# COASTAL STORM RISK MANAGEMENT FEASIBILITY STUDY
FOR THE SOUTH SHORE OF STATEN ISLAND

## PHASE 1
FORT WADSWORTH TO OAKWOOD BEACH

### INDEX TO DRAWINGS

<table>
<thead>
<tr>
<th>SHEET NO.</th>
<th>SHEET TITLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>G-001</td>
<td>COVER SHEET</td>
</tr>
<tr>
<td>G-101</td>
<td>OVERALL SITE AERIAL (1 OF 3)</td>
</tr>
<tr>
<td>G-102</td>
<td>OVERALL SITE AERIAL (2 OF 3)</td>
</tr>
<tr>
<td>G-103</td>
<td>OVERALL SITE AERIAL (3 OF 3)</td>
</tr>
<tr>
<td>G-104</td>
<td>SHEET KEY PLAN</td>
</tr>
<tr>
<td>C-100</td>
<td>SITE PLAN (1 OF 11)</td>
</tr>
<tr>
<td>C-101</td>
<td>SITE PLAN (2 OF 11)</td>
</tr>
<tr>
<td>C-102</td>
<td>SITE PLAN (3 OF 11)</td>
</tr>
<tr>
<td>C-103</td>
<td>SITE PLAN (4 OF 11)</td>
</tr>
<tr>
<td>C-104</td>
<td>SITE PLAN (5 OF 11)</td>
</tr>
<tr>
<td>C-105</td>
<td>SITE PLAN (6 OF 11)</td>
</tr>
<tr>
<td>C-106</td>
<td>SITE PLAN (7 OF 11)</td>
</tr>
<tr>
<td>C-107</td>
<td>SITE PLAN (8 OF 11)</td>
</tr>
<tr>
<td>C-108</td>
<td>SITE PLAN (9 OF 11)</td>
</tr>
<tr>
<td>C-109</td>
<td>SITE PLAN (10 OF 11)</td>
</tr>
<tr>
<td>C-110</td>
<td>SITE PLAN (11 OF 11)</td>
</tr>
<tr>
<td>C-301</td>
<td>SITE PROFILE (1 OF 6)</td>
</tr>
<tr>
<td>C-302</td>
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<tr>
<td>C-306</td>
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<td>C-307</td>
<td>TYPICAL SECTIONS REACHA-1</td>
</tr>
<tr>
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<td>TYPICAL SECTIONS REACHA-2</td>
</tr>
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<td>C-309</td>
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<td>C-310</td>
<td>TYPICAL SECTIONS REACHA-4</td>
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<td>C-311</td>
<td>TYPICAL SECTIONS REACHA-4 AT FORT WADSWORTH (1 OF 2)</td>
</tr>
<tr>
<td>C-312</td>
<td>TYPICAL SECTIONS REACHA-4 AT FORT WADSWORTH (2 OF 2)</td>
</tr>
<tr>
<td>C-313</td>
<td>TYPICAL SECTION BOARDWALK AND ROADWAY</td>
</tr>
<tr>
<td>C-314</td>
<td>TYPICAL SECTION BOARDWALK ACCESS</td>
</tr>
<tr>
<td>C-315</td>
<td>TYPICAL SECTION PEDESTRIAN ACCESS STAIRS</td>
</tr>
<tr>
<td>C-316</td>
<td>TYPICAL MMA AND DTP RAMPS DETAIL</td>
</tr>
<tr>
<td>C-317</td>
<td>TYPICAL DRAINAGE CONTROL STRUCTURE</td>
</tr>
<tr>
<td>C-318</td>
<td>TIDE GATE STRUCTURE DETAILS</td>
</tr>
<tr>
<td>C-319</td>
<td>CONCRETE HEADWALL DETAILS</td>
</tr>
<tr>
<td>C-320</td>
<td>CLOSURE STRUCTURE PLAN AND ELEVATION</td>
</tr>
<tr>
<td>C-321</td>
<td>CLOSURE STRUCTURE DETAILS</td>
</tr>
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NOT FOR CONSTRUCTION

