWS: "CAUTION. POTENTIAL ELECTRIC ARC FLASH HAZARD. WEAR PROPER PROTECTIVE CLOTHING WHILE EXAMINING, ADJUSTING, SERVICING OR MAINTAINING ENERGIZED EQUIPMENT." INSTALL WARNING LABELS ON EXTERIOR FRONT FACE OF ALL PANELBOARDS AND METER SOCKET ENCLOSURES LOCATED IN UNFINISHED/UTILITY TYPE SPACES. INSTALL WARNING LABELS ON INTERIOR FRONT FACE OF ALL PANELBOARDS LOCATED IN FINISHED SPACES. ENTIRE INSTALLATION SHALL COMPLY WITH THE REQUIREMENTS OF THE 2011 NEC, ARTICLE 110.16 (FLASH PROJECTION).
8. PROVIDE PANELBOARD AS REQUIRED. EACH SPACE SHALL BE A FULLY PREPARED SPACE (I.E. COMPLETE WITH ALL PROVISIONS INCLUDING ALL HARDWARE REQUIRED TO MOUNT A FUTURE CIRCUIT BREAKER INCLUDING BUS CONNECTIONS, CIRCUIT BREAKER MOUNTING BRACKET, CIRCUIT BREAKER COVER AND COVER KNOCKOUTS, ETC.). PANELBOARDS SHALL BE NEMA 3R, LOCKABLE WITH THE SAME KEYING.
9. COORDINATE UNDERGROUND RUNS WITH EXISTING CONDITION AND TREE LOCATIONS.
10. VERIFY ELECTRICAL SYSTEM PHASING AND ROTATION WITH UTILITY COMPANY.
11. COMPLY WITH CURRENT NATIONAL, STATE, AND LOCAL ADOPTED CODES.
12. SAW CUT PAVED AREAS IN ACCORDANCE WITH CONSTRUCTION DETAILS.
13. RESTORE DISTURBED PAVED AREAS IN TO THE ORIGINAL CONDITION OR IN ACCORDANCE WITH CONSTRUCTION DETAILS.
14. CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING TEMPORARY POWER (PORTABLE GENERATORS, TEMPORARY SERVICES, ETC.).
15. ALL CONDUITS SHALL BE SCHEDULE 80 PVC, UNLESS NOTED OTHERWISE.
16. UNLESS OTHERWISE INDICATED, ALL CABLES/CONDUCTORS SHALL BE COPPER TYPE.
17. UTILITY SERVICE POLE, FUSE CUTOUTS, OVERHEAD LINES UPSTREAM OF UTILITY SERVICE POLE, AND METERS TO BE PROVIDED BY DELAWARE ELECTRIC COOPERATIVE.
18. CONTRACTOR SHALL HAVE ALL WORK INSPECTED BY UNDERWRITERS INSPECTION AGENCY. INSPECTION CERTIFICATE SHALL BE PROVIDED.
19. ELECTRICAL CONTRACTOR SHALL COORDINATE WITH SITE CONTRACTOR FOR PLACEMENT OF ALL UNDERGROUND CONDUITS AND WIRING. UNDERGROUND SERVICE SHALL BE PLACED AS SHOWN ON THIS SHEET. ANY REVISIONS OR ALTERATIONS TO THE CONDUIT ALIGNMENT SHALL BE APPROVED BY THE ENGINEER.
20. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING UTILITY PERMITS FROM DELDOT IF REQUIRED.
21. TRACER WIRE SHALL BE PROVIDED ON ALL UNDERGROUND UTILITIES. SIZE AND COLOR SHALL BE PER UTILITY AUTHORITY DESIGNATION STANDARDS.

SITE LIGHTING FIXTURE SCHEDULE

QTY	TYPE	LAMPS	VOLTAGE	MOUNT	FIXTURE DESCRIPTION	MANUFACTURER CATALOG NUMBER	REMARKS
2	A	LED	UNIV. 120–277V	POLE MNT SINGLE @ 20'–0"	SINGLE MOUNT, FULL CUTOFF, WILDLIFE FRIENDLY LED DOCK LUMINAIRE AND POLE WITH RECEPTACLE AND PHOTOCELL.	SEE TECHNICAL SPECIFICATIONS FOR LIGHT FIXTURE SELECTION GUIDANCE	20' ALUMINUM POLES WITH SIDE MOUNTED LUMINAIRES AND TOP CAP FOR POLE – SEE TECHNICAL SPECIFICATIONS FOR DETAILS
1	B	LED	UNIV. 120–277V	PILE MNT. SINGLE @ 10'–0"	SINGLE MOUNT, FULL CUTOFF, WILDLIFE FRIENDLY LED DOCK LUMINAIRE AND PHOTOCELL.	SEE TECHNICAL SPECIFICATIONS FOR LIGHT FIXTURE SELECTION GUIDANCE	SIDE MOUNTED LUMINAIRE SHALL BE SECURED DIRECTLY TO THE TIMBER SUPPORT PILE

ELECTRICAL LEGEND

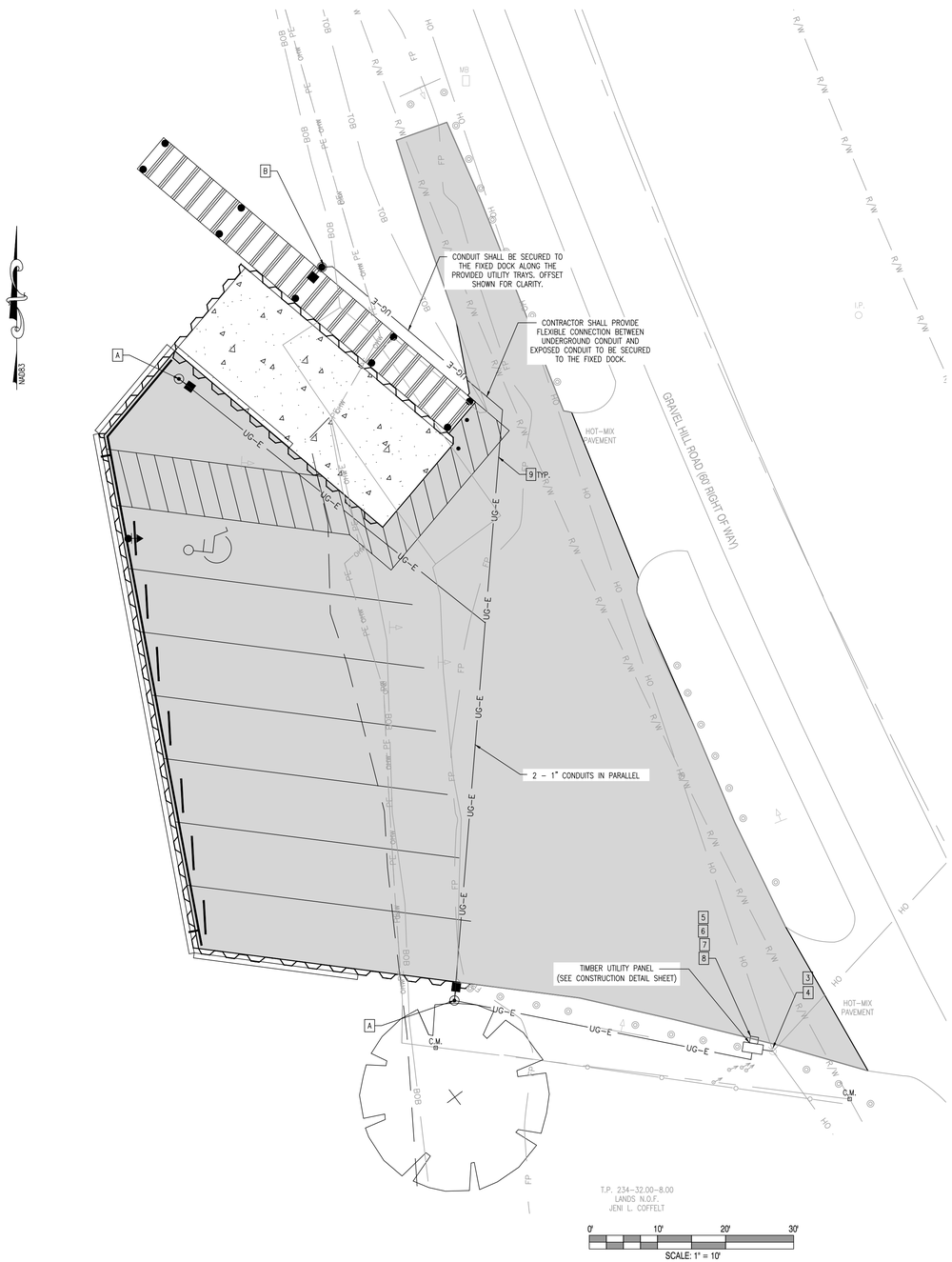
— OH — OVERHEAD ELECTRIC

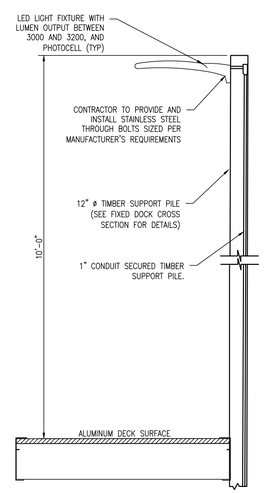
– UG–E– UNDERGROUND ELECTRIC

ELECTRIC UTILITY METER

NOTES:

1. UTILITY PANEL TO INCLUDE ELECTRICAL METER AND FIRE EXTINGUISHER. ADDITIONAL DETAILS ON THE UTILITY PANEL LAYOUT IS PROVIDED ON THE CONSTRUCTION DETAIL SHEET.
2. THE CONTRACTOR SHALL CONTACT DELAWARE ELECTRIC COOPERATIVE (DEC) CUSTOMER SERVICE DEPARTMENT AT (855)–332–9090 TO HAVE NEW METER INSTALLED ONCE CONTRACTOR HAS SUPPLIED CONDUIT TO THE METER PANEL AS INDICATED ON THIS SHEET.
3. DEC TO PROVIDE TRANSFORMER ON EXISTING UTILITY POLE AND MAKE CONNECTIONS. CONTRACTOR TO PROVIDE RISER WIRING, 2" SCHEDULE 80 PVC CONDUIT, AND RISER GUARD ON POLE WITH COILED CABLE SLACK TO ALLOW FOR DEC TRANSFORMER CONNECTION. SERVICE SHALL BE 120/240V, SINGLE–PHASE, 3–WIRE. GROUNDING AS REQUIRED BY DEC. CONTRACTOR TO COORDINATE RELATED WORK AND RESPONSIBILITY WITH DEC, AND INSTALL IN ACCORDANCE.
4. PROVIDE MINIMUM (3) #2AWG, TYPE XHHW COPPER CONDUCTORS BETWEEN PANELBOARD AND METER BASE, AND FROM METER BASE TO UTILITY POLE. VERIFY CONDUCTOR SIZE WITH DEC PRIOR TO ORDERING. CONDUIT SHALL BE 2" SCHEDULE 80 PVC.
5. CONTRACTOR TO PROVIDE A 100A–120/240V–1PH–3W, 12 POLE PANELBOARD WITH 100A MAIN BREAKER AND ALUMINUM BUS. PROVIDE WITH (2)20A–1P BRANCH BREAKERS. PANELBOARD TO BE SERVICE ENTRANCE RATED. COORDINATE SHORT CIRCUIT CURRENT RATING WITH UTILITY. EXAMPLE MANUFACTURERS INCLUDE: SQUARE D, CUTLER HAMMER, AND SIEMENS.
6. PROVIDE DEC APPROVED METER SOCKET/BOX MOUNTED ON TIMBER PANEL BOARD. INSTALLATION SHALL BE IN ACCORDANCE WITH DEC REQUIREMENTS AND THIS SHEET.
7. CONTRACTOR TO PROVIDE PAD LOCKABLE NEMA 4X STAINLESS STEEL CABINET WITH HINGED DOOR TO HOUSE THE 100A PANELBOARD. CABINET HOUSE SHALL BE SIZED ACCORDING TO PANELBOARD REQUIREMENTS AND PROVIDE AMPLE SPACE TO ROUTE INCOMING/OUTGOING CONDUCTORS. CABINET HOUSE SECURED TO THE TIMBER UTILITY PANEL AS SHOWN ON THE CONSTRUCTION DETAIL SHEET. OWNER TO PROVIDE PADLOCK FOR CABINET HOUSING. EXAMPLE MANUFACTURERS INCLUDE: HOFFMAN, WIEGMANN, AND SAGINAW.
8. PROVIDE 5/8" DIAMETER BY 10' LONG COPPER–CLAD STEEL GROUND ROD. DRIVE TOP OF GROUND ROD TO BELOW GRADE. PROVIDE #2 GROUND WIRE IN 3/4"C FROM GROUND ROD TO BUILDING PANEL GROUND BAR. CONNECT GROUND WIRE TO GROUND ROD WITH EXOTHERMIC WELD CONNECTOR. BOND TO METAL WATER PIPE AND STRUCTURE METAL IN COMPLIANT WITH NEC. PROVIDE ADDITIONAL GROUND RODS UNTIL MEET 10 OHMS OR LESS.
9. 2#10, #10G IN 1"C UNDERGROUND AND RISERS, BURIED AT LEAST 36" BELOW GRADE.

