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Consulting Engineers, P.C.
Structural Engineering
Geotechnical Engineering
Historic Preservation

Black Point Beach Association Report
Pier/Groin Structures October 2020

The Black Point Beach Association (BPtBA) maintains four erosion/beach control structures at their beach areas fronting the west side of Niantic Bay on Long Island Sound along with a drainage pipe outlet.

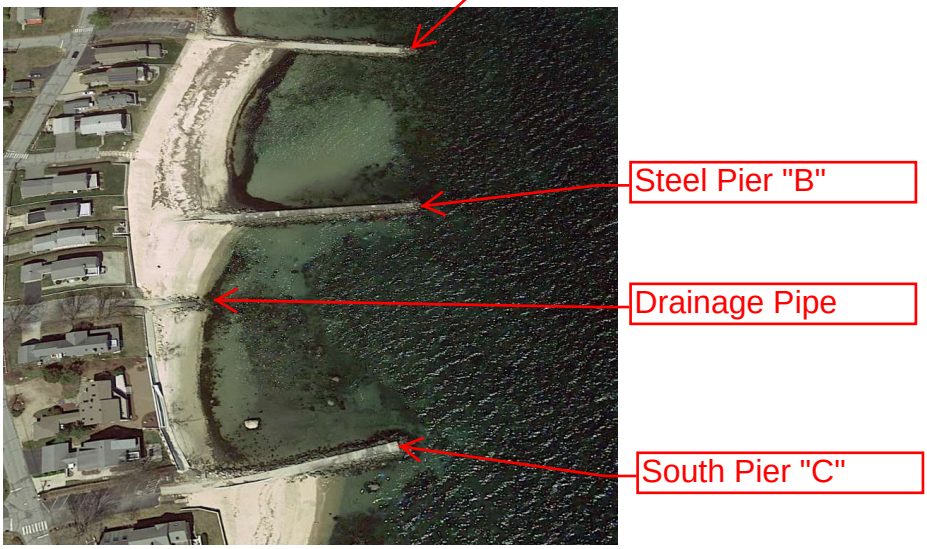

Figure 1 BptBA Nehantic, Steel Pier, Sea Breeze Pier/Groins

Figure 2 BPtBA - Osprey Pier/Groin

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This report is intended as a point in time evaluation of the following existing structures:

1. North Pier “A” off extension of Nehantic Drive approximately 281 feet into Niantic Bay.
2. Steel Pier “B” between Indianola and White Cap roads of approximately 260 feet into Niantic Bay.
3. South Pier “C” off Sea Breeze Avenue approximately 220 feet into Niantic Bay
4. Southern-most Pier “D” off Osprey approximately 200 feet into Niantic Bay.
5. Concrete Covered Drainage Culvert off extension of White Cap Road 60 feet into Niantic Bay.

The intermediate steel faced pier between Indianola Road and White Cap Road has been recently rehabilitated and is in new condition. Refer to attached sketches SK1-SK4 for plan information of the other structures showing current conditions.

General Pier Assessment

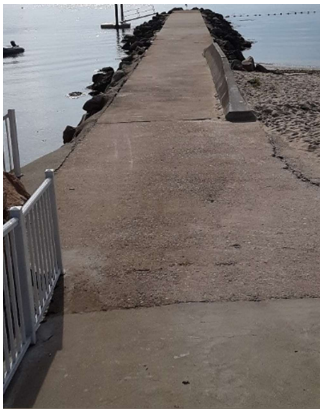
The north and south groins are similarly constructed with an interior cut stone pier structure capped by a concrete paving slab. The sides and leading end are further protected by armor stone revetments that extend out from the top edge of the pier sloping down to the sand bottom.

The effectiveness of this type of revetment structure to wave action is determined by the use of appropriate size stone and maintaining a uniformly consistent plan profile with irregular surface towards the wave direction. When waves are sufficient to displace the exposed stone the created gaps along the revetment can exacerbate additional displacements and lead to deterioration of the protection. Additionally, deterioration of the concrete paving and or integrity of the cut stone pier walls can lead to breakdown of the pier with loss of core materials within.