LOCATION OF NYC PARKS AND RECREATION
ON UPDATED TOPOGRAPHIC INFORMATION AND
FINAL TIE-IN LOCATION TO BE DETERMINED BASED
ON UPDATED TOPOGRAPHIC INFORMATION AND
LOCATION OF NYC PARKS AND RECREATION
DEPARTMENT TRAIL SYSTEM

NOTES

1. TYPICAL SECTIONS SHOWN ON SHEETS C-851 TO C-857.
2. ALL ELEVATIONS REFERENCED TO NAVO 29.
3. STRUCTURE LIMIT SHOWN FOR LEVEL OF PROTECTION ARE BASED
ON THE 15 FT SWL.
4. CONSTRUCTION EASEMENT LIMITS SHOWN FOR PROPOSED
STRUCTURES.
5. CLOSURE STRUCTURE ON SHEETS C-516 & C-516.
6. SANITARY SERVICE ROAD SECTION SHOWN ON SHEET C-687.
7. THE LINE OF PROTECTION EASEMENT SHOWN WITHIN THE OVERLORD
SANITARY SERVICE ROAD SECTION SHOWN ON SHEET C-687 TO COMFORM TO THE CITY
OF NEW YORK STREET PLAN AND RULES PLAN.
FINAL TIDAL MARSH CONFIGURATION BETWEEN STA 83+00 AND STA 93+00 MAY REQUIRE MODIFICATIONS TO THE BURIED SEAWALL. TIDAL MARSH ACCESS ROAD GEOMETRY AND RESPECTIVE SITE GRADING, BASED ON ADDITIONAL SURVEY TO BE PERFORMED DURING THE PRECONSTRUCTION ENGINEERING AND DESIGN PHASE.

NOTES:
1. TYPICAL SECTIONS SHOWN ON SHEETS C-061 TO C-097.
2. ALL ELEVATIONS REFERENCED TO NGVD 29.
3. STRUCTURE LIMITS SHOWN FOR LEVEL OF PROTECTION ARE BASED ON THE 5% FT SWL.
4. CONSTRUCTION EASEMENT LINE 20' OFFSET TO PROPOSED STRUCTURES.
5. CLOSURE STRUCTURE ON SHEETS C-045 & C-046.
6. SANITARY SERVICE ROAD SECTION SHOWN ON SHEET C-087.
7. THE LINE OF PROTECTION (90' STRUCTURES) WITHIN THE OAKWOOD BEACH CORRIDOR HAVE BEEN DESIGNED TO ACCOMMODATE THE CITY OF NEW YORK'S STAINLESS STEEL PRO处方.

LEGEND:
- SANITARY SEWER
- VALVE STORM SEWER OUTLET
- PIPE COVER
- BOATRAMP
- PONDAGE

KEY PLAN

SCALE 1"=100'
NOTES
1. TYPICAL SECTIONS SHOWN ON SHEETS C-891 TO C-907.
2. ALL ELEVATIONS REFERENCED TO NAVD 29.
3. STRUCTURE LIMITS SHOWN FOR LEVEL OF PROTECTION ARE BASED ON THE 1% FT SL.
4. CONSTRUCTION EASEMENT LINE AS SHOWN TO PROPOSED STRUCTURES.
5. CLOSURE STRUCTURE ON SHEETS C-818 & C-819.
6. SANITARY SERVICE ROAD SECTION SHOWN ON SHEET C-817.
7. THE LINE OF PROTECTION FOR STRUCTURES LINES WITH THE OAKWOOD BEACH CORRIDOR HAVE BEEN DESIGNED TO ACCOMMODATE THE CITY OF NEW YORK'S SINKING BEACH PROTECTION PLAN.