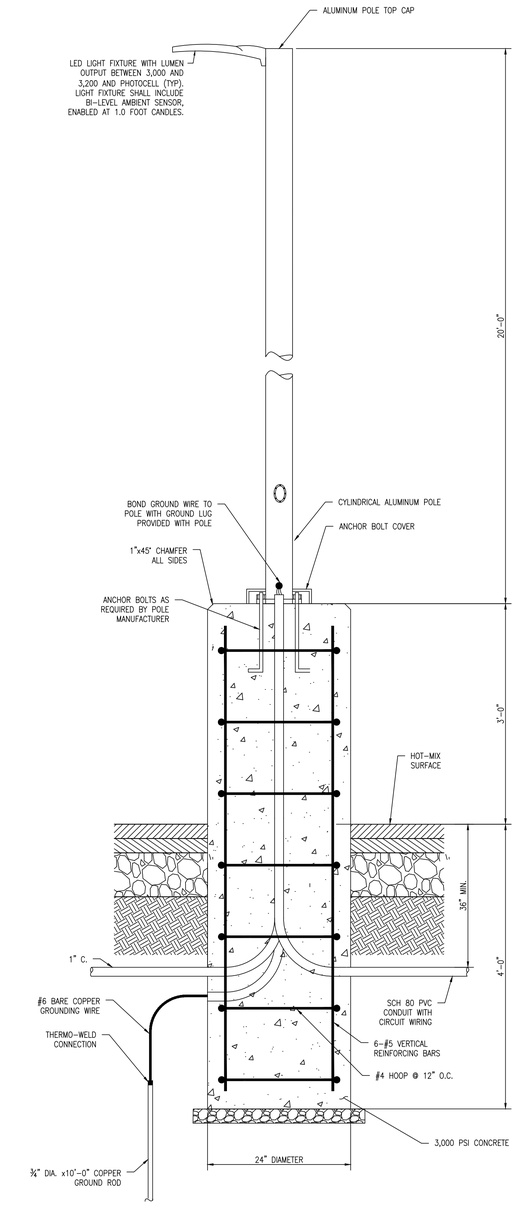




TYPE "B" - DOCK SECURITY LIGHT
SCALE: 1" = 1'- 0"

DOCK SECURITY LIGHT NOTES:

1. CONTRACTOR SHALL PROVIDE EXTENDED TIMBER SUPPORT PILE TO SERVE AS THE LIGHT POLE. LIGHT FIXTURE, AND ALL MATERIALS TO SECURE THE LIGHT FIXTURE TO THE PILE. CONTRACTOR SHALL SECURE LIGHT FIXTURE DIRECTLY TO PILE.
2. PROVIDE AND SECURE ELECTRIC CONDUIT AND WEATHER HEAD TO EXTERIOR OF PILE WITH STAINLESS STEEL BRACKETS AND BOLTS AT 4'–0" MAXIMUM SPACING. POSITION CONDUIT TO AVOID HEADER CHANNEL BRACKETS.
3. SECURITY LIGHT TO BE MOUNTED ON THE FIXED DOCK TIMBER SUPPORT PILE IN THE LOCATION SHOWN ON THIS SHEET.



TYPE "A" LUMINAIRE FOUNDATION
N.T.S.

SITE LIGHTING NOTES:

1. CONTRACTOR SHALL PROVIDE TEMPORARY SHORING OF EXCAVATION FOR CONCRETE LIGHT POLE BASES VIA HEAVY DUTY CARDBOARD CONCRETE FORM TUBING. INSTALLATION SHALL BE PER THE MANUFACTURER'S SPECIFICATIONS. EXAMPLE MANUFACTURERS INCLUDE SONOTUBE & SAKRETE.
2. FOUNDATION SHALL BE POURED ON 4" LAYER OF DE #3 STONE.
3. FOUNDATION SHALL NOT BE POURED BELOW 40°F ON A FALLING TEMPERATURE.

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WEBSITE: www.centuryeng.com
EMAIL: cei@centuryeng.com

REVISIONS

ADDENDUM

DESCRIPTION	DATE

PROJECT
CONSTRUCTION PLANS
FOR
DELAWARE DIVISION OF FISH & WILDLIFE
MILLSBORO BOAT RAMP
GRAVEL HILL ROAD (SR30) MILLSBORO, DELAWARE
INDIAN RIVER HUNDRED, SUSSEX COUNTY, DELAWARE

SHEET TITLE
SITE LIGHTING PLAN

DIV. OF FISH AND WILDLIFE
100% SUBMISSION
FEBRUARY, 2019

DRAWN	CHK'D/DESIGNER
JSW / MDS	AES
SCALE: AS NOTED	SHEET NO.: C107
PROJECT NO. 155001.04	

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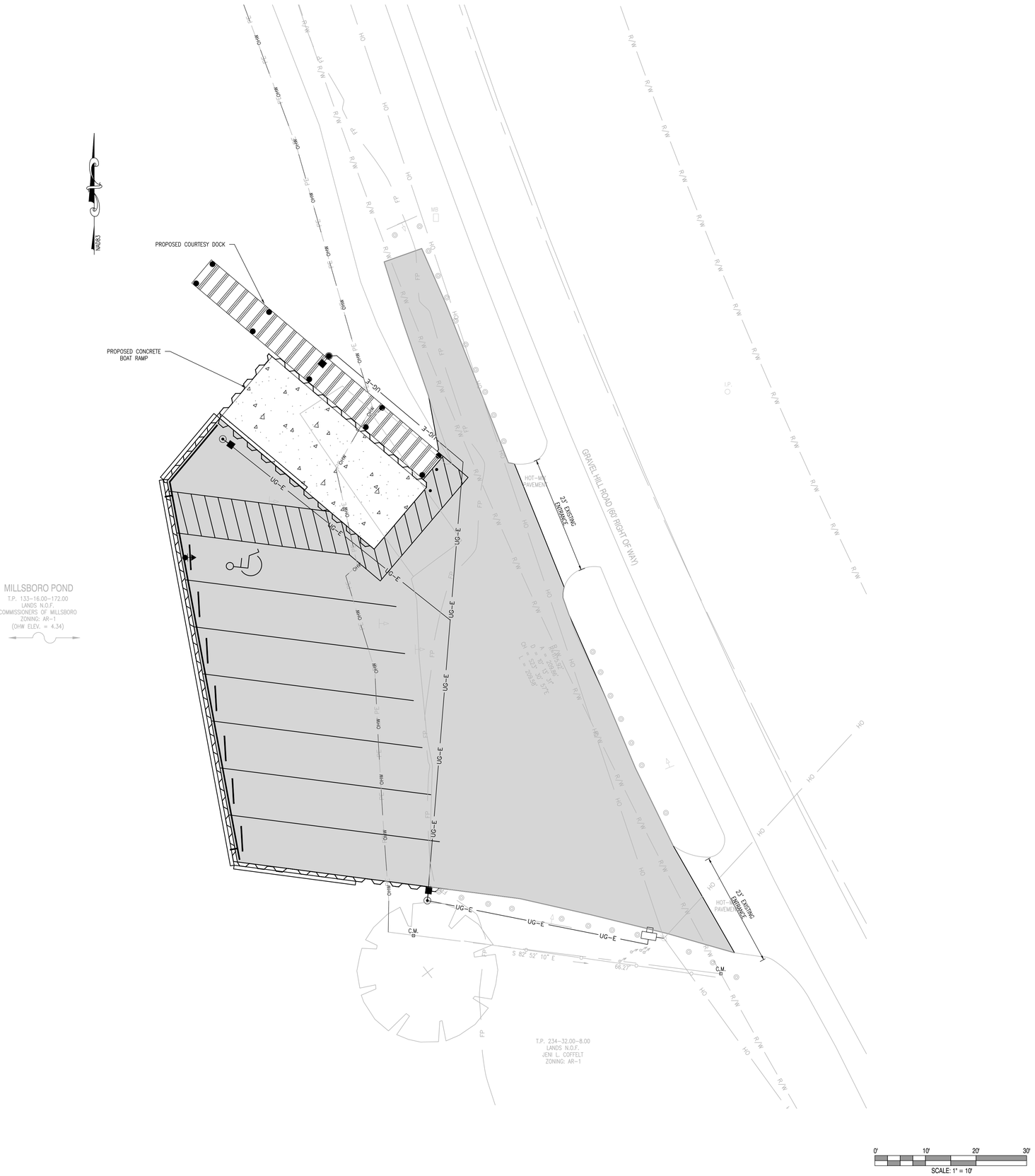

DATA COLUMN

1.	COUNTY TAX MAP:	234-32.00-7.00
2.	FIRE MARSHAL REVIEW NUMBER:	2018-04-0387-MJS-01
3.	REVIEW DATE:	APRIL 19, 2018
4.	REVIEW STATUS:	APPROVED AS SUBMITTED
5.	ADDRESS OF SITE:	PO BOX 466 MILLSBORO, DE 19966
6.	NAME OF BUILDING:	MILLSBORO BOAT RAMP
7.	SUSSEX COUNTY PLANNING NUMBER:	**********
8.	ZONING:	EXISTING AR-1: AGRICULTURAL RESIDENTIAL
9.	LOT AREA:	1.15± ACRES (BASED ON SUSSEX COUNTY GIS MAPPING)
10.	SOURCE OF TITLE:	D.B. 1245-74
11.	BUILDING USE:	N/A
12.	WATER SUPPLIER:	N/A
13.	PROPOSED BUILDING CONSTRUCTION:	N/A
14.	PERIMETER ACCESS: REQUIRED: PROVIDED:	 N/A N/A
15.	FIRE LANE: REQUIRED: PROVIDED:	 N/A N/A
16.	SPRINKLERED:	N/A

17. FIRE LANE NOTE:
ALL FIRE LANES, FIRE HYDRANTS AND FIRE DEPARTMENT CONNECTIONS SHALL BE MARKED IN ACCORDANCE WITH THE STATE FIRE PREVENTION REGULATIONS.

18. OWNER:
TOWN OF MILLSBORO
322 WILSON HIGHWAY
MILLSBORO, DE 19966
(302) 934-8171

19. APPLICANT:
STATE OF DELAWARE
DIVISION OF FISH & WILDLIFE
89 KINGS HIGHWAY
DOVER, DE 19901
JOHN CLARK
(302) 739-9914

20. ENGINEER:
CENTURY ENGINEERING, INC.
4134 N. DUPONT HIGHWAY
DOVER, DE 19901
ALEXANDER SCHMIDT, PE
(302) 734-9188

GENERAL NOTES:

1. ORDINARY HIGH WATER MARK ELEVATION WAS SURVEYED BY CENTURY ENGINEERING, INC. IN JUNE 2017.
2. RIGHT OF WAY, LOCATIONS, PROPERTY LINES PROVIDED BY DELAWARE DIVISION OF FISH & WILDLIFE. CENTURY ENGINEERING, INC. TAKES NO RESPONSIBILITY FOR THEIR ACCURACY.
3. TOPOGRAPHY SURVEY PERFORMED BY CENTURY ENGINEERING, INC. IN JUNE 2017.
4. ACCORDING TO FIRM NO. 10005C0456K, DATED MARCH 16, 2015, PORTIONS OF THE SUBJECT PARCEL ARE WITHIN ZONE AE (BASE FLOOD ELEVATION: 8.3 FEET).
5. BEARING AND DISTANCES SHOWN ON PLAN TAKEN FROM A SURVEY PLAN PREPARED BY J.J. McCANN, INC., DATED DECEMBER 7, 1983, DRAWING NO. IF-137.

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FOR
DELAWARE DIVISION OF FISH & WILDLIFE
MILLSBORO BOAT RAMP
GRAVEL HILL ROAD (SR30) MILLSBORO, DELAWARE
INDIAN RIVER HUNDRED, SUSSEX COUNTY, DELAWARE

SHEET TITLE
FIRE MARSHAL PLAN

DIV. OF FISH AND WILDLIFE
100% SUBMISSION
FEBRUARY, 2019

DRAWN	CHK'D/DESIGNER
JSW / MDS	AES
SCALE	SHEET NO.
1" = 10'	C106
PROJECT NO. 155001.04	

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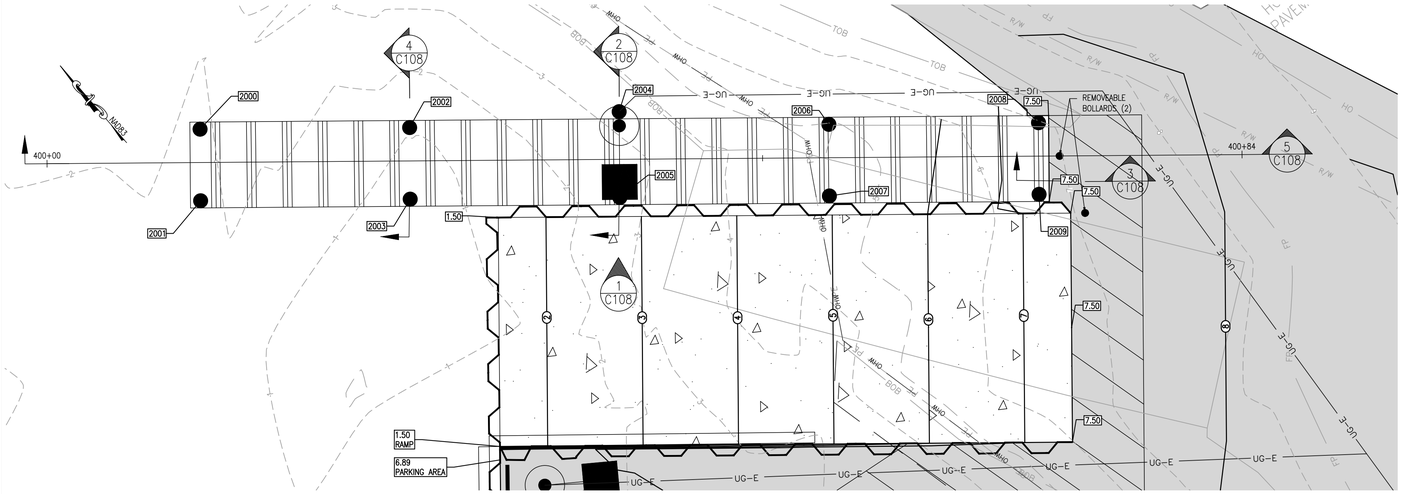