For Piers A,C and D there are areas where the armor stone has gaps which need to be filled to provide an effective profile. This should be done with appropriate size stone and we recommend pieces weighing at least 2400 lbs. minimum with angular proportions. Stone should be placed to provide interlock with adjacent stones and placed to provide an approximate 2 to 1 horizontal to vertical slope. Approximate areas of this work are shown on the attached plan layouts of the piers. Stone replacement and void infills should be accomplished with new stone, not reclaimed stones from the front of the revetment as this could destabilize the structure and this work should be undertaken in a timely fashion such as in the next 5 years.

Gap in Armor Stone Revetment Requiring New Stone Infill

The concrete paving appears to be of different ages and is worn but serviceable. Maintenance should be considered in areas where joints are opening and or where vegetation is growing. This will slow down further deterioration and avoid tripping hazards on the deck.



North Groin Paving

South Groin Paving

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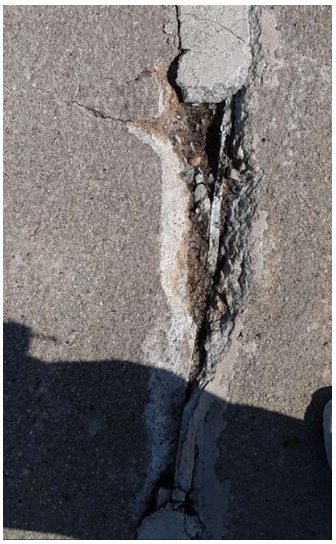

Paving Deterioration

Paving Pothole

Repair for these deteriorated conditions would include removal of any loose cracked/crumbling concrete with new patching placed with depth and bonding to adhere to the substrate concrete. We would also recommend removal of any vegetation growing within joints in the paving as this will speed up deterioration at these joints. This type of work should be considered yearly maintenance provided on an as needed basis.

All piers have undergone some degree of settlement. The most crucial settlement condition exists on the northern side of the South Pier “C” where the revetment appears to be up to 2 feet lower than the concrete paving. We attribute this to storm waves overtopping the groin from the south predominate wave fetch direction with the subsequent removal of the sands beneath the northern revetment. Continued wave action will jeopardize the stability of the groin and we would recommend restoring the height of this with armor stone as of size and conditions noted previously. This work should be undertaken with the next 5 years to safeguard this pier.

Drainage Facility Assessment

The concrete cap structure is intended to provide protection of an approximate 30 inch diameter precast concrete pipe that drains street runoff into the bay. It has a cast-in-place concrete covering over the top and sides from some distance landward out to the discharge end which is partially surrounded by stone to prevent clogging from sand and small stones. The last 21 feet of the enclosure and pipe have broken and settled away from the landside section with a break and separation at the last section. This has allowed the discharge end to shift (rotate counterclockwise 20 degrees or so) and thus compromised the pipe and its hydraulic cross-section limiting its function. Further deterioration will eventually cause the drainage to become clogged.

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Drainage Pipe Concrete Encasement

Broken Last Section of Pipe

We would recommend that the end section of this pipe be replaced with new concrete encasement established back to the break (approximately 21 feet) as soon as possible.

Regulatory Concerns

All four of the piers owned by the Black Point Beach Club Association have a long permit history. Any modifications to the structures, whether for maintenance or improvement, will have permitting required from both the US Army Corps of Engineers and the Connecticut DEP. Maintenance of the structures in substantial in the same location configuration, height, length, width, and armor stone for scour protection will be eligible for the US. Army Corps of Engineers General Permit. All of this work would also be eligible for the Connecticut DEP Certificate of Permission unless the finished elevation of the concrete cap on the groin is raised or if the footprint of the armor stone is increased laterally from the sides of the groin.

With regard to the drainage pipe it would be advisable to apply for a Certificate of Permission immediately in order to preserve the right to maintain the pipe as needed. The pipe is in a delicate situation because the end section, a length of approximately 8 feet, has already become disjointed and has rotated, in position, approximately 30° counterclockwise. The system is still functional and therefore would be eligible for this maintenance work under the COP.