LEGEND
- SANITARY SEWER
- MAJOR STORM SEWER OUTFALL
- SAND COVER
- SAND COVER ON SHEET C-914
- SANITARY SEWER ON SHEET C-914
- STRUCTURE ON SHEET C-819
- PROMENADE ON SHEET C-914

KEY PLAN

1. SANITARY SEWER
2. MAJOR STORM SEWER OUTFALL
3. SAND COVER
4. SAND COVER ON SHEET C-914
5. SANITARY SEWER ON SHEET C-914
6. STRUCTURE ON SHEET C-819
7. PROMENADE ON SHEET C-914

NOTE: SANITARY SEWER
- EBBITS STREET OUTFALL
- REACH A-4
- TOTAL LENGTH = 22,705'

LEGEND
- SANITARY SEWER
- MAJOR STORM SEWER OUTFALL
- SAND COVER
- SAND COVER ON SHEET C-914
- SANITARY SEWER ON SHEET C-914
- STRUCTURE ON SHEET C-819
- PROMENADE ON SHEET C-914

KEY PLAN

1. SANITARY SEWER
2. MAJOR STORM SEWER OUTFALL
3. SAND COVER
4. SAND COVER ON SHEET C-914
5. SANITARY SEWER ON SHEET C-914
6. STRUCTURE ON SHEET C-819
7. PROMENADE ON SHEET C-914

NOTE: SANITARY SEWER
- EBBITS STREET OUTFALL
- REACH A-4
- TOTAL LENGTH = 22,705'
NOTES
1. TYPICAL SECTIONS SHOWN ON SHEETS C-501 TO C-507.
2. ALL ELEVATIONS REFERENCED TO NGVD 29.
3. STRUCTURES LIMITS SHOWN FOR LEVEL OF PROTECTION ARE BASED ON THE 1% F T 1%.
4. CONSTRUCTION EASEMENT LINE @ 90° OFFSET TO PROPOSED STRUCTURES.
5. CLOSURE STRUCTURE ON SHEETS C-505 & C-506.
6. SANITARY SERVICE ROAD SECTION SHOWN ON SHEET C-507.
7. THE LINE OF PROTECTION (LOP) STRUCTURES WITHIN THE DOWNSPOUT DRAIN CORRIDOR HAVE BEEN DESIGNED TO ACCOMMODATE THE CITY OF NEW YORK'S STATION ISLAND BLUEPRINT PLAN.

LEGEND
- PEDESTRIAN ACCESS STAIRS
- SANITARY SEWER OUTFALL
- MAJOR STORM SEWER OUTFALL
- SANITARY/DRAINAGE CONTROL STRUCTURE SEE SHEET C-505
- SAND COVER
- SANITARY/DRAINAGE CONTROL STRUCTURE SEE SHEET C-507
- PROMENADE SEE SHEET C-508

NOTE: FINAL JUNE 2016 NOT FOR CONSTRUCTION
NOTES
1. TYPICAL SECTIONS SHOWN ON SHEETS C-001 TO C-007.
2. ALL ELEVATIONS REFERENCED TO NAVD 88.
3. STRUCTURE LIMITS SHOWN FOR LEVEL OF PROTECTION ARE BASED ON THE 3% ET SWL.
4. CONSTRUCTION EASEMENT LINE OF OFFSET TO PROPOSED STRUCTURE.
5. CLOSURE STRUCTURE ON SHEETS C-016 & C-019.
6. SANITARY SERVICE ROAD SECTION SHOWN ON SHEET C-027.
7. THE LINE OF PROTECTION FOR STRUCTURES WITHIN THE OWHT IS REFERENCED TO NAVD 88.