PLAN VIEW
SCALE: 1" = 5'

FIXED DOCK SUPPORT PILE LAYOUT							
POINT NO.	DESCRIPTION	NORTHING	EASTING	TOP ELEV.*	EST. TIP ELEV.	MIN. EMBEDMENT***	PILE LENGTH** (FT)
2000	PILE	217745.3920	691499.3249	5.10	−8.20	10.0	20.0
2001	PILE	217741.5775	691496.0923	5.10	−8.20	10.0	20.0
2002	PILE	217735.9237	691510.4976	5.10	−9.12	10.0	25.0
2003	PILE	217732.1092	691507.2650	5.10	−9.12	10.0	25.0
2004	PILE	217727.2163	691522.3192	16.10	−7.38	10.0	30.0
2005	PILE	217722.6389	691518.4401	5.10	−7.38	10.0	20.0
2006	PILE	217716.9852	691532.8454	5.80	−5.49	10.0	20.0
2007	PILE	217713.1707	691529.6128	5.80	−5.49	10.0	20.0
2008	PILE	217707.5148	691544.0205	6.50	−3.67	10.0	20.0
2009	PILE	217703.7003	691540.7879	6.50	−3.67	10.0	20.0

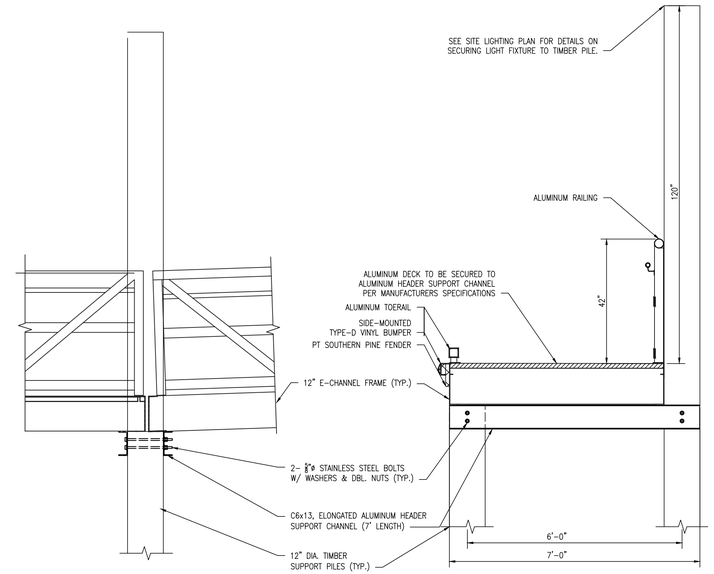
* NOTE: CONTRACTOR SHALL VERIFY THE TOP OF PILE ELEVATIONS WITH THE FIELD CONDITIONS AND DOCK MANUFACTURER DESIGN REQUIREMENTS.

** NOTE: PILE LENGTH COLUMN INDICATES MINIMUM PILE LENGTH TO BE ORDERED BY THE CONTRACTOR. CONTRACTOR SHALL INSTALL PILE TO MEET MINIMUM EMBEDMENT AND ULTIMATE BEARING CAPACITY REQUIREMENTS. EXCESS PILE LENGTHS SHALL BE TRIMMED AS NEEDED.

*** NOTE: IF A VIBRATORY HAMMER IS USED IN-LIEU OF AN IMPACT HAMMER, AN ADDITIONAL FIVE (5) FEET OF EMBEDMENT SHALL BE REQUIRED. ADDITIONAL PILE LENGTH MAY BE ORDERED AT THE CONTRACTORS' DISCRETION TO ENSURE EMBEDMENT CRITERIA IS SATISFIED WHEN USING A VIBRATORY HAMMER.

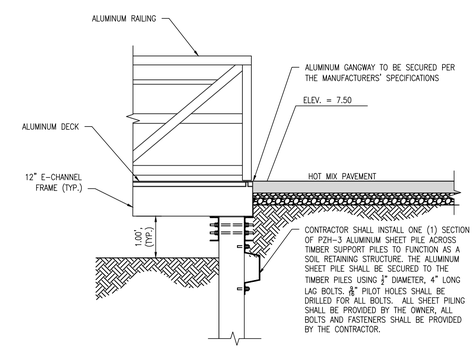
FIXED DOCK NOTES:

1. FINAL DOCK CONFIGURATION TO BE CONFIRMED WITH OWNER.
2. DOCK DIMENSIONS SHOWN ARE NOMINAL FROM ALUMINUM TO ALUMINUM FRAME. FINAL FINISHED DIMENSIONS WILL VARY ACCORDING TO INSTALLED FENDERS & BUMPERS.
3. TOP AND TIP ELEVATIONS OF TIMBER SUPPORT PILES FOR FIXED DOCK PROVIDED ON THIS SHEET.
4. ALL DOCKS, HEADER CHANNELS, RAILING, AND ANCILLARY ITEMS SHALL BE PROVIDED BY THE OWNER. HEADER CHANNELS SHALL BE ORDERED ONE (1) FOOT WIDER THAN THE PLAN LENGTH AND CUT IN THE FIELD BY THE CONTRACTOR.
5. FIXED DOCK SUPPORT PILES SHALL BE DRIVEN TO AN ULTIMATE BEARING CAPACITY OF 18 KIPS (AS DETERMINED BY THE ENGINEER) WHILE ALSO MEETING MINIMUM EMBEDMENT REQUIREMENTS.
6. WOOD PILES, CLASS B, SOUTHERN PINE MEETING REQUIREMENTS OF ASTM D25. PRESSURE IMPREGNATE WITH CHROMATED COPPER ARSENATE (CCA) IN ACCORDANCE WITH AMERICAN WOOD PRESERVERS ASSOCIATION (AWPA) STANDARD C3.

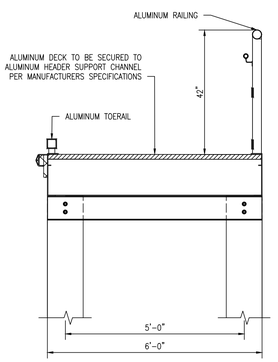


1 C108 GANGWAY SECTION AT PIER BENT
SCALE: 1/2"=1'-0"

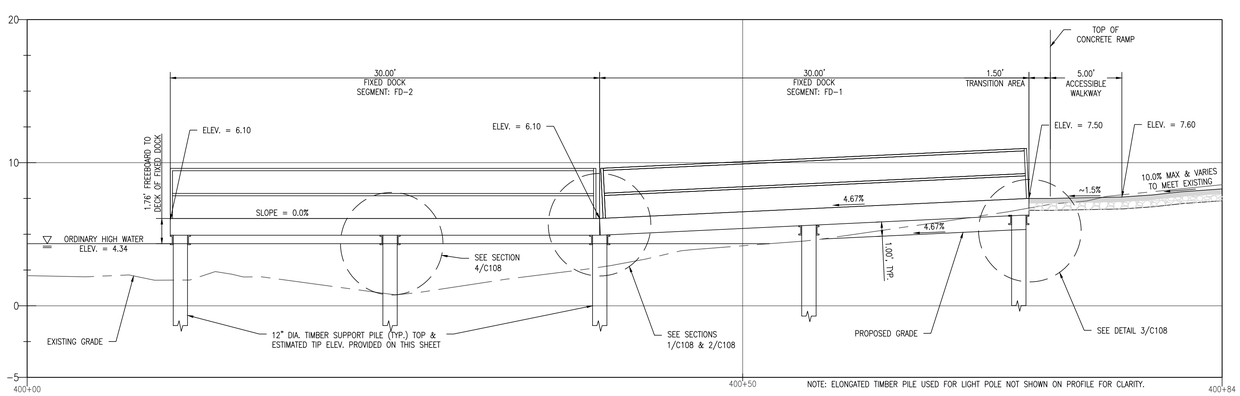
2 C108 GANGWAY ELEVATION AT PIER BENT
SCALE: 1/2"=1'-0"



3 C108 GANGWAY ABUTMENT
SCALE: 1/2"=1'-0"

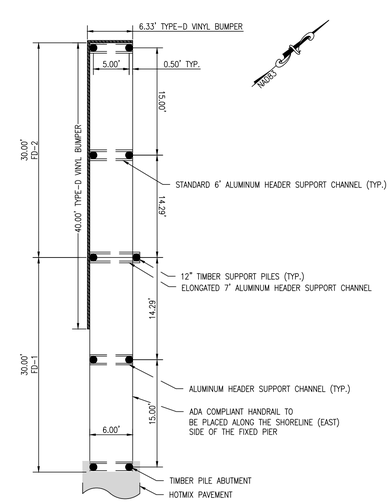


4 C108 GANGWAY ELEVATION AT PIER BENT
SCALE: 1/2"=1'-0"



NOTE: ELONGATED TIMBER PILE USED FOR LIGHT POLE NOT SHOWN ON PROFILE FOR CLARITY.

5 C108 GANGWAY PROFILE
SCALE: 1" = 5'



FIXED DOCK PLAN VIEW
SCALE: 1" = 10'

0' 5' 10' 15'
SCALE: 1" = 5'

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WEBSITE: www.centuryeng.com
EMAIL: cei@centuryeng.com

REVISIONS

ADDENDUM

DESCRIPTION	DATE

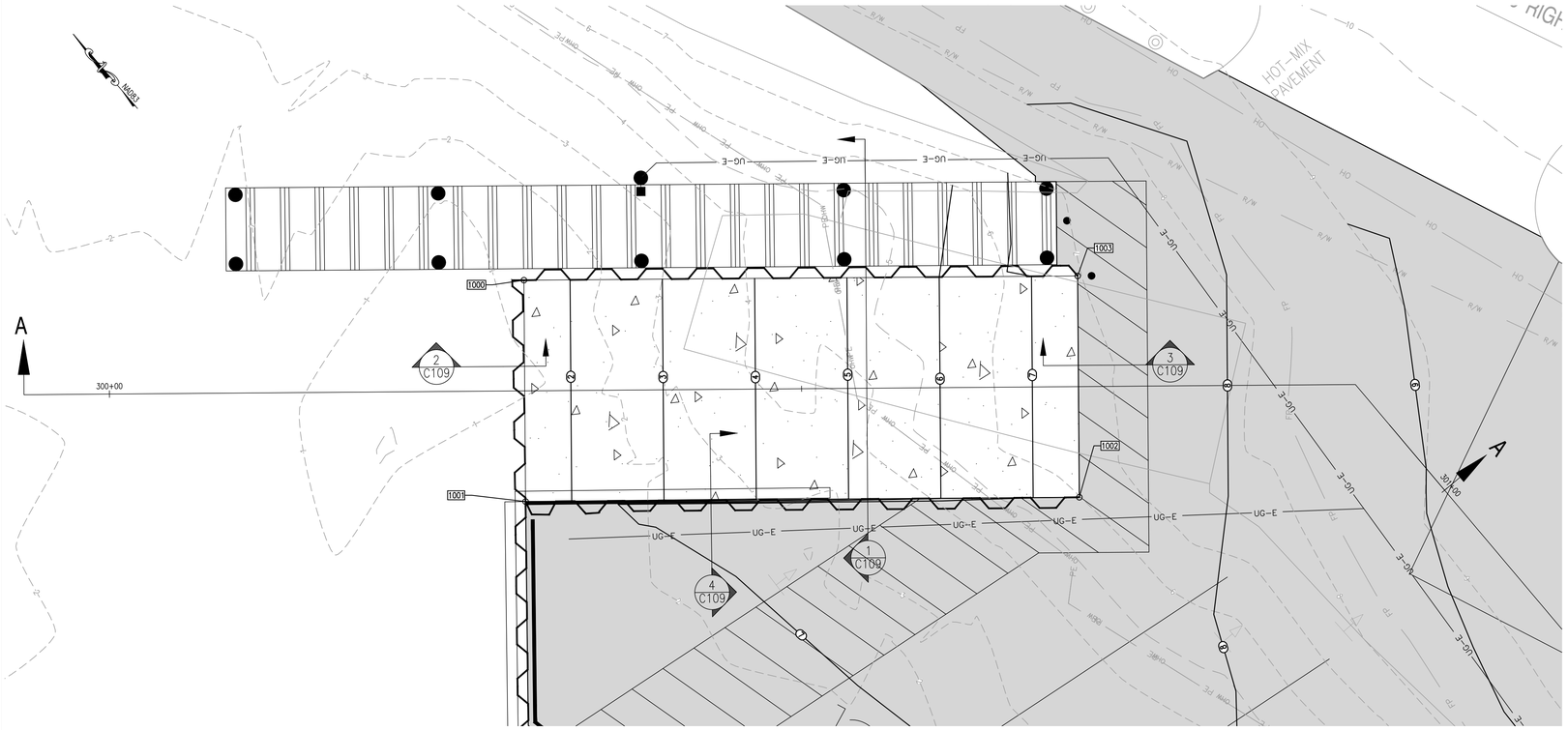
PROJECT
CONSTRUCTION PLANS
FOR
DELAWARE DIVISION OF FISH & WILDLIFE
MILLSBORO BOAT RAMP
GRAVEL HILL ROAD (SR30) MILLSBORO, DELAWARE
INDIAN RIVER HUNDRED, SUSSEX COUNTY, DELAWARE

SHEET TITLE
CROSS SECTION - FIXED DOCK

DIV. OF FISH AND WILDLIFE
100% SUBMISSION
FEBRUARY, 2019

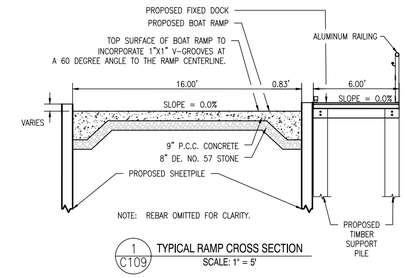
DRAWN: JSW / MDS
CHK'D/DESIGNER: AES
SCALE: AS NOTED
SHEET NO.: C108
PROJECT NO.: 155001.04

