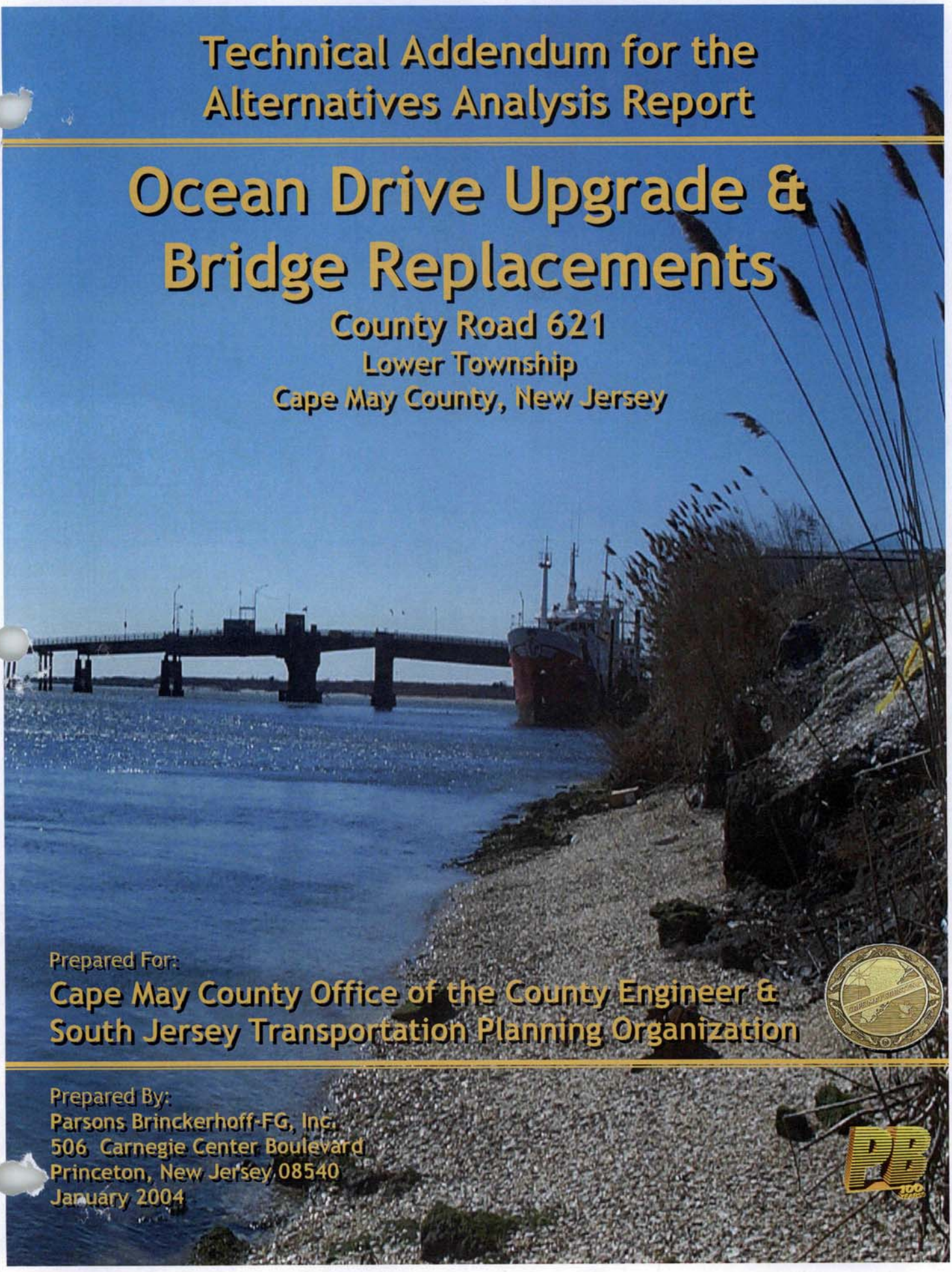
Technical Addendum for the Alternatives Analysis Report

Ocean Drive Upgrade & Bridge Replacements

County Road 621
Lower Township
Cape May County, New Jersey



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Technical Addendum A
Bridge Field Condition and Appraisal Reports

Field Condition and Appraisal Survey Report

A limited field inspection was conducted by engineers from Parsons Brinckerhoff-FG, Inc. on June 2, 2000, of the Mill Creek and Upper Thorofare Bridges to verify the current condition fo the bridge. Prior to this visit, the 8th Cycle Bridge Re-evaluation Survey Report dated April 1997 was reviewed. The recommendations made in this report support the 8th cycle report. The bridges currently carry 10'-0" foot lane of vehicular traffic in each direction and have 1'-6" safetywalkays on both sides.

SUPERSTRUCTURE AND DECK CONDITIONS

Mill Creek Bridge

The existing Mill Creek Bridge consists of 12 spans, 25'-0" each, for a total length of 300'-0". The superstructure consists of four Reinforced Concrete T-Beams with a 7½" thick deck. The beams are spaced at approximately 6'-0" center to center.

The superstructure (deck slab and beams) is in fair condition. The deck has several transverse cracks above the piers. Previously several of the deck joints were removed and filled with concrete. At the existing armored deck joints, the filler material is deteriorated.

The underside of the deck has many large spalls with exposed reinforcement bars. Spall sizes ranging from approximately 1 to 3 square feet. Numerous repaired area spalls exist throughout on the underside.

The bottom of the beams are spalled at several locations, including the previously repaired sections. The reinforcement was exposed and rusted through.

The diaphragms have cracks and efflorescence throughout. Several diaphragms have been repaired. The bearings were noted to be deteriorated at several locations.

The substandard bridge railing is severely deteriorated. The majority of the rails are rusted through. The railing exhibits several locations of previous vehicular impact.

No other significant defects were noted on the superstructure.

Upper Thorofare Bridge

The existing Upper Thorofare Bridge consist of 14 Spans, 25'-0" each, for a total length of 350'-0". The superstructure consists of four Reinforced Concrete T-Beams with a 7½" thick deck. The beams are spaced at approximately 6'-0" center to center.

The superstructure (deck slab and beams) is in fair condition. The deck has several transverse cracks, above many of the piers and other locations. Several deck joints were previously removed and filled with concrete. At the existing armored deck joints, the filler material is deteriorated.

The underside of deck has many scaled areas and spalls with exposed reinforcement bars. The bottom of the beams were spalled in several locations, and the diaphragms have efflorescence and various cracks throughout. The bearings are deteriorated in several locations. The bridge railing is in substandard and in poor condition with severe deterioration and previous vehicular impact damage at several locations.

SUBSTRUCTURE CONDITION

The substructure is comprised of two bin-type abutments on timber piles and piers made up of reinforced concrete pier caps with three precast concrete piles. Rip Rap and bagged concrete slope protection were noted at the abutments.

Mill Creek Bridge

The substructure is in fair condition. The abutments were inspected during low tide in order to facilitate inspections. The North Abutment apron is undermined throughout. At the East end the erosion is approximately 8" and the piles are visible. The concrete bags seem to have no significant benefit. There is extensive cracking and spalling on the west abutment breastwall. The South abutment showed no signs of erosion.

The wingwalls have various map cracks and wide cracks with efflorescence at the seat.

The Piers consist of reinforced concrete pile caps 2'-0" wide by 2'-11" deep and three 20" square precast concrete piles. The pile caps have several areas of map cracks and efflorescence. The end of the caps have medium to wide cracks. Several of the piles have been previously repaired with steel or plastic jackets filled with unreinforced concrete. The steel jackets are moderately rusted.

There are 4 visible timber piles that were cut-off at MHW within the second span from the North Abutment.

Upper Thorofare Bridge

The substructure construction is similar to the Mill Creek Bridge. The abutments were inspected during low tide. The North Abutment apron is also heavily undermined due to erosion. The South Abutment apron showed no signs of erosion.

The wingwalls have map cracks and wide cracks with efflorescence.

Some of the pier caps exhibit map cracking, few wide vertical cracks, and some efflorescence. Several of the piles have been previously repaired with plastic jackets and filled with unreinforced concrete. Some of the piles exhibit wide vertical cracks.

There are visible timber piles that were cut-off at MHW within the first and second span from the West Abutment.

APPROACHES

At each bridge, both approach roadways are paved with bituminous concrete. Both wingwalls have settled approximately 3" to 6" at the rear face of the backwall at the Upper Thorofare Brdige. The guide rails show signs of vehicular impact. The Horizontal sight distance on the Upper Thorofare Bridge is restricted due to curvature. There are markings for an underground utility belonging to Bell Atlantic on the North side of the Upper Thorofare Bridge.

DECK GEOMETRY

At each bridge, the curb to curb width of 20'-0" is inadequate, leading to the bridge being classified as functionally obsolete.

FIELD CONDITION AND APPRAISAL SURVEY REPORT

A limited field inspection was conducted by engineers from Parsons Brinckerhoff-FG, Inc. on June 18-19, 2002 of the Middle Thorofare Bridge to verify the current condition of the bridge. Prior to this visit, the 7th Cycle Bridge Re-Evaluation Survey Report dated October 2001 was reviewed. The recommendations made in this report support the 7th cycle report. The bridge currently carries one 9'-10½" lane of vehicular traffic in each direction and 1'-6" safety walkways on both sides. The bridge is currently appraised "Critical" based on the 7th Cycle report dated October 2001.

SUPERSTRUCTURE AND DECK CONDITIONS

The existing bridge consists of a single leaf steel bascule span, four steel girder-floorbeam-stringer spans and seventeen continuous steel stringer approach spans. The total length of the structure is approximately 1,044 feet.

The deck is in poor condition due to the wide cracks (approximately 30 feet long) and spalls on both the top and underdeck. Spall sizes range from approximately 1 to 6 square feet. There are large wide cracks and incipient spalls at the sidewalk brackets. The headers at both approaches have several potholes and deteriorated patches in the overlay.

The superstructure is in serious condition due to section loss from corrosion and impact damage. The East girder on the bascule span has 3 locations with major collision damage. The West girder on the bascule span also has 3 locations with collision damage but is moderate in comparison. The bearings on the bascule span exhibit heavy rusting. The stringers on the approach span exhibit up to 100% local section loss on the bottom flange at the bearing location.

There are numerous steel cross-bracing diaphragms with severe section loss throughout, but they have been supplemented with new adjacent diaphragms. Additional strengthening repairs were noticed on the stringer spans. These repairs along with the paint system were observed to be in good condition.

The substandard bridge railing is severely deteriorated. There are numerous rails that are rusted through. The railing exhibits several locations of previous vehicular impact.

Span N11 has scaffolding present between the diaphragms. This can be a potential safety hazard because of the extensive boat traffic traveling directly under it. There is also heavy collision damage to the east utility pole support. The east utility pole also exhibits 100% section loss at the base due to severe corrosion.

No other significant defects were noted on the superstructure.

SUBSTRUCTURE CONDITION

The abutments were inspected during low tide in order to facilitate inspections. The abutment showed no visible signs of erosion. Light scaling and water stains are found throughout the breastwalls and backwalls. There is minor debris accumulation on the bridge seats. There is a utility pole on the northeast side of the north abutment that is visibly leaning toward the bridge and can possibly fall and cause damage to the bridge and vehicular traffic on the bridge.

The approach piers consist of reinforced concrete pier caps with precast concrete piles. Minor scaling can be found on the pier caps along with map cracking and some efflorescence.

The precast concrete piles were repaired at several locations with concrete sleeves. The sleeves are heavily deteriorated at several locations with the reinforcing cage exposed. Pier S7 consists of 3 concrete piles, the east pile has heavy collision damage and has been supplemented with 2 steel H-piles for additional support. The main piers appear to be in fair condition.

The timber fendering system has heavy damage to the northeast corner. There is moderate damage to the east side of column E1 on pier S10.

APPROACHES

At each bridge, both approaches are paved with bituminous concrete. Both roadways have settled causing an uneven dip at the rear face of the backwall. There are several potholes and old deteriorated patches in the overlay.

DECK GEOMETRY

The curb-to-curb width of 19'-9" is inadequate, requiring the bridge to be classified as functionally obsolete.

LOAD CARRYING CAPACITY

There is a 15 ton limit sign on both approaches. Based on the 7th Cycle Bridge Survey Report, the Inventory Rating for HS20 and all three NJ legal loads (type 3, 3S2, and 3-3) are below the truck weights. However, the Operating Level accounts for a 12 ton rating load capacity. The bridge should be re-posted for a 12 ton limit.

RECOMMENDATIONS

In order to improve the evacuation route in the event of a major coastal storm, the substandard bridge width and rating should be increased to meet current criteria. In order to achieve these objectives and minimize the current bridge openings, a new bridge with two 12'-0" lanes and two 8'-0" shoulders with a higher vertical profile is recommended.

Technical Addendum B
Geotechnical Report

Preliminary Geotechnical Report

OCEAN DRIVE UPGRADE AND BRIDGE REPLACEMENTS

CAPE MAY COUNTY, NEW JERSEY

prepared for:

COUNTY OF CAPE MAY

prepared by:

PARSONS BRINCKERHOFF-FG, INC.

PRINCETON, NEW JERSEY

MAY 2003

Preliminary Geotechnical Report

OCEAN DRIVE UPGRADE AND BRIDGE REPLACEMENTS
ROUTE 109 TO WILDWOOD CREST

CAPE MAY COUNTY, NEW JERSEY

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ROUTE 109 TO WILDWOOD CREST

CAPE MAY COUNTY, NEW JERSEY

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OCEAN DRIVE UPGRADE AND BRIDGE REPLACEMENTS
ROUTE 109 TO WILDWOOD CREST

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Ocean Drive Upgrade and Bridge Replacements Route 109 to Wildwood Crest

Preliminary Geotechnical Report

1. INTRODUCTION

Ocean Drive, County Route 621, is located in Cape May County in southern New Jersey (Figure 1). The existing Ocean Drive route is important as the major access route to the beach resorts on the barrier island at the south end of the Wildwoods, as an access route for the commercial fishing industry located adjacent to the Middle Thorofare Bridge, as well as for access for emergency vehicles to the southern end of the island. Also, the low load carrying ability of the bridges on the other access route (Route 47) and the distance to Route 147 at the north end of the island increase the importance of this southerly route.

The existing two-lane roadway runs along the northern side of Cape May Harbor and bridges Mill Creek, Upper Thorofare and Middle Thorofare (Figure 1). It was constructed by placing fill in the higher areas of the floodplain within a 120 ft. right-of-way. The road consists of a 20 ft. wide paved roadway and 10 ft. paved shoulders on each side, with 8 to 1 side slopes down to existing grade adjacent to the shoulders. A majority of the existing roadway was constructed at a 0% profile grade at an elevation of 7.5 feet NGVD, with the top of deck of the bridges set at an elevation of 11.0 feet NGVD. The original roadway has settled since its construction to an approximate elevation of 6.0 feet NGVD placing it well below the 100-year flood elevation of 10.4 feet NGVD. The existing bridges over Mill Creek and Upper and Middle Thorofare have substandard widths and thus are functionally obsolete, with 20 ft. curb to curb widths, and low inventory rating load carrying capacities, although the route is not posted because the operating ratings of the bridges is adequate.

Proposed improvements for Ocean Drive consist of raising the roadway profile above the 100-year flood elevation from Route 109 to just west of the Madison Avenue in Wildwood Crest to improve the evacuation route in the event of a major coastal storm, widening the roadway to accommodate 12-foot wide travel lanes, improving the horizontal curvature of the western most section of the roadway, increasing the profile grade to allow for sufficient surface drainage and widening or replacing the bridges crossing Mill Creek, Upper Thorofare and Middle Thorofare. Seven alternatives have been developed to achieve these objectives:

Alternative 3A: In this alternative, Ocean Drive is shifted to the north from Route 109 to the vicinity of the Mill Creek structure, where it then shifts to the south for the remainder of the project length. This alternative will construct a new movable span structure approximately 30 feet to the south of the existing Middle Thorofare Bridge.

Alternative 3B: Similar to Alternative 3A, this alternative replaces the Middle Thorofare Bridge with a new movable structure. However, this alternative locates the new structure 30 feet to the north of the existing bridge. Because the new structure is located to the north, the entire alignment of Ocean Drive is shifted slightly to the north, unlike Alternative 3A, where only a portion of Ocean Drive is shifted northward.

Alternative 3C: This alternative relocates Ocean Drive onto new alignment from just west of Upper Thorofare to just west of Fish Dock Road. The new alignment travels north of the existing alignment along uplands located on the northern edge of the fishing industries, across Middle Thorofare, Thorofare Island and Lower Thorofare before reconnecting with the existing Ocean Drive near Fish Dock Road. The new alignment features a new low-level bridge across Upper Thorofare which is similar in design to the Upper

Thorofare structures proposed in Alternatives 3A and 3B, though located on a skew to the north of the existing bridge which will be removed. A second new structure is created on this alignment. A new high-level, fixed structure is proposed over Middle and Lower Thorofares.

Alternative 3D: This alternative is very similar to Alternative 3C. It also features a new, high-level, fixed bridge over Middle Thorofare. However, the alignment traverses Thorofare Island further to the north, crossing Lower Thorofare to the north of the Two Mile Restaurant. The alignment ties into existing Ocean Drive just before Madison Avenue.

Alternative 3E: This alternative proposes a new fixed bridge on an alignment similar to that of Alternative 3A. The proposed bridge would allow a minimum 116 feet vertical clearance over Middle Thorofare and would also span over Upper Thorofare. Existing Ocean Drive would be connected via a new access road and a rehabilitated Upper Thorofare structure.

Alternative 3F: This alternative also proposes a new fixed bridge with a minimum clearance of 116 feet, however the alignment is shifted to the south featuring only one main channel crossing. The alignment connects the existing portions of Ocean Drive through a t-intersection and a rehabilitated Upper Thorofare Bridge.

Alternative 3G: This alternative features the same alignment as Alternative 3F. The only difference is that the structure type proposed is a Cable-Stayed structure as opposed to the segmental type structure proposed in Alternative 3F.

Alternatives 3F and 3G are considered preferred and as such will be utilized in geotechnical analyses results which are presented in this Report.

All considered alternatives are shown on Figure 2.

2. PURPOSE AND SCOPE OF WORK

The purpose of this study was to explore the subsurface conditions and make preliminary design recommendations for the embankment construction and bridge foundations. In order to achieve our purpose, the following scope of work was undertaken:

- Reviewed available geologic and subsurface information.
- Conducted a site reconnaissance to determine access problems and traffic impact.
- Developed and executed a preliminary subsurface exploration program.
- Provided continuous monitoring of the drilling operations.
- Prepared and executed a laboratory testing program and evaluated laboratory data.
- Performed reduction of soil parameters for various soil strata.
- Evaluated subsurface soil behavior under increased embankment loading.
- Preliminary estimated settlement magnitude and consolidation time and evaluated methods to accelerate settlement.
- Evaluated potential foundation support type for the bridges.
- Identified potential construction problems and recommended solutions.
- Prepared this preliminary Report which includes our conclusions and recommendations.

3. SITE CONDITIONS

3.1 Field Subsurface Exploration Program

Based on a review of the available geotechnical and geological data and site reconnaissance, a subsurface exploration program consisting of test borings was developed to gather information necessary for design of the proposed roadway embankment and bridge foundations. The exploration included disturbed and undisturbed soil sampling in thirteen borings, designated as PB-1 to PB-9 drilled at roadway locations to a depth ranging from 27 to 42 feet and B-1 to B-4 drilled at Mill Creek and Upper Thorofare bridge locations to a depth ranging from 72 to 77 feet in June 2000, four borings, designated as B-5 to B-8, drilled at roadway and Middle Thorofare bridge locations in December 2002 to a depth of 52 feet, and one water boring designated as WB-1 drilled within the Middle Thorofare in March 2003 to a depth of 121 feet. Labor, equipment, utility coordination, traffic planning, and permits for the drilling work was provided by Jersey Boring and Drilling Co., Inc. of Newark, New Jersey and Warren George, Inc. of Jersey City, New Jersey.

Locations of the borings were adjusted in the field as necessary to suit site conditions, to accommodate access requirements of the drilling equipment provided, and/or to avoid utility interference. Field investigation work was conducted in accordance with appropriate standards of the American Society for Testing and Materials (ASTM), including ASTM D 420, "Standard Guide to Site Characterization for Engineering, Design, and Construction Purposes", and ASTM D 4220, "Standard Practices for Preserving and Transporting Soil Samples".

An Acker AD2 drilling rig was utilized to advance land borings and an Acker – Soil XLS drilling rig was used to advance water boring through soil using mud-stabilized rotary drilling. Split spoon samples were taken continuously to a depth as shown in Table 1, while subsequent samples were obtained at 5 foot intervals.

Table 1 ~ Depths of Continuous Sampling

Boring	Depth (ft)	Boring	Depth (ft)
PB-1	0-22	B-1	5-29
PB-2	5-19	B-2	---
PB-3	5-27	B-3	---
PB-4	5-23	B-4	---
PB-5	10-16	B-5	0-12
PB-6	5-32	B-6	0-12
PB-7	5-23	B-7	0-12
PB-8	5-35	B-8	0-12
PB-9	10-16	WB-1	---

The majority of soil samples were obtained using 2" O.D., 1-3/8" I.D., standard penetration test (SPT) split barrel samplers driven 24" into the soil. SPT sampling was conducted in accordance with procedures of ASTM D1586, "Standard Test Method for Penetration Testing and Split-Barrel Sampling of Soils". The sampler was driven by successive blows of a 140 lbs hammer dropped from a height of 30". All SPT samples were visually classified in the field at the time of sampling by PB-FG personnel and described on boring logs using nomenclature in accordance with the Burmister Soil Classification System (Appendix C). Representative specimens of the soil samples were labeled and preserved in glass jars for detailed identification and possible laboratory testing.

Where appropriate, samples of soft to medium stiff cohesive soils were recovered using thin-walled, "Shelby tube" sampling procedures specified in ASTM D 1587 "Standard Practice for Thin-Walled Tube Sampling of Soils". Each 3-inch O.D. Shelby tube was pushed 2 feet into undisturbed soils by application of smooth, uninterrupted hydraulic thrust applied by the drill rig. After being pushed, tubes were left in place for about 15 minutes to permit time for sample expansion and improvement of recovery upon withdrawal. Just prior to withdrawal, drill rods were rotated one revolution using a pipe wrench to shear soils at the bottom of the tube. Upon retrieval from the borehole, approximately one inch of sampled soil was trimmed away from both ends of each tube and the ends and outside of the tubes were cleaned. After cleaning, the ends of each tube were sealed with a plug of non-shrinking micro-crystalline wax. Ends were then fitted with plastic covers, taped, and dipped in wax to preserve the sample moisture content. Each tube was marked, stored, preserved, and transported to the laboratory with care necessary to prevent samples from being excessively jarred, vibrated, heated, cooled, or otherwise disturbed. Field classification of soils recovered in Shelby tubes is limited by the fact that only the top and bottom ends of the sample can be observed until the samples are extruded in the laboratory. A total of four successful Shelby tube samples were recovered in borings and at depths as follows: PB-1 at 10 to 12 feet, PB-2 at 13 to 15 feet, PB-5 at 12 to 14 feet, and PB-9 at 12 to 14 feet.

Unconfined compression tests were performed on selected intact split-spoon samples of the cohesive soils using a hand held pocket penetrometer.

The as-drilled boring locations for all borings drilled for this project are presented in Figures 3A, 3B and 3C. The logs of the test borings are included in Appendix A.

3.2 Geology of the Area

Marine tidal marsh deposits fringe almost the entire province along the Atlantic Ocean and Delaware Bay. A narrow strip of sandy sediment borders and/or overlies the tidal marsh along the ocean coastline and forms the offshore sand bars and barrier islands. On the coastline facing the Atlantic Ocean, the sediment usually consists of well-sorted fine quartz sand with varying amounts of shell fragments and gravel. This unconsolidated deposit was formed as a result of wave, wind and current actions during the latter part of the Quaternary period. The tidal marsh deposit usually consists of a mixture of organic matter and varying percentages of silt and clay.

Alluvial deposits consisting of unconsolidated, stratified sand, silt, clay and gravel in varying proportions underlie the marsh deposits. In general, coarse sand and gravel becomes more abundant as the depth increases and may occur in well-defined, alternating or intermixed layers.

Cohansey Sand Formation of the Tertiary period underlie the coastal and alluvial sediments, consisting primarily of uniform sand with interbeds of silty sand layers. Plastic, cohesive clay may also be present locally as small pockets, lenses, or layers. The thickness of Cohansey Sand formation ranges from approximately 100 to 250 feet in depth. Bedrock depths throughout southern New Jersey are greater than 200 feet.

3.3 Subsurface Conditions

3.3.1 Description of Strata

Information from logs of soil borings has been used together with research into area geology of the site to develop profiles summarizing subsurface conditions. Apparent trends at the specific boring locations have been plotted on the subsurface profile. Subsurface conditions between boring locations were interpolated so that stratum division lines could be extended between boring locations.

To characterize subsurface conditions for engineering purposes, the soils encountered in the field investigation were subdivided into four strata of materials with similar properties: Stratum A – Granular Fill, Stratum B – Sandy Sediments, Stratum C – Tidal Marsh and Stratum D – Alluvial Deposits.

Stratum A – Granular Fill
Fill materials were used to develop existing grades for the roadway and for site development. Fill materials consist predominantly of granular soils ranging from brown to occasional brown and gray coarse to fine sand with varying amounts of mostly fine gravel and silt and miscellaneous fill including roots and shell fragments. The soils of Stratum A were encountered from the ground surface to depths of 2 to 6 feet below grade. The fill materials are generally in medium dense condition with SPT N-values ranging from 10 to 48 blows per foot (average 27 bpf).

Stratum B – Sandy Sediments
Stratum B is composed of gray coarse to fine sandy soils grading, in some borings, with depth to medium to fine and fine sands with varying amounts of silt and occasionally fine gravel. Shell fragments were observed in soil samples recovered in borings drilled in the vicinity of the waterways. The soils of Stratum B were encountered beneath the fill materials of Stratum A to depths of 5 to 18 feet below existing grade. The thickness of the Stratum ranged from 2 to 16 feet. The soils of Stratum B are generally in a loose to medium dense condition with SPT N-values ranging from WOH to 34 blows per foot (average 13 bpf).

Stratum C – Tidal Marsh
Stratum C is comprised of fine-grained soils consisting primarily of dark gray organic silt to organic clay and peat with varying amounts of medium to fine sand, decaying vegetation and shell fragments of various sizes. The soils of Stratum C were encountered beneath the granular soils of Stratum B to depths of 18 to 33 feet below existing grade, with the exception of boring WB-1 where Stratum C materials were encountered between depths of 34 and 38 feet. The thickness of the Stratum ranged from 7 to 24 feet. The consistency of the soils is predominantly very soft with most of the SPT N-values in the range of Weight of Rod and Weight of Hammer per 24 inches of penetration. Remaining SPT N-values ranged from 1 to 36 blows per foot with higher values being observed at interfaces with granular materials of Stratum B and Stratum D. The average SPT N-value considering all recorded values was 2 bpf.

Stratum D – Alluvial Deposits
Stratum D is composed of alternating layers of granular and cohesive materials. It is present underneath Stratum C to the maximum depths of exploration. Layers of granular soil are comprised of gray to dark gray coarse to mostly fine sand with varying amounts of silt and occasionally fine gravel. The soils are generally in a medium dense to dense condition with majority of the SPT N-values ranging from 20 to 60 blows per foot (absolute 5 to 130 bpf; average 48 bpf). Thickness of the granular layers of Stratum D ranged from 1 to over 19 feet. Layers of cohesive materials are comprised of gray to dark gray silt to clay & silt and occasionally organic silt to clayey silt materials with varying amounts of fine sand. The consistency of the soil is medium stiff to hard with most of the SPT N-values in 5 to 35 blows per foot range (absolute WOH to 84 bpf; average 17 bpf). Thickness of the cohesive layers within Stratum D ranged from 1 to over 30 feet.

3.3.2 Groundwater Conditions

Groundwater levels were measured in two temporary observation wells installed in the vicinity of borings PB-1 and PB-8. The average recorded depth to groundwater in the wells was 2.5 feet which corresponds to elevation +4 feet NGVD. Long-term readings were not taken since the wells were kept open for a maximum time of one week upon installation. Tidal, as well as seasonal and annual variations, in groundwater levels should be expected.

Generalized subsurface soil profiles along Ocean Drive are presented on Figures 4A and 4B.

4. SOIL PROPERTIES

4.1 Laboratory Testing Program

The soil laboratory testing for the project was performed by French & Parrello Associates of Holmdel, New Jersey and Princeton Geotechnical and Materials Services, LLC of Trenton, NJ to confirm the soil description and classification recorded in the field during drilling, and to obtain additional soil data. The testing program consisted of basic index, engineering and performance tests on selected soil samples. Index soil tests were performed on representative soil samples of different strata and included grain size analysis, hydrometer analysis, natural water content, Atterberg limits, unit dry weight, and organic content test. Engineering tests were performed on representative soil samples of cohesive materials and included pocket penetrometer and Trovane tests. Performance tests were performed on Shelby tube samples, obtained in borings PB-1, PB-5, PB-7 and PB-9, and included one dimensional consolidation tests. These tests were undertaken to estimate the shear strength and compressibility characteristics of the soils of Stratum C. The summary of the type and number of laboratory tests performed is presented in Table 2. The results of the laboratory testing are presented in Section 4.2 and the test data are shown in Appendix B.

TABLE 2 ~ Laboratory Tests Performed

Test Description	Quantity
Moisture Content	37
Sieve Analysis	12
Hydrometer Analysis	1
Atterberg Limits	22
Organic Content Test	7
Unit Dry Weight	4
One Dimensional Consolidation Test	4
Pocket Penetrometer	4
Trovane Test	4

4.2 Recommended Design Parameters

Following is a discussion of soil properties developed from the findings of the site exploration program and laboratory tests. Recommended design soil parameters are presented in Table 3.

Stratum A – Granular Fill
Stratum A consists predominantly of coarse grained soils. The two main properties required for this type of soil are the unit weight and the angle of internal friction. Based on the SPT N-values, a representative angle of internal friction for this material is estimated to be 34 degrees. Unit weight of Stratum A materials is estimated to be 120 pcf.

Stratum B – Sandy Deposits
Five sieve analyses were performed on samples from the granular materials of Stratum B. Grain size analyses of this material indicate that the sand gradation is coarse to mostly fine with average 78 percent fine sand content and average 17 percent passing the Number 200 sieve. Based on the SPT N-values, a representative angle of internal friction for this material is estimated to be 31 degrees. Unit weight of Stratum B materials is estimated to be 115 pcf.

Stratum C – Tidal Marsh
The properties of the fine grained soils encountered in Stratum C were determined based on visual examination, index and performance laboratory testing as well as field data obtained during standard penetration tests. Based on the SPT N-values, unconfined compression strength obtained from pocket penetrometer and results of Torvane tests, shear strength of Stratum C materials is estimated to be 250 psf. Plasticity tests on the cohesive soils resulted in liquid limit ranging from 28 to 166 (average of 83) and plastic limit ranging from 16 to 66 (average of 34) leading to the average plasticity index of 49. These values are representative of organic silt materials of high plasticity (designated as OH according to the Unified Soil Classification System). The natural moisture contents ranged from 31 to 133 percent (average of 72%). Based on the results of the plasticity tests, secondary compression index is estimated to be 0.015. Three one-dimensional consolidation tests were performed on representative samples of this stratum. Based on the test results unit weight of the organic material is estimated to be 80 pcf, compression ratio is estimated to be 0.315, and coefficient of consolidation is estimated to be 0.1 ft^2/day at roadway locations and Mill Creek Bridge approaches, and 0.04 ft^2/day at Middle Thorofare bridge approach locations. Based on the consolidation test results, Stratum C materials appear to be normally consolidated

Stratum D – Alluvial Deposits
Two sieve analyses were performed on samples from the granular materials of Stratum D. Grain size analyses of this material indicate that the sand gradation is coarse to mostly fine with average 81 percent fine sand content and average 17 percent passing the Number 200 sieve. Based on the SPT N-values, a representative angle of internal friction for this material is estimated to be 38 degrees. Unit weight is estimated to be 125 pcf. For the analysis purpose granular Stratum D materials are assumed to be incompressible. Based on the SPT N-values and unconfined compression strength obtained from pocket penetrometer, shear strength of cohesive Stratum C materials is estimated to be 1000 psf. Plasticity tests on the cohesive soils resulted in liquid limit ranging from 26 to 66 (average of 43) and plastic limit ranging from 17 to 27 (average of 21) leading to the average plasticity index of 22. These values are representative of clay materials of low plasticity (designated as CL according to the Unified Soil Classification System). The natural moisture contents ranged from 27 to 52 percent (average of 39%). Based on the results of the plasticity tests, compression ratio is estimated to be 0.125, recompression ratio is estimated to be 0.02, coefficient of secondary consolidation is estimated to be 0.01, and coefficient of consolidation is estimated to be 0.25 ft^2/day. Based on SPT N-values unit weight is estimated to be 125 pcf. Stratum D materials are assumed to be overconsolidated.

Table 3 ~ Recommended Soil Properties for Design

Stratum	Total Unit Weight pcf	Shear Strength Parameters: Cohesion psf	Shear Strength Parameters: Friction ϕ Deg.	Coefficient of Consolidation C_v*** ft^2/day	Compression Ratio $\frac{Cc}{1+e_0}$	Coefficient of Secondary Consolidation Cα	Elastic Settlement Modulus*
A Granular Fill	120	---	34	---	---	---	0.01
B Sandy Sediments	115	---	31	---	---	---	0.017
C Tidal Marsh	80	250	---	0.1 (roadway and Mill Creek) 0.04 (Middle Thorofare)	0.315	0.015	---
D Alluvial Granular Deposits	125	---	38	---	---	---	---
D Alluvial Cohesive Deposits	125	1000	---	0.25	0.125**	0.01	---

* For calculation of immediate settlement.

** Recompression Ratio $Cr/(1+e_0)=0.02$.

*** $C_h = 1.5 * C_v$.

5. PRELIMINARY ENGINEERING ANALYSES

5.1 Embankment Construction

The proposed roadway grade will be raised by a maximum of about seven feet except at the bridge approaches where the embankment height increases to approximately 15 and 25 feet for Mill Creek and Middle Thorofare Bridges respectively. The placement of the new fill will induce consolidation settlements of the fine-grained soils of Stratum C and Stratum D. The coarse-grained soils of Strata A and B will undergo immediate settlements as the fill is being placed; however, the consolidation settlements will occur gradually over time. Analysis was performed to determine the amount of consolidation settlement and the time required for the consolidation to occur. The analysis was conducted for embankment heights of 7 feet (roadway), 15 feet (Mill Creek Bridge), and 25 feet (Middle Thorofare Bridge) considering the corresponding subsurface conditions. Summary of the settlement analyses is given in Table 4.

The preliminary results indicate that primary settlements for Stratum C will range from approximately 20.5 inches to 30.3 inches and secondary settlements will range from 1.8 to 4.5 inches. The time for 90% primary consolidation to occur would vary from 1.3 to 3.6 years dependent upon the subsurface conditions and the height of embankment fill. Primary settlements for Stratum D will range from approximately 0.5 inches to 7.2 inches and secondary settlements will range from 2.4 to 4.8 inches. Consolidation time would vary from 0.9 to 3.7 years.

Table 4 ~ Preliminary Results of Settlement Analysis

Location	Elastic Settlement (in)	Primary Consolidation Settlement (in)		Secondary Consolidation Settlement* (in)		Consolidation Time** (years)	
		Stratum C	Stratum D	Stratum C	Stratum D	Stratum C	Stratum D
Roadway	0.72	27.38	0.51	4.5	2.4	3.6	0.9
Mill Creek	1.06	30.25	1.54	2.7	2.6	1.3	1.1
Middle Thorofare	2.55	20.54	7.18	1.8	4.8	1.5	3.7

* Including one log cycle of secondary consolidation.

** Time for 90% primary consolidation.

In order to accelerate the consolidation and reduce magnitude of post-construction settlement the following are soil improvement methods considered as effective for the encountered site conditions:

Preloading: It is recommended to preload the area placing surcharge with heights as given in Table 5. The time required for the settlement to occur (primary consolidation and one log cycle of secondary consolidation) using only surcharge fill is less than without the surcharge but still significant. In order to reduce the time required for the settlements to occur, the use of wick drains is recommended. With surcharge heights as recommended in Table 5, and wick drain spacing of 5 feet, the time required for the settlement of Stratum C soils to occur would be three months at roadway locations and Mill Creek and 6 months at Middle Thorofare.

Table 5 ~ Preliminary Results of Settlement Analysis with Surcharge and Wick Drains

Location	Embankment Height (ft)	Surcharge Height (ft)	Wick Drain Spacing (ft)	Consolidation Time - Stratum C	
				With Surcharge* (years)	With Surcharge and Wick Drains* (months)
Roadway	7	4	5	3.8	3
Mill Creek	15	7	5	1.5	3
Middle Thorofare	25	12	5	1.6	6

* Including one log cycle of secondary consolidation.

The fill, consisting of the soils required for the embankment and surcharge loading, should not be placed on frozen ground or in water inundated conditions. Fill should be placed in loose lifts with a maximum thickness of 10 inches using a vibratory roller compactor with a capacity of at least 60 tons.

Based on the results of global stability analysis it will be required to place the fill in stages to maintain slope stability and prevent a bearing capacity failure. Instrumentation consisting of settlement platforms, groundwater observation wells, and piezometers should be included to monitor the settlement of the roadway embankment. Extensometers and inclinometers should also be utilized along the bridge approaches.

Other Soil Improvement Methods: Preloading option with wick drains will reduce settlement magnitude and consolidation time of Stratum C soils along the proposed roadway alignment. Due to the nature of Stratum D soils the same option would not be feasible. At roadway locations estimated

settlement magnitude of approximately 0.5 inches for Stratum D soils should not be of concern and will most probably be absorbed by regular roadway maintenance efforts during the first five-year post-construction period. However, settlement magnitude along the bridge approaches is such that implies a need for permanent improvement of encountered cohesive soils. It should be noted that due to the lack of more detailed laboratory data for Stratum D soils conservative assumptions have been made for the analysis purpose. It is possible that using actual soil parameters settlement magnitude would be less than currently estimated.

Vibro Concrete Columns (VCC) have been recently successfully implemented for soil stabilization at Route 9 over Nacote Creek project. The concept of the VCC technique consists of bypassing materials not suitable for supporting the embankment with concrete columns constructed by a vibratory probe inserted into the soil. That way the embankment load gets transferred to underlying competent granular materials which in the process become densified. The same concept can be used to improve cohesive soils in the area of the bridge approaches along the Ocean Drive. As an alternative to this method a pile supported embankment could be considered.

In order to reduce the magnitude of the settlement, the approach embankments may be constructed using the lightweight fill with unit weight of approximately 40 pcf. If feasible, this option would also include excavation of the Stratum A soils to a depth just above the ground water table and placement of the lightweight fill. Using this option (withouth replacement of Stratum A soils) settlement of Stratum D soils at the location of Mill Creek Bridge approach embankment would be reduced to less than 0.5 inches and at the location of Middle Thorofare Bridge approach embankment to less than 1 inch.

5.2 Bridge Foundations

The preferred alternative involves replacement of the Mill Creek Bridge and construction of a new bridge spanning Upper and Middle Thorofare along the new proposed alignment, and replacement of Upper Thorofare Bridge on the existing alignment.

New Mill Creek and Upper Thorofare Bridges are proposed to be "jointless" bridges with integral abutments and piers supported on a single row of vertical piles to provide required flexibility. Based on a preliminary evaluation of the available subsurface information and staging requirements, square prestressed concrete piles are recommended for support of the bridge abutments and piers. Concrete filled steel pipe piles were considered but not selected because of the corrosive marine environment. In order to protect the abutments against scour and the resulting loss of backfill, permanent sheeting is proposed in front of each abutment. Because of concerns that steel sheeting will corrode in the marine environment, steel sheeting coated with coal tar epoxy is recommended. In addition to protecting against scour in front of the abutments, the sheeting will also protect against erosion of the approach embankments due to settlement and water intrusion in the embankment fill.

Several alternatives have been considered for design of the new bridge spanning across Upper and Middle Thorofare. A fixed bridge alternative is proposed as preferred with the bridge being designed either as segmental concrete bridge (Alternative 3F) or cable stayed bridge (Alternative 3G). In both cases the pier foundations will comprise of prestressed concrete cylinder piles up to the water level where a pile cap can be built. The pier cap over deep water could be constructed using precast concrete forms, floated or barged into its final location. The cylinder piles could be driven through the precast form, which serves as a template, or could be driven first and the form could be installed around the piles. Instead of the prestressed cylinder piles, drilled shafts could be used as an alternative option. Bridge abutments are expected to be supported on square prestressed concrete piles for all alternatives.

As stated in the Preliminary Hydraulic Report issued by Parsons Brinckerhoff in May 2003, the following estimated scour depths should be considered in the foundation design:

- For Alternative 3F: 6.2 to 7.7 feet in Mill Creek and 4.6 to 36.2 feet across Upper Thorofare and Middle Thorofare, and

- For Alternative 3G: 6.2 to 7.7 feet in Mill Creek and 5.2 to 53.6 feet across Upper Thorofare and Middle Thorofare.

Based on the encountered subsurface soils and preliminary scour depths, estimated minimum tip elevation of cylinder piles driven at the location of Middle Thorofare is -120 feet ± NGVD.

5.3 Recommendations

In order to refine the analysis it will be required to plan for and execute an additional subsurface exploration program involving deep borings at roadway and bridge approach locations. A detailed laboratory program should follow the completion of the subsurface exploration with the purpose of acquiring additional information about Stratum C and Stratum D soils.

Once developed, staging should be considered in the analyses in order to evaluate the feasibility and execution of discussed soil improvement methods. Staging influence on proposed foundation support for the bridges should also be evaluated.

Impact of the proposed improvements and soil improvement methods on the adjacent private properties should be evaluated. Driveway access during construction and post-construction should be reviewed and addressed in the future design.

6 Limitations

The boring logs and related information depict subsurface conditions only at the specific exploration location and at the particular time designated on the logs. Subsurface conditions at other locations may differ from conditions occurring at the boring locations.

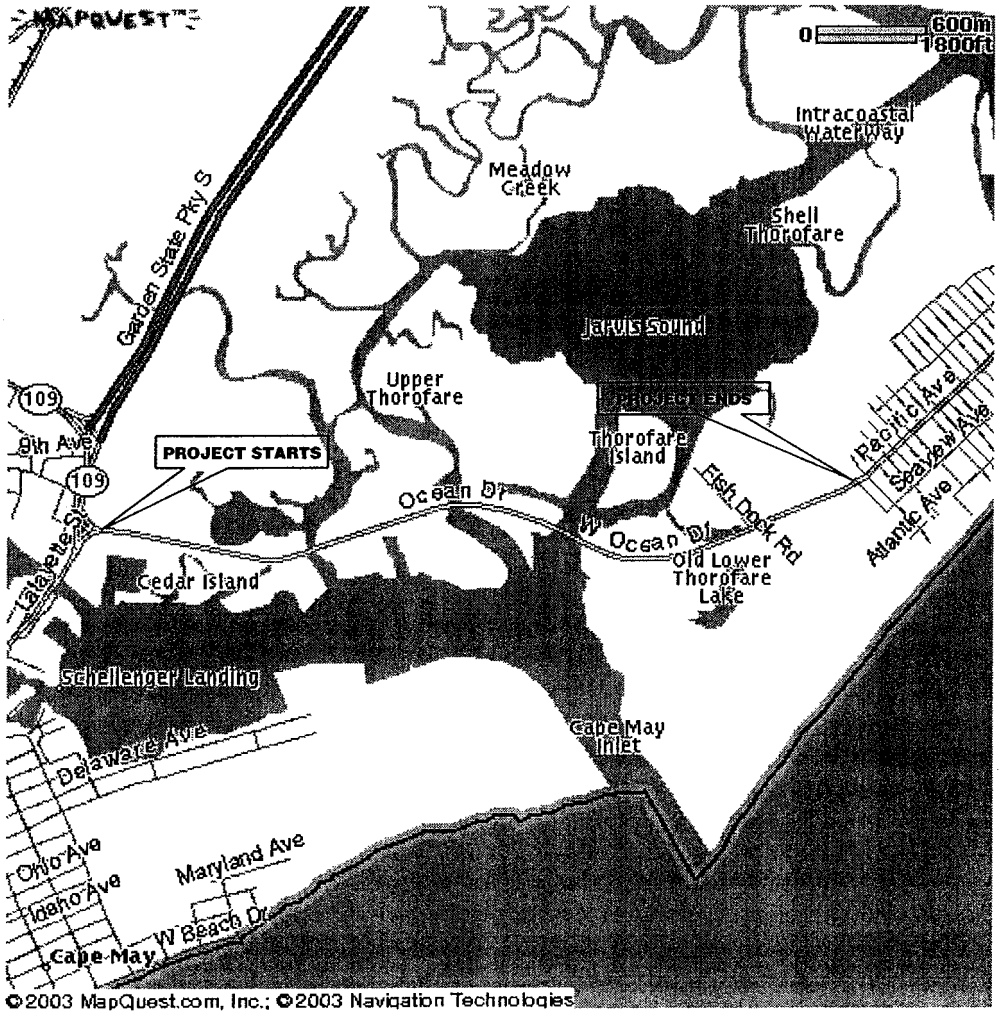
The stratification lines designating the boundary between soil and/or rock types on the logs of borings and on the subsurface profiles represent approximate boundaries. The transition between materials may be gradual and one or more strata may be absent at specific locations.

Water level readings have been made in the observation wells at times and under conditions stated in the observation well logs. This data has been reviewed and interpretations made in the text of this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in season, rainfall, temperature, tides, and other factors not evident at the time measurements were made and reported herein.

The recommendations provided are based on boring and laboratory testing information and they only apply to the specific project and site discussed in this report. The recommendations contained herein are also contingent upon subsurface conditions throughout the site remaining consistent with those encountered during our subsurface exploration. The scope of our services did not include any environmental assessment or exploration for the presence or absence of wetlands or hazardous or toxic materials in the soil, groundwater or air, on or below or around the site.

Services performed by Parsons Brinckerhoff during this project have been conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions. No other representation, expressed or implied, and no warranty or guarantee is included or intended in the services provided.

Figures



COUNTY OF CAPE MAY

SITE LOCATION MAP

OCEAN DRIVE UPGRADE AND BRIDGE REPLACEMENTS ROUTE 109 TO WILDWOOD CREST

PARSONS BRINCKERHOFF-FG, INC.

DATE: May 2003

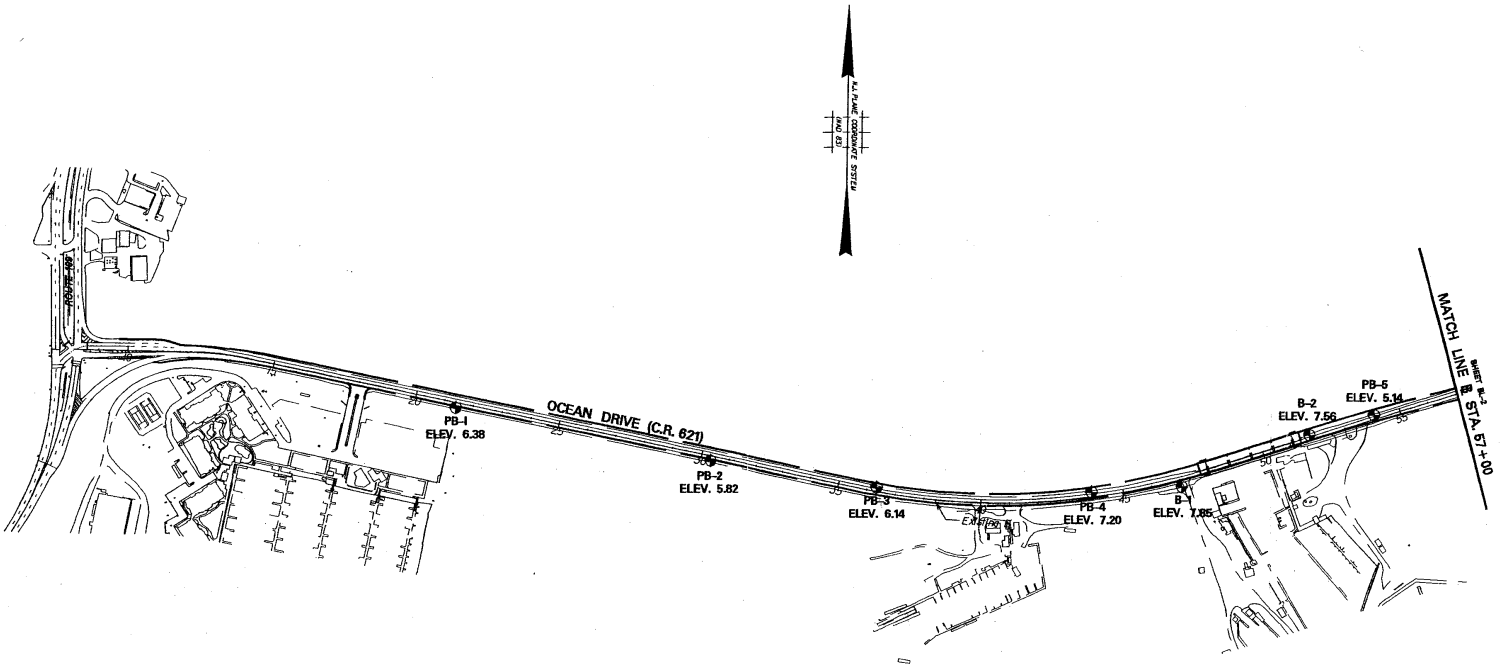
FIGURE 1

ROUTE 109
GARDEN STATE PARKWAY
JARVIS SOUND
UPPER THOROFARE
MIDDLE THOROFARE
LOWER THOROFARE
MILL CREEK
PROJECT LIMIT
PROJECT LIMIT
CAPE MAY HABOR
ATLANTIC OCEAN
LEGEND
ALTERNATIVE 3A
ALTERNATIVE 3B
ALTERNATIVE 3C
ALTERNATIVE 3D
ALTERNATIVE 3E
ALTERNATIVE 3F & 3G
PB
OCEAN DRIVE IMPROVEMENTS
COUNTY OF CAPE MAY IN CONJUNCTION WITH SOUTH JERSEY TRANSPORTATION PLANNING ORGANIZATION
MARCH 2003

FIGURE 2

LOWER TOWNSHIP

CAPE MAY COUNTY



SCALE IN FEET

200' 100' 0 200' 400'

BL-1

BL-3

BORING LOCATIONS		
BORING	STATION	OFFSET
PB-1	21+42.34	17.50' RT.
PB-2	30+33.04	16.12' RT.
PB-3	36+32.37	14.77' LT.
PB-4	43+98.67	17.90' LT.
B-1	47+01.00	23.90' RT.
B-2	51+76.99	15.71' LT.
PB-5	54+10.40	14.97' LT.

LEGEND

Borings Drilled in 2000

Borings Drilled in 2002/2003

NOTE: Elevations given at boring locations are ground surface elevations at the time of the field investigation.

COUNTY OF CAPE MAY

JOB: OCEAN DRIVE UPGRADE & BRIDGE REPLACEMENTS
ROUTE 109 TO WILDWOOD CREST

DETAILS: BORING LOCATION PLAN

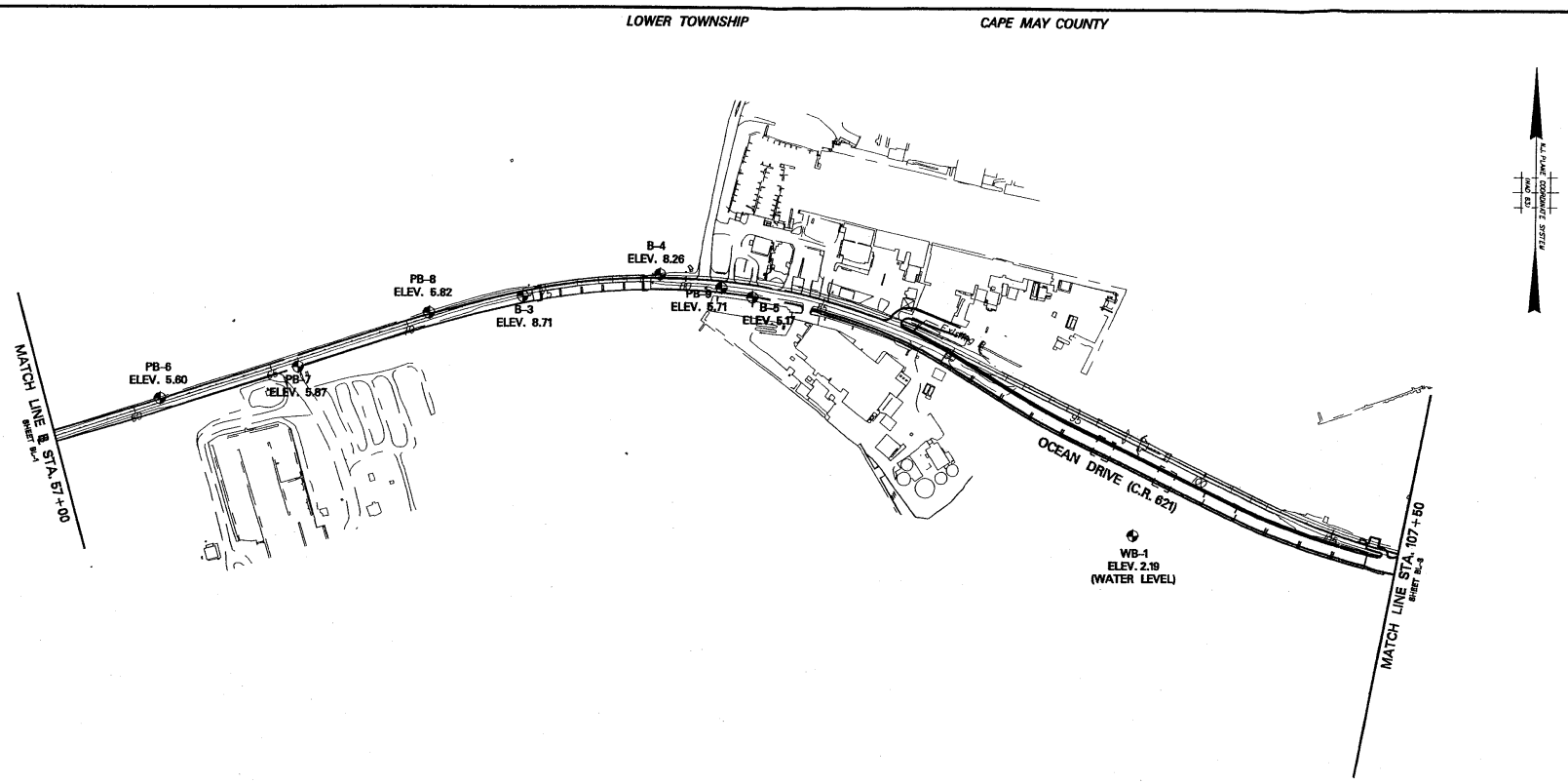
LOWER TOWNSHIP — CAPE MAY COUNTY, NEW JERSEY

DRAWN: | DATE: MARCH 2002 | SCALE: AS SHOWN | SHEET: OF

PREPARED BY: PARSONS BRINCKERHOFF-FG, INC.
506 CARNEGIE CENTER DRIVE, PRINCETON, N.J. 08540

FIGURE 3A

PARSONS BRINCKER... CADD DATA
OPERATOR barber
PLOT DATE 14-APR-2003 16:39
PENTABLE hehx.tbl
DESIGN FILE V:\200128\bl01.dgn



BORING LOCATIONS		
BORING	STATION	OFFSET
PB-6	60+07.40	14.79' LT.
PB-7	65+93.73	26.81' RT.
PB-8	70+85.75	15.07' LT.
B-3	74+17.77	14.98' RT.
B-4	78+07.80	13.88' LT.
PB-9	81+27.80	22.88' RT.
B-5	82+43.09	42.55' RT.
WB-1	98+62.65	307.12' RT.

LEGEND

Borings Drilled in 2000

Borings Drilled in 2002/2003

NOTE: Elevations given at boring locations are ground surface elevations at the time of the field investigation.

SCALE IN FEET
200' 100' 0 200' 400'

BL-2
BL-3

COUNTY OF CAPE MAY

JOB: OCEAN DRIVE UPGRADE & BRIDGE REPLACEMENTS
ROUTE 109 TO WILDWOOD CREST

DETAILS: BORING LOCATION PLAN

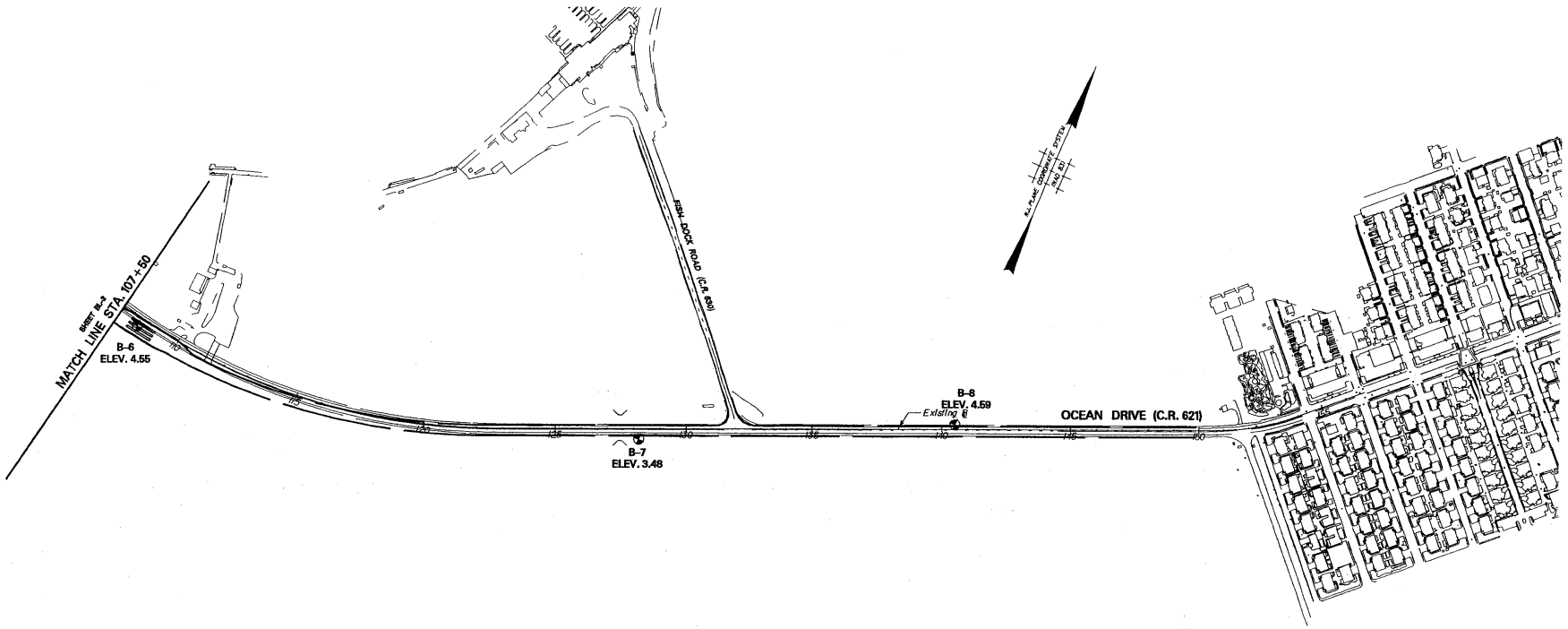
LOWER TOWNSHIP — CAPE MAY COUNTY, NEW JERSEY

DRAWN: | DATE: MARCH 2002 | SCALE: AS SHOWN | SHEET: OF

PREPARED BY: PARSONS BRINCKERHOFF-FG, INC.
506 CARNEGIE CENTER DRIVE, PRINCETON, N.J. 08540

FIGURE 3B

PARSONS BRINCKERHOFF CADD DATA
OPERATOR barber
PLOT DATE 14-APR-2003 16:40
PENTABLE helix.tbl
DESIGN FILE V:\200128\bl02.dgn



SCALE IN FEET
200' 100' 0 200' 400'

BL-3
BL-3

BORING LOCATIONS		
BORING	STATION	OFFSET
B-6	100+30.30	38.70' RT.
B-7	120+20.04	47.47' RT.
B-8	140+1.14	17.60' LT.

LEGEND

Borings Drilled in 2000

Borings Drilled in 2002/2003

NOTE: Elevations given at boring locations are ground surface elevations at the time of the field investigation.

COUNTY OF CAPE MAY

JOB: OCEAN DRIVE UPGRADE & BRIDGE REPLACEMENTS
ROUTE 109 TO WILDWOOD CREST

DETAILS: BORING LOCATION PLAN

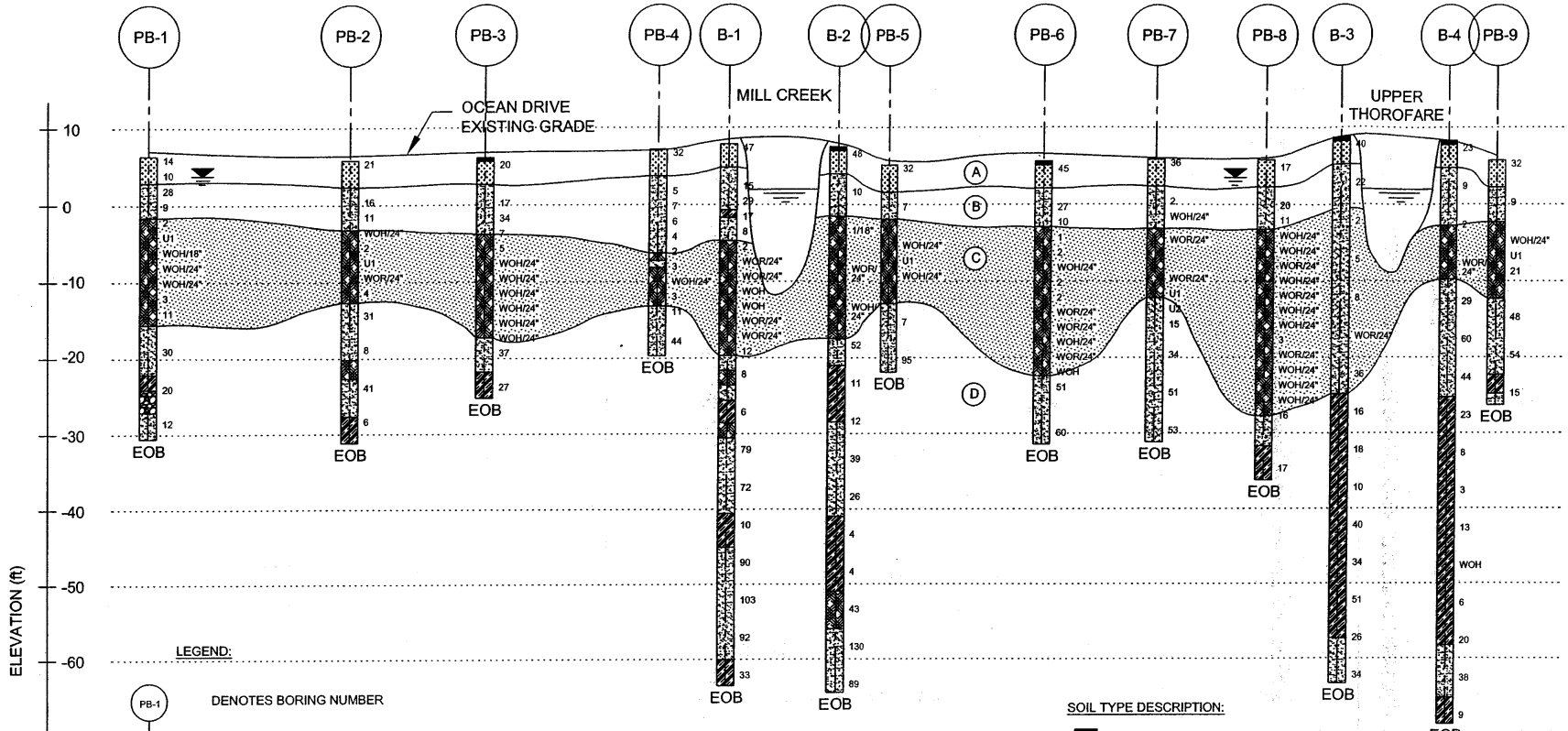
LOWER TOWNSHIP — CAPE MAY COUNTY, NEW JERSEY

DRAWN: | DATE: MARCH 2002 | SCALE: AS SHOWN | SHEET: OF

PREPARED BY: PARSONS BRINCKERHOFF-FG, INC.
506 CARNEGIE CENTER DRIVE, PRINCETON, N.J. 08540

FIGURE 3C

PARSONS BRINCKERHOFF CADD DATA
OPERATOR barber
PLOT DATE 14-APR-2003 16:40
PENTABLE hehx.tbl
DESIGN FILE V:\200128\bl03.dgn



LEGEND:

PB-1 — DENOTES BORING NUMBER

DENOTES APPROXIMATE GROUND SURFACE LINE OR STRATIFICATION LINE

DENOTES ELEVATION OF GROUND WATER TABLE

20 — DENOTES STANDARD PENETRATION RESISTANCE (BLOWS PER 24 in PENETRATION)

EOB — DENOTES END OF BORING

NOTES:

1. BORING LOCATIONS SHOWN ON THE DRAWINGS ARE APPROXIMATE AND PROJECTED ONTO THE PROPOSED ROADWAY ALIGNMENT (SEE BORING LOCATION PLAN FOR EXACT LOCATIONS).
2. EXISTING GROUND LINES AND STRATIFICATION LINES ARE APPROXIMATE AND ARE BASED ON INTERPOLATION BETWEEN BORINGS. ACTUAL CONDITIONS MAY VARY FROM STRATIFICATION SHOWN.

BORING DATA:

BORING	STATION	OFFSET
PB-1	21+42.24	17.50 RT
PB-2	30+33.64	16.12 RT
PB-3	36+32.37	14.77 LT
PB-4	43+89.67	17.90 LT
B-1	47+01.00	23.9 RT
B-2	51+76.99	15.71 LT
PB-5	54+10.40	14.91 LT
PB-6	60+97.40	14.79 LT
PB-7	65+93.73	26.61 RT
PB-8	70+85.75	15.07 LT
B-3	74+17.77	14.98 RT
B-4	79+07.96	13.56 LT
PB-9	81+27.60	22.08 RT

SOIL TYPE DESCRIPTION:

- ASPHALT
- FILL
- SAND WITH VARYING AMOUNTS OF SILT AND GRAVEL
- GRAVEL WITH VARYING AMOUNTS OF SAND AND SILT
- ORGANIC SILT TO CLAY AND PEAT WITH VARYING AMOUNTS OF SAND
- SILT TO CLAY & SILT WITH VARYING AMOUNTS OF SAND

STRATA DESCRIPTION:

- (A) GRANULAR FILL
- (B) SANDY SEDIMENTS
- (C) TIDAL MARSH
- (D) ALLUVIAL DEPOSITS

SCALE:

VERTICAL: 1in = 15 ft

HORIZONTAL: 1 in = 500 ft

COUNTY OF CAPE MAY

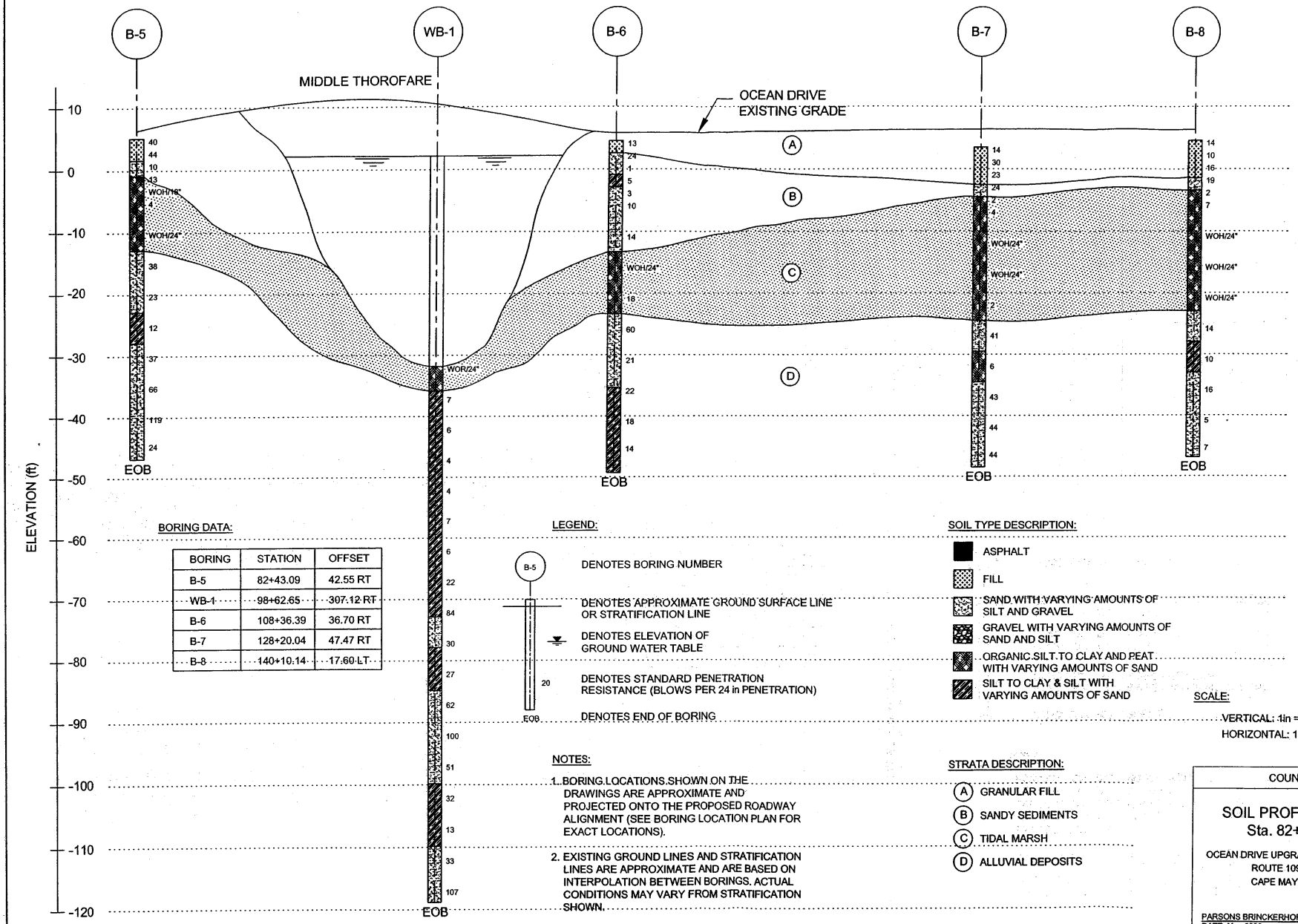
SOIL PROFILE - OCEAN DRIVE
Sta. 21+42 to Sta. 81+28

OCEAN DRIVE UPGRADE AND BRIDGE REPLACEMENTS
ROUTE 109 TO WILDWOOD CREST
CAPE MAY COUNTY, NEW JERSEY

PARSONS BRINCKERHOFF-FG, INC.
DATE: May 2003

FIGURE 4A

Q:\GEO\I\20020BVG\SOIL PROFILE 1.DWG



BORING DATA:

BORING	STATION	OFFSET
B-5	82+43.09	42.55 RT
WB-1	98+62.65	307.12 RT
B-6	108+36.39	36.70 RT
B-7	128+20.04	47.47 RT
B-8	140+10.14	17.60 LT

LEGEND:

B-5 — DENOTES BORING NUMBER

DENOTES APPROXIMATE GROUND SURFACE LINE OR STRATIFICATION LINE

DENOTES ELEVATION OF GROUND WATER TABLE

20 — DENOTES STANDARD PENETRATION RESISTANCE (BLOWS PER 24 in PENETRATION)

EOB — DENOTES END OF BORING

SOIL TYPE DESCRIPTION:

- ASPHALT
- FILL
- SAND WITH VARYING AMOUNTS OF SILT AND GRAVEL
- GRAVEL WITH VARYING AMOUNTS OF SAND AND SILT
- ORGANIC SILT TO CLAY AND PEAT WITH VARYING AMOUNTS OF SAND
- SILT TO CLAY & SILT WITH VARYING AMOUNTS OF SAND

SCALE:

VERTICAL: 1in = 15 ft
HORIZONTAL: 1 in = 500 ft

NOTES:

1. BORING LOCATIONS SHOWN ON THE DRAWINGS ARE APPROXIMATE AND PROJECTED ONTO THE PROPOSED ROADWAY ALIGNMENT (SEE BORING LOCATION PLAN FOR EXACT LOCATIONS).
2. EXISTING GROUND LINES AND STRATIFICATION LINES ARE APPROXIMATE AND ARE BASED ON INTERPOLATION BETWEEN BORINGS. ACTUAL CONDITIONS MAY VARY FROM STRATIFICATION SHOWN.

STRATA DESCRIPTION:

- (A) GRANULAR FILL
- (B) SANDY SEDIMENTS
- (C) TIDAL MARSH
- (D) ALLUVIAL DEPOSITS

COUNTY OF CAPE MAY

SOIL PROFILE - OCEAN DRIVE
Sta. 82+43 to Sta. 140+11

OCEAN DRIVE UPGRADE AND BRIDGE REPLACEMENTS
ROUTE 109 TO WILDWOOD CREST
CAPE MAY COUNTY, NEW JERSEY

PARSONS BRINCKERHOFF-FG, INC.
DATE: May 2003

FIGURE 4B

Q:\GEO\J\20020B\G\SOIL PROFILE 2.DWG

Appendix A

Test Boring Logs

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: PB-1

BORING LOG

PROJECT: Mill Creek / upper Thorofare Bridges
LOCATION: Cape May, NJ
CONTRACTOR: Jersey Boring and Drilling
DRILLER: J. Norton
TYPE RIG: Acker AD-2 (Truck Mounted)
INSPECTOR: R. Fahmy, E. Reed

GROUND ELEVATION: 6.38
STATION: 21+42.24
DRILLING START TIME: 12:30 pm
DRILLING FINISH TIME: 3:20 pm

BASELINE: Ocean Drive
OFFSET: 17.50 RT
DATE: 6/12/00
DATE: 6/12/00

DEPTHS	METHOD(S) OF DRILLING
0-35'	Mud Rotary Drilling

TYPE OF SAMPLE

	UNDISTURBED	
SS SPLIT SPOON O.D.: 2" I.D.: 1-3/8" LENGTH: 24" HAMMER WEIGHT: 140 lbs HAMMER FALL: 30"	U SHELBY TUBE O.D.: I.D.: I.L.:	D DENISON O.D.: I.D.: I.L.:
C CORE BARREL TYPE: O.D.: I.D.:	P PISTON O.D.: I.D.: I.L.:	

CASING
O.D.: I.D.:
WEIGHT OF HAMMER: 300 lbs HAMMER FALL: 24"

BOREHOLE WATER LEVEL DATA

DEPTH	HOUR	DATE	REMARKS
2'4"	3pm	6/13	
2'8"	11am	6/15	
2'8"	1pm	6/16	
2'6"	3pm	6/19	

Notes:
1. The subsurface information shown hereon was obtained for the design and estimate purposes for our Client. It is made available to authorized users only that they may have access to the same information available to our Client. It is presented in good faith, but is not intended as a substitute for investigations, interpretations or judgment of such authorized users.
2. Field identification of soil samples is based on Burmister Soil Identification System.
3. pp = Unconfined compression strength from Pocket Penetrometer (tsf)
4. WOH = Weight of Hammer; WOR = Weight of Rod

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION: RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	SOIL SAMPLING (Blows per 6 inches) 0-6	6-12	12-18	18-24	REC. (in)	FIELD IDENTIFICATION OF SOIL / ROCK
		SS	1	0-2					16	8	7	7	5	16	Brown cf **SAND**, little(+) f Gravel, trace Silt (Fill)
		SS	2	2-4					14	5	3	7	9	14	Brown mf **SAND**, some Clayey Silt (Fill)
															Brown mf **SAND**, little f Gravel (Fill)
5		SS	3	4-6					10	7	13	15	12	10	Gray cf **SAND**, trace Silt
	P	SS	4	6-8					11	5	4	5	3	11	Gray mf **SAND**, and Clay
	U														Gray mf **SAND**, trace f Gravel
	S	SS	5	8-10					11	2	1	1	1	11	Dark Gray **PEAT** with roots, pp = 0.75
10	H														
		U	1	10-12					24					24	Dark Gray **Organic SILT**, with fibers
		SS	6	12-14					4	WOH	0	0	1	4	Dark Gray **Organic SILT**, trace f Gravel
15		SS	7	14-16					24	WOH	0	0	0	24	Dark Gray **Organic SILT** with decaying vegetation, pp=0.25

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: PB-1

BORING LOG (continued)

PROJECT: Mill Creek / upper Thorofare Bridges
LOCATION: Cape May, NJ
INSPECTOR: R. Fahmy, E. Reed

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION: RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	FIELD IDENTIFICATION OF SOIL / ROCK
					SOIL SAMPLING (Blows per 6 inches): 0-6	6-12	12-18	18-24	REC. (in)	
		SS	8	16-18	WOR	0	0	0	19	Dark Gray **Organic SILT** with decaying vegetation, pp = 0.5
		SS	9	18-20	WOH	1	2	1	19	Black **PEAT** with decaying vegetation
20										Dark Gray **Organic SILT**, pp = 0.5
		SS	10	20-22	2	2	9	16	20	Dark Gray **SILT**, trace f Sand, pp = 1.25
										Gray mf **SAND** , little Silt with decaying vegetation
	P									
25	U									
	S	SS	11	25-27	13	15	15	25	18	Gray f **SAND**, trace Silt
	H									
30										
		SS	12	30-32	9	10	10	9	13	Gray **SILT**, some f Sand
										Gray f **GRAVEL**
35										
		SS	13	35-37	5	4	8	9	11	Gray cf **SAND**, trace f Gravel, trace Silt
										E. O. B. @ 37 feet.
										Borehole grouted upon completion.
40										
45										

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: PB-2

BORING LOG

PROJECT: Mill Creek / upper Thorofare Bridges
LOCATION: Cape May, NJ
CONTRACTOR: Jersey Boring and Drilling
DRILLER: J. Norton
TYPE RIG: Acker AD-2 (Truck Mounted)
INSPECTOR: R. Fahmy, E. Reed

GROUND ELEVATION: 5.82
STATION: 30+33.64
DRILLING START TIME: 6:30 am
DRILLING FINISH TIME: 9:15 am

BASELINE: Ocean Drive
OFFSET: 16.12 RT
DATE: 6/13/00
DATE: 6/13/00

DEPTHS	METHOD(S) OF DRILLING
0-35'	Mud Rotary Drilling

BOREHOLE WATER LEVEL DATA			
DEPTH	HOUR	DATE	REMARKS

TYPE OF SAMPLE

	UNDISTURBED	
SS SPLIT SPOON O.D.: 2" I.D.: 1-3/8" LENGTH: 24" HAMMER WEIGHT: 140 lbs HAMMER FALL: 30"	U SHELBY TUBE O.D.: I.D.: I.L.:	D DENISON O.D.: I.D.: I.L.:
C CORE BARREL TYPE: O.D.: I.D.:	P PISTON O.D.: I.D.: I.L.:	

CASING

O.D.: I.D.:
WEIGHT OF HAMMER: 300 lbs HAMMER FALL: 24"

Notes:
1. The subsurface information shown hereon was obtained for the design and estimate purposes for our Client. It is made Available to authorized users only that they may have access to the same information available to our Client. It is Presented in good faith, but is not intended as a substitute for investigations, interpretations or judgment of such Authorized users.
2. Field identification of soil samples is based on Burmister Soil Identification System.
3. pp = Unconfined compression strength from Pocket Penetrometer (tsf)
4. WOH = Weight of Hammer; WOR = Weight of Rod

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION: RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	SOIL SAMPLING (Blows per 6 inches): 0-6	6-12	12-18	18-24	REC. (in)	FIELD IDENTIFICATION OF SOIL / ROCK
		SS	1	0-2	17	14	7	6	17						Brown cf **SAND**, little(+) f Gravel, trace(-) Silt (Fill)
5		SS	2	5-7	5	10	6	7	10						Gray cmf(-) **SAND**, trace(+) f Gravel, trace(-) Silt
		SS	3	7-9	9	8	3	4	11						Gray cf **SAND**, little f Gravel
10		SS	4	9-11	WOH	0	0	0	18						Dark Gray **Organic SILT** with decaying vegetation, pp = 0.25
		SS	5	11-13	2	1	1	2	24						Dark Gray **Organic SILT** with decaying vegetation and shell fragments, pp = 0.25
		U	1	13-15					24						Dark Gray **Organic Clayey SILT**
15															

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: PB-2

BORING LOG (continued)

PROJECT: Mill Creek / upper Thorofare Bridges
ATION: Cape May, NJ
SPECTOR: R. Fahmy, E. Reed

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	SOIL SAMPLING (Blows per 6 inches) 0-6	6-12	12-18	18-24	REC. (in)	FIELD IDENTIFICATION OF SOIL / ROCK
		SS	6	15-17						WOR	0	0	0	21	Dark Gray **Organic SILT** with decaying vegetation, pp = 0.1
		SS	7	17-19						2	2	2	5	24	Dark Gray **Organic SILT & CLAY** with decaying vegetation, 2" PEAT layer, pp = 0.75
20															Black / dark brown cf **SAND**, some(-) Silt
		SS	8	20-22						7	12	19	22	16	Dark Gray f **SAND**, little Silt
		SS	9	25-27						5	3	5	12	20	Same as SS-8
															Dark Gray **Organic SILT**, little(+) f Sand
30															
		SS	10	30-32						16	18	23	20	13	Gray cf **SAND**, trace Silt
35															
		SS	11	35-37						2	2	4	5	24	Dark Gray **Clayey SILT**
															Dark Gray **Clayey SILT**, little fibrous organic material
40															E. O. B. @ 37 feet. Borehole grouted upon completion.
45															

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: PB-3

BORING LOG

PROJECT: Mill Creek / upper Thorofare Bridges
LOCATION: Cape May, NJ
CONTRACTOR: Jersey Boring and Drilling
DRILLER: J. Norton
TYPE RIG: Acker AD-2 (Truck Mounted)
INSPECTOR: E. Reed

GROUND ELEVATION: 6.14
STATION: 36+32.37
DRILLING START TIME: 6:20 am
DRILLING FINISH TIME: 8:00 am

BASELINE: Ocean Drive
OFFSET: 14.77 LT
DATE: 6/15/00
DATE: 6/15/00

DEPTHS	METHOD(S) OF DRILLING
0-30'	Mud Rotary Drilling

BOREHOLE WATER LEVEL DATA			
DEPTH	HOUR	DATE	REMARKS

TYPE OF SAMPLE

	UNDISTURBED	
SS SPLIT SPOON O.D.: 2" I.D.: 1-3/8" LENGTH: 24" HAMMER WEIGHT: 140 lbs HAMMER FALL: 30"	U SHELBY TUBE O.D.: I.D.: I.L.:	D DENISON O.D.: I.D.: I.L.:
C CORE BARREL TYPE: O.D.: I.D.:	P PISTON O.D.: I.D.: I.L.:	

CASING

O.D.: I.D.:
WEIGHT OF HAMMER: 300 lbs HAMMER FALL: 24"

Notes:
1. The subsurface information shown hereon was obtained for the design and estimate purposes for our Client. It is made available to authorized users only that they may have access to the same information available to our Client. It is presented in good faith, but is not intended as a substitute for investigations, interpretations or judgment of such authorized users.
2. Field identification of soil samples is based on Burmister Soil Identification System.
3. pp = Unconfined compression strength from Pocket Penetrometer (tsf)
4. WOH = Weight of Hammer; WOR = Weight of Rod

DEPTH LOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION: RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	SOIL SAMPLING (Blows per 6 inches): 0-6	6-12	12-18	18-24	REC. (in)	FIELD IDENTIFICATION OF SOIL / ROCK
		SS	1	0-2	9	10	10	10	12						Asphalt
															Brown cf **SAND**, trace f Gravel, trace Silt (Fill)
5															
		SS	2	5-7	5	6	11	20	12						Gray c(-)f **SAND**, trace Silt
		SS	3	7-9	10	16	18	21	13						Dark Gray cf **SAND**, trace Silt
10		SS	4	9-11	5	4	3	2	19						Dark Gray f **SAND**, little(+) Silt
															Dark Brown / gray **PEAT** with roots
		SS	5	11-13	2	3	2	3	15						Same as Bottom SS-5
		SS	6	13-15	WOH	0	0	0	24						Dark Gray **Organic SILT** with few pieces of decaying vegetation
15															

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: PB-3

BORING LOG (continued)

PROJECT: Mill Creek / upper Thorofare Bridges
ATION: Cape May, NJ
PECTOR: E. Reed

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	FIELD IDENTIFICATION OF SOIL / ROCK
					SOIL SAMPLING (Blows per 6 inches)					
					0-6	6-12	12-18	18-24	REC. (in)	
		SS	7	15-17	WOH	0	0	0	24	Dark Gray **Organic Clayey SILT** with few pieces of decaying vegetation
		SS	8	17-19	WOH	0	0	0	24	Dark Gray **Organic SILT**, little(+) mf Sand
20		SS	9	19-21	WOH	0	0	0	24	Same as SS-8
		SS	10	21-23	WOR	0	0	0	24	Same as SS-8
		SS	11	23-25	WOR	0	0	3	24	Same as SS-8
										Dark Gray mf **SAND**, some Silt
		SS	12	25-27	9	18	19	20	21	Dark Gray c(-)f **SAND**, trace Silt
30										
		SS	13	30-32	11	12	15	18	16	Dark Gray **SILT**, some f Sand
35										E. O. B. @ 32 feet. Borehole grouted upon completion.
40										
45										

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: PB-4

BORING LOG

PROJECT: Mill Creek / upper Thorofare Bridges
LOCATION: Cape May, NJ
CONTRACTOR: Jersey Boring and Drilling
DRILLER: J. Norton
TYPE RIG: Acker AD-2 (Truck Mounted)
INSPECTOR: E. Reed

GROUND ELEVATION: 7.20
STATION: 43+89.67
DRILLING START TIME: 12:45 pm DATE: 6/15/00
DRILLING FINISH TIME: 2:15 pm DATE: 6/15/00

BASELINE: Ocean Drive
OFFSET: 17.90 LT

DEPTHS	METHOD(S) OF DRILLING
0-25'	Mud Rotary Drilling

BOREHOLE WATER LEVEL DATA			
DEPTH	HOUR	DATE	REMARKS

TYPE OF SAMPLE

	UNDISTURBED	
SS SPLIT SPOON O.D.: 2" I.D.: 1-3/8" LENGTH: 24" HAMMER WEIGHT: 140 lbs HAMMER FALL: 30"	U SHELBY TUBE O.D.: I.D.: I.L.:	D DENISON O.D.: I.D.: I.L.:
C CORE BARREL TYPE: O.D.: I.D.:	P PISTON O.D.: I.D.: I.L.:	

CASING

O.D.: I.D.:
WEIGHT OF HAMMER: 300 lbs HAMMER FALL: 24"

Notes:
1. The subsurface information shown hereon was obtained for the design and estimate purposes for our Client. It is made available to authorized users only that they may have access to the same information available to our Client. It is presented in good faith, but is not intended as a substitute for investigations, interpretations or judgment of such authorized users.
2. Field identification of soil samples is based on Burmister Soil Identification System.
3. pp = Unconfined compression strength from Pocket Penetrometer (tsf)
4. WOH = Weight of Hammer; WOR = Weight of Rod

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION: RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	FIELD IDENTIFICATION OF SOIL / ROCK
					SOIL SAMPLING (Blows per 6 inches)					
					0-6	6-12	12-18	18-24	REC. (in)	
		SS	1	.5-2.5	10	18	14	8	8	Brown c(-)f **SAND**, trace f Gravel, trace Silt (Fill)
5										
		SS	2	5-7	1	2	3	4	8	Gray cf **SAND**, trace Silt, trace(-) f Gravel
		SS	3	7-9	8	5	2	5	10	Gray cf **SAND**, trace Silt
10		SS	4	9-11	3	2	4	2	9	Gray cf **SAND**, trace(+) Silt
		SS	5	11-13	2	2	2	3	13	Gray m(-)f **SAND**, trace(+) Silt
										Dark Gray f **SAND**, little Silt, 1" Peat Layer
		SS	6	13-15	1	1	1	2	12	Dark Gray **Organic Clayey SILT** with Shell Fragments
15										

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: PB-4

BORING LOG (continued)

PROJECT: Mill Creek / upper Thorofare Bridges
ATION: Cape May, NJ
SPECTOR: E. Reed

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	FIELD IDENTIFICATION OF SOIL / ROCK
					SOIL SAMPLING (Blows per 6 inches) 0-6	6-12	12-18	18-24	REC. (in)	
		SS	7	15-17	2	2	1	2	16	Dark Gray m(-)f **SAND**, little(+) Silt
										Dark Gray **Organic Clayey SILT**,trace f Sand, pp = 0.5
		SS	8	17-19	WOH	0	0	0	13	Dark Gray **Organic Clayey SILT**, little mf Sand
20		SS	9	19-21	2	2	1	2	12	Dark Gray **Organic SILT**, trace f Sand
		SS	10	21-23	4	6	5	4	11	Dark Gray mf **SAND**, trace Silt
30		SS	11	25-27	10	19	25	38	13	Dark Gray cf **SAND**, trace Silt, trace f Gravel
										E. O. B. @ 27 feet.
										Borehole grouted upon completion.
35										
40										
45										

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: PB-5

BORING LOG

PROJECT: Mill Creek / upper Thorofare Bridges
ATION: Cape May, NJ
NTRACTOR: Jersey Boring and Drilling
DRILLER: J. Norton
TYPE RIG: Acker AD-2 (Truck Mounted)
INSPECTOR: E. Reed

GROUND ELEVATION: 5.14
STATION: 54+10.40
DRILLING START TIME: 10:00 am
DRILLING FINISH TIME: 11:25 pm

BASELINE: Ocean Drive
OFFSET: 14.91 LT
DATE: 6/14/00
DATE: 6/14/00

DEPTHS	METHOD(S) OF DRILLING
0-25'	Mud Rotary Drilling

BOREHOLE WATER LEVEL DATA			
DEPTH	HOUR	DATE	REMARKS

TYPE OF SAMPLE

	UNDISTURBED	
SS SPLIT SPOON O.D.: 2" I.D.: 1-3/8" LENGTH: 24" HAMMER WEIGHT: 140 lbs HAMMER FALL: 30"	U SHELBY TUBE O.D.: I.D.: I.L.:	D DENISON O.D.: I.D.: I.L.:
C CORE BARREL TYPE: O.D.: I.D.:	P PISTON O.D.: I.D.: I.L.:	

CASING

O.D.: I.D.:
EIGHT OF HAMMER: 300 lbs HAMMER FALL: 24"

Notes:
1. The subsurface information shown hereon was obtained for the design and estimate purposes for our Client. It is made available to authorized users only that they may have access to the same information available to our Client. It is presented in good faith, but is not intended as a substitute for investigations, interpretations or judgment of such authorized users.
2. Field identification of soil samples is based on Burmister Soil Identification System.
3. pp = Unconfined compression strength from Pocket Penetrometer (tsf)
4. WOH = Weight of Hammer; WOR = Weight of Rod

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION: RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	FIELD IDENTIFICATION OF SOIL / ROCK
					SOIL SAMPLING (Blows per 6 inches) 0-6	6-12	12-18	18-24	REC. (in)	
		SS	1	.5-2.5	10	15	17	16	14	Brown c(-)f **SAND**, trace f Gravel, trace Silt (Fill)
5										
		SS	2	5-7	4	4	3	1	9	Dark Gray cf **SAND**, trace Silt
10										
		SS	3	10-12	WOH	0	0	0	23	Dark Gray **Organic Clayey SILT** with little decaying vegetation, pp = 0.25
		U	1	12-14					24	Dark Gray **Organic SILT**
15		SS	6	14-16	WOH	0	0	0	24	Dark Gray **Organic SILT**

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: PB-5

BORING LOG (continued)

PROJECT: Mill Creek / upper Thorofare Bridges
LOCATION: Cape May, NJ
INSPECTOR: E. Reed

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	FIELD IDENTIFICATION OF SOIL / ROCK
					SOIL SAMPLING (Blows per 6 inches) 0-6	6-12	12-18	18-24	REC. (in)	
20		SS	5	20-22	3	3	4	4	15	Dark Gray cf **SAND**, little(-) Silt
		SS	6	25-27	12	23	72	75	11	Dark Gray cf **SAND**, trace f Gravel, trace Silt
30										E. O. B. @ 27 feet. Borehole grouted upon completion.
35										
40										
45										

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: PB-6

BORING LOG

PROJECT: Mill Creek / upper Thorofare Bridges
LOCATION: Cape May, NJ
CONTRACTOR: Jersey Boring and Drilling
DRILLER: J. Norton
TYPE RIG: Acker AD-2 (Truck Mounted)
INSPECTOR: E. Reed

GROUND ELEVATION: 5.60
STATION: 60+97.40
DRILLING START TIME: 6:55 am
DRILLING FINISH TIME: 9:20 am

BASELINE: Ocean Drive
OFFSET: 14.79 LT
DATE: 6/19/00
DATE: 6/19/00

DEPTHS	METHOD(S) OF DRILLING
0-35'	Mud Rotary Drilling

BOREHOLE WATER LEVEL DATA			
DEPTH	HOUR	DATE	REMARKS

TYPE OF SAMPLE

	UNDISTURBED	
SS SPLIT SPOON O.D.: 2" I.D.: 1-3/8" LENGTH: 24" HAMMER WEIGHT: 140 lbs HAMMER FALL: 30"	U SHELBY TUBE O.D.: I.D.: I.L.:	D DENISON O.D.: I.D.: I.L.:
C CORE BARREL TYPE: O.D.: I.D.:	P PISTON O.D.: I.D.: I.L.:	

CASING

O.D.: I.D.:
WEIGHT OF HAMMER: 300 lbs HAMMER FALL: 24"

Notes:
1. The subsurface information shown hereon was obtained for the design and estimate purposes for our Client. It is made available to authorized users only that they may have access to the same information available to our Client. It is presented in good faith, but is not intended as a substitute for investigations, interpretations or judgment of such authorized users.
2. Field identification of soil samples is based on Burmister Soil Identification System.
3. pp = Unconfined compression strength from Pocket Penetrometer (tsf)
4. WOH = Weight of Hammer; WOR = Weight of Rod

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION: RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	SOIL SAMPLING (Blows per 6 inches) 0-6	6-12	12-18	18-24	REC. (in)	FIELD IDENTIFICATION OF SOIL / ROCK
		SS	1	.5-2.5						11	20	25	31	14	Asphalt
															Brown cf **SAND**, trace f Gravel, trace Silt (Fill)
5															
		SS	2	5-7						9	11	16	12	9	Gray cf **SAND**, trace Silt
		SS	3	7-9						6	6	4	6	11	Same as SS-2
10		SS	4	9-11						1	0	1	0	17	Dark Gray / brown **PEAT** with roots, pp = 0.75
		SS	5	11-13						2	1	1	1	14	Same as SS-4
															Dark Gray **Organic SILT** with decaying vegetation
		SS	6	13-15						WOH	0	0	0	22	Dark Gray **Organic SILT**, trace cf Sand
15															

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: PB-6

BORING LOG (continued)

PROJECT: Mill Creek / upper Thorofare Bridges
ATION: Cape May, NJ
PECTOR: E. Reed

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	FIELD IDENTIFICATION OF SOIL / ROCK
					SOIL SAMPLING (Blows per 6 inches)					
					0-6	6-12	12-18	18-24	REC. (in)	
		SS	7	15-17	WOH	0	2	1	17	Same as Bottom SS-5, pp = 0.25
		SS	8	17-19	WOR	0	2	1	24	Same as Bottom SS-5 with shell fragments, pp = 0.25
20		SS	9	19-21	WOR	0	0	0	NR	
		SS	10	21-23	WOR	0	0	0	24	Same as Bottom SS-5
		SS	11	23-25	WOH	0	0	0	24	Dark Gray **Organic Clayey SILT** with decaying vegetation
		SS	12	25-27	WOR	0	0	0	24	Same as SS-11
		SS	13	27-29	WOR	0	WOH	0	NR	
30		SS	14	29-31	25	35	16	18	11	Dark Gray c$^{(+)}$f **SAND**, trace$^{(+)}$ f Gravel, trace$^{(-)}$ Silt
35										
		SS	15	35-37	16	25	35	38	15	Dark Gray c$^{(-)}$f **SAND**, trace Silt
40										E. O. B. @ 37 feet. Borehole grouted upon completion.
45										

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: PB-7

BORING LOG

PROJECT: Mill Creek / upper Thorofare Bridges
LOCATION: Cape May, NJ
CONTRACTOR: Jersey Boring and Drilling
DRILLER: J. Norton
TYPE RIG: Acker AD-2 (Truck Mounted)
INSPECTOR: E. Reed

GROUND ELEVATION: 5.87
STATION: 65+93.73
DRILLING START TIME: 6:55 am
DRILLING FINISH TIME: 9:20 am

BASELINE: Ocean Drive
OFFSET: 26.61 RT
DATE: 6/14/00
DATE: 6/14/00

DEPTHS	METHOD(S) OF DRILLING
0-35'	Mud Rotary Drilling

BOREHOLE WATER LEVEL DATA			
DEPTH	HOUR	DATE	REMARKS

TYPE OF SAMPLE

	UNDISTURBED	
SS SPLIT SPOON O.D.: 2" I.D.: 1-3/8" LENGTH: 24" HAMMER WEIGHT: 140 lbs HAMMER FALL: 30"	U SHELBY TUBE O.D.: I.D.: I.L.:	D DENISON O.D.: I.D.: I.L.:
C CORE BARREL TYPE: O.D.: I.D.:	P PISTON O.D.: I.D.: I.L.:	

CASING

O.D.: I.D.:
WEIGHT OF HAMMER: 300 lbs HAMMER FALL: 24"

Notes:
1. The subsurface information shown hereon was obtained for The design and estimate purposes for our Client. It is made Available to authorized users only that they may have Access to the same information available to our Client. It is Presented in good faith, but is not intended as a substitute for investigations, interpretations or judgment of such Authorized users.
2. Field identification of soil samples is based on Burmister Soil Identification System.
3. pp = Unconfined compression strength from Pocket Penetrometer (tsf)
4. WOH = Weight of Hammer; WOR = Weight of Rod

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION: RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	SOIL SAMPLING (Blows per 6 inches): 0-6	6-12	12-18	18-24	REC. (in)	FIELD IDENTIFICATION OF SOIL / ROCK
		SS	1	0-2	15	14	22	18	14						Brown / gray cf **SAND**, little f Gravel with shell fragments (Fill)
5		SS	2	5-7	2	1	1	1	12						Gray c(-)mf **SAND**, little m(-)f Gravel, trace(+) Silt
10		SS	3	7-9	WOH	0	0	0	NR						
15		SS	4	10-12	WOR	0	0	0	24						Dark Gray **Organic SILT**, trace f Sand

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: PB-7

BORING LOG (continued)

PROJECT: Mill Creek / upper Thorofare Bridges
ATION: Cape May, NJ
SPECTOR: E. Reed

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION: RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	FIELD IDENTIFICATION OF SOIL / ROCK
					SOIL SAMPLING (Blows per 6 inches)					
					0-6	6-12	12-18	18-24	REC. (in)	
		SS	5	15-17	WOR	0	0	0	24	Dark Gray **Organic SILT**, little(-) f Sand pp = 0.25
		U	1	17-19					NR	
20		U	2	19-21					16	Dark Gray c(-)mf **SAND**, some Organic Silt, trace(-) f Gravel
										Dark Gray mf **SAND**, trace Silt
		SS	6	21-23	7	6	9	5	24	Gray mf **SAND**, trace(-) f Gravel, trace Silt
25		SS	7	25-27	13	23	11	12	14	Gray mf **SAND**, trace Silt
										Gray cf **SAND**, little f Gravel
30		SS	8	30-32	10	25	26	13	17	Dark Gray f **SAND**, trace Silt
35		SS	9	35-37	15	23	30	38	11	Dark Gray mf **SAND**, trace Silt
40										E. O. B. @ 37 feet. Borehole grouted upon completion.
45										

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: PB-8

BORING LOG

PROJECT: Mill Creek / upper Thorofare Bridges
LOCATION: Cape May, NJ
CONTRACTOR: Jersey Boring and Drilling
DRILLER: J. Norton
TYPE RIG: Acker AD-2 (Truck Mounted)
INSPECTOR: E. Reed

GROUND ELEVATION: 5.82
STATION: 70+85.75
DRILLING START TIME: 6:30 am
DRILLING FINISH TIME: 8:30 am

BASELINE: Ocean Drive
OFFSET: 15.07 LT
DATE: 6/19/00
DATE: 6/19/00

DEPTHS	METHOD(S) OF DRILLING
0-40'	Mud Rotary Drilling

BOREHOLE WATER LEVEL DATA			
DEPTH	HOUR	DATE	REMARKS
2'3.5"	Morning	6/19	
2'3.5"	Afternoon	6/19	

TYPE OF SAMPLE

SS SPLIT SPOON
O.D.: 2"
I.D.: 1-3/8"
LENGTH: 24"
HAMMER WEIGHT: 140 lbs
HAMMER FALL: 30"

UNDISTURBED

U SHELBY TUBE
O.D.:
I.D.:
I.L.:

D DENISON
O.D.:
I.D.:
I.L.:

C CORE
BARREL TYPE:
O.D.:
I.D.:

P PISTON
O.D.:
I.D.:
I.L.:

CASING
O.D.: I.D.:
WEIGHT OF HAMMER: 300 lbs HAMMER FALL: 24"

Notes:
1. The subsurface information shown hereon was obtained for The design and estimate purposes for our Client. It is made Available to authorized users only that they may have Access to the same information available to our Client. It is Presented in good faith, but is not intended as a substitute for investigations, interpretations or judgment of such Authorized users.
2. Field identification of soil samples is based on Burmister Soil Identification System.
3. pp = Unconfined compression strength from Pocket Penetrometer (tsf)
4. WOH = Weight of Hammer; WOR = Weight of Rod

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION: RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	SOIL SAMPLING (Blows per 6 inches): 0-6	6-12	12-18	18-24	REC. (in)	FIELD IDENTIFICATION OF SOIL / ROCK
		SS	1	0-2	4	8	9	8	16						Brown cf **SAND**, trace f Gravel, trace Silt (Fill)
5		SS	2	5-7	8	9	11	11	8						Gray $c^{(-)}f$ **SAND**, trace Silt
		SS	3	7-9	8	7	4	2	11						Gray cf **SAND**, trace Silt
10		SS	4	9-11	WOH	0	0	0	21						Dark Gray **Organic SILT** with many roots
		SS	5	11-13	WOH	0	0	0	19						Dark Gray **Organic SILT**, $trace^{(+)}$ f Sand with decaying vegetation
15		SS	6	13-15	WOR	0	0	0	24						Dark Gray **Organic SILT**

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: PB-8

BORING LOG (continued)

PROJECT: Mill Creek / upper Thorofare Bridges
LOCATION: Cape May, NJ
INSPECTOR: E. Reed

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	SOIL SAMPLING (Blows per 6 inches) 0-6	6-12	12-18	18-24	REC. (in)	FIELD IDENTIFICATION OF SOIL / ROCK
		SS	7	15-17						WOH	0	0	0	16	Dark Gray **Organic Clayey SILT**
		SS	8	17-19						WOR	0	0	0	24	Dark Gray **Organic SILT**
20		SS	9	19-21						WOH	0	0	0	10	Same as SS-7 (very wet)
		SS	10	21-23						WOH	0	0	0	24	Dark Gray **Organic SILT**
		SS	11	23-25						WOH	2	1	1	24	Same as SS-10
25															
		SS	12	25-27						WOR	0	0	0	24	Dark Gray **Organic SILT**, trace$^{(-)}$ f Sand
		SS	13	27-29						WOH	0	0	0	24	Same as SS-12
30		SS	14	29-31						WOH	0	0	0	24	Dark Gray **Organic Clayey SILT**, trace$^{(-)}$ f Sand,
															pp = 0.5
		SS	15	31-33						WOH	0	0	0	24	Dark Gray **Organic SILT**, trace$^{(-)}$ f Sand
		SS	16	33-35						WOR	7	9	14	24	Dark Gray **Organic Clayey SILT**,trace mf Sand
35															Gray cf **SAND**, trace f Gravel, trace Silt
40															
		SS	17	40-42						5	8	9	9	24	Dark Gray **Clayey SILT**, trace f Sand
															E. O. B. @ 42 feet.
															Borehole grouted upon completion.
45															

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: PB-9

BORING LOG

PROJECT: Mill Creek / upper Thorofare Bridges
LOCATION: Cape May, NJ
CONTRACTOR: Jersey Boring and Drilling
DRILLER: J. Norton
TYPE RIG: Acker AD-2 (Truck Mounted)
INSPECTOR: E. Reed

GROUND ELEVATION: 5.71
STATION: 81+27.60
DRILLING START TIME: 7:15 am
DRILLING FINISH TIME: 9:15 am

BASELINE: Ocean Drive
OFFSET: 22.08 RT
DATE: 6/15/00
DATE: 6/15/00

DEPTHS	METHOD(S) OF DRILLING
0-30'	Mud Rotary Drilling

BOREHOLE WATER LEVEL DATA			
DEPTH	HOUR	DATE	REMARKS

TYPE OF SAMPLE

	UNDISTURBED	
SS SPLIT SPOON O.D.: 2" I.D.: 1-3/8" LENGTH: 24" HAMMER WEIGHT: 140 lbs HAMMER FALL: 30"	U SHELBY TUBE O.D.: I.D.: I.L.:	D DENISON O.D.: I.D.: I.L.:
C CORE BARREL TYPE: O.D.: I.D.:	P PISTON O.D.: I.D.: I.L.:	

CASING

O.D.: I.D.:
WEIGHT OF HAMMER: 300 lbs HAMMER FALL: 24"

Notes:
1. The subsurface information shown hereon was obtained for the design and estimate purposes for our Client. It is made available to authorized users only that they may have access to the same information available to our Client. It is presented in good faith, but is not intended as a substitute for investigations, interpretations or judgment of such authorized users.
2. Field identification of soil samples is based on Burmister Soil Identification System.
3. pp = Unconfined compression strength from Pocket Penetrometer (tsf)
4. WOH = Weight of Hammer; WOR = Weight of Rod

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION: RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	SOIL SAMPLING (Blows per 6 inches): 0-6	6-12	12-18	18-24	REC. (in)	FIELD IDENTIFICATION OF SOIL / ROCK
		SS	1	0-2	13	17	15	13	17						Brown cf **SAND**, little(-) mf Gravel, trace Silt (Fill)
5		SS	2	5-7	7	5	4	5	13						Dark Gray f **SAND**, trace(+) Silt
10		SS	3	10-12	WOH	0	0	0	15						Dark Gray / brown **PEAT**, with roots, pp = 0.5
		U	1	12-14					10						Dark Gray **Organic SILT**, with fibers
15		SS	4	14-16	1	6	15	27	17						Dark Gray **Organic Clayey SILT**, little f Gravel, little(-) Silt

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: PB-9

BORING LOG (continued)

PROJECT: Mill Creek / upper Thorofare Bridges
LOCATION: Cape May, NJ
INSPECTOR: E. Reed

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION: RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	SOIL SAMPLING (Blows per 6 inches): 0-6	6-12	12-18	18-24	REC. (in)	FIELD IDENTIFICATION OF SOIL / ROCK
20															
		SS	5	20-22						9	22	26	27	9	Dark Gray f **SAND**, trace(+) Silt
		SS	6	25-27						17	21	33	21	9	Same as SS-5
30															
		SS	7	30-32						4	5	10	15	16	Brown / Gray / Orange **Clayey SILT**, pp = 1.75
															Brown f **SAND**, little(-) Silt
35															E. O. B. @ 32 feet. Borehole grouted upon completion.
40															
45															

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: B-1

BORING LOG

PROJECT: Mill Creek / upper Thorofare Bridges
ATION: Cape May, NJ
NTRACTOR: Jersey Boring and Drilling
DRILLER: J. Norton
TYPE RIG: Acker AD-2 (Truck Mounted)
INSPECTOR: R. Fahmy, E. Reed

GROUND ELEVATION: 7.85
STATION: 47+01
DRILLING START TIME: 10:40 am
DRILLING FINISH TIME: 2:45 am

BASELINE: Ocean Drive
OFFSET: 23.90 RT
DATE: 6/13/00
DATE: 6/13/00

DEPTHS	METHOD(S) OF DRILLING
0-70'	Mud Rotary Drilling

BOREHOLE WATER LEVEL DATA			
DEPTH	HOUR	DATE	REMARKS

TYPE OF SAMPLE

SS SPLIT SPOON
O.D.: 2"
I.D.: 1-3/8"
LENGTH: 24"
HAMMER WEIGHT: 140 lbs
HAMMER FALL: 30"

UNDISTURBED

U SHELBY TUBE
O.D.:
I.D.:
I.L.:

D DENISON
O.D.:
I.D.:
I.L.:

C CORE
BARREL TYPE:
O.D.:
I.D.:

P PISTON
O.D.:
I.D.:
I.L.:

CASING

O.D.: I.D.:
IGHT OF HAMMER: 300 lbs HAMMER FALL: 24"

Notes:
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2. Field identification of soil samples is based on Burmister Soil Identification System.
3. pp = Unconfined compression strength from Pocket Penetrometer (tsf)
4. WOH = Weight of Hammer; WOR = Weight of Rod

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION: RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	SOIL SAMPLING (Blows per 6 inches): 0-6	6-12	12-18	18-24	REC. (in)	FIELD IDENTIFICATION OF SOIL / ROCK
		SS	1	0-2						21	30	17	19	18	Light Gray f **GRAVEL** with Shell Fragments
															Brown / Orange cf **SAND**, little f Gravel, trace Silt (Fill)
5															
		SS	2	5-7						7	7	8	8	9	Gray f **SAND**, little f Gravel with Shell Fragments
		SS	3	7-9						7	12	17	16	8	Gray mf **SAND**, trace Silt, trace f Gravel
10		SS	4	9-11						7	8	9	11	9	Gray **CLAY & SILT**
															Gray cf **SAND**, trace(-) f Gravel, trace Silt
		SS	5	11-13						2	4	4	2	9	Gray c(-)f **SAND**, little Silt
		SS	6	13-15						1	1	1	1	23	Gray **Organic SILT** with roots
15															

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: B-1

BORING LOG (continued)

PROJECT: Mill Creek / upper Thorofare Bridges
ATION: Cape May, NJ
PECTOR: E. Reed

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	SOIL SAMPLING (Blows per 6 inches) 0-6	6-12	12-18	18-24	REC. (in)	FIELD IDENTIFICATION OF SOIL / ROCK
		SS	7	15-17						WOR	0	0	0	17	Dark Gray **Organic SILT** with decaying vegetation, pp = 0.25
		SS	8	17-19						WOR	0	0	0	24	Dark Gray **Organic SILT**, trace(-) Shell Fragments
20		SS	9	19-21						WOR	0	WOH	0	20	Dark Gray **Organic SILT**, one piece 1" Shell
		SS	10	21-23						WOR	0	WOH	0	18	Dark Gray **Organic SILT** with decaying vegetation , pp = 0.25
		SS	11	23-25						WOR	0	0	0	21	Same as SS-6, pp = 0.75
		SS	12	25-27						WOR	0	0	0	14	Dark Gray **Organic SILT** with decaying vegetation, pp = 0.25
30		SS	13	27-29						WOR	WOH	12	9	14	Dark Gray **SILT**, some mf Sand Dark Gray mf **SAND**, trace Silt (organic odor)
		SS	14	30-32						2	2	6	9	24	Dark Gray **Organic Clayey SILT**, trace mf Sand with decaying vegetation, pp=0.75
35															Dark Gray mf **SAND**, little Silt, trace organic material
		SS	15	35-37						2	3	3	5	24	Dark Gray **CLAY & SILT**
40															Dark Gray **PEAT**
		SS	16	40-42						20	39	40	63	24	Gray mf **SAND**, trace SIlt
45															

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: B-1

BORING LOG (continued)

PROJECT: Mill Creek / upper Thorofare Bridges
ATION: Cape May, NJ
SPECTOR: E. Reed

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	FIELD IDENTIFICATION OF SOIL / ROCK
					SOIL SAMPLING (Blows per 6 inches)					
					0-6	6-12	12-18	18-24	REC. (in)	
		SS	17	45-47	28	43	29	34	7	Gray cf **SAND**, trace Silt
50										
		SS	18	50-52	WOR	5	5	8	24	Dark Gray **SILT & CLAY**, trace mf Sand
		SS	19	55-57	22	35	55	55	12	Gray cf **SAND**, trace Silt
60										
		SS	20	60-62	31	51	52	48	13	Gray c(-)f **SAND**, trace Silt
65										
		SS	21	65-70	26	40	52	54	11	Gray cf **SAND**, trace Silt
70										
		SS	22	70-72	6	14	19	23	19	Gray **SILT**, little f Sand
75										E. O. B. @ 72 feet. Borehole grouted upon completion.

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: B-2

BORING LOG

PROJECT: Mill Creek / upper Thorofare Bridges
LOCATION: Cape May, NJ
CONTRACTOR: Jersey Boring and Drilling
DRILLER: J. Norton
TYPE RIG: Acker AD-2 (Truck Mounted)
INSPECTOR: E. Reed

GROUND ELEVATION: 7.56
STATION: 51+76.99
DRILLING START TIME: 12:00 pm
DRILLING FINISH TIME: 2:35 pm

BASELINE: Ocean Drive
OFFSET: 15.71 LT
DATE: 6/19/00
DATE: 6/19/00

DEPTHS	METHOD(S) OF DRILLING
0-70'	Mud Rotary Drilling

BOREHOLE WATER LEVEL DATA			
DEPTH	HOUR	DATE	REMARKS

TYPE OF SAMPLE

	UNDISTURBED	
SS SPLIT SPOON O.D.: 2" I.D.: 1-3/8" LENGTH: 24" HAMMER WEIGHT: 140 lbs HAMMER FALL: 30"	U SHELBY TUBE O.D.: I.D.: I.L.:	D DENISON O.D.: I.D.: I.L.:
C CORE BARREL TYPE: O.D.: I.D.:	P PISTON O.D.: I.D.: I.L.:	

CASING

O.D.: I.D.:
WEIGHT OF HAMMER: 300 lbs HAMMER FALL: 24"

Notes:
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2. Field identification of soil samples is based on Burmister Soil Identification System.
3. pp = Unconfined compression strength from Pocket Penetrometer (tsf)
4. WOH = Weight of Hammer; WOR = Weight of Rod

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION: RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	SOIL SAMPLING (Blows per 6 inches) 0-6	6-12	12-18	18-24	REC. (in)	FIELD IDENTIFICATION OF SOIL / ROCK
		SS	1	0.5-2.5	26	21	27	25	11						Asphalt
															Brown cf **SAND**, trace f Gravel, trace Silt (Fill)
5		SS	2	5-7	5	6	4	5	9						Gray / Brown cf **SAND**, trace Silt
10		SS	3	10-12	1	0	0	1	13						Dark Gray **Organic SILT** with roots, pp = 0.5
15															

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: B-2

BORING LOG (continued)

PROJECT: Mill Creek / upper Thorofare Bridges
ATION: Cape May, NJ
SPECTOR: E. Reed

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	FIELD IDENTIFICATION OF SOIL / ROCK
					SOIL SAMPLING (Blows per 6 inches) 0-6	6-12	12-18	18-24	REC. (in)	
20		SS	4	15-17	WOR	0	0	0	18	Dark Gray **Organic Clayey SILT**, trace f Sand, pp = 0.25
		SS	5	20-22	WOH	0	0	0	24	Dark Gray **Organic Clayey SILT**, pp = 0.5
30		SS	6	25-27	15	19	33	35	11	Dark Gray cf **SAND**, trace f Gravel, trace Silt
35		SS	7	30-32	5	5	6	5	17	Gray / Orange / Brown **Clayey SILT**, trace f Sand, pp = 0.75
40		SS	8	35-37	2	4	8	8	16	Dark Brown **SILT** Dark Brown / Black **Decaying Wood** Brown c(-)f **SAND**, little Silt
45		SS	9	40-42	12	13	26	30	11	Dark Gray mf **SAND**, trace Silt

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: B-2

BORING LOG (continued)

PROJECT: Mill Creek / upper Thorofare Bridges
ATION: Cape May, NJ
PECTOR: E. Reed

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	SOIL SAMPLING (Blows per 6 inches) 0-6	6-12	12-18	18-24	REC. (in)	FIELD IDENTIFICATION OF SOIL / ROCK
		SS	10	45-47						11	21	14	13	11	Dark Gray, c(-)f **SAND**, trace(+) Silt
50		SS	11	50-52						2	1	3	6	23	Dark Gray **SILT**, some(-) f Sand
55		SS	12	55-57						1	1	3	10	24	Dark Gray **SILT**, trace f Sand, pp = 0.75
60		SS	13	60-62						6	20	23	32	14	Dark Brown **Decomposed Wood**, some m(+)f Sand, some(-) Silt
65		SS	14	65-67						21	54	76	62	15	Gray c(+)f **SAND**, trace(+) Silt, trace(-) f Gravel
70		SS	15	70-72						26	33	56	65	11	Gray c(-)f **SAND**, trace(+) Silt
75															E. O. B. @ 72 feet. Borehole grouted upon completion.

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: B-3

BORING LOG

PROJECT: Mill Creek / upper Thorofare Bridges
LOCATION: Cape May, NJ
CONTRACTOR: Jersey Boring and Drilling
DRILLER: J. Norton
TYPE RIG: Acker AD-2 (Truck Mounted)
INSPECTOR: E. Reed

GROUND ELEVATION: 8.71
STATION: 74+17.77
DRILLING START TIME: 9:00 am
DRILLING FINISH TIME: 12:15 pm

BASELINE: Ocean Drive
OFFSET: 14.98 RT
DATE: 6/16/00
DATE: 6/16/00

DEPTHS	METHOD(S) OF DRILLING
0-70'	Mud Rotary Drilling

BOREHOLE WATER LEVEL DATA			
DEPTH	HOUR	DATE	REMARKS

TYPE OF SAMPLE

	UNDISTURBED	
SS SPLIT SPOON O.D.: 2" I.D.: 1-3/8" LENGTH: 24" HAMMER WEIGHT: 140 lbs HAMMER FALL: 30"	U SHELBY TUBE O.D.: I.D.: I.L.:	D DENISON O.D.: I.D.: I.L.:
C CORE BARREL TYPE: O.D.: I.D.:	P PISTON O.D.: I.D.: I.L.:	

CASING

O.D.: I.D.:
WEIGHT OF HAMMER: 300 lbs HAMMER FALL: 24"

Notes:
1. The subsurface information shown hereon was obtained for the design and estimate purposes for our Client. It is made Available to authorized users only that they may have Access to the same information available to our Client. It is Presented in good faith, but is not intended as a substitute for investigations, interpretations or judgment of such Authorized users.
2. Field identification of soil samples is based on Burmister Soil Identification System.
3. pp = Unconfined compression strength from Pocket Penetrometer (tsf)
4. WOH = Weight of Hammer; WOR = Weight of Rod

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION: RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	SOIL SAMPLING (Blows per 6 inches): 0-6	6-12	12-18	18-24	REC. (in)	FIELD IDENTIFICATION OF SOIL / ROCK
		SS	1	0.5-2.5						10	20	20	16	13	Asphalt
															Brown cf **SAND**, trace f Gravel, trace Silt (Fill)
5															
		SS	2	5-7						7	10	12	14	10	Gray cf **SAND**, trace(-) Silt
10															
		SS	3	10-12						1	1	1	2	13	Dark Gray f **SAND**, some Silt with decaying vegetation
15															

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: B-3

BORING LOG (continued)

PROJECT: Mill Creek / upper Thorofare Bridges
ATION: Cape May, NJ
PECTOR: E. Reed

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	FIELD IDENTIFICATION OF SOIL / ROCK
					SOIL SAMPLING (Blows per 6 inches) 0-6	6-12	12-18	18-24	REC. (in)	
		SS	4	15-17	1	2	3	1	6	Dark Gray f **SAND**, little(-) Silt
20		SS	5	20-22	4	5	3	2	17	Same as SS-4
		SS	6	25-27	WOR	0	0	0	15	Dark Gray cf **SAND**, some(+) Silt & Clay, little(-) mf Gravel
30		SS	7	30-32	21	17	19	18	12	Dark Gray f **SAND**, some(+) Silt
35		SS	8	35-37	5	8	8	10	22	Dark Gray **SILT & CLAY**, little cf Sand, pp = 1.25 (non homogeneous)
40		SS	9	40-42	7	10	8	8	24	Dark Gray **SILT & CLAY**, trace mf Sand, pp = 1.25
45										

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: B-3

BORING LOG (continued)

PROJECT: Mill Creek / upper Thorofare Bridges
ATION: Cape May, NJ
PECTOR: E. Reed

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION: RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	SOIL SAMPLING (Blows per 6 inches): 0-6	6-12	12-18	18-24	REC. (in)	FIELD IDENTIFICATION OF SOIL / ROCK
		SS	10	45-47						2	5	5	5	24	Light Gray **Clayey SILT**, pp = 1.0
50		SS	11	50-52						10	19	21	25	24	Light Gray **Clayey SILT**, little(+) f Sand, pp = 1.5
60		SS	12	55-57						8	13	21	23	24	Light Gray **Clayey SILT**, trace f Sand, pp = 1.0
65		SS	13	60-62						10	25	26	30	24	Gray **SILT**, trace f Sand, pp=1.5
70		SS	14	65-67						3	10	16	17	24	Gray **Clayey SILT**, trace mf Sand Gray cf **SAND**, trace(+) Silt
75		SS	15	70-72						9	16	18	18	20	Gray cf **SAND**, trace Silt (parts including little(+) Silt) E. O. B. @ 72 feet. Borehole grouted upon completion.

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: B-4

BORING LOG

PROJECT: Mill Creek / upper Thorofare Bridges
LOCATION: Cape May, NJ
CONTRACTOR: Jersey Boring and Drilling
DRILLER: J. Norton
TYPE RIG: Acker AD-2 (Truck Mounted)
INSPECTOR: E. Reed

GROUND ELEVATION: 8.26 BASELINE: Ocean Drive
STATION: 79+07.96 OFFSET: 13.56 LT
DRILLING START TIME: 10:45 am DATE: 6/14/00
DRILLING FINISH TIME: 2:40 pm DATE: 6/14/00

DEPTHS	METHOD(S) OF DRILLING
0-75'	Mud Rotary Drilling

BOREHOLE WATER LEVEL DATA			
DEPTH	HOUR	DATE	REMARKS

TYPE OF SAMPLE

	UNDISTURBED	
SS SPLIT SPOON O.D.: 2" I.D.: 1-3/8" LENGTH: 24" HAMMER WEIGHT: 140 lbs HAMMER FALL: 30"	U SHELBY TUBE O.D.: I.D.: I.L.:	D DENISON O.D.: I.D.: I.L.:
C CORE BARREL TYPE: O.D.: I.D.:	P PISTON O.D.: I.D.: I.L.:	

CASING

O.D.: I.D.:
WEIGHT OF HAMMER: 300 lbs HAMMER FALL: 24"

Notes:
1. The subsurface information shown hereon was obtained for the design and estimate purposes for our Client. It is made Available to authorized users only that they may have Access to the same information available to our Client. It is Presented in good faith, but is not intended as a substitute for investigations, interpretations or judgment of such Authorized users.
2. Field identification of soil samples is based on Burmister Soil Identification System.
3. pp = Unconfined compression strength from Pocket Penetrometer (tsf)
4. WOH = Weight of Hammer; WOR = Weight of Rod

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION: RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	SOIL SAMPLING (Blows per 6 inches): 0-6	6-12	12-18	18-24	REC. (in)	FIELD IDENTIFICATION OF SOIL / ROCK
		SS	1	0.5-2.5	14	10	13	12	18						Asphalt
															Brown cf **SAND**, little(-) f Gravel, trace Silt (Fill)
5															
		SS	2	5-7	5	4	5	5	9						Gray mf **SAND**, trace Silt (one piece of Shell)
10															
		SS	3	10-12	1	1	1	1	17						Gray f **SAND**, trace(+) Silt
															Dark Gray / Brown **PEAT**, and Organic Silt with roots
15															

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: B-4

BORING LOG (continued)

PROJECT: Mill Creek / upper Thorofare Bridges
ATION: Cape May, NJ
PECTOR: E. Reed

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	SOIL SAMPLING (Blows per 6 inches) 0-6	6-12	12-18	18-24	REC. (in)	FIELD IDENTIFICATION OF SOIL / ROCK
		SS	4	15-17	WOR	0	0	0	18						Dark Gray **Organic SILT & CLAY**, trace f Sand with decaying vegetation
20		SS	5	20-22	8	13	16	28	18						Dark Gray mf **SAND**, trace Silt
25		SS	6	25-27	16	28	32	38	17						Dark Gray f **SAND**, trace(+) Silt
30		SS	7	30-32	14	20	24	32	17						Brownish Gray f **SAND**, trace Silt
35		SS	8	35-37	7	11	12	12	23						Brown / Orange **Clayey SILT**, some f Sand pp = 0.5
40		SS	9	40-42	4	3	5	8	24						Light Gray / Brown / Orange **Clayey SILT**, trace f Sand pp = 1.0
45															

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: B-4

BORING LOG (continued)

PROJECT: Mill Creek / upper Thorofare Bridges
ATION: Cape May, NJ
PECTOR: E. Reed

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION: RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	FIELD IDENTIFICATION OF SOIL / ROCK
					SOIL SAMPLING (Blows per 6 inches)					
					0-6	6-12	12-18	18-24	REC. (in)	
		SS	10	45-47	1	1	2	8	24	Dark Gray **SILT**, some f Sand
50										
		SS	11	50-52	5	5	8	7	24	Same as SS-10
55										
		SS	12	55-57	WOR	0	WOH	0	24	Dark Gray **SILT**, trace$^{(+)}$ mf Sand
60										
		SS	13	60-62	WOH	3	3	5	24	Dark Gray **SILT**, little$^{(-)}$ f Sand
65										
		SS	14	65-67	WOH	0	20	21	22	Dark Gray **Clayey SILT** pp = 0.5
70										Gray cf **SAND**, trace Silt
		SS	15	70-72	9	17	21	16	12	Dark Gray c$^{(+)}$f **SAND**, trace Silt
75										

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: B-4

BORING LOG (continued)

PROJECT: Mill Creek / upper Thorofare Bridges
ATION: Cape May, NJ
PECTOR: E. Reed

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	FIELD IDENTIFICATION OF SOIL / ROCK
					SOIL SAMPLING (Blows per 6 inches)					
					0-6	6-12	12-18	18-24	REC. (in)	
		SS	16	75-77	3	3	6	9	22	Dark Gray **SILT & CLAY**, trace(-) f Sand, pp = 1.25
80										E.O.B @ 77 feet. Borehole grouted upon completion.
90										
95										
100										
105										

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: B - 5

BORING LOG

PROJECT: Extension of Mill Creek and Upper Thorofare Bridges
LOCATION: Cape May County, NJ
CONTRACTOR: Warren George, Inc.
DRILLER: Sal Laurenza
TYPE RIG: Acker AD2
INSPECTOR: Z. Liu

GROUND ELEVATION: 5.17
STATION: 82+43.09
DRILLING START TIME: 1:05 pm
DRILLING FINISH TIME: 10:15 am

BASELINE: Ocean Drive
OFFSET: 42.55 RT
DATE: 12/23/02
DATE: 12/24/02

DEPTHS (feet)	METHOD(S) OF DRILLING
0-50'	Mud Rotary

BOREHOLE WATER LEVEL DATA			
DEPTH	HOUR	DATE	REMARKS

TYPE OF SAMPLE

	UNDISTURBED	
SS SPLIT SPOON O.D.: 2" I.D.: 1-3/8" LENGTH: 24" HAMMER WEIGHT: 140 lbs HAMMER FALL: 30"	U SHELBY TUBE O.D.: I.D.: I.L.:	D DENISON O.D.: I.D.: I.L.:
C CORE BARREL TYPE: O.D.: I.D.:	P PISTON O.D.: I.D.: I.L.:	

CASING

O.D.: I.D.:
WEIGHT OF HAMMER: 300 lbs HAMMER FALL: 24"

Notes:
1. The subsurface information shown hereon was obtained for the design and estimate purposes for our Client. It is made available to authorized users only that they may have access to the same information available to our Client. It is presented in good faith, but is not intended as a substitute for investigations, interpretations or judgment of such authorized users.
2. Field identification of soil samples is based on Burmister Soil Identification System.
3. pp = Unconfined compression strength from Pocket Penetrometer (tsf)
4. WOH = Weight of Hammer; WOR = Weight of Rod

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION: RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	SOIL SAMPLING (Blows per 6 inches) 0-6	6-12	12-18	18-24	REC. (in)	FIELD IDENTIFICATION OF SOIL / ROCK
	Push	SS	1	0-2	15	20	20	25	15						White and dark gray cf **SAND**, little Silt with Shell fragments (Fill)
	15														
	22	SS	2	2-4	24	18	26	32	17						Dark gray mf **SAND**, some Silt (wet)
	34														
5		SS	3	4-6	10	6	4	1	11						Dark gray f **SAND**, trace Silt, trace Shell Fragments
		SS	4	6-8	1	6	7	7	10						Dark gray **Organic CLAY & SILT**, pp = 0 tsf
		SS	5	8-10	WOH	0	0	2	24						Dark gray **Organic CLAY**, and Peat, pp = 0 tsf
10															
		SS	6	10-12	3	2	2	2	24						Same as SS-4, pp = 0 tsf
15															

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: B - 5

BORING LOG (continued)

PROJECT: Extension of Mill Creek and Upper Thorofare Bridges
LOCATION: Cape May County, NJ
INSPECTOR: Z. Liu

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION: RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	SOIL SAMPLING (Blows per 6 inches): 0-6	6-12	12-18	18-24	REC. (in)	FIELD IDENTIFICATION OF SOIL / ROCK
		SS	7	15-17						WOH	0	0	0	24	Dark gray **Organic SILT & CLAY**, some f Sand, pp = 0 tsf
20		SS	8	20-22						22	18	20	24	16	Gray cf(+) **SAND**, little Silt
30		SS	9	25-27						16	9	14	21	19	Brown and gray f **SAND**, little Silt
35		SS	10	30-32						4	7	5	15	21	Dark grayish brown **CLAY and SILT**, trace f Sand, pp = 0.5 tsf
40		SS	11	35-37						14	19	18	32	18	Gray c(-)mf **SAND**, trace Silt
45		SS	12	40-42						36	27	39	48	19	Brown cf **SAND**, trace Silt

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: B - 5

BORING LOG (continued)

PROJECT: Extension of Mill Creek and Upper Thorofare Bridges
ATION: Cape May County, NJ
SPECTOR: Z. Liu

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	SOIL SAMPLING (Blows per 6 inches) 0-6	6-12	12-18	18-24	REC. (in)	FIELD IDENTIFICATION OF SOIL / ROCK
		SS	13	45-47						65	52	67	74	18	Same as SS-12
50															
		SS	14	50-52						10	12	12	21	20	Gray f **SAND**, and Silt
															End of Boring @ 52 ft.
															Borehole grouted upon completion.
60															
65															
70															
75															

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: B - 6

BORING LOG

PROJECT: Extension of Mill Creek and Upper Thorofare Bridges
ATION: Cape May County, NJ
NTRACTOR: Warren George, Inc.
DRILLER: Sal Laurenza
TYPE RIG: Acker AD2
INSPECTOR: Z. Liu

GROUND ELEVATION: 4.55
STATION: 108+36.39
DRILLING START TIME: 8:25 am
DRILLING FINISH TIME: 1:15 pm

BASELINE: Ocean Drive
OFFSET: 36.70 RT
DATE: 12/26/02
DATE: 12/26/02

DEPTHS (feet)	METHOD(S) OF DRILLING
0-50'	Mud Rotary

BOREHOLE WATER LEVEL DATA			
DEPTH	HOUR	DATE	REMARKS

TYPE OF SAMPLE

SS SPLIT SPOON
O.D.: 2"
I.D.: 1-3/8"
LENGTH: 24"
HAMMER WEIGHT: 140 lbs
HAMMER FALL: 30"

UNDISTURBED

U SHELBY TUBE
O.D.:
I.D.:
I.L.:

D DENISON
O.D.:
I.D.:
I.L.:

C CORE BARREL TYPE:
O.D.:
I.D.:

P PISTON
O.D.:
I.D.:
I.L.:

CASING

O.D.: I.D.:
EIGHT OF HAMMER: 300 lbs HAMMER FALL: 24"

Notes:
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2. Field identification of soil samples is based on Burmister Soil Identification System.
3. pp = Unconfined compression strength from Pocket Penetrometer (tsf)
4. WOH = Weight of Hammer; WOR = Weight of Rod

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION: RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	FIELD IDENTIFICATION OF SOIL / ROCK
					SOIL SAMPLING (Blows per 6 inches): 0-6	6-12	12-18	18-24	REC. (in)	
	Push	SS	1	0-2	5	5	8	13	15	Brown and gray c(-) mf **SAND**, little Silt, trace mf Gravel with roots (Fill)
		SS	2	2-4	9	13	11	9	15	Gray mf **SAND**, little Silt (wet)
5		SS	3	4-6	WOH	0	1	1	10	Dark Gray f **SAND**, some Organic Clay & Silt
		SS	4	6-8	3	3	2	2	18	Dark Gray **CLAY and SILT**, and f Sand
		SS	5	8-10	6	2	1	1	10	Dark gray mf(+) **SAND**, and Clay & Silt, trace Shell Fragments
10										
		SS	6	10-12	1	3	7	13	16	Gray mf **SAND**, some Silt
15										

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: B - 6

BORING LOG (continued)

PROJECT: Extension of Mill Creek and Upper Thorofare Bridges
LOCATION: Cape May County, NJ
INSPECTOR: Z. Liu

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION: RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	SOIL SAMPLING (Blows per 6 inches): 0-6	6-12	12-18	18-24	REC. (in)	FIELD IDENTIFICATION OF SOIL / ROCK
		SS	7	15-17						14	8	6	5	16	Gray mf **SAND**, little Silt with Shell fragments
20		SS	8	20-22						WOH	0	0	0	24	Very dark gray **Organic CLAY**, trace f Sand, pp = 0 tsf
30		SS	9A	25-27						WOH	7	11	5	24	Top 12": Dark gray **Organic CLAY & SILT**, pp = 0 tsf
			9B												Bottom 12": Gray mf **SAND**, little Silt
35		SS	10	30-32						19	30	30	25	18	Gray mf **SAND**, little Silt
40		SS	11	35-37						6	14	7	8	21	Gray mf **SAND**, some Silt
45		SS	12	40-42						10	10	12	17	24	Dark gray **Clayey SILT**, and f Sand

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: B - 6

BORING LOG (continued)

PROJECT: Extension of Mill Creek and Upper Thorofare Bridges
ATION: Cape May County, NJ
PECTOR: Z. Liu

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	SOIL SAMPLING (Blows per 6 inches) 0-6	6-12	12-18	18-24	REC. (in)	FIELD IDENTIFICATION OF SOIL / ROCK
50		SS	13	45-47						7	9	9	12	22	Same as SS-12
		SS	14	50-52						5	6	8	13	23	Same as SS-12
															End of Boring @ 52 ft.
															Borehole grouted upon completion.
60															
65															
70															
75															

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: B - 7

BORING LOG

PROJECT: Extension of Mill Creek and Upper Thorofare Bridges
LOCATION: Cape May County, NJ
CONTRACTOR: Warren George, Inc.
DRILLER: Sal Laurenza
TYPE RIG: Acker AD2
INSPECTOR: Z. Liu

GROUND ELEVATION: 3.48
STATION: 128+20.04
DRILLING START TIME: 1:35 pm
DRILLING FINISH TIME: 5:15 pm

BASELINE: Ocean Drive
OFFSET: 47.47 RT
DATE: 12/26/02
DATE: 12/26/02

DEPTHS (feet)	METHOD(S) OF DRILLING
0-50'	Mud Rotary

BOREHOLE WATER LEVEL DATA			
DEPTH	HOUR	DATE	REMARKS

TYPE OF SAMPLE

	UNDISTURBED	
SS SPLIT SPOON O.D.: 2" I.D.: 1-3/8" LENGTH: 24" HAMMER WEIGHT: 140 lbs HAMMER FALL: 30"	U SHELBY TUBE O.D.: I.D.: I.L.:	D DENISON O.D.: I.D.: I.L.:
C CORE BARREL TYPE: O.D.: I.D.:	P PISTON O.D.: I.D.: I.L.:	

CASING

O.D.: I.D.:
WEIGHT OF HAMMER: 300 lbs HAMMER FALL: 24"

Notes:
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2. Field identification of soil samples is based on Burmister Soil Identification System.
3. pp = Unconfined compression strength from Pocket Penetrometer (tsf)
4. WOH = Weight of Hammer; WOR = Weight of Rod

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION: RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	SOIL SAMPLING (Blows per 6 inches): 0-6	6-12	12-18	18-24	REC. (in)	FIELD IDENTIFICATION OF SOIL / ROCK
	Push	SS	1	0-2						7	9	5	5	14	Dark brown and brown cf **SAND**, little cf Gravel, little Silt
	Push														with Roots (Fill)
	25	SS	2	2-4						8	12	18	24	10	Light brown mf **SAND**, trace Silt (wet) (Fill)
	28														
5		SS	3	4-6						13	10	13	12	12	Same as SS-2
		SS	4	6-8						9	10	14	17	14	Gray mf **SAND**, trace Silt
		SS	5	8-10						4	1	1	1	9	Dark gray **Organic CLAY & SILT**, pp = 0 tsf
10															
		SS	6	10-12						3	2	2	2	23	Same as SS-5, pp = 0 tsf
15															

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: B - 7

BORING LOG (continued)

PROJECT: Extension of Mill Creek and Upper Thorofare Bridges
ATION: Cape May County, NJ
PECTOR: Z. Liu

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	FIELD IDENTIFICATION OF SOIL / ROCK
					SOIL SAMPLING (Blows per 6 inches)					
					0-6	6-12	12-18	18-24	REC. (in)	
		SS	7	15-17	WHO	0	0	0	24	Dark gray **Organic CLAY & SILT**, pp = 0 tsf
20		SS	8	20-22	WHO	0	0	0	22	Very dark gray **Organic Silty CLAY**, trace f Sand, pp = 0 tsf
		SS	9	25-27	2	1	1	2	23	Dark gray **Organic CLAY & SILT**, little mf Sand
30		SS	10	30-32	24	18	23	28	16	Gray c(-) mf **SAND**, little Silt
35		SS	11	35-37	WOR	3	3	5	20	Very dark gray **Organic CLAY and SILT** with lenses of mf Sand
40		SS	12	40-42	21	21	22	25	18	Gray mf **SAND**, trace Silt
45										

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: B - 7

BORING LOG (continued)

PROJECT: Extension of Mill Creek and Upper Thorofare Bridges
ATION: Cape May County, NJ
PECTOR: Z. Liu

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	FIELD IDENTIFICATION OF SOIL / ROCK
					SOIL SAMPLING (Blows per 6 inches)					
					0-6	6-12	12-18	18-24	REC. (in)	
		SS	13	45-47	23	20	24	36	18	Gray mf **SAND**, trace Silt
50										
		SS	14	50-52	21	22	22	37	19	Gray mf **SAND**, trace Silt with Shell fragments
										End of Boring @ 52 ft.
										Borehole grouted upon completion.
60										
65										
70										
75										

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: B - 8

BORING LOG

PROJECT: Extension of Mill Creek and Upper Thorofare Bridges
LOCATION: Cape May County, NJ
CONTRACTOR: Warren George, Inc.
DRILLER: Sal Laurenza
TYPE RIG: Acker AD2
INSPECTOR: Z. Liu

GROUND ELEVATION: 4.59
STATION: 140+1.14
DRILLING START TIME: 7:45 am
DRILLING FINISH TIME: 1:15 pm

BASELINE: Ocean Drive
OFFSET: 17.60 LT
DATE: 12/27/02
DATE: 12/27/02

DEPTHS (feet)	METHOD(S) OF DRILLING
0-50'	Mud Rotary

BOREHOLE WATER LEVEL DATA			
DEPTH	HOUR	DATE	REMARKS

TYPE OF SAMPLE

	UNDISTURBED	
SS SPLIT SPOON O.D.: 2" I.D.: 1-3/8" LENGTH: 24" HAMMER WEIGHT: 140 lbs HAMMER FALL: 30"	U SHELBY TUBE O.D.: I.D.: I.L.:	D DENISON O.D.: I.D.: I.L.:
C CORE BARREL TYPE: O.D.: I.D.:	P PISTON O.D.: I.D.: I.L.:	

CASING

O.D.: I.D.:
WEIGHT OF HAMMER: 300 lbs HAMMER FALL: 24"

Notes:
1. The subsurface information shown hereon was obtained for the design and estimate purposes for our Client. It is made available to authorized users only that they may have access to the same information available to our Client. It is presented in good faith, but is not intended as a substitute for investigations, interpretations or judgment of such authorized users.
2. Field identification of soil samples is based on Burmister Soil Identification System.
3. pp = Unconfined compression strength from Pocket Penetrometer (tsf)
4. WOH = Weight of Hammer; WOR = Weight of Rod

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION: RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	SOIL SAMPLING (Blows per 6 inches): 0-6	6-12	12-18	18-24	REC. (in)	FIELD IDENTIFICATION OF SOIL / ROCK
	Push	SS	1	0-2	3	8	6	10	20						Brown cf **SAND**, little mf Gravel, little Silt with Roots (Fill)
		SS	2	2-4	7	4	6	14	18						Brown cf **SAND**, little mf Gravel, trace Silt (Fill)
5		SS	3	4-6	6	8	8	9	13						Same as SS-2
		SS	4	6-8	6	6	13	13	16						Gray mf **SAND**, trace Silt
		SS	5	8-10	3	1	1	1	7						Very dark gray **PEAT**, and Organic Clay, pp = 0.25 tsf
10															
		SS	6	10-12	4	3	4	4	23						Same as SS-5, pp = 0.25 tsf
15															

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: B - 8

BORING LOG (continued)

PROJECT: Extension of Mill Creek and Upper Thorofare Bridges
ATION: Cape May County, NJ
PECTOR: Z. Liu

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION: RUN (in) / SOIL SAMPLING (Blows per 6 inches) 0-6	REC. (in) / 6-12	REC. (%) / 12-18	L > 4" (in) / 18-24	RQD (%) / REC. (in)	FIELD IDENTIFICATION OF SOIL / ROCK
		SS	7	15-17	WOH	0	0	0	24	Dark gray **Organic CLAY**, pp = 0 tsf
20		SS	8	20-22	WOH	0	0	0	22	Dark gray **Organic CLAY & SILT**, pp = 0 tsf
30		SS	9	25-27	WOH	0	0	2	23	Dark gray **Organic CLAY & SILT**, pp = 0 tsf
		SS	10	30-32	8	5	9	11	16	Gray c(-) mf **SAND**, little Silt
35		SS	11	35-37	WOH	0	10	17	18	Dark gray **CLAY and SILT**, and mf Sand
40		SS	12	40-42	15	8	8	13	19	Gray c(-) mf **SAND**, trace mf Gravel, trace Silt
45										

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: B - 8

BORING LOG (continued)

PROJECT: Extension of Mill Creek and Upper Thorofare Bridges
ATION: Cape May County, NJ
PECTOR: Z. Liu

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	SOIL SAMPLING (Blows per 6 inches) 0-6	6-12	12-18	18-24	REC. (in)	FIELD IDENTIFICATION OF SOIL / ROCK
		SS	13	45-47	3	2	3	5	23						Gray f **SAND**, and Silt
50															
		SS	14	50-52	3	3	4	8	23						Same as SS-13
															End of Boring @ 52 ft.
															Borehole grouted upon completion.
60															
65															
70															
75															

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: WB - 1

BORING LOG

PROJECT: Extension of Mill Creek and Upper Thorofare Bridges
LOCATION: Cape May County, NJ
CONTRACTOR: Warren George, Inc.
DRILLER: Greg V. Marney
TYPE RIG: Acker – Soil XLS
INSPECTOR: Z. Liu

GROUND ELEVATION: 2.19
STATION: 98+62.65
DRILLING START TIME: 7: 50 am
DRILLING FINISH TIME: 8: 30 pm

BASELINE: Ocean Drive
OFFSET: 307.12 RT
DATE: 3/4/03
DATE: 3/4/03

DEPTHS	METHOD(S) OF DRILLING
0 – 119'	Mud Rotary

BOREHOLE WATER LEVEL DATA			
DEPTH	HOUR	DATE	REMARKS

TYPE OF SAMPLE

	UNDISTURBED	
SS SPLIT SPOON O.D.: 2" I.D.: 1-3/8" LENGTH: 24" HAMMER WEIGHT: 140 lbs HAMMER FALL: 30"	U SHELBY TUBE O.D.: I.D.: I.L.:	D DENISON O.D.: I.D.: I.L.:
C CORE BARREL TYPE: O.D.: I.D.:	P PISTON O.D.: I.D.: I.L.:	

CASING

O.D.: I.D.:
WEIGHT OF HAMMER: 300 lbs HAMMER FALL: 24"

Notes:
1. The subsurface information shown hereon was obtained for the design and estimate purposes for our Client. It is made available to authorized users only that they may have access to the same information available to our Client. It is presented in good faith, but is not intended as a substitute for investigations, interpretations or judgment of such authorized users.
2. Field identification of soil samples is based on Burmister Soil Identification System.
3. pp = Unconfined compression strength from Pocket Penetrometer (tsf)
4. WOH = Weight of Hammer; WOR = Weight of Rod

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION: RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	SOIL SAMPLING (Blows per 6 inches) 0-6	6-12	12-18	18-24	REC. (in)	FIELD IDENTIFICATION OF SOIL / ROCK
	PUSH														
5															
10															
15															

Note:
1) The boring was done on the barge.
2) Zero point is at the top of the water.
3) The elevation of top of the water is 2.19 ft.
4) From the top of water to mudline is approximately 34 ft.

BORING LOG (continued)

PROJECT: Extension of Mill Creek and Upper Thorofare Bridges
ATION: Cape May County, NJ
PECTOR: Z. Liu

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION: RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	SOIL SAMPLING (Blows per 6 inches): 0-6	6-12	12-18	18-24	REC. (in)	FIELD IDENTIFICATION OF SOIL / ROCK
20															
30															
															Mudline
35		SS	1	34 - 36	WOR	0	0	0	23						Dark brown **PEAT**, trace mf Sand with shell pieces
	73														
40		SS	2	39 - 41	6	3	4	4	23						Dark gray **CLAY and SILT**, some(+) f Sand
45		SS	3	44 - 46	5	3	3	4	21						Same as SS - 2

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: WB - 1

BORING LOG (continued)

PROJECT: Extension of Mill Creek and Upper Thorofare Bridges
\ATION: Cape May County, NJ
,PECTOR: Z. Liu

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	FIELD IDENTIFICATION OF SOIL / ROCK
					SOIL SAMPLING (Blows per 6 inches) 0-6	6-12	12-18	18-24	REC. (in)	
50		SS	4	49 - 51	WOR	0	4	5	24	Same as SS - 2
		SS	5	54 - 56	2	1	3	5	23	Dark gray **Clayey SILT**, little f Sand
60		SS	6	59 - 61	4	2	5	15	22	Dark gray **CLAY and SILT**, some(+) f Sand
65		SS	7	64 - 66	7	3	3	8	22	Same as SS - 6
70		SS	8	69 - 71	5	9	13	17	23	Dark gray **Silty CLAY**
75		SS	9A	74 - 76	9	43	41	37	22	Top 12" Same as SS - 8

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: WB - 1

BORING LOG (continued)

PROJECT: Extension of Mill Creek and Upper Thorofare Bridges
ATION: Cape May County, NJ
PECTOR: Z. Liu

DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	SOIL SAMPLING (Blows per 6 inches) 0-6	6-12	12-18	18-24	REC. (in)	FIELD IDENTIFICATION OF SOIL / ROCK
			9B												Bottom 10" cf **SAND**, little Silt
80		SS	10	79 - 81						28	15	15	25	20	Top 6" cf **SAND**, little Silt
															Bottom 14" Gray **SILT & CLAY**, little$^{(+)}$ f Sand
		SS	11	84 - 86						8	11	16	19	23	Dark gray **Silty CLAY**
90		SS	12	89 - 91						49	31	31	30	14	Gray cf **SAND**, trace Silt
95		SS	13	94 - 96						40	44	56	55	12	Same as SS - 12
100		SS	14	99 -101						23	25	26	20	14	Gray c$^{(-)}$ mf **SAND**, trace Silt
105		SS	15	104-106						19	15	17	15	20	Gray **CLAY & SILT**, trace f Sand, pp = 1.0 tsf

PARSONS BRINCKERHOFF-FG, INC.