KEY PLAN
- SANITARY SEWER (TYP)
- FLOOD PROTECTION LEVEE EASEMENT (TYP)
- BOARDWALK (TYP)
- CONSTRUCTION EASEMENT (TYP)
- FINAL JUNE 2016
- TOE OF SAND COVERAGE (TYP)
- CREW OF BURIED SEAWALL (TYP)
- RELOCATE FOUNTAIN
- MATCH LINE - SEE SHEET C-008

LEGEND
- SANITARY SEWER
- FLOOD PROTECTION EASEMENT
- RELOCATE FOUNTAIN
- BOARDWALK
- CONSTRUCTION EASEMENT

NOT FOR CONSTRUCTION
NOTE:

1. TYPICAL SECTIONS SHOWN ON SHEETS C-501 TO C-507.
2. ALL ELEVATIONS REFERENCED TO NGVD 29.
3. VALUES FOR 15.6 FT SWL CALCULATED ALONG CONSTRUCTION EASEMENT LINE @ 50' OFFSET TO PROPOSED STRUCTURE LIMITS SHOWN FOR LEVEL OF PROTECTION.
4. CLOSURE STRUCTURE ON SHEETS C-515 & C-516.
5. BASELINE. REFER TO SITE PLANS FOR BASELINE LOCATION.
6. SANITARY/DRAINAGE CONTROL STRUCTURE SEE SHEET C-514.
7. COMBINED TRUCK & PEDESTRIAN RAMP, SEE SHEET C-510.
8. SANITARY SERVICE ROAD SECTION SHOWN ON SHEET C-507.

LEGEND

- Accessway Path
- Combined Truck & Pedestrian Access Ramp, SEE SHEET C-510
- Maintenance Vehicle Access Ramp, SEE SHEET C-512
- Boardwalk Access
- Structural Access Stairs, SEE SHEET C-513
- Drainage Control Structure, SEE SHEET C-509
- Existing Surface

FINAL JUNE 2016
NOT FOR CONSTRUCTION.
NOTE:
1. TYPICAL SECTIONS SHOWN ON SHEETS C-501 TO C-507.
2. ALL ELEVATIONS REFERENCED TO NGVD 29.
3. MEASUREMENTS FOR STRUCTURES CALCULATED ALONG CONSTRUCTION EASEMENT LINE @ 50' OFFSET TO PROPOSED 4.
4. STRUCTURE LIMITS SHOWN FOR LEVEL OF PROTECTION ARE BASED ON THE 15.6 FT SWL.
5. SANITARY SERVICE ROAD SECTION SHOWN ON SHEET C-507.6.
6. CLOSURE STRUCTURE ON SHEETS C-515 & C-516.7.
7. MAINTENANCE VEHICLE ACCESS STRUCTURES.
8. BEACH CORRIDOR HAVE BEEN DESIGNED TO ACCOMMODATE THE CITY LINE OF PROTECTION (LOP) STRUCTURES WITHIN THE OAKWOOD 7.
9. DAMAGES OWNERSHIP AGREEMENTS FOR AREA OF PREMISES OTHER THAN THE LAND OWNED AND DEVELOPED BY THE CORPSE OF ENGINEERS FOR USE OF NEW YORK'S STATEN ISLAND BLUEBELT PLAN.

LEGEND
- DTP: DTP
- MVA: MVA
- TG: TIDE GATE
- BA: BOARDWALK ACCESS
- PAV: PEDESTRIAN ACCESS RAMP, SEE SHEET C-510
- MAINT: MAINTENANCE VEHICLE ACCESS
- DRAIN: DRAINAGE CONTROL STRUCTURE, SEE SHEET C-514
- SANITARY/DRAINAGE CONTROL OF NEW YORK'S STATEN ISLAND BLUEBELT PLAN.