Q:\PROJECTS\155001.00 DNREC Fish and Wildlife\155001.04 Reconstruction of the Millsboro Boating Access Facility\CADD FILES\Sheets\Construction Plans\C108 CrossSection_FixedDock.dwg, 1/31/2019 2:01 PM

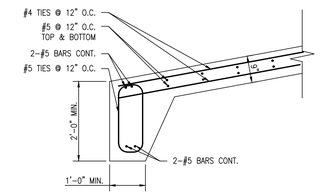


PLAN VIEW
SCALE: 1" = 5'

BOAT RAMP LAYOUT				
POINT NO.	DESCRIPTION	NORTHING	EASTING	ELEVATION
1000	RAMP	217727.1216	691511.0932	1.50
1001	RAMP	217714.9153	691500.7489	1.50
1002	RAMP	217689.0546	691531.2649	7.50
1003	RAMP	217701.2610	691541.6092	7.50

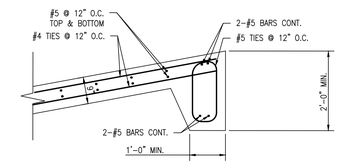


1 C109 TYPICAL RAMP CROSS SECTION
SCALE: 1" = 5'

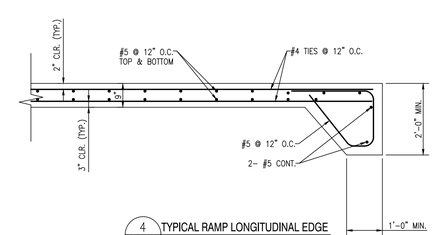


2 C109 RAMP TOE DETAIL
SCALE: 1" = 2'-0"

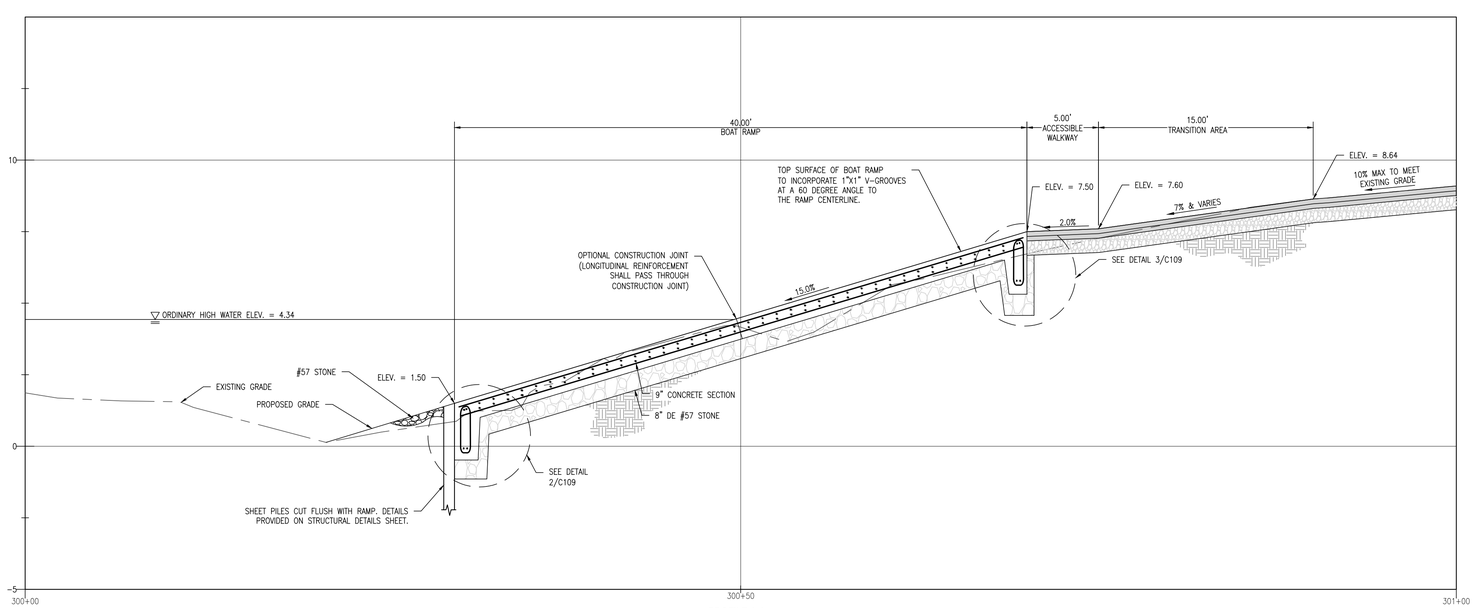
NOTE:
STONE BASE AND SHEET PILES NOT SHOWN FOR CLARITY.



3 C109 RAMP TOP DETAIL
SCALE: 1" = 2'-0"



4 C109 TYPICAL RAMP LONGITUDINAL EDGE
SCALE: 1" = 2'-0"



PROFILE A-A
HORIZONTAL SCALE: 1" = 5'
VERTICAL SCALE: 1" = 2.5'

NOTES:

1. REFER TO SHEET STRUCTURAL DETAIL SHEET FOR CONCRETE NOTES.

0' 5' 10' 15'
SCALE: 1" = 5'

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FOR
DELAWARE DIVISION OF FISH & WILDLIFE
MILLSBORO BOAT RAMP
GRAVEL HILL ROAD (SR30) MILLSBORO, DELAWARE
INDIAN RIVER HUNDRED, SUSSEX COUNTY, DELAWARE

SHEET TITLE
CROSS SECTION - BOAT RAMP

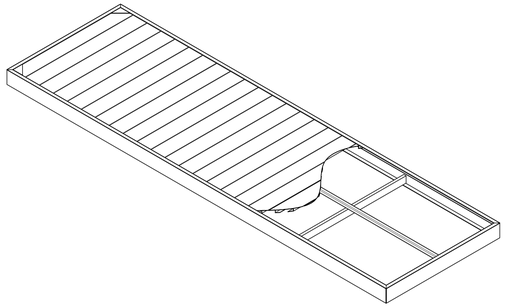
DIV. OF FISH AND WILDLIFE
100% SUBMISSION
FEBRUARY, 2019

DRAWN: JSW / MDS
CHK'D/DESIGNER: AES
SCALE: AS NOTED
SHEET NO.: C109
PROJECT NO.: 155001.04

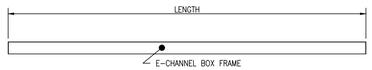
C:\PROJECTS\155001.00 DNREC Fish and Wildlife\Reconstruction of the Millsboro Boating Access Facility\CADD FILES\Sheets\Construction Plans\C109 CrossSection_BoatRamp.dwg, 1/31/2019 3:25 PM

FIXED DOCK DETAILS NOTE:

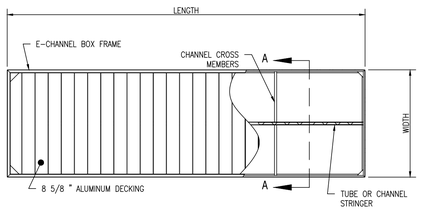
1. ALL DETAILS WITH AN DOUBLE ASTERISK (**) ARE PROVIDED BY THE DOCK MANUFACTURER AND SHOWN FOR ILLUSTRATIVE PURPOSES ONLY.



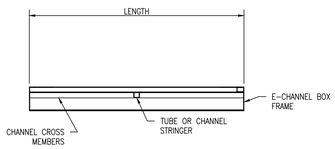
**ISOMETRIC VIEW OF ALUMINUM FIXED PIER
NOT TO SCALE



**ELEVATION VIEW OF ALUMINUM FIXED PIER
NOT TO SCALE



**PLAN VIEW OF ALUMINUM FIXED PIER
NOT TO SCALE



**SECTION A-A
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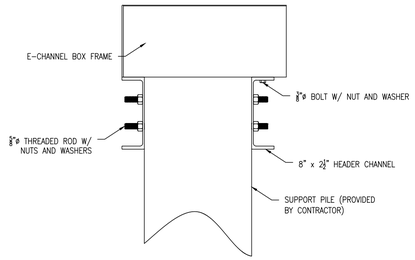
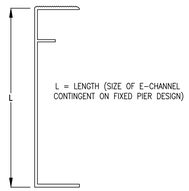
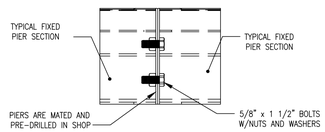


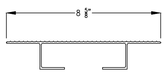
**HEADER DETAIL
NOT TO SCALE



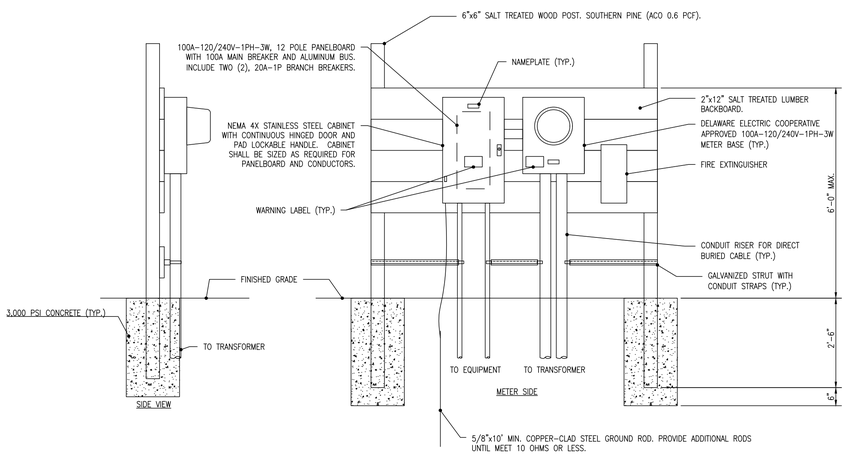
**E-CHANNEL DETAIL
NOT TO SCALE



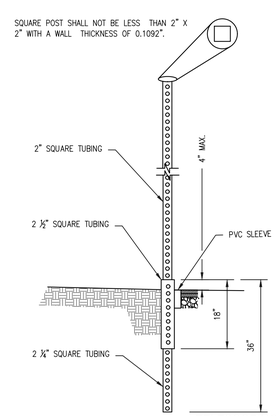
**FIXED PIER BOLTED CONNECTION DETAIL
NOT TO SCALE



**8 5/8" ALUMINUM DECKING DETAIL
NOT TO SCALE



UTILITY PANEL
SCALE: 1" = 2'



TELESCOPING STEEL SIGN POST BREAK AWAY ASSEMBLY
NOT TO SCALE

NOTES:

1. SQUARE TUBES ARE TO BE FORMED FROM GALVANIZED SHEET STRUCTURAL (PHYSICAL) QUALITY, ASTM A 446, GRADE A, COATING DESIGNATION G 90, REGULAR SPANGLE, OR HOT ROLLED CARBON SHEET STEEL STRUCTURAL (PHYSICAL) QUALITY, ASTM A 570, GRADE 33.
   A. NOMINAL OUTSIDE DIMENSION, (INCHES):
      2 X 2
      2 1/4 X 2 1/4
      2 1/2 X 2 1/2
   B. ALL FOUR SIDES ARE TO HAVE EVENLY SPACED 7/16" DIAMETER HOLES ON 1" CENTERS THE ENTIRE LENGTH OF THE TUBE.
   C. TOLERANCE ON HOLE SIZE IS ± 1/64". TOLERANCE ON HOLE SPACING IS ± 1/8" IN 20 FEET.
   D. STANDARD CORNER RADIUS SHALL BE 5/32" ± 1/64".
   E. THE FASTENERS TO BE SUPPLIED UNDER THIS SPECIFICATION SHALL BE 5/16" GRADE 5 UNC CORNER BOLTS WITH CADMIUM OR ZINC PLATING, INSTALLATION OF SIGNS SHALL BE WITH 3/8" X 2.5" BOLT WITH LOCKNUT AND WASHER.
2. REGULATORY SIGNS WIDER THAN 30" SHALL BE MOUNTED ON TWO POSTS. WHEN MORE THAN ONE REGULATORY SIGN IS TO BE INSTALLED ON THE SAME POST ASSEMBLY, THE MOUNTING HOLES SHALL BE DRILLED IN THE FIELD AS THE ASSEMBLY IS BEING CONSTRUCTED.
3. CONTRACTOR SHALL PROVIDE AND INSTALL PVC SLEEVES (4" INSIDE DIAMETER MINIMUM, 6" INSIDE DIAMETER MAXIMUM) IN PROPOSED CONCRETE SIDEWALKS, ISLANDS, AND PARKING AREAS FOR FUTURE TRAFFIC SIGN POSTS AS DIRECTED BY THE ENGINEER. THE LOWER END OF THE SLEEVE SHALL BE SET ON TOP OF THE SOIL.