For long term performance and proper protection all of the piers will need to be increased in height at least 1 foot within the next 20 or so years. Additionally, the South Pier is recommended to have enhancement of over 10% volume to bring the northern side armor stone revetment back up to its original level. These larger projects will require new Structures and Dredging permits with currently run for 5 years with the possibility of extensions beyond.

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Future Capital Expenditures

As requested based upon the current conditions of the structures, anticipated deterioration and future sea level rise, we have tabulated and estimated the potential capital costs to maintain the Association's beach structures and allow for their continued performance in the attached schedule.

ANTICIPATED CAPITAL EXPENDITURE SCHEDULE (30 YEARS OUT)

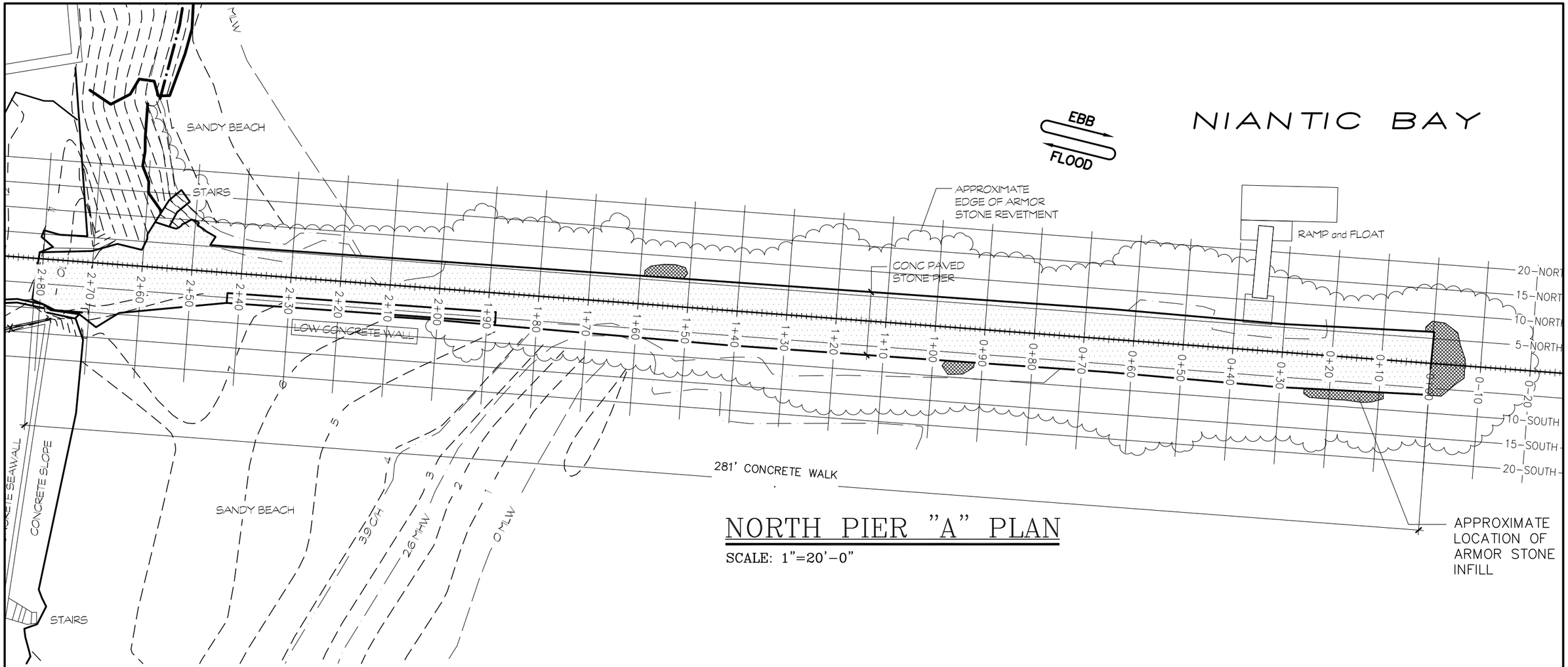
ASSET (LOCATION)		1-5 YR. 2020-2025	5-10 YR. 2025-2035	10-20 YR. 2035-2045	20-30 YR. 2045-2055
NORTH PIER A (NEHANTIC)	.	**Repair Armor Stone** **Maintenance Sched 2** $30,000,$1000/yr	**Maintenance Sched 2** $1000/yr	**Raise Pier 1 Ft.** **Maintenance Sched 3** $350,000,$4000/2yr	**Repair Armor Stone** **Maintenance Sched 3** $30,000,$4500/2yr
MIDDLE PIER B (STEEL)		**Maintenance Sched 1** $5000/2yr	**Maintenance Sched 1** $5000/2yr	**Maintenance Sched 1** $5000/2yr	**Raise Pier 1 Ft.** **Maintenance Sched 1** $200,000,$7000/2yr
South PIER C (SEA BREEZE)		**Repair Armor Stone** **Enhance Armor Stone** **Maintenance Sched 2** $30,000,$80,000,$1000/yr	**Maintenance Sched 2** $1000/yr	**Raise Pier 1 Ft** **Maintenance Sched 3** $350,000,$4000/2yr	**Repair Armor Stone** **Maintenance Sched 3** $30,000,$4500/2yr
PIER D (OSPREY)		**Repair Armor Stone** **Maintenance Sched 2** $30,000,$1000/yr	**Raise Pier 1 Ft.** **Maintenance Sched 3** $350,000,$4000/2yr	**Maintenance Sched 3** $4000/2yr	**Repair Armor Stone** **Maintenance Sched 3** $30,000,$4500/2yr
DRAIN PIPE (WHITE CAP)		**Pipe Repair** $80,000	$0	$0	$0
Total Costs		$277,500	$382,500	$785,000	$392,500