BORING NUMBER: WB - 1

BORING LOG (continued)

PROJECT: Extension of Mill Creek and Upper Thorofare Bridges
LOCATION: Cape May County, NJ
INSPECTOR: Z. Liu

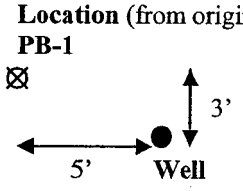
DEPTH BELOW GROUND SURFACE (ft)	BLOWS ON CASING	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	ROCK CORING INFORMATION RUN (in)	REC. (in)	REC. (%)	L > 4" (in)	RQD (%)	FIELD IDENTIFICATION OF SOIL / ROCK
					SOIL SAMPLING (Blows per 6 inches) 0-6	6-12	12-18	18-24	REC. (in)	
110		SS	16	109-111	9	6	7	11	18	Dark gray **Silty CLAY**, pp = 0.75 tsf
'5		SS	17	114-116	19	14	19	25	16	Gray mf **SAND** with several seams of Clayey Silt
120		SS	18	119-121	41	35	72	77	16	Gray cf **SAND**, trace f Gravel, trace Silt
125										End of Boring @ 121 ft.
130										
135										

MILL CREEK / upper THOROFARE BRIDGES

Cape May, NJ

Well Point at PB-1
Installed Monday, June 12, 2000
Taken out Monday, June 19, 2000

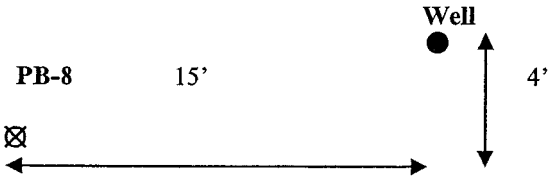
Location (from original boring)



Readings	
June 13	2'4"
June 15	2'8"
June 16	2'8"
June 19	2'6"

Well Point at PB-8
Installed Monday, June 19, 2000
Taken out Monday, June 19, 2000

Location (from original boring)



Readings	
June 19	
morning	2'3.5"
afternoon	2'3.5"

Appendix B

Laboratory Test Results

PRINCETON GEOTECHNICAL & MATERIALS SERVICES, LLC

Telephone 609-341-5860 • Fax 609-396-6952

Project: Mill Creek Extension **Job No.:** 20020B **Client:** Parsons Brinckerhoff

Date: 3/18/03 **Engineer:** AKF

SUMMARY OF LABORATORY TEST RESULTS

Boring No.	Sample No.	Depth (ft)	Natural Moisture Content %	Atterberg Limits		Specific Gravity	Grain Size		Consolidation Test	Triaxial Test				Unconfined Compressive Strength (q psf)
				Liquid Limit (%)	Plastic Limit (%)		Sieve	Hydr.		UU	CU	Cell Pressure (psi)	Back Pressure (psi)	
B-5	SS-3	4-6	26.5				*							
	SS-4	6-8	76											
	SS-5	8-10	94.6	100	42									
	SS-6	10-12	70.9											
	SS-10	30-32	29.4	36	19									
B-6	SS-3	4-6	37.8				*							
	SS-4	6-8	47.5				*							
	SS-5	8-10	41.7				*							
	SS-8	20-22	71.7	84	29									
	SS-12	40-42	27.7				*							
B-7	SS-5	8-10	70.9											
	SS-6	10-12	76.5											
	SS-7	15-17	62.9											
	SS-8	20-22	51.8	62	25									
	SS-9	25-27	35.8											
	SS-11	35-37	33.5	34	23									

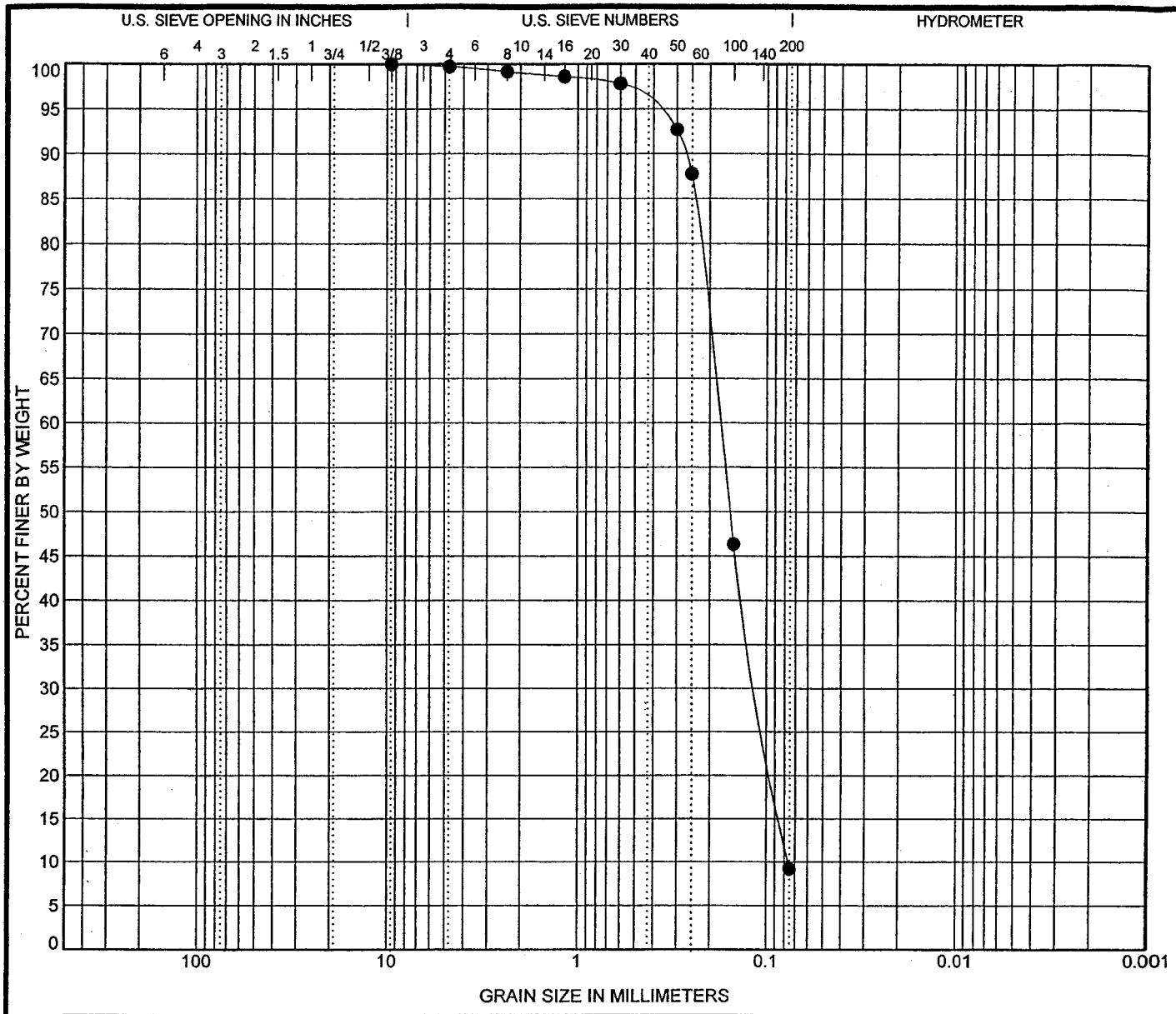
PRINCETON GEOTECHNICAL & MATERIALS SERVICES, LLC
Telephone 609-341-5860 • Fax 609-396-6952

Project: Mill Creek Extension **Job No.:** 20020B **Client:** Parsons Brinckerhoff

Date: 3/18/03 **Engineer:** AKF

SUMMARY OF LABORATORY TEST RESULTS

Boring No.	Sample No.	Depth (ft)	Natural Moisture Content %	Atterberg Limits		Specific Gravity	Grain Size		Consolidation Test	Triaxial Test				Unconfined Compressive Strength (q psf)
				Liquid Limit (%)	Plastic Limit (%)		Sieve	Hydr.		UU	CU	Cell Pressure (psi)	Back Pressure (psi)	
B-8	SS-5	8-10	132.8	166	66									
	SS-6	10-12	48.9											
	SS-7	15-17	82.2	77	32									
	SS-8	20-22	66.1											
	SS-9	25-27	53.2											
	SS-11	35-37	18.5				*							
WB-1	SS-2	39-41	31.7				*							
	SS-5	54-56	39.6				*	*						
	SS-8	69-71	42.1	44	21									
	SS-11	84-86	50.5	59	24									
	SS-15	104-106	51.2											
	SS-16	109-111	51.9	66	27									



COBBLES	GRAVEL			SAND			SILT OR CLAY
	coarse	medium	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	B-5 SS-3 4.0	Dark gray fine SAND, trace Silt, trace Shell Fragments				0.90	2.33

	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-5 4.0	9.5	0.178	0.111	0.076	0.3	90.5	9.2	

Princeton Geotechnical & Materials Services, LLC
1545 Lamberton Road
Trenton NJ, 08611

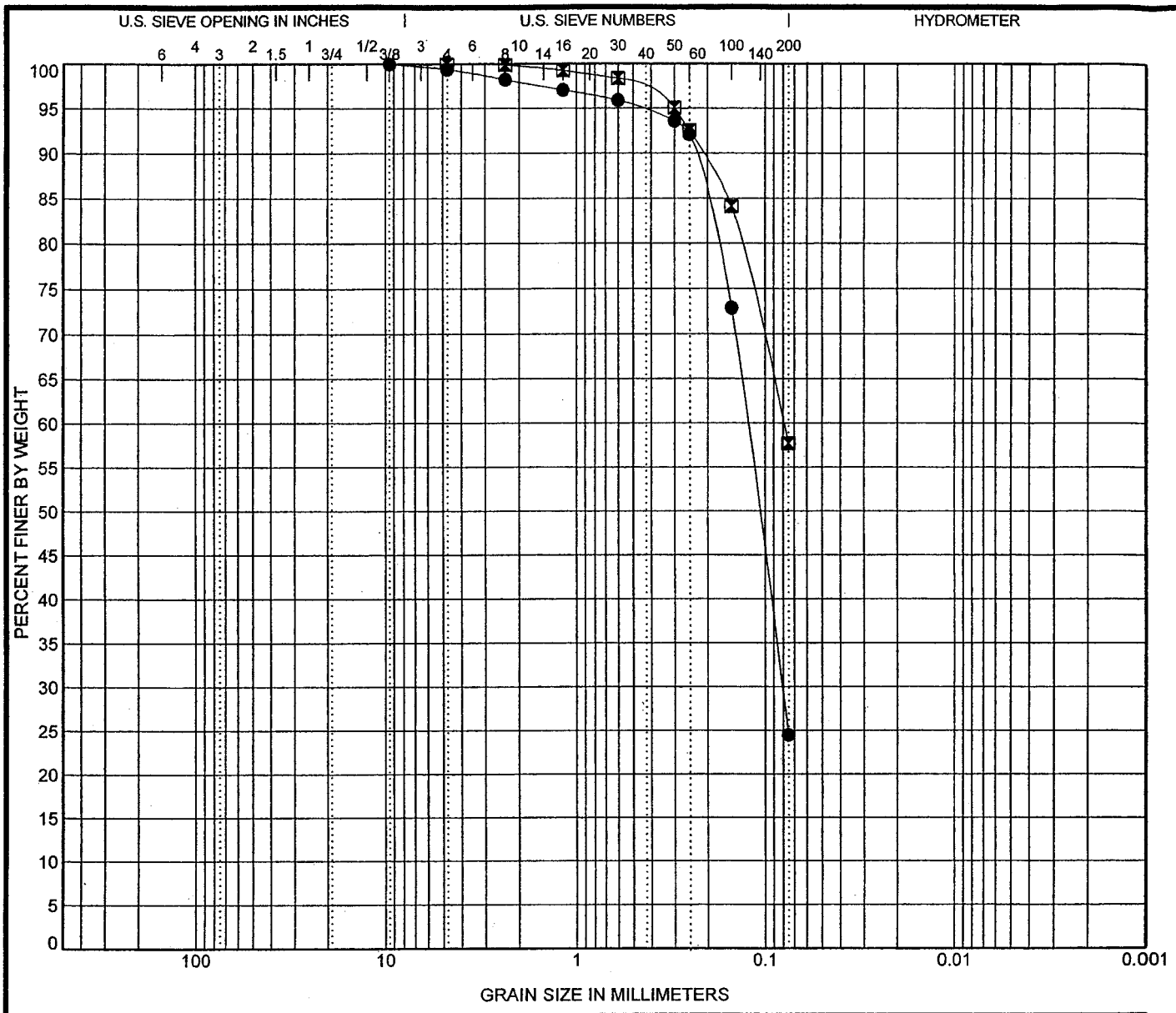
GRAIN SIZE DISTRIBUTION

Project: Mill Creek Extension

Location: Cape May County, NJ

Number: Parsons Brinckerhoff- Job No. 20020B

GRAIN SIZE MILL CREEK.PB.GPJ SADAT ASSOCIATES.GDT 10/3/03



COBBLES	GRAVEL			SAND			SILT OR CLAY
	coarse	medium	fine	coarse	medium	fine	

	Specimen Identification			Classification	LL	PL	PI	Cc	Cu
●	B-6	SS-3	4.0	Dark gray fine SAND, some Clay and Silt					
⊠	B-6	SS-4	6.0	Dark gray CLAY and SILT, and fine Sand					

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-6	4.0	9.5	0.125	0.081		0.6	74.9	24.5	
⊠	B-6	6.0	4.75	0.08			0.0	42.3	57.7	

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Trenton, NJ 08611

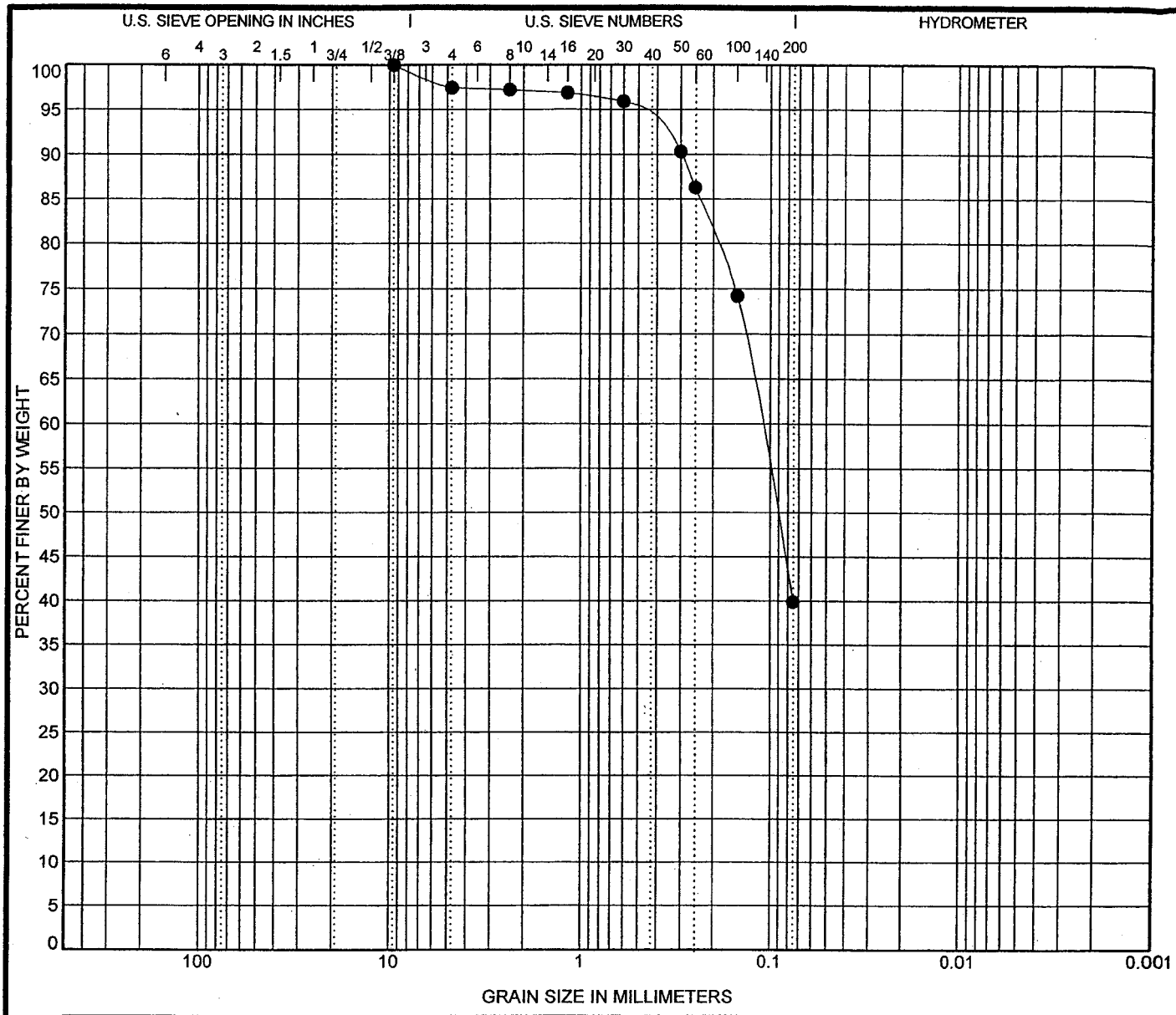
GRAIN SIZE DISTRIBUTION

Project: Mill Creek Extension

Location: Cape May County, NJ

Number: Parsons Brinckerhoff- Job No. 20020B

GRAIN SIZE MILL CREEK.PB.GPJ SADAT ASSOCIATES.GDT 18/3/03



COBBLES	GRAVEL			SAND			SILT OR CLAY
	coarse	medium	fine	coarse	medium	fine	

	Specimen Identification			Classification	LL	PL	PI	Cc	Cu
●	B-6	SS-5	8.0	Dark gray medium(-)-fine(+) SAND, and Clay and Silt, trace Shell Fragments					

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-6	8.0	9.5	0.113			2.5	57.6	39.9	

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Trenton, NJ 08611

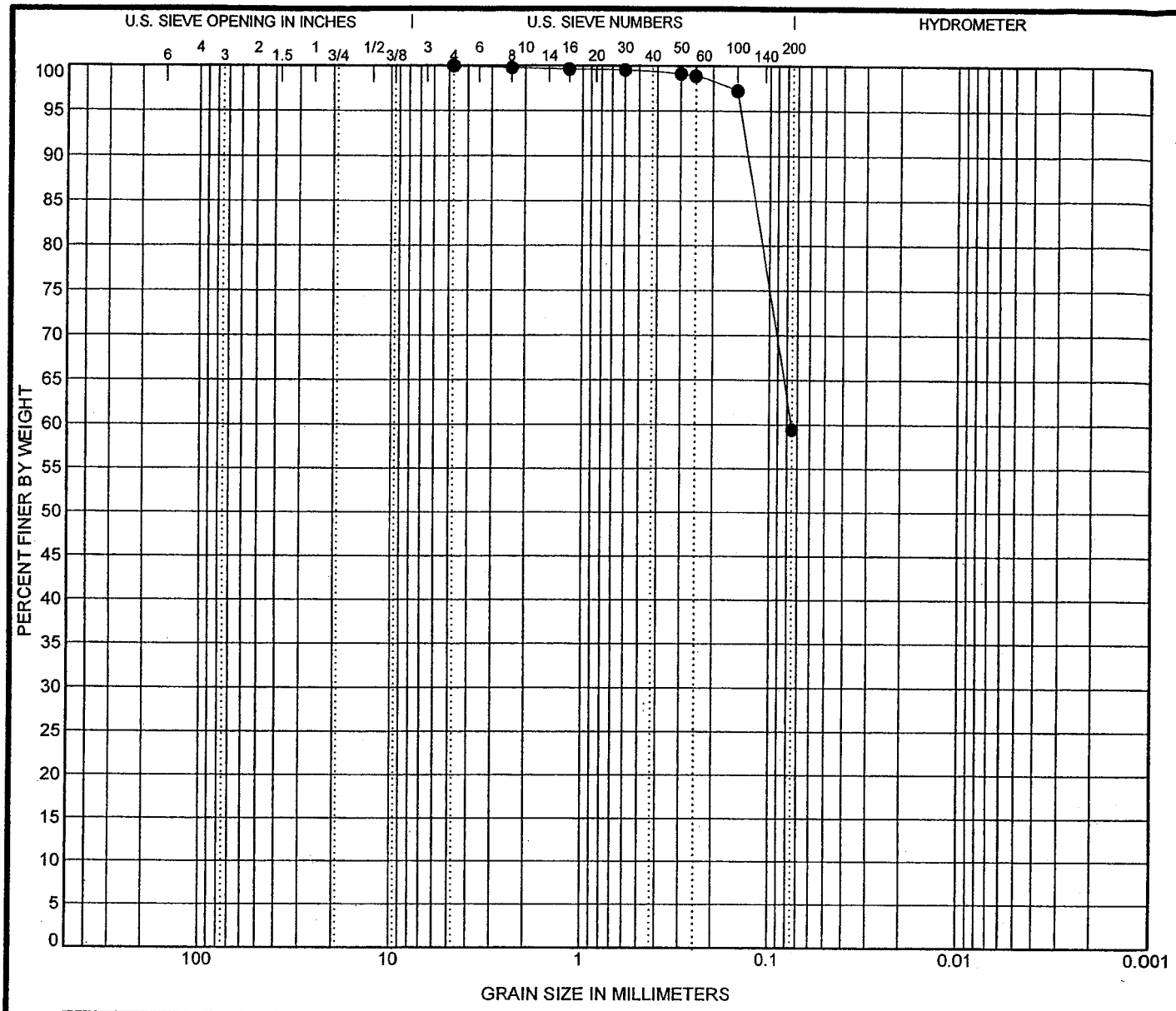
GRAIN SIZE DISTRIBUTION

Project: Mill Creek Extension

Location: Cape May County, NJ

Number: Parsons Brinckerhoff- Job No. 20020B

GRAIN SIZE MILL CREEK PB.GPJ SADAT ASSOCIATES.GDT 1/8/03



COBBLES	GRAVEL			SAND			SILT OR CLAY
	coarse	medium	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	B-6 SS-12 40.0	Dark gray Clayey SILT, and fine Sand					

	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-6 40.0	4.75	0.076			0.0	40.6	59.4	

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Trenton, NJ 08611

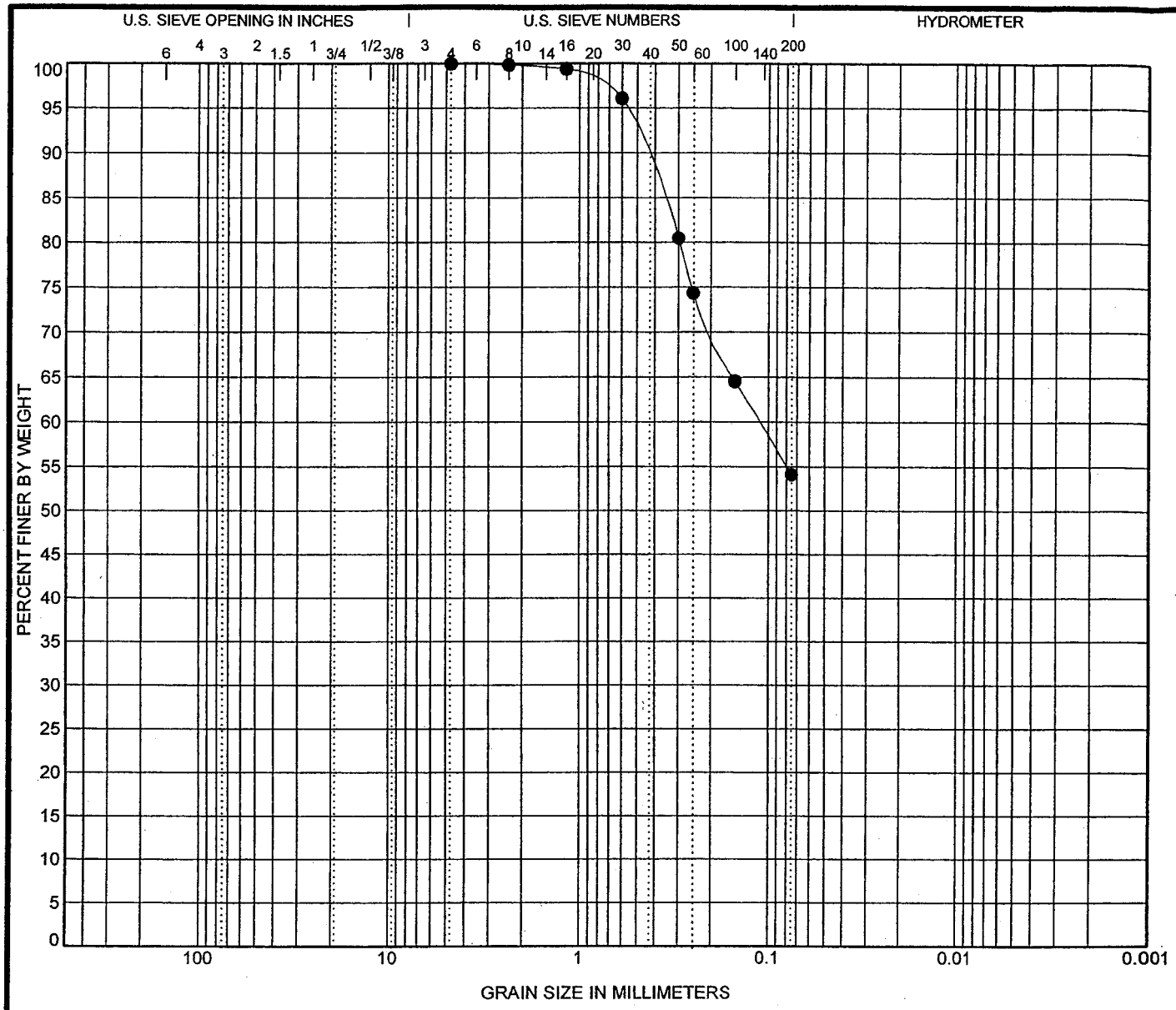
GRAIN SIZE DISTRIBUTION

Project: Mill Creek Extension

Location: Cape May County, NJ

Number: Parsons Brinckerhoff- Job No. 20020B

GRAIN SIZE MILL CREEK.PB.GPJ SADAT ASSOCIATES.GDT 18/3/03



COBBLES	GRAVEL			SAND			SILT OR CLAY
	coarse	medium	fine	coarse	medium	fine	

	Specimen Identification			Classification	LL	PL	PI	Cc	Cu
●	B-8	SS-11	35.0	Dark gray CLAY and SILT, and medium-fine Sand					

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-8	35.0	4.75	0.111			0.0	45.9	54.1	

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Trenton NJ 08611

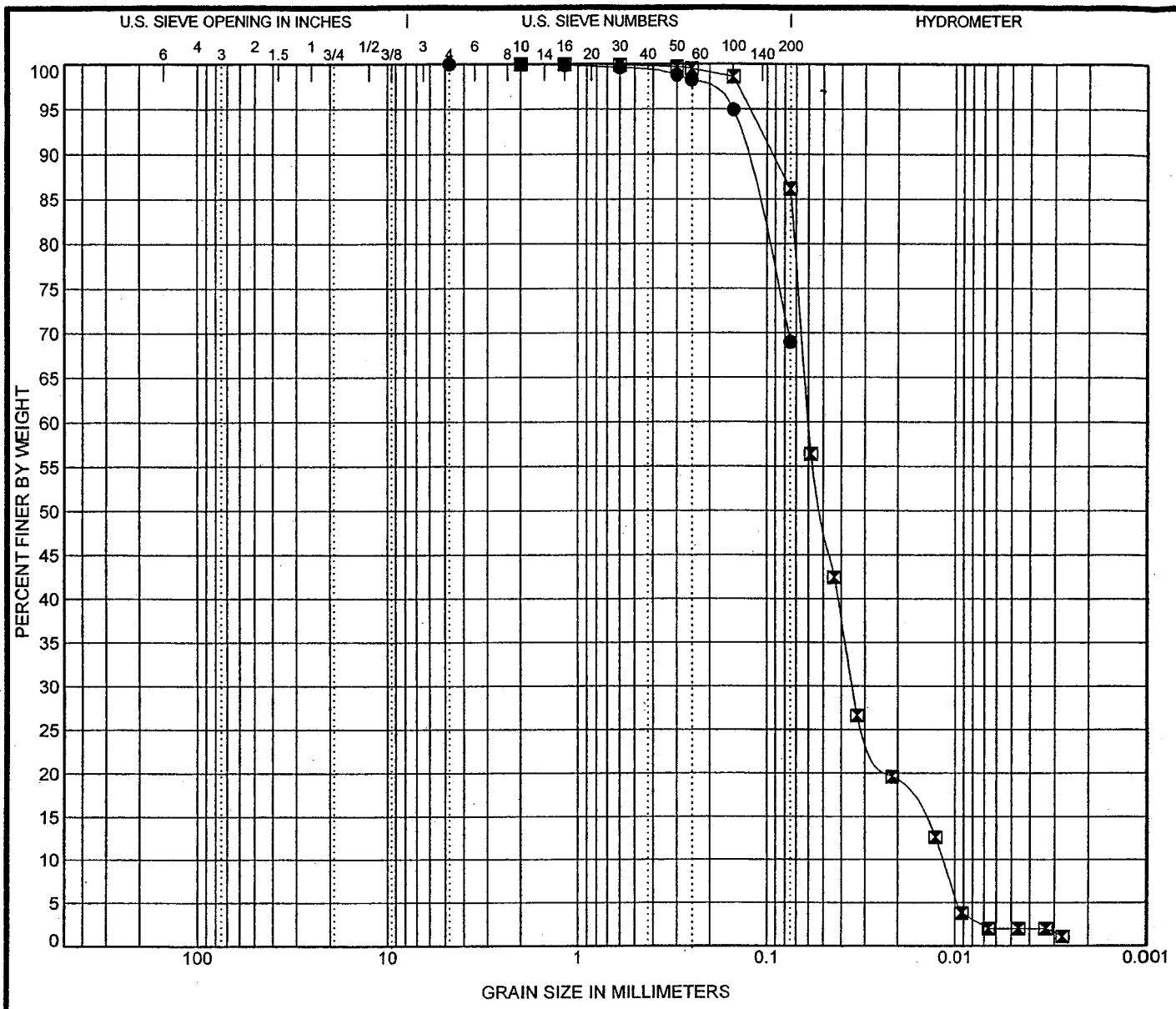
GRAIN SIZE DISTRIBUTION

Project: Mill Creek Extension

Location: Cape May County, NJ

Number: Parsons Brinckerhoff- Job No. 20020B

GRAIN SIZE MILL CREEK PB.GPJ SADAT ASSOCIATES.GDT 18/3/03



COBBLES	GRAVEL			SAND			SILT OR CLAY
	coarse	medium	fine	coarse	medium	fine	

	Specimen Identification			Classification	LL	PL	PI	Cc	Cu
●	WB-1	SS-2	39.0	Dark gray CLAY and SILT, some(+) fine Sand					
⊠	WB-1	SS-5	54.0	Dark gray Clayey SILT, little fine Sand				1.78	5.19

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	WB-1	39.0	4.75				0.0	31.0	69.0	
⊠	WB-1	54.0	2	0.06	0.035	0.012	0.0	13.8	84.2	2.0

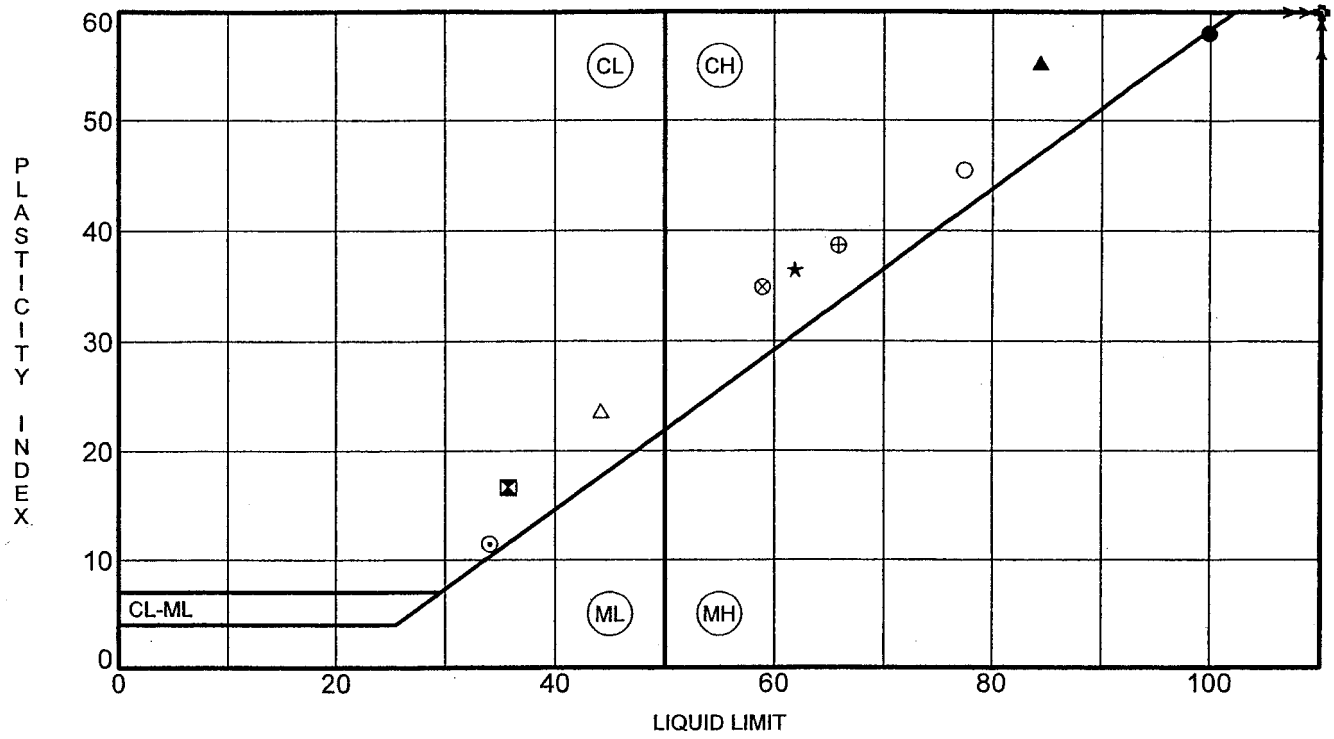
GRAIN SIZE DISTRIBUTION

Project: Mill Creek Extension

Location: Cape May County, NJ

Number: Parsons Brinckerhoff- Job No. 20020B

GRAIN SIZE MILL CREEK PB.GPJ SADAT ASSOCIATES.GDT 18/3/03



Specimen Identification				LL	PL	PI	Me	Classification
●	B-5	SS-5	8.0	100	42	58	94.6	Dark gray organic CLAY, and Peat
⊠	B-5	SS-10	30.0	36	19	17	29.4	Dark grayish brown CLAY and SILT, trace fine Sand
▲	B-6	SS-8	20.0	84	29	55	71.7	Very dark gray organic CLAY, trace fine Sand
★	B-7	SS-8	20.0	62	25	37	51.8	Very dark gray organic Silty CLAY, trace fine Sand
⊙	B-7	SS-11	35.0	34	23	11	33.5	Very dark gray organic CLAY and SILT, little(+) fine Sand
✿	B-8	SS-5	8.0	166	66	100	133	Very dark gray PEAT, and organic Clay
○	B-8	SS-7	15.0	77	32	45	82.2	Dark gray organic CLAY
△	WB-1	SS-8	69.0	44	21	23	42.1	Dark gray Silty CLAY
⊗	WB-1	SS-11	84.0	59	24	35	50.5	Dark gray Silty CLAY
⊕	WB-1	SS-16	109.0	66	27	39	51.9	Dark gray Silty CLAY

Princeton Geotechnical & Materials Services, LLC
1545 Lamberton Road
Trenton, NJ 08611, P.O. Box 4532
Telephone: 609-341-5860
Fax: 609-396-6952

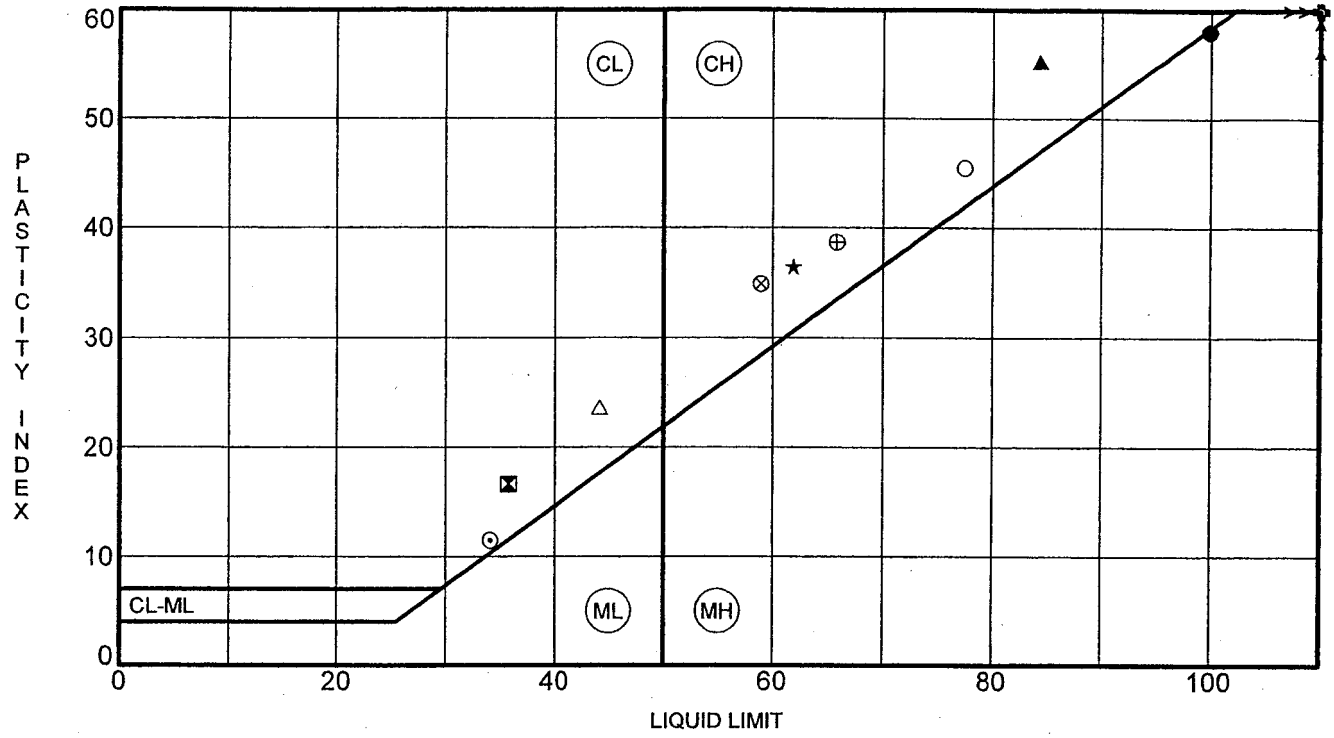
ATTERBERG LIMITS' RESULTS

Project: Mill Creek Extension

Location: Cape May County, NJ

Number: Parsons Brinckerhoff- Job No. 20020B

ATTERBERG LIMITS MILL CREEK.PB.GPJ SADAT ASSOCIATES.GDT 18/3/03



	Specimen Identification			LL	PL	PI	M_c	Classification
●	B-5	SS-5	8.0	100	42	58	94.6	
⊠	B-5	SS-10	30.0	36	19	17	29.4	
▲	B-6	SS-8	20.0	84	29	55	71.7	
★	B-7	SS-8	20.0	62	25	37	51.8	
⊙	B-7	SS-11	35.0	34	23	11	33.5	
✿	B-8	SS-5	8.0	166	66	100	133	
○	B-8	SS-7	15.0	77	32	45	82.2	
△	WB-1	SS-8	69.0	44	21	23	42.1	
⊗	WB-1	SS-11	84.0	59	24	35	50.5	
⊕	WB-1	SS-16	109.0	66	27	39	51.9	

Princeton Geotechnical & Materials Services, LLC
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Trenton, NJ 08611, P.O. Box 4532
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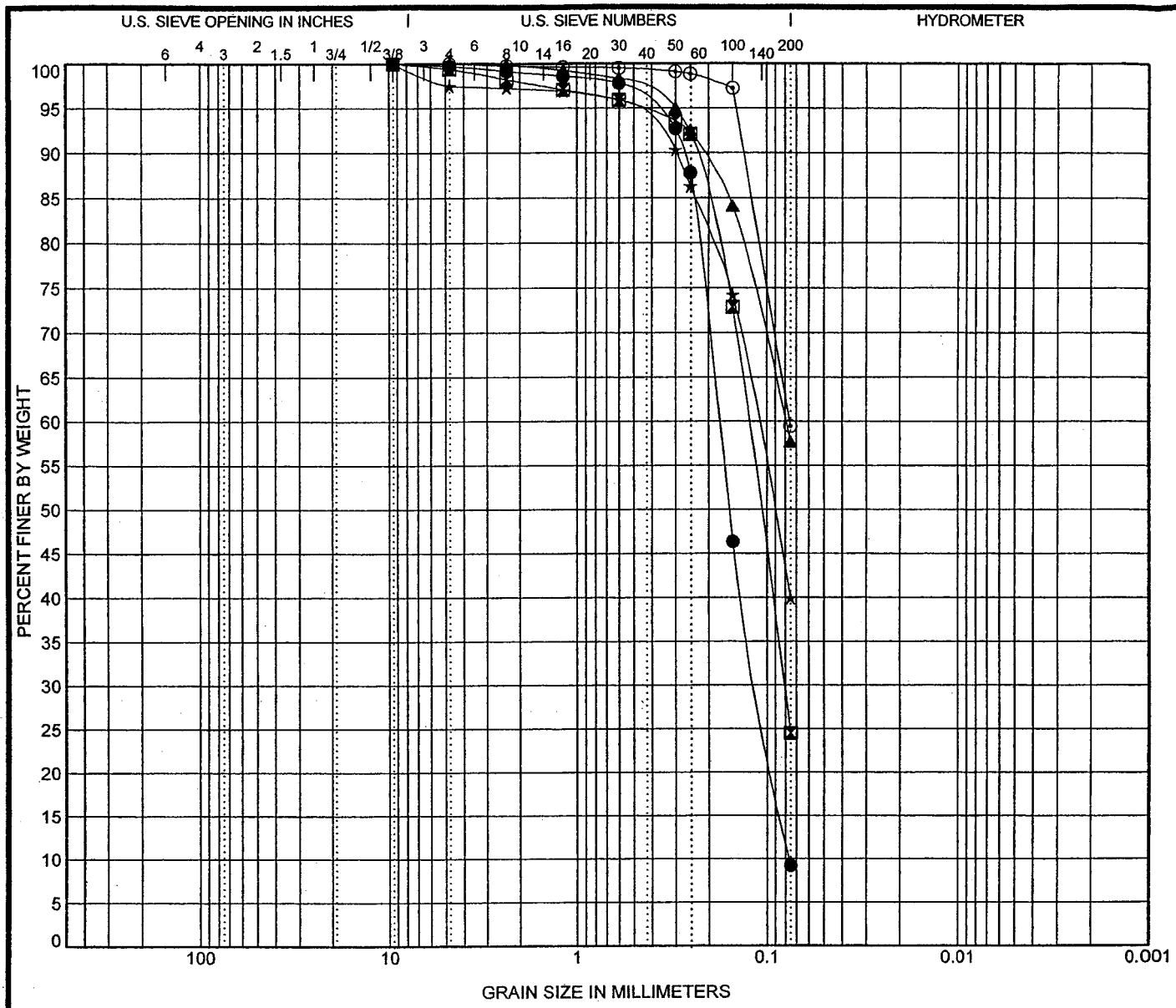
ATTERBERG LIMITS' RESULTS

Project: Mill Creek Extension

Location: Cape May County, NJ

Number: Parsons Brinckerhoff- Job No. 20020B

ATTERBERG LIMITS MILL CREEK.PB.GPJ SADAT ASSOCIATES.GDT 18/3/03



COBBLES	GRAVEL			SAND			SILT OR CLAY
	coarse	medium	fine	coarse	medium	fine	

	Specimen Identification			Classification	LL	PL	PI	Cc	Cu
●	B-5	SS-3	4.0					0.90	2.33
⊠	B-6	SS-3	4.0						
▲	B-6	SS-4	6.0						
★	B-6	SS-5	8.0						
⊙	B-6	SS-12	40.0						

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-5	4.0	9.5	0.178	0.111	0.076	0.3	90.5	9.2	
⊠	B-6	4.0	9.5	0.125	0.081		0.6	74.9	24.5	
▲	B-6	6.0	4.75	0.08			0.0	42.3	57.7	
★	B-6	8.0	9.5	0.113			2.5	57.6	39.9	
⊙	B-6	40.0	4.75	0.076			0.0	40.6	59.4	

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1545 Lamberton Road
Trenton, NJ 08611

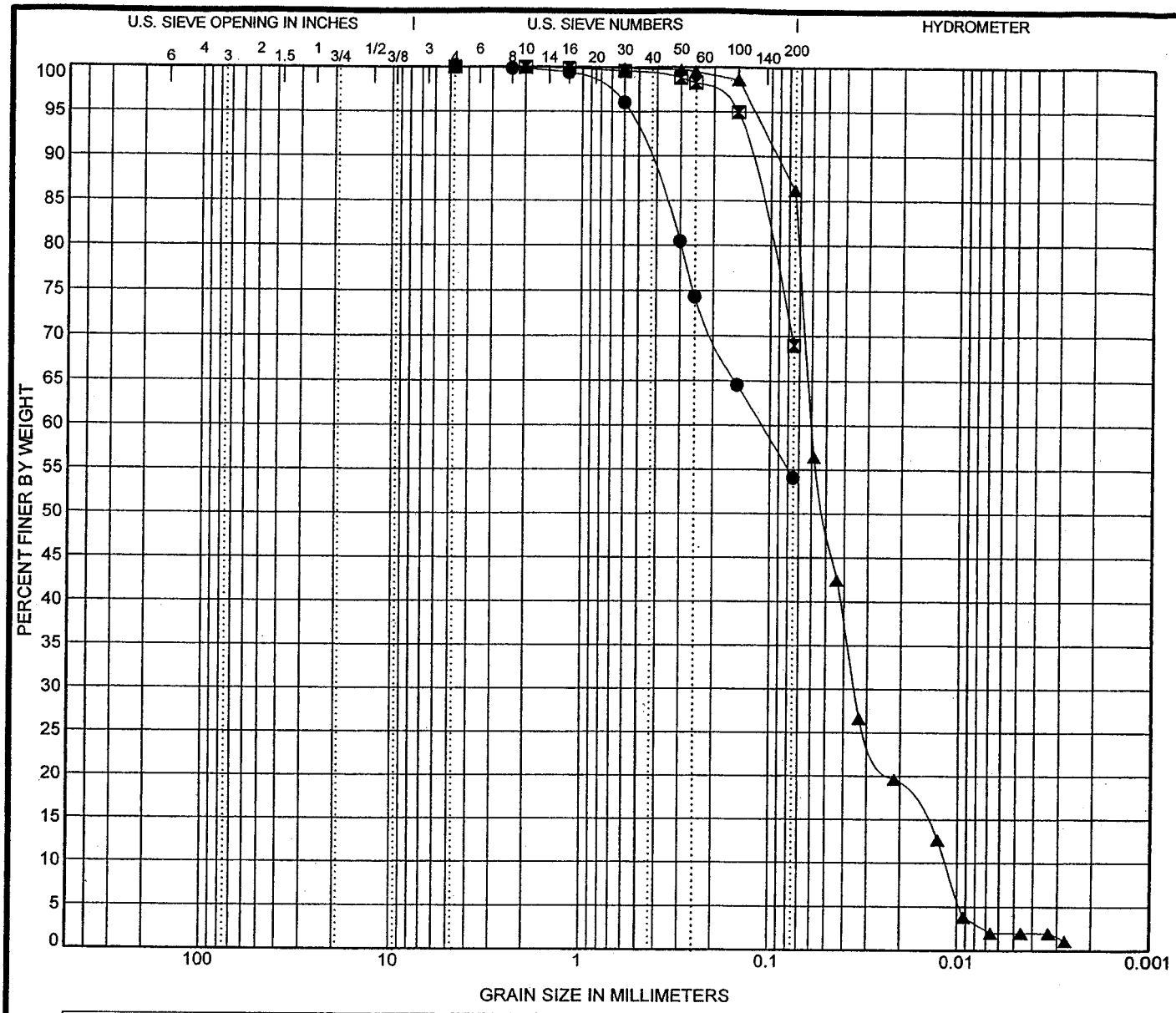
GRAIN SIZE DISTRIBUTION

Project: Mill Creek Extension

Location: Cape May County, NJ

Number: Parsons Brinckerhoff- Job No. 20020B

GRAIN SIZE MILL CREEK.PB.GPJ SADAT ASSOCIATES.GDT 18/3/03



COBBLES	GRAVEL			SAND			SILT OR CLAY
	coarse	medium	fine	coarse	medium	fine	

	Specimen Identification			Classification	LL	PL	PI	Cc	Cu
●	B-8	SS-11	35.0						
⊠	WB-1	SS-2	39.0						
▲	WB-1	SS-5	54.0					1.78	5.19

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-8	35.0	4.75	0.111			0.0	45.9	54.1	
⊠	WB-1	39.0	4.75				0.0	31.0	69.0	
▲	WB-1	54.0	2	0.06	0.035	0.012	0.0	13.8	84.2	2.0

Princeton Geotechnical & Materials Services, LLC
1545 Lamberton Road
Trenton, NJ 08611

GRAIN SIZE DISTRIBUTION

Project: Mill Creek Extension

Location: Cape May County, NJ

Number: Parsons Brinckerhoff- Job No. 20020B

GRAIN SIZE MILL CREEK.PB.GPJ SADAT ASSOCIATES.GDT 18/3/03

FRENCH & PARRELLO
ASSOCIATES, P.A.
CONSULTING ENGINEERS

SUMMARY OF LABORATORY TEST RESULTS

PROJECT: Parsons - Cape May **PROJECT #:** 00L031A **DATE:** 7/00

Boring & Sample Number	Source	Classification	Natural Water Content %	Atterberg Limits		Unconfined Compression		Unit Dry Weight	Specific Gravity	Pocket Pen. TSF	Torvane TSF	Grain Size	Consolidation	Triaxial	CBR	pH	Organic Content %
				Liquid Limit	Plastic Limit	Stress TSF	Strain %										
PB-1 U-1	10' - 12'	Dark Grey Organic SILT, with fibers	103	121	48			44	2.56	0.25	0.43		*				
PB-1 S-7	14' - 16'	Dark Grey Organic SILT	71														
PB-2 S-2	5' - 7'	Grey cmf- SAND, trace+ f Gravel, trace- Silt	19									*					
PB-2 U-1	13' - 15'	Hold															
PB-3 S-8	17' - 19'	Dark Grey Organic SILT, little+ mf Sand	40	28	16												2.27
PB-4 S-9	19' - 20'	Dark Grey Organic SILT, trace f Sand	31														
PB-5 U-1	12' - 14'	Dark Grey Organic SILT	68	63	27			56	2.67	0.17	0.15		*				
PB-6 S-6	13' - 15'	Dark Grey Organic SILT, trace cmf Sand	74	59	26												
PB-7 S-2	5' - 7'	Grey c-mf SAND, little m-f Gravel, trace+ Silt	18									*					
PB-7 U-1	19' - 21'	Dark Grey c-mf SAND, some Organic Silt, trace- f Gravel	21	NP	NP			105	2.62	0.45	0.3	*	*				
PB-8 S-8	17' - 19'	Dark Grey Organic SILT	62	75	30												4.38
PB-9 U-1	12' - 14'	Dark Grey Organic SILT, with fibers	100	125	52			42	2.59	0.35	0.25		*				
B-1 S-8	17' - 19'	Dark Grey Organic SILT, trace- Shell fragments	42	44	20												2.33
B-1 S-15	35' - 37'	Dark Grey Organic SILT	38	38	18												2.87
B-2 S-5	20' - 22'	Dark Grey Organic SILT	62	79	27												5.00

* SEE TEST CURVES

FRENCH & PARRELLO
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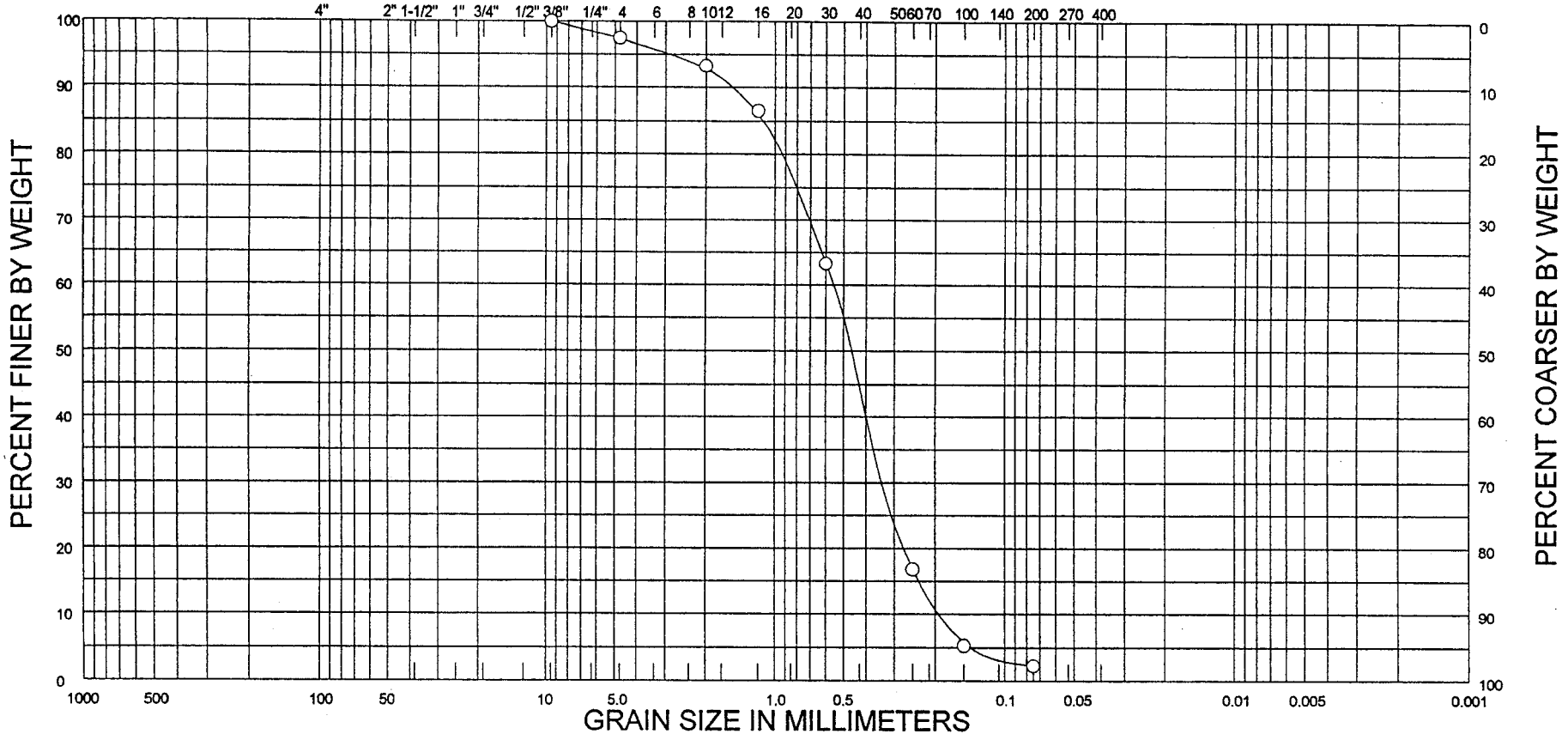
CONSULTING ENGINEERS

SUMMARY OF LABORATORY TEST RESULTS

PROJECT: Parsons - Cape May **PROJECT #:** 00L031A **DATE:** 7/00

Boring & Sample Number	Source	Classification	Natural Water Content %	Atterberg Limits		Unconfined Compression		Unit Dry Weight	Specific Gravity	Pocket Pen. TSF	Torvane TSF	Grain Size	Consolidation	Triaxial	CBR	pH	Organic Content %
				Liquid Limit	Plastic Limit	Stress TSF	Strain %										
B-3 S-6	25' - 27'	Dark Grey cmf SAND, some+ Silt & Clay, little- mf Gravel	16	17	12												1.25
B-4 S-6	25' - 27'	Grey f SAND, trace+ Silt	30									*					
B-4 S-12	55' - 57'	Dark Grey Organic SILT, trace+ mf Sand	27	26	17												1.02

* SEE TEST CURVES



BURMISTER CLASSIFICATION	COBBLES	GRAVEL c	GRAVEL m	GRAVEL f	SAND c	SAND m	SAND f	SILT OR CLAY	
		76.2	25.4	9.52	2.0	0.59	0.25	0.074	Millimeters
		3 in.	1 in.	3/8 in.	Nos. 10	30	60	200	Sieves

00L031A	Parsons - Cape May	
PB-2	S-2	5' - 7'
Grey cmf- SAND, trace+ f Gravel, trace- Silt		

GRADATION CURVE

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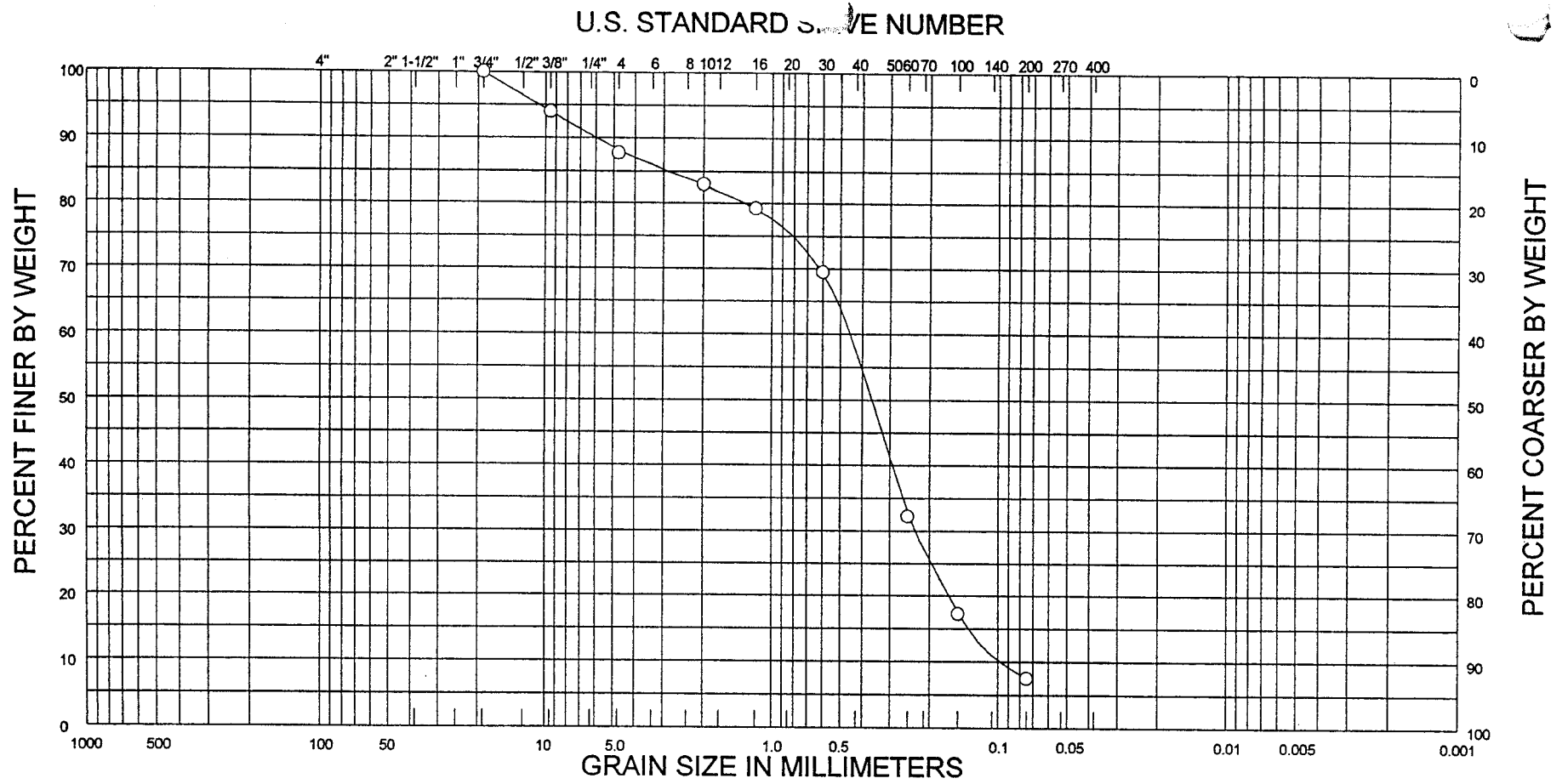

BURMISTER CLASSIFICATION	COBBLES	GRAVEL c	GRAVEL m	GRAVEL f	SAND c	SAND m	SAND f	SILT OR CLAY	
		76.2	25.4	9.52	2.0	0.59	0.25	0.074	Millimeters
		3 in.	1 in.	3/8 in.	Nos. 10	30	60	200	Sieves

00L031A	Parsons - Cape May	
PB-7	S-2	5' - 7'
Grey c-mf SAND, little m-f Gravel, trace+ Silt		

GRADATION CURVE

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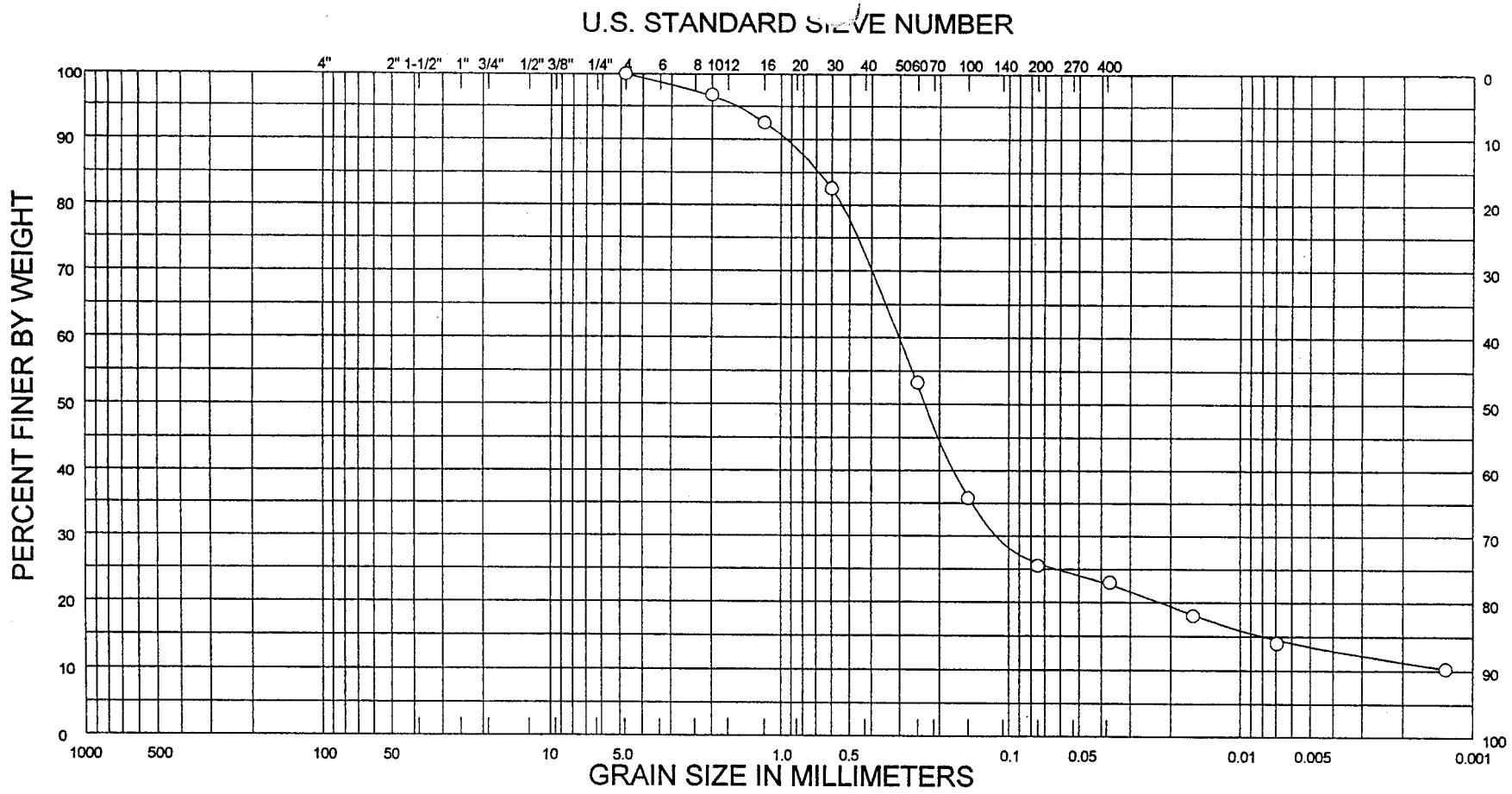
ASSOCIATES, P.A.
CONSULTING ENGINEERS



BURMISTER CLASSIFICATION	COBBLES	GRAVEL c	GRAVEL m	GRAVEL f	SAND c	SAND m	SAND f	SILT OR CLAY	
		76.2	25.4	9.52	2.0	0.59	0.25	0.074	Millimeters
		3 in.	1 in.	3/8 in.	Nos. 10	30	60	200	Sieves

00L031A Parsons - Cape May
PB-7 U-2 19' - 21'
Dark Grey c-mf SAND, some Organic Silt, trace- f Gravel

GRADATION CURVE

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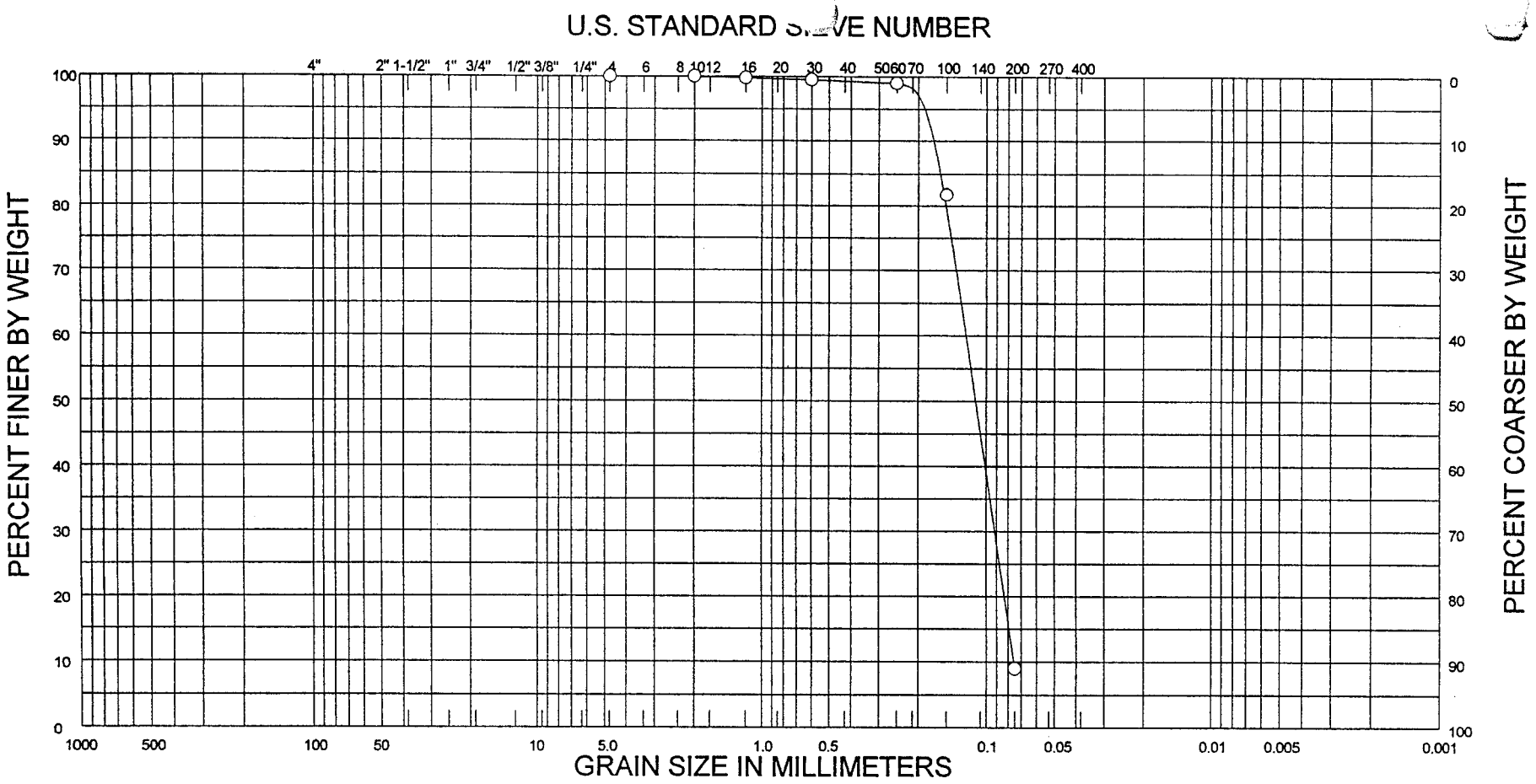

BURMISTER CLASSIFICATION	COBBLES	GRAVEL c	GRAVEL m	GRAVEL f	SAND c	SAND m	SAND f	SILT OR CLAY	
		76.2	25.4	9.52	2.0	0.59	0.25	0.074	Millimeters
		3 in.	1 in.	3/8 in.	Nos. 10	30	60	200	Sieves

00L031A Parsons - Cape May
B-4 S-6 25' - 27'
Grey f SAND, trace+ Silt

GRADATION CURVE

FRENCH & PARRELLO
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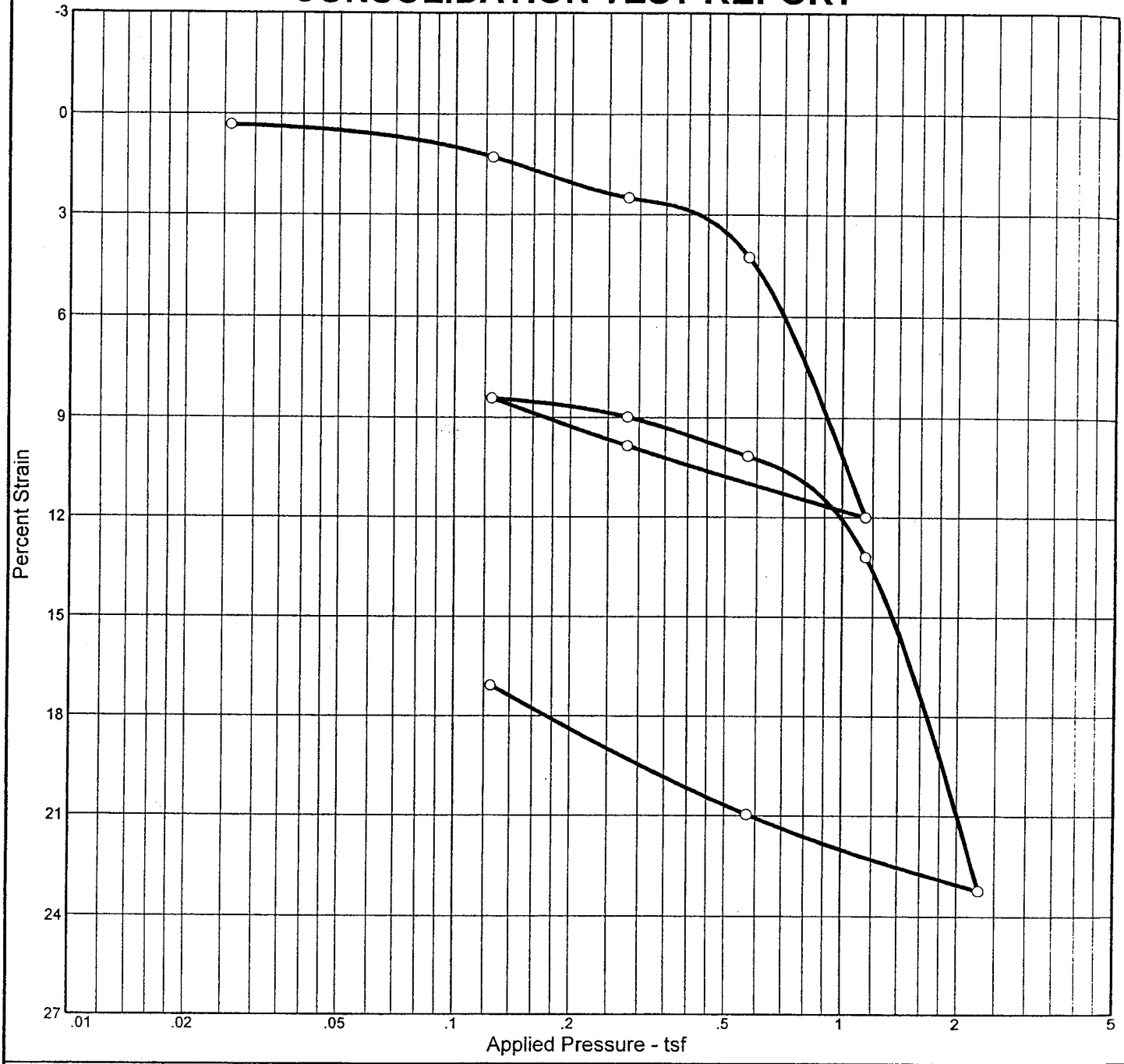
CONSOLIDATION TEST REPORT



Natural Sat.	Natural Moist.	Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Swell Press. (tsf)	Swell %	e_o
100.0 %	103.0 %	44.0	121	73	2.56	0.40	0.76	1.39	0.30			2.636

MATERIAL DESCRIPTION	USCS	AASHTO
Dark Grey Organic SILT with fibers		

Project No. 00L031A **Client:** Parsons

Project: Cape May

Location: PB-1 U-1 10'-12'

Remarks:
PB-1 U-1 10'-12'

CONSOLIDATION TEST REPORT

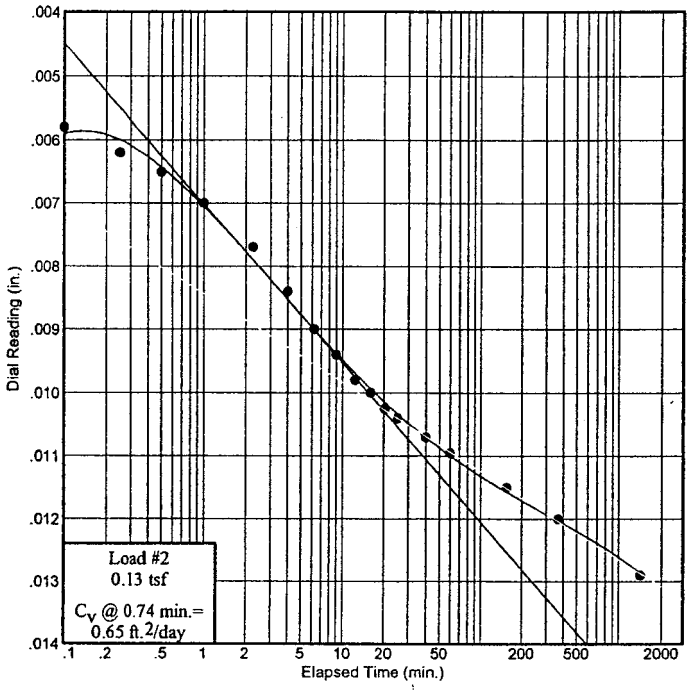
FRENCH & PARRELLO ASSOCIATES, P.A.
CONSULTING ENGINEERS

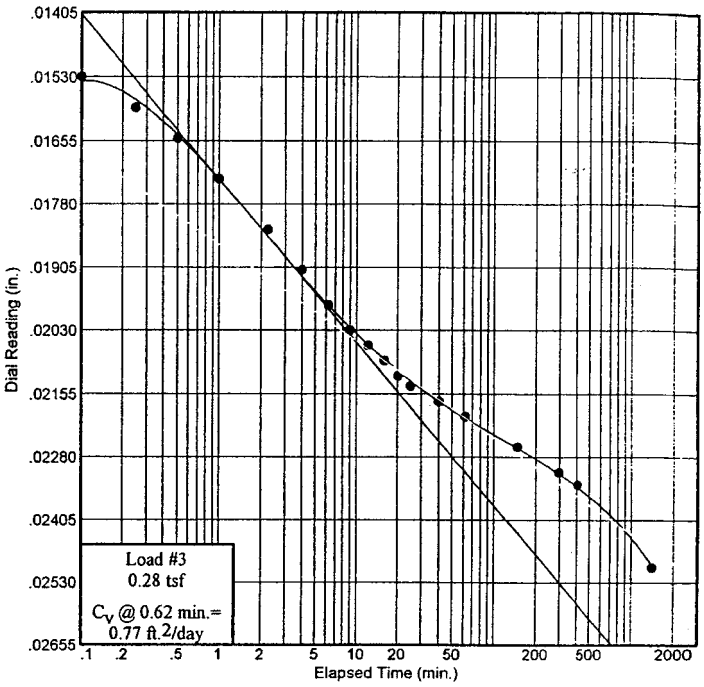
Plate

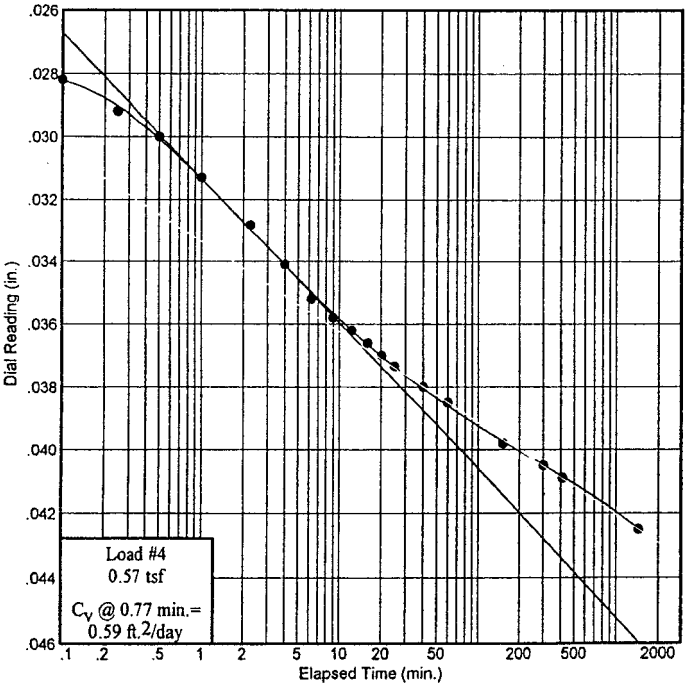
Dial Reading vs. Time

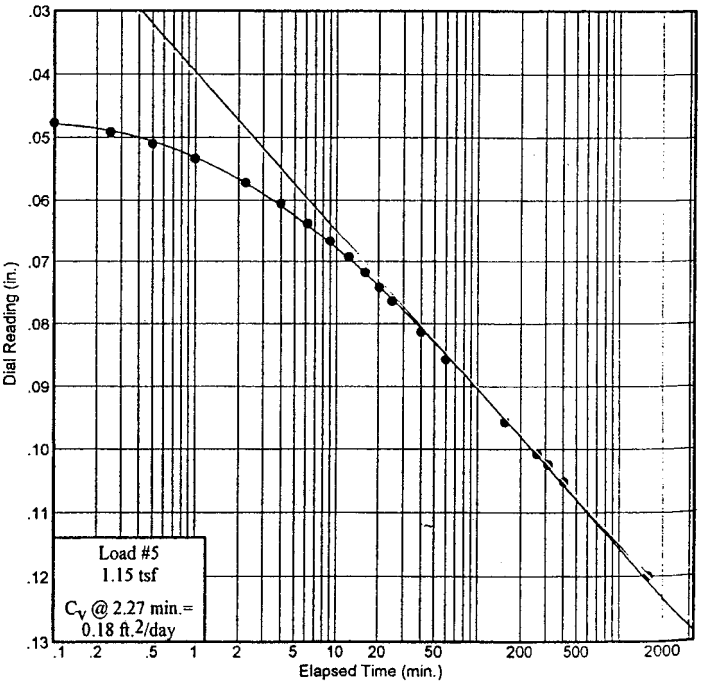
Project No.: 00L031A
Project: Cape May

Location: PB-1 U-1 10'-12'









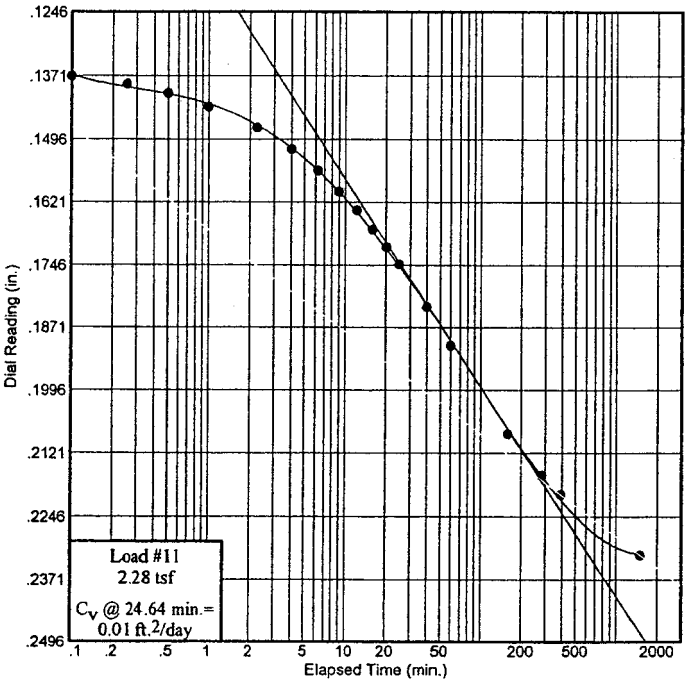
Dial Reading vs. Time
FRENCH & PARRELLO ASSOCIATES, P.A.
CONSULTING ENGINEERS

Plate

Dial Reading vs. Time

Project No.: 00L031A
Project: Cape May

Location: PB-1 U-1 10'-12'



Dial Reading vs. Time
FRENCH & PARRELLO ASSOCIATES, P.A.
CONSULTING ENGINEERS

Plate

CONSOLIDATION TEST DATA

Client: Parsons
Project: Cape May
Project Number: 00L031A

Sample Data

Source: PB-1 U-1 10'-12'
Sample No.: PB-1 U-1 10'12'
Elev. or Depth: 10'-12' **Sample Length (in./cm.):**
Location: PB-1 U-1 10'-12'
Description: Dark Grey Organic SILT with fibers
Liquid Limit: 121 **Plasticity Index:** 73
USCS: **AASHTO:** **Figure No.:**
Testing Remarks: PB-1 U-1 10'-12'

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST		AFTER TEST	
Wet w+t =	114.98 g.	Consolidometer # =	18	Wet w+t =	98.77 g.
Dry w+t =	56.64 g.			Dry w+t =	56.64 g.
Tare Wt. =	.00 g.	Spec. Gravity =	2.56	Tare Wt. =	.00 g.
Height =	1.00 in.	Height =	1.00 in.		
Diameter =	2.50 in.	Diameter =	2.50 in.		
Weight =	114.98 g.	Defl. Table =	n/a		
Moisture =	103.0 %	Ht. Solids =	0.2751 in.	Moisture =	74.4 %
Wet Den. =	89.2 pcf	Dry Wt. =	56.64 g.	Dry Wt. =	56.64 g.*
Dry Den. =	44.0 pcf	Void Ratio =	2.636	Void Ratio =	2.015
Consolidn. =	0.40 tsf	Saturation =	100.0 %		

*** Final dry weight used in calculations**

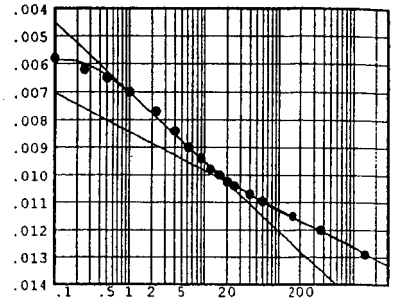
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.00000				2.636	
0.03	0.00330	0.00000			2.624	0.3 Comprs.
0.13	0.01290	0.00000	0.65	0.001	2.589	1.3 Comprs.
0.28	0.02500	0.00000	0.77	0.002	2.545	2.5 Comprs.
0.57	0.04250	0.00000	0.59	0.003	2.481	4.3 Comprs.
1.15	0.12000	0.00000	0.18	0.026	2.199	12.0 Comprs.
0.28	0.09850	0.00000			2.278	9.9 Comprs.
0.13	0.08420	0.00000			2.330	8.4 Comprs.
0.28	0.08985	0.00000			2.309	9.0 Comprs.
0.57	0.10160	0.00000			2.266	10.2 Comprs.
1.15	0.13200	0.00000			2.156	13.2 Comprs.
2.28	0.23220	0.00000	0.01	0.023	1.791	23.2 Comprs.
0.57	0.20965	0.00000			1.873	21.0 Comprs.
0.13	0.17070	0.00000			2.015	17.1 Comprs.

ϕ = 1.39 P_c = 0.76 tsf C_r = 0.30

Pressure: 0.13 tsf | **TEST READINGS** | **Load No. 2**

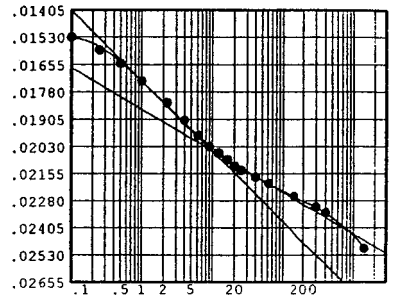
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.00330	11	16.00	0.01000
2	0.10	0.00580	12	20.25	0.01025
3	0.25	0.00620	13	25.00	0.01040
4	0.50	0.00650	14	40.00	0.01070
5	1.00	0.00700	15	60.00	0.01095
6	2.25	0.00770	16	155.00	0.01150
7	4.00	0.00840	17	368.00	0.01200
8	6.25	0.00900	18	1423.00	0.01290
9	9.00	0.00940			
10	12.25	0.00980			



Void Ratio = 2.589 **Compression** = 1.3 %
D_0 = 0.00330 D_{50} = 0.00676 D_{100} = 0.01023
C_v **at 0.7 min.** = 0.65 ft.^{2}/day C_α = 0.001

Pressure: 0.28 tsf | **TEST READINGS** | **Load No. 3**

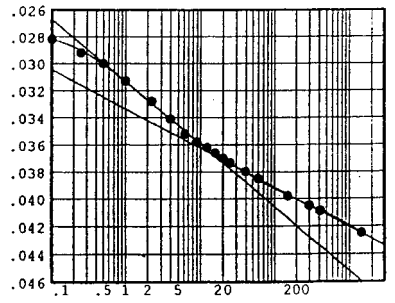
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.01290	11	16.00	0.02090
2	0.10	0.01530	12	20.25	0.02120
3	0.25	0.01590	13	25.00	0.02140
4	0.50	0.01650	14	40.00	0.02170
5	1.00	0.01730	15	62.00	0.02200
6	2.25	0.01830	16	147.00	0.02260
7	4.00	0.01910	17	297.00	0.02310
8	6.25	0.01980	18	408.00	0.02335
9	9.00	0.02030	19	1425.00	0.02500
10	12.25	0.02060			



Void Ratio = 2.545 **Compression** = 2.5 %
D_0 = 0.01290 D_{50} = 0.01669 D_{100} = 0.02047
C_v **at 0.6 min.** = 0.77 ft.^{2}/day C_α = 0.002

Pressure: 0.57 tsf | **TEST READINGS** | **Load No. 4**

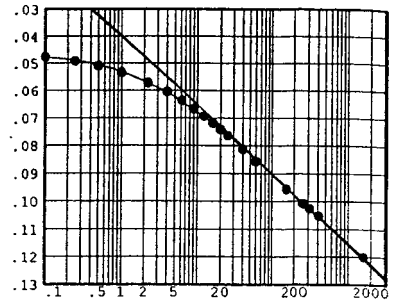
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.02500	11	16.00	0.03660
2	0.10	0.02820	12	20.25	0.03700
3	0.25	0.02920	13	25.00	0.03735
4	0.50	0.03000	14	40.00	0.03800
5	1.00	0.03130	15	60.00	0.03850
6	2.25	0.03280	16	152.00	0.03980
7	4.00	0.03410	17	300.00	0.04050
8	6.25	0.03520	18	413.00	0.04090
9	9.00	0.03580	19	1455.00	0.04250
10	12.25	0.03620			



Void Ratio = 2.481 **Compression** = 4.3 %
D_0 = 0.02500 D_{50} = 0.03087 D_{100} = 0.03673
C_v **at 0.8 min.** = 0.59 ft.^{2}/day C_α = 0.003

Pressure: 1.15 tsf **TEST READINGS** **Load No. 5**

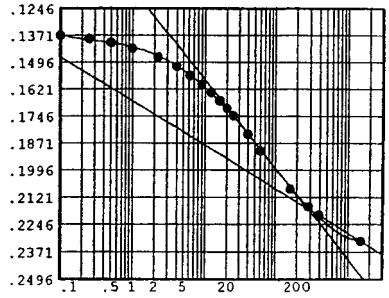
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.04250	11	16.00	0.07180
2	0.10	0.04770	12	20.25	0.07420
3	0.25	0.04920	13	25.00	0.07640
4	0.50	0.05100	14	40.00	0.08130
5	1.00	0.05340	15	60.00	0.08570
6	2.25	0.05720	16	156.00	0.09570
7	4.00	0.06050	17	262.00	0.10080
8	6.25	0.06370	18	313.00	0.10250
9	9.00	0.06670	19	407.00	0.10520
10	12.25	0.06930	20	1602.00	0.12000



Void Ratio = 2.199 **Compression** = 12.0 %
D_0 = 0.04250 D_{50} = 0.05731 D_{100} = 0.07213
C_v **at 2.3 min.** = 0.18 ft.^{2}/day C_α = 0.026

Pressure: 2.28 tsf **TEST READINGS** **Load No. 11**

No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.13200	11	16.00	0.16750
2	0.10	0.13720	12	20.25	0.17100
3	0.25	0.13870	13	25.00	0.17440
4	0.50	0.14050	14	40.00	0.18300
5	1.00	0.14320	15	60.00	0.19070
6	2.25	0.14730	16	160.00	0.20830
7	4.00	0.15160	17	282.00	0.21650
8	6.25	0.15580	18	390.00	0.22030
9	9.00	0.16000	19	1500.00	0.23220
10	12.25	0.16370			

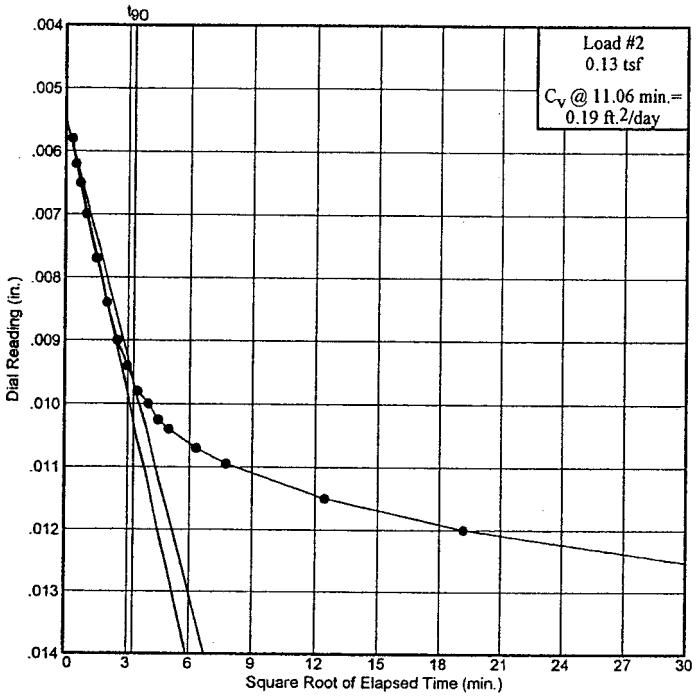


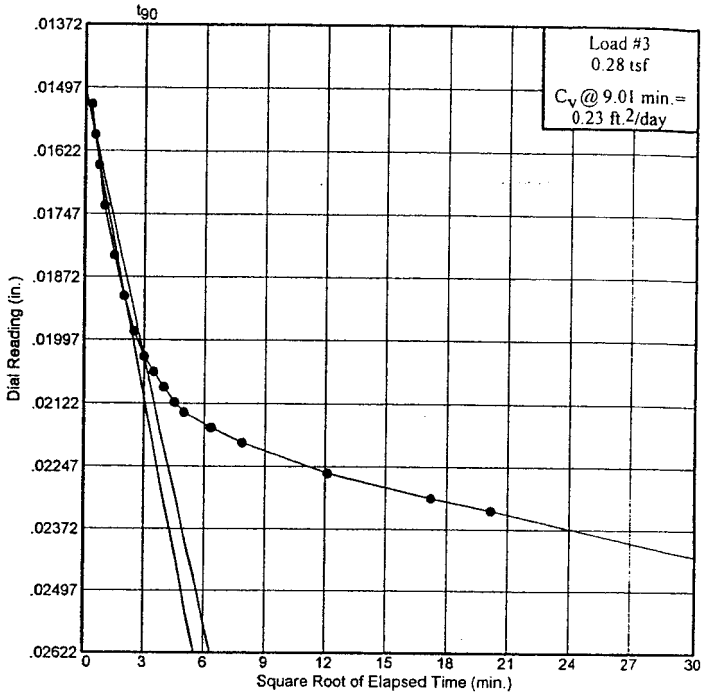
Void Ratio = 1.791 **Compression** = 23.2 %
D_0 = 0.13200 D_{50} = 0.17460 D_{100} = 0.21720
C_v **at 24.6 min.** = 0.01 ft.^{2}/day C_α = 0.023

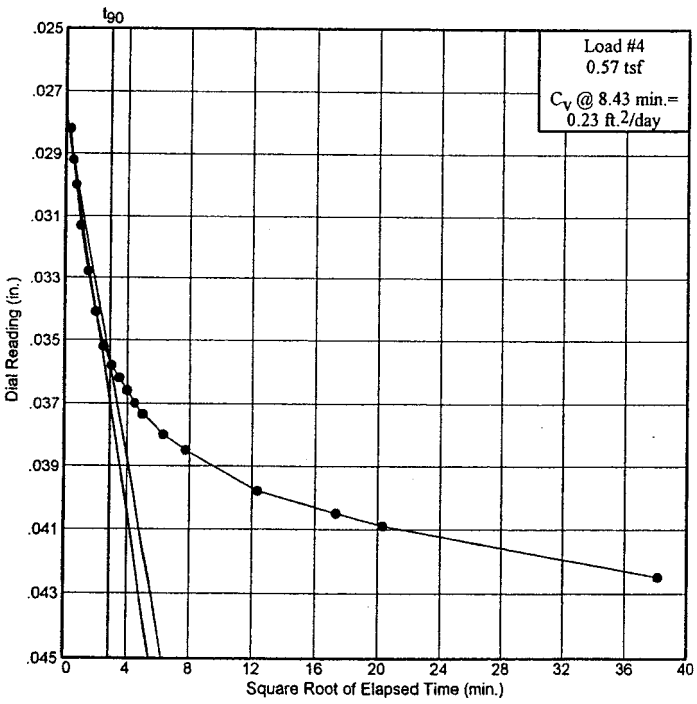
Dial Reading vs. Time

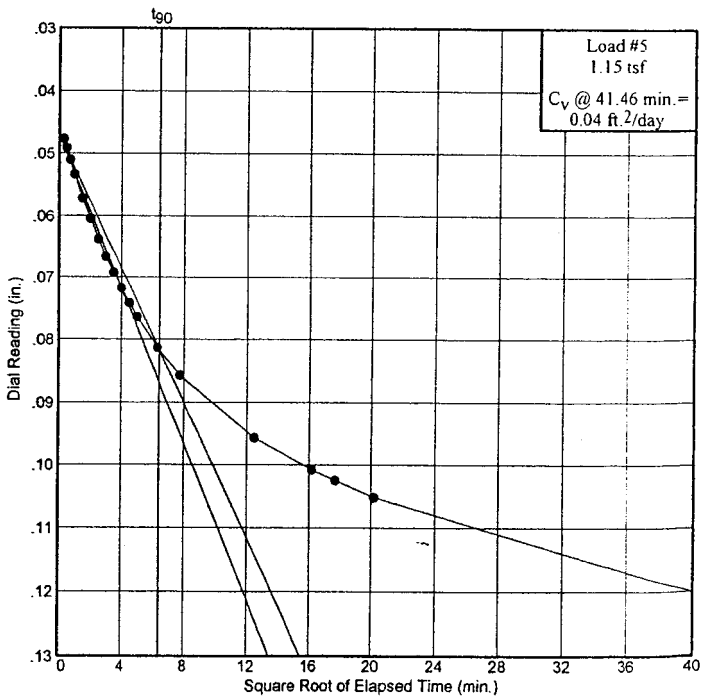
Project No.: 00L031A
Project: Cape May

Location: PB-1 U-1 10'-12'









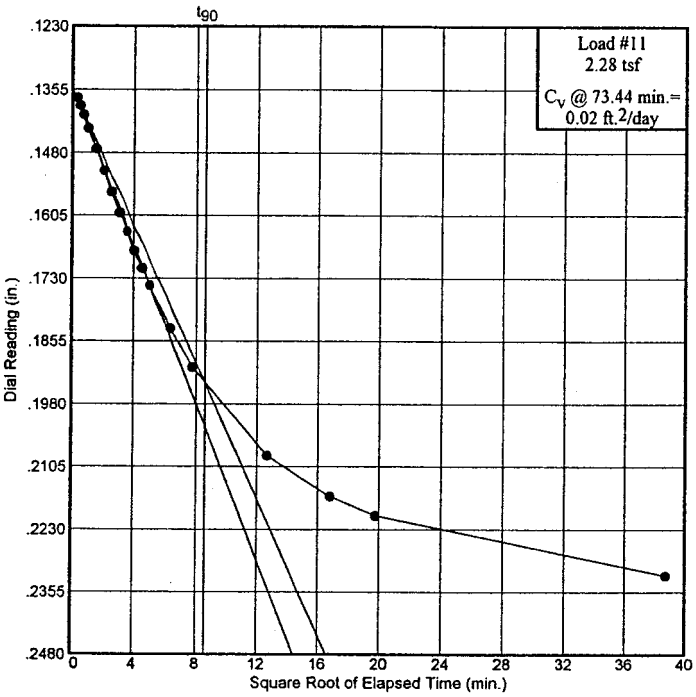
Dial Reading vs. Time
FRENCH & PARRELLO ASSOCIATES, P.A.
CONSULTING ENGINEERS

Plate

Dial Reading vs. Time

Project No.: 00L031A
Project: Cape May

Location: PB-1 U-1 10'-12'



Dial Reading vs. Time
FRENCH & PARRELLO ASSOCIATES, P.A.
CONSULTING ENGINEERS

Plate

CONSOLIDATION TEST DATA

Client: Parsons
Project: Cape May
Project Number: 00L031A

Sample Data

Source: PB-1 U-1 10'-12'
Sample No.: PB-1 U-1 10'12'
Elev. or Depth: 10'-12' **Sample Length (in./cm.):**
Location: PB-1 U-1 10'-12'
Description: Dark Grey Organic SILT with fibers
Liquid Limit: 121 **Plasticity Index:** 73
USCS: **AASHTO:** **Figure No.:**
Testing Remarks: PB-1 U-1 10'-12'

Test Specimen Data

TOTAL SAMPLE	BEFORE TEST	AFTER TEST
Wet w+t = 114.98 g.	**Consolidometer #** = 18	**Wet w+t** = 98.77 g.
Dry w+t = 56.64 g.		**Dry w+t** = 56.64 g.
Tare Wt. = .00 g.	**Spec. Gravity** = 2.56	**Tare Wt.** = .00 g.
Height = 1.00 in.	**Height** = 1.00 in.	
Diameter = 2.50 in.	**Diameter** = 2.50 in.	
Weight = 114.98 g.	**Defl. Table** = n/a	
Moisture = 103.0 %	**Ht. Solids** = 0.2751 in.	**Moisture** = 74.4 %
Wet Den. = 89.2 pcf	**Dry Wt.** = 56.64 g.	**Dry Wt.** = 56.64 g.*
Dry Den. = 44.0 pcf	**Void Ratio** = 2.636	**Void Ratio** = 2.015
Qbrdn. = 0.40 tsf	**Saturation** = 100.0 %	

*** Final dry weight used in calculations**

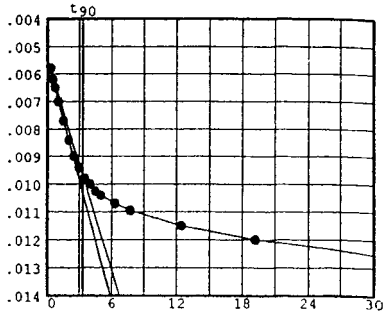
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.00000				2.636	
0.03	0.00330	0.00000			2.624	0.3 Comprs.
0.13	0.01290	0.00000	0.19		2.589	1.3 Comprs.
0.28	0.02500	0.00000	0.23		2.545	2.5 Comprs.
0.57	0.04250	0.00000	0.23		2.481	4.3 Comprs.
1.15	0.12000	0.00000	0.04		2.199	12.0 Comprs.
0.28	0.09850	0.00000			2.278	9.9 Comprs.
0.13	0.08420	0.00000			2.330	8.4 Comprs.
0.28	0.08985	0.00000			2.309	9.0 Comprs.
0.57	0.10160	0.00000			2.266	10.2 Comprs.
1.15	0.13200	0.00000			2.156	13.2 Comprs.
2.28	0.23220	0.00000	0.02		1.791	23.2 Comprs.
0.57	0.20965	0.00000			1.873	21.0 Comprs.
0.13	0.17070	0.00000			2.015	17.1 Comprs.

= 1.39 P_c = 0.76 tsf C_r = 0.30

Pressure: 0.13 tsf **TEST READINGS** **Load No. 2**

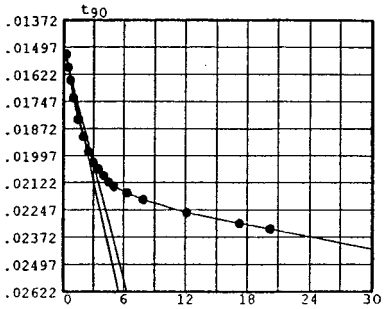
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.00330	11	16.00	0.01000
2	0.10	0.00580	12	20.25	0.01025
3	0.25	0.00620	13	25.00	0.01040
4	0.50	0.00650	14	40.00	0.01070
5	1.00	0.00700	15	60.00	0.01095
6	2.25	0.00770	16	155.00	0.01150
7	4.00	0.00840	17	368.00	0.01200
8	6.25	0.00900	18	1423.00	0.01290
9	9.00	0.00940			
10	12.25	0.00980			



Void Ratio = 2.589 **Compression** = 1.3 %
D_0 = 0.00546 D_{90} = 0.00966 D_{100} = 0.01013
C_v **at 11.1 min.** = 0.19 ft.^{2}/day

Pressure: 0.28 tsf **TEST READINGS** **Load No. 3**

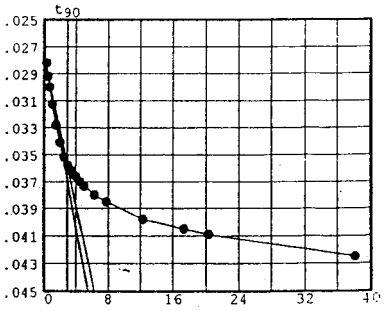
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.01290	11	16.00	0.02090
2	0.10	0.01530	12	20.25	0.02120
3	0.25	0.01590	13	25.00	0.02140
4	0.50	0.01650	14	40.00	0.02170
5	1.00	0.01730	15	62.00	0.02200
6	2.25	0.01830	16	147.00	0.02260
7	4.00	0.01910	17	297.00	0.02310
8	6.25	0.01980	18	408.00	0.02335
9	9.00	0.02030	19	1425.00	0.02500
10	12.25	0.02060			



Void Ratio = 2.545 **Compression** = 2.5 %
D_0 = 0.01497 D_{90} = 0.02030 D_{100} = 0.02089
C_v **at 9.0 min.** = 0.23 ft.^{2}/day

Pressure: 0.57 tsf **TEST READINGS** **Load No. 4**

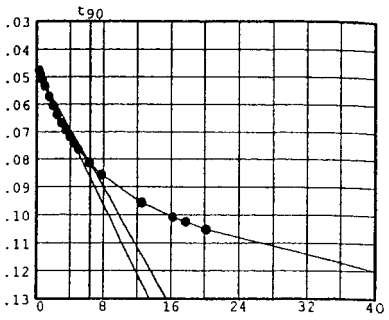
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.02500	11	16.00	0.03660
2	0.10	0.02820	12	20.25	0.03700
3	0.25	0.02920	13	25.00	0.03735
4	0.50	0.03000	14	40.00	0.03800
5	1.00	0.03130	15	60.00	0.03850
6	2.25	0.03280	16	152.00	0.03980
7	4.00	0.03410	17	300.00	0.04050
8	6.25	0.03520	18	413.00	0.04090
9	9.00	0.03580	19	1455.00	0.04250
10	12.25	0.03620			



Void Ratio = 2.481 **Compression** = 4.3 %
D_0 = 0.02769 D_{90} = 0.03568 D_{100} = 0.03657
C_v **at 8.4 min.** = 0.23 ft.^{2}/day

Pressure: 1.15 tsf **TEST READINGS** **Load No. 5**

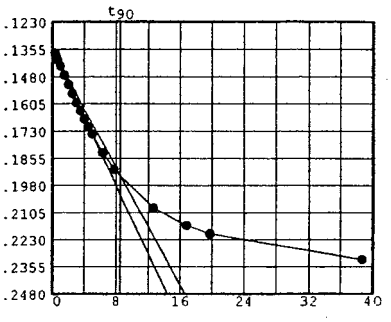
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.04250	11	16.00	0.07180
2	0.10	0.04770	12	20.25	0.07420
3	0.25	0.04920	13	25.00	0.07640
4	0.50	0.05100	14	40.00	0.08130
5	1.00	0.05340	15	60.00	0.08570
6	2.25	0.05720	16	156.00	0.09570
7	4.00	0.06050	17	262.00	0.10080
8	6.25	0.06370	18	313.00	0.10250
9	9.00	0.06670	19	407.00	0.10520
10	12.25	0.06930	20	1602.00	0.12000



Void Ratio = 2.199 **Compression** = 12.0 %
D_0 = 0.04708 D_{90} = 0.08165 D_{100} = 0.08549
C_v **at 41.5 min.** = 0.04 ft.^{2}/day

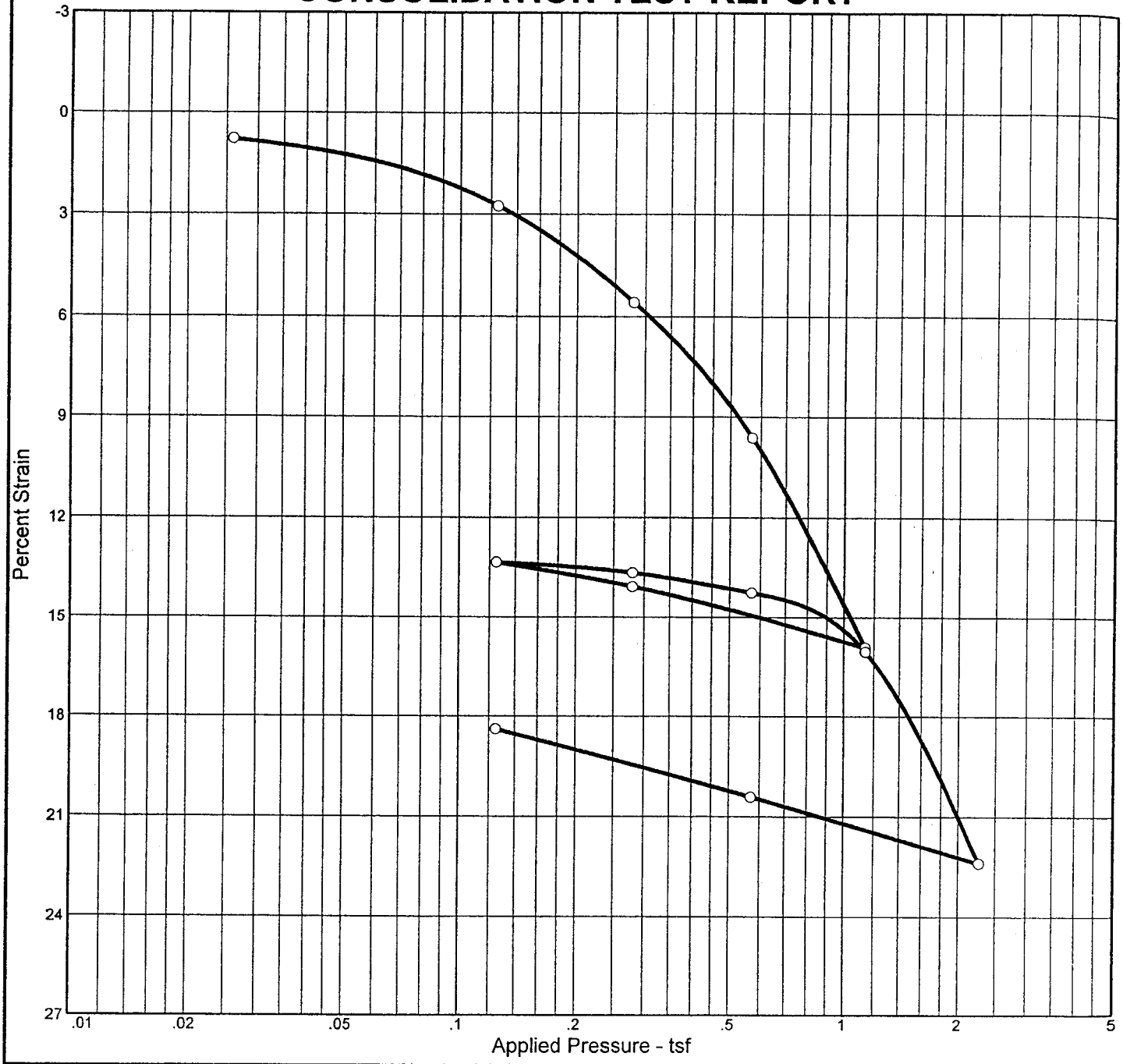
Pressure: 2.28 tsf **TEST READINGS** **Load No. 11**

No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.13200	11	16.00	0.16750
2	0.10	0.13720	12	20.25	0.17100
3	0.25	0.13870	13	25.00	0.17440
4	0.50	0.14050	14	40.00	0.18300
5	1.00	0.14320	15	60.00	0.19070
6	2.25	0.14730	16	160.00	0.20830
7	4.00	0.15160	17	282.00	0.21650
8	6.25	0.15580	18	390.00	0.22030
9	9.00	0.16000	19	1500.00	0.23220
10	12.25	0.16370			



Void Ratio = 1.791 **Compression** = 23.2 %
D_0 = 0.13555 D_{90} = 0.19366 D_{100} = 0.20011
C_v **at 73.4 min.** = 0.02 ft.^{2}/day

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Swell Press. (tsf)	Swell %	e_o
Sat.	Moist.											
101.6 %	68.5 %	59.6	63	36	2.67	0.60	0.57	0.60	0.14			1.799

MATERIAL DESCRIPTION	USCS	AASHTO
Dark Grey Organic SILT		

Project No. 00L031A **Client:** Parsons

Project: Cape May

Location: PB-5 U-1 12'-14'

Remarks:
PB-5 U-1 12'-14'

CONSOLIDATION TEST REPORT

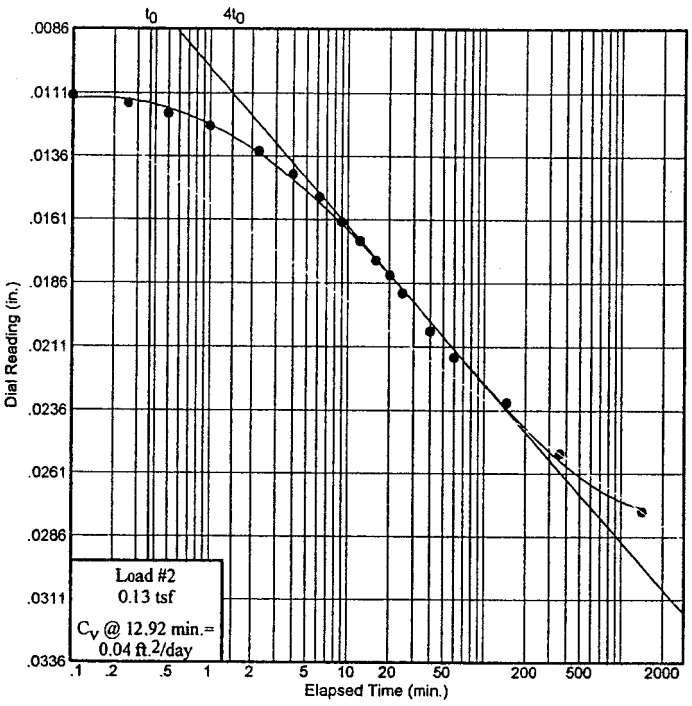
FRENCH & PARRELLO ASSOCIATES, P.A.
CONSULTING ENGINEERS

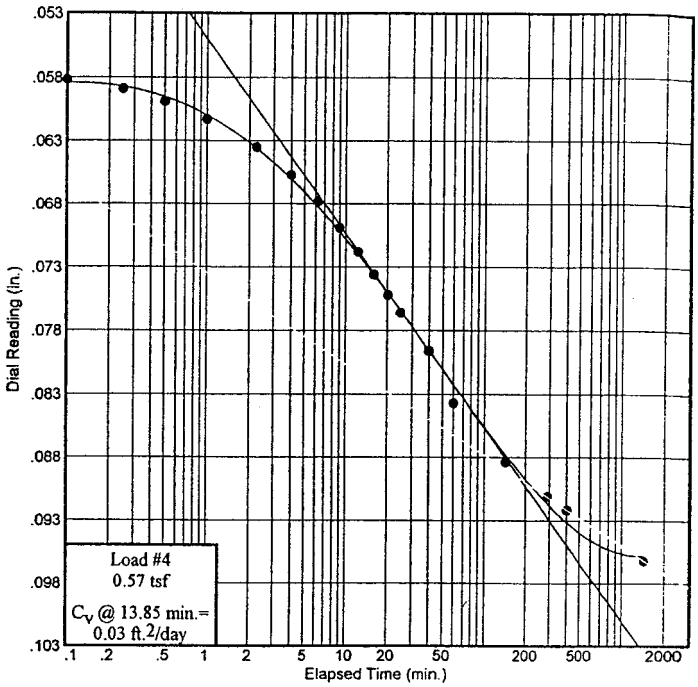
Plate

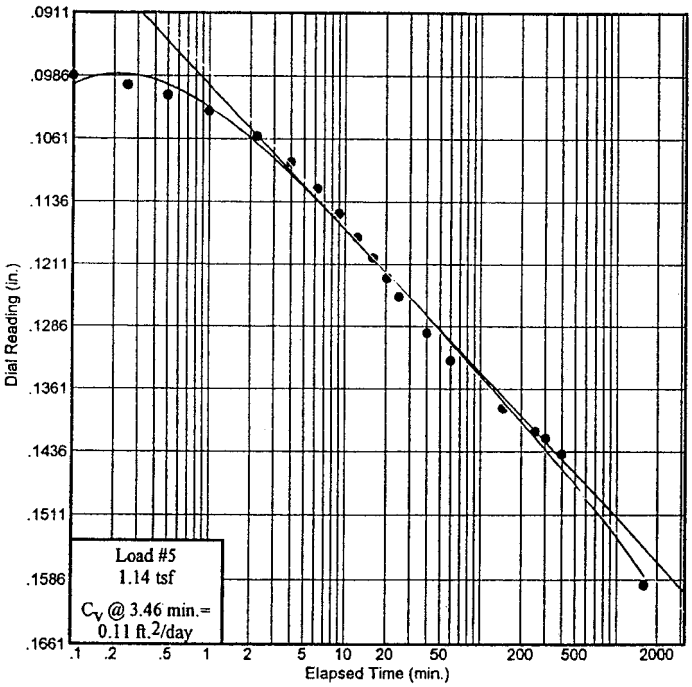
Dial Reading vs. Time

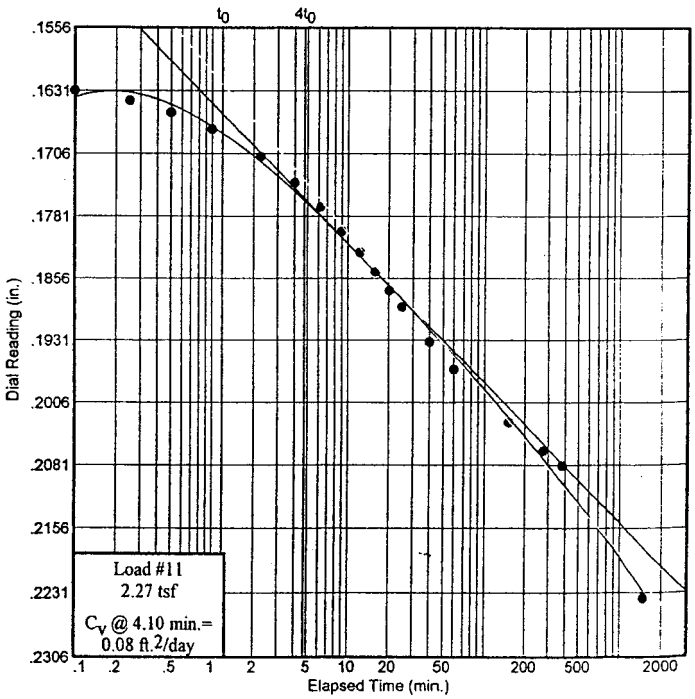
Project No.: 00L031A
Project: Cape May

Location: PB-5 U-1 12'-14'









Dial Reading vs. Time
FRENCH & PARRELLO ASSOCIATES, P.A.
CONSULTING ENGINEERS

Plate

CONSOLIDATION TEST DATA

Client: Parsons
Project: Cape May
Project Number: 00L031A

Sample Data

Source: PB-5 U-1 12'-14'
Sample No.: PB-5 U-1
Elev. or Depth: 12'-14'
Sample Length (in./cm.):
Location: PB-5 U-1 12'-14'
Description: Dark Grey Organic SILT
Liquid Limit: 63
Plasticity Index: 36
USCS:
AASHTO:
Figure No.:
Testing Remarks: PB-5 U-1 12'-14'

Test Specimen Data

TOTAL SAMPLE	BEFORE TEST	AFTER TEST
Wet w+t = 129.27 g.	**Consolidometer #** = 18	**Wet w+t** = 114.58 g.
Dry w+t = 76.74 g.		**Dry w+t** = 76.74 g.
Tare Wt. = .00 g.	**Spec. Gravity** = 2.67	**Tare Wt.** = .00 g.
Height = 1.00 in.	**Height** = 1.00 in.	
Diameter = 2.50 in.	**Diameter** = 2.50 in.	
Weight = 129.27 g.	**Defl. Table** = n/a	
Moisture = 68.5 %	**Ht. Solids** = 0.3573 in.	**Moisture** = 49.3 %
Wet Den. = 100.3 pcf	**Dry Wt.** = 76.74 g.	**Dry Wt.** = 76.74 g.*
Den. = 59.6 pcf	**Void Ratio** = 1.799	**Void Ratio** = 1.284
brdn. = 0.60 tsf	**Saturation** = 101.6 %	

*** Final dry weight used in calculations**

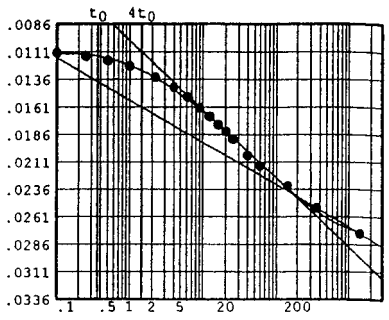
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.00000				1.799	
0.03	0.00790	0.00000			1.777	0.8 Comprs.
0.13	0.02760	0.00000	0.04	0.004	1.721	2.8 Comprs.
0.28	0.05580	0.00000		0.009	1.643	5.6 Comprs.
0.57	0.09620	0.00000	0.03	0.008	1.529	9.6 Comprs.
1.14	0.15920	0.00000	0.11	0.020	1.353	15.9 Comprs.
0.28	0.14075	0.00000			1.405	14.1 Comprs.
0.13	0.13340	0.00000			1.425	13.3 Comprs.
0.28	0.13655	0.00000			1.417	13.7 Comprs.
0.57	0.14260	0.00000			1.400	14.3 Comprs.
1.14	0.16040	0.00000			1.350	16.0 Comprs.
2.27	0.22380	0.00000	0.08	0.023	1.172	22.4 Comprs.
0.57	0.20415	0.00000			1.227	20.4 Comprs.
0.13	0.18390	0.00000			1.284	18.4 Comprs.

= 0.60 P_c = 0.57 tsf C_r = 0.14

Pressure: 0.13 tsf **TEST READINGS** **Load No. 2**

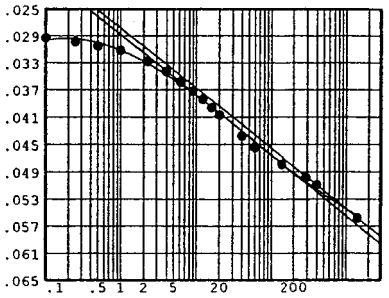
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.00790	11	16.00	0.01770
2	0.10	0.01120	12	20.25	0.01830
3	0.25	0.01150	13	25.00	0.01900
4	0.50	0.01190	14	40.00	0.02050
5	1.00	0.01240	15	60.00	0.02150
6	2.25	0.01340	16	146.00	0.02330
7	4.00	0.01430	17	359.00	0.02530
8	6.25	0.01520	18	1423.00	0.02760
9	9.00	0.01620			
10	12.25	0.01695			



Void Ratio = 1.721 **Compression** = 2.8 %
D_0 = 0.01019 D_{50} = 0.01715 D_{100} = 0.02411
C_v **at 12.9 min.** = 0.04 ft.^{2}/day C_α = 0.004

Pressure: 0.28 tsf **TEST READINGS** **Load No. 3**

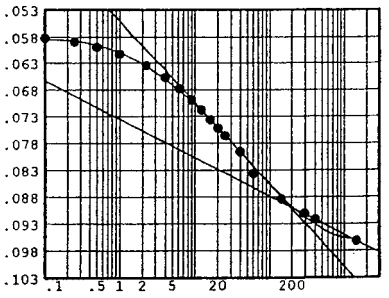
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.02760	11	16.00	0.03960
2	0.10	0.02930	12	20.25	0.04070
3	0.25	0.02990	13	40.00	0.04380
4	0.50	0.03050	14	60.00	0.04540
5	1.00	0.03120	15	138.00	0.04790
6	2.25	0.03280	16	288.00	0.04990
7	4.00	0.03430	17	399.00	0.05090
8	6.25	0.03580	18	1425.00	0.05580
9	9.00	0.03720			
10	12.25	0.03840			



Void Ratio = 1.643 **Compression** = 5.6 %

Pressure: 0.57 tsf **TEST READINGS** **Load No. 4**

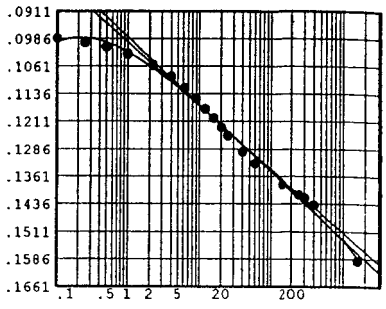
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.05580	11	16.00	0.07360
2	0.10	0.05820	12	20.25	0.07520
3	0.25	0.05890	13	25.00	0.07660
4	0.50	0.05990	14	40.00	0.07960
5	1.00	0.06130	15	60.00	0.08370
6	2.25	0.06350	16	143.00	0.08840
7	4.00	0.06570	17	291.00	0.09110
8	6.25	0.06780	18	404.00	0.09220
9	9.00	0.06990	19	1455.00	0.09620
10	12.25	0.07180			



Void Ratio = 1.529 **Compression** = 9.6 %
D_0 = 0.05580 D_{50} = 0.07278 D_{100} = 0.08975
C_v **at 13.9 min.** = 0.03 ft.^{2}/day C_α = 0.008

Pressure: 1.14 tsf **TEST READINGS** **Load No. 5**

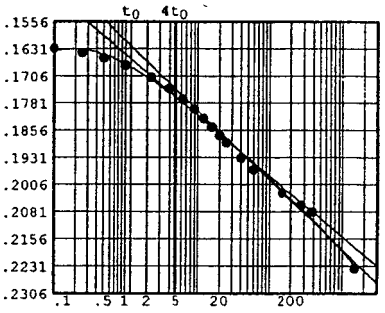
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.09620	11	16.00	0.12030
2	0.10	0.09860	12	20.25	0.12280
3	0.25	0.09970	13	25.00	0.12500
4	0.50	0.10090	14	40.00	0.12940
5	1.00	0.10280	15	60.00	0.13270
6	2.25	0.10580	16	147.00	0.13840
7	4.00	0.10890	17	253.00	0.14120
8	6.25	0.11200	18	304.00	0.14200
9	9.00	0.11500	19	398.00	0.14390
10	12.25	0.11780	20	1601.00	0.15920



Void Ratio = 1.353 **Compression** = 15.9 %
D_0 = 0.09620 D_{50} = 0.10940 D_{100} = 0.12261
C_v **at 3.5 min.** = 0.11 ft.^{2}/day C_α = 0.020

Pressure: 2.27 tsf **TEST READINGS** **Load No. 11**

No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.16040	11	16.00	0.18480
2	0.10	0.16310	12	20.25	0.18710
3	0.25	0.16430	13	25.00	0.18910
4	0.50	0.16570	14	40.00	0.19330
5	1.00	0.16770	15	60.00	0.19660
6	2.25	0.17100	16	151.00	0.20300
7	4.00	0.17410	17	273.00	0.20640
8	6.25	0.17700	18	381.00	0.20820
9	9.00	0.17990	19	1491.00	0.22380
10	12.25	0.18240			

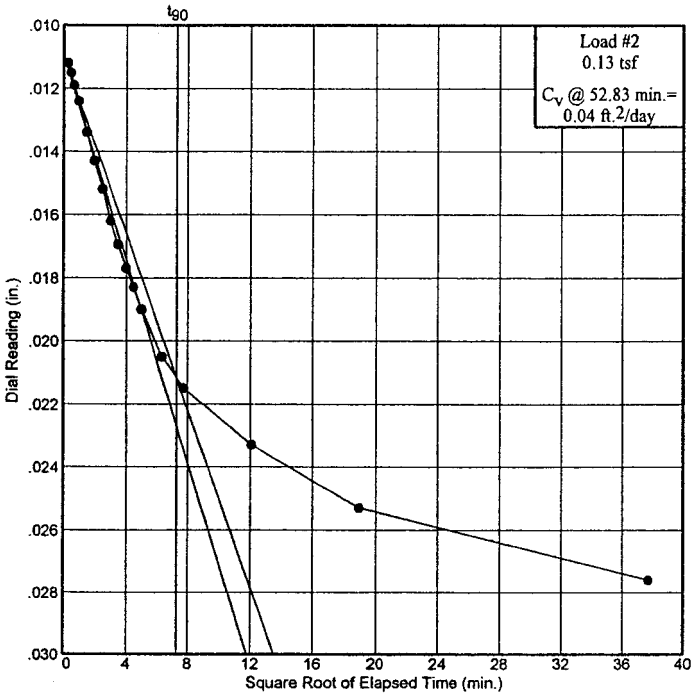


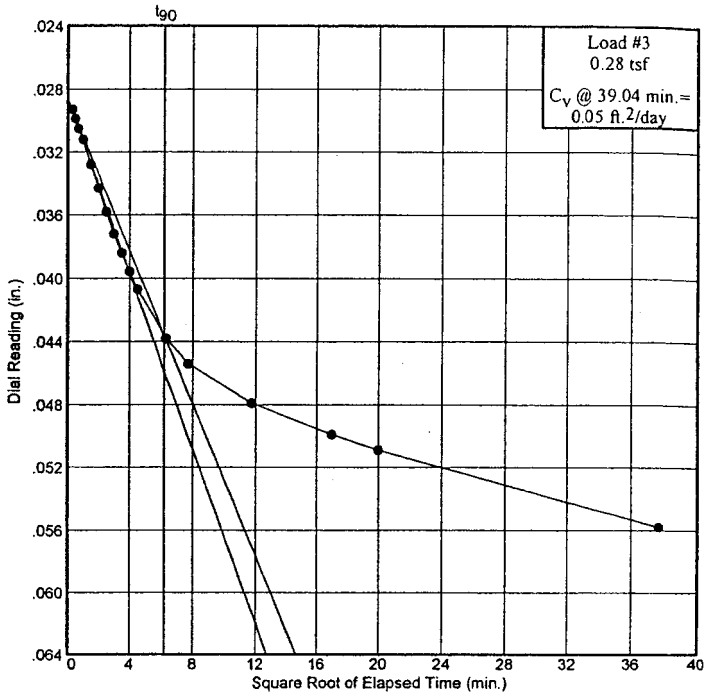
Void Ratio = 1.172 **Compression** = 22.4 %
D_0 = 0.16008 D_{50} = 0.17532 D_{100} = 0.19056
C_v **at 4.1 min.** = 0.08 ft.^{2}/day C_α = 0.023

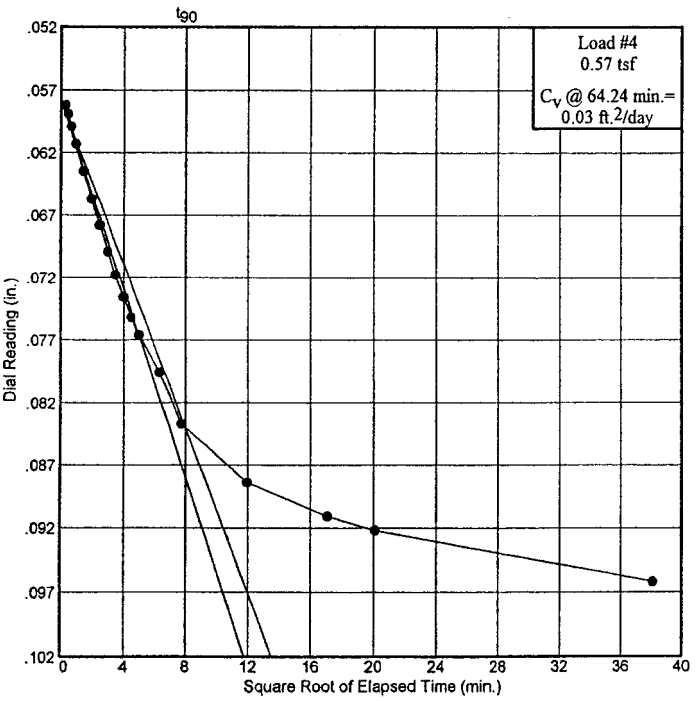
Dial Reading vs. Time

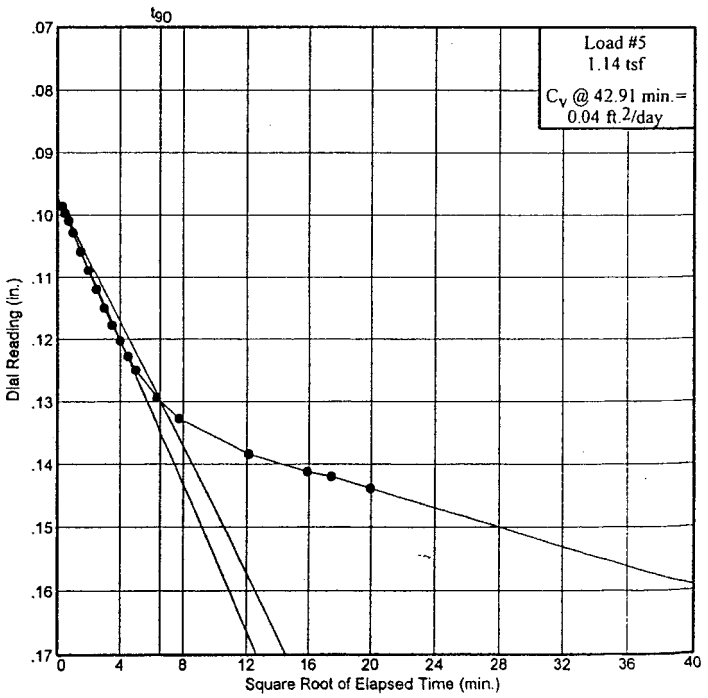
Project No.: 00L031A
Project: Cape May

Location: PB-5 U-1 12'-14'









Dial Reading vs. Time

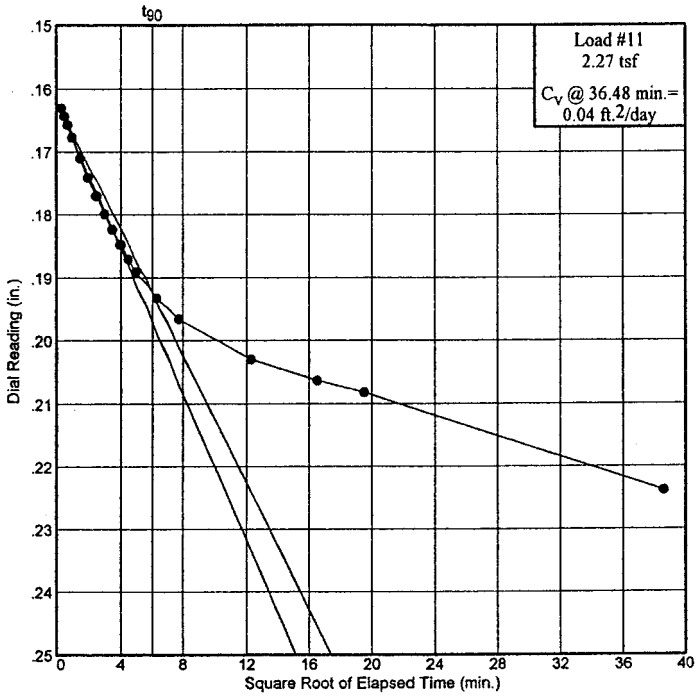
FRENCH & PARRELLO ASSOCIATES, P.A.
CONSULTING ENGINEERS

Plate

Dial Reading vs. Time

Project No.: 00L031A
Project: Cape May

Location: PB-5 U-1 12'-14'



Dial Reading vs. Time
FRENCH & PARRELLO ASSOCIATES, P.A.
CONSULTING ENGINEERS

Plate

CONSOLIDATION TEST DATA

Client: Parsons
Project: Cape May
Project Number: 00L031A

Sample Data

Source: PB-5 U-1 12'-14'
Sample No.: PB-5 U-1
Elev. or Depth: 12'-14' **Sample Length (in./cm.):**
Location: PB-5 U-1 12'-14'
Description: Dark Grey Organic SILT
Liquid Limit: 63 **Plasticity Index:** 36
USCS: **AASHTO:** **Figure No.:**
Testing Remarks: PB-5 U-1 12'-14'

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST		AFTER TEST	
Wet w+t =	129.27 g.	Consolidometer # =	18	Wet w+t =	114.58 g.
Dry w+t =	76.74 g.			Dry w+t =	76.74 g.
Tare Wt. =	.00 g.	Spec. Gravity =	2.67	Tare Wt. =	.00 g.
Height =	1.00 in.	Height =	1.00 in.		
Diameter =	2.50 in.	Diameter =	2.50 in.		
Weight =	129.27 g.	Defl. Table =	n/a		
Moisture =	68.5 %	Ht. Solids =	0.3573 in.	Moisture =	49.3 %
Wet Den. =	100.3 pcf	Dry Wt. =	76.74 g.	Dry Wt. =	76.74 g.*
Den. =	59.6 pcf	Void Ratio =	1.799	Void Ratio =	1.284
brdn. =	0.60 tsf	Saturation =	101.6 %		

*** Final dry weight used in calculations**

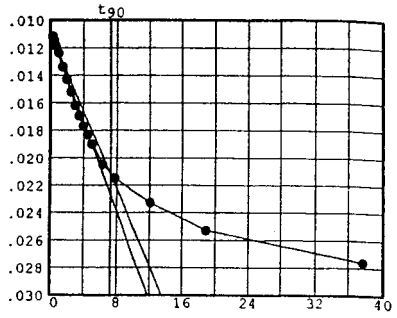
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.00000				1.799	
0.03	0.00790	0.00000			1.777	0.8 Comprs.
0.13	0.02760	0.00000	0.04		1.721	2.8 Comprs.
0.28	0.05580	0.00000	0.05		1.643	5.6 Comprs.
0.57	0.09620	0.00000	0.03		1.529	9.6 Comprs.
1.14	0.15920	0.00000	0.04		1.353	15.9 Comprs.
0.28	0.14075	0.00000			1.405	14.1 Comprs.
0.13	0.13340	0.00000			1.425	13.3 Comprs.
0.28	0.13655	0.00000			1.417	13.7 Comprs.
0.57	0.14260	0.00000			1.400	14.3 Comprs.
1.14	0.16040	0.00000			1.350	16.0 Comprs.
2.27	0.22380	0.00000	0.04		1.172	22.4 Comprs.
0.57	0.20415	0.00000			1.227	20.4 Comprs.
0.13	0.18390	0.00000			1.284	18.4 Comprs.

= 0.60 P_c = 0.57 tsf C_r = 0.14

Pressure: 0.13 tsf **TEST READINGS** **Load No. 2**

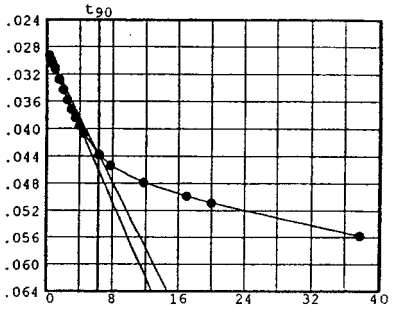
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.00790	11	16.00	0.01770
2	0.10	0.01120	12	20.25	0.01830
3	0.25	0.01150	13	25.00	0.01900
4	0.50	0.01190	14	40.00	0.02050
5	1.00	0.01240	15	60.00	0.02150
6	2.25	0.01340	16	146.00	0.02330
7	4.00	0.01430	17	359.00	0.02530
8	6.25	0.01520	18	1423.00	0.02760
9	9.00	0.01620			
10	12.25	0.01695			



Void Ratio = 1.721 **Compression** = 2.8 %
D_0 = 0.01093 D_{90} = 0.02116 D_{100} = 0.02230
C_v **at 52.8 min.** = 0.04 ft.^{2}/day

Pressure: 0.28 tsf **TEST READINGS** **Load No. 3**

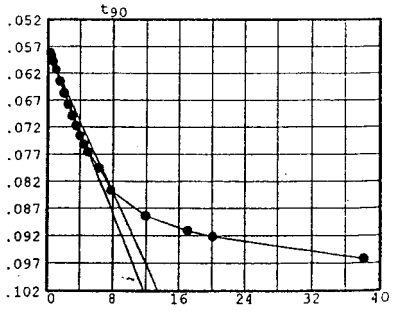
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.02760	11	16.00	0.03960
2	0.10	0.02930	12	20.25	0.04070
3	0.25	0.02990	13	40.00	0.04380
4	0.50	0.03050	14	60.00	0.04540
5	1.00	0.03120	15	138.00	0.04790
6	2.25	0.03280	16	288.00	0.04990
7	4.00	0.03430	17	399.00	0.05090
8	6.25	0.03580	18	1425.00	0.05580
9	9.00	0.03720			
10	12.25	0.03840			



Void Ratio = 1.643 **Compression** = 5.6 %
D_0 = 0.02858 D_{90} = 0.04367 D_{100} = 0.04535
C_v **at 39.0 min.** = 0.05 ft.^{2}/day

Pressure: 0.57 tsf **TEST READINGS** **Load No. 4**

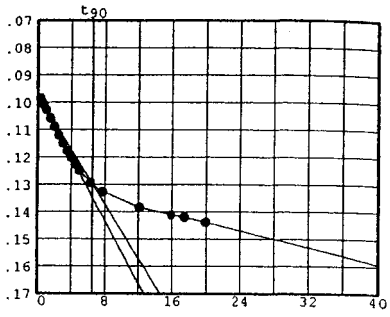
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.05580	11	16.00	0.07360
2	0.10	0.05820	12	20.25	0.07520
3	0.25	0.05890	13	25.00	0.07660
4	0.50	0.05990	14	40.00	0.07960
5	1.00	0.06130	15	60.00	0.08370
6	2.25	0.06350	16	143.00	0.08840
7	4.00	0.06570	17	291.00	0.09110
8	6.25	0.06780	18	404.00	0.09220
9	9.00	0.06990	19	1455.00	0.09620
10	12.25	0.07180			



Void Ratio = 1.529 **Compression** = 9.6 %
D_0 = 0.05775 D_{90} = 0.08400 D_{100} = 0.08692
C_v **at 64.2 min.** = 0.03 ft.^{2}/day

Pressure: 1.14 tsf **TEST READINGS** **Load No. 5**

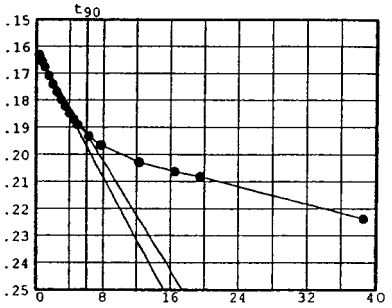
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.09620	11	16.00	0.12030
2	0.10	0.09860	12	20.25	0.12280
3	0.25	0.09970	13	25.00	0.12500
4	0.50	0.10090	14	40.00	0.12940
5	1.00	0.10280	15	60.00	0.13270
6	2.25	0.10580	16	147.00	0.13840
7	4.00	0.10890	17	253.00	0.14120
8	6.25	0.11200	18	304.00	0.14200
9	9.00	0.11500	19	398.00	0.14390
10	12.25	0.11780	20	1601.00	0.15920



Void Ratio = 1.353 **Compression** = 15.9 %
D_0 = 0.09710 D_{90} = 0.12992 D_{100} = 0.13357
C_v **at 42.9 min.** = 0.04 ft.^{2}/day

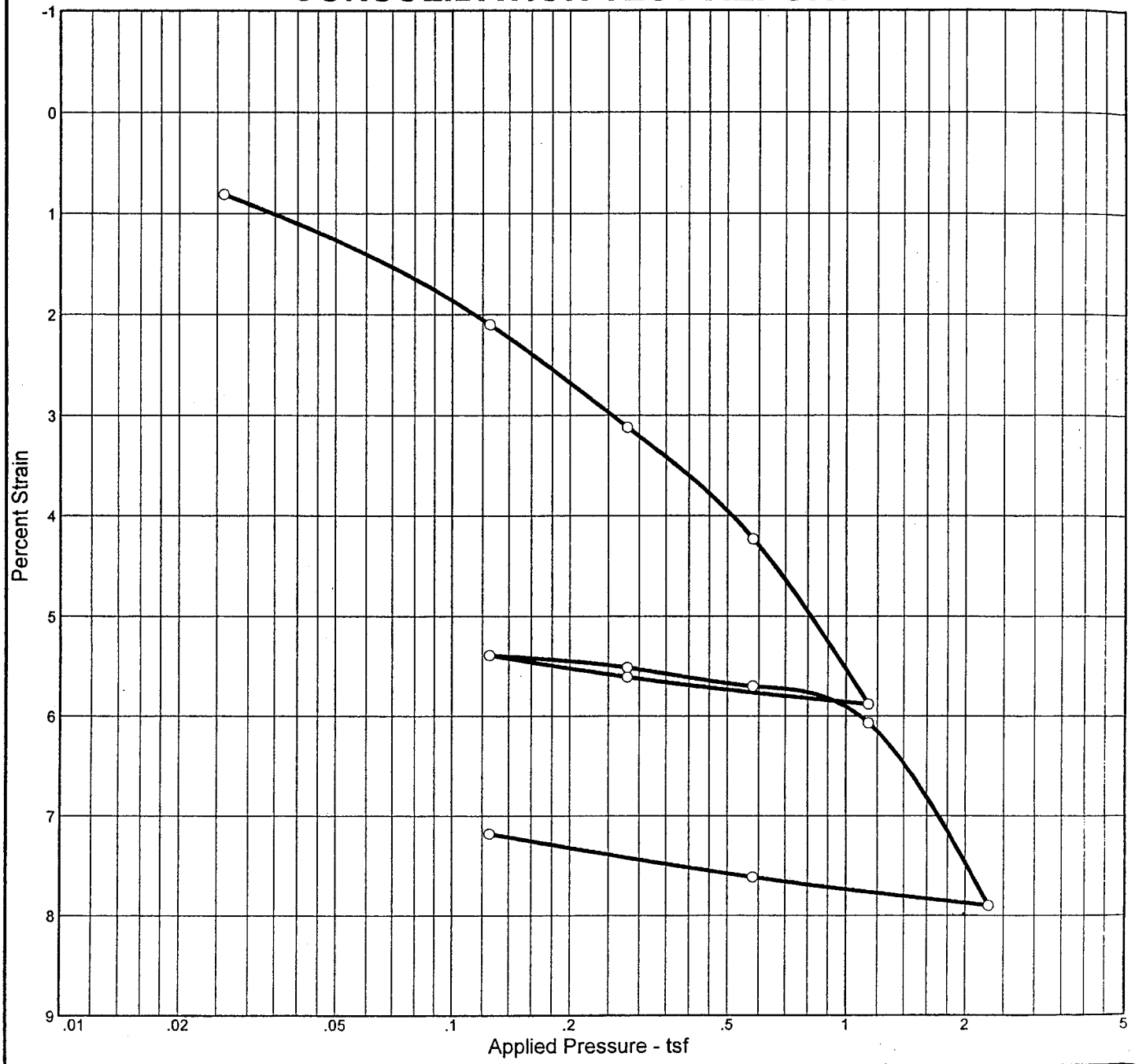
Pressure: 2.27 tsf **TEST READINGS** **Load No. 11**

No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.16040	11	16.00	0.18480
2	0.10	0.16310	12	20.25	0.18710
3	0.25	0.16430	13	25.00	0.18910
4	0.50	0.16570	14	40.00	0.19330
5	1.00	0.16770	15	60.00	0.19660
6	2.25	0.17100	16	151.00	0.20300
7	4.00	0.17410	17	273.00	0.20640
8	6.25	0.17700	18	381.00	0.20820
9	9.00	0.17990	19	1491.00	0.22380
10	12.25	0.18240			



Void Ratio = 1.172 **Compression** = 22.4 %
D_0 = 0.16184 D_{90} = 0.19240 D_{100} = 0.19579
C_v **at 36.5 min.** = 0.04 ft.^{2}/day

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Swell Press. (tsf)	Swell %	e_o
Sat.	Moist.											
100.3 %	21.3 %	105.0	0	0	2.62	0.80	0.69	0.10	0.02			0.557

MATERIAL DESCRIPTION	USCS	AASHTO
Dark Grey c-mf SAND, Some Organic Silt, trace- f Gravel		

Project No. 00L031A **Client:** Parsons

Project: Cape May

Location: PB-7 U-1 12'-14'

Remarks:
PB-7 U-1 19'-21'

CONSOLIDATION TEST REPORT

FRENCH & PARRELLO ASSOCIATES, P.A.

CONSULTING ENGINEERS

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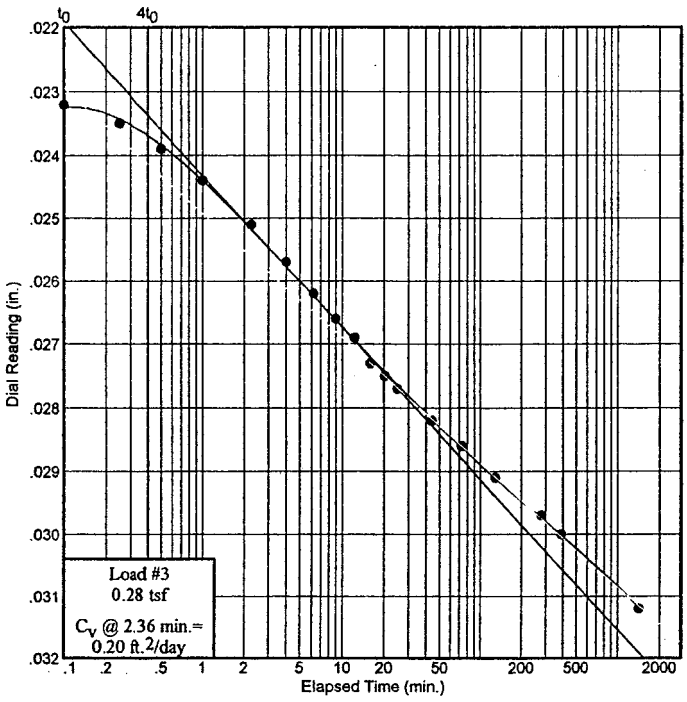
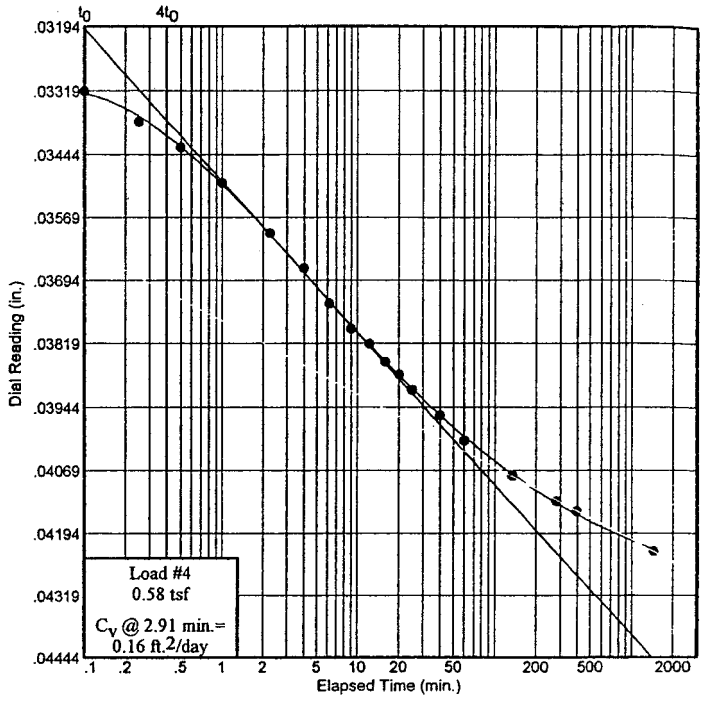
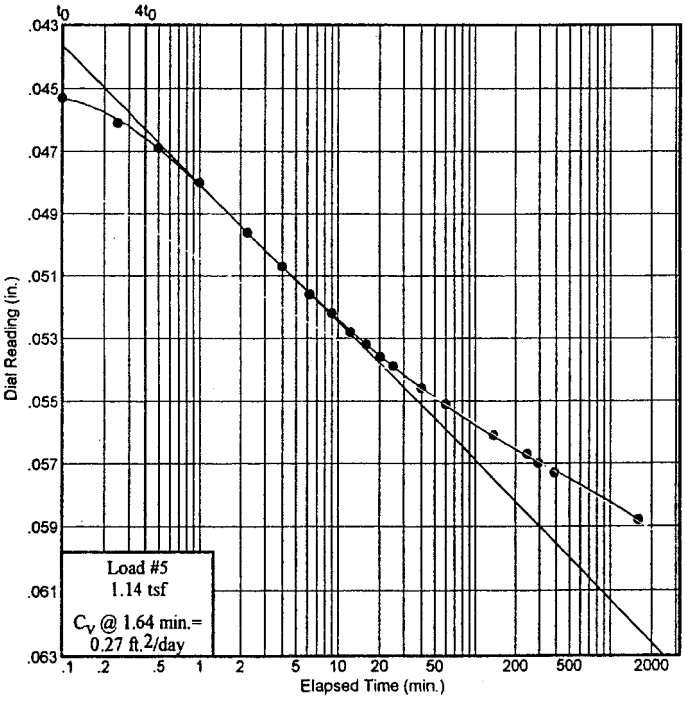
Dial Reading vs. Time

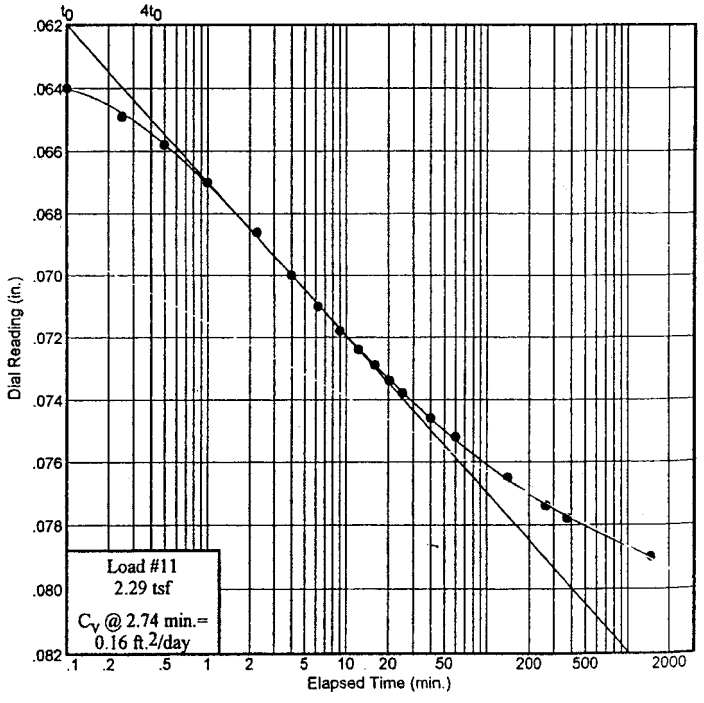
Project No.: 00L031A
Project: Cape May

Location: PB-7 U-1 12'-14'









Dial Reading vs. Time
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CONSULTING ENGINEERS

Plate

CONSOLIDATION TEST DATA

Client: Parsons
Project: Cape May
Project Number: 00L031A

Sample Data

Source: PB-7 U-1 19'-21'
Sample No.: PB-7 U-1
Elev. or Depth: 12'-14' **Sample Length (in./cm.):**
Location: PB-7 U-1 12'-14'
Description: Dark Grey c-mf SAND, Some Organic Silt, trace- f Gravel
Liquid Limit: 0 **Plasticity Index:** 0
USCS: **AASHTO:** **Figure No.:**
Testing Remarks: PB-7 U-1 19'-21'

Test Specimen Data

TOTAL SAMPLE	BEFORE TEST	AFTER TEST
Wet w+t = 164.22 g.	Consolidometer # = 18	Wet w+t = 159.12 g.
Dry w+t = 135.35 g.		Dry w+t = 135.35 g.
Tare Wt. = .00 g.	Spec. Gravity = 2.62	Tare Wt. = .00 g.
Height = 1.00 in.	Height = 1.00 in.	
Diameter = 2.50 in.	Diameter = 2.50 in.	
Weight = 164.22 g.	Defl. Table = n/a	
Moisture = 21.3 %	Ht. Solids = 0.6422 in.	Moisture = 17.6 %
Wet Den. = 127.4 pcf	Dry Wt. = 135.35 g.	Dry Wt. = 135.35 g.*
Den. = 105.0 pcf	Void Ratio = 0.557	Void Ratio = 0.445
brdn. = 0.80 tsf	Saturation = 100.3 %	

*** Final dry weight used in calculations**

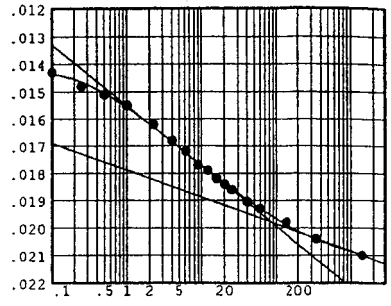
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.00000				0.557	
0.03	0.00810	0.00000			0.544	0.8 Comprs.
0.13	0.02100	0.00000		0.001	0.524	2.1 Comprs.
0.28	0.03120	0.00000	0.20	0.002	0.509	3.1 Comprs.
0.58	0.04230	0.00000	0.16	0.001	0.491	4.2 Comprs.
1.14	0.05880	0.00000	0.27	0.003	0.466	5.9 Comprs.
0.28	0.05610	0.00000			0.470	5.6 Comprs.
0.13	0.05390	0.00000			0.473	5.4 Comprs.
0.28	0.05515	0.00000			0.471	5.5 Comprs.
0.58	0.05700	0.00000			0.468	5.7 Comprs.
1.14	0.06070	0.00000			0.463	6.1 Comprs.
2.29	0.07900	0.00000	0.16	0.003	0.434	7.9 Comprs.
0.58	0.07615	0.00000			0.439	7.6 Comprs.
0.13	0.07180	0.00000			0.445	7.2 Comprs.

= 0.10 P_c = 0.69 tsf C_r = 0.02

Pressure: 0.13 tsf | **TEST READINGS** | **Load No. 2**

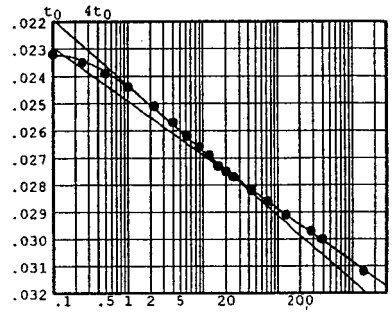
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.00810	11	16.00	0.01820
2	0.10	0.01430	12	20.25	0.01840
3	0.25	0.01480	13	25.00	0.01860
4	0.50	0.01510	14	40.00	0.01905
5	1.00	0.01550	15	60.00	0.01930
6	2.25	0.01620	16	137.00	0.01980
7	4.00	0.01680	17	350.00	0.02040
8	6.25	0.01720	18	1423.00	0.02100
9	9.00	0.01770			
10	12.25	0.01790			



Void Ratio = 0.524 **Compression** = 2.1 %

Pressure: 0.28 tsf | **TEST READINGS** | **Load No. 3**

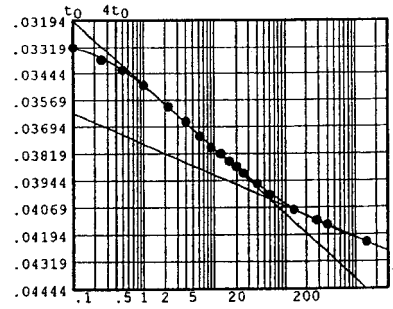
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.02100	11	16.00	0.02730
2	0.10	0.02320	12	20.25	0.02750
3	0.25	0.02350	13	25.00	0.02770
4	0.50	0.02390	14	44.00	0.02820
5	1.00	0.02440	15	73.00	0.02860
6	2.25	0.02510	16	129.00	0.02910
7	4.00	0.02570	17	279.00	0.02970
8	6.25	0.02620	18	390.00	0.03000
9	9.00	0.02660	19	1425.00	0.03120
10	12.25	0.02690			



Void Ratio = 0.509 **Compression** = 3.1 %
D_0 = 0.02281 D_{50} = 0.02523 D_{100} = 0.02765
C_v **at 2.4 min.** = 0.20 ft.^{2}/day C_α = 0.002

Pressure: 0.58 tsf | **TEST READINGS** | **Load No. 4**

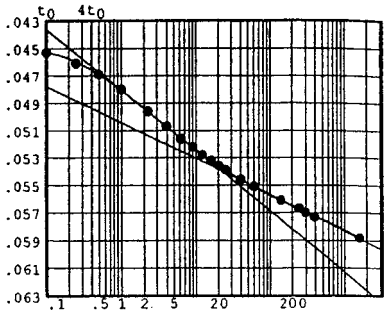
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.03120	11	16.00	0.03855
2	0.10	0.03320	12	20.25	0.03880
3	0.25	0.03380	13	25.00	0.03910
4	0.50	0.03430	14	40.00	0.03960
5	1.00	0.03500	15	60.00	0.04010
6	2.25	0.03600	16	134.00	0.04080
7	4.00	0.03670	17	282.00	0.04130
8	6.25	0.03740	18	395.00	0.04150
9	9.00	0.03790	19	1455.00	0.04230
10	12.25	0.03820			



Void Ratio = 0.491 **Compression** = 4.2 %
D_0 = 0.03243 D_{50} = 0.03637 D_{100} = 0.04031
C_v **at 2.9 min.** = 0.16 ft.^{2}/day C_α = 0.001

Pressure: 1.14 tsf | **TEST READINGS** | **Load No. 5**

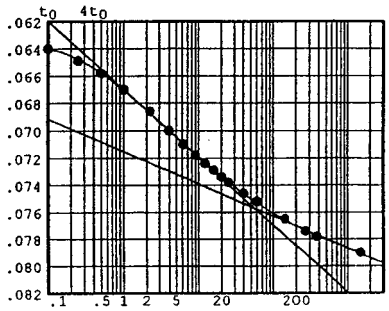
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.04230	11	16.00	0.05320
2	0.10	0.04530	12	20.25	0.05360
3	0.25	0.04610	13	25.00	0.05390
4	0.50	0.04690	14	40.00	0.05460
5	1.00	0.04800	15	60.00	0.05510
6	2.25	0.04960	16	138.00	0.05610
7	4.00	0.05070	17	244.00	0.05670
8	6.25	0.05160	18	295.00	0.05700
9	9.00	0.05220	19	389.00	0.05730
10	12.25	0.05280	20	1600.00	0.05880



Void Ratio = 0.466 **Compression** = 5.9 %
D_0 = 0.04408 D_{50} = 0.04901 D_{100} = 0.05395
C_v **at 1.6 min.** = 0.27 ft.^{2}/day C_α = 0.003

Pressure: 2.29 tsf | **TEST READINGS** | **Load No. 11**

No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.06070	11	16.00	0.07290
2	0.10	0.06400	12	20.25	0.07340
3	0.25	0.06490	13	25.00	0.07380
4	0.50	0.06580	14	40.00	0.07460
5	1.00	0.06700	15	60.00	0.07520
6	2.25	0.06860	16	142.00	0.07650
7	4.00	0.07000	17	264.00	0.07740
8	6.25	0.07100	18	372.00	0.07780
9	9.00	0.07180	19	1482.00	0.07900
10	12.25	0.07240			

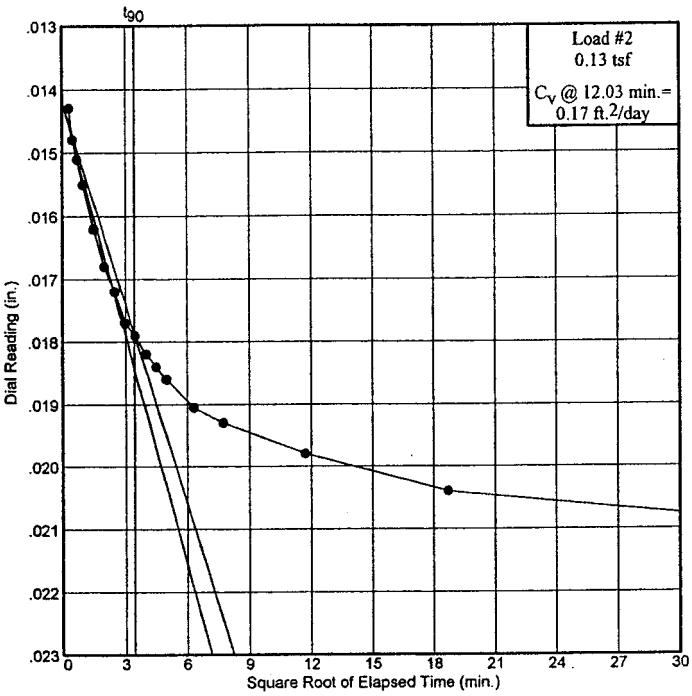


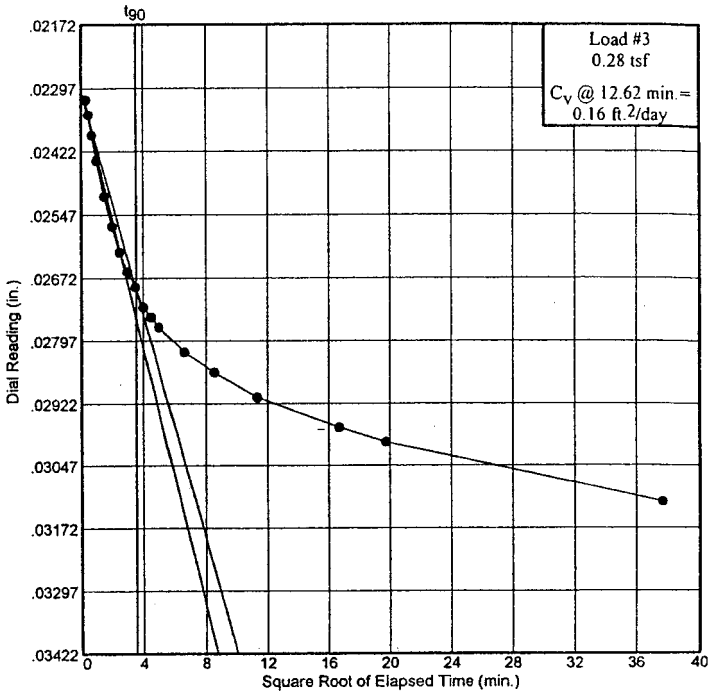
Void Ratio = 0.434 **Compression** = 7.9 %
D_0 = 0.06265 D_{50} = 0.06917 D_{100} = 0.07568
C_v **at 2.7 min.** = 0.16 ft.^{2}/day C_α = 0.003

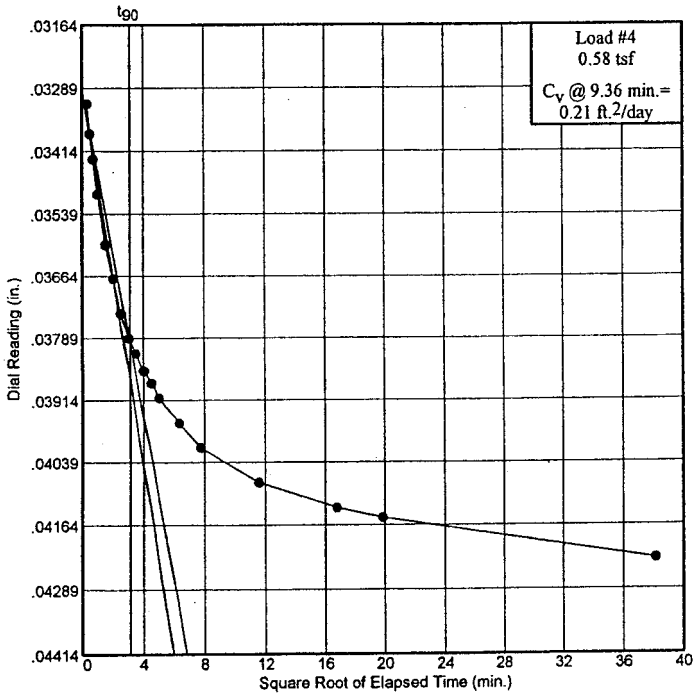
Dial Reading vs. Time

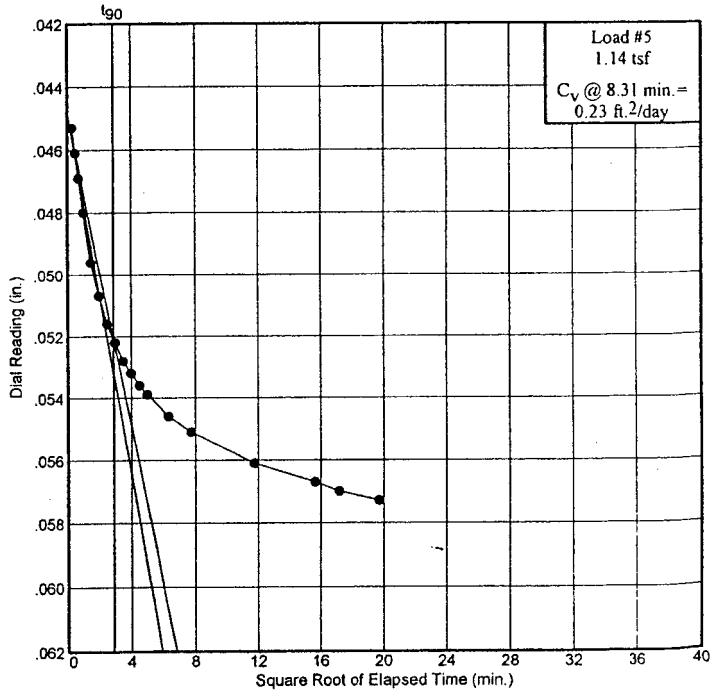
Project No.: 00L031A
Project: Cape May

Location: PB-7 U-1 12'-14'









Dial Reading vs. Time

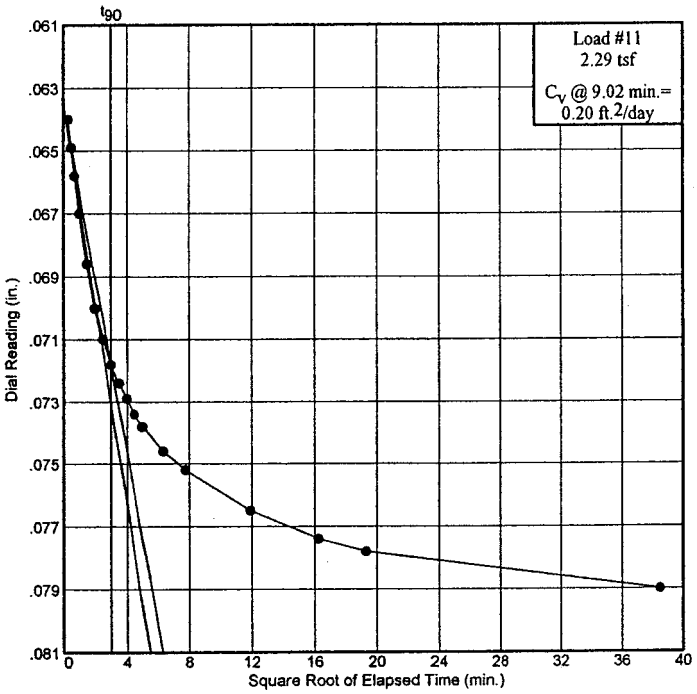
FRENCH & PARRELLO ASSOCIATES, P.A.
CONSULTING ENGINEERS

Plate

Dial Reading vs. Time

Project No.: 00L031A
Project: Cape May

Location: PB-7 U-1 12'-14'



Dial Reading vs. Time
FRENCH & PARRELLO ASSOCIATES, P.A.
CONSULTING ENGINEERS

Plate

CONSOLIDATION TEST DATA

Client: Parsons
Project: Cape May
Project Number: 00L031A

Sample Data

Source: PB-7 U-1 19'-21'
Sample No.: PB-7 U-1
Elev. or Depth: 12'-14' **Sample Length (in./cm.):**
Location: PB-7 U-1 12'-14'
Description: Dark Grey c-mf SAND, Some Organic Silt, trace- f Gravel
Liquid Limit: 0 **Plasticity Index:** 0
USCS: **AASHTO:** **Figure No.:**
Testing Remarks: PB-7 U-1 19'-21'

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST		AFTER TEST	
Wet w+t =	164.22 g.	Consolidometer # =	18	Wet w+t =	159.12 g.
Dry w+t =	135.35 g.			Dry w+t =	135.35 g.
Tare Wt. =	.00 g.	Spec. Gravity =	2.62	Tare Wt. =	.00 g.
Height =	1.00 in.	Height =	1.00 in.		
Diameter =	2.50 in.	Diameter =	2.50 in.		
Weight =	164.22 g.	Defl. Table =	n/a		
Moisture =	21.3 %	Ht. Solids =	0.6422 in.	Moisture =	17.6 %
Wet Den. =	127.4 pcf	Dry Wt. =	135.35 g.	Dry Wt. =	135.35 g.*
Dry Den. =	105.0 pcf	Void Ratio =	0.557	Void Ratio =	0.445
Consolidn. =	0.80 tsf	Saturation =	100.3 %		

*** Final dry weight used in calculations**

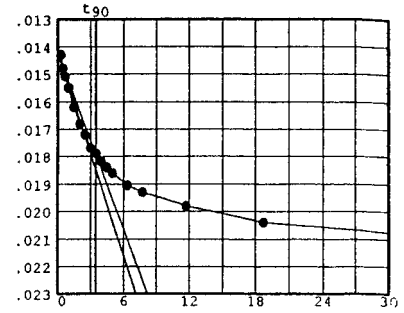
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.00000				0.557	
0.03	0.00810	0.00000			0.544	0.8 Comprs.
0.13	0.02100	0.00000	0.17		0.524	2.1 Comprs.
0.28	0.03120	0.00000	0.16		0.509	3.1 Comprs.
0.58	0.04230	0.00000	0.21		0.491	4.2 Comprs.
1.14	0.05880	0.00000	0.23		0.466	5.9 Comprs.
0.28	0.05610	0.00000			0.470	5.6 Comprs.
0.13	0.05390	0.00000			0.473	5.4 Comprs.
0.28	0.05515	0.00000			0.471	5.5 Comprs.
0.58	0.05700	0.00000			0.468	5.7 Comprs.
1.14	0.06070	0.00000			0.463	6.1 Comprs.
2.29	0.07900	0.00000	0.20		0.434	7.9 Comprs.
0.58	0.07615	0.00000			0.439	7.6 Comprs.
0.13	0.07180	0.00000			0.445	7.2 Comprs.

C_c = 0.10 P_c = 0.69 tsf C_r = 0.02

Pressure: 0.13 tsf — **TEST READINGS** — **Load No. 2**

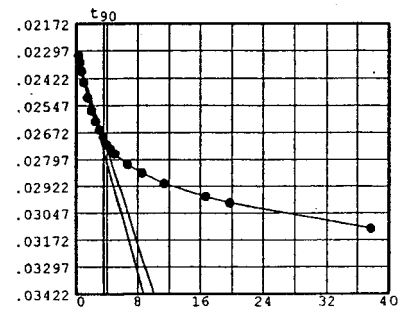
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.00810	11	16.00	0.01820
2	0.10	0.01430	12	20.25	0.01840
3	0.25	0.01480	13	25.00	0.01860
4	0.50	0.01510	14	40.00	0.01905
5	1.00	0.01550	15	60.00	0.01930
6	2.25	0.01620	16	137.00	0.01980
7	4.00	0.01680	17	350.00	0.02040
8	6.25	0.01720	18	1423.00	0.02100
9	9.00	0.01770			
10	12.25	0.01790			



Void Ratio = 0.524 **Compression** = 2.1 %
D_0 = 0.01418 D_{90} = 0.01789 D_{100} = 0.01830
C_v **at 12.0 min.** = 0.17 ft.^{2}/day

Pressure: 0.28 tsf — **TEST READINGS** — **Load No. 3**

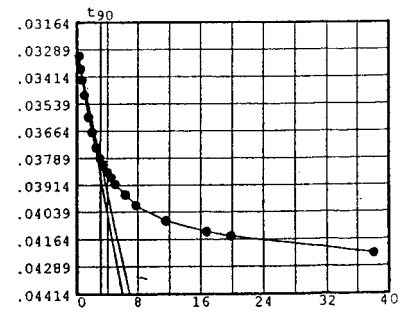
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.02100	11	16.00	0.02730
2	0.10	0.02320	12	20.25	0.02750
3	0.25	0.02350	13	25.00	0.02770
4	0.50	0.02390	14	44.00	0.02820
5	1.00	0.02440	15	73.00	0.02860
6	2.25	0.02510	16	129.00	0.02910
7	4.00	0.02570	17	279.00	0.02970
8	6.25	0.02620	18	390.00	0.03000
9	9.00	0.02660	19	1425.00	0.03120
10	12.25	0.02690			



Void Ratio = 0.509 **Compression** = 3.1 %
D_0 = 0.02298 D_{90} = 0.02694 D_{100} = 0.02738
C_v **at 12.6 min.** = 0.16 ft.^{2}/day

Pressure: 0.58 tsf — **TEST READINGS** — **Load No. 4**

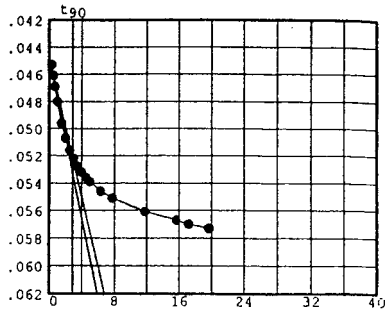
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.03120	11	16.00	0.03855
2	0.10	0.03320	12	20.25	0.03880
3	0.25	0.03380	13	25.00	0.03910
4	0.50	0.03430	14	40.00	0.03960
5	1.00	0.03500	15	60.00	0.04010
6	2.25	0.03600	16	134.00	0.04080
7	4.00	0.03670	17	282.00	0.04130
8	6.25	0.03740	18	395.00	0.04150
9	9.00	0.03790	19	1455.00	0.04230
10	12.25	0.03820			



Void Ratio = 0.491 **Compression** = 4.2 %
D_0 = 0.03289 D_{90} = 0.03794 D_{100} = 0.03850
C_v **at 9.4 min.** = 0.21 ft.^{2}/day

Pressure: 1.14 tsf **TEST READINGS** **Load No. 5**

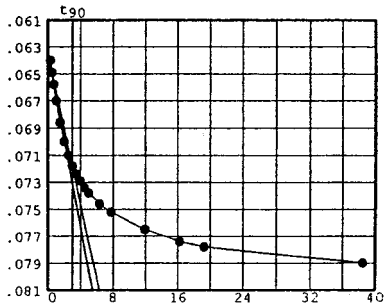
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.04230	11	16.00	0.05320
2	0.10	0.04530	12	20.25	0.05360
3	0.25	0.04610	13	25.00	0.05390
4	0.50	0.04690	14	40.00	0.05460
5	1.00	0.04800	15	60.00	0.05510
6	2.25	0.04960	16	138.00	0.05610
7	4.00	0.05070	17	244.00	0.05670
8	6.25	0.05160	18	295.00	0.05700
9	9.00	0.05220	19	389.00	0.05730
10	12.25	0.05280	20	1600.00	0.05880



Void Ratio = 0.466 **Compression** = 5.9 %
D_0 = 0.04478 D_{90} = 0.05206 D_{100} = 0.05287
C_v **at 8.3 min.** = 0.23 ft.^{2}/day

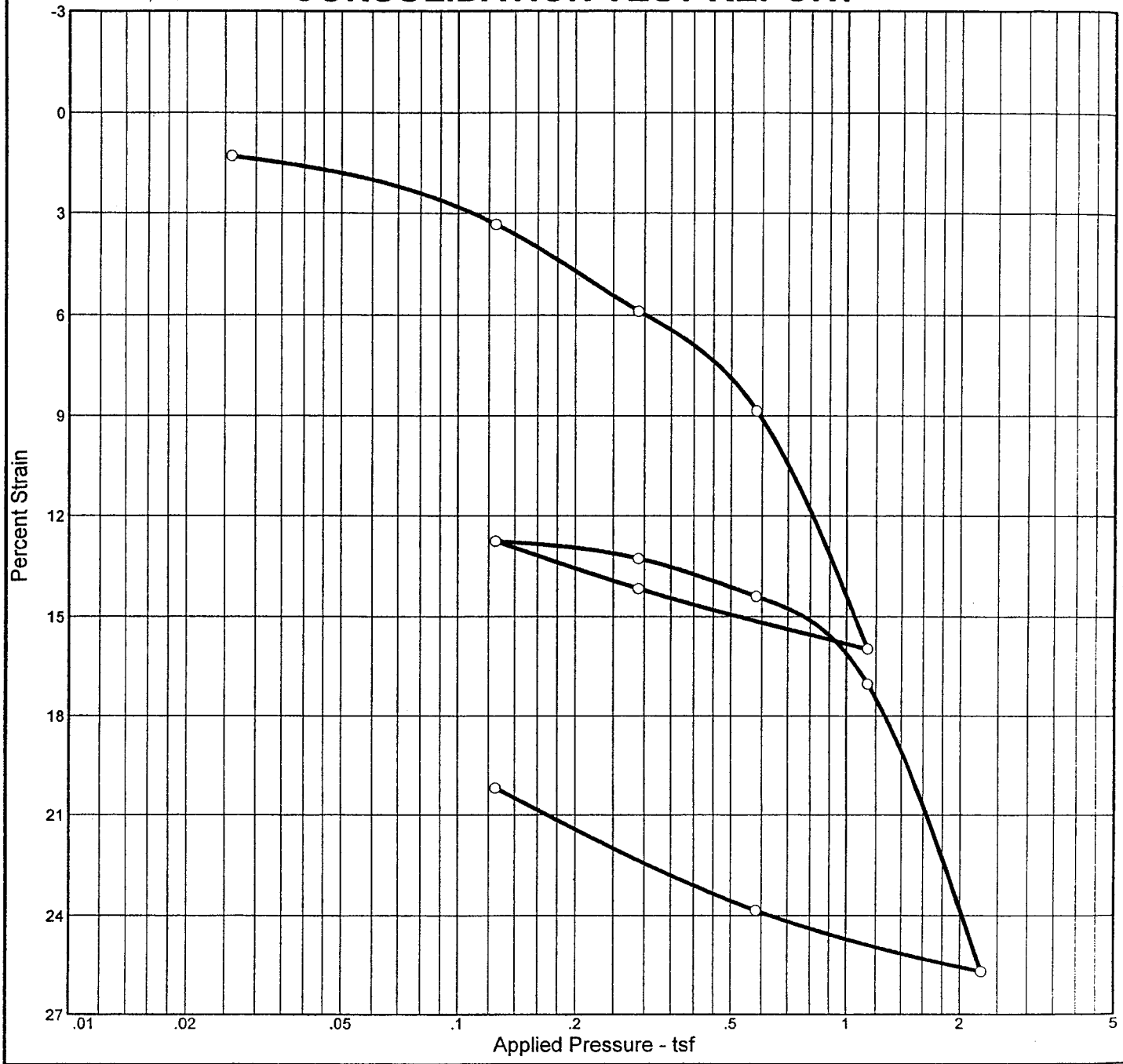
Pressure: 2.29 tsf **TEST READINGS** **Load No. 11**

No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.06070	11	16.00	0.07290
2	0.10	0.06400	12	20.25	0.07340
3	0.25	0.06490	13	25.00	0.07380
4	0.50	0.06580	14	40.00	0.07460
5	1.00	0.06700	15	60.00	0.07520
6	2.25	0.06860	16	142.00	0.07650
7	4.00	0.07000	17	264.00	0.07740
8	6.25	0.07100	18	372.00	0.07780
9	9.00	0.07180	19	1482.00	0.07900
10	12.25	0.07240			



Void Ratio = 0.434 **Compression** = 7.9 %
D_0 = 0.06342 D_{90} = 0.07180 D_{100} = 0.07274
C_v **at 9.0 min.** = 0.20 ft.^{2}/day

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Swell Press. (tsf)	Swell %	e_o
Sat.	Moist.											
100.3 %	99.7 %	45.3	125	73	2.59	0.40	0.74	1.17	0.26			2.573

MATERIAL DESCRIPTION	USCS	AASHTO
Dark Grey Organic SILT with fibers		

Project No. 00L031A **Client:** Parsons

Project: Cape May

Location: PB-9 U-1 12'-14'

Remarks:
PB-9 U-1 12'-14'

CONSOLIDATION TEST REPORT

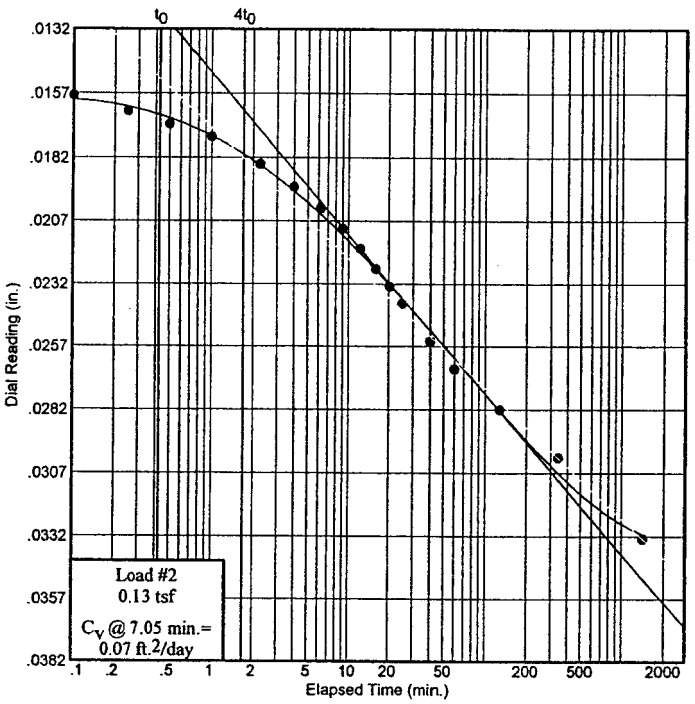
FRENCH & PARRELLO ASSOCIATES, P.A.
CONSULTING ENGINEERS

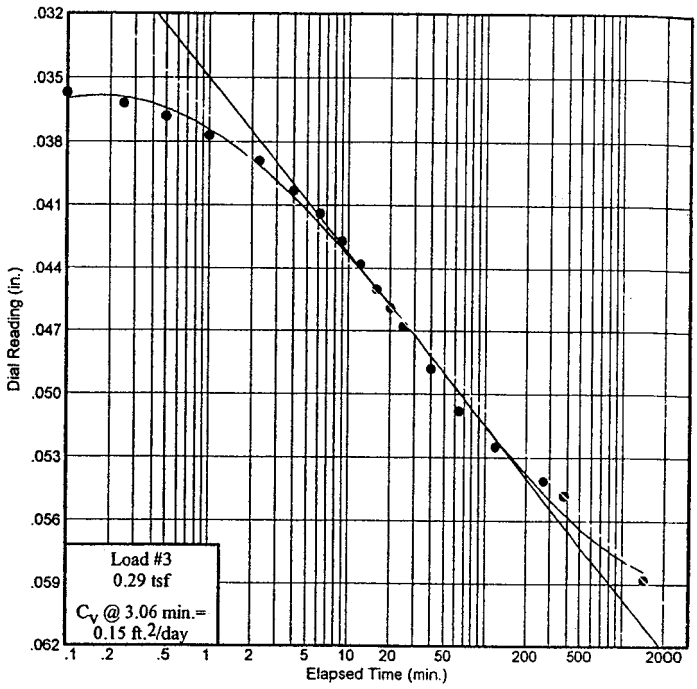
Plate

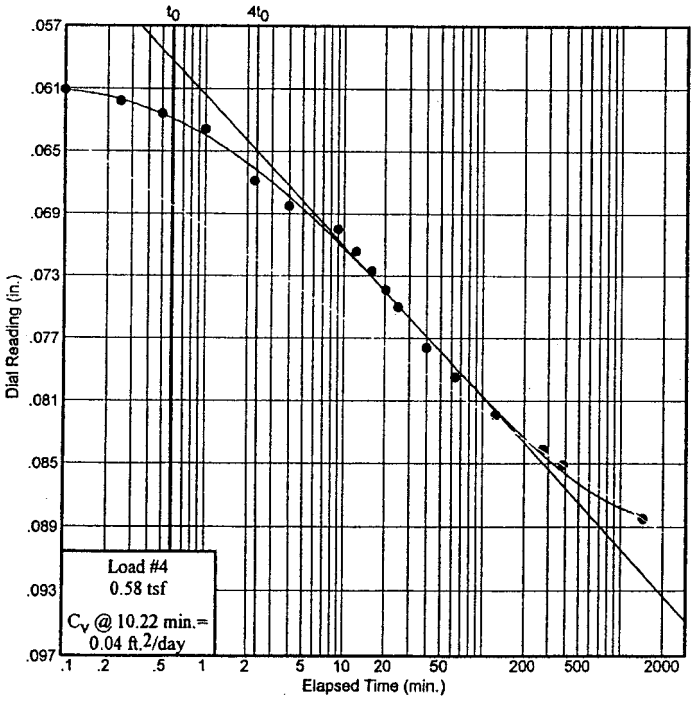
Dial Reading vs. Time

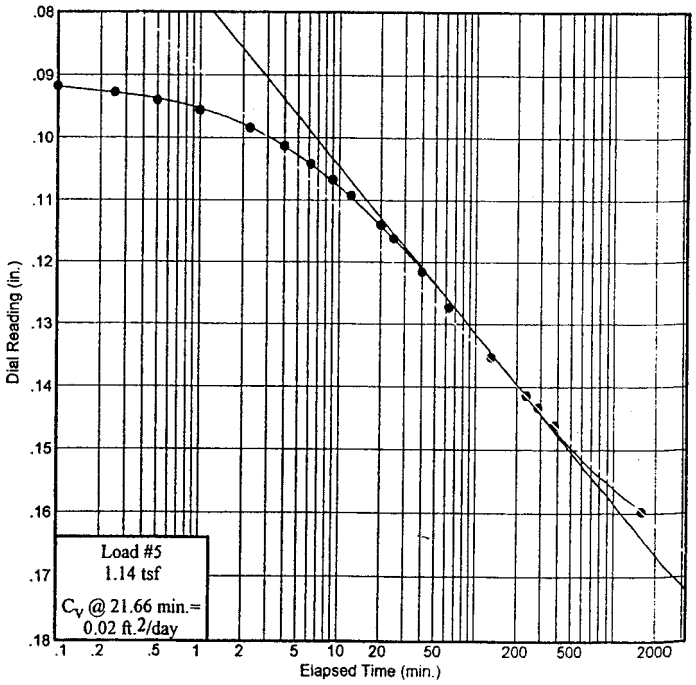
Project No.: 00L031A
Project: Cape May

Location: PB-9 U-1 12'-14'









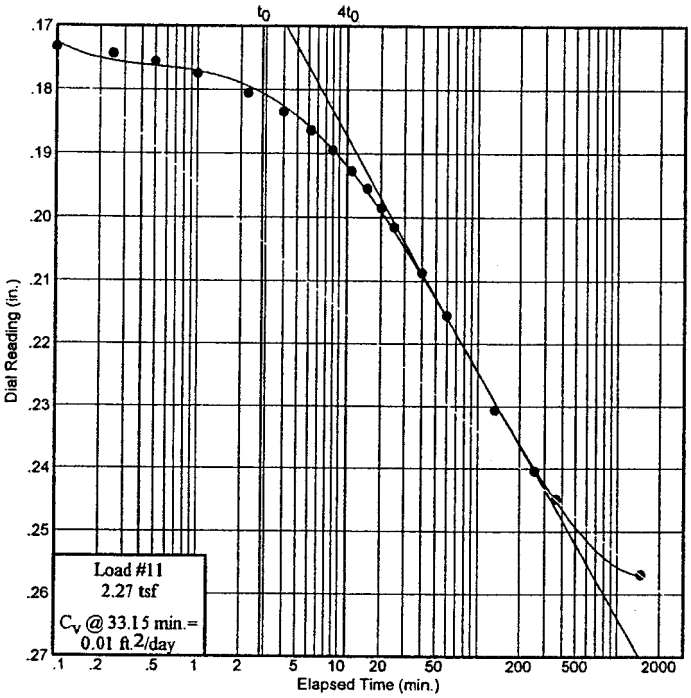
Dial Reading vs. Time
FRENCH & PARRELLO ASSOCIATES, P.A.
CONSULTING ENGINEERS

Plate

Dial Reading vs. Time

Project No.: 00L031A
Project: Cape May

Location: PB-9 U-1 12'-14'



Dial Reading vs. Time
FRENCH & PARRELLO ASSOCIATES, P.A.
CONSULTING ENGINEERS

Plate

CONSOLIDATION TEST DATA

Client: Parsons
Project: Cape May
Project Number: 00L031A

Sample Data

Source: Pb-9 U-1 12'-14'
Sample No.: PB-9 U-1
Elev. or Depth: 12'-14' **Sample Length (in./cm.):**
Location: PB-9 U-1 12'-14'
Description: Dark Grey Organic SILT with fibers
Liquid Limit: 125 **Plasticity Index:** 73
USCS: **AASHTO:** **Figure No.:**
Testing Remarks: PB-9 U-1 12'-14'

Test Specimen Data

TOTAL SAMPLE	BEFORE TEST	AFTER TEST
Wet w+t = 116.43 g.	Consolidometer # = 18	Wet w+t = 101.66 g.
Dry w+t = 58.31 g.		Dry w+t = 58.31 g.
Tare Wt. = .00 g.	Spec. Gravity = 2.59	Tare Wt. = .00 g.
Height = 1.00 in.	Height = 1.00 in.	
Diameter = 2.50 in.	Diameter = 2.50 in.	
Weight = 116.43 g.	Defl. Table = n/a	
Moisture = 99.7 %	Ht. Solids = 0.2799 in.	Moisture = 74.3 %
Wet Den. = 90.4 pcf	Dry Wt. = 58.31 g.	Dry Wt. = 58.31 g.*
Den. = 45.3 pcf	Void Ratio = 2.573	Void Ratio = 1.852
brdn. = 0.40 tsf	Saturation = 100.3 %	

*** Final dry weight used in calculations**

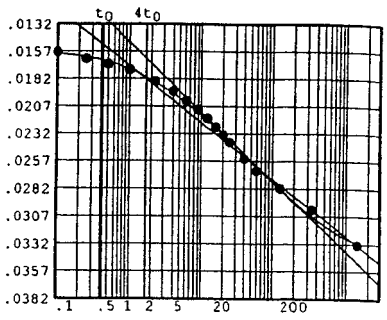
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.00000				2.573	
0.03	0.01300	0.00000			2.527	1.3 Comprs.
0.13	0.03330	0.00000	0.07	0.005	2.454	3.3 Comprs.
0.29	0.05880	0.00000	0.15	0.007	2.363	5.9 Comprs.
0.58	0.08850	0.00000	0.04	0.006	2.257	8.9 Comprs.
1.14	0.15980	0.00000	0.02	0.024	2.002	16.0 Comprs.
0.29	0.14160	0.00000			2.067	14.2 Comprs.
0.13	0.12740	0.00000			2.118	12.7 Comprs.
0.29	0.13260	0.00000			2.099	13.3 Comprs.
0.58	0.14390	0.00000			2.059	14.4 Comprs.
1.14	0.17030	0.00000			1.964	17.0 Comprs.
2.27	0.25680	0.00000	0.01	0.024	1.655	25.7 Comprs.
0.58	0.23850	0.00000			1.721	23.9 Comprs.
0.13	0.20190	0.00000			1.852	20.2 Comprs.