0' 2' 4' 6'
SCALE: 1" = 2'

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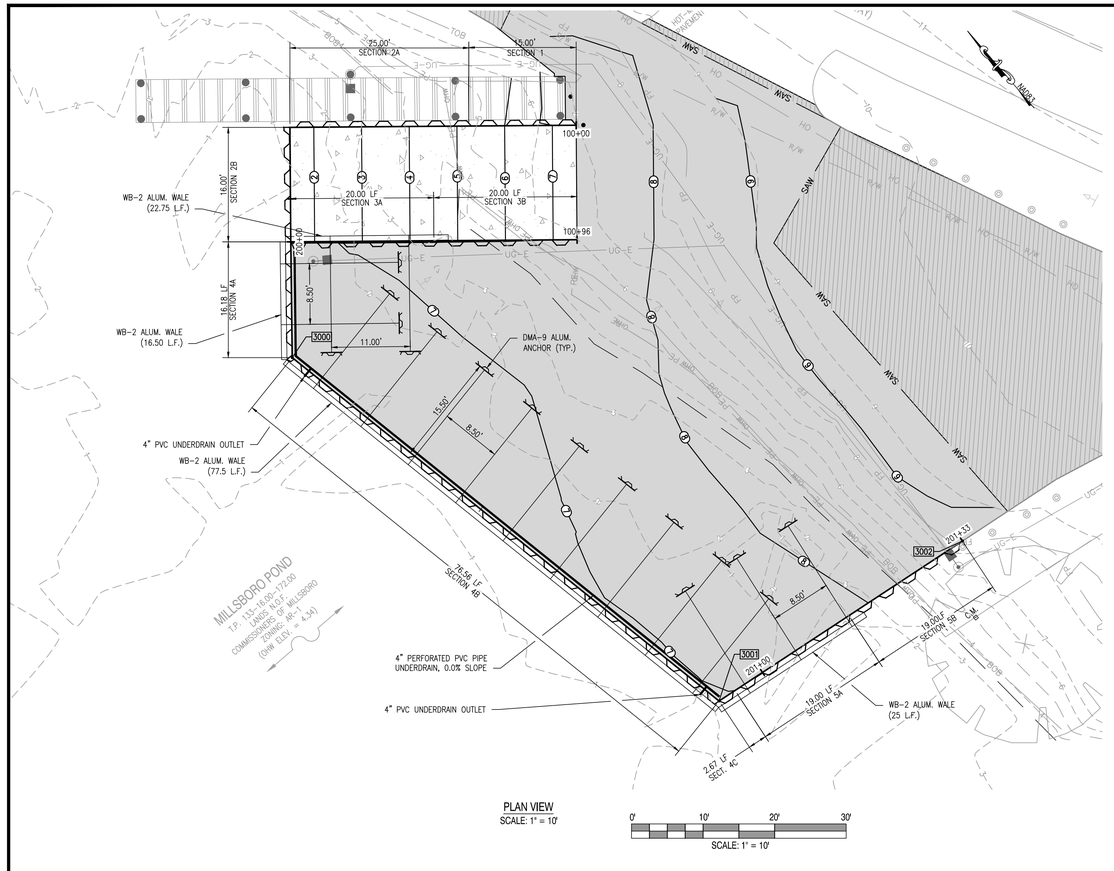
MILLSBORO BOAT RAMP
GRAVEL HILL ROAD (SR30) MILLSBORO, DELAWARE
INDIAN RIVER HUNDRED, SUSSEX COUNTY, DELAWARE

SHEET TITLE
CONSTRUCTION DETAILS

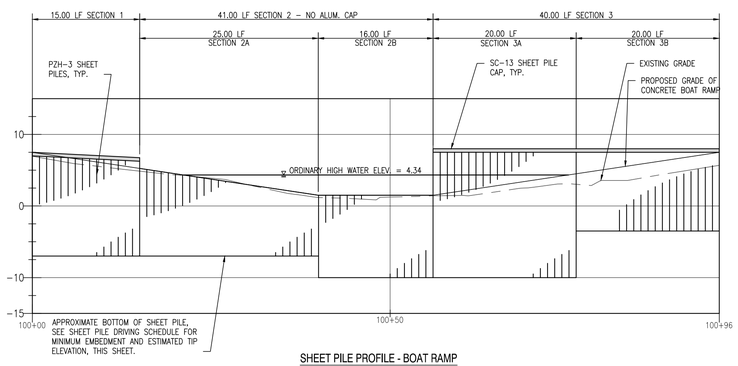
DIV. OF FISH AND WILDLIFE
100% SUBMISSION
FEBRUARY, 2019

DRAWN	CHK'D/DESIGNER
JSW / MDS	AES
SCALE	SHEET NO.
AS NOTED	C110
PROJECT NO. 155001.04	

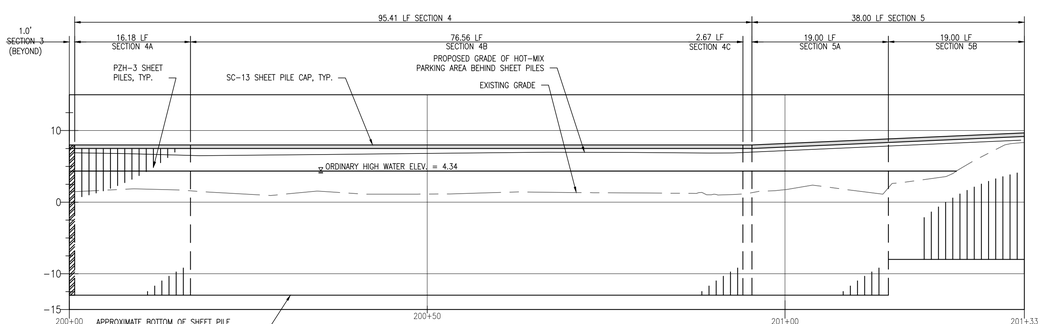


PLAN VIEW
SCALE: 1" = 10'

0' 10' 20' 30'
SCALE: 1" = 10'



SHEET PILE PROFILE - BOAT RAMP
SCALE: 1" = 10'



SHEET PILE PROFILE - PARKING AREA
SCALE: 1" = 10'

STRUCTURAL NOTES:

DESIGN AND CONSTRUCTION SPECIFICATIONS:

1. LOADS:
   1.1. LIVE LOAD – FIXED DOCKS: 40 POUNDS PER SQUARE FOOT WITH A MAXIMUM DEFLECTION OF L/180.

2. MATERIALS:
   2.1. ALUMINUM:
      2.1.1. ALL STRUCTURAL ALUMINUM IS ALLOY 6061–T6, MILL FINISH.
      2.1.2. ALL WELDED FABRICATION IN ACCORDANCE WITH AWS D1.2, UNLESS NOTED OTHERWISE. FILLER METAL TO BE 5356 SERIES WIRE.

   2.2. REINFORCING STEEL:
      2.2.1. ALL REINFORCING STEEL SHALL BE AASHTO M31, (ASTM A615), GRADE 60.
      2.2.2. ALL REINFORCING STEEL SHALL BE EPOXY COATED IN ACCORDANCE WITH AASHTO M284.

   2.3. TIMBER:
      2.3.1. PILES SHALL BE CLASS B SOUTHERN YELLOW PINE IN ACCORDANCE WITH ASTM D25.
      2.3.2. DIMENSION LUMBER SHALL BE SOUTHERN YELLOW PINE, NO. 2 OR BETTER.
      2.3.3. ALL PILES AND DIMENSION LUMBER SHALL BE TREATED WITH CHROMATED COPPER ARSENATE (CCA) WITH A MINIMUM RETENTION OF 2.5 POUNDS PER CUBIC FOOT.

   2.4. CONCRETE:
      2.4.1. ALL EXPOSED CONCRETE PAD EDGES SHALL HAVE A 1" CHAMFER.
      2.4.2. AN OPTIONAL TRANSVERSE CONSTRUCTION JOINT MAY BE PLACED AT THE MID–SPAN OF THE BOAT RAMP AS SHOWN.
      2.4.3. ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH SECTION 610 OF THE DELDOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION (DATED AUGUST 2016) UNLESS OTHERWISE NOTED.
      2.4.4. SUBMIT CONCRETE MIX DESIGNS FOR REVIEW AND APPROVAL PRIOR TO STARTING WORK. ALL CONCRETE SHALL USE A DELDOT APPROVED MIX.
      2.4.5. CONCRETE DESIGN MIXES/STRENGTHS SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF F'C = 4,500 PSI. ALL CONCRETE SHALL CONTAIN A WATER–REDUCING ADMIXTURE. CALCIUM CHLORIDE IS PROHIBITED.
      2.4.6. CONCRETE FOR RAMP SHALL BE DELDOT CLASS A (F'C = 4,500 PSI) AND SHALL CONFORM TO SECTION 610004 – PORTLAND CEMENT MASONRY, ABUTMENT ABOVE FOOTING, CLASS A.
      2.4.7. UNLESS OTHERWISE SHOWN, CONCRETE COVER OVER REINFORCEMENT SHALL BE 1" FOR INTERIOR FACE OF WALLS NOT EXPOSED TO EARTH, 2" FOR EXTERIOR FACE OF WALLS, 3" FOR FOOTINGS AND OTHER STRUCTURAL CONCRETE DEPOSITED AGAINST GROUND, 2" FOR CONCRETE PERMANENTLY EXPOSED TO EARTH OR WEATHER, AND 0.75" FOR SLABS.
      2.4.8. NO CONCRETE SHALL BE PLACED IN WATER OR ON FROZEN SUBGRADE.
      2.4.9. THE REQUIRED AIR CONTENT FOR ALL CONCRETE SHALL BETWEEN 3% AND 7%.
      2.4.10. PROOF ROLL SUBGRADES FOR PAVED AREAS UNDER THE DIRECTION OF THE INSPECTION AGENCY. REMOVE ALL UNSUITABLE AREAS AND REPLACE WITH COMPACTED STRUCTURAL FILL MATERIALS. PLACE FILL IN 6" LIFTS AND COMPACT FILL TO AT LEAST 95% OF THE MAXIMUM DENSITY AS DETERMINED BY THE ASTM D1557 MODIFIED PROCTOR TEST. FILL MATERIAL SHALL BE SM OR BETTER AS CLASSIFIED PER ASTM D2487.
      2.4.11. CONCRETE SHALL BE POURED WITHIN 24 HOURS OF EXCAVATION UNLESS APPROVED BY THE ENGINEER.

3. CONNECTIONS:
   3.1. ALL BOLTS AND NAILS SHALL BE HOT–DIPPED GALVANIZED IN ACCORDANCE WITH ASTM A153, AASHTO M232 OR STAINLESS STEEL IN ACCORDANCE WITH ASTM A316, AS SHOWN ON THE PLANS.
   3.2. BOLTED CONNECTIONS THAT ARE EXPOSED TO PEDESTRIANS SHALL BE POSITIONED SUCH THAT THE BOLT HEADS FACE THE DECK AND NUTS FACE AWAY FROM THE THE PUBLIC.

4. CONTRACTOR SHALL PROVIDE DEWATERING SYSTEM AS NECESSARY FOR CONSTRUCTION OF BOAT RAMP AND FIXED DOCK. CONTRACTOR SHALL OBTAIN ANY NECESSARY DEWATERING PERMITS. DEWATERING SYSTEM SHALL BE INCIDENTAL TO THE CONTRACT.

5. ALL DOCK HARDWARE IS TO BE STAINLESS STEEL, SERIES 304.

6. ALL DOCKS, HEADER CHANNELS, RAILING, AND ANCILLARY ITEMS SHALL BE PROVIDED BY THE OWNER.

7. ALL SHEET PILE MATERIALS INCLUDING SHEETING, RODS, WALES, ANCHORS, CAPS, AND FASTENERS SHALL BE PROVIDED BY THE CONTRACTOR. SPECIFIC ITEM DESIGNATIONS SHOWN ON THIS SHEET (PZH–3 SHEETING, SC–13 CAPS, WB–2 RODS, DMA–9 ANCHOR, WB–2 WALE) REFER TO GATORDOCK PRODUCTS. THE CONTRACTOR MAY SUBMIT EQUIVALENT SUBSTITUTIONS FOR REVIEW BY THE OWNER PRIOR TO ORDERING.

8. THE NOTES ON THESE DRAWINGS ARE NOT INTENDED TO REPLACE SPECIFICATIONS. SEE SPECIFICATIONS FOR REQUIREMENTS IN ADDITION TO GENERAL NOTES. FOR INCONSISTENCIES BETWEEN THESE DRAWINGS AND THE SPECIFICATIONS, THE STRICTER REQUIREMENT SHALL APPLY, AND THE ENGINEER SHALL BE NOTIFIED PRIOR TO PROCEEDING WITH THE AFFECTED PORTION OF THE WORK.

9. THE STRUCTURE IS DESIGNED TO BE SELF SUPPORTING AND STABLE AFTER THE CONSTRUCTION IS COMPLETE. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO DETERMINE ERECTION PROCEDURES AND SEQUENCE TO ENSURE THE SAFETY OF THE STRUCTURE AND ITS COMPONENTS DURING ERECTION. THIS INCLUDES, BUT IS NOT LIMITED TO, THE ADDITION OF NECESSARY SHORING, SHEETING, TEMPORARY BRACING, GUYS OR TIE DOWNS. PROVIDE ALL SHORING AND BRACING REQUIRED TO STABILIZE AND PROTECT EXISTING AND ADJACENT STRUCTURES AND SYSTEMS DURING COURSE OF DEMOLITION AND CONSTRUCTION. SUCH MATERIAL SHALL REMAIN THE PROPERTY OF THE CONTRACTOR AFTER COMPLETION OF THE PROJECT.

10. SECTIONS AND DETAILS SHOWN ON ANY STRUCTURAL DRAWINGS SHALL BE CONSIDERED TYPICAL FOR SIMILAR CONDITIONS.

11. ALL APPLICABLE FEDERAL, STATE AND MUNICIPAL REGULATIONS SHALL BE FOLLOWED, INCLUDING THE FEDERAL DEPARTMENT OF LABOR OCCUPATIONAL SAFETY AND HEALTH ACT.

12. ANY AND ALL MODIFICATIONS TO THE STRUCTURAL ELEMENTS INDICATED ON THESE DRAWINGS MUST BE APPROVED IN ADVANCE BY THE ENGINEER.