Repair/Upgrade Legend:

Maintenance Sched 1: For Steel Pier includes Bi-yearly sealing of concrete and patching of any breaks in the epoxy coating on steel sheeting.
Maintenance Sched 2: For Piers A,C and D, Patch Repair of Concrete, clean joints
Maintenance Sched 3: For New Raised Concrete Piers Bi-yearly Concrete Sealing
Repair Armor Stone: Repair Pockets of Missing Stone as shown on SK sheets for current repair and anticipate 20 tons for future repairs.
Enhance Armor Stone: For Pier C only - Full permit and raise stone on North Side of South Pier per SK2
Raise Pier 1 Ft.: Full permit and 1 foot concrete paving w/ improvement of revetments.
Pipe Repair: For Drain Pipe only - COP permit and replace last 21 feet of pipe and encasement.

Notes:

1. All estimated costs are in 2020 dollars.
2. It is anticipated that due to sea level rise all piers will need to be elevated approximately 1 foot achieved by pouring on top of old concrete cap spread out in time as shown This would be necessary to maintain the erosion control function of the piers.



NORTH PIER "A" PLAN

SCALE: 1"=20'-0"

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NORTH PIER "A" (NEHANTIC) CONDITION ASSESSMENT

BLACK POINT BEACH ASSOC. NIANTIC, CT

DATE:	12AUG20
PROJECT:	#20113
SCALE:	AS SHOWN
DRAWN BY:	CCB
CHECKED BY:	

DWG. NO. SK1

NIANTIC BAY

EBB

FLOOD

APPROXIMATE AREA TO RESTORE ELEVATION OF ARMOR STONE REVETMENT

APPROXIMATE LOCATION OF ARMOR STONE INFILL

BOULDER (TYP)

CONCRETE STONE

CONCRETE WALK

222' CONC WALK

2.6 MAX

3.9 C/H

ROCKS

ROCKS

HOUSE

STEP

STAIRS

SANDY BEACH

SAND

CONC

CONCRETE SEA

20-NORTH
15-NORTH
10-NORTH
5-NORTH
0-50
0-40
0-30
0-20
0-10
10-SOUTH
15-SOUTH
20-SOUTH

SOUTH PIER "C" PLAN

SCALE: 1"=20'-0"

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SOUTH PIER "C"
(SEA BREEZE)
CONDITION
ASSESSMENT

BLACK POINT
BEACH ASSOC.
NIANTIC, CT

DATE:	12AUG20
PROJECT:	#20113
SCALE:	AS SHOWN
DRAWN BY:	CCB
CHECKED BY:	

DWG. NO.
SK2

PIER "D" PLAN

SCALE: 1"=20'-0"