= 1.17 P_c = 0.74 tsf C_r = 0.26

Pressure: 0.13 tsf **TEST READINGS** **Load No. 2**

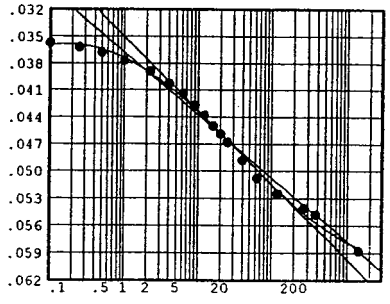
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.01300	11	16.00	0.02260
2	0.10	0.01580	12	20.25	0.02330
3	0.25	0.01640	13	25.00	0.02400
4	0.50	0.01690	14	40.00	0.02550
5	1.00	0.01740	15	60.00	0.02660
6	2.25	0.01845	16	128.00	0.02820
7	4.00	0.01935	17	341.00	0.03010
8	6.25	0.02020	18	1423.00	0.03330
9	9.00	0.02100			
10	12.25	0.02180			



Void Ratio = 2.454 **Compression** = 3.3 %
D_0 = 0.01503 D_{50} = 0.02070 D_{100} = 0.02637
C_v at 7.0 min. = 0.07 ft.^{2}/day C_α = 0.005

Pressure: 0.29 tsf **TEST READINGS** **Load No. 3**

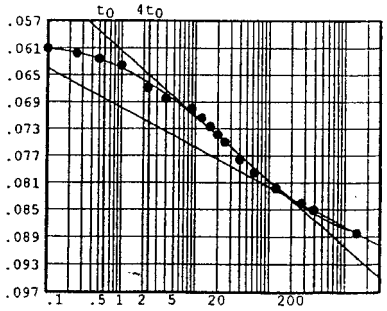
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.03330	11	16.00	0.04500
2	0.10	0.03570	12	20.25	0.04590
3	0.25	0.03620	13	25.00	0.04680
4	0.50	0.03680	14	40.00	0.04880
5	1.00	0.03770	15	64.00	0.05080
6	2.25	0.03890	16	120.00	0.05250
7	4.00	0.04030	17	270.00	0.05410
8	6.25	0.04140	18	381.00	0.05480
9	9.00	0.04270	19	1425.00	0.05880
10	12.25	0.04380			



Void Ratio = 2.363 **Compression** = 5.9 %
D_0 = 0.03330 D_{50} = 0.03990 D_{100} = 0.04650
C_v at 3.1 min. = 0.15 ft.^{2}/day C_α = 0.007

Pressure: 0.58 tsf **TEST READINGS** **Load No. 4**

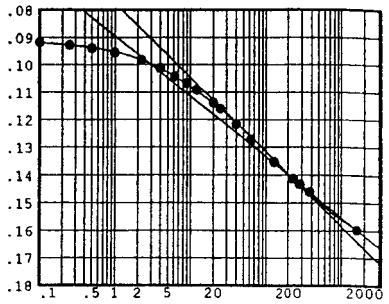
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.05880	11	20.25	0.07390
2	0.10	0.06110	12	25.00	0.07500
3	0.25	0.06180	13	40.00	0.07760
4	0.50	0.06260	14	64.00	0.07950
5	1.00	0.06360	15	125.00	0.08190
6	2.25	0.06690	16	273.00	0.08410
7	4.00	0.06850	17	386.00	0.08510
8	9.00	0.07000	18	1455.00	0.08850
9	12.25	0.07140			
10	16.00	0.07270			



Void Ratio = 2.257 **Compression** = 8.9 %
D_0 = 0.05961 D_{50} = 0.07132 D_{100} = 0.08304
C_v at 10.2 min. = 0.04 ft.^{2}/day C_α = 0.006

Pressure: 1.14 tsf **TEST READINGS** **Load No. 5**

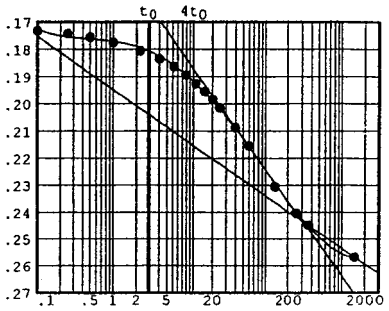
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.08850	11	20.25	0.11390
2	0.10	0.09180	12	25.00	0.11610
3	0.25	0.09280	13	40.00	0.12160
4	0.50	0.09400	14	63.00	0.12730
5	1.00	0.09560	15	129.00	0.13530
6	2.25	0.09840	16	235.00	0.14140
7	4.00	0.10130	17	286.00	0.14330
8	6.25	0.10420	18	380.00	0.14610
9	9.00	0.10670	19	1599.00	0.15980
10	12.25	0.10920			



Void Ratio = 2.002 **Compression** = 16.0 %
D_0 = 0.08850 D_{50} = 0.11486 D_{100} = 0.14122
C_v **at 21.7 min.** = 0.02 ft.^{2}/day C_α = 0.024

Pressure: 2.27 tsf **TEST READINGS** **Load No. 11**

No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.17030	11	16.00	0.19550
2	0.10	0.17330	12	20.25	0.19850
3	0.25	0.17440	13	25.00	0.20150
4	0.50	0.17560	14	40.00	0.20870
5	1.00	0.17750	15	60.00	0.21550
6	2.25	0.18060	16	133.00	0.23060
7	4.00	0.18350	17	255.00	0.24040
8	6.25	0.18640	18	363.00	0.24490
9	9.00	0.18950	19	1473.00	0.25680
10	12.25	0.19270			

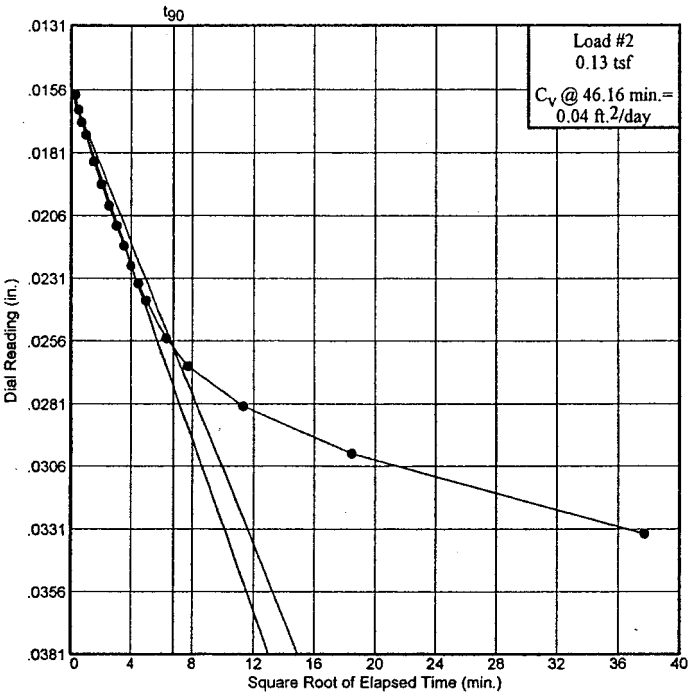


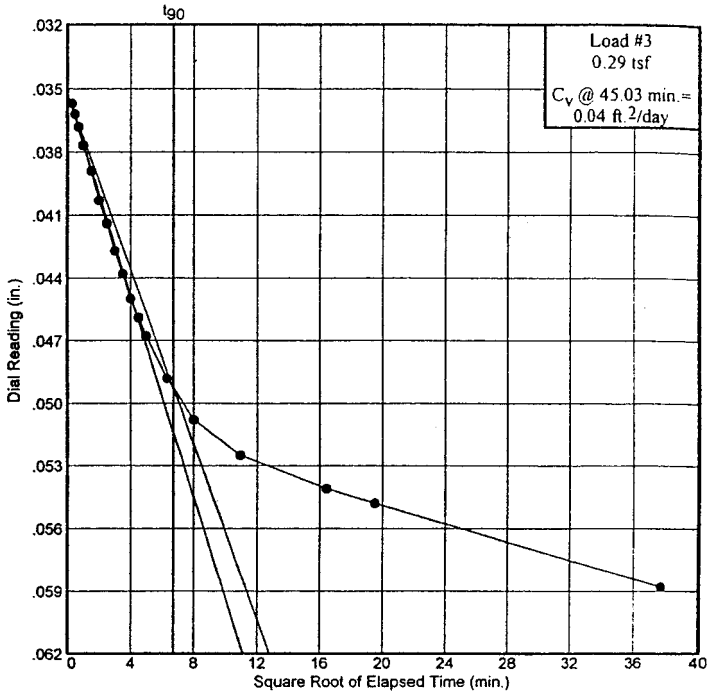
Void Ratio = 1.655 **Compression** = 25.7 %
D_0 = 0.16928 D_{50} = 0.20631 D_{100} = 0.24334
C_v **at 33.1 min.** = 0.01 ft.^{2}/day C_α = 0.024

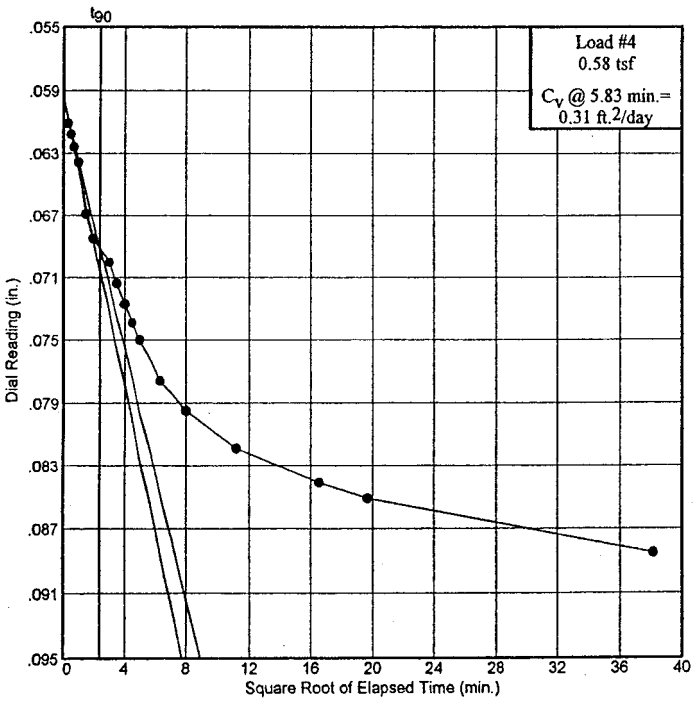
Dial Reading vs. Time

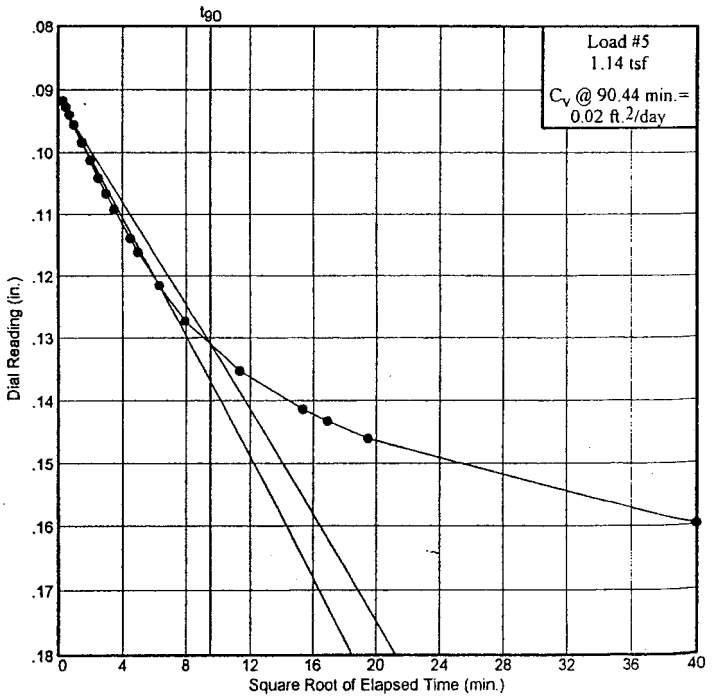
Project No.: 00L031A
Project: Cape May

Location: PB-9 U-1 12'-14'









Dial Reading vs. Time

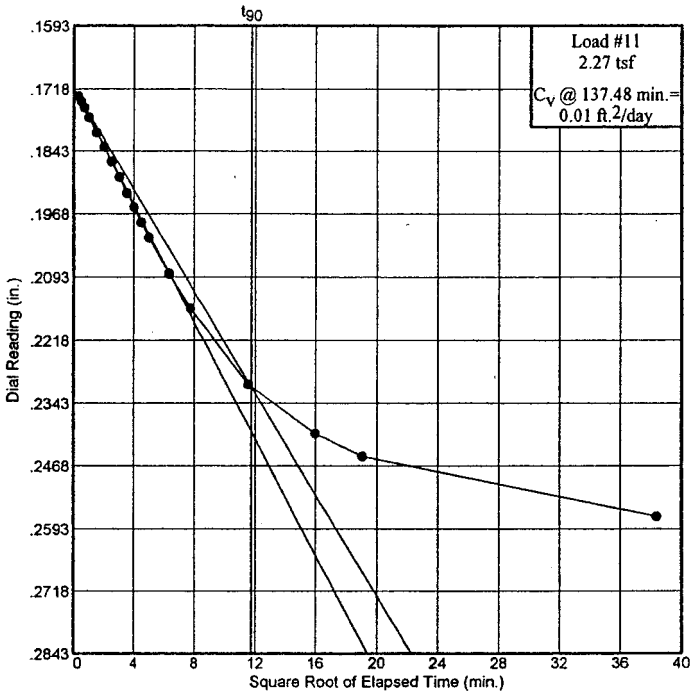
FRENCH & PARRELLO ASSOCIATES, P.A.
CONSULTING ENGINEERS

Plate

Dial Reading vs. Time

Project No.: 00L031A
Project: Cape May

Location: PB-9 U-1 12'-14'



Dial Reading vs. Time
FRENCH & PARRELLO ASSOCIATES, P.A.
CONSULTING ENGINEERS

Plate

CONSOLIDATION TEST DATA

Client: Parsons
Project: Cape May
Project Number: 00L031A

Sample Data

Source: Pb-9 U-1 12'-14'
Sample No.: PB-9 U-1
Elev. or Depth: 12'-14' **Sample Length (in./cm.):**
Location: PB-9 U-1 12'-14'
Description: Dark Grey Organic SILT with fibers
Liquid Limit: 125 **Plasticity Index:** 73
USCS: **AASHTO:** **Figure No.:**
Testing Remarks: PB-9 U-1 12'-14'

Test Specimen Data

TOTAL SAMPLE	BEFORE TEST	AFTER TEST
Wet w+t = 116.43 g.	Consolidometer # = 18	Wet w+t = 101.66 g.
Dry w+t = 58.31 g.		Dry w+t = 58.31 g.
Tare Wt. = .00 g.	Spec. Gravity = 2.59	Tare Wt. = .00 g.
Height = 1.00 in.	Height = 1.00 in.	
Diameter = 2.50 in.	Diameter = 2.50 in.	
Weight = 116.43 g.	Defl. Table = n/a	
Moisture = 99.7 %	Ht. Solids = 0.2799 in.	Moisture = 74.3 %
Wet Den. = 90.4 pcf	Dry Wt. = 58.31 g.	Dry Wt. = 58.31 g.*
Dry Den. = 45.3 pcf	Void Ratio = 2.573	Void Ratio = 1.852
Consolidn. = 0.40 tsf	Saturation = 100.3 %	

*** Final dry weight used in calculations**

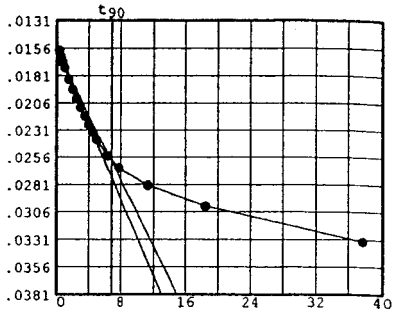
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.00000				2.573	
0.03	0.01300	0.00000			2.527	1.3 Comprs.
0.13	0.03330	0.00000	0.04		2.454	3.3 Comprs.
0.29	0.05880	0.00000	0.04		2.363	5.9 Comprs.
0.58	0.08850	0.00000	0.31		2.257	8.9 Comprs.
1.14	0.15980	0.00000	0.02		2.002	16.0 Comprs.
0.29	0.14160	0.00000			2.067	14.2 Comprs.
0.13	0.12740	0.00000			2.118	12.7 Comprs.
0.29	0.13260	0.00000			2.099	13.3 Comprs.
0.58	0.14390	0.00000			2.059	14.4 Comprs.
1.14	0.17030	0.00000			1.964	17.0 Comprs.
2.27	0.25680	0.00000	0.01		1.655	25.7 Comprs.
0.58	0.23850	0.00000			1.721	23.9 Comprs.
0.13	0.20190	0.00000			1.852	20.2 Comprs.

OCR = 1.17 P_c = 0.74 tsf C_r = 0.26

Pressure: 0.13 tsf **TEST READINGS** **Load No. 2**

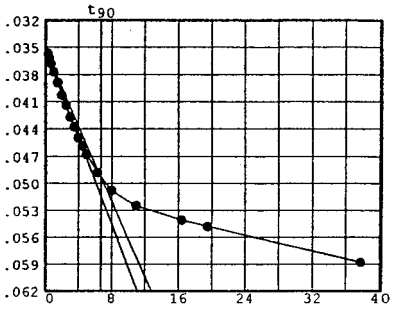
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.01300	11	16.00	0.02260
2	0.10	0.01580	12	20.25	0.02330
3	0.25	0.01640	13	25.00	0.02400
4	0.50	0.01690	14	40.00	0.02550
5	1.00	0.01740	15	60.00	0.02660
6	2.25	0.01845	16	128.00	0.02820
7	4.00	0.01935	17	341.00	0.03010
8	6.25	0.02020	18	1423.00	0.03330
9	9.00	0.02100			
10	12.25	0.02180			



Void Ratio = 2.454 **Compression** = 3.3 %
D_0 = 0.01566 D_{90} = 0.02586 D_{100} = 0.02700
C_v **at 46.2 min.** = 0.04 ft.^{2}/day

Pressure: 0.29 tsf **TEST READINGS** **Load No. 3**

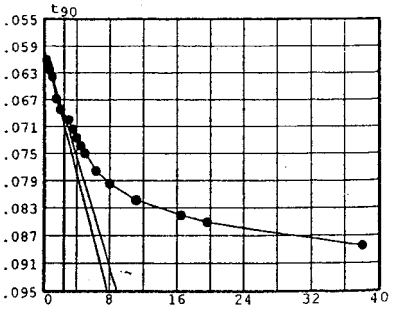
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.03330	11	16.00	0.04500
2	0.10	0.03570	12	20.25	0.04590
3	0.25	0.03620	13	25.00	0.04680
4	0.50	0.03680	14	40.00	0.04880
5	1.00	0.03770	15	64.00	0.05080
6	2.25	0.03890	16	120.00	0.05250
7	4.00	0.04030	17	270.00	0.05410
8	6.25	0.04140	18	381.00	0.05480
9	9.00	0.04270	19	1425.00	0.05880
10	12.25	0.04380			



Void Ratio = 2.363 **Compression** = 5.9 %
D_0 = 0.03521 D_{90} = 0.04926 D_{100} = 0.05082
C_v **at 45.0 min.** = 0.04 ft.^{2}/day

Pressure: 0.58 tsf **TEST READINGS** **Load No. 4**

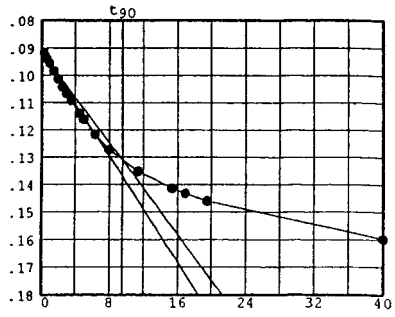
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.05880	11	20.25	0.07390
2	0.10	0.06110	12	25.00	0.07500
3	0.25	0.06180	13	40.00	0.07760
4	0.50	0.06260	14	64.00	0.07950
5	1.00	0.06360	15	125.00	0.08190
6	2.25	0.06690	16	273.00	0.08410
7	4.00	0.06850	17	386.00	0.08510
8	9.00	0.07000	18	1455.00	0.08850
9	12.25	0.07140			
10	16.00	0.07270			



Void Ratio = 2.257 **Compression** = 8.9 %
D_0 = 0.05947 D_{90} = 0.06912 D_{100} = 0.07019
C_v **at 5.8 min.** = 0.31 ft.^{2}/day

Pressure: 1.14 tsf **TEST READINGS** **Load No. 5**

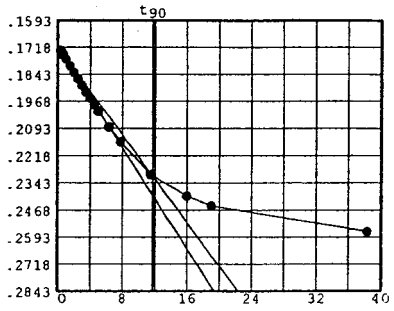
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.08850	11	20.25	0.11390
2	0.10	0.09180	12	25.00	0.11610
3	0.25	0.09280	13	40.00	0.12160
4	0.50	0.09400	14	63.00	0.12730
5	1.00	0.09560	15	129.00	0.13530
6	2.25	0.09840	16	235.00	0.14140
7	4.00	0.10130	17	286.00	0.14330
8	6.25	0.10420	18	380.00	0.14610
9	9.00	0.10670	19	1599.00	0.15980
10	12.25	0.10920			



Void Ratio = 2.002 **Compression** = 16.0 %
D_0 = 0.09129 D_{90} = 0.13098 D_{100} = 0.13539
C_v **at 90.4 min.** = 0.02 ft.^{2}/day

Pressure: 2.27 tsf **TEST READINGS** **Load No. 11**

No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.17030	11	16.00	0.19550
2	0.10	0.17330	12	20.25	0.19850
3	0.25	0.17440	13	25.00	0.20150
4	0.50	0.17560	14	40.00	0.20870
5	1.00	0.17750	15	60.00	0.21550
6	2.25	0.18060	16	133.00	0.23060
7	4.00	0.18350	17	255.00	0.24040
8	6.25	0.18640	18	363.00	0.24490
9	9.00	0.18950	19	1473.00	0.25680
10	12.25	0.19270			



Void Ratio = 1.655 **Compression** = 25.7 %
D_0 = 0.17186 D_{90} = 0.23103 D_{100} = 0.23760
C_v **at 137.5 min.** = 0.01 ft.^{2}/day

Appendix C

Burmister Soil Identification Method

BURMISTER SOIL IDENTIFICATION METHOD

A) Soil Components and Fractions

Sieve	3" 76mm	1" 25mm	3/8" 10mm	No.10 2mm	No. 30 0.6mm	No. 60 0.25mm	No. 200 0.075mm	0.002mm
Granular Components Fractions	GRAVEL			SAND			SILT	
	coarse	medium	fine	coarse	medium	fine		
Clay Soil Components							CLAY-SOIL Defined and Named on a Plasticity Basis	

B) Identifying Terms for Granular Soils

Combined gravel, sand, and silt soils identified by gradation and weight proportion of components.

Components		**Minor Component Proportion Terms**	**Defining Range of Percentages**
Principal Components (50% or more):	GRAVEL, SAND, SILT (all capitals)		
Minor Components (less than 50%):	Gravel	and	35 to 50%
	Sand	some	20 to 35%
	Silt	little	10 to 20%
		trace	1 to 10%

Gradation Terms for Granular Soils	
coarse to fine (cf)	all fractions more than 10%
coarse to medium (cm)	fine less than 10%
medium to fine (mf)	coarse less than 10%
coarse (c)	medium and fine less than 10%
medium (m)	coarse and fine less than 10%
fine (f)	coarse and medium less than 10%
Plus (+) or minus (-) signs used to indicate nearer upper or lower limits of gradation and proportion terms.	

C) Identifying Terms for Clay Soils.

Combined silt and clay soils identified by relative plasticity.

Overall Plasticity	**Smallest Thread Diameter in (mm)**	**Plasticity Index**	**Principal Component**	**Minor Component**
Non-Plastic	Crumbles Immediately	0	SILT	Silt
Slight	1/4 (6)	1 to 5	Clayey SILT	Clayey Silt
Low	1/8 (3)	5 to 10	SILT and CLAY	Silt and Clay
Medium	1/16 (1.5)	10 to 20	CLAY and SILT	Clay and Silt
High	1/32 (0.8)	20 to 40	Silty CLAY	Silty Clay
Very High	1/64 (0.4)	more than 40	CLAY	Clay
Organic Soils	Classify soils using same system as inorganic soils. e.g. Organic Clayey SILT.			

Example: Soil, 60% coarse to fine Sand, 25% medium to fine Gravel, 15% Clayey Silt, color-brown.
Identification: Brown coarse to fine SAND, some medium to fine Gravel, little Clayey Silt.
or Brown cf SAND, some mf Gravel, little Clayey Silt.

Reference: D. M. Burmister, "Principles and Techniques of Soil Identification", 29th Highway Research Board Proceedings, 1949.

Technical Addendum C
Accident Data Reports

Crash Data for CR 621 (Ocean Drive)

Accident Summary	Year 1999	2000	2001	Total	% of Total	2001 Statewide AVG
Fatal	0	0	0	0	0.0%	0.3%
Injury	2	6	3	11	52.4%	31.1%
Property Damage Only	5	3	2	10	47.6%	68.7%
Total	7	9	5	21	100.0%	
Type						
1 - Same Direction - Rear End	2	3	3	8	38.1%	28.4%
2 - Same Direction - Sideswipe	0	0	0	0	0.0%	11.6%
Subtotal	2	3	3	8	38.1%	40.0%
3 - Right Angle	2	1	0	3	14.3%	22.3%
4 - Opposite Direction	0	2	1	3	14.3%	2.8%
5 - Left Turn	0	0	0	0	0.0%	6.3%
6 - Struck Parked Vehicle	0	0	0	0	0.0%	6.8%
7 - Other						
Fixed Object	3	2	1	6	28.6%	10.5%
Animal	0	0	0	0	0.0%	3.3%
Other	0	1	0	1	4.8%	7.7%
Subtotal	3	3	1	7	33.3%	21.40%
Grand Total (Type)	7	9	5	21	100.0%	
Pavement Conditions						
Dry	7	8	5	20	95.2%	76.9%
Wet Surface	0	1	0	1	4.8%	18.2%
Snow or Ice	0	0	0	0	0.0%	4.2%
Unknown, Other	0	0	0	0	0.0%	0.8%
Total	7	9	5	21	100.0%	
Time of Day						
Day	5	7	3	15	71.4%	71.4%
Night, Dawn, Dusk	2	2	2	6	28.6%	27.7%
Unknown	0	0	0	0	0.0%	0.9%
Total	7	9	5	21	100.0%	

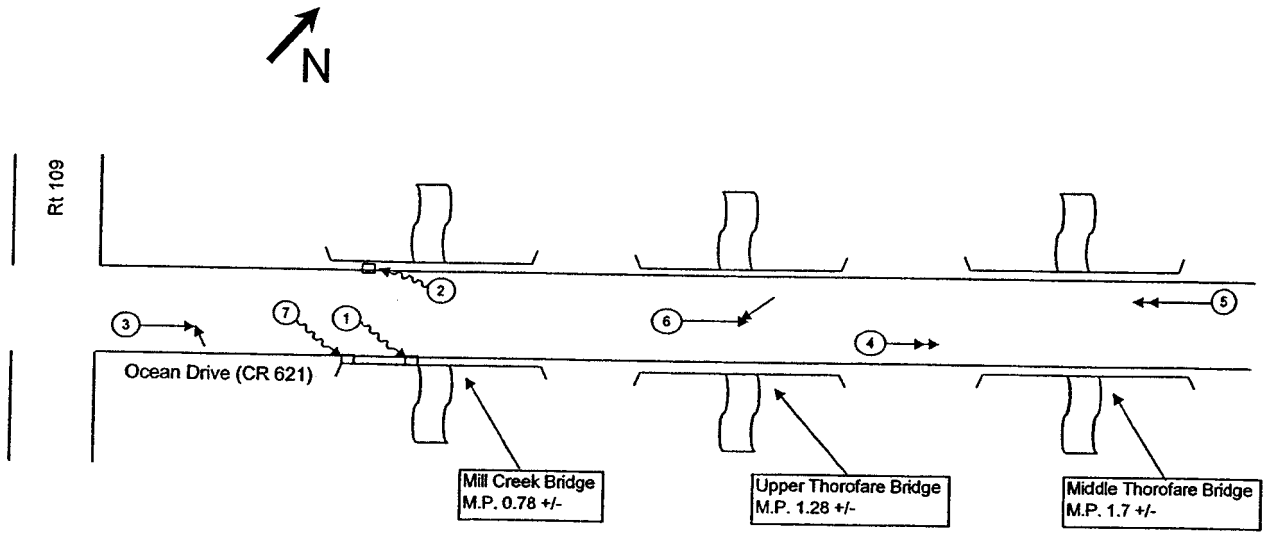
Crash Data for CR 621 (Ocean Ave)

Type	Year		
	1999	2000	2001
1 - Same Direction - Rear End	2	3	3
2 - Same Direction - Sideswipe	0	0	0
3 - Angle	2	1	0
4 - Head-On		2	1
5 - Left Turn	0	0	0
6 - Struck Parked Vehicle	0		0
7 - Other	3	3	1
TOTAL	7	9	5

LOCATION: CR 621 (Ocean Drive)
Between RT 109 & Fish Dock Rd
MUNICIPALITY: Lower Twp
COUNTY: Cape May

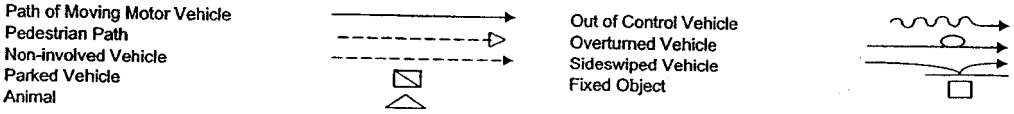
DONE BY: S. Slack
DATE: 12/4/2002
CHECKED BY: J. Keiser
DATE: 12/18/2002

1999 COLLISION DIAGRAM



No.	Date	Day	Time	No. Injured	Surface Condition	Weather	Light Condition	Collision Type	Direction(s)	Misc.
1	02/10/99	WED	12:28	0	DRY	CLEAR	DAY	FO	NB	
2	06/21/99	MON	22:34	0	DRY	CLEAR	DARK (No Lights)	FO	SB	
3	07/24/99	SUN	10:22	0	DRY	CLEAR	DAY	RA	NB,SB	
4	08/06/99	FRI	17:31	2	DRY	CLEAR	DAY	SD	NB	RE
5	08/30/99	MON	11:10	0	DRY	CLEAR	DAY	SD	SB	RE
6	10/02/99	SAT	9:04	0	DRY	CLEAR	DAY	ANGLE	NB,SB	
7	11/14/99	SUN	5:05	2	DRY	CLEAR	DARK (No Lights)	FO	NB	

LEGEND



ACCIDENT SUMMARY

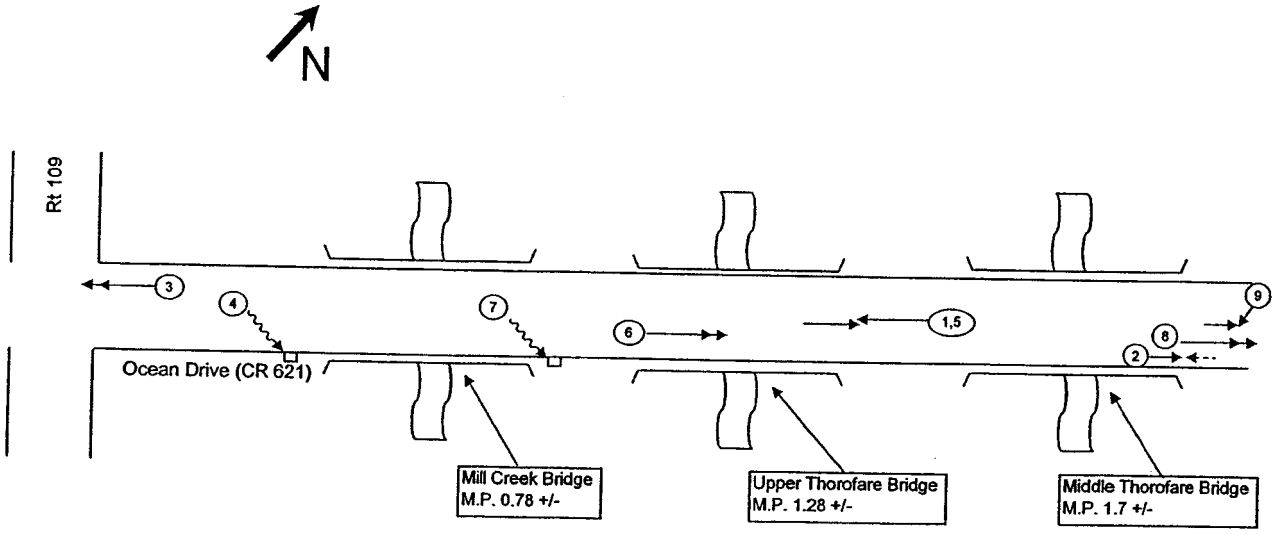
CLASSIFICATION BY TYPES	DAY	DARK	TOTALS
APPROACHING SAME DIRECTION	2	0	2
APPROACHING OPPOSITE DIRECTION	0	0	0
RIGHT ANGLE ACCIDENTS	2	0	2
LEFT TURN ACCIDENTS	0	0	0
FIXED OBJECT ACCIDENTS	1	2	3
PEDESTRIAN ACCIDENTS	0	0	0
ANIMAL ACCIDENTS	0	0	0
OTHER ACCIDENTS	0	0	0
TOTALS	5	2	7

NUMBER OF ACCIDENTS WITH:	
	PROPERTY
5	DAMAGE ONLY
2	INJURIES
0	FATALITIES
7	TOTAL

LOCATION: CR 621 (Ocean Drive)
Between RT 109 & Fish Dock Rd
MUNICIPALITY: Lower Twp
COUNTY: Cape May

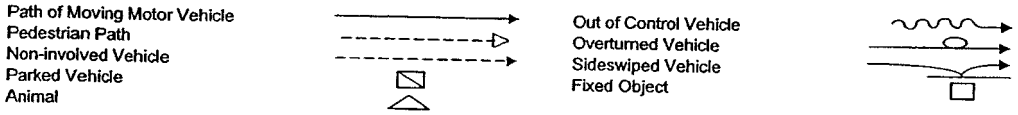
DONE BY: S. Slack
DATE: 12/4/2002
CHECKED BY: J. Keiser
DATE: 12/18/2002

2000 COLLISION DIAGRAM



No.	Date	Day	Time	No. Injured	Surface Condition	Weather	Light Condition	Collision Type	Direction(s)	Misc.
1	03/30/00	THU	10:11	1	DRY	CLEAR	DAY	OD	NB, SB	
2	06/14/00	WED	11:53	1	DRY	CLEAR	DAY	PED	NB	
3	06/18/00	SUN	1:02	0	WET	RAIN	DARKON	SD	SB	RE
4	06/22/00	THU	22:40	2	DRY	CLEAR	DARKON	FO	NB	
5	07/04/00	TUE	12:32	4	DRY	CLEAR	DAY	OD	NB, SB	
6	07/07/00	FRI	11:13	1	DRY	CLEAR	DAY	SD	SB	RE
7	07/17/00	MON	9:26	0	DRY	CLEAR	DAY	FO	NB	
8	08/05/00	SAT	19:03	0	DRY	CLEAR	DAY	SD	NB	RE
9	08/29/02	TUE	17:15	1	DRY	CLEAR	DAY	RA	NB,SB	

LEGEND



ACCIDENT SUMMARY

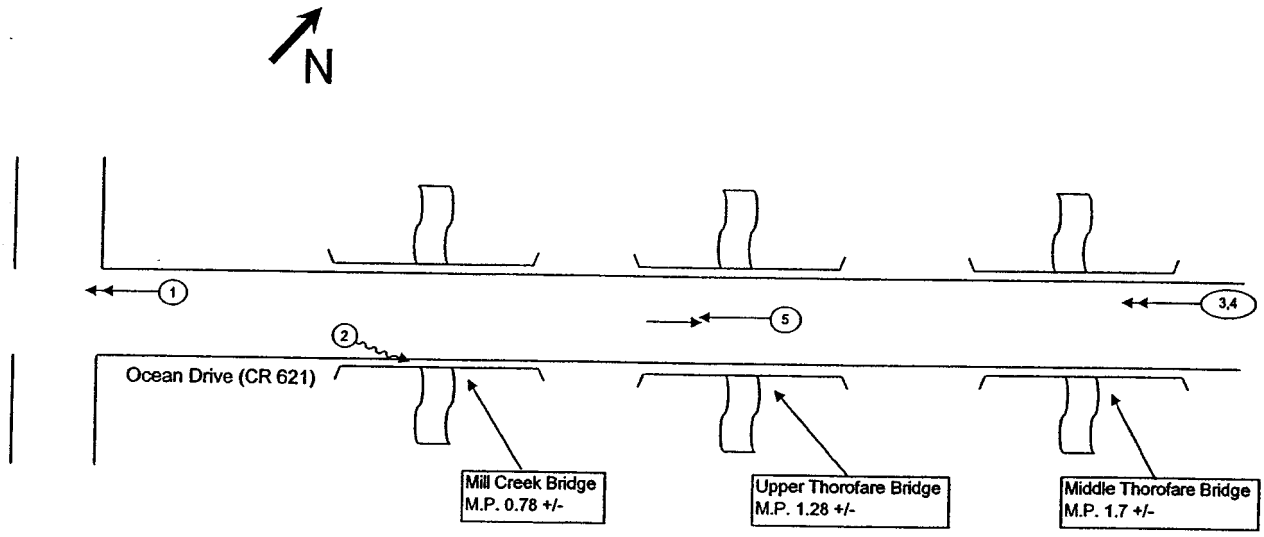
CLASSIFICATION BY TYPES	DAY	DARK	TOTALS
APPROACHING SAME DIRECTION	2	1	3
APPROACHING OPPOSITE DIRECTION	2	0	2
RIGHT ANGLE ACCIDENTS	1	0	1
LEFT TURN ACCIDENTS	0	0	0
FIXED OBJECT ACCIDENTS	1	1	2
PEDESTRIAN ACCIDENTS	1	0	1
ANIMAL ACCIDENTS	0	0	0
OTHER ACCIDENTS	0	0	0
TOTALS	7	2	9

NUMBER OF ACCIDENTS	WITH:
3	PROPERTY DAMAGE ONLY
6	INJURIES
0	FATALITIES
9	TOTAL

LOCATION:	CR 621 (Ocean Drive)
	Between RT 109 & Fish Dock Rd
MUNICIPALITY:	Lower Twp
COUNTY:	Cape May

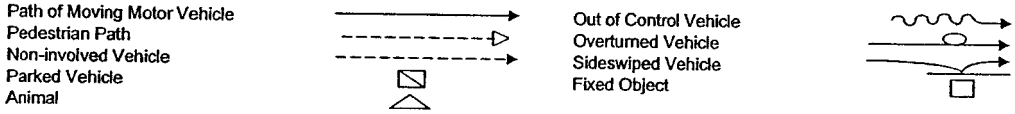
DONE BY: S. Slack
DATE: 12/4/2002
CHECKED BY: J. Keiser
DATE: 12/18/2002

2001 COLLISION DIAGRAM



No.	Date	Day	Time	No. Injured	Surface Condition	Weather	Light Condition	Collision Type	Direction(s)	Misc.
1	01/31/01	WED	14:41	1	DRY	CLEAR	DAY	SD	SB	RE
2	03/10/01	SAT	18:09	0	DRY	CLEAR	DARK (No Lights)	FO	NB	
3	08/04/01	SAT	21:03	3	DRY	CLEAR	DARK (No Lights)	SD	SB	RE
4	08/12/01	SUN	14:41	0	DRY	CLEAR	DAY	SD	SB	RE
5	09/10/01	MON	8:13	1	DRY	CLEAR	DAY	OD	NB,SB	

LEGEND



ACCIDENT SUMMARY

CLASSIFICATION BY TYPES	DAY	DARK	TOTALS
APPROACHING SAME DIRECTION	2	1	3
APPROACHING OPPOSITE DIRECTION	1	0	1
RIGHT ANGLE ACCIDENTS	0	0	0
LEFT TURN ACCIDENTS	0	0	0
FIXED OBJECT ACCIDENTS	1	0	1
PEDESTRIAN ACCIDENTS	0	0	0
ANIMAL ACCIDENTS	0	0	0
OTHER ACCIDENTS	0	0	0
TOTALS	4	1	5

NUMBER OF ACCIDENTS WITH:	
PROPERTY	
2	DAMAGE ONLY
3	INJURIES
0	FATALITIES
5	TOTAL

Technical Addendum D
Navigation Study Report

NAVIGATION STUDY

MIDDLE THOROFARE BRIDGE REPLACEMENT

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Cape May County Department of Public Works 2

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VI. Appendices 12

I. INTRODUCTION

The purpose of this study was to determine navigational requirements and important data needed to plan for the replacement of Bridge No. 3100006, Ocean Drive over Middle Thorofare and the Intracoastal Waterway(also known as Two Mile Bridge). An elevation of the existing bridge is presented in Figure 1 and shows the horizontal and vertical clearances at this structure. To determine the navigational requirements for the new bridge and obtain pertinent related data, a variety of sources were contacted, including: the United States Coast Guard (USCG), New Jersey Department of Transportation (NJDOT), Cape May County Engineer's Office, Atlantic Cape Fisheries, Lund Fisheries, Two Mile Landing Marina and Restaurant, Snow's/Doxsee, Inc. and other local property and marina owners.

Two Mile Bridge spans Middle Thorofare just west of Cape May Inlet and east of Jarvis Sound. The waterway is affected by tidal variations and there are numerous marinas servicing Middle Thorofare and Jarvis Sound that lie adjacent to and to the north of this bridge. A majority of the largest vessels involved in the local fishing industries use Middle Thorofare as their only access to the Atlantic Ocean and make up the Cape May/Wildwood Fishing Fleet. This fleet is the largest in New Jersey and one of the largest on the East Coast of the United States.

Cape May County's data base of bridge openings from the past three years at the Two Mile Bridge was queried to determine the number of openings per year. This data base also identified the number of openings per day, the names and classifications of the vessels, and specific dates and times of the openings throughout the year. This data was used in additional studies to determine the impact of the new bridge's elevation on future bridge openings, vessel restrictions and traffic disruptions.

Bridge replacement alternatives for Two Mile Bridge include high-level, fixed bridges and mid-level, movable structures on parallel or new alignments as shown in the aerial view of the site in Figure 2. Existing and proposed fishing vessel data was obtained to aid in the determination of the optimum elevation and span length for each of the alternatives.

A map of the area is shown in Figure 3, with the local marinas identified that are home ports to vessels that typically pass the Two Mile Bridge. These marinas are generally at the Atlantic Cape Fisheries and Lund Fisheries on the western shore of Middle Thorofare; Two Mile Landing, Cold Spring Harbor and Lund's Fisheries on the eastern shore of Lower Thorofare, Otten's Harbor in Wildwood, and Snow's/Doxsee Dock on the eastern shore of Upper Thorofare.

II. INFORMATION OBTAINED

United States Coast Guard (USCG)--No data was provided from the USCG about the height of their vessels that use the Two Mile Bridge, but their vessels appear to be under 45 feet in height based on conversations with USCG personnel at the Cape May base. The Bridge Administrator in the US Coast Guard Office in Norfolk, VA, at a meeting on December 12, 2002, informed representatives of Cape May County and PB that the only USCG concern is that the bridge provide adequate clearance for the present and future needs of the local fishing fleet. Minutes of that meeting are included in Appendix B. The USCG also stated that they were not in favor of adding regulations that revise the "on-demand" opening of this bridge if a new movable bridge were constructed.

Cape May County Engineer's Office--The data provided from the County included specific dates on all bridge openings over the past three years (2000, 2001 and 2002), names of the vessels, day, month and the time of day, and showed that there are approximately 7500 openings per year. The vessels were categorized into five classifications—Charter/Party, Commercial, Pleasure Craft, Sailing Vessels, and US Coast Guard. Tables 1, 2 and 3 present summaries of the bridge openings for the years 2000, 2001 and 2002, respectively, for these classifications and are included in Appendix "A" of this report. The names of these vessels were then alphabetized and the number of openings required by that vessel per year was determined. This data is also shown in Appendix "A".

New Jersey Department of Transportation (NJDOT) --State Route 47 is an east-west highway that carries traffic from the Garden State Parkway to Wildwood. The roadway crosses Grassy Sound (Intracoastal Waterway) via a bascule bridge that is the first bridge north of the Two Mile Bridge. No navigation studies were available from NJDOT for this bridge.

Navigational Survey of Marinas, Businesses, Commercial Fishing and Tour Vessel Owners, and Nearby Property Owners--Vessel heights were not included in the County's database. This data is essential in determining the potential impacts and limitations of a new movable bridge constructed at a higher elevation than the present 23 feet minimum vertical clearance. A survey of local fishermen and tour boat owners was therefore conducted to gather vessel heights and navigation-related concerns of fishermen, local marinas, businesses and property owners in the area of the Two Mile Bridge. The vessel height survey was conducted between October 17, 2002 and April 8, 2003 with assistance from Atlantic Cape Fisheries personnel. Additionally, vessel owners listed on the "Northeast Fishing Vessel List" dated 12/20/00 (provided to PB by Atlantic Cape Fisheries), the Internet Site—"NMFS Northeast Region Vessel Permit Data," and the County's Bridge Tender logs were contacted via telephone to obtain vessel heights. The data received from these contacts accounted for 14,995 openings of the 22,944 which occurred during the three year period of the study. A listing of all vessels, including the height, and number of times the vessel traversed the Two Mile Bridge during the three year period (2000, 2001, 2002) is included in Appendix "A" of this report.

The owner of the Two Mile Landing Marina informed us that his marina has 62 boat slips and 2 moorings in Jarvis Sound. He stated that his facility is one of the very few deep water ports for sailboats with masts as tall as 90 feet. He typically has 8 to 12 sailboats docked at his facility each summer season with masts varying from 51 to 90 feet in height. He informed us that while sailing vessels with masts up to 75 feet do travel on the Intracoastal Waterway north of the Two Mile Bridge, larger sailboats do not travel north on this waterway because of the shallow depth of water around North Wildwood.

A meeting with the managers of the Snow's/Doxsee packaging plant identified two vessels (IRENE B AND IRENE B III, shown in Photo #1) that were previously used by them to transport fresh products from Port Norris to their facility. These vessels are 66 feet in height and are no longer used since their products are now trucked to the site. They did note, however, they would not like to lose this docking facility.

The owner of Atlantic Cape Fisheries, Dan Cohen, provided dredging information regarding Cold Spring Inlet (Cape May Inlet0 dated Sept. 30, 1996. A copy of this material is included in Appendix B and states that " Section 860 of the Water Resources Development Act of 1986 further modifies the Cold Spring Inlet project by authorizing the planning, engineering and design of a project to increase the depth of the 2,000-foot reach of the New Jersey Intracoastal Waterway in Cape May County to 15 feet." This 2,000 feet extends to the north of the existing bridge location and ends at the entrance to Atlantic Cape and Lund's Fishery docks.

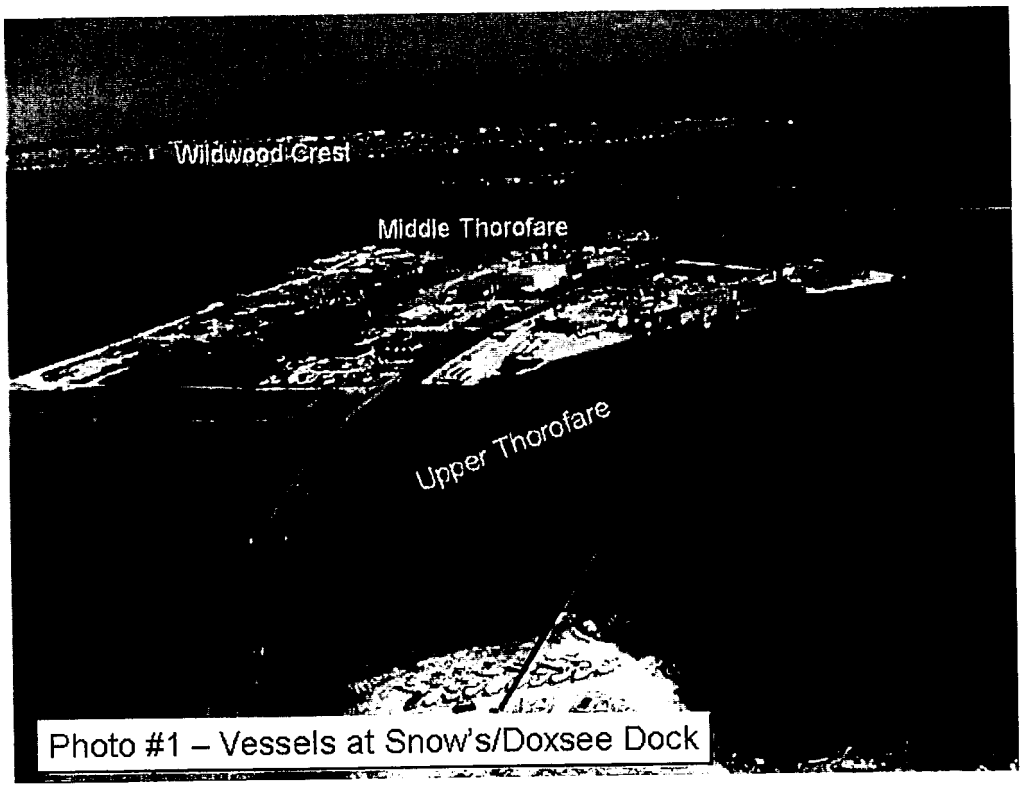


Photo #1 – Vessels at Snow's/Doxsee Dock

III. ANALYSIS

Based upon the information obtained, there is a need to provide increased horizontal and vertical clearances for navigation at the Middle Thorofare Bridge. Vessel sizes are presently restricted by the horizontal clearance at the existing bridge which measures 50 feet between fenders at the movable span. Vertical clearance while the bridge is in the closed position is 23 feet minimum and requires approximately 7500 openings of the bridge each year, causing considerable traffic delays, especially during the peak summer season. Traffic backups as much as one mile long in either direction have been observed during this season.

Representatives of the local fishing industry have expressed an interest in utilizing refrigerated fishing vessels of the "Bukhta", "Frio Canada" and "Lima" types that are as large as 108 feet high, 59 feet wide and 400 feet long. These vessels cannot navigate the existing waterway due to the restrictive horizontal clearance at the existing Middle Thorofare Bridge. The ability to use these vessels will eliminate a time consuming and costly step in the processing of fresh fish, which currently requires handling them multiple times and transporting them to additional locations prior to distribution. Given the highly perishable nature of the goods being shipped, and the associated costs with the extra processing steps, the use of the larger vessels will very favorably impact the local fishing industry. Not accommodating such vessels would limit the prosperity of the local fishing industry, in direct contradiction to the US Coast Guard requirements that "existing and future needs of the fisheries be accommodated in planning for replacement of the bridge.

The docks that must be accessed by these larger vessels include Atlantic Cape's and Lund's dock on the western shore of Middle Thorofare, and Lund's Fisheries dock on the eastern shore of Lower Thorofare.

The Chamber of Commerce for Cape May has also officially requested that the Cape May County Freeholders strongly consider replacement of the Two Mile Bridge with a fixed, high level bridge in order to remove navigational and vehicular restrictions, and ease the flow of traffic in both directions. A copy of this request is shown in Appendix B.

The NOAA (National Oceanic and Atmospheric Administration) Navigational Chart for the vicinity of Two Mile Bridge is shown in Figure 4. This chart was carefully reviewed during the layout of the various alternative alignments being considered. Increasing the horizontal clearance to 130 feet at the bridge was considered and evaluated. The NOAA Chart shows sufficient water depths to the east of the existing channel opening to increase the bridge opening to 130 feet from fender to fender. This new opening with the centerline set at the face of the existing northern fender was presented to the boat owners of fishing vessels and Atlantic Cape Fisheries, Lund's Fisheries and Snow's/Doxsee. They all considered this opening acceptable for the 400 feet long by 60 feet wide refrigeration vessels that they (Atlantic Cape and Lund's Fisheries) plan to utilize at their docks when this project has been completed. The 130 feet width for the movable span was acceptable but they would prefer a wider opening if a fixed bridge was constructed.

The location of the "channel span" for each of the fixed bridge alignments was placed in deep water and centered over the Intracoastal Waterway channel. Access to the dock for Snow's/Doxsee on the eastern shore of Upper Thorofare was also provided.

An evaluation of the vessels, their heights, and their dock locations was conducted relative to the various alternative alignments to determine which alternatives would meet the needs of the mariners. The following information was key in evaluating the acceptability of the alternative alignments:

1. The vessels that moor at Ottens Harbor in Wildwood use Middle Thorofare to access their dock and are all under 75 feet tall.

2. The fishing vessels that moor at the eastern shore of the Lower Thorofare docks are presently less than 75 feet tall, but future plans for the dock by Lund's Fisheries may see usage by the 108 feet tall refrigeration vessel. Sailboats that dock at Two Mile Marina have masts as tall as 90 feet.

3. The vessels that moor at the western shore of Middle Thorofare are presently less than 75 feet tall, but future plans for the dock by Atlantic Cape and Lund's Fisheries may see usage by the 108 feet tall refrigeration vessel.

4. The vessels that dock on the eastern shore of Upper Thorofare are both less than 75 feet tall and future vessels using this dock are anticipated to be about the same size.

Based upon this information the following alignment alternatives would meet the requirements of the fishing industry and mariners, for present and future uses.

1. Alternative 3A—Mid-Level, Double Leaf Bascule Bridge, set at a minimum vertical clearance of 45 feet above mean high water (MHW) in the closed position with a channel width of 130 feet between fenders, and aligned just south and parallel to the existing bridge.

2. Alternative 3B—Mid-Level, Double Leaf Bascule Bridge, set at a minimum vertical clearance of 45 feet above MHW in the closed position with a channel width of 130 feet between fenders, and aligned just north and parallel to the existing bridge.

3. Alternative 3C—High Level, Fixed Bridge, with 75 feet minimum vertical clearance above MHW and 225 feet between piers (130 feet minimum horizontal clearance) over the channel at Middle Thorofare, and 116 feet minimum vertical clearance above MHW and 225 feet between piers(130 feet minimum horizontal clearance) over the channel at Lower Thorofare, and aligned north of Atlantic Cape Fisheries and tying into Ocean Drive just south of Fish Dock Road.

4. Alternative 3D—High Level, Fixed Bridge, with 75 feet minimum vertical clearance above MHW, 175 feet between piers (130 feet minimum horizontal clearance) over the channel at Middle Thorofare, and aligned north of Atlantic Cape Fisheries and Two Mile Landing and tying into Ocean Drive north of Fish Dock Road.

5. Alternative 3E—High Level, Fixed Bridge, with 116 feet minimum vertical clearance above MHW, 350 feet between piers (130 feet minimum horizontal clearance) over the channel at Middle Thorofare with approach spans of 180 feet and aligned just south and parallel to the existing bridge.

6. Alternative 3F—High Level, Fixed Bridge, with 116 feet minimum vertical clearance above MHW, 350 feet between piers (130 feet minimum horizontal clearance) over the Middle Thorofare channel and 75 feet minimum vertical clearance above MHW over Upper Thorofare, with approach spans of 170 to 180 feet (130 feet minimum horizontal clearance) and the bridge aligned approximately 350 feet south of the existing bridge.

7. Alternative 3G-- High Level, Fixed Bridge, with a three span cable stayed structure with an 860 foot main span (130 feet minimum horizontal clearance) and 116 feet minimum vertical clearance above MHW over the Middle Thorofare channel, and side spans of 370 feet. Minimum vertical clearance of the side span over Upper Thorofare of 75 feet. Approach spans will be 180 feet, provide 130 feet minimum horizontal clearance and the bridge will be aligned approximately 350 feet south of the existing bridge.

An additional analysis of the vessel heights was conducted to evaluate the significance of raising the alternatives which feature bascule bridges (Alternative 3A and 3B) from 45 feet to 55 feet above MHW in the closed position. Table 4 (Appendix A) lists the vessels by height in descending order and identifies how often the vessel passed through the Two Mile Bridge in 2000 and 2001, and 2002. These vessel heights were obtained via the survey that was conducted and includes 60 vessels. Although this is a small percentage of the total list of 1,445 different vessels that traversed the Two Mile Bridge, it represents 65.4% (14,995/22,944) of all the required openings for the 3 year period. If the sailboats, as listed in Table 1, 2 and 3 (Appendix A) are all included in the summary (since the sailboats are mostly higher than 50 feet), this percentage increases to 81% (18,524/22,944)of the openings. Thus the data represents a significant number of all vessels using the waterway and passing under the Two Mile Bridge. Table 4 demonstrates that 6,866 vessels have heights ranging from 25 to 45 feet above the water line. Bridge openings for these vessels would be eliminated if a new movable bridge was constructed with 45 feet vertical clearance in the closed position. This represents a reduction in openings of 30% (6,866/22,944). If a vertical clearance of 55 feet is provided, then the number of openings is reduced by another 2,929 vessels, increasing the reduction of openings to 42.7%. These are significant reductions in the number of openings but approximately 4300 [(1.00-.427) x 7500 = 4300] openings per year would still occur, with many of them occurring in the peak summer season. It is also important to note that the increase of vertical clearance to 55 feet would add substantial right-of-way impacts along the approach roadways, resulting in significant damages to the very fishing industries who are major stakeholders in this project.

IV. CONCLUSIONS

The following conclusions were reached by this study:

1. Alignments that are parallel and adjacent to the existing bridge and include a movable span should have a clear horizontal channel opening of 130 feet and be placed 45 feet above MHW. Raising the bridge to 45 feet above MHW reduces the number of bridge openings in a year by 30%. Raising the bridge to 55 feet above MHW reduces the number of openings by an additional 12.7% which is not that significant, but would result in significant right-of-way impacts to neighboring industries.

2. High Level Fixed bridges aligned to the north of the Atlantic Cape Fisheries Marina but to the south of Two Mile Landing should provide 75 feet minimum vertical clearance above MHW at Middle Thorofare and 116 feet minimum above MHW at Lower Thorofare, and have piers spaced to provide a minimum horizontal clearance of 130 feet for the channels in both waterways.

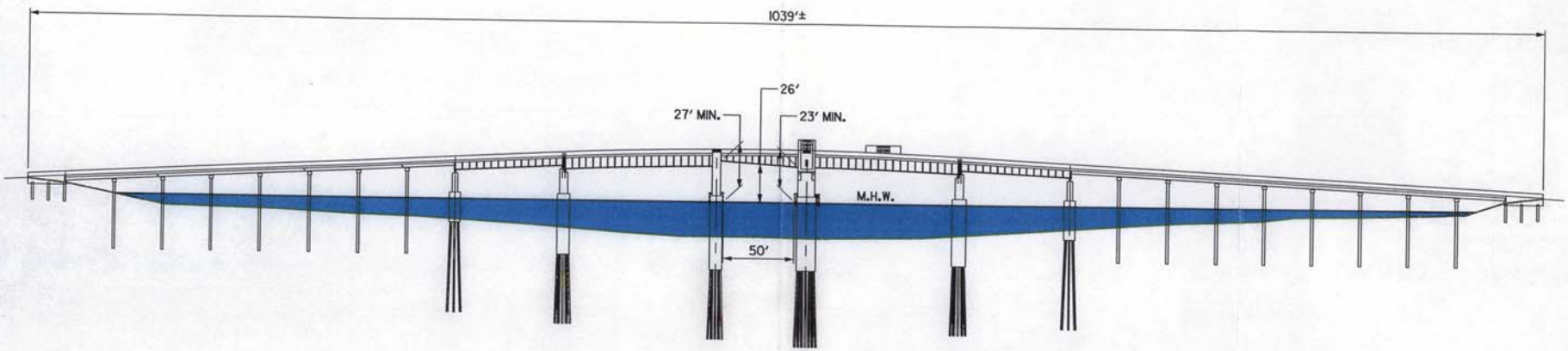
3. High Level Fixed bridges aligned to the north of the Atlantic Cape Fisheries Marina and Two Mile Landing should provide 75 feet minimum vertical clearance above MHW at Middle Thorofare and have piers spaced to provide a minimum horizontal clearance of 130 feet for the channel span.

4. A high level fixed bridge on a parallel alignment to the south and adjacent to the existing bridge should provide 116 feet minimum vertical clearance and 130 feet minimum horizontal clearance over the Middle Thorofare channel.

5. A high level fixed bridge on an alignment approximately 350 feet south of the existing bridge with a 350 feet main span or larger should provide 116 feet minimum vertical clearance above MHW over Middle Thorofare and 75 feet minimum above MHW over Upper Thorofare and a minimum horizontal clearance of 130 feet for the channels of both waterways.

All of the solutions above will satisfy the present and future needs of the fishing fleet and local mariners.

V. FIGURES



EXISTING MIDDLE THOROFARE BRIDGE

FIGURE 1

OCEAN DRIVE IMPROVEMENTS

COUNTY OF CAPE MAY IN CONJUNCTION WITH SOUTH JERSEY TRANSPORTATION PLANNING ORGANIZATION

FIGURE 2

PB 100 YEARS

OCEAN DRIVE IMPROVEMENTS

COUNTY OF CAPE MAY IN CONJUNCTION WITH SOUTH JERSEY TRANSPORTATION PLANNING ORGANIZATION

MARCH 2003

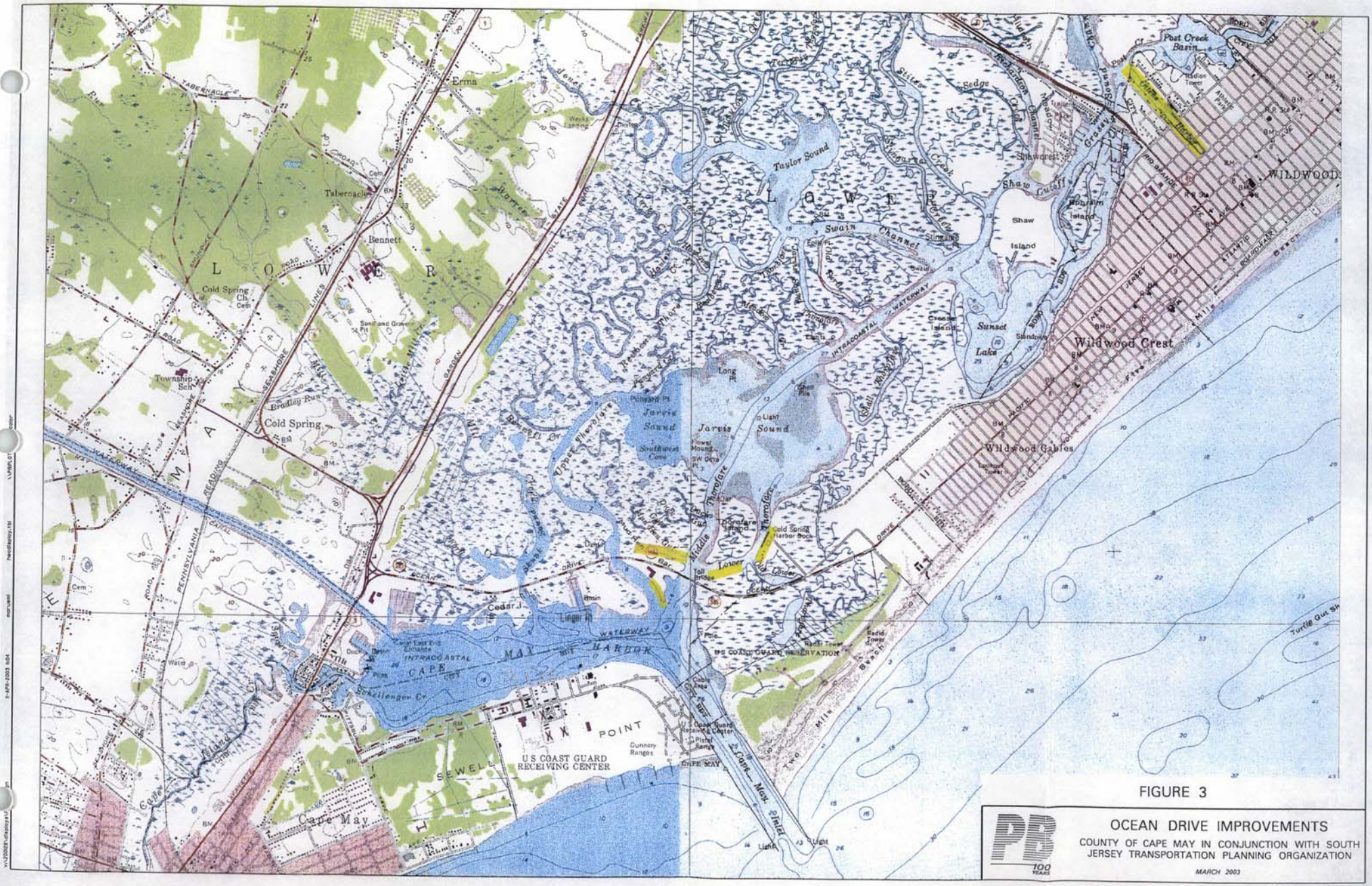


FIGURE 3

PB 100 YEARS

OCEAN DRIVE IMPROVEMENTS

COUNTY OF CAPE MAY IN CONJUNCTION WITH SOUTH JERSEY TRANSPORTATION PLANNING ORGANIZATION

MARCH 2003

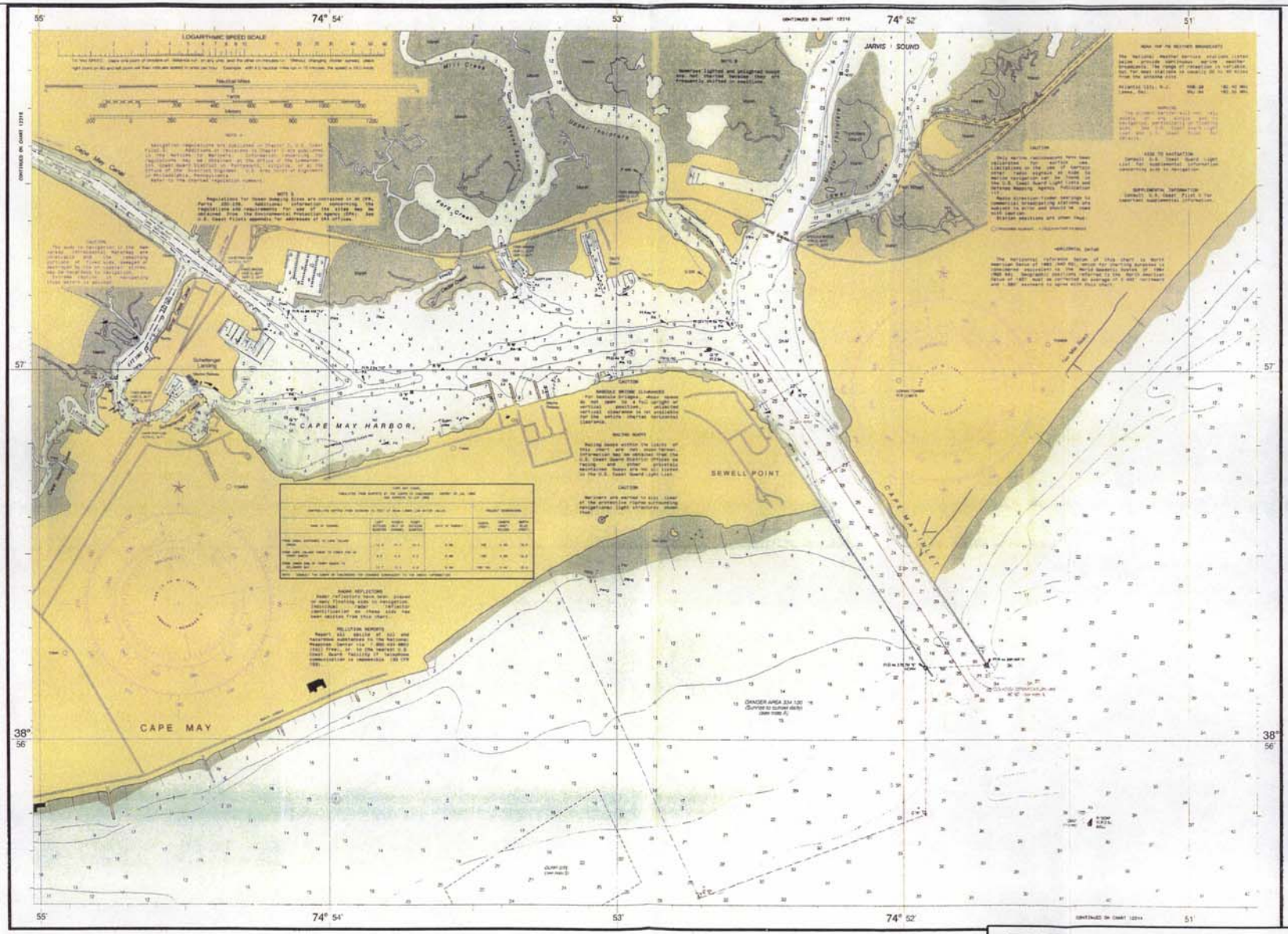


FIGURE 4

PB 100 YEARS

OCEAN DRIVE IMPROVEMENTS

COUNTY OF CAPE MAY IN CONJUNCTION WITH SOUTH JERSEY TRANSPORTATION PLANNING ORGANIZATION

MARCH 2003

VI. APPENDIX A

INFORMATION FROM CAPE MAY COUNTY DEPARTMENT OF PUBLIC WORKS

TABLE 1

2000 TwoMile Query_Crosstab

Type	*Openings*	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*
Charter/Party	1442	1	1	4	6	121	265	326	361	266	66	22	3
Commercial	4772	344	337	260	199	351	491	473	626	551	544	419	177
Pleasure Craft	431	3		2	6	27	57	88	119	61	23	37	8
Sailing Vessel	1241	21	8	10	20	72	225	283	304	173	95	27	3
US Coast Guard	26	2	1	5	1	4	4	1		2	4	2	

TABLE 2

2001 TwoMile Query_Crosstab

Type	*Openings*	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*
Charter/Party	1316			1	14	122	251	303	319	238	28	33	7
Commercial	4397	451	267	258	272	317	446	318	455	507	433	423	250
Pleasure Craft	539	4		1	2	15	50	128	172	56	35	61	15
Sailing Vessel	1117	21		5	23	73	189	262	228	197	64	44	11
US Coast Guard	28	3		5	3	2		5	7			3	

TABLE 3

2002 TwoMile Query_Crosstab

Type	Openings	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Charter/Party	1406		2	8	14	130	251	313	363	237	59	20	9
Commercial	4172	346	297	328	272	357	382	314	456	516	399	321	184
Pleasure Craft	876	2		6	19	33	81	165	230	148	91	63	38
Sailing Vessel	1171	26	7	5	21	90	230	237	270	161	79	35	10
US Coast Guard	10			4		4					2		

Vessel	Height	Number of Openings in 2000-2001	Number of Openings in 2002
Nancy Elizabeth	80	64	29
Tina Lynn	80	71	24
Nightwatch	75	247	102
Crystal Ann	75	99	32
Generation	75	61	18
Capt. Tuck	75	6	
Capt. Sig	72	318	157
Miss Kathy	72	378	206
Lauren Kim	72	398	207
Susan Marie II	70	93	31
Jersey Cape	70	56	3
Erin Renee	67	32	21
Irene B	66	2	33
Irene-B III	66	1	213
Miss Lauren	65	1	
Capt. Fella	65	2	
New Sea Rover	65	219	161
Yankee	65		317
Celerbation	61		
Instigator	61	129	105
Dyrsten	60	109	53
My Girl	60	57	24
Adrianna	60	118	45
Mt. Vernon	59	130	115
Francis M. Lee, Sr.	59	41	40
Flicka	58	111	60
Barbara Anne	57	12	24
Melissa J	57		240
Jersey Girl	57	90	38
Lady Roslyn	56	103	57
Venturer	55	25	
Fish Finder (Noreen Marie)	55	46	6
Golden Nugget	55	182	92
Jill Adventure	55	34	12
Stephanie Dee	55	55	48
Mabel Susan	55	295	100
Cape May	55	41	48
Capt. Bob	55	72	50
Elise G.	55	344	89
Evening Star	52	288	123
Abracadabra	52	135	59
Starbrite	51	229	97
Defiance	50	27	15
Susan Marie	50	60	28
Luke - J	50	40	17
Retriever	50	152	17
Royal Flush	45	603	255
Agitator	45	303	136
Blue Diamond	45	93	

Vessel	Height	Number of Openings in 2000-2001	Number of Openings in 2002
Dewey	40		
Danielle	40	357	110
Blue Runner	35	178	85
Miss Patty	35	416	154
Delta Lady	30	1664	810
Starlight	30	284	129
Twilight	30		21
Starship	30	408	181
Barbara Ann	29	85	17
Wendy Lee	25	133	30
Outsider (Alicia Linn)	25	379	
Elizabeth C. II	25	24	11
Golden Rings			
Goose			
Gorbouec			
Grace			
Grand Traveller			
Gaviola			
Grand Slam			
Gator			
Get Along			
Gemeni			
Gemini			6
Life's Loves			
Generations		2	
Gee Wiz			
Genesis			
Gipper			
Gypsy Spray			3
Go Fish			
Gazelle			
Getaway III			1
Gin & Tonic			
Georgetown			
Gloria Jean		1	
Glory		3	
Genevieve		15	
Hi Banks			
Hatteras 36			2
Hatteras 70			
Havadori			
Hawk		8	4
Hawk F/V		1	
Hawke			
Headboat			1
Gypsea			
Helene Sue		2	
Hardway			
High Anxiety			1

Vessel	Height	Number of Openings in 2000-2001	Number of Openings in 2002
Highland Fling			1
Highlander			
Hillary			
Hista			
Hista Nada			
Hjag			1
Helen W. Smith			
Gypsy			
Green			1
Green & White			
Green Arrow			
Green Hull			
Greg & Jeff			
Ground Forgiven			
Gunamo			
Hattatude			
Fynn			
Harmony			
Freyja			
Halens			1
Halo			10
Halrazed			2
Hamburg			
Hangover			1
Hardaway			
Gray Ghost			
Gwen Geist			
Fifty Fifty			
Father & Son			
Father & Sun			
Fem Fatale			1
Ferily			
Fiddler Crab			
Fiddler Green			6
Fiddler Spirit			
Fiddler's Dream			
FrinRenne			
Fiesta			
Family Affair			
Final Delivery			
Fine & Dandy		13	26
Fine N Dandy		34	
Finn			1
First Cast			
First Light			
Fish Finder			
Fish Story			1
Fiddler's Green			
Escapade			3

Vessel	Height	Number of Openings in 2000-2001	Number of Openings in 2002
EliziaBleu			1
Elligh Can Vita			1
Elsa C.			
Embla			1
Emma B		2	
Endless Energy			1
Endorfin			
Ensure			2
Fantasea			
Erica Lyn		1	
Family Affair III			
Esperanza			
Evrik			2
Executive Stu			
Executive Suite			
Exile			
Explorer		1	
F.V. Viking II			
Fair Skies			4
Fisherman Green			
Equalizer			38
Ian Nigel		2	6
Fish Tank			
Francie Lee		23	
Francis Di			
Francis Lee			
Frau Lu			2
Fredricksburg			
Free Spirit			
Free Will			3
Foundations			
Fresh Start			
Foundation			15
Friendship			
Hook Up			1
Full Circle			3
Full Moon			
Lily G.		1	
Fun Seeker			
Further			
Furyo			1
FV Chief			
Freedom			
Five Keys			1
Fyn			
Fisherman's Dream			8
Fishfinder			
Fishin Story			41
Fishing Story		7	

Vessel	Height	Number of Openings in 2000-2001	Number of Openings in 2002
Fishing Story II			
Fishing Vessel		1	
Fish-n-it is			8
Foxy Lady			1
Fit Queen			
Fisher Dreams			
Flamingo			
Flying			
Flying Fredy			1
Flying Pony			8
Fool's Paradise			1
For Sale			
Foray			2
Fortuna			2
Fortune			
Fishy Story			
Kimberly & Kathleen			
Kathy Rose		25	11
Katie For Shaw			
Katrina Lee			9
Katzenjammer			
Kelsey Ann			
Kelsey Anne			
K-Flick-I			
Ki			1
Kokomo			10
Kimberly & Katherine			
Kathleen & Mary		5	6
Kindred Spirit			1
King Nummy			
Kings			1
Kismet			
Kiss Me			
Knot For Shore			2
Knot Four			1
Judy Rose		65	67
Ki-Bela-Mi			1
Kamian			
Hunter			
Jupiter			
Just Desert			
Just Duet			
Just Us			1
Justice			
Kahlua			
Kaiosk			
Kathy Lee			1
Kamiam			2
Kathleen Mary		4	

Vessel	Height	Number of Openings in 2000-2001	Number of Openings in 2002
Karahd D		5	6
Karamiss			
Karan D.		1	
Karen J			
Kariana			3
Karina			4
Karina II			5
Kat			
Kokomo II			
Kam Ho			2
Laura Kim		2	
Lady Macy			
Lady Margaret			
Lady Primo		1	
Lara			
Las Brizas			
Las Jean			
Last Shot			2
Laura & Matt		1	
Koamo			
Laura Ann		2	5
Lady Lee			
Lauren & Matthew		2	
Leprechaun			1
Lauren Mathew			
Leader			2
Lefty			
Legacy			
Legasea			
Lemon Heart			
Laura & Matthew		1	
Lady Deborah			
Konstanz			
Kyrie			
La Bourno Vita			1
La Nika			1
La Vista			
Lady Ann		1	
Lady Barbara			
Lady Beth			
Lady Lou			
Lady Catee			3
Lady Lorraine		16	8
Lady Diane			
Lady Ellen		1	
Lady Grace Marie		2	
Lady Helen		10	13
Lady In Red			2
Lady Jane		6	4

Vessel	Height	Number of Openings in 2000-2001	Number of Openings in 2002
Lady K			
Lady Katie		1	
Judy Marie		2	2
Lady Bev			
Iron Eagle			1
Insure			41
Integrity		2	
Interim			
Intermint			
Liberty			1
Intrigue III			1
Invincible		2	
Iona			
Jaded			2
Irish Mist			2
Innss Out Men			1
Isis			
Iso Kala			2
Issues			
Ivone Michele			
J- Lynn		1	
Jackie B.		13	
Jackie Sue			2
Julia Reanne		1	
Irene B III			
Impatience			1
Hoplane			
Horizon			4
Horizons			
Horn Pipes			
Hot Sparks			1
Hot Totty			
Humbird			1
Humming Bird			1
Inspector II			
Leo			
Inshore		101	8
Impulse			
Elizabeth II		1	
Life is Good			2
E Q 2			2
Impulsive			
In Sync			2
Independence			
Independence MV			
Leslie & Charles			
Huntress			
John's Girl			
Joan's Ark			2

Vessel	Height	Number of Openings in 2000-2001	Number of Openings in 2002
Joe's			
Joe's Girls			
Johanna			
John Ann			
John Bry			
John Francis			
John N.		2	
Jacqueline A.			
John-Jack			8
Jessica Lynn		3	
Joi - De - Villa			
Jolie-Dame			
Leprechaun 2			1
Jolly Dame			
Josephine		4	
Joyce - D		4	2
Jubilation			8
Judy K			
JohnAnn			
Jean Marie		6	
Jag			1
Jagermeister			1
Jail			1
Jail Ho			1
Jake The Fake			
Jamie Elizabeth		2	
Jane C			
Janice Lynell		6	6
JoAnne			
Jashes			
Jillian			
Jeannie Marie		1	10
Jennie Lee			2
Jenny Lee			
Jenses			1
Les Play			
Jersey Coast Yes			1
Jersey Giant		13	10
Jersey Talk		1	
Life's Love			3
Janus			1
Baystar II			
Bar Noise			
Barbara Louise III			
Barbara Pauline			13
Barbara Rose			
Baroness			2
Barron			1
Barroness			

Vessel	Height	Number of Openings in 2000-2001	Number of Openings in 2002
Basel			
Easy Goer			
Bay Star II			4
Baba			1
Bazil			
Beachcomber			3
Beachcomer			
Bealicia			
Beast			
Beautiful Lady			3
Bella-Mi			1
Belle Adele			
Bay Prince			2
Atlantic Traveler			
Arch Angel			
Argo			5
Armyaki			
Arondale			
Ashley			1
Ashling			
Ashton Gray			2
Asling			
Baltic Breeze			1
Athena			
Baby Doll			1
Atlantic Twin			
Augaluck			
Aurochs			
Aurora			
Aurura			
Avalon			4
Avante`			2
Avenger			
Big Bird			
At 2 Mile			2
Breaking Away			
Bernice - C			
Bob Cat			
BoBo			
Boheme			
Bona			
Borderline			
Bottom Line			
Bound			
Boat			
Breakaway			
bnew			1
Break-Wind			
Brendan			

Vessel	Height	Number of Openings in 2000-2001	Number of Openings in 2002
Brewmaster			
Brewski			
Brigadoon			
Briseis			
Brittany			2
Buddy			
Bull Dog			1
Break of Dawn			
Blondie's Dory			
Aquatizer			
Big Bob			24
Big Dog			4
Big Dogs			
Biggy			
BiJo			
Black Hawk			
Black Knight			2
Boat Ass			
Blinkin			1
Bernice C.			
Blue Boat			
Blue Bonnet			
Blue Chip			
Blue Deck			
Blue Hoagie			
Blue Hull			2
Blue Skies			
Bluebonnet			
Bnasty Habit			1
Blackhawk			
Adventurer			
Afishionado			11
Act III			4
Addie Byrd			
Adler Green			2
Adrean Rose			
Adrien Rose			16
Adriena Rose			
Adriene Rose			
Act I			
Adventure			1
Act 1			
Adventurer II			
Adventurer Jill			1
Adventuress			
Adventurous			22
Aegis			
Aeo			3
Aeolis			
			1

Vessel	Height	Number of Openings in 2000-2001	Number of Openings in 2002
Aeolus III			2
Arc Force			
Adrienne Rose			
507601			1
100 Proof			2
2 Brothers			
20/20			1
226107			
2-Brothers			
3 Sports Boats			
3/4 Time			
316			2
Act II			
5 Keys			4
After 50			5
607601			
8's Ail			
A. Green			
A. Hawke			
Abigail & Myles			2
Absolute			10
ABU			
Acclaim			
Act			
5 - Keys			3
Andrea Rose			
Aerio			3
Amaretto			8
Ambrosia			47
Amen			
Amethyst			
Amorpause			
Amruy			
Amy Marie			30
Amanda & Ashley			4
Andante'			
Al's Boat			1
Andrea Stephen			
Angela Michelle			
Angela Z.			
Anna			
Anna Lisa			
Annapolis			1
Anytime			1
April One			
C - Venture			13
Anastasia			1
Algae			
After Hour			6

Vessel	Height	Number of Openings in 2000-2001	Number of Openings in 2002
Afterhours			7
Agape			8
Airborn			1
Airborne			
Aisling			11
Alacrity			2
Alborada			
Amanda Ashley			6
Alexandra L			12
Aquatizer VII			
Alicia Rose			
Alisa Marie			
Alison Rose			
Allegro			
Allison			
Allison Rose			
Allons			
Almost Heaven			
Alpha			
Alchemy			
Diamond Lil			
Dog Do Chow			
Del Mar			
Delaware		1	
Den - Mark		2	
Denos Dream			
Deserving			
Desperado			
Destiny			
Debonair			
Diamond Girl		5	2
Debbie Sue			1
Diane			
Diane Lynn		4	6
Diane Marie		2	
Dianna Lynn		4	
Discovery			1
Dixie Girl		3	
Dobado			2
Doc			2
Crystal & Rebecca		6	
Details			3
Darana - R			2
Business			8
Crystal Girl			4
Curlew			
Cygnet Explorer		2	
Cygnus			
Damlyme			

Vessel	Height	Number of Openings in 2000-2001	Number of Openings in 2002
Dana Elizabeth		1	
Dana Point			
Decoy			1
Danny		4	
Dolphin			1
Darana R			
Dark & Stormy			
Dark Hull			
Dawn			1
Dawn Marie			1
Dawn Trader		10	5
Dawn Treader		81	53
Dawner			
Deauville			
Danikki			
Echo			
Doe's Eyes			
Duck's Away			
Dutch Treat			2
DYAD			4
Dyaid-Catamaran			
Dyana			2
Loopholes			2
Eastern Star		2	
Duck			
Ebony C.			
Duce's Wild			
Ectasea			
Egg Harbor			
Egg Harbor 52			
Egg Harbor 53			
Elan			
Eleanor Mary		2	
Electra			
Eliza G.			
Elizabeth B. II		1	
Lin Z			
Dream Feeder			2
Dolphin II		1	2
Don B He			3
Dona Maria		12	6
Dona Marie			4
Doodle Bug			
Double			1
Double Take			1
Dre One			1
Ducks Away			3
Dream Chaser			7
Cristern			2

Vessel	Height	Number of Openings in 2000-2001	Number of Openings in 2002
Dream Maker			3
Dreamalong			
Dreammaker			
Dredge Mike Thomas		1	
Dreilze			
Dreizhen		1	
Driller			1
Drop Anchor			
Drumline			
Dream Catcher			1
Catamaran Mahee			
Chanticleer			4
Carly Ann		4	11
Carly Anna			
Carol Ann			
Carolina Lady			
Carrie Mae			1
Cas-sce-sea			1
Castlevie			1
Cariba			2
Catamaran			
Carellan			4
Catch The Spirit			10
Cat's Paw			3
Caucauo			2
Cavileer			1
Celebration			20
Center Line Crane			2
Chadds Ford			14
Challenge			2
Crystal Anne		6	1
Catamara			2
Capt. Billy Haver			2
Elizabeth Dawn			22
C & L		173	40
Cajun Love			5
Cal 25			2
Caline			1
Calinos			
Canadian Flag			1
Canyon Enterprise			
Carioca			
Capt S			
Chaos			
Capt. Bucky Smith		94	7
Capt. Frank		5	
Capt. Jack			
Capt. Joe			20
Capt. Peabody		2	

Vessel	Height	Number of Openings in 2000-2001	Number of Openings in 2002
Capt. Ralph			29
Capt. Wool			1
Capt. Zig			2
Captain's Lady			3
Canyon Hobo			1
Confrontation			
Chanlia			
Cocomo			
Cocomo II			
Colleen Marie			
Columbia			2
Come Monday			1
Comit			
Comly		1	
Claire Elizabeth		3	
Concubines			1
Cirrus			2
Connemara			
Constantino L		21	1
Cool Breeze			3
Cordelia			10
Cory Ann			
Courage			2
Courageous			4
Cove Shot			1
Crane Barge			
Competitive Bid			
Chief Jay			
Charade			
Charlie			1
Charlie Tuna			1
Cheers			
Cheery - O's			
Cherie Amour			
Chesapeake			
Cheshire Cat			
Clean Sweep			3
Chief			
C - L			2
Chipper B			
Chiqut			
Chris Pride		1	8
Christ Pride		2	
Christi Caroline		3	
Christopher Pride			1
Chum Stain		3	104
Chumley			
Chummy			
Cheyenne			

Vessel	Height	Number of Openings in 2000-2001	Number of Openings in 2002
Stacia Marie		1	
Steven D		2	
Spirit			1
Spirit of St. Joe			
Spoinion			1
Spoon Pin			
Sport			1
Sport Boat			1
Sport Fisher			
Special K			
Spring Break			
Southwind			
Stacia Marie III			
Stalker			6
Star Dust II			1
Starfire			
Starfish			1
Stargazer			2
Steal Away 3			
Stephen Dee		1	
S - Way			
Sportsman Boat			
So Long			
Sir Luff A Lot			
Siren's Song			
Sirius			
Skal		1	
Skylark		1	
Slam Me			1
Slammer			1
Slo Poke			13
Spindrift			
Snoopy II			
Steven Dee		2	
Soap Ring			1
Soehip			
Sojourn			
Solaise			
Son Ship I			
Sons Of Thunder			2
Sorry Too			
Southern Cross		2	
Southern Miss		4	1
Small Red			1
Sure Shot			1
Steven - D		1	2
Sunday Morning			
Sundogs			
Sunixawi			

Vessel	Height	Number of Openings in 2000-2001	Number of Openings in 2002
Sunkist			
Sunny Nicola			1
Sunset			
Sunset Lady			
SunBum			
Sure Power			35
Sun Shine			1
Susan		1	
Susan L		4	
Susan Marie III		1	
Susan Rose		30	11
Swan			
Sweet Pea			2
Sweetie			8
T & T			
Tail Hook			1
Sure Power			
Sue Marie III		1	2
Stevie - D		1	
Sting			21
Stone Broke			
Storm Vogel			4
Strabo			
Street Legal			
Strega			
Stress			
Suncast			
Sue Ann		1	
Silverfish			1
Sugar			1
Suhail			
Sumac			
Summer Breeze			
Summer Girl			4
Summer Wind			
Summerwind			
Summit			
Sun Dogs			
Strike III			
Sea Mist			1
Simple Pleasures			1
Se La Vie			7
Sea Adventure			1
Sea Adventuress			2
Sea Breeze			25
Sea Flower			
Sea Fox		2	2
Sea Hag			
Scorpion		9	19

Vessel	Height	Number of Openings in 2000-2001	Number of Openings in 2002
Sea Huntress			17
Scallywag			
Sea Mistress			
Sea Quail			2
Sea Rover		35	20
Sea Tow		33	34
Sea Tow /Sail			3
Sea Tow/Barge		2	5
Sea Tow/Crane		1	7
Sea Tractor		33	2
Sea Turtle			2
Sea Hunter			1
Salty Paws			1
Long Trayer			
S.S. Sophie			
Sages Realm			3
Sail			
Sail 47			
Sail U.D.			
SailBoat			
Sailing Shoes			
Scott & Mike			
Sal's Ear			
Sea Witch			
Sandy Pearl			2
Sanity			3
Sansone			
Sar			4
Sara Rose			1
Sassafras			
Sassy Girl		37	7
Savannah			1
Scalawag			
Sailor		8	
Shi-ve			2
Shearwater			4
Shekeman Glory			8
Shekinah Glory		1	
Shekinah Grey			
Shekinn			
Shelby			2
Shiek Glory			
Shinitzsha			
Sea Venture			6
Shirley-Dom			
Shannon			
Shona			
Shore Power			14
Shuman		3	

Vessel	Height	Number of Openings in 2000-2001	Number of Openings in 2002
Shuman-USACOE			
Siddie Golden			2
Silver Fox			
Silver Lining			2
Silver Moon			
Tamandra			
Ship			1
Serendipity			2
Simon Peter		4	
Seafarer		5	8
SeaFox			
SeaTow		1	
Seawife			
Second Chance			
Second Wind			
SECS			
Seeker			2
Sheakri			2
September			1
Shaun Michele			
Serenity IV			3
Serf's Up			1
Serria Too			1
Seven Seas			1
Shabu			
Shadow Fox IV			
Shamrock		4	
Shamus			
Sea Wife			2
Seos			
Wave Runner			
Valiant Lady			
Walden			
Wanderer			
Wandering One			1
War Cry			2
War Eagle			
Warhog			
Washingtonian			1
Viva Doris			
Wave Dancer			
Viva			1
Waypoint			2
Wayward Wind			
We 3			1
Weatherall			
Wego bay			
We'll Sea			
Whale Song			

Vessel	Height	Number of Openings in 2000-2001	Number of Openings in 2002
Whale Watcher			
Whimsy			
Waterbug			
Victor-Rae		1	
Tail Rope			
Vaud J.		2	10
Venture		1	
Venturous			1
Verities			
Vertie Mae			1
Vessel			1
Vic-ter-Ray			
Voyager			
Victoria Elizabeth		3	2
White Dove II		6	22
Victory			
Vida			
Viking			1
Viking II			
Villa De Conde			36
Virginia Lynn			
Virginia Surf			
Vita			
Vita Duris			
Victor			
Winner's World			
Windless			
Windmill			1
Windows			
Winds			1
Winds of Destiny			
Windsong			
Windswept			1
Windwalker			
Whispers			
Wings			2
Windamere			1
Winsome Wind			
Wint Te			
Wish You Were Here			5
Worries End			
Woy Woy			1
X Kaliber			
YANQUI			2
Yes!			1
Young Heart			
Windy Lee			
Wile Coyote			1
Valerie			

Vessel	Height	Number of Openings in 2000-2001	Number of Openings in 2002
White Dove Too		61	6
White Dove Two		7	
White Hull			
White Sail			
White Star			
White Wing			
White/Blue II			2
Who Cares			2
Windemere			
Wild Cat			
Winddriven			
Wilma Irene		3	1
Win Some			2
Wind			3
Wind Catcher			
Wind Dancer			3
Wind Drift			1
Wind Driven			
Wind Song			2
White Dove		5	8
Wight Half			
Tow Boat US		1	2
Varok			1
Time Even			1
Time on line			
Timeless			2
Tony & Jan		13	2
Top Gun			
Top Pop			2
Topaz			1
Tiki XIV			
Tow			
Tiger Sailing			1
Toyden			
Tradition			1
Tranquility			1
Transit 3			1
Travesty			
Travis & Natalie		2	
Trawler Killybags			
Treoja			1
Trevia			1
Touchdown			1
Ten Marie			
S - D			
Tamara			1
Tamara Alane		2	
Tango			
Tanzer			

Vessel	Height	Number of Openings in 2000-2001	Number of Openings in 2002
Tapa			1
Tar Baby			4
Tas			2
Timberline		2	
TeHani			1
Tropic			
Terrapin			1
That's For Shore			
The Beast		1	3
The Brit			
The Dorcas Hardy			
The Frog			
Thou Swell			3
Three Eleven East			
Tiara			
Teaser			
USCG 47251			4
USCG 33441			
USCG 33442			
USCG 41332			2
USCG 41419			
USCG 41454			
USCG 45310		1	
USCG 45311		1	
USCG 46308			
Trinity			
USCG 47202			
Unfair Advantage			
USCG 47350			
USCG 47351			
USCG 47630			
USCG 49407			
USCG 73503			
USCG 75303			
USCG Buoy Tender			
USCG Sledge			
Valenca			1
USCG 47201			
Tun Tower			3
Takard			
Truant			
Tug - Big Harry			
Tug - Independence			
Tug - Jacklyn - A			
Tug - Mr. PcTc			
Tug - Mr. Pete			
Tug - Sarah Rose		2	
Tug & Barge		1	
USCG			4

Vessel	Height	Number of Openings in 2000-2001	Number of Openings in 2002
Tug-Dorothy Ann		1	
Uptick			
Tuna T.			
Tuna Tower			
Tweedler & Donna			
Tweedles & Donna			
Two Brothers			5
Two Is Company			
Two Mile Wig			1
Under My Skin			
Triumphant Land			
Tug & Tow		1	
Mission Bound			
Montreal			1
Miss Patricia Ann			
Miss Peggy			1
Miss Penelope			
Miss Sue Ann		1	
Miss T		6	
Miss Vertie Mae		1	
Miss Vertie May		3	
Miss Merna			1
Miss Wilma Ilene		2	
Miss Maude			3
Missy G		1	
Mist			
Mistie			1
Mistress			
Misty			
Misty Dream			
Miz Dawn		2	
Mod Rum			2
S.F. Litho Craft			
Miss Wilma Eileen		8	5
Miss DC			1
Ministry			2
Mirage			2
Mirasil			
mis patt			1
Misbehaven			
Mischief			
Miss Amanda		2	5
Miss Ann		1	
Miss Millie			
Miss Cape May			2
Moon Dancer			
Miss Dee			
Miss Julie		4	9
Miss Laura			

Vessel	Height	Number of Openings in 2000-2001	Number of Openings in 2002
Miss Laura (2nd Cassiopeia)		25	
Miss Lisa		2	
Miss Mandy		2	
Miss Margaret			4
Miss Marge		1	
Miss Margie		12	10
Miss Brooklyn		6	
Nigel Ian			
Monkey Business			
Nancy Elizabeth III		2	
N-Ass Stan			1
Nasty Habit			23
Nasty Habit II			3
Nasty Habit III			4
Nastyt Habit			1
Neptune			
Nancy			1
Nicole Leigh		2	
Nameless		1	224
Nighthawk			10
Nightmusic			
Nijnkasi			
Nikosa			
Nimble			
Nimbus			
Nincasa			
Ninkasi			
No Control			
Nicole & Elizabeth		2	4
Murph The Surf			1
Mooncusser			2
Moonshadow			1
Morning Dew			
Morning Flame			
Morning Fog			
Mornings Sun			1
Morvie Canada			
Mountain Dancer			
Nancy Ann			1
Mr. Pete			
Mikalia & Louise		4	
Murphy's Law			9
MV Eastern Star		2	
My Destiny			1
My Itch			2
My Law			
My Marzy			1
Mystic Turtle			
N Sync			1

Vessel	Height	Number of Openings in 2000-2001	Number of Openings in 2002
Na - a			
Mr. O'neal			
Madeline		1	
Mike Thomas		1	1
Luzitano			
M. S. Greer			2
M<abel s			
Ma`op			1
Mabel Rose			
Mabel Susan III (Sharon Ann)		9	
Mable Susan		2	
Luff Affair			
Mad Marlin			1
Lucky Dog			8
Madison			1
Maetta			
Magic			2
Magic Bus IV			
Magnum		2	
MaiHai			
Mailing			
Majestic			
Major			1
Mac Dragon			1
Liquid Assets			1
Lisa G		1	
Lisa Marie			1
Little Joe			
Little Sammie		4	
Live Dot			1
Loblolly			
Lobster Dock			1
Luke J			
LolliPop			2
Manuella, Maine			
Loon			
Yvonne Michele			
Loralei			
Lori Marie		2	
Lost Ark			
Losta Duck			
Lou - Lou			
Loveboat			1
Lucky 13			2
Lois Jean		2	
Metra			1
May 2			2
Megan Elizabeth			

Vessel	Height	Number of Openings in 2000-2001	Number of Openings in 2002
Melissa Lou (Njord)		4	
Men's Fish			1
Merri Sue			2
Merry Mac			3
Merry Mee			
Met II			2
MaMa			
Metaphor II			5
Master Son			
Mi Tmo			
Michael Van			2
Michele Louis			
Michele Louise			
Mid Life			
Mid Wife			
Midnight			1
Midnight Mayor			1
No Regrets			
Metaphor			
Mary & Clyde		8	9
Mikalia Louisa			
Many Thanks			
Marcus			1
Margaret Holly			2
Margaret Rose		35	3
Marijane			2
Mars Motor			1
Marsalo III			
Marshall			1
Maxed Out			
Marwhal			
Max II			
Mary & Elizabeth			2
Mary Ann		8	
Mary Eileen		2	5
Mary Elizabeth		16	6
Mary K		2	
Mary Katherine			2
Mary Lou		2	
MaryAnn		2	
Manta II			
Marshell			
Quahog			
Phase II			
Pristine			1
Promise			
Proteus			
Providian		7	
Puddle Duck			4

Vessel	Height	Number of Openings in 2000-2001	Number of Openings in 2002
Puddles			1
Puffin			
Princess			1
Pyewacate			
Primrose			
Que Sera Sera			2
Queen Dolphin			1
Queequeg			
R & K			2
Rachel			
Radar Love			
Rae-Mar			
Rainmaker			4
Ranger			2
Puravita			2
Pompano Honey			1
No Joke			
Phyllis Ann II		1	
PickPocket			52
Pikero			1
Pilgrim's Progress			
Pipe Dream			8
Please Advise			1
Pleasure			
Priorities			
Pog Mo Thon			1
Ray			
Poo Mo Chuy			
Pooppa Bocca			
Popeye			
Poppa Boca			2
Poppa Bocca II			1
Porch Beacon			1
Porkey Pine			1
Porthole			
Prelude			
Pleasure Boat			
Ruagh II Canada			
Roberts			1
Roger's Reason			1
Romantica			2
Ronda & Dennis		2	3
Rookey Duck			
Rookey Duke			3
Rosebud			3
Rothan II			
Rapid Transit			
Route 66			
Rita C		1	3

Vessel	Height	Number of Openings in 2000-2001	Number of Openings in 2002
Ruby S		2	10
Ruby's			
Ruff & Ready			
Ruff N Ready			
Rum Runner			
Run Away			
Rust Bucket			
Ruth Ann II		4	
RuthAnn II			
Roupillon			
Reel Flare			1
Petit Bateau			12
Razzy Raft			
Real Desire			3
Real Escape			
Rebecca			
Red Boat 607601			1
Red Boat Jon			1
Red Canada			1
Reel D			3
Rita Dianne		6	4
Reel Desire III			1
Rita Diane			10
Reel Time			2
ReHani			1
Rejoice			2
Renaissance			4
Rhapsody			2
Rich Man			
Richard M			1
Riddler			2
Rascal			
Reel Desire			8
Ocean View			2
Phillis			
Not For Shore			
Not For Shore III			
Not Sure			1
NRC Patriot			
Nutty Irishman			2
Nymphia			
Ocean		1	
Northwind			
Ocean Front			
Northstar/Sea Tow		2	2
Oceanis			1
Octopus			
O'Dalaigh			
Odyssey			4

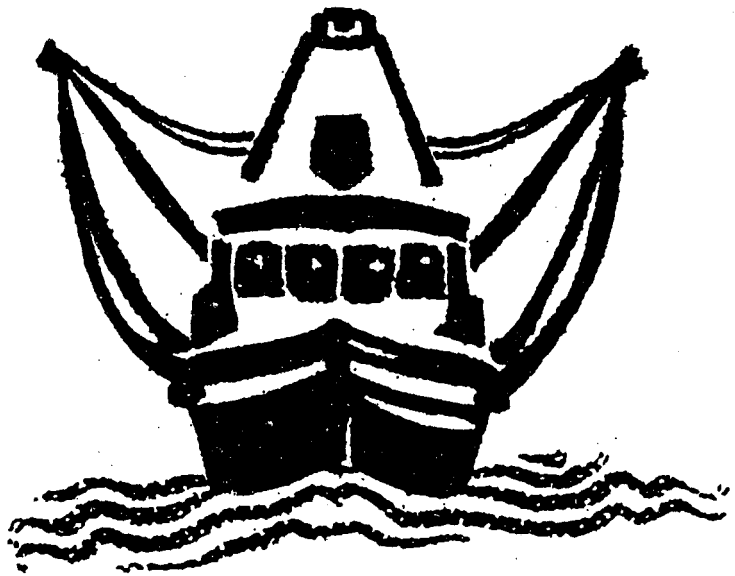
Vessel	Height	Number of Openings in 2000-2001	Number of Openings in 2002
On Delivery			
On Top			
One Set			
Opil Ker			1
Orlando Princess			
Ocean Clipper			2
North Star 4			
Lionheart		4	5
Nodik			
Nomad			
Noreen Marie			
Noren Marie			14
Norfolk Rebel			
Norma C II		2	
Noronna		1	
Noscence			
North Star			1
Our Tern			1
North Star 6			1
Northern Exposure			1
Northern Lights V			
Northern Star			
Northstar			1
Northstar 3		2	
Northstar 4		1	
Northstar 5		14	2
Northstar IV		1	
Norronna		2	3
Penny Anne			
Pearl			
Pearl Bnon			1
Peetinacan & Tow			
Pegasus			
Peggie			1
Peggy of Stony Creek			1
Pelican's Nest			
Penelope			5
Oro Mahi-Ahi			2
Penlie			
Patti Z			
Penot			30
Peppermint			2
Peptide			
Per Chance			2
Perception			
Perfection			
Perky Lady			
Perseverence			
Persistence			
			1

Vessel	Height	Number of Openings in 2000-2001	Number of Openings in 2002
Penguin			3
Pain-in-the-Ass			1
No Matter What			
Outrage			
Outrageous			
Outrigger			
Outsider			
Ouzo			
Over at Two			1
Oz			
P/V Duchess			
Peacock			
Pagan			
Peabody			
Palmar			
Pam Ann			
Pamela Ann		1	
Paragon			
Paramour			3
Patience			2
Patrician			
Patti D			2
Osprey's Nest			
Pacifica			

VI. APPENDIX B

DATA AND CORRESPONDENCE RELATED TO NAVIGATIONAL SURVEY

Northeast Fishing



Vessel List

Created on December 18, 2000
by the Fisheries Statistics Office of the National Marine Fisheries Service

SAMPLE PAGES

2000 Northeast Fishing Vessel List for Federally permitted vessels created on 12/18/00 by the Fisheries Statistics Office of the National Marine Fisheries Service. Information is sorted in alphabetical order by **vessel name**. Vessel names that begin with a number will appear first on this list. Data contained in this list are vessel name, Permit (Federal Permit Number), Hull (USCG, state or tribal registration number), owner, and principal port and state of vessel.

Vessel Name	Permit	Hull	Owner	Principal Port	State
20 FT SEACRAFT	146577	MS8066WZ	GIBBS, BRUCE L	CHATHAM	MA
3 BEES	135753	MS6564AP	BOAT 3 BEES INC	PIGEON COVE	MA
3+1	230092	263181	LUNEDEI, MICHAEL	SANDWICH	MA
38 SPECIAL	222214	963892	POTTER, JEROME P	SO GOULDSBORO	ME
3JC	128853	MS8688HB	O'CONNELL, JAMES M	CHATHAM	MA
4/0	130808	NJ4228FV	OLSON, GUSTAVE E	WILDWOOD	NJ
51	214870	575709	FAULKINGHAM, WILLIAM R	WINTER HARBOR	ME
A A R C	241347	935265	COSTA, JAMES M	PROVINCETOWN	MA
A J	117540	NY4176EN	GONCHARUK, JOHN M	SHINNECOCK	NY
A MARIA	210958	650871	MCINTIRE, CARL O	OGUNQUIT	ME
A/C III	233189	1061243	BANNICK, LAWRENCE	SHARK RIVER	NJ
AARON & ALEXA	233139	1047510	NEW SHELL LOBSTER INC	GLOUCESTER	MA
AARON & MELISSA II	330516	648627	BOAT AARON & MELISSA INC	PORTLAND	ME
AARON & SARAH	250456	606921	PAGE, DALE R	BOOTHBAY HARBOR	ME
ABBIE & HOLLY	220686	618026	BREWSTER FISHING INC	BARNEGAT LIGHT	NJ
ABBY	146558	MS8639ZC	NEWTON, CHRISTOPHER	ORLEANS	MA
ABIDE	111391	NY8789BZ	FLEISHMAN, SANDRA	MONTAUK	NY
ABIGAIL	148000	MS9884KS	FOLEY, THOMAS L	ORLEANS	MA
ABIGAIL	148116	MS9304ZC	FOLEY, THOMAS L	ORLEANS	MA
ABIGAIL & MYLES	410151	589364	TRAWLER CRYSTAL & REBECCA	CARROLLTON	VA
ABOUT TIME	210810	636347	ROBERTSON, GEORGE	SANDWICH	MA
ABRACADABRA	230957	657274	RUDDOCK, RAYMOND R	MONTAUK	NY
ABRACADABRA	330380	612315	TRAWLER ABRACADABRA INC	CAPE MAY	NJ
ABSECON	410055	258419	F/V ABSECON INC	CHINCOTEAGUE	VA
ABSOLUT	242521	1050248	TLC INC	WESTPORT ISLAND	ME
ACADIA	220446	562627	DAUPHINEE, FREDERICK W	SCITUATE	MA
ACADIA	241902	1027153	CAMPBELL, MICHAEL S	PLYMOUTH	MA
ACADIAN	148045	ME4371Z	GILLETTE, JULIE A	PROSPECT HARBOR	ME
ACCEPT-IT	221526	693969	WARRINGTON, MARK L	PORTSMOUTH	NH
ACCIPITER	148228	NJ4251GM	KOMETA, RONALD	CAPE MAY	NJ
ACCOMMODATOR	101764	ME8179A	BACKMAN, FREDERICK A	WINTER HARBOR	ME
ACES HIGH	214859	1048132	CAMPBELL, KENNETH D	YARMOUTH	ME
ACES HIGH	231025	660604	SILVER FOX FISHERIES INC	POINT JUDITH	RI
ACORES	410519	961198	IVONILDE FISHING CORP	NEW BEDFORD	MA
ACT I	310153	554626	FRYE, WAYNE E	NEW BEDFORD	MA
ACT II	147255	MS2472KV	MILLS, EVERETT B	WESTPORT	MA
ACT III	410341	673467	BALD INC	NEW BEDFORD	MA
ACT IV	410366	679608	NORPORT INC	NEW BEDFORD	MA

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Vessel Name	Permit	Hull	Owner	Principal Port	State
ADA-ANN	233166	618307	WILKIN, WILLIAM C	SEA ISLE CITY	NJ
ADAM AND JOSHUA	220167	550909	KIMBALL, MERRILL C	PORTLAND	ME
ADDIE BYRD	146750	MD9128BD	CAREY, EDWARD F	OCEAN CITY	MD
ADDIE N	146874	ME4997V	ALLEY, CLOSSON FRANKLIN	BEALS	ME
ADIOS	220359	544267	RIDGEWAY-RUDOLPH, VICTORIA	MONTAUK	NY
ADMIRAL FRANCES	320638	654831	MISS FRANCIS INC	POINT JUDITH	RI
ADRENALIN	231684	939797	VARNEY, SCOTT F	CHEBEAGUE ISLAND	ME
ADRENALIN	233300	930797	VARNEY, SCOTT FORBES	CHEBEGUE ISLAND	ME
ADRIANNA	320416	609594	F/V ADRIANNA INC	CAPE MAY	NJ
ADRIEN ROSE	240172	538410	LITTLE HUSTLER INC	CAPE MAY	NJ
ADVANTAGE	100623	MS5259SP	COTTI, RICHARD C	HARWICH	MA
ADVANTAGE	221514	641941	ROBINSON, WILLIAM E	SAUGUS	MA
ADVENTURA	220603	608517	IGLESIAS, DAVID	TIVERTON	RI
ADVENTURE	147026	ME7846E	WATERMAN, STEVEN L	SO THOMASTON	ME
ADVENTURER	321025	993104	MCFISH INC	PORTLAND	ME
ADVENTURER II	310361	534194	ADVENTURER FLEET INC	WILDWOOD	NJ
ADVENTURESS	320411	575124	ADVENTURES INC	SHINNECOCK	NY
AERIE ONE	230978	660321	SMART, HOWARD R	WAKEFIELD	RI
AFT HOURS	136424	MS3803B	NIHTILA, ROBERT S	MARSHFIELD	MA
AFTA DAVID	240309	588937	MERRYMAN, RICHARD K	SOUTH HARPSWELL	ME
AFTER YOU TOO	146859	CT2841AT	BLUME, FRANK	BASS RIVER	MA
AFTERNOON DELIGHT II	232680	912543	LAZARO, GENE R	VINALHAVEN	ME
AGGIE LOU	125835	ME8678J	TAYLOR, DAVID A	CUSHING	ME
AGGRAVATION	231460	668419	AGGRAVATION INC	GALILEE	RI
AGGRESSOR	320577	620064	RON-GINO FISHERIES	STONINGTON	CT
AGITATOR	137596	ME2151P	ROGDE, DANIEL	JONESPORT	ME
AGITATOR	410256	598200	M & P BOAT INC	WILDWOOD	NJ
AHAB	147161	NH0382BE	STETTNER, MARC J	PORTSMOUTH	NH
AIRBORNE	137878	NC1767BV	MICHAEL HOFFMAN/JOSEPH HOFFMAN	MANTEO	NC
AJ	410411	599164	TRIDENT MARITIME CO / W RABER	SEATTLE	WA
AKULA	145371	MS4490KH	BADAMS, JON C	EASTHAM	MA
AL'S PAL	148211	NC3976AN	MCGUIRE, ALFRED H	WILMINGTON	NC
AL-N-JOY	231902	571723	L L J LOBSTERS INC	BELFORD	NJ
ALAN J II	100452	ME3145V	FREEMAN, MYRON P	YORK HARBOR	ME
ALASKA JINGLE	140882	ME2602V	HARRIS, WILLIAM A	FREEPORT	ME
ALBACORE	148028	MS0011NT	DECOSTA, ROBERT R	NANTUCKET	MA
ALEADY GONE	147561	MS1248AV	BELL, THOMAS J	SCITUATE	MA
ALENTEJO	330148	517000	KAVANAGH FISHERIES INC	NEW BEDFORD	MA
ALEXA	320144	537017	WALLS, ALLAN E	PORTLAND	ME
ALEXA J	220415	NJ9384GK	SEA FRESH LLC	BELFORD	NJ
ALEXANDRA L	250968	938522	BLUEBILL FISHERIES	CAPE MAY	NJ

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Vessel Name	Permit	Hull	Owner	Principal Port	State
ALEXANDRIA	242550	1063377	POLAND, PETER H	ROUND POND	ME
ALEXIS MARGARET	242563	1068251	HEMEON, RONALD A	GLOUCESTER	MA
ALFHILD	230190	252619	ORLOFF, ROBERT J	NEW YORK	NY
ALICE & ANN	129153	ME1609Z	STEVENS, EVELYN	FIVE ISLANDS	ME
ALICE & RO	232609	930250	ALLEY, GARY C	STEUBEN	ME
ALICE AMANDA	410494	943737	F/V ALICE AMANDA INC	HAMPTON	VA
ALICE BELLE	214925	250500	POTTER, A LEROY	SOUTHPORT	NC
ALICE MARIE	250634	645133	TREBLOC SEAFOOD, INC.	SANDWICH	MA
ALICE MARIE	330593	600802	TRAWLER MI JOY INC	BEAUFORT	NC
ALICE O	210270	592941	OLSEN, GEORGE E	PORTLAND	ME
ALICIA ANN	232096	982760	GREGORY F & ALICIA A WALINSKI	CHATHAM	MA
ALICIA LINN	241238	921758	J W COMMERCIAL FISHING INC	SEA ISLE CITY	NJ
ALICIA T	127149	MS5286AT	TALBOT, RICHARD E	SAUGUS	MA
ALIESHA MARIE	210433	595139	MASON, GEORGE	SCITUATE	MA
ALISON LEE	233151	1048307	SMITH, JOSEPH A	EDGARTOWN	MA
ALISON ROSE	250991	937288	ALISON ROSE INC	LITTLE COMPTON	RI
ALL MAINE WOMAN	250300	557344	ALL MAINE WOMAN INC	POINT JUDITH	RI
ALL MINE	145787	MS8942KM	GOVE, RONALD W	NAHANT	MA
ALL R'S	134287	MS5606WT	KRAUSE, RONALD E	GLOUCESTER	MA
ALL R'S	220242	560334	COPP, RICKIE L	CUNDY'S HARBOR	ME
ALL SET	233309	1068195	TWIN COVES CORP	SEBASCO HARBOR	ME
ALLIANCE	330098	530910	EPIPHANY SEAFOOD INC	POINT JUDITH	RI
ALLISON	214080	1023884	CASTELLANO, JOSEPH P	MONTAUK	NY
ALLISON	410453	931593	F V ALLISON LLC	BARNEGAT LIGHT	NJ
ALLISON CAROL	115856	MS3296YY	MONDELLO, PETER S	GLOUCESTER	MA
ALLYSON	320114	503707	DOBSON, DONALD E	POINT JUDITH	RI
ALLYSON J	131486	ME2E	PORTER, BRUCE W	CUTLER	ME
ALMAHROSA	330251	555787	ALMAHROSA FISHING CORP	BOSTON	MA
ALMIRA JANE	148019	ME1033Y	PARADY, LOUIS W	KITTERY POINT	ME
ALMIRA JANE	220364	589587	POTTLE, THOMAS R	EASTPORT	ME
ALMOST THERE	146488	FL8639HD	BROWN, CARL E	SEBASTIAN	FL
ALOSA	230178	558858	GOOD, JOHN J	PLYMOUTH	MA
ALPHA & OMEGA	147508	ME1722V	HOLMES, DANUAL L	CUTLER	ME
ALPHA & OMEGA II	410493	944084	FREEDOM FISHING CORP	FAIRHAVEN	MA
ALTERNATIVE	210955	584798	NORBERT & LYNN SULLIVAN-CRITCH	BRANT ROCK	MA
ALTHEA	250004	249004	CASEY, BRENDAN	NEW YORK	NY
ALTHEA K	100277	MS6930PP	ALTHEA K INC	NANTUCKET	MA
ALURING	127434	MS1034HT	LITTLEFIELD, ROBERT	BASS RIVER	MA

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Vessel Name	Permit	Hull	Owner	Principal Port	State
ALWA	250006	248540	BAKER, ALAN R	PLYMOUTH	MA
ALYSSA & SETH	231629	930190	PERRY, JOSEPH B	PLYMOUTH	MA
ALYSSA & ZACHARY	320304	566708	ALYSSA & ZACHARY FISHING CORP	NEW BEDFORD	MA
ALYSSA ANN	231732	944587	RICCA, WILLIAM T	MONTAUK	NY
ALYSSA B	231296	587925	BRACKETT, NORMAN R	SOUTH BRISTOL	AK
AMANDA & ANDY	231826	956676	JAS FISHERIES	GLOUCESTER	MA
AMANDA & CHRISTOPHER	126230	RI1812C	ATWELL, THOMAS F	WICKFORD	RI
AMANDA ELIZABETH	242609	1087735	HAWKES, GARY E	CUNDY'S HARBOR	ME
AMANDA FRANCES	222867	288452	WRIGHT, VIRGINIA M	OCEAN CITY	MD
AMANDA L	222178	971363	AMANDA L INC	NARRAGANSETT	RI
AMANDA LAYKIN	222703	995265	FRANCOEUR, RICHARD	KENNEBUNKPORT	ME
AMANDA MARIE	213031	688792	PARISI, MATTHEW S	GLOUCESTER	MA
AMANDA MARIE	214649	1043112	THREE LANTERNS SHIP SUPPLY INC	GLOUCESTER	MA
AMANDA MY	220524	603467	DRISCOLL, STEVEN J	RYE	NH
AMANDA S	146834	MS4333KP	SMALL, JOHN WESLEY	CHATHAM	MA
AMANDA SUE	128298	ME4401V	SMITH, CHARLES W	BIDDEFORD	ME
AMANDA TARA	330183	545441	BAY HEAD INC	OCEANSIDE	NY
AMANDA'S WILL	222312	961609	DYER, DENNIS Y	FREEPORT	ME
AMANDA-JOY	131449	ME2465C	ALLEY, COLON S	JONESPORT	ME
AMAZING GRACE	222749	600847	CARLSON, DAVID A	SWANS ISLAND	ME
AMBASSADOR	410214	610564	TONNESSEN FISHERIES INC	NEW BEDFORD	MA
AMBER AND JOHN	134630	MS3411KR	RUTH D INC	GLOUCESTER	MA
AMBER ANGEL	212207	906262	MEYER, JAMES H	CHARLESTON	SC
AMBER ANN	121235	ME4661C	BEAL, ELIHU E	JONESPORT	ME
AMBER WAVE II	214301	610083	YOUNG, NORMAN K	VINALHAVEN	ME
AMBITION	221616	657270	WILLIAMS, RAYMOND	ENGELHARD	NC
AMBJORG & JULIE	127504	MS4965KV	A & J FISHERIES INC	MANCHESTER	MA
AMELIA ANNE	232092	982482	LISI, GREGORY	WAKEFIELD	RI
AMERICAN BEAUTY	310537	686438	CONNOLLY, MARTIN J	SANDWICH	MA
AMERICAN BORN	221646	676271	RAVENELLE, RICHARD	WESTPORT	MA
AMERICAN CLASSIC	330777	1068050	WALSH'S DEEP SEA FISHING INC	LYNN	MA
AMERICAN EAGLE	310357	299827	CAMPBELL & CO INC	BELMAR	NJ
AMERICAN GOLD II	241711	621204	PARISI, CHARLES	GLOUCESTER	MA
AMERICAN HERITAGE	251242	674546	WELCH, STEPHEN P	SCITUATE	MA
AMEY LOUISE	146703	ME3994X	ALLEN, HOLLY CHASE	LOOKOUT PT HARPSWELL	ME
AMIE	210713	603011	BIGELOW, ALBERT E	BELFORD	NJ
AMIE LIN	148071	NH6087BC	KNOWLES, CHARLES S B	SEABROOK	NH
AMIE'S TURN	136399	ME3429F	MEANS, NORMAN A	SACO	ME
AMITY	221080	633266	POLAND, EDWARD	NEW HARBOR	ME
AMOS & AGGIE	147984	ME1428P	ELLIOTT, RICHARD J	PORTLAND	ME
AMY & PAM	128797	MS3693FT	QUINTAL, PAUL M	PLYMOUTH	MA

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Vessel Name	Permit	Hull	Owner	Principal Port	State
AMY A	144015	MS7481KR	TOMASIAN, GREG	HARWICH	MA
AMY C	231092	664386	COLEMAN, KEVIN	NEWPORT	RI
AMY GALE	231844	952493	HODGDON, CHARLES STEPHEN	BOOTHBAY HARBOR	ME
AMY JILL	212431	935643	FLANAGAN, JOHN R	WICKFORD	RI
AMY LEE	134196	RI5878N	ROGERS, SCOTT	JERUSALEM	RI
AMY MARIE	410173	600409	CAPE CLAM INC	CAPE MAY	NJ
AMY MICHELE	330590	697569	AMY MICHELE LLC	NEWINGTON	NH
AMY PHILBRICK	321047	1038300	AMY PHILBRICK LLC	NEWINGTON	NH
AMY YVONNE	232564	1028833	STEVE PHILBROOK INC	ISLESFORD	ME
ANA PALMIRA	330174	569464	ANA PALMIRA FISHING CORP	NEW BEDFORD	MA
ANCORA PRAIA	250431	292750	SANDIA FISHING CORP	PROVINCETOWN	MA
AND MAC	310154	555196	AND MAC FISHERIES INC	NEW BEDFORD	MA
ANDORRA	220526	604523	ANDORRA INC	TIVERTON	RI
ANDREA C	147092	MS2417KV	CEBULA, AARON H	FAIRHAVEN	MA
ANDREA DAN	231293	687536	LOWERY, RODNEY	BOOTHBAY HARBOR	ME
ANDREA J	330270	590337	SEAWARD FISHERIES CORPORATION	SCITUATE	MA
ANDREA J II	320394	603726	DWYER FISHERIES INC	SCITUATE	MA
ANDREA JEAN	410200	607725	J & G SCALLOPS INC	NEW BEDFORD	MA
ANDREA LYNN	129638	NH7925BB	LAW, STEPHEN R	PORTSMOUTH	NH
ANDREW G	147115	DL3985U	TOWNSEND, CHESTER V	DAGSBORO	DE
ANDROMEDA	135735	NH7537AU	SAVAGE, JON J	RYE HARBOR	NH
ANDY O	115048	MS9659RR	SKIPPER, WILLIAM J	GREEN HARBOR	MA
ANDY ONE	320932	536626	FV ANDY ONE INC	HAMPTON	VA
ANGEL	212088	645415	NORWOOD, ROBERT A	BOOTHBAY HARBOR	ME
ANGEL DAWN	320669	670468	TRAWLER CAPT PETE INC	HAMPTON	VA
ANGELA & ASHLEY	123828	ME4046P	PARADY, BRADFORD F	KITTERY POINT	ME
ANGELA AND ROSE	250366	587293	RMV INC	GLOUCESTER	MA
ANGELA JOY	148229	FL1063GY	GOFF, BRIAN OR CATHY	FORT PIERCE	FL
ANGELA LEIGH	124304	ME5448V	MERCHANT, ALLAN	JONESPORT	ME
ANGELA MICHELLE	321079	1092315	CARTER FISHERIES INC	GLOUCESTER	MA
ANGELA ROSE	146592	ME0552N	FIANDACA, JOSEPH J	LUNT HARBOR	ME
ANGELENA	136406	ME183LL	SMITH, LEON R	JONESPORT	ME
ANGELICA JOSEPH	240677	638992	ANGELICA FISHERIES INC	GLOUCESTER	MA
ANGELINDA	220127	502714	PIERCE, MERLE B	HARPSWELL	ME
ANGELINE	220007	228279	LARSEN, STANLEY L	CHILLMARK	MA
ANGENETTE	230003	250536	BORJESON, RONALD	BOSTON	MA
ANGIE AND MARY	222061	942359	FREDETTE FISHERIES-W FREDETTE	POINT JUDITH	RI
ANGIE O	221017	650046	PAMELA ANGELA INC	WAKEFIELD	RI

NMFS Northeast Region Vessel Permit Data

Do You Want to See Permit Information?

Enter Below Either the "Vessel Permit Number" or "Coast Guard Documentation/State Registration Number" to Retrieve the Most Recent Vessel and Permit Information.

Vessel Permit Number: 320600

Coast Guard Documentation or State Registration Number:

Display Vessel and Permit Data | Clear

Disclaimer:

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NERO Home Page

National Marine Fisheries Service

NMFS vessel/fishery data as of 08-APR-2003: 10:04 AM

Most Recent Vessel Data

Site visit: 25880

Vessel: MELISSA J
Northeast Federal Fishery Permit: 320600
US Coast Guard Doc #/State Registration # : 642230
Primary Owner|Corporation Name: FOXY INVESTMENTS INC
Address: 208 HAND AVENUE
P O BOX 61
CAPE MAY COURT HOUSE, NJ. 08210
Phone: (609) 463-1170

Hailing Port: PHILADELPHIA, PA.
Principal Port: ATLANTIC CITY, NJ.

Most Recent Northeast Federal Fishery Permit Data

Permit Year	Plan	Category	Description	Start Date	End Date
2003	RCB	A	RED CRAB - INCIDENTAL BYCATCH	28-MAR-2003	29-FEB-2004
2002	OQ	6	OCEAN QUAHOG - 2002	11-FEB-2003	30-APR-2003
2002	SCG	1	SEA SCALLOP - GENERAL - 2002	11-FEB-2003	30-APR-2003
2002	SF	1	SURF CLAM - 2002	11-FEB-2003	30-APR-2003

PARSONS BRINCKERHOFF
TELEPHONE CONVERSATION MEMORANDUM

Project: MILL CREEK/MIDDLE THOROFARE **Job No.:** 20020B (Use Complete Number) **Date:** 1/31/03

From: DAN COHEN—ATLANTIC CAPE FISHERIES
Indicate Department, Field Office, etc., for "In House" calls.
Indicate Agency or Firm for other than "In House" Calls.

Talked To: TOM FISHER

Tel. No.:

Item Discussed: NAMES OF VESSELS THAT DOCK AT UPPER THOROFARE NEAR DOXSEE SEA FOOD

Information Obtained: DAN INFORMED ME THAT THE IRENE B AND IRENE B III BOTH DOCK AT THE DOCKSEE LOCATION ON THE UPPER THOROFARE. EACH VESSEL IS ABOUT 75 FEET HIGH FROM THE WATER LINE TO THE TOP OF THE RIGGING.

Action Required: TOM FISHER NEEDS TO INCORPORATE THIS INFORMATION INTO THE DEVELOPMENT OF ALIGNMENT ALTERNATIVE 'F' THAT IS SOUTH OF THE EXISTING BRIDGE.

Meeting Minutes

Meeting Information:	**Date:**	January 24, 2003	**Time:**	1:00 PM
	Subject:	HEIGHT OF FIXED OR MOVABLE BRIDGE-TWO MILE BRIDGE REPLACEMENT	**Location:**	LUND FISHERIES
	Attendees:	TOM FISHER –PB JEFF REICHLE—LUND FISHERIES DAN COHEN—ATLANTIC CAPE FISHERIES		

Minutes: The purpose of the meeting was to share with the fishery owners the discussions we had with FHWA regarding replacement options for the Two Mile Bridge (Middle Thorofare Bridge) and obtain from them their costs due to the ROW impacts from the various alignment alternatives. Tom provided a colored copy of the plans for Alternatives 3A, 3B, 3C, 3D and 3E to Jeff for his use. These plans identified the impacts to the adjacent properties from the different alternatives in colors, but was not definitive enough for the owners to specify the costs of these impacts. PB will review each alternative and specify the impacts to the properties in a listing for each alternative so that costs can be defined.

Tom also explained to them that FHWA was also interested in the number of employees of the industry, gross income per year, affect of losing the industry to the local area for each alternative. Tom agreed to define the information that is required in a letter to them and have the letter to them by 1/31/03.

We then discussed the future use of the 108 feet tall by 400 feet long by 59 feet wide refrigeration vessel and attempted to confirm that it only needed to dock at the Atlantic Cape Marina on Middle Thorofare and not at Lund's dock on Lower Thorofare, based upon previous conversations. Jeff stated that he had already invested $600 to $800K in dock and refrigeration facilities at the Lower Thorofare dock and thus he was looking to improve his fish handling capability by docking the large vessel there. He stated that he presently loses about $400 to $600k per year due to the present vessel width limitation of 50 feet at the existing bridge, which causes by multiple handling of the fish. Alternate 3C therefore needs to be modified to have a vertical clearance over Lower Thorofare of 110 feet instead of the planned 75 feet.

Dan Cohen had to leave and Jeff and Tom discussed another alignment that would require a longer fixed span bridge that was aligned to the south of the existing bridge and provide 110 to 120 feet vertical clearance over the channel. (Tom subsequently discussed this with Dale Foster and it was agreed that this southern alignment should be included in the Alternatives Analysis Report. A cable stayed bridge option may be viable on this alignment.)

200208

Two Mile Marina
P.O. Box 1528
Ocean Drive
Wildwood Crest, NJ 08260
Phone: 609-522-1341
FAX: 609-523-1751
email: twomile@eclipse.net

Facsimile

To: Thomas Fisher
@Fax: 609-734-6955
From: James J. Salasin
Date: Monday, January 13, 2003 @ 12:38PM
Re: Sail Boats - Two Mile Marina
Pages: 1, including this

Below is an updated list of marina sailboat patrons. Keep in mind that this list does not include transient vessels that patronize the marina. The listing includes 2002 vessels and those that have reserved for the 2003 season. Mast heights are not known for all the vessels although I believe that none of our seasonal tenants are greater than 62' plus several feet for antennas.

Because of Cape Mays location to the Delaware Bay, Intercoastal Waterway and the Atlantic Ocean, it is a popular and often necessary "stop over" point for vessels traveling North or South. Because the Two Mile Marina has the deepest waters of any marina in Cape May County, large vessels with deep drafts often stay with us. We have accommodated deep draft sail boats with mast higher than those quoted below. It is not unusual for us to dock sailboats with mast heights in excess of 70'. No other marina in the area has the capability of accommodating these deeper draft vessels.

Seasonal and Monthly Sailboats

Boat Name	Length	Mast Height plus antenna
Impatience	37'	55'
KiBola M	43'	52'
Halo	34'	51'
Murphy's Law	36'	53'
Petit Bateau	41'	59'
Cordelia	27'	unknown
Aisling	30'	unknown
Metaphore 2	32'	unknown
Celebration	41'	51'
R. Rhodes (owner)	41'	unknown
Blue Horizon	45'	62'
Insync	35'	unknown

If you have any questions, please feel free to call.

Fisher, Thomas

From: Eleanor A. Bochenek [bochenek@vertigo.hsrl.rutgers.edu]
Sent: Monday, January 06, 2003 9:40 AM
To: fishert@pbworld.com
Cc: acfish@aol.com
Subject: bridge data

bridgeinfo.xls (21 KB)

Tom:
Attached is an excel spreadsheet with the bridge information. Eleanor

Eleanor A. Bochenek
Rutgers University
Haskin Shellfish Research Laboratory
1636 Delaware Ave
Cape May, NJ 08204
609-898-0928 ext 12
609-898-8241 fax

Vessel Height in Feet from Wildwood and Cape May

Vessel Name	water line	out-rigger	Tot. Height above H_20 line	vessel length	Contact	Dock	Address	City	State	Zip Code	Phone
Abracadabra			52	80		Lunds Fisheries	997 Ocean Dr	Cape May	NJ	08204	609-884-7600
Adrianna	10		?	74	Dan Cohen	Atlantic Capes	985 Ocean Dr	Cape May	NJ	08204	609-884-3000
Barbara Anne	12	45	57	90	Dan Cohen	Atlantic Capes	985 Ocean Dr	Cape May	NJ	08204	609-884-3000
Capt. A.T.			65		Old Point		817 Jefferson Ave	Newport News	VA	23607	757-247-0557
Capt. Joe			*		Gary Osmundsen*	Capt'n Sigs Dock		Wildwood	NJ		609-522-0885
Capt. Fella			65		Old Point		817 Jefferson Ave	Newport News	VA	23607	757-247-0557
Capt. Sig			*	110	Gary Osmundsen*	Capt'n Sigs Dock		Wildwood	NJ		609-522-0885
Capt. Tuck	10	65	75		Old Point		817 Jefferson Ave	Newport News	VA	23607	757-247-0557
Dewey			40	49	Rick Hoff	Dock Street					609-522-3400
Dyrsten			60	160		Lunds Fisheries	997 Ocean Dr	Cape May	NJ	08204	609-884-7600
Erin Renee	12	55	67	96	Dan Cohen	Atlantic Capes	985 Ocean Dr	Cape May	NJ	08204	609-884-3000
Evening Star			52	79		Lunds Fisheries	997 Ocean Dr	Cape May	NJ	08204	609-884-7600
Flicka			58	140		Lunds Fisheries	997 Ocean Dr	Cape May	NJ	08204	609-884-7600
Francis M. Lee	11	48	59	82	Dan Cohen	Atlantic Capes	985 Ocean Dr	Cape May	NJ	08204	609-884-3000
Instigator	11	50	61	75	Ken Hand	Atlantic Capes	7312 Pacific Ave	Wildwood Crest	NJ	08260	609-522-1598
Irene B III	11.5	55	66.5	78	Charles F. Burke			Wildwood	NJ	08260	609-886-2042
Jersey Girl	12	45	57	85	Dan Cohen	Atlantic Capes	985 Ocean Dr	Cape May	NJ	08260	609-884-3000
Jill Adventure	10	45	55	71							
Lauren Kim			*	85	Gary Osmundsen*	Capt'n Sigs Dock		Wildwood	NJ	08260	609-522-0885
Lady Roslyn	11	45	56	72	Dan Cohen	Atlantic Capes	985 Ocean Dr.	Cape May	NJ	08204	609-884-3000
Melissa Kim			*		Gary Osmundsen*	Capt'n Sigs Dock		Wildwood	NJ	08260	609-522-0885
Miss Kathy			*	110	Gary Osmundsen*	Capt'n Sigs Dock		Wildwood	NJ	08260	609-522-0885
Miss Lauren			65		Old Point		817 Jefferson Ave	Newport News	VA	23607	757-247-0557
Mount Vernon			59	80		Lunds Fisheries	997 Ocean Dr	Cape May	NJ	08204	609-884-7600
My Girl	10	50	60	75	Dan Cohen	Atlantic Capes	985 Ocean Dr.	Cape May	NJ	08204	609-884-3000
Norreen Marine	9.5	38	47.5		Dan Cohen	Atlantic Capes	985 Ocean Dr.	Cape May	NJ	08204	609-884-3000
Stephanie Dee	11		?	75	Dan Cohen	Atlantic Capes	985 Ocean Dr.	Cape May	NJ	08204	609-884-3000
StarBrite			51	80		Lunds Fisheries	997 Ocean Dr	Cape May	NJ	08204	609-884-7600
Susan Marie I			50		Rick Hoff	Dock Street		Wildwood	NJ	08260	609-522-3400
Susan Marie II			70	76	Rick Hoff	Dock Street		Wildwood	NJ	08260	609-522-3400
Venturer	15	40	55	88	Dan Cohen	Atlantic Capes	985 Ocean Dr.	Cape May	NJ	08204	609-884-3000

*Gary Osmundsen boats range from 65 to 72 feet above the water line

Cape May/Wildwood

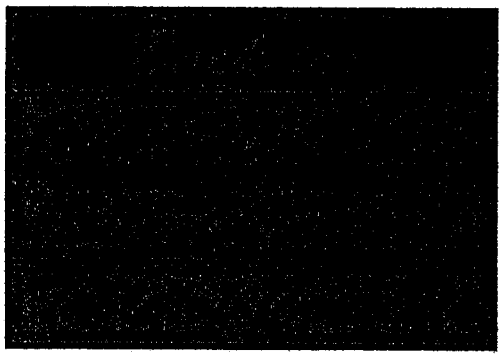
Part of the Cape May fleet at the Jersey Capes dock (N.Stolpe photo)

At the Southernmost tip of New Jersey - and almost as far South as Washington, DC - the combined port of Cape May/Wildwood is the largest in New Jersey and one of the largest on the East Coast.

The center of fish processing and freezing in New Jersey, Cape May/Wildwood is the home port to some of the largest vessels fishing on the Atlantic coast and has led the way in developing new fisheries and new domestic and international markets for New Jersey seafood.
Major Cape May fisheries focus on squid, mackerel, fluke, sea bass, porgies, lobsters and menhaden. In addition to

these, Wildwood boats aare also in the surf clam/ocean quohog fisheries.

Like many Jersey Shore communities, much of Cape May's and Wildwood's economies are dependent on seasonal tourism - which is dependent both on the weather and the overall state of the economy. The year-round character of commercial fishing is a major factor in keepnig these communities going in the off-season.



Fisher, Thomas

From: Fisher, Thomas
Sent: Tuesday, October 15, 2002 9:48 AM
To: 'Jeff Reichle'
Subject: RE:

Importance: High

Jeff,
Is it the intension that these vessels dock only at Two Mile Fisheries on the east shore of Lower Thorofare or would they dock in the marine on the west shore of Middle Thorofare too? Thanks for the info. I am having a meeting with Dan Cohen on Thursday, 10/17/02 at 10:00- 10:30 am in his office at the site to expedite the vessel height survey we previously discussed.

Tom

-----Original Message-----
From: Jeff Reichle [mailto:jreichle@lundsfish.com]
Sent: Monday, October 14, 2002 2:49 PM
To: Tom Fisher
Subject:

Hi Tom

Sorry for the delay in getting this info to you. Please find following the information I rec'd from the ship's agent. Any questions please call.

Best Regards

Jeff

-----Original Message-----
From: Rossen Shipping Co. A/S [mailto:reefer@rossenshipping.dk]
Sent: 14 October 2002 16:42
To: Alexander Marr
Subject: CAPE MAY, N.J.

Rossen Shipping Co. A/S
1, Knudsvej - Postbox 1054
DK-2960 Rungsted Kyst - Copenhagen - Denmark
Phone: +45 45868088 - Fax: +45 45867888 - Tlx: 37414 ross dk
Alexander / Steen
Following are the particulars of vsls that would appear
the most likely candidates for Lund Fisheries' cargoes:-
- "Frio Canada"-type - full capacity: 2900nmt Fish
104m long over all - 16m beam - 6,67m draft fully laden
and 5,5/5,6m with only 2500t cgo o/b dep. on bunkes
/water o/b - 29m to highest mast when in ballast (95 FT.)
- "Bukhta"- type - full capacity: 3600nmt Fish
127m length over all - 18m beam - 7,96m draft fully laden
and 6,5/7m with 2500t cgo o/b dep. on bunkers/water o/b -
33-32m to highest mast whenin ballast (108 FT.)
- "Lima"-type fm Seatrade - full capacity: 2650nmt Fish
102m length over all - 14m beam - 5,7m draft fully laden
and abt. 5,3m with 2500t o/b dep. on bunkers/water o/b -
abt. 30m to highest mast when in ballast (98 FT.)
- "Saturnas"-type - full capacity: 2200t Fish
92m length over all - 16m beam - 6,56m draft fully laden
ıd dep. on bunkers/water o/b - abt. 28m to highest (92 FT.)
ast when in ballast
ı e g a r d s,
Rossen Shipping Co. A/S

PARSONS BRINCKERHOFF
TELEPHONE CONVERSATION MEMORANDUM

Project: MIDDLE THOROFARE **Job No.:** 20020B **Date:** 10/8/02
(Use Complete Number)

From: DIANE HENFEY—OWNER OF DELTA LADY-SIGHTSEEING BOAT OUT OF WILDWOOD-.BILL HENFEY-HUSBAND
Indicate Agency or Firm for other than "In House" Calls.

Talked To: TOM FISHER

Tel. No.: 609-522-1919

Item Discussed: I REQUESTED INFO ON THE DIMENSIONS OF THE DELTA LADY PADDLE WHEELER SIGHT SEEING BOAT, AND FREQUENCY OF TRIPS

Information Obtained:

VESSEL SIZE: 30' HIGH X 80' LONG X 23' WIDE

TRIP FREQUENCY: SUMMER TIME—3 TRIPS PER DAY, EVERY DAY; THUS 6 OPENINGS PER DAY

OFF-SEASON (SENIORS)—5 TRIPS PER DAY BUT NOT EVERY DAY; THUS 10 OPENINGS A DAY POSSIBLE.

Summer
6 x 100 = 600
5 x 100 = 500
1100

Action Required: NONE

20020B

Two Mile Landing
P.O. Box 1528
Ocean Drive and Fishdock Road
Wildwood Crest, NJ 08260
609-522-1341 Fax 609-523-1751

June 8, 2002

Thomas Fisher
Parsons Brinkerhoff
506 Carnegie Center
Princeton, NJ 085640-6243

Dear Tom,

It was good to see you on Wednesday evening. Thank you for dining at Two Mile. I hope you and your colleagues enjoyed your meal.

The informal meeting regarding the Ocean Drive alignment must of slipped my mind. We had a fire in one of the other restaurants on Tuesday and I had spend the last couple of days resolving a host of issues in that regard. I do remain very interested in what goes on with Ocean Drive so please keep me informed of any future developments or meetings.

I misquoted you on the mast height of the vessels currently moored at our Marina. There are presently three sailboats with 64' mast including 3' antennas. I had told you 70 feet. In addition, we have five sailboats with 50' plus mast. For your information there is a commercial sight seeing vessel, Schooner Yankee, moored at the property next door with a 65' mast.

As I had mentioned to you on Wednesday, several of the my sailboat patrons expressed concern over the possibility of cutting them off from the marina. They state that Two Mile is one of the few marinas in the area that have enough water to accept the deep drafts of large sailboats. Please keep this in mind.

Again, if I can be of any assistance to you or your project please give me a call.

Sincerely,

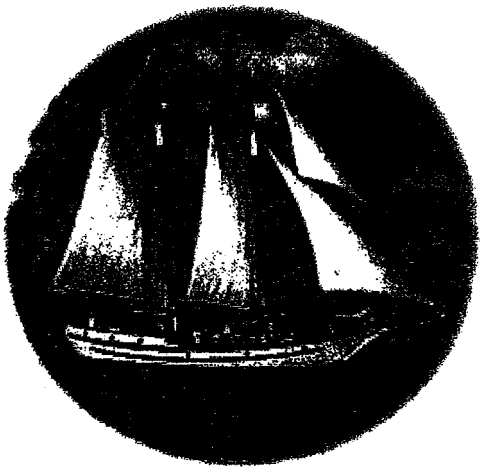
James Salasin
Owner/Manager

RECEIVED
JUN 11 2002

Come Sail With Us...

A Tall Ship Adventure Aboard The

SCHOONER YANKEE



Since she was built in Atlantic City in 1982, the celebrated **Schooner "Yankee"** has sailed from many ports, from East Port, Maine to St. Croix, U.S. Virgin Islands.

She is 80 feet overall, has a beam of 16 feet, draws six and one half feet of water and is 64 feet tall. The "Yankee" has been designed for your comfort and safety with enough seating for 46 passengers.

Weighing in at a stout 50 tons, you hardly know there is a sea under you.

The Schooner Yankeee is maintained in pristine condition.

Both Captain and crew welcome you aboard for a refreshing new way to get together with business associates, entertain friends, have a family outing or just make some new friends on a relaxing sail.

Join the merry company aboard and lend a hand setting sails, coiling halyards, trying your hand at the helm, or lie back, soak up the sun, sea breeze and do nothing at all.

Sailing Daily From ...

DOLPHIN COVE

Between Cape May and Wildwood, New Jersey

MAY 15 through SEPT. 25 → 130 days x 2 = 260

(609) 884-1919

THE OCEAN REEF CLUB

Fishing Village, Key Largo, Fla.

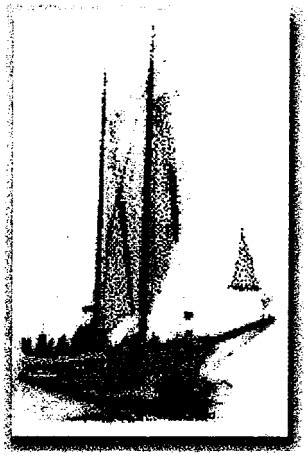
NOV. 1 through MAY 1

(305) 367-2525

Ask us about our 4 day Chesapeake Bay trips in October

Schooner *Yankee*

A.J. Meerwald - Specifications



Sparred Length	**115'**
Length on Deck	**85'**
Draft	**6'**
Beam	**22'3"**
Rig Height	**70'**
Freeboard	**4'**
Sail Area	**3562 sq.ft**
Gross Tonnage	**57**

CAPE MAY COUNTY CHAMBER OF COMMERCE
CAPE MAY COURT HOUSE, NJ 08210

RESOLUTION NUMBER 2002-6

Whereas, The County of Cape May is planning to rebuild Ocean Drive between Cape May and Wildwood Crest; and

Whereas, the reconstruction of Ocean Drive will entail widening the roadway and rebuilding two at grade bridges, as well as the current drawbridge; and

Whereas, current plans call for another drawbridge over Middle Thorofare that will have to open and close to accommodate the growing recreational boater and commercial fishing industries located in that area; and

Whereas, currently the drawbridge seriously impedes both mariner traffic and motorist traffic; and

Whereas, a fixed high level span on a new alignment will allow a free flow of motorist and ship traffic.

Now, Therefore Be It Resolved, that The Cape May County Chamber of Commerce, does hereby call on the Freeholders of Cape May County to explore and consider design of a fixed, high level bridge, spanning the Middle Thorofare and intra-coastal waterway in lieu of a new drawbridge; and

Be it further resolved that the commercial fisheries located in the area be consulted for their input into the planning.

BY ORDER OF THE BOARD OF DIRECTORS OF THE CAPE MAY COUNTY CHAMBER OF COMMERCE THIS 16th DAY OF MAY, 2002.

Joyce Gould, President

Diane Wieland, Secretary

Robert C. Patterson, Jr., Executive Director

20020B

CAPE MAY COUNTY
DEPARTMENT of PUBLIC WORKS
Office of the COUNTY ENGINEER

4 Moore Road
Cape May Court House, N.J. 08210-1601
(609) 465-1035 ☐ Fax: 465-1418
E-mail: countyengineer@co.cape-may.nj.us

DANIEL BEYEL
Freeholder

DALE M. FOSTER
Engineer

FAX TO: Amy Greene (Beth Choddy
Gibson (Mark Gibson
Grubb (Glenn Modica)
[redacted]
CC: Jim Maloney
Rama
Miguel

May 15, 2002

Thomas Fisher, PE
Parsons Brinckerhoff - FG, Inc.
506 Carnegie Center
Princeton, NJ 08540

Re: Middle Thorofare Bridge Scoping Project

Dear Mr. Fisher:

Jerry Jamison from the Cape May County Engineer's Office met with Daniel Cohen, President, Atlantic Capes Fisheries, Inc. to gather preliminary information as to the type of vessels the fishing industry uses in the area of the Middle Thorofare Bridge.

The following are contacts in regards to the fishing industry in the Cape May Harbor area:

1. Daniel Cohen, President
   Atlantic Capes Fisheries, Inc.
   PO Box 555
   Cape May, NJ 08204-0555
   (609) 884-3000
   (609) 425-1044 (cell)
   acfish@aol.com
   (Also president of the Cape May Seafood Association and actively involved with the entire commercial fleet.)

2. Jeff Reichle
   Lund's Fisheries
   997 Ocean Drive
   Cape May, NJ 08204
   (609) 884-7600

3. Gary Osmundsen
   Captain Sigs Dock
   (609) 522-0885
   (609) 602-1911 (cell)

MAY 20 2002

4. Rick Hoff
   Dock Street Seafood
   4408 Park Boulevard
   Wildwood, NJ 08260
   (609) 522-3400

5. Carl (Lodi) Carlson
   Carlson's Fish & Ice
   4408 Park Boulevard
   Wildwood, NJ 08260
   (609) 522-3400

The following are the number and height of boats docked at specific locations:

- **Atlantic Cape Fisheries**
  - Approximately 14 boats
  - Max height: 72'
- **Lund's Fisheries**
  - Approximately 11 boats
  - Max height: 72'
- **Two Mile Landing**
  - Approximately 5 boats
  - Max height: 65'
- **Cold Spring Harbor**
  - Approximately 9 boats
  - Max height: 75'
- **Otten's Harbor**
  - Approximately 12 boats
  - Max height: 72'

Mr. Cohen provided the following comments:

1. The US Army Corps of Engineers is supposed to maintain a channel depth of 25 feet for Cold Spring Inlet. Some locations in the channel are only 18 feet deep at low tide.

2. Boat sizes:

   Height (Air Draft): Crystal Ann is probably the tallest vessel with a height from waterline to highest point of approximately 75 feet.

   Beam (Width of Vessel): The Dyrsten and Flicka are approximately 39 feet wide. Outriggers on the vessels tend to be 50 feet long. Therefore with outriggers down, the Dyrsten would be 139 feet in width.

   Draft: The maximum depth of a vessel in the Cape May Fleet from waterline to lowest point on keel or screw is 18 feet.

If a new bridge is built across Middle Thorofare, Mr. Cohen indicated that the fishing industry would use "Reefer" vessels that could be as long as 440 feet with a draft of 26.3 feet and as wide as 59 feet. However, Mr. Cohen feels that this size "Reefer" would be a problem due to the channel depths and therefore they would look to a smaller size "Reefer" vessel. Mr. Cohen will provide data on the smaller size "Reefer" when he is able to track it down.

Mr. Cohen and the Cape May Seafood Association is very interested in being included and involved in the planning stage of this project. They are available to assist and support our efforts.

Should you have any questions, please do not hesitate to contact me.

Very truly yours,

Dale M. Foster, P.E.
County Engineer

DMF/jm

Two Mile Landing
PO Box 1528
Ocean Drive and Fishdock Road
Wildwood Crest, NJ 08260
609-522-1341 Fax:609-523-1751

200205
cc: TAF
J Maloney
Rome, M Santiago

RECEIVED
APR 3 2002
PB - PRINCETON

March 29, 2002

Thomas Fisher
Parsons Brinkerhoff
506 Carnegie Center
Princeton, NJ 08540-6243

Re: Ocean Drive Realignment

Dear Mr. Fisher,

Thank you for the return call and explanation regarding your consulting work for the county. At your request I am writing as follow-up to our phone conversation. You had asked me to inform you about my business and my knowledge of the area.

First of all, Two Mile Landing is a very large complex consisting of two restaurants, four bars, a gift shop, an arcade and a 62 slip marina. We are a seasonal business servicing in excess of 250,000 customers each summer. Our property consist of approximately 200 acres encompassing lands adjacent to Ocean Drive, both sides of Fish Dock Road and all of Thorofare Island.

As I had told you over the phone, I am concerned about any proposed Ocean Drive alignment that may affect my businesses. You made me aware of two possible alignments that would certainly have an adverse affect. The two westerly alignments that would transverse portions of our property including Thorofare Island would not be acceptable to me for the following reasons:

- My businesses are highly dependent on accessibility. In addition, our exposure to heavily traveled Ocean Drive provides us with our greatest source of new business - the "drive by" customer. Any bypass around my businesses would have significant consequences resulting in a great loss of revenues.
- Our waterfront location and the direct western exposure of our 700 dining seats offers our customers uninterrupted sunsets across a pristine meadow teaming with wildlife and wetlands. Needless to say this is a big attraction to our restaurant and marina patrons. A large bridge with an elevated roadway would disrupt that setting forever resulting in even further and permanent loss of income.

You had mentioned that one proposed route would align the highway just south of the Two Mile property and connect into Fish Dock Rd. Please be informed that any route across lower thorofare would require a span high enough to clear the 70 foot sailboat mast of vessels moored at our marina or in the safe refuse of Jarvis Sound.

It appears to me that an undertaking to realign Ocean Drive west of Lower Thorofare would not be economically feasible and a huge expense to tax payers. There are just too many

Two Mile Landing
PO Box 1528
Ocean Drive and Fishdock Road
Wildwood Crest, NJ 08260
609-522-1341 Fax:609-523-1751

wetlands to mitigate and too much private property to condemn. A more sensible approach would be to improve the existing span or relocate one adjacent to it. A new draw bridge with a center span high enough to accommodate, without opening, most fishing vessels and pleasure boats would be a reasonable alternative. A draw 25 feet higher than the existing bridge would, in my estimation, accommodate 75% to 90% of the vessels currently requiring a bridge opening.

The most feasible and least costly alternative would be to simply make the needed improvements to the existing structure, eliminate the toll booths and toll taking, require sport fishing boats to lower their outriggers and schedule timed openings as they do elsewhere on the intercoastal. Any one of these changes would reduce back up traffic significantly to a level that would be acceptable.

I travel this route on average four times daily from early Spring through the Fall. The problem of traffic backing up primarily occurs during the summer months of July and August and from my experience only during midday of the changeover days of Saturdays and Sundays. In addition any inclement weather during the Summer creates long traffic delays not only on Ocean Drive but everywhere. Of course the Ocean Drive delays are a result of the bridge openings during these periods. In my opinion, the delays are tolerable but could be improved with some minor and comparably inexpensive changes.

Someone had mentioned to me that Ocean Drive had to be improved to accommodate emergency routing off of the barrier island. I don't believe so. Today's technology provides us with accurate weather forecasting far in advance of any emergency situation. In the past, when such an emergency has occurred, the Ocean Drive bridges have been abandoned allowing road traffic to flow freely across without openings or toll collecting.

I have recently seen surveyor's tapes along Ocean Drive and Fish Dock Road. I assume they are your markings and you are progressing with your scoping project. Please keep me informed of any scheduled hearings or community meetings you may be sponsoring. I hope that the information I have supplied is helpful. If you have any questions, please give me a call.

Sincerely,

James Salasin
Operating Partner

20020B
File
cc: TAF, SB, JMalonay, MS
Dale Foster

PO Box 555
985 Ocean Drive
Cape May, NJ 0820
609-884-3000
Fax 609-884-3261

Atlantic Capes Fisheries

Fax

To:	Thomas Fisher	**From:**	Danny Cohen
Fax:	609-734-6900	**Pages:**	4 w/cover
Phone:		**Date:**	6/17/03
Re:	Cold Springs Inlet Data	**CC:**	

☐ **Urgent** ☐ **For Review** ☐ **Please Comment** ☐ **Please Reply** ☐ **Please Recycle**

• **Comments:**

Good Morning Mr. Fisher,

I have attached the data on the inlet that we got from the Army Corp of Eng.

COLD SPRING INLET, NEW JERSEY
(Cape May Inlet)

CONDITION OF IMPROVEMENT 30 September 1996

PREVIOUS PROJECTS: None

EXISTING PROJECT: The existing project, adopted in 1907 and modified in 1945, provides for an entrance channel 25 feet deep, protected by two parallel jetties, the channel extending from the 25-foot depth contour in Atlantic Ocean to a line 500 feet harborward of a line joining the landward ends of the jetties; and a channel 20 feet deep from the entrance channel to deep water in Cape May Harbor. The project length is about 2-1/4 miles.

Section 860 of the Water Resources Development Act of 1986 further modifies the Cold Spring Inlet project by authorizing the planning, engineering and design of a project to increase the depth of the 2,000-foot reach of the New Jersey Intracoastal Waterway in Cape May County to 15 feet.

PROGRESS OF WORK:

Completed and Under Maintenance: The project was completed in 1942 as an emergency measure prior to formal authorization.

Contract for restoration of jetties, was completed 5 November 1965.

The U.S. Government side casting dredge Schweizer (CESAW) performed maintenance dredging 13 through 27 March 1996 and 12 through 27 September 1996, removing 143,000 cubic yards at a cost of $206,000.

Agate Dredging Co. performed maintenance dredging 10 July 1996 through 30 September 1996, removing 12,000 cubic yards at a cost of $84,000.

Work Remaining: None under the existing project. However, the results of Phase I AE&D study for Cape May Inlet to Lower Township, New Jersey, recommended the Cold Spring Inlet project be modified to include beach erosion control measures for Cape May City. These measures, as described on page B-13, provided mitigation for the shore damages caused by the inlet jetties under the provisions of Section 111 of the River and Harbor Act of 1968. The Phase II AE&D studies on that prospective modification were completed in July 1983.

Minimum Depths:

Date of Survey	Section	Project Depth (Feet)	Minimum Depths (Local M.L.W.) Left Outside Quarter (Feet)	Mid-channel for Half Proj Width (Feet)	Right Outside Quarter (Feet)
30 JAN 97	Between Jetties	25	16.5	14.0	15.1
24 JAN 97	Inner End of Jetties to Cape May Harbor	20	17.6	23.2	22.1
23 JAN 97	Thence to Coast Guard Wharves	20	12.7	12.0	8.9
23 JAN 97	Thence to Schellenger Landing	20	-	10.5	-

COST OF CONSTRUCTION:

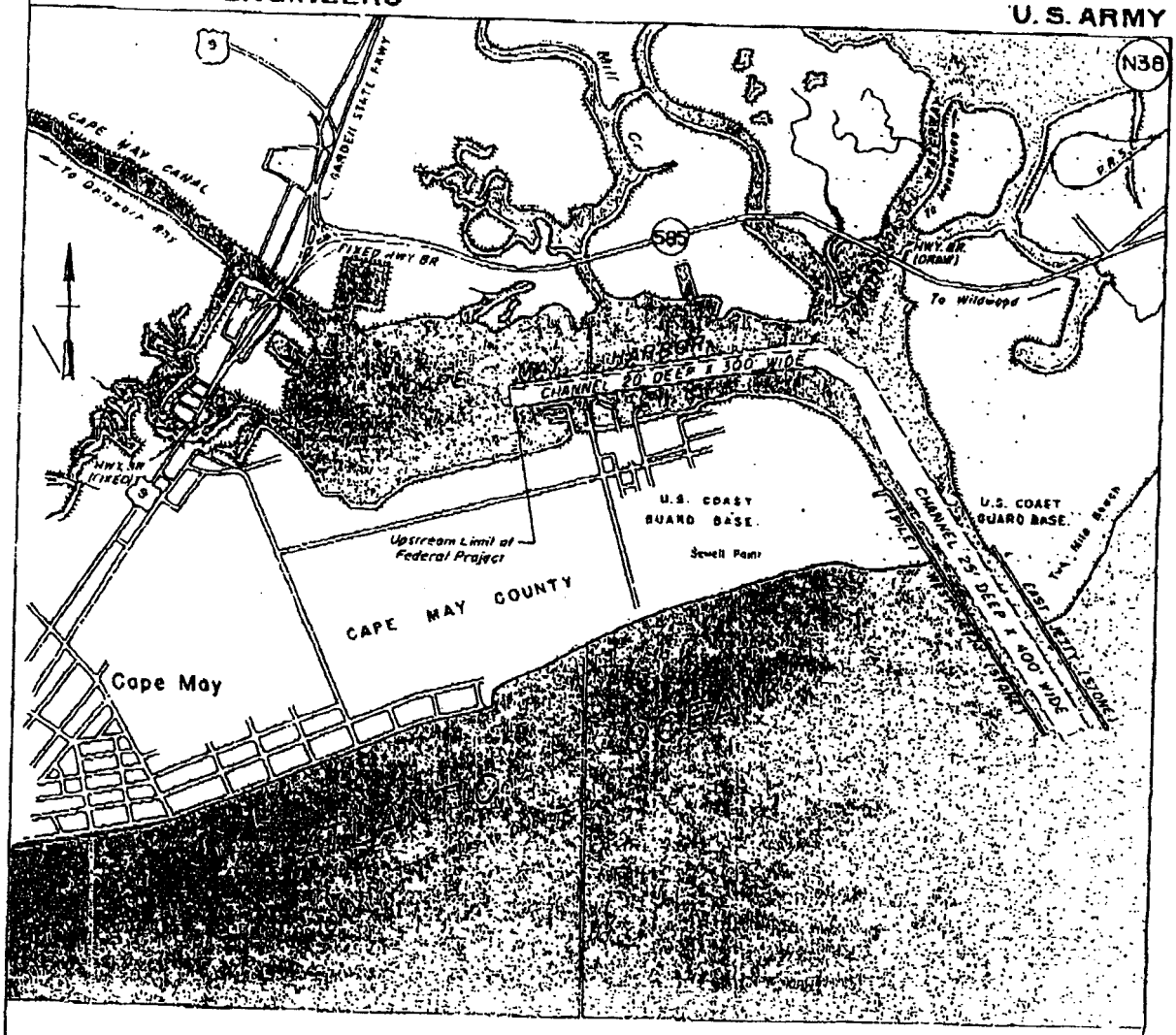
	New Work	Maintenance	Rehabilitation	Total
United States Funds	$929,275 1/	$6,411,612	$1,134,346	$8,475,233
Contributed Funds	100,000	-		100,000
Total Costs	$1,029,275 1/	$6,411,612	$1,134,346	$8,575,233

1/ Includes $50,000 Department of the Navy Funds.

RANGE OF TIDES: At landward end of west jetty, 4.3 feet.

CORPS OF ENGINEERS

U.S. ARMY



COLD SPRING INLET

NEW JERSEY

REVISED 30 SEPT 1984

SCALE OF FEET

1000 0 1 2 3 4 5000

U.S. ARMY ENGINEER DISTRICT, PHILA.

Technical Addendum E
Environmental Documentation Report

AMY S. GREENE
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ENVIRONMENTAL DOCUMENTATION REPORT FOR OCEAN DRIVE UPGRADE AND BRIDGE REPLACEMENTS ROUTE 109 TO WILDWOOD CREST LOWER TOWNSHIP AND WILDWOOD CREST BOROUGH CAPE MAY COUNTY, NEW JERSEY

May 7, 2003

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ASGECI Project #1807
PB Project #20020

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I. INTRODUCTION

The South Jersey Transportation Planning Organization plans to reconstruct Ocean Drive (County Road 621, formerly County Route 585), from its intersection with NJ Route 109 through to the Borough of Wildwood Crest, Cape May County, NJ (Figure 1). Ocean Drive serves as a major connector between Wildwood Crest, at the southern end of the barrier island, and the mainland. Ocean Drive also provides an evacuation route for the southern portion of the barrier island in the event of extreme high tides. Ocean Drive is the primary landside access route for the marinas servicing the bulk of the Cape May Fishing fleet.