PILE INSTALLATION NOTES:

1. FULL TIME INSPECTION OF THE PILE INSTALLATION SHALL BE PROVIDED BY OWNER AND PERFORMED BY AN ENGINEER OR EXPERIENCED FOUNDATION INSPECTOR REGISTERED AS A PROFESSIONAL ENGINEER IN THE STATE OF DELAWARE TO ESTABLISH AN ACCURATE RECORD OF PILE DRIVING. INSPECTION SHOULD VERIFY THAT SUITABLE PILES ARE BEING INSTALLED. RECORDS SHALL INCLUDE PROJECT NAME AND NUMBER, NAME OF CONTRACTOR, PILE LOCATION AND NUMBER, COMPUTED PILE CAPACITY, TYPE AND SIZE OF HAMMER USED, TYPE OF PILE DRIVING CAP USED, RATE OF OPERATION OF PILE DRIVING EQUIPMENT, PILE DIMENSIONS, ELEVATION OF TIP, ELEVATION OF BUTT BEFORE AND AFTER CUT–OFF, GROUND ELEVATION, CONTINUOUS RECORD OF NUMBER OF BLOWS FOR EACH FOOT OF PENETRATION, PLUMBNESS, HORIZONTAL LOCATION, PILE UPLIFT AND ANY UNUSUAL OCCURRENCES DURING PILE DRIVING.

2. ALL TIMBER SUPPORT PILES SHALL BE DRIVEN IN THE LOCATIONS SHOWN ON THE PLANS WITHIN THE FOLLOWING TOLERANCES. DEVIATION OF THE LOCATION OF THE TOP OF A PILE FROM THAT SHOWN ON PLANS SHALL NOT EXCEED 2 INCHES AFTER INITIAL DRIVING, AND 4 INCHES AFTER DRIVING IS COMPLETED. PILES SHALL BE DRIVEN WITH A MAXIMUM DEVIATION FROM VERTICAL OF 1 INCH IN 48 INCHES OF PILE LENGTH.

3. ALL SHEET PILES FOR THE PROPOSED RETAINING WALL SHALL BE DRIVEN IN THE LOCATIONS SHOWN ON THE PLAN WITHIN THE FOLLOWING TOLERANCES. HORIZONTAL DEVIATION OF ANY POINT FROM A STRAIGHT LINE CONNECTING THE TWO ENDS OF THE WALL SECTION SHALL BE A MAXIMUM OF 6 INCHES. THE LOCATION OF THE TOP OF A PILE FROM THAT SHOWN ON PLANS SHALL NOT EXCEED 2 INCHES AFTER INITIAL DRIVING, AND 4 INCHES AFTER DRIVING IS COMPLETED. PILES SHALL BE DRIVEN WITH A MAXIMUM DEVIATION FROM VERTICAL OF 2% OF ANY VERTICAL LENGTH, OR A MAXIMUM OF 4 INCHES. TOP OF CAP ELEVATIONS SHALL BE WITHIN 1 INCH OF PLAN ELEVATIONS.

4. SHEET PILES THAT ARE IN CONTACT WITH CONCRETE SHALL BE BE PROTECTED WITH BITUMINOUS ASPHALT COATING APPLIED TO THE PILES AT THE CONCRETE INTERFACE IN ACCORDANCE WITH SECTION 31 62 16 – ALUMINUM SHEET PILES.

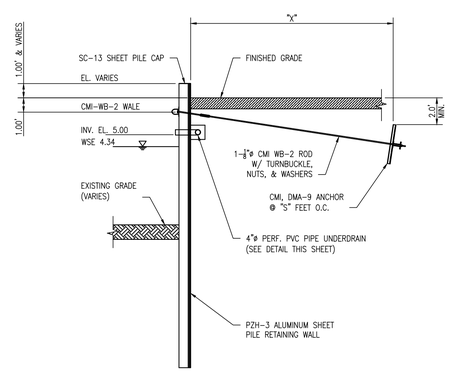
PARKING AREA SHEET PILE LAYOUT

POINT NO.	DESCRIPTION	NORTHING	EASTING
3000	PILE	217702.5249	691490.3406
3001	PILE	217627.2349	691504.2419
3002	PILE	217622.0006	691544.5987

NOTE:
POINT LOCATION DATA FOR SHEET PILES SURROUNDING CONCRETE BOAT RAMP PROVIDED ON THE BOAT RAMP CROSS SECTION PLAN SHEET.

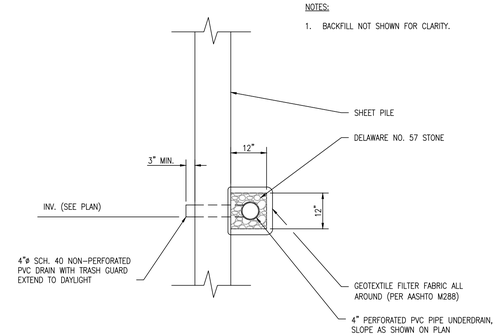
SHEET PILE DRIVING SCHEDULE

SECTION	CAP	TOP ELEVATION	MIN. TIP ELEVATION	"X" TIE–BACK OFFSET	"S" TIE–BACK SPACING
1	YES	VARIES FROM 7.50–6.75, FLUSH W/ FIXED DOCK	–7.00	––	––
2A	NO	VARIES FROM 5.25–1.50, FLUSH W/ BOAT RAMP	–7.00	––	––
2B	NO	1.50, FLUSH W/ BOAT RAMP	–10.00	––	––
3A	YES	8.00	–10.00	15.50	11.00
3B	YES	8.00	–3.50	––	––
4A	YES	8.00	–13.00	15.50	8.5
4B	YES	8.00	–13.00	15.50	8.5
4C	YES	8.00	–13.00	15.50	8.5
5A	YES	VARIES FROM 8.00–8.33, 1' ABOVE FINISHED GRADE	–13.00	15.50	8.5
5B	YES	VARIES FROM 8.33–8.65, 1' ABOVE FINISHED GRADE	–8.00	––	––



TYPICAL RETAINING WALL CROSS SECTION
SCALE: NONE

NOTES:
1. BACKFILL NOT SHOWN FOR CLARITY.



UNDERDRAIN DETAIL
SCALE: 3/4" = 1'-0"

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REVISIONS

ADDENDUM

DESCRIPTION	DATE

PROJECT
CONSTRUCTION PLANS
FOR
DELAWARE DIVISION OF FISH & WILDLIFE
MILLSBORO BOAT RAMP
GRAVEL HILL ROAD (SR30) MILLSBORO, DELAWARE
INDIAN RIVER HUNDRED, SUSSEX COUNTY, DELAWARE

SHEET TITLE
STRUCTURAL DETAILS

DIV. OF FISH AND WILDLIFE
100% SUBMISSION
FEBRUARY, 2019

DRAWN	CHK'D/DESIGNER
JSW / MDS	AES

SCALE: AS NOTED
SHEET NO.: C111
PROJECT NO. 155001.04

G:\PROJECTS\155001.00 DNREC Fish and Wildlife\155001.04 Reconstruction of the Millsboro Boating Access Facility\CADD FILES\Sheets\Construction Plans\C111_B1_STRUCTURAL DETAILS.dwg, 2/4/2019 4:58 PM

HYNES & ASSOCIATES

LOG OF BORING B-1

(Page 1 of 1)

Century Engineering, Inc.
4134 North DuPont Highway
Dover, Delaware 19901

Century-Millsboro Boat Ramp Improvements

Project No.: JDH-10/17/438

Date Completed: : December 7, 2017
Logged By: : C. Johnston
Drilled By: : M. Hynes
Drilling Method: : HSA (Mobile B-47 HD)
Total Depth: : 30.5 feet

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	Blows per 6 inches	REMARKS
0	Brown, saturated, very loose, fine to coarse SAND, with little to some organic silt, trace peat		SM	1	1-1-3	Scale 1" ~ 5 feet
2	Gray, saturated, loose, fine to coarse SAND, with trace silt		SP	2	3-3-3	Depth to midline was 3 feet at the time of drilling.
4	Gray, saturated, medium dense, fine to medium SAND, with little to some silt		SM	3	12-12-15	
6	Brown, saturated, medium dense, fine to coarse SAND, with trace silt, trace clay		SP	4	5-7-8	
8	Orange brown, saturated, medium dense, fine to coarse SAND, with trace silt		SP	5	6-8-9	
10	Orange brown, saturated, medium dense, fine to coarse SAND, with trace to little silt		SP-SM	6	6-10-11	
12	Orange brown, saturated, medium dense, fine to coarse SAND, with trace silt		SP	7	4-11-15	
14	Orange brown, saturated, medium dense, fine to coarse SAND, with trace silt		SP	8	8-12-14	
16	Boring terminated at 30.5 feet					

HYNES & ASSOCIATES

LOG OF BORING B-2

(Page 1 of 1)

Century Engineering, Inc.
4134 North DuPont Highway
Dover, Delaware 19901

Century-Millsboro Boat Ramp Improvements

Project No.: JDH-10/17/438

Date Completed: : December 7, 2017
Logged By: : C. Johnston
Drilled By: : M. Hynes
Drilling Method: : HSA (Geoprobe 3230)
Total Depth: : 30.5 feet

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	Blows per 6 inches	REMARKS
0	Dark brown, saturated, very loose, fine to coarse SAND, with little to some organic silt		SM-OL	1	WOH/12"-3	Scale 1" ~ 5 feet
2	Gray, saturated, loose, fine to coarse SAND, with little silt		SM	2	1-1-5-5	Depth to mudline was 2.7 feet at the time of drilling.
4	Brown, saturated, medium dense, fine to coarse SAND, with trace to little silt, trace gravel		SP	3	7-6-10	
6	Brown, saturated, medium dense, fine to coarse SAND, with trace to little silt, trace gravel		SP-SM	4	6-7-7	
8	Orange brown, saturated, medium dense, fine to coarse SAND, with trace silt		SP	5	6-7-9	
10	Orange brown, saturated, medium dense, medium to coarse SAND, with trace silt		SP	6	6-10-11	
12	Orange brown, saturated, medium dense, fine to coarse SAND, with trace silt, trace gravel		SP	7	6-10-15	
14	Orange brown, saturated, medium dense, fine to coarse SAND, with trace silt, trace gravel		SP	8	10-12-15	
16	Boring terminated at 30.5 feet					

HYNES & ASSOCIATES

LOG OF BORING B-3

(Page 1 of 1)

Century Engineering, Inc.
4134 North DuPont Highway
Dover, Delaware 19901

Century-Millsboro Boat Ramp Improvements

Project No.: JDH-10/17/438

Date Completed: : October 5, 2017
Logged By: : C. Johnston
Drilled By: : M. Hynes
Drilling Method: : HSA (Geoprobe 3230)
Total Depth: : 30.5 feet

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	Blows per 6 inches	REMARKS
0	Dark brown, wet, very loose, fine to coarse SAND, with trace silt		SP	1	2-2-1	Scale 1" ~ 5 feet
2	Brown, wet to saturated, very loose, fine to coarse SAND, with trace to little silt		SP-SM	2	1-1-1	Approximately 6 inches of organic bearing soil was encountered at the ground surface.
4	Light gray, saturated, very loose, fine to coarse SAND, with trace to little silt		SP-SM	3	2-1-1	Groundwater was encountered at 3.5 feet during drilling operations.
6	Light gray, saturated, very loose, fine to coarse SAND, with trace to little silt		SP-SM	4	1-1-1	At completion water was at 3 feet; boring caved in at 4 feet.
8	Orange brown, saturated, loose, fine to coarse SAND, with trace to little silt		SP-SM	5	3-4-6	
10	Light orange brown, saturated, loose, fine to coarse SAND, with trace to little silt, trace gravel		SP-SM	6	2-4-3	
12	Orange brown, saturated, loose, medium to coarse SAND, with trace silt		SP	7	5-7-1	
14	Orange brown, saturated, medium dense, medium to coarse SAND, with trace silt		SP	8	5-8-13	
16	Boring terminated at 30.5 feet					

HYNES & ASSOCIATES

LOG OF BORING B-4

(Page 1 of 1)