1. SEE SHEET C-301 FOR CONTINUATION
2. SEE SHEET C-302 FOR CONTINUATION
3. SEE SHEET C-303 FOR CONTINUATION

FINAL JUNE 2016
NOT FOR CONSTRUCTION.
NOTE:
1. TYPICAL SECTIONS SHOWN ON SHEET C-307.
2. ALL ELEVATIONS REFERENCED TO NGVD 29.
3. DRAWN FOR 15.6 FT SWL (CALCULATED ALONG CONSTRUCTION EASEMENT LINE @ 50' OFFSET TO PROPOSED 4.500' O.C. LIMITS SHOWN FOR LEVEL OF PROTECTION ARE BASED ON THE 15.6 FT SWL.
5. STRUCTURES.
6. SANITARY/DRAINAGE CONTROL STRUCTURES SEE SHEET C-514.
7. DRAINAGE CONTROL STRUCTURE, SANITARY/DRAINAGE SERVICE ROAD SECTION SHOWN ON SHEET C-507.6.
8. CLOSURE STRUCTURE ON SHEETS C-515 & C-516.5.
9. MAINTENANCE VEHICLE ACCESS, SEE SHEET C-512.
10. COMBINED TRUCK & PEDESTRIAN RAMP, SEE SHEET C-510.
11. PEDESTRIAN ACCESS STAIRS, SEE SHEET C-509.
12. BOARDWALK ACCESS, SEE SHEET C-508.
13. TIDE GATE, SEE SHEET C-513.
14. LEGEND
- DTP = DESIGN TRUE POINT
- MVA = MAIN VEHICLE ACCESS
- TG = TIDE GATE
- BA = BOARDWALK ACCESS
- PA = PEDESTRIAN ACCESS STAIRS
- COMBINED TRUCK & PEDESTRIAN RAMP, SEE SHEET C-510
- MAINTENANCE VEHICLE ACCESS, SEE SHEET C-512
- DRAINAGE CONTROL STRUCTURE, SANITARY/DRAINAGE SERVICE ROAD SECTION SHOWN ON SHEET C-507.6
- CLOSURE STRUCTURE ON SHEETS C-515 & C-516.5
- SANITARY/DRAINAGE CONTROL STRUCTURES SEE SHEET C-514
- DTM = DESIGN TRUE METER

SEE SHEET C-302 FOR CONTINUATION

SEE SHEET C-304 FOR CONTINUATION
NOTE:
1. Typical sections shown on C401 to C507.
2. All elevations referenced to NGVD 29.
3. Shown for 15.6 ft SWL calculated along location, refer to site plans for baseline location.

LEGEND
- TYPICAL SCHEMAS SHOWN ON C401 TO C507
- ALL ELEVATIONS REFERENCED TO NGVD 29
- SHOWN FOR 15.6 FT SWL CALCULATED ALONG LOCATION, REFER TO SITE PLANS FOR BASELINE LOCATION

FINAL JUNE 2016
NOT FOR CONSTRUCTION
NOTE:
1. TYPICAL SECTIONS SHOWN ON SHEET C-515.
2. ALL ELEVATIONS REFERENCED TO NGVD 29.
3. SHOWN FOR 15.6 FT SWL, CALculated ALONG.
4. INCLUDE REFERENCE TO SITE PLANS FOR BASELINE LOCATION.

LEGEND:
- PERMANENT ACCESS STAIRS
- SEE SHEET C-504
- TIDE GATE
- SEE SHEET C-306 FOR CONTINUATION
- SEE SHEET C-304 FOR CONTINUATION
- COMBINED TRUCK & PEDESTRIAN ACCESS RAMP, SEE SHEET C-510
- MAINTENANCE VEHICLE ACCESS RAMP, SEE SHEET C-512
- SANITARY/DRAINAGE CONTROL STRUCTURE, SEE SHEET C-514
- SEE SHEET C-511