The objective of the project is to raise the roadway surface to an elevation above the 100-year flood plain. Currently, the entire length of the roadway within the project area is below the 100-year flood plain. Additionally, the existing fixed bridges over Mill Creek and Upper Thorofare, and the bascule bridge over Middle Thorofare, will be replaced with new bridge structures. The replacement of the Middle Thorofare bridge also involves elevating and widening the bridge structure at this crossing. The existing bridge is functionally obsolete and presents severe problems for both vessel passage, due to its low clearance and narrow width between piers, and auto travel, due to the frequent opening of the drawbridge on this heavily traveled road. In order to elevate this bridge structure, the current alignment of Ocean Drive would also be shifted. Seven (7) alternative alignments for Ocean Drive are evaluated herein. The locations of these alignments are shown on Figure 2.

Amy S. Greene Environmental Consultants, Inc. (ASGECI) was contracted to prepare an inventory of environmental resources in the project area. This inventory included delineation of wetlands within the proposed project area, consultation with environmental agencies, a habitat assessment, identification of resources in the project area, identification of potential impacts, and identification of potential mitigation measures.

This report will be used during the project scoping phase and may serve as the basis for the required permit applications for the chosen project alternative.

SOURCE: Cape May County N.J. Street and Road Map, Alfred B. Patton, 1997.

FIGURE 1
COUNTY ROAD MAP

Ocean Drive Upgrade &
Bridge Replacement
Route 109 to Wildwood Crest
Lower Twp. & Wildwood Crest Borough
Cape May County, New Jersey
ASGECI Project #1807

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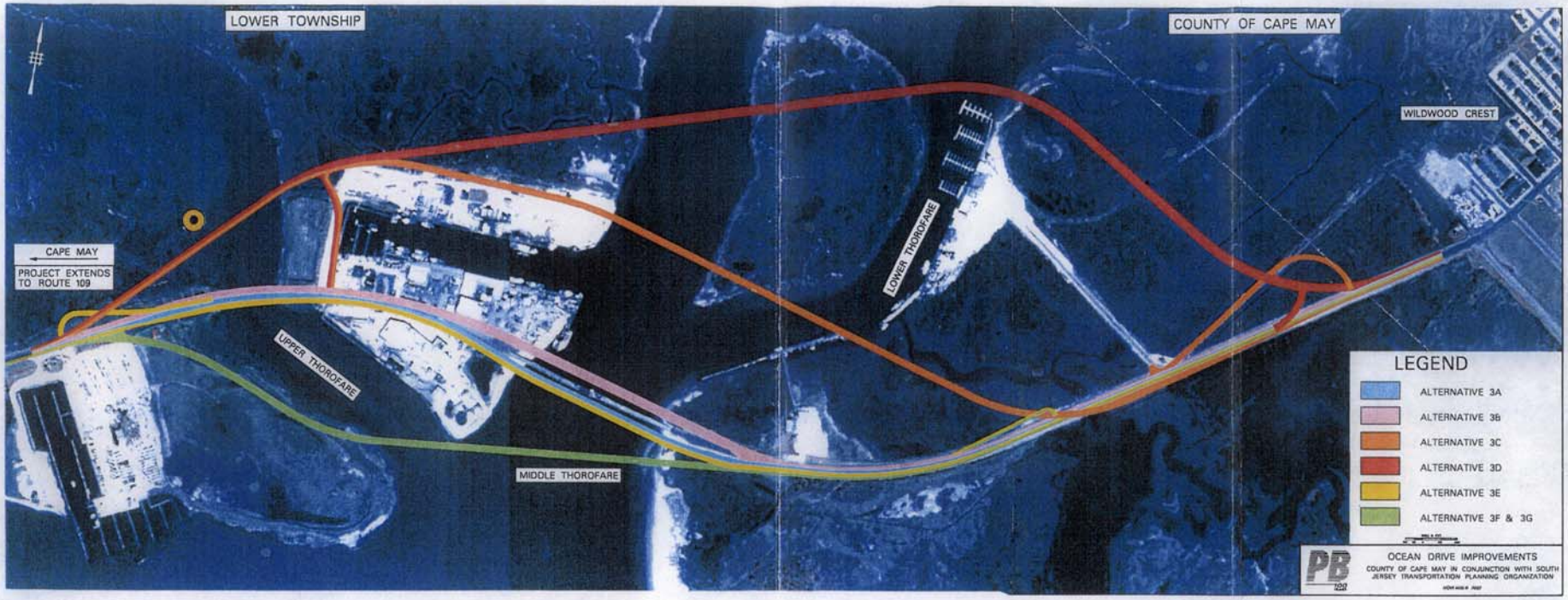

Location of Active Osprey Nest

N

Scale Unknown

FIGURE 2
ALTERNATIVES EVALUATED

Ocean Drive Upgrade &
Bridge Replacement
Route 109 to Wildwood Crest
Lower Twp. & Wildwood Crest Borough
Cape May County, New Jersey
ASGECI Project #1807

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SOURCE: Parsons Brinkerhoff, Ocean Drive Improvements, Alternatives Map, November 2002.

II. PROJECT DESCRIPTION

The project will result in the reconstruction of approximately 2.8 miles of road surface and three bridges. The reconstructed road and bridges will be built at an elevation above the 100-year floodplain. This will result in raising the elevation of the road by a minimum of 5 feet for its entire length.

The existing right-of-way for Ocean Drive is 120 feet in width. The construction of the original road in 1940 included the placement of fill within a corridor 40-feet in width. The existing road consists of a 20-foot wide paved roadbed with 10-foot wide unpaved shoulders on either side of the road. A majority of the existing roadway was constructed at elevation 7.5 feet, with the top deck of the bridges set at 11.0 feet. Since its construction in the late 1930's, the roadway has settled to an approximate elevation of 6.0 feet, placing it well below the 100-year flood elevation of 10.4 feet. Because of this, the entire roadway is susceptible to flooding, possibly making the evacuation route impassable during a flood.

The initial phase of this study, performed in 2000, sought to replace only the Mill Creek and Upper Thorofare Bridges while raising Ocean Drive from Route 109 to the Middle Thorofare Bridge (refer to photographs A through D; Appendix B). From this effort, two alternative road alignments, Alternatives 1 and 2 were developed and presented to the community at a public information center in the summer of 2000. Alternatives 1 and 2 shifted the roadway approximately 4.5 ft. to the south and north, respectively, to allow for staged construction with minimal impacts to existing traffic patterns and wetlands that border the roadway. Based on comments received at the public information center, a hybrid of Alternatives 1 and 2 was considered. This alternative, known as Alternative 3, would shift Ocean Drive to the north from Route 109 to Mill Creek, and then to the south to Middle Thorofare, thereby minimizing property impacts throughout the project length.

At that same public meeting, representatives from the local fishing industry expressed concerns about the Middle Thorofare Bridge, specifically, the bridge's height limitations, frequent openings, and narrow channel width – all of which negatively impact their businesses. At the request of the local fisheries and the Cape May County Chamber of Commerce, the replacement of the Middle Thorofare Bridge has been added as part of this study, as has the relocation of the existing toll facility on the bridge and the raising of Ocean Drive north to the intersection with Jefferson Avenue in Wildwood Crest. The original alternatives have been expanded to include seven new alternatives, Alternatives 3A – 3G. Alternatives 3B, 3C and 3D use the north road shift (Alternative 2 discussed above) while Alternatives 3A, 3E, 3F and 3G use the north/south hybrid road shift (Alternative 3 discussed above) for the section of the project between Route 109 and Middle Thorofare.

Alternatives 3A and 3B involve replacing the Middle Thorofare Bridge with a new moveable span structure on a parallel alignment, while Alternatives 3C, 3D, 3E and 3F involve a new high-level segmental structure on a new or parallel alignment. Alternative 3G involves replacing the Middle Thorofare Bridge with a new high level cable-stayed bridge on a new alignment. Under each alternative, the proposed road connecting to the Middle Thorofare Bridge will consist of

two 12-foot wide paved lanes plus 8-foot wide shoulders and 4-foot berms on either side of the road. In several locations, 7-foot wide sidewalks would also be constructed.

Because Ocean Drive is important to commerce and as an evacuation route, traffic flow will be maintained along the existing alignment for the duration of the project, regardless of the alternative chosen. Subsequent to construction, those portions of the existing Ocean Drive that are no longer in use will be closed. These areas may be utilized as fishing piers, or in some areas, could potentially be utilized to mitigate for disturbances to wetlands that will occur as a result of the project.

Distinctive features of each of the seven alternatives are described below. The proposed locations for each alternative are provided on Figure 2. Typical cross sections of movable, segmental and cable-stayed bridges are provided on Figure 2A.

Alternative 3A

Under this alternative, Ocean Drive will be shifted to the north from Route 109 to the vicinity of the Mill Creek structure, then shifted to the south for the remainder of the project length. This alternative will construct a new moveable span structure approximately 30' to the south of the existing Middle Thorofare bridge. The 30 ft. offset will allow for the proposed structure to be constructed while the existing bridge is still in use. The existing 2-lane toll facility on the bridge will be relocated to a new, 4-lane, semi-automated facility immediately east of the proposed bridge. The bridge would achieve a minimum 45 ft. vertical clearance above the proposed 130 ft. wide navigable channel. Upon completion of the project, the existing Middle Thorofare Bridge will be demolished and the approach roadways will be removed, with the exception of the eastern approach roadway and abutment, where a possible fishing pier is suggested.

Alternative 3B

Similar to Alternative 3A, this alternative replaces the Middle Thorofare Bridge with a new moveable structure. However, this alternative locates the new structure 30' to the north of the existing bridge. Because the new structure is located to the north, the entire alignment of Ocean Drive is shifted slightly to the north, unlike alternative 3A. The northerly shift of the roadway and the bridge would cause significant right-of-way and access impacts to the businesses located on Ocean Drive's north side between Upper Thorofare and Middle Thorofare. As with Alternative 3A, this alternative would be constructed while the existing bridge is still in use and would provide a minimum 45 ft. vertical clearance above the proposed 130 ft. wide navigable channel.

Alternative 3C

Alternative 3C relocates Ocean Drive onto a new alignment from just west of Upper Thorofare to just west of Fish Dock Road to provide a high-level, fixed segmental structure crossing of Middle Thorofare. The new alignment travels north of the existing alignment along upland areas located on the northern edge of the fishing industries, across Middle Thorofare, Thorofare Island

CABLE STAYED BRIDGE
(ALIGNMENT ALTERNATIVE 3G)

SEGMENTAL BRIDGE
(ALIGNMENT ALTERNATIVES 3C, 3D, 3E & 3F)

MOVABLE BRIDGE
(ALIGNMENT ALTERNATIVES 3A & 3B)

Scale Unknown

SOURCE: Parsons Brinkerhoff, Ocean Drive Improvements, Typical Bridge Elevations Map, February 2003.

FIGURE 2A
TYPICAL BRIDGE ELEVATIONS

Ocean Drive Upgrade &
Bridge Replacement
Route 109 to Wildwood Crest
Lower Twp. & Wildwood Crest Borough
Cape May County, New Jersey
ASGECI Project #1807

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and Lower Thorofare before reconnecting with the existing Ocean Drive near Fish Dock Road. The new alignment features a new low-level bridge across Upper Thorofare which is similar in design to the Upper Thorofare structures proposed in Alternatives 3A and 3B, though located on a skew to the north of the existing bridge which will be removed. The structure will have a minimum 75 ft. vertical clearance over the navigable channel of Middle Thorofare and a minimum 116 foot clearance over the width of Lower Thorofare. The additional clearance over Lower Thorofare is provided due to the presence of Two Mile Fisheries docks located immediately north of the alignment. As shown in Figure 2A, the horizontal span that the segmental structure would provide is also greater than could be provided with a movable structure.

The existing bridges over both Middle Thorofare and Upper Thorofare will be demolished. Roadway improvements along Ocean Drive to the east of the new alignment will be similar to Alternatives 3A and 3B above. The existing toll plaza will be relocated to the east. Two sections of connector roadway will be constructed to maintain access to businesses located along sections of Ocean Drive that will be bypassed. These bypass sections will not be raised above the 100-year flood elevation. Much like Alternative 3B, portions of the alignment that follow the existing Ocean Drive will be shifted slightly to the north to accommodate staged construction.

Alternative 3D

Alternative 3D is very similar to Alternative 3C. It also features a new, high-level fixed segmental bridge over Middle Thorofare. However, the alignment traverses Thorofare Island further to the north where the channel is deep. The profile of the bridge maintains the same 75 ft. minimum vertical clearance over Middle Thorofare, but only maintains a 48 ft. minimum vertical clearance over Lower Thorofare, as it passes north of the Two Mile Fisheries docks and marina, beyond the point where large ships would need to travel. Existing Ocean Drive would be connected to the new alignment in the same manner as in Alternative 3C; however, one connection would be made north of Fish Dock Road. The existing bridges over both Middle Thorofare and Upper Thorofare will be demolished.

Alternative 3E

Alternative 3E would provide a new high-level, fixed segmental structure crossing of Middle Thorofare along a parallel alignment to the immediate south of the existing bridge. The profile of the bridge would maintain a 116 foot high clearance over the navigation channel. This alternative is on the same alignment as Alternative 3A. However, unlike Alternative 3A, businesses located between the Upper and Middle Thorofare Bridges would be negatively impacted by the increased profile of this fixed span option, which would require acquisition of portions of the properties of Lund's Fisheries, Axelson and Johnson Fish Co., and the Blue Claw Restaurant. The existing bridge over Upper Thorofare would be rehabilitated to allow for continued access to Lund's fisheries, Axelson and Johnson Fish Co., and the Blue Claw Restaurant. A jughandle driveway would be provided to allow for access to the marina located on the west side of Upper Thorofare, south of Ocean Drive (Block 793, Lot 15.06).
The toll collection facility on the eastern approach to the bridge would need to be located farther from the bridge structure, closer to Wildwood Crest, in the vicinity of Fish Dock Road.

Alternative 3F

Alternative 3F would provide a new high-level fixed segmental structure crossing Middle Thorofare, along an alignment several hundred feet south of the existing bascule bridge over Middle Thorofare. The profile of the bridge would maintain a 116-foot high clearance over the navigation channel. This alternative minimizes impacts to local businesses by shifting the raised portion of the western approach to an undeveloped area of dredge spoils, avoiding the right-of-way impacts and property acquisitions that would be necessary under Alternatives 3B and 3E. The existing bridge over Upper Thorofare would be rehabilitated to allow for continued access to Lund's Fisheries, Axelson and Johnson Fish Co., and the Blue Claw Restaurant. The entrance to the marina located on the west side of Upper Thorofare, south of Ocean Drive (Block 793, Lot 15.06) would not require a separate jughandle for access under this alternative. The toll collection facility would be located to the east of the Middle Thorofare Bridge, between Middle Thorofare and Fish Dock Road.

Alternative 3G

Alternative 3G would be constructed in the same location as that proposed for Alternative 3F; however, under this alternative, the bridge over Middle Thorofare would be a new, high-level cable-stayed structure. The profile of the bridge would also maintain a 116-foot clearance over the navigation channel. Cables extending from two main towers would support the structure. The main towers would extend approximately 180 feet above the proposed roadway elevation. The total height of the structure would be 300 feet. The support structures of the bridge would be lit by upward-facing lights located along the bridge fascia. Additionally, the bridge towers would be lit by red aviation beacons, as required by the Federal Aviation Administration (FAA). As shown in Figure 2A, the horizontal span that this cable-stayed bridge could provide is much greater than the clearance that a segmental structure could provide. As with Alternative 3F, this alternative avoids right-of-way impacts that would negatively impact Lund's Fisheries, Axelson and Johnson Fish Co., and the Blue Claw Restaurant. This alternative would also involve the rehabilitation of the existing bridge over Upper Thorofare to provide continued access to these businesses. The toll would be located to the east of the Middle Thorofare Bridge, between Middle Thorofare and Fish Dock Road.

III. EXISTING ECOLOGICAL RESOURCES

Ecological resources present in the project area are described below.

The NJDEP's Coastal Permit Program Rules are set forth at N.J.A.C. 7:7 *et seq*. These rules address activities regulated under the Coastal Area Facility Review Act (CAFRA), the Wetlands Act of 1970, and the Waterfront Development Law. In reviewing permit applications for activities regulated under N.J.A.C. 7:7 *et seq*., NJDEP consults the Coastal Zone Management (CZM) Policies (N.J.A.C. 7:7E) to determine if a permit should be issued for the activity. The CZM policies include a list of "special areas," which have been determined by NJDEP to merit special attention. Many of the ecological resources described below are considered to be special areas under the CZM policies, and will need to be addressed as such during the permitting process for the chosen alternative.

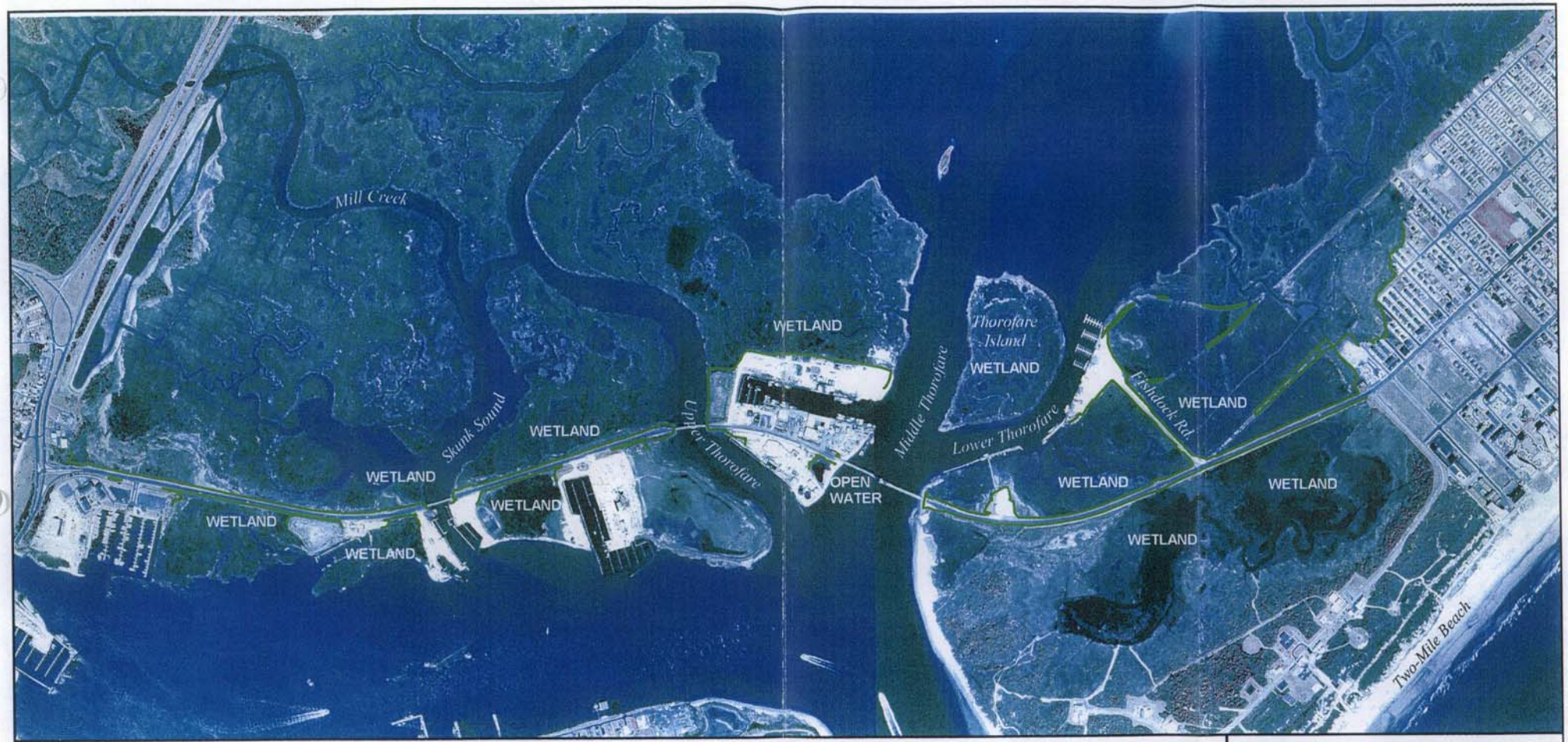
A. Wetland/Open Water Resources

1. Wetlands

Amy S. Greene Environmental Consultants, Inc. delineated the wetlands along the entire project alignment in December 1999 and March, 2002. Tidal wetlands were identified paralleling the north and south sides of the project alignment, except at the extreme western end of Ocean Drive, near Route 109, and in areas where fill has been placed for site development. These wetlands are generally found at the toe of slope of the fill associated with the construction of the original roadbed (refer to photographs C, D, K, and L; Appendix B). The wetland locations were surveyed by Gibson Associates, Inc. The surveyed wetland boundaries are shown on Figure 3.

The tidal wetlands that parallel the project alignment are comprised of a mix of high marsh and low marsh, depending on the surface elevation. The high marsh is located at elevations above the mean high water line, in areas that are inundated by the tidal waters only during storm events and higher-high tides. The high marsh is dominated by salt meadow hay (*Spartina patens*), spike grass (*Distichlis spicata*) and black grass (*Juncus gerardi*) with some glasswort (*Salicornia* spp.) and sea lavender (*Limonium carolinianum*) intermixed. The upper edge of the high marsh, paralleling the roadbed, includes some eastern red cedar (*Juniperus virginiana*) trees, shrubs of grounsel tree (*Baccharis halmifolia*), high tide bush (*Iva frutescens*) and poison ivy (*Rhus radicans*) along with common reed (*Phragmites australis*), seaside goldenrod (*Solidago sempervirens*) and switchgrass (*Panicum virgatum*) in the herbaceous layer. Areas of dredge spoil deposits contain shrub vegetation similar to that described for the upper edge of the high marsh (above), and are generally dominated by common reed. The low marsh is located at elevations below the mean high water line, in the areas that are inundated by the tide on a twice-daily basis. The vegetation in the low marsh is comprised entirely of saltmarsh cordgrass (*Spartina alterniflora*).

It should also be noted that the NJDEP publishes maps delineating the limits of tidal wetlands south of the Raritan Bay. Under the Coastal Wetlands Act of 1970, the wetland limits shown on the NJDEP maps are considered to be the regulatory limit of tidal wetlands. The 1970 NJDEP maps were generated based on review of aerial photography. Inaccuracies



Wetlands Delineated in 2000 and 2002 by Amy S. Greene Environmental Consultants, Inc.

SITE LOCATION

0 1000'

FIGURE 3
WETLAND DELINEATION

Ocean Drive Upgrade &
Bridge Replacement
Route 109 to Wildwood Crest
Lower Twp. & Wildwood Crest Borough
Cape May County, New Jersey
ASGECI Project #1807

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are inherent in the mapping, due to the lack of field verification, and changes that may have occurred since that time.

The NJDEP-delineated limit of wetlands in the study area are shown on Figure 4. Within the project area, the NJDEP mapping is virtually the same as the wetland limits delineated by ASGECI. It is anticipated that, when the project enters the permitting phase, the ASGECI wetland delineation will be utilized to evaluate impacts. Any differences between the ASGECI and NJDEP wetland limits will be addressed with the NJDEP at that time.

2. Beaches and Dunes

Limited areas of beaches and dunes were identified within the project area. These areas are located at the eastern and western ends of the Middle Thorofare Bridge, extending slightly to the north and south of the bridge abutments.

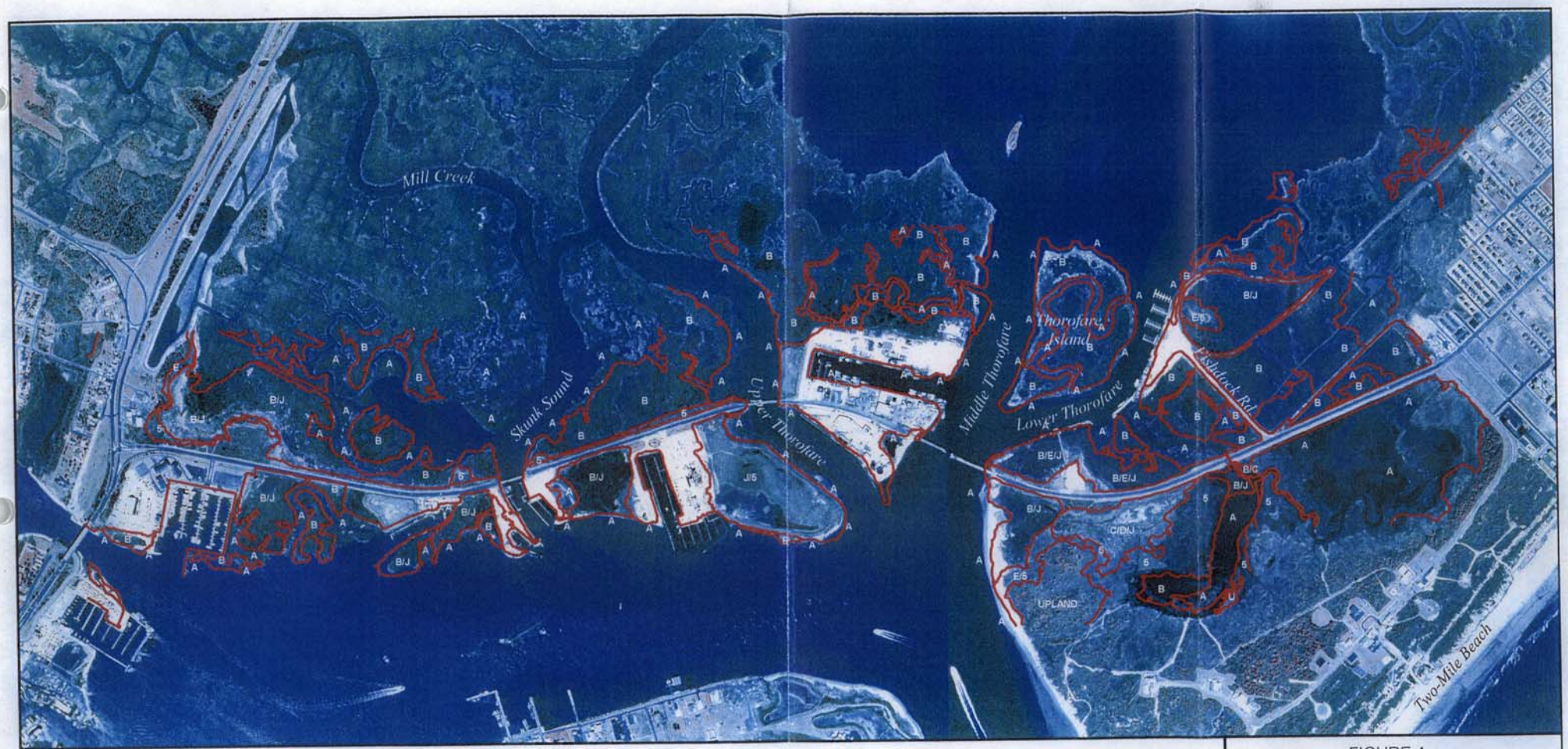
The narrow strip of beach that extends to the south of the eastern bridge abutment (refer to photograph G; Appendix B) continues for some distance to the south, and appears to be contiguous with Two Mile Beach, located on the southern shore of the Coast Guard base. Above this strip of beach, several small dunes are also present. No other dunes were noted within or adjacent to the project area.

3. Water Resources

The project area is located paralleling the north side of Cape May Harbor and the U.S. Coast Guard Reservation to the east of the Cape May Inlet. Mill Creek, Upper Thorofare and Middle Thorofare begin at Cape May Harbor and meander through an expansive tidal marsh in a generally northerly direction, connecting to Jarvis Sound. Lower Thorofare provides another connection between Jarvis Sound and Middle Thorofare. Cape May Harbor is connected to the Atlantic Ocean via the Cape May Inlet. Cape May Harbor is home to much of the Cape May commercial fishing fleet.

The Cape May Harbor Nautical Chart, catalog 1, panel E, published by the National Oceanic and Atmospheric Administration (Figure 5), provides water depths for the waterways within the project area. According to NOAA tidal gage information (provided to ASGECI by Parsons Brinckerhoff), the elevation of mean higher-high water for the project area is 2.21 feet, mean high water is 1.78 feet, mean low water is –3.14 feet and mean lower-low water is –3.30 feet (North American Vertical Datum (NAVD)1988).

According to the Flood Insurance Study, prepared by the Federal Emergency Management Agency (FEMA) for the Township of Lower, the elevation of the 100-year flood plain has been calculated to be 8.56 feet (North American Datum (NAD), 1983) or 9.8 feet (National Geodetic Vertical Datum (NGVD), 1929). The entire project alignment is located within the extent of the 100-year flood plain as shown on the Flood Insurance Study map (Figure 6). According to calculations performed by Parsons-Brinckerhoff (calculations based on FEMA), the actual elevation of the 100-year flood plain at Ocean Drive is 10.4 ft (NGVD 1929).



LEGEND:

A - Spartina Alternaflora (High Vigor) - Salt Marsh Cord Grass
B - Spartina Alternaflora (Low Vigor) - Salt Marsh Cord Grass
C - Spartina Patens - Salt Meadow Grass
D - Distichlis Spicata - Spike Grass
E - Iva Frutescens - Hightide Bush
J - Predominantly Bare Ground
5 - Phragmites Communis - Common Reed

SOURCE:
NJDEP Coastal Wetlands Maps of 1970.

SITE LOCATION

0 1000'

FIGURE 4
COASTAL WETLAND MAPPING

Ocean Drive Upgrade &
Bridge Replacement
Route 109 to Wildwood Crest
Lower Twp. & Wildwood Crest Borough
Cape May County, New Jersey
ASGECI Project #1807

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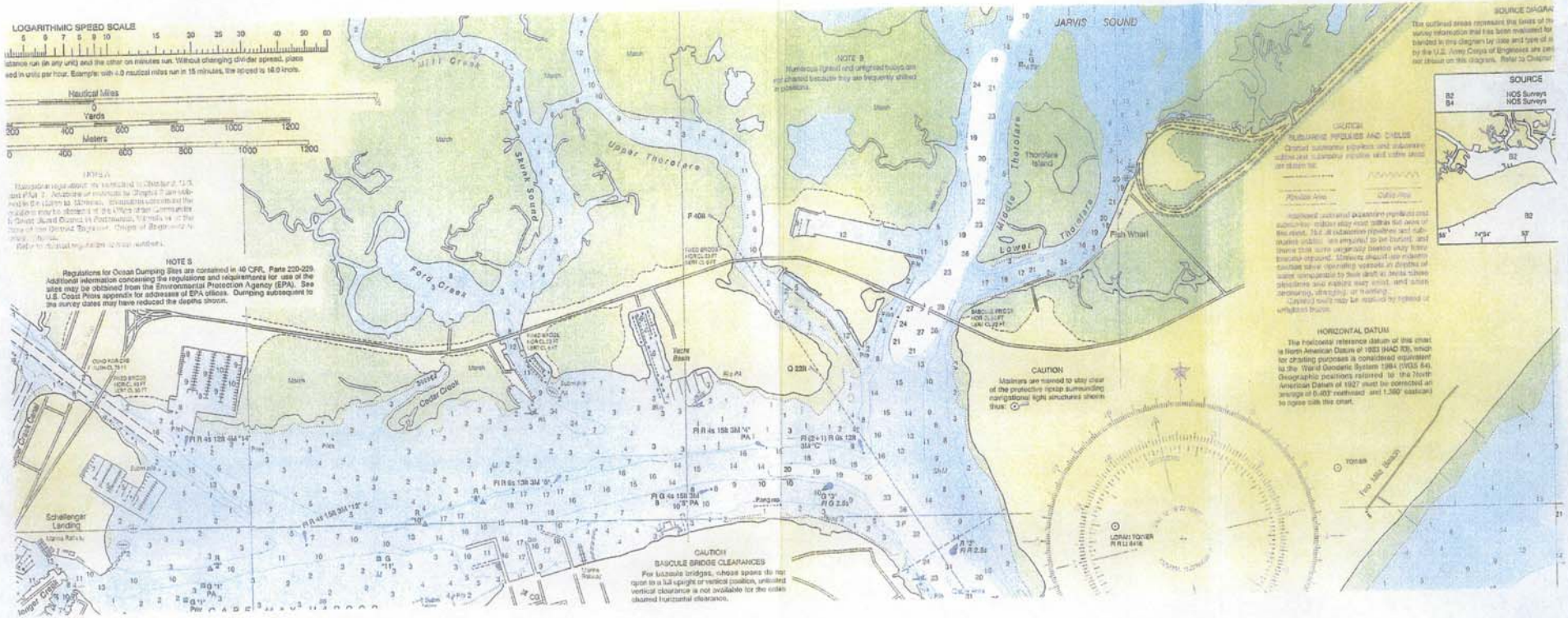

SOURCE:
NOAA, Nautical Chart 12317, United States - East Coast, New Jersey, Cape May Harbor, 30th Edition, February 3, 1996.

SITE LOCATION

0 1220'

FIGURE 5
NOAA NAVIGATIONAL CHART

Ocean Drive Upgrade &
Bridge Replacement
Route 109 to Wildwood Crest
Lower Twp. & Wildwood Crest Borough
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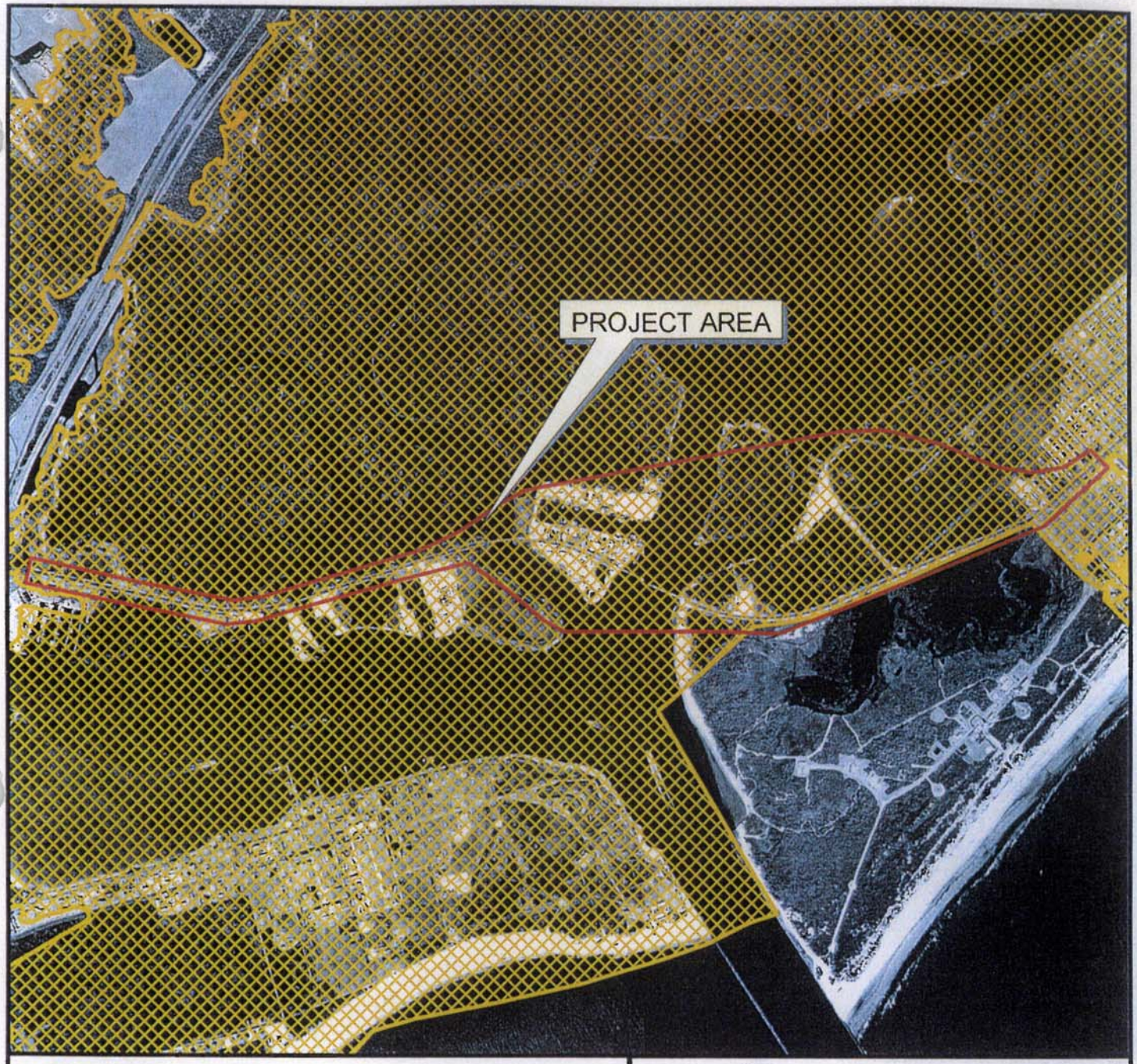

LEGEND:

100 YEAR FLOODPLAIN WITHIN MAPPED MUNICIPALITIES

NOTE: Floodplains were not mapped inside the US Coast Gaurd Station

SOURCES:
Floodplain information was obtained from the Federal Emergency Managment Agency (FEMA), National Flood Insurance Program, Q3 Flood Data, Disk 18, Digital Product, September 1996.

Aerial Photography was obtained from NJDEP Office of Information Resources Management, Bureau of Geographic Information and Analysis, 1995/97 Color Infrared Digital Imagery, Index #177-2.

This (map/publication/report) was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.

0 2000'

FIGURE 6
FLOODPLAIN MAPPING

Ocean Drive Upgrade &
Bridge Replacement
Route 109 to Wildwood Crest
Lower Twp. & Wildwood Crest Borough
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4. Sole Source Aquifer

The project area is located within the Coastal Plain Sole Source Aquifer region (Figure 7). This aquifer is the largest in the State and includes the entirety of nine counties. Depth to ground water is highly variable.

B. Terrestrial Resources

1. Land Resources

Ocean Drive runs in an east-west direction, connecting Route 109 at its western terminus with the Town of Wildwood Crest at its northeastern end (Figure 8). The majority of the project alignment crosses tidal marsh; however, a number of commercial and residential developments have been constructed along the road. Several marinas are located on the south side of the road, which have access to Cape May Harbor. The land between Upper Thorofare and Middle Thorofare includes the Snow's/Doxsee Seafood Company on the south side of Ocean Drive and the Hinch Marina and Axelson and Johnson Fisheries Company on the north side. Collectively, these fisheries make up one of the largest seaports on the east coast of the United States.

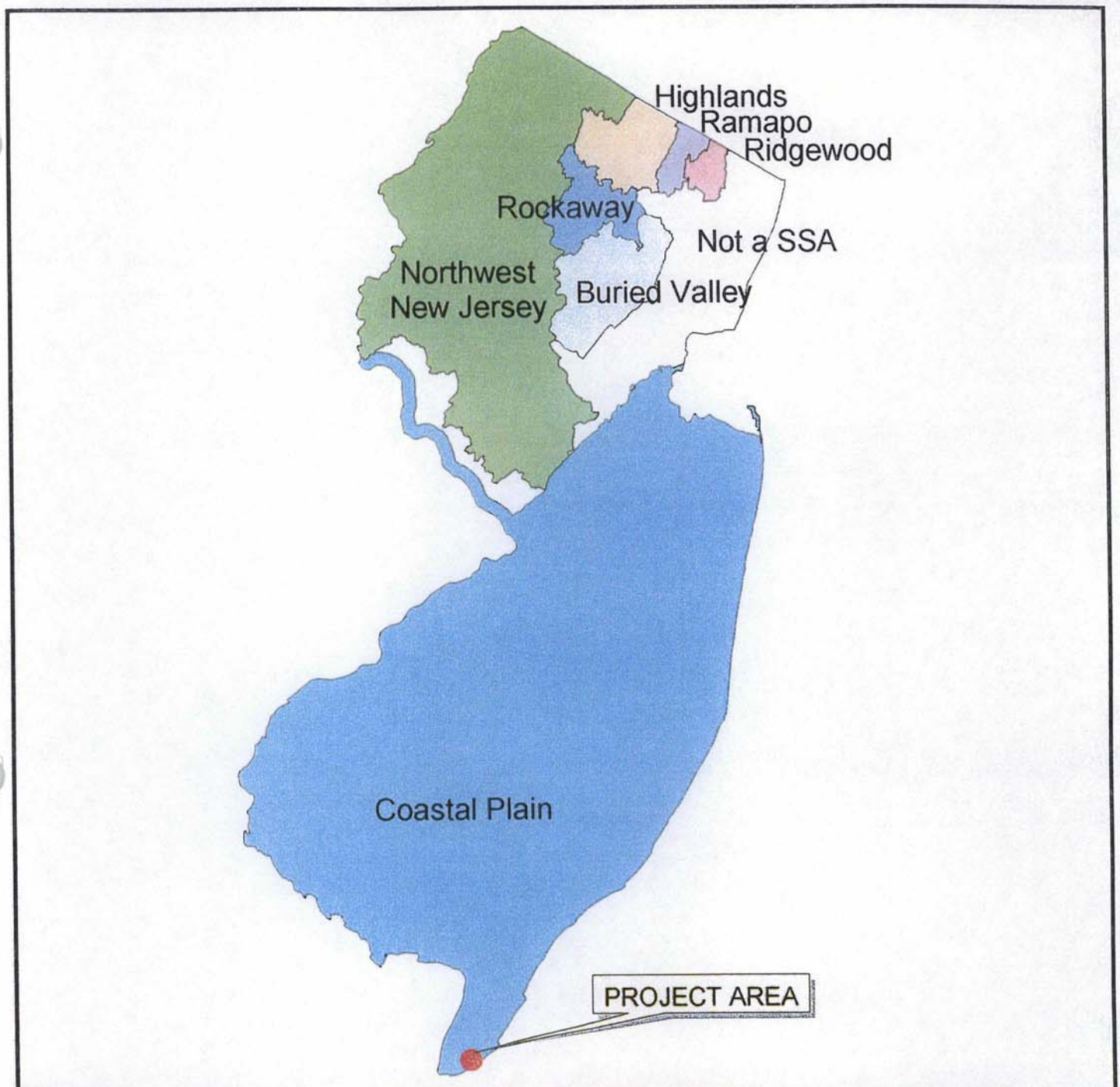
The land on the north side of Ocean Drive, between the Upper Thorofare at the east end and Route 109 at the west end is comprised of the Marmora Wildlife Management Area (MWMA). The MWMA consists of many tracts of land which, combined, comprise over 11,500 acres and are located from Cape May north to Marmora along the Intracoastal Waterway. Much of the land included in the MWMA was acquired under the Green Acres Program. A portion of the MWMA was purchased by the Division of Fish, Game, and Wildlife with license money from sportsmen. It provides recreational opportunities in the form of waterfowl hunting, fishing, crabbing, bird watching, and boating.

East of the Middle Thorofare bridge, the roadway is bordered to the south by a U.S.Coast Guard Training Center. To the north is another commercial fishing facility, two marinas and a 700-seat restaurant complex. These businesses are separated from Ocean Drive by a large area of wetlands and are accessed by Fish Dock Road (County Route 630). Upland areas are present within the wetlands. These areas are the remnants of an abandoned railroad bed and an abandoned stretch of Park Boulevard, which formerly led to Wildwood Crest (refer to photographs H, I and J; Appendix B).

2. Soils

According to the Soil Conservation Service (SCS) Soil Survey of Cape May County (Markley, 1973), the Ocean Drive project alignment crosses five soil mapping units (Figure 9). These mapping units are identified as Coastal beach – urban land complex (Cu), Fill land, sandy (FL), Fill land, sandy organic substratum (FM), Tidal marsh, deep (TD) and Water (W).

Coastal beach – urban land complex consists of undeveloped coastal beaches and coastal beach areas used for residential or commercial purposes. Fill land, sandy is described as occurring on the mainland in areas that received an average of several feet of fill. This soil-mapping unit is typically infertile and sandy. Fill land, sandy is mapped by the SCS at the



Sole-Source Aquifers
- Buried Valley
- Coastal Plain
- Highlands
- Northwest New Jersey
- Not a SSA
- Ramapo
- Ridgewood
- Rockaway

NOT TO SCALE

SOURCE: NJGS Sole-Source Aquifer Digital GIS Coverage, 1999.

FIGURE 7
SOLE-SOURCE AQUIFER MAP

Ocean Drive Upgrade &
Bridge Replacement
Route 109 to Wildwood Crest
Lower Twp. & Wildwood Crest Borough
Cape May County, New Jersey
ASGECI Project #1807

AMY S. GREENE
ENVIRONMENTAL CONSULTANTS, INC.

SITE LOCATION

0 2000'

SOURCE:
USGS 7.5 Minute Digital Raster Graphic (DRG) Topographic Series Map, Cape May and Wildwood N.J. Quadrangle.

FIGURE 8
USGS TOPOGRAPHIC MAP

Ocean Drive Upgrade & Bridge Replacement
Route 109 to Wildwood Crest
Lower Twp. & Wildwood Crest Borough
Cape May County, New Jersey
ASGECI Project #1807

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LEGEND:

Cu - Coastal Beach-Urban Land complex
FL - Fill land, sandy
FM - Fill land, sandy organic substratum
TD - Tidal marsh, deep
TM - Tidal Marsh
W - Water

0 2000'

FIGURE 9
SCS SOILS MAP

Ocean Drive Upgrade &
Bridge Replacement
Route 109 to Wildwood Crest
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SOURCES:
Soils data obtained from USDA SCS, Soil Survey of Cape May County, New Jersey, Markley, 1977.

extreme western end of the project alignment, adjacent to Route 109, in areas that are generally located above the elevation of the tidal marsh. Fill land, sandy organic substratum is described as occurring in areas that were originally tidal marsh. These areas of tidal marsh were altered by filling for development. Fill land, sandy organic substratum is mapped by the SCS in two distinct locations between the west side of Mill Creek and Route 109. The
land between Upper Thorofare and Middle Thorofare is also mapped as Filled land, sandy organic substratum. This soil-mapping unit generally underlies the commercial and residential development that has occurred along Ocean Drive. Tidal marsh, deep soils are described as very poorly drained silty or mucky flats that are flooded twice daily by the tides. These areas are constantly saturated and are dominated by a substrate of soft silt loam or organic material that is at least 8 feet deep. This soft layer is typically underlain by firm sand, gravel and clay. Tidal marsh, deep is mapped by the SCS in the central portion of the site, between Route 109 and Mill Creek and for the entire alignment between Mill Creek and Upper Thorofare. Water represents the areas of open water of creeks, waterways, and dredged channels.

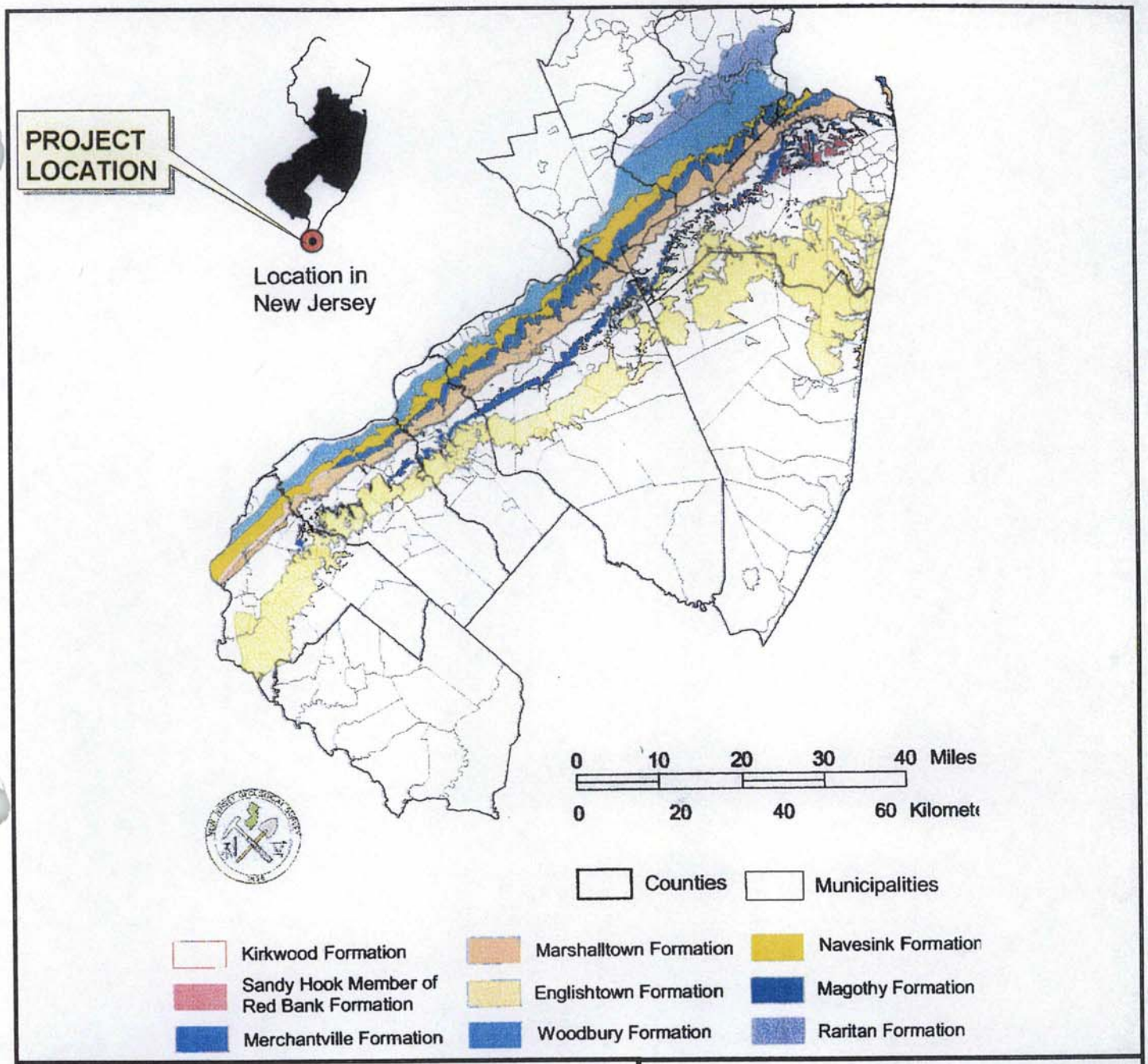
Copies of the original site plans that were prepared for the construction of the "Ocean Highway Bridges," prepared in 1938 were also available for review. These plans include the project alignment and the bridges over Mill Creek, Upper Thorofare and Middle Thorofare. The plan views show that the road and bridges were designed to cross tidal marsh. The profiles show that the site was generally flat, with elevations in the range of 2.4 to 2.8 feet above mean sea level. The only change in elevation occurs at the extreme western end of the project alignment, where Ocean Drive slopes gently upward to an elevation of near 15 feet above mean sea level in the vicinity of Route 109. These plans include "notes on probings." The "notes on probings" indicate that the majority of the project alignment crossing the tidal marsh is underlain by mud at depths of 7 to 15 feet.

The results of the field investigations performed for this project and the information provided by the original construction plans for the "Ocean Highway Bridges" is consistent with the soil mapping information prepared by the SCS.

3. Acid – Producing Soils

Acid-producing soils are encountered in certain regions in New Jersey. Earth moving operations may expose soils that have the potential to become extremely acidic. The soil becomes acidic when the naturally occurring sulfur compounds in the minerals marcasite and pyrite are exposed to oxygen. These acid-sulfate soils have the potential to lower the pH to below 3.8. It is extremely difficult to establish vegetation on acid-sulfate soils.

Acid-sulfate soils occur in a band that stretches across the inner coastal plain, from Monmouth and Middlesex County and south through Salem County (Rutgers Coop. Ext., 1994). According to available mapping (Soil Conservation Service, 1999) there are no acid-producing soils in Cape May County (Figure 10). Acid-producing soils are not expected to be a concern on this project.



LEGEND:

NO ACID PRODUCING SOILS WERE MAPPED IN THE STUDY AREA.

SOURCE:
NJ State Conservation Committee, Standards for Soil Erosion and Sediment Control in New Jersey, Adopted July 1999, Figure 1-1, Coastal Plain Formations of New Jersey Associated with Acid-Producing Soils.

FIGURE 10
ACID-PRODUCING SOILS MAP

Ocean Drive Upgrade &
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Cape May County, New Jersey
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C. Terrestrial Wildlife and Habitat

1. Endangered / Threatened Species

The NJDEP Natural Heritage Program (NJNHP), NJDEP Landscape Project Mapping, the Cape May Bird Observatory (CMBO), the NJDEP Endangered and Nongame Species Program, the US Fish and Wildlife Service (USFWS), and the National Marine Fisheries Service (NMFS) were consulted regarding this project (Appendix A). Correspondence received from these agencies identified a total of 15 endangered or threatened species as being potentially in the project area, or in the immediate vicinity. These species are summarized in Table 1.

Descriptions of the typical habitat of each of the endangered or threatened species is identified in Table 1, and evaluations of the potential for habitat to occur in or near the project area, are provided below. The NJDEP Landscape Map (Figure 10A) identifies critical habitat within the project area. Areas mapped in blue are emergent wetland critical habitat, species rank 4, for presence of state endangered species. Areas mapped in green are forest critical habitat, species rank 4, for presence of state endangered species. At least one state endangered species is present in the areas mapped as blue or green. Areas mapped in red are beach critical habitat, species rank 5, and include at least one federally listed species. A field investigation performed by ASGECI found that the areas mapped as forest critical habitat (green) along Ocean Drive include very limited forest cover in the form of a few scattered eastern red cedar (*Juniperus virginiana*) and some shrubs. The peninsula that is mapped as forest critical habitat, located west of Cape May inlet (Middle Thorofare), consists entirely of dredge spoils with a fringe of tidal marsh. The dredge spoils are dominated by barren ground and common reed, with some ponded areas. There are no significant trees, other than a few eastern red cedar, or areas of forest on this peninsula. The Landscape Map does not accurately depict forest critical habitat within the project area.

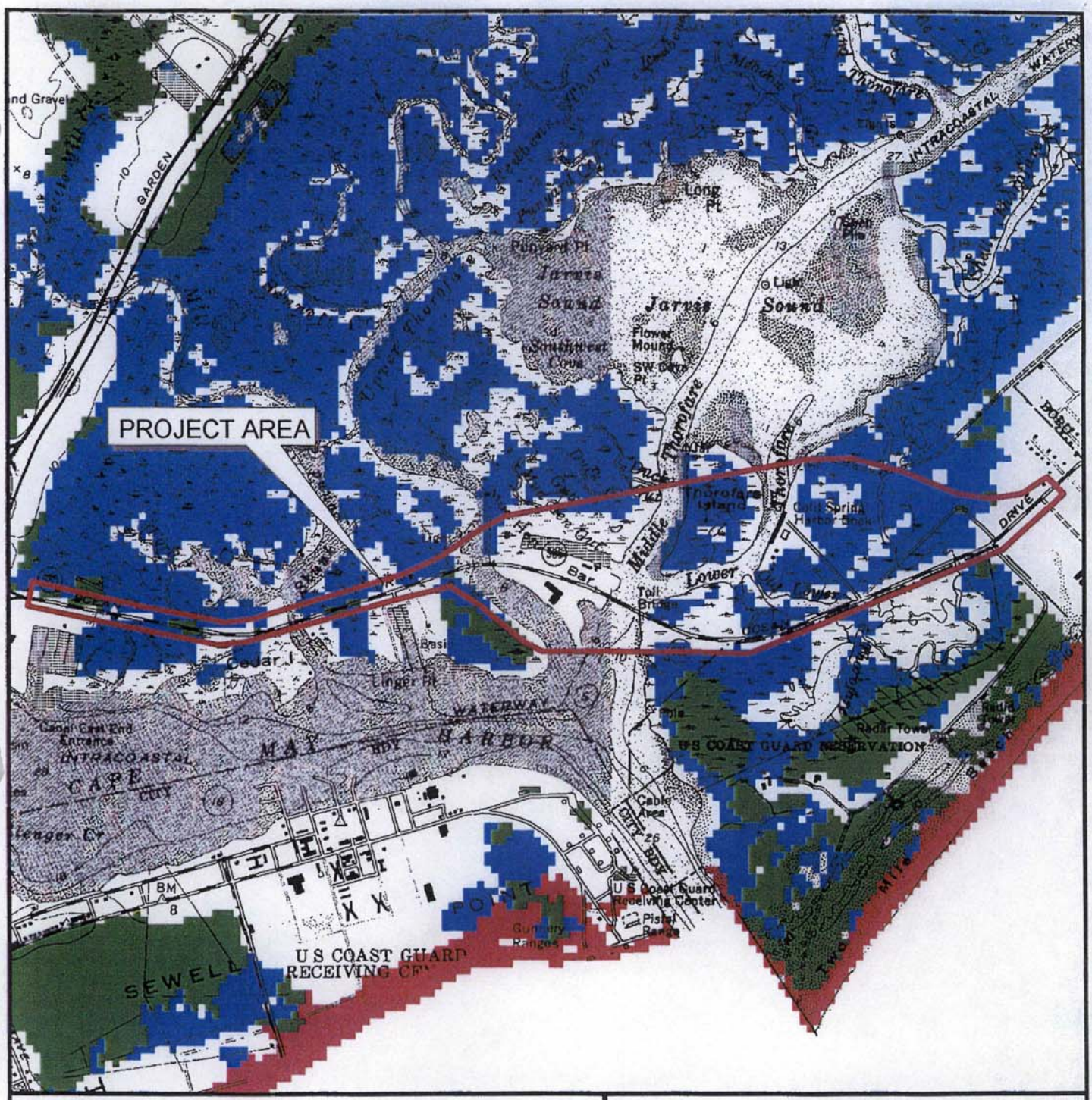
Ocean Drive abuts a NJ Natural Heritage Priority Site termed the "Two Mile Beach Site." This priority site includes the entire Coast Guard Reservation, south of Ocean Drive and east of the Cape May (Middle Thorofare) inlet (Appendix A). It is identified as a priority site due to the unique coastal habitats including beach and dune, coastal dune shrubland and coastal dune forest. This Priority Site provides many of the unique communities that are utilized by the threatened and endangered species identified by agencies consulted.

Descriptions of the typical habitat of each of the endangered or threatened species identified in Table 1, and evaluations of the potential for habitat to occur in or near the project area, are provided below.

BIRDS

Yellow-crowned Night Heron

This colonial nesting species nests along the coast, most often with other herons and egrets, but seldom alone. Between 1978 and 1995 there were only 15 to 17 known colonies (Walsh et al. 1999). This heron is migratory and most have left the state before the end of October. Only a few rare winter sightings have occurred in New Jersey (Walsh et al. 1999). First returning birds arrive at nesting colonies by late March. The nest is a platform made of sticks and is typically placed in trees (about 30-40 feet above the ground) or sometimes in shrubby thickets (Kaufmann



LEGEND:

- Forest Critical Habitat
- Emergent Critical Habitat
- Beach Critical Habitat

0 2000'

SOURCES:
NJDEP Forest, Emergent and Beach Critical Habitats, New Jersey Department of Environmental Protection, Division of Fish and Wildlife, Endangered Nongame Species Program, vector digital data, NJ Division of Fish and Wildlife, Trenton, NJ, October 23, 2001.

Monochromatic Bit-Mapped 7.5 Minute Topographic Images of New Jersey, Gregory C. Herman and Maryann C. Scott, N.J. Geological Survey Digital Geodata Series DGS99-1, May 27, 1999, derived from USGS 7.5 Minute Digital Raster Graphic (DRG) Topographic Series Map, Cape May and Wildwood N.J. Quadrangles.

FIGURE 10A
NJDEP LANDSCAPE MAP

Ocean Drive Upgrade &
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Table 1

Endangered / Threatened Species Reported in the Project Vicinity

Common Name	Scientific Name	Federal Status	State Status [1]	Source /Proximity
BIRDS				
Yellow-crowned Night Heron	*Nyctanssa violacea*	---	T/T	NHP Record - may be onsite
Black-crowned Night Heron	*Nycticorax nycticorax*	---	T/S	NHP Record - may be onsite
Piping Plover	*Charadrius melodus*	T	E	NHP Record - may be in immediate vicinity
Least Tern	*Sterna antillarum*	---	E	NHP Record - may be in immediate vicinity
Black Skimmer	*Rynchops niger*	---	E	NHP Record - may be in immediate vicinity
Barred Owl	*Strix varia*	---	T/T	NHP Record - may be in immediate vicinity
Osprey	*Pandion halieatus*	---	T/T	NHP Record - may be in immediate vicinity
Red Knot	*Calidris canutus*	---	T (non-breeding only)	NHP Record - may be in immediate vicinity
Northern Harrier	*Circus cyaneus*		E/U	CMBO observation – may be in vicinity
SEA TURTLES				
Loggerhead turtle	*Caretta caretta*	T	E	NMFS correspondence
Green turtle	*Chelonia mydas*	T	---	NMFS correspondence
Kemp's ridley	*Lepidochelys kempii*	E	E	NMFS correspondence
Leatherback	*Cermochelys coriacea*	E	E	NMFS correspondence
FISH				
Shortnose sturgeon	*Acipenser brevirostrum*	E	E	NMFS correspondence
PLANTS				
Larger buttonweed	*Diodia virginiana*	---	E	NJNHP correspondence – may be in immediate vicinity

1. Status: T = threatened, E = endangered, U = undetermined, S = stable. Certain bird species are granted different breeding and non-breeding status (N.J.A.C. 7:25-4.17). The status for these species is indicated as (breeding status / nonbreeding status).

Sources: NJNHP letter dated March 8, 2002; USFWS letter dated May 6, 2002; CMBO letter dated April 8, 2002; NMFS letter dated June 20, 2002. (Kaufmann 1996).

1996). Occasionally they will nest in large pines in suburban settings (Walsh et al. 1999). The typical clutch of 4-5 eggs is incubated for 21-25 days. Both parents incubate and feed the young, and the first flight occurs in about 6 weeks after hatching. This heron feeds heavily on crustaceans (crabs and crayfish), but will consume mollusks, frogs, insects, and fish as well (Kaufmann 1996).

This species is listed by the NJNHP as being possibly on the project site, due to the historic presence of a heron rookery on the Coast Guard base to the east of Cape May inlet. According to David Jenkins of the NJ Nongame and Endangered Species program (personal conversation, August 23, 2002), the heron rookery is no longer present in this location. The nearest active heron rookery is located well beyond the limits of the project area, close to the border of Wildwood and Wildwood Crest. While nesting and breeding activities are not likely to occur in the immediate vicinity of the project site, it is likely that this species utilizes the marshes in the vicinity of the project area as foraging habitat.
Similar to the yellow-crowned night heron, this species is listed by the NJNHP as being possibly on the project site, due to the former presence of the heron rookery on the Coast Guard base to the east of Cape May inlet. As this rookery is no longer present, it is not likely that this species would be nesting or breeding in the project area. It is, however, likely that this species utilizes the marshes in the vicinity of the project area as foraging habitat.

Black-crowned Night Heron
This species usually nests colonially with other herons and egrets along the coast in shrubs and trees, but may occasionally nest in reeds or on the ground. Numbers of this heron are reduced in winter (Walsh et al. 1999) suggesting a partial short-distance migrant, but there are always some birds that overwinter. In spring, numbers near nesting areas are usually building through April. The diet is principally fish, but includes a wide variety of organisms such as squid, crustaceans, aquatic insects, clams, mussels, frogs, snakes, and carrion The flimsy to substantial stick nest is made by the female with materials supplied by the male. The typical clutch of 3-4 eggs (range 1-7) is incubated by both parents for 21-26 days. Young start branching-out in about 4 weeks and can fly in about 6 weeks where they may follow parents to foraging grounds or continue to beg for food.

Piping Plover
Piping plovers (*Charadrius melodus*) are beach nesting birds. This species is highly migratory, and return to their nesting beaches in New Jersey as early as early March, but more regularly by late March (Walsh *et al.* 1999). Males establish a breeding territory, usually by mid-April (USFWS 2000). During the breeding season, the birds typically forage and nest in open, dry or wet bare sand, or areas of sand that are very sparsely vegetated with growths of dune grass (*Ammophila breviligulata*), glassworts (*Salicornia* sp.) and sea lavender (*Limonium carolinianum*). The nest is simply a scrape or slight depression in the sand where the clutch of 3-4 eggs is laid. Eggs hatch in May or June after 30 days of incubation (Richards 1988). The young are precocial and are able to feed themselves within a day or two of hatching (Kaufman 1996). Fledging is in roughly 21-35 days (Kaufman 1996; Richards 1988).

Minimal beach habitat is present within the project area. These areas are located on the eastern and western edges of Middle Thorofare, in the vicinity of the existing bascule bridge. As a result

of their proximity to the Middle Thorofare bridge and Ocean Drive, these areas are frequently exposed to human activity and are heavily utilized for fishing. Thus, it is not expected that the piping plover would utilize the beaches within the project area for breeding or nesting. These species have been identified by the NJNHP as being present at Two Mile Beach, which is located on the US Coast Guard Training Center to the east of Middle Thorofare. At its closest point, Two Mile Beach is located approximately 2,000 ft. to the south of Ocean Drive. The US Fish and Wildlife service has not identified piping plover (Federally-listed threatened) as known to occur within the vicinity of the project area (Appendix A – USFWS response letter).

Least Tern

The Least Tern is also a beach nesting bird. This species is a neotropical migrant, migrating as far south as Brazil, but returning to the Atlantic coast in early May to breed (Walsh et al. 1999). They nest alone or in colonies on open sandy beaches, dunes, dredge spoil areas, sandbars (islands), and occasionally on gravel roof tops (Peterson 1988; Kaufmann 1996). The nest is a shallow scrape, sometimes lined with pebbles, debris, and grass where 2-3 eggs are deposited. After 25 days of incubation, the young hatch and may walk to cover within a few days. The young attain their first flight in 19-20 days, but may remain with parents for another 2-3 months. The diet is mostly small fish and crustaceans, but also some small mollusks and marine worms (Kaufmann 1996). As fall approaches, they suddenly depart in late August or early September.

The minimal beach habitat that is present within the project area is too frequently subjected to human disturbance to provide habitat for the least tern. This species has been documented to nest on Two Mile Beach at the US Coast Guard Training Center, approximately 2,000 feet south of the project area.

Black Skimmer

The Black Skimmer is another beach nesting bird. Black Skimmers are migratory coastal birds, leaving the New Jersey coast in late September through late October, with an occasional straggler remaining as late as early December (Walsh et al. 1999). In spring, they return fairly early, by mid-April. This species nests on open sandy beaches and sandy islands that are close to sheltered tidewaters such as lagoons, inlets, estuaries, and bays (Kaufmann 1996). Their diet is mostly fish and calm waters are needed to accommodate their unique fishing technique which consists of dragging their lower bill just under the water surface as they fly just inches above the waters' surface. They are a colonial nesting bird which almost always nest in mixed species colonies with beach-nesting terns. Their nest is no more than a shallow scrape in the sand (Kaufmann 1996). Both parents incubate the eggs, which takes 21-23 days before hatching. Both parents feed the chicks by regurgitation. The young are able to fly in about 23-25 days.

The minimal beach habitat that is present within the project area is too frequently subjected to human disturbance to provide habitat for the black skimmer. This species has been documented to nest on Two Mile Beach at the US Coast Guard Training Center approximately 2,000 to the south of the project area, along with the least tern and piping plover.

Barred Owl

This owl is a non-migratory permanent resident of forests in northern and southern New Jersey, but is practically extirpated in central New Jersey along the New York-Philadelphia corridor

(Walsh et al., 1999). This owl requires large tracts of undisturbed forest dominated by mature and old-growth stands (Bosakowski et al. 1987, Bosakowski 1989); particularly forested wetlands. Large tree habitat is necessary to provide large old cavity trees for nest sites as well as open flyway space below the canopy for hunting (Devereux and Mosher 1984).

No large tracts of forest are present within the project area that would offer habitat for the barred owl. Therefore, it is not expected that this species would be present within the project area.

Osprey

The Osprey is a fish hawk, which typically nests in large trees, snags, telephone poles, utility towers, channel markers, old buildings, and on specially-built (artificial) nest platforms (NJDEP 1995). This species is a neotropical migrant, completely leaving the state by late October, and returning as early as mid-March. Distribution is principally coastal, from Raritan Bay south to Cape May and the Delaware Bayshore (Walsh et al. 1999). Feeding occurs almost exclusively on fish captured from rivers, lakes, reservoirs, estuaries, bays and the open ocean along the coast (Ehrlich et al. 1988, NJDEP 1995). In New Jersey, ospreys are commonly found fishing in the Atlantic Ocean, coastal estuaries and bays, in the brackish portions of larger rivers, and along the Delaware Bayshore north to Salem County. Nest building and courtship begin late-March; eggs are laid in mid-April to mid-May. Incubation takes about 32-42 days and most young hatch in late May (NJDEP, no date). Ospreys feed almost entirely on fish and may travel several miles from the nest to reach good fishing grounds (Poole 1989). Lack of suitable trees and snags in coastal areas can limit nesting opportunities, so artificial nesting platforms are needed to support higher nesting densities. Over 150 nest structures have been installed over the years, but these structures require maintenance and replacement, which is sometimes provided by volunteers (NJDEP 1995).

Although no ospreys are known to nest within the immediate project area, an osprey nest has been identified in relatively close proximity.

During the performance of site visits on 2000 and 2002, one osprey (*Pandion haliaetus*, State-listed as threatened) nest was observed within the vicinity of the project alignment. The osprey nest is located on a 40-foot tall navigation beacon that is located 420 feet north of the bridge over Upper Thorofare (location shown on Figure 2). The osprey nest was noted to be active during May 2000 and August, 2002 site investigations. It should be noted that an additional osprey nest was identified by the NJNHP as being located 2000 ft. west of the mouth of Mill Creek, along the southern shore. This nest was not observed during the performance of field investigations within or adjacent to the project alignment. Based on the description provided by the NJNHP, it appears that the nest would be located approximately 5,000 feet from the limits of the project area, and is therefore not likely to be impacted by the project.

Red Knot

The Red Knot is a long distance migrant to the arctic tundra where it begins courtship activities in early June (Richards 1988). It does not breed in New Jersey, but rarely may overwinter in small numbers (Walsh et al. 1999). However, New Jersey shores have been documented as important stop-over feeding and resting sites to support the migration. Spring migration coincides with the egg-laying period of the horseshoe crab, as knots will eagerly feed on the eggs from mid-May to early June. The preferred winter habitat is large open mud flats backed by tidal

marsh (Richards 1988). Here, they feed on small invertebrates, mainly mollusks, but also crustaceans, worms, and insects. Like most other arctic breeding shorebirds, the return journey begins in late July-early August (Richards 1988). However, numbers of New Jersey migrants are less dramatic then spring because the horseshoe crab breeding season is well over by then (Walsh et al. 1999).

This species has been observed along the beachfront of the Coast Guard base to the east of Middle Thorofare. It is also likely that this species utilizes the marshes of the MWMA for foraging.

Northern Harrier

The northern harrier nests on the ground in dense fields or marshes. The nest may be a shallow depression lined with grass, or a platform of sticks, grass, or weeds. This species migrates singly, over long periods in spring and fall. Northern harriers feed mostly on small mammals and birds, as well as large insects, snakes, and amphibians. This species hunts by flying low over fields, scanning the ground. Personnel from the NJ Audubon Society – Cape May Bird Observatory (CMBO) indicated that northern harrier (*Circus cyanus*, State listed as endangered) forages in the area during the non-breeding season. No records have been identified of this species nesting in the project area.

SEA TURTLES

Loggerhead Turtle

The loggerhead turtle (*Caretta caretta*) nests along the Atlantic and Gulf Coasts as far north as the Carolinas and, very rarely, north to New Jersey. Females come onshore at night from May – August to lay eggs on wide, sloping beaches. It is found in coastal bays, lagoons, estuaries, and open seas. The species is omnivorous, their diet including sponges, mollusks, crustaceans, sea urchins and marine plants (Behler and King, 1979).

Green Turtle

The green turtle (*Chelonias mydas*) typically nests along the southeast coast of Florida. A subspecies (*C. mydas mydas*) is known to range up the east coast of North America into New England, but does not typically nest as far north as New Jersey. This species is herbivorous, and is found in shallow waters with abundant aquatic plants, and open seas during migrations (Behler and King, 1979; Conant and Collins, 1991).

Kemp's Ridley

Kemp's Ridley, or the Atlantic Ridley (*Lepidochelys kempi*) nests along a short stretch of the Tamaulipas beach in the Gulf of Mexico. Nesting occurs between April and July. In the summer months, this species (particularly immature individuals) may range up the Atlantic Coast as far north as New England or Nova Scotia. This species is typically found in shallow coastal waters. (Behler and King, 1979; Conant and Collins, 1991).

Leatherback

The Leatherback turtle (*Dermochelys coriacea*) is the largest of all living turtles, commonly ranging from 4-6 feet in length (sometimes larger). Adults weigh 600-1600 lbs (Behler and

King, 1979). This species typically nests on the east and west coasts of Florida between April and November, but may range as far north as Newfoundland in the summer. This species can be found in open seas, bays and estuaries.

None of the sea turtles described above are known to nest within the project area. There is the potential, however, that these species could be present, particularly within the summer months. Consultation with the NMFS will likely be required during the scoping process, and prior to the onset of construction activities

FISH

The shortnose sturgeon (*Acipenser brevirostrum*) is an anadromous fish species, the populations of which have been adversely affected by the historic industrial use of rivers, and by overfishing. Juveniles remain in freshwater for their first summer of life and then migrate to deeper, more brackish water in winter. Juveniles migrate to and from freshwater for a number of years before entering the marine environment and joining the adult migration pattern (Friedland, K., 2002). According to Ms. Anita Riportella of the NMFS (pers. conversation, 8/27/02), in the NJ/NY area, this species is only found in the upper reaches of the Hudson River, and in the Delaware River. Thus, it is not expected that this species would be found within the project area, or would be impacted by the project.

PLANTS

Larger buttonweed (*Diodia virginiana*) is the only endangered plant identified by the agencies consulted as potentially being found within the project area. This species is found in coastal wetlands in southern New Jersey. The NJNHP letter identified the known occurrence of this species as being found to the west of the Parkway. Therefore, it is not expected that the project would impact this known population.

Although no other endangered plants have been identified within the project area, there are many endangered plants that are listed by the Natural Heritage Program as occurring within the same USGS topographic quadrangle as the project area. The project area contains a tidal marsh/upland ecotone along nearly the entire length of the roadway. This type of ecotone may provide habitat for a number of endangered plants.

2. Migratory Birds

The marshes along the roadway are known to be utilized heavily by migratory shorebirds and waterfowl. This was noted by both CMBO and ENSP personnel and in available literature (NJDEP, 1987). The project area is included in a larger geographic area that has been designated as an important migratory stopover for shorebirds, passerines, and raptors (NJDEP, Environmentally Sensitive Areas Guidance Document). According to this guidance document, "The migratory stopover areas for migrant shorebirds include all beaches and tidal marsh habitats along the Delaware Bay and Atlantic coast from Cape May Point north to the Cohansey River and Cape May Point North to Sea Isle City. The migratory stopover areas for migrating raptors and passerines include the lower 10 kilometers of Cape May Peninsula.

The NJ Audubon Society (1989) has designated the Cape May peninsula as a "Migratory Bird Corridor." The Cape May peninsula is the single greatest concentration point for migratory birds in New Jersey, where migration is restricted by the geography, and through which millions of birds pass each year.

3. Waterfowl Concentration Areas

The marshes and open waters of the Marmora Wildlife Management Area (MWMA) are heavily utilized by waterfowl in the fall and winter (Brown, 1992; NJDEP, 1987). High populations of black duck (*Anas rubripes*), brant (*Branta bernicla*), bufflehead (*Bucephala albeola*), Canada goose (*Branta canadensis*), American widgeon (*Anas americana*), and blue-winged teal (*Anas discors*) are commonly noted in the literature (NJDEP, 1987).

4. Colonial Nesting Waterbirds

According to NJNHP correspondence (dated March 8, 2002; Appendix A), there are records of common terns (*Sterna hirundo*) on Thorofare Island. It has also been noted by ENSP personnel that common terns nest within the marshes of the MWMA, in locations approximately 2,000 feet north of Ocean Drive. Common tern is viewed by NJDEP as a "species of special concern," due to their declining population in New Jersey.

The NJNHP letter (March 8, 2002) identified the historic presence of a heron rookery on the Coast Guard base to the east of Cape May inlet. According to David Jenkins of the NJ Nongame and Endangered Species program (personal conversation, August 23, 2002), the heron rookery is no longer present in this location. The nearest active heron rookery is located well beyond the limits of the project area, close to the border of Wildwood and Wildwood Crest.

5. Wildlife Travel Corridors

The embankments along Ocean Drive may provide nesting habitat and travel corridors for diamondback terrapins (*Malaclemys terrapin*). According to Palmer and Cordes (1988), female terrapins generally nest within 150 meters of tidal waters, in sandy substrates above the mean high tide. Nesting occurs in June and July in New Jersey. Terrapins prefer to excavate nests in sparsely vegetated areas, with grass cover of between 5% and 25%. They also prefer to nest on flat ground or on very gently sloping surfaces, generally requiring slopes of less than 7%. Slopes greater than 25% (4:1) are considered unsuitable for nesting.

Terrapins are known to excavate nests in suitable roadside embankments along tidal areas, and in the process of their movements to and from these locations are occasionally hit by passing vehicles. Terrapins are considered a common species and are collected (hunted) during the appropriate season.

Conversations with the Middle Thorofare Bridge tender (B. MacBride, pers. conv. 6/30/00) suggest that the terrapin is seen occasionally along Ocean Drive. He reported that they are seen on the road during nesting season, June and July, and sometimes during warm weather in the fall. He observed that they are infrequently reported by motorists.

D. Aquatic Wildlife and Habitat

1. Finfish Migratory Pathways

Finfish migratory pathways are waterways which serve as passageways for diadromous fish to or from seasonal spawning areas, and may include juveniles and/or adults of anadromous and catadramous fishes. Waterways such as rivers, streams, creeks, bays, and inlets may serve this function. In New Jersey, the species of concern (NJDEP, 2000, Chapter 7:7E-3.5) are the alewife or river herring (*Alosa pseudoharengus*), blueback herring (*Alosa sapidissima*), American shad (*Alosa sapidissima*), striped bass (*Morone saxatilis*), Shortnose sturgeon (*Acipenser brevirostrum*), and the American eel (*Anguila rostrata*).

A review of "New Jersey Anadromous Fish Inventory" (Zich, 1977) did not identify Mill Creek or Upper Thorofare as passageways for anadromous fish. However, a separate tidal creek (also named Mill Creek) located in Dennis Twp., Cape May County, approximately 10 miles north of the project alignment, was identified by Zich as a spawning run for alewife. Although Mill Creek and Upper Thorofare are not listed by Zich, it is likely that the tidal marshes, their freshwater reaches and Jarvis Sound provide important breeding and feeding habitat for the species of concern.

2. Shellfish Habitat

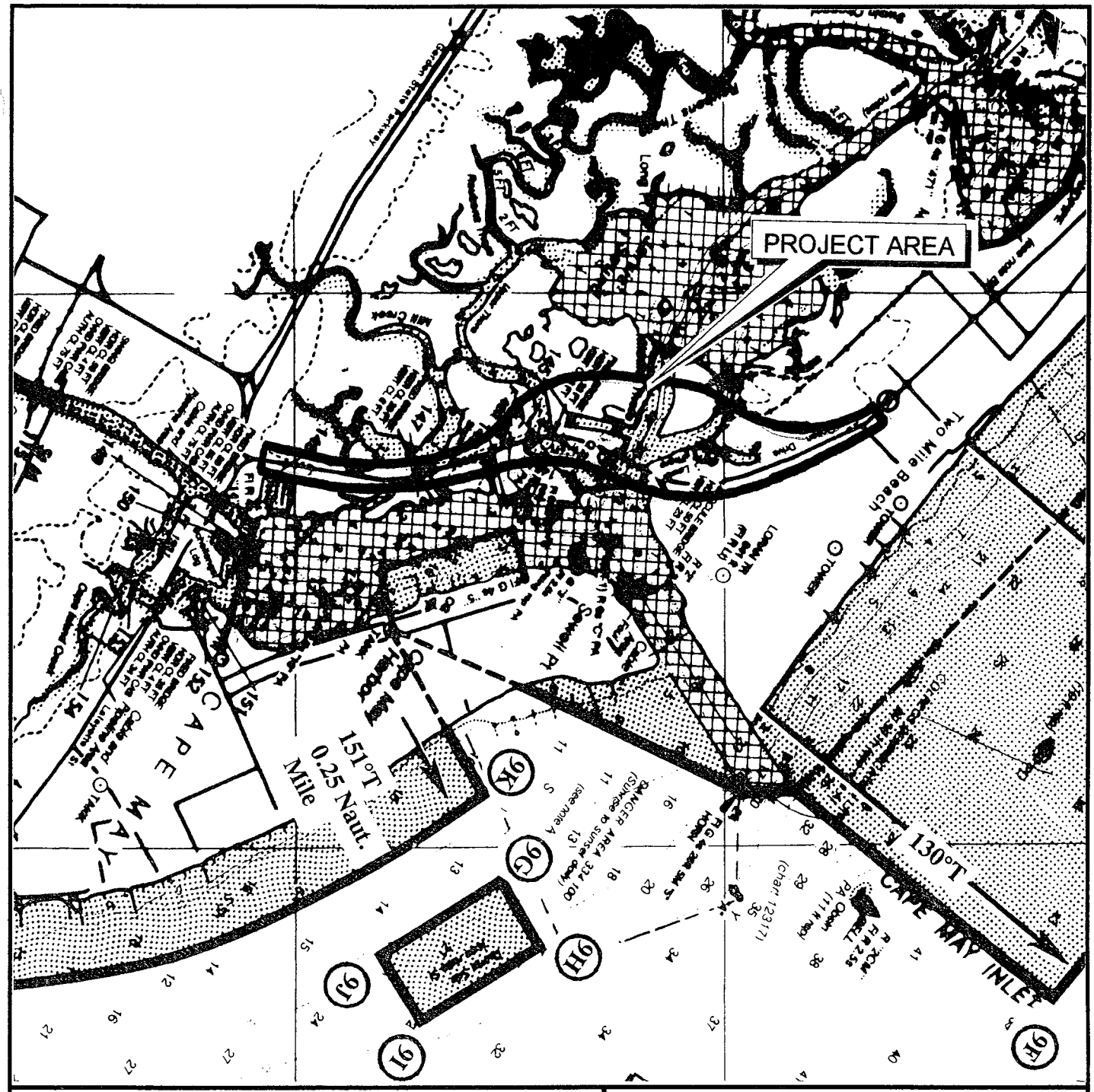
Shellfish habitat is defined in the CZM policies as an estuarine bay or river bottom, which has a history of production for hard clams, soft clams, eastern oysters, bay scallops, or blue mussels. The substrate beneath the two bridges will provide a suitable habitat for shellfish. An investigation performed by ASGECI in the year 2000 of the shallow waters beneath and immediately adjacent to the bridges within the project area identified a sparse population of soft clam (*Mya arenaria*), hard clam (*Mercenaria mercenaria*) and blue mussels (*Mytilus edulis*).

According to the map entitled "Distribution of Shellfish Resources in Relation to the New Jersey Intracoastal Water Way", Plate IV, Longport to Cape May, dated 1963, the project area is located within an area identified as "High Commercial Value" for Hard Clams.

Although the waters of Mill Creek and Upper Thorofare are located within a shellfish region that is identified as having a High Commercial Value for Hard Clams, these waters are also classified as a "prohibited" shellfish harvesting area according to the NJDEP (1999) Shellfish Growing Water Classification Chart #9 (Figure 11). These waters are degraded as a result of marine traffic and industry and are condemned for the harvesting of oysters, clams and mussels. In addition, docking facilities are located immediately adjacent to the south side of the Ocean Drive Bridge over Mill Creek, as well as the Hinch Marina and Axelson and Johnson Fisheries Company on the north side of Ocean Drive adjacent to the Middle Thorofare bridge. Shellfishing is prohibited where such facilities exist. According to Jeffrey Normandt of the NJDEP, Bureau of Shellfisheries (pers. comm., 01/20/00), there are no shellfish leases for any of the waters within the project area. These waters, although potentially productive habitat for shellfish, are considered degraded and are not suitable for shellfish harvesting.

3. Submerged Vegetation Habitat

Under the CZM policies, a submerged vegetation special area consists of water areas supporting or documented as previously supporting rooted, submerged vascular plants such as widgeon



LEGEND:

- SPECIAL RESTRICTED AREA
- PROHIBITED AREA
- SEASONAL AREA
- APPROVED AREA

SITE LOCATION

NOT TO SCALE

SOURCE:
NJDEP, Bureau of Marine Water Monitoring, Shellfish Growing Water Classification Chart 9, 2001.

FIGURE 11
SHELLFISH HABITAT

Ocean Drive Upgrade &
Bridge Replacement
Route 109 to Wildwood Crest
Lower Twp. & Wildwood Crest Borough
Cape May County, New Jersey
ASGECI Project #1807

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grass (*Ruppia maritima*), sago pondweed (*Potamogeton pectinatus*), horned pondweed (*Zanichella palustris*), and eelgrass (*Zostera marina*).

The Submerged Aquatic Vegetation (SAV) species that occur in the immediate vicinity of the Mill Creek and Upper Thorofare bridges were collected and identified on May 25, 2000. Our survey found three common species of SAV within the project areas beneath the two bridges. Two of these species are green algaes and are identified as sea lettuce (*Ulva lactuca*) and the green algae (*Enteromorpha intestinalis*). In addition, the common rockweed (*Fucus vesiculosus*) was also identified. These three species were found occurring as a sparse fringe along the immediate shoreline and did not occur as a dense or expansive bed. These three species are not listed among the SAV species, which are regulated under the SAV special areas rule.

According to the "The New Jersey Submerged Aquatic Vegetation Distribution Atlas Final Report", dated 1979, the distribution of SAV along the New Jersey Coast is distinctly stratified. This study found that from Cape May north to Great Bay, only the algal species of SAV, almost exclusively sea lettuce, are found. Aerial photographs depicting SAV beds were prepared by the NJDEP for 27 USGS quadrangles along the New Jersey coast.

The Mill Creek and Upper Thorofare bridges are located within the Cape May Quadrangle (Figure 12). The mapping does show a bed of sea lettuce located approximately 400 feet north of the bridge over Mill Creek, and an area of SAV located approximately 200' to the north of the project area (approximately 600 feet north of the bridge over Upper Thorofare). The SAV mapping does not show the presence of any other SAV species of concern under the Submerged Aquatic Vegetation rule in the vicinity of the project area.

The NJDEP, Division of Fish, Game and Wildlife, Bureau of Shellfisheries has prepared "Eelgrass Inventory" maps, dated 1983, for portions of the New Jersey coast. These maps may be utilized to determine the locations of eelgrass beds. According to Mike Celestino of the Bureau of Shellfisheries, there are no "Eelgrass Inventory" maps available for the project area (pers. comm., 06/05/00).

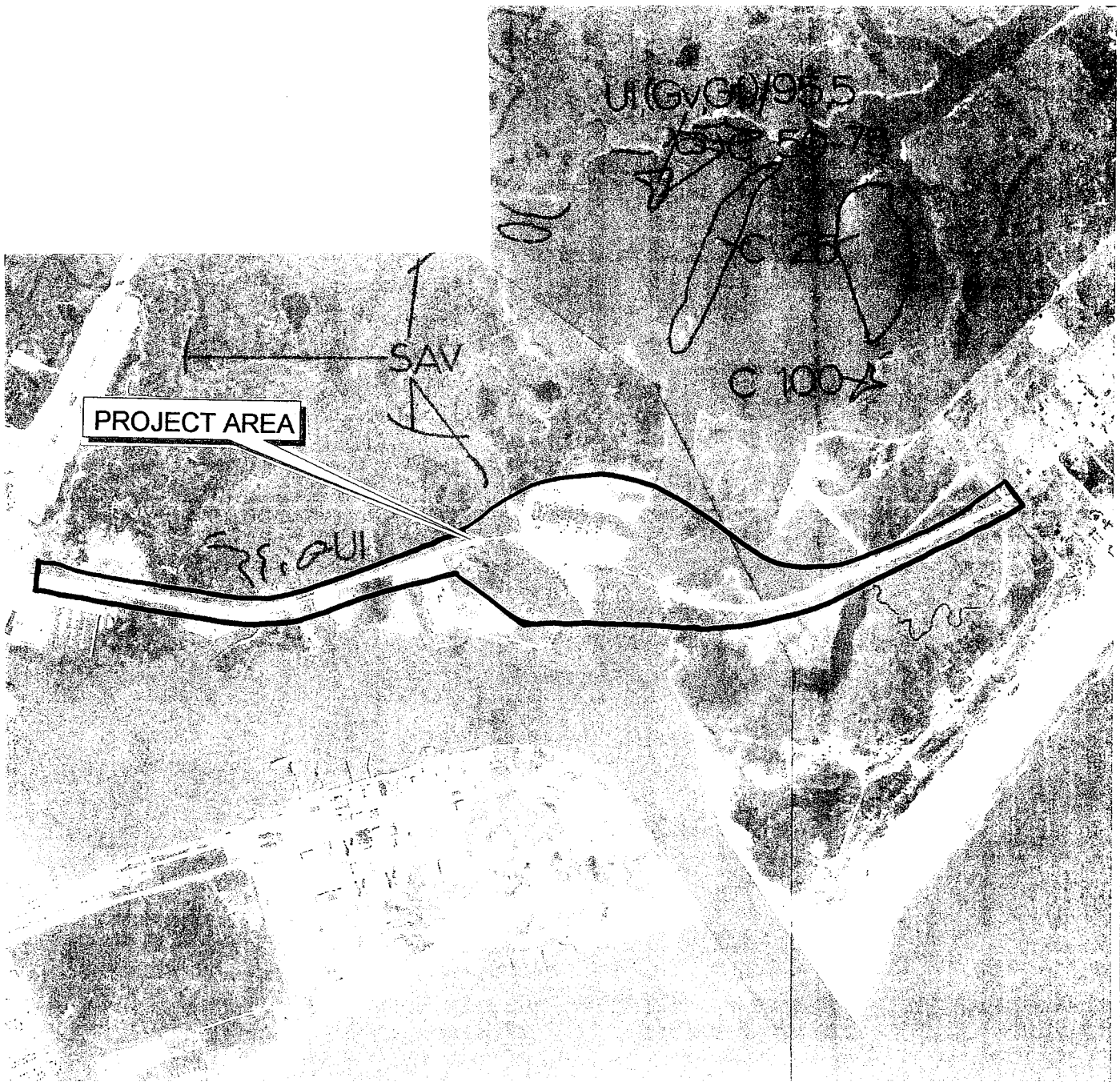
ASGECI contacted Ms. Anita Riportella of the NMFS to determine if their agency had any concerns regarding SAV within the project area. Ms. Riportella stated that the NMFS did not have any SAV concerns in this area of the State (pers. comm., 12/16/99).

4. Breeding Areas for Aquatic Furbearers:

Muskrats (*Ondatra zibethicus*) have been reported from the MWMA, especially fresh water sections (Brown, 1992; NJDEP, 1987). Brown also notes that otter (*Lutra canadensis*) can be seen infrequently in the area. Although both of these species may occur as transients within the project area, the habitat is not suitable to support a breeding population.

5. Recreational Fishing:

The NMFS identifies the Coastal Waters surrounding Cape May, including Cape May Harbor, Middle Thorofare and Jarvis Sound as essential fish habitat for one or more life forms (eggs, larvae, juvenile, adult) for many fish species. NMFS provides a geographic listing of essential



LEGEND:
Ul - Ulva lactuca
Gv - Gracilaria verrucosa
Gf - Gracilaria folifera
C = % Coverage
SAV = Submerged Aquatic Vegetation not distinguished by species

0 2000'

SOURCE: NJDEP, New Jersey Submerged Aquatic Vegetation Distribution Map - 1979, Cape May and Wildwood Quadrangles.

FIGURE 12
SUBMERGED AQUATIC VEGETATION MAP

Ocean Drive Upgrade & Bridge Replacement
Route 109 to Wildwood Crest
Lower Twp. & Wildwood Crest Borough
Cape May County, New Jersey
ASGECI Project #1807

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fish habitat (EFH) for managed marine fishes. The database is available on the world wide web (www.nero.nmfs.gov). The NMFS essential fish habitat list is provided as Table 2, below. The majority of these species will likely use the waters for spawning in April and May and continue to feed until the fall migration back to the ocean. Some species, such as the striped bass (Morone saxatilus), will overwinter within the estuaries.

According to Brown (1992) the "Cape May wildlife management areas coastal bays and estuaries are excellent for striped bass, weakfish (Cynoscion regalis), summer flounder (Paralichthys dentatus) and bluefish." The NJDEP, Guide to Wildlife Management Areas states "present are stripers, weakfish, fluke, flounder, perch and bluefish." Recreational fishing for weakfish was noted along the Middle Thorofare during the May 2000 field investigation. The MWMA is also noted as being good for crabbing and clamming (Brown, 1992 and NJDEP, 1987).

Table 2
Fish and Shellfish Life Stages Documented in Cape May

Species	Egg	larvae	juvenile	Adult
Atlantic Butterfish (*Peprilus triacanthus*)		×	×	×
Atlantic Cod (*Gadus morhua*)				×
Atlantic Sea Herring (*Clupea harengus*)			×	×
Atlantic Angel Shark (*Squatina dumerili*)		×	×	×
Atlantic Sharpnose Shark (*Rhizopriodon terraenovae*)				×
Black Sea Bass (*Centropristus striata*)	n/a		×	×
Bluefish (*Pomatomus saltatrix*)			×	×
Cobia (*Rachycentron canadum*)	×	×	×	×
Dusky Shark (*Charcharinus obscurus*)		×		
King Mackerel (*Scomberomorus cavalla*)	×	×	×	×
Monkfish (*Lophius americanus*)	×	×		
Red Hake (*Urophycis chuss*)	×	×	×	
Sand Tiger Shark (*Odontaspis taurus*)		×		×
Sandbar Shark (*Charcharinus plumbeus*)		×	×	×
Sandbar Shark (*Charcharinus plumbeus*)		HAPC	HAPC	HAPC
Scalloped Hammerhead Shark (*Sphyrna lewini*)			×	
Scup (*Stenotomus chrsysops*)	n/a	n/a	×	×
Spanish Mackerel (*Scomberomorus maculatus*)	×	×	×	×
Summer Flounder (*Paralicthys dentatus*)		×	×	×
Tiger Shark (*Galeocerdo cuvieri*)		×		
Winter Flounder (*Pleuronectes americanus*)	×	×	×	×
Windowpane Flounder (*Scopthalmus aquosus*)	×	×	×	×

Source: NMFS Essential Fish Habitat (EFH) Designations from Website
n/a = no data available on lifestage or lifestage not present in species reproductive cycle.
HAPC = Habitat Area of Particular Concern
× = EFH has been designated for a given species and life stage.

IV. POTENTIAL IMPACTS AND MITIGATING MEASURES

The proposed project will result in impacts to ecological resources. These impacts may be either temporary impacts or long–term impacts. Temporary impacts are the category of impacts that generally occur during the construction phase of the project. Long-term impacts are permanent and may be direct or indirect. Direct impacts to ecological resources result from the permanent loss of habitat as a result of the construction of new structures/facilities. Indirect impacts are the impacts that result from the implementation or functioning of the new structures/facilities. The indirect impacts are not always apparent during the project-planning phase and may be difficult to identify.

Seven conceptual alternatives have been prepared for the project. The impacts associated with each alternative are evaluated herein. Measures to minimize temporary, direct and indirect impacts will be incorporated into the design of the chosen alternative. In some cases the impacts are unavoidable and are accepted as the consequences of the project. Unavoidable impacts may require some form of mitigation, to be determined in cooperation with reviewing agencies.

The potential impacts to natural resources associated with each of the alternatives are described below. The assessment of impacts provided below is based on conceptual plans for the alternatives. During the design process of the chosen alternative, potential impacts should be revisited in greater detail.

A. Water Quality

Under any of the seven alternatives evaluated (Alternatives 3A through 3G, Figure 2), impacts to water quality are expected to be inconsequential.

The project will result in the reconstruction of approximately 2.8 miles of road surface and three bridges. The existing road consists of two 10-foot wide paved travel lanes with 10-foot wide unpaved shoulders; whereas, the proposed road will consist of two 12-foot wide paved lanes plus 8-foot wide paved shoulders and 4-foot berms on either side of the road. Additional areas of impervious, paved surface will be constructed as a result of the additional pavement to either side of the road, as well as the addition of sidewalks.

Under any of the seven alternatives, the project will result in an increase in the area of impervious surface; however, there will be no additional travel lanes constructed. Since there will be no additional lanes added, there should be no indirect, long-term increase in traffic. The road surface will be crowned and stormwater that is generated on the paved surfaces will discharge directly as sheet flow off of the pavement edges. Stormwater will drain from each of the bridge alternatives via scuppers directly to the surface waters / wetlands below.

The stormwater that is generated on the paved road surfaces includes contaminants that are released by the vehicles that travel the roads, predominantly hydrocarbons and metals. Road salts, another common contaminant, may also be applied for de-icing during winter weather. Since there is no additional traffic anticipated, the level of contamination that is generated by vehicles or salting roads should not increase. In addition, there are very limited opportunities for providing any form of stormwater quality treatment. The project alignment is flat and is

bordered by wetlands for much of its length. Any additional construction of ditches, swales, detention or retention facilities or stormwater infrastructure piping will result in additional wetland disturbance. The project will be designed so that runoff will leave the roadway via sheet flow, discharging to the adjacent tidal wetlands, as it does currently. The long-term impacts to water quality as a result of the project should be the same as the current impacts. Since the runoff will be discharged as sheet flow to tidal areas and will not be discharged directly to groundwater, the project is not expected to have any impact on groundwater or to the sole source aquifer.

In order to mitigate temporary impacts to environmental resources during construction, the following measures will be included in the project design:

- The Contractor will primarily work from the existing road and shoulders during construction. Due to the presence of adjacent wetlands, silt fences and orange construction fencing will be installed along the limit of grading. The fencing will prevent unauthorized encroachment.
- Equipment and materials will be stored/stockpiled in designated areas and will not be placed in environmentally sensitive areas.
- Turbidity barriers should be placed in the tidal waters during bridge pier demolition and construction to reduce sedimentation. Bridge demolition shall be performed in a manner that prevents debris from entering the tidal waters. Timing restrictions will be imposed to minimize impacts to fisheries during breeding / spawning periods.
- Concrete pours at bridges will be isolated to prevent fresh concrete from coming in contact with tidal waters.
- The standards for "Soil Erosion and Sediment Control in New Jersey," or equal engineering specifications, will be followed.

The implementation of appropriate soil erosion and sediment control practices should minimize the temporary impacts to environmental resources that may result during construction.

B. Floodplain

The entire project alignment is located within the tidal 100-year floodplain (see Figure 6). A major project objective is to raise the road above the elevation of the 100-year flood in order to provide a safe evacuation route in the event of a major storm. The road will be raised approximately 5 feet for much of its length in order to accomplish this objective. This will require the placement of significant quantities of fill within the project alignment.

The placement of fill within the floodplain of tidal waters is not regulated under the Flood Hazard Area Control Act rules (N.J.A.C. 7:13-1.3(b)1.) which state that, "Tidal flooding is the result of higher than normal tides which in turn inundate low lying coastal areas. The 100-year tidal flood elevation will not be affected by development. Therefore, certain areas in which the regulatory flood is the 100-year tidal flood will not be regulated under this chapter." It is implicit in this statement that additional fill within tidal floodplains has a negligible effect on flood elevations since they are under the influence of ocean surface water elevations.

Since the project lies within an area that is subject to tidal flooding it is not regulated under the Flood Hazard Area Control Act Rules.

C. Wetlands

Ocean Drive is paralleled by tidal wetlands for much of its length, and crosses three major tidal channels. The wetland boundaries, which were delineated by ASGECI in 2000 and 2002 (see Figure 3), are generally found at the immediate toe of the fill that was placed for the construction of the existing road and bridges. The only upland areas identified are found at the extreme western end of the project, near Route 109, or where fill has historically been placed for development adjacent to Ocean Drive.

Elevation and minor widening of the Ocean Drive roadbed, and the reconstruction of the three bridges, will require the placement of significant quantities of fill and new structures. The road will be elevated approximately 5 feet and will be widened from an existing width of about 40 feet to a proposed width of 44 feet (total width of fill). The elevating and widening will result in unavoidable wetland encroachment.

Each of the seven alternatives evaluated for the project would result in different impacts to wetlands and open waters, as summarized in Table 3 below. Since the alternative designs are conceptual in nature, temporary impacts to wetlands and open waters have not been calculated. Temporary wetland impacts would also occur during construction from activities such as movement of equipment, storage and stockpiling of materials and equipment and the construction of temporary access roads and sediment collection basins. Temporary impacts would be expected to be a relatively minor component of overall wetland disturbance, and would be calculated during the permitting and final design stage of the project.
Alternatives 3C and 3D would primarily impact wetlands that are located to the north of Ocean Drive. The wetlands to the north of Ocean Drive are in some areas associated with the MWMA, and are all associated with an expansive tidal marsh, which is of high ecological value.

Alternatives 3A, 3B and 3E would limit wetland impacts to the fringes of the tidal marshes, along the existing right-of-way of Ocean Drive. Of these three alternatives, Alternative 3B results in the least disturbance (2.88 acres) while alternative 3E results in the greatest impact (4.74 acres) to tidal marsh. The construction of Alternative 3E would involve a minor impact to the lands of the MWMA, resulting from the jughandle entrance to the marina located south of Ocean Drive and west of Upper Thorofare (Block 793, Lot 15.06). Alternative 3A results in 3.26 acres of wetland and open water impact.

Alternatives 3C and 3D involve significant realignment of Ocean Drive to the north for its crossings over Upper and Middle Thorofare, causing significant impacts to tidal marshes, including areas within the MWMA. Impacts associated with these two alternatives would occur not only to the fringes of the tidal marshes, but would also impact portions of the marsh interior. Alternative 3C minimizes disturbances by positioning the roadway along the marsh edge on the north side of the fishery complex, and provides for a shorter crossing of the marsh complex to the east of Middle Thorofare than does Alternative 3D. Alternative 3C results in a total of 10.11 acres of wetland and open water disturbance, while Alternative 3D would disturb a total of 11.42

Table 3
Summary of Wetland and Open Water Impacts
Alternatives 3A through 3G

Impacts (in ac.)	Alternative 3A	Alternative 3B	Alternative 3C	Alternative 3D	Alternative 3E	Alternative 3F	Alternative 3G
State open waters	**0.2**	**0.2**	**0.05**	**0.06**	**0.2**	**0.01**	**0.08**
Wetlands							
Perm – Fill/Piers	2.35	2.04	7.12	5.96	2.8	1.86	1.89
Perm-Shading	0.71	0.64	2.94	5.4	1.74	3.31	3.31
Total Wetland Disturbance	**3.06**	**2.68**	**10.06**	**11.36**	**4.54**	**5.17**	**5.2**
Total Overall Disturbance	**3.26**	**2.88**	**10.11**	**11.42**	**4.74**	**5.18**	**5.28**

Note: Impact calculations provided by Parsons-Brinckerhoff, March 3, 2003. Calculations are based on conceptual plans and are approximate.

acres of wetland and open waters. Alternative 3D positions Ocean Drive further into the marsh along its entire alignment. The majority of the wetlands that would be impacted under this alternative are in the marsh interior and therefore of high ecological value. Both of these alternatives involve the placement of piers on Thorofare Island, which is currently undeveloped and consists of a mosaic of low and high marsh.

Alternatives 3F (segmental bridge) and 3G (cable-stayed bridge) result in realignment of Ocean Drive to the south for its crossings over Middle and Upper Thorofare. The footprint of these two alternatives is the same, and therefore, the direct impacts to wetlands associated with either alternative are nearly identical. Alternative 3F results in a total wetland and open water impact of 5.18 acres, while Alternative 3G results in a total wetland and open water impact of 5.28 acres. There is a slight increase in open water disturbance associated with Alternative G that is related to the construction of larger piers for the cable-stayed bridge. The portion of the road to be realigned under these alternatives would impact areas of tidal marsh, beach and dunes to the east of Middle Thorofare, and an area of relatively degraded wetlands to the west of Upper Thorofare. These degraded wetlands have developed within an area of dredge spoils that form the western edge of Upper Thorofare. The vegetation within the dredge spoil deposits consists of a monoculture of common reed. A complex of low tidal marsh and high tidal marsh occur as a fringe between the dredge spoil deposits and the western edge of Upper Thorofare. The MWMA and associated wetland complex would not be impacted under either of these alternatives.

Both the USACOE Section 404 Permit and the combined NJ Coastal Wetlands Permit will require mitigation of wetland and open water impacts. Mitigation of impacts to intertidal and subtidal shallows will also be required for the Waterfront Development Permit. Intertidal and subtidal shallows require mitigation at a 1:1 ratio. Wetland mitigation will likely be required at a ratio of 2 acres of wetland creation for each one acre of wetland that is permanently disturbed by placement of fill. A mitigation ratio for wetland areas to be impacted by shading will need to be discussed with the ACOE; however, it is believed that these types of impacts can be mitigated for at a ratio of 1:1. Temporary wetland impacts (lasting less than 6 months) do not require mitigation, assuming that they are restored in kind.

The applicant will propose wetland mitigation to compensate for the wetlands impacts as a result of this project. Mitigation options to be explored may include the restoration of historically filled areas (i.e., footprint of abandoned railroad bed and an abandoned stretch of Park Boulevard), creation of additional wetlands, enhancement of degraded wetlands, or the purchase of mitigation credits (if available).

D. Endangered and Threatened Species

As described in Section III C, several endangered and threatened species are known to utilize the marshes and open water complexes in the vicinity of the project area. The potential impacts to these species that could result for the construction of Alternatives 3A through 3E are described below.

Alternative 3A

Under this alternative, both temporary disturbances associated with construction activities, and permanent disturbances, would generally be located in the same corridor as the existing Ocean Drive.

Breeding osprey (state-listed, threatened) were identified nesting on a 40-foot tall navigation beacon that is located 420 feet north of the bridge over Upper Thorofare. In general, if the project can be staged in such a way that no construction will occur within 1,000 feet of the nest during the breeding season (April 1 through July 15), no impacts would be expected to this species. Otherwise, the nesting pair could be disturbed by construction activity and nesting activity aborted, potentially resulting in egg or chick mortality. If it were necessary to perform construction activities during the breeding season, consultation with NJDEP would be necessary to determine appropriate mitigating measures. The osprey nest could potentially be relocated further from the project area to prevent disturbance during the breeding season. The nest would likely need to be moved and successfully re-established before construction would be permitted.

Measurable permanent impacts to other endangered and threatened bird species would not be expected to occur as a result of the construction of this alternative. None of the other species that have been identified as being present within the project area are known to nest within or immediately adjacent to the location of this alternative. Construction activity could impact some of the foraging activities of these birds on a short term basis; however, as there are extensive marshes available in the vicinity of the project area, it is not likely that this temporary impact would cause long term impacts to the species. Construction of the project would involve the

loss of a narrow fringe of wetland immediately parallel to Ocean Drive. This minor habitat loss is not anticipated to have a significant impact on these species.

It is not likely that sea turtles that may be present in the project area would be impacted by the project, unless blasting or dredging were necessary during construction. The need for blasting may, however, be necessary for demolition of the existing structure. The sea turtles identified in the vicinity of the project area would not utilize the habitat to be disturbed for breeding. These species are generally found in open water areas, where impacts would be limited to the placement of piles. When the proper precautions are taken, NMFS does not consider the placement of piles as a hazard to sea turtles, as they would be able to remove themselves from the area (pers. conversation, A. Riportella, 8/27/02).

Based on correspondence with governing agencies, endangered plants have not been identified within the immediate project alignment. The project alignment is mowed and grades gently down to tidal high and low marsh or open water along nearly the entire length of the roadway. The high marsh, which was closest to the road, was generally dominated by common reed or salt meadow hay. The areas immediately adjacent to the roadbed, and the areas dominated by common reed, are not expected to provide habitat for endangered plants.

Due to the number of rare, endangered and threatened species in the project area, consultation with the NJDEP, NMFS, and USFWS would likely be required before permits could be obtained for this alternative.

Alternative 3B

The impacts to endangered and threatened wildlife under Alternative 3B would be generally the same as those that would occur under alternative 3A. Due to the number of rare, endangered and threatened species in the project area, consultation with the NJDEP, NMFS, and USFWS would likely be required before permits could be obtained for this alternative.

Alternative 3C

Under this alternative, the osprey nest that is located 420 ft. to the north of the existing alignment would likely need to be moved. If construction were to be performed outside of the breeding season, this alternative would still result in the roadway being constructed in very close proximity to the existing nest. The presence of an active, elevated roadway this close to the nest would almost certainly deter osprey from nesting in this location. The nest would likely need to be moved and successfully re-established before construction would be permitted.

Since known breeding areas for other endangered or threatened birds would not be impacted by this alternative, permanent impacts to these species would not be expected. Construction activity could impact some of the foraging activities of these birds on a short term basis; however, as there are extensive marshes available in the vicinity of the project area, it is not likely that this temporary impact would cause long term impacts to the species. Construction of this alternative would result in a greater amount of loss of foraging habitat than Alternatives 3A or 3B.

Unless dredging or blasting were to be necessary as part of the project, it is not expected that impacts would occur to sea turtles (see discussion under Alternative 3A).

Endangered plants have not been identified by the agencies consulted as being located within the footprint of this alternative.

Due to the number of rare, endangered and threatened species in the project area, consultation with the NJDEP, NMFS, and USFWS would likely be required before permits could be obtained for this alternative.

Alternative 3D

The impacts to endangered and threatened wildlife under Alternative 3D would be generally the same as those that would occur under Alternative 3C. This alternative would impact a greater area than would Alternative 3C, leading to greater loss of foraging habitat for birds. Due to the number of rare, endangered and threatened species in the project area, consultation with the NJDEP, NMFS, and USFWS would likely be required before permits could be obtained for this alternative.

Alternative 3E

Alternative 3E will follow the same alignment as Alternative 3A, although it will consist of a high-level fixed bridge rather than a lower level bascule bridge, and includes the construction of a new jughandle entrance for the marina located south of Ocean Drive and west of Upper Thorofare (Block 793, Lot 15.06). The high-level structure will result in a greater disturbance to wetlands since the length of the approaches that transition from the high-level structure back to the road elevation will be greater than would those for Alternative 3A. Impacts to threatened and endangered species are expected to be similar to those described under Alternative 3A (above), although construction of this alternative would result in additional loss of wetland foraging habitat. The construction of the new driveway entrance to the marina (Block 793, Lot 15.06) would involve construction activities occurring in close proximity to the osprey nest that is located approximately 420 feet north of Ocean Drive. If the project can be staged in such a way that no construction will occur within 1,000 feet of the nest during the breeding season (April 1 through July 15), no impacts would be expected to this species. Otherwise, the nesting pair could be disturbed by construction activity and nesting activity aborted, potentially resulting in egg or chick mortality. If it were necessary to perform construction activities during the breeding season, consultation with NJDEP would be necessary to determine appropriate mitigating measures, such as nest relocation.

Due to the number of rare, endangered and threatened species in the project area, consultation with the NJDEP, NMFS, and USFWS would likely be required before permits could be obtained for this alternative.

Alternative 3F

Alternative 3F involves the realignment of Ocean Drive to the south for its crossings over Middle and Upper Thorofare. The portion of the road to be realigned under this alternative would impact fringes of wetland adjacent to Ocean Drive, as well as an area of tidal marsh to the east of the existing Middle Thorofare bridge, and an area of wetland, dredge spoils dominated by a monoculture of common reed, to the west of Upper Thorofare. None of the endangered or threatened species that have been identified as being present in the project area are known to nest

within or immediately adjacent to the location of this alternative. It is possible that endangered or threatened birds may utilize the low marsh and high marsh areas for foraging, although to a lesser degree within the monoculture of common reed and within the wetlands fringing the road.

The majority of the wetlands that would be impacted are associated with the dredge spoils to the west of Upper Thorofare. This wetland area is degraded and offers habitat that is of marginal value to wildlife in comparison to other nearby marsh areas, such as those contained within the MWMA. As there are extensive marshes available in the vicinity of the project area, the loss of marginal wetland habitat is not expected to result in significant impacts to wildlife. In contrast to the three other alternatives that would provide fixed segmental structures over Middle Thorofare (Alternatives 3C, 3D and 3E), Alternative 3F does not involve impacts to the wetlands within the MWMA.

Construction activities could impact the foraging activities on a short term basis; however, it is not likely that this temporary impact would cause long term impacts to birds or other species.

Due to the number of rare, endangered and threatened species in the project area, consultation with the NJDEP, NMFS, and USFWS would likely be required before permits could be obtained for this alternative.

Alternative 3G

Direct impacts to endangered and threatened species that would be associated with this alternative are similar to those described under Alternative F, as these two alternatives share a design footprint. Since known breeding areas for other endangered or threatened birds would not be impacted by this alternative, permanent impacts to these species would not be expected. Construction activity could impact some of the foraging activities of these birds on a short term basis, and some foraging habitat would be permanently lost as a result of the project. As with Alternative F, this alternative shifts much of the wetland impact to an area of degraded wetlands to the west of Upper Thorofare, and avoids impacts to the marshes associated with the MWMA, which are considered to be of higher ecological value.

The towers and support cables associated with the proposed cable-stayed bridge over Middle Thorofare will have a maximum structure height of 300 feet. The structure will also include various types of lighting. The height and lighting may result in impacts to bird species, particularly migratory birds. The coastal marshes of Cape May County provide valuable resting and feeding habitat for birds migrating along the Atlantic flyway, one of the four major north/south migratory routes across the U.S. As currently proposed, the support structures of the bridge would be lit by upward-facing lights located along the bridge fascia. Additionally, the bridge towers would be lit by red aviation beacons, as required by the Federal Aviation Administration (FAA). The roadway would also include standard roadway lighting.

Birds migrating at night are strongly attracted to sources of artificial light, particularly during periods of inclement weather (Fatal Light Awareness Program website, 2003 (www.flap.org)). Fatalities occur with structures such as lighthouses, communication towers and brightly lit high-rise buildings. During bad weather, lights disorient night-flying migratory songbirds which rely on the subtle glimmer of stars and the shadows of the landscape for navigation. Under low

clouds or in fog, lights overpower these cues and the bird's reaction is to circle the lighted towers and buildings, eventually collapsing from exhaustion or repeated collisions (Leahy 1982, Weidensaul 1999). A secondary threat resulting from their aggregation at lighted structures is their increased vulnerability to predation.

The height of the structure will also play a role. It is generally accepted that the taller a structure the greater the impact on migratory birds (TowerKill organization - http:www.towerkill.com/isues/consum.html). In addition, structures taller than 200 feet require lighting in accordance with FAA safety guidelines. The combination of lighting along with tower height can increase the threat to birds, especially during inclement weather. The majority of bird mortality occurs at night since most species migrate at night (Evans undated) although raptors tend to migrate during daylight. Altitudes of migrating birds are highly variable, although most nocturnal birds are thought to migrate at altitudes of between 50 meters (164 feet) and 1000 meters (3280 feet) (Richardson undated). Coastlines, mountain ridges and valleys or sides of mountain have all been shown to concentrate migratory birds, often in relatively low flight above the ground. Some types of migrants, e.g. shorebirds and waterfowl, often concentrate in restricted areas of suitable habitat, such as coastal marshes, while resting and feeding between migratory flights. Birds taking off and landing from these concentrations areas are often flying lower than typical migration altitudes. (Richardson, undated).

Anecdotal reports suggest that birds are more strongly attracted to red lights than to white lights and strobes might be even less attractive (Beason, undated). It is assumed that lighting fixtures that face downward and lighting fixtures that are shrouded from above will reduce their potential to attract birds. To date, there is limited information on practical applications or methods to mitigate impacts to migratory birds from structures.

Information from the USFWS regarding potential impacts to migratory birds from the cable-stayed bridge (Alternative G) over Middle Thorofare and potential methods to mitigate impacts has been provided (Appendix A). The USFWS suggests that migratory birds, including geese and non-sea ducks, cormorants, gulls and raptors "may be adversely affected by the project" or the "risk of collision with the proposed structure would be considered relatively high." Neotropical migratory birds, although they generally migrate at high altitudes, may be at the greatest risk during low visibility conditions. Under these conditions they may be attracted to the aviation safety lights which would increase the risk of collision with structures. The USFWS recommends using the minimum amount of aviation lighting; white strobe lights are preferred over red incandescent strobe lights; and that lights with the longest possible duration off-cycle are the least attractive. Bright spot lights and mercury vapor lamps should not be used except temporarily during maintenance work.

With the exception of the barred owl, all of the endangered and threatened birds that have been identified in or immediately adjacent to the project area are migratory birds. It can be assumed that a brightly-lit structure such as a cable-stayed bridge presents a hazard to these species, as well as other bird species that may be migrating through the project area.

Due to the number of rare, endangered and threatened species in the project area, consultation with the NJDEP, NMFS, and USFWS would likely be required before permits could be obtained for this alternative.

E. Wildlife

Information obtained suggests that the tidal marshes that fringe Ocean Drive provide important wildlife habitat. The Two Mile Beach Priority Site also includes unique coastal communities that provide important wildlife habitat. The project alignment (Ocean Drive) abuts the southern boundary of the MWMA, which includes extensive tidal marshes, and areas of tidal creek and open water. These marshes and surface waters are important breeding and feeding habitat for a wide range of species. These marshes are especially important to the migratory birds that cross through Cape May County during their spring and fall migrations. The alignments 3A, 3E, 3F and 3G cross the northwestern corner of the Two Mile Beach Priority site and would result in minor disturbances to beach, dune and tidal marsh. Alternatives 3F and 3G would have slightly greater impacts than would alternatives 3A and 3E, since they are slightly further to the south. Although these alignments would disturb small areas of beach and dune, there would be no disturbance to coastal scrub or forest communities.

For Alternatives 3A through 3F, if wetland disturbances and removal of woody vegetation are minimized to the extent practicable, the impact to migratory birds should be insignificant. The construction of the cable-stayed bridge proposed under Alternative G has the potential to impact migratory birds through collisions with the elevated structures of the bridge.

The NJNHP has records of common terns nesting on Thorofare Island. This species is viewed by NJDEP as a "species of special concern," due to their declining population in New Jersey. Alternatives 3A, 3B, 3E, 3F and 3G would not involve impacts to Thorofare Island, and are therefore not likely to impact the common tern nesting colony. Alternatives 3C and 3D would both result in impacts to Thorofare Island, and may deter the common tern from continuing to nest in this location.

Under any of the seven alternatives, the proposed project is expected to result in the complete removal of the existing bridges over the tidal waters of Mill Creek, Upper Thorofare and Middle Thorofare. The bridges will be replaced with new structures. These tidal channels connect the Atlantic Ocean, via Cape May Harbor, to the expansive marshes within the MWMA. These tidal waters are important finfish migratory pathways while the tidal marshes are important spawning and nursery grounds.

The removal and replacement of piers associated with bridge construction will cause siltation and turbidity during construction phases only. Plumes of silt and turbidity are expected to be localized, and extremely temporary and are not expected to impede fish migration. NMFS would need to review the proposed alternatives to determine if essential fish habitat (EFH) could be impacted by the project. Activities that could create turbidity in EFH areas may be subject to timing restrictions, to prevent impacts to spawning. Of particular concern to NMFS are potential impacts to spawning winter flounder, the presence of which could result in timing restrictions being placed on work in the water between January 1 through May 31 (A. Riportella, pers. conversation, 8/27/02). Timing restrictions may also be imposed to prohibit construction during peak spawning periods for other fish, which would typically be the period, April 1 through June 30.

Diamondback terrapins may occasionally nest in the roadside embankments such as those found along Ocean Drive. However, the road embankment is sloped and terrapins are reported not to nest on slopes greater than 25%. The terrapins also avoid nesting in areas with dense vegetation since a root mat prohibits nest excavation. Under any of the seven proposed alternatives, the roadside embankments will be steeply sloped, or a retaining wall may be constructed, and will be vegetated immediately following the completion of construction. These factors should prohibit terrapin nesting behavior. Based on the proposed project designs, impacts to terrapin nesting or migration are not expected under any of the seven alternatives.

F. Section 4f / Parklands

The U.S. Department of Transportation Act of 1966 sets forth requirements for Federally-funded transportation projects that require the "use" of publicly-owned land from a public park, recreation area or wildlife / waterfowl refuge, or land from an historic site of national, state or local significance. These lands are known as Section 4(f) lands. A "use" can be either a direct taking of the lands, an indirect impact created by the proximity of the project to the lands (called a "constructive use"), or a temporary occupancy.

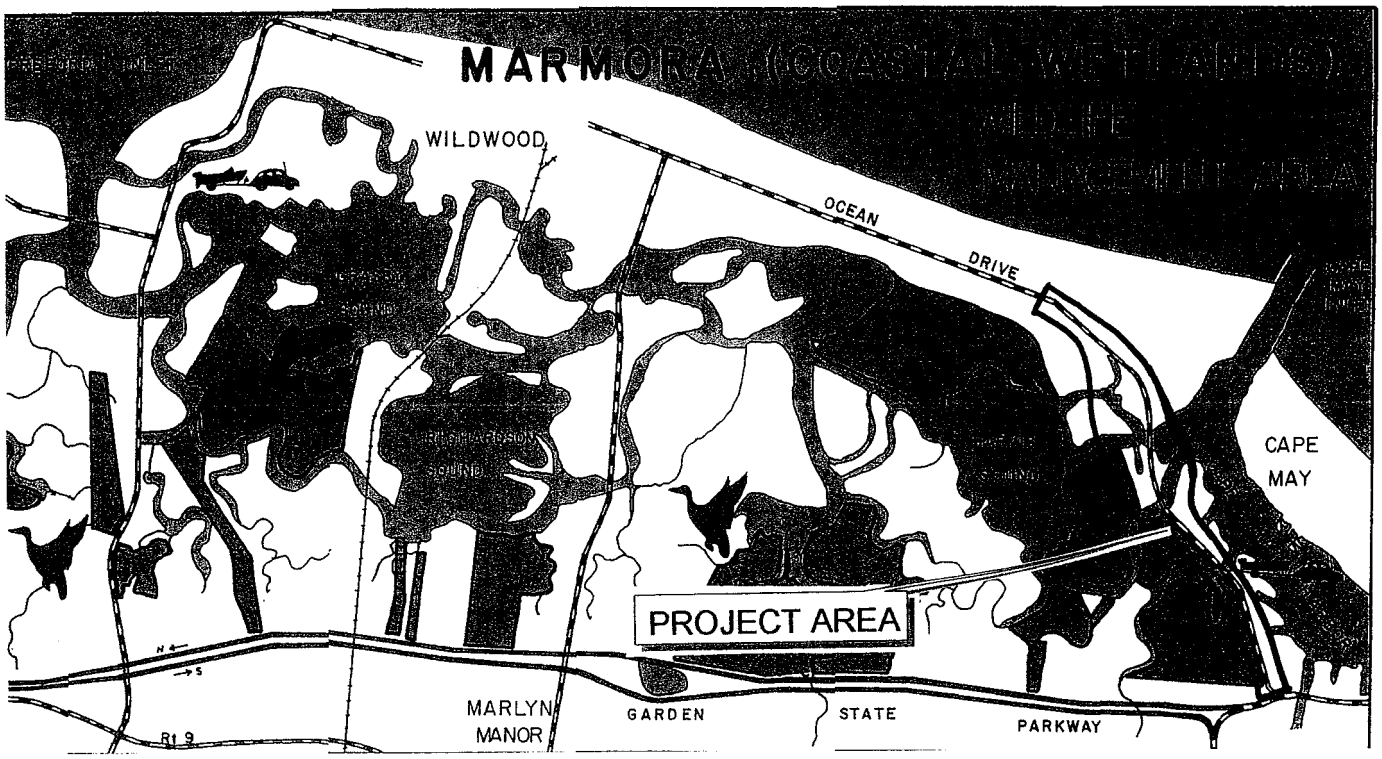
As a wildlife management area, The MWMA would be considered to be a 4(f) resource. A Section 4(f) review would be necessary to obtain approval to utilize such lands for the project. The evaluation of historic resources is beyond the scope of this report.

The general location of the MWMA are defined in the "Guide to New Jersey's Wildlife Management Areas" (NJDEP, 1987, updated 1997) (Figure 13). Review of a municipal tax map and deeds are necessary to determine the exact property boundaries.

Based on the preliminary design, Alternatives 3A, 3B, 3F and 3G do not directly impact the lands of the MWMA. The portions of the MWMA immediately adjacent to Ocean Drive are already subject to the disturbance associated with the roadway. Therefore, it is not expected that expansion of the roadway under these alternatives would constitute a "constructive use".

Alternatives 3C, 3D, and 3E would directly impact the lands of the MWMA, Alternative 3D to a greater extent. Under the U.S. Department of Transportation Act of 1966, a Section 4(f) review would be necessary to obtain approval to utilize these lands for the project. The Section 4(f) review requires that alternatives be evaluated to determine if the project could be constructed without impact to the 4(f) resource. If a feasible alternative exists that would not impact the resource, then it must be selected.

As Green Acres Funds were used to obtain some of the lands of the MWMA, approval from the Statehouse Commission would also be necessary before these lands could be utilized for the project.



SOURCE: NJDEP, Division of Fish Game and Wildlife, Guide to New Jersey's Wildlife Management Areas, 1992.

Not To Scale

FIGURE 13
LIMITS OF MARMORA WILDLIFE MANAGEMENT AREA IN THE PROJECT AREA

Ocean Drive Upgrade &
Bridge Replacement
Route 109 to Wildwood Crest
Lower Twp. & Wildwood Crest Borough
Cape May County, New Jersey
ASGECI Project #1807

AMY S. GREENE
ENVIRONMENTAL CONSULTANTS, INC.

V. PERMITS, APPROVALS AND CONDITIONS

This section identifies potential resource protection permits and approvals that may be required for project implementation (Table 4). Table 4 also identifies consultations that will likely be required. Preliminary consultations on impacts to endangered, threatened or rare species or EFH have been requested from many of the governing agencies (i.e., NJNHP, USFWS, NMFS), as discussed herein. These agencies should continue to be consulted throughout the alternative selection process, and during the design phase once an alternative has been selected.

The type of permits and consultations required will depend on the chosen alternative, but would be similar for each of the seven alternatives. The following approvals / consultations may be required:

Table 4
Permits and Approvals Required

Act	Agency	Approval
National Environmental Policy Act	FHWA	Categorical Exclusion confirmation or Environmental Assessment; Section 4(f) evaluation and approval
NJ Waterfront Development Act	NJDEP	Waterfront Development Permit
NJ Wetlands Act of 1970	NJDEP	Tidal Wetlands Permit
Clean Water Act	NJDEP	Section 401 Water Quality Certification
Clean Water Act	USACOE	Section 404 Permit
Rivers and Harbors Act	USACOE and USCG	Section 9 and Section 10 Permits
Historic Preservation Act	NJDEP SHPO	Section 106 consultation for historic resources
Magnuson-Stevens Fishery Conservation and Management Act	NMFS	Endangered Marine Species and Essential Fish Habitat consultation

A preapplication conference with the regulatory agencies was conducted on November 13, 2002 to introduce the proposed project. The meeting minutes are included in Appendix B.

VI. REFERENCES

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Evans, W. Undated. Avian Mortality at Communications Towers – Presentation #5. Application of Avian Night Flight Call Monitoring for Towerkill Mitigation. US Fish and Wildlife Service – sponsor. http://migratorybirds.fws.gov/issues/towers

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APPENDIX A – CORRESPONDENCE

New Jersey Natural Heritage, response letter dated March 8, 2002

US Fish and Wildlife Service, response letter dated May 6, 2002

Cape May Bird Observatory, response letter dated April 8, 2002

National Marine Fisheries Service, response letter dated June 20, 2002

US Fish and Wildlife Service, response letter dated April 14, 2003.

NJ Natural Heritage Priority Site Map and Description – Two Mile Beach

Conversation logs with the following parties:

Anita Riportella, NOAA, National Marine Fisheries, December 16, 1999
Jeff Normandt, NJDEP Bureau of Shellfisheries, January 20, 2000
David Jenkins, NJDEP Endangered and Nongame Species Program, January 31, 2000
David Jenkins, NJDEP Endangered and Nongame Species Program, February 8, 2000
Gail Moore, NJDEP, Land Use Regulation Program, March 21, 2000
Mike Celestino, NJDEP, Bureau of Shellfisheries, June 5, 2000
Bob MacBride, Middle Thorofare Bridge Tender, June 30, 2000
Dave Jenkins, NJDEP Endangered and Nongame Species Program, August 23, 2002
Anita Riportella, NOAA, National Marine Fisheries, August 27, 2003

James E. McGreevey
Governor

State of New Jersey

Department of Environmental Protection
Division of Parks and Forestry
Office of Natural Lands Management
Natural Heritage Program
P.O. Box 404
Trenton, NJ 08625-0404
Tel. #609-984-1339
Fax. #609-984-1427

Bradley M. Campbell
Commissioner

March 8, 2002

RECEIVED
MAR 11 2002
AMY S. GREENE
ENVIRONMENTAL CONSULTANTS, INC.

Sean J. Ronan
Amy S. Greene Environmental Consultants, Inc.
18 Commerce Street Plaza
Flemington, NJ 08822

Re: ASGECI Project #1807, Mill Creek

Dear Mr. Ronan:

Thank you for your data request regarding rare species information for the above referenced project site in Lower Township, Cape May County.

The Natural Heritage Data Base has records for occurrences of snowy egret, black-crowned night-heron, yellow-crowned night-heron, glossy ibis, common tern, coastal heron rookery and migratory raptor concentration site that may be on the site, and for red knot, piping plover, osprey, black skimmer, least tern, common tern, barred owl, and three rare plants that may be in the immediate vicinity of the site. The attached lists provide more information about these occurrences. **Because some species are sensitive to disturbance or sought by collectors, this information is provided to you on the condition that no specific locational data are released to the general public. This is not intended to preclude your submission of this information to regulatory agencies from which you are seeking permits.**

The Natural Heritage Data Base has records for occurrences of rare species and natural communities that may be present on the Cape May and Wildwood USGS quadrangles. The attached lists provide additional information about these occurrences. Also attached is a list of rare species and natural communities that have been documented from Cape May County. This county list can be used as a master species list for directing further inventory work. If suitable habitat is present at the project site, these species have potential to be present. If you have questions concerning the wildlife records or wildlife species mentioned in this response, we recommend you contact the Division of Fish and Wildlife, Endangered and Nongame Species Program.

The Natural Heritage Program reviews its data periodically to identify priority sites for natural diversity in the State. Included as priority sites are some of the State's best habitats for rare and endangered species and natural communities. Three of these sites are located within or near the areas you have outlined. Please refer to the enclosed Natural Heritage Priority Site Maps for the locations and boundaries of these sites. On the back of each Priority Site Map is a report describing the significance of the site. You may find the site biodiversity significance rating to be useful if you need to prioritize among the sites in your environmental assessment.

In order to red flag the general locations of documented occurrences of rare and endangered species and natural communities, we have prepared computer generated Natural Heritage Index Maps. Enclosed please find these maps for the Cape May and Wildwood USGS quadrangles. If individual projects are to be located in the areas of these maps that contain letter codes, the Natural Heritage Program can be contacted for additional information.

PLEASE SEE THE ATTACHED 'CAUTIONS AND RESTRICTIONS ON NHP DATA'.

Thank you for consulting the Natural Heritage Program. The attached invoice details the payment due for processing this data request. Feel free to contact us again regarding any future data requests.

Sincerely,

Herbert A. Lord

Herbert A. Lord
Data Request Specialist

cc: Thomas F. Breden
Lawrence Niles
NHP File No. 02-3807488

CAUTIONS AND RESTRICTIONS ON NATURAL HERITAGE DATA

The quantity and quality of data collected by the Natural Heritage Program is dependent on the research and observations of many individuals and organizations. Not all of this information is the result of comprehensive or site-specific field surveys. Some natural areas in New Jersey have never been thoroughly surveyed. As a result, new locations for plant and animal species are continuously added to the data base. Since data acquisition is a dynamic, ongoing process, the Natural Heritage Program cannot provide a definitive statement on the presence, absence, or condition of biological elements in any part of New Jersey. Information supplied by the Natural Heritage Program summarizes existing data known to the program at the time of the request regarding the biological elements or locations in question. They should never be regarded as final statements on the elements or areas being considered, nor should they be substituted for on-site surveys required for environmental assessments. The attached data is provided as one source of information to assist others in the preservation of natural diversity.

This office cannot provide a letter of interpretation or a statement addressing the classification of wetlands as defined by the Freshwater Wetlands Act. Requests for such determination should be sent to the DEP Land Use Regulation Program, P.O. Box 401, Trenton, NJ 08625-0401.

This cautions and restrictions notice must be included whenever information provided by the Natural Heritage Database is published.

POSSIBLY ON PROJECT SITE
RARE SPECIES AND NATURAL COMMUNITIES PRESENTLY RECORDED IN
THE NEW JERSEY NATURAL HERITAGE DATABASE

NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	REGIONAL STATUS	GRANK	SRANK	DATE OBSERVED	IDENT.
*** Vertebrates								
EGRETTA THULA	SNOWY EGRET		S/S		G5	S3B,S4N	1983-06-??	Y
NYCTANASSA VIOLACEA	YELLOW-CROWNED NIGHT-HERON		T/T		G5	S2B	1983-06-07	Y
NYCTICORAX NYCTICORAX	BLACK-CROWNED NIGHT-HERON		T/S		G5	S3B,S4N	1983-06-??	Y
PLEGADIS FALCINELLUS	GLOSSY IBIS		D/S		G5	S3B,S4N	1983-06-??	Y
STERNA HIRUNDO	COMMON TERN		D/S		G5	S3B	1985-06-??	Y
*** Other types								
COASTAL HERON ROOKERY	COASTAL HERON ROOKERY				GU	S3	1983-06-??	Y
MIGRATORY RAPTOR CONCENTRATION SITE	MIGRATORY RAPTOR CONCENTRATION SITE				G?	S1	2000-??-??	Y

Records Processed

IMMEDIATE VICINITY OF PROJECT SITE
RARE SPECIES AND NATURAL COMMUNITIES PRESENTLY RECORDED IN
THE NEW JERSEY NATURAL HERITAGE DATABASE

NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	REGIONAL STATUS	GRANK	SRANK	DATE OBSERVED	IDENT.
*** Vertebrates								
CALIDRIS CANUTUS	RED KNOT		T		G5	S3N	1998-??-??	Y
CHARADRIUS MELODUS	PIPING PLOVER	LT	E		G3	S1B	1996-06-??	Y
PANDION HALIAETUS	OSPREY		T/T		G5	S2B	1987-06-??	Y
RYNCHOPS NIGER	BLACK SKIMMER		E		G5	S1B	1986-??-??	Y
RYNCHOPS NIGER	BLACK SKIMMER		E		G5	S1B	1976-??-??	Y
STERNA ANTILLARUM	LEAST TERN		E		G4	S1B	1988-SUMMR	Y
STERNA HIRUNDO	COMMON TERN		D/S		G5	S3B	1985-06-??	Y
STRIX VARIA	BARRED OWL		T/T		G5	S3B	1991-01-17	Y

07 MAR 2002

IMMEDIATE VICINITY OF PROJECT SITE
RARE SPECIES AND NATURAL COMMUNITIES PRESENTLY RECORDED IN
THE NEW JERSEY NATURAL HERITAGE DATABASE

NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	REGIONAL STATUS	GRANK	SRANK	DATE OBSERVED	IDENT.
*** Vascular plants								
CUSCUTA POLYGONORUM	SMARTWEED DODDER				G5	S2	1993-10-15	Y
DIODIA VIRGINIANA	LARGER BUTTONWEED		E		G5T5	S1	1986-08-23	Y
HYDROCOTYLE VERTICILLATA VAR VERTICILLATA	WHORLED MARSH-PENNYWORT				G5T5	S2	1993-10-15	Y

11 Records Processed

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New Jersey Field Office
Ecological Services
927 North Main Street, Building D
Pleasantville, New Jersey 08232
Tel: 609/646 9310
Fax: 609/646 0352
http://njfieldoffice.fws.gov

In Reply Refer to:

ES-02/192

MAY 6 2002

RECEIVED
MAY 7 - 2002
AMY S. GREENE
ENVIRONMENTAL CONSULTANTS INC.

Elizabeth Chudy, Wetland Ecologist
Amy S. Greene Environmental Consultants, Inc.
18 Commerce Street Plaza
Flemington, New Jersey 08822-1743

Dear Ms. Chudy:

This responds to your March 19, 2002 request to the U.S. Fish and Wildlife Service (Service) for information on the presence of federally listed endangered and threatened species within the vicinity of the proposed improvements to Ocean Drive (County Route 621) (ASGECI Project #1807) located in Lower Township and Wildwood Crest Borough, Cape May County, New Jersey.

AUTHORITY

This response is provided pursuant to Section 7 of the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) (ESA) to ensure the protection of federally listed endangered and threatened species. These comments do not address all Service concerns for fish and wildlife resources and do not preclude separate review and comments by the Service pursuant to the December 22, 1993 Memorandum of Agreement among the U.S. Environmental Protection Agency, New Jersey Department of Environmental Protection (NJDEP), and the Service, if project implementation requires a permit from the NJDEP pursuant to the New Jersey Freshwater Wetlands Protection Act (N.J.S.A. 13:9B *et seq.*), or comments by the Service as afforded by the Fish and Wildlife Coordination Act (48 Stat. 401; 16 U.S.C. 661 *et seq.*), if project implementation requires a permit from the U.S. Army Corps of Engineers pursuant to the Clean Water Act of 1977 (33 U.S.C. 1344 *et seq.*); nor do they preclude comments on any forthcoming environmental documents pursuant to the National Environmental Policy Act of 1969 as amended (83 Stat. 852; 42 U.S.C. 4321 *et seq.*).

FEDERALLY LISTED SPECIES

Except for an occasional transient bald eagle (*Haliaeetus leucocephalus*), no other federally listed or proposed endangered or threatened flora or fauna under Service jurisdiction are known to occur within the vicinity of the proposed project site. Therefore, no further consultation

pursuant to Section 7 of the ESA is required by the Service. If additional information on federally listed species becomes available, or if project plans change, this determination may be reconsidered.

Current information regarding federally listed and candidate species occurring in New Jersey is enclosed, as well as addresses of State agencies that may be contacted for current site-specific information regarding federal candidate and State-listed species. The Service encourages federal agencies and other planners to consider federal candidate species in project planning. Information is also enclosed regarding permit requirements for activities in wetlands.

STATE-LISTED SPECIES

The NJDEP's Landscape Maps show foraging habitat on the project site for the State-listed (endangered) black skimmer (*Rynchops niger*) and least tern (*Sterna antillarum*); for the State-listed (threatened) black-crowned night heron (*Nycticorax nycticorax*), yellow-crowned night heron (*Nyctanasa violaceus*), and osprey (*Pandion haliaetus*); and for other colonial waterbirds and raptors. Please contact the NJDEP's Endangered and Nongame Species Program (address enclosed) for recommendations to avoid adverse effects to these species from project implementation.

Please contact Wendy Walsh of my staff at (609) 646-9310, extension 48 if you have any questions about the enclosed material or require further assistance regarding federally listed endangered or threatened species.

Sincerely,

John C. Staples
Assistant Supervisor

Enclosures

FEDERALLY LISTED ENDANGERED AND THREATENED SPECIES IN NEW JERSEY

An **ENDANGERED** species is any species that is in danger of extinction throughout all or a significant portion of its range.

A **THREATENED** species is any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

	COMMON NAME	SCIENTIFIC NAME	STATUS
FISHES	**Shortnose sturgeon***	*Acipenser brevirostrum*	E
REPTILES	**Bog turtle**	*Clemmys muhlenbergii*	T
	Atlantic Ridley turtle*	*Lepidochelys kempii*	E
	Green turtle*	*Chelonia mydas*	T
	Hawksbill turtle*	*Eretmochelys imbricata*	E
	Leatherback turtle*	*Dermochelys coriacea*	E
	Loggerhead turtle*	*Caretta caretta*	T
BIRDS	**Bald eagle**	*Haliaeetus leucocephalus*	T
	Piping plover	*Charadrius melodus*	T
	Roseate tern	*Sterna dougallii dougallii*	E
MAMMALS	**Eastern cougar**	*Felis concolor couguar*	E+
	Indiana bat	*Myotis sodalis*	E
	Gray wolf	*Canis lupus*	E+
	Delmarva fox squirrel	*Sciurus niger cinereus*	E+
	Blue whale*	*Balaenoptera musculus*	E
	Finback whale*	*Balaenoptera physalus*	E
	Humpback whale*	*Megaptera novaeangliae*	E
	Right whale*	*Balaena glacialis*	E
	Sei whale*	*Balaenoptera borealis*	E
	Sperm whale*	*Physeter macrocephalus*	E

FEDERAL CANDIDATE SPECIES IN NEW JERSEY

CANDIDATE SPECIES are species that appear to warrant consideration for addition to the federal List of Endangered and Threatened Wildlife and Plants. Although these species receive no substantive or procedural protection under the Endangered Species Act, the U.S. Fish and Wildlife Service encourages federal agencies and other planners to give consideration to these species in the environmental planning process.

SPECIES	SCIENTIFIC NAME
Bog asphodel	*Narthecium americanum*
Hirst's panic grass	*Panicum hirstii*

Note: For complete listings of taxa under review as candidate species, refer to Federal Register Vol. 64, No. 205, October 25, 1999 (Endangered and Threatened Wildlife and Plants; Review of Plant and Animal Taxa that are Candidates for Listing as Endangered or Threatened Species).

Revised 11/99

FEDERAL CANDIDATE AND STATE-LISTED SPECIES

Candidate species are species under consideration by the U.S. Fish and Wildlife Service (Service) for possible inclusion on the List of Endangered and Threatened Wildlife and Plants. Although these species receive no substantive or procedural protection under the Endangered Species Act, the Service encourages federal agencies and other planners to consider federal candidate species in project planning.

The New Jersey Natural Heritage Program maintains the most up-to-date information on federal candidate species and State-listed species in New Jersey and may be contacted at the following address:

Mr. Thomas Breden
Natural Heritage Program
Division of Parks and Forestry
P.O. Box 404
Trenton, New Jersey 08625
(609) 984-0097

Additionally, information on New Jersey's State-listed wildlife species may be obtained from the following office:

Dr. Larry Niles
Endangered and Nongame Species Program
Division of Fish and Wildlife
P.O. Box 400
Trenton, New Jersey 08625
(609) 292-9400

If information from either of the aforementioned sources reveals the presence of any federal candidate species within a project area, the Service should be contacted to ensure that these species are not adversely affected by project activities.

Revised 08/00

PERMIT REQUIREMENTS FOR ACTIVITIES IN WETLANDS

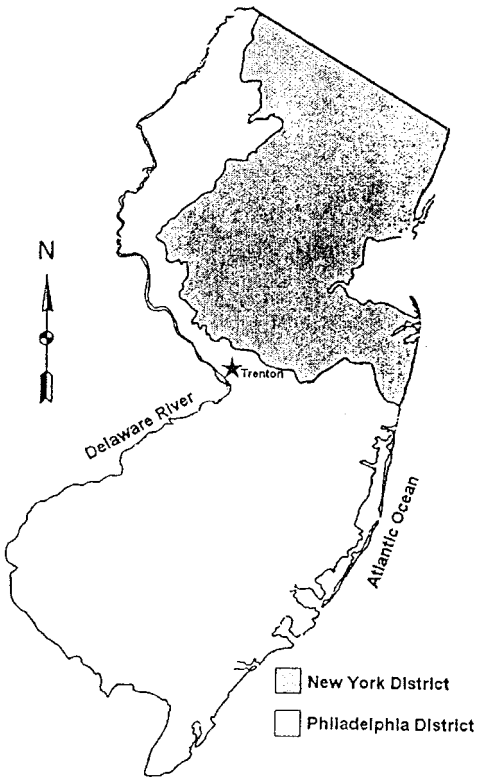
A review of the Service's National Wetland Inventory maps indicates that wetlands occur within the project area. Wetlands provide habitats for a variety of migratory and resident species of fish and wildlife. Thus, the Service discourages activities in and affecting the Nation's wetlands that would unnecessarily damage, degrade, or destroy the values associated with them. Project activities in wetlands may require federal and State permits from the U.S. Army Corps of Engineers pursuant to the Clean Water Act of 1977 (33 U.S.C. 1344 *et seq.*), and the New Jersey Department of Environmental Protection and Energy pursuant to the Freshwater Wetlands Protection Act (N.J.S.A. 13:9B-1 *et seq.*). Thus, if work is proposed in wetlands, the following offices must be contacted to determine federal and State permit requirements, respectively:

Federal Permitting Authority:

Regulatory Branch
U.S. Army Corps of Engineers
New York District
26 Federal Plaza
New York, New York 10278-0090
(212) 264-3996
Fax #: (212) 264-4260

or

Regulatory Branch
U.S. Army Corps of Engineers
Philadelphia District
100 Penn Square East
Philadelphia, Pennsylvania 19107-3390
(215) 656-6725
Fax #: (215) 656-6724



State Permitting Authority:

Land Use Regulation Program
Department of Environmental Protection and Energy
CN 401
Trenton, New Jersey 08625-0401
(609) 292-1235
Fax #: Northern Counties (609-292-1231); Southern Counties (609-292-8115)

BEACH → file 1807

NEW JERSEY AUDUBON SOCIETY
Cape May Bird Observatory

RECEIVED
APR 8 - 2002
AMY S. GREENE
ENVIRONMENTAL CONSULTANTS INC.

April 5, 2002

Elizabeth Chudy
Amy S. Greene Environmental Consultants, Inc.
18 Commerce Street Plaza
Flemington, N. J., 08822-1743

Thank you for your interest in the New Jersey Breeding Bird Atlas data. Enclosed are the printouts for the area requested. Please be advised this information is given to you, and only to you, for use on the stated projects. If you or anyone else needs any other information on this or other blocks, please call me and I will be happy to provide it. A note of caution when using this data; this data is a survey of the species found in the block. If a species was not found, it does not mean the species is not there. This is especially important to consider when evaluating the distribution of rare, Threatened, or Endangered Species, or those species that are difficult to detect. Highlighted species indicate Threatened & Endangered species.

The data collected represent five years of field work where observers evaluate the likely hood of breeding species by behaviors seen. The evidence is blocked into Possible, Probable and Confirmed breeding. For most species, even the lowest codes indicate a strong likely hood of breeding.

If you have questions, please call me. Good luck with this project.

Cheers,

Vince Elia
Research Associate

Center for Research and Education • 600 Route 47 North • Cape May Court House, NJ 08210 USA • Telephone: 609/861-0700 • Fax: 609/861-1651
Northwood Center • 701 East Lake Drive • P.O. Box 3 • Cape May Point, NJ 08212 USA • Telephone: 609/884-2736 • Fax: 609/884-6052
Birding Hotline: 609/861-0466
RECYCLED PAPER

Block 178 / Wildwood Quad
Ocean Drive Improvements

Species	Status	Year
Green Heron	X	93
Black-crwnd Night-Heron	X	93
American Black Duck	FL	93
Mallard	FL	93
Gadwall	X	94
Osprey	NE	93
Clapper Rail	FL	93
Piping Plover	NE	0
Killdeer	NY	93
Willet	NE	93
Common Tern	P	93
Forster's Tern	P	93
Least Tern	NE	93
Rock Dove	NB	94
Mourning Dove	P	93
Barred Owl	P	95
Willow Flycatcher	UN	94
Great Crested Flycatcher	P	93
Eastern Kingbird	X	93
Purple Martin	ON	93
Tree Swallow	FL	93
N. Rough-winged Swallow	X	93
Barn Swallow	X	93
Blue Jay	X	93
Fish Crow	FY	93
American Robin	FY	93
Gray Catbird	FY	93
Northern Mockingbird	T	93
Brown Thrasher	FY	93
European Starling	FY	93
Yellow Warbler	FY	93
Common Yellowthroat	A	93
Northern Cardinal	P	93
Blue Grosbeak	X	94
Sharp-tailed Sparrow	P	93
Seaside Sparrow	FY	93
Song Sparrow	FY	93
Red-winged Blackbird	FY	93
Boat-tailed Grackle	FL	93
Common Grackle	FL	93
House Finch	C	93
American Goldfinch	X	93
House Sparrow	FY	93
Total Species	43	

LEGEND:
NJ State Plane Coordinates at the approximate center of site:

North: x
East: x

SOURCE:
Monochromatic Bit-Mapped 7.5 Minute Topographic Images of New Jersey, Gregory C. Herman and Maryann C. Scott, N.J. Geological Survey Digital Geodata Series DGS99-1, May 27, 1999, derived from USGS 7.5 Minute Digital Raster Graphic (DRG) Topographic Series Map, xxxx N.J. Quadrangle.

0 2000'

FIGURE 3
USGS TOPOGRAPHIC MAP

Block xxx: Lot xxx
Township of xxx
Cape May County, New Jersey
Lower Twp. and Wildwood Crest

ASGECI Project #xxxx

AMY S. GREENE
ENVIRONMENTAL CONSULTANTS, INC.

1807

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northeast Fisheries Science Center
James J. Howard Marine Sciences Laboratory
74 Magruder Road
Highlands, New Jersey 07732

TO: Thomas Bosakowski
Amy S. Greene
Flemington NJ

DATE: 6/20/02

SUBJECT: Ocean Drive (La 621)
Lower Twp. Fairlawn Woodlands
ASGECI # 1807

Anita Riportella
Anita Riportella
(Reviewing Biologist)

We have reviewed the information provided to us regarding the above subject project. We offer the following preliminary comments pursuant to the Endangered Species Act, the Fish and Wildlife Coordination Act and the Magnuson-Stevens Fishery Conservation and Management Act: more information needed, ESA + EFH consultations necessary

Endangered and Threatened Species

___ There are no endangered or threatened species in the project area.

X The following endangered or threatened species may be present in the project area:

___ shortnose sturgeon (*Acipenser brevirostrum*)

Sea turtles: ___ loggerhead (*Caretta caretta*) ___ Kemp's ridley (*Lepidochelys kempii*)
___ green (*Chelonia mydas*) ___ leatherback (*Dermochelys coriacea*)

DEPENDING UPON PROJECT DETAILS, POSSIBLE RECOMMENDATIONS MAY INCLUDE:

Anadromous Fishes

___ The following may be present in the project area:

___ blueback herring (*Alosa aestivalis*) ___ alewife (*Alosa pseudoharengus*)
___ striped bass (*Morone saxatilis*) ___ American shad (*Alosa sapidissima*)

DEPENDING UPON THE PROJECT DETAILS POSSIBLE RECOMMENDATIONS INCLUDE:

Essential Fish Habitat

X The project area has been designated as Essential Fish Habitat (EFH) for one or more species. When detail of the project are made available and permit applications have been made, conservation recommendations may be given. For a listing of EFH and further information, please go to our website at:

http://www.nero.nmfs.gov/ro/doc/webintro.html.
-If you wish to discuss this further, please call 732-872-3116-

#1807

Summary of Essential Fish Habitat (EFH) Designation

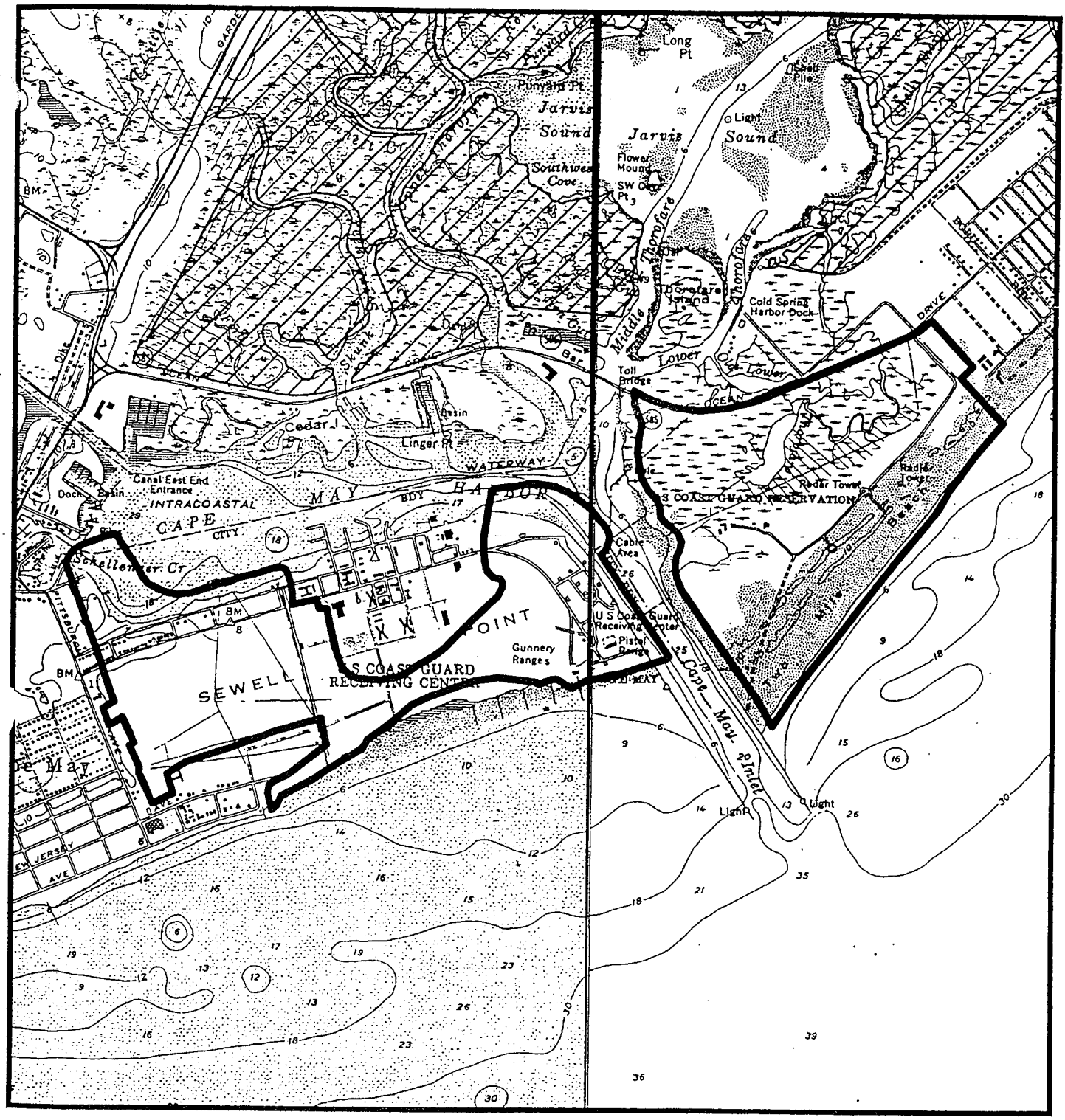
10' x 10' Square Coordinates: for Cape May

Boundary	North	East	South	West
Coordinate	39° 00.0' N	74° 50.0' W	38° 50.0' N	75° 00.0' W

Square Description (i.e. habitat, landmarks, coastline markers): Waters within the square within the Atlantic Ocean surrounding Cape May, N.J., from east of Wildwood Crest, NJ., south around the tip past Cape May Inlet, Sewell Pt., Cape May, NJ., Cape May Pt., Cape May Canal, up to just north of North Cape May, NJ. The waters within this square affect THE New Jersey Inland Bay estuary and the following as well: Overfalls Shoal, Eph Shoal, McCrie Shoal, Prissy Wicks Shoal, Middle Shoal, North Shoal, Cape May Channel, Bay Shore Channel, Cape May Harbor, Skunk Sound, Cape Island Creek, Middle Thorofare, Jarvis Sound, Jones Creek, Swain Channel, Taylor Sound, Sunset Lake, and Richardson Channel. The waters on the northwest corner of the square, just south and just west of the tip of the cape, are found within the salt water salinity zone of the Delaware Bay estuary.

Species	Eggs	Larvae	Juveniles	Adults
Atlantic cod *(Gadus morhua)*				X
haddock *(Melanogrammus aeglefinus)*				
pollock *(Pollachius virens)*				
whiting *(Merluccius bilinearis)*				
red hake *(Urophycis chuss)*	X	X	X	
white hake *(Urophycis tenuis)*				
redfish *(Sebastes fasciatus)*	n/a			
witch flounder *(Glyptocephalus cynoglossus)*				
winter flounder *(Pleuronectes americanus)*	X	X	X	X
yellowtail flounder *(Pleuronectes ferruginea)*				
windowpane flounder *(Scopthalmus aquosus)*	X	X	X	X
American plaice *(Hippoglossoides platessoides)*				
ocean pout *(Macrozoarces americanus)*				
Atlantic sea scallop *(Placopecten magellanicus)*				
Atlantic sea herring *(Clupea harengus)*			X	X
monkfish *(Lophius americanus)*	X	X		
bluefish *(Pomatomus saltatrix)*			X	X
long finned squid *(Loligo pealei)*	n/a	n/a		
Atlantic butterfish *(Peprilus triacanthus)*		X	X	X

Atlantic mackerel *(Scomber scombrus)*				
summer flounder *(Paralicthys dentatus)*		X	X	X
scup *(Stenotomus chrysops)*	n/a	n/a	X	X
black sea bass *(Centropristus striata)*	n/a		X	X
surf clam *(Spisula solidissima)*	n/a	n/a		
ocean quahog *(Artica islandica)*	n/a	n/a		
spiny dogfish *(Squalus acanthias)*	n/a	n/a		
tilefish *(Lopholatilus chamaeleonticeps)*				
king mackerel *(Scomberomorus cavalla)*	X	X	X	X
Spanish mackerel *(Scomberomorus maculatus)*	X	X	X	X
cobia *(Rachycentron canadum)*	X	X	X	X
sand tiger shark *(Odontaspis taurus)*		X		X
Atlantic angel shark *(Squatina dumerili)*		X	X	X
Atl. sharpnose shark *(Rhizoprionodon terraenovae)*				X
dusky shark *(Charcharinus obscurus)*		X		
sandbar shark *(Charcharinus plumbeus)*		X	X	X
sandbar shark *(Charcharinus plumbeus)*		HAPC	HAPC	HAPC
tiger shark *(Galeocerdo cuvieri)*		X		
scalloped hammerhead shark *(Sphyrna lewini)*			X	



Natural Heritage Priority Site

Two Mile Beach Site

Cape May County

NJ Department of Environmental Protection
Division of Parks and Forestry
Natural Lands Management

0.3 0 0.3 Miles

Priority Site
Public Land

N
W E
S

Natural Heritage Priority Site
Two Mile Beach Site

Locational Information

Quad Name: Wildwood ; Cape May
County: Cape May
Municipality: Lower Twp ; Cape May City

Description of Site

This site is on parts of two adjacent barrier islands (Cape May and Wildwood) on the Atlantic Ocean side of Cape May peninsula. Communities include marine intertidal sand beach, coastal dune grass, coastal dune shrubland, coastal dune forest, and salt marsh.

Boundary Justification

Primary bounds are drawn to include beach and dune habitat used by State Endangered birds, and rare coastal dune grass, coastal dune shrubland and coastal dune forest communities. Secondary bounds include adjacent salt marsh and disturbed but undeveloped portions of the US Coast Guard Station - Cape May Unit.

Biodiversity Rank B2

Contains good and excellent populations of a globally rare State Endangered bird species, and additional occurrences of State Endangered and Threatened birds. Contains fair to good (but small) examples of rare coastal dune grass, coastal dune shrubland and coastal dune forest communities.

1807 20020 6.0 c/f, 6.2 c/14
cc: TAF, JEM, SB, MAS
C. Kim
ASGE(1

United States Department of the Interior

FISH AND WILDLIFE SERVICE

RECEIVED
APR 23 2003
AMY S. GREENE
ENVIRONMENTAL CONSULTANTS INC.
APR 15 2003

APR 14 2003

In Reply Refer to:

ES-03/186

New Jersey Field Office
Ecological Services
927 North Main Street, Building D
Pleasantville, New Jersey 08232
Tel: 609/646 9310
Fax: 609/646 0352
http://njfieldoffice.fws.gov

Steven Balzano, Principal Environmental Scientist
Parsons Brinckerhoff
506 Carnegie Center
Princeton, New Jersey 08540-6243

Dear Mr. Balzano:

As requested in your March 6, 2003 letter, the U.S. Fish and Wildlife Service (Service) has reviewed your request for information regarding: (1) potential adverse impacts to migratory birds as a result of the proposed bridge replacement across Middle Thorofare; and (2) measures that could be taken to avoid or minimize adverse impacts to migratory birds. You have also requested updated information on the presence of federally listed species. The proposed project site is located along Ocean Drive (County Road 621), from Route 109 to the Borough of Wildwood Crest, Lower Township, Cape May County, New Jersey. The applicant is proposing to replace the existing movable bridge with a fixed bridge. The preferred alternative is a Cable Stayed design consisting of an 860-foot horizontal span across Middle Thorofare adjoined by two 370-foot approach spans, with a minimum 116-foot vertical clearance for boats. The total height of the structure would be 300 feet. The Service provided information on the presence of federally listed species on May 6, 2002 (ES-02/192) and attended the pre-application discussion at the November 13, 2002 interagency Joint Permit Processing meeting.

AUTHORITY

This response is pursuant to the Migratory Bird Treaty Act (40 Stat. 755 as amended; 16 U.S.C. 703-712), and Section 7 of the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) to ensure the protection of federally listed endangered and threatened species. Additional comments are provided as technical assistance. These comments do not preclude separate review and comments by the Service as afforded by the Fish and Wildlife Coordination Act (48 Stat. 401; 16 U.S.C. 661 *et seq.*), if an individual permit is required from the U.S. Army Corps of Engineers (Corps) pursuant to the Clean Water Act of 1977 (33 U.S.C. 1344 *et seq.*), or comments pursuant to the December 22, 1993 Memorandum of Agreement among the U.S. Environmental Protection Agency, New Jersey Department of Environmental Protection, and the Service, if project implementation requires a permit from the New Jersey Department of Environmental Protection pursuant to the New Jersey Freshwater

Wetlands Protection Act (N.J.S.A. 13:9B *et seq.*), nor do they preclude comments on any forthcoming environmental documents pursuant to the National Environmental Policy Act of 1969 as amended (83 Stat. 852; 42 U.S.C. 4321 *et seq.*) (NEPA).

FEDERALLY LISTED SPECIES

Except for an occasional transient bald eagle (*Haliaeetus leucocephalus*), no other federally listed or proposed threatened or endangered flora or fauna are known to occur within the vicinity of the project site, including the southern alignment alternatives (3F and 3G). If additional information on federally listed endangered or threatened species becomes available, this determination may be reconsidered.

SERVICE REVIEW

Migratory Birds

Migratory birds are a federal trust responsibility. Native migratory birds are afforded protection under the Migratory Bird Treaty Act. Atlantic coastal areas are considered an important migratory bird corridor. The Service shares your concern that the proposed cable stayed structure (alternative 3G) may constitute a collision risk to migratory birds and has prepared the following list of migratory bird species that may be adversely affected by the proposed project, according to information from Rowlett (1980), Walsh *et al.* (1999), and Russell (pers. comm., 2002):

1. Geese and non-sea ducks generally inhabit coastal wetlands, back bays, and inland wetlands. Risk of collision with the proposed structures would be considered relatively high. Frequent, low-level, diurnal feeding flights could increase collision risks.
2. Cormorants are common spring and fall migrants, and winter along the coast. Cormorants migrate along the coast and could be adversely affected by the proposed project.
3. Gulls generally fly at altitudes below 262 feet (80 meters). Some species are common year-round, particularly along coastal areas. Gulls are known to habituate to man-made structures, which may increase the likelihood of collisions.
4. Terns, skimmers, plovers, and other shorebirds chiefly utilize sandy beaches and migrate near shorelines. Risks presented by the proposed project to terns, skimmers, plovers, and other shorebirds are discountable, but would increase relative to the presence of sandy, un-vegetated areas in the vicinity of the proposed project.
5. Raptors may follow shorelines during migration, flying at low altitude, and may cross wide water gaps. The peregrine falcon (*Falco peregrinus*), northern harrier (*Circus cyaneus*), and osprey (*Pandion haliaetus*) are State-listed in New Jersey. They migrate mostly along the coast and may be adversely affected by the proposed project.

6. Neo-tropical migratory passerine birds would be at greatest risk during migrations at night and when visibility is limited (*e.g.*, rain, fog, snow, low cloud cover); however, most migrate at high altitudes. Under conditions of low visibility, migrating flocks may be attracted to aviation safety lights mounted on the structures, which could increase the risk of collisions (Kerlinger and Hatch, 2001). Species flying at lower elevations during the day include swallows. Swallows may also drift offshore at night during migration, pausing to rest on shore.

7. Oceanic / pelagic seabirds, seaducks, alcids, and mergansers dive for fish, molluscs, and crustaceans in shallow coastal waters; they are unlikely to be adversely affected by the proposed project.

For information on wading birds, the Service recommends the applicant contact Mr. Don Wilkinson, New Jersey Division of Fish and Wildlife, 1670 E. Buckshutem Road, Milville, New Jersey 08332; phone (856) 785-0455. For further information on State-listed raptors, please contact Ms. Kathy Clark, Endangered and Nongame Species Program, New Jersey Division of Fish and Wildlife, 2201 Route 631, Woodbine, New Jersey 08270; phone (609) 628-2103.

Lighting

Structures taller than 199 feet (60.65 meters) will be required by the Federal Aviation Administration (FAA) to employ aircraft warning lights. The Service recommends using the minimum amount of pilot warning and obstruction avoidance lighting required by the FAA that would not compromise safety. White strobe lights are recommended over red incandescent blinking lights. Lights with a longest possible off-cycle are less attractive to birds than lights with a shorter off-cycle. Avoid solid red or pulsating incandescent red warning lights at night. Effects of red strobe lights are still under investigation (Manville, 2000). According to Kerlinger and Hatch (2001), bright spotlights or mercury vapor lights are known to attract birds and should be used only on occasions where the safety of maintenance workers is a concern.

The Service recommends that the applicant install visual markers on the bridge cables to increase their visibility to birds. The Service further recommends that the applicant provide for post-construction monitoring to ensure that migratory birds are not adversely affected. Findings from monitoring activities should be provided to the Service for review and comment.

National Environmental Policy Act

Due to the magnitude of the project and potential impacts, the Service recommends that project proponents prepare documentation pursuant to NEPA for any federal permit or license requirements, and that the federal action agency (Corps) submit the NEPA document to this office for review. We further recommend that the applicant continue its coordination efforts in the pre-construction phase of this project with the Corps, the New Jersey Department of Environmental Protection, and the National Marine Fisheries Service.

Please find enclosed the current information regarding federally listed and candidate species occurring in New Jersey, along with the addresses of State agencies that may be contacted for current site-specific information regarding federal candidate and State-listed species. Please contact Carlo Popolizio of my staff at (609) 646-9310, extension 32, if you have any questions or require further assistance regarding federally listed threatened or endangered species and federal trust species.

Sincerely,

John C. Staples
Assistant Supervisor

Enclosures

LITERATURE CITED

Kerlinger, P. and J. Hatch. 2001. Preliminary avian risk assessment for the Cape Wind energy project. Prepared for Cape Wind Associates, L.L.C. and Environmental Science Services, Incorporated. Boston, Massachusetts. 53 pp.

Manville, A.M., Jr. 2000. The ABCs of avoiding bird collisions at communication towers: the next steps. Proceedings of the Avian Interactions Workshop, December 2, 1999, Charleston, South Carolina. Electric Power Research Institute. 15 pp.

Rowlett, R.A. 1980. Observations of marine birds and mammals in the northern Chesapeake Bight. U.S. Department of the Interior, Fish and Wildlife Service, Biological Services Program, FWS/OBS-80/04. 87 pp.

Walsh, J., V. Elia, R.Kane, and T. Halliwell. 1999. Birds of New Jersey. New Jersey Audubon Society, Bernardsville, New Jersey. 704 pp.

PERSONAL COMMUNICATION

Russell, R. 2002. Nongame Bird Biologist. U.S. Department of the Interior, Fish and Wildlife Service, Division of Migratory Birds, Region 3, Minneapolis, Minnesota.

AMY S. GREENE
ENVIRONMENTAL CONSULTANTS, INC.