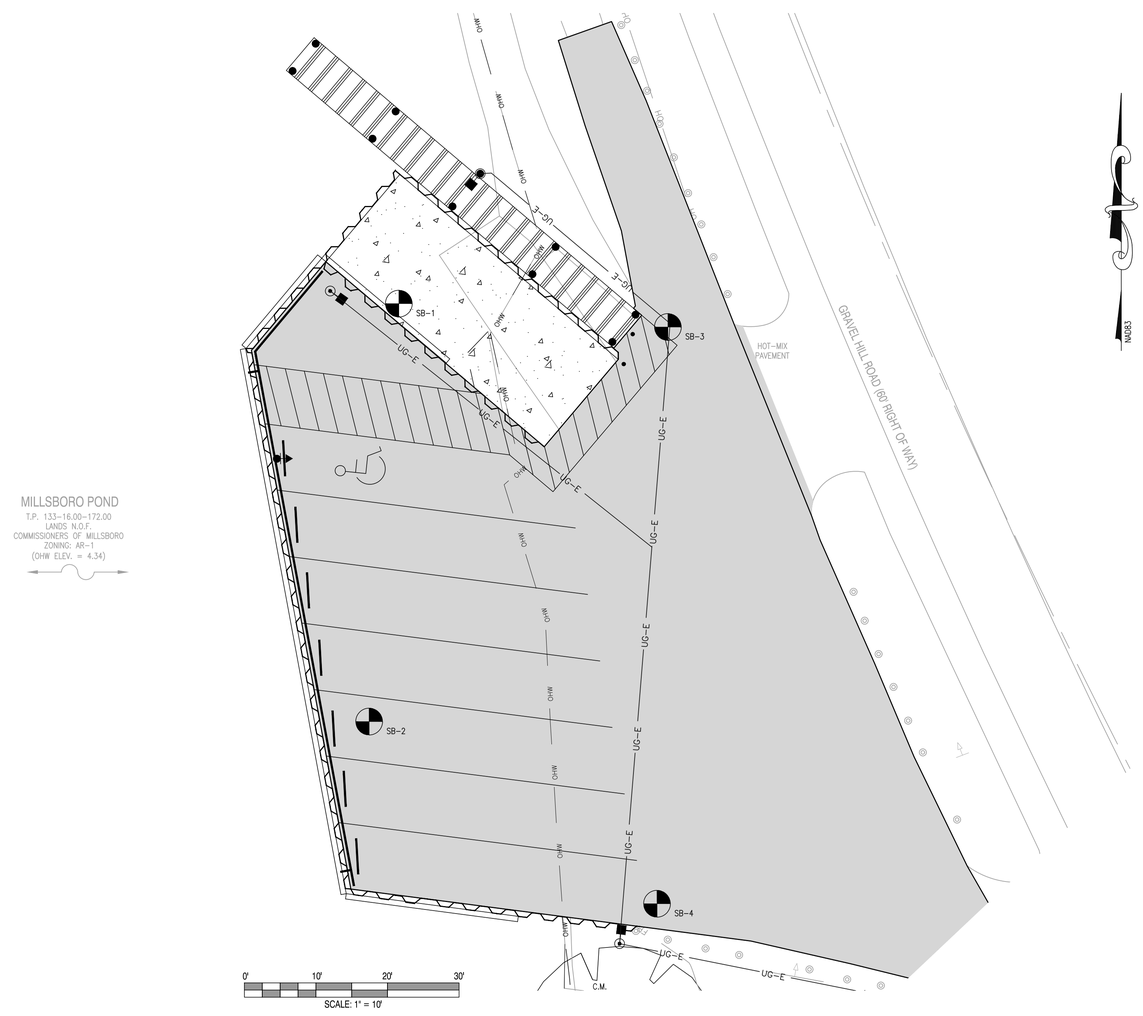
Century Engineering, Inc.
4134 North DuPont Highway
Dover, Delaware 19901

Century-Millsboro Boat Ramp Improvements

Project No.: JDH-10/17/438

Date Completed: : December 7, 2017
Logged By: : C. Johnston
Drilled By: : M. Hynes
Drilling Method: : HSA (Geoprobe 3230)
Total Depth: : 30.5 feet

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	Blows per 6 inches	REMARKS
0	Light brown, wet, very loose, fine to coarse SAND, with trace silt		SP	1	2-2-1	Scale 1" ~ 5 feet
2	Light brown, wet to saturated, very loose, fine to coarse SAND, with trace silt		SP	2	2-1-2	Approximately 2 inches of asphalt and 6 inches of crushed stone were encountered at the ground surface.
4	Light gray, saturated, very loose, fine to coarse SAND, with trace silt		SP	3	WOH/18"	Groundwater was encountered at 3 feet during drilling operations.
6	Light brown, saturated, very loose, fine to coarse SAND, with trace silt		SP	4	1-2-2	Boring caved in at 5 feet.
8	Orange brown, saturated, loose, fine to coarse SAND, with trace to little silt		SP-SM	5	3-3-5	
10	Brown, saturated, loose, fine to coarse SAND, with trace silt		SP	6	2-4-5	
12	Orange brown, saturated, loose, fine to coarse SAND, with trace to little silt		SP-SM	7	3-5-5	
14	Light orange brown, saturated, medium dense, fine to coarse SAND, with trace silt		SP	8	4-6-9	
16	Boring terminated at 30.5 feet					



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REVISIONS

ADDENDUM

DESCRIPTION	DATE

PROJECT
CONSTRUCTION PLANS
FOR
DELAWARE DIVISION OF FISH & WILDLIFE
MILLSBORO BOAT RAMP
GRAVEL HILL ROAD (SR30) MILLSBORO, DELAWARE
INDIAN RIVER HUNDRED, SUSSEX COUNTY, DELAWARE

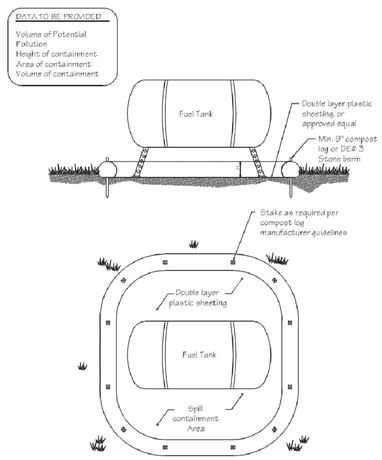
SHEET TITLE
SOIL BORING LOGS

DIV. OF FISH AND WILDLIFE
100% SUBMISSION
FEBRUARY, 2019

DRAWN: JSW / MDS
CHK'D/DESIGNER: AES
SCALE: 1" = 10'
SHEET NO.: C112
PROJECT NO.: 155001.04

Standard Detail & Specifications

Construction Site Waste Mgt & Spill Control



Source:	Symbol:	Detail No.
Delaware ESC Handbook		**DE-ESC-3.6.1** Sheet 1 of 5

Effective April 2016

Standard Detail & Specifications

Construction Site Waste Mgt & Spill Control

Pollution Prevention – Spill Prevention

1. Fueling should only take place in signed designated areas, away from downstream drainage facilities and watercourses.
2. Fueling must be with nozzles equipped with automatic shut-off to control drips. Do not top off.
3. Protect the areas where equipment or vehicles are being repaired, maintained, fueled or parked from storm water run-on and runoff.
4. Use barriers such as berms to prevent storm water run-on and runoff, and to contain spills.
5. Place a "Fueling Area" sign next to each fueling area.
6. Store hazardous materials such as fuel, solvents, oil and chemicals in secondary containment.
7. Inspect vehicles and equipment for leaks on each day of use. Repair fluid and oil leaks immediately.
8. Absorbent spill clean-up materials and spill kits must be available in fueling areas and on fuel trucks.
9. If fueling is to take place at night, make sure the fueling area is sufficiently illuminated.
10. Properly dispose of used oil, fluids, lubricants and spill clean-up materials.

CLEAN UP SPILLS

1. If it is safe to do so, immediately contain and clean up any chemical and/or hazardous material spills.
2. Properly dispose of used oil, fluids, lubricants and spill clean-up materials.
3. Do not bury spills or wash them down with water.

LEAKS AND DRIPS

1. Use drip pans or absorbent pads at all times. Place under and around leaky equipment.
2. Do not allow oil, grease, fuel or chemicals to drip onto the ground.
3. Have spill kits and clean up material on-site.
4. Repair leaky equipment promptly or remove problem vehicles and equipment from the site. Clean up contaminated soil immediately.
5. Store contaminated waste in sealed containers constructed of suitable material. Label these containers properly.
6. Clean up all spills and leaks. Promptly dispose of waste and spent clean up materials.

Source:	Symbol:	Detail No.
Delaware ESC Handbook		**DE-ESC-3.6.1** Sheet 2 of 5

Effective April 2016

Standard Detail & Specifications

Construction Site Waste Mgt & Spill Control

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 3 of 5

Effective April 2016

Standard Detail & Specifications

Construction Site Waste Mgt & Spill Control

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 4 of 5

Effective April 2016

Standard Detail & Specifications

Construction Site Waste Mgt & Spill Control

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

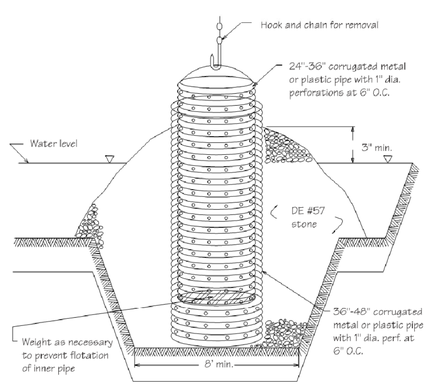
DNREC 24-Hour Toll Free Number	**800-662-8802**
DNREC Solid & Hazardous Waste Branch	**302-739-9403**

Source:	Symbol:	Detail No.
Adapted from USEPA Pub. 840-B-92-002		**DE-ESC-3.6.1** Sheet 5 of 5

Effective April 2016

Standard Detail & Specifications

Pumping Pit - Type 2



Section

Source:	Symbol:	Detail No.
Adapted from MD Stds. & Specs. for ESC	PP-2	**DE-ESC-3.2.2.2** Sheet 1 of 2

Effective April 2016

Standard Detail & Specifications

Pumping Pit - Type 2

Construction Notes:

1. Pit shall have a minimum bottom width of 8'.
2. The inside standpipe should be constructed by perforating a 24" to 36" diameter corrugated or PVC pipe. The perforations shall be 1/2" X 6" slits or 1" diameter holes 6" on center.
3. The outside pipe shall be at least 12" larger in diameter than the inside pipe.
4. After installing the standpipes, the pit surrounding the standpipes should then be backfilled with DE #57 aggregate. The height of the stone shall be a min. 3" above the design high water elevation in the trap or basin.
5. The standpipes should extend 12" to 18" above the design high water elevation in the trap or basin.

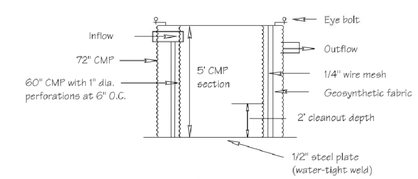
NOTE: If discharge will be pumped directly to a storm drainage system, the standpipe must be wrapped with Type GD-II geotextile fabric before installation. If desired, 1/2" hardware cloth may be placed around the standpipe, prior to attaching the geotextile fabric. This will increase the rate of water seepage into the pipe.

Source:	Symbol:	Detail No.
Adapted from MD Stds. & Specs. for ESC	PP-2	**DE-ESC-3.2.2.2** Sheet 2 of 2

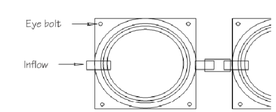
Effective April 2016

Standard Detail & Specifications

Portable Sediment Tank



Section



Plan

Construction Notes:

1. Required storage volume = 1 c.f. storage/1 gpm pump discharge.
2. Tanks may be connected in series to provide required storage.

Source:	Symbol:	Detail No.
Adapted from MD Stds. & Specs. for ESC	ST	**DE-ESC-3.2.1.1** Sheet 1 of 1

Effective April 2016

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REVISIONS

ADDENDUM

DESCRIPTION	DATE

PROJECT
CONSTRUCTION PLANS
FOR
DELAWARE DIVISION OF FISH & WILDLIFE
MILLSBORO BOAT RAMP
GRAVEL HILL ROAD (SR30) MILLSBORO, DELAWARE
INDIAN RIVER HUNDRED, SUSSEX COUNTY, DELAWARE

SHEET TITLE
EROSION & SEDIMENT CONTROL DETAILS

DIV. OF FISH AND WILDLIFE
100% SUBMISSION
FEBRUARY, 2019

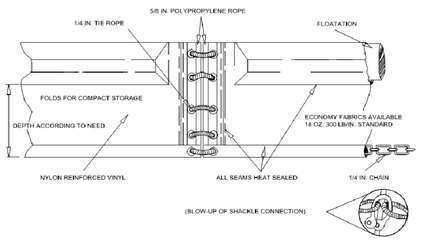
DRAWN	CHK'D/DESIGNER
JSW / MDS	AES

SCALE	SHEET NO.
NONE	C113

PROJECT NO. 155001.04

G:\PROJECTS\155001.00 DNREC Fish and Wildlife\155001.04 (Reconstruction of the Millsboro Boating Access Facility)\CADD FILES\Sheets\Construction Plans\C113 EROSION & SEDIMENT CONTROL DETAILS.dwg, 5/21/2019 12:43 PM

Standard Detail & Specifications
Turbidity Curtain



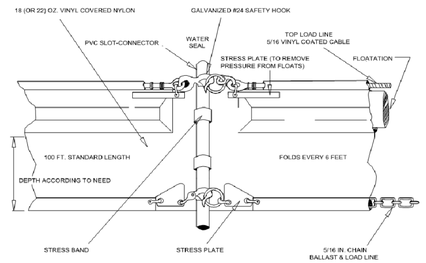
Typical Section - Type 1

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 1 of 8

Effective April 2016

Standard Detail & Specifications
Turbidity Curtain



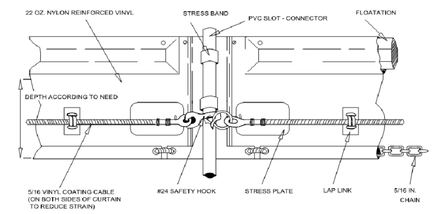
Typical Section - Type 2

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

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

Effective April 2016

Standard Detail & Specifications
Turbidity Curtain



Typical Section - Type 3

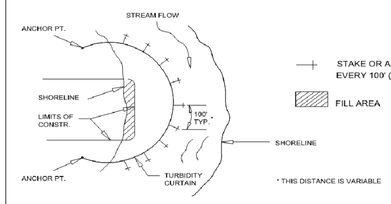
DATA
Curtain Type (1, 2, or 3)
Layout (Std. or Alt.)