SEE SHEET C-304 FOR CONTINUATION

SEE SHEET C-306 FOR CONTINUATION
NOTE
1. TYPICAL SECTIONS SHOWN ON SHEETS C-501 TO C-507.
2. ALL ELEVATIONS REFERENCED TO NGVD 29.
3. SMALLELLS FOR 15.6 FT SWL ARE CALCULATED GROSS (G/E) REFER TO SITE PLANS FOR BASELINE LOCATION.
4. TYPICAL SECTIONS SHOWN ON SHEETS C-501 TO C-507.
5. ALL ELEVATIONS REFERENCED TO NGVD 29.
6. TYPICAL SECTIONS SHOWN ON SHEETS C-501 TO C-507.
7. ALL ELEVATIONS REFERENCED TO NGVD 29.
8. TYPICAL SECTIONS SHOWN ON SHEETS C-501 TO C-507.
9. ALL ELEVATIONS REFERENCED TO NGVD 29.
10. TYPICAL SECTIONS SHOWN ON SHEETS C-501 TO C-507.

LEGEND
- PEDESTRIAN ACCESS STAIRS
- COMBINED TRUCK & PEDESTRIAN ACCESS RAMPS, SEE SHEET C-510
- COMBINED PEDESTRIAN & MOTOR access RAMP, SEE SHEET C-510
- SANITARY SERVICE ROAD SECTION SHOWN ON SHEET C-507.
- CLOSURE STRUCTURE ON SHEETS C-515 & C-516.
- STRUCTURES.
- CONSTRUCTION EASEMENT LINE @ 50' OFFSET TO PROPOSED.
- ON THE 15.6 FT SWL.
- STRUCTURE LIMITS SHOWN FOR LEVEL OF PROTECTION ARE BASED
- ALL ELEVATIONS REFERENCED TO NGVD 29.
- TYPICAL SECTIONS SHOWN ON SHEETS C-501 TO C-507.

SEE SHEET C-305 FOR CONTINUATION
NOT FOR CONSTRUCTION

FINAL JUNE 2016

1. SECTION REPRESENTS STA 10+25 TO 13+40 AND 15+00 TO 40+00.
FLOOD WALL SECTION

NOTES
1. SECTION REPRESENTS STA 47+14.81 TO STA 65+40.

LANDSIDE

WATERSIDE

SEE TABLE

PILE TIP EL.

APPROX. EXISTING GROUND SURFACE EL., 10.3 FEET NGVD

SCOUR BLANKET W50 = 900lb

REINFORCED CONCRETE WALL

TOP OF WALL EL.

SEE TABLE

REINFORCED CONCRETE FOOTING

PILE (TYP)

SEE TABLE FOR PILE TYPE, SIZE, AND SPACING 'S'

H22 STEEL SHEET PILE

W/ SEALED INTERLOCKS

APPROX. EXISTING GROUND SURFACE EL., 10.3 FEET NGVD

SCOUR BLANKET W50 = 900lb

LANDSIDE

WATERSIDE

LANDSIDE

WATERSIDE

ELEVATIONS (FT, NGVD)

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<th>PILE TIP</th>
<th>TYPE</th>
<th>SIZE</th>
<th>H (FT)</th>
<th>B (FT)</th>
<th>T (FT)</th>
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<tr>
<td>14.3</td>
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NOTES

1. MIN. 2.0' THICKNESS OF BEDDING STONE LAYER IN CORE AREA. THICKNESS WILL VARY WITH EXISTING GROUND ELEVATION.
2. MIN. 1.5' THICKNESS OF BEDDING STONE LAYER IN CORE AREA. THICKNESS WILL VARY WITH EXISTING GROUND ELEVATION.
3. SECTION REPRESENT STA. 268+00 TO STA. 288+00.

STA. 288+00.
3. SECTION REPRESENT STA. 266+00 TO STA. 288+00. THICKNESS WILL VARY WITH EXISTING GROUND ELEVATION.

1. MIN. 2.0' THICKNESS OF BEDDING STONE LAYER IN CORE AREA. THICKNESS WILL VARY WITH EXISTING GROUND ELEVATION.
2. MIN. 1.5' THICKNESS OF BEDDING STONE LAYER IN CORE AREA. THICKNESS WILL VARY WITH EXISTING GROUND ELEVATION.