18 COMMERCE STREET PLAZA • FLEMINGTON, NJ 08822-1743
(908) 788-9676 • FAX (908) 788-6788 • PA (610) 250-0773 • E-MAIL mail@amygreene.com

CONVERSATION LOG

JOB NUMBER:	1807
JOB NAME:	Mill Creek, Cape May County, NJ
DATE:	December 16, 1999
TIME:	
YOUR NAME:	Ann Ertman
SPOKE TO:	Anita Riportella
FROM:	National Marine Fisheries Service
TEL.#:	732-872-3116 **FAX#:**

Content of Phone Call:

I called to ask her about SAV and fish/shellfish habitat in the study area. She said that NMFS does not have SAV concerns for any areas south of Little Egg Inlet. For fish/shellfish habitat, she suggested I check the NMFS web site at http://www.nero.nmfs.gov/ro/doc.webintro.html. I checked the site. They have some specific information about Essential Fish Habitats offshore of this area (attached), but no information regarding local estuaries. Some generic estuary information and information for Great Bay were included (attached).

AMY S. GREENE
ENVIRONMENTAL CONSULTANTS, INC.

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(908) 788-9676 • FAX (908) 788-6788 • PA (610) 250-0773 • E-MAIL mail@amygreene.com

CONVERSATION LOG

JOB NUMBER:	1807
JOB NAME:	Mill Creek, Cape May County, NJ
DATE:	January 20, 2000
TIME:	
YOUR NAME:	Ann Ertman
SPOKE TO:	Jeff Normant
FROM:	NJDEP, Bureau of Shellfisheries
TEL.#:	609-748-2040 **FAX#:**

Content of Phone Call:

Called him regarding his letter dated Jan 14 to see if he has additional information regarding shellfish leases or SAV. He said that there are no shellfish leases in the area. He does not have any SAV information, but suggested we may be able to get some from LURP.

Copy to: Curtis; File.

AMY S. GREENE
ENVIRONMENTAL CONSULTANTS, INC.

18 COMMERCE STREET PLAZA • FLEMINGTON, NJ 08822-1743
(908) 788-9676 • FAX (908) 788-6788 • PA (610) 250-0773 • E-MAIL mail@amygreene.com

CONVERSATION LOG

JOB NUMBER:	**1807**
JOB NAME:	**Mill Creek & Upper Thorofare Bridges**
DATE:	**January 31, 2000**
TIME:	**11:15**
YOUR NAME:	**Peg Brancheau**
SPOKE TO:	**David Jenkins**
FROM:	**NJDEP – Endangered and Nongame Species Program**
TEL #:	**609-292-9400**

Content of Phone Call:

I called to gather information from Dave regarding the Ocean Drive project.

He said there are ospreys in the area, but he is not sure how close the nests are to the project. If we fax him a map, he will ask Kathy Clark to check and see where the osprey nests are.

The whole area is considered stopover area for migratory birds. (This is noted in DPCC guidance). Migratory shorebirds might use the marsh and areas along inlets especially.

It is likely to be an area where diamondback terrapins breed.

Peregrine falcons are not an issue in the area.

He does not know of any other endangered or threatened species in the area.

Copy to: Curtis, Lois, Amy, file

AMY S. GREENE
ENVIRONMENTAL CONSULTANTS, INC.

18 COMMERCE STREET PLAZA • FLEMINGTON, NJ 08822-1743
(908) 788-9676 • FAX (908) 788-6788 • PA (610) 250-0773 • E-MAIL mail@amygreene.com

CONVERSATION LOG

JOB NUMBER:	**1807**
JOB NAME:	**Mill Creek & Upper Thorofare Bridges (Ocean Drive)**
DATE:	**February 8, 2000**
TIME:	**4:30 PM**
YOUR NAME:	**Peg Brancheau**
SPOKE TO:	**Dave Jenkins**
FROM:	**NJDEP – Endangered and Nongame Species Program**
TEL #:	**609-292-9400**

Content of Phone Call:

He called back in response to our fax requesting locations of endangered/threatened species within one mile of the project area. He said there are tern colonies within one mile of the project area, in the marshes, but they would not be a concern for this project.

There are several osprey nests within one mile of the project. One or two nests are within ¼ mile (probably within 1,000 feet) of the project, to the south of Ocean Drive. Kathy Clark, the osprey specialist, was not certain if one of the nests has been used yet. I asked for locations of these nests so that the project may be staged to accommodate nesting, if needed. He will ask Kathy for these locations.

Copy to: file, Curtis, Ann

AMY S. GREENE
ENVIRONMENTAL CONSULTANTS, INC.

18 COMMERCE STREET PLAZA • FLEMINGTON, NJ 08822-1743
(908) 788-9676 • FAX (908) 788-6788 • PA (610) 250-0773 • E-MAIL mail@amygreene.com

CONVERSATION LOG

JOB NUMBER:	1807	
JOB NAME:	Mill Creek, Cape May County, NJ	
DATE:	March 21, 2000	
TIME:		
YOUR NAME:	Ann Ertman	
SPOKE TO:	Gail Moore	
FROM:	NJDEP, LURP	
TEL.#:	609-292-1235	**FAX#:**

Content of Phone Call:

I called to see if she has any SAV information for the project area. She says her mapping information does not extend this far south. She hasn't seen anything in the general area, but suggests we should do a survey since this area isn't mapped. See Section 3.6 of LURP rules for a list of SAV species of concern.

Copy to: Curtis; File.

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CONVERSATION LOG

JOB NUMBER: 1807
JOB NAME: Mill Creek, Cape May County, NJ
DATE: June 5, 2000
TIME:
YOUR NAME: Curtis Helm
SPOKE TO: Mike Celestino, Assistant Biologist
FROM: NJDEP, Bureau of Shellfisheries
TEL.#: 609-748-2040 **FAX#:**

Content of Phone Call:

I contacted Mike Celestino to determine if the NJDEP, Division of Fish and Wildlife, Bureau of Shellfisheries has maps of eelgrass beds for the referenced project area. MC stated that the Bureau of Shellfisheries does not have any mapping available for the Cape May area and that their maps begin north of the project area.

Copy to: File.

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CONVERSATION LOG

JOB NUMBER:	1807
JOB NAME:	Mill Creek, Cape May County, NJ
DATE:	June 30, 2000
TIME:	
YOUR NAME:	Curtis Helm
SPOKE TO:	Bob MacBride
FROM:	Middle Thorofare Bridge Tender
TEL.#:	609-522-2815 **FAX#:**

Content of Phone Call:

I contacted Mr. MacBride to determine if he had any knowledge of diamond back terrapins occurrence along Ocean Drive. He has been the Middle Thorofare bridge tender for 27 years and stated that there are occasional reports from motorists that "turtles" were seen on the road. Note: the diamond back terrapin is the only "turtle"species that is likely to be seen on Ocean Drive. He said that they are reported in the early summer and again later in the fall on warm days. He said that he was not aware of any accidents that may have occurred although the turtles are sometimes hit by cars.

Copy to: file

ASG/tmh

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CONVERSATION LOG

JOB NUMBER:	**1807**
JOB NAME:	**Mill Creek**
DATE:	**August 23, 2002**
TIME:	
YOUR NAME:	**Beth Chudy**
SPOKE TO:	**Dave Jenkins**
FROM:	**NJDEP Nongame & Endangered Species Program**
TEL.#:	**908-735-9652** **FAX#:**

Content of Phone Call:

I called Dave to ask about bird species that were identified on the NJNHP letter as potentially being in or near the project area.

Osprey – he does not know the exact locations of any nests, and suggested that we ask Kathy Clark. I told him that we had already done so and she was not able to give us that information. We know of one nest site about 400 feet north of the existing alignment, NJNHP identified what appears to be a different nest that we have not seen in the field. Dave thinks that it is possible that the birds relocated from the NJNHP location to the location that we see now. Any nests that are in close proximity should be easily identifiable.

Black-crowned and yellow-crowned night herons – these species historically nested in a heron rookery that was located on the Coast Guard base on the eastern side of Cape May inlet. The rookery is no longer utilized by herons. The closest known rookeries are on dredge spoil areas at the north end of Wildwood Crest. He does not expect these species to nest within the project area, although they do utilize it for foraging.

He brought up that there are terns known to nest in the area. The NJNHP letter identified Thorofare Island as a nesting site for Common tern. This is a species of special concern (colonial nesting birds), and it is likely that anything that would impact this nesting area would be of concern to NJDEP and would need to be addressed during the permitting stage as one of the CZM policies.

cc: Tom Brodde, Curtis Helm, File 1807

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CONVERSATION LOG

JOB NUMBER:	**1807**	
JOB NAME:	**Mill Creek**	
DATE:	**August 27, 2002**	
TIME:		
YOUR NAME:	**Beth Chudy**	
SPOKE TO:	**Anita Riportella**	
FROM:	**NMFS**	
TEL.#:	**732-872-3116**	**FAX#:**

Content of Phone Call:

I called Anita to ask for more information about the species that NNMFS listed as potentially being present within the project area.

None of the sea turtles listed nest in the project area, but could be found foraging there in summer through fall. NMFS would have concerns about these animals if there were to be any dredging or blasting, and would require timing restrictions between June and November. Although they listed shortnose sturgeon, this species is only found in the upper Hudson and Delaware Rivers, and thus is not a concern for the project area.

Depending on how the project would be constructed, it would be necessary to get an Essential Fish Habitat consultation. If construction activities would potentially cause sedimentation of EFH areas, timing restrictions could be required to protect winter flounder spawning (January 1 – May 31). Further consultation would be necessary when an alternative is chosen. She recommended that the alternatives be discussed at a joint-agency pre-application meeting. Agencies meet in Trenton once a month. I told her that the project engineers are going to schedule us for one of these meetings, but I was not sure if they have done it yet. The meetings are currently booked through November.

cc: Tom Brodde, Curtis Helm, File 1807

APPENDIX B

PRE-APPLICATION CONFERENCE MEETING MINUTES

Meeting Minutes

MILL CREEK/UPPER THOROFARE/MIDDLE THOROFARE BRIDGE REPLACEMENT SCOPING

Meeting Information:	**Date:**	November 13, 2002	**Time:**	11:00AM
	Subject:	JOINT AGENCY MEETING	**Location:**	NJDEP OFFICE 501 EAST STATE STREET
	Attendees:	(SEE ATTACHED LIST)		

Minutes:

The purpose of the meeting was to introduce the project to NJDEP, ACOE, US Fish & Wildlife, NJ Fish & Wildlife, National Marine Fisheries and the USCG and obtain their insight into the requirements to justify an Initially Prefered Alternative. Mr. Larry Slavitter chaired the meeting for the USACOE. Mr. Slavitter stated that Jerry Jones of the ACOE could not attend; and that he would be involved if there were dredging issues. Larry also stated that the Coast Guard (Waverly Gregory) could not provide a representative but that they should be kept informed by sending them minutes of the meeting. They are especially interested if the channel will be moved. Mr. Fisher stated that no dredging or relocation of the channel is currently proposed for any of the alternatives. Larry then turned the meeting over to Dale Foster and the project team for their presentation.

Mr. Foster provided a brief history of Ocean Drive, condition of the three bridge structures and an overview of the project alternatives. Dale stated that the road would be raised to above the 100-year floodplain to provide an emergency evacuation route for portions of Lower Twp. And the "Wildwoods". He described the bridges as being functionally obsolete, since they were too narrow by today's standards. The Middle Thorofare Bridge also has a 15-ton weight limit which eliminates the route for some Cape Fisheries trucks/trailers. Mr. Foster also discussed the navigation channel beneath the Middle Thorofare bridge which is currently 50 feet in width, and is too narrow for convenient and safe navigation of the fishing fleet. There are 6 to 10 boat impacts with the bridge fenders annually. The narrow bridge width reportedly limits the growth of the Cape Fisheries industry. Tom Fisher indicated that the proposed movable bridge would provide a channel width of 130 feet that will safely accommodate the existing broad-beamed fishing vessels and future use of the marina by larger vessels that may be 400 feet long and 60 feet wide.

Mr. Tom Fisher followed Dale and stated that the maximum height of the Cape Fisheries vessels, presently, is in the range of 75 feet. He said that there are about 7500 Middle Thorofare bridge openings per year, and that they had received bridge opening survey information on the vessels and their ports, which did not include heights. Parsons Brinckerhoff is currently working on

determining the heights of the vessels that pass through the bridge. Mr. Fisher said that if the Middle Thorofare bridge is raised to a height of 45 feet there may be a reduction of about 2000 openings per year. The current height of the bridge is 23 feet. Mr. Fisher said that they are looking into raising the height to 55 feet and won't know the impact of this increased height until they complete their analysis of vessel heights and the bridge openings. Tom explained that their experience has found that the FHWA does not prefer to build moveable bridges unless socially, economically or environmentally justified. Mr. Fisher provided some initial cost estimates which suggested that the moveable bridges (3A and 3B) are in the range of $75 million and the fixed structure (3D) is about $130 million. The project team presently prefers the parallel movable bridge alignment 3A due to economic and environmental concerns and this is supported by the local fisheries as well.

Mr. Curtis Helm followed Mr. Fisher and provided a brief description of the wetland communities, which consists of tidal marsh and includes most everything that is not built within the project area. Mr. Helm said that ASGECI had delineated all of the project area wetlands. Mr. McLaughlin asked if the delineation included all of the alignments and Mr. Helm responded that it did. Mr. Cubberley and Mr. Slavitter suggested that a Jurisdictional Determination/Letter of Interpretation be submitted to the agencies for review, and that it be done relatively soon since the wetland flags may disappear. It should be done before permits are issued. The submission will provide an opportunity for the agencies to review the project alignments as well as review the wetland delineation.

Mr. Helm handed out a spread sheet that had been prepared by PB that provided the various impacts to natural resources from the four proposed alignments (See Attachment). The spread sheet did not include alignment 3E (parallel fixed structure); however it was explained that alignment 3E would have natural resource impacts similar to alignment 3A. It was mentioned that alignment 3E should be considered dismissed since it has such a significant and negative impact on the Cape Fisheries properties. The impact numbers were briefly discussed and Mr. Helm stated that alignment 3A was the alignment preferred by the project team. Although this alignment has a slightly greater impact on the natural resources than alignment 3B, it has the least impact on the Cape Fisheries properties.

Ms. Ripartella of NOAA/NMFS said that an Essential Fish Habitat (EFH) assessment should be prepared for the project area. This document will be required by the ACOE during their permit review. Mr. Popolizio of the USFWS

said that they did not have any concerns regarding Threatened or Endangered species. He did however explain that they will have concerns regarding the protection of shellfish habitat. Mr. Helm explained that the shellfish within the project area were mapped by NJDEP within an area that is restricted for harvest. This shellfish habitat will still need to be protected during construction. Ms Ripartella said that sea turtles should not be a concern if we will propose to drive piles but might be a concern if we will be dredging or blasting. She also said that Atlantic sturgeon would not be an issue since they don't use these waters. The early life stages of winter flounder may be a consideration which would not allow work during the period January 1 to May 31. Mr. Wilkinson stated that although the NJDEP did not have any specific wildlife or Threatened and Endangered species concerns, the general project area is an important migratory stopover area. He also said that the area was commonly used by long legged waders and that the osprey would have to be protected, which means that no construction can occur within 1000 feet between 3/1 and 7/31.

Mr. Helm mentioned that the roadbed would be widened from 40 to 44 feet and that the road would be raised about 4 feet in height to raise it above the 100 year floodplain elevation. Mr. McLaughlin said that the project must be designed to minimize impacts. Mr. McLaughlin and Mr. Wilkinson asked if the project included features such as retaining walls or construction on piles in order to minimize impacts. Mr. Helm said that the project was currently in the conceptual phase, only comparing alignments, and that once the preferred alignment was selected, the detailed design would include design to further decrease wetland impacts such as the use of retaining walls or steep side slopes reinforced with a geogrid type of material. There was a general consensus among the parties that it is not possible to eliminate wetland impacts due to the project location.

It was noted that the project team was aware that wetland mitigation would be required and that there are few opportunities for mitigation within the project area. The project team was also aware that any reduction in wetland impacts would reduce the amount of wetlands mitigation required so every effort would be made to reduce wetland impacts. Mr. Slavitter said that he was aware that the few uplands (old railroad and road bed) located near Two Mile Restaurant were not for sale since he had been involved in another mitigation project in the area. He also said that there was possibly a contamination issue with theroad property.

Mr. McLaughlin said that the NJDEP would want to see the impacts to intertidal and subtidal shallows quantified (areas between spring high water and to within

four feet of mean low water). It was mentioned that a bathymetric survey had been performed so that these impacts could be quantified. Mr. Helm stated that there was no Submerged Aquatic Vegetation within the project areas and that none had been mapped by NJDEP. It was generally agreed that it was unlikely that SAV would occur since there are relatively strong currents through the project area.

There was additional mention that the design should include pipes beneath the roads to allow for wildlife passage and to minimize impacts to hydrology. Mr. Foster mentioned that there appears to be one undersized pipe near the Coast Guard property and Two Mile Dock Road that would be replaced with a properly sized pipe.

Mr. McLaughlin stated that pressure treated lumber could not be used for fenders and suggested a polymer/plastic that is now being promoted. The NJDEP said that access to the waterfront should be maintained and that a portion of the existing structure might be left as a fishing pier. Mr Helm mentioned that the lands abutting the alignment were all wetland and any public access would require public parking which would most likely impact wetlands. Mr. Wilkinson mentioned that NJDEP has a boat access somewhere along Ocean Drive that should be maintained. It was also mentioned that the concrete from the piers could be dumped at the artificial reef sites in the Atlantic Ocean. We could contact Bill Finley who works for NJDEP out of the Nacote Creek office.

Mr. Slavitter stated that the ACOE would require a "paper trail" that showed that impacts have been avoided, minimized and mitigated. They will want a detailed alternatives analysis showing that the environmental impacts from the preferred alternative are the least practicable and are justified. He must be able to defend the Federal Government decision to issue a permit. Mr McLaughlin wanted some detail on the impacts to the Cape Fisheries from the 3E alternative. The consensus among the agency representatives was that they did not approve of Alternatives 3C and 3D due to the magnitude of the wetland impacts.

Mr. Fisher reiterated that the project team preferred the 3A alternative and that they were currently working on setting up a meeting with the FHWA in order to present the alternatives. He again stated that the FHWA may prefer to fund the fixed bridge alternative.

Mr. McLaughlin asked if the number of openings could be reduced by requiring the non-commercial fishing vessels to lower moveable structures, such as

antennae, and possibly develop a bridge opening schedule. Mr. Foster said that this was not practical since the Coast Guard in the past has had a policy of not restricting/detaining the commercial fishing fleet.

Mr. Cubberley asked if the project included Tidelands Grants. Mr. Foster said that the project area was covered under a "Blanket Grant" that included all structures south of Turtle Gut. Mr. Cubberley asked that a copy of this license be included in the NJDEP permit that will be required for the project.

The following is a summary of the key concerns expressed by the joint committee members regarding this project at this meeting:

1. In general, wherever possible wetland impacts should be eliminated or minimized. This is especially of concern along the roadway section that is to be raised about 4 to 5 feet in order to get above the 100 year flood elevation. Presently it is envisioned that this would be accomplished by placing fill on top of the existing roadway with a slight shift of roadway centerline. Consideration should be given to replacing the typical side slopes of 2:1 or 1:1 with retaining walls or geogrid or some innovative solution of some type and thus eliminate considerable impacts to wetlands. Consideration of placing the roadway on structure may be evaluated also. A cost needs to be defined for the retaining walls or structure so that it is clear why their use is or is not justified.

2. Documentation of truck accidents on the narrow bridges must be provided in order to substantiate the need for widening the structures from 20 feet curb-to-curb to 44 feet curb-to-curb.

3. Documentation from the community that may eliminate an alternative from consideration should be provided.

4. Submit a Jurisdictional Determination/Letter of Interpretation to the agencies for review as soon as possible.

5. The vessel height survey is presently underway. Data from this will be added to the bridge opening data that Dale Foster has provided on ACCESS for the past three years and the data will then be analyzed to establish the following: 1) the optimum height for a mid level movable bridge, 2) the normal time of day for passage of the large commercial fishing vessels, and 3) how many openings can be eliminated per year by constructing the mid level movable bridge.

6. The USCG could be approached about restricting the bridge openings to specific times of day if it becomes a key issue regarding approval of a new movable bridge.

7. NJDEP indicated that the project area would not be deemed a high quality viewshed under the coastal zoning rules.

8. Dale explained that the movable span at Middle Thorofare is eligible to be on the Register of Historic Bridges but has two identical sister bridges that are in Cape May County and still operational. Middle Thorofare sees a significant traffic flow (between 10,000 and 20,000 vpd), while the other two see much less traffic (about 1500 vpd). The County intends to preserve the other two movable bridges after Middle Thorofare has been replaced.

9. NJDEP asked that the present access to the wildlife management area boat ramp be maintained.

10. NJDEP suggested that all riparian grant issues be addressed prior to permit application in order to avoid delays, but appeared satisfied that the project area is within the blanket tidelands grant.

11. NJDEP wants all the culverts maintained and/or enhanced. Suggestions included adding culverts to improve wetland flushing and provide movement corridors for terrapins to avoid roadkill.

12. NJDEP requires 1000 feet buffer maintained around Osprey nests with April through July restricted for construction activities.

13. NJDEP requested that exsiting structures be maintained to provide public access to the waterfront as much as possible. This can be accommodated on the east shore of Middle Thorofare.

14. NJDEP wants intertidal shallows impacts addressed for each alternative.

15. NJDEP prefers alternative building materials for fender systems such as FRP, fiberglass, etc. in lieu of treated timber.

16. NMFS wants a June to November restriction on blasting in the waterways for sea turtles and January through May restriction on in-water construction for winter flounder. This may be impractical since it only leaves Decemebr for construction.

17. NJDEP indicated that a life cycle cost analysis may have to be prepared in order to justify the constuction of a movable bridge instead of a fixed bridge. This is required per FHWA since they typically do not want to build new movable structures. A future meeting is planned with FHWA to obtain their support for the movable bridge alternative 3A.

18. NJDEP is interested in a future meeting in the spring of 2003, subsequent to the selection of an IPA to further review permit requirements and other issues.

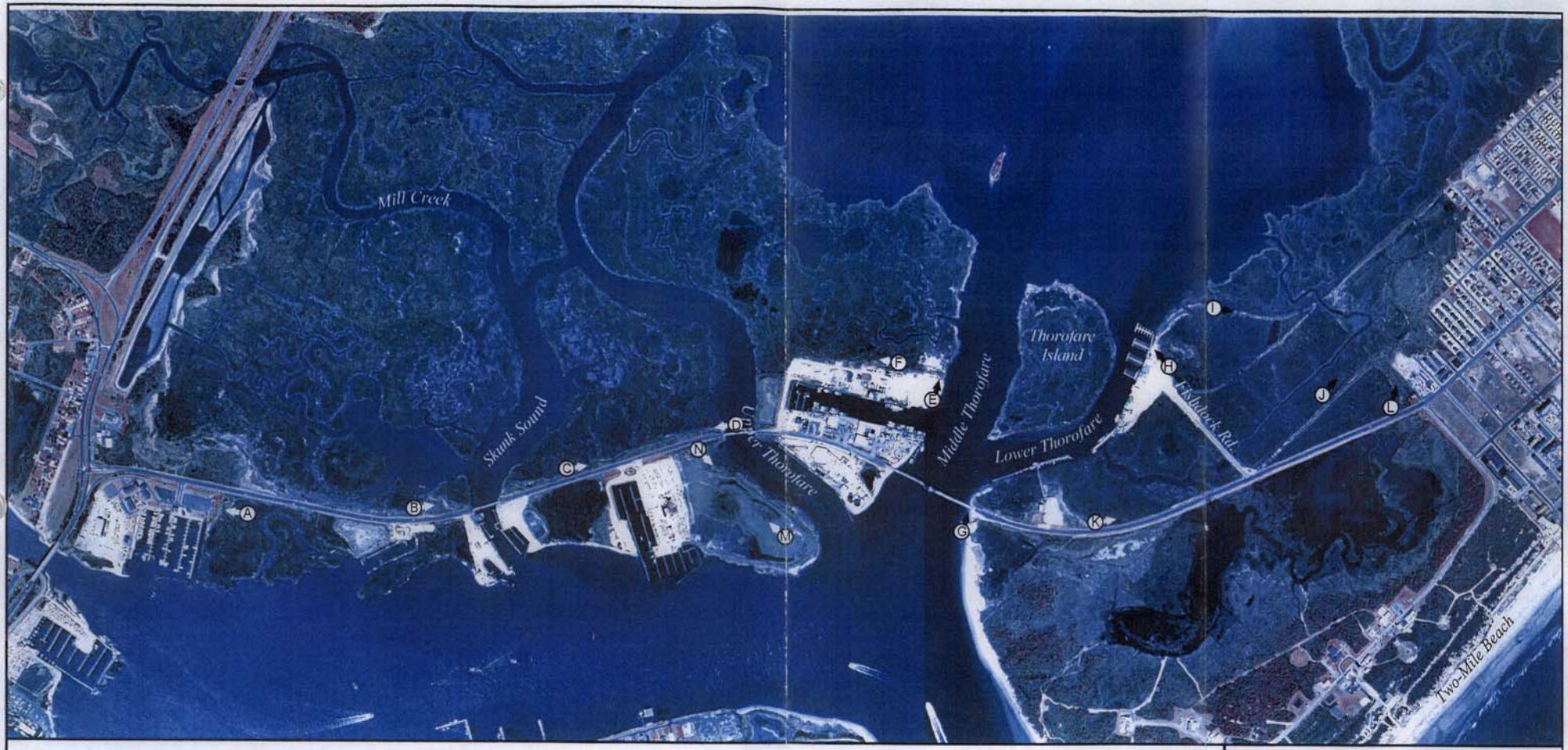
New Jersey Department of Environmental Protection
Land Use Regulation Program

Meeting Attendance Sheet

Date: 13 Nov 02 Subject: County Road 621

NOTE: The guidance provided at a pre-application meeting is not binding upon the Department, in accordance with N.J.A.C. 7:7A N.J.S.A. 58:16A-50 et seq. and N.J.S.A. 12:5-3. Therefore, the Department shall in no way commit itself to approval or rejectic proposed project as a result of these discussions. By attending this meeting all acknowledge this standard.

Name	Title	Telephone #	Affiliation
1. Larry Slavitter	Biologist	215 656-6734	Army Corps
2. Curtis HELM	ENV. SCIENTIST	908 786 9676	AMY GREENE ENV.
3. Dale M Foster	Cape May County Engineer	609 465 1035	Cape May County
4. Steven Balcano	Env. Scientist	609-734-7012	PB
5. Tom Fisher	Project Manager	609-734-7046	FTB
6. Anita Riportella	Biologist	732-872-3116	NOAA/NMFS
7. Wendy Walsh	Biologist	607-383-3938 x48	USFWS
8. Carlo Popolizio	Biologist	(607) 383-3938 x 32	USFWS
9. Bill McLaughlin	Env Spec.	(609) 984 0195	DEP-LURP
10. Don Wilkinson	Biologist	856-785 2711	NJF&W
11. Bob Cubberley	Env. Scientist	609 633 6755	DEP-LURP
12.			
13.			
14.			
15.			



Photograph Location and Direction of View

SITE LOCATION

0 1000'

PHOTOGRAPH
LOCATION MAP

Ocean Drive Upgrade &
Bridge Replacement
Route 109 to Wildwood Crest
Lower Twp. & Wildwood Crest Borough
Cape May County, New Jersey
ASGECI Project #1807

AMY S. GREENE
ENVIRONMENTAL CONSULTANTS, INC.

Photo A – View, facing west, of wetland swale located on south side of Ocean Drive at western end of project area.

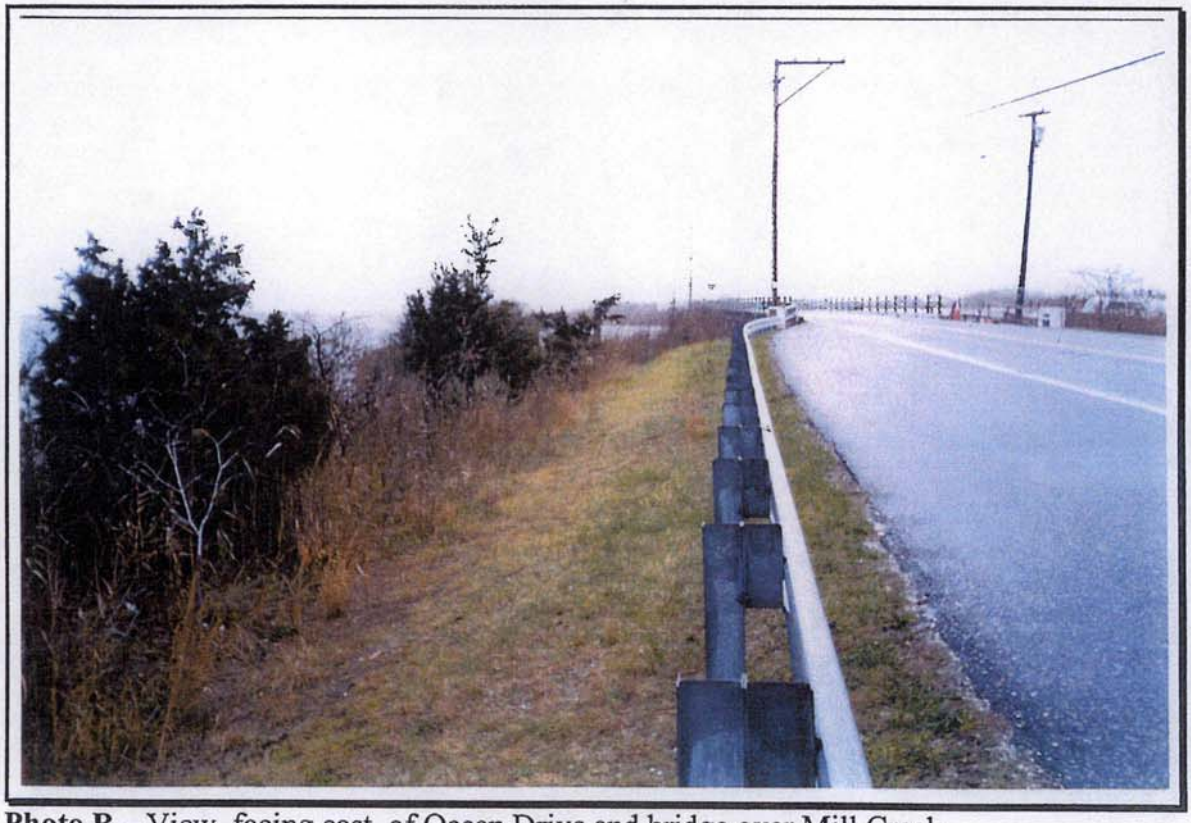


Photo B – View, facing east, of Ocean Drive and bridge over Mill Creek.

Photo C – View, facing east, of wetland fringe adjacent to northern edge of Ocean Drive. Typical vegetation includes saltmarsh cordgrass (*Spartina alterniflora*) and common reed (*Phragmites australis*) in wetlands, and lawn species on the upland edge.

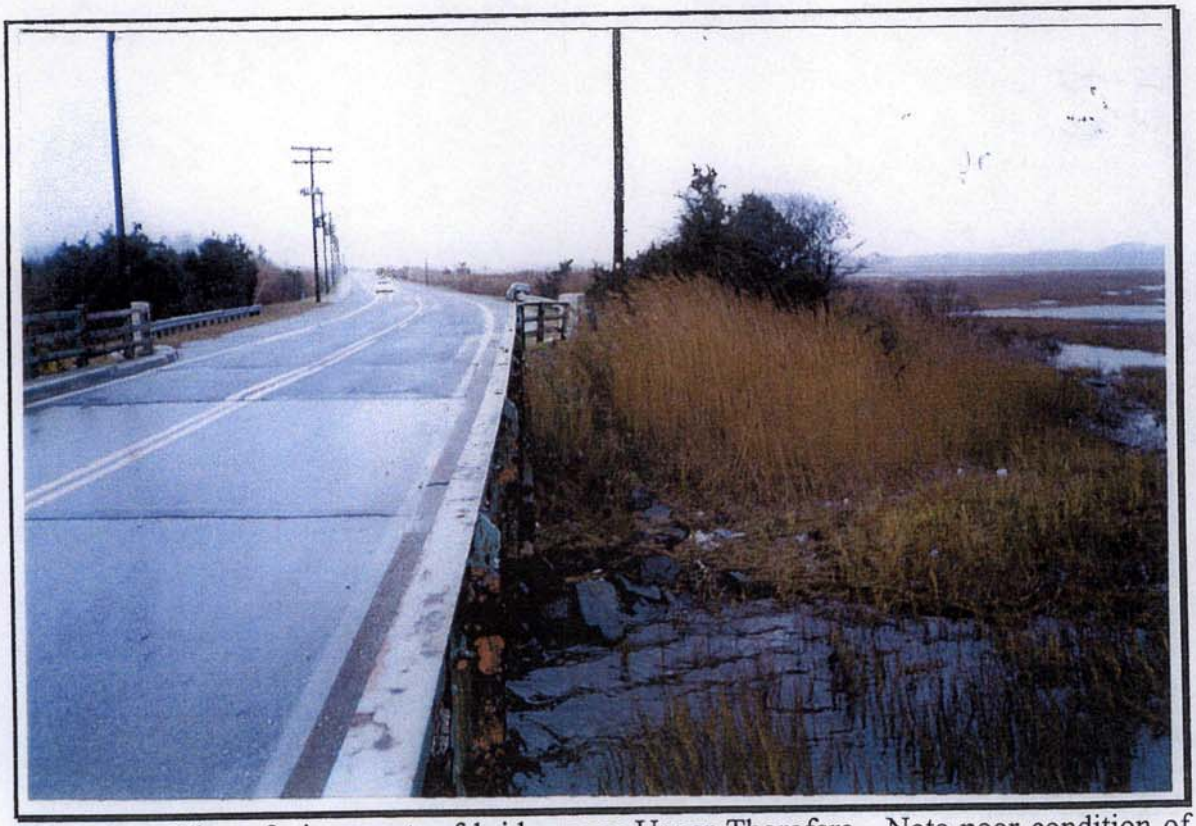


Photo D – View, facing west, of bridge over Upper Thorofare. Note poor condition of bridge.

Photo E – View, facing north, of eastern edge of fisheries complex, showing transition from State open water open water edge to wetland fringe (common reed in background of photo).

Photo F – View, facing west, of tidal marsh to north of fisheries complex. Photo shows proposed location of Alternative 3C, along the northern edge of the fishery.

Photo G – View, facing north, of southeastern side of Middle Thorofare bridge. Note narrow strip of beach and transition to marsh. This is one of few beach areas identified within the project area.

Photo H – View, facing northwest, of restaurant complex at northern end of Fish Dock Road, and adjacent marsh.

Photo I – View, facing east, of abandoned railroad bed located in marshes to east of Fish Dock Road.

Photo J – View, facing northeast, of abandoned stretch of Park Boulevard, which forms an upland island within the marshes to the east of Fish Dock Road.

Photo K – View, facing east, of marsh edge adjacent to Ocean Drive in eastern portion of project area.

Photo L – View, facing north, of marshes and new development at extreme eastern end of project area.

Photo M

View northwest of interior of dredge spoil area with barren land and common reed.

Photo N

View southeast of tidal fringe along east side of dredge spoil peninsula. Fringe dominated by typical low marsh and high marsh vegetation.

Technical Addendum F
Hazardous Waste Screening Report

SCOPING FOR MILL CREEK, UPPER THOROFARE BRIDGES, AND MIDDLE THOROFARE BRIDGES

SITE SCREENING STUDY DRAFT REPORT

prepared for:
South Jersey Planning Organization

prepared by:
Parsons Brinckerhoff-FG, Inc.
Princeton, New Jersey

June 2003

SCOPING FOR MILL CREEK, UPPER THOROFARE, AND MIDDLE THOROFARE BRIDGES

SITE SCREENING STUDY REPORT

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SCOPING FOR MILL CREEK, UPPER THOROFARE,

AND MIDDLE THOROFARE BRIDGES

CAPE MAY COUNTY

SITE SCREENING STUDY REPORT

I. INTRODUCTION

The existing Ocean Drive from Route 109 to Madison Avenue east of the toll bridge at Middle Thorofare is proposed to be raised above the 100-year storm elevation. The three bridges within the project limits are proposed to be widened or replaced. The existing roadway consists of one traffic lane and a shoulder in each direction within a 120 foot width right-of-way.

II PROJECT DESCRIPTION

The proposed alignment has not been finalized; seven alternatives have been developed with three alternatives following basically the existing alignment and the remaining alternatives relocating Ocean Drive to the north or south. The project alternatives and location are presented in Figure 1 (aerial photo).

III METHODOLOGY

The purpose of the site screening was to identify areas of potential contamination within a study corridor consisting of the proposed right-of-way plus 250 feet on either side. Items of concern included solid waste landfills, ISRA (Industrial Site Recovery Act) sites, and properties with storage tanks. The study included the following scope:

- Environmental agency list review,
- Site Reconnaissance, and
- Contacts with state and local environmental agencies.

The following sources were used during the records review process:

- A site assessment report was performed of the following databases:
  US EPA National Priority List
  US EPA RCRA Corrective Actions
  US EPA permitted treatment, storage, disposal facilities
  State Equivalent Priority List
  State Equivalent CERCLIS list
  US EPA Sites under review by US EPA
  State/Regional/County Leaking Underground Storage Tanks
  State/Regional/County Solid Waste Landfills, Incinerators, or Transfer Stations
  State/County Registered Underground Storage Tanks
  US EPA RCRA registered underground storage Tanks
  RCRA registered small or large generators of hazardous waste
  US EPA / State ERNS and state spills lists
- Listing of Known Contaminated Sites in New Jersey dated 2001
- Cape May County Health Department

- New Jersey Department of Environmental Protection Central File Unit
- NJDEP List of Underground Storage Tank Case Status

In addition, a site visit was performed on May 15, 2003. The majority of the property within the project area consists of marshland. Businesses consist of Canyon Club Marina, Cedar Creek Maina/Seatow, Bree-Zee-Lee Yacht Basin, Snow's Doxsee Inc., Lund's Fisheries, Axelsson & Johnson Fish Co., Inc., Axelsson's Blue Claw Restaurant, and Hinch Marina. A tabulation of the properties, addresses, and block and lot numbers is included in Appendix A. The site assessment report is included in Appendix B.

IV ENVIRONMENTAL INFORMATION INVENTORY / FINDINGS / INVOLVEMENT

The record search did not indicate any open cases currently undergoing investigation or remediation. Several sites have undergone environmental investigations and remediations; however, these cases have been closed.

The following properties were identified through the various searches.

Texaco Gas Station
Ware Partnership — Block 793 Lot 11.02 c-a
795 Route 109

Case ID #: 93-03-1-1710-15
The site is located along Route 109 north of the existing Ocean Drive. The case was closed on November 26, 1997 when a No Further Action letter was issued. The case involved three gasoline tanks, one diesel tank, and one waste oil tank.

Borden Clam Products or Snow's / Doxsee — Block 822.01 Lot 1.01
994 Ocean Drive

Case ID #: 92-02-20-1445
The case was closed on April 14, 1997. The notification date was February 20, 1992. During pile driving, below ground piping for a diesel fuel station were broken. The underground piping was associated with two above ground storage tanks each having a diameter of 10 ½ feet by 40 feet. Due to the loss of diesel fuel in the vicinity of an aboveground fueling facility and pump station, a soil and ground water investigation was initiated. Approximately 160 tons of contaminated soils was removed from the site.

Case #: 92-2-19-1650-24
On February 19, 1992, the illegal dumping of oil-like products into wetlands at the rear of the property was reported.

Case #: 92-9-13-1231-11
On September 13, 1992, a leak occurred from the bushing on a transformer. The estimated release was less than one gallon. A repair/cleanup crew was on-site.

Lund's Fisheries
997 Ocean Drive

Block 793 Lot 15.01

Case # 89-07-02-1500
One 1,000 gallon underground storage tank was removed and two underground storage tanks of unknown capacity were abandoned in place. The case was closed in 1991.

Case # 97-6-25-1416-09
On June 25, 1997, a freon leak occurred at the site's warehouse. The worker repairing a valve was sprayed by freon and become unconscious. The building was vented.

Bree-Zee-Lee Yacht Basin
978 to 982 Ocean Drive

Block 822.2, Lots 3 and 4

Case # 96-04-18-1018-55
On April 17, 1996, a ruptured gasoline tank was discovered on one of the vessels in storage at the Bree-Zee-Lee Yacht Basin. The spill volume was estimated at about 100 to 150 gallons. Soil was excavated from an irregular oval-shaped area of approximately 20 feet by 37 feet. The depth of the excavated area ranged from 2 inches to 24 inches. Five soil samples were collected and submitted for analysis. A site closure report indicating that levels of benzene, toluene, and xylene were below NJDEP cleanup standards was submitted to the Cape May County Board of Health.

Atlantic Cape Fisheries
985 Ocean Drive

Block 793 Lot 15.06

On July 13, 2001, an oil pollution incident was documented by the United States Coast Guard and the Cape May County Department of Health. A rainbow sheen in the lagoon of the Hinch Marina occurred and was traced to fuel leakage from a large steel fishing vessel at the Cape Atlantic Fisheries. The Cape May County Department of Health sanitary inspector observed personnel cleaning the site.

US Coast Guard Electronic Engineering Center Block 821 Lot 1

Case # 92-03-02-246
The site was issued a letter of no further action on April 20, 1995 with respect to a leaking underground storage tank.

Harbortowne Resort Marina
900 Ocean Drive

Block 823.01 Lot 3.02

Case #98-01-12-1247-13
The case involved underground storage tanks and a letter of No Further Action was issued on August 31, 1998.

Documentation for incidents and cases is included in Appendix C.

V KNOWN CONTAMINATED SITES LIST / FINDINGS / INVOLVEMENT

There are no sites listed in the 2001 Edition of the Known Contaminated Sites in New Jersey. The listings of contaminated sites in Lower Township are included in Appendix D.

VI ISRA SITES / FINDINGS / INVOLVEMENT

No ISRA sites were identified.

VII UST SITES / FINDINGS / INVOLVEMENT

UST sites (Texaco Gas Station, Lund's Fisheries, and US Coast Guard Electronic Engineering Center) were discussed in Section IV.

The database of registered underground storage tanks lists Lunds Fisheries.

VIII POTENTIAL ASBESTOS SITES / INVOLVEMENT

It is our understanding that no buildings will be demolished and there is no involvement with asbestos.

IX AGENCY COORDINATION RESULTS

As discussed in IV, there are no open cases. State and county health department agencies were contacted regarding the closed cases.

X CONSTRAINTS TO SURFACE / SUBSURFACE ACTIVITIES

There are no constraints to surface / subsurface activities.

XI HISTORICAL LAND USE / AERIAL REVIEW

No additional sources of contamination or property use contributing to contamination were determined by review of historical land use / aerial review.

There are no Sanborn Maps for the area.

XII CONCLUSION / SAMPLING RECOMMENDATIONS

There are no open cases, while there have been incidents relating to underground storage tanks and/or soil contamination at the former Borden Clam Products Facility, Lunds Fisheries, Bree-Zee-Lee Yacht Basin, Harbortowne Resort Marina, and the US Coast Guard Electronic Engineering Center. Soil sampling is recommended prior to property acquisition from these facilities.

Work in connection with widening of the roadway may result in excavation of materials suspected of contamination by sight or smell. With a minor right of way property transfer, liability should be limited to the source of the contamination. Should any material be uncovered suspected of being hazardous, proper procedures should be taken to store, test, and dispose of materials. Liabilities associated with this project appear relatively low, but should consider protectionary language in parcel acquisition contracts.

Demolition of the bridges (particularly the movable bridge) may encounter potentially contaminated materials. Care should be taken during demolition.

FIGURE

Figure 1

OCEAN DRIVE IMPROVEMENTS

COUNTY OF CAPE MAY IN CONJUNCTION WITH SOUTH JERSEY TRANSPORTATION PLANNING ORGANIZATION

APPENDIX A

Lower Township, Cape May County
Mailing Address - Cape May Zip Code 08204
South Side of Ocean Drive

	Address	Owner	Block	Lot
		ROUTE 109		
Canyon Club Resort Marina	902 Ocean Drive	Hrbtwn Resort Marina, Inc.	823.01	3.01
Vacant	906 Ocean Drive	Hrbtwn Resort Marina, Inc.	823.01	2
Cedar Creek Marina / Seatow	926 Ocean Drive	Leslie and Joyce Lawrence	823	1
Vacant	952 Ocean Drive	Thomas Boyce	822.03	9
	954 Ocean Drive	Cape Harbor Enterprises	822.03	8
	956 Ocean Drive	Bertram S. Mears	822.03	7.01
Marina	956A Ocean Drive	Joan McDuell	822.03	7.02
		MILL CREEK		
Marina	960 Ocean Drive	Harlo Inc.	822.02	6
Vacant	964 to 992 Ocean Drive	Harlo Inc.	822.02	5
Vacant	"	Harlo Inc.	822.02	2
Bree-Zee-Lee Yacht Basin	978 to 982 Ocean Drive	Jenco Inc.	822.02	4
	"	Jenco Inc.	822.02	3
		UPPER THOROFARE		
Snow's Doxsee Inc.	994 Ocean Drive		822.01	1.01
		MIDDLE THOROFARE		

Lower Township, Cape May County
Mailing Address - Cape May Zip Code 08204
North Side of Ocean Drive

Business	Address	Owner	Block	Lot
		ROUTE 109		
Texaco Station	769 Route 109	G&D Investments, Inc.	793	11.02 c-b
Cape Port Marine Supply, Inc.	795 Route 109	Ware Partnership	793	11.02 c-a
Vacant	797 Route 109	Statt Corp. @ Atlas Motor Inn	793	11.03
Vacant	903 Ocean Drive	State of New Jersey Department of Environmental Protection	793	12.02
Vacant	915 Ocean Drive	State of New Jersey Department of Environmental Protection	793	12.01
		MILL CREEK		
Vacant	959 Ocean Drive	State of New Jersey Department of Environmental Protection	793	13
Vacant	915 Ocean Drive	State of New Jersey Department of Environmental Protection	793	14
Vacant	983 Ocean Drive	Harry J. Mogck	793	15.07
		UPPER THOROFARE		
Hinch Marina	989 Ocean Drive		793	15.04
Axelsson's Blue Claw Restaurant	991 Ocean Drive		793	15.03
Axelsson & Johnson Fish Co., Inc.	993 Ocean Drive		793	15.02
Lund's Fisheries	997 Ocean Drive		793	15.01
		MIDDLE THOROFARE		

Lots 12.01, 14, and 15.08 are grouped together with the same address.

APPENDIX B

The EDR Radius Map
with GeoCheck®

Ocean D, Cape May, NJ
Ocean Dr/Wissahickon Ave
Cape May, NJ 08204

Inquiry Number: 00987371.1r

June 02, 2003

Environmental Data Resources, Inc.

***The* Source For Environmental Risk Management Data**

3530 Post Road
Southport, Connecticut 06890

Nationwide Customer Service

Telephone: 1-800-352-0050
Fax: 1-800-231-6802
Internet: www.edrnet.com

FORM-DEC

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Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

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EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc. (EDR). The report meets the government records search requirements of ASTM Standard Practice for Environmental Site Assessments, E 1527-00. Search distances are per ASTM standard or custom distances requested by the user.

TARGET PROPERTY INFORMATION

ADDRESS

OCEAN DR/WISSAHICKON AVE
CAPE MAY, NJ 08204

COORDINATES

Latitude (North):	38.957200 - 38° 57' 25.9"
Longitude (West):	74.877300 - 74° 52' 38.3"
Universal Tranverse Mercator:	Zone 18
UTM X (Meters):	510631.5
UTM Y (Meters):	4311826.5
State Plane X (Feet):	1940100.5
State Plane Y (Feet):	45181.5
Elevation:	1 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property:	2438074-H8 CAPE MAY, NJ
Source:	USGS 7.5 min quad index

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the ASTM E 1527-00 search radius around the target property for the following databases:

FEDERAL ASTM STANDARD

NPL ---------- National Priority List
Proposed NPL ---------- Proposed National Priority List Sites
CERCLIS ---------- Comprehensive Environmental Response, Compensation, and Liability Information System
CERC-NFRAP ---------- CERCLIS No Further Remedial Action Planned
CORRACTS ---------- Corrective Action Report
RCRIS-TSD ---------- Resource Conservation and Recovery Information System
RCRIS-LQG ---------- Resource Conservation and Recovery Information System

STATE ASTM STANDARD

SWF/LF ---------- Solid Waste Facility Directory

EXECUTIVE SUMMARY

FEDERAL ASTM SUPPLEMENTAL

CONSENT Superfund (CERCLA) Consent Decrees
ROD Records Of Decision
Delisted NPL National Priority List Deletions
HMIRS Hazardous Materials Information Reporting System
MLTS Material Licensing Tracking System
MINES Mines Master Index File
NPL Liens Federal Superfund Liens
PADS PCB Activity Database System
DOD Department of Defense Sites
RAATS RCRA Administrative Action Tracking System
TRIS Toxic Chemical Release Inventory System
TSCA Toxic Substances Control Act
SSTS Section 7 Tracking Systems

STATE OR LOCAL ASTM SUPPLEMENTAL

NJ MAJOR FACILITIES List of Major Facilities
NJ PF Publicly Funded Cleanups Site Status Report
CHROME Chromate Chemical Production Waste Sites

EDR PROPRIETARY HISTORICAL DATABASES

Coal Gas Former Manufactured Gas (Coal Gas) Sites

BROWNFIELDS DATABASES

INST CONTROL Sites With Closed Case(s) With Restrictions

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. EDR's definition of a site with an elevation equal to the target property includes a tolerance of +/- 10 feet. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property (by more than 10 feet). Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

FEDERAL ASTM STANDARD

RCRIS: The Resource Conservation and Recovery Act database includes selected information on sites

that generate, store, treat, or dispose of hazardous waste as defined by the Act. The source of this database is the U.S. EPA.

A review of the RCRIS-SQG list, as provided by EDR, and dated 09/09/2002 has revealed that there are 3 RCRIS-SQG sites within approximately 1.25 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
LUNDS FISHERIES INC	*997 OCEAN DR*	*1/8 - 1/4 W*	*A3*	*7*
SNOW'S/DOXSEE	*994 OCEAN DR*	*1/8 - 1/4 W*	*A8*	*11*
USCG ELECTRONICS ENGINEERING	*OCEAN HWY*	*1/2 - 1 ESE*	*32*	*49*

ERNS: The Emergency Response Notification System records and stores information on reported releases of oil and hazardous substances. The source of this database is the U.S. EPA.

A review of the ERNS list, as provided by EDR, and dated 12/31/2001 has revealed that there are 13 ERNS sites within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
997 OCEAN DR	997 OCEAN DR	1/8 - 1/4 W	A2	7
997 OCEAN DRIVE	997 OCEAN DRIVE	1/8 - 1/4 W	A4	10
997 OCEAN DR	997 OCEAN DR	1/8 - 1/4 W	A5	10
997 OCEAN DRIVE	997 OCEAN DRIVE	1/8 - 1/4 W	A6	10
994 OCEAN DR	994 OCEAN DR	1/8 - 1/4 W	A7	10
994 OCEAN DR	994 OCEAN DR	1/8 - 1/4 W	A10	12
989 OCEAN DR	989 OCEAN DR	1/4 - 1/2 W	B20	29
989 OCEAN DR	989 OCEAN DR	1/4 - 1/2 W	B21	29
985 OCEAN DRIVE	985 OCEAN DRIVE	1/4 - 1/2 W	C23	35
985 OCEAN DR	985 OCEAN DR	1/4 - 1/2 W	C24	36
985 OCEAN DRIVE	985 OCEAN DRIVE	1/4 - 1/2 W	C26	39
985 OCEAN DR	985 OCEAN DR	1/4 - 1/2 W	C27	39
985 OCEAN DRIVE	985 OCEAN DRIVE	1/4 - 1/2 W	C28	39

STATE ASTM STANDARD

SHWS: Known contaminated sites in New Jersey except those associated with Bureau of Underground Storage Sites (BUST)

A review of the SHWS list, as provided by EDR, has revealed that there are 2 SHWS sites within approximately 2 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
307 E TRENTON AVE	307 E TRENTON AVE	1 - 2 E	37	55
ROSEMANS BOAT YARD	5 ROSEMANS LN	1 - 2 WSW	38	55

LUST: The Leaking Underground Storage Tank Incident Reports contain an inventory of reported leaking underground storage tank incidents. The data come from the Department of Environmental Protection & Energy's Incident Report.

A review of the LUST list, as provided by EDR, and dated 09/17/2002 has revealed that there are 5 LUST sites within approximately 1.5 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
LUNDS FISHERIES INC	***997 OCEAN DR***	***1/8 - 1/4 W***	***A3***	***7***
US COAST GUARD ELECTRONIC ENG	OCEAN DR	1/4 - 1/2 W	B16	24
WILDWOOD CREST DPW	NEWARK AVE / RAILROAD	1 - 2 ENE	35	54
SOUTH JERSEY EAST/CANYON CLUB	OCEAN HWY / GARDEN ST	1 - 2 W	36	54

Lower Elevation	Address	Dist / Dir	Map ID	Page
US COAST GUARD TRAINING CENTER	***1 MUNRO DR***	***1 - 2 SSW***	***34***	***52***

UST: The Underground Storage Tank database contains registered USTs. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA). The data come from the Department of Environmental Protection & Energy's UST Data.

A review of the UST list, as provided by EDR, and dated 09/15/1999 has revealed that there are 3 UST sites within approximately 1.25 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
LUNDS FISHERIES INC	***997 OCEAN DR***	***1/8 - 1/4 W***	***A3***	***7***
USCG TRAINING CENTER CAPE MAY	***1 MUNRO AVE***	***1/2 - 1 SSW***	***31***	***42***
USCG ELECTRONICS ENGINEERING	***OCEAN HWY***	***1/2 - 1 ESE***	***32***	***49***

FEDERAL ASTM SUPPLEMENTAL

FINDS: The Facility Index System contains both facility information and "pointers" to other sources of information that contain more detail. These include: RCRIS; Permit Compliance System (PCS); Aerometric Information Retrieval System (AIRS); FATES (FIFRA [Federal Insecticide Fungicide Rodenticide Act] and TSCA Enforcement System, FTTS [FIFRA/TSCA Tracking System]; CERCLIS; DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes); Federal Underground Injection Control (FURS); Federal Reporting Data System (FRDS); Surface Impoundments (SIA); TSCA Chemicals in Commerce Information System (CICS); PADS; RCRA-J (medical waste transporters/disposers); TRIS; and TSCA. The source of this database is the U.S. EPA/NTIS.

A review of the FINDS list, as provided by EDR, and dated 03/19/2003 has revealed that there are 7 FINDS sites within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
LUNDS FISHERIES INC	***997 OCEAN DR***	***1/8 - 1/4 W***	***A3***	***7***
SNOW'S/DOXSEE	***994 OCEAN DR***	***1/8 - 1/4 W***	***A8***	***11***
BORDEN CLAM PRODUCTS	994 OCEAN DRIVE	1/8 - 1/4 W	A13	18
HINCH MARINA INC	989 OCEAN DRIVE	1/4 - 1/2 W	B17	25
MILL CREEK MARINA	***980 OCEAN DRIVE***	***1/4 - 1/2 W***	***C29***	***39***
USCG ELECTRONICS ENGINEERING	***OCEAN HWY***	***1/2 - 1 ESE***	***32***	***49***
BREE ZEE LEE YACHT BASIN	***930 OCEAN DRIVE***	***1/2 - 1 W***	***33***	***51***

EXECUTIVE SUMMARY

FTTS: FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act) over the previous five years. To maintain currency, EDR contacts the Agency on a quarterly basis.

A review of the FTTS list, as provided by EDR, and dated 04/15/2003 has revealed that there is 1 FTTS site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
SWANS/DOXSEE, INC	994 OCEAN DRIVE	1/8 - 1/4 W	A9	12

STATE OR LOCAL ASTM SUPPLEMENTAL

NJ SPILLS: All hazmat known or unknown spills to the ground reported to the DEP's Env. Action Line. The office has not conducted any investigations to determine it's validity or accuracy.

A review of the NJ Spills list, as provided by EDR, has revealed that there are 6 NJ Spills sites within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
SNOW'S DOXFEE	994 OCEAN DR	1/8 - 1/4 W	A11	12
BORDEN CLAM PROCESSING FACILIT	994 OCEAN DR	1/8 - 1/4 W	A12	17
SNOWS DOXSEE CLAM PRODUCTS	994 OCEAN DR	1/8 - 1/4 W	A14	19
BORDEN FOODS INC	***994 OCEAN DR***	***1/8 - 1/4 W***	***A15***	***20***
ATLANTIC CAPE FISHERIES	***985 OCEAN***	***1/4 - 1/2 W***	***C25***	***36***
BREEZEE LEE	OCEAN DR	1/2 - 1 W	30	40

NJ RELEASE: Hazardous material release. Initial notification information reported to the Dept. of Env. Protection's Action Line. The office has not conducted any investigations to determine it's validity. or accuracy.

A review of the NJ Release list, as provided by EDR, has revealed that there are 5 NJ Release sites within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
MIDDLE THOROFARE	997 OCEAN DR	1/8 - 1/4 W	A1	6
BACKWATER LAGOON	989 OCEAN DR	1/4 - 1/2 W	B18	25
AREA OF	985 OCEAN DR	1/4 - 1/2 W	C22	29
ATLANTIC CAPE FISHERIES	***985 OCEAN***	***1/4 - 1/2 W***	***C25***	***36***
USCG TRAINING CENTER CAPE MAY	***1 MUNRO AVE***	***1/2 - 1 SSW***	***31***	***42***

NJ PDES: The NJPDES contains the names, addresses and other information of all permitted New Jersey Pollutant Discharge Elimination Sytem dischargers.

A review of the NJPDES list, as provided by EDR, and dated 09/18/2002 has revealed that there are 4 NJPDES sites within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
BORDEN FOODS INC	***994 OCEAN DR***	***1/8 - 1/4 W***	***A15***	***20***
HINCH MARINA INC	989 OCEAN DRIVE	1/4 - 1/2 W	B19	27
MILL CREEK MARINA	***980 OCEAN DRIVE***	***1/4 - 1/2 W***	***C29***	***39***

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
BREE ZEE LEE YACHT BASIN	*930 OCEAN DRIVE*	*1/2 - 1 W*	*33*	*51*

BROWNFIELDS DATABASES

NJ BROWNFIELDS: Brownfields are identified as formter or current commmercial or industrial use sites that are presently vacant or underutilized, on which there is suspected to have been a discharge of a contamination to the soil or groundwater at concentra tions greater than applicable cleanup criteria.

A review of the Brownfields list, as provided by EDR, and dated 04/01/2001 has revealed that there is 1 Brownfields site within approximately 1.5 miles of the target property.

Lower Elevation	Address	Dist / Dir	Map ID	Page
US COAST GUARD TRAINING CENTER	*1 MUNRO DR*	*1 - 2 SSW*	*34*	*52*

EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped:

Site Name	Database(s)
GULF SERVICE STATION CAPE MAY CITY	SHWS
RITE AID OF NJ INC	SHWS
TONY'S MARINE RAILWAY INC	NJPDES
CITY OF CAPE MAY PUBLIC WORKS	NJPDES
TRANQUILITY PARK NORTH	NJPDES
ROBBRO LLC	NJPDES
SHELL SERV STA-CAPE MAY	NJPDES
BIDWELL CREEK MARINA	NJPDES
EAGLE LAUNDRY GROUNDWATER INVEST	NJPDES
STORM SEWER OCEAN OUTFALL	NJPDES
NORTH WILDWOOD CITY OF	NJPDES
WESTWOOD MOBILE ESTATE/REEVES	NJPDES
WILDWOOD CITY OF	NJPDES
WILDWOOD CITY OF	NJPDES
SHAWCREST MOBILE HOME PARK	NJPDES
WILDWOOD STP CITY OF	NJPDES
WILDWOOD CREST STP	NJPDES
LEPOR & SONS COMPOST	SWF/LF
NJ TRANSIT TRAIN STATION (FORMER)	LUST
THE APPLIANCE STORE	LUST
FORMER GETTY S/S/LION LIMO	LUST
BOHM'S SOD FARM	UST
CAPE ISLAND YACHT CORP	RCRIS-SQG, FINDS
CAPE MAY DEPT OF PUBLIC WORKS	RCRIS-SQG, FINDS
EVERLON FABRICS	RCRIS-SQG, FINDS
CAPE MAY CO-SCHELLENGER LANDING BR	RCRIS-SQG, FINDS
ATLANTIC ELECTRIC - CAPE MAY SUBST	RCRIS-SQG, FINDS
BORDEN CLAM PRODUCTS	RCRIS-SQG
PIPEWELDERS MARINE INC	RCRIS-SQG, FINDS
CAPE MAY POINT LIGHTHOUSE	RCRIS-SQG, FINDS
CAPE MAY CO BRG COMM MIDDLE THOROF	RCRIS-SQG, FINDS
CAPE MAY COUNTY OF	RCRIS-SQG, FINDS
CAPE MAY CO BRG COMM GRASSY SOUND	RCRIS-SQG, FINDS
NJ HWY AUTH - WILDWOOD N RAMP TOLL	RCRIS-SQG, FINDS
NJ HWY AUTH - WILDWOOD S RAMP TOLL	RCRIS-SQG, FINDS
EDS TEXACO	RCRIS-SQG, FINDS
ATLANTIC ELECTRIC - WILDWOOD SUBST	RCRIS-SQG, FINDS
CAPE MAY - LEWES FERRY	FINDS, RCRIS-LQG
CAPE MAY BRIDGE	NJ Spills, NJ Release
BEACH AT	NJ Spills, NJ Release
CAPE MAY WATER WORKS BLDG/DPW	NJ Spills
CAPE MAY CITY WTR	NJ Spills
CAPE AVE BEACH AT THE END OF	NJ Spills
CAPE MAY MUA	NJ Spills
WATERS EDGE-	NJ Spills, NJ Release
OCEAN ATLANTIC TEXTILES	NJ Spills
U.S.C.G. TRAINING CENTER	NJ Spills, NJ Release
ALONG ROADSIDE	NJ Spills, NJ Release
CAPE CONCRETE CO	NJ Spills
CAPE MAY CTY AIRPORT & IND PAR	NJ Spills
CML FERRY CO.	NJ Spills, NJ Release
CAPE MAY FERRY TERMINAL	NJ Spills
WOODED AREA	NJ Spills, NJ Release
ON THE BEACH	NJ Spills, NJ Release
IN FRONT OF FAMILY DOLLAR	NJ Spills, NJ Release
ON THE ROADWAY	NJ Spills, NJ Release
IN STORM DRAINS	NJ Spills, NJ Release
BEHIND MCDONALDS	NJ Spills, NJ Release
ON ROAD AT 15TH AVE &	NJ Spills, NJ Release

ZABERER'S RESTAURANT	NJ Spills, NJ Release
MAN HOLE	NJ Spills, NJ Release
AREA OF	NJ Spills, NJ Release
MID TOWN MOTEL	NJ Spills, NJ Release
ON RIO GRANDE AVE AND PARK A	NJ Spills, NJ Release
AREA OF	NJ Spills, NJ Release
SIGHT SEERER CORP	NJ Spills, NJ Release
AREA OF	NJ Spills, NJ Release
AMORE HOTEL	NJ Spills, NJ Release
AMARI MOTEL	NJ Spills, NJ Release
WILDWOOD CITY HALL	NJ Spills, NJ Release
ON ROAD AT INTC SUSQUAHANNA &	NJ Spills, NJ Release
INTERSECTION OF	NJ Spills, NJ Release
APARTMENT BUILDING	NJ Spills, NJ Release
MONTEREY MOTEL	NJ Spills, NJ Release
100 BLOCK WEST FERN AVE +	NJ Spills, NJ Release
STORM DRAIN:	NJ Spills, NJ Release
COLD SPRING INLET	NJ Spills, NJ Release
ON BEACH	NJ Spills, NJ Release
PUBLIC WORKS GARAGE-REAR OF	NJ Spills, NJ Release
AREA OF	NJ Release
SOUTH JERSEY MARINA	NJ Release
NEXT TO SO JERSEY MARINA	NJ Release
SOUTH JERSEY MARINE	NJ Release
CAPE MAY MUA	NJ Release
CAPE MAY HARBOR	NJ Release
ATLANTIC OCEAN	NJ Release
CAPE MAY LEWES FERRY TERMINAL	NJ Release
CAPE MAY CANAL+CAPE IS.CR	NJ Release
CAPE MAY MARINE	NJ Release
PIER 4	NJ Release
ON BEACH TNT PROPERTY BY	NJ Release
2 MILE SANDING MARINA	NJ Release
HINCHES MARINA	NJ Release
MUA CAPE MAY COUNTY	NJ Release
CAPE MAY CNTY COURT HOUSE	NJ Release
CAPE MAY HARBOR	NJ Release
1/2 MILE OFF TOWN BEACH	NJ Release
CAPE MAY HARBOR	NJ Release
CAPE MAY LEWES	NJ Release
CAPE MAY HARBOR	NJ Release
IN CAPE MAY INLET	NJ Release
NJ TRANSIT (FORMER SITE)	NJ Release
MADISON AVE PUMPING STATION	NJ Release
MADISON AVE PUMP STATION	NJ Release
NEAR PACIFIC ON	NJ Release
ATLANTIC OCEAN	NJ Release
ATLANTIC OCEAN	NJ Release
CAPE MAY HARBOR OFF	NJ Release
CAPE MAY HARBOR	NJ Release
.5 MILE INSIDE CAPE MAY HBR	NJ Release
CAPE MAY HARBOR	NJ Release
CAPE MAY HARBOR	NJ Release
MIDDLE THOROFARE/HINCH MARINA	NJ Release
AREA OF	NJ Release
CANYON CLUB	NJ Release
AREA OF	NJ Release
AREA OF HINCH MARINA	NJ Release
FISHING DOCK	NJ Release
BREAZY LEE YACHT BASIN	NJ Release
COHENS DOCK	NJ Release
AMERICAN CO OP	NJ Release

EXECUTIVE SUMMARY

ATLANTIC CAPE FISHERIS	NJ Release
OFF CAPE MAY HARBOR 1/8 MILE	NJ Release
SHELTON COLLEGE VACANT BLDG	NJ Release
USCG BASE CAPE MAY	NJ Release
USCG TRINING CTR	NJ Release
CAPE MAY USCG	NJ Release
BEACH COMBER CAMPING RESORT	NJ Release
AREA OF BRANDY WINE LIGHT	NJ Release
CAPE MAY HARBOR	NJ Release
ATLANTIC CAPE FISHERIES	NJ Release
CAPE MAY WHALE WATCH CENTER	NJ Release
3/4 IN SERVICE/LOU'S PIZZA	NJ Release
AREA OF DOC MIKES RESTAURANT	NJ Release
RONALD CORNWALL/CAPE ISL CAMP	NJ Release
CAPE MAY LEWES FERRY	NJ Release
CAPE MAY LEWIS FERRY	NJ Release
AREA OF	NJ Release
CAPE MAY CTY MUA	NJ Release
IN MARSH BY BRIDGE ON	NJ Release
SERVICE STATION	NJ Release
GEORGE'S SUNOCO	NJ Release
GEORGE SCHMIDT SUNOCO STA	NJ Release
AREA OF	NJ Release
INTERSECTION-WALNUT & SPRUCE	NJ Release
IIN WATERWAY	NJ Release
IIN WATERWAY	NJ Release
IIN WATERWAY	NJ Release
IIN WATERWAY	NJ Release
IIN WATERWAY	NJ Release
IIN WATERWAY	NJ Release
IIN WATERWAY	NJ Release
IIN WATERWAY	NJ Release
IIN WATERWAY	NJ Release
RICHARDSON'S CHANNEL	NJ Release
IN AREA OF	NJ Release
AREA OF	NJ Release
FISHING DOCK	NJ Release
FISHING DOCK	NJ Release
FISHING DOCK	NJ Release
FISHING DOCK	NJ Release
FISHING DOCK	NJ Release
FISHING DOCK	NJ Release
FISHING DOCK	NJ Release
FISHING DOCK	NJ Release
FISHING DOCK	NJ Release
FISHING DOCK	NJ Release
FISHING DOCK	NJ Release
FISHING DOCK	NJ Release
INTERSECTION OF	NJ Release
MILL CREEK MARINA	NJ Release
BACK BAY NEAR WILDWOOD STP	NJ Release
BACK BAY NEAR WILDWOOD STP	NJ Release
INTERSECTION OF GARFIELD &	NJ Release
AREA OF	NJ Release
OTTENS HARBOR	NJ Release
WILDWOOD AUTO SERVICE	NJ Release
ON ROADWAY	NJ Release
LION LIMOSINE SERVICE	NJ Release
GETTY STA	NJ Release
INTERSECTION OF	NJ Release
NATURAL GAS MAIN	NJ Release
GAS MAIN ON	NJ Release

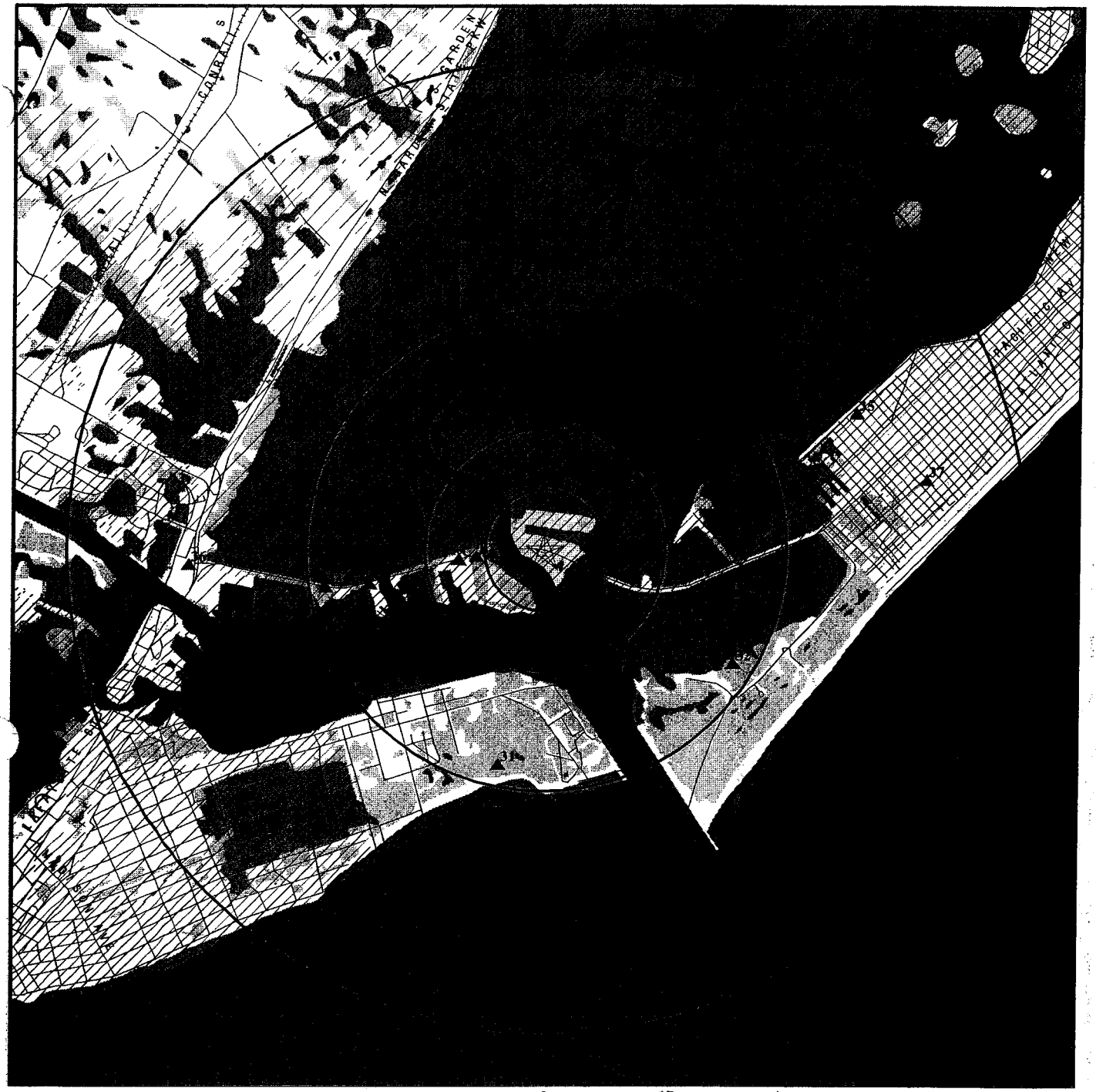
EXECUTIVE SUMMARY

AREA OF LOWER THOROFARE OFF	NJ Release
NEAR FISHING PIER	NJ Release
AREA OF LAKE VIEW DOCKS	NJ Release
TREATMENT PLANT	NJ Release
A AND J FISH HOUSE OCEAN DRIVE	ERNS
ATLANTIC CAPE FISHERIES DOCK / 985	ERNS
ATLANTIC CAPE FISHERIES IN I.C.W.	ERNS
ATLANTIC CAPE FISHERIES	ERNS
BAYSIDE JETTY CAPE MAY	ERNS
BRIDGE OVER SKUNK SOUND ON OCEAN D	ERNS
CAPE MAY HARBOR	ERNS
CAPE MAY HARBOR	ERNS
CAPE MAY HARBOR FAROH'S CUT	ERNS
CAPE MAY LEWIS FERRY TERMINAL	ERNS
CAPE MAY MARINE	ERNS
CAPE MAY MARINE	ERNS
CAPE MAY CANAL, 50 YRDS FROM JETTY	ERNS
CAPE MAY RR BRIDGE	ERNS
CAPE MAY HARBOR CAPE MAY YACHT CLU	ERNS
CAPE MAY FISHERIES DOCK - 985 OCEA	ERNS
CAPE MAY HARBOR	ERNS
CAPE MAY USCG BASE	ERNS
CAPE MAY HARBOR	ERNS
CAPE MAY HARBOR	ERNS
CAPE MAY - NEAR 2 MILE BRIDGE	ERNS
CAPE MAY HARBOR	ERNS
CAPE MAY HARBOR SCHELLENGER CREEK	ERNS
CAPE MAY HARBOR	ERNS
CAPE MAY HARBOR	ERNS
CAPE MAY HARBOR	ERNS
CAPE MAY HARBOR	ERNS
CAPE MAY HARBOR	ERNS
CAPE MAY HARBOR	ERNS
CAPE MAY HARBOR 38 57 N 74 53 W	ERNS
CAPE MAY HARBOR	ERNS
CAPE MAY HARBOR/FAROH'S CUT	ERNS
CAPE MAY HARBOR CPE MAY COAST GUAR	ERNS
CAPE ISLAND CREEK	ERNS
CAPE MAY HARBOR	ERNS
CAPE MAY USCG STATION	ERNS
CAPE MAY HARBOR	ERNS
COMMANDING OFFICER USCG TRAINING C	ERNS
COMPANY DOCK 985 OCEAN DR.	ERNS
CONTRACTOR FOR CAPE MAY BRIDGE COM	ERNS
DELAWARE BAY 3 MILES WEST OF CAPE	ERNS
HARBOR OFF OCEAN DRIVE	ERNS
HINCHES MARINA ON CAPE MAY HARBOR	ERNS
ON INLAND WATERWAY .5 MILE INSIDE	ERNS
INTERCOASTAL WATERWAY - 985 OCEAN	ERNS
SOUTH JERSEY MARINA AT CAPE MAY HA	ERNS
SOUTH JERSEY MARINA CAPE MAY HARBO	ERNS
LAGOON OFF MIDDLE THORO- FARES. DO	ERNS
3 MILES OFFSHORE OF CAPE MAY INLET	ERNS
38 MILES EAST OF CAPE MAY	ERNS
38 MILES EAST OF CAPE MAY	ERNS
38 MILES EAST OF CAPE MAY	ERNS
MILL CREEK OFF OCEAN DRIVE	ERNS
MILL CREEK OFF OCEAN DRIVE	ERNS
OCEAN DRIVE (ROUTE 621)	ERNS
989 OCEAN DRIVE	ERNS
989 OCEAN DRIVE	ERNS
985 OCEAN DR.	ERNS

EXECUTIVE SUMMARY

OCEAN DRIVE AT CAPE MAY	ERNS
989 OCEAN DRIVE	ERNS
985 OCEAN DRIVE	ERNS
985 OCEAN DR	ERNS
985 OCEAN DR	ERNS
989 OCEAN DRIVE	ERNS
985 OCEAN DRIVE/ATLANTIC CAPE FISH	ERNS
989 OCEAN DR OFF INTRACOASTAL WATE	ERNS
997 OCEAN DR AT THE DOCK	ERNS
989 OCEAN DR BACKWATER LAGOON	ERNS
994 OCEAN DRIVE PROCESSING PLANT V	ERNS
994 OCEAN DRIVE BORDEN CLAM PRODUC	ERNS
OCEAN DR.	ERNS
985 OCERN DRIVE ATLANTIC CAPE FISH	ERNS
OFF CAPE MAY HARBOR 1/8 MI N OF 2	ERNS
OFFSHORE SHEEN 40 MILES EAST OF CA	ERNS
OIL SHEEN - 3 MILES OFF CAPE MAY C	ERNS
PATROL BOAT PIER USCG BASE CAPE MA	ERNS
PIER 4 SUPCEN CAPE MAY	ERNS
PIER 4 TRACEN CAPE MAY	ERNS
SKUNK SOUND - CAPE MAY HARBOR	ERNS
USCG TRACEN CAPE MAY/PIER 4/USCG V	ERNS
USCG TRACEN CAPE MAY PIER NO. 4	ERNS
USCG STATION CAPE MAY	ERNS
USCGC VIGOROUS USCG TRACEN CAPE MA	ERNS
USCGC VIGOROUS USCG TRACEN CAPE MA	ERNS
USCGC VIGOROUS USCG TRACEN CAPE MA	ERNS
CAPE MAY LEWES FERRI TERMINAL	ERNS
1ST AVE AND OLD NJ AVE	ERNS
OCEAN DRIVE - ACROSS FROM PORT ARE	ERNS
OCEAN DR ACROSS FROM PORT AREA IN	ERNS
CITY OF CAPE MAY PUBLIC WORKS	FINDS
CAPE MAY OMS	FINDS
CE-CAPE MAY DREDGE	FINDS
CE CAPE MAY DREDGE	FINDS
USCG-CAPE MAY LIGHT	FINDS
BAKER-HUGHES D.B.A. ICO INC.	FINDS
NJ TRANSIT - WILDWOOD GARAGE	FINDS

OVERVIEW MAP - 00987371.1r - Parsons Brinckerhoff



★ Target Property

▲ Sites at elevations higher than or equal to the target property

◆ Sites at elevations lower than the target property

Coal Gasification Sites

National Priority List Sites

Landfill Sites

Dept. Defense Sites

0 1/2 1 2 Miles

Oil & Gas pipelines

100-year flood zone

500-year flood zone

Wetlands

NJ Wetlands

TARGET PROPERTY:	Ocean D, Cape May, NJ	CUSTOMER:	Parsons Brinckerhoff
ADDRESS:	Ocean Dr/Wissahickon Ave	CONTACT:	Anna Woznyj
CITY/STATE/ZIP:	Cape May NJ 08204	INQUIRY #:	00987371.1r
LAT/LONG:	38.9572 / 74.8773	DATE:	June 02, 2003 3:19 pm

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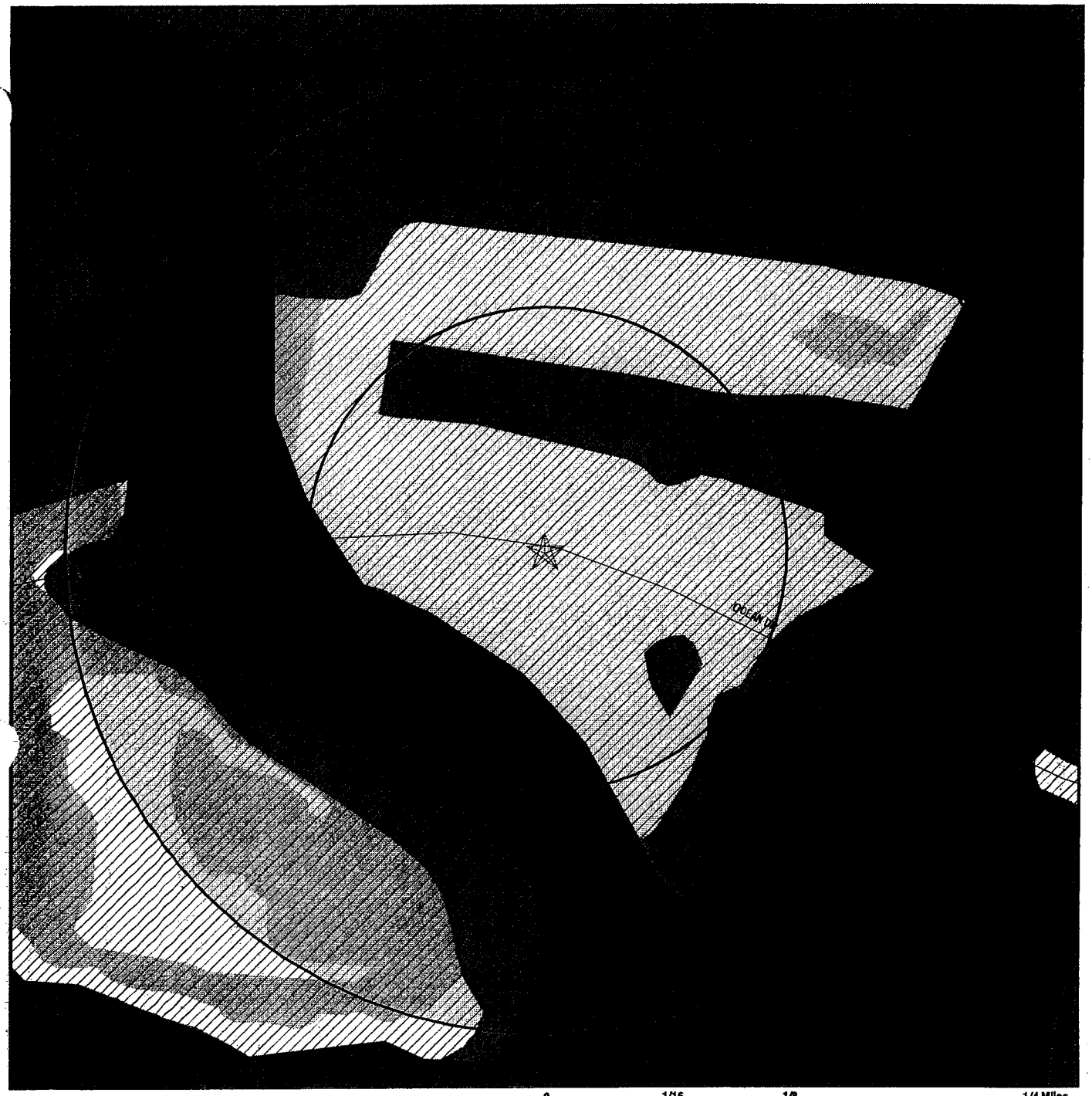
DETAIL MAP - 00987371.1r - Parsons Brinckerhoff



0 1/16 1/8 1/4 Miles

- ★ Target Property
- ▲ Sites at elevations higher than or equal to the target property
- ◆ Sites at elevations lower than the target property
- Coal Gasification Sites
- Sensitive Receptors
- National Priority List Sites
- Landfill Sites
- Dept. Defense Sites
- Oil & Gas pipelines
- 100-year flood zone
- 500-year flood zone
- Wetlands
- NJ Wetlands

TARGET PROPERTY:	Ocean D, Cape May, NJ	CUSTOMER:	Parsons Brinckerhoff
ADDRESS:	Ocean Dr/Wissahickon Ave	CONTACT:	Anna Woznyj
CITY/STATE/ZIP:	Cape May NJ 08204	INQUIRY #:	00987371.1r
LAT/LONG:	38.9572 / 74.8773	DATE:	June 02, 2003 3:19 pm

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MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
FEDERAL ASTM STANDARD								
NPL		2.000	0	0	0	0	0	0
Proposed NPL		2.000	0	0	0	0	0	0
CERCLIS		1.500	0	0	0	0	0	0
CERC-NFRAP		1.250	0	0	0	0	0	0
CORRACTS		2.000	0	0	0	0	0	0
RCRIS-TSD		1.500	0	0	0	0	0	0
RCRIS Lg. Quan. Gen.		1.250	0	0	0	0	0	0
RCRIS Sm. Quan. Gen.		1.250	0	2	0	1	0	3
ERNS		1.000	0	6	7	0	NR	13
STATE ASTM STANDARD								
State Haz. Waste		2.000	0	0	0	0	2	2
State Landfill		1.500	0	0	0	0	0	0
LUST		1.500	0	1	1	0	3	5
UST		1.250	0	1	0	2	0	3
FEDERAL ASTM SUPPLEMENTAL								
CONSENT		2.000	0	0	0	0	0	0
ROD		2.000	0	0	0	0	0	0
Delisted NPL		2.000	0	0	0	0	0	0
FINDS		1.000	0	3	2	2	NR	7
HMIRS		1.000	0	0	0	0	NR	0
MLTS		1.000	0	0	0	0	NR	0
MINES		1.250	0	0	0	0	0	0
NPL Liens		1.000	0	0	0	0	NR	0
PADS		1.000	0	0	0	0	NR	0
DOD		2.000	0	0	0	0	0	0
RAATS		1.000	0	0	0	0	NR	0
TRIS		1.000	0	0	0	0	NR	0
TSCA		1.000	0	0	0	0	NR	0
SSTS		1.000	0	0	0	0	NR	0
FTTS		1.000	0	1	0	0	NR	1
STATE OR LOCAL ASTM SUPPLEMENTAL								
NJ Major Facilities		1.500	0	0	0	0	0	0
NJ Spills		1.000	0	4	1	1	NR	6
NJ Release		1.000	0	1	3	1	NR	5
NJ PF		1.000	0	0	0	0	NR	0
CHROME		1.000	0	0	0	0	NR	0
NJPDES		1.000	0	1	2	1	NR	4
EDR PROPRIETARY HISTORICAL DATABASES								
Coal Gas		2.000	0	0	0	0	0	0

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
BROWNFIELDS DATABASES								
Brownfields		1.500	0	0	0	0	1	1
INST CONTROL		1.250	0	0	0	0	0	0

NOTES:

AQUIFLOW - see EDR Physical Setting Source Addendum

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

Coal Gas Site Search: No site was found in a search of Real Property Scan's ENVIROHAZ database.

A1 **MIDDLE THOROFARE** **NJ Release** **S102226880**
West **997 OCEAN DR** **N/A**
1/8-1/4 **CAPE MAY, NJ**
1150 ft.

Site 1 of 15 in cluster A

Relative:
Equal

Actual:
1 ft.

NJ Release:

Facility ID:	8430.00000	Case Number:	96-5-29-1512-37
Date Received:	05/29/1996	Operator:	ROB
Location:	Other	Nature of Incident:	Other
Facility Phone:	Not reported	Facility Type:	Commercial
Date of Incident:	05/29/1996	Time of Incident:	14:45
Substance(s):	DIESEL FUEL		
Substance Type:	Liquid	Substance Identity:	Known
Unit:	Not reported		
Official:			
Notification:	Not reported		
Name:	Not reported		
Phone:	Not reported		
Date:	Not reported		
Time:	Not reported		
Description:	Not reported		
Notify:	Not reported		
Method:	Not reported		
Contained:	Not reported		
A310 Letter:	Yes	TCPA Chemical:	No
Hazrds Material:	Yes	CAS Number:	Not reported
COMU:	0502	Ref. Code:	002
Amnt Released:	10 GALS		
Release Type:	Terminated	Contained:	Yes
Injuries:	No	Facility Evacuation:	No
Public Exposure:	No	Public Evacuation:	No
Police at Scene:	No	Firemen at Scene:	No
Contamination of:	Water	Receiving Water:	MIDDLE THOROFARE
Caller:			
Name:	NRC/FAX	Title:	Not reported
Address:	Not reported		
Telephone:	800-424-8802		
Responsible Party:			
Name:	Suspected	Company:	WHITE DOVE TOOL INC.
Contact:	MICHAEL GENOVESE	Title:	Not reported
Address:	997 OCEAN DR CAPE MAY, NJ		
County:	CAPE MAY	Telephone:	609-729-9050
NJ Spill:			
Name:	NJSP/OEM	Title:	FAXED
Telephone:	609-882-2000		
Date:	5/29/1996	Time:	Not reported
Local Municipality:			
Name:	CAPE MAY CITY	Municipality Title:	OPR. #600
Telephone:	609-884-9500		
Date:	5/29/1996	Time:	15:24
Other:			
Name:	Not reported	Title:	Not reported
Telephone:	Not reported		

MIDDLE THOROFARE (Continued) **S102226880**

Date:	Not reported	Time:	15:24
Incident:			
Name:	Not reported	Referred To:	Not reported
Region:	Not reported	Telephone:	Not reported
Date:	Not reported	Incident Time:	Not reported
ITM:	Not reported		

Incident Description:	Spill
Incident Type:	Not reported
Wind Direction/Speed:	Not reported
Office Notified:	Not reported
Off Notified Phone:	Not reported
Date Office Notified:	Not reported
Assistance Requested:	No
Date A310 Letter Printed:	Not reported
Date Local Authority Was Notified:	Not reported
Date Update:	Not reported
Date Report Faxed to Local Authority:	Not reported
Local Authority Notification Date 1:	Not reported
Local Authority Notification Date 2:	Not reported
Local Authority Notification Date 3:	Not reported
Status at Spill:	F/V WHITE DOVE/OVERFILLED FUEL TANKS AND MATERIAL WAS RELEASED THROUGH THE VENTS. LEAK IS SECURED/BOOMS ARE DEPLOYED/ABSORENT PADS ARE BEING USED.
Comments:	Not reported

A2
West
1/8-1/4
1150 ft.

Relative:
Equal

Actual:
1 ft.

997 OCEAN DR
997 OCEAN DR
CAPE MAY, NJ 08204

Site 2 of 15 in cluster A

ERNS **96498569**
N/A

A3
West
1/8-1/4
1150 ft.

Relative:
Equal

Actual:
1 ft.

LUNDS FISHERIES INC
997 OCEAN DR
CAPE MAY, NJ 08204

Site 3 of 15 in cluster A

RCRIS-SQG **1000192394**
FINDS **NJD069020774**
LUST
UST

RCRIS:

Owner:	LUND'S FISHERIES INC (212) 555-1212
EPA ID:	NJD069020774
Contact:	JEFFREY REICHLE (609) 729-9050
Classification:	Small Quantity Generator
Used Oil Recyc:	No
TSDF Activities:	Not reported

LUNDS FISHERIES INC (Continued) **1000192394**

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

LUST:

Case ID:	89-07-20-1500
Facility Status:	Site Issued Letter of No Further Action
Facility Phone:	Not reported
UST ID:	0182342
Lead Program Assigned to Case:	Bureau of Underground Storage Tanks
TMS Number:	Not reported
Remedial Level:	Not reported
Case Manager:	Not reported
No Further Action:	12/20/1991 0:00:00
RAW Approved:	Not reported
CEA:	Not reported
Date CEA Lifted:	Not reported
Dead Notice:	Not reported

UST:

Facility ID:	0182342	Facility Status:	Inactive
Install Date:	1/1/44 0:00:00	Facility Type:	B. COMMERCIAL/INDUSTRIAL
Unique Tank ID:	3.00	Owner Tank ID:	E1

Operator:	Not reported
Operator Address:	Not reported
Owner:	LIND'S FISHERIES
Owner Address:	997 OCEAN DRIVE CAPE MAY, NJ 08204
Tank Capacity:	1000.00 Gallons
Tank Contents:	F. WASTE OIL
Tank Construction:	D. FIBERGLASS-REINFORCED PLASTIC
Tank Structure:	A. SINGLE WALL
Pipe Contents:	B. CATHODICALLY PROTECTED STEEL
Pipe Structure:	A. SINGLE WALL
Over Fill Products:	No
Spill Containment Around Fill Pipe:	No
Tank Status:	F. Abandoned in Place
Date Tank Removed:	Not reported
Date Tank Abandoned in Place:	8/10/89 0:00:00
Date Tank Taken Out of Service:	Not reported
Date of Tank Sale or Transfer:	Not reported
Tank Closure Number:	Not reported
Tank ISRA Number:	Not reported
Tank in Wellhead Protection Area:	Not reported
Is Facility in Compliance Rules:	No

LUNDS FISHERIES INC (Continued) **1000192394**

Facility ID:	0182342	Facility Status:	Inactive
Install Date:	1/1/44 0:00:00	Facility Type:	B. COMMERCIAL/INDUSTRIAL
Unique Tank ID:	1.00	Owner Tank ID:	C1
Operator:	Not reported		
Operator Address:	Not reported		
Owner:	LIND'S FISHERIES		
Owner Address:	997 OCEAN DRIVE CAPE MAY, NJ 08204		
Tank Capacity:	4000.00 Gallons		
Tank Contents:	B. UNLEADED GASOLINE		
Tank Construction:	B. CATHODICALLY PROTECTED STEEL		
Tank Structure:	A. SINGLE WALL		
Pipe Contents:	B. CATHODICALLY PROTECTED STEEL		
Pipe Structure:	A. SINGLE WALL		
Over Fill Products:	No		
Spill Containment Around Fill Pipe:	No		
Tank Status:	G. REMOVED 8/27/89		
Date Tank Removed:	Not reported		
Date Tank Abandoned in Place:	Not reported		
Date Tank Taken Out of Service:	Not reported		
Date of Tank Sale or Transfer:	Not reported		
Tank Closure Number:	Not reported		
Tank ISRA Number:	Not reported		
Tank in Wellhead Protection Area:	Not reported		
Is Facility in Compliance Rules:	No		

Facility ID:	0182342	Facility Status:	Inactive
Install Date:	1/1/44 0:00:00	Facility Type:	B. COMMERCIAL/INDUSTRIAL
Unique Tank ID:	2.00	Owner Tank ID:	C2
Operator:	Not reported		
Operator Address:	Not reported		
Owner:	LIND'S FISHERIES		
Owner Address:	997 OCEAN DRIVE CAPE MAY, NJ 08204		
Tank Capacity:	4000.00 Gallons		
Tank Contents:	B. UNLEADED GASOLINE		
Tank Construction:	B. CATHODICALLY PROTECTED STEEL		
Tank Structure:	A. SINGLE WALL		
Pipe Contents:	B. CATHODICALLY PROTECTED STEEL		
Pipe Structure:	A. SINGLE WALL		
Over Fill Products:	No		
Spill Containment Around Fill Pipe:	No		
Tank Status:	F. Abandoned in Place		
Date Tank Removed:	Not reported		
Date Tank Abandoned in Place:	8/10/89 0:00:00		
Date Tank Taken Out of Service:	Not reported		
Date of Tank Sale or Transfer:	Not reported		
Tank Closure Number:	Not reported		
Tank ISRA Number:	Not reported		
Tank in Wellhead Protection Area:	Not reported		
Is Facility in Compliance Rules:	No		

Map ID / Direction / Distance / Distance (ft.) / Elevation	Site	Database(s)	EDR ID Number / EPA ID Number
A4 West 1/8-1/4 1150 ft. Relative: Equal Actual: 1 ft.	997 OCEAN DRIVE 997 OCEAN DRIVE CAPE MAY, NJ 08204 Site 4 of 15 in cluster A	ERNS	96499738 N/A
A5 West 1/8-1/4 1150 ft. Relative: Equal Actual: 1 ft.	997 OCEAN DR 997 OCEAN DR CAPE MAY, NJ 08204 Site 5 of 15 in cluster A	ERNS	96493474 N/A
A6 West 1/8-1/4 1150 ft. Relative: Equal Actual: 1 ft.	997 OCEAN DRIVE 997 OCEAN DRIVE CAPE MAY, NJ 08204 Site 6 of 15 in cluster A	ERNS	96507864 N/A
A7 West 1/8-1/4 1298 ft. Relative: Equal Actual: 1 ft.	994 OCEAN DR 994 OCEAN DR CAPE MAY, NJ 08204 Site 7 of 15 in cluster A	ERNS	93344679 N/A

A8 West 1/8-1/4 1298 ft. **SNOW'S/DOXSEE** **RCRIS-SQG 1000434777**
994 OCEAN DR **FINDS NJD002347789**
CAPE MAY, NJ 08204

Site 8 of 15 in cluster A

Relative: Equal

Actual: 1 ft.

RCRIS:
Owner: SNOWS DOXSEE INC
(609) 884-0440
EPA ID: NJD002347789
Contact: ROBERT BURGESS
(609) 884-0440
Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported

Violation Status: Violations exist

Regulation Violated: Not reported
Area of Violation: GENERATOR-ALL REQUIREMENTS (OVERSIGHT)
Date Violation Determined: 06/17/1996
Actual Date Achieved Compliance: 07/22/1996

Enforcement Action: WRITTEN INFORMAL
Enforcement Action Date: 06/17/1996
Penalty Type: Not reported

Regulation Violated: Not reported
Area of Violation: GENERATOR-MANIFEST REQUIREMENTS
Date Violation Determined: 06/17/1996
Actual Date Achieved Compliance: 07/22/1996

Regulation Violated: Not reported
Area of Violation: GENERATOR-MANIFEST REQUIREMENTS
Date Violation Determined: 09/09/1992
Actual Date Achieved Compliance: 09/09/1992

There are 3 violation record(s) reported at this site:

Evaluation	Area of Violation	Date of Compliance
Non-Financial Record Review	GENERATOR-ALL REQUIREMENTS (OVERSIGHT)	19960722
Compliance Evaluation Inspection	GENERATOR-ALL REQUIREMENTS (OVERSIGHT)	19960722
	GENERATOR-MANIFEST REQUIREMENTS	19960722
Compliance Schedule Evaluation	GENERATOR-MANIFEST REQUIREMENTS	19920909
Compliance Evaluation Inspection	GENERATOR-MANIFEST REQUIREMENTS	19920909

FINDS:
Other Pertinent Environmental Activity Identified at Site:
AIRS Facility System (AIRS/AFS)
Facility Registry System (FRS)
National Compliance Database (NCDB)
Permit Compliance System (PCS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

A9
West
1/8-1/4
1298 ft.

Relative:
Equal

Actual:
1 ft.

SWANS/DOXSEE, INC
994 OCEAN DRIVE
CAPE MAY, NJ 08204

Site 9 of 15 in cluster A

FTTS **1006453138**
N/A

FTTS Insp:

Region:	E
Inspected Date:	1998042100
Insp Number:	1998042100
Violation occurred:	No
Inspector:	Not reported
Investigation Type:	04/21/
Facility Function:	A.
Investig Reason:	100
Legislation Code:	EPCRA

A10
West
1/8-1/4
1298 ft.

Relative:
Equal

Actual:
1 ft.

994 OCEAN DR
994 OCEAN DR
CAPE MAY, NJ 08204

Site 10 of 15 in cluster A

ERNS **93344675**
N/A

A11
West
1/8-1/4
1298 ft.

Relative:
Equal

Actual:
1 ft.

SNOW'S DOXFEE
994 OCEAN DR
LOWER TWP, NJ 08204

Site 11 of 15 in cluster A

NJ Spills **S104865061**
N/A

NJ Spill:

Facility ID:	69136.00000	Case Number:	00-10-11-1026-35
Date Received:	10/11/2000	Operator:	Not reported
Location:	Facility	Nature of Incident:	Not reported
Facility Phone:	609-884-0440	Facility Type:	Industrial
Official Notif Name:	Not reported	Official Notif Phone:	Not reported
Official Notif Date:	Not reported	Official Notif Time:	Not reported
Official Notif Desc:	Not reported		
Date of Incident:	10/10/2000	Time of Incident:	18:00
Substance(s):	PROPYLENE GLYCOL		
Substance Type:	Liquid	Substance Identity:	Known
A310 Letter:	Not reported	TCPA Chemical:	No
Hazrds Material:	No	CAS Number:	57556
COMU:	0505	Ref. Code:	Not reported
Amnt Released:	300.00000	Release VE:	Not reported
Release Type:	Terminated	Contained:	Not reported
Injuries:	No	Facility Evacuation:	No
Public Exposure:	No	Public Evacuation:	No
Police at Scene:	No	Firemen at Scene:	No
Contamination of:	Land	Receiving Water:	Not reported
Caller:			
Name:	GARY DIETZE	Title:	SNOW'S DOXFEE
Address:	994 OCEAN DR		
	LOWER TWP, NJ		
Phone:	609-884-0440		

SNOW'S DOXFEE (Continued) **S104865061**

Responsible Party:

Name:	Known	Company:	SNOW'S DOXFEE
Contact:	GARY DIETZE	Title:	PROJ COORD
Address:	994 OCEAN DR LOWER TWP, NJ		
County:	CAPE MAY	Phone:	609-884-0440

NJ Spill:

Name:	Not reported	Title:	Not reported
Phone:	Not reported		
Date:	Not reported	Time:	Not reported

Local Municipality:

Name:	Not reported	Title:	Not reported
Phone:	Not reported		
Date:	Not reported	Time:	Not reported

Other:

Name:	Not reported	Title:	Not reported
Phone:	Not reported		
Date:	Not reported	Time:	Not reported

Incident:

Name:	Not reported	Referred To:	Not reported
Region:	Not reported	Telephone:	Not reported
Date:	Not reported	Incident Time:	Not reported
ITM:	Not reported		

Incident Description:	Not reported
Wind Direction/Speed:	Not reported
Official Notofication Info:	OEP-WATER
Official Notify:	Southern
Method:	Faxed, Mailed
Notify Type:	Facility
NJ Spill Type:	Not reported
Unit:	GALS.
Contained:	Yes
Assistance Requested:	No
Date A310 Letter Printed:	Not reported
Date Local Authority Was Notified:	Not reported
Date Update:	Not reported
Date Report Faxed to Local Authority:	Not reported
Local Authority Notification Date 1:	Not reported
Local Authority Notification Date 2:	Not reported
Local Authority Notification Date 3:	Not reported
Status at Spill:	Not reported
Comments:	Not reported

Facility ID:	69136.00000	Case Number:	00-10-11-1026-35
Date Received:	10/11/2000	Operator:	Not reported
Location:	Facility	Nature of Incident:	Not reported
Facility Phone:	609-884-0440	Facility Type:	Industrial
Official Notif Name:	Not reported	Official Notif Phone:	Not reported
Official Notif Date:	Not reported	Official Notif Time:	Not reported
Official Notif Desc:	Not reported		
Date of Incident:	10/10/2000	Time of Incident:	18:00
Substance(s):	PROPYLENE GLYCOL		
Substance Type:	Liquid	Substance Identity:	Known
A310 Letter:	Not reported	TCPA Chemical:	No
Hazrds Material:	No	CAS Number:	57556
COMU:	0505	Ref. Code:	Not reported
Amnt Released:	300.00000	Release VE:	Not reported

SNOW'S DOXFEE (Continued) **S104865061**

Release Type:	Terminated	Contained:	Not reported
Injuries:	No	Facility Evacuation:	No
Public Exposure:	No	Public Evacuation:	No
Police at Scene:	No	Firemen at Scene:	No
Contamination of:	Land	Receiving Water:	Not reported
Caller:			
Name:	GARY DIETZE	Title:	SNOW'S DOXFEE
Address:	994 OCEAN DR LOWER TWP, NJ		
Phone:	609-884-0440		
Responsible Party:			
Name:	Known	Company:	SNOW'S DOXFEE
Contact:	GARY DIETZE	Title:	PROJ COORD
Address:	994 OCEAN DR LOWER TWP, NJ		
County:	CAPE MAY	Phone:	609-884-0440
NJ Spill:			
Name:	Not reported	Title:	Not reported
Phone:	Not reported		
Date:	Not reported	Time:	Not reported
Local Municipality:			
Name:	Not reported	Title:	Not reported
Phone:	Not reported		
Date:	Not reported	Time:	Not reported
Other:			
Name:	Not reported	Title:	Not reported
Phone:	Not reported		
Date:	Not reported	Time:	Not reported
Incident:			
Name:	Not reported	Referred To:	Not reported
Region:	Not reported	Telephone:	Not reported
Date:	Not reported	Incident Time:	Not reported
ITM:	Not reported		

Incident Description:	Not reported
Wind Direction/Speed:	Not reported
Official Notofication Info:	OEM
Official Notify:	NJSP
Method:	Faxed
Notify Type:	Facility
NJ Spill Type:	Not reported
Unit:	GALS.
Contained:	Yes
Assistance Requested:	No
Date A310 Letter Printed:	Not reported
Date Local Authority Was Notified:	Not reported
Date Update:	Not reported
Date Report Faxed to Local Authority:	Not reported
Local Authority Notification Date 1:	Not reported
Local Authority Notification Date 2:	Not reported
Local Authority Notification Date 3:	Not reported
Status at Spill:	Not reported
Comments:	Not reported

Facility ID:	69136.00000	Case Number:	00-10-11-1026-35
Date Received:	10/11/2000	Operator:	Not reported
Location:	Facility	Nature of Incident:	Not reported
Facility Phone:	609-884-0440	Facility Type:	Industrial

SNOW'S DOXFEE (Continued) **S104865061**

Official Notif Name: Not reported
Official Notif Date: Not reported
Official Notif Desc: Not reported
Official Notif Phone: Not reported
Official Notif Time: Not reported
Date of Incident: 10/10/2000
Time of Incident: 18:00
Substance(s): PROPYLENE GLYCOL
Substance Type: Liquid
Substance Identity: Known
A310 Letter: Not reported
TCPA Chemical: No
Hazrds Material: No
CAS Number: 57556
COMU: 0505
Ref. Code: Not reported
Amnt Released: 300.00000
Release VE: Not reported
Release Type: Terminated
Contained: Not reported
Injuries: No
Facility Evacuation: No
Public Exposure: No
Public Evacuation: No
Police at Scene: No
Firemen at Scene: No
Contamination of: Land
Receiving Water: Not reported

Caller:
Name: GARY DIETZE
Title: SNOW'S DOXFEE
Address: 994 OCEAN DR
LOWER TWP, NJ
Phone: 609-884-0440

Responsible Party:
Name: Known
Company: SNOW'S DOXFEE
Contact: GARY DIETZE
Title: PROJ COORD
Address: 994 OCEAN DR
LOWER TWP, NJ
County: CAPE MAY
Phone: 609-884-0440

NJ Spill:
Name: Not reported
Title: Not reported
Phone: Not reported
Date: Not reported
Time: Not reported

Local Municipality:
Name: Not reported
Title: Not reported
Phone: Not reported
Date: Not reported
Time: Not reported

Other:
Name: Not reported
Title: Not reported
Phone: Not reported
Date: Not reported
Time: Not reported

Incident:
Name: Not reported
Referred To: Not reported
Region: Not reported
Telephone: Not reported
Date: Not reported
Incident Time: Not reported
ITM: Not reported

Incident Description: Not reported
Wind Direction/Speed: Not reported
Official Notofication Info: DFG
Official Notify: HQ
Method: Faxed
Notify Type: Facility
NJ Spill Type: Not reported
Unit: GALS.
Contained: Yes
Assistance Requested: No
Date A310 Letter Printed: Not reported
Date Local Authority Was Notified: Not reported
Date Update: Not reported
Date Report Faxed to Local Authority: Not reported

SNOW'S DOXFEE (Continued) **S104865061**

Local Authority Notification Date 1: Not reported
Local Authority Notification Date 2: Not reported
Local Authority Notification Date 3: Not reported
Status at Spill: Not reported
Comments: Not reported

Facility ID: 69136.00000
Date Received: 10/11/2000
Location: Facility
Facility Phone: 609-884-0440
Official Notif Name: Not reported
Official Notif Date: Not reported
Official Notif Desc: Not reported
Date of Incident: 10/10/2000
Substance(s): PROPYLENE GLYCOL
Substance Type: Liquid
A310 Letter: Not reported
Hazrds Material: No
COMU: 0505
Amnt Released: 300.00000
Release Type: Terminated
Injuries: No
Public Exposure: No
Police at Scene: No
Contamination of: Land

Case Number: 00-10-11-1026-35
Operator: Not reported
Nature of Incident: Not reported
Facility Type: Industrial
Official Notif Phone: Not reported
Official Notif Time: Not reported

Time of Incident: 18:00

Substance Identity: Known
TCPA Chemical: No
CAS Number: 57556
Ref. Code: Not reported
Release VE: Not reported
Contained: Not reported
Facility Evacuation: No
Public Evacuation: No
Firemen at Scene: No
Receiving Water: Not reported

Caller:
Name: GARY DIETZE
Address: 994 OCEAN DR
LOWER TWP, NJ
Phone: 609-884-0440

Title: SNOW'S DOXFEE

Responsible Party:
Name: Known
Contact: GARY DIETZE
Address: 994 OCEAN DR
LOWER TWP, NJ
County: CAPE MAY

Company: SNOW'S DOXFEE
Title: PROJ COORD

Phone: 609-884-0440

NJ Spill:
Name: Not reported
Phone: Not reported
Date: Not reported

Title: Not reported

Time: Not reported

Local Municipality:
Name: Not reported
Phone: Not reported
Date: Not reported

Title: Not reported

Time: Not reported

Other:
Name: Not reported
Phone: Not reported
Date: Not reported

Title: Not reported

Time: Not reported

Incident:
Name: Not reported
Region: Not reported
Date: Not reported
ITM: Not reported

Referred To: Not reported
Telephone: Not reported
Incident Time: Not reported

Incident Description: Not reported
Wind Direction/Speed: Not reported
Official Notofication Info: Not reported
Official Notify: OTHER

SNOW'S DOXFEE (Continued) **S104865061**

Method:	Not reported
Notify Type:	Facility
NJ Spill Type:	Not reported
Unit:	GALS.
Contained:	Yes
Assistance Requested:	No
Date A310 Letter Printed:	Not reported
Date Local Authority Was Notified:	Not reported
Date Update:	Not reported
Date Report Faxed to Local Authority:	Not reported
Local Authority Notification Date 1:	Not reported
Local Authority Notification Date 2:	Not reported
Local Authority Notification Date 3:	Not reported
Status at Spill:	Not reported
Comments:	Not reported

A12 **BORDEN CLAM PROCESSING FACILIT** **NJ Spills** **S104432314**
West **994 OCEAN DR** **N/A**
1/8-1/4 **CAPE MAY, NJ**
1298 ft.

Site 12 of 15 in cluster A

Relative: Equal

Actual: 1 ft.

NJ Spill:

Facility ID:	1399.00000	Case Number:	92-1-24-1438-56
Date Received:	01/24/1992	Operator:	CARM
Location:	Facility	Nature of Incident:	Facility
Facility Phone:	609-884-0440	Facility Type:	Rural
Official Notif Name:	Not reported	Official Notif Phone:	Not reported
Official Notif Date:	Not reported	Official Notif Time:	Not reported
Official Notif Desc:	Not reported		
Date of Incident:	01/22/1992	Time of Incident:	17:45
Substance(s):	SOIL CONTAMINATED W/HYDROCARBONS		
Substance Type:	Liquid	Substance Identity:	Known
A310 Letter:	Yes	TCPA Chemical:	No
Hazrds Material:	Yes	CAS Number:	Not reported
COMU:	0502	Ref. Code:	002
Amnt Released:	UNKNOWN	Release VE:	Not reported
Release Type:	Continuous	Contained:	No
Injuries:	No	Facility Evacuation:	No
Public Exposure:	No	Public Evacuation:	No
Police at Scene:	No	Firemen at Scene:	No
Contamination of:	Land	Receiving Water:	NONE

Caller:

Name:	KARL GOLINSKI	Title:	BORDEN CLAM FAC
Address:	994 OCEAN DR. CAPE MAY, NJ		
Phone:	609-884-0440		

Responsible Party:

Name:	Known	Company:	BORDEN CLAM PROCESSI
Contact:	KARL GOLINSKI	Title:	ENGINEER
Address:	994 OCEAN DR CAPE MAY, NJ		
County:	CAPE MAY	Phone:	609-884-0440

NJ Spill:

Name:	OEM	Title:	Not reported
Phone:	609-882-2000		
Date:	01/24/1992	Time:	Not reported

Local Municipality:

Name:	CAPE MAY CITY	Title:	OPER POWELL

BORDEN CLAM PROCESSING FACILIT (Continued) **S104432314**

Phone:	609-884-8414		
Date:	01/24/1992	Time:	14:48
Other:			
Name:	Not reported	Title:	Not reported
Phone:	Not reported		
Date:	/ /	Time:	Not reported
Incident:			
Name:	CHRIS HAGERMAN	Referred To:	DRPSR
Region:	ER2	Telephone:	Office,Maile
Date:	01/24/1992	Incident Time:	14:46
ITM:	T		
Name:	Not reported	Referred To:	DRPSR
Region:	Southern	Telephone:	Faxed
Date:	01/24/1992	Incident Time:	Not reported
ITM:	T		
Name:	Not reported	Referred To:	DRPSR
Region:	Not reported	Telephone:	Not reported
Date:	/ /	Incident Time:	Not reported
ITM:	Not reported		

Incident Description:	CONTAMINATED SOIL
Wind Direction/Speed:	Not reported
Official Notofication Info:	Not reported
Official Notify:	Not reported
Method:	Not reported
Notify Type:	Not reported
NJ Spill Type:	Not reported
Unit:	Not reported
Contained:	Not reported
Assistance Requested:	No
Date A310 Letter Printed:	01/24/1992
Date Local Authority Was Notified:	/ /
Date Update:	/ /
Date Report Faxed to Local Authority:	01/24/1992
Local Authority Notification Date 1:	/ /
Local Authority Notification Date 2:	/ /
Local Authority Notification Date 3:	/ /
Status at Spill:	CONTAMINATED SOIL ISOLATED IN LOADING PUMP AREA.STORAGE TANKS ARE ABOVE GROUND WITH PRODUCT.FOLLOW UP EVALUATION IN PROGRESS.
Comments:	Not reported

A13
West
1/8-1/4
1298 ft.

Relative:
Equal

Actual:
1 ft.

BORDEN CLAM PRODUCTS
994 OCEAN DRIVE
CAPE MAY, NJ 08204

Site 13 of 15 in cluster A

FINDS **1006618123**
110004140297

A14 **SNOWS DOXSEE CLAM PRODUCTS** **NJ Spills** **S102223525**
West **994 OCEAN DR** **N/A**
1/8-1/4 **CAPE MAY, NJ**
1298 ft.

Site 14 of 15 in cluster A

Relative:
Equal

Actual:
1 ft.

NJ Spill:

Facility ID:	2164.00000	Case Number:	96-2-9-1316-33
Date Received:	02/09/1996	Operator:	JIMH
Location:	Facility	Nature of Incident:	Facility
Facility Phone:	Not reported	Facility Type:	Commercial
Official Notif Name:	Not reported	Official Notif Phone:	Not reported
Official Notif Date:	Not reported	Official Notif Time:	Not reported
Official Notif Desc:	Not reported		
Date of Incident:	02/08/1996	Time of Incident:	15:25
Substance(s):	OIL HYDRAULIC		
Substance Type:	Liquid	Substance Identity:	Known
A310 Letter:	Yes	TCPA Chemical:	No
Hazrds Material:	Yes	CAS Number:	Not reported
COMU:	0502	Ref. Code:	101
Amnt Released:	5 GAL	Release VE:	Estimate
Release Type:	Terminated	Contained:	Yes
Injuries:	No	Facility Evacuation:	No
Public Exposure:	No	Public Evacuation:	No
Police at Scene:	No	Firemen at Scene:	No
Contamination of:	Land	Receiving Water:	Not reported
Caller:			
Name:	MR. BRIDGES/X233	Title:	WASTE MANAGEMENT
Address:	PO 602 SCOTT AVE WOODBINE, NJ		
Phone:	609-861-0163		
Responsible Party:			
Name:	Known	Company:	WASTE MANAGEMENT
Contact:	MR. BRIDGES/X233	Title:	S& COMP. MGR
Address:	PO 602 SCOTT AVE WOODBINE, NJ		
County:	CAPE MAY	Phone:	609-861-0163
NJ Spill:			
Name:	Not reported	Title:	Not reported
Phone:	Not reported		
Date:	Not reported	Time:	Not reported
Local Municipality:			
Name:	CAPE MAY CITY	Title:	OPER HAINES
Phone:	609-884-9500		
Date:	2/9/1996	Time:	13:24
Other:			
Name:	Not reported	Title:	Not reported
Phone:	Not reported		
Date:	Not reported	Time:	Not reported
Incident:			
Name:	Not reported	Referred To:	Not reported
Region:	Not reported	Telephone:	Not reported
Date:	Not reported	Incident Time:	Not reported
ITM:	Not reported		

Incident Description:	Spill
Wind Direction/Speed:	Not reported
Official Notofication Info:	Not reported
Official Notify:	Not reported
Method:	Not reported

SNOWS DOXSEE CLAM PRODUCTS (Continued) **S102223525**

Notify Type:	Not reported
NJ Spill Type:	Not reported
Unit:	Not reported
Contained:	Not reported
Assistance Requested:	No
Date A310 Letter Printed:	Not reported
Date Local Authority Was Notified:	Not reported
Date Update:	Not reported
Date Report Faxed to Local Authority:	Not reported
Local Authority Notification Date 1:	Not reported
Local Authority Notification Date 2:	Not reported
Local Authority Notification Date 3:	Not reported
Status at Spill:	SPILLAGE FROM TRUCK HOSE DURING TRASH PICKUP. COMPANY DID PICKUP.
Comments:	Not reported

A15
West
1/8-1/4
1298 ft.

Relative:
Equal

Actual:
1 ft.

BORDEN FOODS INC **NJ Spills S104433108**
994 OCEAN DR **NJPDES N/A**
LOWER TWP, NJ 08204

Site 15 of 15 in cluster A

NJ PDES:

NJPDES Permit Number :	NJ0004961
Facility Telephone :	(609) 884-0440
Facility Contact :	ROBERT BURGESS
Facility Municipality:	LOWER TWP.
Discharger Classification:	Minor
Facility Enforcement region:	SOUTHERN
Facility Ownership:	PRIVATE
Facility Primary SIC code:	2091
Facility Discharge Basin code:	013408
Facility Discharge Basin name:	ATLANTIC OCEAN
Fac Lat/Long:	385730 / 745230
Facility Lot number:	Not reported
Facility Block number:	Not reported
Date Permit Application Received :	11/28/1986
Date Draft Permit Issued To Facility:	/ /
Permittee Name:	SNOW'S/DOXSEE INC
PI Number:	Not reported
Permittee Street Address:	994 OCEAN DR
	Not reported
	Not reported
Permittee PO Box:	Not reported
	LOWER TWP, NJ 08204
Date Final Permit Issued To Facility:	03/05/1987
Date Final Permit Becomes Effective:	05/01/1987
Date Final Permit Expires:	10/31/1987
Permit Discharge Category:	B
Category Description:	IND/COMMERCIAL/THERMAL DSW

NJPDES Permit Number :	NJ0083151
Facility Telephone :	(609) 884-0440
Facility Contact :	ROBERT BURGESS
Facility Municipality:	LOWER TWP.
Discharger Classification:	Minor
Facility Enforcement region:	SOUTHERN
Facility Ownership:	PRIVATE
Facility Primary SIC code:	2091
Facility Discharge Basin code:	013408

BORDEN FOODS INC (Continued) **S104433108**

Facility Discharge Basin name:	ATLANTIC OCEAN
Fac Lat/Long:	385730 / 745230
Facility Lot number:	Not reported
Facility Block number:	Not reported
Date Permit Application Received :	01/14/1998
Date Draft Permit Issued To Facility:	03/04/1999
Permittee Name:	SNOW'S/DOXSEE INC
PI Number:	Not reported
Permittee Street Address:	994 OCEAN DR
	Not reported
	Not reported
Permittee PO Box:	Not reported
	CAPE MAY, NJ 08204
Date Final Permit Issued To Facility:	05/31/1999
Date Final Permit Becomes Effective:	06/01/1999
Date Final Permit Expires:	05/31/2004
Permit Discharge Category:	L
Category Description:	DISCHARGE TO POTW (SIU)
NJPDES Permit Number :	NJ0100412
Facility Telephone :	(609) 884-0440
Facility Contact :	ROBERT BURGESS
Facility Municipality:	LOWER TWP.
Discharger Classification:	Minor
Facility Enforcement region:	SOUTHERN
Facility Ownership:	PRIVATE
Facility Primary SIC code:	2091
Facility Discharge Basin code:	013408
Facility Discharge Basin name:	ATLANTIC OCEAN
Fac Lat/Long:	385730 / 745230
Facility Lot number:	Not reported
Facility Block number:	Not reported
Date Permit Application Received :	05/22/1992
Date Draft Permit Issued To Facility:	01/27/1993
Permittee Name:	SNOW'S/DOXSEE INC
PI Number:	Not reported
Permittee Street Address:	994 OCEAN DRIVE
	Not reported
	Not reported
Permittee PO Box:	Not reported
	CAPE MAY, NJ 08204
Date Final Permit Issued To Facility:	05/28/1993
Date Final Permit Becomes Effective:	07/01/1993
Date Final Permit Expires:	06/30/1998
Permit Discharge Category:	E
Category Description:	LAND APPL INDUSTRIAL RESIDUALS
NJPDES Permit Number :	NJ0110329
Facility Telephone :	(609) 884-0440
Facility Contact :	ROBERT BURGESS
Facility Municipality:	LOWER TWP.
Discharger Classification:	Minor
Facility Enforcement region:	SOUTHERN
Facility Ownership:	PRIVATE
Facility Primary SIC code:	2091
Facility Discharge Basin code:	013408
Facility Discharge Basin name:	ATLANTIC OCEAN

BORDEN FOODS INC (Continued) **S104433108**

Fac Lat/Long:	385730 / 745230
Facility Lot number:	Not reported
Facility Block number:	Not reported
Date Permit Application Received :	02/05/1996
Date Draft Permit Issued To Facility:	/ /
Permittee Name:	SNOW'S/DOXSEE, INC
PI Number:	Not reported
Permittee Street Address:	994 OCEAN DRIVE
	Not reported
	Not reported
Permittee PO Box:	Not reported
	CAPE MAY, NJ 08204
Date Final Permit Issued To Facility:	05/05/1997
Date Final Permit Becomes Effective:	05/05/1997
Date Final Permit Expires:	01/31/2002
Permit Discharge Category:	5G2
Category Description:	STORMWATER BASIC (GP)
NJPDES Permit Number :	NJ0083151
Facility Telephone :	(609) 884-0440
Facility Contact :	ROBERT BURGESS
Facility Municipality:	LOWER TWP
Discharger Classification:	MINOR
Facility Enforcement region:	SOUTHERN
Facility Ownership:	PRIVATE
Facility Primary SIC code:	2091
Facility Discharge Basin code:	Not reported
Facility Discharge Basin name:	Not reported
Fac Lat/Long:	Not reported
Facility Lot number:	Not reported
Facility Block number:	Not reported
Date Permit Application Received :	Not reported
Date Draft Permit Issued To Facility:	Not reported
Permittee Name:	SNOW'S/DOXSEE INC
PI Number:	46905
Permittee Street Address:	994 OCEAN DR
	Not reported
	Not reported
Permittee PO Box:	Not reported
	CAPE MAY, NJ 08204
Date Final Permit Issued To Facility:	04/03/2000
Date Final Permit Becomes Effective:	06/01/1999
Date Final Permit Expires:	05/31/2004
Permit Discharge Category:	L
Category Description:	DISCHARGE TO POTW (SIU)
NJPDES Permit Number :	NJG0110329
Facility Telephone :	(609) 884-0440
Facility Contact :	ROBERT BURGESS
Facility Municipality:	LOWER TWP
Discharger Classification:	MINOR
Facility Enforcement region:	SOUTHERN
Facility Ownership:	PRIVATE
Facility Primary SIC code:	2091
Facility Discharge Basin code:	Not reported
Facility Discharge Basin name:	Not reported
Fac Lat/Long:	Not reported

BORDEN FOODS INC (Continued) **S104433108**

Facility Lot number:	Not reported
Facility Block number:	Not reported
Date Permit Application Received :	Not reported
Date Draft Permit Issued To Facility:	Not reported
Permittee Name:	SNOW'S/DOXSEE INC
PI Number:	46905
Permittee Street Address:	994 OCEAN DR
	Not reported
	Not reported
Permittee PO Box:	Not reported
	CAPE MAY, NJ 08204
Date Final Permit Issued To Facility:	09/04/2002
Date Final Permit Becomes Effective:	06/01/2002
Date Final Permit Expires:	05/31/2007
Permit Discharge Category:	5G2
Category Description:	STORMWATER BASIC (GP)

NJ Spill:

Facility ID:	2910.00000	Case Number:	92-2-20-1445-34
Date Received:	02/20/1992	Operator:	RICH
Location:	Facility	Nature of Incident:	Citizen
Facility Phone:	Not reported	Facility Type:	Industrial
Official Notif Name:	Not reported	Official Notif Phone:	Not reported
Official Notif Date:	Not reported	Official Notif Time:	Not reported
Official Notif Desc:	Not reported		
Date of Incident:	01/01/1988	Time of Incident:	ON GO
Substance(s):	OIL FUEL		
Substance Type:	Liquid	Substance Identity:	Known
A310 Letter:	Yes	TCPA Chemical:	No
Hazrds Material:	Yes	CAS Number:	Not reported
COMU:	0505	Ref. Code:	017
Amnt Released:	Estimate 9000 G	Release VE:	Estimate
Release Type:	Not reported	Contained:	No
Injuries:	No	Facility Evacuation:	No
Public Exposure:	No	Public Evacuation:	No
Police at Scene:	No	Firemen at Scene:	No
Contamination of:	Land	Receiving Water:	Not reported
Caller:			
Name:	LOROY JONES	Title:	CIT
Address:	SWAINTOWN, NJ		
Phone:	Not reported		
Responsible Party:			
Name:	Suspected	Company:	BORDEN FOODS INC
Contact:	Not reported	Title:	Not reported
Address:	994 OCEAN DR		
	CAPE MAY, NJ		
County:	CAPE MAY	Phone:	Not reported
NJ Spill:			
Name:	OEM	Title:	Not reported
Phone:	609-882-2000		
Date:	02/20/1992	Time:	Not reported
Local Municipality:			
Name:	LOWER TWP	Title:	OPER 145
Phone:	609-886-2711		
Date:	02/20/1992	Time:	14:53
Other:			
Name:	Not reported	Title:	Not reported
Phone:	Not reported		

BORDEN FOODS INC (Continued) **S104433108**

Date:	/ /	Time:	Not reported
Incident:			
Name:	CHERYL PRIEST	Referred To:	DRPSR
Region:	Southern	Telephone:	Faxed,Mail
Date:	02/20/1992	Incident Time:	14:53
ITM:	B		
Name:	Not reported	Referred To:	Not reported
Region:	Not reported	Telephone:	Not reported
Date:	/ /	Incident Time:	Not reported
ITM:	Not reported		
Name:	Not reported	Referred To:	Not reported
Region:	Not reported	Telephone:	Not reported
Date:	/ /	Incident Time:	Not reported
ITM:	Not reported		

Incident Description:	Spill
Wind Direction/Speed:	Not reported
Official Notofication Info:	Not reported
Official Notify:	Not reported
Method:	Not reported
Notify Type:	Not reported
NJ Spill Type:	Not reported
Unit:	Not reported
Contained:	Not reported
Assistance Requested:	No
Date A310 Letter Printed:	/ /
Date Local Authority Was Notified:	/ /
Date Update:	/ /
Date Report Faxed to Local Authority:	/ /
Local Authority Notification Date 1:	/ /
Local Authority Notification Date 2:	/ /
Local Authority Notification Date 3:	/ /
Status at Spill:	DURING PILE-DRIVING AT SITE A PIPE WAS BROKEN AND OIL SOAKED INTO GROUND AND RAN UNDER BOILER ROOM AREA, NO CLEANUP DONE
Comments:	ADDR IS IN LOWER TWP NOT CAPE MAY PER CAPE MAY PD

B16 **US COAST GUARD ELECTRONIC ENG CTR (WILDWOOD FACILI** **LUST** **S104588793**
West **OCEAN DR** **N/A**
1/4-1/2 **WILDWOOD, NJ**
1501 ft.

Site 1 of 6 in cluster B

Relative:
Equal

Actual:
1 ft.

LUST:

Case ID:	92-03-02-1046
Facility Status:	Site Issued Letter of No Further Action
Facility Phone:	Not reported
UST ID:	0220646
Lead Program Assigned to Case:	Bureau of Underground Storage Tanks
TMS Number:	C91-4478
Remedial Level:	Site has more than 1 area of concern or more than 1 media of concern.
Case Manager:	Not reported
No Further Action:	4/20/1995 0:00:00
RAW Approved:	Not reported
CEA:	Not reported
Date CEA Lifted:	Not reported
Dead Notice:	Not reported

US COAST GUARD ELECTRONIC ENG CTR (WILDWOOD FACILI (Continued) **S104588793**

B17 **HINCH MARINA INC** **FINDS** **1004560389**
West **989 OCEAN DRIVE** **110009836543**
1/4-1/2 **LOWER TOWNSHIP, NJ 08204**
1741 ft.

Site 2 of 6 in cluster B

Relative: **Equal**

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Permit Compliance System (PCS)

Actual: **1 ft.**

B18 **BACKWATER LAGOON** **NJ Release** **S102226810**
West **989 OCEAN DR** **N/A**
1/4-1/2 **CAPE MAY, NJ**
1741 ft.

Site 3 of 6 in cluster B

Relative: **Equal**

NJ Release:

Facility ID:	8294.00000	Case Number:	96-5-26-1631-38
Date Received:	05/26/1996	Operator:	KIM
Location:	Other	Nature of Incident:	Other
Facility Phone:	Not reported	Facility Type:	Residential
Date of Incident:	05/26/1996	Time of Incident:	13:00
Substance(s):	OIL SHEEN		
Substance Type:	Liquid	Substance Identity:	Known
Unit:	Not reported		
Official:			
Notification:	Not reported		
Name:	Not reported		
Phone:	Not reported		
Date:	Not reported		
Time:	Not reported		
Description:	Not reported		
Notify:	Not reported		
Method:	Not reported		
Contained:	Not reported		
A310 Letter:	Yes	TCPA Chemical:	No
Hazrds Material:	Yes	CAS Number:	Not reported
COMU:	0502	Ref. Code:	002
Amnt Released:	UNKNOWN		
Release Type:	Continuous	Contained:	No
Injuries:	No	Facility Evacuation:	No
Public Exposure:	No	Public Evacuation:	No
Police at Scene:	No	Firemen at Scene:	No
Contamination of:	Water	Receiving Water:	UNKNOWN LAGOON
Caller:			
Name:	NRC/FAX	Title:	NRC
Address:	Not reported		
Telephone:	800-424-8802		
Responsible Party:			
Name:	UnKnown	Company:	Not reported
Contact:	Not reported	Title:	Not reported
Address:	Not reported		
County:	Not reported	Telephone:	Not reported
NJ Spill:			
Name:	NJSP/OEM	Title:	FAXED
Telephone:	609-882-2000		

BACKWATER LAGOON (Continued) **S102226810**

Date:	5/26/1996	Time:	Not reported
Local Municipality:			
Name:	CAPE MAY CITY	Municipality Title:	DISP #603
Telephone:	609-884-9500		
Date:	5/26/1996	Time:	16:37
Other:			
Name:	Not reported	Title:	Not reported
Telephone:	Not reported		
Date:	Not reported	Time:	16:37
Incident:			
Name:	Not reported	Referred To:	Not reported
Region:	Not reported	Telephone:	Not reported
Date:	Not reported	Incident Time:	Not reported
ITM:	Not reported		

Incident Description:	Spill
Incident Type:	Not reported
Wind Direction/Speed:	Not reported
Office Notified:	Not reported
Off Notified Phone:	Not reported
Date Office Notified:	Not reported
Assistance Requested:	No
Date A310 Letter Printed:	Not reported
Date Local Authority Was Notified:	Not reported
Date Update:	Not reported
Date Report Faxed to Local Authority:	Not reported
Local Authority Notification Date 1:	Not reported
Local Authority Notification Date 2:	Not reported
Local Authority Notification Date 3:	Not reported
Status at Spill:	UNKNOWN SHEEN SIGHTING, SHEEN SIZE: 100 YDS X 50 YDS/ COLOR: GREEN-BLUE
Comments:	Not reported

Facility ID:	8300.00000	Case Number:	96-5-26-1821-30
Date Received:	05/26/1996	Operator:	DIANNE
Location:	Other	Nature of Incident:	Other
Facility Phone:	Not reported	Facility Type:	Not reported
Date of Incident:	05/26/1996	Time of Incident:	13:00
Substance(s):	OIL SHEEN		
Substance Type:	Liquid	Substance Identity:	Known
Unit:	Not reported		
Official:			
Notification:	Not reported		
Name:	Not reported		
Phone:	Not reported		
Date:	Not reported		
Time:	Not reported		
Description:	Not reported		
Notify:	Not reported		
Method:	Not reported		
Contained:	Not reported		
A310 Letter:	No	TCPA Chemical:	No
Hazrds Material:	Yes	CAS Number:	Not reported
COMU:	0502	Ref. Code:	002
Amnt Released:	UNKNOWN		
Release Type:	Continuous	Contained:	No
Injuries:	No	Facility Evacuation:	No
Public Exposure:	No	Public Evacuation:	No

BACKWATER LAGOON (Continued) **S102226810**

Police at Scene:	No	Firemen at Scene:	No
Contamination of:	Water	Receiving Water:	BACKWATER LAGOON
Caller:			
Name:	NRC	Title:	NRC/FAX
Address:	Not reported		
Telephone:	800-424-8802		
Responsible Party:			
Name:	UnKnown	Company:	Not reported
Contact:	Not reported	Title:	Not reported
Address:	Not reported		
County:	Not reported	Telephone:	Not reported
NJ Spill:			
Name:	NJSP/OEM	Title:	FAXED
Telephone:	609-882-2000		
Date:	5/26/1996	Time:	Not reported
Local Municipality:			
Name:	CAPE MAY CITY	Municipality Title:	SEE TD-8294
Telephone:	609-884-9500		
Date:	5/26/1996	Time:	Not reported
Other:			
Name:	Not reported	Title:	Not reported
Telephone:	Not reported		
Date:	Not reported	Time:	Not reported
Incident:			
Name:	Not reported	Referred To:	Not reported
Region:	Not reported	Telephone:	Not reported
Date:	Not reported	Incident Time:	Not reported
ITM:	Not reported		

Incident Description:	Spill
Incident Type:	Not reported
Wind Direction/Speed:	Not reported
Office Notified:	Not reported
Off Notified Phone:	Not reported
Date Office Notified:	Not reported
Assistance Requested:	No
Date A310 Letter Printed:	Not reported
Date Local Authority Was Notified:	Not reported
Date Update:	Not reported
Date Report Faxed to Local Authority:	Not reported
Local Authority Notification Date 1:	Not reported
Local Authority Notification Date 2:	Not reported
Local Authority Notification Date 3:	Not reported
Status at Spill:	UNKNOWN SHEEN SIGHTING. SHEEN SIZE 5FT X 5 FT. COLOR GREEN/BLUE. REFER TO ORIGINAL CASE 96-5-26-1631-38.
Comments:	Not reported

B19
West
1/4-1/2
1741 ft.

HINCH MARINA INC **NJPDES S105297522**
989 OCEAN DRIVE **N/A**
LOWER TOWNSHIP, NJ 08204

Site 4 of 6 in cluster B

Relative:
Equal

Actual:
1 ft.

NJ PDES:

NJPDES Permit Number :	NJ0111015
Facility Telephone :	(609) 884-8031
Facility Contact :	GENE BASTIAN JR
Facility Municipality:	LOWER TWP.
Discharger Classification:	Not reported
Facility Enforcement region:	SOUTHERN

HINCH MARINA INC (Continued) **S105297522**

Facility Ownership:	PRIVATE
Facility Primary SIC code:	4493
Facility Discharge Basin code:	Not reported
Facility Discharge Basin name:	Not reported
Fac Lat/Long:	0 / 0
Facility Lot number:	Not reported
Facility Block number:	Not reported
Date Permit Application Received :	02/05/1996
Date Draft Permit Issued To Facility:	/ /
Permittee Name:	HINCH MARINA INC
PI Number:	Not reported
Permittee Street Address:	989 OCEAN DRIVE
	Not reported
	Not reported
Permittee PO Box:	Not reported
	CAPE MAY, NJ 08204
Date Final Permit Issued To Facility:	05/05/1997
Date Final Permit Becomes Effective:	05/05/1997
Date Final Permit Expires:	01/31/2002
Permit Discharge Category:	5G2
Category Description:	STORMWATER BASIC (GP)
NJPDES Permit Number :	NJG0111015
Facility Telephone :	(609) 884-8031
Facility Contact :	GENE BASTIAN JR
Facility Municipality:	LOWER TWP
Discharger Classification:	MINOR
Facility Enforcement region:	SOUTHERN
Facility Ownership:	PRIVATE
Facility Primary SIC code:	4493
Facility Discharge Basin code:	Not reported
Facility Discharge Basin name:	Not reported
Fac Lat/Long:	Not reported
Facility Lot number:	Not reported
Facility Block number:	Not reported
Date Permit Application Received :	Not reported
Date Draft Permit Issued To Facility:	Not reported
Permittee Name:	HINCH MARINA INC
PI Number:	47891
Permittee Street Address:	989 OCEAN DR
	Not reported
	Not reported
Permittee PO Box:	Not reported
	CAPE MAY, NJ 08204
Date Final Permit Issued To Facility:	09/04/2002
Date Final Permit Becomes Effective:	06/01/2002
Date Final Permit Expires:	05/31/2007
Permit Discharge Category:	5G2
Category Description:	STORMWATER BASIC (GP)

B20
West
1/4-1/2
1741 ft.

Relative:
Equal

Actual:
1 ft.

989 OCEAN DR
989 OCEAN DR
CAPE MAY, NJ 08204

Site 5 of 6 in cluster B

ERNS **94380336**
N/A

B21
West
1/4-1/2
1741 ft.

Relative:
Equal

Actual:
1 ft.

989 OCEAN DR
989 OCEAN DR
CAPE MAY, NJ 08204

Site 6 of 6 in cluster B

ERNS **94381455**
N/A

C22
West
1/4-1/2
1889 ft.

Relative:
Equal

Actual:
1 ft.

AREA OF
985 OCEAN DR
CAPE MAY, NJ

Site 1 of 8 in cluster C

NJ Release **S102228908**
N/A

NJ Release:

Facility ID:	12136.00000
Date Received:	07/31/1996
Location:	Other
Facility Phone:	Not reported
Date of Incident:	07/31/1996
Substance(s):	OIL SHEEN
Substance Type:	Liquid
Unit:	Not reported
Official:	
Notification:	Not reported
Name:	Not reported
Phone:	Not reported
Date:	Not reported
Time:	Not reported
Description:	Not reported
Notify:	Not reported
Method:	Not reported
Contained:	Not reported
A310 Letter:	Yes
Hazrds Material:	Yes
COMU:	0502
Amnt Released:	UNK
Release Type:	Continuous
Injuries:	No
Public Exposure:	No
Police at Scene:	No
Contamination of:	Water
Caller:	

Case Number:	96-7-31-0930-59
Operator:	JOYCE
Nature of Incident:	Other
Facility Type:	Residential
Time of Incident:	08:30
Substance Identity:	Known
TCPA Chemical:	No
CAS Number:	Not reported
Ref. Code:	101
Contained:	No
Facility Evacuation:	No
Public Evacuation:	No
Firemen at Scene:	No
Receiving Water:	CAPE MAY HARBOR

AREA OF (Continued) **S102228908**

Facility ID:	63166.00000	Case Number:	00-06-19-1110-55
Date Received:	06/19/2000	Operator:	Not reported
Location:	Other	Nature of Incident:	Not reported
Facility Phone:	Not reported	Facility Type:	Residential
Date of Incident:	06/19/2000	Time of Incident:	10:45
Substance(s):	OIL SHEEN		
Substance Type:	Liquid	Substance Identity:	Known
Unit:	UNKNOWN		
Official:			
Notification:	OEM		
Name:	Not reported		
Phone:	Not reported		
Date:	06/19/2000		
Time:	Not reported		
Description:	Not reported		
Notify:	NJSP		
Method:	Faxed		
Contained:	No		
A310 Letter:	Not reported	TCPA Chemical:	No
Hazrds Material:	Yes	CAS Number:	Not reported
COMU:	0502	Ref. Code:	Not reported
Amnt Released:	0.00000		
Release Type:	Continuous	Contained:	Not reported
Injuries:	No	Facility Evacuation:	No
Public Exposure:	No	Public Evacuation:	No
Police at Scene:	No	Firemen at Scene:	No
Contamination of:	Water	Receiving Water:	MIDDLE THOROFARE
Caller:			
Name:	NRC/FAX	Title:	NRC
Address:	Not reported		
Telephone:	800-424-8802		
Responsible Party:			
Name:	Unknown	Company:	Not reported
Contact:	Not reported	Title:	Not reported
Address:	Not reported		
County:	Not reported	Telephone:	Not reported
NJ Spill:			
Name:	Not reported	Title:	Not reported
Telephone:	Not reported		
Date:	Not reported	Time:	Not reported
Local Municipality:			
Name:	Not reported	Municipality Title:	Not reported
Telephone:	Not reported		
Date:	Not reported	Time:	Not reported
Other:			
Name:	Not reported	Title:	Not reported
Telephone:	Not reported		
Date:	Not reported	Time:	Not reported
Incident:			
Name:	Not reported	Referred To:	Not reported
Region:	Not reported	Telephone:	Not reported
Date:	Not reported	Incident Time:	Not reported
ITM:	Not reported		
Incident Description:	Not reported		
Incident Type:	Not reported		
Wind Direction/Speed:	Not reported		

AREA OF (Continued) **S102228908**

Office Notified: Not reported
Off Notified Phone: Not reported
Date Office Notified: 06/19/2000
Assistance Requested: No
Date A310 Letter Printed: Not reported
Date Local Authority Was Notified: Not reported
Date Update: Not reported
Date Report Faxed to Local Authority: Not reported
Local Authority Notification Date 1: Not reported
Local Authority Notification Date 2: Not reported
Local Authority Notification Date 3: Not reported
Status at Spill: LOOSE VALVE ON CONTAINER LEAKED MATERIAL ON DECK OF VESSEL CSX EXPEDITION. 1 GAL IN WATER. TANK IS A CYLINDRICAL CORROSIVE CONTAINER.
Comments: Not reported

Facility ID: 63166.00000
Date Received: 06/19/2000
Location: Other
Facility Phone: Not reported
Date of Incident: 06/19/2000
Substance(s): OIL SHEEN
Substance Type: Liquid
Unit: UNKNOWN
Official:
Notification: OPR POWELL
Name: CAPE MAY CITY
Phone: 609-884-9500
Date: 06/19/2000
Time: 11:13
Description: Not reported
Notify: MUNIC
Method: Office
Contained: No
A310 Letter: Not reported
Hazrds Material: Yes
COMU: 0502
Amnt Released: 0.00000
Release Type: Continuous
Injuries: No
Public Exposure: No
Police at Scene: No
Contamination of: Water
Caller:
Name: NRC/FAX
Address: Not reported
Telephone: 800-424-8802
Responsible Party:
Name: Unknown
Contact: Not reported
Address: Not reported
County: Not reported
NJ Spill:
Name: Not reported
Telephone: Not reported
Date: Not reported
Local Municipality:
Name: Not reported

Case Number: 00-06-19-1110-55
Operator: Not reported
Nature of Incident: Not reported
Facility Type: Residential
Time of Incident: 10:45

Substance Identity: Known

TCPA Chemical: No
CAS Number: Not reported
Ref. Code: Not reported

Contained: Not reported
Facility Evacuation: No
Public Evacuation: No
Firemen at Scene: No
Receiving Water: MIDDLE THOROFARE

Title: NRC

Company: Not reported
Title: Not reported

Telephone: Not reported

Title: Not reported

Time: Not reported

Municipality Title: Not reported

AREA OF (Continued) **S102228908**

Telephone:	Not reported		
Date:	Not reported	Time:	Not reported
Other:			
Name:	Not reported	Title:	Not reported
Telephone:	Not reported		
Date:	Not reported	Time:	Not reported
Incident:			
Name:	Not reported	Referred To:	Not reported
Region:	Not reported	Telephone:	Not reported
Date:	Not reported	Incident Time:	Not reported
ITM:	Not reported		

Incident Description:	Not reported
Incident Type:	Not reported
Wind Direction/Speed:	Not reported
Office Notified:	CAPE MAY CITY
Off Notified Phone:	609-884-9500
Date Office Notified:	06/19/2000
Assistance Requested:	No
Date A310 Letter Printed:	Not reported
Date Local Authority Was Notified:	Not reported
Date Update:	Not reported
Date Report Faxed to Local Authority:	Not reported
Local Authority Notification Date 1:	Not reported
Local Authority Notification Date 2:	Not reported
Local Authority Notification Date 3:	Not reported
Status at Spill:	LOOSE VALVE ON CONTAINER LEAKED MATERIAL ON DECK OF VESSEL CSX EXPEDITION. 1 GAL IN WATER. TANK IS A CYLINDRICAL CORROSIVE CONTAINER.
Comments:	Not reported

Facility ID:	63166.00000	Case Number:	00-06-19-1110-55
Date Received:	06/19/2000	Operator:	Not reported
Location:	Other	Nature of Incident:	Not reported
Facility Phone:	Not reported	Facility Type:	Residential
Date of Incident:	06/19/2000	Time of Incident:	10:45
Substance(s):	OIL SHEEN		
Substance Type:	Liquid	Substance Identity:	Known
Unit:	UNKNOWN		
Official:			
Notification:	DFG		
Name:	Not reported		
Phone:	Not reported		
Date:	06/19/2000		
Time:	Not reported		
Description:	Not reported		
Notify:	HQ		
Method:	Faxed		
Contained:	No		
A310 Letter:	Not reported	TCPA Chemical:	No
Hazrds Material:	Yes	CAS Number:	Not reported
COMU:	0502	Ref. Code:	Not reported
Amnt Released:	0.00000		
Release Type:	Continuous	Contained:	Not reported
Injuries:	No	Facility Evacuation:	No
Public Exposure:	No	Public Evacuation:	No
Police at Scene:	No	Firemen at Scene:	No
Contamination of:	Water	Receiving Water:	MIDDLE THOROFARE
Caller:			

AREA OF (Continued) **S102228908**

Name:	NRC/FAX	Title:	NRC
Address:	Not reported		
Telephone:	800-424-8802		
Responsible Party:			
Name:	Unknown	Company:	Not reported
Contact:	Not reported	Title:	Not reported
Address:	Not reported		
County:	Not reported	Telephone:	Not reported
NJ Spill:			
Name:	Not reported	Title:	Not reported
Telephone:	Not reported		
Date:	Not reported	Time:	Not reported
Local Municipality:			
Name:	Not reported	Municipality Title:	Not reported
Telephone:	Not reported		
Date:	Not reported	Time:	Not reported
Other:			
Name:	Not reported	Title:	Not reported
Telephone:	Not reported		
Date:	Not reported	Time:	Not reported
Incident:			
Name:	Not reported	Referred To:	Not reported
Region:	Not reported	Telephone:	Not reported
Date:	Not reported	Incident Time:	Not reported
ITM:	Not reported		

Incident Description:	Not reported
Incident Type:	Not reported
Wind Direction/Speed:	Not reported
Office Notified:	Not reported
Off Notified Phone:	Not reported
Date Office Notified:	06/19/2000
Assistance Requested:	No
Date A310 Letter Printed:	Not reported
Date Local Authority Was Notified:	Not reported
Date Update:	Not reported
Date Report Faxed to Local Authority:	Not reported
Local Authority Notification Date 1:	Not reported
Local Authority Notification Date 2:	Not reported
Local Authority Notification Date 3:	Not reported
Status at Spill:	LOOSE VALVE ON CONTAINER LEAKED MATERIAL ON DECK OF VESSEL CSX EXPEDITION. 1 GAL IN WATER. TANK IS A CYLINDRICAL CORROSIVE CONTAINER.
Comments:	Not reported

C23
West
1/4-1/2
1889 ft.

Relative:
Equal

Actual:
1 ft.

985 OCEAN DRIVE
985 OCEAN DRIVE
CAPE MAY, NJ 08204

Site 2 of 8 in cluster C

ERNS 96514492
N/A

C24
West
1/4-1/2
1889 ft.

Relative:
Equal

Actual:
1 ft.

985 OCEAN DR
985 OCEAN DR
CAPE MAY, NJ 08204

Site 3 of 8 in cluster C

ERNS **96514044**
N/A

C25
West
1/4-1/2
1889 ft.

Relative:
Equal

Actual:
1 ft.

ATLANTIC CAPE FISHERIES
985 OCEAN
CAPE MAY, NJ

Site 4 of 8 in cluster C

NJ Spills **S102204446**
NJ Release **N/A**

NJ Release:

Facility ID:	19392.00000	Case Number:	96-12-5-1235-20
Date Received:	12/05/1996	Operator:	JIMH
Location:	Facility	Nature of Incident:	Facility
Facility Phone:	Not reported	Facility Type:	Commercial
Date of Incident:	12/05/1996	Time of Incident:	11:30
Substance(s):	DIESEL FUEL		
Substance Type:	Liquid	Substance Identity:	Known
Unit:	Not reported		
Official:			
Notification:	Not reported		
Name:	Not reported		
Phone:	Not reported		
Date:	Not reported		
Time:	Not reported		
Description:	Not reported		
Notify:	Not reported		
Method:	Not reported		
Contained:	Not reported		
A310 Letter:	No	TCPA Chemical:	No
Hazrds Material:	Yes	CAS Number:	Not reported
COMU:	0502	Ref. Code:	002
Amnt Released:	25 GAL		
Release Type:	Terminated	Contained:	Yes
Injuries:	No	Facility Evacuation:	No
Public Exposure:	No	Public Evacuation:	No
Police at Scene:	No	Firemen at Scene:	No
Contamination of:	Water	Receiving Water:	MIDDLE THOROFARE
Caller:			
Name:	DAN COHEN	Title:	SEA PRODUCTS
Address:	POB 555		
	CAPE MAY, NJ		
Telephone:	609-884-3000		
Responsible Party:			
Name:	Known	Company:	SEA PRODUCTS
Contact:	DAN COHEN	Title:	PRES
Address:	POB 555		
	CAPE MAY, NJ		
County:	CAPE MAY	Telephone:	609-884-3000
NJ Spill:			
Name:	NJSP/OEM	Title:	FAXED
Telephone:	Not reported		

ATLANTIC CAPE FISHERIES (Continued) **S102204446**

Date:	Not reported	Time:	Not reported
Local Municipality:			
Name:	CAPE MAY CITY	Municipality Title:	TD 19390 FOR A310
Telephone:	609-884-9500		
Date:	12/5/1996	Time:	Not reported
Other:			
Name:	Not reported	Title:	Not reported
Telephone:	Not reported		
Date:	Not reported	Time:	Not reported
Incident:			
Name:	Not reported	Referred To:	Not reported
Region:	Not reported	Telephone:	Not reported
Date:	Not reported	Incident Time:	Not reported
ITM:	Not reported		

Incident Description:	Spill
Incident Type:	Not reported
Wind Direction/Speed:	Not reported
Office Notified:	Not reported
Off Notified Phone:	Not reported
Date Office Notified:	Not reported
Assistance Requested:	No
Date A310 Letter Printed:	Not reported
Date Local Authority Was Notified:	Not reported
Date Update:	Not reported
Date Report Faxed to Local Authority:	Not reported
Local Authority Notification Date 1:	Not reported
Local Authority Notification Date 2:	Not reported
Local Authority Notification Date 3:	Not reported
Status at Spill:	SPILLAGE DURING TRANSFER OF FUEL. COMPANY DOING CLEANUP
Comments:	Not reported

NJ Spill:

Facility ID:	7535.00000	Case Number:	94-5-3-1557-36
Date Received:	05/03/1994	Operator:	JIMH
Location:	Facility	Nature of Incident:	Facility
Facility Phone:	609-884-3000	Facility Type:	Commercial
Official Notif Name:	Not reported	Official Notif Phone:	Not reported
Official Notif Date:	Not reported	Official Notif Time:	Not reported
Official Notif Desc:	Not reported		
Date of Incident:	05/03/1994	Time of Incident:	15:45
Substance(s):	DIESEL FUEL		
Substance Type:	Liquid	Substance Identity:	Known
A310 Letter:	Yes	TCPA Chemical:	No
Hazrds Material:	Yes	CAS Number:	Not reported
COMU:	0502	Ref. Code:	101
Amnt Released:	15 GALLON	Release VE:	Estimate
Release Type:	Terminated	Contained:	Yes
Injuries:	No	Facility Evacuation:	No
Public Exposure:	No	Public Evacuation:	No
Police at Scene:	No	Firemen at Scene:	No
Contamination of:	Land	Receiving Water:	Not reported
Caller:			
Name:	MR. COHEN	Title:	ATLANTIC CAPE FISH
Address:	985 OCEAN CAPE MAY, NJ		
Phone:	609-884-3000		
Responsible Party:			
Name:	Known	Company:	R.A.REIFF INC

ATLANTIC CAPE FISHERIES (Continued) **S102204446**

Contact:	Not reported	Title:	Not reported
Address:	2025 RT 70 CHERRY HILL		
County:	CAMDEN	Phone:	Not reported
NJ Spill:			
Name:	Not reported	Title:	Not reported
Phone:	Not reported		
Date:	/ /	Time:	Not reported
Local Municipality:			
Name:	CAPE MAY CITY	Title:	OPER 603
Phone:	609-884-9500		
Date:	05/03/1994	Time:	16:02
Other:			
Name:	Not reported	Title:	Not reported
Phone:	Not reported		
Date:	/ /	Time:	Not reported
Incident:			
Name:	Not reported	Referred To:	DRPSR
Region:	BFO-CAS	Telephone:	Faxed,Mailed
Date:	05/03/1994	Incident Time:	Not reported
ITM:	Not reported		
Name:	Not reported	Referred To:	Not reported
Region:	Not reported	Telephone:	Not reported
Date:	/ /	Incident Time:	Not reported
ITM:	Not reported		
Name:	Not reported	Referred To:	Not reported
Region:	Not reported	Telephone:	Not reported
Date:	/ /	Incident Time:	Not reported
ITM:	Not reported		

Incident Description:	Spill
Wind Direction/Speed:	Not reported
Official Notofication Info:	Not reported
Official Notify:	Not reported
Method:	Not reported
Notify Type:	Not reported
NJ Spill Type:	Not reported
Unit:	Not reported
Contained:	Not reported
Assistance Requested:	No
Date A310 Letter Printed:	/ /
Date Local Authority Was Notified:	/ /
Date Update:	/ /
Date Report Faxed to Local Authority:	/ /
Local Authority Notification Date 1:	/ /
Local Authority Notification Date 2:	/ /
Local Authority Notification Date 3:	/ /
Status at Spill:	OVERFILL ON GROUND. COMPANY DOING CLEANUP
Comments:	Not reported

Map ID / Direction / Distance / Distance (ft.) / Elevation	Site	Database(s)	EDR ID Number / EPA ID Number
C26 West 1/4-1/2 1889 ft. Relative: Equal Actual: 1 ft.	985 OCEAN DRIVE 985 OCEAN DRIVE CAPE MAY, NJ 08204 Site 5 of 8 in cluster C	ERNS	92293926 N/A
C27 West 1/4-1/2 1889 ft. Relative: Equal Actual: 1 ft.	985 OCEAN DR 985 OCEAN DR CAPE MAY, NJ 08204 Site 6 of 8 in cluster C	ERNS	96503427 N/A
C28 West 1/4-1/2 1889 ft. Relative: Equal Actual: 1 ft.	985 OCEAN DRIVE 985 OCEAN DRIVE CAPE MAY, NJ 08204 Site 7 of 8 in cluster C	ERNS	2002626704 N/A
C29 West 1/4-1/2 1981 ft. Relative: Equal Actual: 1 ft.	MILL CREEK MARINA 980 OCEAN DRIVE CAPE MAY, NJ 08204 Site 8 of 8 in cluster C	FINDS NJPDES	1004560421 110006803806

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Permit Compliance System (PCS)

NJ PDES:

NJPDES Permit Number :	NJ0110965
Facility Telephone :	(609) 884-4849
Facility Contact :	HARRY COLSON
Facility Municipality:	CAPE MAY CITY
Discharger Classification:	Not reported
Facility Enforcement region:	SOUTHERN
Facility Ownership:	PRIVATE
Facility Primary SIC code:	4493
Facility Discharge Basin code:	Not reported
Facility Discharge Basin name:	Not reported
Fac Lat/Long:	0 / 0

MILL CREEK MARINA (Continued) **1004560421**

Facility Lot number:	Not reported
Facility Block number:	Not reported
Date Permit Application Received :	02/05/1996
Date Draft Permit Issued To Facility:	/ /
Permittee Name:	HARRY COLSON
PI Number:	Not reported
Permittee Street Address:	206 E STANTON ROAD
	Not reported
	Not reported
Permittee PO Box:	Not reported
	WILDWOOD CREST, NJ 08260
Date Final Permit Issued To Facility:	05/05/1997
Date Final Permit Becomes Effective:	05/05/1997
Date Final Permit Expires:	01/31/2002
Permit Discharge Category:	5G2
Category Description:	STORMWATER BASIC (GP)
NJPDES Permit Number :	NJG0110965
Facility Telephone :	(609) 884-4849
Facility Contact :	HARRY COLSON
Facility Municipality:	LOWER TWP
Discharger Classification:	MINOR
Facility Enforcement region:	SOUTHERN
Facility Ownership:	PRIVATE
Facility Primary SIC code:	4493
Facility Discharge Basin code:	Not reported
Facility Discharge Basin name:	Not reported
Fac Lat/Long:	Not reported
Facility Lot number:	Not reported
Facility Block number:	Not reported
Date Permit Application Received :	Not reported
Date Draft Permit Issued To Facility:	Not reported
Permittee Name:	MILL CREEK MARINA
PI Number:	47886
Permittee Street Address:	400 PORTSMOUTH RD
	Not reported
	Not reported
Permittee PO Box:	Not reported
	CAPE MAY, NJ 08204
Date Final Permit Issued To Facility:	09/05/2002
Date Final Permit Becomes Effective:	06/01/2002
Date Final Permit Expires:	05/31/2007
Permit Discharge Category:	5G2
Category Description:	STORMWATER BASIC (GP)

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30 West 1/2-1 3919 ft. **BREEZEE LEE** **OCEAN DR** **CAPE MAY, NJ** **NJ Spills** **S104426291** **N/A**

Relative: Equal

Actual: 1 ft.

NJ Spill:

Facility ID:	10081.00000	Case Number:	91-7-11-1135-15
Date Received:	07/11/1991	Operator:	ROGER
Location:	Other	Nature of Incident:	Facility
Facility Phone:	Not reported	Facility Type:	Industrial
Official Notif Name:	Not reported	Official Notif Phone:	Not reported
Official Notif Date:	Not reported	Official Notif Time:	Not reported
Official Notif Desc:	Not reported		
Date of Incident:	07/11/1991	Time of Incident:	11:15

BREEZEE LEE (Continued) **S104426291**

Substance(s):	GASOLINE		
Substance Type:	Liquid	Substance Identity:	Known
A310 Letter:	Yes	TCPA Chemical:	No
Hazrds Material:	Yes	CAS Number:	Not reported
COMU:	0502	Ref. Code:	017
Amnt Released:	25-50 GALS.	Release VE:	Estimate
Release Type:	Terminated	Contained:	Yes
Injuries:	No	Facility Evacuation:	No
Public Exposure:	No	Public Evacuation:	No
Police at Scene:	No	Firemen at Scene:	No
Contamination of:	Land	Receiving Water:	NONE
Caller:			
Name:	PAUL RIGGINS	Title:	RIGGINS OIL CO.
Address:	Not reported		
Phone:	609-825-7600		
Responsible Party:			
Name:	Known	Company:	BREEZEE LEE
Contact:	PAUL RIGGINS	Title:	PRESIDENT
Address:	OCEAN DR CAPE MAY, NJ		
County:	CAPE MAY	Phone:	609-825-7600
NJ Spill:			
Name:	OEM	Title:	Not reported
Phone:	609-882-2000		
Date:	07/11/1991	Time:	Not reported
Local Municipality:			
Name:	CAPE MAY CITY	Title:	DISP.WARD
Phone:	609-884-8414		
Date:	07/11/1991	Time:	11:40
Other:			
Name:	Not reported	Title:	Not reported
Phone:	Not reported		
Date:	/ /	Time:	Not reported
Incident:			
Name:	Not reported	Referred To:	DHWM
Region:	Southern	Telephone:	Faxed
Date:	07/11/1991	Incident Time:	Not reported
ITM:	B		
Name:	Not reported	Referred To:	Not reported
Region:	Not reported	Telephone:	Not reported
Date:	/ /	Incident Time:	Not reported
ITM:	Not reported		
Name:	Not reported	Referred To:	Not reported
Region:	Not reported	Telephone:	Not reported
Date:	/ /	Incident Time:	Not reported
ITM:	Not reported		

Incident Description:	Spill
Wind Direction/Speed:	Not reported
Official Notofication Info:	Not reported
Official Notify:	Not reported
Method:	Not reported
Notify Type:	Not reported
NJ Spill Type:	Not reported
Unit:	Not reported
Contained:	Not reported
Assistance Requested:	No
Date A310 Letter Printed:	/ /

BREEZEE LEE (Continued) **S104426291**

Date Local Authority Was Notified: / /
Date Update: / /
Date Report Faxed to Local Authority: / /
Local Authority Notification Date 1: / /
Local Authority Notification Date 2: / /
Local Authority Notification Date 3: / /
Status at Spill: BROKEN PUMP CAUSE OF SPILL. MATERIAL IS CONTAINED CLEANED UP.
Comments: Not reported

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31 SSW 1/2-1 4787 ft. **USCG TRAINING CENTER CAPE MAY**
1 MUNRO AVE
CAPE MAY, NJ 08204

UST **U003404579**
NJ Release **N/A**

Relative: Equal

Actual: 1 ft.