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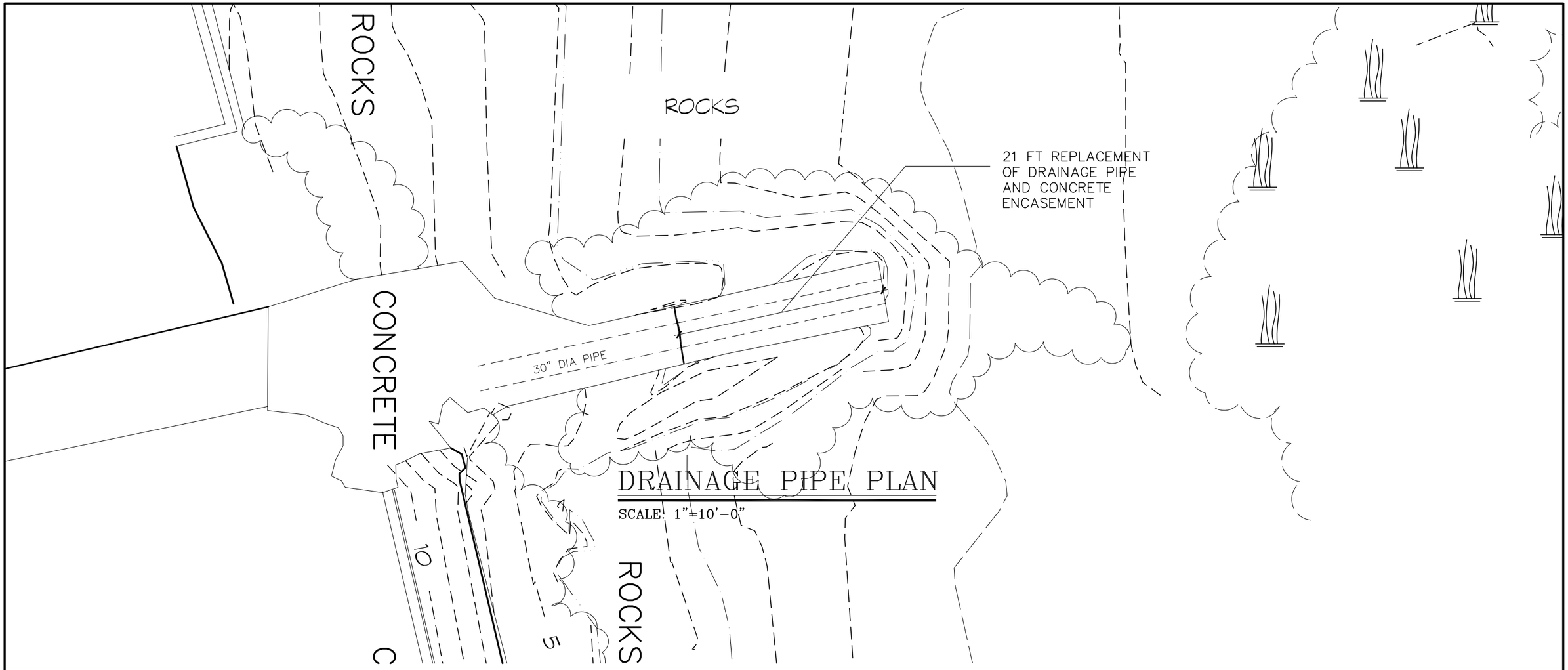
PIER "D"
(OSPREY)
CONDITION
ASSESSMENT

BLACK POINT
BEACH ASSOC.
NIANTIC, CT

DATE: 12AUG20	DWG. NO.
PROJECT: #20113	SK3
SCALE: AS SHOWN	
DRAWN BY: CCB	
CHECKED BY:	



DRAINAGE PIPE PLAN

SCALE: 1"=10'-0"

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DRAINAGE PIPE CONDITION ASSESSMENT

BLACK POINT BEACH ASSOC.
NIANTIC, CT

DATE:	12AUG20
PROJECT:	#20113
SCALE:	AS SHOWN
DRAWN BY:	CCB
CHECKED BY:	

DWG. NO.
SK4