1. MIN. 2.0' THICKNESS OF BEDDING STONE LAYER IN CORE AREA. THICKNESS WILL VARY WITH EXISTING GROUND ELEVATION.
2. MIN. 1.5' THICKNESS OF BEDDING STONE LAYER IN CORE AREA. THICKNESS WILL VARY WITH EXISTING GROUND ELEVATION.
NOTES
1. MIN. 2' THICKNESS OF BEDDING STONE
   LAYER IN CORE AREA. THICKNESS WILL
   VARY WITH EXISTING GROUND ELEVATION.
2. MIN. 1.5' THICKNESS OF BEDDING STONE
   LAYER IN CORE AREA. THICKNESS WILL
   VARY WITH EXISTING GROUND ELEVATION.
3. SECTION REPRESENTS STA. 266-00 TO
   STA. 288-00.

1. MIN. 2.0' THICKNESS OF BEDDING STONE
   LAYER IN CORE AREA. THICKNESS WILL
   VARY WITH EXISTING GROUND ELEVATION.
2. MIN. 1.5' THICKNESS OF BEDDING STONE
   LAYER IN CORE AREA. THICKNESS WILL
   VARY WITH EXISTING GROUND ELEVATION.
3. SECTION REPRESENTS STA. 266-00 TO
   STA. 288-00.

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FINAL JUNE 2016

C-507

TYPICAL SECTION - BOARDWALK

SECTION FROM STA. 158+00 TO STA. 266+00.

NOTE

1. SECTION REPRESENTS TYPICAL BOARDWALK SECTION FROM STA. 158+00 TO STA. 266+00.
NOTES

1. STAIR LAYOUT SHOWN FOR THE 15.6 FT SWL. NUMBERS OF STAIRS WILL VARY BASED ON SWL. SEE SHEETS C-504 THROUGH C-506 FOR BURIED SEAWALL DIMENSIONS.
LEGEND

MVA = MOTOR VEHICLE ACCESS RAMP
DTP = COMBINED TRUCK &
"PEDESTRIAN ACCESS RAMP"

NOTE:
1. RAMP SHOWN IS A TYPICAL CONDITION
   RAMP GEOMETRY MAY VARY BY LOCATION.

PLAN - TYPICAL MVA AND DTP RAMP DETAIL

NOT TO SCALE

CREST OF BURIED SEAWALL
LIMITS OF SAND COVER (TYP)
12' WIDE X 30' LONG MVA OR
DTP RAMP @ 1:12 SLOPE (TYP)

TOE OF RAMP SLOPE
AT EXISTING GRADE
5' LANDING (TYP)

CREST OF BURIED SEAWALL
LIMITS OF SAND COVER (TYP)
17' CREST WIDTH

TOE OF RAMP SLOPE
AT EXISTING GRADE
20' LENGTH VARY

LIMITS OF SAND COVER (TYP)

12' WIDE X 30' LONG MVA OR
DTP RAMP @ 1:12 SLOPE (TYP)

TO E X I S T I N G  G R A D E
(T O V A R I E S ) 15'-20' SLOPE

D E S C R I P T I O N

1. RAMP SHOWN IS A TYPICAL CONDITION
   RAMP GEOMETRY MAY VARY BY LOCATION.
L WALL AND EPOXY GROUT FOR BASE PLATE 1 3/4" BLOCK OUT

TOSL EL VARIES C/L REMOVEABLE POST

C-516 SCALE: 3/4"=1'-0"

PLAN VIEW

SECTION C-516 SCALE: 3/4"=1'-0"

SECTION C-516 SCALE: 3/4"=1'-0"

SECTION C-516 SCALE: 3/4"=1'-0"

1 3/4" BLOCK OUT FOR BASE PLATE AND EPOXY GROUT

TOP OF WALL/PILASTER EL. 18.00

NOT FOR CONSTRUCTION

FINAL JUNE 2016