NJ Release:

Facility ID:	81851.00000	Case Number:	01-07-19-0933-37
Date Received:	/ /	Operator:	Not reported
Location:	Facility	Nature of Incident:	Not reported
Facility Phone:	609-898-6889	Facility Type:	Commercial
Date of Incident:	07/19/2001	Time of Incident:	09:25
Substance(s):	OIL SLOP		
Substance Type:	Not reported	Substance Identity:	Not reported
Unit:	GALS.		
Official:			
Notification:	DRPSR		
Name:	C.HAGERMAN		
Phone:	Not reported		
Date:	07/19/2001		
Time:	09:38		
Description:	Not reported		
Notify:	ER2		
Method:	Office		
Contained:	Yes		
A310 Letter:	Not reported	TCPA Chemical:	No
Hazrds Material:	Yes	CAS Number:	Not reported
COMU:	0502	Ref. Code:	Not reported
Amnt Released:	2.00000		
Release Type:	Terminated	Contained:	Not reported
Injuries:	Not reported	Facility Evacuation:	Not reported
Public Exposure:	Not reported	Public Evacuation:	Not reported
Police at Scene:	Not reported	Firemen at Scene:	Not reported
Contamination of:	Water	Receiving Water:	CAPE MAY HARBOR
Caller:			
Name:	CHRIS HAJDUK	Title:	USCG
Address:	1 MUNRO AVE CAPE MAY, NJ		
Telephone:	609-898-6889		
Responsible Party:			
Name:	Known	Company:	USCG
Contact:	CHRIS HAJDUK	Title:	ENV SPEC
Address:	1 MUNRO AVE CAPE MAY, NJ		
County:	CAPE MAY	Telephone:	609-898-6889
NJ Spill:			
Name:	Not reported	Title:	Not reported
Telephone:	Not reported		
Date:	Not reported	Time:	Not reported
Local Municipality:			
Name:	Not reported	Municipality Title:	Not reported

USCG TRAINING CENTER CAPE MAY (Continued) **U003404579**

Telephone:	Not reported		
Date:	Not reported	Time:	Not reported
Other:			
Name:	Not reported	Title:	Not reported
Telephone:	Not reported		
Date:	Not reported	Time:	Not reported
Incident:			
Name:	Not reported	Referred To:	Not reported
Region:	Not reported	Telephone:	Not reported
Date:	Not reported	Incident Time:	Not reported
ITM:	Not reported		

Incident Description:	Spill
Incident Type:	Not reported
Wind Direction/Speed:	Not reported
Office Notified:	C.HAGERMAN
Off Notified Phone:	Not reported
Date Office Notified:	07/19/2001
Assistance Requested:	Not reported
Date A310 Letter Printed:	Not reported
Date Local Authority Was Notified:	Not reported
Date Update:	Not reported
Date Report Faxed to Local Authority:	Not reported
Local Authority Notification Date 1:	Not reported
Local Authority Notification Date 2:	Not reported
Local Authority Notification Date 3:	Not reported
Status at Spill:	OVERFILL OF PORTABLE STORAGE TANK.
Comments:	Not reported

Facility ID:	81851.00000	Case Number:	01-07-19-0933-37
Date Received:	/ /	Operator:	Not reported
Location:	Facility	Nature of Incident:	Not reported
Facility Phone:	609-898-6889	Facility Type:	Commercial
Date of Incident:	07/19/2001	Time of Incident:	09:25
Substance(s):	OIL SLOP		
Substance Type:	Not reported	Substance Identity:	Not reported
Unit:	GALS.		
Official:			
Notification:	OEM		
Name:	Not reported		
Phone:	Not reported		
Date:	07/19/2001		
Time:	Not reported		
Description:	Not reported		
Notify:	NJSP		
Method:	Faxed		
Contained:	Yes		
A310 Letter:	Not reported	TCPA Chemical:	No
Hazrds Material:	Yes	CAS Number:	Not reported
COMU:	0502	Ref. Code:	Not reported
Amnt Released:	2.00000		
Release Type:	Terminated	Contained:	Not reported
Injuries:	Not reported	Facility Evacuation:	Not reported
Public Exposure:	Not reported	Public Evacuation:	Not reported
Police at Scene:	Not reported	Firemen at Scene:	Not reported
Contamination of:	Water	Receiving Water:	CAPE MAY HARBOR
Caller:			
Name:	CHRIS HAJDUK	Title:	USCG

USCG TRAINING CENTER CAPE MAY (Continued) **U003404579**

Address: 1 MUNRO AVE
CAPE MAY, NJ
Telephone: 609-898-6889
Responsible Party:
Name: Known
Contact: CHRIS HAJDUK
Address: 1 MUNRO AVE
CAPE MAY, NJ
County: CAPE MAY
NJ Spill:
Name: Not reported
Telephone: Not reported
Date: Not reported
Local Municipality:
Name: Not reported
Telephone: Not reported
Date: Not reported
Other:
Name: Not reported
Telephone: Not reported
Date: Not reported
Incident:
Name: Not reported
Region: Not reported
Date: Not reported
ITM: Not reported
Company: USCG
Title: ENV SPEC
Telephone: 609-898-6889
Title: Not reported
Time: Not reported
Municipality Title: Not reported
Time: Not reported
Title: Not reported
Time: Not reported
Referred To: Not reported
Telephone: Not reported
Incident Time: Not reported
Incident Description: Spill
Incident Type: Not reported
Wind Direction/Speed: Not reported
Office Notified: Not reported
Off Notified Phone: Not reported
Date Office Notified: 07/19/2001
Assistance Requested: Not reported
Date A310 Letter Printed: Not reported
Date Local Authority Was Notified: Not reported
Date Update: Not reported
Date Report Faxed to Local Authority: Not reported
Local Authority Notification Date 1: Not reported
Local Authority Notification Date 2: Not reported
Local Authority Notification Date 3: Not reported
Status at Spill: OVERFILL OF PORTABLE STORAGE TANK.
Comments: Not reported

Facility ID: 81851.00000
Date Received: / /
Location: Facility
Facility Phone: 609-898-6889
Date of Incident: 07/19/2001
Substance(s): OIL SLOP
Substance Type: Not reported
Unit: GALS.
Official:
Notification: OPER TAYLOR
Name: CAPE MAY CITY
Phone: 609-884-9500
Date: 07/19/2001
Time: 09:38
Case Number: 01-07-19-0933-37
Operator: Not reported
Nature of Incident: Not reported
Facility Type: Commercial
Time of Incident: 09:25
Substance Identity: Not reported

USCG TRAINING CENTER CAPE MAY (Continued) **U003404579**

Description:	Not reported		
Notify:	MUNIC		
Method:	Office		
Contained:	Yes		
A310 Letter:	Not reported	TCPA Chemical:	No
Hazrds Material:	Yes	CAS Number:	Not reported
COMU:	0502	Ref. Code:	Not reported
Amnt Released:	2.00000		
Release Type:	Terminated	Contained:	Not reported
Injuries:	Not reported	Facility Evacuation:	Not reported
Public Exposure:	Not reported	Public Evacuation:	Not reported
Police at Scene:	Not reported	Firemen at Scene:	Not reported
Contamination of:	Water	Receiving Water:	CAPE MAY HARBOR
Caller:			
Name:	CHRIS HAJDUK	Title:	USCG
Address:	1 MUNRO AVE CAPE MAY, NJ		
Telephone:	609-898-6889		
Responsible Party:			
Name:	Known	Company:	USCG
Contact:	CHRIS HAJDUK	Title:	ENV SPEC
Address:	1 MUNRO AVE CAPE MAY, NJ		
County:	CAPE MAY	Telephone:	609-898-6889
NJ Spill:			
Name:	Not reported	Title:	Not reported
Telephone:	Not reported		
Date:	Not reported	Time:	Not reported
Local Municipality:			
Name:	Not reported	Municipality Title:	Not reported
Telephone:	Not reported		
Date:	Not reported	Time:	Not reported
Other:			
Name:	Not reported	Title:	Not reported
Telephone:	Not reported		
Date:	Not reported	Time:	Not reported
Incident:			
Name:	Not reported	Referred To:	Not reported
Region:	Not reported	Telephone:	Not reported
Date:	Not reported	Incident Time:	Not reported
ITM:	Not reported		

Incident Description:	Spill
Incident Type:	Not reported
Wind Direction/Speed:	Not reported
Office Notified:	CAPE MAY CITY
Off Notified Phone:	609-884-9500
Date Office Notified:	07/19/2001
Assistance Requested:	Not reported
Date A310 Letter Printed:	Not reported
Date Local Authority Was Notified:	Not reported
Date Update:	Not reported
Date Report Faxed to Local Authority:	Not reported
Local Authority Notification Date 1:	Not reported
Local Authority Notification Date 2:	Not reported
Local Authority Notification Date 3:	Not reported
Status at Spill:	OVERFILL OF PORTABLE STORAGE TANK.
Comments:	Not reported

USCG TRAINING CENTER CAPE MAY (Continued) **U003404579**

Facility ID:	81851.00000	Case Number:	01-07-19-0933-37
Date Received:	/ /	Operator:	Not reported
Location:	Facility	Nature of Incident:	Not reported
Facility Phone:	609-898-6889	Facility Type:	Commercial
Date of Incident:	07/19/2001	Time of Incident:	09:25
Substance(s):	OIL SLOP		
Substance Type:	Not reported	Substance Identity:	Not reported
Unit:	GALS.		
Official:			
Notification:	DFG		
Name:	Not reported		
Phone:	Not reported		
Date:	07/19/2001		
Time:	Not reported		
Description:	Not reported		
Notify:	HQ		
Method:	Faxed		
Contained:	Yes		
A310 Letter:	Not reported	TCPA Chemical:	No
Hazrds Material:	Yes	CAS Number:	Not reported
COMU:	0502	Ref. Code:	Not reported
Amnt Released:	2.00000		
Release Type:	Terminated	Contained:	Not reported
Injuries:	Not reported	Facility Evacuation:	Not reported
Public Exposure:	Not reported	Public Evacuation:	Not reported
Police at Scene:	Not reported	Firemen at Scene:	Not reported
Contamination of:	Water	Receiving Water:	CAPE MAY HARBOR
Caller:			
Name:	CHRIS HAJDUK	Title:	USCG
Address:	1 MUNRO AVE CAPE MAY, NJ		
Telephone:	609-898-6889		
Responsible Party:			
Name:	Known	Company:	USCG
Contact:	CHRIS HAJDUK	Title:	ENV SPEC
Address:	1 MUNRO AVE CAPE MAY, NJ		
County:	CAPE MAY	Telephone:	609-898-6889
NJ Spill:			
Name:	Not reported	Title:	Not reported
Telephone:	Not reported		
Date:	Not reported	Time:	Not reported
Local Municipality:			
Name:	Not reported	Municipality Title:	Not reported
Telephone:	Not reported		
Date:	Not reported	Time:	Not reported
Other:			
Name:	Not reported	Title:	Not reported
Telephone:	Not reported		
Date:	Not reported	Time:	Not reported
Incident:			
Name:	Not reported	Referred To:	Not reported
Region:	Not reported	Telephone:	Not reported
Date:	Not reported	Incident Time:	Not reported
ITM:	Not reported		

Incident Description: Spill

USCG TRAINING CENTER CAPE MAY (Continued) **U003404579**

Incident Type: Not reported
Wind Direction/Speed: Not reported
Office Notified: Not reported
Off Notified Phone: Not reported
Date Office Notified: 07/19/2001
Assistance Requested: Not reported
Date A310 Letter Printed: Not reported
Date Local Authority Was Notified: Not reported
Date Update: Not reported
Date Report Faxed to Local Authority: Not reported
Local Authority Notification Date 1: Not reported
Local Authority Notification Date 2: Not reported
Local Authority Notification Date 3: Not reported
Status at Spill: OVERFILL OF PORTABLE STORAGE TANK.
Comments: Not reported

Facility ID: 27595.00000
Date Received: 6/30/98 0:00:00
Location: Other
Facility Phone: Not reported
Date of Incident: 6/30/98 0:00:00
Substance(s): NONE
Substance Type: Not reported
Unit: NONE
Official:
Notification: Not reported
Name: ROB SCHRADER
Phone: Not reported
Date: 6/30/98 0:00:00
Time: 15:05
Description: Not reported
Notify: ER2
Method: Office
Contained: Not reported
A310 Letter: No
Hazrds Material: No
COMU: 0502
Amnt Released: 0.00
Release Type: Not reported
Injuries: No
Public Exposure: No
Police at Scene: No
Contamination of: Water
Caller:
Name: P.O.IAN WOODS
Address: Not reported
Telephone: 215-271-4885
Responsible Party:
Name: Unknown
Contact: Not reported
Address: Not reported
County: Not reported
NJ Spill:
Name: Not reported
Telephone: Not reported
Date: Not reported
Local Municipality:

Case Number: 98-06-30-1505-29
Operator: JOYCE
Nature of Incident: Other
Facility Type: Commercial
Time of Incident: Not reported

Substance Identity: Known

TCPA Chemical: No
CAS Number: Not reported
Ref. Code: 002

Contained: Not reported
Facility Evacuation: No
Public Evacuation: No
Firemen at Scene: Not reported
Receiving Water: ATLANTIC OCEAN

Title: USCG/PHLA

Company: Not reported
Title: Not reported

Telephone: Not reported

Title: Not reported

Time: Not reported

USCG TRAINING CENTER CAPE MAY (Continued) **U003404579**

Name:	Not reported	Municipality Title:	Not reported
Telephone:	Not reported		
Date:	Not reported	Time:	Not reported
Other:			
Name:	Not reported	Title:	Not reported
Telephone:	Not reported		
Date:	Not reported	Time:	Not reported
Incident:			
Name:	Not reported	Referred To:	Not reported
Region:	Not reported	Telephone:	Not reported
Date:	Not reported	Incident Time:	Not reported
ITM:	Not reported		

Incident Description:	Abandoned Containers
Incident Type:	Not reported
Wind Direction/Speed:	Not reported
Office Notified:	ROB SCHRADER
Off Notified Phone:	Not reported
Date Office Notified:	6/30/98 0:00:00
Assistance Requested:	Yes
Date A310 Letter Printed:	Not reported
Date Local Authority Was Notified:	Not reported
Date Update:	Not reported
Date Report Faxed to Local Authority:	Not reported
Local Authority Notification Date 1:	Not reported
Local Authority Notification Date 2:	Not reported
Local Authority Notification Date 3:	Not reported
Status at Spill:	1 ABANDONED SEALED CONTAINER OF UNK LIQ FOUND NEAR BUOY 5 ATLANTIC OCEAN. DRUM MARKINGS CHEVRON CLARITY HYDRAULIC OIL SER 8WI5032.
Comments:	Not reported

The NJ Release database contains 2 additional records for this site.
Please click here or contact your EDR Account Executive for more information.

USCG TRAINING CENTER CAPE MAY (Continued) **U003404579**

UST:

Facility ID:	0327981	Facility Status:	Inactive
Install Date:	1/1/44 0:00:00	Facility Type:	D. Federal
Unique Tank ID:	1.00	Owner Tank ID:	0001

Operator:	US COAST GUARD
Operator Address:	Not reported
Owner:	US COAST GUARD
Owner Address:	1 MUNRO AVE CAPE MAY, NJ 08204
Tank Capacity:	150.00 Gallons
Tank Contents:	P. Other Hazardous Substances/HELICOPTER RESIDUE
Tank Construction:	A. Bare steel
Tank Structure:	A. Single Wall
Pipe Contents:	A. Bare Steel
Pipe Structure:	A. Single Wall
Over Fill Products:	No
Spill Containment Around Fill Pipe:	No
Tank Status:	G. Removed
Date Tank Removed:	Not reported
Date Tank Abandoned in Place:	Not reported
Date Tank Taken Out of Service:	1/1/88 0:00:00
Date of Tank Sale or Transfer:	Not reported
Tank Closure Number:	N98-2238
Tank ISRA Number:	Not reported
Tank in Wellhead Protection Area:	Not reported
Is Facility in Compliance Rules:	No

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32 **USCG ELECTRONICS ENGINEERING** **RCRIS-SQG** **1000544604**
ESE **OCEAN HWY** **FINDS** **NJ9690310991**
1/2-1 **WILDWOOD, NJ 08260** **UST**
4822 ft.

Relative:
Higher

Actual:
3 ft.

RCRIS:

Owner:	US COAST GUARD (212) 555-1212
EPA ID:	NJ9690310991
Contact:	ROBERT EVELYN (609) 523-7261

Classification: Small Quantity Generator
Used Oil Recyc: No
TSDF Activities: Not reported

Violation Status: No violations found

NY MANIFEST
Additional detail is available in NY MANIFEST. Please contact your EDR Account Executive for more information.

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Resource Conservation and Recovery Act Information system (RCRAINFO)

USCG ELECTRONICS ENGINEERING (Continued) **1000544604**

UST:

Facility ID:	0220646	Facility Status:	Inactive
Install Date:	1/1/82 0:00:00	Facility Type:	D. FEDERAL
Unique Tank ID:	1.00	Owner Tank ID:	E1
Operator:	Not reported		
Operator Address:	Not reported		
Owner:	USA-UNITED STATES COAST GUARD		
Owner Address:	USCG EECEN (E) WILDWOOD, NJ 08260 - 0060		
Tank Capacity:	550.00 Gallons		
Tank Contents:	B. UNLEADED GASOLINE		
Tank Construction:	D. FIBERGLASS-REINFORCED PLASTIC		
Tank Structure:	A. SINGLE WALL		
Pipe Contents:	A. BARE STEEL		
Pipe Structure:	A. SINGLE WALL		
Over Fill Products:	No		
Spill Containment Around Fill Pipe:	No		
Tank Status:	G. REMOVED 2/4/92 C91-4478		
Date Tank Removed:	Not reported		
Date Tank Abandoned in Place:	Not reported		
Date Tank Taken Out of Service:	Not reported		
Date of Tank Sale or Transfer:	Not reported		
Tank Closure Number:	Not reported		
Tank ISRA Number:	Not reported		
Tank in Wellhead Protection Area:	Not reported		
Is Facility in Compliance Rules:	No		

Facility ID:	0220646	Facility Status:	Inactive
Install Date:	1/1/82 0:00:00	Facility Type:	D. FEDERAL
Unique Tank ID:	2.00	Owner Tank ID:	P2
Operator:	Not reported		
Operator Address:	Not reported		
Owner:	USA-UNITED STATES COAST GUARD		
Owner Address:	USCG EECEN (E) WILDWOOD, NJ 08260 - 0060		
Tank Capacity:	550.00 Gallons		
Tank Contents:	A. LEADED GASOLINE		
Tank Construction:	D. FIBERGLASS-REINFORCED PLASTIC		
Tank Structure:	A. SINGLE WALL		
Pipe Contents:	A. BARE STEEL		
Pipe Structure:	A. SINGLE WALL		
Over Fill Products:	No		
Spill Containment Around Fill Pipe:	No		
Tank Status:	G. REMOVED 2/4/92 C91-4478		
Date Tank Removed:	Not reported		
Date Tank Abandoned in Place:	Not reported		
Date Tank Taken Out of Service:	Not reported		
Date of Tank Sale or Transfer:	Not reported		
Tank Closure Number:	Not reported		
Tank ISRA Number:	Not reported		
Tank in Wellhead Protection Area:	Not reported		
Is Facility in Compliance Rules:	No		

33 West 1/2-1 4897 ft.

BREE ZEE LEE YACHT BASIN
930 OCEAN DRIVE
CAPE MAY, NJ 08204

FINDS 1004560420
NJPDES 110006803799

Relative: Equal

Actual: 1 ft.

FINDS:
Other Pertinent Environmental Activity Identified at Site:
Facility Registry System (FRS)
Permit Compliance System (PCS)

NJ PDES:

NJPDES Permit Number :	NJ0110949
Facility Telephone :	(609) 884-4849
Facility Contact :	HARRY COLSON
Facility Municipality:	CAPE MAY CITY
Discharger Classification:	Not reported
Facility Enforcement region:	SOUTHERN
Facility Ownership:	PRIVATE
Facility Primary SIC code:	4493
Facility Discharge Basin code:	Not reported
Facility Discharge Basin name:	Not reported
Fac Lat/Long:	0 / 0
Facility Lot number:	Not reported
Facility Block number:	Not reported
Date Permit Application Received :	02/05/1996
Date Draft Permit Issued To Facility:	/ /
Permittee Name:	HARRY COLSON
PI Number:	Not reported
Permittee Street Address:	206 E STANTON ROAD
	Not reported
	Not reported
Permittee PO Box:	Not reported
	WILDWOOD CREST, NJ 08260
Date Final Permit Issued To Facility:	05/05/1997
Date Final Permit Becomes Effective:	05/05/1997
Date Final Permit Expires:	01/31/2002
Permit Discharge Category:	5G2
Category Description:	STORMWATER BASIC (GP)
NJPDES Permit Number :	NJG0110949
Facility Telephone :	(609) 884-4849
Facility Contact :	HARRY COLSON
Facility Municipality:	LOWER TWP
Discharger Classification:	MINOR
Facility Enforcement region:	SOUTHERN
Facility Ownership:	PRIVATE
Facility Primary SIC code:	4493
Facility Discharge Basin code:	Not reported
Facility Discharge Basin name:	Not reported
Fac Lat/Long:	Not reported
Facility Lot number:	Not reported
Facility Block number:	Not reported
Date Permit Application Received :	Not reported
Date Draft Permit Issued To Facility:	Not reported
Permittee Name:	BREE ZEE LEE YATCH BASIN
PI Number:	47884
Permittee Street Address:	400 PORTSMOUTH RD
	Not reported
	Not reported
Permittee PO Box:	Not reported

BREE ZEE LEE YACHT BASIN (Continued) **1004560420**

CAPE MAY, NJ 08204

Date Final Permit Issued To Facility:	09/05/2002
Date Final Permit Becomes Effective:	06/01/2002
Date Final Permit Expires:	05/31/2007
Permit Discharge Category:	5G2
Category Description:	STORMWATER BASIC (GP)

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34 **US COAST GUARD TRAINING CENTER** **LUST** **U002155792**
SSW **1 MUNRO DR** **UST** **N/A**
> 1 **CAPE MAY, NJ 08204** **Brownfields**
6881 ft.

Relative:
Lower

Actual:
0 ft.

LUST:

Case ID:	Not reported
Facility Status:	Site Issued Letter of No Further Action
Facility Phone:	(609) 292-9208
UST ID:	0327981
Lead Program Assigned to Case:	Bureau of Field Operations - Initial Notice Section
TMS Number:	N98-2238
Remedial Level:	Site has 1 area of concern with 1 media of concern.
Case Manager:	Stuart Friedman
No Further Action:	1/10/2000 0:00:00
RAW Approved:	Not reported
CEA:	Not reported
Date CEA Lifted:	Not reported
Dead Notice:	Not reported

NJ BROWNFIELD:

Status:	Not reported
Status Date:	04/18/1995
Lead Agency:	BFO-S
XY Origin:	ZIP
Remedial Lead:	C1
X Co-Ordinate:	371702.75449
Y Co-Ordinate:	49365.53576

Contaminated Site List #: NJ4690308933

US COAST GUARD TRAINING CENTER (Continued) **U002155792**

UST:

Facility ID:	0028776	Facility Status:	Inactive
Install Date:	1/1/73 0:00:00	Facility Type:	D. FEDERAL
Unique Tank ID:	1.00	Owner Tank ID:	A2
Operator:	Not reported		
Operator Address:	Not reported		
Owner:	USA US COAST GAURD TRAINING CENT		
Owner Address:	ATTN: A ZAMMIT, COORDINATOR CAPE MAY, NJ 08204		
Tank Capacity:	6000.00 Gallons		
Tank Contents:	P. OTHER HAZARDOUS SUBSTANCES: WATER		
Tank Construction:	A. BARE STEEL		
Tank Structure:	A. SINGLE WALL		
Pipe Contents:	A. BARE STEEL		
Pipe Structure:	A. SINGLE WALL		
Over Fill Products:	No		
Spill Containment Around Fill Pipe:	No		
Tank Status:	G. REMOVED		
Date Tank Removed:	Not reported		
Date Tank Abandoned in Place:	Not reported		
Date Tank Taken Out of Service:	Not reported		
Date of Tank Sale or Transfer:	Not reported		
Tank Closure Number:	Not reported		
Tank ISRA Number:	Not reported		
Tank in Wellhead Protection Area:	Not reported		
Is Facility in Compliance Rules:	No		

Facility ID:	0028776	Facility Status:	Inactive
Install Date:	1/1/73 0:00:00	Facility Type:	D. FEDERAL
Unique Tank ID:	2.00	Owner Tank ID:	A3
Operator:	Not reported		
Operator Address:	Not reported		
Owner:	USA US COAST GAURD TRAINING CENT		
Owner Address:	ATTN: A ZAMMIT, COORDINATOR CAPE MAY, NJ 08204		
Tank Capacity:	6000.00 Gallons		
Tank Contents:	P. OTHER HAZARDOUS SUBSTANCES: WATER		
Tank Construction:	A. BARE STEEL		
Tank Structure:	A. SINGLE WALL		
Pipe Contents:	A. BARE STEEL		
Pipe Structure:	A. SINGLE WALL		
Over Fill Products:	No		
Spill Containment Around Fill Pipe:	No		
Tank Status:	G. REMOVED		
Date Tank Removed:	Not reported		
Date Tank Abandoned in Place:	Not reported		
Date Tank Taken Out of Service:	Not reported		
Date of Tank Sale or Transfer:	Not reported		
Tank Closure Number:	Not reported		
Tank ISRA Number:	Not reported		
Tank in Wellhead Protection Area:	Not reported		
Is Facility in Compliance Rules:	No		

US COAST GUARD TRAINING CENTER (Continued) **U002155792**

Facility ID:	0028776	Facility Status:	Inactive
Install Date:	1/1/80 0:00:00	Facility Type:	D. FEDERAL
Unique Tank ID:	3.00	Owner Tank ID:	E1

Operator:	Not reported
Operator Address:	Not reported
Owner:	USA US COAST GAURD TRAINING CENT
Owner Address:	ATTN: A ZAMMIT, COORDINATOR CAPE MAY, NJ 08204
Tank Capacity:	4000.00 Gallons
Tank Contents:	H. HOME HEATING OIL (NO. 2)
Tank Construction:	D. FIBERGLASS-REINFORCED PLASTIC
Tank Structure:	A. SINGLE WALL
Pipe Contents:	A. BARE STEEL
Pipe Structure:	A. SINGLE WALL
Over Fill Products:	No
Spill Containment Around Fill Pipe:	No
Tank Status:	G. REMOVED 04/12/89
Date Tank Removed:	Not reported
Date Tank Abandoned in Place:	Not reported
Date Tank Taken Out of Service:	Not reported
Date of Tank Sale or Transfer:	Not reported
Tank Closure Number:	Not reported
Tank ISRA Number:	Not reported
Tank in Wellhead Protection Area:	Not reported
Is Facility in Compliance Rules:	No

35
ENE
> 1
7414 ft.

WILDWOOD CREST DPW **LUST** **S104391650**
NEWARK AVE / RAILROAD AVE **N/A**
WILDWOOD CREST, NJ

Relative:
Higher

Actual:
2 ft.

LUST:

Case ID:	94-11-01-1604
Facility Status:	Site Issued Letter of No Further Action
Facility Phone:	(609) 633-1275
UST ID:	0024185
Lead Program Assigned to Case:	Bureau of Underground Storage Tanks
TMS Number:	C94-2062
Remedial Level:	Site has confirmed soil and ground water contamination.
Case Manager:	Tim Nuss
No Further Action:	7/30/1999 0:00:00
RAW Approved:	Not reported
CEA:	Y
Date CEA Lifted:	Not reported
Dead Notice:	Not reported

36
West
> 1
7888 ft.

SOUTH JERSEY EAST/CANYON CLUB MARINA **LUST** **S104393350**
OCEAN HWY / GARDEN STATE PKWY **N/A**
CAPE MAY, NJ

Relative:
Higher

Actual:
7 ft.

LUST:

Case ID:	98-01-12-1247-13
Facility Status:	Site Issued Letter of No Further Action
Facility Phone:	(609) 984-7830
UST ID:	0005159
Lead Program Assigned to Case:	Bureau of Underground Storage Tanks

SOUTH JERSEY EAST/CANYON CLUB MARINA (Continued) **S104393350**

TMS Number:	C97-0868
Remedial Level:	Site has more than 1 area of concern or more than 1 media of concern.
Case Manager:	Jay Basavanhally
No Further Action:	8/13/1998 0:00:00
RAW Approved:	Not reported
CEA:	Not reported
Date CEA Lifted:	Not reported
Dead Notice:	Not reported

37
East
> 1
8474 ft.

307 E TRENTON AVE **SHWS** **S105008554**
307 E TRENTON AVE **N/A**
WILDWOOD CREST BOROUGH, NJ

Relative:
Higher

Actual:
7 ft.

SHWS:

Facility ID:	NJL800500084	Case ID:	990608104104
Contact:	Bureau of Field Operations - Southern		
Case Status:	ACTIVE		
Sub Section Code:	A		
Status Date:	07/29/1999		
Site Municipality:	515		
Sub Section Label:	SITES WITH ON-SITE SOURCE(S) OF CONTAMINATION		
Remedial Action Type:	Not reported		
CEA/DER:	Not reported		

38
WSW
> 1
10491 ft.

ROSEMANS BOAT YARD **SHWS** **S105008243**
5 ROSEMANS LN **N/A**
CAPE MAY CITY, NJ

Relative:
Equal

Actual:
1 ft.

SHWS:

Facility ID:	NJL800470593	Case ID:	13141
Contact:	Bureau of Underground Storage Tanks		
Case Status:	ACTIVE		
Sub Section Code:	A		
Status Date:	01/06/2000		
Site Municipality:	502		
Sub Section Label:	SITES WITH ON-SITE SOURCE(S) OF CONTAMINATION		
Remedial Action Type:	Not reported		
CEA/DER:	Not reported		

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
CAPE MAY	S102205314	CAPE MAY BRIDGE	RT 109		NJ Spills, NJ Release
CAPE MAY	1000197208	CAPE ISLAND YACHT CORP	RTE 109	08204	RCRIS-SQG, FINDS
CAPE MAY	S105344848	AREA OF	1230 RT 109	08204	NJ Release
CAPE MAY	S105680028	TONY'S MARINE RAILWAY INC	1203 RT 109	08204	NJPDES
CAPE MAY	S104692331	SOUTH JERSEY MARINA	RT 109		NJ Release
CAPE MAY	S105340399	NEXT TO SO JERSEY MARINA	RT 109		NJ Release
CAPE MAY	S104716516	SOUTH JERSEY MARINE	1231 HWY 109		NJ Release
CAPE MAY	S103899257	CAPE MAY MUA	2701 RT 47 S		NJ Release
CAPE MAY	S103899412	CAPE MAY HARBOR	38' 57/074' 54 W		NJ Release
CAPE MAY	99610582	A AND J FISH HOUSE OCEAN DRIVE	A AND J FISH HOUSE OCEAN DRIVE	08204	ERNS
CAPE MAY	S104727098	ATLANTIC OCEAN	ATLANTIC OCEAN		NJ Release
CAPE MAY	96484049	ATLANTIC CAPE FISHERIES DOCK / 985	ATLANTIC CAPE FISHERIES DOCK /		ERNS
CAPE MAY	91238583	ATLANTIC CAPE FISHERIES IN I.C.W.	ATLANTIC CAPE FISHERIES IN I.C		ERNS
CAPE MAY	2000540341	ATLANTIC CAPE FISHERIES	ATLANTIC CAPE FISHERIES		ERNS
CAPE MAY	2000529707	BAYSIDE JETTY CAPE MAY	BAYSIDE JETTY CAPE MAY	08204	ERNS
CAPE MAY	S102487308	CAPE MAY LEWES FERRY TERMINAL	BET DEL BAY-OCEAN		NJ Release
CAPE MAY	S105466404	LEPOR & SONS COMPOST	RD#1 BOX 446	08204	SWF/LF
CAPE MAY	94374606	BRIDGE OVER SKUNK SOUND ON OCEAN D	BRIDGE OVER SKUNK SOUND ON OCE	08204	ERNS
CAPE MAY	S104364913	BEACH AT	BROADWAY		NJ Spills, NJ Release
CAPE MAY	S102209533	CAPE MAY WATER WORKS BLDG/DPW	CANNING HOUSE LN		NJ Spills
CAPE MAY	S105325439	CAPE MAY CITY WTR	CANNING HOUSE LN	08204	NJ Spills
CAPE MAY	1000197446	CAPE MAY DEPT OF PUBLIC WORKS	CANNING HOUSE WAY	08204	RCRIS-SQG, FINDS
CAPE MAY	984583231	CAPE MAY HARBOR	CAPE MAY HARBOR		ERNS
CAPE MAY	984583230	CAPE MAY HARBOR	CAPE MAY HARBOR		ERNS
CAPE MAY	96517290	CAPE MAY HARBOR FAROH'S CUT	CAPE MAY HARBOR FAROH'S CUT		ERNS
CAPE MAY	96510455	CAPE MAY LEWIS FERRY TERMINAL	CAPE MAY LEWIS FERRY TERMINAL		ERNS
CAPE MAY	96501223	CAPE MAY MARINE	CAPE MAY MARINE		ERNS
CAPE MAY	96499622	CAPE MAY MARINE	CAPE MAY MARINE		ERNS
CAPE MAY	8716043	CAPE MAY CANAL, 50 YRDS FROM JETTY	CAPE MAY CANAL, 50 YRDS FROM J		ERNS
CAPE MAY	94404708	CAPE MAY RR BRIDGE	CAPE MAY RR BRIDGE		ERNS
CAPE MAY	S104705757	CAPE MAY CANAL+CAPE IS.CR	CAPE ISLAND BRIDGE		NJ Release
CAPE MAY	8715696	CAPE MAY HARBOR CAPE MAY YACHT CLU	CAPE MAY HARBOR CAPE MAY YACHT		ERNS
CAPE MAY	96485069	CAPE MAY FISHERIES DOCK - 985 OCEA	CAPE MAY FISHERIES DOCK - 985		ERNS
CAPE MAY	94373419	CAPE MAY HARBOR	CAPE MAY HARBOR		ERNS
CAPE MAY	93335307	CAPE MAY USCG BASE	CAPE MAY USCG BASE		ERNS
CAPE MAY	92290702	CAPE MAY HARBOR	CAPE MAY HARBOR		ERNS
CAPE MAY	92287723	CAPE MAY HARBOR	CAPE MAY HARBOR		ERNS
CAPE MAY	92274216	CAPE MAY - NEAR 2 MILE BRIDGE	CAPE MAY - NEAR 2 MILE BRIDGE		ERNS
CAPE MAY	92272266	CAPE MAY HARBOR	CAPE MAY HARBOR		ERNS
CAPE MAY	93301766	CAPE MAY HARBOR SCHELLENGER CREEK	CAPE MAY HARBOR SCHELLENGER CR		ERNS
CAPE MAY	91221980	CAPE MAY HARBOR	CAPE MAY HARBOR		ERNS
CAPE MAY	91216333	CAPE MAY HARBOR	CAPE MAY HARBOR		ERNS
CAPE MAY	91203897	CAPE MAY HARBOR	CAPE MAY HARBOR		ERNS

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
CAPE MAY	90180606	CAPE MAY HARBOR	CAPE MAY HARBOR		ERNS
CAPE MAY	89210467	CAPE MAY HARBOR	CAPE MAY HARBOR		ERNS
CAPE MAY	8871902	CAPE MAY HARBOR	CAPE MAY HARBOR		ERNS
CAPE MAY	99636166	CAPE MAY HARBOR 38 57 N 74 53 W	CAPE MAY HARBOR 38 57 N 74 53		ERNS
CAPE MAY	96490039	CAPE MAY HARBOR	CAPE MAY HARBOR		ERNS
CAPE MAY	S102228417	CAPE AVE BEACH AT THE END OF	CAPE AVE		NJ Spills
CAPE MAY	S102228396	CAPE MAY MARINE	CAPE MAY CANAL		NJ Release
CAPE MAY	96518300	CAPE MAY HARBOR/FAROH'S CUT	CAPE MAY HARBOR/FAROH'S CUT	08204	ERNS
CAPE MAY	94362506	CAPE MAY HARBOR CPE MAY COAST GUAR	CAPE MAY HARBOR CPE MAY COAST	08204	ERNS
CAPE MAY	93340115	CAPE ISLAND CREEK	CAPE ISLAND CREEK	08204	ERNS
CAPE MAY	91235508	CAPE MAY HARBOR	CAPE MAY HARBOR	08204	ERNS
CAPE MAY	91235414	CAPE MAY USCG STATION	CAPE MAY USCG STATION	08204	ERNS
CAPE MAY	91235392	CAPE MAY HARBOR	CAPE MAY HARBOR	08204	ERNS
CAPE MAY	1006686369	CITY OF CAPE MAY PUBLIC WORKS	CAPE MAY DESALINATION PLANT	08204	FINDS
CAPE MAY	1004043499	CITY OF CAPE MAY PUBLIC WORKS	CAPE MAY DESALINATION PLANT	08204	NJPDES
CAPE MAY	1000364564	EVERLON FABRICS	CAPE MAY INDUSTRIAL PARK	08204	RCRIS-SQG, FINDS
CAPE MAY	S104692172	PIER 4	CAPE MAY HARBOR		NJ Release
CAPE MAY	S102227261	ON BEACH TNT PROPERTY BY	CAPE MAY POINT PARK		NJ Release
CAPE MAY	S105345105	2 MILE SANDING MARINA	CAPE MAY HARBOR		NJ Release
CAPE MAY	S104716417	HINCHES MARINA	CAPE MAY HARBOR		NJ Release
CAPE MAY	S104714786	MUA CAPE MAY COUNTY	CAPERT LANE		NJ Release
CAPE MAY	S102208772	CAPE MAY MUA	CAPHART LN		NJ Spills
CAPE MAY	94364915	COMMANDING OFFICER USCG TRAINING C	COMMANDING OFFICER USCG TRAINI		ERNS
CAPE MAY	90162975	COMPANY DOCK 985 OCEAN DR.	COMPANY DOCK 985 OCEAN DR.		ERNS
CAPE MAY	S105341961	CAPE MAY CNTY COURT HOUSE	COMPOST RD		NJ Release
CAPE MAY	93324779	CONTRACTOR FOR CAPE MAY BRIDGE COM	CONTRACTOR FOR CAPE MAY BRIDGE		ERNS
CAPE MAY	S105343986	CAPE MAY HARBOR	DELAWARE AVE		NJ Release
CAPE MAY	92254864	DELAWARE BAY 3 MILES WEST OF CAPE	DELAWARE BAY 3 MILES WEST OF C		ERNS
CAPE MAY	S104725571	1/2 MILE OFF TOWN BEACH	IN DELAWARE BAY		NJ Release
CAPE MAY	S104694582	CAPE MAY HARBOR	DELEWARE AVE		NJ Release
CAPE MAY	S105296038	TRANQUILITY PARK NORTH	DEVELOPMENT CO	08204	NJPDES
CAPE MAY	S104661079	CAPE MAY LEWES	FERRY TERMINAL		NJ Release
CAPE MAY	1006491015	CAPE MAY OMS	600 GARDEN STATE PARKWAY	08204	FINDS
CAPE MAY	1006531730	CE-CAPE MAY DREDGE	GSA 9600-09908	08204	FINDS
CAPE MAY	1004561249	CE CAPE MAY DREDGE	GSA 9600-09908	08204	FINDS
CAPE MAY	94381456	HARBOR OFF OCEAN DRIVE	HARBOR OFF OCEAN DRIVE		ERNS
CAPE MAY	91222300	HINCHES MARINA ON CAPE MAY HARBOR	HINCHES MARINA ON CAPE MAY HAR		ERNS
CAPE MAY	S105296989	ROBBRO LLC	T/A HOLLY SHORES CAMPGROUND	08204	NJPDES
CAPE MAY	96485899	ON INLAND WATERWAY .5 MILE INSIDE	ON INLAND WATERWAY .5 MILE INS		ERNS
CAPE MAY	92296848	INTERCOASTAL WATERWAY - 985 OCEAN	INTERCOASTAL WATERWAY - 985 OC		ERNS
CAPE MAY	S104429412	WATERS EDGE-	JEFFERSON ST BEACH		NJ Spills, NJ Release
CAPE MAY	S104696198	CAPE MAY HARBOR	SOUTH JERSEY MARINE		NJ Release
CAPE MAY	8866653	SOUTH JERSEY MARINA AT CAPE MAY HA	SOUTH JERSEY MARINA AT CAPE MA		ERNS
CAPE MAY	99625552	SOUTH JERSEY MARINA CAPE MAY HARBO	SOUTH JERSEY MARINA CAPE MAY H		ERNS
CAPE MAY	S104720354	IN CAPE MAY INLET	ON JETTY		NJ Release
CAPE MAY	S104394983	NJ TRANSIT TRAIN STATION (FORMER)	LAFAYETTE ST		LUST
CAPE MAY	1000870251	CAPE MAY CO-SCHELLENGER LANDING BR	LAFAYETTE ST OVER CAPE	08204	RCRIS-SQG, FINDS

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
CAPE MAY	1000153399	ATLANTIC ELECTRIC - CAPE MAY SUBST	LAFAYETTE ST	08204	RCRIS-SQG, FINDS
CAPE MAY	S104370096	NJ TRANSIT (FORMER SITE)	LAFFYETTE ST		NJ Release
CAPE MAY	91219112	LAGOON OFF MIDDLE THORO- FARES. DO	LAGOON OFF MIDDLE THORO- FARES		ERNS
CAPE MAY	1004561381	USCG-CAPE MAY LIGHT	LIGHTHOUSE AVE	08204	FINDS
CAPE MAY	1000197441	CAPE MAY - LEWES FERRY	LINCOLN BLVD	08204	FINDS, RCRIS-LQG
CAPE MAY	S104696521	MADISON AVE PUMPING STATION	MADISON AVE		NJ Release
CAPE MAY	S104716136	MADISON AVE PUMP STATION	MADISON AVE		NJ Release
CAPE MAY	S104480652	NEAR PACIFIC ON	MADISON AVE		NJ Release
CAPE MAY	S102192734	OCEAN ATLANTIC TEXTILES	502 SOUTH MAIN ST		NJ Spills
CAPE MAY	S105296518	SHELL SERV STA-CAPE MAY	233 N MAIN ST / S DENNIS RD	08204	NJPDES
CAPE MAY	S104726718	ATLANTIC OCEAN	MIDDLE THOROFARE		NJ Release
CAPE MAY	91225214	3 MILES OFFSHORE OF CAPE MAY INLET	3 MILES OFFSHORE OF CAPE MAY I		ERNS
CAPE MAY	S102485609	ATLANTIC OCEAN	70 MILES OFF		NJ Release
CAPE MAY	96511765	38 MILES EAST OF CAPE MAY	38 MILES EAST OF CAPE MAY	08204	ERNS
CAPE MAY	96509069	38 MILES EAST OF CAPE MAY	38 MILES EAST OF CAPE MAY	08204	ERNS
CAPE MAY	96507930	38 MILES EAST OF CAPE MAY	38 MILES EAST OF CAPE MAY	08204	ERNS
CAPE MAY	94396902	MILL CREEK OFF OCEAN DRIVE	MILL CREEK OFF OCEAN DRIVE		ERNS
CAPE MAY	94392216	MILL CREEK OFF OCEAN DRIVE	MILL CREEK OFF OCEAN DRIVE		ERNS
CAPE MAY	S104724008	CAPE MAY HARBOR OFF	MISS CHRIS FISHING		NJ Release
CAPE MAY	S104466572	CAPE MAY HARBOR	38 57 N/74 53 W		NJ Release
CAPE MAY	S102225084	.5 MILE INSIDE CAPE MAY HBR	1 MI NORTH OF BRIDGE		NJ Release
CAPE MAY	S105355444	CAPE MAY HARBOR	900 OCEAN DRIVE		NJ Release
CAPE MAY	S105355443	CAPE MAY HARBOR	900 OCEAN DRIVE		NJ Release
CAPE MAY	90180637	OCEAN DRIVE (ROUTE 621)	OCEAN DRIVE (ROUTE 621)		ERNS
CAPE MAY	2001569482	989 OCEAN DRIVE	989 OCEAN DRIVE		ERNS
CAPE MAY	2001566420	989 OCEAN DRIVE	989 OCEAN DRIVE		ERNS
CAPE MAY	2000545989	985 OCEAN DR.	985 OCEAN DR.		ERNS
CAPE MAY	2000543107	OCEAN DRIVE AT CAPE MAY	OCEAN DRIVE AT CAPE MAY		ERNS
CAPE MAY	2000535874	989 OCEAN DRIVE	989 OCEAN DRIVE		ERNS
CAPE MAY	2000532628	985 OCEAN DRIVE	985 OCEAN DRIVE		ERNS
CAPE MAY	2002619858	985 OCEAN DR	985 OCEAN DR		ERNS
CAPE MAY	2002601204	985 OCEAN DR	985 OCEAN DR		ERNS
CAPE MAY	2002596625	989 OCEAN DRIVE	989 OCEAN DRIVE		ERNS
CAPE MAY	96518301	985 OCEAN DRIVE/ATLANTIC CAPE FISH	985 OCEAN DRIVE/ATLANTIC CAPE	08204	ERNS
CAPE MAY	96509969	989 OCEAN DR OFF INTRACOASTAL WATE	989 OCEAN DR OFF INTRACOASTAL	08204	ERNS
CAPE MAY	96506891	997 OCEAN DR AT THE DOCK	997 OCEAN DR AT THE DOCK	08204	ERNS
CAPE MAY	96492567	989 OCEAN DR BACKWATER LAGOON	989 OCEAN DR BACKWATER LAGOON	08204	ERNS
CAPE MAY	94382291	994 OCEAN DRIVE PROCESSING PLANT V	994 OCEAN DRIVE PROCESSING PLA	08204	ERNS
CAPE MAY	93344643	994 OCEAN DRIVE BORDEN CLAM PRODUC	994 OCEAN DRIVE BORDEN CLAM PR	08204	ERNS
CAPE MAY	2000527043	OCEAN DR.	OCEAN DR.	08204	ERNS
CAPE MAY	1000186324	BORDEN CLAM PRODUCTS	OCEAN DR	08204	RCRIS-SQG
CAPE MAY	S105066975	MIDDLE THOROFARE/HINCH MARINA	989 OCEAN DR		NJ Release
CAPE MAY	S105132846	AREA OF	989 OCEAN DR		NJ Release
CAPE MAY	S105342870	CANYON CLUB	OCEAN DRIVE		NJ Release
CAPE MAY	S105350173	AREA OF	315 OCEAN AV		NJ Release
CAPE MAY	S105355755	AREA OF HINCH MARINA	989 OCEAN DR		NJ Release
CAPE MAY	S104705436	FISHING DOCK	OCEAN DR		NJ Release

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
CAPE MAY	S104797869	BREAZY LEE YACHT BASIN	OCEAN DR/CAPE MAY HARBOR		NJ Release
CAPE MAY	S104371372	COHENS DOCK	OCEAN DR		NJ Release
CAPE MAY	1000225249	PIPEWELDERS MARINE INC	OCEAN DR & US HWY 109	08204	RCRIS-SQG, FINDS
CAPE MAY	S104715801	AMERICAN CO OP	OCEAN HWY		NJ Release
CAPE MAY	S102488775	ATLANTIC CAPE FISHERIS	985 OCERN DR		NJ Release
CAPE MAY	96517088	985 OCERN DRIVE ATLANTIC CAPE FISH	985 OCERN DRIVE ATLANTIC CAPE		ERNS
CAPE MAY	S102228320	OFF CAPE MAY HARBOR 1/8 MILE	NORTH OF 2 MI BIRDGE		NJ Release
CAPE MAY	96499491	OFF CAPE MAY HARBOR 1/8 MI N OF 2	OFF CAPE MAY HARBOR 1/8 MI N O		ERNS
CAPE MAY	S105346330	SHELTON COLLEGE VACANT BLDG	OFF NEW JERSEY AVE		NJ Release
CAPE MAY	8716764	OFFSHORE SHEEN 40 MILES EAST OF CA	OFFSHORE SHEEN 40 MILES EAST O		ERNS
CAPE MAY	91235397	OIL SHEEN - 3 MILES OFF CAPE MAY C	OIL SHEEN - 3 MILES OFF CAPE M	08204	ERNS
CAPE MAY	S103900518	USCG BASE CAPE MAY	PATROL BOAT PIER		NJ Release
CAPE MAY	99628414	PATROL BOAT PIER USCG BASE CAPE MA	PATROL BOAT PIER USCG BASE CAP	08204	ERNS
CAPE MAY	S104711044	USCG TRINING CTR	PENNSYLVANIA AVE		NJ Release
CAPE MAY	S102203202	U.S.C.G. TRAINING CENTER	E/O PENNSYLVANIA AVE		NJ Spills, NJ Release
CAPE MAY	S103896483	CAPE MAY USCG	PENNYSLVANIA AVE		NJ Release
CAPE MAY	96487451	PIER 4 SUPCEN CAPE MAY	PIER 4 SUPCEN CAPE MAY	08204	ERNS
CAPE MAY	93328379	PIER 4 TRACEN CAPE MAY	PIER 4 TRACEN CAPE MAY	08204	ERNS
CAPE MAY	S102198741	ALONG ROADSIDE	PITTSBU AVE / GSPKWY		NJ Spills, NJ Release
CAPE MAY	S104361997	BEACH COMBER CAMPING RESORT	RAILROAD AVE		NJ Release
CAPE MAY	94377334	SKUNK SOUND - CAPE MAY HARBOR	SKUNK SOUND - CAPE MAY HARBOR	08204	ERNS
CAPE MAY	S105344798	AREA OF BRANDY WINE LIGHT	IN THE DELAWARE BAY		NJ Release
CAPE MAY	S102195874	CAPE MAY HARBOR	UNK		NJ Release
CAPE MAY	S104720380	ATLANTIC CAPE FISHERIES	UNKNOWN		NJ Release
CAPE MAY	984186370	USCG TRACEN CAPE MAY/PIER 4/USCG V	USCG TRACEN CAPE MAY/PIER 4/US		ERNS
CAPE MAY	90187567	USCG TRACEN CAPE MAY PIER NO. 4	USCG TRACEN CAPE MAY PIER NO.		ERNS
CAPE MAY	96506866	USCG STATION CAPE MAY	USCG STATION CAPE MAY	08204	ERNS
CAPE MAY	96516316	USCGC VIGOROUS USCG TRACEN CAPE MA	USCGC VIGOROUS USCG TRACEN CAP		ERNS
CAPE MAY	984186371	USCGC VIGOROUS USCG TRACEN CAPE MA	USCGC VIGOROUS USCG TRACEN CAP		ERNS
CAPE MAY	99637568	USCGC VIGOROUS USCG TRACEN CAPE MA	USCGC VIGOROUS USCG TRACEN CAP	08204	ERNS
CAPE MAY	S104717805	CAPE MAY WHALE WATCH CENTER	WILSON DRIVE		NJ Release
CAPE MAY	S103029866	GULF SERVICE STATION CAPE MAY CITY	YACHT / WASHINGTON AVES		SHWS
CAPE MAY POINT	1004753093	CAPE MAY POINT LIGHTHOUSE	LIGHTHOUSE AVE	08204	RCRIS-SQG, FINDS
CASPER	1006744793	BAKER-HUGHES D.B.A. ICO INC.	939 ROBERTSON RD	08260	FINDS
COLD SPRING	S105338776	3/4 IN SERVICE/LOU'S PIZZA	1028 RT 109	08204	NJ Release
COLD SPRING	S105339683	AREA OF DOC MIKES RESTAURANT	RT 109	08204	NJ Release
ELDORA DENNIS TWP	U000364995	BOHM'S SOD FARM	ROUTE 47	08204	UST
ERMA	S105313667	CAPE CONCRETE CO	705 RT 9 SOUTH	08204	NJ Spills
ERMA	S105070964	RONALD CORNWALL/CAPE ISL CAMP	LOT 109 BAYBERRY	08204	NJ Release
ERMA	S104438143	CAPE MAY CTY AIRPORT & IND PAR	TERMINAL DRIVE	08204	NJ Spills
LOWER TOWNSHIP	1000693101	CAPE MAY CO BRG COMM MIDDLE THOROF	OCEAN DR CROSS RTE 621 OVER	08260	RCRIS-SQG, FINDS
LOWER TWP	1000197443	CAPE MAY COUNTY OF	BREAKWATER RD	08204	RCRIS-SQG, FINDS
MIDDLE TOWNSHIP	1000693100	CAPE MAY CO BRG COMM GRASSY SOUND	OCEAN DR CROSS RTE 619 OVER	08260	RCRIS-SQG, FINDS
MIDDLE TWP	S105680033	BIDWELL CREEK MARINA	DELSEA DR	08204	NJPDES
MIDDLE TWP	1001079295	NJ HWY AUTH - WILDWOOD N RAMP TOLL	GSP N RAMP INTERCHANGE 4	08204	RCRIS-SQG, FINDS
MIDDLE TWP	1001079294	NJ HWY AUTH - WILDWOOD S RAMP TOLL	GSP S RAMP INTERCHANGE 4	08204	RCRIS-SQG, FINDS
NORTH CAPE MAY	S104724969	CAPE MAY LEWES FERRY	PO 827	08204	NJ Release

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
NORTH CAPE MAY	92278767	CAPE MAY LEWES FERRI TERMINAL	CAPE MAY LEWES FERRI TERMINAL	08204	ERNS
NORTH CAPE MAY	S104862758	CAPE MAY LEWIS FERRY	CHARLES SANDMAN BLVD	08204	NJ Release
NORTH CAPE MAY	S102211516	CML FERRY CO.	CHARLES SANDMAN X217	08204	NJ Spills, NJ Release
NORTH CAPE MAY	S102485493	CAPE MAY FERRY TERMINAL	LINCOLN BLVD	08204	NJ Spills
NORTH CAPE MAY	S104434903	WOODED AREA	OFF CAPEWOODS DR	08204	NJ Spills, NJ Release
NORTH WILDWOOD	S105348952	AREA OF	21 ST / DELAWARE	08260	NJ Release
NORTH WILDWOOD	S104437639	ON THE BEACH	21 ST / THE BEACH	08260	NJ Spills, NJ Release
NORTH WILDWOOD	S104726278	CAPE MAY CTY MUA	10TH AVE	08260	NJ Release
NORTH WILDWOOD	S105048594	THE APPLIANCE STORE	26TH / NEW YORK AVENUES	08260	LUST
NORTH WILDWOOD	S104725151	IN MARSH BY BRIDGE ON	RT 621	08260	NJ Release
NORTH WILDWOOD	92295056	1ST AVE AND OLD NJ AVE	1ST AVE AND OLD NJ AVE	08260	ERNS
NORTH WILDWOOD	S104364305	IN FRONT OF FAMILY DOLLAR	26TH+DELAWARE AVE	08260	NJ Spills, NJ Release
NORTH WILDWOOD	S102488331	ON THE ROADWAY	CHESTNUT/OLD NJ AVE	08260	NJ Spills, NJ Release
NORTH WILDWOOD	S105680406	EAGLE LAUNDRY GROUNDWATER INVEST	DELAWARE AVE	08260	NJPDES
NORTH WILDWOOD	S104431659	IN STORM DRAINS	FIRST AVE/NJ AVE	08260	NJ Spills, NJ Release
NORTH WILDWOOD	S105296447	STORM SEWER OCEAN OUTFALL	JOHN F KENNEDY BEACH DRIVE	08260	NJPDES
NORTH WILDWOOD	S104351451	SERVICE STATION	NEW YORK/ SPRUCE ST	08260	NJ Release
NORTH WILDWOOD	S102227462	BEHIND MCDONALDS	NEW YORK/NO WILDWOOD	08260	NJ Spills, NJ Release
NORTH WILDWOOD	S104431655	ON ROAD AT 15TH AVE &	NEW YORK AVE	08260	NJ Spills, NJ Release
NORTH WILDWOOD	S105295792	NORTH WILDWOOD CITY OF	OAK / VIRGINIA AVES	08260	NJPDES
NORTH WILDWOOD	S104436618	ZABERER'S RESTAURANT	OFF RT#147	08260	NJ Spills, NJ Release
NORTH WILDWOOD	S104710147	GEORGE'S SUNOCO	SPRUCE + DELAWARE AV	08260	NJ Release
NORTH WILDWOOD	S104710149	GEORGE SCHMIDT SUNOCO STA	SPRUCE+DELAWARE AVE.	08260	NJ Release
NORTH WILDWOOD	S104705517	AREA OF	WALNUT / OLD NEW JER	08260	NJ Release
NORTH WILDWOOD	S104716143	INTERSECTION-WALNUT & SPRUCE	NORTH WILDWOOD BLVD	08260	NJ Release
WEST CAPE MAY	S104438934	MAN HOLE	ATLANTIC AVE	08204	NJ Spills, NJ Release
WEST CAPE MAY	S105297103	WESTWOOD MOBILE ESTATE/REEVES	STIMPSON LANE	08204	NJPDES
WILDWOOD	S105296525	WILDWOOD CITY OF	MUNICIPAL BUILDING	08260	NJPDES
WILDWOOD	S105296602	WILDWOOD CITY OF	MUNICIPAL BUILDING	08260	NJPDES
WILDWOOD	96485068	OCEAN DRIVE - ACROSS FROM PORT ARE	OCEAN DRIVE - ACROSS FROM PORT	08260	ERNS
WILDWOOD	96484061	OCEAN DR ACROSS FROM PORT AREA IN	OCEAN DR ACROSS FROM PORT AREA	08260	ERNS
WILDWOOD	1000543052	EDS TEXACO	RIO GRANDE & PARK AVE NE COR	08260	RCRIS-SQG, FINDS
WILDWOOD	S105295814	SHAWCREST MOBILE HOME PARK	1 SHAWCREST RD	08260	NJPDES
WILDWOOD	1000153401	ATLANTIC ELECTRIC - WILDWOOD SUBST	SPENCER SPICER & NEW JERSEY	08260	RCRIS-SQG, FINDS
WILDWOOD CITY	S105355866	IIN WATERWAY	NORTH 400 BLK TACONY	08260	NJ Release
WILDWOOD CITY	S105355867	IIN WATERWAY	NORTH 400 BLK TACONY	08260	NJ Release
WILDWOOD CITY	S105355868	IIN WATERWAY	NORTH 400 BLK TACONY	08260	NJ Release
WILDWOOD CITY	S105355869	IIN WATERWAY	NORTH 400 BLK TACONY	08260	NJ Release
WILDWOOD CITY	S105355870	IIN WATERWAY	NORTH 400 BLK TACONY	08260	NJ Release
WILDWOOD CITY	S105355871	IIN WATERWAY	NORTH 400 BLK TACONY	08260	NJ Release
WILDWOOD CITY	S105355872	IIN WATERWAY	NORTH 400 BLK TACONY	08260	NJ Release
WILDWOOD CITY	S105355873	IIN WATERWAY	NORTH 400 BLK TACONY	08260	NJ Release
WILDWOOD CITY	S105355874	IIN WATERWAY	NORTH 400 BLK TACONY	08260	NJ Release
WILDWOOD CITY	S104705909	RICHARDSON'S CHANNEL	RT. 47	08260	NJ Release
WILDWOOD CITY	S104370019	AREA OF	ANDREW+PACIFIC AVES	08260	NJ Spills, NJ Release
WILDWOOD CITY	S104796500	MID TOWN MOTEL	ATLANTIC/LINCOLN AVES	08260	NJ Spills, NJ Release
WILDWOOD CITY	S105008878	RITE AID OF NJ INC	3400 NJ AVE	08260	SHWS

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
WILDWOOD CITY	S105134871	ON RIO GRANDE AVE AND PARK A	2 BLKS EAST	08260	NJ Spills, NJ Release
WILDWOOD CITY	S104709305	IN AREA OF	4700 BLOCK OCEAN AVE	08260	NJ Release
WILDWOOD CITY	S104481453	AREA OF	500 BLOCK W. BURKE AVE	08260	NJ Spills, NJ Release
WILDWOOD CITY	S104700920	AREA OF	4300 BLOCK/NEW JERSE	08260	NJ Release
WILDWOOD CITY	S104481221	SIGHT SEERER CORP	400 DAVIS AVE	08260	NJ Spills, NJ Release
WILDWOOD CITY	S105470255	FISHING DOCK	FOOT OF PARK BLVD	08260	NJ Release
WILDWOOD CITY	S105470256	FISHING DOCK	FOOT OF PARK BLVD	08260	NJ Release
WILDWOOD CITY	S105470257	FISHING DOCK	FOOT OF PARK BLVD	08260	NJ Release
WILDWOOD CITY	S105470258	FISHING DOCK	FOOT OF PARK BLVD	08260	NJ Release
WILDWOOD CITY	S105470259	FISHING DOCK	FOOT OF PARK BLVD	08260	NJ Release
WILDWOOD CITY	S105470260	FISHING DOCK	FOOT OF PARK BLVD	08260	NJ Release
WILDWOOD CITY	S105470261	FISHING DOCK	FOOT OF PARK BLVD	08260	NJ Release
WILDWOOD CITY	S105470262	FISHING DOCK	FOOT OF PARK BLVD	08260	NJ Release
WILDWOOD CITY	S105470263	FISHING DOCK	FOOT OF PARK BLVD	08260	NJ Release
WILDWOOD CITY	S105470264	FISHING DOCK	FOOT OF PARK BLVD	08260	NJ Release
WILDWOOD CITY	S105470265	FISHING DOCK	FOOT OF PARK BLVD	08260	NJ Release
WILDWOOD CITY	S105470266	FISHING DOCK	FOOT OF PARK BLVD	08260	NJ Release
WILDWOOD CITY	S104796440	AREA OF	JUNIPER / BOARDWALK	08260	NJ Spills, NJ Release
WILDWOOD CITY	S104960268	AMORE HOTEL	LEAMING / PACIFIC AVES	08260	NJ Spills, NJ Release
WILDWOOD CITY	S104365254	AMARI MOTEL	LEAMING+PACIFIC AVES	08260	NJ Spills, NJ Release
WILDWOOD CITY	S102486305	INTERSECTION OF	LEAMING/PACIFIC AVES	08260	NJ Release
WILDWOOD CITY	S104727199	WILDWOOD CITY HALL	NEW JERSEY AVE	08260	NJ Spills, NJ Release
WILDWOOD CITY	S103912824	MILL CREEK MARINA	OCEAN DR	08260	NJ Release
WILDWOOD CITY	S105352169	BACK BAY NEAR WILDWOOD STP	OFF RT#9/MAIN BLVD INTO	08260	NJ Release
WILDWOOD CITY	S105352170	BACK BAY NEAR WILDWOOD STP	OFF RT#9/MAIN BLVD INTO	08260	NJ Release
WILDWOOD CITY	S105340834	INTERSECTION OF GARFIELD &	PACIFIC AV	08260	NJ Release
WILDWOOD CITY	S104364936	AREA OF	PARK BLVD.+WEST OAK AVE	08260	NJ Release
WILDWOOD CITY	S104694261	OTTENS HARBOR	PARK BLVD	08260	NJ Release
WILDWOOD CITY	S104704744	WILDWOOD AUTO SERVICE	RIO GRAND / PARK BLV	08260	NJ Release
WILDWOOD CITY	S104438763	ON ROAD AT INTC SUSQUAHANNA &	RIO GRANDE AVES	08260	NJ Spills, NJ Release
WILDWOOD CITY	S104861921	INTERSECTION OF	SCHELLENGER/ARTIC AVES	08260	NJ Spills, NJ Release
WILDWOOD CITY	S104442090	APARTMENT BUILDING	TAYLOR+HUDSON AVES	08260	NJ Spills, NJ Release
WILDWOOD CITY	1006686238	NJ TRANSIT - WILDWOOD GARAGE	YOUNG & SUSQUEHANNA AVE	08260	FINDS
WILDWOOD CITY	S104699301	ON ROADWAY	YOUNG / PARK	08260	NJ Release
WILDWOOD CITY OF	S105295782	WILDWOOD STP CITY OF	SPICER / MEDITERRANEAN AVES	08260	NJPDES
WILDWOOD CREST	S104703575	LION LIMOSINE SERVICE	ASTER AVE / NEW JERS	08260	NJ Release
WILDWOOD CREST	S104704487	GETTY STA	COLUMBINE / NEW JERS	08260	NJ Release
WILDWOOD CREST	S104365664	MONTEREY MOTEL	410 E.MONTEREY+BEACH	08260	NJ Spills, NJ Release
WILDWOOD CREST	S102199872	100 BLOCK WEST FERN AVE +	FERN AVE+PARK BLVD	08260	NJ Spills, NJ Release
WILDWOOD CREST	S105344011	INTERSECTION OF	HETHER / PARK BLVD	08260	NJ Release
WILDWOOD CREST	S104706354	NATURAL GAS MAIN	MYRTAL / PARK BLVD	08260	NJ Release
WILDWOOD CREST	S104692267	GAS MAIN ON	NEW JERSEY AV	08260	NJ Release
WILDWOOD CREST	S104588488	FORMER GETTY S/S/LION LIMO	6000 NEW JERSEY INC.	08260	LUST
WILDWOOD CREST	S104439340	STORM DRAIN:	NEWARK AVE / BEACH	08260	NJ Spills, NJ Release
WILDWOOD CREST	S105345090	AREA OF LOWER THOROFARE OFF	OCEAN DRIVE	08260	NJ Release
WILDWOOD CREST	S104417395	COLD SPRING INLET	OCEAN DR	08260	NJ Spills, NJ Release
WILDWOOD CREST	S104357649	NEAR FISHING PIER	RT.621 OR OCEAN DR	08260	NJ Release

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
WILDWOOD CREST	S105132545	AREA OF LAKE VIEW DOCKS	7200 PARK BLVD	08260	NJ Release
WILDWOOD CREST	S105295882	WILDWOOD CREST STP	SHAW ISLAND	08260	NJPDES
WILDWOOD CREST	S104435876	ON BEACH	TOLEDO AVE	08260	NJ Spills, NJ Release
WILDWOOD CREST	S104705588	TREATMENT PLANT	TONICA / NEW JERSE	08260	NJ Release
WILDWOOD CREST	S104435077	PUBLIC WORKS GARAGE-REAR OF	W.TRENTON/BAYVIEW DR	08260	NJ Spills, NJ Release

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Elapsed ASTM days: Provides confirmation that this EDR report meets or exceeds the 90-day updating requirement of the ASTM standard.

FEDERAL ASTM STANDARD RECORDS

NPL: National Priority List
Source: EPA
Telephone: N/A
National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 04/30/03
Date Made Active at EDR: 06/02/03
Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 05/05/03
Elapsed ASTM days: 28
Date of Last EDR Contact: 05/09/03

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 3
Telephone 215-814-5418

EPA Region 4
Telephone 404-562-8033

EPA Region 6
Telephone: 214-655-6659

EPA Region 8
Telephone: 303-312-6774

Proposed NPL: Proposed National Priority List Sites
Source: EPA
Telephone: N/A

Date of Government Version: 04/30/03
Date Made Active at EDR: 06/02/03
Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 05/05/03
Elapsed ASTM days: 28
Date of Last EDR Contact: 05/05/03

CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System
Source: EPA
Telephone: 703-413-0223
CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 03/19/03
Date Made Active at EDR: 04/08/03
Database Release Frequency: Quarterly

Date of Data Arrival at EDR: 03/24/03
Elapsed ASTM days: 15
Date of Last EDR Contact: 03/24/03

CERCLIS-NFRAP: CERCLIS No Further Remedial Action Planned
Source: EPA
Telephone: 703-413-0223
As of February 1995, CERCLIS sites designated "No Further Remedial Action Planned" (NFRAP) have been removed from CERCLIS. NFRAP sites may be sites where, following an initial investigation, no contamination was found, contamination was removed quickly without the need for the site to be placed on the NPL, or the contamination was not serious enough to require Federal Superfund action or NPL consideration. EPA has removed approximately 25,000 NFRAP sites to lift the unintended barriers to the redevelopment of these properties and has archived them as historical records so EPA does not needlessly repeat the investigations in the future. This policy change is part of the EPA's Brownfields Redevelopment Program to help cities, states, private investors and affected citizens to promote economic redevelopment of unproductive urban sites.

Date of Government Version: 03/19/03
Date Made Active at EDR: 04/08/03
Database Release Frequency: Quarterly

Date of Data Arrival at EDR: 03/24/03
Elapsed ASTM days: 15
Date of Last EDR Contact: 03/24/03

CORRACTS: Corrective Action Report
Source: EPA
Telephone: 800-424-9346
CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 03/31/03
Date Made Active at EDR: 05/08/03
Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 04/07/03
Elapsed ASTM days: 31
Date of Last EDR Contact: 03/10/03

RCRIS: Resource Conservation and Recovery Information System
Source: EPA/NTIS
Telephone: 800-424-9346
Resource Conservation and Recovery Information System. RCRIS includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA).

Date of Government Version: 09/09/02
Date Made Active at EDR: 10/28/02
Database Release Frequency: Varies

Date of Data Arrival at EDR: 09/24/02
Elapsed ASTM days: 34
Date of Last EDR Contact: 04/18/03

ERNS: Emergency Response Notification System
Source: National Response Center, United States Coast Guard
Telephone: 202-260-2342
Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 12/31/01
Date Made Active at EDR: 07/15/02
Database Release Frequency: Annually

Date of Data Arrival at EDR: 07/02/02
Elapsed ASTM days: 13
Date of Last EDR Contact: 04/28/03

FEDERAL ASTM SUPPLEMENTAL RECORDS

BRS: Biennial Reporting System
Source: EPA/NTIS
Telephone: 800-424-9346
The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/99
Database Release Frequency: Biennially

Date of Last EDR Contact: 03/17/03
Date of Next Scheduled EDR Contact: 06/16/03

CONSENT: Superfund (CERCLA) Consent Decrees
Source: EPA Regional Offices
Telephone: Varies
Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: N/A
Database Release Frequency: Varies

Date of Last EDR Contact: N/A
Date of Next Scheduled EDR Contact: N/A

ROD: Records Of Decision
Source: EPA
Telephone: 703-416-0223
Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 01/09/03
Database Release Frequency: Annually

Date of Last EDR Contact: 04/07/03
Date of Next Scheduled EDR Contact: 07/07/03

DELISTED NPL: National Priority List Deletions
Source: EPA
Telephone: N/A
The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 04/30/03
Database Release Frequency: Quarterly

Date of Last EDR Contact: 05/05/03
Date of Next Scheduled EDR Contact: 08/04/03

FINDS: Facility Index System/Facility Identification Initiative Program Summary Report
Source: EPA
Telephone: N/A
Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 03/19/03
Database Release Frequency: Quarterly

Date of Last EDR Contact: 04/07/03
Date of Next Scheduled EDR Contact: 07/07/03

HMIRS: Hazardous Materials Information Reporting System
Source: U.S. Department of Transportation
Telephone: 202-366-4555
Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 01/31/02
Database Release Frequency: Annually

Date of Last EDR Contact: 04/25/03
Date of Next Scheduled EDR Contact: 07/21/03

MLTS: Material Licensing Tracking System
Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/23/03
Database Release Frequency: Quarterly

Date of Last EDR Contact: 04/07/03
Date of Next Scheduled EDR Contact: 07/07/03

MINES: Mines Master Index File
Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959

Date of Government Version: 03/11/03
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 03/31/03
Date of Next Scheduled EDR Contact: 06/30/03

NPL LIENS: Federal Superfund Liens
Source: EPA
Telephone: 205-564-4267
Federal Superfund Liens. Under the authority granted the USEPA by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner receives notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/91
Database Release Frequency: No Update Planned
Date of Last EDR Contact: 05/27/03
Date of Next Scheduled EDR Contact: 08/25/03

PADS: PCB Activity Database System
Source: EPA
Telephone: 202-564-3887
PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 03/26/03
Database Release Frequency: Annually
Date of Last EDR Contact: 05/12/03
Date of Next Scheduled EDR Contact: 08/11/03

DOD: Department of Defense Sites
Source: USGS
Telephone: 703-648-5920
This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 04/01/03
Database Release Frequency: Semi-Annually
Date of Last EDR Contact: 05/12/03
Date of Next Scheduled EDR Contact: 08/11/03

RAATS: RCRA Administrative Action Tracking System
Source: EPA
Telephone: 202-564-4104
RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/95
Database Release Frequency: No Update Planned
Date of Last EDR Contact: 03/10/03
Date of Next Scheduled EDR Contact: 06/09/03

TRIS: Toxic Chemical Release Inventory System
Source: EPA
Telephone: 202-260-1531
Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/00
Database Release Frequency: Annually
Date of Last EDR Contact: 03/25/03
Date of Next Scheduled EDR Contact: 06/23/03

TSCA: Toxic Substances Control Act
Source: EPA
Telephone: 202-260-5521
Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/98
Database Release Frequency: Every 4 Years
Date of Last EDR Contact: 03/06/03
Date of Next Scheduled EDR Contact: 06/09/03

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
Source: EPA
Telephone: 202-564-2501

Date of Government Version: 04/15/03
Database Release Frequency: Quarterly
Date of Last EDR Contact: 06/24/03
Date of Next Scheduled EDR Contact: 06/23/03

SSTS: Section 7 Tracking Systems
Source: EPA
Telephone: 202-564-5008
Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/00
Database Release Frequency: Annually
Date of Last EDR Contact: 04/23/03
Date of Next Scheduled EDR Contact: 07/21/03

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide; Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-564-2501
FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/15/03
Database Release Frequency: Quarterly
Date of Last EDR Contact: 03/24/03
Date of Next Scheduled EDR Contact: 06/23/03

STATE OF NEW JERSEY ASTM STANDARD RECORDS

SHWS: Known Contaminated Sites in New Jersey
Source: New Jersey Department of Environmental Protection
Telephone: 609-292-8761
The Known Contaminated Sites in New Jersey includes sites under the purview of the Site Remediation Program which have contamination present at levels greater than the applicable cleanup criteria for soil and/or groundwater standards. The sites appearing in Known Contaminated Sites in New Jersey are classified as either active, where the site is assigned to a specific remedial program area, or pending, where the site is awaiting assignment to a specific remedial program area. Sites where no further action (NFA) designation has been given are not included in this report unless there are other areas of identified contamination which have not been remediated. This report includes sites being remediated under all of the various regulatory programs administered by the Site Remediation Program such as: Federal Superfund Program, Federal Resource Conservation and Recovery Act (RCRA), New Jersey's Industrial Site Recovery Act (ISRA), New Jersey's Underground Storage of Hazardous Substances Act, New Jersey's Spill Compensation and Control Act, New Jersey's Solid Waste Management Act, New Jersey's Water Pollution Control Act.

Date of Government Version: 05/01/01
Date Made Active at EDR: 07/25/01
Database Release Frequency: Varies
Date of Data Arrival at EDR: 06/18/01
Elapsed ASTM days: 37
Date of Last EDR Contact: 03/27/03

SWF/LF: Solid Waste Facility Directory
Source: Department of Environmental Protection
Telephone: 609-984-6741
Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 03/24/03
Date Made Active at EDR: 05/01/03
Database Release Frequency: Quarterly
Date of Data Arrival at EDR: 03/31/03
Elapsed ASTM days: 31
Date of Last EDR Contact: 03/03/03

LUST: Regulated UST Contamination Sites Listing
Source: New Jersey Department of Environmental Protection
Telephone: 609-292-8761
Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state.

Date of Government Version: 09/17/02
Date Made Active at EDR: 01/28/03
Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 01/15/03
Elapsed ASTM days: 13
Date of Last EDR Contact: 03/25/03

UST: Underground Storage Tank Data
Source: Department of Environmental Protection
Telephone: 609-633-1455
Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 09/15/99
Date Made Active at EDR: 10/18/99
Database Release Frequency: Varies

Date of Data Arrival at EDR: 09/15/99
Elapsed ASTM days: 33
Date of Last EDR Contact: 03/11/03

STATE OF NEW JERSEY ASTM SUPPLEMENTAL RECORDS

NJ MAJOR FACILITIES: List of Major Facilities
Source: Department of Environmental Protection
Telephone: 609-292-1690
Major facilities means all facilities, located on one or more contiguous or adjacent properties owned or operated by the same person, having total combined storage capacity of 20,000 gallons or more for hazardous substances other than petroleum or petroleum products, or 200,000 gallons or more of hazardous substances of all kinds.

Date of Government Version: 01/02/02
Database Release Frequency: No Update Planned

Date of Last EDR Contact: 05/12/03
Date of Next Scheduled EDR Contact: 08/11/03

NJ Spills: Spills
Source: Department of Environmental Protection
Telephone: 609-633-0898
Initial notification information of hazardous material incidents, where there is land contamination, reported to the Department of Environmental Protection's Environmental Action Line. The DEP has not conducted any investigation to determine its validity or accuracy.

Date of Government Version: 03/31/02
Database Release Frequency: Annually

Date of Last EDR Contact: 04/15/03
Date of Next Scheduled EDR Contact: 07/07/03

NJ Release: Hazardous Material Incident Database
Source: Department of Environmental Protection
Telephone: 604-633-0898
Hazardous material release. Initial notification information reported to the Department of Environmental Protection's Environmental Action Line and the office has not conducted any investigations to determine its validity or accuracy.

Date of Government Version: 03/31/02
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 04/15/03
Date of Next Scheduled EDR Contact: 07/07/03

PF: Publicly Funded Cleanups Site Status Report
Source: Department of Environmental Protection
Telephone: 609-292-9418
The report focuses on publicly funded cleanups and features progress achieved and underway at all sites that are being addressed by the NJDEP with public funds.

Date of Government Version: 12/31/01
Database Release Frequency: Annually

Date of Last EDR Contact: 05/27/03
Date of Next Scheduled EDR Contact: 08/25/03

CHROME: Chromate Chemical Production Waste Sites
Source: Department of Environmental Protection
Telephone: 609-984-4071
Known chromate chemical production waste sites.

Date of Government Version: 02/06/03
Database Release Frequency: Varies

Date of Last EDR Contact: 03/11/03
Date of Next Scheduled EDR Contact: 06/09/03

NJPDES: New Jersey Pollutant Discharge Elimination System Dischargers
Source: Department of Environmental Protection
Telephone: 609-242-4543
The NJPDES contains the names, addresses and other information of all permitted New Jersey Pollutant Discharge Elimination Sytem dischargers.

Date of Government Version: 09/18/02
Database Release Frequency: Varies

Date of Last EDR Contact: 03/17/03
Date of Next Scheduled EDR Contact: 06/16/03

EDR PROPRIETARY HISTORICAL DATABASES

Former Manufactured Gas (Coal Gas) Sites: The existence and location of Coal Gas sites is provided exclusively to EDR by Real Property Scan, Inc. ©Copyright 1993 Real Property Scan, Inc. For a technical description of the types of hazards which may be found at such sites, contact your EDR customer service representative.

Disclaimer Provided by Real Property Scan, Inc.

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STATE OF NEW JERSEY BROWNFIELDS DATABASES RECORDS

Brownfields: Brownfields Database
Source: Department of Environmental Protection
Telephone: 609-633-0537
Brownfields are identified as former or current commercial or industrial use sites that are presently vacant or underutilized, on which there is suspected to have been a discharge of a contamination to the soil or groundwater at concentrations greater than applicable cleanup criteria.

Date of Government Version: 04/01/01
Database Release Frequency: Annually

Date of Last EDR Contact: 04/17/03
Date of Next Scheduled EDR Contact: 07/14/03

INST CONTROL: Sites With Closed Case(s) With Restrictions
Source: Department of Environmental Protection
Telephone: 609-292-2943
Sites where engineering and/or institutional controls remain in place as part of a remedial action to address soil and/or groundwater contamination. These restrictions ensure protection of human health and the environment as long as they are maintained.

Date of Government Version: 05/01/01
Database Release Frequency: Varies

Date of Last EDR Contact: 04/08/03
Date of Next Scheduled EDR Contact: 06/23/03

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

Oil/Gas Pipelines: This data was obtained by EDR from the USGS in 1994. It is referred to by USGS as GeoData Digital Line Graphs from 1:100,000-Scale Maps. It was extracted from the transportation category including some oil, but primarily gas pipelines.

Electric Power Transmission Line Data
Source: PennWell Corporation
Telephone: (800) 823-6277
This map includes information copyrighted by PennWell Corporation. This information is provided on a best effort basis and PennWell Corporation does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of PennWell.

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Daycare Centers: Child Care Center Listings
Source: Department of Human Services
Telephone: 609-292-1018

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 1999 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 from the U.S. Fish and Wildlife Service.

New Jersey State Wetlands
Source: New Jersey Department of Environmental Protection
This data was obtained by EDR in 2002 from the New Jersey Department of Environmental Protection.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

STREET AND ADDRESS INFORMATION

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GEOCHECK®- PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

OCEAN D, CAPE MAY, NJ
OCEAN DR/WISSAHICKON AVE
CAPE MAY, NJ 08204

TARGET PROPERTY COORDINATES

Latitude (North):	38.957199 - 38° 57' 25.9"
Longitude (West):	74.877296 - 74° 52' 38.3"
Universal Tranverse Mercator:	Zone 18
UTM X (Meters):	510631.5
UTM Y (Meters):	4311826.5
State Plane X (Feet):	1940100.5
State Plane Y (Feet):	45181.5
Elevation:	1 ft. above sea level

EDR's GeoCheck Physical Setting Source Addendum has been developed to assist the environmental professional with the collection of physical setting source information in accordance with ASTM 1527-00, Section 7.2.3. Section 7.2.3 requires that a current USGS 7.5 Minute Topographic Map (or equivalent, such as the USGS Digital Elevation Model) be reviewed. It also requires that one or more additional physical setting sources be sought when (1) conditions have been identified in which hazardous substances or petroleum products are likely to migrate to or from the property, and (2) more information than is provided in the current USGS 7.5 Minute Topographic Map (or equivalent) is generally obtained, pursuant to local good commercial or customary practice, to assess the impact of migration of recognized environmental conditions in connection with the property. Such additional physical setting sources generally include information about the topographic, hydrologic, hydrogeologic, and geologic characteristics of a site, and wells in the area.

Assessment of the impact of contaminant migration generally has two principle investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata. EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

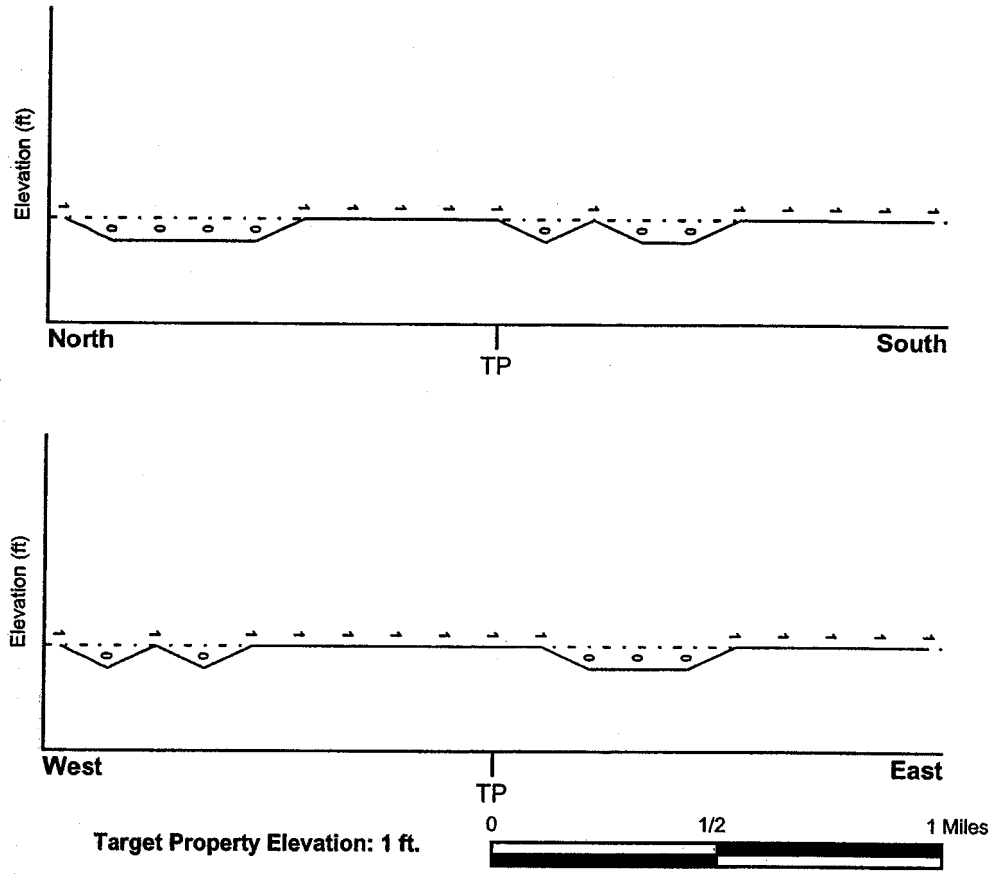
TOPOGRAPHIC INFORMATION

Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

USGS Topographic Map:	2438074-H8 CAPE MAY, NJ
General Topographic Gradient:	General ESE
Source:	USGS 7.5 min quad index

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES



Source: Topography has been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Target Property County	FEMA Flood Electronic Data
CAPE MAY, NJ	YES - refer to the Overview Map and Detail Map

Flood Plain Panel at Target Property:	3401530008B
Additional Panels in search area:	3401530004B 3401530005B 3453300001C 3401530007B 3401530010B 00000000000 3452880001E

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
CAPE MAY	YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Site-Specific Hydrogeological Data*:

Search Radius:	1.25 miles
Status:	Not found

AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
Not Reported		

* ©1996 Site-specific hydrogeological data gathered by CERCLIS Alerts, Inc., Bainbridge Island, WA. All rights reserved. All of the information and opinions presented are those of the cited EPA report(s), which were completed under a Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS) investigation.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT

Era:	Cenozoic
System:	Quaternary
Series:	Pleistocene
Code:	Qp *(decoded above as Era, System & Series)*

GEOLOGIC AGE IDENTIFICATION

Category: Stratifed Sequence

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps. The following information is based on Soil Conservation Service STATSGO data.

Soil Component Name:	SULFAQUENTS
Soil Surface Texture:	mucky-peat
Hydrologic Group:	Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.
Soil Drainage Class:	Very poorly. Soils are wet to the surface most of the time. Depth to water table is less than 1 foot, or is ponded.

Hydric Status: Soil meets the requirements for a hydric soil.

Corrosion Potential - Uncoated Steel: HIGH

Depth to Bedrock Min: > 60 inches

Depth to Bedrock Max: > 60 inches

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification			
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil	Permeability Rate (in/hr)	Soil Reaction (pH)
1	0 inches	14 inches	mucky-peat	A-8	Highly organic soils, Peat.	Max: 20.00 Min: 0.60	Max: 7.30 Min: 4.50
2	14 inches	72 inches	silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 2.00 Min: 0.60	Max: 7.30 Min: 5.60

OTHER SOIL TYPES IN AREA

Based on Soil Conservation Service STATSGO data, the following additional subordinant soil types may appear within the general area of target property.

Soil Surface Textures: gravelly - sandy loam
extremely gravelly - sand
sand
sandy loam

Surficial Soil Types: gravelly - sandy loam
extremely gravelly - sand
sand
sandy loam

Shallow Soil Types: No Other Soil Types

Deeper Soil Types: gravelly - sandy loam
extremely gravelly - sand
coarse sand
fine sand
stratified

ADDITIONAL ENVIRONMENTAL RECORD SOURCES

According to ASTM E 1527-00, Section 7.2.2, "one or more additional state or local sources of environmental records may be checked, in the discretion of the environmental professional, to enhance and supplement federal and state sources... Factors to consider in determining which local or additional state records, if any, should be checked include (1) whether they are reasonably ascertainable, (2) whether they are sufficiently useful, accurate, and complete in light of the objective of the records review (see 7.1.1), and (3) whether they are obtained, pursuant to local, good commercial or customary practice." One of the record sources listed in Section 7.2.2 is water well information. Water well information can be used to assist the environmental professional in assessing sources that may impact groundwater flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 1 mile
State Database	1.000

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
A1	USGS1233622	0 - 1/8 Mile South
A2	USGS1233621	0 - 1/8 Mile SSW
3	USGS1233624	1/4 - 1/2 Mile West
4	USGS1233625	1/2 - 1 Mile East
B5	USGS1233614	1/2 - 1 Mile SW
B6	USGS1233613	1/2 - 1 Mile SSW
7	USGS1233616	1/2 - 1 Mile SW

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No PWS System Found		

Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No Wells Found		

PHYSICAL SETTING SOURCE MAP - 00987371.1r

- County Boundary
- Major Roads
- Contour Lines
- Airports
- Earthquake epicenter, Richter 5 or greater
- Water Wells
- Public Water Supply Wells
- Cluster of Multiple Icons

0 1/4 1/2 1 Miles

- Groundwater Flow Direction
- Indeterminate Groundwater Flow at Location
- Groundwater Flow Varies at Location
- Closest Hydrogeological Data

TARGET PROPERTY:	Ocean D, Cape May, NJ	CUSTOMER:	Parsons Brinckerhoff
ADDRESS:	Ocean Dr/Wissahickon Ave	CONTACT:	Anna Woznyj
CITY/STATE/ZIP:	Cape May NJ 08204	INQUIRY #:	00987371.1r
LAT/LONG:	38.9572 / 74.8773	DATE:	June 02, 2003 3:20 pm

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GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation

	Database	EDR ID Number
A1 **South** **0 - 1/8 Mile** **Higher**	**FED USGS**	**USGS1233622**

Agency:	USGS	Site ID:	385723074524001
Site Name:	SNOW 3		
Dec. Latitude:	38.95639		
Dec. Longitude:	-74.87778		
Coord Sys:	NAD27		
State:	NJ		
County:	Cape May County		
Altitude:	5.00		
Hydrologic code:	02040302		
Topographic:	Not Reported		
Site Type:	Ground-water other than Spring		
Const Date:	19691020	Inven Date:	Not Reported
Well Type:	Single well, other than collector or Ranney type		
Primary Aquifer:	121CNSY		
Aquifer type:	C	Well depth:	291
Hole depth:	Not Reported	Source:	Not Reported
Project no:	090042		

A2 **SSW** **0 - 1/8 Mile** **Higher**	**FED USGS**	**USGS1233621**

Agency:	USGS	Site ID:	385722074524101
Site Name:	SNOW 2/SEALED		
Dec. Latitude:	38.95611		
Dec. Longitude:	-74.87806		
Coord Sys:	NAD27		
State:	NJ		
County:	Cape May County		
Altitude:	10.00		
Hydrologic code:	02040302		
Topographic:	Not Reported		
Site Type:	Ground-water other than Spring		
Const Date:	19570000	Inven Date:	Not Reported
Well Type:	Single well, other than collector or Ranney type		
Primary Aquifer:	121CNSY		
Aquifer type:	U	Well depth:	320
Hole depth:	Not Reported	Source:	Not Reported
Project no:	090041		

---

3 **West** **1/4 - 1/2 Mile** **Higher**	**FED USGS**	**USGS1233624**

Agency:	USGS	Site ID:	385725074525701
Site Name:	SNOW 1		
Dec. Latitude:	38.95694		
Dec. Longitude:	-74.8825		
Coord Sys:	NAD27		
State:	NJ		
County:	Cape May County		
Altitude:	5		
Hydrologic code:	02040302		
Topographic:	Not Reported		
Site Type:	Ground-water other than Spring		
Const Date:	19650000	Inven Date:	Not Reported
Well Type:	Single well, other than collector or Ranney type		
Primary Aquifer:	121CNSY		
Aquifer type:	Not Reported	Well depth:	278
Hole depth:	Not Reported	Source:	Not Reported
Project no:	090044		

4
East
1/2 - 1 Mile
Higher

FED USGS **USGS1233625**

Agency:	USGS	Site ID:	385729074520101
Site Name:	2 MILE BOAT DOCK		
Dec. Latitude:	38.95806		
Dec. Longitude:	-74.86694		
Coord Sys:	NAD27		
State:	NJ		
County:	Cape May County		
Altitude:	5		
Hydrologic code:	02040302		
Topographic:	Not Reported		
Site Type:	Ground-water other than Spring		
Const Date:	19790330	Inven Date:	19910522
Well Type:	Single well, other than collector or Ranney type		
Primary Aquifer:	121CNSY		
Aquifer type:	C	Well depth:	296
Hole depth:	296	Source:	D
Project no:	090394		

B5
SW
1/2 - 1 Mile
Higher

FED USGS **USGS1233614**

Agency:	USGS	Site ID:	385650074531101
Site Name:	USCG 1		
Dec. Latitude:	38.9475		
Dec. Longitude:	-74.88611		
Coord Sys:	NAD27		
State:	NJ		
County:	Cape May County		
Altitude:	11.00		
Hydrologic code:	02040302		
Topographic:	Not Reported		
Site Type:	Ground-water other than Spring		
Const Date:	19430504	Inven Date:	Not Reported
Well Type:	Single well, other than collector or Ranney type		
Primary Aquifer:	121CNSY		
Aquifer type:	C	Well depth:	322
Hole depth:	Not Reported	Source:	Not Reported
Project no:	090017		

GEOCHECK®- PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation

	Database	EDR ID Number
B6 **SSW** **1/2 - 1 Mile** **Higher**	**FED USGS**	**USGS1233613**

Agency:	USGS	Site ID:	385650074531001
Site Name:	USGS TEST 6		
Dec. Latitude:	38.94722		
Dec. Longitude:	-74.88611		
Coord Sys:	NAD27		
State:	NJ		
County:	Cape May County		
Altitude:	11.00		
Hydrologic code:	02040302		
Topographic:	Not Reported		
Site Type:	Ground-water other than Spring		
Const Date:	19570720	Inven Date:	Not Reported
Well Type:	Single well, other than collector or Ranney type		
Primary Aquifer:	121CNSY		
Aquifer type:	C	Well depth:	325
Hole depth:	Not Reported	Source:	Not Reported
Project no:	090030		

---

7 **SW** **1/2 - 1 Mile** **Higher**	**FED USGS**	**USGS1233616**

Agency:	USGS	Site ID:	385652074532701
Site Name:	USCG 2		
Dec. Latitude:	38.94778		
Dec. Longitude:	-74.89083		
Coord Sys:	NAD27		
State:	NJ		
County:	Cape May County		
Altitude:	11.00		
Hydrologic code:	02040302		
Topographic:	Not Reported		
Site Type:	Ground-water other than Spring		
Const Date:	19430504	Inven Date:	Not Reported
Well Type:	Single well, other than collector or Ranney type		
Primary Aquifer:	121CNSY		
Aquifer type:	C	Well depth:	325
Hole depth:	Not Reported	Source:	Not Reported
Project no:	090018		

GEOCHECK®- PHYSICAL SETTING SOURCE MAP FINDINGS
RADON

AREA RADON INFORMATION

State Database: NJ Radon

Tier Assessment Report

Zip	City	Tier	Total Sites	# sites>4 pCi/L
08204	CAPE MAY	3	24	1
08204	WEST CAPE MAY	3	1	0

Federal EPA Radon Zone for CAPE MAY County: 3

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for CAPE MAY COUNTY, NJ

Number of sites tested: 17

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area	0.480 pCi/L	100%	0%	0%
Basement	0.700 pCi/L	100%	0%	0%

PHYSICAL SETTING SOURCE RECORDS SEARCHED

HYDROLOGIC INFORMATION

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 1999 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 from the U.S. Fish and Wildlife Service.

New Jersey State Wetlands
Source: New Jersey Department of Environmental Protection
This data was obtained by EDR in 2002 from the New Jersey Department of Environmental Protection.

HYDROGEOLOGIC INFORMATION

AQUIFLOW^R Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the national Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

ADDITIONAL ENVIRONMENTAL RECORD SOURCES

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

STATE RECORDS

New Jersey Public-Community Water-Supply Wells
Source: New Jersey Department of Environmental Protection
Telephone: 609-292-5550

New Jersey Monitoring Wells
Source: Department of Environmental Quality
Telephone: 609-984-6587
Ambient Groundwater Quality of the New Jersey Part of the Newark Basin. Natural groundwater quality in the Newark Basin summarize natural groundwater quality in sedimentary bedrock formations of the Newark basin part of the Piedmont physiographic province of New Jersey.

RADON

State Database: NJ Radon
Source: Department of Environmental Protection
Telephone: 609-984-5425
Radon Test Results

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

OTHER

Airport Landing Facilities: Private and public use landing facilities
Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

Environmental Data Resources, Inc.

"Linking Technology with Tradition"

Sanborn® Map Report

Ship to: Anna Woznyj
Parsons Brinckerhoff
506 Carnegie Center Boulevard
Princeton, NJ 08540

1205619DEC 609-734-7000

Order Date: 5/14/2003 **Completion Date:** 5/16/2003
Inquiry #: 0977167.4S
P.O. #: na
Site Name: Ocean Dr Cape May NJ
Address: Ocean Dr/Wissahickon Ave
City/State: Cape May, NJ 08204
Cross Streets: Station Avenue

This document reports that the largest and most complete collection of Sanborn fire insurance maps has been reviewed based on client-supplied information, and fire insurance maps depicting the target property at the specified address were not identified.

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APPENDIX C

Former Borden Clam Products

State of New Jersey
Department of Environmental Protection
Division of Responsible Party Site Remediation
Southern Field Office
CN 407
Trenton, New Jersey 08625-0407
(609) 584-4150 (Office)
(609) 584-4170 (Telefax)

Christine Todd Whitman
Governor

Robert C. Shinn, Jr.
Commissioner

April 14, 1997

Borden Services Company
Health, Safety and Environment
180 East Broad Street, 15th Floor
Columbus, Ohio 43215-3799

Attention: Roger Girard

RE: Former Borden Clam Products Facility
Block: 822.01 Lot: 1.01
994 Ocean Drive
Lower Township, Cape May County
Case #92-02-20-1445
No Further Action Proposal dated March, 1997

Dear Mr. Girard:

Pursuant to the authority vested in the Commissioner of the New Jersey Department of Environmental Protection (Department) and duly delegated to the Section Chief of the Bureau of Field Operations' Southern Field Office pursuant to N.J.S.A. 13:1B-4, the referenced No Further Action (NFA) proposal for the below referenced area of concern (AOC) is hereby approved.

This approval is based upon the Department's review of the Soil Investigation & Remediation Report received on May 16, 1994, the Ground Water Sampling Report received on October 7, 1996, the Final Remediation Documentation received on January 7, 1997 and the Confirmatory Subsurface Investigation of the Previous Phase I/Phase II Remedial Excavation Areas received on March 25, 1997, which were submitted to the Department in accordance with the Memorandum of Agreement dated January 21, 1993.

Due to the loss of diesel fuel in the vicinity of an aboveground fueling facility and pump station, a soil and ground water investigation was initiated. Approximately 160 tons of contaminated soils were removed for remediation to Soil Remediation of Philadelphia, Inc.

One soil sample exceeded the Department's criterion for total petroleum hydrocarbons, however, the volatile organic compounds analysis of this sample was below the cleanup criteria developed for this site. Although a de minimus quantity of contaminated soil remained in the area of concern, an evaluation of the contaminant's persistence, toxicity and location indicated limited potential for significant human health or environmental impacts. Ground water at the site had been impacted by the discharge and was also remediated. The analytical data from the ground water samples after the completion of the ground water remediation were below the Ground Water Quality Standards (N.J.A.C. 7:9-6). All work at the site was certified by C. Richard Springer on March 18, 1997.

This approval shall be limited only to the above referenced AOC, and the condition of such area as of the date of this letter, and shall not be construed to address any other areas of the site. This NFA Approval Letter shall not restrict or prohibit the Department or any other agency from taking regulatory action under any other statute, rule or regulation.

Sincerely,

William H. Dunfee FOR

Thomas W. Downey, Section Chief
Bureau of Field Operations

c: File 05-05-21 through Jon Malkin
William Dunfee, SFO
Mark Pedersen, Case Assignment Section
Cape May County Health Department

05-05-21

ORIGINAL

TRC Environmental Corporation

1099 Wall Street West
Lyndhurst, New Jersey 07071
Telephone 201-933-5541
Facsimile 201-933-5601

January 6, 1997

Mr. Jon Malkin
Principal Environmental Specialist
New Jersey Department of Environmental Protection (NJDEP)
Southern Field Office - CN 407
Trenton, New Jersey 08625-0407

Subject: **Submission of Final Remediation Documentation for the former Borden Clam Products Facility (now Snow's/Doxsee) in Cape May, New Jersey, Case # 92-02-20-1445**
TRC Project # 20-309-000

Dear Mr. Malkin:

In accordance with your letter to Borden Services Company (Borden) dated October 8, 1996, the recovery well RW-1 and the three monitoring wells MW-1, MW-2, and MW-3 were abandoned on November 21, 1996 in accordance with the requirements of N.J.A.C. 7:9-9.1 et seq. The well abandonments were performed by a NJ-certified drilling company, James C. Anderson, Inc. (JCA) under the oversight of TRC Environmental Corporation (TRC) Geologist Bruce R. Babcock.

TRC is pleased to present the following documentation as required in your letter on behalf of Borden regarding the former ground water recovery/monitoring wells and treatment system at the former Borden Clam Products Facility (now Snow's/Doxsee) in Cape May, New Jersey in order that a letter of No Further Action be issued:

- Signed N.J.A.C. 7:28C-1.2 Certification Form (Re: TRC Report dated October 7, 1996).
- Well Abandonment Forms for RW-1, MW-1, MW-2, and MW-3.
- Copy of Van Note-Harvey Associates, P.C. Letter documenting the disposition of carbon filter materials from the former ground water treatment system.
- Copies of the Site Well Permits, Well Records, and Form B Certifications.

If you have any questions, please feel free to contact me at (201) 933-5541.

Sincerely,

TRC Environmental Corporation

Edward P. Benz

Edward P. Benz, P.G.
Senior Program Manager

RECEIVED
JAN 7 1997

TRC Environmental Corporation

1099 Wall Street West
Lyndhurst, New Jersey 07071
Telephone 201-933-5541
Facsimile 201-933-5601

JWM
RRAR

March 24, 1997
EB015-97

Mr. Jon Malkin
NJDEP - Central/Southern Field Office
300 Horizon Center - CN 407
Robbinsville, New Jersey 08691

RECEIVED
MAR 2 5 1997

Re: Confirmatory Subsurface Investigation
Former Borden Clam Products Facility
994 Ocean Drive
Cape May, New Jersey
Case #92-02-20-1445
TRC Project No. 20-309-000

Dear Mr. Malkin:

Attached is the report documenting the results of the confirmatory subsurface investigation of two (2) diesel fuel oil spill area clean up actions (Phase I and II) that were remediated in 1992 under the direction of others at the referenced facility. The results of this investigation indicate that with the exception of one de minimus sampling location for total petroleum hydrocarbons in soil, the diesel fuel contaminated soils from both clean up areas have been remediated to current NJDEP compliance levels for diesel fuel constituents in soil.

Based upon the enclosed data and the de minimus nature of the residual contaminants in the immediate vicinity of only one of the 14 locations sampled, TRC Environmental Corporation, on behalf of Borden Services Company requests that NJDEP grant a de minimus exemption for the one isolated area of residual total petroleum hydrocarbons identified by the investigation and that a no further action determination be issued for this remaining area of concern.

Please call me if you have any questions concerning this submission.

Sincerely,

TRC Environmental Corporation

Edward P. Benz

Edward P. Benz
Senior Program Manager

EPB/cp
Attachment: Confirmatory Subsurface Investigation Report

CONFIRMATORY SUBSURFACE INVESTIGATION OF THE PREVIOUS PHASE I/PHASE II REMEDIAL EXCAVATION AREAS AT THE FORMER BORDEN CLAM PRODUCTS FACILITY 994 OCEAN DRIVE CAPE MAY, NEW JERSEY

Prepared For

Borden Services Company
Health, Safety, and Environment
180 East Broad Street, 15th Floor
Columbus, Ohio 43212-3799

Prepared By

TRC Environmental Corporation
1099 Wall Street West
Lyndhurst, New Jersey 07071

TRC PROJECT NO. 20-309-001

MARCH 1997

1.0 INTRODUCTION

1.1 Introduction

Borden Services Company (Borden) retained TRC Environmental Corporation (TRC) to perform a confirmatory subsurface investigation in accordance with the New Jersey Department of Environmental Protection (NJDEP) Technical Requirements for Site Remediation (N.J.A.C. 7:26E-1.1 et seq.) for a spill area previously excavated near two former diesel above ground storage tanks (ASTs) at the former Borden facility located at 994 Ocean Drive in Cape May, New Jersey. The site location is shown on Figure 1 in Appendix A.

This report includes a brief description of the property remediation history, site assessment methodology, sampling results, and conclusions and recommendations.

1.2 Property Description and Site History

The former Borden Clam Products facility was utilized as a processing plant where clams and other seafood products were unloaded from fishing vessels, processed, and packaged for retail. Borden sold the property to the current owner, Snow's/Doxsee, in 1994.

In 1992, Borden retained Van Note-Harvey Associates, P.C. (VNHA) of Cape May, New Jersey to conduct an investigation and remediation of contamination from a diesel fuel storage and dispensing area on the site.

VNHA conducted the remediation in three phases during the construction of a wastewater treatment system which is now inactive. A summary of this activity was contained in VNHA's *Borden Clam Products Soil Investigation and Remediation Report*, dated December 1993, and revised in May 1994 to address NJDEP questions regarding the report. Excerpts from this report are presented in Appendix B.

As part of the remediation, three monitoring wells (MW-1 to MW-3) and a recovery well (RW-1) were installed along with a product recovery system to remove free product present in the ground water by the former ASTs.

In May 1996, Borden retained TRC to conduct a round of ground water samples from site wells MW-1, MW-2, MW-3, and RW-1 in accordance with a 1993 Memorandum of Agreement (MOA) between Borden and the NJDEP, and with NJDEP letters dated July 24, 1994 and October 30, 1995. The purpose of the ground water sampling program was to assess the success of the operation of a product recovery system operated by Borden at the site from March 22, 1994 to July/ August 1994.

TRC submitted a report on January 6, 1997 to the NJDEP documenting the sampling and final groundwater remediation activities required in NJDEP's letter of October 8, 1996 for the Borden site, which included the sealing and abandonment of the three monitoring wells and the recovery well, and the disposition of any activated charcoal materials that were utilized in the on-site treatment of groundwater. The report documented the absence of free product in the wells and that concentrations of volatile organic compounds and base neutral compounds in all the wells are either undetected or below NJDEP ground water quality criteria.

NJDEP responded to TRC's submission in a letter to Borden, dated January 8, 1997, indicating that based upon a review of past soil cleanup data submitted by VNHA, there was no record of where post excavation soil samples were collected from two diesel fuel oil spill clean up areas (Phase I and Phase II excavations), nor was there any record in their files of the analytical data associated with Phase I and Phase II post-excavation soil samples.

TRC contacted VNHA at the request of Borden to inquire if the sample locations and analytical data missing from NJDEP's files were available for submission to the state. Subsequent to this inquiry, TRC received a copy of the Soil Investigation and Remediation report, dated May 13, 1994, that was submitted to NJDEP, a letter from NJDEP dated May 18, 1994, responding to the report and a follow-up letter to NJDEP, dated July 12, 1994, providing additional information on the clean up excavations performed at the site.

Upon receipt and review of these documents, TRC contacted the NJDEP Case Manager and inquired if these data were in his possession. The case manager responded that he had the documents and had reviewed them prior to issuing the January 8, 1997 letter to Borden. He indicated that the information and data that he has concerning the diesel fuel-contaminated soils cleanup in the Phase I and Phase II areas does not satisfy the current NJDEP Technical Requirements for Site Remediation (Technical Requirements) for post-excavation sampling of cleanup excavations (i.e., 1 sample per 30 linear feet of sidewall and 1 sample per 900 square feet of excavation bottom). The Case Manager further stated that all of the samples, as per the Technical Requirements, must be analyzed for total petroleum hydrocarbons (TPH), at least 25% of the samples, if any, that contain 1,000 parts per million (ppm) of TPH must also be analyzed for volatile organics with a forward library search (VO+10), and that usually no area of concern containing above 10,000 ppm of total organics (including TPH) is allowed to remain in-place without a use restriction being required by NJDEP.

1.3 Site Geology

Cape May lies in the Coastal Plain Physiographic Province. Generally, in the area of the subject site, the soils are recently developed on the glacial outwash deposited during the Wisconsinan Glaciation in the Pleistocene period. They are sandy and gravelly, and are generally well drained and rapidly permeable. Bedrock of Precambrian and Early Paleozoic

age underlies the Cape May area at a depth of approximately 4,100 feet below ground surface (bgs).

Shallow site soils primarily consisted of white to light brown fine to coarse sands and crushed clam shells, which are underlain by black sand/silt and matted peat marsh materials.

The site is approximately 5-10 feet above mean sea level (MSL). Shallow ground water was encountered below the area of the former remediation from 5 to 7 feet bgs. Ground water at the site is tidally influenced and fluctuates in depth by as much as two feet, as observed by TRC's water level measurements collected from the site wells.

2.0 TECHNICAL OVERVIEW

Prior to the soil boring installations, TRC established the perimeter wall locations of the Phase I and II clean up excavations as shown on Figure 2.1, Soil Remediation Excavation and Sample Location Plan, contained in the May 13, 1994 VNHA report. Following field establishment of the perimeter wall locations, nine excavation side wall soil boring locations (BSW-1 to BSW-9) and five excavation bottom soil boring locations (BBS-1 to BBS-5) were staked out for sampling. Two of the bottom sampling locations (BBS-2 and BBS-4) were placed in the vicinity of two VNHA test pit locations (Test Pit 1 and Test Pit 4) that were reported (Table 6.1 of the May 13, 1994 VNHA Report) to contain TPH concentrations over 1,000 ppm in order to verify the remediation of these areas. The boring locations were declared by Snow's/Doxsee as being clear of utilities after a review of site plans. The TRC soil boring locations are presented in Figure 2 in Appendix A.

The soil borings were installed by a New Jersey-licensed drilling contractor, Aquifer Drilling and Testing (ADT) of Queens, New York, with a Mobile B-57 hollow stem auger drilling rig and 3-inch diameter steel split spoons. The borings were advanced to the water table, which varied in depth from 5 to 7 feet below grade. Boring Logs documenting the materials encountered at each location are presented in Appendix C.

All down the hole drilling equipment would have been decontaminated between drilling locations by steam cleaning. However, the borings were advanced with split spoons only and no augering was conducted. The sampling equipment (split spoons and stainless steel spoons) were decontaminated between samples by scrubbing with an alconox and water solution and double rinsing with potable water and then deionized water to preclude cross contamination between sampling locations. The drill spoils generated from the borings were containerized in one 55-gallon drum and stored on-site in a location acceptable to the current site owner, Snow's/Doxsee.

Each split spoon soil sample was examined by the TRC geologist for indications of staining or petroleum odor and scanned with a Organic Vapor Meter (OVM) Model 580A photoionization device for indications of gross volatile organics contamination. The OVM measurements obtained during the advance of each boring are shown on the boring logs for each sample interval.

One soil sample from the six-inch depth interval in each boring that exhibited the most staining/odor or the highest OVM reading above background (0.1 ppm) was obtained from the split-spoon sampler with a decontaminated stainless steel spoon. If no impacts were encountered in the soil boring, the sample was obtained in the six-inch interval immediately below the bottom of the fill material detected in the bottom (BBS) borings, or in the six-inch interval at the soil/water interface in the sidewall (BSW) borings

All samples were placed into laboratory supplied sample bottles with a decontaminated stainless steel trowel/spoon. The samples were labelled, entered on a chain-of-custody document and placed into a chilled cooler and hand delivered to Accutest in Dayton, New Jersey, a NJDEP-certified laboratory. All soil samples were analyzed with a three-day laboratory reporting turn-around time (TAT) for TPH by Method 418.1 (modified). Two samples which exceeded 1,000 ppm of TPH were also analyzed with a 21-day TAT for VO+10 by Method 8240, and one sample was additionally analyzed for TPH-Gasoline Related Organics (GRO) and Diesel Related Organics (DRO) by Method 8015 (modified). Two field rinsate blank samples (one per sampling day) were also collected from a decontaminated split spoon sampler for quality assurance and quality control (QA/QC) purposes, and were also analyzed for TPH and VO+10.

3.0 SOIL SAMPLING RESULTS

Overall, 12 of the 14 samples were below 1,000 ppm of TPH, and required no further analysis.

Five of the nine sidewall (BSW) samples had TPH concentrations less than the method detection limit, and the remaining four sidewall samples had TPH concentrations ranging from 63.5 ppm to 526 ppm.

Two of the five bottom (BBS) samples had TPH concentrations less than the method detection limit (BBS-1 and BBS-2), and the remaining three bottom samples had TPH concentrations of 710 ppm (BBS-4), 3,360 ppm (BBS-3), and 10,700 ppm (BBS-5).

The two samples with TPH concentrations greater than 1,000 ppm (BBS-3 and BBS-5) were also analyzed for VO+10. Sample BBS-3 had concentrations less than the method detection limit for all volatile compounds, and sample BBS-5 had detections of only three volatile compounds - acetone [(57.1 parts per billion (ppb)], carbon disulfide (13.7 ppb), and toluene (79.7 ppb). The concentrations of all three compounds were all below their respective NJDEP soil cleanup criteria. The Sampling Results Summary Tables are presented in Appendix D. The laboratory data reports for the samples are presented in Appendix E.

4.0 CONCLUSIONS

- None of the nine excavation side wall samples contained levels of TPH over 1,000 ppm which confirms that the lateral extent of the diesel fuel-impacted soils in this area was remediated by the 1993 cleanup excavations.

- Neither of the two VNHA test pit locations (Test Pit 1 and Test Pit 4) within the excavation areas that had previously contained levels of TPH over 1,000 ppm were discovered to still contain elevated TPH concentrations by the two TRC soil boring samples BBS-2 (<30 ppm) and BBS-4 (710 ppm) that were performed in proximity to the VNHA test pit locations. These data confirm that the former elevated TPH concentrations at the VNHA sample locations were remediated.

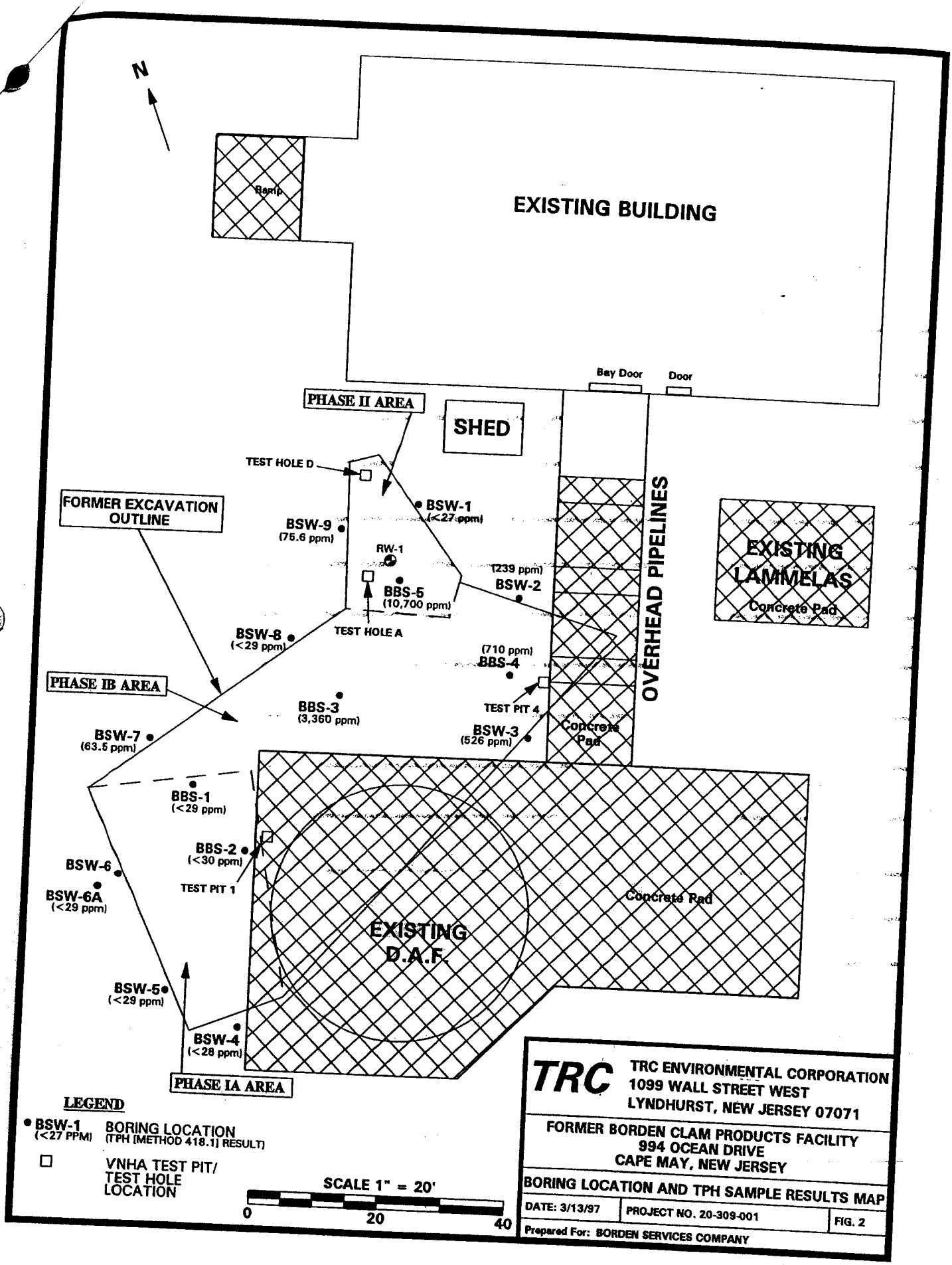
- Only two of the five TRC excavation bottom samples contained TPH levels above 1,000 ppm. Analysis of both samples for VO+10 did not detect volatile compound concentrations above NJDEP residential, non-residential, or impact to ground water quality clean up criteria.

- Only sample BBS-5 contained a total organic compound concentration above 10,000 ppm.

- Due to the absence of levels of volatile compounds above NJDEP residential, non-residential, and impact to ground water quality clean up criteria in sample BBS-5, and the absence of free product and detectable concentrations of volatile compounds and base neutral compounds in the final ground water sampling (9-16-96) of the recovery well, RW-1, (located approximately 4 feet to the north of BBS-5) that allowed NJDEP to require sealing of the well, it is evident that the residual TPH level in this sample is not a concern for direct contact, nor does it pose the potential for negative impact to ground water quality. In addition, the absence of levels of TPH above 1,000 ppm in the other water table soil samples [TRC samples BSW-1 (<27 ppm), BSW-9 (75.6 ppm), and VNHA sample Test Hole A (44 ppm)] located within an approximately ten-foot radius of BBS-5 document that the three-inch layer of TPH-impacted soils detected by sample BBS-5 is a de minimus condition constituting less than 10 cubic yards of soil. The VNHA data for Test Hole A are presented on Table 6.4 in Appendix B.

5.0 RECOMMENDATIONS

Based upon the data generated by the Confirmatory Subsurface Investigation, TRC, on behalf of Borden Services Company, requests that NJDEP render a de minimus exemption for the isolated residual TPH contamination layer in the area immediately surrounding sample location BBS-5, and issue a no further action determination for soil and ground water for this remaining site area of concern.



TRC TRC ENVIRONMENTAL CORPORATION
1099 WALL STREET WEST
LYNDHURST, NEW JERSEY 07071

FORMER BORDEN CLAM PRODUCTS FACILITY
994 OCEAN DRIVE
CAPE MAY, NEW JERSEY

BORING LOCATION AND TPH SAMPLE RESULTS MAP

DATE: 3/13/97	PROJECT NO. 20-309-001	FIG. 2

Prepared For: BORDEN SERVICES COMPANY

DEP-090
3/91

New Jersey Department of Environmental Protection

RECEIVED CAPE MAY CO. FEB 21 1992

COMMUNICATIONS CENTER NOTIFICATION REPORT

Received 2/19/92 TD Log # 2850

Operator JOYCE Reviewed By A.G. Case # 92-2-19-1650-24

Notification Type Citizen

Reported By ANONYMOUS Affiliation Phone

Street Address Municipality State

Incident Location: Facility

Site: SNOWS CANNERY S DIV BORDEN FDS Phone

Street Address Municipality County State

OCEAN DR LOWER TWP CAPE MAY NJ

Location Type Commercial Incident Date 2/19/92 Time ONGO

Substance Released OIL LIKE SUBSTANCE

Amount Released ( ): UNK

ID Suspect State Liquid CAS # Release Is Intermittent

Additional Substances

Substance Contained? N Hazardous Material? Y TCPA? N A310 Letter? Y

COMU Code 0505 Referral Code 002

Incident Description Illegal Dumping

Injuries? N Public Evac? N Facility Evac? N Public Exposure? N

Police On Scene? N Firemen On Scene? N DEP Requested? Y Wind Sp/Dir

Contamination Of Land,Water Receiving Water UNKNOWN

Status at Scene

ILLEGAL DUMPING OF OIL LIKE PRODUCTS INTO WETLANDS AT REAR OF PROPERTY

Responsible Party Known

Party SNOWS CANNERY S DIV

Contact ANONYMOUS Phone

Title

Street Address Municipality County State

OCEAN DR LOWER TWP CAPE MAY NJ

OFFICIALS NOTIFIED

	Name	Affiliation	Phone	Date	Time
NJSP	OEM	DISP #140	609-882-2000	2/19/92	
MUNIC	LOWER TWP		609-886-2711	2/19/92	1656
OTHER					

	Name	Affiliation	Method	Date	Time	T/M
1		DRPSR ER2	Faxed,Mail	2/19/92		T
2		DCR HQ1	Faxed	2/19/92		T
3		DFG	Faxed	2/19/92		T

COMMENTS

ALSO FAXED TO DEP-MONITORING. JS

DEP-090
3/91

New Jersey Department of Environmental Protection

COMMUNICATIONS CENTER NOTIFICATION REPORT

RECEIVED
FEB 24 1992
CAPE MAY COUNTY
HEALTH DEPARTMENT

Received 2/20/92 TD Log# 2910

Operator RICH Reviewed By [signature] Case# 92-2-20-1445-34

Notification Type Citizen

Reported By LOROY JONES
Affiliation CIT
Phone
Street Address
Municipality SWAINTOWN
State NJ

Incident Location: Facility
Site: BORDEN FOODS INC
Phone
Street Address 994 OCEAN DR
Municipality LOWER TWP
County CAPE MAY
State NJ

Location Type Industrial
Incident Date 1/01/88
Time ON GO

Substance Released OIL FUEL
Amount Released (Estimate): 9000 GAL
ID Known
State Liquid
CAS#
Release Is Terminated
Additional Substances
Substance Contained? N
Hazardous Material? Y
TCPA? N
A310 Letter? Y
COMU Code 0505
Referral Code 017

Incident Description Spill

Injuries? N
Police On Scene? N
Public Evac? N
Firemen On Scene? N
Facility Evac? N
DEP Requested? N
Public Exposure? N
Wind Sp/Dir

Contamination Of Land
Receiving Water

Status at Scene
DURING PILE-DRIVING AT SITE A PIPE WAS BROKEN AND OIL SOAKED INTO GROUND AND RAN UNDER BOILER ROOM AREA. NO CLEANUP DONE

Responsible Party Suspected
Party BORDEN FOODS INC
Contact
Phone
Title
Street Address 994 OCEAN DR
Municipality CAPE MAY
County CAPE MAY
State NJ

OFFICIALS NOTIFIED

	Name	Affiliation	Phone	Date	Time
NJSP	OEM		609-882-2000	2/20/92	
MUNIC	LOWER TWP	OPER 145	609-886-2711	2/20/92	1453
OTHER					

	Name	Affiliation	Method	Date	Time	T/M
1	CHERYL PRIEST	DRPSR Southern	Faxed,Mail	2/20/92	1453	B
2						
3						

COMMENTS

ADDR IS IN LOWER TWP NOT CAPE MAY PER CAPE MAY PD

DEP-059
3/91

New Jersey Department of Environmental Protection

COMMUNICATIONS CENTER NOTIFICATION REPORT

Received 9/13/92 | TD Log # 15077

Operator JOYCE | Reviewed By JS | Case # 92-9-13-1231-11

Notification Type Facility

Reported By	Affiliation	Phone
AL HUDSON	ATLANTIC ELECTRIC	609-465-3055
Street Address	**Municipality**	**State**
420 RT#9 NORTH	CAPE MAY COURT HOUSE	NJ

Incident Location: Other

Site: BORDENS CLAM PROCESSING PLANT | Phone N/A

Street Address	Municipality	County	State
OCEAN DRIVE	LOWER TWP	CAPE MAY	NJ

Location Type Commercial | Incident Date 9/13/92 | Time 1100

Substance Released OIL TRANSFORMER NON-PCB

Amount Released Estimate): <1 GAL

ID Known | State Liquid | CAS # | Release Is Terminated

Additional Substances

Substance Contained? Y | Hazardous Material? Y | TCPA? N | A310 Letter? Y

COMU Code 0505 | Referral Code 101

Incident Description Spill

Injuries? N | Public Evac? N | Facility Evac? N | Public Exposure? N

Police On Scene? N | Firemen On Scene? N | DEP Requested? N | Wind Sp/Dir

Contamination Of Land | Receiving Water

Status at Scene

BUSHING ON PADMOUNT TRANSFORMER LEAKED PRODUCT ONTO GROUND. REPAIR/CLEANUP CREW ON SITE.

Responsible Party Known

Party ATLANTIC ELECTRIC

Contact AL HUDSON | Phone 609-465-3055 | Title DIST SUPER

Street Address	Municipality	County	State
420 RT#9 NORTH	CAPE MAY COURT HOUSE	CAPE MAY	NJ

OFFICIALS NOTIFIED

	Name	Affiliation	Phone	Date	Time
NJSP					
MUNIC	LOWER TWP	DISP #145	609-886-2711	9/13/92	1236
OTHER					

	Name	Affiliation	Method	Date	Time	T/M
1		DRPSR BFO-SA	Faxed,Mail	9/13/92		B
2						

COMMENTS

RECEIVED
JUN 0 9 1992
CAPE MAY COUNTY
HEALTH DEPARTMENT

State of New Jersey
Department of Environmental Protection and Energy
Division of Responsible Party Site Remediation
Southern Field Office
20 Clementon Road
Gibbsboro, NJ 08026
Tel. # 609-346-8000
Fax. # 609-346-8010

Scott A. Weiner
Commissioner

Karl J. Delaney
Director

May 28, 1992

Carl Golinski
Borden, Inc.
994 Ocean Drive
Lower Twp, NJ 08204

Re: March 12, 1992 Notice of Violation, Borden, Inc., Ocean Drive, Lower Twp.,

Dear Mr. Golinski:

During a discussion with your consultant this date, I was informed that approximately 20 cy of visibly contaminated soil was removed from the AGST area. Mr. Umbach stated that a well was installed into a part of the AGST excavation which appeared to have 0.5" of floating fuel. He verbally proposed to begin free product removal from the well, but I stated that the Department require submission of written specifications for the recovery/discharge system involved. Mr. Umbach stated that he could submit such a document.

Be advised that free floating fuel represents an unacceptable environmental condition. The submission of recovery system proposal and associated monitor wells should be accomplished as soon as possible.

Very truly yours,

Nick Sodano
HSMS II

NS
cc: William Dunfee, BFO-So.
Joan Thaler, CMCHD
Dave Umbach, VNH
case file 05-05-21

CAPE MAY COUNTY DEPARTMENT OF HEALTH

MEMO

TO File #30352-HS/ER

FROM Joan F. Thaler, Sanitary Inspector **DATE** February 25, 1988

SUBJECT 5 Gallon hydraulic oil leak

2/25/88

During on-site visit 11:50 hours at Snow Foods, 994 Ocean Drive, Township of Lower, I met with Russell Bragg, Engineering/Maintenance Manager, and Jerry Lewis, Quality Control Manager, concerning five gallon hydraulic oil leak which occurred at the facility on February 19, 1988. According to Bragg, leak occurred when crane blew hose during lifting operation. Speedi Dri absorbant was used to contain spill.

I inspected the area of the spill and observed the absorbant in place on the concrete surface under and adjacent to the crane. Spill area estimated to be approximately 5 feet in diameter. I advised Bragg and Lewis to have absorbant cleaned up and stored on-site. Reinspection is scheduled for February 26, 1988.

During visit, Bragg and Lewis provided the following information for emergency response planning:

1. Above Ground Storage Tank - CARBON DIOXIDE one tank 75,000 lbs. capacity. use-coolant.

2. Above Ground Storage Tanks - PROPANE - two tanks, 30,000 lbs. capacity each. use-boiler fuel.

3. Above Ground Storage Tanks - DIESEL FUEL - two tanks, 20,000 gallons capacity use-boat & truck fuel.

4. Mobile Tank - NITROGEN - 3000 lb. capacity, substitute for CO_2 Coolant.

Site map noting location of chemicals will be provided, when available.

Joan F. Thaler,
Sanitary Inspector

JFT/jam

cc: Raymond W. Chadwick, Jr. Chief Sanitary Inspector
Hank Heacock, Asst. Chief Sanitary Inspector
Charles A. Adelizzi, Sr. Sanitary Inspector - Lower Twp.
Wm. Dunfee, DEP-HWM - Southern Field Office

Lund's Fisheries

CASIE/PROTANK

SUPPLEMENT TO

DISCHARGE INVESTIGATION AND CORRECTIVE ACTION REPORT

FOR

LUND'S FISHERIES

997 OCEAN HIGHWAY

TOWNSHIP OF LOWER, CAPE MAY COUNTY, NEW JERSEY

NJ DEP CASE # 89-07-20-1500

ANALYSIS FOR 2ND ROUND OF GROUNDWATER MONITORING WELL SAMPLING

PREPARED FOR:

LUND'S FISHERIES
997 OCEAN HIGHWAY
CAPE MAY COUNTY, NEW JERSEY 08204

PREPARED BY:

CASIE/PROTANK

Bryan Fallucca

BRYAN FALLUCCA
ENVIRONMENTAL SCIENTIST

REVIEWED BY:

CASIE/PROTANK

KRIS KLUK, PH.D.,P.E.

MARCH 1991

• P.O. BOX 92 • FRANKLINVILLE, N.J. 08322 • (609) 696-4401 • TELEFAX NO. (609) 696-7065

1.0 SUMMARY

On January 22, 1991, Casie/Protank collected a second (2nd) round of samples from the three (3) groundwater monitoring wells that were installed according to the Scope of Work for this case. These samples were transported and submitted to QC Incorporated for analysis of Semivolatile and Volatile Compounds (see Tables 2 and 3, Attachment C for summary of analytical results).

Attachment A contains a groundwater contour map which also indicates the location of each monitoring well.

Attachment B contains all pertinent surveying data (Table 1).

Attachment C contains a summary of the 2nd round analytical results (Tables 2 and 3).

Attachment D contains the analytical package from QC Incorporated.

2.0 RECOMMENDATIONS

Second round sampling results do not indicate the presence of any volatile or semivolatile contaminants in monitoring wells one (1) or two (2). Volatile contamination was detected in monitoring well three (3). However, only 1 volatile, Toluene at 32 ug/L, was found. Casie/Protank recommends that this case, NJDEP Case 89-07-20-1500, be closed.

• P.O. BOX 92 • FRANKLINVILLE, N.J. 08322 • (609) 696-4401 • TELEFAX NO. (609) 696-7065

TABLE 2

LUND'S FISHERIES

SUMMARY OF VOLATILE COMPOUND CONCENTRATIONS (ug/L)
EPA METHOD 624+15

MONITORING WELLS		MW-1	MW-2	MW-3
	ANALYSIS NO	333679	333680	333681
C.A.S. NO.	ORGANIC COMPOUND			
74-87-3	Chloromethane	10. U	10. U	10. U
74-83-9	Bromomethane	10. U	10. U	10. U
75-01-4	Vinyl Chloride	10. U	10. U	10. U
75-00-3	Chloroethane	10. U	10. U	10. U
75-09-2	Methylene Chloride	3.1 JB	5. U	7.2 B
75-35-4	1,1-Dichloroethene	5. U	5. U	5. U
75-34-3	1,1-Dichloroethane	5. U	5. U	5. U
540-59-0	1,2-Dichloroethene (total)	5. U	5. U	5. U
67-66-3	Chloroform	5. U	5. U	5. U
107-06-2	1,2-Dichloroethane	5. U	5. U	5. U
71-55-6	1,1,1-Trichloroethane	5. U	5. U	5. U
56-23-6	Carbon Tetrachloride	5. U	5. U	5. U
75-27-4	Bromodichloromethane	5. U	5. U	5. U
78-87-5	1,2-Dichloropropane	5. U	5. U	5. U
10061-01-5	cis-1,3-Dichloropropene	5. U	5. U	5. U
79-01-6	Trichloroethene	5. U	5. U	5. U
124-48-01	Dibromochloromethane	5. U	5. U	5. U
79-00-5	1,1,2-Trichloroethane	5. U	5. U	5. U
71-43-2	Benzene	5. U	5. U	5. U
10061-02-6	trans-1,3-Dichloropropene	5. U	5. U	5. U
75-25-2	Bromoform	5. U	5. U	5. U
127-18-4	Tetrachloroethene	5. U	5. U	5. U
79-34-5	1,1,2,2-tetrachloroethane	5. U	5. U	5. U
108-88-3	**Toluene**	5. U	5. U	32
108-90-7	Chlorobenzene	5. U	5. U	5. U
100-41-4	Ethylbenzene	5. U	5. U	5. U
--------	Dichlorobenzene (Total)	5. U	5. U	5. U
--------	2-Chloroethylvinyl Ether	10. U	10. U	10. U
--------	Methyl Tert-Butyl Ether	10. U	10. U	10. U
--------	Tert-Butyl Alcohol	10. U	10. U	10. U
--------	Xylenes (Total)	5. U	5. U	5. U
--------	Trichlorofluoromethane	10. U	10. U	10. U

U - Analyzed for but not detected.

J - Indicates an estimated value.

B - This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns data the user to take appropriate action.

TABLE 3

LUND'S FISHERIES

SUMMARY OF SEMIVOLATILE COMPOUND CONCENTRATIONS (ug/L)
EPA METHOD 625+15

MONITORING WELLS		MW-1	MW-2	MW-3
C.A.S. NO.	ORGANIC COMPOUND	333679	333680	333681
62-75-9	N-Nitrosodimethylamine	10. U	10. U	10. U
111-44-4	bis (2-Chloroethyl) Ether	10. U	10. U	10. U
541-73-1	1,3-Dichlorobenzene	10. U	10. U	10. U
106-46-7	1,4-Dichlorobenzene	10. U	10. U	10. U
95-50-1	1,2-Dichlorobenzene	10. U	10. U	10. U
39638-32-9	bis(2-Chloroisopropyl) Ether	10. U	10. U	10. U
621-64-7	N-Nitroso-Di-n-Propylamine	10. U	10. U	10. U
67-72-1	Hexachloroethane	10. U	10. U	10. U
98-95-3	Nitrobenzene	10. U	10. U	10. U
78-59-1	Isophorone	10. U	10. U	10. U
111-91-1	bis(2-Chloroethoxy)Methane	10. U	10. U	10. U
120-82-1	1,2,4-Trichlorobenzene	10. U	10. U	10. U
91-20-3	Naphthalene	10. U	10. U	2. J
87-68-3	Hexachlorobutadiene	10. U	10. U	10. U
77-47-4	Hexachlorocyclopentadiene	10. U	10. U	10. U
91-58-7	2-Chloronaphthalene	10. U	10. U	10. U
131-11-3	Dimethyl Phthalate	10. U	10. U	10. U
208-96-8	Acenaphthylene	10. U	10. U	10. U
606-20-2	2,6-Dinitrotoluene	10. U	10. U	10. U
83-32-9	Acenaphthene	10. U	10. U	10. U
51-28-5	2,4-Dinitrophenol	10. U	10. U	10. U
84-66-2	Diethylphthalate	10. U	10. U	10. U
7005-72-3	4-Chlorophenyl-phenylether	10. U	10. U	10. U
86-73-7	Fluorene	10. U	10. U	10. U
86-30-6	N-Nitrosodiphenylamine (1)	10. U	10. U	10. U
103-33-3	Azobenzene (2)	10. U	10. U	10. U
101-55-3	4-Bromophenyl-phenylether	10. U	10. U	10. U
118-74-1	Hexachlorobenzene	10. U	10. U	10. U
85-01-8	Phenanthrene	1. J	10. U	1. J
120-12-7	Anthracene	10. U	10. U	10. U
84-74-2	Di-n-Butylphthalate	10. U	10. U	10. U
206-44-0	Fluoranthene	10. U	10. U	10. U
92-87-5	Benzidine	50. U	50. U	50. U
129-00-0	Pyrene	10. U	10. U	10. U
85-68-7	Butylbenzylphthalate	10. U	10. U	10. U
91-94-1	3,3 -Dichlorobenzidine	20. U	20. U	20. U
56-55-3	Benzo(a)Anthracene	10. U	10. U	10. U
218-01-9	Chrysene	10. U	10. U	10. U
117-81-7	bis(2-Ethylhexyl) Phthalate	4. BJ	28. B	4. BJ
117-84-0	Di-n-Octyl Phthalate	10. U	10. U	10. U
205-99-2	Benzo(b)Fluoranthene	10. U	10. U	10. U
207-08-9	Benzo(k)Fluoranthene	10. U	10. U	10. U
50-32-8	Benzo(a)Pyrene	10. U	10. U	10. U
193-39-5	Indeno(1,2,3-cd)Pyrene	10. U	10. U	10. U
53-70-3	Dibenz(a,h)Anthracene	10. U	10. U	10. U
191-24-2	Benzo(g,h,i)Perylene	10. U	10. U	10. U

U - Analyzed for but not detected.

J - Indicates an estimated value.

B - This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns data the user to appropriate action.

Cape Port Gulf Station - Diesel UST
Soil Samples Collected - May 12, 1993

Sample Location	Matrix	MDL	Results	NJDEP Remediation Std.
DS-4 Lab ID# V6226	Soil	10.0 ppm	39.49 ppm TPHC	1000 ppm
DS-5 Lab ID# V6227	Soil	10.0 ppm	40.83 ppm TPHC	1000 ppm
DS-6 Lab ID# V6228	Soil	10.0 ppm	50.07 ppm TPHC	1000 ppm
Diesel Tank Pipe Run Soil Samples Collected - May 12, 1993				
DP-1 Lab ID# V6229	Soil	10.0 ppm	60.54 ppm TPHC	1000 ppm
DP-1 Lab ID# V6229	Soil	0.005 ppm	0.0181 ppm Methylene Chloride	1.0 ppm
DP-2 Lab ID# V6230	Soil	10.0 ppm	53.52 ppm TPHC	1000 ppm
DP-3 Lab ID# V6231	Soil	10.0 ppm	< 10.0 ppm TPHC	1000 ppm
DP-4 Lab ID# V6232	Soil	10.0 ppm	43.30 ppm TPHC	1000 ppm

Cape Port Gulf Station - Gasoline Tanks Pipe Run
Soil Samples Collected - May 12, 1993

Sample Location	Matrix	MDL	Results	NJDEP Remediation Std.
GP-1 Lab ID# V6233	Soil	0.005 ppm	not detected Volatiles	
GP-1 Lab ID# V6233	Soil	Tentatively Identified	0.1721 ppm 1,2,2-trichloro-1,2,2-trifluoroethane	not established
GP-1 Lab ID# V6233	Soil	0.50 ppm	3.95 ppm Lead	100 ppm
GP-2 Lab ID# V6234	Soil	0.005 ppm	0.0077 ppm Methylene Chloride	1.0 ppm
GP-2 Lab ID# V6234	Soil	Tentatively Identified	1.0302 ppm 1,2,2-trichloro-1,2,2-trifluoroethane	not established
GP-2 Lab ID# V6234	Soil	0.50 ppm	3.38 ppm Lead	100 ppm
GP-3 Lab ID# V6235	Soil	0.005 ppm	0.0079 ppm Methylene Chloride	1.0 ppm
GP-3 Lab ID# V6235	Soil	Tentatively Identified	0.6808 ppm 1,2,2-trichloro-1,2,2-trifluoroethane	not established
GP-3 Lab ID# V6235	Soil	0.50 ppm	< 0.50 ppm Lead	100 ppm

Cape Port Gulf Station - Gasoline Tanks Pipe Run
Soil Samples Collected - May 12, 1993

Sample Location	Matrix	MDL	Results	NJDEP Remediation Std.
GP-4 Lab ID# V6236	Soil	0.005 ppm	0.0066 ppm Methylene Chloride	1.0 ppm
GP-4 Lab ID# V6236	Soil	Tentatively Identified	0.6272 ppm 1,2,2-trichloro- 1,2,2-trifluoroethane	not established
GP-4 Lab ID# V6236	Soil	0.50 ppm	12.89 ppm Lead	100 ppm
GP-5 Lab ID# V6237	Soil	0.005 ppm	0.0077 ppm Methylene Chloride	1.0 ppm
GP-5 Lab ID# V6237	Soil	Tentatively Identified	1.3271 ppm 1,2,2-trichloro- 1,2,2-trifluoroethane	not established
GP-5 Lab ID# V6237	Soil	0.50 ppm	5.0 ppm Lead	100 ppm

* Methylene Chloride was detected in all volatile compounds quality contol blanks.

Cape Port Gulf Station - Excavation Perimeter
Soil Samples Collected - March 9, 1995

Sample Location	Matrix	MDL	Results	NJDEP Remediation Std.
SB-2 Lab ID# V13663	Soil	10.0 ppm	132.86 ppm TPHC	1000 ppm
SB-2 Lab ID# V13663	Soil	3.42 ppm	below detection Lead	100 ppm
SB-3 Lab ID# V13664	Soil	0.0065 ppm	0.0077 ppm Methylene Chloride	1.0 ppm
SB-3 Lab ID# V13664	Soil	Tentatively Identified Compounds:		
		1,1,2-trichloro-1,2-ethane	@ 0.08991 ppm	
		2,2,3,3-tetramethyl-Butane	@ 0.09283 ppm	
		2-Methyl-Heptane	@ 0.02697 ppm	
		3-Methyl-Heptane	@ 0.03720 ppm	
		2,4,6,8-Tetramethyl-1-undecen	@ 0.04498 ppm	
		4-propyl-heptane	@ 0.02473 ppm	
		Di-n-butylphthalate	@ 0.11332 ppm	
SB-3 Lab ID# ILFC Batch NO:95010	Soil	Forensic Analysis	0.13 ppm Benzene	1.0 ppm
			0.56 ppm Toluene	500 ppm
			0.25 ppm Ethylbenzene	100 ppm

Cape Port Gulf Station - Monitoring Well MW-2
Soil Samples Collected During Well Installation - January 30, 1997

Sample Location	Matrix	MDL	Results	Remediation Std.
MW-2 Lab ID# 97-0006282	Soil		< 50.0 ppm Lead	100 ppm
MW-2 Lab ID# 9706282V	Soil		below detection volatile organics	

Tentatively Identified Compounds are not listed in the NJDEP Soil Cleanup Criteria.

GS-9 Lab ID# 97-0006283	Soil		< 50.0 ppm Lead	100 ppm
GS-9 Lab ID# 9706283V	Soil		below detection volatile organics	
GS-10 Lab ID# 97-0006284	Soil		< 50.0 ppm Lead	100 ppm
GS-10 Lab ID# 9706284V	Soil		below detection volatile organics	

GROUND WATER MONITORING

Two (2) ground water monitoring wells, screened in the first water bearing zone, are located within ten feet of, and are downgradient from the former excavation. Monitoring well MW-1 was installed on June 17, 1996. Monitoring well MW-2 was installed on January 30, 1997. Both monitoring wells were installed by Eastern Drilling Company, Inc. a New Jersey Licensed Well Driller # 1060.

July 11, 1996, and February 26, 1997. During the two separate ground water sampling events the wells were unlocked, and scanned with a properly calibrated PID. Prior to evacuation the wells were checked for floating product, measured for depth to water from the top of casing, and field tested for pH, temperature, and specific conductivity.

A peristaltic pump was utilized to purge each well by lowering dedicated tubing into each well, and pumping 3 - 4 volumes of water. The wells were allowed to stabilize prior to sample collection.

Dedicated bottom fill bailers were used to collect ground water samples from each monitoring well. The bailers were slowly lowered into the wells and then retrieved. Collected ground water was carefully transferred to appropriate laboratory cleaned glass containers, labelled, and cooled for transfer to the laboratory. A field blank was prepared by pouring laboratory analyte free water through the bailers, and collected for laboratory analyses. Trip Blanks accompanied the sample containers to and from the laboratory.

AQUEOUS MATRIX ANALYTICAL RESULTS

The aqueous samples were delivered to Enviro-Probe Laboratory within 48 hours of collection from MW-1. Laboratory holding times have been achieved, and laboratory QA/QC standards have been completed. Aqueous samples were collected from MW-2, and delivered to EMSL Analytical, Inc. A water sample was collected from MW-1, and analyzed for lead by EMSL. All NJDEP protocol was followed, and QA/QC standards were achieved.

Location	Matrix	Sample Depth	Parameters	Method
MW-1	Water	Throughout Water Column	VO+10 Lead	Bottom Fill Bailer
MW-2				

Water Sample	MDL	Results	Class II-A PQL's
MW-1 Lab ID# V9604060	10 ppb	Volatile Organics were not detected	

The MDL exceeds some Class II-A PQL's. Compounds were analyzed for but not detected.

Tentatively Identified Compounds are not currently listed in the Class II-A Ground Water Quality Criteria standards. TIC's total 276.8 ppb.

MW-1 Lab ID# 9604063	< 0.04 mg/l Lead unfiltered (analyzed but not detected)	0.010 mg/l

Collected 2-26-97

Water Sample	MDL	Results	Class II-A PQL's
MW-2 Lab ID# 9712712V	1 ppb	2 ppb methylene chloride	2 ppb
	1 ppb	37 ppb ethylbenzene	700 ppb
	1 ppb	225 ppb xylenes (total)	1000 ppb

Tentatively Identified Compounds total 1801 ppb.

SOIL LOG

CONTINUOUS SPLIT SPOON SAMPLING DURING MONITOR WELL INSTALLATION

MW-1 Installed on June 17, 1996 by Eastern Drilling Co. #1060
Soil samples were not collected for laboratory analysis.

0 - .5 Black top

.5 - 12 Clean fill, tan sand with trace of fine gravel

12 - 19 Gray sand with of medium gravel

wet at 14.0' well finished at 19.0'

MW-2 Installed on January 30, 1997 by Eastern Drilling Co. Soil core samples were collected and analyzed by EMSL Laboratory for VO+10 and Lead.

0 - 1.0' Black top

1.0' - 6.0' Clean fill, tan sand with trace of gravel

6.0' - 14.0' Tan sand with medium coarse gravel

14.0' - 18.5' Gray sand with, silt, and medium gravel

wet at 14.5' well finished at 18.5'

Cape Port Gulf Station - Monitoring Wells Installations
MW-1 Installed on June 17, 1996. MW-2 Installed on January 30, 1997 by Eastern Drilling Company, a New Jersey Certified Well Driller.

Well#	Permit#	Date installed	Well Dia.	Screened interval	Total Depth of well
MW-1	37-06027	6-17-96	4 in.	9ft.-19ft.	19ft.
MW-2	37-06154	1-30-97	4 in.	8.5ft.-18.5ft.	18.5ft.

During the installations of MW-1 and MW-2, soil cuttings displaced by the hollow stem auger were visually examined and field screened using a recently calibrated HNu Photoionization Detector (PID). The cuttings were placed in plastic bags and allowed to equilibrate prior to field screening. Results: MW-1 no readings. MW-2 2ppm @ 9 ft.

WATER CHEMISTRY MEASUREMENTS

July 11, 1996
MW-1 pH 5.6
Temp. 16 C.
Cond. 88
DO 1.3 ppm

Depth to water
from toc 10' 7"

February 26, 1997
MW-2 pH 5.5
Temp. 17.2 C.
cond. 89
DO 1.2 ppm

Depth to water
from toc 10' 8"

July 11, 1996 ground water samples were analysed by Enviro-Probe, Inc. NJDEP Certification# 12054. February 26, 1997 ground water samples were analysed by EMSL Analytical, Inc. NJDEP Certification# 04653. A chain of custody was prepared for each separate event. Ground water samples were analysed for volatile organics (VOC's) using EPA Method 624 calibrated for xylenes MTBE, and TBA, with a forward library search. Lead was analysed using EPA Method 239.2. Ground water from MW-1 was not field filtered prior to collection for lab analysis of lead. Ground water from MW-2 was field filtered prior to collection for lab analysis of lead.

Analytical results indicate that all targeted compounds are below current ground water standards. Tentatively Identified Compounds (TIC's) totalled 1801 ppb.

CONCLUSION

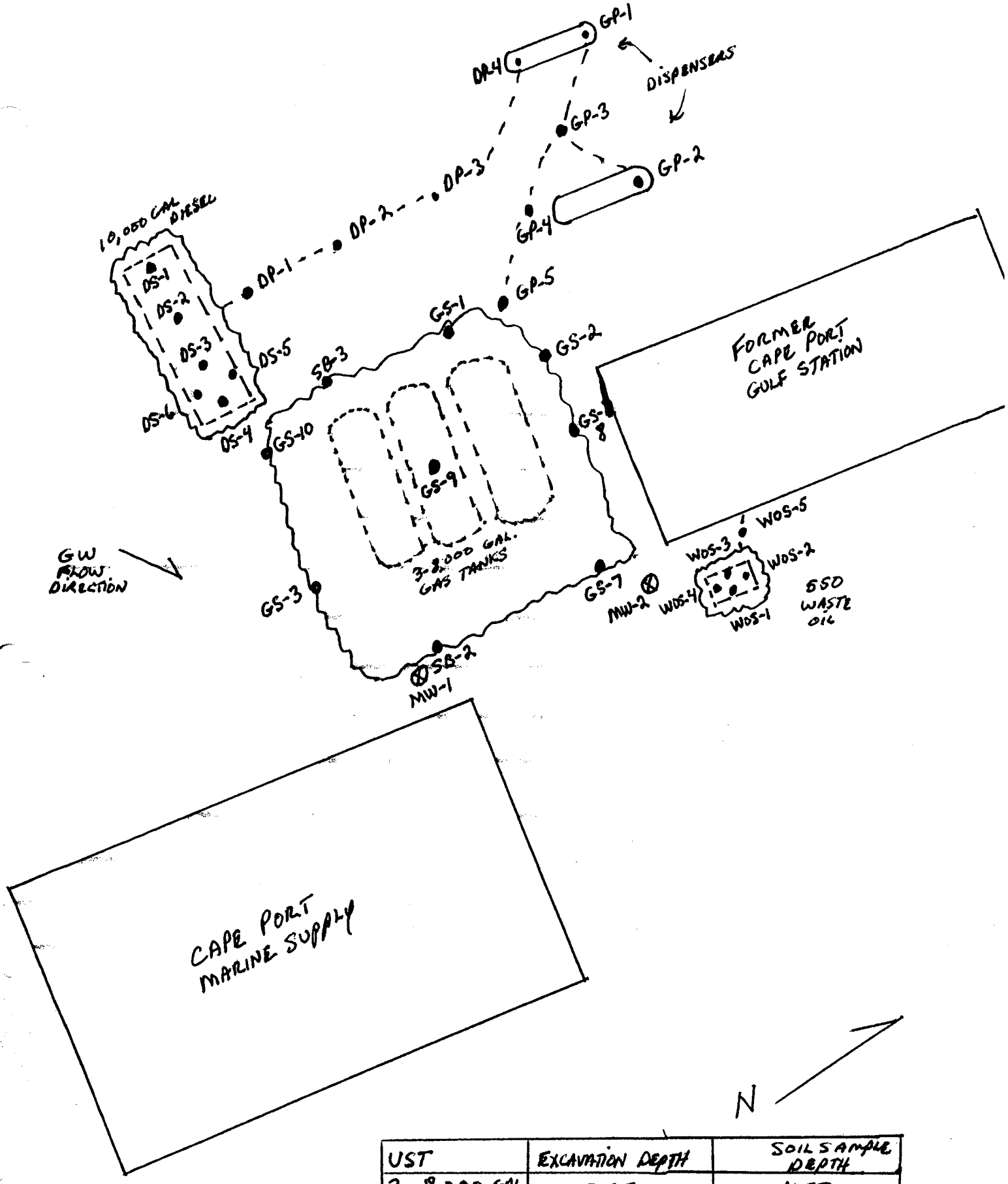
The following recommendation is based on the data gathered during the remedial investigation of soil and ground water :

1. It is believed that all sources of contamination have been effectively removed from the site. Soil samples collected from the perimeter of gasoline tanks excavation, at the bottom of each sidewall, the soil sample collected from the base of the excavation, and the soil samples collected during the installation of MW-2 have been determined clean in accordance with NJDEP Site Remediation News Impact to Ground Water Soil Cleanup Criteria.

2. Ground water samples collected from monitoring wells located within ten feet downgradient from the gasoline tanks excavation has been determined to be below NJDEP Class II-A Ground Water Quality Criteria Standards for target compounds. Tentitively Identified Compounds were detected in ground water from MW-2 at 1,801 ppb total.

RECOMMENDATION

Since targeted compounds in soil and ground water are below action levels, and the first water bearing zone is non-potable due to marsh mat odor, the high level of Tentively Identified Compounds is of no significance. Therefore, it is recommended that no further action is required at the site.

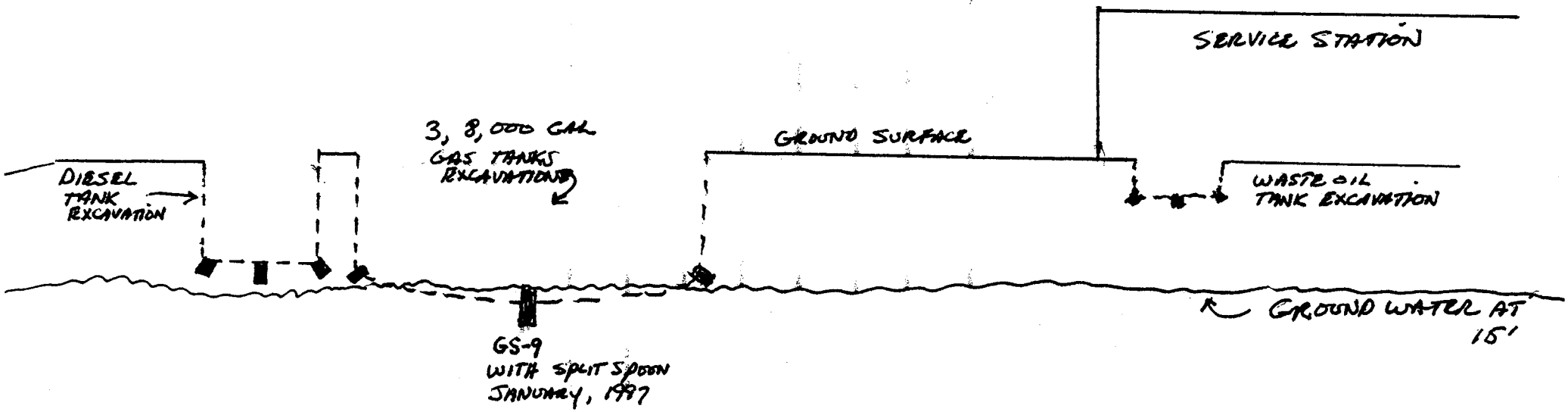


UST	EXCAVATION DEPTH	SOIL SAMPLE DEPTH
3, 8,000 GAL GASOLINE	15 FT GW ENTERED EXC.	14 FT.
DIESEL 10,000 GAL.	13.5 FT.	13 FT.
WASTE OIL 550 GAL.	5 FT.	5.5 FT.

SCALE: 1" = 20'

Hwy 109
N
DISPENSERS
PIPE TRENCH
FORMER CAPE PORT GULF STATION
DIESEL 10,000 GAL
EXCAVATION
PIPE TRENCH
GAS
GAS
GAS
8,000 GA.
EXCAVATION
550 GAL W.O.
EXCAVATION
CAPE PORT MARINE SUPPLY

CROSS SECTIONAL VIEW
OF SOIL SAMPLE LOCATIONS



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State of New Jersey
Department of Environmental Protection and Energy
Division of Responsible Party Site Remediation
CN 029
Trenton, NJ 08625-0029
Tel. # 609-984-3156
Fax. # 609-292-5604

Scott A. Weiner
Commissioner

Karl J. Delaney
Director

DEC 18 1991

Mr. Jeff Reichle
Lund Fisheries, Inc.
997 Ocean Drive
Lower Township, NJ 08270

CERTIFIED
RETURN RECEIPT REQUESTED

RE: Lund Fisheries, Lower Twp. Cape May Co.
Case# 89-07-02-1500, UST# 0182342

Dear Mr. Reichle:

On June 1990 and March 14, 1991, the New Jersey Department of Environmental Protection and Energy (the Department) received a report from your company. This report documents the corrective action measures undertaken in response to the discharge from your underground storage tank system.

Based on our review of the information submitted, we find that you have complied with the Department's existing requirements regarding corrective action for the investigated underground storage tank system (s). Therefore, you are not required to apply for a New Jersey Pollutant Discharge Elimination System Permit at this time to address ground water remediation associated with the investigated discharge (s) noted in the above referenced report.

In addition, you are required to properly seal all abandoned wells. Therefore, all monitoring wells installed as part of the investigation and corrective action of the discharge at your facility that you no longer plan to use for ground water monitoring must be sealed properly in accordance with the requirements of N.J.A.C. 7:9-9.1 et seq. by a licensed well driller certified to seal wells. The well abandonment forms must be completed and submitted to the Bureau of Water Allocation.

Thank you for your cooperation in this matter.

Very truly yours,

Joseph W. Krulik
Section Chief
Southern Tank Management Section
Bureau of Underground Storage Tanks

GWQM 177

c: Joan Thaler, Cape May Health Department
Mike Kelly, Case Manager
Edward Post, Cheif Southern Region Bureau of Regional Enforcement
Rick Kropp, Bureau of Water Allocation

CASIE/PROTANK

Date: December 21, 1989

State of New Jersey
Department of Environmental Protection
Division of Water Resources
CN 029
Trenton, N.J. 08625-0029

Attention: Frank Sanclementi

Re: NJ DEP case #89-07-20-1500
Lund's Fisheries
Ocean Drive, Cape May, New Jersey

Dear Mr. Sanclementi:

On December 12, 1989 Casie/Protank received the authorization from Lund's Fisheries to undertake the ground water cleanup and discharge investigation at their facility in Cape May. A written report will be submitted to the Bureau of Underground Storage Tanks within 120 days of the above date on which Casie/Protank received the authorization to proceed with the environmental work at this particular site. The effective target completion date would be April 12, 1990.

Accompanying this letter is a work plan and schedule with implementation target dates for the activities that will be performed. The work is to be done in accordance with the guidelines and procedures outlined in the September 1989 NJ DEP Scope of Work.

Should you have any questions in regard to this case please contact me at (609) 696-4401.

Sincerely:

James E. Cahill
Project manager/geologist

Enclosure: Work Plan and Schedule of work.

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WORK PLAN FOR LUND'S FISHERIES:

A preliminary site investigation has been performed for the Lund's Fisheries site in Cape May. The source of the contamination, several small underground storage tanks have already been removed from the site. The contaminated soil has been stockpiled on site and is contained by plastic. The removal of the contaminated soil from the site will take place pending the approval by a landfill.

The soil was excavated from the tank void in all lateral directions. Due to the close proximity to a water body, and the strong tidal influence, surface water was encountered in the excavation. The prior analytical work has shown contamination in this immediate area. Because of the physical obstacles at this particular location, it was not feasible to remove all of the contamination from the tank void at the time of the previous work.

Due to these factor, the installation of ground water monitoring wells is necessary. The main concern is not the contamination of drinking water, but rather the contamination of the coastal waters surrounding the site. Three (3) monitoring wells will be installed at the site to monitor the quality of groundwater.

WELL PLACEMENT:

Three ground water monitoring wells will be installed on the site in accordance with the NJ DEP Scope of Work for Investigation and Corrective Action Requirements. The well placements were determined by evaluating the site specific conditions; in particular the ground water flow direction. The monitoring wells will be installed at the locations shown on the attached map. The basis of the location selections were as follows:

MW #1: Will be installed at the location in the immediate area where contamination was found (tank area).

MW #2: At the opposite side of a concrete containment barrier adjacient to the location where contamination was found.

MW #3: A Background well to be located in an area that is believed a sufficient distance away from the source of the discharge (preferably up-gradient).

The monitoring wells will have "flush mount" covers due to the heavy activity at the site.

The attached Casie/Protank Monitoring Well Specifications and installation procedures will be followed.

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LUND'S FISHERIES:

PLANNED SCHEDULE OF WORK:

Well installation:	1/03/90 - 10/5/90
Well Development:	1/08/90 - 1/12/90
Surveying:	January
Ground water sampling:	
1st round	1/24/90 - 1/30/90
2nd round	2/24/90 - 2/30/90
(dependant on 1st round results and owner's approval)	
Soil Removal	(presently awaiting landfill approval)
Final Report (DICAR)	4/20/90

The NJ DEP will be notified of any deviation from this planned outline for the schedule of work for the Lund's Fisheries site. Casie/Protank will keep the DEP case agent informed on the progress of the activities performed at the site as well as the analytical results and findings of this investigation. The Scope of Work will used as a guideline for this project.

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Form DWR-052
/81

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER RESOURCES

REPORT OF PHONE CALL OR VISIT

Bureau or Office BUST

In -- Out _____ File _____

Date 8-7-89 Time 1:30 Routing Frank ~~RT~~ ISP

Person Contacted Jeff Reichle Phone No. 609-723-4050

Affiliation Lands Fishery

Subject of (Call) Visit Permission to backfill

Summary of (Call) Visit They are in the process of excavating 2 leaking UST's which are partially under supports for an above ground tank. They feel any further work will undermine the stability of the above ground tank support. They request permission to abandon ~~tanks~~ UST's in place & backfill & install wells.

I gave approval provided tanks were abandoned properly and contaminated soils encountered were addressed per the SRW. I also put Mr. Reichle on notice that further soil decontamination may have to be addressed depending on the ground-water monitoring results.

Action Recommended _____

Joseph A Miller

CASIE/PROTANK

Closed

DISCHARGE INVESTIGATION AND CORRECTIVE ACTION REPORT

FOR

LUND'S FISHERIES

997 OCEAN HIGHWAY

TOWNSHIP OF LOWER, CAPE MAY COUNTY, NEW JERSEY

NJ DEP CASE # 89-07-20-1500

PREPARED FOR:

LUND'S FISHERIES
997 OCEAN HIGHWAY
CAPE MAY, NEW JERSEY 08204

RECEIVED
JUL 5 8 53 AM '90
BUREAU OF UNDERGROUND
STORAGE TANKS

PREPARED BY:

CASIE/PROTANK
P.O. BOX 92
FRANKLINVILLE, NEW JERSEY 08322

JUNE 1990

U.S.T.

#0182342

● P.O. BOX 92 ● FRANKLINVILLE, N.J. 08322 ● (609) 696-4401 ● TELEFAX NO. (609) 696-7065

CASIE/PROTANK

DISCHARGE INVESTIGATION AND CORRECTIVE ACTION REPORT

FOR

LUNDS FISHERIES

997 OCEAN HIGHWAY

TOWNSHIP OF LOWER, CAPE MAY COUNTY, NEW JERSEY

NJ DEP CASE # 89-07-20-1500

PREPARED FOR:

LUNDS FISHERIES
997 OCEAN HIGHWAY
TOWNSHIP OF LOWER, NEW JERSEY 08204

PREPARED BY:

CASIE/PROTANK

James E. Cahill

JAMES E. CAHILL, PROJECT MANAGER/GEOLOGIST

REVIEWED BY:

CASIE/PROTANK

R. Jay Chappell

R. JAY CHAPPELL, GEOLOGIST

JUNE 1990

● P.O. BOX 92 ● FRANKLINVILLE, N.J. 08322 ● (609) 696-4401 ● TELEFAX NO. (609) 696-7065

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1.0 INTRODUCTION:

1.1 SCOPE OF WORK:

In accordance with the New Jersey Department of Environmental Protection (NJDEP), Division of Water Resources, Bureau of Underground Storage Tanks, this Discharge Investigation and Corrective Action Report (DICAR) has been prepared by Casie/Protank on behalf of Lund's Fisheries, Incorporated. This investigation pertains to the Lund's Fisheries facility in Cape May, New Jersey. The case has been assigned NJ DEP case number: 89-07-20-1500.

The tasks completed to date, concerning the reporting requirements, health and safety procedures, corrective actions for discharges to the environment, and the discharge mitigation requirements are covered within this report.

In accordance with the NJDEP procedures outlined in the Field Manual for Water Data Acquisition, all groundwater samples obtained from the monitoring wells were submitted to Bridgeport Environmental, Incorporated, a certified NJDEP laboratory, for the analysis of the selected parameters. The monitoring wells were installed by A & H Environmental Drilling, a New Jersey licensed well driller (#980 and #1110), in accordance with the permitting requirements of the NJ DEP, Division of Water Resources. The wells were surveyed by Lewis B. Conley jr. (NJPLS) of Van Note-Harvey Associates.

1.2 SUMMARY:

The Lund's Fisheries site is located at 997 Ocean Drive in Cape May, New Jersey. The facility has been incorporated since 1954 and has been solely owned and operated by Lund's Fisheries.

On July 20, 1989, the NJDEP received notification of a discharge of hazardous substances from Lund's Fisheries, following the removal of a 4,000 gallon underground storage tank that contained gasoline and the inertion of a 4,000 gallon gasoline tank and a 1,000 gallon waste-oil tank. Further investigation of groundwater and surrounding soils was required by the NJDEP.

On August 2, 1989, a letter from the NJDEP was sent to the Lund's Fisheries requiring the Scope of Work investigation and remediation to be performed at the 997 Ocean Drive site. Casie/Protank was contracted to perform the groundwater investigation on behalf of Lund's Fisheries on December 12, 1989.

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One (1) 4,000 gallon underground gasoline tank was removed on May 16, 1989, The tank was excavated by Lund's Fisheries and cleaned and disposed by Casie/Protank. A 4,000 gallon gasoline tank and a 1000 gallon waste oil tank were inerted in place. It was not practical to remove these two tanks due to the factor that the tanks are located underneath a 30,000 gallon aboveground tank with a concrete containment berm. The contaminated soil surrounding the tanks, approximately 80 cubic yards (yrds3) was staged on plastic.

The contaminated soil is presently stockpiled on the property. The material has been approved by the NJ DEP for classification and disposal as an ID-27 waste. Presently, the material is awaiting approval for off-site disposal. The soil disposal information is included in Appendix D.

The work plan called for the installation of three (3) monitoring wells. The wells were installed by A & H Environmental Drilling, a licensed New Jersey driller, under the supervision of Casie/ Protank on January 9, 1990. At the time of well installation, slight petroleum odors were noted in well boring from Monitoring Well No. 1.

The monitoring wells were developed by Casie/Protank on January 25, 1990 and the first round of sampling was performed by Casie/Protank on February 14, 1990. The samples were subsequently transported and submitted to Bridgeport Environmental for analysis of EPA methods 624 + 15 and 625 + 15. The analytical results were received by Casie/Protank from Bridgeport Environmental, Incorporated in March 1990. The results indicated that low levels of various compounds were present in the Monitoring Wells (see Table 2, pages 6-2 and 6-3 for the summary of analytical results).

The groundwater elevations were obtained from each of the monitoring wells. However, the groundwater elevations in the area in question are subject to strong influence from tidal fluctuations. The groundwater flow direction has been determined to be toward the east (toward Middle Thorofare).

A well search has been performed for the area surrounding the Lund's site. It does not appear that the discharge will pose a threat to drinking water supplies in the area. However, a well search of the area has located a number of "deep" water wells in the immediate area. The primary environmental concern is the possible contamination of the wetlands and tidal waters. The effect of the discharge on the wetlands and tidal waters does not appear to be significant at this time.

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2.0 SITE DESCRIPTION:

2.1 LOCATION:

Lund's Fisheries is located at 997 Ocean Drive in Lower Township, Cape May County, New Jersey. The site coordinates are north 38 57' 27" latitude and west 74 52'33" longitude. The site is positioned on the Location Map which is part of the Cape May, New Jersey quadrangle, 7.5 minute series topographic map (Map 1, page 2-2). (1)

2.2 SITE LAYOUT:

The Lund's Fisheries site is 231,715 square feet or 5.319 acres (to pierhead line) in size. The property is bordered by a manmade lagoon on the north and by Middle Thorofare on the east. Ocean Drive bounds the property to the south and another fishery borders the site on the west (Lot 15.02). Numerous structures are present at the Lund's site. A detailed site map (to scale) is presented as Map 2, page 2-3. The entire property, its structures and descriptions are shown on this map. The locations of the underground storage tanks is also displayed on this map. The tanks were located adjacent to the 30,000 gallon above ground diesel tank with containment. (1), (2)

2.3 OWNERSHIP HISTORY:

The site is presently owned by Lund's Fisheries, Incorporated. The property has been in the possession of Lund's since 1954. Prior to being obtained by Lund's Fisheries, no other business occupied the site. (3)

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2.4 SITE USE HISTORY:

The site has been utilized solely as a full service marine fishery operation. The buildings are utilized for fish processing, refrigeration and freezing fish products, administrative offices, ice houses, and miscellaneous utility buildings. The facility has been in operation for approximately 36 years. Some of the activities that regularly take place in addition to the fish processing activities include: servicing the fishing boats (pumping diesel fuel, and accumulating and disposing of the spent oil from the ships. An existing 30,000 gallon above-ground diesel fuel tank with containment, serves to fuel fishing vessels of the Atlantic Fleet. Bilge oil and water from the fishing vessels is accumulated in drums and a 550 gallon above ground waste-oil tank with containment. The material is subsequently removed from the site on a regular schedule. Presently, Lund's Fisheries is a very active business entity. (3)

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3.0 ENVIRONMENTAL SETTING:

3.1 WATER SUPPLY:

All of Cape May County's water supply is taken from the ground by either shallow or deep wells within the county. The number of permanent residents and visitors is increasing so rapidly that demand for water will soon exceed the supply. The problem is most severe in the communities on the barrier islands, where salt water has started to contaminate the wells in the Kirkwood aquifer at about 500 to 650 feet. (4)

It is estimated that the winter population uses about 10% of the rainfall that can replenish the groundwater taken from most shallow wells. The summer population uses 20%, but because there are clay layers between the surface and the water producing strata, water percolating from the surface cannot reach the aquifers that are supplying most of the water now taken from deep wells. Some of the wells in the southern part of the county have been abandoned because of salt water contamination, and new wells are being developed in the northern part of Cape May County. (4)

All public supply wells in the City of Wildwood tap the Cohansey Sand at an average depth of 250 feet. Static water level below land surface ranges from 6 to 24 feet. Yield values range from 250 to 1,050 gallons per minute (gpm) and draw-down ranges from 38 to 56 feet. The screened interval ranges from a high of 191 feet to a low of 251. (4)

A one to five mile computer well search and a one mile microfiche radius search has been performed for the Lund's Fisheries location. This information is included in Appendix E. Lund's Fisheries has it's own water supply wells. Two deep water supply wells are located on the site. In addition, businesses in the immediate area also have water supply wells on site. All the water supply wells are "deep" wells. It is highly unlikely that these wells would be affected by the discharge at the Lund's Fisheries site. The individual wells that were located by the well search are listed in Appendix E. The relative locations of the wells are also presented on the corresponding map that is also included in Appendix E.