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

Effective April 2016

Standard Detail & Specifications
Turbidity Curtain

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



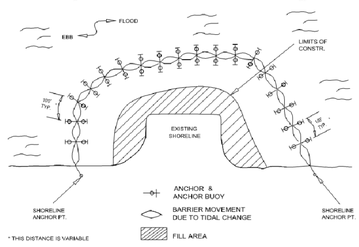
Plan - Std. Layout

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

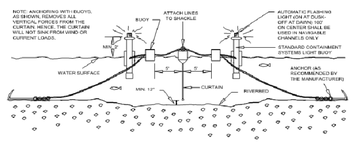
Effective April 2016

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

Effective April 2016

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 with the 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

Effective April 2016

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

Effective April 2016

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

Effective April 2016

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REVISIONS

ADDENDUM

DESCRIPTION	DATE

PROJECT
CONSTRUCTION PLANS
FOR
DELAWARE DIVISION OF FISH & WILDLIFE
MILLSBORO BOAT RAMP
GRAVEL HILL ROAD (SR30) MILLSBORO, DELAWARE
INDIAN RIVER HUNDRED, SUSSEX COUNTY, DELAWARE

SHEET TITLE
EROSION & SEDIMENT CONTROL DETAILS

DIV. OF FISH AND WILDLIFE
100% SUBMISSION
FEBRUARY, 2019

DRAWN	CHK'D/DESIGNER
JSW / MDS	AES

SCALE	SHEET NO.
NONE	C114

PROJECT NO. 155001.04

Q:\PROJECTS\155001.00 DNREC Fish and Wildlife\155001.04 Reconstruction of the Millsboro Boating Access Facility\CADD FILES\Sheets\Construction Plans\C114 EROSION & SEDIMENT CONTROL DETAILS.dwg, 5/31/2018 12:44 PM

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

Effective April 2016

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. Compost material used to improve the percentage of organic matter shall be provided by a certified supplier.

Compost amendments that are intended to meet specific post-construction stormwater management goals shall further meet the requirements of **Appendix 3.06.2 Post Construction Stormwater Management BMP Standards and Specifications, Section 14.0 Soil Amendments.**

Source:	Symbol:	Detail No.
USDA - NRCS		**DE-ESC-3.4.1** Sheet 2 of 2

Effective April 2016

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[7]
				Coastal Plain			Piedmont			All	
	Certified Seed	lb/Ac[5]	lb/1000 sq.ft.	2/1-4/30	[4] 5/1-8/14	8/15-10/31	3/1-4/30	[4] 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		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 lbs/Ac	2/3		O			O			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".

NOTE: TEMPORARY SEED MIX SHALL BE DNREC TEMPORARY MIX #3, #5, OR #6.

Source:	Symbol:	Detail No.
Delaware ESC Handbook		**DE-ESC-3.4.3** Sheet 1 of 4

Effective April 2016

Standard Detail & Specifications

Vegetative Stabilization

PERMANENT SEEDING AND SEEDING DATES

Mix No.	Seeding Mixtures / Certified Seed[7]	Seeding Rate[8]		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[9] 10/31-2/1	Remarks
	Well Drained Soils	lb/Ac	lb/1000 sq.ft.								
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 incorporate. Germinates only in hot weather.
2	Overbingua Sheep Fescue Common Lespedeza[1] 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[3]	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[3]	100 70 15 5 3	2.3 1.61 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[4,7] **or** Coastal Panicgrass Big Bluestem Little Bluestem Indian Grass	10 10 5 5 5	0.23 0.23 0.11 0.11 0.1		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[1] Indian Grass[1] Little Bluestem[1] 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.

Source:	Symbol:	Detail No.
Delaware ESC Handbook		**DE-ESC-3.4.3** Sheet 2 of 4

Effective April 2016

Standard Detail & Specifications

Vegetative Stabilization

PERMANENT SEEDING AND SEEDING DATES (cont.)

Mix No.	Seeding Mixtures / Certified Seed[7]	Seeding Rate[8]		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[9] 10/31-2/1	Remarks
	Poorly Drained Soils	lb/Ac	lb/1000 sq.ft.								
9	Redtop Creeping Bentgrass Sheep Fescue Rough Bluegrass	75 35 30 45	1.72 0.8 0.69 1	O	A	O	O	A	O	Add 100 lbs./ac Winter Rye	Quick stabilization of disturbed sites and waterways.
10	Reed Canarygrass	20	0.23	A		O	A		O		Close 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 59 degrees in order to germinate, and will remain dormant until then.

NOTE: PERMANENT SEED MIX SHALL BE DNREC PERMANENT MIX #9 FOR WET GROUND AREAS, AND SEED MIX #12 FOR DRY GROUND AREAS.

Source:	Symbol:	Detail No.
Delaware ESC Handbook		**DE-ESC-3.4.3** Sheet 3 of 4

Effective April 2016

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

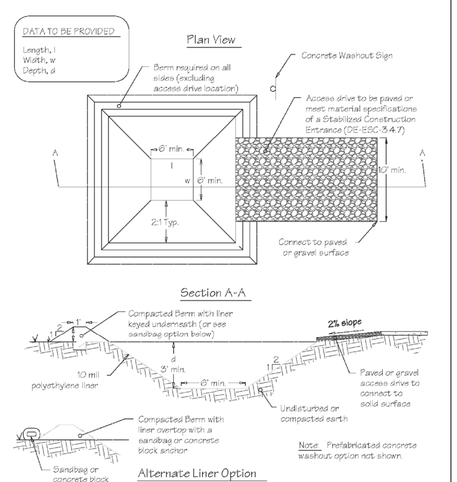
   All mulching shall be done in accordance with detail **DE-ESC-3.4.5**.

Source:	Symbol:	Detail No.
Delaware ESC Handbook		**DE-ESC-3.4.3** Sheet 4 of 4

Effective April 2016

Standard Detail & Specifications

Concrete Washout



Source:	Symbol:	Detail No.
Adapted from Colorado Urban Storm Drainage Criteria Manual, Vol 3	CW	**DE-ESC-3.6.2** Sheet 1 of 2

Effective April 2016

Standard Detail & Specifications

Concrete Washout

Construction Notes:

1. Locate washout area a minimum of 50 feet from open channels, stormdrain inlets, wetlands or waterbodies.
2. Locate washout area so that it is accessible to concrete equipment (service with a minimum 10 foot wide gravel accessway), but so it is not in a highly active construction area causing accidental damage.
3. Minimum dimensions for prefabricated units are 4 feet by 4 feet by 1 foot deep with a minimum 4mil polyethylene plastic liner. Minimum dimensions for constructed concrete washout areas are 6 feet by 6 feet by 3 feet deep, with a minimum 10mil polyethylene liner, 2:1 side slopes, and a 1 foot high by 1 foot wide compacted fill berm.
4. The liner must be free of tears or holes and placed over smooth surfaces to prevent puncturing. For excavated washouts, anchor the liner underneath the berm or overtop with sandbags or concrete blocks to hold in place.
5. Provide a sign designating the washout area, and for large construction sites, provide signs throughout directing traffic to its location.
6. Allow washed out concrete mixture to harden through evaporation of the wastewater. Once the facility has reached 75 percent of its capacity, remove the hardened concrete by reusing the broken aggregate onsite, recycling, or disposing of offsite. The hardened material can be buried on site with minimum of 1 foot of clean, compacted fill.
7. Apply a new liner before reusing the station for additional washouts after maintenance has occurred.

Source:	Symbol:	Detail No.
Adapted from Colorado Urban Storm Drainage Criteria Manual, Vol 3	CW	**DE-ESC-3.6.2** Sheet 2 of 2

Effective April 2016

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REVISIONS

ADDENDUM

DESCRIPTION	DATE

PROJECT
CONSTRUCTION PLANS
FOR
DELAWARE DIVISION OF FISH & WILDLIFE
MILLSBORO BOAT RAMP
GRAVEL HILL ROAD (SR30) MILLSBORO, DELAWARE
INDIAN RIVER HUNDRED, SUSSEX COUNTY, DELAWARE

SHEET TITLE
EROSION & SEDIMENT CONTROL DETAILS

DIV. OF FISH AND WILDLIFE
100% SUBMISSION
FEBRUARY, 2019

DRAWN	CHK'D/DESIGNER
JSW / MDS	AES
SCALE: NONE	SHEET NO. C115
PROJECT NO. 155001.04	

O:\PROJECTS\155001.00 DNREC Fish and Wildlife\155001.04 (Reconstruction of the Millsboro Boating Access Facility)\CADD FILES\Sheets\Construction Plans\C115 EROSION & SEDIMENT CONTROL DETAILS.dwg, 5/21/2018 12:45 PM

Standard Detail & Specifications
Mulching

DELAWARE EROSION & SEDIMENT CONTROL HANDBOOK

1. Materials and Amounts

a. *Straw* - Straw shall be unrotted small grain straw applied at the rate of 1-1/2 to 2 tons per acre, or 70 to 90 pounds (two bales) per 1,000 square feet. Mulch materials shall be relatively free of weeds and shall be free of noxious weeds such as; thistles, Johnsongrass, and quackgrass. Spread mulch uniformly by hand or mechanically. For uniform distribution of hand spread mulch, divide area into approximately 1,000 square feet sections and place 70-90 pounds (two bales) of mulch in each section.

b. *Wood chips* - Apply at the rate of approximately 6 tons per acre or 275 pounds per 1,000 square feet when available and when feasible. These are particularly well suited for utility and road rights-of-way. If wood chips are used, increase the application rate of nitrogen fertilizer by 20 pounds of N per acre (200 pounds of 10-10-10 or 66 pounds of 30-0-0 per acre).

c. *Hydraulically applied mulch* -The following conditions apply to hydraulically applied mulch:

i. Definitions:

a. Wood fiber mulch shall consist of specially prepared wood that has been processed to a uniform state, is packaged for sale as a hydraulic mulch for use with hydraulic seeding equipment, and consists of a minimum of 70% virgin or recycled wood fiber combined with 30% paper fiber and additives.

b. Blended fiber mulch shall consist of any hydraulic mulch that contains greater than 30% paper fiber. The paper component must consist of specially prepared paper that has been processed to a uniform fibrous state and is packaged for sale as a hydraulic mulch for use with hydraulic seeding equipment.

c. A bonded fiber matrix (BFM) consists of long strand, specially prepared wood fibers that have been processed to a uniform state held together by a water resistant bonding agent. BFMs shall contain no paper (cellulose) mulch but may contain small percentages of synthetic fibers to enhance performance.

d. Refer to **Figure 3.4.5a** for conditions and limitations of use for each of the above categories of hydraulic mulch.

ii. All components of the hydraulically applied mulches shall be pre-packaged by the manufacturer to assure material performance. Field mixing of the mulch components is acceptable, but must be done per manufacturers recommendations to ensure the proper results.

iii. Hydraulic mulches shall be applied with a viable seed and at manufacturer's recommended rates. Increased rates may be necessary based on site conditions.

iv. Hydraulically applied mulches and additives shall be mixed according to manufacturers recommendations.

iv. Materials within this category shall only be used when hydraulically applied mulch has been specified for use on the approved Sediment and Stormwater Plan, or supplemental approval from the plan approval agency has been obtained in writing for a specific area.

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v. Application:

a. Apply product to geotechnically stable slopes that have been designed and constructed to divert runoff away from the face of the slope.

b. Do not apply to saturated soils, or if precipitation is anticipated within 24-48 hours.

c. During the spring (March 1 to May 31) and fall (September 1 to November 30) seasons, hydraulic mulches may be applied in a one-step process where all components are mixed together in single-tank loads. It is recommended that the product be applied from opposing directions to achieve optimum soil coverage.

d. During the summer (June 1 to August 31) and winter (December 1 to February 28) seasons, the following two-step process is required:

Step One– Mix and apply seed and soil amendments with a small amount of mulch for visual metering.

Step Two – Mix and apply mulch at manufacturers recommended rates over freshly seeded surfaces. Apply from opposing directions to achieve optimum soil coverage.

e. Minimum curing temperature is 40° F (4° C). The best results and more rapid curing are achieved at temperatures exceeding 60° F (15° C). Curing times may be accelerated in high temperature, low humidity conditions on dry soils.

vi. Recommended application rates are for informational purposes only. Conformance with this standard and specification shall be performance-based and requires **100% soil coverage**. Any areas with bare soil showing shall be top dressed until full coverage is achieved.

d. *Compost blanket (CB)* - Loosely applied with a pneumatic blower so that a 1" compost blanket uniformly covers the **soil with 100% coverage.** This application can be used with seed to promote germination by applying the approved seed mix directly into the loosely blown compost. The compost blanket performs best on slopes less than 2:1 and requires no mulch anchoring.

2. Anchoring mulch - Mulch must be anchored immediately to minimize loss by wind or water. This may be done by one of the following methods, depending upon size of area, erosion hazard, and cost.

a. *Crimping* - A crimper is a tractor drawn implement designed to punch and anchor mulch into the top two (2) inches of soil. This practice affords maximum erosion control but is limited to flatter slopes where equipment can operate safely. On sloping land, crimping should be done on the contour whenever possible.

b. *Tracking* - Tracking is the process of cutting mulch (usually straw) into the soil using a bulldozer or other equipment that runs on cleated tracks. Tracking is used primarily on slopes 3:1 or steeper and should be done up and down the slope with cleat marks running across the slope.

c. *Liquid mulch binders* - Applications of liquid mulch binders should be heavier at edges, in valleys, and at crests of banks and other areas where the mulch will be moved by wind or water. All other areas should have a uniform application of binder. The use of synthetic binders is the preferred method of mulch binding and should be applied at the rates recommended by the manufacturer.

d. *Paper fiber* - The fiber binder shall be applied at a net dry weight of 750 lbs/ac. The wood cellulose fiber shall be mixed with water, and the mixture shall contain a maximum of 50 lbs. of wood cellulose fiber per 100 gallons.

e. *Nettings* - Synthetic or organic nettings may be used to secure straw mulch. Install and secure according to the manufacturers recommendations.

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MULCHING MATERIAL SELECTION GUIDE

Percent Slope	Type of Mulch / App. Rate*	Dec. 1 to Feb. 28(29)	March 1 to May 31	June 1 to Aug. 31	Sept. 1 to Nov. 30
Level to 5%	Wood Fiber @ 2000 lbs/ac. minimum BFM @ 3000 lbs/ac. min. Straw @ 2 Tons/ac. min. Chemical Binder** Stabilization Matting*** 1" Compost Blanket (CB)	XXXX