3.2 SURFACE WATER:

The Lund's Fisheries site ranges from approximately 0 - 12 feet above mean sea level. There are not any fresh water bodies in the vicinity of the site. The property is located on a man-made peninsula extending from Cape May toward the barrier island were Wildwood is located. Middle Thorofare borders the property on the east and a man-made lagoon is located on the north. The Atlantic Ocean is approximately one mile due east of the site. The entire area surrounding the Lund's Fisheries site has been altered from natural conditions. Most of the land in the area has been built-up with fill material. (1), (2), (5)

Surface runoff at the site flows northward and eastward towards the manmade lagoon and Middle Thorofare. A large area of coastal wetlands and backbays are located directly to the north, east, and south of the site as can be seen on the site location map (Map 1, page 2-2). (1), (2)

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3.3 GEOLOGY:

Cape May County is underlain by unconsolidated and semiunconsolidated deposits of Quaternary, Tertiary, and Cretaceous age. These deposits which are composed mostly of alternating sand, silt, and clay, range in thickness from 4,000 to 6,000 feet and are underlain by crystalline rocks of older Paleozoic or Precambrian age, called the "basement complex". These Cretaceous to Recent deposits were deposited in fluvial, deltaic, estuarine, and marine environments. Fossil plant and shell remains are common in many of them. (4)

KIRKWOOD FORMATION:

The Kirkwood Formation can be subdivided into five natural units. Two of the units are aquifers and the other three function as aquicludes. The lower aquifer (the 800-foot sand) is dominantly gray medium to coarse sand, usually containing a thin ironstone and clay in the middle. This unit averages about 140 feet in thickness and the top occurs between 670 and 878 feet below mean sea level in different parts of the county; it is the principal aquifer for the coastal communities from Brigantine to Stone Harbor. The upper aquifer in the Kirkwood is composed of medium to coarse sand averaging 50 feet in thickness. The top of the upper aquifer occurs from 260 feet below mean sea level in the northwest part of the county to about 600 feet in the southeast, at Wildwood. In recent years the upper aquifer has been supporting water to Wildwood, Stone Harbor, Cape May City, and Cape May Point. (4)

COHANSEY SAND:

Overlying the Kirkwood Formation is the Cohansey Sand of Pliocene age. The Cohansey Sand in Cape May County contains in effect one aquifer. Several clay tongues which occur under the resort communities on the Cape May peninsula from Avalon to Cape May City pinch out toward the west, northwest, and north, so that the aquifer represents a continuous section of permeable materials in most of the county. (4)

The top of the most permeable part of the aquifer ranges from 75 feet below mean sea level in the northwestern part of Cape May County to a maximum of about 270 feet in the Wildwood area. The aquifer in the highly developed lower peninsular area is dominantly a medium to coarse sand and fine gravel that averages 100 feet in thickness. The Cohansey Sand is the principal aquifer in Cape May County. (4)

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BRIDGETON FORMATION:

Overlying the Cohansey Sand in Northwestern Cape May County is the Bridgeton Formation of Pleistocene age. This formation has a maximum thickness of 60 feet and consists predominantly of a dirty sand and sandy gravel with an abundant mixture of silt and clay. The formation is believed to be absent south of the Great Cedar Swamp. The Bridgeton Formation on the Cape May peninsula was removed by erosion prior to Cape May deposition. (4)

The Bridgeton Formation along with the deltaic sand facies of the Cape May Formation and Recent beach and dune deposits constitute the unconfined aquifer or Holly Beach water-bearing zone in Cape May County. (4)

CAPE MAY FORMATION:

The most extensive of the unconsolidated sediments exposed at the surface in the Cape May area is the Cape May Formation, which rests over the Cohansey Formation. The Cape May Formation in Cape May County is believed to have been deposited in three environments-estuarine, marine, and deltaic. The estuarine environment resulted in two distinct facies: a basal sand, overlain by a black clay. A single beach sand facies was deposited in the marine environment, and the deposition of heterogeneous coarse clastics occurred in the deltaic environment. (4)

The estuarine environment of the Cape May Formation is restricted to subsurface deposits and occurs in the peninsular portion of Cape May County. In this area, two river channels were incised into the underlying Cohansey Sand. When the shoreline advanced, these channels were flooded, forming a typical estuarine environment. (4)

Sedimentation in the channels was characterized by the initial deposition of a basal coarse sand and gravel layer. This was followed by the continued deposition of fine sand, silt, and clay in the main channels. (4)

The estuarine sand facies which occurs at the base of the deposit rests unconformably on the underlying Cohansey Sand. This facies of the Cape May Formation is restricted mainly to Middle and Lower Townships and to the vicinity of the shore resorts along the eastern margin of the county. The estuarine sand facies is on the average about 30 feet thick, and ranges in depth from 50 to 130 feet below mean sea level on Cape May Peninsula. (4)

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The estuarine sand facies, which is a channel-fill deposit, has a wide range of textures. The sand facies varies from silty clay to coarse sand and fine gravel. The coarse clastics are predominant. The aquifer in this facies is widely used for domestic and small industrial supplies. (4)

The estuarine clay facies of the Cape May Formation is underlain conformably by the estuarine sand facies. The contact between the two units is generally marked by a sharp transition from coarse sand and gravel below to a silty blue clay above. In some places, the contact is more gradational. The estuarine clay facies is unconformably overlain by the deltaic sand facies of the Cape May Formation on the mainland and the marine sand facies on the barrier islands. (4)

The top of the estuarine clay facies of the Cape May Formation lies about 30 to 70 feet below sea level and attains a maximum thickness of about 130 feet. (4)

The estuarine clay facies occurs only in the subsurface deposits in Cape May County. This facies exhibits a wide range of texture from silty blue clay to coarse sand and fine gravel; the silty clay is predominant. The sand and gravel occurs as stringers or lenses usually less than 10 feet thick. Sand and gravel is also interspersed within the clay. The sorting is poor, as would be expected in an estuarine environment. (4)

The marine sand facies of the Cape May Formation is restricted to the subsurface and occurs in the eastern portion of Cape May County from Cape May north to Ocean City. It is a typical beach deposit, composed of medium to coarse subrounded to rounded frosted quartz sand. In this area the marine sand facies of the Cape May Formation is underlain by the Cohansey Sand from Ocean City to Stone Harbor and the estuarine clay facies of the Cape May Formation from Stone Harbor to Cape May. (4)

The top of the marine sand facies of the Cape May Formation in Cape May County lies about 25 feet below sea level and ranges in thickness from about 20 to 110 feet. (4)

The deltaic sand facies of the Cape May Formation crops out over most of the peninsular surface of Cape May County east and south of the Great Cedar Swamp. The deltaic sand facies represent the last episode in the deposition of the Cape May Formation. (4)

The present location and extent of Cape May County can be attributed to the deposition of the Cape May delta. The delta was built out from the mainland toward the south in the direction of the Cape May peninsula. (4)

The deltaic sand facies of the Cape May Formation is underlain mostly by the estuarine clay facies on the Cape May peninsula. In the northern part of the peninsula between Swainton and Beesleys Point the contact between the deltaic sand facies of the Cape May Formation and the underlying Cohansey Sand is less discernible. (4)

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The deltaic sand facies occurs up to altitudes of about 35 feet and attain maximum thickness of 80 feet, but averages about 50 feet. The Great Cedar Swamp is the approximate area of delineation between the Bridgeton Formation and deltaic sand facies of the Cape May. (4)

The deltaic sand has variable texture. Characteristically, it is a coarse to fine subrounded to subangular quartz sand. Thin beds of fine gravel and pebbles are common in many areas but are concentrated locally on the western side of the Cape May peninsula. Local beds of silt and clay are typical in the subsurface in the area south of Cape May Court House. (4)

The deltaic sand facies of the Cape May Formation along with the Bridgeton Formation and the Recent beach and dune deposits comprise the Holly Beach water bearing zone. (4)

The recent deposits in Cape May County include all of the post-Cape May sediments. These sediments include dune and related beach deposits, tidal marsh and swamp deposits, and stream alluvium. The most noteworthy of these deposits in the vicinity of the Lund's Fisheries site are the tidal marsh and swamp deposits. (4)

There are extensive deposits of silt and clay in the lagoonal areas behind the barrier islands on the eastern side of Cape May County and in the mud flats of the streams having their headwaters in the mainland area of the county. The sediments deposited in these areas comprise the tidal marsh and swamp deposits. (4)

The deposits range in thickness from 0 to 30 feet. The tidal marsh and swamp deposits are unconformable with the underlying Cape May Formation. (4)

3.4 HYDROGEOLOGY:

The geologic and hydrogeologic conditions in the study area were researched as part of the DICAR. A preliminary literature review was conducted to determine surface and subsurface geologic conditions, soil character, and the status of groundwater transport and storage in the Cape May and Wildwood areas.

3.5 SOILS:

The properties of the soils underlying the Lund's site are too variable in composition and texture to assign a designated classification. The site location is mapped as Fill Land, sandy organic substratum (FM) in the Soil Survey of Cape May County. The site location is shown on the Cape May County Soil Map No. 29 which is displayed as Map 3, page 3-6. (5)

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Fill Land, sandy organic stratum, (FM) is mostly on the western edge of the barrier island beach along the ocean. Most of it was originally so low in elevation that it was covered by tidal water daily. At that time, it consisted mostly of silt loam high in organic matter content and was covered with silt-tolerant grasses and shrubs. Now most areas have been altered by diking, dredging, and filling. The dredged material ranges from fine sand to coarse sand and gravel as much as 2 inches in diameter. The fill material ranges from 1 to 20 feet in thickness and averages about 3 to 5 feet. Permeability is rapid, and available water capacity is low. The organic matter content and natural fertility are low. (5)

Most areas of this land type have little or no vegetation. Some areas are sparsely covered with bayberry or phragmites. (5)

Many areas of Fill land, sandy organic substratum, on the barrier beach have been developed for residential or commercial uses. Because of the variable properties of the fill material, the thickness of the fill, and the properties of the fill material, the thickness of the fill, and the properties of the underlying material, special foundations are generally needed for all structures. (5)

The Lund's site is built over Tidal Marsh. The Tidal Marsh consists of very poorly drained, silty or mucky flats that are flooded twice daily by tides. They are almost constantly saturated and have a low bearing capacity. The surface layer is generally silt loam, but in places it is muck. Below this are layers of soft silt loam and organic material. This soft material is dominantly more than 8 feet thick but ranges from 1 to more than 10 feet in thickness. (5)

3.6 GROUNDWATER:

Five fresh-water aquifers underlie Cape May County. These are included in the upper 1,100 feet of the Coastal Plain sediments and they range in age from Miocene to Recent. These aquifers in the order of their present development, are the Cohansey Sand of Pliocene age, two sands in the Kirkwood Formation of Miocene age, the estuarine sand facies of the Cape May Formation of Pleistocene age, and the Holly Beach water bearing zone of Pleistocene and Recent age. (4)

3.7 LAND USE:

The land immediately surrounding the Lund's Fisheries site is predominately commercial in nature. The businesses consist mainly of marinas for commercial and private boats, and businesses related to the seafood industry. The area is also a major summer resort community, many businesses are orientated toward tourism and recreation activities. (2)

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4.0 DISCHARGE MITIGATION:

The discharge mitigation activities for the Lund's Fisheries were performed by Casie/Protank. On July 20, 1989, the NJDEP received notification of a discharge of hazardous substances from the authorities at Lund's Fisheries. Further investigation of groundwater and surrounding soils was required by the NJDEP to confirm the initial discovery of the discharge. (3)

The 4000 gallon gasoline tank was excavated by Lund's Fisheries. The tank was cleaned and disposed of by Casie/Protank. The second 4000 gallon gasoline tank and a 1000 gallon waste oil tank were first cleaned and then inerted in place. The contaminated soil surrounding the tanks, approximately 80 cubic yards (yrds3), was excavated. The soil removed is presently stockpiled on the property. The soil has been classified by the NJDEP as an ID 27 waste. Presently, the soil is awaiting disposal approval. The soil pile analysis and the disposal information are included in Appendix D. (3)

The post excavation sampling in the tank void indicated that petroleum contamination existed in the tank void. It was not feasible to excavate all of the contaminated material due the presence of the containment barrier of the 30,000 gallon diesel fuel tank above the area of contamination. A discharge of hazardous substances was reported by Lund's Fisheries to the NJDEP at this time.

On August 2, 1989, a letter from the NJDEP was sent to Lund's Fisheries, detailing the Scope of Work investigation and remediation to be performed at the site. Casie/Protank was contracted by Lund's to perform the groundwater investigation on their behalf.

The work plan required the installation of three (3) monitoring wells. The wells were installed by A & H Environmental Drilling, a licensed New Jersey driller, under the supervision of Casie/Protank on January 9, 1990. At the time of well installation, slight petroleum odors were noted in well boring from Monitoring Well #01 (closest to the underground storage tanks.

The monitoring wells were developed by Casie/Protank on January 25, 1990 and the first round of groundwater samples were collected by Casie/Protank on February 14, 1990. The samples were subsequently transported and submitted to Bridgeport Environmental for analysis of volatile organic and semivolatile organic compounds (EPA methods 624 + 15 and 625 + 15 respectively).

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The analytical results from the first round of groundwater sampling revealed trace amounts of the following compounds:

MW #01: 6 ug/l of methylene chloride was found in the blank.
8 ug/l of benzene.
2 ug/l of Toluene was found in the sample and the blank.
9 ug/l of ethylbenzene.
17 ug/l of total xylenes
11 ug/l of naphthalene
3 ug/l of acenaphthene was found in the sample and the sample blank.
3 ug/l of fluorene was found in the sample and the blank.

MW #02: 8 ug/l of chloroform.

MW #03: 3 ug/l of methylene chloride was found in the sample and the blank.
2 ug/l of hexachlorethane was found in the sample and the sample blank.

The groundwater elevations were obtained from each of the monitoring wells at the time of groundwater sampling. Measurements were also taken at high and low tides on April 26th and 27th, 1990. The groundwater elevations did change during the tidal cycle, but the groundwater flow direction remained the same, toward the east. This information is also presented in Table 1, page 5-3.

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5.0 GROUNDWATER MONITORING:

Casie/Protank inspected the site to assess the conditions of the property and select locations for the placement of monitoring wells. The placement of these monitoring wells was as presented in the work plan for the site. The locations are shown in Map 4, page 5-2. The well locations were selected as follows:

MW #01: Placed at the former location of the underground storage tanks attributed to the discharge, adjacent to the above ground diesel oil tank.

MW #02: Down-gradient from the tank area, adjacent to a ice house.

MW #03: A background well, up-gradient from the tank area and MW #01.

The monitoring wells were installed on January 9, 1990. The wells were installed by A & H Environmental Drilling of Barrington, New Jersey. The boring were initially made using a eight inch diameter Hollow-Stem auger. The boring were subsequently widened with 12 inch diameter Hollow-Stem auger. Split Spoon samples were collected and logged. The wells were screened from 3 to 13 feet with 4 inch diameter, polyvinyl chloride (PVC) slotted piping. The as-built monitoring well specifications are attached as Appendix C. The three monitoring wells have flush-mounted covers at grade level.

The soil conditions were noted as being sandy fill with shell fragments from 0 to 5'. From 5 to 15' below the surface, the material is primarily tidal clays and mud with organic matter and shell fragments. The soil characteristics were consistent with the made land fill material, and were not characteristic of a standard soil classification. The boring logs, maintained by Casie/Protank, are included in Appendix C. (2)

The monitoring wells were developed by Casie/Protank on January 25, 1990. The wells were sampled by Casie on February 14, 1990. The aqueous samples from each well were submitted to Bridgeport Environmental, Inc. for analysis of volatile organic compounds and semivolatile organic compounds (EPA methods 624 + 15 and 625 +15).

At the time of the first round of groundwater sampling, groundwater measurements were also obtained. The surveying information for each monitoring well noting latitude, longitude, top-of-casing elevation, and groundwater elevation is shown in Table 1, page 5-3. The groundwater flow direction based on these measurements has been determined to be toward the east (Middle Thorofare). The groundwater flow direction is shown on Map 5, page 5-4.

In March 1990, Casie/Protank received the first round of analytical data from Bridgeport Environmental, Incorporated. The analytical results for the groundwater sampling are discussed in Section 6.0.

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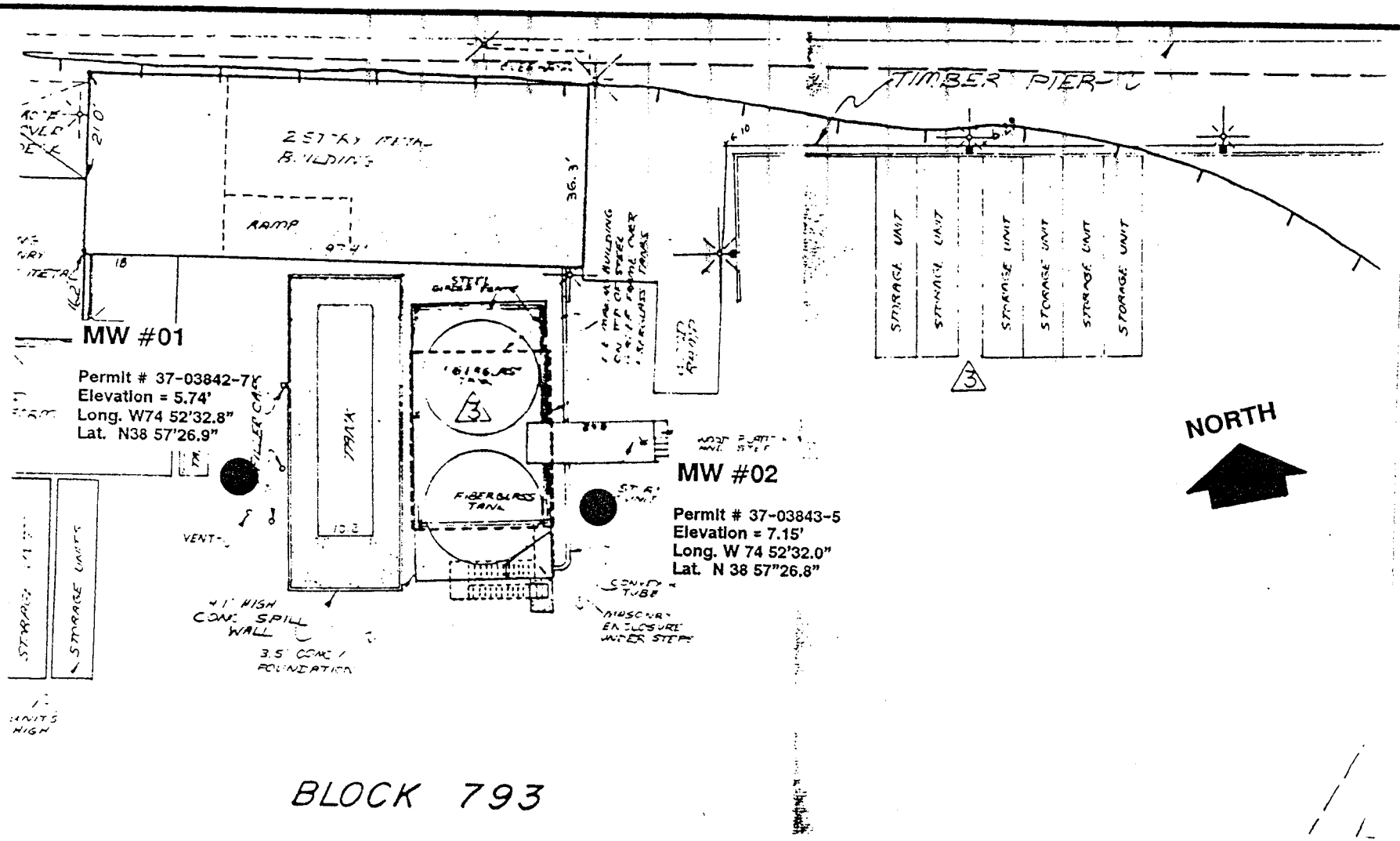
MAP 4



LUND'S FISHERIES
997 Ocean Drive
Lower Township, New Jersey

SCALE: 1"=30'	APPROVED BY CASIE/PROTANK	DRAWN BY JEC
DATE: 1/22/96		

MONITORING WELL LOCATIONS

DRAWING NUMBER

TELEDYNE | AB-01

TABLE 1:

LUND'S FISHERIES SURVEYING DATA:

MONITORING WELL	MW #01	MW #02	MW #03
WELL PERMIT NUMBER	37-03842-7	37-03843-5	37-03844-3
LONGITUDE	W74 52'32.8"	W74 52'32.0"	W74 52'33.2"
LATITUDE	N38 57'26.9"	N38 57'26.8"	N3857'25.8"
ELEVATIONS (IN FEET) ABOVE MEAN SEA LEVEL:			
TOP OF CASING	5.74'	7.15'	8.35'
DEPTH TO WATER (2/15/90)	1.68'	4.41'	3.75'
WATER TABLE	4.06'	2.74'	4.60'
TOTAL DEPTH	14.99'	11.79'	14.39'

MEASUREMENTS AT HIGH AND LOW TIDES:

April 26, 1990 Low tide at Broad Creek (Middle Thorofare) 4:07 pm

TIME	4:21pm	4:34pm	4:47pm
DEPTH TO WATER	1.14'	4.22'	3.58'
WATER TABLE	4.60'	2.93'	4.77'

April 27, 1990 high tide at Broad Creek (Middle Thorofare) 11:30 am

TIME	11:29am	11:34am	11:39am
DEPTH TO WATER	1.06'	5.23'	3.23'
WATER TABLE	4.68'	1.92'	5.12'

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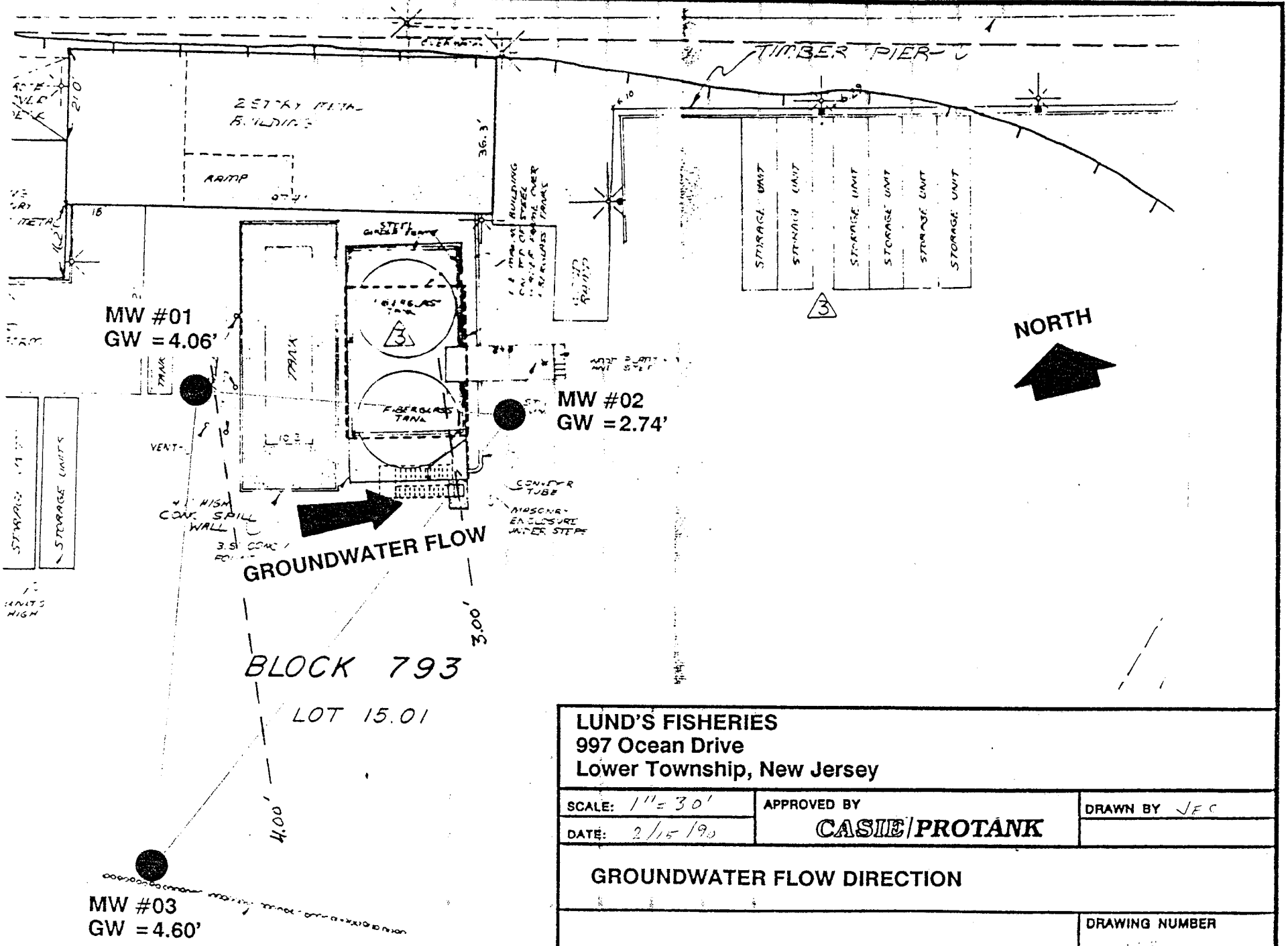
MAP 5



LUND'S FISHERIES
997 Ocean Drive
Lower Township, New Jersey

SCALE: 1" = 30'	APPROVED BY CASIE/PROTANK	DRAWN BY JFC
DATE: 2/15/90		

GROUNDWATER FLOW DIRECTION

DRAWING NUMBER

TELEDYNE ... VB-01

6.0 SUMMARY OF ANALYTICAL RESULTS:

The laboratory analysis was performed during February and March, 1990. The analytical data and the support QA/QC is attached as Appendix D. A summary of the results from the first round of aqueous sampling is displayed in Table 2, page 6-2 and 6-3. The results indicate trace levels of the volatile compounds and semivolatile compounds. The analytical results from Monitoring Well No. 1 revealed the highest concentrations of volatile and semi-volatile. The analysis from Monitoring Well No.2 revealed trace levels of chloroform. The analysis from monitoring Well No. 3 revealed trace levels of methylene chloride and hexachlorethane. **(6)**

The monitoring wells have been surveyed by professional land surveyor (NJPLS), licensed in the State of New Jersey (Lewis H. Conley of Van Note-Harvey Associates). The well locations have been surveyed to latitude, longitude, and top-of-casing elevation. These sheets have been submitted to the NJDEP, Division of Water Resources, Bureau of Water Allocation, in accordance with the permit requirements. **(6)**

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TABLE 2 (A)

LUND'S FISHERIES:

SUMMARY OF VOLATILE COMPOUND CONCENTRATIONS (ug/l)

FIRST ROUND OF AQUEOUS SAMPLES COLLECTED: (2/14/90)

(EPA method 624+15)

C.A.S. Number	Organic Compound	SAMPLE LOCATIONS MW 01 A	MW 02 A	MW 03 A
74-87-3	Chloromethane	10 U	10 U	10 U
74-83-9	Bromomethane	10 U	10 U	10 U
75-01-4	Vinyl Chloride	10 U	10 U	10 U
75-00-3	Chloroethane	10 U	10 U	10 U
75-09-2	Methylene Chloride	6 B	5 U	3 J,B
67-64-1	Acetone	10 U	10 U	10 U
107-02-8	Acrolein	50 U	50 U	50 U
167-13-1	Acrylonitrile	50 U	50 U	50 U
75-15-0	Carbon Disulfide	10 U	10 U	10 U
75-35-4	1,1 - Dichloroethene	5 U	5 U	5 U
75-34-3	1,1 - Dichloroethane	5 U	5 U	5 U
156-60-5	Trans -1,2 - Dichloroethene	5 U	5 U	5 U
67-66-3	**Chloroform**	**11**	**8**	5 U
107-02-2	1,2 - Dichloroethane	5 U	5 U	5 U
78-93-3	2 - Butanone	10 U	10 U	10 U
71-55-6	1,1,1 - Trichloroethane	5 U	5 U	5 U
56-23-6	Carbon Tetrachloride	5 U	5 U	5 U
108-05-4	Vinyl Acetate	10 U	10 U	10 U
75-27-4	Bromodichloromethane	5 U	5 U	5 U
78-87-5	1,2 - Dichloropropane	5 U	5 U	5 U
10061-02-6	Trans - 1,3 Dichlorethene	5 U	5 U	5 U
79-01-6	Trichloroethene	5 U	5 U	5 U
124-48-1	Dibromochloromethane	5 U	5 U	5 U
79-00-5	1,1,2 - Trichloromethane	5 U	5 U	5 U
71-43-2	**Benzene**	**8**	5 U	5 U
10061-01-5	cis - 1,3 - Dichloropropene	5 U	5 U	5 U
110-75-8	2 - Chloroethylvinylether	10 U	10 U	10 U
75-25-2	Bromoform	5 U	5 U	5 U
108-10-1	4-Methyl-2-Pentanone	10 U	10 U	10 U
591-78-6	2-Hexanone	10 U	10 U	10 U
127-18-4	Tetrachlorethene	5 U	5 U	5 U
79-34-5	1,1,2,2-Tetrachloroethane	5 U	5 U	5 U
108-88-3	Toluene	2 J	5 U	5 U
108-90-7	Chlorobenzene	5 U	5 U	5 U
100-41-4	**Ethylbenzene**	**9**	5 U	5 U
100-42-5	Styrene	5 U	5 U	5 U
	Total Xylenes	**17**	5 U	5 U
	Total Dichlorobenzenes	5 U	5 U	5 U

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TABLE 2 B

LUND'S FISHERIES:

SUMMARY OF SEMIVOLATILE CONCENTRATIONS (ug/l)

FIRST ROUND OF AQUEOUS SAMPLES COLLECTED: (1/15/90)

C.A.S. NUMBER	SEMIVOLATILE COMPOUND (EPA method 625 + 15)	SAMPLE LOCATIONS MW 01 B	MW 01 B	MW 03 B
111-44-4	bis(-2-Chloroethyl)Ether	10.U	10.U	10.U
541-73-1	1,3-Dichlorobenzene	10.U	10.U	10.U
106-46-7	1,4-Dichlorobenzene	10.U	10.U	10.U
95-50-1	1,2-Dichlorobenzene	10.U	10.U	10.U
39638-32-9	bis(2-chloroisopropyl)Ether	10.U	10.U	10.U
621-64-7	N-Nitroso-Di-n-Propylamine	10.U	10.U	10.U
67-72-1	Hexachlorethane	10.U	10.U	2.J
98-95-3	Nitrobenzene	10.U	10.U	10.U
78-59-1	Isophorone	10.U	10.U	10.U
111-91-1	bis(-2-Choroethoxy)Methane	10.U	10.U	10.U
120-82-1	1,2,4-Trichlorbenzene	10.U	10.U	10.U
91-20-3	**Naphthalene**	**11**	10.U	10.U
131-11-3	Dimethyl Phthalate	10.U	10.U	10.U
208-96-8	Acenaphthylene	10.U	10.U	10.U
83-32-9	Acenaphthene	3.J	10.U	10.U
121-14-2	2,4-Dinitrotoluene	10.U	10.U	10.U
606-20-2	2,6-Dinitrotoluene	10.U	10.U	10.U
84-66-2	Diethylphthalate	10.U	10.U	10.U
191-24-2	Benzo(g,h,i)Perylene	10.U	10.U	10.U
7005-72-3	4-Chlorophenyl-phenylether	10.U	10.U	10.U
86-73-7	Fluorene	3.J	10.U	10.U
86-30-6	N-Nitrososdiphenylamine (1)	10.U	10.U	10.U
101-55-3	4-Bromophenyether	10.U	10.U	10.U
118-74-1	Hexachlorobenzene	10.U	10.U	10.U
85-01-8	Phenanthrene	10.U	10.U	10.U
120-12-7	Anthracene	10.U	10.U	10.U
84-74-2	Di-n-Butylphthalate	10.U	10.U	10.U
206-44-0	Fluoranthene	10.U	10.U	10.U
129-00-0	Pyrene	10.U	10.U	10.U
85-68-7	Butylbenzylphthate	10.U	10.U	10.U
99-09-5	Benzidine	20.U	20.U	20.U
91-94-1	3,3'-Dichlorobenzadine	20.U	20.U	20.U
56-55-3	Benzo(a)Anthracene	10.U	10.U	10.U
117-81-7	bis(2-Ethylhexyl)Phthalate	10.U	10.U	10.U
218-01-9	Chrysene	10.U	10.U	10.U
117-84-0	Di-n-Octyl Phthalate	10.U	10.U	10.U
205-99-2	Benzo(b)Fluoranthene	10.U	10.U	10.U
207-08-9	Benzo(a)Fluoranthene (2)	****	****	****
50-32-8	Benzo(a)Pyrene	10.U	10.U	10.U
193-39-5	Indeno(1,2,3-cd)Pyrene	10.U	10.U	10.U
53-70-3	Dibenzo(a,h)Anthracene	10.U	10.U	10.U

(1)-Cannot be separated from diphenylamine
(2)-Cannot be separated from Benzo(b)Fluoranthene

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7.0 RECOMMENDATIONS:

Based on the findings of this investigation, it is recommended that an additional round of groundwater sampling and analysis be performed. It is not recommended at this time that remedial actions be taken because of the low concentrations of contaminants in the groundwater samples. The second round of groundwater sampling should also be analyzed by EPA method 624 + 15, and EPA method 625 + 15.

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APPENDIX A

POST EXCAVATION SOIL SAMPLING

● P.O. BOX 92 ● FRANKLINVILLE, N.J. 08332 ● (609) 696-4401 ● TELEFAX NO. (609) 696-7065

CASIE / PROTANK

August 9, 1989

Sample Identification: Lund's Fisheries
Ocean Highway
Cape May, N.J.

Date Sampled: 8-7-89

Date Analyzed: 8-8-89

Analysis: Petroleum Hydrocarbons

LOG NO.	SAMPLE NO.	RESULTS, ppm
9H07A	A1 (Front)	443
9H07B	B1 (Back)	467
9H07C	C1 (Side)	80,008

Submitted by:

Robert A. White
Laboratory Director

RAW/lam

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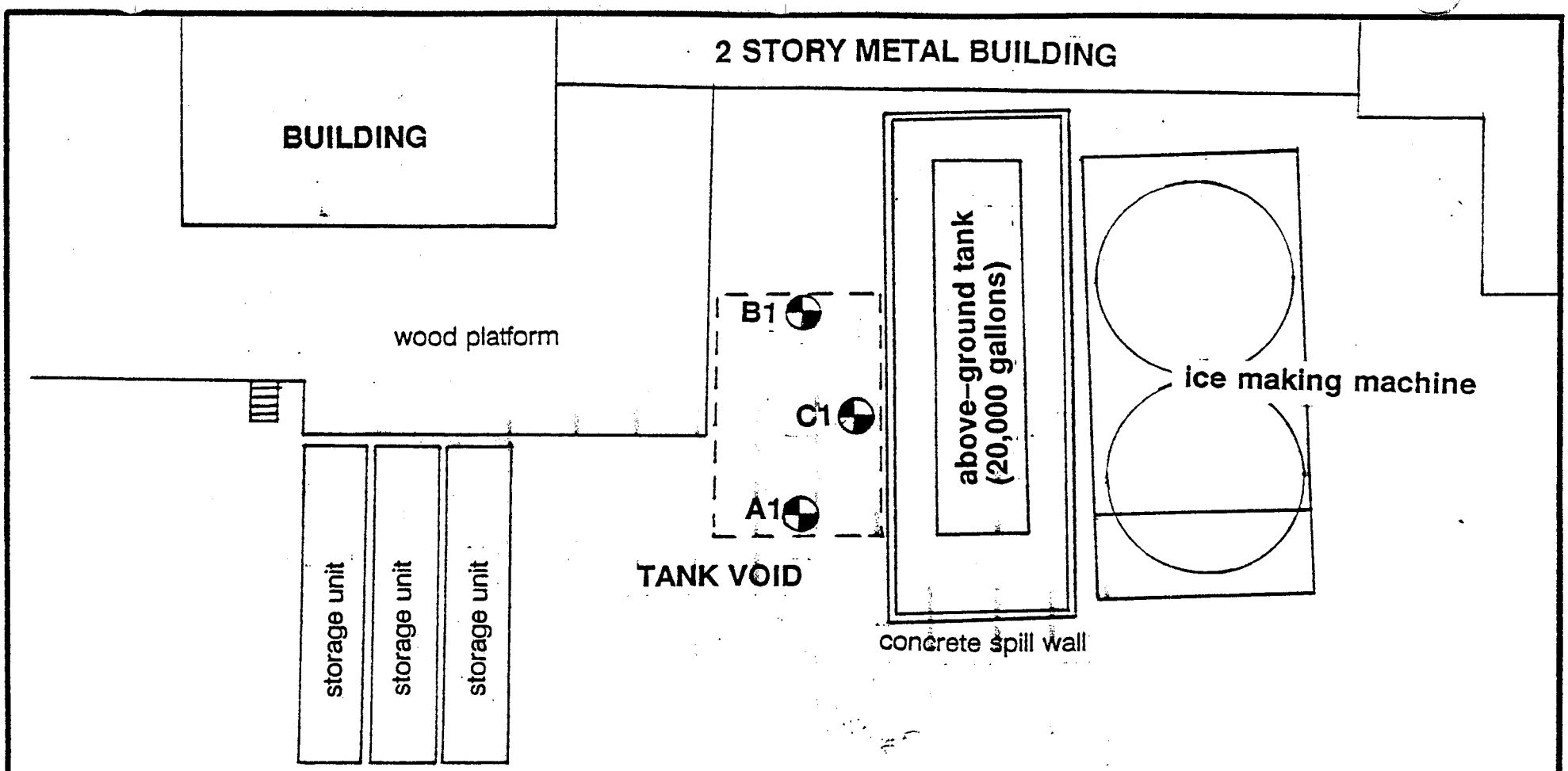

LUNDS FISHERIES

SCALE: AS SHOWN	APPROVED BY	DRAWN BY JEC
DATE: SAMPLES TAKEN 8/7/89	CASIE/PROTANK	12/5/89

SOIL SAMPLE LOCATIONS

DRAWING NUMBER

TELEDYNE POST 18AB-01

12-23-91

State of New Jersey
Department of Environmental Protection and Energy
Division of Responsible Party Site Remediation
CN 029
Trenton, NJ 08625-0029
Tel. # 609-984-3156
Fax. # 609-292-5604

Scott A. Weiner
Commissioner

Karl J. Delaney
Director

DEC 18 1991

Mr. Jeff Reichle
Lund Fisheries, Inc.
997 Ocean Drive
Lower Township, NJ 08204

CERTIFIED
RETURN RECEIPT REQUESTED

RE: Lund Fisheries, Lower Twp. Cape May Co.
Case# 89-07-02-1500, UST# 0182342

Dear Mr. Reichle:

On June 1990 and March 14, 1991, the New Jersey Department of Environmental Protection and Energy (the Department) received a report from your company. This report documents the corrective action measures undertaken in response to the discharge from your underground storage tank system.

Based on our review of the information submitted, we find that you have complied with the Department's existing requirements regarding corrective action for the investigated underground storage tank system (s). Therefore, you are not required to apply for a New Jersey Pollutant Discharge Elimination System Permit at this time to address ground water remediation associated with the investigated discharge (s) noted in the above referenced report.

In addition, you are required to properly seal all abandoned wells. Therefore, all monitoring wells installed as part of the investigation and corrective action of the discharge at your facility that you no longer plan to use for ground water monitoring must be sealed properly in accordance with the requirements of N.J.A.C. 7:9-9.1 et seg. by a licensed well driller certified to seal wells. The well abandonment forms must be completed and submitted to the Bureau of Water Allocation.

CAPE MAY COUNTY

DEC 23 1991

HEALTH DEPARTMENT

Thank you for your cooperation in this matter.

Very truly yours,

Joseph W. Krulik
Section Chief
Southern Tank Management Section
Bureau of Underground Storage Tanks

GWQM 177

c: Joan Thaler, Cape May Health Department
Mike Kelly, Case Manager
Edward Post, Cheif Southern Region Bureau of Regional Enforcement
Rick Kropp, Bureau of Water Allocation

CAPE MAY COUNTY
DEC 23 1991
HEALTH DEPARTMENT

CAPE MAY COUNTY DEPARTMENT OF HEALTH

MEMO

TO FILE - Lower Township - HS/ER - LUNDS FISHERIES - File #89-07-20-1500

FROM Robert Burner, Environmental Specialist **DATE** August 9, 1989

SUBJECT LEAKING UST

On August 7, 1989 I met with Jeff Reichle, owner, Lunds Fisheries, Ocean Drive, Lower Township. Reichle has contracted CASIE/Protank, Franklinville, New Jersey to excavate one 1,000 gallon UST and properly abondon two UST's of unknown capacity on site. Reichle has decided to abondon two of the three UST's on site since a 20,000 gallon capacity fuel tank is located directly above the tank field. The tanks to be left in the ground are to be inerted and cleaned by CASIE. A release was evident in the excavation and John Washington, CASIE, advised that monitoring wells would be placed on site. Washington also advised that soil samples had been taken from the cradle of the excavated tank and these results would be supplied to Cape May County Health Department for review.

As per teleconference with Frank SanClementi, DEP/UST, Lunds would be issued a Scope of Work to initiate remedial action.

R. Burner

Robert Burner
Environmental Specialist

RB:cam

cc:: Raymond W. Chadwick, Jr., Chief Sanitarian
Henry A. Heacock, III, Assistant Chief Sanitarian
Alexander B. West, Sanitary Inspector

CHECKLIST FOR COMPLIANCE WITH UST CLOSURE REQUIREMENTS

INSPECTOR R. Burner DATE 8/7/89

AGENCY C. M. C. H. D. PHONE # 609-465-1208

Until the adoption of the State's underground storage tanks (UST) regulations governing removal and abandonment in place, there will be different procedures for Federally-regulated and State-regulated tanks. See accompanying information to determine what tanks are regulated by which law.

FACILITY NAME Lunds Fisheries UST # _____

STREET ADDRESS Ocean Drive

Lower Twp.

FACILITY CONTACT Jeff Reichle

FOR ALL TANKS:

Administrative Requirements

Y 1. The facility has obtained a demolition permit from the municipal construction code enforcement official for any removal or abandonment in place.

_____ 2. The facility is registered with BUST. (If in doubt, call UST Hotline 1-800-722-TANK)

Y 3. The facility has filed a Standard Reporting Form (SRF) with BUST and the health agency. 30 days prior to closure.

_____ 4. A completed Site Assessment Compliance Statement (SACS) is submitted to BUST and the health agency within 90 days after closure.

Site Inspection

N 5. The contractor has prepared a safe work area.

Y 6. All residual material has been removed from the tank and the facility has proper disposal documentation.

Y 7. If the tank is being removed, its disposal site has been determined. (Mark NA if tank is being abandoned.)

Y 8. Upon removal, the excavation is visually examined for contamination. The tank is also examined for holes.

Y 9. Releases or evidence that a release has occurred are reported to the DEP Environmental Hotline. (Mark NA if no evidence of a release was observed).

Y 10. Any removed soil should be stockpiled properly. (Mark NA if no soils are being stockpiled.)

FOR FEDERALLY-REGULATED TANKS:

_____ 11. A site assessment which measures for evidence of a release was conducted.

_____ 12. If ground water monitoring wells are used in the site assessment, well drilling permits were obtained and a licensed well driller was used.

COMMENTS Tank field directly beneath 20K above ground tank. Confined space entry to clean tank is not safe. 1 @ 1K removed 2 Abandoned on site

cc: R. W. Chadwick
H. Heacock 11/29/89

Let's protect our earth

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Underground Storage Tanks
CN-029, Trenton, NJ 08625

For State Use Only
Date Rec'd
Auth
Routing
UST NO. 0182432

SITE ASSESSMENT COMPLIANCE STATEMENT

Supplement to the New Jersey Standard Reporting Form
(Complete for ALL regulated UST abandonments or removals)

Within ninety (90) days of completing the UST closure of any State or Federally-regulated tank, the owner or operator must submit this completed form to the NJDEP Bureau of Underground Storage Tanks. If the facility is located in one of the counties listed on the back, a copy of this form must also be sent to the Health Agency indicated.

The owner or operator of any Federally-regulated tank must also comply with the following:

40 CFR Part 280.72 Assessing the site at closure or change-in-service

"(a) Before permanent closure or a change-in-service is completed, owners and operators must measure for the presence of a release where contamination is most likely to be present at the UST site. In selecting sample types, sample locations, and measurement methods, owners and operators must consider the method of closure, the nature of the stored substance, the type of backfill, the depth to ground water, and other factors appropriate for identifying the presence of a release."

FACILITY Lindy Fisheries Inc. UST # 0182432

Check off the following items as appropriate for the site.

✓ The UST facility is only regulated by State law, therefore a site assessment is not mandatory.

CAPE MAY COUNTY
NOV 29 1989
DEPARTMENT OF HEALTH

___ The UST facility is regulated by Federal law and a site assessment was conducted.

The results of the site assessment indicate:

___ There was NO release from the UST system.

✓ There was a release from the UST system and it was reported to the DEP Environmental Hotline (609-292-7172).

NOTE: The results of the site assessment are not to be submitted to the DEP or Health Agency unless requested to do so. The results are to be available for inspection at the UST facility.

Questions can be directed to the Bureau at (609) 984-3156.

*** This registration form shall be signed by the highest ranking individual at the facility with overall responsibility for that facility (7:14B-2.3 (a) 1). ***

"I certify under penalty of law that the information provided in this document is true, accurate and complete. I am aware that there are significant civil and criminal penalties for submitting false, inaccurate or incomplete information, including fines and/or imprisonment.

(SIGNATURE) Date 11 127

Jeffrey Reichle
(PRINT OR TYPE NAME)

Operator

CAPE MAY COUNTY HEALTH DEPARTMENT

COMPLAINT INSPECTION REPORT

PROGRAM AREA: REFERENCE NO. 1107 HS / ER

____WATER	____HAZARDOUS SUBSTANCE	____FOOD
____Well	____UST-Regulated	____HOUSING
____Sewage Overflow	____UST-Unregulated	____INSECT/RODENT
____AIR	*Low Env. Concern	____NOISE
____SOLID WASTE	____PESTICIDE	____MISCELLANEOUS

COMPLAINT RECEIVED: X Citizen Time _____ Date 6/25-97
____N.J.D.E.P.
____N.J.D.O.H. ____Other _____

MUNICIPALITY: Lower

Type of Complaint: Freon leak at Lunds Fisheries.

OWNER OF PROPERTY: Lunds Fisheries Inc. PHONE NO. _____

ADDRESS: 997 Ocean Drive, Cape May ZIP _____

BLOCK NO. 793 LOT NO. 15.01 BY: _____

PERSON COMPLAINING: _____

ADDRESS: _____ PHONE NO. _____

ACTION TAKEN: ____No Action ____Legal Notice
*Close Out File
*Inspection/Investigation ____Municipal Summons
____Follow Up Inspection ____Referred to N.J.D.E.P.

COMMENTS: 1:15 Approximate time of Accident
1:20 Received Call from Supervisor (Dan Judge)
1:35 Arrived at Scene. Erma Fire, Wildwood Coast Hazmat, Coast Guard and Lower Police on Scene.
* David Lee - On-Scene Coordinator (Wildwood Coast Hazmat)
* D. Lepre - Operations (Erma - Chief)
* Diana Burnell - Capt of Wildwood Coast

DATE INSPECTOR'S SIGNATURE

HD/EH 10-88 (Rev.1/96)

* Mike Byrne - V.P. of Lynge (Co Partial Owner)

Crest & Coast Guard were suiting up when I arrived & setting up Decons. I introduced myself to the On-Scene commander (Police were directing traffic - they were not involved) Mr Lee asked me to observe there actions and make any recommendations I felt were nessisary.

Apparently, Lunds had shut down one of the Freezer units (on 6/24) in their Cold Storage Warehouse. A worker was repairing a valve on the unit when the remaining Freon in the line (reported by Mike Byrne to be between 4-5 lbs) sprayed out, rendering him unconscious & burning his arm. Another worker had draged him from the building & they had already been taken to Burdette by ambulance. Freon was reported to be R22.

Freon 'sleek' monitors were supplied by Mr Byrne.

1:45 : Wildwood Crest & US Coast Guard Hazmat members entered building.

2:18 : I called Chris Hagerman at BER; told him assistance was not needed at this point

2:20 : I called DEP Hotline to report the Incident 97-6-25=1416-09 Operator 17.

2:30 : All teams Out. Freon/R22 is no longer leaking, but is present in building. No one [redacted] injured (or present) in structure. O2 levels were fine, just needed to finish venting building

Teams had opened bay door & set up vent fans supplied by Erma. Temp in warehouse still below freezing.

— Decon had already taken place: All equipment cleaned up & removed. —

David Lee met with all principls to discuss incident. My observations were things went very well, the only problems I noted were ① confusion with communications between Wildwood Crest & Coast Guard and ② That the Decon was set up so close to the incident before the amount of Freon / R22 was known. He responded ① they will correct the confusion with frequencies and ② He was confident that the amount involved would not pose a Hazard.

3:20 Monitors were clear. I entered building with David Lee & Mike Burn. While they examined the lines, I confirmed that all food was still in a Frozen State.

3:25 Left Scene.

Bree Zee Lee Yacht Basin

RECEIVE
JUN 2 1 1996
CAPE MAY COUNTY
HEALTH DEPARTMENT

SITE CLOSURE REPORT

Prepared for:
HENRY J. LUNN / BOAT US
34' Silverton - "Miss Marie"
Bree Zee Lee Yacht Basin
Ocean Drive
Lower Township, New Jersey

Submitted to:
CAPE MAY COUNTY BOARD OF HEALTH
Environmental Health Section
Crest Haven Complex
Cape May Court House, NJ 08210-3067

INTRODUCTION

On April 17, 1996, Northstar Marine, Inc. was called by Boat US to investigate a report of a ruptured gasoline tank aboard the vessel Miss Marie, a 34 foot Silverton powerboat in winter storage at Bree Zee Lee Yacht Basin. The vessel is owned by Mr. Henry Lunn, 260 Holly Ave., Gloucester, NJ 08097. The vessel is insured by Boat US.

SITE DESCRIPTION

The spill site is located at the Bree Zee Lee Yacht Basin on Ocean Drive in Lower Township, NJ. The site is a boat storage yard and marina. The soils in the area are comprised of a layer of shells approximately 3 inches thick which overlie a layer of compacted sand.

SITE REMEDIATION AND CLOSURE

Upon arrival at 6:30pm, April 17th, it was found that a gasoline leak had occurred and had spilled onto the ground at the stern end of the boat. The remaining fuel was pumped from the fuel tank to prevent additional leakage and further contamination of the soils. The bilges were also pumped out to reduce the potential fire risk. The gasoline was pumped into 55 gallon drums which were then sealed.

The following morning the Cape May County Department of Health (CMC Health) was notified of the spill. The Coast Guard and Marine Police were then notified by the Dept. of Health. The NJ Department of Environmental Protection was notified by the Marine Police. The Coast Guard and Marine Police visited the spill site and determined that it was not in their juristiciton and consequently left. NJ DEP assigned a reference number, 96-04-18-1018-55, to the spill. Bill Dotts and Nick Thalasinos, CMC Health, inspected the site and verbally approved the methodology Northstar Marine, Inc. proposed to remediate the site.

Digsafe was called to mark out the location of underground utilities in the vicinity of the spill. One power cable had to be hand dug out and removed because it went through the middle of the spill site. A number of boats were moved out of the area so that excavating equipment could be brought in to dig out the area. Soil samples were taken for chemical analysis to determine if the soils could be recycled.. The soil analysis performed by EMSL in Hammonton, NJ showed that the soils could be recycled as asphalt. The analytical results for the soil samples are attached as Appendix A.

A bobcat was used to excavate the site. The material was stockpiled on plastic sheeting and covered to prevent further contamination. The final dimension of the excavated site was an irregular oval-shaped area of approximately 20 feet by 37 feet. The site is shown in Figure 1. The depth of the excavation tapered from 24 inches under the stern of the boat

to 2 inches around the perimeter. The site was cordoned off with "Caution" tape and "No Trespassing" and "No Smoking" signs were placed around the site.

On May 6, 1996 five soil samples were taken to determine if the site had been cleaned to NJ DEP standards. Four soil samples were taken with a soil auger at a depth of 6-12 inches around the perimeter of the excavated area and one sample was taken in the center of the site just below the surface. The samples were sent to All-Test Environmental Laboratories, Inc., where they were analyzed for Volatile Organic Compounds (VOC-15). The analytical results showed that all samples were clean and well within NJ DEP cleanup standards. The analytical results and chain of custody receipt are shown in Appendix B.

The contaminated soil was removed from the site on May 8, 1996 and taken to Soil Remediation Technology in Bridgeton, NJ for recycling. The site was then filled with clean gravel. The transportation manifests are shown in Appendix C.

CONCLUSION

The final volatile organic carbon analytical results showed that levels of BTEX were below NJ DEP cleanup standards and that the site had been properly cleaned. The CMC Dept. of Health was notified by telephone that the site had been properly closed and that they would receive a copy of the final report.

CAPE MAY COUNTY HEALTH DEPARTMENT

COMPLAINT INSPECTION REPORT

PROGRAM AREA:

____WATER	✓ HAZARDOUS SUBSTANCE	____FOOD
____Well	____UST-Regulated	____HOUSING
____Sewage Overflow	____UST-Unregulated	____INSECT/RODENT
____AIR	____Low Env. Concern	____NOISE
____SOLID WASTE	____PESTICIDE	____MISCELLANEOUS

COMPLAINT RECEIVED: ✓ Citizen Time 9:45 Date 4-18-96
____N.J.D.E.P.
____N.J.D.O.H. ____Other____

MUNICIPALITY: Cape May

Type of Complaint: Gasoline spill of approx. 100 gallons. Stopped the leak. Gas into pond. Turn left toward 2 Mile first bridge

OWNER OF PROPERTY: Breezy Lee Marina PHONE NO.____

ADDRESS: Ocean Drive, Cape May ZIP____

BLOCK NO.____ LOT NO.____ BY: Car

PERSON COMPLAINING: Mr. Freeland, North Star Marina

ADDRESS:____ PHONE NO. 827-0833

____Close Out File

ACTION TAKEN:
____No Action ____Legal Notice
____Inspection/Investigation ____Municipal Summons
____Follow Up Inspection ____Referred to N.J.D.E.P.

COMMENTS: 10:30am 4-18-96 arrived on site & found Walt Freeland of Northstar environmental on scene of Breezy-Lee Marina. It seems that a gasoline tank of a boat in dry storage in the lot sprung a leak. The gasoline

4-22-96
DATE

INSPECTOR'S SIGNATURE

HD/EH 10-88 (Rev.4/95)

flooded the bilge & ran out of the boat onto the sand & shell lot behind the boat. Northstar is excavating the soil to a depth of 24-30" in the area of the spill. Amount of material is thought to be approx. 100-150 gals of gas. Coast Guard & Marine Police have been notified.

4-19-96 Walt Vreeland called dirt is excavated on plastic covered and area cordoned off. SRT is doing testing and disposal. Nick out to take photo. Boat bilge is washed out & water placed in drums

4-22-96 Walt Vreeland called dirt is out - excavation larger than anticipated - still cordoned off told walt to take 1 sample from each sidewall 6" down and 6" in and 1 sample from bottom of excavation.

Cape Atlantic Fisheries

U.S. Department of Transportation

United States Coast Guard

NOTICE OF FEDERAL INTEREST FOR AN OIL POLLUTION INCIDENT

COMMANDING OFFICER
COMMANDING OFFICER
USCG MSO/GROUP OFFICE
1 WASHINGTON AVE.
PHILADELPHIA, PA 19147-4395

F/V. VENTURER c/o ATLANTIC CAPE FISHERIES, INC.

P.O. BOX 555

CAPE MAY, NJ 08204

13JUL01

Gentlemen:

On or about 13JUL01/0615, an oil pollution incident occurred or threatens to occur at ATLANTIC CAPE FISHERIES / MIDDLE THOROUGHFARE LAGOON. You may be financially responsible for that incident. Under Federal Statutes, the United States Government may take action to minimize or mitigate damage to the public health or welfare that is threatened or that may be caused by this incident.

Under the Oil Pollution Act of 1990, the responsible party is liable for, among other things, removal costs and damages resulting from this incident. The failure or refusal of the responsible party to provide all reasonable cooperation and assistance requested by the Federal On-Scene Coordinator (OSC) will eliminate any defense or entitlement to limited liability which otherwise might be available under the Act.

You are advised that your failure to properly carry out the removal of the discharge as ordered by the OSC or to comply with any administrative orders necessary to protect the public health and welfare, may subject you to additional penalties. For such failure, owners, operators, or persons in charge of the vessel or facility from which the oil is discharged are subject under the Federal Water Pollution Control Act (FWPCA), as amended, to a civil penalty of up to $25,000 per day of violation or up to 3 times the costs incurred by the Oil Spill Liability Trust Fund. Should you require further information concerning this matter, please contact 215-271-4884 LT. MATTHEW MERRIMAN at the above address and telephone number.

As long as the OSC determines that you are taking adequate actions in this matter, Federal removal action will usually be limited to monitoring the progress of your actions and providing guidance as necessary. Under the FWPCA, as amended, your response actions may be taken into account in determining the amount of any penalty assessed as a result of the discharge.

Sincerely,

MSTJ JOHN BARNES

Received and Acknowledged: _____

Witness(es): _____

_____

DEPT. OF TRANSP., USCG, CG-5549 (5-92) * U.S. G.P.O.:2000 505-169 SN 7530-01-GF3-26

NJSP
NWW 729-9003 Fax Dave Williams
5

GERALD M. THORNTON
Freeholder

LOUIS J. LAMANNA, M.A.
Health Officer
Public Health Coordinator

CAPE MAY COUNTY
DEPARTMENT of HEALTH

4 Moore Road
Cape May Court House, N.J. 08210-1601
(609) 465-1187 after hours (609) 465-1190
Fax: (609) 465-3933

July 13 2001

Incident report for: Hinch Marina, Ocean Drive, Lower Township NJ

I received a telephone call from Ms. Hinch at 9:15 am concerning an on going problem with some type of fuel release in the lagoon where their marina is located. Ms. Hinch stated that she had called the NRC and the US coast Guard and as yet she felt there had not been any response. I advised her to immediately call the NJ State Police Marine Division in North Wildwood and then the NJDEP hotline. I gave her the numbers and told her to call me right back if the Coast Guard or NJ State Police did not respond. I told her I would be responding late morning as long as the Coast Guard or Marine Police were on site.

At approximately 11:45 am I arrived at the marina and immediately noticed a strong petroleum odor characteristic of fuel oil or diesel fuel. There was a rainbow sheen over most of the lagoon where the marina is located and on past the Cape Atlantic Fisheries dock. Additionally there were heavier accumulations of fuel in the lagoon ends, under Cape Atlantic docks and on the up tide sides of some private boats at the marina. There were several workmen from Cape Atlantic placing absorbant pads and socks at the heavier collection areas. I notified the NJDEP Bureau of Emergency Response at approximately 12:15 pm and apprised them of the situation.

After assessing the marina area I proceeded to the office of Cape Atlantic Fisheries and met with Dan Cohen. Mr. Cohen stated that a large steel fishing vessel named the Venturer had been towed into the dock and had some fuel leakage into the bilge and he felt that the bilge pumps had then pumped the material into the waterway. At this time he was unaware of the exact source of the leak but crewmen were in the process of pumping out any surplus fuel to a dock storage area. I recommended that he place a boom around the vessel to prevent further impact to the waterway. Mr. Cohen estimates the release at 20 gallons but my assessment would be at 100+ gallons of fuel and bilge slop.

I did a thorough walk through of the Cape Atlantic docks and the entire Hinch marina docks and pointed out areas that still needed collection attention. Mr. Cohen also agreed to wash any private boats that had staining of fuel products on them. Additionally, he also agreed to remove some organic material from the lagoon ends even though he felt it did not result from the original release. Further, Mr. Cohen and I met with the owners of Hinch Marina to address any other areas of concern.

This release occurred sometime around 6:30 am and first became known to me at approximately 9:15 am 7-13-01. US Coast Guard Group Cape May and MSO Philadelphia responded sometime during the am. Also, the NJSP Marine Bureau trooper

Dave Williams responded and conducted an investigation that revealed the Venturer to be the source of the release. The coast Guard has issued a N.O.V. and according to trooper Williams he will be issuing a summons for the release to Cape Atlantic. As I was satisfied that qualified persons were conducting an adequate clean up and the release was terminated I left the site at approximately 1330 hour.

William W. Dotts
Sanitary Inspector
R.E.H.S.

APPENDIX D

KCS-NJ County - Municipality Listing (2001 Edition)
County and Municipality: CAPE MAY LOWER TOWNSHIP

A SITES WITH ON-SITE SOURCE(S) OF CONTAMINATION

Site Name / Contact	Case Number	Site Address / Case Status	- Status Date	Site Identifier / Control/Remedial Action Type
MICHAELS AUTOMOTIVE BUST	0328232	505 BAYSHORE RD ACTIVE	- 6/14/99	NJL800472151
MOBIL SERVICE STATION LOWER TOWNSHIP BUST	0062561	LINCOLN BLVD & BAYSHORE RD ACTIVE	- 3/2/90	NJC876000449
MOBIL SERVICE STATION LOWER TOWNSHIP BUST	0098535	BAYSHORE & PENNSYLVANIA AVES ACTIVE	- 12/30/97	NJL800243792
OFF SHORE GETTY SERVICE STATION BUST	0166160	400 BAYSHORE RD & FLORIDA AVE ACTIVE	- 1/3/01	NJL800580037
PLAZA GAS & CAR WASH BSM	991201-I	1805 BAYSHORE RD ACTIVE	- 12/1/99	NJL800522500
ROUTE 9 BUST	NJL600192967-001	RTE 9 ACTIVE	- 1/27/93	NJL000055046
SMITHS LANDFILL LOWER TOWNSHIP BFO-CA	921227	BAYSHORE RD PENDING	- 12/4/92	NJD981877749
SOUTHERN JERSEY AIRWAYS INCORPORATED BUST	0032528	CAPE MAY COUNTY AIRPORT ACTIVE	- 5/22/92	NJP000854885
ST RAYMOND CATHOLIC CHURCH BUST	0332561	25 E OCEAN AVE ACTIVE	- 5/1/00	NJL800505224
SUNOCO SERVICE STATION LOWER TOWNSHIP BUST	0164568	3836 BAYSHORE RD ACTIVE	- 10/26/89	NJD000695718

24 SITES WITH ON-SITE SOURCE(S) OF CONTAMINATION IN LOWER TOWNSHIP

C SITES WITH CLOSED CASE(S) WITH RESTRICTIONS

Site Name / Contact	Case Number	Site Address / Case Status	- Status Date	Control/Remedial Action Type	Site Identifier
CAPE CONCRETE COMPANY BUST	0250571	705 RTE 9 S NFA	- 2/28/95	CEA	NJD002333458
EXXON SERVICE STATION LOWER TOWNSHIP BUST	0086826	1149 RTE 9 NFA-A	- 7/26/99	CEA	NJD986610129

2 SITES WITH CLOSED CASE(S) WITH RESTRICTIONS IN LOWER TOWNSHIP

KCS-NJ County - Municipality Listing (2001 Edition)
County and Municipality: CAPE MAY LOWER TOWNSHIP

County: CAPE MAY
Municipality: LOWER TOWNSHIP

A SITES WITH ON-SITE SOURCE(S) OF CONTAMINATION

Site Name / Contact	Case Number	Site Address / Case Status	- Status Date	Site Identifier / Control/Remedial Action Type
3800 BAYSHORE DRIVE		3800 BAYSHORE DR		NJL000075127
BFO-CA	981109	PENDING	- 11/5/98	
3910 BAYSHORE ROAD		3910 BAYSHORE RD		NJL800373763
BFO-S	971222093821	ACTIVE	- 4/1/98	
40 E PACIFIC AVENUE		40 E PACIFIC AVE		NJL800596132
BFO-S	000831171826	ACTIVE	- 1/4/01	
BATES AVENUE GROUND WATER CONTAMINATION		22 BATES AVE W		NJL860000769
BFO-S	980805	PENDING	- 8/3/98	
CAPE MAY COUNTY AIRPORT		BREAKWATER RD		NJD986644540
BUST	0077556	ACTIVE	- 5/19/92	
BCM	NJD986644540	ACTIVE	- 12/15/95	
CAPE MAY COUNTY ROAD DEPARTMENT		COUNTY AIRPORT BLDG 107		NJD981489917
BUST	0044868	ACTIVE	- 8/10/95	
CAPE MAY LEWES FERRY		RTE 9		NJD981141575
BFO-S	9212181435	ACTIVE	- 11/28/94	
EMSIG MANUFACTURING CORPORATION		FULLING MILL RD		NJL800279812
BFO-S	970103003039	ACTIVE	- 2/10/97	
EVERLON INCORPORATED		RANGER & HORNETS RDS		NJL500011226
BFMCR	940685	PENDING	- 6/27/94	
EXXON SERVICE STATION LOWER TOWNSHIP		3731 BAY SHORE RD		NJD986607893
BUST	0073622	ACTIVE	- 7/7/98	
EXXON SERVICE STATION LOWER TOWNSHIP		BAYSHORE & FULLING RD		NJL600251425
BUST	0303202	ACTIVE	- 2/7/96	
JIMS AUTO SERVICE		BAYSHORE RD & TAMPA AVE		NJL800574626
BUST	0330536	ACTIVE	- 6/19/00	
LOWER TOWNSHIP RESCUE SQUAD		MAIN ST & GEORGIA AVE		NJL800083743
BFO-IN	NJL800083743-001	ACTIVE	- 8/23/94	
BUST	0303158	ACTIVE	- 7/3/97	
LOWER TOWNSHIP SANITARY LANDFILL		FULLING MILL RD		NJL900000787
BFO-CA	930577	PENDING	- 5/19/93	

Technical Addendum G
Area of Potential Effects Report

cc: File, TAF, SB, J. Maloney, M. Santiago, Glenn Modica, Curtis Helm

HPO-G2003-40
Log # 03-0770-2
Page 1 of 4

RECEIVED
JUL 18 2003
CAPE MAY COUNTY ENGINEER

State of New Jersey

ames E. McGreevey
Governor

Department of Environmental Protection
Division of Parks & Forestry, Historic Preservation Office
PO Box 404, Trenton, NJ 08625
TEL: (609) 292-2023 FAX: (609) 984-0578
www.state.nj.us/dep/hpo

Bradley M. Campbell
Commissioner

July 3, 2003

Mr. Elkins Green, Manager
Bureau of Environmental Services
New Jersey Department of Transportation
1035 Parkway Avenue
PO Box 600
Trenton, New Jersey 08625-0600

Dear Mr. Green:

As Deputy State Historic Preservation Officer for New Jersey, in accordance with 36 CFR Part 800: Protection of Historic Properties, as published in the *Federal Register* on December 12, 2000 (65 FR 77725-77739), I am providing **Initial Consultation Comments** for the following proposed undertaking:

Ocean Drive Upgrade and Bridge Replacements
CR 621 over Mill Creek, Upper and Middle Thorofare
Lower Township, Cape May County.

This letter is in response to your submission of documents initiating consultation pursuant to the requirements of 36 CFR Part 800.3.

800.3 Initiation of the Section 106 Process

I concur that the New Jersey Department of Transportation (NJDOT), the Historic Preservation Office (HPO), Cape May County, and Lower Township are the appropriate public agency consulting parties for the initiation of consultation. Public involvement activities may identify additional consulting parties.

The HPO appreciates receipt of confirmation, within the Area of Potential Effects (APE) Report, that letters soliciting comments on the proposed project activities will be sent to all consulting and interested parties, and that all comments will be documented in the final cultural resources report and will be incorporated in the assessment of project effects. The HPO wishes to clarify that it is of importance that, not only the identified consulting and interested parties, but also the identified Cape May Harbor fishing industry contacts, be involved in these outreach and response efforts. The HPO also appreciates the

NATURE SAVER™ FAX MEMO 01616	Date 7/18	# of pages ▶ 3
To: Tom Fisher	From: Dale Fisher	
Co./Dept.	Co.	
Phone #	Phone #	
	Fax #	

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confirmation that the engineering consultant has met with local business owners and intends to continue to involve these parties in future project consultation. The HPO also appreciates the confirmation that future project consultation will include local officials, as well as consulting and interested parties, and that a public information center will be instituted for the project. This public involvement plan appears to be appropriate to the nature and magnitude of the proposed project.

As is also noted in the submitted APE report, the cultural resources survey report shall acknowledge, in accordance with the public involvement plan, the comments and/or information provided by consulting parties and individuals and organizations with a knowledge of or an interest in historic properties within the project APE. The HPO appreciates your acknowledgement that, in accordance with the NJDOT and HPO ratified Section 106 Implementation Procedures, as summarized in a June 7, 2000 memorandum of record, "cultural resources survey reports will be sent to all consulting parties in order to solicit input on the various elements of the project [identification, evaluation, alternatives to avoid or minimize adverse effects if they are anticipated, and potential mitigation measures]." The documentation of public participation in the evaluation of historic resources and project effects will substantially enhance the quality, timeliness, and public value of the National Historic Preservation Act Section 106 consultation. The HPO requests that all consulting parties be afforded a concurrent opportunity to review and comment on the cultural resources report(s).

I concur with the delineated architectural APE as discussed during past consultation and described within the submitted APE report, and which includes those areas that will be directly or indirectly impacted by the project activities. The HPO appreciates the indication that the architectural APE will differ depending upon which project alternative is ultimately selected. Please note that a final architectural APE mapping must be provided to this office once the preferred alternative is selected. Please understand that, where the delineated APE boundary bisects or divides a property, the block and lot line of the property will be the actual historic property survey boundary and, therefore, the contents of each complete parcel will be documented and evaluated on the appropriate survey form.

In addition to describing, in general, the activities proposed for resource surveys within the APE, the APE report states that, "due to the limited project effects, the scope of work for the maritime survey will consist solely of contacting marina owners and other knowledgeable individuals to aid in the identification of vessels more than 50 years of age and to provide an overview of the type of vessels present within the APE. National Register evaluations of maritime resources will not be undertaken." I concur with this proposal for the evaluation of maritime resources, and the HPO appreciates the efforts already undertaken in compiling a list of Cape May Harbor fishing industry contacts. I also concur with the delineated archaeological APE as described within the submitted APE report, to include the entire project construction area plus construction staging areas and wetland mitigation sites.

I agree that the Cape May County Historical and Genealogical Society, the Cape May Historic Preservation Commission, the Cape May County Department of Culture and Heritage, the Greater Cape May Historical Society, the Mid-Atlantic Center for the Arts, and the Down Jersey Marine Museum are all organizations with a potential interest in and a knowledge of historic properties within the APE and should be considered information resources for the pending cultural resources evaluation.

The HPO looks forward to the opportunity to consult further on the preferred alternative and the final architectural mapping for this project. Should you have any questions regarding these comments or need further assistance, please contact Charles Scott at (609) 633-2396 or Andrea Tingey at (609) 984-0539.

Sincerely,

Dorothy P. Guzzo
Deputy State Historic
Preservation Officer

cc Christina McClelland, NJDOT
Steven Moy, NJDOT Local Aid
Lourdes Casteneda, FHWA
Jeanette Mar, FHWA
Tom Chelius, SJTPO
Dale Foster, Cape May County
Consulting / Interested Parties

AREA OF POTENTIAL EFFECTS REPORT
OCEAN DRIVE (CR 621) UPGRADE AND BRIDGE REPLACEMENTS
LOWER TOWNSHIP AND WILDWOOD CREST BOROUGH
CAPE MAY COUNTY, NEW JERSEY

MARCH 2004

RICHARD GRUBB & ASSOCIATES, INC.
Cultural Resource Consultants

Area of Potential Effects Report
Ocean Drive (CR 621) Upgrade and Bridge Replacements
Lower Township and Wildwood Crest Borough
Cape May County, New Jersey

Principal Investigators:

Glenn R. Modica (Historic Architecture)
Ilene Grossman-Bailey (Archaeology)

Prepared by:

Richard Grubb & Associates, Inc.
30 North Main Street
Cranbury, New Jersey 08512

Prepared for:

Parsons Brinckerhoff Quade & Douglass, Inc.
506 Carnegie Center Drive
Princeton, New Jersey 08540

and

County of Cape May
Administration Building
4 Moore Road
Cape May Court House, New Jersey 08210

Introduction

Cape May County, using funds provided by the Federal Highway Administration and administered by the New Jersey Department of Transportation and the South Jersey Planning Organization, is proposing to improve to Ocean Drive (County Route 621) from its intersection with NJ Route 109 in Lower Township to Madison Avenue in Wildwood Crest Borough. The Initially Preferred Alternative (IPA) proposes to raise the roadway and upgrade it to a viable evacuation route for the 100-year storm in Cape May County. The project will also replace three functionally obsolete and/or structurally deficient bridges, including the major structure over Middle Thorofare. The IPA proposes a Cable-Stayed type bridge for the Middle Thorofare crossing. The existing Middle Thorofare Bridge, a 22-span, single leaf bascule structure built in 1940, was determined eligible for listing in the National Register of Historic Places by the New Jersey Historic Preservation Office (HPO) on June 30, 1995.

In accordance with the provisions of 36 CFR 800, this report presents the Area of Potential Effects (APE) and a list of interested historic preservation groups and consulting parties for the proposed undertaking. An APE report, dated July 2000 (revised January 2003 and March 2003), had been submitted to the NJDOT and HPO for concurrence. In the APE report, multiple APE's were delineated to corresponded with effects resulting from separate alternatives. The APE-Architecture for Alternative 3G (Initially Preferred Alternative) was based upon the potential viewshed to the 300-foot towers of the Cable-Stayed bridge and was delineated as a 2 ½-mile radius from the towers. A viewshed map prepared for the APE report outlined areas that could potentially have a view of the towers. By letter dated July 3, 2003 (HPO-G2003-40), the HPO concurred with the delineated APE's, with the condition that "final architectural APE mapping must be provided to this office once the preferred alternative is selected."

Field Survey

On March 12, 2004 a field survey was held in Cape May County to determine the APE for the IPA. The following persons were in attendance: Dale Foster, Cape May County Engineer; Andrea Tingey, NJDEP–HPO; Lauralee Rappleye, NJDOT–BEPR; Christina McClelland, NJDOT – BEPR; Sal Mikhael, NJDOT - Local Aid; Steve Balzano, Parsons Brinckerhoff; Miguel Santiago, Parsons Brinckerhoff; Jim Maloney, Parsons Brinckerhoff; and, Glenn Modica, Richard Grubb & Associates. The purpose of the field survey was to verify the accuracy of the viewshed map previously submitted and to identify the areas that would have an unobstructed view of the proposed towers. A 500-foot radio tower in the Borough of Wildwood- which would be near the easternmost tower- was used a visual aid to determine an APE. This survey was also

conducted to examine and document views of the proposed bridge from various historic sites and districts in Cape May and Wildwood Crest and to determine remaining efforts required to approve the Area of Potential Effects and Cultural Resources Report.

The attendees assembled at the Cape May County offices and determined to visit numerous sites in Cold Spring, Cape May City and Wildwood Crest to determine if the proposed bridge would be visible. In order to accommodate all attendees to the various sites, bus transportation was arranged to facilitate the discussions regarding the APE. These sites included:

- Historic Cold Spring Village Railroad Station and Village Junction Control Tower
- Route 9 near Cold Spring
- "Tranquility," a residential community
- Locations along and near Cape May Harbor (Lobster House, Fisherman's Memorial)
- Various streets in Cape May
- Cupola of the Chalfonte Hotel
- 4th Floor of Congress Hall
- Emlen Physick Estate
- Cape May Beach
- US Coast Guard Loran Unit
- Wildwood Shore Resort Historic District

Photographs were taken at each of these locations. Additionally, the location and direction of the photographs were documented with GIS generated coordinates and a compass. Such documentation will ensure that the best possible representation of the bridge will be produced in photosimulations.

After the field visits, the group returned to Cape May County offices to review results and determine direction.

Conclusions

Based upon the results of the field visit, Andrea Tingey (HPO) delineated the APE-Architecture as follows: beginning on the west side of the Garden State Parkway (GSP) at the GSP Bridge over Jones Creek (m.p. 2.4); then south along the west side of the GSP through its intersection with NJ Route 109, through the Cape May Canal and bordering the east side of the island at Schellenger's Landing to the municipal boundary of Cape May City; then south along the Cape May City boundary to the Atlantic Ocean shoreline; then east along the shoreline to Cape May

Inlet; then across Cape May Inlet to the opposite shoreline; then south along the shore line to the Atlantic Ocean; then north along the shoreline to the southern boundary between Wildwood Crest Borough and Wildwood City; then west along the south side of the municipal boundary to the east side of Atlantic Avenue; then south along the east side of Atlantic Avenue to the north side of Rosemary Road (a point approximately 2.5 miles from the proposed towers); then west along the north side of Rosemary Road to the Sunset Lake shoreline; then following the shoreline through the Intracoastal Waterway, through Swain Channel and through Jones Creek to the place of beginning. The APE-Architecture and APE-Archaeology (the area of direct impacts) are shown on Figure 1.

In order to assess project effects on the Cape May Historic District and Wildwood Shore Resort Historic District as single resources, the APE-Architecture extends beyond the 2 ½-mile viewshed limit to include the entirety of the districts.

Based upon the results of the field survey, it was determined that the following historic properties are outside the boundaries of the APE-Architecture, since dense vegetation will screen views from the properties to the towers:

- Cold Spring Historic District
- Cold Spring Grange Hall
- Historic Cold Spring Village Railroad Station
- Historic Cold Spring Village Junction Control Tower

The following are within the APE-Architecture but contain no standing structures more than 50 years of age:

- "Tranquility," a residential development on the north side of Route 109, between the GSP and Route 9
- A campground east of Route 9 opposite Tabernacle Road
- Wildwood Crest Borough (excluding the Wildwood Shore Resort Historic District)

During the field survey it was believed that Two Mile Landing contained standing structures more than 50 years of age. Subsequent investigation has revealed that this is not the case. The buildings comprising the restaurant at Two Mile Landing were built in the late 1970s, according to Robert Sandman, whose father constructed it. Buildings had existed on the site since at least the 1930s, and by the 1970s the site consisted of several run-down shacks, a decrepit dock and a

burned out restaurant. All buildings more than 50 years of age were razed for construction of the existing buildings.

Based upon the results of the field survey, nine resources in the APE-Architecture contain standing structures more than 50 years of age. For the forthcoming Section 106 Cultural Resources Report, these nine resources will be treated as follows:

Cape May Historic District:
A Base Survey Form and Eligibility Worksheet will be completed for the Cape May Historic District that will identify the character-defining features of the resource so that project effects can be adequately assessed.

Wildwood Shore Resort Historic District:
A Base Survey Form and Eligibility Worksheet will be completed for the Wildwood Shore Resort Historic District that will identify the character-defining features of the resource so that project effects can be adequately assessed.

Garden State Parkway Historic District:
A Base Survey Form and Eligibility Worksheet will be completed for the Garden State Parkway Historic District that will identify the character-defining features of the resource so that project effects can be adequately assessed.

A cluster of buildings on the west side of Route 109, west of Schellenger's Landing Road
About 30 standing structures more than 50 years of age are at this location. Since it is unlikely that any of the standing structures are individually eligible, they will be evaluated collectively as a potential historic district, with associations with the local maritime industry and Schellenger's Landing being fully explored. A Historic District Overlay and Eligibility Worksheet will be prepared for the potential district, preliminarily called "Schellenger's Landing Historic District." Photographs with photo locations will be taken of all buildings in the potential district. Richard Grubb & Associates will present photographs of the individual buildings in the potential district to the HPO and NJDOT, so that no more than five of the most distinctive buildings may be further evaluated at the intensive-level.

One commercial/residential building in Bree-z-Lee Marina
This building will be evaluated with a Base Survey Form, Building/Element Attachment and an Eligibility Worksheet.

United States Coast Guard Training Center, Cape May City

In 1994, Meredith Arms Bzdak prepared a Historic Building Survey for the United States Coast Guard Training Center and recommended the property not eligible for listing in the National Register. Based upon a review of the report during the field visit, Andrea Tingey (HPO) concurred with this assessment and recommended no further evaluation.

"Hornbeam," a National Register-eligible buoy tender (United States Coast Guard Training Center, Cape May City)

A Base Survey Form and Eligibility Worksheet will be completed for the Hornbeam that will identify the character-defining features of the resource so that project effects can be adequately assessed.

United States Coast Guard Loran Unit, Wildwood Crest Borough

One building on this property, located on the west side of the access road, may be more than 50 years of age. Aerial mapping will be used to determine its age. If the building is more than 50 years of age, then Dale Foster (Cape May County Engineer) will attempt to arrange a site visit for the cultural resources consultant. If access is denied, then the building will be exempt from the architectural survey.

NJ Route 109 buildings (west side of the Garden State Parkway):

Approximately 10 buildings more than 50 years of age- mostly dating to the 1920s-1940s-and in poor condition were identified at this location. Based upon interagency concurrence during the field survey, these properties are exempt from further architectural survey.

In compliance with 36 CFR Part 800.3, a list of Consulting and Interested Parties has been included in this report. Letters describing the project scope and soliciting comments on cultural resources concerns will be sent to all identified parties. Copies of these letters will be included in the final report submitted to the HPO. All responses received by Richard Grubb & Associates will be documented in the final report, and comments will be incorporated into the identification of cultural resources concerns and assessment of project effects within the APE. Additional public participation on the project will include consultation with local elected officials and distribution of the draft cultural resources report to Consulting and Interested Parties. A Public Information Center was held in Wildwood Crest Borough on June 14, 2003. Another Public Information Center is planned for Summer 2004 to present the Initially Preferred Alternative. Documentation from both Public Information Centers will be included in the Cultural Resources Report.

Consulting Parties

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New Jersey Department of Transportation
New Jersey Historic Preservation Office
South Jersey Transportation Planning Organization
Cape May County
Lower Township
Cape May City

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Cape May Court House, NJ 08210
Ion Williams

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Mary Rothwell, Secretary

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Cape May, NJ 08204
Harry Savage, President

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P.O. Box 340
1048 Washington Street
Cape May, NJ 08204
B. Michael Zuckerman, Director

Down Jersey Marine Museum
P.O. Box 1031
Delran, NJ 08075

Doo Wop Preservation League Museum
3201 Pacific Avenue
Wildwood City, NJ 08260
Jack Morey, Executive Vice-President

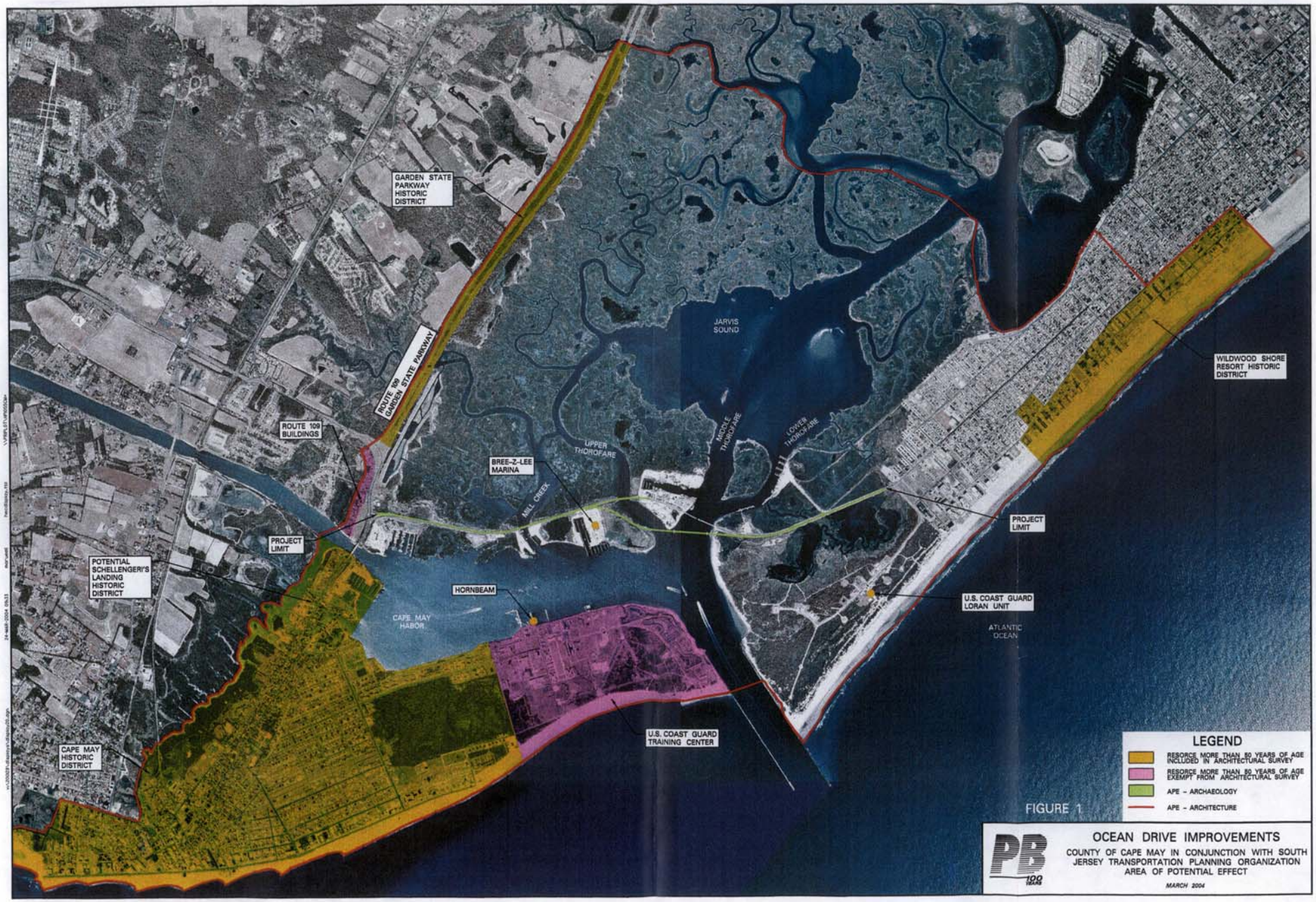

FIGURE 1

PB 100 YEARS

OCEAN DRIVE IMPROVEMENTS

COUNTY OF CAPE MAY IN CONJUNCTION WITH SOUTH JERSEY TRANSPORTATION PLANNING ORGANIZATION
AREA OF POTENTIAL EFFECT

MARCH 2004

AREA OF POTENTIAL EFFECTS REPORT
OCEAN DRIVE (CR 621) UPGRADE AND BRIDGE REPLACEMENTS
LOWER TOWNSHIP AND WILDWOOD CREST BOROUGH
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Doo Wop Preservation League Museum
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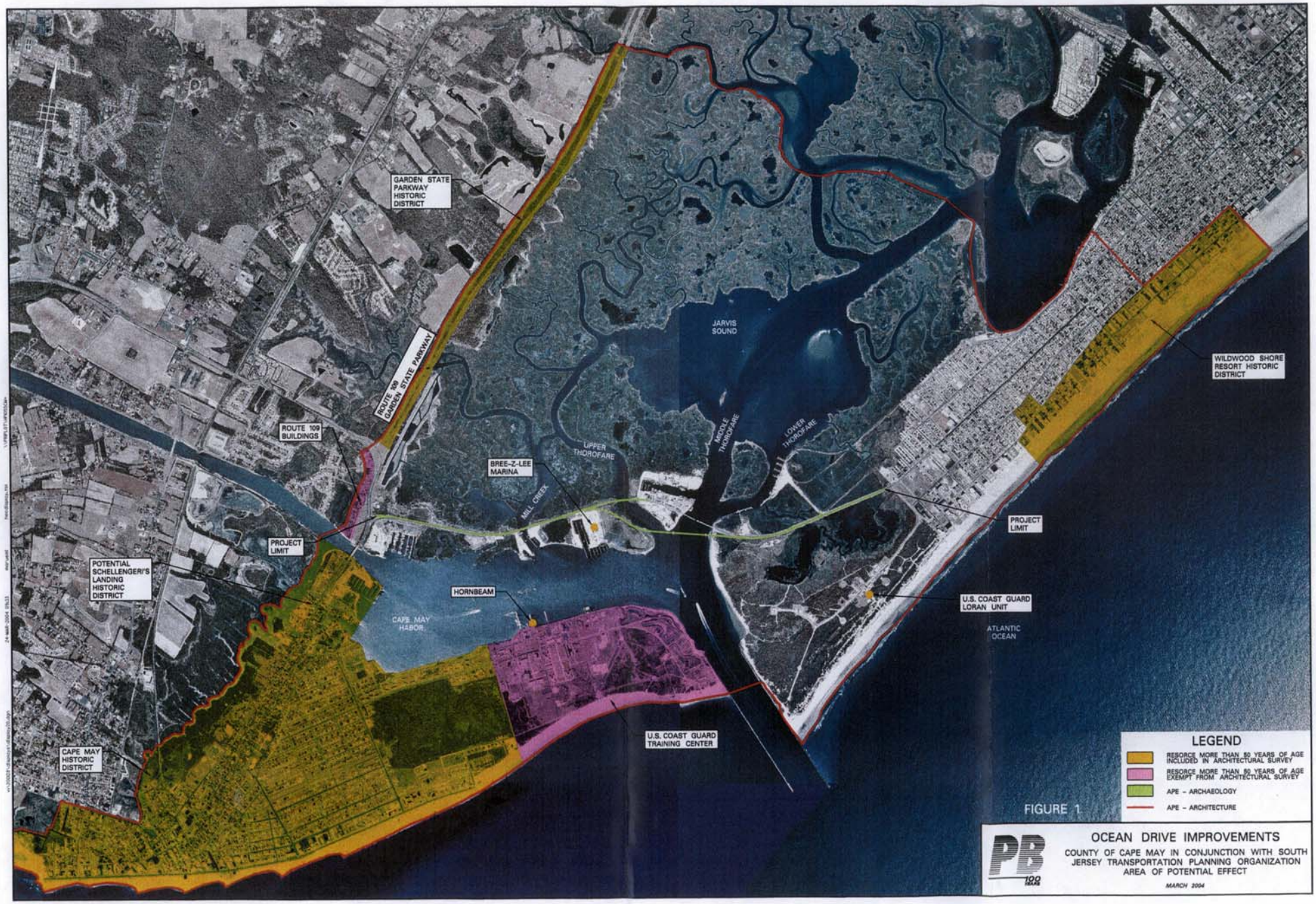


FIGURE 1

PB

OCEAN DRIVE IMPROVEMENTS

COUNTY OF CAPE MAY IN CONJUNCTION WITH SOUTH JERSEY TRANSPORTATION PLANNING ORGANIZATION

AREA OF POTENTIAL EFFECT

MARCH 2004

Technical Addendum H
Hydraulic Analysis Report

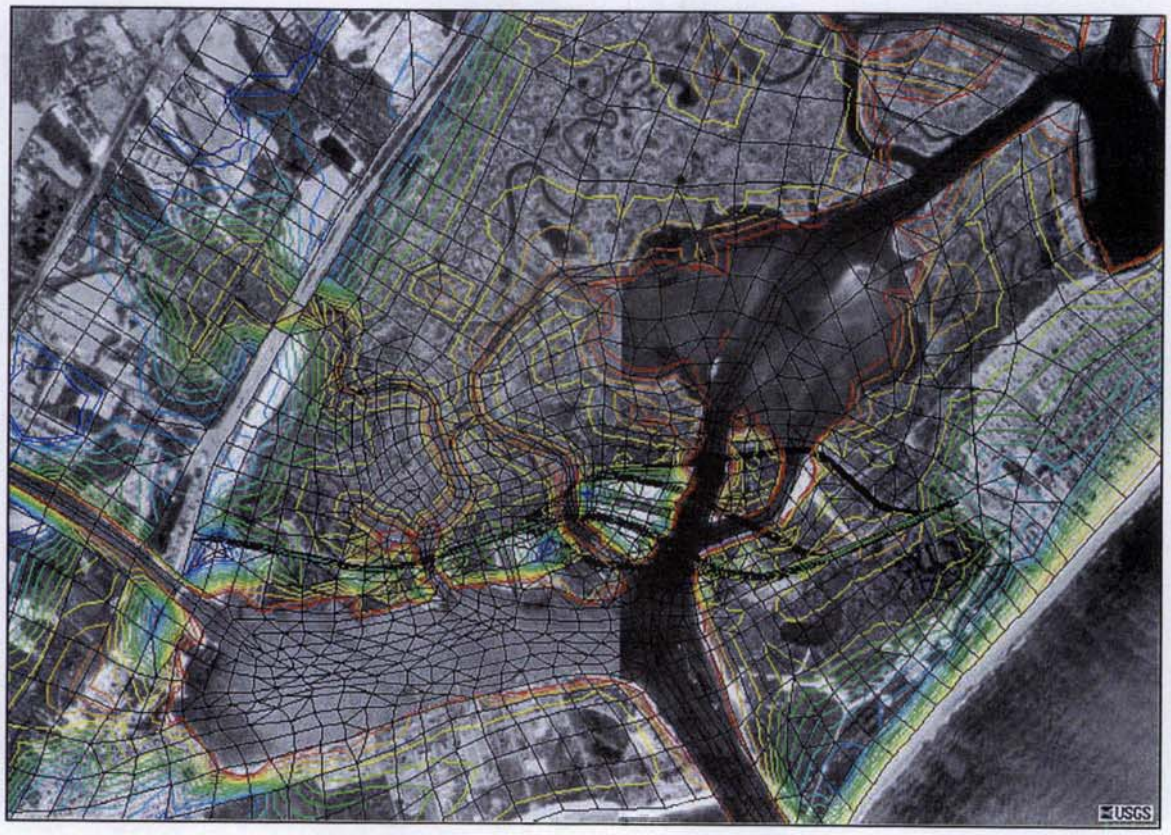
OCEAN DRIVE

PRELIMINARY HYDRAULIC REPORT

FOR THE IMPROVEMENTS TO OCEAN DRIVE
FROM ROUTE 109 TO WILDWOOD CREST

COUNTY ROAD 621

TOWNSHIP OF LOWER
CAPE MAY COUNTY, NEW JERSEY



PREPARED BY PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.

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INTRODUCTION

BACKGROUND

Ocean Drive, County Route 621, is located in Cape May County in southern New Jersey. The two-lane road runs along the northern side of Cape May Harbor, and connects Route 109 to Wildwood Crest, bridging Mill Creek, Upper Thorofare, and Middle Thorofare (Figures 1 and 2). The roadway crown is located below the elevation of the 100-year storm-surge. Improvements are proposed to widen the roadway and raise it above the 100-year floodplain. The purpose of this study is to evaluate hydraulic impacts of proposed improvements to Ocean Drive, and to evaluate scour impacts at the bridge crossings.

EXISTING CONDITIONS

The Atlantic coastline of southern New Jersey consists of barrier islands separated from the mainland. The area between the mainland and the barrier islands contains tidal bays and coastal wetlands. Ocean Drive connects the southern tip of the beach community of Wildwood Crest with the mainland. Jarvis Sound, Taylor Sound, Sunset Lake, and a series of interconnected tidal channels lie between Wildwood Crest and the mainland, to the north of Ocean Drive. The Garden State Parkway runs along the eastern edge of the mainland, and Wildwood Boulevard connects the central portion of Wildwood to the Garden State Parkway approximately three miles north of Ocean Drive.

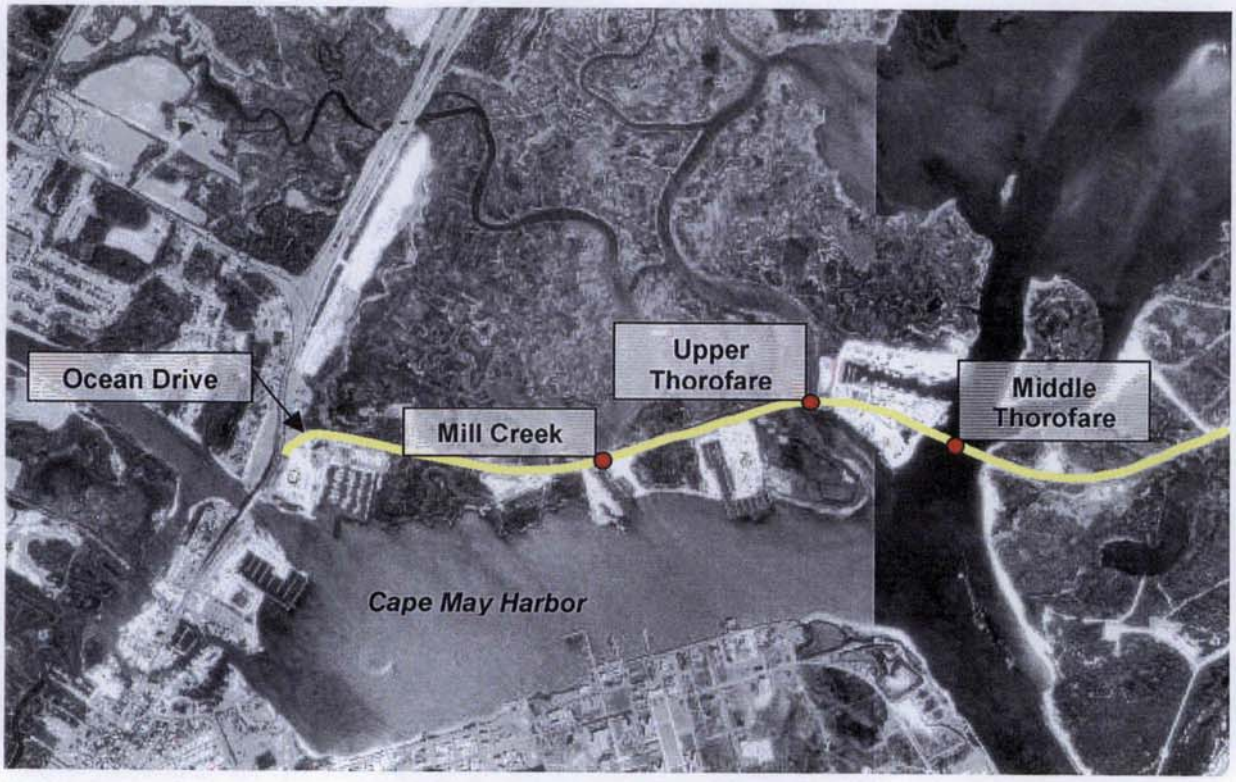

Figure 1: Aerial View of Ocean Drive

Ocean Drive is important as an access route to the beach resorts on the barrier island, as an access route for the commercial fishing industry located adjacent to the Middle Thorofare Bridge, and for emergency vehicle access to the southern section of the island.

Ocean Drive is composed of a two-lane causeway crossing the tidal marshes, with bridges across Mill Creek, Upper Thorofare, and Middle Thorofare. Ocean Drive is the primary access route to communities, recreation areas, and marinas on the southern tip of Wildwood Crest.

The existing bituminous roadway was constructed in the late 1930's, by placing fill in the higher areas of the existing floodplain within a 120-foot right-of-way. The two-lane roadway consists of a 40-foot wide paved surface with 10-foot travel lanes and 10-foot shoulders on either side, with 8:1 slopes down to existing grade adjacent to the shoulders. A majority of the existing roadway was constructed at 0% profile at an elevation of 7.5 feet NGVD, with the top of deck of the bridges set at an elevation of 11.0 feet NGVD.

In addition to insufficient travel lane widths and substandard horizontal curvature, the original roadway has settled since its construction to an approximate elevation of 6.0 feet NGVD, placing it well below the FEMA 100-year flood elevation of 10.4 feet NGVD. Consequently, the entire roadway is susceptible to flooding, possibly making the evacuation route impassible during a flood.

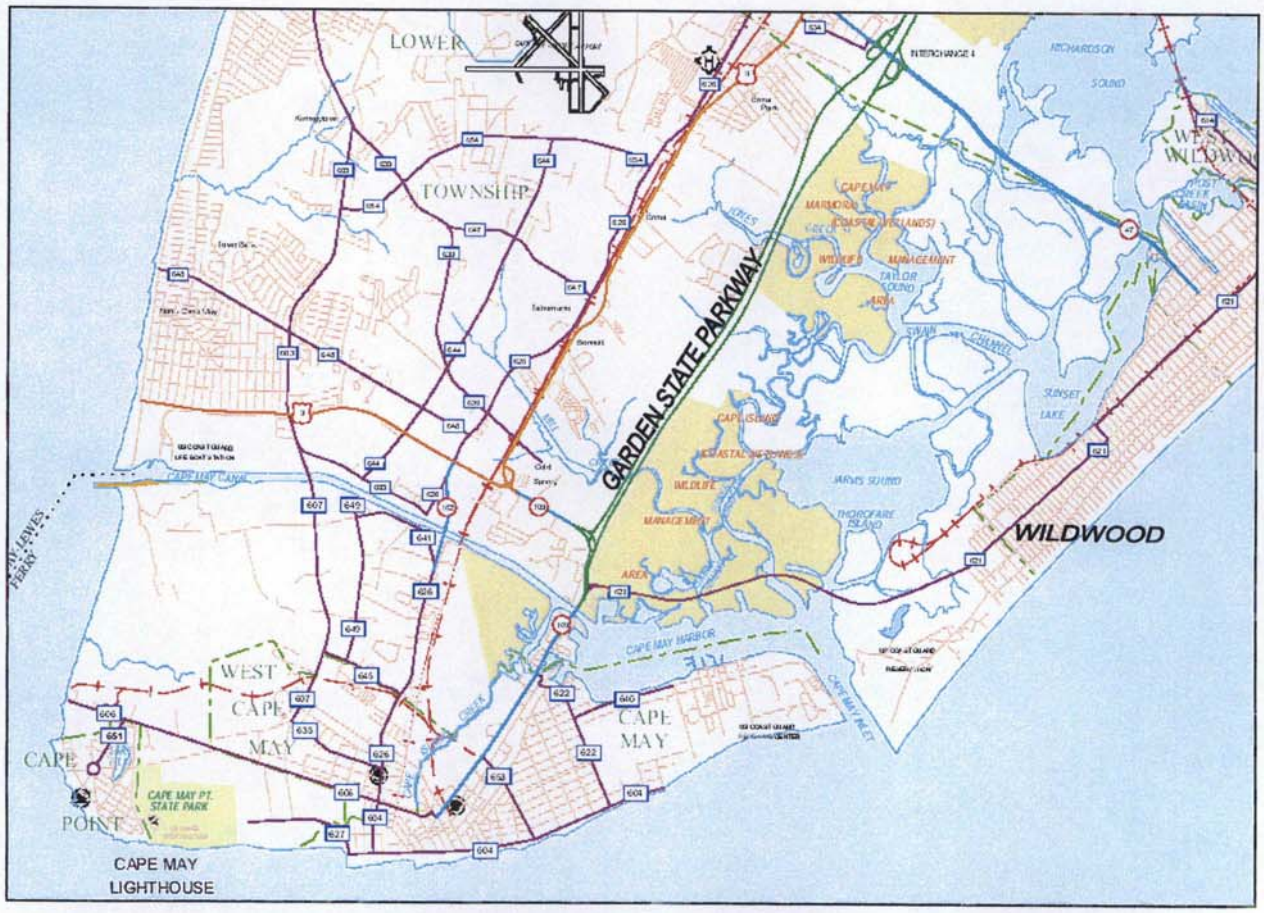

Figure 2: Ocean Drive Vicinity Map, from NJDOT Division of Information Technology

PROPOSED IMPROVEMENTS

Much of the causeway portion of the roadway lies below the 100-year flood elevation. Proposed improvements for Ocean Drive consist of raising the road profile above the 100-year flood elevation, widening the roadway to accommodate 12-foot wide travel lanes, improving the horizontal curvature of the western-most section of the roadway, and increasing the profile grade to allow for sufficient surface drainage. The proposed alternatives are shown in Figure 3, and summarized below. The existing alignment is the same as Alternatives 3A, 3B, and 3E.

Figure 3: Proposed Alternatives for Ocean Drive

The initial phase of this study sought to replace only the Mill Creek and Upper Thorofare Bridges while raising Ocean Drive from Route 109 to the Middle Thorofare Bridge. Project objectives have been expanded to include the replacement of Middle Thorofare Bridge. Seven alternatives have been developed to achieve these objectives.

Alternative 3A

In this alternative, Ocean Drive is shifted to the north from Route 109 to the vicinity of the Mill Creek structure, where it then shifts to the south for the remainder of the project length. This alternative will construct a new moveable span structure approximately 30' to the south of the existing Middle Thorofare bridge.

Alternative 3B

Similar to Alternative 3A, this alternative replaces the Middle Thorofare Bridge with a new moveable structure. However, this alternative locates the new structure 30' to the north of the existing bridge. Because the new structure is located to the north, the entire alignment of Ocean Drive is shifted slightly to the north, unlike alternative 3A, where only a portion of the alignment was shifted northward.

Alternative 3C

Alternative 3C relocates Ocean Drive onto a new alignment from just west of Upper Thorofare to just west of Fish Dock Road. The new alignment travels north of the existing alignment along uplands located on the northern edge of the fishing industries, across Middle Thorofare, Thorofare Island and Lower Thorofare before reconnecting

with the existing Ocean Drive near Fish Dock Road. The new alignment features a new low-level bridge across Upper Thorofare which is similar in design to the Upper Thorofare structures proposed in Alternatives 3A and 3B, though located on a skew to the north of the existing bridge which will be removed. A second new structure is created on this alignment. A new high-level, fixed structure is proposed over Middle and Lower Thorofares.

Alternative 3D
Alternative 3D is very similar to Alternative 3C. It also features a new, high-level, fixed bridge over Middle Thorofare. However, the alignment traverses Thorofare Island further to the north, crossing Lower Thorofare to the north of the Two Mile Restaurant. The alignment ties into existing Ocean Drive just before Madison Avenue.

Alternative 3E
Alternative 3E proposes a new fixed bridge on an alignment similar to that of Alternative 3A. The proposed bridge would allow a minimum 116 ft vertical clearance over Middle Thorofare and would also span over Upper Thorofare. Existing Ocean Drive would be connected via a new access road and a rehabilitated Upper Thorofare structure.

Alternative 3F
Alternative 3F also proposes a new fixed bridge with a minimum vertical clearance of 166 ft, however the alignment is shifted to the south featuring only one main channel crossing. The alignment connects the existing portions of Ocean Drive through a t-intersection and a rehabilitated Upper Thorofare bridge.

Alternative 3G
Alternative 3G features the same alignment as Alternative 3F. The only difference is that the structure type proposed is a Cable-Stayed Structure as opposed to the segmental type structure proposed in Alternative 3F.

STUDY OBJECTIVES

The purpose of this report is to determine if the raising of Ocean Drive creates any hydraulic impacts to flow patterns and daily tidal circulation during a storm surge, and to evaluate scour at the three bridge crossings for proposed conditions. Changes in storm surge flow could increase coastal flooding and bridge scour due to the damming effect of the raised profile. Changes in tidal circulation could adversely impact the hydrology of the wetland. Cape May is home to 288 species of special emphasis, including 52 species of plants and 151 species of birds. The area is one of the prime birding areas on the East Coast. Due to the sensitivity of tidal saltwater marshes, any impacts to tidal circulation could potentially adversely impact the entire ecosystem.

Two-dimensional hydraulic modeling is used to evaluate potential hydraulic impacts that raising Ocean Drive could have on normal tidal circulation, storm surge flooding, and the bridge scour potential at the bridges over Mill Creek, Upper Thorofare, and Middle Thorofare. The hydraulic model simulates flow through the marsh and tidal channels bordering Ocean Drive. Simulations were prepared of a 100-year storm surge and for a cycle of normal daily tides for existing conditions. Four proposed improvement options are also simulated, from which conclusions on three additional proposed alternates are also drawn. Comparison of flow patterns is made to identify hydraulic impacts of altering the alignment, raising the roadway, and replacing the bridges.

HYDRAULIC ANALYSIS

INTRODUCTION

The hydraulic analysis consists of several steps. A review was made of FEMA flood insurance studies to determine the appropriate minimum elevation of Ocean Drive. NOAA tidal data was reviewed to determine tidal behavior in the vicinity of Ocean Drive and to develop storm surge stage graphs. A finite element model was setup to perform hydraulic modeling. The hydraulic model was run to simulate normal tidal circulation and the 100-year storm surge.

100-YEAR FLOOD ELEVATION AT OCEAN DRIVE

One intent of the proposed Ocean Drive Improvements is to raise the roadway above the elevation of the 100-year flood so that the roadway is useable for evacuation during major storm events. The 100-year flood elevation along Ocean Drive was determined from the 1983 Flood Insurance Rate Map (FIRM) for Cape May, New Jersey (FEMA, 1983). The map is shown in Figure 4, and reports the 100-year flood elevation near Ocean Drive as 10 feet NGVD 1929. Elevations are to the nearest foot, and increase moving towards the north. The blue line in Figure 4 marks the boundary between a base flood elevation of 11 feet NGVD 1929, to the north, and 10 feet NGVD 1929, to the south. Accounting for the increase, the elevation of the 100-year floodplain along Ocean Drive is 10.4 feet (1929 NGVD). This corresponds to an elevation of 9.1 feet NAVD 1988, which is the vertical datum used in this analysis.

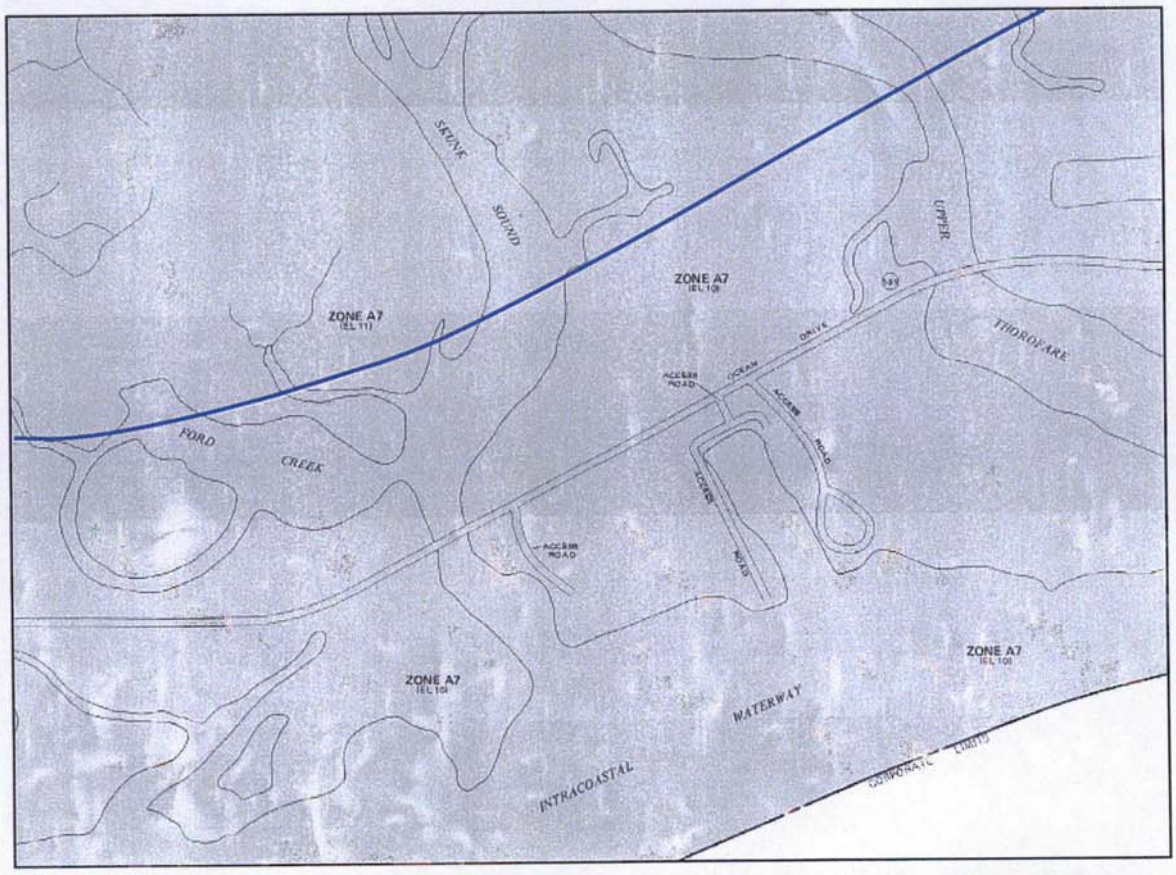

Figure 4. From the February 1983 FEMA FIRM for the Township of Lower, Cape May County, New Jersey (Community-panel number 340153-0007B)

TIDAL DATA

Tidal Range

Hydraulic conditions along Ocean Drive are tidally controlled. Ocean Drive divides the tidal marsh surrounding Jarvis Sound and Sunset Lake, to the north, and Cape May Harbor, to the south. Though the marsh is hydraulically connected through Wildwood Boulevard, tidal circulation in the marsh is dominated by flows from the south. Tidal flows enter the marsh from Cape May Harbor via Mill Creek, Upper Thorofare, and Middle Thorofare.

The National Oceanic and Atmospheric Administration maintains a tidal benchmark at the ferry terminal in the Cape May Canal. The benchmark, Station 8536110, is located between Ferry Slips #1 and #2, and has been in place since October 25, 1965. Tidal elevations established by NOAA for the 1983-2001 Tidal Epoch are listed in Table 1.

Table 1: Elevations of Tidal Datums at NOAA Benchmark 8536110 (Cape May, Cape May Canal, Delaware Bay), feet NAVD 1988

Highest Observed Water Level (9/27/85)	5.79
Mean Higher High Water	2.42
Mean High Water	1.99
Mean Tide Level	-0.44
Mean Low Water	-2.86
Mean Lower Low Water	-3.02
Lowest Observed Water Level (01/28/71)	-6.04

Storm Surge

The astronomical tide, and the storm surge hydrograph (stage graph) are used as the boundary conditions for hydraulic modeling of the marshes surrounding Ocean Drive. The 100-year tidal storm surge hydrographs for Cape May Canal and the Cape May Harbor entrance have been developed for this study based on information from NOAA tidal benchmark 8536110 and methods outlined in the Pooled Fund Study SPR-3(22) 2002 report entitled *Tidal Hydraulic Modeling for Bridges* (Ayres Associates 2002).

Storm surge elevations for the development of the 100-year storm surge stage graph were available from two sources: the Hurdat ADCIRC database (Pooled Fund Study) for the Cape May Inlet, and the Flood Insurance Study for the Township of Lower, Cape May County, New Jersey, Community Number 340153 (FEMA 1983). The ADCIRC surge heights resulted in a peak elevation of tidal storm surge less than the 100-year base flood elevation reported by FEMA. Therefore, the surge height was increased until the peak of the tidal storm surge equaled the FEMA elevation. Following the most conservative approach, the peak of the storm surge coincides with the mid-rising tide. The mean tide level is -0.44 feet NAVD. During model calibration, the surge height had to be further increased to offset computational dampening at

the model boundaries. The 100-year surge heights and peak elevation of the storm surge plus tide curve used in the model are shown in Table 2. The storm duration is estimated from the data provided in NOAA technical report NWS-38 (National Weather Service, 1987) to be R/f = 35 nautical miles / 19 knots = 1.84 hr, where R is the 50% probability radius of maximum winds, and f is the forward speed of the storm.

Table 2: Storm Surge Heights and Peak Flood Elevations

Location	Storm Surge Height (ft)	Peak Flood Elevation (ft NAVD 88)
Cape May Inlet	13.19	12.75

The average tidal amplitude at NOAA benchmark 8536110 is 4.85 feet, with a mean lower low water elevation 2.86 ft below NAVD 1988, and a mean tide level of 0.44 feet below NAVD 88. The height $H(t)$ of the astronomical tide was approximated using the equation

$$H_t(t) = a\cos\frac{2\pi t}{T}$$

Where: a is the tidal amplitude
And T is the tidal amplitude

The tide was then adjusted to NAVD 1988 using the mean tide level of –0.44 feet. The storm surge $S_t(t)$ was computed using the Alternative Surge Hydrograph method presented in the Pooled Fund Study. The Alternative Method involves the following equations:

$$S_t(t) = S_p\left(1 - e^{-|D/(t-ts)|} - 0.14(t - t_0)e^{[-0.18(t-t_s)|}\right) \quad \text{for } t > t_0$$

$$S_t(t) = S_p\left(1 - e^{-|D/t|}\right) \quad \text{for } t < t_0$$

Where: t_0 is the time of the peak surge.

This method allows for a steeper receding limb of the storm surge. The 100-year tidal storm surge stage graph is shown in Figure 5. Tides at the Cape May Inlet and Cape May Canal occur simultaneously. Therefore, the stage time series at each boundary are the same.

Fifty hours of normal tidal circulation are also simulated in the hydraulic analysis. Tides at the boundaries (Townsends Inlet and Corson Inlet) are also lagged by 15 minutes. Figure 6 shows the 100-hour time series used in the analysis. The time series represents fifty hours of an astronomical tidal cycle varying between Mean High Water and Mean Low Water, followed by a fifty-hour storm surge plus tide stage graph, with the peak storm elevation occurring at hour 76.

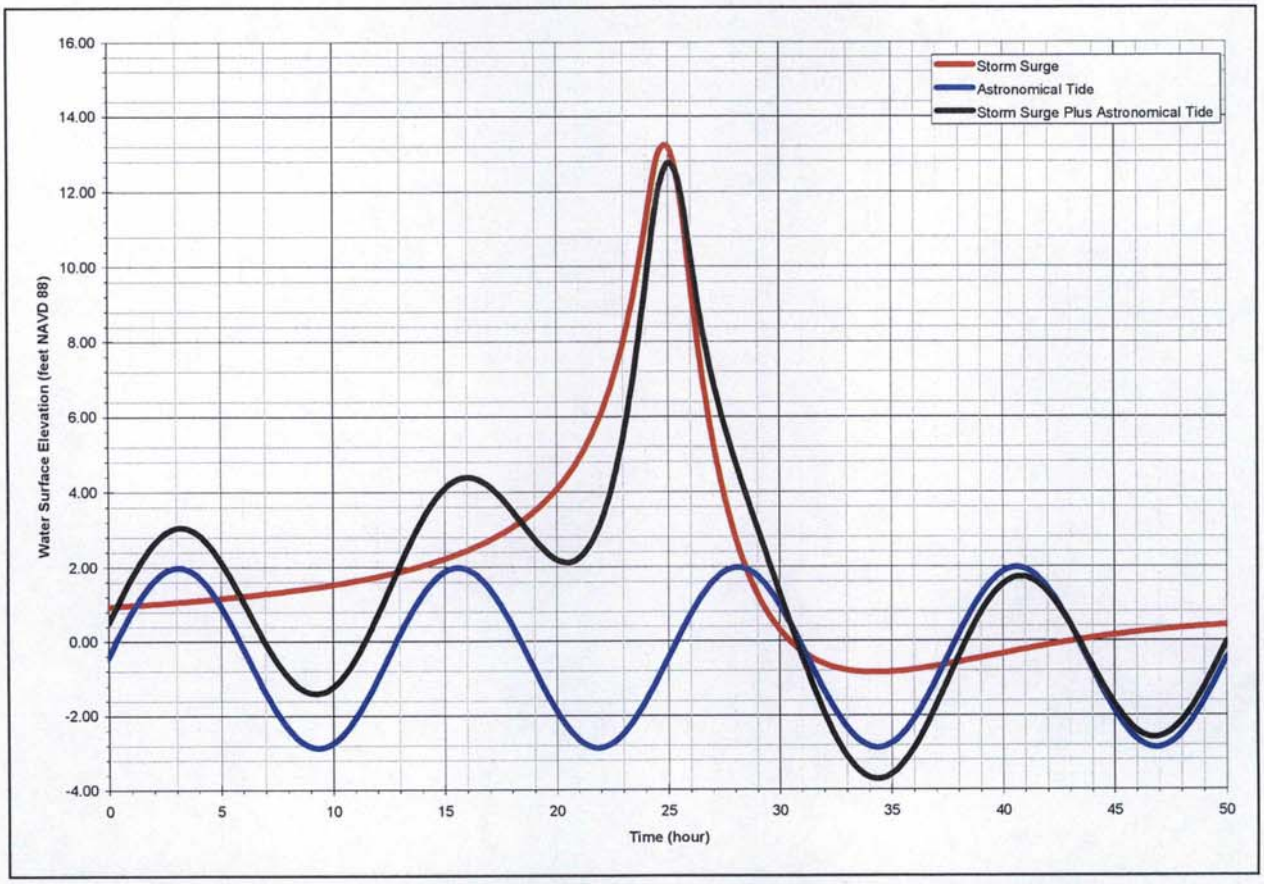

Figure 5: Storm Surge plus Astronomical Tide Stage Graph for Cape May

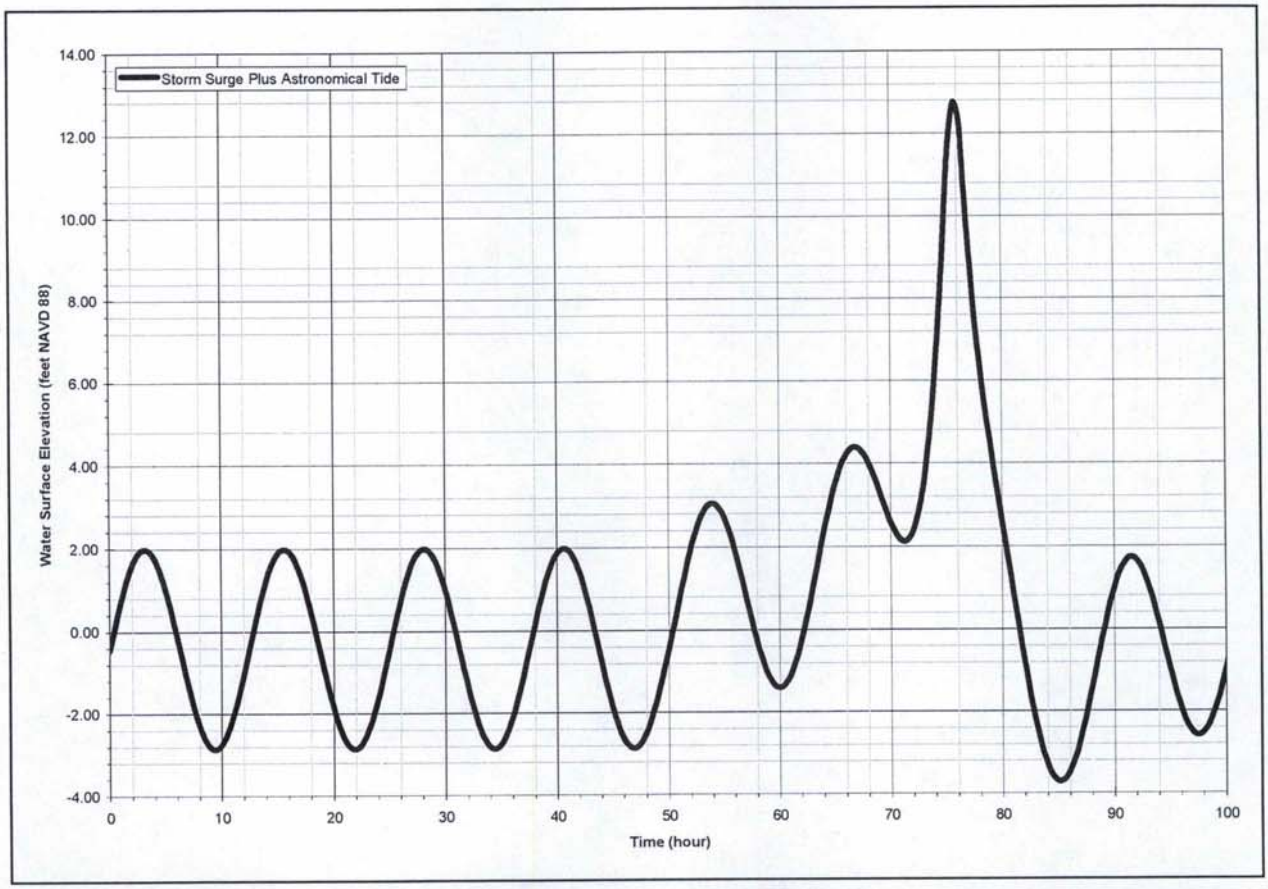

Figure 6: 100-hour Stage Graph of Astronomical Tide and Tidal Storm Surge for Cape May

HYDRAULIC MODEL DEVELOPMENT

Model Selection

Hydraulic modeling of the tidal marsh and channels surrounding Ocean Drive requires a dynamic hydraulic model to simulate the tidal cycle and a storm surge. Version 3.0 of the FHWA two-dimensional hydraulic model FESWMS-2DH (Froehlich, 2001) was used to model both normal tidal circulation and the 100-year storm surge. FESWMS-2DH employs the finite element network method to solve two dimensional, depth-averaged equations of flow momentum and mass. The study area or "solution domain" is represented in FESWMS-2DH by a finite element network. The network is comprised of a series of interconnected elements. Elements may be triangular or quadrilateral in shape. Elements are used to describe the study area, and are assigned hydraulic parameters such as Manning's roughness coefficient using property codes. Corner and mid-side nodes define the locations and elevations of elements. Each node has x-, y-, and z- coordinates. FESWMS-2DH solves the momentum and energy equations and computes the direction and depth of flow at each node point in the finite element network.

Network Layout

Solution Domain

The finite element network used in this analysis extends from the Cape May Inlet on the Atlantic Ocean and the Cape May Canal entrance in the Delaware Bay to a northern boundary at Wildwood Boulevard. The model encompasses the tidal marsh, channels, and bays between the Garden State Parkway and the barrier island. Areas along the Garden State Parkway were eliminated from the model, and areas above an approximate elevation of 9 feet NAVD 1988 and with steep slopes were disabled. The model covers approximately 25 square miles, bounded by open water, Wildwood Boulevard, the Garden State Parkway, and Sandman Boulevard. The existing conditions model contains 2829 elements, consisting of 9549 nodes. The model network is shown in Figures 7 and 8.

Element Properties

Element property types are used to represent differing areas of hydraulic properties or to distinguish between different land features within the network. Selection of material properties is based on field review of conditions in the marshes and tidal channels.

The element property types used for the model of the Sea Isle Boulevard area are shown in Figures 7 and 8 and described below. Model parameters associated with the types can be found in Appendix A.

- *High*: This element type represents the area bounding the high side of the marsh. Shown in light brown.
- *Marsh*: This element type represents the tidal marsh areas, and any low-lying areas. Shown in green.
- *Shallow*: This element type denotes the shallow portions of the harbor, sounds, and channels. Shown in light blue.
- *Deep*: This element type denotes the deep or navigable portions of the Canal, Harbor, and waterways. Shown in royal blue.

- *Bridge*: The bridge elements have the same material properties as the channels.
- *Roadway*: The roadway elements are defined for ease of modeling the different proposed alternatives.
- *Approach and Disable*: The approaches share the roughness characteristics of deep channel, but have a high eddy viscosity, required for numerical stability under extreme storm surges at the outside boundaries of the model. Disabled elements represent areas of high elevation.

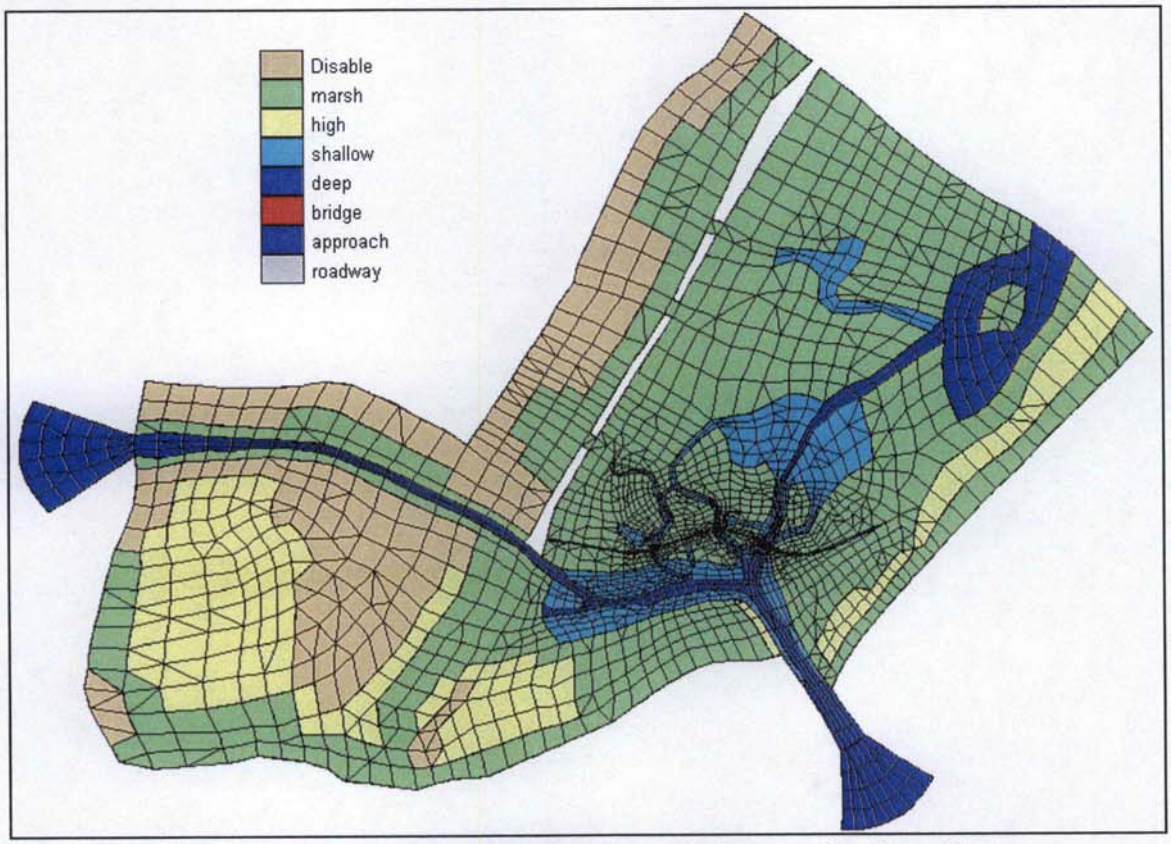

Figure 7: Model Network and Material Groups for Cape May

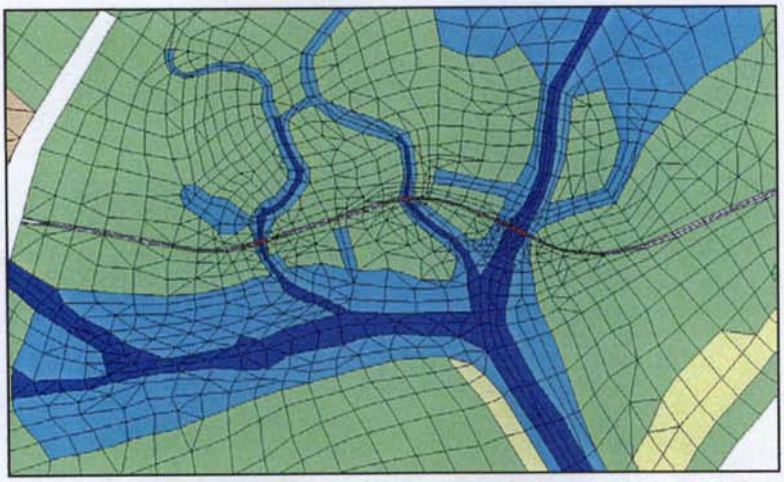

Figure 8: Close-up of Model Network along Ocean Drive

Network Development

Bathymetric Data

Network coordinate data is referenced to the NAVD 1988 vertical datum, and the New Jersey State Plane coordinate system (referenced to NAD83), with all values in U.S. survey feet. Existing and proposed conditions models were developed, with their only differences being the presence of weirs to allow for causeway overtopping, and the dimensions of the culverts.

Bathymetric data for Cape May Harbor, Mill Creek, Middle Thorofare, Upper Thorofare, Lower Thorofare, Jarvis Sound, and Sunset Lake was obtained from a Digital Elevation Model (DEM) maintained by the Special Projects Office of the NOAA National Ocean Service, available at http://spo.nos.noaa.gov/bathy. NOAA bathymetric DEM's are derived by sampling elevation values in a 30-meter grid pattern from a triangulated irregular network developed from historical sounding measurements. Because the source sounding data is of variable and often unknown resolution, with generally few data points near the edge of water, the NOAA DEMs are also less accurate near the channel edge. Elements near the channel edge were manually edited accordingly. The NOAA bathymetric DEM was supplemented by project survey of cross sections upstream and downstream of each of the three bridge crossings. Bathymetry for the approach sections in the Delaware Bay, Cape May Canal, and the Atlantic were taken from NOAA Navigation Charts.

Detailed project topographic survey data was available for the area approximately 600 feet on either side of the Ocean Drive centerline and the proposed alignments. The remaining elevations were obtained from 10 meter USGS DEM's for the Cape May and Wildwood quadrangles. USGS quadrangle maps and aerial photography were also used to verify material boundaries. Due to the resolution of the USGS DEM's, the elevations for the lower edge of the high marsh had to be manually adjusted, to approximately 1.3 feet NAVD (approximately equal to the mean high water for neap tides). The marsh areas in the model domain are generally defined between the Mean Tide Level elevation of –0.44 feet NAVD and the Mean Higher High Water elevation of 2.42 feet NAVD, with the majority of the marsh being at or above the elevation of 1.3 feet. The mean high water elevation is 1.99 feet NAVD, indicating that the marshlands are inundated during less than half of all tidal cycles. This is the range that would be expected for this type of vegetation. The model bathymetry and ground elevation data for the model is shown in Figure 9.

Boundary Conditions

Tidal boundary conditions were applied to the approach section in the Delaware Bay and in the Atlantic. The rest of the model boundary was closed, with the exception of a flux boundary where Wildwood Boulevard crosses Grassy Sound. The intent of the flux boundary was to provide an exit for any flow that may otherwise artificially accumulate in the marsh. While it is possible that a large storm surge could overwash the barrier island, such a scenario was not considered to be the critical case for evaluating the effects of proposed improvements to Ocean Drive. In the event of barrier island overtopping, a surge traveling parallel to Ocean Drive would not be affected by the causeway elevation, and would not produce high velocities or large head differential through the bridge opening. Surge heights near the bridge would also be attenuated by overland roughness in the densely developed areas of Wildwood Crest. An ocean storm surge driven into Cape May Inlet south of Ocean Drive, then traveling directly toward the roadway via the wetlands and waterways behind the island, would result in the maximum head differential across the causeway, and maximum velocity through the bridge openings.

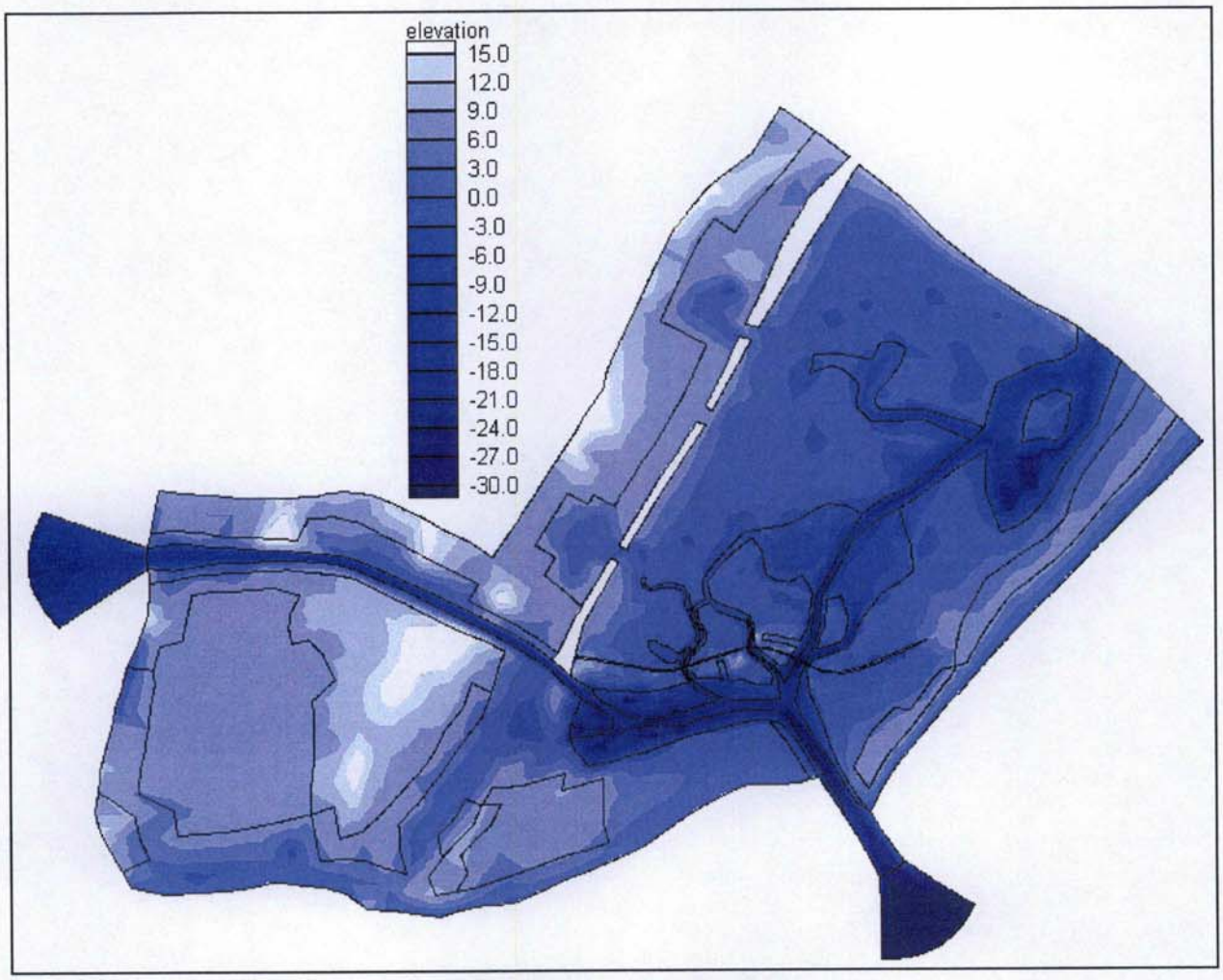

Figure 9: Model Bathymetry for Cape May

Model Simulations

Existing Conditions

The existing roadway was represented with a triangular cross section using two rows of elements. Centerline elevations were assigned based on project survey of existing topography. Ocean Drive is an elevated causeway, and under existing conditions, the roadway is not overtopped by normal tidal circulation. During the peak of a storm surge, flow depths of 3 to 4 feet may overtop the roadway.

The existing Mill Creek Bridge has 11 piers consisting of three 2-foot square piles each. The existing Upper Thorofare Bridge had 13 piers each consisting of three 2-foot square piles. The existing Middle Thorofare Bridge has 21 piers, 15 of which consist of three 20-inch piles each, and seven of which each consist of two circular piles, ranging in diameter from 8 to 14 feet.

Proposed Conditions

For proposed conditions, Alternatives 3a, 3e, 3f, and 3g were modeled. Alternative 3b was not modeled because of its similarity to Alternative 3a. Alternatives 3c and 3d were not modeled, because their hydraulic impact would not be significantly different from the other segmental bridge options.

The model was run for existing and proposed conditions using the same land use and topography. The only difference in bathymetry for the proposed conditions model was a 200-foot wide dredged channel extending from Cape May Inlet, through Middle Thorofare, and just into Lower Thorofare at a depth of 25 feet below Mean Low Water, or –28 feet NAVD 1988, and a minimum tie-in slope of 2:1.

For proposed conditions, the existing bridge piers were replaced by proposed piers, and the roadway elements were disabled to represent the proposed vertical realignment of the causeway, which will allow no overtopping during the 100-year storm surge. In areas where proposed aerial structures follow the existing alignment or where the existing alignment is abandoned, the roadway elements were not disabled, but their elevations were decreased to that of the surrounding marsh. Four alternate bridge and roadway alignments were modeled:

Alternative 3a

In Alternative 3a, the proposed roadway follows an alignment just south of the existing alignment, but is wider and is raised to an elevation above the 100-year floodplain elevation. This option calls for a four span bridge over Mill Creek, a five span bridge over Upper Thorofare, and a twelve span, moveable span bridge over Middle Thorofare. The proposed alignment is represented in the model by disabling the roadway elements in the network and replacing the existing piers with the proposed piers. This prevents any flow connections across the roadway. The piers are shown in Figure 10.

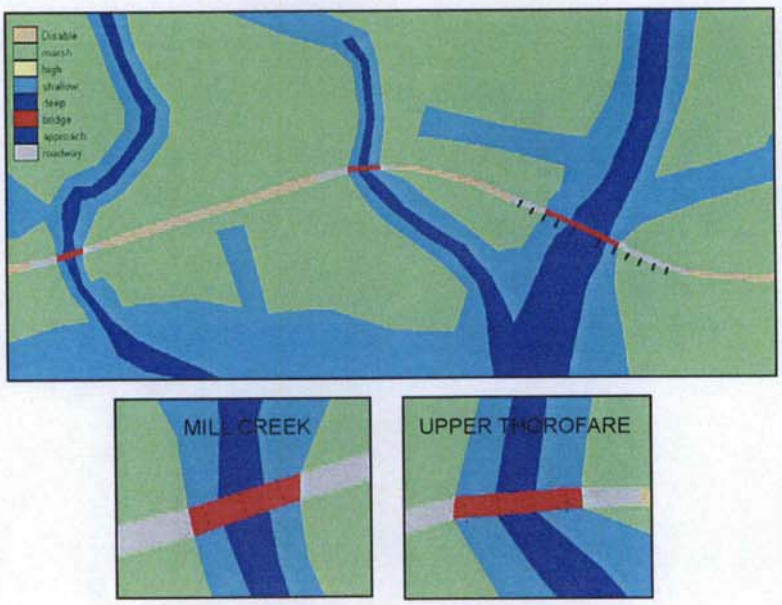

Figure 10: Ocean Drive Alternative 3a

Alternative 3e

In Alternative 3e, the proposed roadway follows the existing alignment except for the portion between Upper Thorofare and Middle Thorofare, which is spanned by a twenty-two span bridge, with 21 piers, that follows an alignment just south of the existing roadway. This option also calls for a four span bridge over Mill Creek that is the same as for Alternative 3a. The proposed alignment is represented in the model by replacing the existing piers with the proposed piers, and disabling the roadway elements except in the area between Upper and Middle Thorofares, where the roadway elements are lowered to represent the marsh under the proposed bridge. Refer to Figure 11.

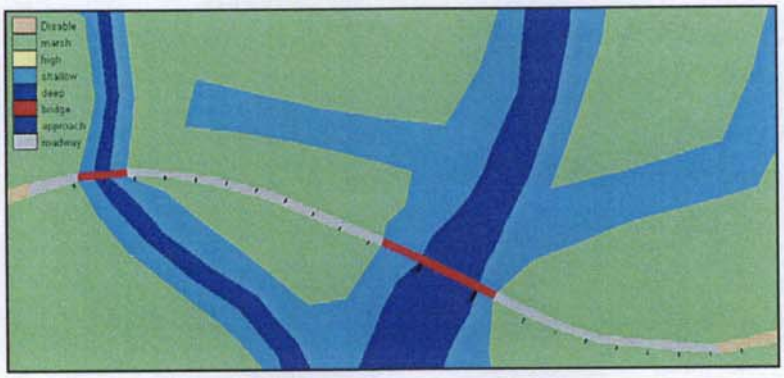

Figure 11: Ocean Drive Alternative 3e

Alternative 3f

In Alternative 3f, the proposed roadway follows the existing alignment except for the portion between Upper Thorofare and Middle Thorofare, which is spanned by a twenty-three span bridge with 22 piers that follows an alignment south of the existing roadway. This option also calls for a four span bridge over Mill Creek that is the same as for Alternative 3a. The proposed alignment is represented in the model by replacing the existing piers with the proposed piers, and disabling the roadway elements except in between the points where the proposed alignment ties in with the existing alignment. In the section where the roadway elements are not disabled, the roadway is lowered to the elevation of the marsh. The piers are shown in Figure 12.

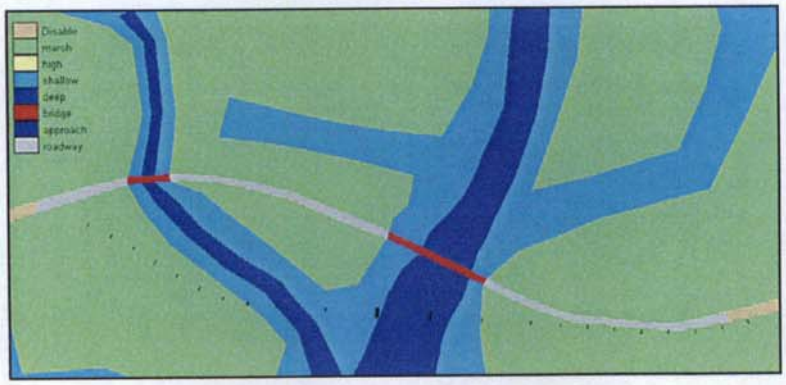

Figure 12: Ocean Drive Alternative 3f

Alternative 3g

In Alternative 3g, the proposed roadway follows the existing alignment except for the portion between Upper Thorofare and Middle Thorofare, which is spanned by a twenty-one span cable-stayed bridge with 20 piers that follows an alignment south of the existing roadway. The two main piers are larger than the other piers, and set outside of the deeper portion of Middle Thorofare. This option also calls for a four span bridge over Mill Creek that is the same as for Alternative 3a. The proposed alignment is represented in the model by replacing the existing piers with the proposed piers, and disabling the roadway elements except in between the points where the proposed alignment ties in with the existing alignment. In the section where the roadway elements are not disabled, the roadway is lowered to the elevation of the marsh. The piers are shown in Figure 13.

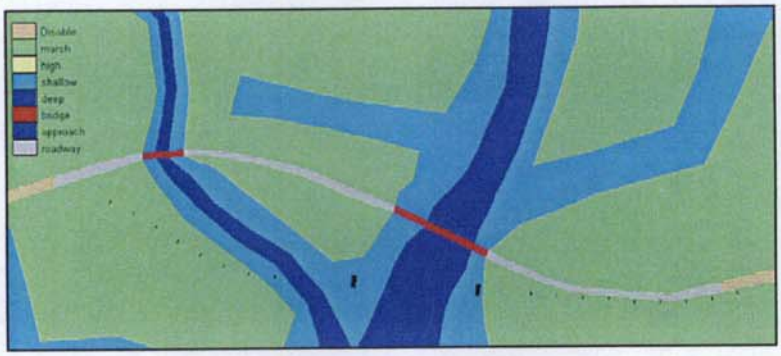

Figure 13: Ocean Drive Alternative 3g

HYDRAULIC ANALYSIS RESULTS

NORMAL TIDAL CIRCULATION

Flow Results

FESWMS-2DH was run to simulate normal tidal circulation for a 50-hour period. The model was run for Existing Conditions and Proposed Alternatives 3a, 3e, 3f, and 3g. All five models are essentially identical for the purposes of normal tidal circulation. Because normal tides do not overtop existing Ocean Drive, the pattern, timing, and volume of flow are essentially identical for existing conditions and proposed conditions.

Figure 14 shows maximum water depth in the marsh during the modeled tidal circulation, for Existing Conditions and Alternate 3a. The other alternates yield similar results. In both cases, the mean high water tide results in approximately 0.3 feet of water in the marsh. This is equal to the difference between Mean High Water and the Mean High Water for Neap Tides. Figure 15 shows velocity magnitude and direction coinciding with high tide. The slight differences can be attributed to the difference in the treatment of the roadway elements between the two models.

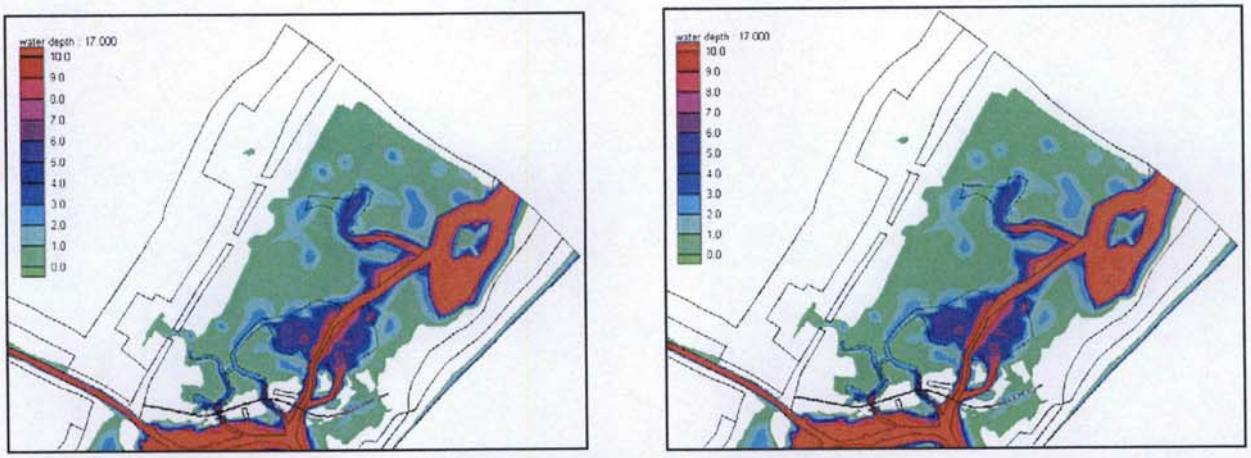

Figure 14: Water Depth in the Marsh During High Tide for Existing Conditions (left) and Alternative 3a (right)

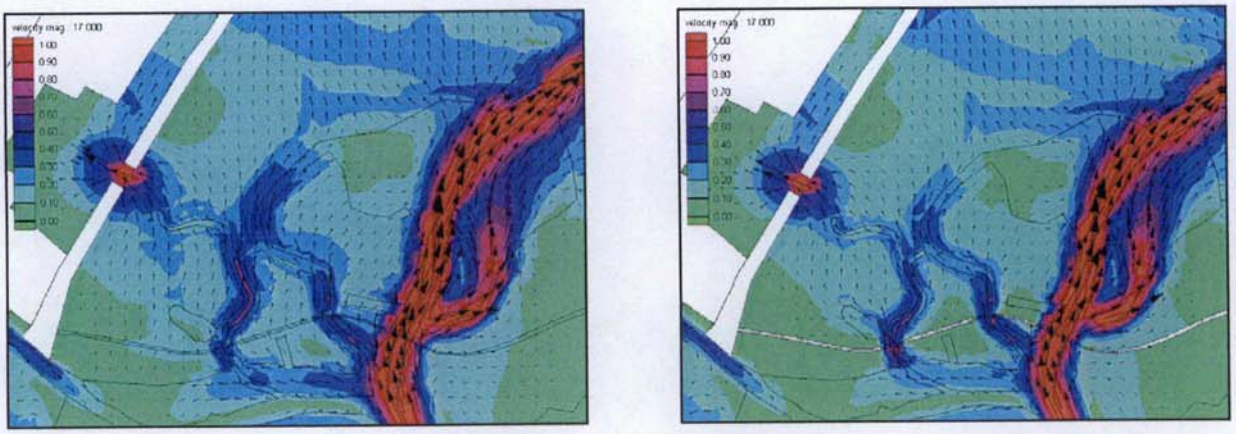

Figure 15: Velocity Magnitude and Direction in the Marsh During High Tide for Existing Conditions (left) and Alternative 3a (right)

FLOODPLAIN IMPACTS

Flow Results

FESWMS-2DH was run to simulate the 100-year storm surge. The surge is a 50-hour simulation that superimposes a surge on normal tidal cycles. The model was run for Existing Conditions and Proposed Alternatives 3a, 3e, 3f, and 3g.

Peak water surface elevations are shown in Figure 16 for Existing and Proposed Conditions. Peak water surface elevations are slightly higher on the north end of the marsh. Higher water surface elevations on the north side are a result of the obstruction to flow caused by Wildwood Boulevard. For existing conditions, the peak water surface elevation at the north end of the marsh occurs at hour 77.25, approximately fifteen minutes after the peak water surface elevation at the Middle Thorofare Bridge. Flow is primarily through the channels of Mill Creek, Upper Thorofare, and Middle Thorofare, but there is also flow that overtops the roadway.

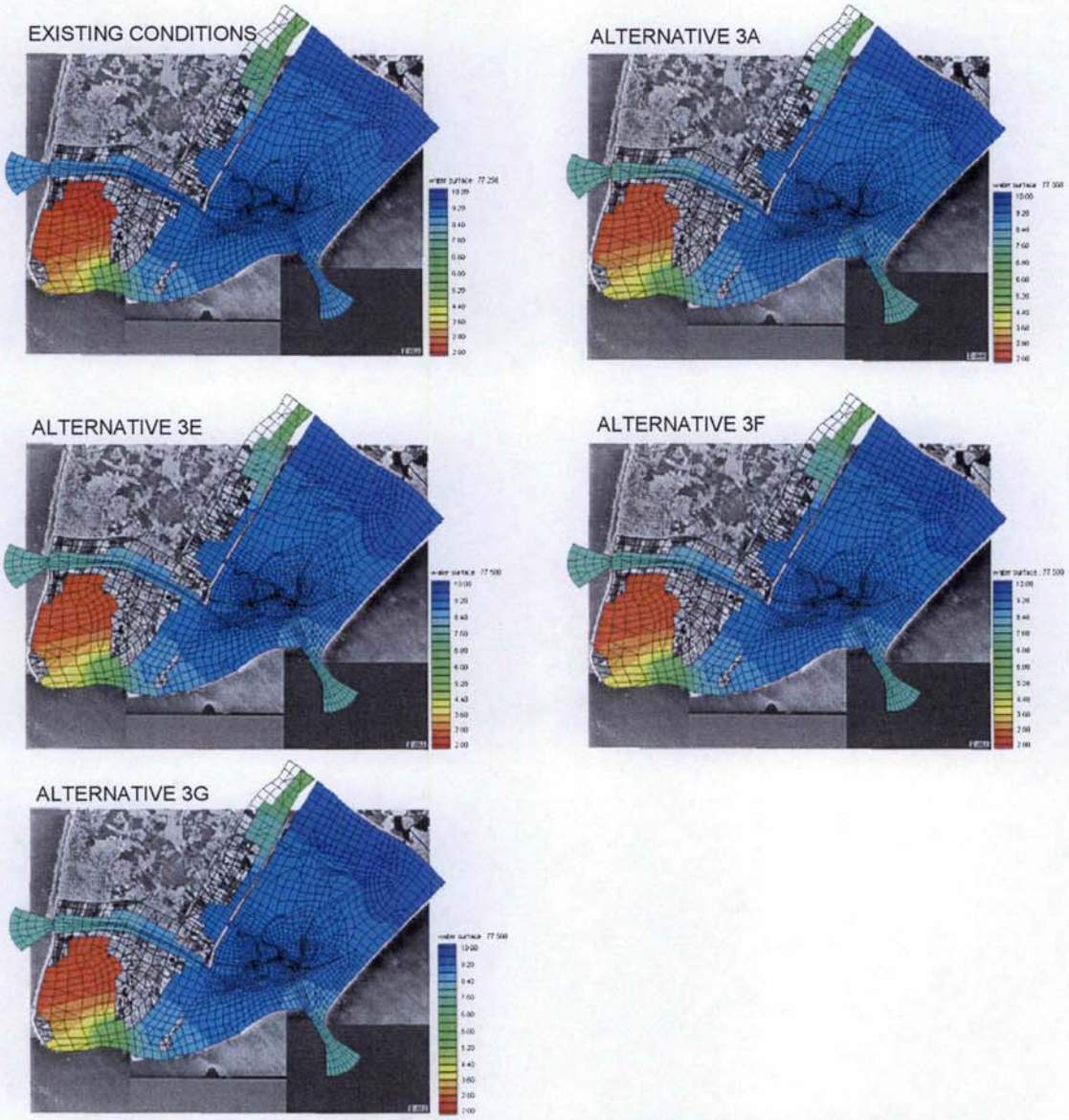

Figure 16: Peak Water Surface Elevations for 100-year Storm Surge

For proposed conditions, the peak water surface elevation in the northern end of the marsh occurs at hour 77.5, approximately fifteen minutes later than for existing conditions. The delay is due to the obstruction to flow caused by raising Ocean Drive. For proposed conditions, all flow is directed through Mill Creek, Upper Thorofare, and Middle Thorofare. The process is illustrated in Figure 17, which shows Ocean Drive for Existing Conditions and Alternative 3a. The color contours show water surface elevations on a scale of 7 to 9 feet. The arrows represent the direction and magnitude of flow velocity; larger arrows represent higher velocities.

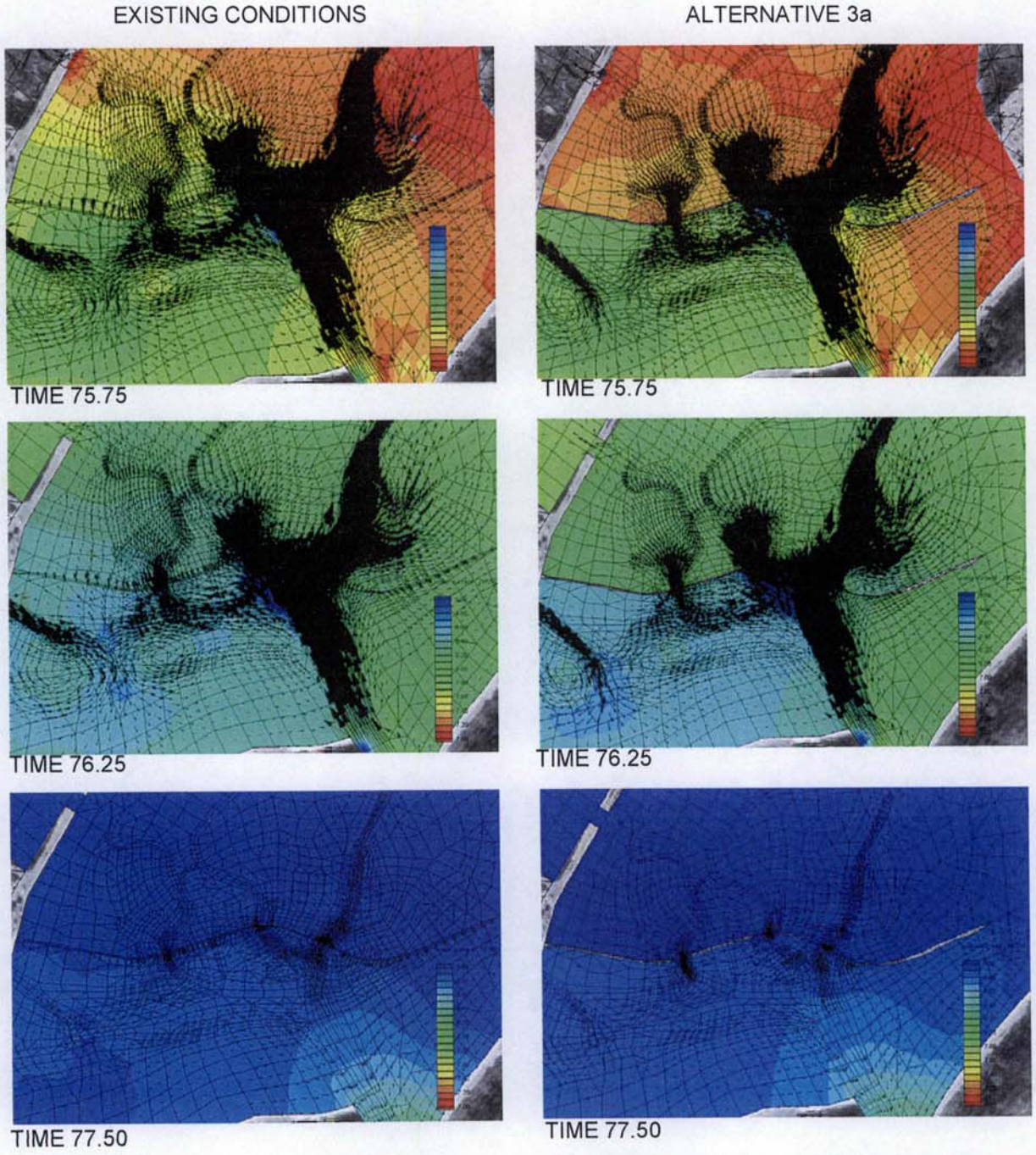

Figure 17: Velocity and Flood Elevation for Existing Conditions and Alternative 3a

At time 75.75, which coincides with the peak of the storm surge plus tide stage graph at the model boundaries, velocities across the western half of Ocean Drive reach up to 2.6 feet per second for existing conditions. For Alternate 3a, there is no flow over the roadway, velocities through the bridge openings are slightly higher, and the water surface elevations are lower immediately north of the western end of Ocean Drive.

At time 76.25, flow continues to be strong over the existing roadway, while the proposed roadway continues to prevent the water surface from rising as quickly on the western side of the marsh. By time 77.5, flow in the marsh has reversed. The existing roadway is overtopped by flows exiting the marsh. For proposed conditions, flow builds up along the northern side of Ocean Drive resulting in higher water surface elevations.

Discussion

Review of the model results shows that under existing conditions, roadway overtopping allows significant flow exchange in both directions during the storm surge. Removal of this exchange by raising the roadway causes water to first back up on the south side of Ocean Drive, and prevents flow relief after the storm surge on the north side. The net effect is that there are slight changes in the peak water surface elevations.

There are also changes in the pattern of flows at the bridge openings, particularly at the Mill Creek Bridge. Figure 18 shows the velocity magnitude and direction at the bridge for Existing Conditions and Alternative 3a. Results for the other proposed alternatives are similar. Because the flood cannot breach the proposed roadway, all flow is directed through the bridge opening. Changes in flow patterns at the other two bridges are less significant, as shown in Figure 19.

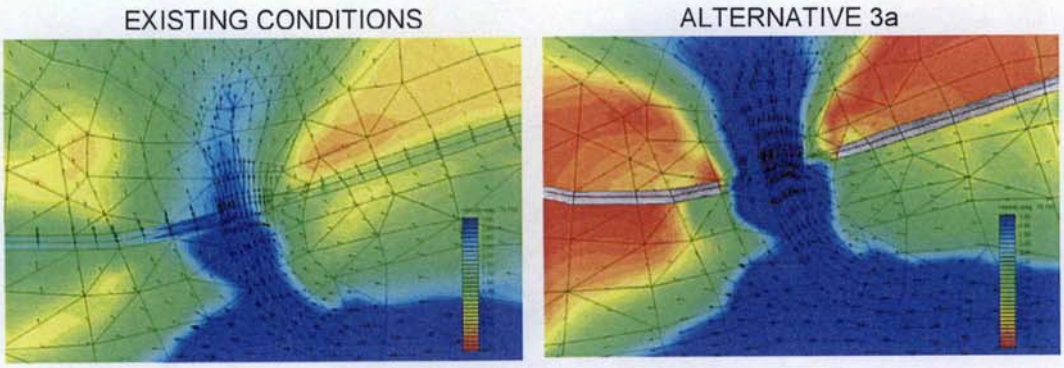

Figure 18: Velocity Magnitude and Direction at the Mill Creek Bridge

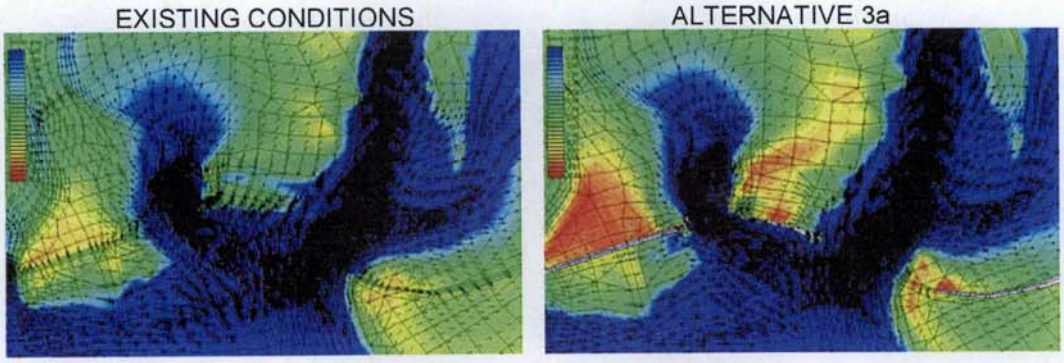

Figure 19: Velocity Magnitude and Direction at the Upper and Middle Thorofare Bridges

SCOUR ANALYSIS

Results from the hydraulic analysis of Ocean Highway were used to prepare a scour analysis of the bridges over Mill Creek, Upper Thorofare, and Middle Thorofare. Bridge scour is a function of the combination of flow depth at bridge piers and flow velocity. Typically, maximum scour at tidal bridges does not occur at the same time as peak water surface levels because water velocities drop to zero as water surfaces peak and flow reverses. Peak scour potential at the three bridges occurs on the rising storm surge when velocities peak. Scour potential at the bridge was evaluated using the guidelines and procedures presented in the Federal Highway Administration Hydraulic Engineering Circular No. 18: *Evaluating Scour at Bridges, Fourth Edition* (HEC-18). In the scour analysis, total potential scour is estimated as the sum of three components: long-term trends, contraction scour, and local scour.

Long-Term Trends

Long-term trends refer to trends in the geomorphic shape of the channel that are a result of evolutionary processes. These changes may be the natural trend of the stream or may be the result of some modification to the stream or watershed. Long-term trends should be thought of as occurring over a period of years or decades rather than days. These trends may change over the life of a bridge.

Because the flow in tidal channels within saltwater marshes is bi-directional, the channels tend to remain fairly stable, and they do not meander as much as streams that are subject to a unidirectional flow (Mitsch and Gosselink, 1993). Long-term vertical bed stability under these conditions is good. Long-term scour trends at the Ocean Drive are therefore negligible.

Contraction Scour

Contraction scour is caused by channel width constriction at the bridge crossing. Contraction scour occurs when the area of flow is decreased, resulting in increased velocities and bed shear stress in the contracted area. There are two basic forms of contraction scour, live-bed and clear-water, both of which are based on the principle of conservation of sediment transport. Live-bed is the condition where bed material upstream of the crossing is being transported. For live-bed scour, material is removed until equilibrium is reached between sediment transported into and out of the contracted section. Clear-water is the condition where there is no transportation of upstream bed material.

Determination of clear water or live bed scour conditions is made by evaluating the critical velocity for transport of sediment. Critical velocity is estimated using:

$$V_c = 11.17\, y^{1/6}\, D_{50}^{1/3}$$

where V_c is the critical velocity (fps);

y is the average depth of flow (ft); and

D_{50} is median particle size of the of the bed material (ft).

The value of D_{50} for the Middle Thorofare Bridge is 0.051 mm in the channel, from the March, 2003, borings by Warren George, Inc. The average depth of flow for the 100 and 500-year events was determined using the bathymetric data from the project survey and the water surface elevations from the modeling output.

Live bed conditions exist in the channels because the critical velocity for beginning of sediment motion is less than the mean channel velocity. FHWA (in HEC-18) recommends the modified version of Laursen's 1960 equation for estimating live-bed contraction scour. Laursen's equation will overestimate scour if the contraction is the result of bridge piers and abutments. The equation is

$$\frac{Y_2}{Y_1} = \left(\frac{Q_2}{Q_1}\right)^{\frac{6}{7}} \left(\frac{W_1}{W_2}\right)^{k_1}$$

where

Y_1 = average depth in the upstream main channel, feet

Y_2 = average depth in the contracted section, feet

W_1 = bottom width of the upstream main channel, feet

W_2 = bottom width of the contracted section, feet

Q_1 = flow in the upstream channel transporting sediment, cfs

Q_2 = flow in the contracted channel, cfs

k_1 = relates to the mode of bed material transport

Y_S = $Y_2 - Y_1$ = average contraction scour depth, feet

For all but the Middle Thorofare piers for Alternative 3a, contraction scour is zero. Contraction scour calculations are given in Appendix B.

Local Pier Scour

Local scour is the result of water flowing around a pier or an abutment. These obstructions induce the formation of vortex systems caused by the acceleration of the flow around the obstruction. A horseshoe vortex is formed by water hitting the upstream surface of the obstruction. In addition, piers have vertical vortices, referred to as wake vortices, downstream of the obstruction. Both vortices remove material from the base of the obstruction. However, the intensity of the vortices diminishes downstream from the obstruction.

The Colorado State University (CSU) equation is one of the numerous pier scour equations that have been developed, mainly from laboratory models. The basic input parameters are flow depth, pier shape, Froude number, pier width, and angle of attack. The CSU equation estimates equilibrium scour depths.

The CSU equation is:

$$\frac{Y_s}{Y_1} = 2.0 K_1 K_2 K_3 K_4 \left(\frac{a}{Y_1}\right)^{0.65} Fr_1^{0.43}$$

where:

Y_s = scour depth (ft.)

Y_1 = flow depth just upstream of the pier (ft.)

K_1 = correction for pier nose shape

K_2 = correction for angle of attack

K_3 = correction factor for bed condition

K_4 = correction factor for armoring

a = pier width (ft.)

Fr = Froude number.

The above equation applies when the footing below the pier remains below the bed elevation. Pier footings and/or pile caps may be exposed to the flow either by design or by long-term degradation, contraction scour, or lateral shifting of the stream.

The May 2001 version of HEC-18 has modified the computational methods for complex pier foundations. The methodology is called the "superposition of scour components method of analysis." The components of a complex pier are shown in Figure 20.

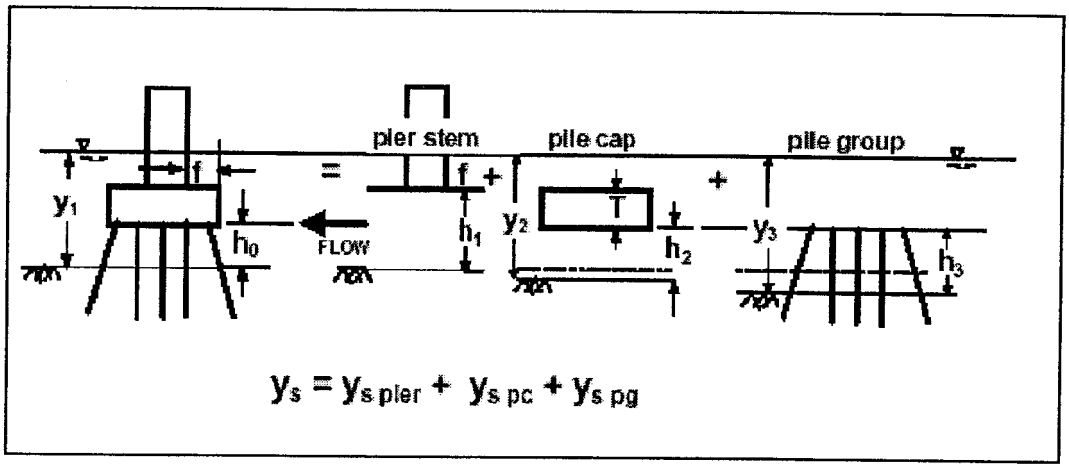

Figure 20: HEC-18 Figure 6.4, Definition Sketch of Scour Components for a Complex Pier

Earlier editions of HEC-18 had recommended using the larger of the exposed footing scour estimate or the pier stem scour estimate, treating the pier stem portion as a full depth pier that extended below the scour depth. The current HEC-18 recommends adding the components using a more realistic estimate of the pier stem component and using an adjusted approach velocity, V_2 to calculate V_f and a wide pier correction factor in the computations for the exposed footing component of scour.

The variables used in the analysis are as follows:

f = distance between the front edge of pile cap or footing and pier, ft

h_o = height of the pile cap above bed at beginning of computation, ft
$h_1 = h_0 + T$ = height of pier stem above the bed before scour, ft
$h_2 = h_0 + y_{spier}/2$ = height of pile cap after pier stem scour component has been computed, ft
$h_3 = h_o + y_{spier}/2 + y_{spc}/2$ = height of pile group after the pier stem and pile cap scour components have been computed, ft
S = spacing between columns of piles, pile center to pile center, ft
T = thickness of pile cap or footing, ft
y_1 = approach flow depth at the beginning of computations, ft
$y_2 = y_1 + y_{spier}/2$ = adjusted flow depth for pile cap computations, ft
$y_3 = y1 + y_{spier}/2 + y_{spc}/2$ = adjusted flow depth for pile group computations, ft
V_1 = approach velocity used at the beginning of computations, fps
$V_2 = V_1(y_1/y_2)$ = adjusted velocity for pile cap computations, fps
$V_3 = V_1(y_1/y_3)$ = adjusted velocity for pile group computations, fps

The total scour by superposition is as follows:

$y_s = y_{spier} + y_{spc} + y_{spg}$

Where:

y_s = total scour depth, ft
y_{spier} = scour component for the pier stem in the flow, ft
y_{spc} = scour component for the pier cap or footing in the flow, ft
y_{spg} = scour component for the piles exposed to the flow, ft

The pier stem component is determined by the following equation:

$$y_{spier} = y_1 K_{hpier}\left[2.0K_1K_2K_3K_4\left(\frac{a_{pier}}{y_1}\right)^{0.65}\left(\frac{V_1}{\sqrt{gy_1}}\right)^{0.43}\right]$$

Where:

K_{hpier} = coefficient to account for the height of the pier stem above the bed and the shielding effect by the pile cap overhang distance, f, in front of the pier stem (Determine from figure 6.5 in HEC-18)

The pile cap (footing) scour component is determined by the following equation:

Case 1: The bottom of the pile cap is above the bed and in the flow either by design or after the bed has been lowered by scour caused by the pier stem component.

$$y_{spc} = y_2\left[2.0K_1K_2K_3K_4K_w\left(\frac{a^*_{pc}}{y_2}\right)^{0.65}\left(\frac{V_2}{\sqrt{gy_2}}\right)^{0.43}\right]$$

Where:

$a^*_{pc} = (a^*_{pc} / a_{pc}) a_{pc}$, a^*_{pc} is determined from Figure 6.6 in HEC-18

K_w = wide pier correction factor

Case 2: The bottom of the pile cap (footing) is located on or below the bed.

$$y_{spc} = y_f \left[2.0 K_1 K_2 K_3 K_4 K_w \left(\frac{a_{pc}}{y_f} \right)^{0.65} \left(\frac{V_f}{\sqrt{g y_f}} \right)^{0.43} \right]$$

Where:

V_f = the average velocity of flow at the exposed footing, fps

$$V_f = \frac{\ln\left(10.93 \frac{y_f}{k_s} + 1 \right)}{\ln\left(10.93 \frac{y_2}{k_s} + 1 \right)}$$

Where:

k_s = grain roughness of bed (normally taken as the D_{84} of the bed material), ft

Scour estimates for all of the piers of the existing bridges along Ocean Drive were determined using the methodology for simple piers. Scour estimates for the proposed piers for the Mill Creek Bridge (all alternatives) were also determined using the simple pier methodology, as were the estimates for the proposed Upper Thorofare Bridge for Alternative 3a. Scour estimates for the remaining proposed piers were determined using the methodology for Case 1 scour. Pier Scour Calculations are given in Appendix C.

Local Abutment Scour

Local abutment scour occurs at abutments when the abutment obstructs the flow. The obstruction of the flow forms a horizontal vortex along the abutment similar to the vortex formed at piers. Abutment failures and erosion of the approach have occurred from the action of the downstream wake vortex. Abutment scour depends on the interaction of the flow obstructed by the abutment and approach and the flow in the main channel at the abutment. Despite the fact that the abutments of the Ocean Drive Bridges obstruct flow, abutment scour is negligible since the majority of the flow passes through the bridge openings. Flow in the marsh that cannot pass over the roadway circulates through the marsh rather than being directed along the roadway and through the bridge openings.

SCOUR ANALYSIS RESULTS

Scour analysis results for Existing Conditions and Proposed Alternatives 3a, 3e, 3f, and 3g are given in Tables 3, 4, 5, 6, and 7, respectively. Contraction scour for all but the Middle Thorofare piers for Alternative 3a is negligible, not only because the piers take up such a small percentage of the flow area, but also because the flow spreads out significantly as it moves northward.

The results of the scour analysis are discussed below for each condition modeled. The piers are labeled numerically from west to east by bridge, such that Pier 3aMC2 is the second pier from the west on the Mill Creek Bridge for Alternative 3a.

Existing Conditions

For existing conditions, estimated scour depths range from 4.2 to 5 feet in Mill Creek, from 8.6 to 11.2 feet in Upper Thorofare, and from 5.4 to 30.3 feet in Middle Thorofare.

Table 4: Scour Estimates for Existing Conditions

Pier	Scour Depths (feet)				Ground Elevation (ft NAVD88)	Scour Elevation (ft NAVD88)
	Contraction	Local	Long Term	Total		
Mill Creek						
ExMC1	0.0	4.2	0.0	4.2	-2.5	-6.6
ExMC2	0.0	4.5	0.0	4.5	-5.7	-10.2
ExMC3	0.0	4.4	0.0	4.4	-10.5	-14.9
ExMC4	0.0	4.4	0.0	4.4	-14.3	-18.7
ExMC5	0.0	4.6	0.0	4.6	-14.9	-19.5
ExMC6	0.0	4.7	0.0	4.7	-15.0	-19.7
ExMC7	0.0	4.8	0.0	4.8	-12.8	-17.6
ExMC8	0.0	4.9	0.0	4.9	-10.4	-15.3
ExMC9	0.0	4.9	0.0	4.9	-6.3	-11.2
ExMC10	0.0	5.0	0.0	5.0	-2.6	-7.6
ExMC11	0.0	4.7	0.0	4.7	0.3	-4.4
Upper Thorofare						
ExUT1	0.0	8.6	0.0	8.6	0.3	-8.3
ExUT2	0.0	8.8	0.0	8.8	-1.5	-10.3
ExUT3	0.0	8.7	0.0	8.7	-3.8	-12.5
ExUT4	0.0	9.0	0.0	9.0	-6.0	-15.0
ExUT5	0.0	9.3	0.0	9.3	-8.2	-17.5
ExUT6	0.0	9.5	0.0	9.5	-9.3	-18.8
ExUT7	0.0	9.4	0.0	9.4	-10.1	-19.5
ExUT8	0.0	9.3	0.0	9.3	-10.9	-20.2
ExUT9	0.0	9.6	0.0	9.6	-11.0	-20.6
ExUT10	0.0	10.0	0.0	10.0	-9.2	-19.2
ExUT11	0.0	10.5	0.0	10.5	-7.2	-17.7
ExUT12	0.0	10.9	0.0	10.9	-3.9	-14.8
ExUT13	0.0	11.2	0.0	11.2	-0.9	-12.2
Middle Thorofare						

Pier	Scour Depths (feet)				Ground Elevation (ft NAVD88)	Scour Elevation (ft NAVD88)
	Contraction	Local	Long Term	Total		
ExMT1	0.0	6.4	0.0	6.4	0.9	-5.5
ExMT2	0.0	6.6	0.0	6.6	-0.2	-6.8
ExMT3	0.0	6.7	0.0	6.7	-1.3	-8.0
ExMT4	0.0	7.2	0.0	7.2	-3.2	-10.4
ExMT5	0.0	7.9	0.0	7.9	-6.3	-14.2
ExMT6	0.0	8.3	0.0	8.3	-9.7	-18.0
ExMT7	0.0	8.2	0.0	8.2	-13.3	-21.5
ExMT8	0.0	18.1	0.0	18.1	-17.5	-35.6
ExMT9	0.0	19.6	0.0	19.6	-26.7	-46.3
ExMT10	0.0	25.1	0.0	25.1	-32.7	-57.8
ExMT11	0.0	30.3	0.0	30.3	-32.9	-63.2
ExMT12	0.0	23.2	0.0	23.2	-30.2	-53.4
ExMT13	0.0	17.7	0.0	17.7	-26.3	-44.0
ExMT14	0.0	8.1	0.0	8.1	-20.6	-28.7
ExMT15	0.0	7.5	0.0	7.5	-15.8	-23.3
ExMT16	0.0	6.9	0.0	6.9	-12.9	-19.8
ExMT17	0.0	5.6	0.0	5.6	-9.5	-15.1
ExMT18	0.0	5.4	0.0	5.4	-5.5	-10.9
ExMT19	0.0	5.4	0.0	5.4	-1.7	-7.1
ExMT20	0.0	5.4	0.0	5.4	-0.9	-6.3
ExMT21	0.0	5.8	0.0	5.8	0.9	-4.9

Alternative 3a

For Alternative 3a, estimated scour depths range from 6.2 to 7.9 feet in Mill Creek, from 12.2 to 15.9 feet in Upper Thorofare, and from 16.7 to 66.1 feet in Middle Thorofare. Scour estimates at Piers MT5 and MT6 are higher than other piers due to the location of the pile caps, which contribute more than 90% of the scour depth estimate. The pile caps are at an elevation tha obstructs the flow, causing increased scour. Scour estimates at Piers MT4 and MT7 are roughly 60% lower because the pile cap is suspended in the flow column, and does not present as large an obstacle to the flow. Scour depths for Alternative 3b would be of similar magnitude.

Table 5: Scour Estimates for Alternative 3a

Pier	Scour Depths (feet)				Ground Elevation (ft NAVD88)	Scour Elevation (ft NAVD88)
	Contraction	Local	Long Term	Total		
Mill Creek						
3aMC1	0.0	6.2	0.0	6.2	-10.4	-16.6
3aMC2	0.0	7.6	0.0	7.6	-14.8	-22.4
3aMC3	0.0	7.9	0.0	7.9	-4.4	-12.3
Upper Thorofare						
3aUT1	0.0	12.2	0.0	12.2	-2.9	-15.1
3aUT2	0.0	13.6	0.0	13.6	-9.2	-22.8

Pier	Scour Depths (feet)				Ground Elevation (ft NAVD88)	Scour Elevation (ft NAVD88)
	Contraction	Local	Long Term	Total		
3aUT3	0.0	14.6	0.0	14.6	-12.0	-26.6
3aUT4	0.0	15.9	0.0	15.9	-5.8	-21.7
Middle Thorofare						
3aMT1	3.6	23.9	0.0	27.5	4.0	-23.5
3aMT2	3.6	26.9	0.0	30.6	1.4	-29.2
3aMT3	3.6	30.5	0.0	34.1	-4.0	-38.1
3aMT4	3.6	15.7	0.0	19.4	-15.2	-34.6
3aMT5	3.6	62.4	0.0	66.1	-31.0	-97.1
3aMT6	3.6	55.7	0.0	59.3	-29.0	-88.3
3aMT7	3.6	14.3	0.0	17.9	-13.5	-31.4
3aMT8	3.6	19.2	0.0	22.9	-4.2	-27.1
3aMT9	3.6	14.3	0.0	17.9	2.0	-15.9
3aMT10	3.6	13.8	0.0	17.4	3.4	-14.0
3aMT11	3.6	13.1	0.0	16.7	3.9	-12.8

Alternative 3e

For Alternative 3e, estimated scour depths range from 6.1 to 7.7 feet in Mill Creek, and from 5.4 to 33.8 feet across Upper Thorofare and Middle Thorofare. Scour estimates at Piers MT1 and MT3, which border Upper Thorofare, are higher than the other piers due to the elevation of the pile caps, which contribute more than 50% of the scour depth estimate. The pile cap is also the major contributor to scour at Pier MT11, accounting for 23.6 feet of the total estimated depth of 33.8 feet. At Pier MT21, the scour estimate is heavily influenced by an angle of attack of nearly 45 degrees. This attack angle increases the pile cap scour by a factor of 1.48 compared to a similar pier aligned with the flow.

Table 6: Scour Estimates for Alternative 3e

Pier	Scour Depths (feet)				Ground Elevation (ft NAVD88)	Scour Elevation (ft NAVD88)
	Contraction	Local	Long Term	Total		
Mill Creek						
3eMC1	0.0	6.1	0.0	6.1	-10.4	-16.5
3eMC2	0.0	7.5	0.0	7.5	-14.8	-22.3
3eMC3	0.0	7.7	0.0	7.7	-4.4	-12.1
Middle Thorofare						
3eMT1	0.0	35.8	0.0	35.8	1.0	-34.8
3eMT2	0.0	22.7	0.0	22.7	-9.5	-32.2
3eMT3	0.0	34.7	0.0	34.7	0.0	-34.7
3eMT4	0.0	25.5	0.0	25.5	4.0	-21.5
3eMT5	0.0	15.5	0.0	15.5	5.8	-9.7
3eMT6	0.0	15.0	0.0	15.0	5.8	-9.2
3eMT7	0.0	16.0	0.0	16.0	6.0	-10.0
3eMT8	0.0	19.6	0.0	19.6	6.0	-13.6

Pier	Scour Depths (feet)				Ground Elevation (ft NAVD88)	Scour Elevation (ft NAVD88)
	Contraction	Local	Long Term	Total		
3eMT9	0.0	23.6	0.0	23.6	5.9	-17.7
3eMT10	0.0	23.4	0.0	23.4	4.0	-19.4
3eMT11	0.0	33.8	0.0	33.8	0.1	-33.7
3eMT12	0.0	19.8	0.0	19.8	-28.9	-48.7
3eMT13	0.0	14.9	0.0	14.9	-24.3	-39.2
3eMT14	0.0	18.1	0.0	18.1	0.4	-17.8
3eMT15	0.0	14.4	0.0	14.4	3.4	-11.0
3eMT16	0.0	17.1	0.0	17.1	2.2	-14.9
3eMT17	0.0	14.0	0.0	14.0	2.7	-11.3
3eMT18	0.0	16.4	0.0	16.4	3.2	-13.2
3eMT19	0.0	18.6	0.0	18.6	2.1	-16.5
3eMT20	0.0	5.4	0.0	5.4	2.9	-2.5
3eMT21	0.0	23.1	0.0	23.1	2.6	-20.5

Alternative 3f

For Alternative 3f, estimated scour depths range from 6.2 to 7.7 feet in Mill Creek, and from 4.6 to 36.2 feet across Upper Thorofare and Middle Thorofare. Piers MT1 through MT9 and MT22 all have an angle of attack greater then 45 degrees. At these piers, aligning the piers to the flow would reduce the pier stem component of scour by a factor of approximately 1.8, and would reduce the pile cap component of scour by a factor of approximately 1.3. Scour depths for Alternatives 3c and 3d would be similar to those of Alternatives 3e and 3f.

Table 7: Scour Estimates for Alternative 3f

Pier	Scour Depths (feet)				Ground Elevation (ft NAVD88)	Scour Elevation (ft NAVD88)
	Contraction	Local	Long Term	Total		
Mill Creek						
3fMC1	0.0	6.2	0.0	6.2	-10.4	-16.6
3fMC2	0.0	7.4	0.0	7.4	-14.8	-22.2
3fMC3	0.0	7.7	0.0	7.7	-4.4	-12.1
Middle Thorofare						
3fMT1	0.0	14.9	0.0	14.9	6.5	-8.4
3fMT2	0.0	18.8	0.0	18.8	7.2	-11.6
3fMT3	0.0	18.2	0.0	18.2	5.2	-13.0
3fMT4	0.0	22.9	0.0	22.9	3.0	-19.9
3fMT5	0.0	28.4	0.0	28.4	0.4	-28.0
3fMT6	0.0	33.2	0.0	33.2	0.5	-32.7
3fMT7	0.0	34.5	0.0	34.5	0.5	-34.0
3fMT8	0.0	36.2	0.0	36.2	0.5	-35.7
3fMT9	0.0	31.5	0.0	31.5	-1.9	-33.4
3fMT10	0.0	24.6	0.0	24.6	-6.9	-31.5

Pier	Scour Depths (feet)				Ground Elevation (ft NAVD88)	Scour Elevation (ft NAVD88)
	Contraction	Local	Long Term	Total		
3fMT11	0.0	18.5	0.0	18.5	-22.3	-40.8
3fMT12	0.0	18.2	0.0	18.2	-27.0	-45.2
3fMT13	0.0	17.7	0.0	17.7	-4.2	-21.9
3fMT14	0.0	14.3	0.0	14.3	2.9	-11.4
3fMT15	0.0	14.9	0.0	14.9	2.2	-12.7
3fMT16	0.0	14.1	0.0	14.1	2.7	-11.4
3fMT17	0.0	11.7	0.0	11.7	3.3	-8.4
3fMT18	0.0	14.9	0.0	14.9	2.0	-12.9
3fMT19	0.0	15.0	0.0	15.0	2.9	-12.1
3fMT20	0.0	15.2	0.0	15.2	2.7	-12.5
3fMT21	0.0	12.5	0.0	12.5	1.9	-10.6
3fMT22	0.0	4.6	0.0	4.6	2.2	-2.4

Alternative 3g

For Alternative 3g, estimated scour depths range from 6.2 to 7.7 feet in Mill Creek, and from 5.2 to 53.6 feet across Upper Thorofare and Middle Thorofare. Estimates of scour for the main piers, Piers MT10 and MT11, are high due to the shear size of the pier stems and pile caps. Using rounded pile caps and piers stems, rather than square, reduces the scour estimates at these piers by roughly five feet.

Table 8: Scour Estimates for Alternative 3g

Pier	Scour Depths (feet)				Ground Elevation (ft NAVD88)	Scour Elevation (ft NAVD88)
	Contraction	Local	Long Term	Total		
Mill Creek						
3gMC1	0.0	6.2	0.0	6.2	-10.4	-16.6
3gMC2	0.0	7.4	0.0	7.4	-14.8	-22.2
3gMC3	0.0	7.7	0.0	7.7	-4.4	-12.1
Middle Thorofare						
3gMT1	0.0	7.8	0.0	7.8	8.0	0.2
3gMT2	0.0	19.3	0.0	19.3	6.5	-12.8
3gMT3	0.0	19.4	0.0	19.4	4.3	-15.1
3gMT4	0.0	23.2	0.0	23.2	2.0	-21.2
3gMT5	0.0	32.0	0.0	32.0	0.3	-31.8
3gMT6	0.0	34.0	0.0	34.0	0.5	-33.5
3gMT7	0.0	34.9	0.0	34.9	0.5	-34.4
3gMT8	0.0	32.5	0.0	32.5	-0.4	-32.9
3gMT9	0.0	39.0	0.0	39.0	-7.0	-46.0
3gMT10	0.0	53.6	0.0	53.6	-8.0	-61.6
3gMT11	0.0	37.9	0.0	37.9	-5.0	-42.9

Pier	Scour Depths (feet)				Ground Elevation (ft NAVD88)	Scour Elevation (ft NAVD88)
	Contraction	Local	Long Term	Total		
3gMT12	0.0	20.0	0.0	20.0	2.8	-17.2
3gMT13	0.0	14.8	0.0	14.8	2.4	-12.4
3gMT14	0.0	14.2	0.0	14.2	2.5	-11.7
3gMT15	0.0	11.6	0.0	11.6	3.5	-8.1
3gMT16	0.0	15.1	0.0	15.1	1.9	-13.2
3gMT17	0.0	15.0	0.0	15.0	2.8	-12.2
3gMT18	0.0	15.1	0.0	15.1	2.7	-12.4
3gMT19	0.0	12.4	0.0	12.4	1.9	-10.5
3gMT20	0.0	5.2	0.0	5.2	2.0	-3.2

SUMMARY AND CONCLUSIONS

Ocean Drive is the primary connection between the south New Jersey mainland and the barrier island on which the community of Wildwood is located. The vertical profile of Ocean Drive is low with long sections located below the FEMA 100-year floodplain elevation of 9.1 feet NAVD 1988. Proposed conditions will raise the roadway's vertical alignment above the level of the 100-year storm surge and will replace the bridges over Mill Creek, Upper Thorofare, and Middle Thorofare.

The purpose of this study is to evaluate the impacts on tidal circulation and floodplain elevations associated with raising the roadway, and to evaluate scour depths associated with proposed bridge replacement alternatives over Mill Creek, Upper Thorofare, and Middle Thorofare. Hydraulic impacts were evaluated using two-dimensional hydraulic modeling. Conclusions based on model results are as follows:

- Raising to roadway to an elevation above the 100-year floodplain elevation of 9.1 feet NAVD 1988 prevents roadway overtopping during a 100-year event, and has no impacts on peak flood elevations in the vicinity of Ocean Drive.
- Raising the roadway will not impact normal tidal circulation. The existing roadway blocks tidal circulation between the north and south sides of the roadway.
- Raising the roadway slightly alters the timing of peak flood elevations for the 100-year storm surge, but does not result in any significant difference in flood elevations in the marsh or along Ocean Drive. Because roadway overtopping is prevented, raising the roadway will create an increase in peak water surface elevation of less than 0.2 feet on the south side of the causeway, and a decrease in peak water surface elevation on the north side of the causeway of less than 0.2 feet. The south side of Ocean Drive will flood faster under proposed conditions because of the restriction caused by the raised roadway. Similarly, it will take longer for the marsh to drain as the flood recedes, because all water will have to leave through the three channels.
- Raising the roadway alters the timing and volume of flow through the Mill Creek Bridge, and increases potential scour depth by approximately 50%. Even with the increase, however, the scour estimates are not excessive, and can be easily accommodated in the final design.
- Scour estimates for several of the proposed piers are high primarily due to the preliminary nature of the design. As the design is refined, scour estimates can be reduced by improving pier alignment to flow, and using rounded edges for pier stems and pile caps. The use of drilled shafts rather than pier stems supported by pile caps founded on pile groups would also reduce scour estimates.

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APPENDIX A: MODEL INPUT PARAMETERS

Cape May Material Properties

Material	n1	n2	D1	D2	Vo	Storativity
Marsh	0.06	0.035	1	5	100	3
High	0.08	0.065	1	5	100	0
Shallow	0.024	0.018	1	5	100	6
Deep	0.021	0.016	2	10	50	3
Bridge	0.021	0.016	2	5	50	3
Very_High	0.1	0.08	1	5	100	0
Approach	0.021	0.016	2	10	500	3
High_Slope	0.1	0.08	1	2	50	1

Cape May Simulation Parameters

Simulation Parameter	Value
Starting Water Surface Elevation	0.0
Average Water Density (slugs/ft3)	1.937
Unit Flow Convergence	0.1
Water Depth Convergence	0.01
Depth Tolerance for Drying (ft)	0.5
Relaxation Factor	0.9
Iterations	12
Time Step Size	0.25
Start Time	0
Simulation Duration	100.0
Time Integration Factor	0.667

APPENDIX B: CONTRACTION SCOUR CALCULATIONS

Ocean Highway, Cape May, NJ
Bridges over Mill Creek, Upper Thorofare, and Middle Thorofare
Contraction Scour Computations
Page 1 of 1
Pier Configuration: Existing Conditions
Scour Event: 100-year Tidal Storm Surge

MADE BY: Jennifer Sampson
DATE: 2 May 2003
CHECKED BY: Kelly Brennan
DATE: 6 May 2003

Determine Live-bed or Clear-water Contraction Scour

	Parameters	Unit	Note	Mill Creek	Upper Thorofare	Middle Thorofare
V_1	Average velocity in upstream reach	(fps)		3.35	8.80	7.70
y_1	Average depth in the upstream main channel	(ft)		13.52	10.82	20.80
D_{50}	D_{50}	(ft)		0.0002	0.0002	0.0002
ω	Fall velocity (Figure 5.8 in HEC-18) ω (fps) = 3.28ω (m/s)	(fps)		0.0092	0.0092	0.0092
	Computations					
V_c	Critical Velocity, $V_c = 11.17 * y^{(1/6)} D^{(1/3)}$	(fps)		1.01	0.97	1.08
	Scour Type			***Live-bed***	***Live-bed***	***Live-bed***

Live-bed Contraction Scour

	Parameters	Unit	Note	Mill Creek	Upper Thorofare	Middle Thorofare
Q_1	Flow in the upstream channel transporting sediment	(cfs)	1	10081	32247	181532
Q_2	Flow in the contracted channel	(cfs)	2	11754	29762	190059
W_1	Bottom width of upstream main channel that is transporting bed material	(ft)	3	216.50	345.00	1006.00
W_2	Bottom width of the main channel in the contracted section less pier widths	(ft)	4	213.93	325.29	984.51
S_1	Slope of energy gradeline of main channel	(ft/ft)		0.00400	0.00400	0.00400
y_o	Existing depth in the contracted section before scour	(ft)	5	16.58000	13.16000	25.19000
	Computations					
	$V_* = \text{Shear velocity in the upstream section } (gyS_1)^{0.5}$	(fps)		1.32	1.18	1.64
	V^* / ω			143.69	128.54	178.22
	k_1, Exponent determined by mode of bed material transport			0.69	0.69	0.69
	$y_2/y_1 = (Q_2/Q_1)^{6/7} (W_1/W_2)^{k1}$			1.15	0.97	1.06
	y_2	(ft)		15.55	10.52	21.96
	y_s = scour depth, $y_s = y_2 - y_o$	***(ft)***	***6***	***0.00***	***0.00***	***0.00***

Notes:

1. Q_1 is the flow in the main channel upstream of the bridge not including overbank flows.
2. Q_2 may be the total flow going through the bridge opening as in cases 1a and 1b. It is not the total flow for Case 1c. For Case 1c, contraction scour must be computed separately for the main channel and the left and/or right overbank areas.
3. W_1 and W_2 are not easily defined. In some cases, it is acceptable to use the topwidth of the main channel to define these widths. Whether the topwidth or bottom width is used, it is important to be consistent so that W_1 and W_2 refer to either bottom widths or top widths.
4. The average width of the bridge opening (W_2) is normally taken as the bottom width, with the width of the piers subtracted.
5. In sand channels where the contraction scour hole is filled in on the falling stage, the y_o depth may be approximated by y_1. Sketches or surveys through the bridge can help in determining the existing bed elevation.
6. Scour depths with live-bed contraction scour may be limited by coarse sediments in the bed material armoring the bed. Where coarse sediments are present, it is recommended that scour depths be calculated for live-bed scour conditions using the clear water scour equation in addition to the live-bed equation, and that the smaller calculated scour depth be used.
7. Scour is computed using HEC-18, Evaluating Scour at Bridges, 4th edition, FHWA publication No. FHWA NHI 01-001, May 2001

Ocean Highway, Cape May, NJ
Bridges over Mill Creek, Upper Thorofare, and Middle Thorofare
Contraction Scour Computations
Page 1 of 1
Pier Configuration: Alternate 3a
Scour Event: 100-year Tidal Storm Surge

MADE BY: Jennifer Sampson
DATE: 2 May 2003
CHECKED BY: Kelly Brennan
DATE: 6 May 2003

Determine Live-bed or Clear-water Contraction Scour

	Parameters	Unit	Note	Mill Creek	Upper Thorofare	Middle Thorofare
V_1	Average velocity in upstream reach	(fps)		4.39	6.98	5.47
y_1	Average depth in the upstream main channel	(ft)		13.75	10.67	18.04
D_{50}	D_{50}	(ft)		0.0002	0.0002	0.0002
ω	Fall velocity (Figure 5.8 in HEC-18) ω(fps) = 3.28ω(m/s)	(fps)		0.0092	0.0092	0.0092
	Computations					
V_c	Critical Velocity, $V_c = 11.17 * y^{(1/6)} D^{(1/3)}$	(fps)		1.01	0.97	1.06
	Scour Type			***Live-bed***	***Live-bed***	***Live-bed***

Live-bed Contraction Scour

	Parameters	Unit	Note	Mill Creek	Upper Thorofare	Middle Thorofare
Q_1	Flow in the upstream channel transporting sediment	(cfs)	1	13453	31494	206802
Q_2	Flow in the contracted channel	(cfs)	2	17169	29368	210507
W_1	Bottom width of upstream main channel that is transporting bed material	(ft)	3	216.50	413.89	1488.90
W_2	Bottom width of the main channel in the contracted section less pier widths	(ft)	4	223.30	275.40	1394.60
S_1	Slope of energy gradeline of main channel	(ft/ft)		0.00400	0.00400	0.00400
y_o	Existing depth in the contracted section before scour	(ft)	5	17.21000	14.15000	15.54000
	Computations					
	V_* = Shear velocity in the upstream section $(gyS_1)^{0.5}$	(fps)		1.33	1.17	1.52
	V_* / ω			144.90	127.65	165.98
	k_1, Exponent determined by mode of bed material transport			0.69	0.69	0.69
	$y_2/y_1=(Q_2/Q_1)^{6/7}(W_1/W_2)^{k1}$			1.21	1.25	1.06
	y_2	(ft)		16.59	13.31	19.16
	y_s = scour depth, $y_s = y_2 - y_o$	***(ft)***	***6***	***0.00***	***0.00***	***3.62***

Notes:

1. Q_1 is the flow in the main channel upstream of the bridge not including overbank flows.
2. Q_2 may be the total flow going through the bridge opening as in cases 1a and 1b. It is not the total flow for Case 1c. For Case 1c, contraction scour must be computed separately for the main channel and the left and/or right overbank areas.
3. W_1 and W_2 are not easily defined. In some cases, it is acceptable to use the topwidth of the main channel to define these widths. Whether the topwidth or bottom width is used, it is important to be consistent so that W_1 and W_2 refer to either bottom widths or top widths.
4. The average width of the bridge opening (W_2) is normally taken as the bottom width, with the width of the piers subtracted.
5. In sand channels where the contraction scour hole is filled in on the falling stage, the y_o depth may be approximated by y_1. Sketches or surveys through the bridge can help in determining the existing bed elevation.
6. Scour depths with live-bed contraction scour may be limited by coarse sediments in the bed material armoring the bed. Where coarse sediments are present, it is recommended that scour depths be calculated for live-bed scour conditions using the clear water scour equation in addition to the live-bed equation, and that the smaller calculated scour depth be used.
7. Scour is computed using HEC-18, Evaluating Scour at Bridges, 4th edition, FHWA publication No. FHWA NHI 01-001, May 2001

Ocean Highway, Cape May, NJ
Bridges over Mill Creek, Upper Thorofare, and Middle Thorofare
Contraction Scour Computations
Page 1 of 1
Pier Configuration: Alternate 3e
Scour Event: 100-year Tidal Storm Surge

MADE BY: Jennifer Sampson
DATE: 2 May 2003
CHECKED BY: Kelly Brennan
DATE: 6 May 2003

Determine Live-bed or Clear-water Contraction Scour

	Parameters	Unit	Note	Mill Creek	Upper Thorofare	Connection	Middle Thorofare
V_1	Average velocity in upstream reach	(fps)		4.31	7.51	7.52	7.88
y_1	Average depth in the upstream main channel	(ft)		13.29	10.68	6.00	24.15
D_{50}	D_{50}	(ft)		0.0002	0.0002	0.0002	0.0002
ω	Fall velocity (Figure 5.8 in HEC-18) ω (fps) = 3.28ω (m/s)	(fps)		0.0092	0.0092	0.0092	0.0092
	Computations						
V_c	Critical Velocity, $V_c = 11.17 * y^{(1/6)} D^{(1/3)}$	(fps)		1.01	0.97	0.88	1.11
	Scour Type			***Live-bed***	***Live-bed***	***Live-bed***	***Live-bed***

Live-bed Contraction Scour

	Parameters	Unit	Note	Mill Creek	Upper Thorofare	Connection	Middle Thorofare
Q_1	Flow in the upstream channel transporting sediment	(cfs)	1	12810	33640	16122	201508
Q_2	Flow in the contracted channel	(cfs)	2	16150	38159	14362	208217
W_1	Bottom width of upstream main channel that is transporting bed material	(ft)	3	216.50	413.89	357.40	945.00
W_2	Bottom width of the main channel in the contracted section less pier widths	(ft)	4	223.30	521.77	1162.80	897.00
S_1	Slope of energy gradeline of main channel	(ft/ft)		0.00400	0.00400	0.00400	0.00400
y_o	Existing depth in the contracted section before scour	(ft)	5	16.77000	10.17000	3.48000	26.59000
	Computations						
	$V_* = $ Shear velocity in the upstream section $(gyS_1)^{0.5}$	(fps)		1.31	1.17	0.88	1.76
	V^* / ω			142.46	127.71	95.72	192.04
	k_1, Exponent determined by mode of bed material transport			0.69	0.69	0.69	0.69
	$y_2/y_1 = (Q_2/Q_1)^{6/7} (W_1/W_2)^{k1}$			1.19	0.95	0.40	1.07
	y_2	(ft)		15.87	10.14	2.41	25.75
	y_s = scour depth, $y_s = y_2 - y_o$	***(ft)***	***6***	***0.00***	***0.00***	***0.00***	***0.00***

Notes:

1. Q_1 is the flow in the main channel upstream of the bridge not including overbank flows.
2. Q_2 may be the total flow going through the bridge opening as in cases 1a and 1b. It is not the total flow for Case 1c. For Case 1c, contraction scour must be computed separately for the main channel and the left and/or right overbank areas.
3. W_1 and W_2 are not easily defined. In some cases, it is acceptable to use the topwidth of the main channel to define these widths. Whether the topwidth or bottom width is used, it is important to be consistent so that W_1 and W_2 refer to either bottom widths or top widths.
4. The average width of the bridge opening (W_2) is normally taken as the bottom width, with the width of the piers subtracted.
5. In sand channels where the contraction scour hole is filled in on the falling stage, the y_o depth may be approximated by y_1. Sketches or surveys through the bridge can help in determining the existing bed elevation.
6. Scour depths with live-bed contraction scour may be limited by coarse sediments in the bed material armoring the bed. Where coarse sediments are present, it is recommended that scour depths be calculated for live-bed scour conditions using the clear water scour equation in addition to the live-bed equation, and that the smaller calculated scour depth be used.
7. Scour is computed using HEC-18, Evaluating Scour at Bridges, 4th edition, FHWA publication No. FHWA NHI 01-001, May 2001

Ocean Highway, Cape May, NJ
Bridges over Mill Creek, Upper Thorofare, and Middle Thorofare
Contraction Scour Computations
Page 1 of 1
Pier Configuration: Alternate 3f
Scour Event: 100-year Tidal Storm Surge

MADE BY: Jennifer Sampson
DATE: 2 May 2003
CHECKED BY: Kelly Brennan
DATE: 6 May 2003

Determine Live-bed or Clear-water Contraction Scour

	Parameters	Unit	Note	Mill Creek	Upper & Middle Thorofare, Piers 8-13
V_1	Average velocity in upstream reach	(fps)		4.34	7.49
y_1	Average depth in the upstream main channel	(ft)		13.30	22.10
D_{50}	D_{50}	(ft)		0.0002	0.0002
ω	Fall velocity (Figure 5.8 in HEC-18) ω (fps) = 3.28ω (m/s)	(fps)		0.0092	0.0092
	Computations				
V_c	Critical Velocity, $V_c = 11.17 * y^{(1/6)} D^{(1/3)}$	(fps)		1.01	1.09
	Scour Type			***Live-bed***	***Live-bed***

Live-bed Contraction Scour

	Parameters	Unit	Note	Mill Creek	Upper & Middle Thorofare, Piers 8-13
Q_1	Flow in the upstream channel transporting sediment	(cfs)	1	12916	269638
Q_2	Flow in the contracted channel	(cfs)	2	16220	261172
W_1	Bottom width of upstream main channel that is transporting bed material	(ft)	3	216.50	1406.00
W_2	Bottom width of the main channel in the contracted section less pier widths	(ft)	4	223.30	1642.00
S_1	Slope of energy gradeline of main channel	(ft/ft)		0.00400	0.00400
y_o	Existing depth in the contracted section before scour	(ft)	5	16.78000	19.62000
	Computations				
	V_* = Shear velocity in the upstream section $(gyS_1)^{0.5}$	(fps)		1.31	1.69
	V^* / ω			142.51	183.71
	k_1, Exponent determined by mode of bed material transport			0.69	0.69
	$y_2/y_1 = (Q_2/Q_1)^{6/7}(W_1/W_2)^{k1}$			1.19	0.87
	y_2	(ft)		15.83	19.32
	y_s = scour depth, $y_s = y_2 - y_o$	***(ft)***	***6***	***0.00***	***0.00***

Notes:

1. Q_1 is the flow in the main channel upstream of the bridge not including overbank flows.
2. Q_2 may be the total flow going through the bridge opening as in cases 1a and 1b. It is not the total flow for Case 1c. For Case 1c, contraction scour must be computed separately for the main channel and the left and/or right overbank areas.
3. W_1 and W_2 are not easily defined. In some cases, it is acceptable to use the topwidth of the main channel to define these widths. Whether the topwidth or bottom width is used, it is important to be consistent so that W_1 and W_2 refer to either bottom widths or top widths.
4. The average width of the bridge opening (W_2) is normally taken as the bottom width, with the width of the piers subtracted.
5. In sand channels where the contraction scour hole is filled in on the falling stage, the y_o depth may be approximated by y_1. Sketches or surveys through the bridge can help in determining the existing bed elevation.
6. Scour depths with live-bed contraction scour may be limited by coarse sediments in the bed material armoring the bed. Where coarse sediments are present, it is recommended that scour depths be calculated for live-bed scour conditions using the clear water scour equation in addition to the live-bed equation, and that the smaller calculated scour depth be used.
7. Scour is computed using HEC-18, Evaluating Scour at Bridges, 4th edition, FHWA publication No. FHWA NHI 01-001, May 2001

Ocean Highway, Cape May, NJ
Bridges over Mill Creek, Upper Thorofare, and Middle Thorofare
Contraction Scour Computations
Page 1 of 1
Pier Configuration: Alternate 3g
Scour Event: 100-year Tidal Storm Surge

MADE BY: Jennifer Sampson
DATE: 2 May 2003
CHECKED BY: Kelly Brennan
DATE: 6 May 2003

Determine Live-bed or Clear-water Contraction Scour

	Parameters	Unit	Note	Mill Creek	Upper & Middle Thorofare, Piers 8-11
V_1	Average velocity in upstream reach	(fps)		4.23	7.51
y_1	Average depth in the upstream main channel	(ft)		13.30	22.05
D_{50}	D_{50}	(ft)		0.0002	0.0002
ω	Fall velocity (Figure 5.8 in HEC-18) ω (fps) = 3.28ω (m/s)	(fps)		0.0092	0.0092
	Computations				
V_c	Critical Velocity, $V_c = 11.17 * y^{(1/6)} D^{(1/3)}$	(fps)		1.01	1.09
	Scour Type			***Live-bed***	***Live-bed***

Live-bed Contraction Scour

	Parameters	Unit	Note	Mill Creek	Upper & Middle Thorofare, Piers 8-11
Q_1	Flow in the upstream channel transporting sediment	(cfs)	1	12607	270866
Q_2	Flow in the contracted channel	(cfs)	2	15812	263013
W_1	Bottom width of upstream main channel that is transporting bed material	(ft)	3	216.50	1406.00
W_2	Bottom width of the main channel in the contracted section less pier widths	(ft)	4	223.30	1632.00
S_1	Slope of energy gradeline of main channel	(ft/ft)		0.00400	0.00400
y_o	Existing depth in the contracted section before scour	(ft)	5	16.76000	19.60000
	Computations				
	V_* = Shear velocity in the upstream section $(gyS_1)^{0.5}$	(fps)		1.31	1.69
	V^* / ω			142.51	183.50
	k_1, Exponent determined by mode of bed material transport			0.69	0.69
	$y_2/y_1=(Q_2/Q_1)^{6/7}(W_1/W_2)^{k1}$			1.19	0.88
	y_2	(ft)		15.81	19.40
	y_s = scour depth, $y_s = y_2 - y_o$	***(ft)***	***6***	***0.00***	***0.00***

Notes:

1. Q_1 is the flow in the main channel upstream of the bridge not including overbank flows.
2. Q_2 may be the total flow going through the bridge opening as in cases 1a and 1b. It is not the total flow for Case 1c. For Case 1c, contraction scour must be computed separately for the main channel and the left and/or right overbank areas.
3. W_1 and W_2 are not easily defined. In some cases, it is acceptable to use the topwidth of the main channel to define these widths. Whether the topwidth or bottom width is used, it is important to be consistent so that W_1 and W_2 refer to either bottom widths or top widths.
4. The average width of the bridge opening (W_2) is normally taken as the bottom width, with the width of the piers subtracted.
5. In sand channels where the contraction scour hole is filled in on the falling stage, the y_o depth may be approximated by y_1. Sketches or surveys through the bridge can help in determining the existing bed elevation.
6. Scour depths with live-bed contraction scour may be limited by coarse sediments in the bed material armoring the bed. Where coarse sediments are present, it is recommended that scour depths be calculated for live-bed scour conditions using the clear water scour equation in addition to the live-bed equation, and that the smaller calculated scour depth be used.
7. Scour is computed using HEC-18, Evaluating Scour at Bridges, 4th edition, FHWA publication No. FHWA NHI 01-001, May 2001

APPENDIX C: PIER SCOUR CALCULATIONS

Ocean Highway over Mill Creek
Structure No. 0500030
Scour Calculations for Piers 1 through 11
Page 1 of 1
Prepared by Parsons Brinckerhoff, Inc.
for NJDOT
5/6/2003

EXISTING CONDITIONS

MADE BY: Jennifer Sampson
DATE: 2 May 2003
CHECKED BY: Kelly Brennan
DATE: 2 May 2003

PIER SCOUR COMPUTATIONS FOR SIMPLE COLUMNS
100-YEAR EVENT

	Description	Units	ExMC1	ExMC2	ExMC3	ExMC4	ExMC5	ExMC6	ExMC7	ExMC8	ExMC9	ExMC10	ExMC11	Note
USER DATA REQUIRED FOR CALCULATION														
Simulation Data														
i	Time Step		306	305	305	301	321	321	321	320	319	318	318	
t(i)	Simulation Time (Peak Surge at 75:75 Hours)	Hours	76:30:00	76:15:00	76:15:00	75:15:00	80:15:00	80:15:00	80:15:00	80:00:00	79:45:00	79:30:00	79:30:00	
z_w	Water Surface Elevation	feet - NAVD	8.64	8.38	8.42	6.73	5.13	5.12	5.11	5.50	5.88	6.27	6.29	
V_1	Approach velocity	feet/sec	2.42	2.97	2.97	3.43	2.76	2.86	2.88	2.86	2.80	2.68	2.68	
α	Flow Direction	Degrees	117.11	115.22	112.99	105.48	-79.76	-80.56	-81.70	-83.82	-85.71	-90.81	-90.87	
Pier Data														
a	Pier Width	feet	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	
L	Pier Length		5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	
z_b	Bottom elevation at start of computations	feet - NAVD	-2.47	-5.70	-10.50	-14.30	-14.90	-15.00	-12.80	-10.40	-6.30	-2.60	0.30	
θ	Angle of Pier Orientation	Degrees	107.69	107.69	107.69	107.69	107.69	107.69	107.69	107.69	107.69	107.69	107.69	
K_1	Pier Nose Shape Correction Factor		1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1
Scour Calculations														
L/a	Length/Width Ratio		2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	
K_2	Correction Factor for Angle of Attack		1.29	1.23	1.17	1.07	1.23	1.26	1.29	1.34	1.39	1.52	1.52	
K_3	Bed Form Correction Factor		1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	
K_4	Armoring Correction Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2
Y_1	Flow Depth Upstream of Pier	feet	11.11	14.08	18.92	21.03	20.03	20.12	17.91	15.90	12.18	8.87	5.99	
Fr_1	Froude Number		0.13	0.14	0.12	0.13	0.11	0.11	0.12	0.13	0.14	0.16	0.19	
$[a/Y_1]^{0.65}$			0.29	0.25	0.21	0.19	0.20	0.20	0.21	0.23	0.27	0.34	0.44	
Y_s/Y_1	Relative Scour Depth		0.38	0.32	0.24	0.21	0.23	0.24	0.27	0.31	0.40	0.56	0.79	3
Y_s	Scour Depth	feet	4.17	4.52	4.45	4.41	4.58	4.74	4.80	4.92	4.87	4.98	4.73	

Notes
1. Pier Nose Shape Correction Factor = 1.1 for square piers.
2. Armoring Correction Factor = 1.0 for no armoring.
3. Relative Scour Depth $Y_s/Y_1 = 2*K_1*K_2*K_3*K_4*(a/Y_1)^{0.65}(Fr_1)^{0.43}$

Ocean Highway over Upper Thorofare
Structure No. 3100006
Scour Calculations for Piers 1 through 13
Page 1 of 1
Prepared by Parsons Brinckerhoff, Inc. for NJDOT
5/6/2003

EXISTING CONDITIONS

MADE BY: Jennifer Sampson
DATE: 2 May 2003
CHECKED BY: Kelly Brennan
DATE: 2 May 2003

PIER SCOUR COMPUTATIONS FOR SIMPLE COLUMNS
100-YEAR EVENT

	Description	Units	ExUT1	ExUT2	ExUT3	ExUT4	ExUT5	ExUT6	ExUT7	ExUT8	ExUT9	ExUT10	ExUT11	ExUT12	ExUT13	Note
USER DATA REQUIRED FOR CALCULATION																
Simulation Data																
i	Time Step		303	303	303	304	303	304	304	304	304	303	303	303	303	
t(i)	Simulation Time (Peak Surge at 75:75 Hours)	Hours	75:45:00	75:45:00	75:45:00	76:00:00	75:45:00	76:00:00	76:00:00	76:00:00	76:00:00	75:45:00	75:45:00	75:45:00	75:45:00	
z_w	Water Surface Elevation	feet - NAVD	8.21	8.08	8.20	8.58	8.30	8.65	8.68	8.61	8.54	7.97	7.73	7.27	6.81	
V_1	Approach velocity	feet/sec	7.05	7.43	7.05	7.18	7.77	7.69	7.47	7.27	7.42	7.72	7.90	8.57	9.34	
α	Flow Direction	Degrees	128.51	126.11	124.85	123.76	122.10	121.81	120.32	120.15	121.01	124.56	130.46	136.36	144.21	
Pier Data																
a	Pier Width	feet	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	
L	Pier Length		5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	
z_b	Bottom elevation at start of computations	feet - NAVD	0.28	-1.50	-3.80	-6.00	-8.20	-9.30	-10.10	-10.90	-11.00	-9.20	-7.20	-3.90	-0.93	
θ	Angle of Pier Orientation	Degrees	98.44	98.38	98.25	97.25	97.07	95.94	95.26	94.63	94.07	94.00	92.88	92.36	91.46	
K_1	Pier Nose Shape Correction Factor		1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1
Scour Calculations																
L/a	Length/Width Ratio		2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	
K_2	Correction Factor for Angle of Attack		1.75	1.71	1.69	1.68	1.66	1.67	1.66	1.67	1.69	1.76	1.87	1.95	2.04	
K_3	Bed Form Correction Factor		1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	
K_4	Armoring Correction Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2
Y_1	Flow Depth Upstream of Pier	feet	7.93	9.58	12.00	14.58	16.50	17.95	18.78	19.51	19.54	17.17	14.93	11.17	7.74	
Fr_1	Froude Number		0.44	0.42	0.36	0.33	0.34	0.32	0.30	0.29	0.30	0.33	0.36	0.45	0.59	
$[a/Y_1]^{0.65}$			0.36	0.32	0.28	0.24	0.23	0.21	0.21	0.20	0.20	0.22	0.24	0.29	0.37	
$Y_{s/Y1}$	Relative Scour Depth		1.08	0.92	0.73	0.62	0.57	0.53	0.50	0.48	0.49	0.58	0.70	0.98	1.45	3
Y_s	Scour Depth	feet	8.58	8.79	8.75	9.04	9.36	9.51	9.36	9.34	9.58	9.95	10.49	10.91	11.24	

Notes
1. Pier Nose Shape Correction Factor = 1.1 for square piers.
2. Armoring Correction Factor = 1.0 for no armoring.
3. Relative Scour Depth $Y_S/Y_1 = 2*K_1*K_2*K_3*K_4*(a/Y_1)^{0.65}(Fr_1)^{0.43}$

Ocean Highway over Middle Thorefare
Structure No. 0500029
Scour Calculations for Piers 1 through 21
Page 1 of 1
Prepared by Parsons Brinckerhoff, Inc.
for NJDOT
5/6/2003

EXISTING CONDITIONS

MADE BY: Jennifer Sampson
DATE: 2 May 2003
CHECKED BY: Kelly Brennan
DATE: 2 May 2003

PIER SCOUR COMPUTATIONS FOR SIMPLE COLUMNS
100-YEAR EVENT

	Description	Units	ExMT1	ExMT2	ExMT3	ExMT4	ExMT5	ExMT6	ExMT7	ExMT8	ExMT9	ExMT10	ExMT11	ExMT12	ExMT13	ExMT14	ExMT15	ExMT16	ExMT17	ExMT18	ExMT19	ExMT20	ExMT21	Note
USER DATA REQUIRED FOR CALCULATION																								
Simulation Data																								
i	Time Step		302	302	302	302	302	302	302	302	302	302	302	302	302	302	302	302	301	301	301	301	317	
t(i)	Simulation Time (Peak Surge at 75:75 Hours)	Hours	75:30:00	75:30:00	75:30:00	75:30:00	75:30:00	75:30:00	75:30:00	75:30:00	75:30:00	75:30:00	75:30:00	75:30:00	75:30:00	75:30:00	75:30:00	75:30:00	75:15:00	75:15:00	75:15:00	75:15:00	79:15:00	
z_w	Water Surface Elevation	feet - NAVD	8.62	8.62	8.62	8.95	8.96	8.83	8.64	8.61	8.42	8.13	7.96	7.51	7.40	7.37	7.28	7.22	6.79	6.79	6.81	6.81	6.39	
V_1	Approach velocity	feet/sec	5.59	5.59	5.59	6.42	7.63	8.15	8.24	8.08	9.12	9.71	8.88	6.69	5.32	5.04	3.91	3.47	2.36	2.36	1.91	1.91	3.41	
α	Flow Direction	Degrees	52.02	52.02	52.02	52.48	52.94	53.34	55.41	55.92	56.67	53.34	52.65	46.12	46.93	46.41	42.46	43.32	44.35	44.35	31.05	31.05	-137.57	
Pier Data																								
a	Pier Width	feet	1.83	1.83	1.83	1.83	1.83	1.83	1.83	8.00	8.00	10.00	14.00	10.00	8.00	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	
L	Pier Length		5.50	5.50	5.50	5.50	5.50	5.50	5.50	16.00	16.00	20.00	28.00	20.00	16.00	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	
z_b	Bottom elevation at start of computations	feet - NAVD	0.90	-0.20	-1.30	-3.20	-6.30	-9.70	-13.30	-17.50	-26.70	-32.70	-32.90	-30.20	-26.30	-20.60	-15.80	-12.90	-9.50	-5.50	-1.70	-0.90	0.90	
θ	Angle of Pier Orientation	Degrees	64.58	64.58	64.58	64.58	64.58	64.58	64.58	64.58	64.58	64.58	64.58	64.58	64.58	64.58	64.58	64.58	64.58	64.58	64.58	64.58	64.58	
K_1	Pier Nose Shape Correction Factor		1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1
Scour Calculations																								
L/a	Length/Width Ratio		3.00	3.00	3.00	3.00	3.00	3.00	3.00	2.00	2.00	2.00	2.00	2.00	2.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	
K_2	Correction Factor for Angle of Attack		1.37	1.37	1.37	1.36	1.35	1.34	1.28	1.18	1.17	1.23	1.24	1.35	1.33	1.51	1.60	1.58	1.56	1.56	1.81	1.81	1.60	
K_3	Bed Form Correction Factor		1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	
K_4	Armoring Correction Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2
Y_1	Flow Depth Upstream of Pier	feet	7.72	8.82	9.92	12.15	15.26	18.53	21.94	26.11	35.12	40.83	40.86	37.71	33.70	27.97	23.08	20.12	16.29	12.29	8.51	7.71	5.49	
Fr_1	Froude Number		0.35	0.33	0.31	0.32	0.34	0.33	0.31	0.28	0.27	0.27	0.24	0.19	0.16	0.17	0.14	0.14	0.10	0.12	0.12	0.12	0.26	
$[a/Y_1]^{0.65}$			0.39	0.36	0.33	0.29	0.25	0.22	0.20	0.46	0.38	0.40	0.50	0.42	0.39	0.17	0.19	0.21	0.24	0.29	0.37	0.39	0.49	
$Y_{s/Y1}$	Relative Scour Depth		0.84	0.74	0.67	0.59	0.52	0.45	0.37	0.69	0.56	0.61	0.74	0.62	0.53	0.29	0.32	0.34	0.34	0.44	0.64	0.70	1.06	3
Y_s	Scour Depth	feet	6.45	6.56	6.67	7.21	7.94	8.32	8.19	18.13	19.64	25.07	30.32	23.20	17.74	8.07	7.46	6.88	5.58	5.37	5.43	5.36	5.80	

Notes
1. Pier Nose Shape Correction Factor = 1.1 for square piers.
2. Armoring Correction Factor = 1.0 for no armoring.
3. Relative Scour Depth $Y_s/Y_1 = 2.0 * K_1 * K_2 * K_3 * K_4 * (a/Y_1)^{0.65} * (Fr_1)^{0.43}$

Ocean Highway over Mill Creek **ALTERNATIVE 3A**
Structure No. 0500030
Scour Calculations for Piers 1 through 3
Page 1 of 1
Prepared by Parsons Brinckerhoff, Inc.
for NJDOT
5/6/2003

MADE BY: Jennifer Sampson
DATE: 1 May 2003
CHECKED BY: Kelly Brennan
DATE: 1 May 2003

PIER SCOUR COMPUTATIONS FOR SIMPLE COLUMNS
100-YEAR EVENT

	Description	Units	3aMC1	3aMC2	3aMC3	Note
USER DATA REQUIRED FOR CALCULATION						
Simulation Data						
i	Time Step		301	321	318	
t(i)	Simulation Time (Peak Surge at 75:75 Hours)	Hours	75:15:00	80:15:00	79:30:00	
z_w	Water Surface Elevation	feet - NAVD	6.41	5.17	6.23	
V_1	Approach velocity	feet/sec	4.77	4.74	4.49	
α	Flow Direction	Degrees	107.20	-79.18	-86.46	
Pier Data						
a	Pier Width	feet	3.00	3.00	3.00	
L	Pier Length		9.00	9.00	9.00	
z_b	Bottom elevation at start of computations	feet - NAVD	-10.40	-14.80	-4.40	
θ	Angle of Pier Orientation	Degrees	107.69	107.69	107.69	
K_1	Pier Nose Shape Correction Factor		1.0	1.0	1.0	1
Scour Calculations						
L/a	Length/Width Ratio		3.00	3.00	3.00	
K_2	Correction Factor for Angle of Attack		1.02	1.22	1.41	
K_3	Bed Form Correction Factor		1.10	1.10	1.10	
K_4	Armoring Correction Factor		1.00	1.00	1.00	2
Y_1	Flow Depth Upstream of Pier	feet	16.81	19.97	10.63	
Fr_1	Froude Number		0.20	0.19	0.24	
$[a/Y_1]^{0.65}$			0.33	0.29	0.44	
$Y_{s/Y1}$	Relative Scour Depth		0.37	0.38	0.74	3
Y_s	Scour Depth	feet	6.20	7.58	7.90	

Notes
1. Pier Nose Shape Correction Factor = 1.0 for round piers.
2. Armoring Correction Factor = 1.0 for no armoring.
3. Relative Scour Depth $Y_s/Y_1 = 2*K_1*K_2*K_3*K_4*(a/Y_1)^{0.65}(Fr_1)^{0.43}$

Ocean Highway over Upper Thorofare
Structure No. 3100006
Scour Calculations for Piers 1 through 4
Page 1 of 1
Prepared by Parsons Brinckerhoff, Inc. for NJDOT
5/6/2003

ALTERNATIVE 3A

MADE BY: Jennifer Sampson
DATE: 1 May 2003
CHECKED BY: Kelly Brennan
DATE: 1 May 2003

PIER SCOUR COMPUTATIONS FOR SIMPLE COLUMNS
100-YEAR EVENT

	Description	Units	3aUT1	3aUT2	3aUT3	3aUT4	Note
USER DATA REQUIRED FOR CALCULATION							
Simulation Data							
i	Time Step		303	303	303	303	
t(i)	Simulation Time (Peak Surge at 75:75 Hours)	Hours	75:45:00	75:45:00	75:45:00	75:45:00	
z_w	Water Surface Elevation	feet - NAVD	8.14	8.45	8.08	6.75	
V_1	Approach velocity	feet/sec	8.98	9.01	8.43	9.47	
α	Flow Direction	Degrees	121.41	122.67	129.09	142.95	
Pier Data							
a	Pier Width	feet	3.00	3.00	3.00	3.00	
L	Pier Length		9.00	9.00	9.00	9.00	
z_b	Bottom elevation at start of computations	feet - NAVD	-2.90	-9.20	-12.00	-5.80	
θ	Angle of Pier Orientation	Degrees	98.38	96.58	94.77	92.97	
K_1	Pier Nose Shape Correction Factor		1.0	1.0	1.0	1.0	1
Scour Calculations							
L/a	Length/Width Ratio		3.00	3.00	3.00	3.00	
K_2	Correction Factor for Angle of Attack		1.62	1.68	1.82	2.02	
K_3	Bed Form Correction Factor		1.10	1.10	1.10	1.10	
K_4	Armoring Correction Factor		1.00	1.00	1.00	1.00	2
Y_1	Flow Depth Upstream of Pier	feet	11.04	17.65	20.08	12.55	
Fr_1	Froude Number		0.48	0.38	0.33	0.47	
$[a/Y_1]^{0.65}$			0.43	0.32	0.29	0.39	
$Y_{s/Y1}$	Relative Scour Depth		1.11	0.77	0.72	1.27	3
Y_s	Scour Depth	feet	12.24	13.55	14.55	15.89	

Notes
1. Pier Nose Shape Correction Factor = 1.0 for round piers.
2. Armoring Correction Factor = 1.0 for no armoring.
3. Relative Scour Depth $Y_S/Y_1 = 2*K_1*K_2*K_3*K_4*(a/Y_1)^{0.65}(Fr_1)^{0.43}$

Ocean Highway over Middle Thorofare
Structure No. 0500029
Scour Calculations for Piers 1 through 11
Page 1 of 2
Prepared by Parsons Brinckerhoff, Inc.
for NJDOT
5/6/2003

ALTERNATIVE 3A

MADE BY: Jennifer Sampson
DATE: 1 May 2003
CHECKED BY: Kelly Brennan
DATE: 1 May 2003

PIER SCOUR COMPUTATIONS FOR COMPLEX PIERS
100-YEAR EVENT

	Description	Units	3aMT1	3aMT2	3aMT3	3aMT4	3aMT5	3aMT6	3aMT7	3aMT8	3aMT9	3aMT10	3aMT11	Note
USER DATA REQUIRED FOR CALCULATION														
Simulation Data														
i	Time Step		300	300	301	302	302	301	323	306	314	313	313	
t(i)	Simulation Time (Peak Surge at 75:75 Hours)	Hours	75:00:00	75:00:00	75:15:00	75:30:00	75:30:00	75:15:00	80:45:00	76:30:00	78:30:00	78:15:00	78:15:00	
z_a	Water Surface Elevation	feet - NAVD	6.97	6.97	7.57	8.16	7.93	6.91	3.87	8.50	7.36	7.75	7.71	
V_1	Approach velocity	feet/sec	6.47	6.47	7.06	10.43	10.08	7.81	5.69	2.55	1.89	1.90	1.97	
α	Flow Direction	Degrees	45.95	45.95	61.97	58.33	56.36	56.36	-121.12	67.09	-139.92	-142.15	-133.50	
Pier Data														
	Pier Stem													
a	Pier Width	feet	5.00	5.00	5.00	5.00	6.00	6.00	5.00	5.00	5.00	5.00	5.00	
L	Pier Length		54.00	54.00	54.00	54.00	74.00	74.00	54.00	54.00	54.00	54.00	54.00	
z_b	Bottom elevation at start of computations	feet - NAVD	4.00	1.40	-4.00	-15.20	-31.00	-29.00	-13.50	-4.20	2.00	3.40	3.90	
θ	Angle of Pier Orientation	Degrees	58.74	58.74	60.55	64.12	64.33	64.33	64.33	64.33	67.67	70.52	73.38	
K_{1pier}	Pier Nose Shape Correction Factor		1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	
f	Distance between front edge of pile cap or footing and pier		2.0	2.0	2.0	2.0	4.0	4.0	2.0	2.0	2.0	2.0	2.0	
	Pile Cap													
h_0	Height of pile cap above bed at start	feet	-5.00	-3.90	-1.00	10.20	-6.50	-8.50	8.50	-0.80	-3.70	-6.50	-7.00	
T	Thickness of pile cap	feet	9	9	9	9	18	18	9	9	9	9	9	
K_{1pc}	Pile Cap shape correction factor		1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	Square Pile Cap - See HEC-18 Table 6.1
a_{pc}	Pile cap width	feet	22	22	22	22	24	24	22	22	22	22	22	
L_{pc}	Length of pile cap	feet	58	58	58	58	82	82	58	58	58	58	58	
	Pile Group													
K_{1pg}	Pile Group shape correction factor		1	1	1	1	1	1	1	1	1	1	1	Circular Piles
S	Center to Center spacing of piles	feet	14	14	14	14	10	10	14	14	14	14	14	
a_{proj}	Projected composite width of pile group	feet	11.96	11.96	10.66	9.80	13.64	14.37	9.69	15.06	16.55	18.13	16.33	
a	Diameter of single pile	feet	4	4	4	4	4	4	4	4	4	4	4	
m	Number of rows of aligned piles		2	2	2	2	2	2	2	2	2	2	2	
Bed Conditions														
D_{50}	Median Grain Diameter	mm	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	From March, 2003 borings by Warren George, Inc.
D_{84}	Grain roughness or 84% grain size	mm	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	From March, 2003 borings by Warren George, Inc.
D_{95}	95% Grain size	mm	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	From March, 2003 borings by Warren George, Inc.
D_{50}	Median Grain Diameter	feet	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	
D_{84}	Grain roughness or 84% grain size	feet	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	
D_{95}	95% Grain size	feet	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	
V_cD_{50}	Critical Velocity for D_{50}	ft/sec	0.74	0.82	0.93	1.04	1.13	1.12	0.99	0.94	0.81	0.79	0.77	$11.17^{*}y_1{}^{1/6}{}^{*}d_{50}{}^{1/3}$
$V_{i0}D_{50}$	Velocity required to initiate scour for D_{50}	ft/sec	0.28	0.31	0.35	0.39	0.42	0.41	0.37	0.35	0.30	0.29	0.29	HEC-18 Eq. 6.7
V_cD_{95}	Critical Velocity for D_{95}	ft/sec	1.01	1.12	1.26	1.42	1.55	1.53	1.35	1.28	1.11	1.07	1.05	$11.17^{*}y_1{}^{1/6}{}^{*}d_{95}{}^{1/3}$
$V_{i0}D_{95}$	Velocity required to initiate scour for D_{95}	ft/sec	0.40	0.44	0.50	0.56	0.60	0.59	0.53	0.50	0.44	0.42	0.41	HEC-18 Eq. 6.7
V_r			18.08	16.21	15.64	20.81	18.18	14.11	11.57	5.04	4.19	4.39	4.71	HEC-18 Eq. 6.6

ALTERNATIVE 3A

MADE BY: Jennifer Sampson
DATE: 1 May 2003
CHECKED BY: Kelly Brennan
DATE: 1 May 2003

PIER SCOUR COMPUTATIONS FOR COMPLEX PIERS
100-YEAR EVENT

	Description	Units	3aMT1	3aMT2	3aMT3	3aMT4	3aMT5	3aMT6	3aMT7	3aMT8	3aMT9	3aMT10	3aMT11	Note
Scour Calculations														
	Pier Stem													
L/a	Length/Width Ratio		10.80	10.80	10.80	10.80	12.33	12.33	10.80	10.80	10.80	10.80	10.80	
α	Angle of Attack	Degrees	12.79	12.79	8.59	5.79	7.95	8.98	5.45	22.76	27.59	32.67	26.88	
K_{2s}	Correction Factor for Angle of Attack		2.20	2.20	1.86	1.61	1.88	1.98	1.58	2.88	3.17	3.43	3.13	$K_{2s} = (\cos\alpha + L_s/a_s \sin\alpha)^{0.65}$ HEC-19 Eq. 6.4
K_3	Bed Form Correction Factor		1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	
K_4	Armoring Correction Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	See pg. 6.6 HEC-18
f/a_{pier}			0.40	0.40	0.40	0.40	0.67	0.67	0.40	0.40	0.40	0.40	0.40	
h_1/a_{pier}			0.80	1.02	1.60	3.84	1.92	1.58	3.50	1.64	1.06	0.50	0.40	
K_{Hpier}	Coefficient to account for height of pier stem above bed and pile cap overhang f		0.14	0.10	0.02	-0.28	-0.01	0.02	-0.20	0.02	0.10	0.22	0.24	$(.4075-.0689\,f/a_{pier})-(.4271-.0778\,f/a_{pier})\,h_1/a_{pier}+(.1615-.0455\,f/a_{pier})(h_1/a_{pier})^2-(.0269-.012\,f/a_{pier})\,(h_1/a_{pier})^3$
K_w	Wide pier adjustment factor		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.6	
Y_1	Flow Depth Upstream of Pier	feet	2.97	5.57	11.57	23.36	38.93	35.91	17.37	12.70	5.36	4.35	3.81	$z_w - zb$
h_1	Height of pier stem above bed at beginning of computations	feet	4.00	5.10	8.00	19.20	11.50	9.50	17.50	8.20	5.30	2.50	2.00	$T+h_o$
Fr_{pier}	Froude Number		0.0000	0.4827	0.3659	0.3804	0.2846	0.2297	0.0000	0.1260	0.1437	0.1603	0.1776	$V_1/(g^*Y_1)^{.5}$
ys_{pier}	Scour Depth	feet	0.00	2.07	0.46	-6.14	-0.23	0.65	0.00	0.38	1.63	3.89	3.99	$y_1{*}K_{1pier}{*}2K_{hpier}K_{3pier}K_3K_4(a_{pier}/y_1)^{0.65}(Fr_{pier})^{.43}$
	Pile Cap													
h_2	Adjusted height of pile cap above bed	feet	-5.00	-2.86	-0.77	7.13	-6.62	-8.18	8.50	-0.61	-2.88	-4.56	-5.00	$h_0+ys_{pier}/2$
y_2	Adjusted flow depth for pile cap scour	feet	2.97	6.61	11.80	20.29	38.82	36.23	17.37	12.89	6.18	6.29	5.81	$y_1+ys_{pier}/2$
V_2	Adjusted velocity for pile cap scour	ft./sec	6.47	5.45	6.92	12.01	10.11	7.74	5.69	2.51	1.64	1.31	1.29	$V_1(y_1/y_2)$
T*	Effective Pile Cap Thickness	ft	7.97	9.00	9.00	9.00	18.00	18.00	8.87	9.00	9.00	9.00	9.00	Check for Top of Pile Cap Above Water Surface
y_2^*	Effective Flow Depth (for Equivalent full depth solid pier width)	ft	2.97	6.61	11.80	20.29	38.82	36.23	17.37	12.89	6.18	6.29	5.81	Max value of y_2 is 3.5 a_{pc}
a_{pc}*	Equivalent full depth solid pier width	feet	22.00	22.00	22.00	2.95	24.00	24.00	2.22	22.00	22.00	22.00	22.00	$a_{pc}[\exp\{-2.705+.0.51\ln(T^*/y_2) - 2.783(h_2/y_2)^3 + 1.751/\exp(h_2/y_2)\}]$
Fr_{pc}	Pile Cap Froude Number		0.66	0.37	0.36	0.47	0.29	0.23	0.24	0.12	0.12	0.09	0.09	$V_2/(g^*y_2)^{.5}$
K_{2pc}	Correction factor for angle of attack		1.33	1.33	1.23	1.16	1.28	1.31	1.15	1.54	1.62	1.70	1.61	$K_{2pc} = (\cos\alpha + L_{pc}/a_{pc}\sin\alpha)^{0.65}$ HEC-18 Eq. 6.4
K_w	Wide pier adjustment factor		0.70	0.67	0.71	1.00	1.00	1.00	1.00	0.55	0.49	0.47	0.47	See HEC-18 p. 6.7
ys_{pc}	Pile Cap Scour	feet	20.51	20.42	24.10	11.79	51.36	46.54	6.90	15.27	10.87	9.81	9.10	$y_2{*}2K_{tpc}K_{3pc}K_3K_4K_w(a_{pc}/y_2)^{0.65}(Fr_{pc})^{.43}$
	Pile Group													
K_{sp}	Coefficient for pile spacing		0.53	0.53	0.56	0.58	0.60	0.59	0.59	0.48	0.47	0.45	0.47	$1-4/3[1-1/(a_{pg}/a)[1-(S/a)^{-0.5}]$
K_m	Coefficient for aligned rows		1.12	1.12	1.12	1.12	1.08	1.08	1.12	1.12	1.12	1.12	1.12	
a^*_{pg}	Effective width of pile group	feet	7.09	7.09	6.66	6.38	8.86	9.21	6.34	8.11	8.60	9.12	8.53	$a_{pg}K_{sp}K_m$
y_3	Adjusted flow depth for pile cap scour	feet	13.22	16.82	23.85	26.19	64.50	59.50	20.82	20.53	11.61	11.19	10.36	$y_1+ys_{pier}/2+ys_{pc}/2$
V_3	Adjusted velocity for pile cap scour	ft./sec	1.45	2.14	3.42	9.31	6.08	4.71	4.74	1.58	0.87	0.74	0.72	$V_1(y_1/y_3)$
h_3	Adjusted height of pile group above bed	feet	5.25	7.35	11.28	13.02	19.06	15.09	11.95	7.03	2.55	0.35	-0.45	$h_0+ys_{pier}/2+ys_{pc}/2$
y_{3max}			13.22	16.82	23.31	22.31	31.02	32.23	20.82	20.53	11.61	11.19	10.36	$\min(3.5^*a^*_{pg}, y_3)$
h_3/y_{3max}	Ratio of pile depth to flow depth		0.40	0.44	0.48	0.58	0.61	0.47	0.57	0.34	0.22	0.03	-0.04	
Kh_{pg}	Pile group height factor		0.55	0.59	0.64	0.73	0.76	0.62	0.72	0.48	0.32	0.02	0.00	$\{3.08(h_3/y_{3max}) - 5.23(h_3/y_{3max})^2 + 5.25(h_3/y3max)^3 - 2.10(h_3/y_{3max})^4\}^{0.65}$
Fr_{pg}	Pile Group Froude Number		0.07	0.09	0.12	0.35	0.19	0.15	0.18	0.06	0.05	0.04	0.04	$V_3/(g^*y_{3max})^{.5}$
ys_{pg}	Pile Group Scour		3.39	4.45	5.91	10.10	11.31	8.53	7.37	3.59	1.76	0.13	0.00	$y_{3max}{*}2{*}Kh_{pg}K_{spg}K_3K_4(a_{pg}/y_{3max})^{0.65}(Fr_{pg})^{.43}$
Total Scour														
Y_s	Scour Depth	feet	23.89	26.95	30.48	15.74	62.44	55.71	14.27	19.24	14.26	13.83	13.09	$ys_{pier} + ys_{pc} + ys_{pg}$

ALTERNATIVE 3E

Ocean Highway over Mill Creek
Structure No. 0500030
Scour Calculations for Piers 1 through 3
Page 1 of 1
Prepared by Parsons Brinckerhoff, Inc.
for NJDOT
5/6/2003

MADE BY: Jennifer Sampson
DATE: 1 May 2003
CHECKED BY: Kelly Brennan
DATE: 1 May 2003

PIER SCOUR COMPUTATIONS FOR SIMPLE COLUMNS
100-YEAR EVENT

	Description	Units	3eMC1	3eMC2	3eMC3	Note
USER DATA REQUIRED FOR CALCULATION						
Simulation Data						
i	Time Step		304	322	318	
t(i)	Simulation Time (Peak Surge at 75:75 Hours)	Hours	76:00:00	80:30:00	79:30:00	
z_w	Water Surface Elevation	feet - NAVD	7.86	4.78	6.26	
V_1	Approach velocity	feet/sec	4.20	4.57	4.27	
α	Flow Direction	Degrees	109.03	-79.30	-86.46	
Pier Data						
a	Pier Width	feet	3.00	3.00	3.00	
L	Pier Length		9.00	9.00	9.00	
z_b	Bottom elevation at start of computations	feet - NAVD	-10.40	-14.80	-4.40	
θ	Angle of Pier Orientation	Degrees	107.69	107.69	107.69	
K_1	Pier Nose Shape Correction Factor		1.0	1.0	1.0	1
Scour Calculations						
L/a	Length/Width Ratio		3.00	3.00	3.00	
K_2	Correction Factor for Angle of Attack		1.04	1.22	1.41	
K_3	Bed Form Correction Factor		1.10	1.10	1.10	
K_4	Armoring Correction Factor		1.00	1.00	1.00	2
Y_1	Flow Depth Upstream of Pier	feet	18.26	19.58	10.66	
Fr_1	Froude Number		0.17	0.18	0.23	
$[a/Y_1]^{0.65}$			0.31	0.30	0.44	
$Y_{s/Y1}$	Relative Scour Depth		0.33	0.38	0.73	3
Y_s	Scour Depth	feet	6.11	7.46	7.74	

Notes
1. Pier Nose Shape Correction Factor = 1.0 for round piers.
2. Armoring Correction Factor = 1.0 for no armoring.
3. Relative Scour Depth $Y_s/Y_1 = 2*K_1*K_2*K_3*K_4*(a/Y_1)^{0.65}(Fr_1)^{0.43}$

Ocean Highway over Middle Thorofare
Structure No. 0500029 and 3100006
Scour Calculations for Piers 1 through 21

Prepared by Parsons Brinckerhoff, Inc.
for NJDOT
5/6/2003

ALTERNATIVE 3E

MADE BY: Jennifer Sampsen
DATE: 1 May 2003
CHECKED BY: Kelly Brennan
DATE: 1 May 2003

PIER SCOUR COMPUTATIONS FOR COMPLEX PIERS
100-YEAR EVENT

	Description	Units	3eMT1	3eMT2	3eMT3	3eMT4	3eMT5	3eMT6	3eMT7	3eMT8	3eMT9	3eMT10	3eMT11	3eMT12	3eMT13	3eMT14	3eMT15	3eMT16	3eMT17	3eMT18	3eMT19	3eMT20	3eMT21	Note
USER DATA REQUIRED FOR CALCULATION																								
Simulation Data																								
i	Time Step		303	303	303	304	305	304	304	304	304	305	304	302	323	315	313	314	313	313	314	300	322	
t(i)	Simulation Time (Peak Surge at 75:75 Hours)	Hours	75:45:00	75:45:00	75:45:00	75:00:00	76:15:00	76:00:00	76:00:00	76:00:00	76:00:00	76:15:00	76:00:00	75:30:00	80:45:00	78:45:00	78:15:00	78:30:00	78:15:00	78:15:00	78:30:00	75:00:00	80:30:00	
z_w	Water Surface Elevation	feet - NAVD	8.08	7.93	7.08	8.80	8.70	8.26	8.32	8.46	8.99	9.61	8.98	7.99	3.92	7.01	7.77	7.42	7.80	7.80	7.45	5.83	4.23	
V_1	Approach velocity	feet/sec	7.43	8.77	9.76	4.34	2.73	2.61	2.84	3.56	4.32	4.18	9.03	10.66	5.90	2.93	2.45	2.90	2.25	2.44	2.80	0.45	0.93	
α	Flow Direction	Degrees	123.82	119.06	146.45	126.17	112.87	112.64	110.52	116.37	112.70	66.66	67.21	55.69	-120.69	-127.14	-124.96	-121.87	-116.88	-123.87	-119.58	5.21	-128.06	
Pier Data																								
Pier Stem																								
a	Pier Width	feet	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	
L	Pier Length		20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	
z_b	Bottom elevation at start of computations	feet - NAVD	1.00	-9.50	0.00	4.00	5.80	5.00	6.00	6.00	5.90	4.00	0.10	-28.90	-24.30	0.35	3.40	2.20	2.70	3.20	2.10	2.90	2.60	
θ	Angle of Pier Orientation	Degrees	99.35	96.01	92.67	89.33	85.82	79.56	73.29	67.02	62.87	62.87	62.87	62.87	62.87	67.07	71.54	75.67	79.79	83.92	88.16	92.17	96.29	
K_{1per}	Pier Nose Shape Correction Factor		1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	
f	Distance between front edge of pile cap or footing and pier		10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Pile Cap																								
h_0	Height of pile cap above bed at start	feet	-3.00	7.50	-2.00	-4	-4	-4	-4	-4	-4	-4	-2.10	26.90	22.30	-2.35	-4	-4	-4	-4	-4	-4	-4	
T	Thickness of pile cap	feet	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	
K_{1pc}	Pile Cap shape correction factor		1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	Square Pile Cap - See HEC-18 Table 6.1
a_{pc}	Pile cap width	feet	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	
L_{pc}	Length of pile cap	feet	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	
Pile Group																								
K_{1pg}	Pile Group shape correction factor		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Circular Piles
S	Center to Center spacing of piles	feet	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
a_{proj}	Projected composite width of pile group	feet	17.56	17.07	23.43	21.89	18.47	20.58	22.03	24.10	24.02	16.99	10.52	11.51	10.32	13.97	14.78	15.14	14.84	18.73	18.71	18.46	24.52	
a	Diameter of single pile	feet	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
m	Number of rows of aligned piles		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
Bed Conditions																								
D_{50}	Median Grain Diameter	mm	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	From March, 2003 borings by Warren George, Inc.
D_{84}	Grain roughness or 84% grain size	mm	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	From March, 2003 borings by Warren George, Inc.
D_{95}	95% Grain size	mm	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	From March, 2003 borings by Warren George, Inc.
D_{50}	Median Grain Diameter	feet	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	
D_{84}	Grain roughness or 84% grain size	feet	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	
D_{95}	95% Grain size	feet	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	
V_cD_{50}	Critical Velocity for D_{50}	ft/sec	0.85	0.99	0.95	0.80	0.74	0.72	0.71	0.72	0.74	0.82	0.89	1.12	1.07	0.84	0.79	0.81	0.81	0.79	0.81	0.74	0.67	$11.17*y_t^{1/6}*d_{50}^{1/2}$
V_tD_{50}	Velocity required to initiate scour for D_{50}	ft/sec	0.31	0.36	0.31	0.29	0.27	0.26	0.26	0.26	0.27	0.30	0.32	0.41	0.39	0.31	0.29	0.30	0.29	0.29	0.30	0.27	0.24	HEC-18 Eq. 6.7
V_cD_{95}	Critical Velocity for D_{95}	ft/sec	1.17	1.35	1.17	1.09	1.00	0.98	0.97	0.98	1.01	1.12	1.21	1.53	1.47	1.15	1.08	1.11	1.10	1.08	1.11	1.01	0.91	$11.17*y_t^{1/6}*d_{95}^{1/2}$
V_tD_{95}	Velocity required to initiate scour for D_{95}	ft/sec	0.45	0.52	0.45	0.42	0.38	0.37	0.37	0.37	0.39	0.43	0.46	0.59	0.56	0.44	0.41	0.42	0.42	0.42	0.43	0.39	0.35	HEC-18 Eq. 6.7
V_r			17.50	17.78	23.24	10.61	7.03	6.89	7.65	9.67	11.44	9.92	20.60	19.14	10.75	6.52	5.78	6.74	5.07	5.68	6.45	0.52	2.15	HEC-18 Eq. 6.6

ALTERNATIVE 3E

MADE BY: Jennifer Sampson
DATE: 1 May 2003
CHECKED BY: Kelly Brennan
DATE: 1 May 2003

PIER SCOUR COMPUTATIONS FOR COMPLEX PIERS
100-YEAR EVENT

	Description	Units	3eMT1	3eMT2	3eMT3	3eMT4	3eMT5	3eMT6	3eMT7	3eMT8	3eMT9	3eMT10	3eMT11	3eMT12	3eMT13	3eMT14	3eMT15	3eMT16	3eMT17	3eMT18	3eMT19	3eMT20	3eMT21	Note
Scour Calculations																								
	Pier Stem																							
L/a	Length/Width Ratio		2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	
α	Angle of Attack	Degrees	24.46	23.05	53.78	36.84	27.05	33.09	37.23	49.34	49.83	22.79	4.34	7.18	3.76	14.21	16.50	17.54	16.68	27.79	27.73	86.95	44.35	
$K_{1\alpha}$	Correction Factor for Angle of Attack		1.54	1.52	1.86	1.72	1.58	1.67	1.72	1.84	1.84	1.51	1.12	1.19	1.10	1.35	1.40	1.42	1.40	1.59	1.59	1.84	1.80	$K_{1\alpha} = (\cos\alpha + L_a/a_s \sin\alpha)^{0.65}$ HEC-18 Eq. 6.4
K_2	Bed Form Correction Factor		1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	2.10	3.10	
K_4	Armoring Correction Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	See pg. 6.6 HEC-18
f/a_{pier}			1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	
h_f/a_{pier}			0.38	1.69	0.50	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.49	4.11	3.64	0.46	0.25	0.25	0.25	0.25	0.25	0.25	0.25	
K_{4pier}	Coefficient to account for height of pier stem above bed and pile cap overhang f		0.21	0.01	0.18	0.25	0.25	0.25	0.26	0.26	0.25	0.25	0.19	-0.09	-0.06	0.19	0.25	0.26	0.25	0.26	0.25	0.25	0.25	$(.4075 - .0669\,f/a_{pier}) - (.4271 - .0778\,f/a_{pier})\,h_f/a_{pier} + (.1615 - .0455\,f/a_{pier})\,(h_f/a_{pier})^2 - (.0269 - .012\,f/a_{pier})\,(h_f/a_{pier})^3$
K_w	Wide pier adjustment factor		1.0	1.0	1.0	0.7	0.6	0.6	0.6	0.7	0.7	0.7	1.0	1.0	1.0	1.0	0.6	0.7	0.6	0.6	0.6	0.4	1.0	
Y_1	Flow Depth Upstream of Pier	feet	7.08	17.43	7.08	4.80	2.90	2.46	2.32	2.46	3.09	5.61	8.88	36.89	28.22	6.66	4.37	5.22	5.10	4.60	5.35	2.93	1.63	$z_a - zb$
h_1	Height of pier stem above bed at beginning of computations	feet	3.00	13.50	4.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	3.90	32.90	28.30	3.65	2.00	2.00	2.00	2.00	2.00	2.00	2.00	$T+h_f$
Fr_{pier}	Froude Number		0.4921	0.3701	0.6469	0.3488	0.2825	0.2931	0.3288	0.3996	0.4335	0.3112	0.5337	0.3093	0.0000	0.2003	0.2072	0.2239	0.1752	0.2005	0.2134	0.0464	0.0000	$V_1/(g^*Y_1)^{.5}$
ys_{pier}	Scour Depth	feet	4.52	0.20	5.26	4.38	3.09	3.13	3.32	3.93	4.41	3.88	3.20	-2.15	0.00	2.38	2.75	3.07	2.71	3.16	3.42	3.16	0.00	$y_1 * K_{4pier} * 2K_{1pier} K_{2pier} K_3 K_4 (a_{pier}/y_1)^{0.65} (Fr_{pier})^{.43}$
	Pile Cap																							
h_2	Adjusted height of pile cap above bed	feet	-0.74	7.60	0.63	-1.81	-2.45	-2.44	-2.34	-2.03	-1.79	-2.06	-0.50	25.82	22.30	-1.16	-2.62	-2.46	-2.64	-2.42	-2.29	-2.42	-4.00	$h_f + ys_{pier}/2$
y_2	Adjusted flow depth for pile cap scour	feet	9.34	17.53	9.71	6.99	4.45	4.02	3.98	4.43	5.29	7.55	10.48	36.81	28.22	7.85	5.75	6.75	6.46	6.18	7.06	4.51	1.63	$Y_1 + ys_{pier}/2$
V_2	Adjusted velocity for pile cap scour	ft./sec	5.63	8.72	7.12	2.98	1.78	1.59	1.66	1.98	2.52	3.11	7.65	10.98	5.90	2.49	1.87	2.24	1.77	1.82	2.12	0.29	0.93	$V_1(y_1/y_2)$
T*	Effective Pile Cap Thickness	ft	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	5.92	6.00	6.00	6.00	6.00	6.00	6.00	6.00	5.63	Check for Top of Pile Cap Above Water Surface
y_2^*	Effective Flow Depth (for Equivalent full depth solid pier width)	ft	9.34	17.53	9.71	6.99	4.45	4.02	3.98	4.43	5.29	7.55	10.48	35.812	28.22	7.85	5.75	6.75	6.46	6.18	7.06	4.51	1.63	Max value of y_2 is 3.5 a_{pc}
a_{pc}*	Equivalent full depth solid pier width	feet	25.00	2.40	6.74	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	0.55	0.43	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	$a_{pc}[\exp(-2.705 + 0.51\ln(T^*/y_2) - 2.783(h_f/y_2)^2 + 1.751/\exp(h_f/y_2))]$
Fr_{pc}	Pile Cap Froude Number		0.32	0.37	0.40	0.20	0.15	0.14	0.15	0.17	0.19	0.20	0.42	0.32	0.20	0.16	0.14	0.15	0.12	0.13	0.14	0.02	0.13	$V_2/(g^*y_2)^{.5}$
K_{2pc}	Correction factor for angle of attack		1.34	1.33	1.51	1.44	1.37	1.42	1.45	1.60	1.50	1.32	1.08	1.12	1.07	1.22	1.25	1.26	1.25	1.37	1.37	1.39	1.48	$K_{2pc} = (\cos\alpha + L_{pc}/a_{pc} \sin\alpha)^{.65}$ HEC-18 Eq. 6.4
K_w	Wide pier adjustment factor		0.66	1.00	1.00	0.57	0.50	0.48	0.49	0.51	0.54	0.57	0.72	1.00	1.00	0.54	0.50	0.53	0.50	0.50	0.52	0.13	0.42	See HEC-18 p. 6.7
ys_{pc}	Pile Cap Scour	feet	23.57	10.05	18.90	15.77	9.90	9.38	9.81	11.64	14.08	16.07	23.62	3.98	2.36	12.02	9.70	11.34	9.53	10.65	11.96	2.29	16.87	$y_2 * 2K_{4pc} K_{2pc} K_3 K_4 K_w (a_{pc}/y_2)^{0.65} (Fr_{pc})^{.43}$
	Pile Group																							
K_{sp}	Coefficient for pile spacing		0.62	0.63	0.59	0.60	0.62	0.60	0.60	0.59	0.59	0.63	0.71	0.69	0.71	0.66	0.65	0.64	0.65	0.61	0.61	0.62	0.59	$1-4/3[1 - 1/(a_{pile}/a)[1 - (G/a)^{.65}]$
K_m	Coefficient for aligned rows		1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	
a^*_{pg}	Effective width of pile group	feet	11.67	11.41	14.76	13.95	12.15	13.26	14.03	15.11	15.07	11.37	7.97	8.49	7.86	9.79	10.21	10.40	10.24	12.29	12.28	12.15	15.34	$a_{pcs} K_{sp} K_m$
y_3	Adjusted flow depth for pile cap scour	feet	21.12	22.55	19.16	14.87	9.40	8.71	8.89	10.25	12.33	15.09	22.29	37.80	29.40	13.86	10.60	12.42	11.22	11.45	13.03	5.65	10.07	$Y_1 + ys_{pier}/2 + ys_{pc}/2$
V_3	Adjusted velocity for pile cap scour	ft./sec	2.49	6.78	3.61	1.40	0.84	0.74	0.74	0.86	1.08	1.56	3.60	10.40	5.66	1.41	1.01	1.22	1.02	0.98	1.15	0.23	0.15	$V_1(y_1/y_3)$
h_3	Adjusted height of pile group above bed	feet	11.04	12.62	10.08	6.08	2.49	2.25	2.57	3.79	5.25	5.47	11.31	27.81	23.48	4.85	2.23	3.21	2.12	2.85	3.68	-1.28	4.44	$h_f + ys_{pier}/2 + ys_{pc}/2$
y_{3max}			21.12	22.55	19.16	14.87	9.40	8.71	8.89	10.25	12.33	15.09	22.29	29.73	27.53	13.86	10.60	12.42	11.22	11.45	13.03	5.65	10.07	$\min(3.5^* a^*_{pg}; y_3)$
h_3/y_{3max}	Ratio of pile depth to flow depth		0.52	0.56	0.53	0.41	0.27	0.26	0.29	0.37	0.43	0.36	0.51	0.94	0.85	0.35	0.21	0.26	0.19	0.25	0.28	-0.23	0.44	
Kh_{pg}	Pile group height factor		0.67	0.71	0.68	0.56	0.38	0.37	0.42	0.52	0.58	0.51	0.66	0.99	0.95	0.49	0.30	0.37	0.27	0.36	0.41	0.00	0.59	$(3.08\,(h_3/y_{3max}) - 5.23(h_3/y_{3max})^2 + 5.25(h_3/y3max)^3 - 2.10(h_3/y_{3max})^4)^{.65}$
Fr_{pg}	Pile Group Froude Number		0.10	0.25	0.15	0.06	0.05	0.04	0.04	0.05	0.05	0.07	0.13	0.34	0.19	0.07	0.05	0.06	0.05	0.05	0.06	0.02	0.01	$V_3/(g^*y_{3max})^{.5}$
ys_{pg}	Pile Group Scour		7.76	12.49	10.52	5.37	2.55	2.46	2.85	4.02	5.09	4.48	6.99	17.96	12.51	3.74	1.98	2.73	1.79	2.65	3.26	0.00	6.21	$y_{3max} * 2 * Kh_{pg} K_{sp} K_m K_4 (a_{pc}/y_{3max})^{0.65} (Fr_{pg})^{.43}$
Total Scour																								
Y_s	Scour Depth	feet	35.85	22.74	34.68	25.52	15.54	14.97	15.98	19.59	23.58	23.43	33.81	19.79	14.87	18.13	14.44	17.15	14.04	16.35	18.62	5.45	23.08	$ys_{pier} + ys_{pc} + ys_{pg}$

Ocean Highway over Mill Creek
Structure No. 0500030
Scour Calculations for Piers 1 through 3
Page 1 of **1**
Prepared by Parsons Brinckerhoff, Inc.
for NJDOT
5/6/2003

ALTERNATIVE 3F

MADE BY: Jennifer Sampson
DATE: 1 May 2003
CHECKED BY: Kelly Brennan
DATE: 2 May 2003

PIER SCOUR COMPUTATIONS FOR SIMPLE COLUMNS
100-YEAR EVENT

	Description	Units	3fMC1	3fMC2	3fMC3	Note
USER DATA REQUIRED FOR CALCULATION						
Simulation Data						
i	Time Step		304	322	318	
t(i)	Simulation Time (Peak Surge at 75:75 Hours)	Hours	76:00:00	80:30:00	79:30:00	
z_w	Water Surface Elevation	feet - NAVD	7.87	4.79	6.26	
Y_1	Approach velocity	feet/sec	4.24	4.51	4.22	
α	Flow Direction	Degrees	109.55	-79.30	-86.46	
Pier Data						
a	Pier Width	feet	3.00	3.00	3.00	
L	Pier Length		9.00	9.00	9.00	
z_b	Bottom elevation at start of computations	feet - NAVD	-10.36	-14.79	-4.43	
θ	Angle of Pier Orientation	Degrees	107.69	107.69	107.69	
K_1	Pier Nose Shape Correction Factor		1.0	1.0	1.0	1
Scour Calculations						
L/a	Length/Width Ratio		3.00	3.00	3.00	
K_2	Correction Factor for Angle of Attack		1.06	1.22	1.41	
K_3	Bed Form Correction Factor		1.10	1.10	1.10	
K_4	Armoring Correction Factor		1.00	1.00	1.00	2
Y_1	Flow Depth Upstream of Pier	feet	18.23	19.58	10.69	
Fr_1	Froude Number		0.17	0.18	0.23	
$[a/Y_1]^{0.65}$			0.31	0.30	0.44	
$Y_{s/Y1}$	Relative Scour Depth		0.34	0.38	0.72	3
Y_s	Scour Depth	feet	6.23	7.42	7.70	

Notes
1. Pier Nose Shape Correction Factor = 1.0 for round piers.
2. Armoring Correction Factor = 1.0 for no armoring.
3. Relative Scour Depth $Y_s/Y_1 = 2*K_1*K_2*K_3*K_4*(a/Y_1)^{0.65}(Fr_1)^{0.43}$

Ocean Highway over Middle Thorofare
Structure No. 0500029 and 3100006
Scour Calculations for Piers 1 through 22

Prepared by Parsons Brinckerhoff, Inc.
for NJDOT
5/6/2003

ALTERNATIVE 3F

MADE BY: Jennifer Sampson
DATE: 1 May 2003
CHECKED BY: Kelly Brennan
DATE: 2 May 2003

PIER SCOUR COMPUTATIONS FOR COMPLEX PIERS
100-YEAR EVENT

	Description	Units	3fMT1	3fMT2	3fMT3	3fMT4	3fMT5	3fMT6	3fMT7	3fMT8	3fMT9	3fMT10	3fMT11	3fMT12	3fMT13	3fMT14	3fMT15	3fMT16	3fMT17	3fMT18	3fMT19	3fMT20	3fMT21	3fMT22	Note
USER DATA REQUIRED FOR CALCULATION																									
Simulation Data																									
i	Time Step		304	305	304	303	303	303	306	306	302	304	300	303	324	314	314	314	313	314	314	314	302	302	
t(i)	Simulation Time (Peak Surge at 75:75 Hours)	Hours	76:00:00	76:15:00	76:00:00	75:45:00	75:45:00	75:45:00	76:30:00	76:30:00	75:30:00	76:00:00	75:00:00	75:45:00	81:00:00	78:30:00	78:30:00	78:30:00	78:15:00	78:30:00	78:30:00	78:30:00	75:30:00	75:30:00	
z_w	Water Surface Elevation	feet - NAVD	8.17	8.70	8.69	8.34	8.30	8.22	8.96	9.05	8.48	9.93	7.15	7.86	3.13	7.40	7.42	7.40	7.81	7.34	7.43	7.43	6.63	6.77	
V_1	Approach velocity	feet/sec	2.89	3.87	3.15	3.65	4.44	5.73	5.72	5.90	8.68	8.00	8.08	8.25	3.76	1.95	2.02	1.93	1.73	2.19	2.20	2.21	1.56	0.68	
α	Flow Direction	Degrees	153.32	139.46	149.08	154.07	153.61	147.31	151.26	151.03	137.85	116.37	69.50	73.80	-118.26	-126.28	-129.87	-123.93	-114.59	-116.88	-117.06	-111.67	-46.01	20.05	
Pier Data																									
	Pier Stem																								
a_{pier}	Pier Width	feet	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	
L_{pier}	Pier Length		20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	
z_b	Bottom elevation at start of computations	feet - NAVD	6.50	7.20	5.20	3.00	0.40	0.50	0.50	0.50	-1.90	-6.90	-22.30	-27.00	-4.20	2.90	2.20	2.70	3.30	2.00	2.90	2.70	1.90	2.20	
θ	Angle of Pier Orientation	Degrees	71.77	63.65	57.74	57.74	57.74	63.73	72.58	81.44	85.74	85.74	85.74	85.74	85.74	85.74	85.74	85.74	85.74	85.74	89.69	94.85	100.01	105.16	
K_{1pier}	Pier Nose Shape Correction Factor		1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	See HEC-18 Table 8.1
f	Distance between front edge of pile cap or footing and pier		10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
	Pile Cap																								
h_b	Height of pile cap above bed at start	feet	-4	-4	-4	-4	-2.40	-2.50	-2.50	-2.50	-0.10	4.90	20.30	25.00	2.20	-4	-4	-4	-4	-4	-4	-4	-4	-4	
T	Thickness of pile cap	feet	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	
K_{1pc}	Pile Cap shape correction factor		1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	Square Pile Cap - See HEC-18 Table 8.1
a_{pc}	Pile cap width	feet	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	
L_{pc}	Length of pile cap	feet	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	
	Pile Group																								
K_{1pg}	Pile Group shape correction factor		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Circular Piles
S	Center to Center spacing of piles	feet	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
a_{pmj}	Projected composite width of pile group	feet	19.27	20.13	18.20	18.95	18.88	18.96	19.70	21.06	23.68	19.72	14.68	13.18	17.40	20.21	19.36	19.38	16.11	16.92	18.36	18.28	20.89	18.73	
a	Diameter of single pile	feet	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
m	Number of rows of aligned piles		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
Bed Conditions																									
D_{50}	Median Grain Diameter	mm	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	From March, 2003 borings by Warren George, Inc.
D_{84}	Grain roughness or 84% grain size	mm	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	From March, 2003 borings by Warren George, Inc.
D_{95}	95% Grain size	mm	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	From March, 2003 borings by Warren George, Inc.
D_{50}	Median Grain Diameter	feet	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	
D_{84}	Grain roughness or 84% grain size	feet	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	
D_{95}	95% Grain size	feet	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	
$V_c D_{50}$	Critical Velocity for D_{50}	ft/sec	0.67	0.66	0.76	0.81	0.87	0.87	0.88	0.88	0.91	0.99	1.08	1.11	0.86	0.79	0.81	0.80	0.79	0.81	0.79	0.80	0.80	0.79	$11.17 Y_1^{1/6} d_{50}^{1/3}$
$V_c D_{50}$	Velocity required to initiate scour for D_{50}	ft/sec	0.24	0.24	0.28	0.30	0.32	0.32	0.32	0.32	0.33	0.36	0.39	0.41	0.31	0.29	0.30	0.29	0.29	0.30	0.29	0.29	0.29	0.29	HEC-18 Eq. 6.7
$V_c D_{95}$	Critical Velocity for D_{95}	ft/sec	0.92	0.90	1.04	1.11	1.19	1.18	1.20	1.20	1.24	1.35	1.48	1.52	1.17	1.08	1.11	1.09	1.08	1.11	1.08	1.09	1.10	1.08	$11.17 Y_1^{1/6} d_{95}^{1/3}$
$V_c D_{95}$	Velocity required to initiate scour for D_{95}	ft/sec	0.35	0.34	0.40	0.43	0.45	0.45	0.46	0.46	0.48	0.52	0.57	0.58	0.45	0.41	0.42	0.42	0.41	0.43	0.41	0.42	0.42	0.41	HEC-18 Eq. 6.7
V_1			8.28	11.55	7.93	8.63	9.96	13.12	12.89	13.28	19.26	16.26	14.89	14.78	8.43	4.41	4.45	4.32	3.81	4.88	5.05	5.04	3.30	1.03	HEC-18 Eq. 6.6

ALTERNATIVE 3F

MADE BY: Jennifer Sampson
DATE: 1 May 2003
CHECKED BY: Kelly Brennan
DATE: 2 May 2003

PIER SCOUR COMPUTATIONS FOR COMPLEX PIERS
100-YEAR EVENT

	Description	Units	3fMT1	3fMT2	3fMT3	3fMT4	3fMT5	3fMT6	3fMT7	3fMT8	3fMT9	3fMT10	3fMT11	3fMT12	3fMT13	3fMT14	3fMT15	3fMT16	3fMT17	3fMT18	3fMT19	3fMT20	3fMT21	3fMT22	Note
Scour Calculations																									
	Pier Stem																								
L/a	Length/Width Ratio		2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	
α	Angle of Attack	Degrees	81.56	75.81	88.66	83.67	84.13	83.58	78.68	69.59	52.12	30.63	16.24	11.94	24.00	32.02	29.61	29.67	20.33	22.62	26.75	26.52	33.98	85.11	
K_{2s}	Correction Factor for Angle of Attack		1.87	1.89	1.80	1.75	1.76	1.86	1.88	1.90	1.85	1.64	1.39	1.30	1.53	1.66	1.62	1.62	1.47	1.51	1.58	1.57	1.68	1.85	$K_{2s} = (\cos\alpha + L_s/a_s \sin\alpha)^{0.65}$ HEC-18 Eq. 6.4
K_3	Bed Form Correction Factor		1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	
K_4	Armoring Correction Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	See pg. 6.6 HEC-18
f/a_{pier}			1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	
h_1/a_{pier}			0.25	0.25	0.25	0.25	0.45	0.44	0.44	0.44	0.74	1.36	3.29	3.88	1.03	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	
K_{t4pier}	Coefficient to account for height of pier stem above bed and pile cap overhang f		0.25	0.25	0.25	0.25	0.20	0.20	0.20	0.20	0.13	0.04	-0.05	-0.08	0.08	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	$(.4075 - .0665\ f/a_{pier}) - (.4271 - .0770\ f/a_{pier})\ h_1/a_{pier} + (.1615 - .0455\ f/a_{pier})\ (h_1/a_{pier})^2 - (.0269 - .012\ f/a_{pier})\ (h_1/a_{pier})^3$
K_w	Wide pier adjustment factor		1.0	1.0	0.7	0.7	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.5	
Y_1	Flow Depth Upstream of Pier	feet	1.67	1.50	3.49	5.34	7.90	7.72	8.46	8.55	10.38	16.83	29.45	34.86	7.33	4.50	5.22	4.70	4.51	5.34	4.53	4.73	4.93	4.57	$z_w - zb$
h_1	Height of pier stem above bed at beginning of computations	feet	2.00	2.00	2.00	2.00	3.60	3.50	3.60	3.50	5.90	10.90	26.30	31.00	8.20	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	$T+h_0$
Fr_{pier}	Froude Number		0.0000	0.0000	0.2967	0.2781	0.2787	0.3634	0.3466	0.3654	0.4750	0.3437	0.2623	0.2461	0.0000	0.1620	0.1555	0.1572	0.1433	0.1672	0.1822	0.1790	0.1234	0.0958	$V_1/(g^*y_1)^{.5}$
y_{pier}	Scour Depth	feet	0.00	0.00	3.84	4.21	3.83	4.57	4.68	4.80	3.79	1.00	-1.26	-1.74	0.00	2.97	3.01	2.92	2.50	2.91	2.98	3.00	2.77	2.11	$y_1*K_{1pier}*2*K_{2pier}K_{3pier}K_4(a_{pier}/y_1)^{.065}(Fr_{pier})^{.43}$
	Pile Cap																								
h_2	Adjusted height of pile cap above bed	feet	-4.00	-4.00	-2.08	-1.89	-0.49	-0.22	-0.16	-0.10	1.80	5.40	19.67	24.13	2.20	-2.52	-2.50	-2.54	-2.75	-2.54	-2.51	-2.50	-2.61	-2.95	$h_0+y_{spier}/2$
y_2	Adjusted flow depth for pile cap scour	feet	1.67	1.50	5.41	7.45	9.81	10.01	10.80	10.95	12.27	17.33	28.83	33.98	7.33	5.98	6.72	6.16	5.76	6.79	6.03	6.23	6.32	5.63	$y_1+y_{spier}/2$
V_2	Adjusted velocity for pile cap scour	ft./sec	2.89	3.87	2.03	2.62	3.58	4.42	4.48	4.60	7.34	7.77	8.25	8.46	3.76	1.47	1.56	1.48	1.35	1.72	1.66	1.68	1.21	0.55	$V_1(y_1/y_2)$
T*	Effective Pile Cap Thickness	ft	5.67	5.50	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	5.13	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	Check for Top of Pile Cap Above Water Surface
y_2^*	Effective Flow Depth (for Equivalent full depth solid pier width)	ft	1.67	1.50	5.41	7.45	9.81	10.01	10.80	10.95	12.27	17.33	28.83	33.98	7.33	5.98	6.72	6.16	5.76	6.79	6.03	6.23	6.32	5.63	Max value of y_2 is 3.5 a_{pc}
a_{pc}*	Equivalent full depth solid pier width	feet	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	5.22	3.22	0.75	0.60	5.12	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	$a_{pc}[\exp(-2.705 + 0.51\ \ln(T^*/y_2) - 2.783(h_2/y_2)^2 + 1.751\exp(h_2/y_2))]$
Fr_{pc}	Pile Cap Froude Number		0.39	0.56	0.16	0.17	0.20	0.25	0.24	0.25	0.37	0.33	0.27	0.26	0.24	0.11	0.11	0.10	0.10	0.12	0.12	0.12	0.09	0.04	$V_2/(g^*y_2)^{.5}$
K_{2pc}	Correction factor for angle of attack		1.43	1.46	1.37	1.41	1.41	1.41	1.45	1.49	1.51	1.40	1.25	1.19	1.34	1.41	1.39	1.39	1.30	1.32	1.36	1.36	1.42	1.40	$K_{2pc} = (\cos\alpha + L_{pc}/a_{pc} \sin\alpha)^{0.65}$ HEC-18 Eq. 6.4
K_w	Wide pier adjustment factor		0.56	0.60	0.51	0.55	0.59	0.63	0.63	0.63	1.00	1.00	1.00	1.00	1.00	0.47	0.48	0.47	0.46	0.49	0.49	0.49	0.45	0.19	See HEC-18 p. 8.7
y_{spc}	Pile Cap Scour	feet	12.52	15.40	11.13	14.26	18.28	21.24	22.19	23.33	16.72	12.19	4.64	3.97	10.26	9.31	9.76	9.26	8.07	9.92	9.80	9.92	8.34	2.47	$y_2*2K_{spc}K_{spc}K_3K_4K_4(a_{pc}/y_2)^{.065}(Fr_{pc})^{.42}$
	Pile Group																								
K_{sp}	Coefficient for pile spacing		0.61	0.61	0.62	0.61	0.61	0.61	0.61	0.60	0.59	0.61	0.65	0.67	0.62	0.61	0.61	0.61	0.63	0.63	0.62	0.62	0.60	0.61	$1-4/3[1 - 1/(a_{pxg}/a)[1 - (S/a)^{-0.6}]$
K_m	Coefficient for aligned rows		1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	
a^*_{pg}	Effective width of pile group	feet	12.57	13.02	12.01	12.40	12.37	12.41	12.80	13.51	14.89	12.81	10.16	9.37	11.59	13.07	12.62	12.63	10.91	11.34	12.10	12.05	13.43	12.29	$a_{pxg} K_{sp} K_m$
y_3	Adjusted flow depth for pile cap scour	feet	7.93	9.20	10.97	14.58	18.95	20.63	21.90	22.61	20.64	23.42	31.15	35.97	12.46	10.64	11.60	10.79	9.80	11.76	10.93	11.19	10.49	6.86	$y_1+y_{spc}/2 + y_{spc}/2$
V_3	Adjusted velocity for pile cap scour	ft./sec	0.61	0.63	1.00	1.34	1.85	2.14	2.21	2.23	4.37	5.75	7.64	7.99	2.21	0.82	0.91	0.84	0.80	1.00	0.91	0.93	0.73	0.45	$V_1(y_1/y_3)$
h_3	Adjusted height of pile group above bed	feet	2.26	3.70	3.48	5.24	8.66	10.41	10.94	11.57	10.16	11.49	21.99	26.11	7.33	2.14	2.38	2.09	1.29	2.42	2.39	2.46	1.55	-1.71	$h_0+y_{spc}/2+ y_{spc}2$
y_{3max}			7.93	9.20	10.97	14.58	18.95	20.63	21.90	22.61	20.64	23.42	31.15	32.79	12.46	10.64	11.60	10.79	9.80	11.76	10.93	11.19	10.49	6.86	$\min(3.5^* a^*_{pg}, y_3)$
h_3/y_{3max}	Ratio of pile depth to flow depth		0.29	0.40	0.32	0.36	0.46	0.50	0.50	0.51	0.49	0.49	0.71	0.80	0.59	0.20	0.21	0.19	0.13	0.21	0.22	0.22	0.15	-0.25	
Kh_{pg}	Pile group height factor		0.41	0.55	0.45	0.50	0.61	0.66	0.65	0.66	0.64	0.64	0.84	0.91	0.74	0.29	0.30	0.28	0.18	0.30	0.32	0.32	0.21	0.00	$(3.08\ (h_3/y_{3max}) - 5.23(h_3/y_{3max})^2 + 5.25(h_3/y3max)^3 - 2.10(h_3/y_{3max})^4)^{1.065}$
Fr_{pg}	Pile Group Froude Number		0.04	0.04	0.05	0.06	0.07	0.08	0.08	0.08	0.17	0.21	0.24	0.25	0.11	0.04	0.05	0.05	0.04	0.05	0.05	0.05	0.04	0.03	$V_3/(g^*y_{3max})^{.5}$
y_{Spg}	Pile Group Scour		2.37	3.38	3.28	4.39	6.32	7.35	7.60	8.08	11.03	11.43	15.09	15.97	7.46	2.04	2.14	1.93	1.08	2.09	2.22	2.25	1.39	0.00	$y_{3max}*2*Kh_{pg}K_{spg}K_3K_4(a_{pg}/y_{3max})^{.065}(Fr_{pg})^{.43}$
Total Scour																									
Y_s	Scour Depth	feet	14.90	18.77	18.24	22.86	28.43	33.16	34.48	36.21	31.55	24.62	18.48	18.19	17.72	14.32	14.91	14.11	11.65	14.93	15.00	15.17	12.50	4.58	$y_{Spier} + y_{Spc} + y_{Spg}$

ALTERNATIVE 3G

MADE BY: Jennifer Sampson
DATE: 1 May 2003
CHECKED BY: Kelly Brennan
DATE: 2 May 2003

PIER SCOUR COMPUTATIONS FOR SIMPLE COLUMNS
Overtopping Event

	Description	Units	3gMC1	3gMC2	3gMC3	Note
USER DATA REQUIRED FOR CALCULATION						
Simulation Data						
i	Time Step		304	322	318	
t(i)	Simulation Time (Peak Surge at 75:75 Hours)	Hours	76:00:00	80:30:00	79:30:00	
z_w	Water Surface Elevation	feet - NAVD	7.87	4.78	6.26	
V_1	Approach velocity	feet/sec	4.12	4.50	4.21	
α	Flow Direction	Degrees	109.55	-79.30	-86.46	
Pier Data						
a	Pier Width	feet	3.00	3.00	3.00	
L	Pier Length		9.00	9.00	9.00	
z_b	Bottom elevation at start of computations	feet - NAVD	-10.40	-14.80	-4.40	
θ	Angle of Pier Orientation	Degrees	107.69	107.69	107.69	
K_1	Pier Nose Shape Correction Factor		1.0	1.0	1.0	1
Scour Calculations						
L/a	Length/Width Ratio		3.00	3.00	3.00	
K_2	Correction Factor for Angle of Attack		1.06	1.22	1.41	
K_3	Bed Form Correction Factor		1.10	1.10	1.10	
K_4	Armoring Correction Factor		1.00	1.00	1.00	2
Y_1	Flow Depth Upstream of Pier	feet	18.27	19.58	10.66	
Fr_1	Froude Number		0.17	0.18	0.23	
$[a/Y_1]^{0.65}$			0.31	0.30	0.44	
$Y_{s/Y1}$	Relative Scour Depth		0.34	0.38	0.72	3
Y_s	Scour Depth	feet	6.15	7.41	7.69	

Notes
1. Pier Nose Shape Correction Factor = 1.0 for round piers.
2. Armoring Correction Factor = 1.0 for no armoring.
3. Relative Scour Depth $Y_s/Y_1 = 2*K_1*K_2*K_3*K_4*(a/Y_1)^{0.65}(Fr_1)^{0.43}$

ALTERNATIVE 3G

MADE BY Jennifer Sampson
DATE 1 May 2003
CHECKED BY Kelly Brennan
DATE 2 May 2003

PIER SCOUR COMPUTATIONS FOR COMPLEX PIERS
100-YEAR EVENT

	Description	Units	3gMT1	3gMT2	3gMT3	3gMT4	3gMT5	3gMT6	3gMT7	3gMT8	3gMT9	3gMT10	3gMT11	3gMT12	3gMT13	3gMT14	3gMT15	3gMT16	3gMT17	3gMT18	3gMT19	3gMT20	Note
USER DATA REQUIRED FOR CALCULATION																							
Simulation Data																							
i	Time Step		305	304	303	303	303	303	306	302	303	303	318	313	314	314	313	314	314	314	302	301	
t(i)	Simulation Time (Peak Surge at 75:75 Hours)	Hours	76:15:00	76:00:00	75:45:00	75:45:00	75:45:00	75:45:00	76:30:00	75:30:00	75:45:00	75:45:00	79:30:00	78:15:00	78:30:00	78:30:00	78:15:00	78:30:00	78:30:00	78:30:00	75:30:00	75:15:00	
z_w	Water Surface Elevation	feet - NAVD	8.49	8.43	8.37	8.32	8.20	8.24	9.04	8.39	9.18	9.63	5.68	7.79	7.42	7.40	7.82	7.34	7.44	7.43	6.81	6.27	
V_1	Approach velocity	feet/sec	1.83	3.93	3.20	3.52	5.54	5.99	5.63	8.52	8.78	8.10	3.92	1.78	2.02	1.92	1.74	2.20	2.19	2.21	1.60	0.84	
α	Flow Direction	Degrees	149.03	143.12	151.26	154.35	147.08	152.46	150.75	142.72	86.00	86.00	-116.83	-129.14	-124.10	-124.22	-114.65	-117.00	-117.34	-111.78	-50.65	16.67	
Pier Data																							
	Pier Stem																						
a	Pier Width	feet	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	10.00	33.00	33.00	10.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	
L	Pier Length		20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	51.00	51.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	
z_b	Bottom elevation at start of computations	feet - NAVD	8.00	6.50	4.30	2.00	0.25	0.50	0.50	-0.40	-7.00	-8.00	-5.00	2.80	2.40	2.50	3.50	1.90	2.80	2.70	1.90	2.00	
θ	Angle of Pier Orientation	Degrees	69.62	61.03	57.74	57.74	59.30	68.68	78.05	85.74	85.74	85.74	85.74	85.74	85.74	85.74	85.74	85.74	86.98	94.13	99.29	104.45	
K_{1pier}	Pier Nose Shape Correction Factor		1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	
f	Distance between front edge of pile cap or footing and pier		10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	15.0	16.5	16.5	15.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
	Pile Cap																						
h_0	Height of pile cap above bed at start	feet	-4	-4	-4	-4.00	-2.25	-2.50	-2.50	-1.60	-26	-21	-28	-33.8	-4	-4	-4	-4	-4	-4	-4	-4	
T	Thickness of pile cap	feet	6	6	6	6	6	6	6	6	15	25	25	15	6	6	6	6	6	6	6	6	
K_{1pc}	Pile Cap shape correction factor		1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	Square Pile Cap - See HEC-18 Table 6.1
a_{pc}	Pile cap width	feet	25	25	25	25	25	25	25	25	33	78	78	33	25	25	25	25	25	25	25	25	
L_{pc}	Length of pile cap	feet	40	40	40	40	40	40	40	40	51	87	87	51	40	40	40	40	40	40	40	40	
	Pile Group																						
K_{1pg}	Pile Group shape correction factor		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Circular Piles
S	Center to Center spacing of piles	feet	10	10	10	10	10	10	10	10	10	14.5	14.5	10	10	10	10	10	10	10	10	10	
a_{proj}	Projected composite width of pile group	feet	19.59	19.19	18.53	18.99	18.33	18.93	20.60	22.95	12.11	30.18	45.12	25.95	19.44	19.48	16.14	16.96	18.21	18.07	19.52	18.33	
a	Diameter of single pile	feet	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	6	6	6	6	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
m	Number of rows of aligned piles		2	2	2	2	2	2	2	2	2	5	5	2	2	2	2	2	2	2	2	2	
Bed Conditions																							
D_{50}	Median Grain Diameter	mm	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	From March, 2003 borings by Warren George, Inc.
D_{84}	Grain roughness or 84% grain size	mm	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	From March, 2003 borings by Warren George, Inc.
D_{95}	95% Grain size	mm	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	From March, 2003 borings by Warren George, Inc.
D_{50}	Median Grain Diameter	feet	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	
D_{84}	Grain roughness or 84% grain size	feet	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	
D_{95}	95% Grain size	feet	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	
V_cD_{50}	Critical Velocity for D_{50}	ft/sec	0.55	0.69	0.78	0.84	0.87	0.87	0.88	0.88	0.98	0.99	0.91	0.80	0.81	0.80	0.79	0.82	0.79	0.80	0.80	0.78	$11.17 y_1^{1/6} d_{50}^{1/3}$
V_cD_{50}	Velocity required to initiate scour for D_{50}	ft/sec	0.20	0.25	0.28	0.30	0.32	0.32	0.32	0.32	0.35	0.34	0.31	0.29	0.29	0.29	0.29	0.30	0.29	0.29	0.29	0.29	HEC-18 Eq. 6.7
V_cD_{95}	Critical Velocity for D_{95}	ft/sec	0.75	0.94	1.06	1.14	1.19	1.18	1.20	1.21	1.34	1.36	1.25	1.10	1.10	1.10	1.07	1.11	1.09	1.09	1.10	1.07	$11.17 y_1^{1/6} d_{95}^{1/3}$
V_cD_{95}	Velocity required to initiate scour for D_{95}	ft/sec	0.29	0.36	0.41	0.44	0.45	0.45	0.46	0.46	0.51	0.48	0.44	0.42	0.42	0.42	0.41	0.43	0.42	0.42	0.42	0.41	HEC-18 Eq. 6.7
V_r			6.27	11.24	7.86	8.05	12.59	13.74	12.65	19.43	17.81	15.19	7.67	3.83	4.49	4.25	3.87	4.90	5.02	5.04	3.41	1.47	HEC-18 Eq. 6.6

ALTERNATIVE 3G

MADE BY Jennifer Sampson
DATE 1 May 2003
CHECKED BY Kelly Brennan
DATE 2 May 2003

PIER SCOUR COMPUTATIONS FOR COMPLEX PIERS
100-YEAR EVENT

	Description	Units	3gMT1	3gMT2	3gMT3	3gMT4	3gMT5	3gMT6	3gMT7	3gMT8	3gMT9	3gMT10	3gMT11	3gMT12	3gMT13	3gMT14	3gMT15	3gMT16	3gMT17	3gMT18	3gMT19	3gMT20	Note
Scour Calculations																							
	Pier Stem																						
L/a	Length/Width Ratio		2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.00	1.55	1.55	2.00	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	
α	Angle of Attack	Degrees	79.41	82.10	86.48	83.39	87.78	83.79	72.69	56.99	0.26	0.26	22.56	34.88	29.84	29.95	20.39	22.73	26.32	25.92	30.06	87.77	
K_{2s}	Correction Factor for Angle of Attack		1.88	1.87	1.78	1.75	1.83	1.86	1.90	1.88	1.01	1.00	1.31	1.55	1.63	1.63	1.47	1.51	1.57	1.57	1.63	1.83	$K_{2s} = (\cos\alpha + L_a/a_s \sin\alpha)^{0.65}$ HEC-18 Eq. 6.4
K_3	Bed Form Correction Factor		1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	
K_4	Armoring Correction Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	See pg. 6.6 HEC-18
l/a_{pier}			1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.50	0.50	0.50	1.50	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	
h_1/a_{pier}			0.25	0.25	0.25	0.25	0.47	0.44	0.44	0.55	-1.10	0.12	-0.09	-1.88	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	
K_{1pier}	Coefficient to account for height of pier stem above bed and pile cap overhang f		0.25	0.25	0.25	0.25	0.19	0.20	0.20	0.17	0.77	0.33	0.41	1.28	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	$(.4075 - .0669\ (l/a_{pier}))-(.4271-.0778\ (l/a_{pier}))\ h_1/a_{pier}+(.1615-.0455\ (l/a_{pier}))\ (h_1/a_{pier})^2 - (.0269-.012\ (l/a_{pier}))\ (h_1/a_{pier})^3$
K_w	Wide pier adjustment factor		1.0	1.0	0.7	0.7	1.0	1.0	1.0	1.0	1.0	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.5	
Y_1	Flow Depth Upstream of Pier	feet	0.49	1.93	4.07	6.32	7.95	7.74	8.54	8.79	16.18	17.63	10.68	4.99	5.02	4.90	4.32	5.44	4.64	4.73	4.91	4.27	$z_w - zb$
h_1	Height of pier stem above bed at beginning of computations	feet	2.00	2.00	2.00	2.00	3.75	3.50	3.50	4.40	-11.00	4.00	-3.00	-18.80	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	$T+h_o$
Fr_{pier}	Froude Number		0.0000	0.0000	0.2796	0.2465	0.3461	0.3795	0.3395	0.5063	0.3844	0.3400	0.2113	0.1402	0.1588	0.1526	0.1473	0.1666	0.1794	0.1787	0.1270	0.0713	$V_1/(g^*y_1)^{.5}$
y_{Spier}	Scour Depth	feet	0.00	0.00	3.90	4.24	4.28	4.65	4.70	4.83	14.77	13.33	14.84	16.17	3.00	2.93	2.49	2.93	2.98	2.98	2.71	2.27	$y_1*K_{1pier}*2K_{2pier}K_{3pier}K_4K_w(a_{pier}/y_1)^{0.65}(Fr_{pier})^{.43}$
	Pile Cap																						
h_2	Adjusted height of pile cap above bed	feet	-4.00	-4.00	-2.05	-1.88	-0.11	-0.17	-0.15	0.82	-18.62	-14.34	-20.58	-25.71	-2.50	-2.54	-2.75	-2.53	-2.51	-2.51	-2.64	-2.87	$h_o+y_{Spier}/2$
y_2	Adjusted flow depth for pile cap scour	feet	0.49	1.93	6.02	8.43	10.09	10.06	10.89	11.20	23.57	24.29	18.10	13.07	6.52	6.36	5.56	6.90	6.12	6.22	6.26	5.40	$y_1+y_{Spier}/2$
V_2	Adjusted velocity for pile cap scour	ft./sec	1.83	3.93	2.16	2.63	4.36	4.60	4.41	6.68	6.03	5.88	2.31	0.68	1.55	1.48	1.35	1.74	1.66	1.68	1.25	0.66	$V_1(y_1/y_2)$
T*	Effective Pile Cap Thickness	ft	4.49	5.93	6.00	6.00	6.00	6.00	6.00	6.00	15.00	25.00	25.00	15.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	Check for Top of Pile Cap Above Water Surface
y_2^*	Effective Flow Depth (for Equivalent full depth solid pier width)	ft	0.49	1.93	6.02	8.43	10.09	10.06	10.89	11.20	23.57	24.29	18.10	13.074	6.52	6.36	5.56	6.90	6.12	6.22	6.26	5.40	Max value of y_2 is 3.5 a_{pc}
a_{pc}*	Equivalent full depth solid pier width	feet	25.00	25.00	25.00	25.00	25.00	25.00	25.00	6.19	33.00	78.00	78.00	33.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	$a_{pc}[\exp(-2.705 + 0.51\ \ln(T^*/y_2) - 2.783(h_2/y_2)^3 + 1.751/\exp(h_2/y_2))]$
Fr_{pc}	Pile Cap Froude Number		0.46	0.50	0.16	0.16	0.24	0.26	0.24	0.35	0.22	0.21	0.10	0.03	0.11	0.10	0.10	0.12	0.12	0.12	0.09	0.05	$V_2/(g^*y_2)^{.5}$
K_{2pc}	Correction factor for angle of attack		1.44	1.42	1.39	1.41	1.38	1.41	1.48	1.51	1.00	1.00	1.22	1.41	1.39	1.39	1.30	1.32	1.36	1.36	1.39	1.38	$K_{2pc} = (\cos\alpha + L_{pc}/a_{pc} \sin\alpha)^{0.65}$ HEC-18 Eq. 6.4
K_w	Wide pier adjustment factor		0.49	0.60	0.52	0.55	0.62	0.63	0.63	1.00	0.65	0.58	0.46	0.21	0.48	0.47	0.46	0.49	0.49	0.49	0.46	0.22	See HEC-18 p. 6.7
y_{Spc}	Pile Cap Scour	feet	7.81	15.70	11.96	14.59	20.55	21.83	22.47	17.76	24.28	37.46	23.10	3.87	9.68	9.32	8.01	10.01	9.81	9.87	8.32	2.95	$y_2*2K_{2pc}K_{3pc}K_4K_w(a_{pc}/y_2)^{0.65}(Fr_{pc})^{.43}$
	Pile Group																						
K_{sp}	Coefficient for pile spacing		0.61	0.61	0.62	0.61	0.62	0.61	0.60	0.59	0.82	0.56	0.52	0.73	0.61	0.61	0.63	0.63	0.62	0.62	0.61	0.62	$1-4/3[1 - 1/(a_{pcs}/a)][1 - (S/a)^{.05}]$
K_m	Coefficient for aligned rows		1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.04	1.31	1.31	1.04	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	
a^*_{pg}	Effective width of pile group	feet	12.74	12.53	12.18	12.43	12.08	12.40	13.27	14.51	10.35	22.12	30.95	19.68	12.66	12.69	10.92	11.36	12.02	11.94	12.70	12.08	$a_{pcs} K_{sp} K_m$
y_3	Adjusted flow depth for pile cap scour	feet	4.40	9.78	12.00	15.73	20.36	20.98	22.12	20.09	35.71	43.02	29.64	15.01	11.36	11.02	9.57	11.91	11.03	11.16	10.42	6.88	$y_1+y_{Spier}/2 + y_{Spc}/2$
V_3	Adjusted velocity for pile cap scour	ft./sec	0.20	0.78	1.08	1.41	2.16	2.21	2.17	3.73	3.98	3.32	1.41	0.59	0.89	0.85	0.78	1.01	0.92	0.94	0.75	0.52	$V_1(y_1/y_3)$
h_3	Adjusted height of pile group above bed	feet	-0.09	3.85	3.93	5.41	10.16	10.74	11.08	9.70	-6.48	4.39	-9.03	-23.78	2.34	2.13	1.25	2.47	2.39	2.43	1.52	-1.39	$h_o+y_{Spier}/2+ y_{Spc}/2$
y_{3max}			4.40	9.78	12.00	15.73	20.36	20.98	22.12	20.09	35.71	43.02	29.64	15.01	11.36	11.02	9.57	11.91	11.03	11.16	10.42	6.88	$\min(3.5^* a^*_{pg}, y_3)$
h_3/y_{3max}	Ratio of pile depth to flow depth		-0.02	0.39	0.33	0.34	0.50	0.51	0.50	0.48	-0.18	0.10	-0.30	-1.58	0.21	0.19	0.13	0.21	0.22	0.22	0.15	-0.20	
Kh_{pg}	Pile group height factor		0.00	0.54	0.47	0.49	0.65	0.66	0.65	0.64	0.00	0.13	0.00	0.00	0.30	0.28	0.18	0.30	0.31	0.31	0.20	0.00	$(3.08\ (h_3/y_{3max}) - 5.23(h_3/y_{3max})^2 + 5.25(h_3/y3max)^3 - 2.10(h_3/y_{3max})^4)^{1.65}$
Fr_{pg}	Pile Group Froude Number		0.02	0.04	0.06	0.06	0.08	0.08	0.08	0.15	0.12	0.09	0.05	0.03	0.05	0.05	0.04	0.05	0.05	0.05	0.04	0.03	$V_3/(g^*y_{3max})^{.5}$
y_{Spg}	Pile Group Scour		0.00	3.57	3.57	4.38	7.18	7.54	7.76	9.95	0.00	2.82	0.00	0.00	2.14	1.94	1.07	2.12	2.20	2.21	1.33	0.00	$y_{max}*2*Kh_{pg}K_{spg}K_4K_w(a_{pg}/y_{3max})^{0.65}(Fr_{pg})^{.43}$
Total Scour																							
Y_s	Scour Depth	feet	7.81	19.27	19.43	23.21	32.01	34.02	34.92	32.55	39.05	53.60	37.93	20.04	14.82	14.20	11.57	15.07	14.98	15.07	12.36	5.21	$y_{Spier} + y_{Spc} + y_{Spg}$

Technical Addendum I
Toll Plaza Relocation Study

DRAFT

MIDDLE THOROFARE BRIDGE

TOLL PLAZA RELOCATION STUDY

Originally Prepared: August 1994

Revised: February 2001

Prepared for:

Cape May County Bridge Commission

Prepared by:

Parsons Brinckerhoff-FG, Inc.

Parsons Brinckerhoff performed the traffic analyses, developed the conceptual toll plaza design, and prepared the preliminary cost estimate to relocate and expand the toll collection facilities and mechanical controls on the Middle Thorofare Bridge. In order to relocate the toll plaza from its present location on the bridge to the east approach on the Wildwood side, a preliminary wetland delineation and land survey was also performed. The Commission desires to relocate and expand the toll collection facilities in order to improve the processing rate at the plaza caused by growth in traffic and an increasing number of bridge openings resulting in excessive vehicular queue lengths. By moving the plaza to the east approach, the existing two manual toll lane facility can be expanded to four lanes by adding two automatic lanes. The expansion could more than double the existing processing rate on the bridge. In addition, the Commission is planning to construct a new bridge adjacent to the existing structure within the next five to ten years. The location of the new toll plaza is to be situated so as to serve the new bridge which will also include a movable span but with a slightly higher clearance than the existing facility which should lower the number of bridge openings especially during peak traffic periods.

Background

The Middle Thorofare Bridge is a single leaf bascule type bridge which spans the Middle Thorofare Waterway along Ocean Drive, Cape May County Route 621. The bridge, aligned on an east-west orientation as it spans the Middle Thorofare, connects the Wildwoods to the north with Cape May City to the south. The Middle Thorofare is a narrow river-like body of water on the Intercoastal Waterway which provides marine traffic access to the Cape May Harbor and ultimately the Atlantic Ocean via the Cape May Inlet from the large inland bodies of water such as Jarvis Sound, Sunset Lake, Richardson Sound, and Grassy Sound.

Presently a toll of $0.50 is collected from both travel directions. The existing facility, in its closed position, provides a mean high water level clearance for a vessel with a maximum height of 23 feet. During the six-month period extending from May through October, bridge openings occur rather frequently. During the peak month of August, bridge openings occur about 40 times per day, accommodating approximately 1700 boats. Numerous commercial fishing vessels based in the inland waters cause the majority of the bridge openings. However, large sailboats and summer season excursion and tour boats add to the bridge opening totals. During the winter months (November through April) the volume of boats causing the bridge to open drops to under 600 requiring 20 or fewer bridge openings per day.

The toll bridge provides two travel lanes over the Middle Thorofare. The existing toll plaza, with two manually operated lanes, is located on the structure just east of the bascule opening adjacent to a small building which houses the bridge controls. Two toll collectors man the facility during the day and evening shifts. During the summer, an additional collector is added to these shifts. One collector mans the

late night/early morning shift. The bridge's mechanical controls, including the traffic signals and gates to stop vehicular traffic on the approaches, are the responsibilities of the toll collectors.

Existing Traffic Characteristics

Peak traffic conditions historically occur during July and August. Therefore, the focus of the data collection was in July, 1993. The following traffic data was obtained and collected by PB and the Cape May County Bridge Commission staff:

- Daily and monthly historical two-way traffic volumes (1988 to present);
- Bridge Opening Logs;
- Hourly Automatic Traffic Recorder (ATR) counts; and,
- Traffic queue lengths resulting from water traffic bridge openings.

The daily and monthly historical (1988 to 1993) traffic volumes assisted in the development of the growth factors for projected bridge traffic volumes. The bridge opening logs (1991 through July 1993) presented the number and time of bridge openings and the length in time of each opening. The ATR counts were used to obtain directional traffic counts (July 1993), and to verify the historical two-way traffic counts where applicable. The number of vehicles in queue, primarily resulting from bridge openings, were counted during the July 1993 count period to determine the actual traffic demand due to normal traffic operations.

Existing Traffic Volumes

Monthly two-way traffic volumes at the Middle Thorofare Bridge typically range between 50,000 in February and 300,000 in July. Figure 1 graphically illustrates the historical monthly traffic volume variation. The monthly variation, normalizing February, for the Middle Thorofare Bridge based on historical data from 1988 to 1993 is summarized in the following table. As presented in the figure, the monthly variations have remained very similar over the course of each year between 1988 and July 1993. The only significant change has occurred during the summer months of July and August in terms of the peak travel month of the year. Between 1990 and 1992 August was the peak month while in prior years July had higher volumes.

MONTHLY TRAFFIC VARIATIONS

Month	Adjustment Factor
January	1.01
February	1.00
March	1.16
April	1.49
May	2.38
June	3.27
July	5.07
August	6.22
September	3.90
October	2.04
November	1.33
December	1.24

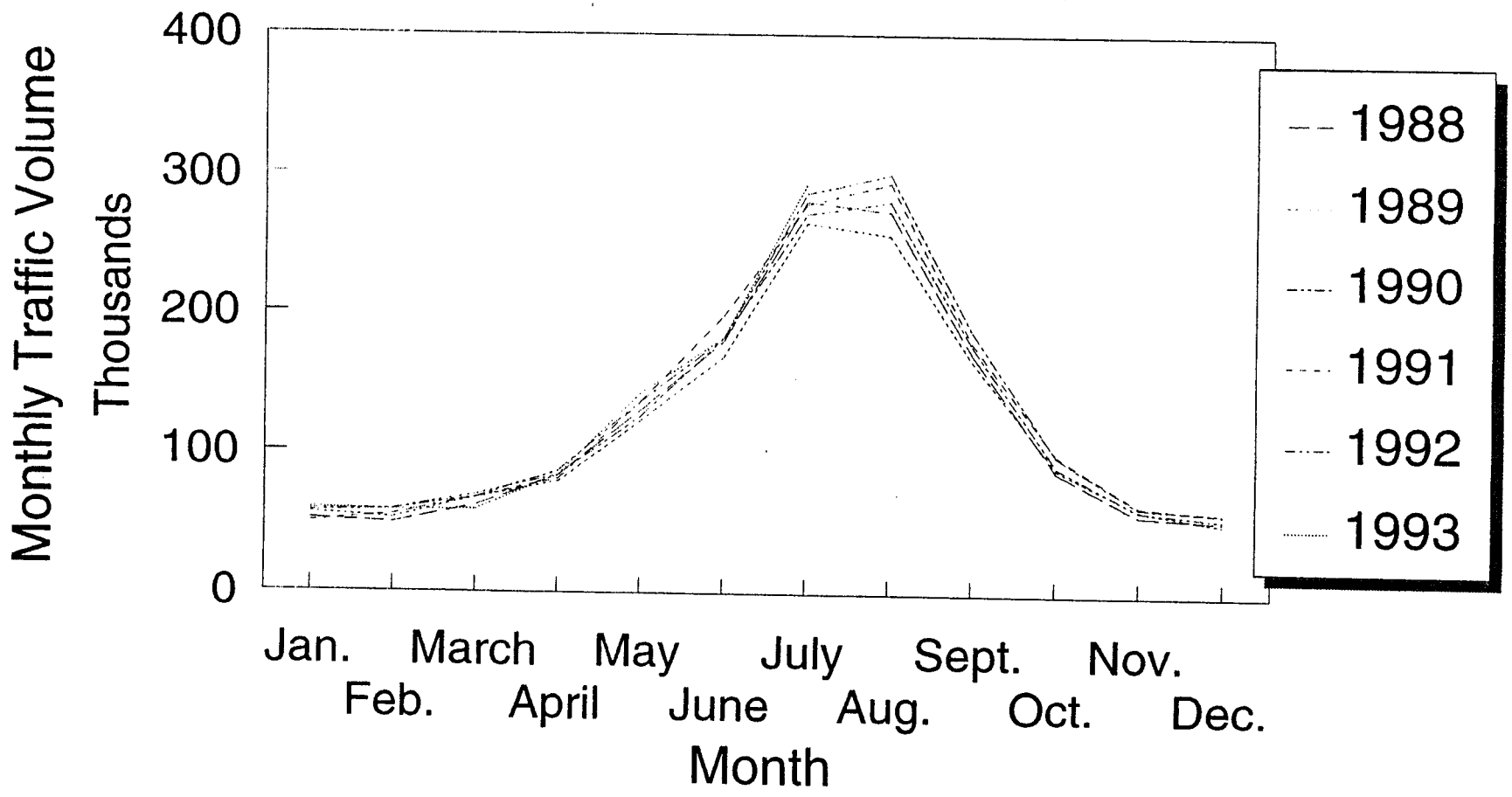
Daily traffic volume variations for each month during 1992 through July 1993 are included in the appendix. Typically, weekend traffic for all months, although more pronounced during the summer, is higher than weekday traffic. The daily variation in traffic is shown in Figure 2 and as expected the summer volumes on a daily basis are about twice the daily traffic based on the average for the entire year. The annual daily variation is quite stable with volumes averaging about 4,000 vehicles per day from Monday through Thursday. Volumes increase to approximately 4,500 vehicles per day on Friday then to well over 5,000 vehicles on Saturdays. The volume drops to about 4,500 vehicles per day for a typical Sunday in 1992.

The daily variations for the summer period presents a somewhat different picture. On a typical Monday, traffic is somewhat greater than the other weekdays with an average volume of about 7,000 vehicles. The average summer Friday volume increases to over 7,500 vehicles then to approximately 9,000 on Saturdays. The average summer Sunday volume in 1992 totaled 8,000 vehicles per day.

The day of week variations, normalizing Tuesday, for the Middle Thorofare Bridge is summarized in the following table and re-emphasizes the summer daily peaking conditions.

Middle Thorofare Bridge

Monthly Traffic Volume Variation



Parsons Brinckerhoff

Figure 1

DAILY TRAFFIC VARIATIONS

Day of Week	Adjustment Factor	
	Average Weekday	Summer Weekday
Monday	1.08	1.11
Tuesday	1.00	1.00
Wednesday	1.03	1.03
Thursday	1.07	1.07
Friday	1.19	1.20
Saturday	1.42	1.47
Sunday	1.21	1.30

Summer hour in traffic volume variations for the weekday and weekend day are graphically depicted in Figures 3 and 4, respectively. During a typical summer weekday there is no distinct morning peak hour. Traffic gradually increases from 6:00 A.M. to a midday peak between 12 noon to 1:00 P.M.

The typical summer weekday midday peak hour serves 7.5% of the daily traffic. ATR and historical traffic counts suggest that this is approximately 710 vehicles (310 westbound vehicles, 380 eastbound vehicles). The directional distribution is 46.5% westbound and 53.5% eastbound.

The typical summer weekday afternoon peak hour occurs early, between 3:45 P.M. and 4:45 P.M., and accounts for 7.7% of the daily traffic or approximately 730 vehicles. Of the 730 vehicles, the total consists of 395 westbound (54.0%) and 335 eastbound (46.0%) vehicles. After the afternoon peak period which lasts until 8:00 P.M., the traffic volumes taper off gradually during the evening hours to a trickle by about 2:00 A.M.

The highest typical peak hours are consistently observed during the summer weekend days. While the hourly traffic volume variation is similar to the typical summer weekday, the typical summer weekend day midday peak hour is nearly 13% higher, (795 vehicles and 7.0% of daily traffic), and the afternoon peak hour is approximately 19% higher (865 vehicles and 7.6% of daily traffic) than the typical summer weekday peak hours. While the typical summer weekend day midday peak hour is similar, occurring between 12:15 P.M. and 1:15 P.M., the afternoon peak hour occurs much later between 6:15 P.M. and 7:15 P.M. The directional distributions for the typical summer weekend day are consistent with the summer weekdays. The midday peak hour traffic volume distribution is 41.5% westbound and 58.5% eastbound. The afternoon peak hour traffic volume distribution is 54.5% westbound and 45.5% eastbound.

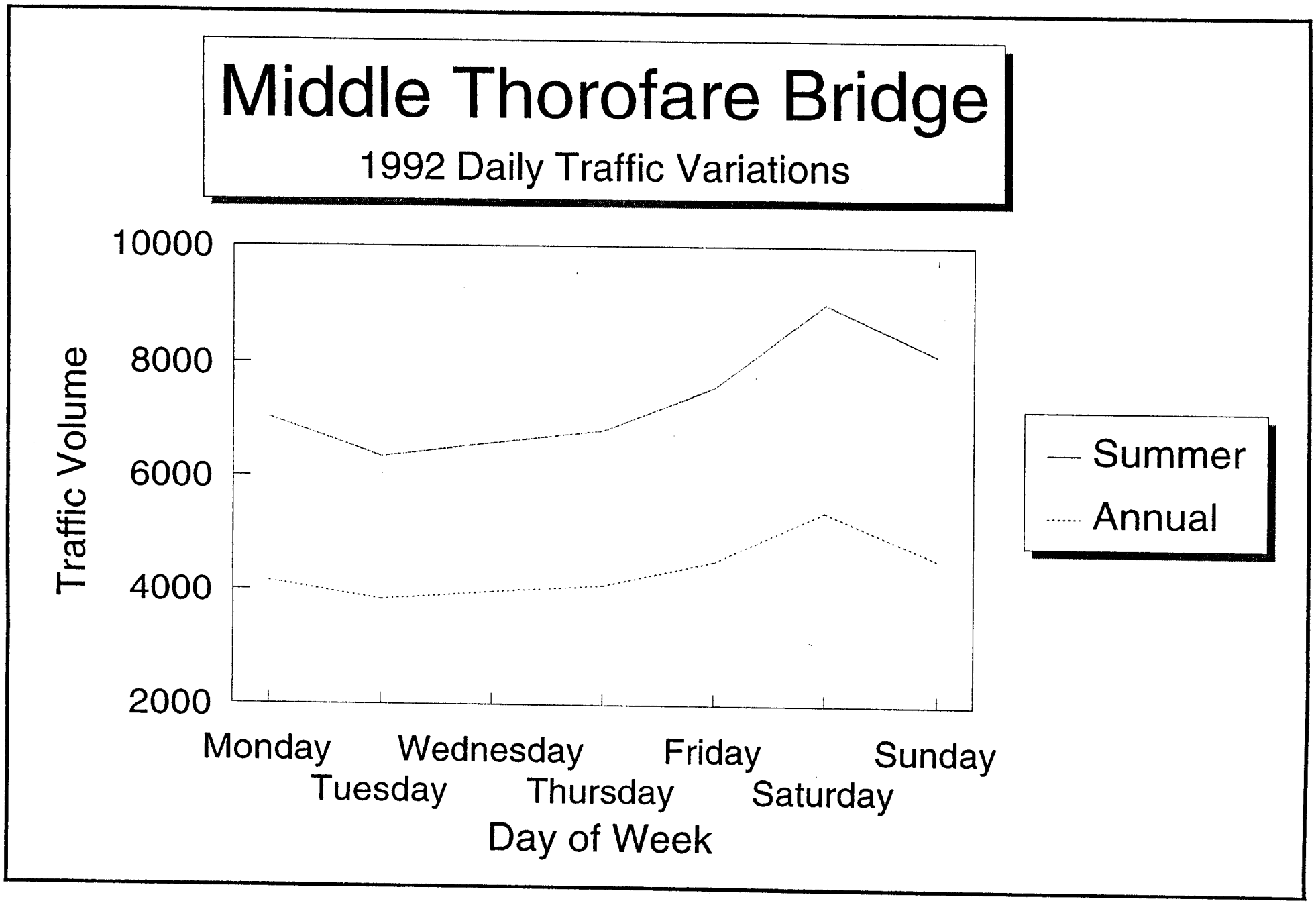


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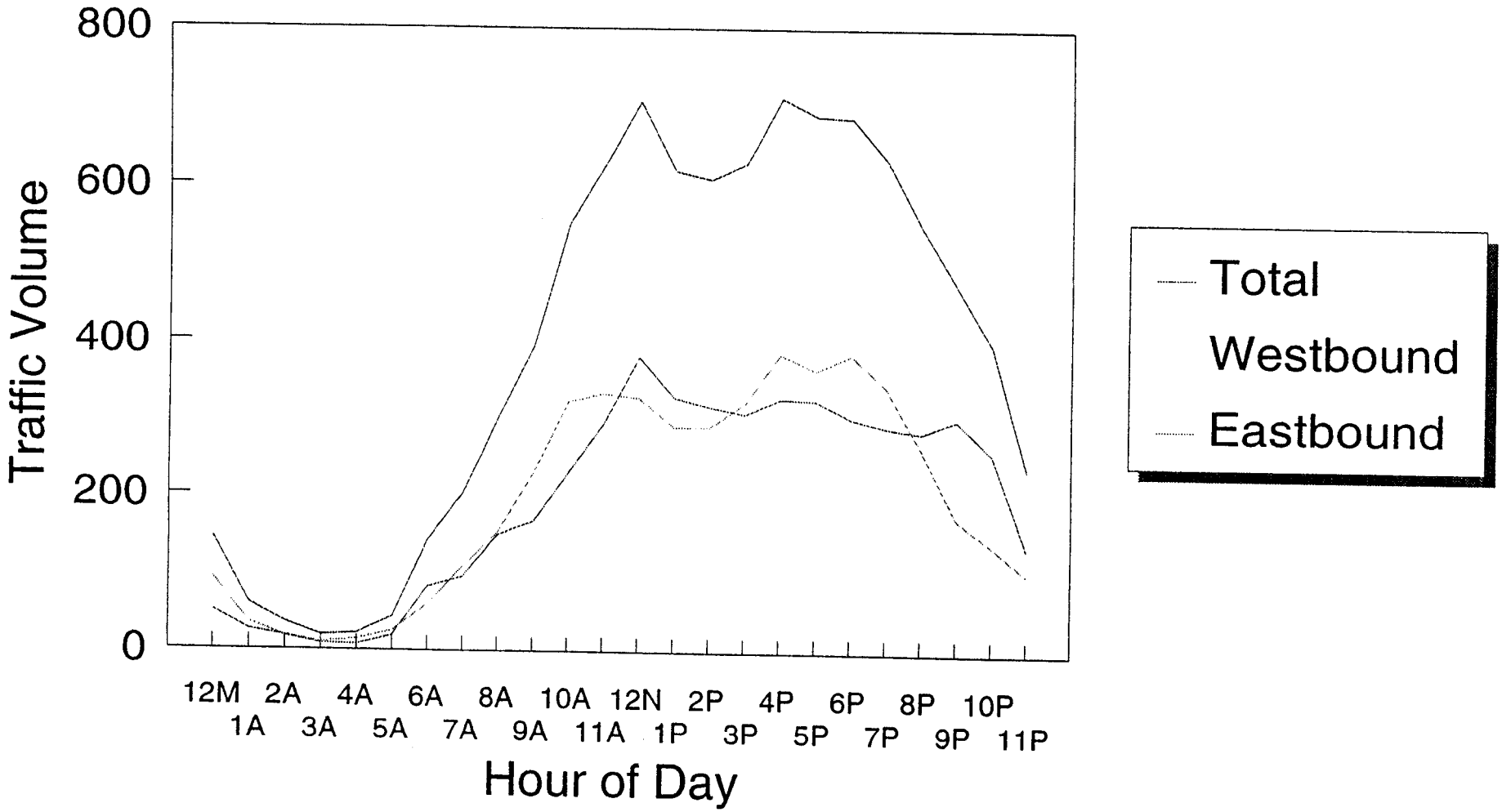
Figure 2

Middle Thorofare Bridge

Summer Weekday Hourly Traffic Variation

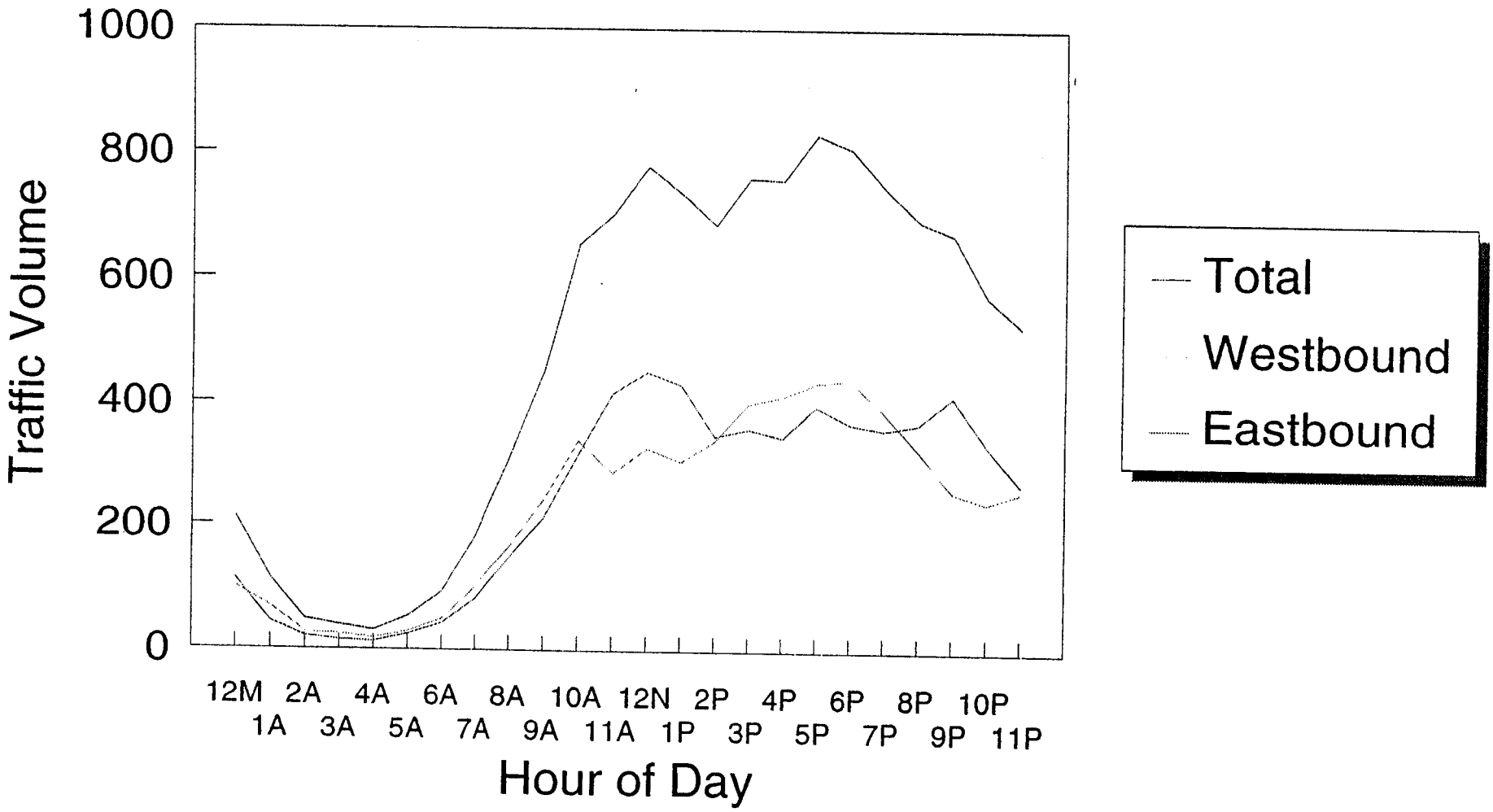


Parsons Brinckerhoff

Figure 3

Middle Thorofare Bridge

Summer Weekend Day Hourly Traffic Variation



Parsons Brinckerhoff

Figure 4

Existing Traffic Operations and Bridge Openings

The time of day, number of openings, and duration of openings all have varying effects on traffic operations (specifically the number of vehicles in queue) at the Middle Thorofare Bridge. The number of bridge openings per hour for the month of July and the estimated resulting highest observed number of vehicles in queue are summarized in the following table.

Time Period	Average Number of Openings per Hour	Highest Observed Number of Vehicles in Queue	
		Westbound	Eastbound
10 P.M. to 7 A.M.	0.5	20	20
7 A.M. to 10 A.M.	1.0	115	100
10 A.M. to 5 P.M.	1.5	115	125
5 P.M. to 10 P.M.	1.0	115	100

The duration of a typical bridge opening was estimated to last approximately 6.5 minutes based on the July 1993 observations obtained by bridge personnel. Between the hours of 7 A.M. and 10 P.M. during the peak summer travel days, the highest observed vehicles in queue extended upwards of 125 vehicles in the eastbound direction and 115 vehicles in the westbound direction. Based on a processing rate of about 400 vehicles per hour through the toll plaza, the maximum queue length of 125 vehicles required about 15 minutes to dissipate the queue.

Existing Condition

The existing Middle Thoroughfare Bridge, as originally laid out in 1938, utilized design standards different from current standards due to the smaller traffic volumes and speeds that existed at the time. Using the most recent NJDOT design manual as a reference and evaluating the existing as-built plans, the bridge was built to standards below those presently being used. With its combination of steep vertical grades and short vertical curve length at the high point, the existing bridge was designed to a current standard of 27 mph. Additionally, the horizontal curvature with lack of sufficient superelevation rates the approach roadway curves at a design speed of much less than 30 mph.

If the existing bridge is replaced in the future, current standards must be used to design vertical and horizontal alignment geometry that will safely allow vehicles to pass through the project area at a design speed to be determined by evaluation and analysis.

Bridge Improvement Design Issues

The Cape May County Bridge Commission authorized a feasibility study to determine that the existing toll plaza on the Middle Thorofare bridge should be expanded to four lanes and relocated off of the structure. In addition, they have made an assessment that the existing bridge may have to be replaced sometime in the near future. In order to facilitate the construction of a new toll plaza at the eastern end of the existing bridge, it was necessary to study several design issues to insure that the new toll plaza could accommodate vehicular traffic along a future replacement bridge alignment. Two horizontal alternatives (south and north) and three vertical bridge profiles (35, 40 and 45 mph) were among the alignments studied during this stage. Wetlands in the immediate area of the bridge were mapped and the impacts created from each of the alignment alternatives were evaluated. Locations for the proposed toll plaza were also studied for each of the alignments.

North Alignment

Eastbound traffic approaching the bridge would shift slightly north of the existing bridge by following a flatter 4000 foot radius curve to the right. The main tangent of the proposed bridge would be parallel to the existing alignment with approximately a 20 foot clearance between the outside edges. At the easterly end of the bridge, the proposed alignment has a 2000 foot radius curve to the right followed by a short tangent and then a 2000 foot radius curve to the left. The proposed north alignment ties into the existing alignment approximately 800 feet east of the existing bridge abutment. Two distinct disadvantages to this alternative are its impacts to the Lund's Fisheries driveway and parking lot and its potential impacts to wetlands along the north side of the roadway at the easterly touchdown.

South Alignment

From a point 600 feet west of the existing bridge, the recommended south alignment enters a 2000 foot radius curve to the right followed by a 180 foot tangent and then a 2000 foot radius curve to the left. This curve ties into a tangent parallel to the existing structure and provides for a 20 foot clearance between the two bridges. Just east of the proposed movable spans, the alignment compound curves to the left via 3500 foot radius and 6000 foot radius curves. These curves tie the south alignment into the existing at a point 800 feet east of the existing bridge abutment. This alignment is advantageous because it does not impact Lund's Fisheries and any impacts to Bordens driveway and parking area can be resolved with minor modifications. The only possible impact into wetlands would be at the southwest corner of the proposed bridge abutment and could probably be mitigated using an extended length retaining/wingwall.

45 MPH Profile

The proposed profile at this design speed would require a 880 foot long crest curve centered on the channel and two sag curves 400 feet in length at each touchdown. At the west end, this alternate would create 6 feet of fill at the Lund's Fisheries driveway, requiring extensive regrading, driveway relocation and possible loss of parking area. These impacts are further magnified if the north alignment alternative were to be selected. At the east end of the bridge, fill would be increased by 7 feet at the abutment and 4 feet at the toll plaza location. This would make it near impossible to construct temporary grading from the toll plaza down to the existing bridge. For the north alternative, construction of approximately 200 linear feet of retaining wall would be necessary to prevent major impacts to wetlands at the north side of the east abutment. The 45 MPH profile would provide for 30 feet of vertical clearance from the mean high water to the bottom of the movable span at the centerline of the channel.

40 MPH Profile

The proposed profile at this design speed would require a 660 feet long crest curve centered on the channel and two sag curves 330 feet in length at each touchdown. At the west end, this alternate would create 3 feet of fill at the Lund's Fisheries driveway, requiring some regrading of the driveway and the parking area. The required regrading would again be increased if the north alignment alternative were to be selected. At the east end of the bridge, fill would be increased by 3.5 feet at the abutment and 3 feet at the toll plaza location. This would require the construction of steep temporary grading from the toll plaza down to the existing bridge. For the north alternative, construction of approximately 150 linear feet of retaining wall would be necessary to prevent major impacts to wetlands at the north side of the east abutment. The 40 MPH profile would also provide for 30 feet of vertical clearance from the mean high water to the bottom of the movable span at the centerline of the channel.

35 MPH Profile

The recommended proposed profile at this design speed would require a 440 feet long crest curve centered on the channel and two sag curves 280 feet in length at each touchdown. At the west end, this alternate would create less than 2 feet of fill at the Lund's Fisheries driveway, requiring minor regrading of the driveway. The required regrading would again be increased and restriping of the parking area would be required if the north alignment alternative were to be selected. At the east end of the bridge, fill would be increased by 2 feet at the abutment and at the toll plaza location. This would require the construction of temporary grading from the toll plaza to the existing bridge. For the north alternative, construction of approximately 100 linear feet of retaining wall would be necessary to prevent major impacts to wetlands at the north side of the east abutment. The 35 MPH

profile would also provide for a higher vertical clearance (32 feet) from the mean high water to the bottom of the movable span at the centerline of the channel.

Projected Traffic Volumes and Traffic Operations

The summer weekend day demand was identified as the highest typical traffic volume. Therefore, as a worst case scenario projected peak hour traffic volumes were developed for this period. A regional growth rate was used for the Middle Thorofare Bridge which combined a growth rate of 1.7% per year from 1993 to 2000; and a growth rate of 1.1% per year from 2000 to 2003. These regional growth rates were used in the report entitled *Ocean City-Longport Bridge Traffic Study* revised on July 12, 1993 and prepared for the Cape May County Bridge Commission.

The midday peak hour is estimated at 925 vehicles (380 westbound and 545 eastbound). The afternoon peak hour is estimated at 1010 vehicles (550 westbound and 460 eastbound). However, these peak hour traffic volumes reflect an average hourly demand. Bridge closings will decrease the capacity of the bridge resulting in queued vehicles during the peak hour. A worst case demand scenario is summarized in the following table in which a bridge closure occurs just prior to the beginning of the peak hour resulting in a significant queue not able to cross the bridge. This queue in addition to the peak hour demand is the total adjusted demand which needs to cross the bridge during the peak hour.

WORST CASE PROJECTED
PEAK HOUR TRAFFIC VOLUMES

	Projected PH Demand		Estimated Residual Queue		Adjusted PH Demand	
Peak Hour	Westbound	Eastbound	Westbound	Eastbound	Westbound	Eastbound
Midday	380	545	115	125	495	670
Afternoon	550	460	115	100	665	560

The anticipated toll plaza configuration, discussed in greater detail in the following section, is anticipated to include two lanes in each direction - one manual and one automatic toll collection lane. The Middle Thorofare Bridge toll collection experience which is similar to other toll facilities, indicates that a manual toll collection lane can consistently process over 400 vehicles per hour when the bridge is not opened for marine traffic. An automatic toll collection lane can process approximately 600 vehicles per hour.

We have assumed that a peak hour market share of vehicles which would use exact change or tokens would be fifty percent. Factors supporting this market share percentage are based on the existing toll already set at fifty cents, and other facilities that indicate similar exact change/token market shares. However, initially

this market share would be slightly less but over a short transition period the market share could even exceed fifty percent of the peak hour traffic volumes.

During the midday peak hour, under the worst case scenario, queues are anticipated to quickly dissipate in the both travel directions after the bridge is re-opened to traffic resulting in all of the demand being processed prior to the end of the peak hour. Traffic in the westbound direction with the relocated toll plaza will continue to process vehicles even when the bridge is open to marine traffic. In the eastbound direction a maximum queue of 125 vehicles will be dissipated in approximately 6 to 7 minutes depending on the percentage of vehicles using the eastbound automatic lane.

During the late afternoon peak hour which projects a 2003 westbound volume of 665 vehicles assuming a bridge opening occurred immediately before the peak hour and an eastbound volume of 560, the expanded toll facilities will dissipate both volumes in less than 6 minutes.

Toll Collection System Configuration

The Toll Collection System (TCS) for the Middle Thorofare Bridge will include a computer based system and three toll collection islands with four toll collection lanes. Both manual and automatic toll collection payment method components will be included in the toll collection system. The four toll lanes will be configured to include the following payment methods as shown in Figures **5 and 6: Figure 5 presents the concept originally proposed in 1994**

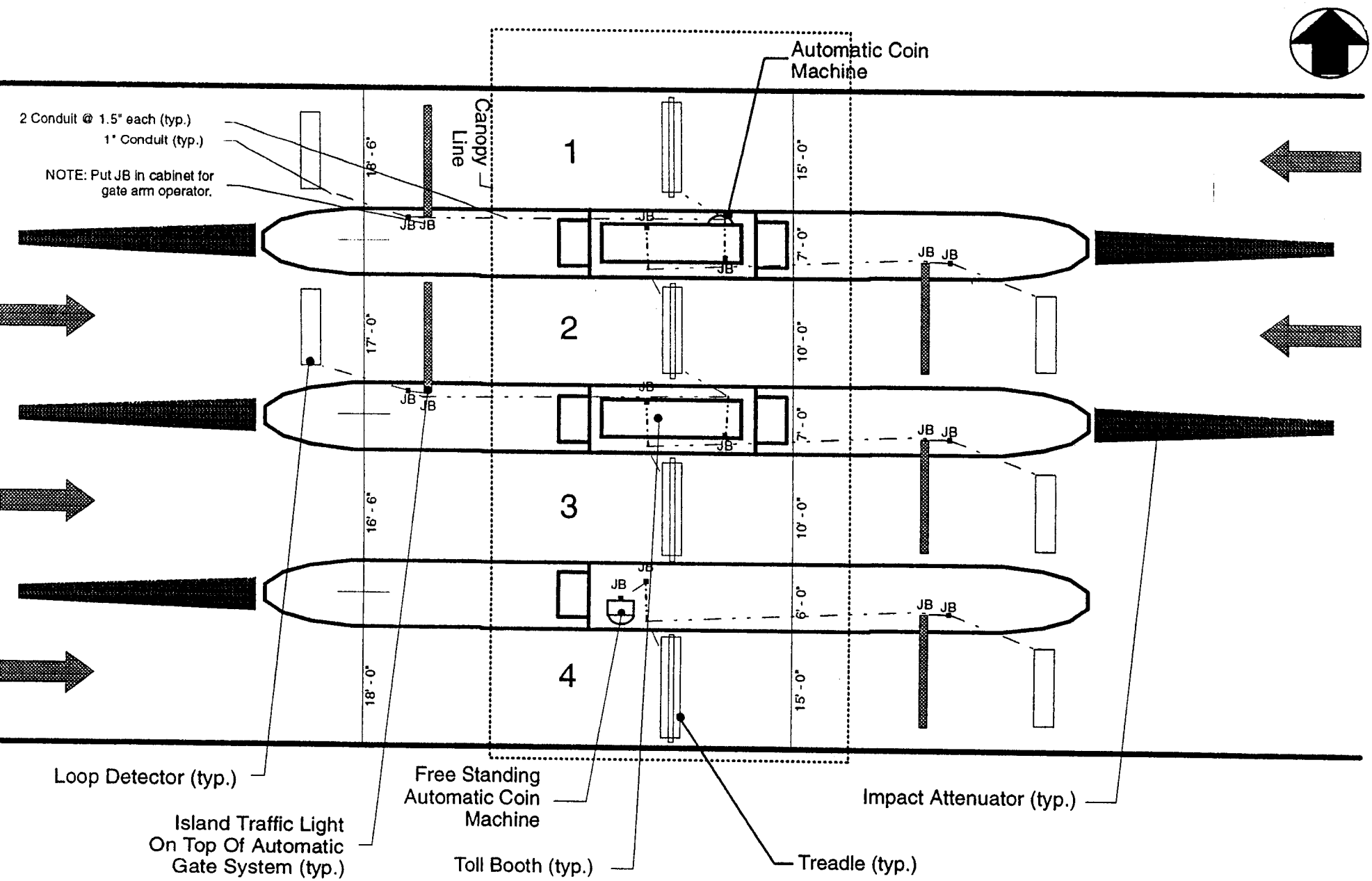
- Lane 1 - westbound manual and automatic toll collection;
- Lane 2 - eastbound and westbound manual toll collection;
- Lane 3 - eastbound manual toll collection; and,
- Lane 4 - eastbound automatic toll collection.

Toll booths shall be provided on the islands between lanes 1 and 2 and between lanes 2 and 3. The toll booths will be designed to provide for manual toll collection in both travel directions. Additionally, the toll booth between lanes 1 and 2 will also include an automatic coin machine for the automatic toll collection in the westbound travel direction.

During normal operations, manual toll collections will be processed in lanes 2 and 3 while automatic collections will occur in lanes 1 and 4. The toll booth for manual collections between lanes 1 and 2 will only be used in the event of a breakdown in the manual toll collection operation in either lanes 2 and 3 serving the main toll booth.

The toll collection system for a manual toll collection in lanes 2 and 3 shall be comprised of the following elements for each travel direction:

- Toll Terminal;



TOLL ISLAND EQUIPMENT LAYOUT AND CONDUIT RUNS

- Lane Controller;
- Receipt Printer;
- Patron Fare Indicator;
- Treadle;
- Loop Detector;
- Intercom;
- Island Traffic Light/Alarm Indicator;
- Automatic Gate System;
- Canopy Lane Use Signal;

The toll collection system for the combination manual and automatic toll collection lane in Lane 1 shall be comprised of the elements:

- Toll Terminal;
- Lane Controller;
- Receipt Printer;
- Patron Fare Indicator;
- Treadle;
- Loop Detector;
- Intercom;
- Island Traffic Light/Alarm Indicator;
- Automatic Gate System;
- Canopy Lane Use Signal;
- Automatic Coin Machine;
- Dual Vault Housing; and,
- Coded Cash Vaults.

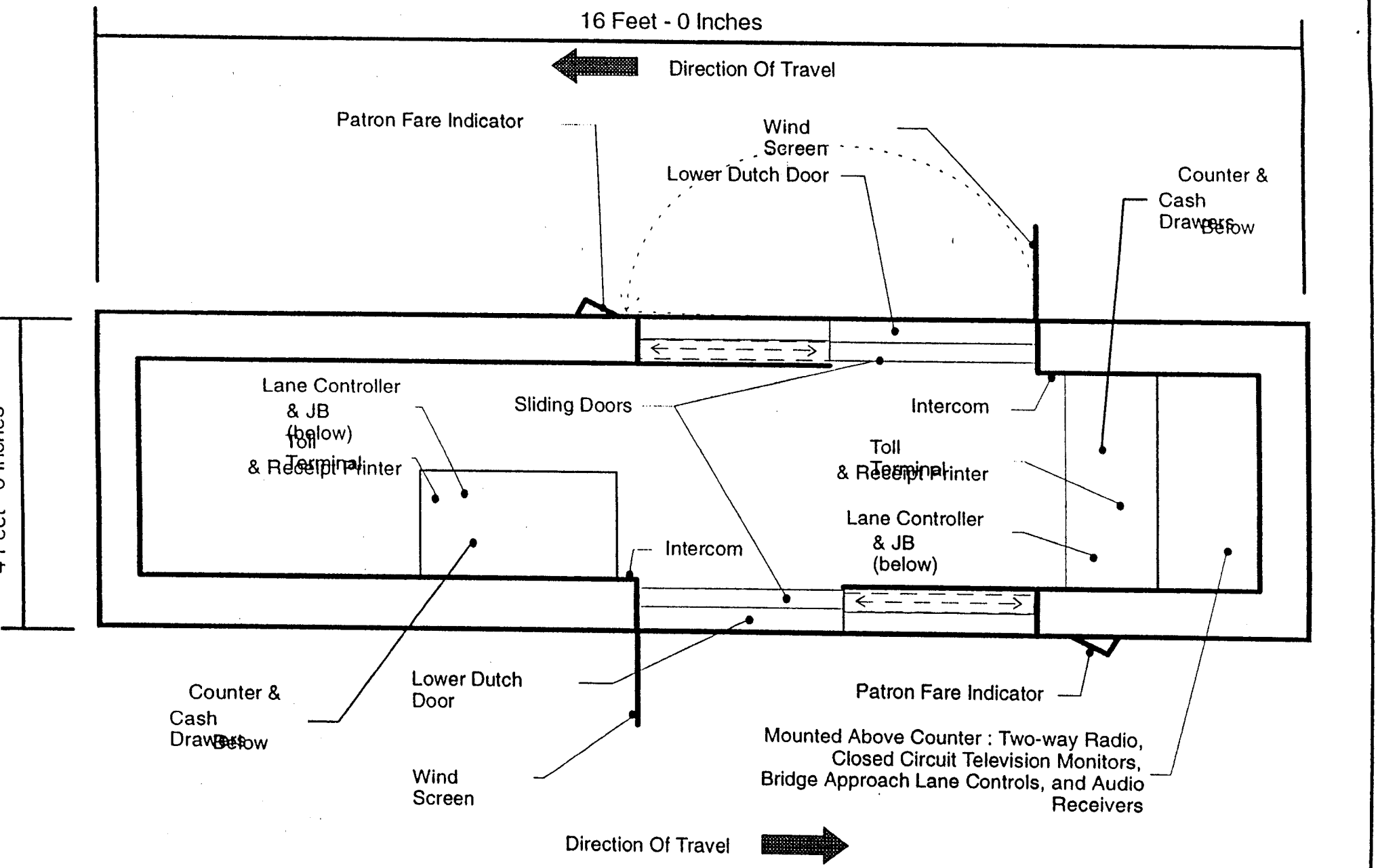
The toll collection system in Lane 4 which is to be automatic toll collection only in the eastbound direction shall be comprised of the following:

- Automatic Coin Machine;
- Dual Vault Housing; and,
- Coded Cash Vaults.

Figure 6 illustrates the toll booth equipment layout.

Closed Circuit Television (CCTV) System

A closed circuit television system will be provided to monitor approaching marine and vehicular bridge traffic. It is anticipated that a fixed mounted camera will be located on each roadway approach, and two pan-tilt-zoom cameras will be located on the bridge covering both marine approaches. The controls for the cameras and video monitors with split screen viewing capabilities will be located in the main toll booth and in the office of the Bridge Administration Building.



TOLL BOOTH AND EQUIPMENT LAYOUT

Variable Message Roadway Approach Signing

Adequate approach roadway signing is an important safety concern especially when there is a bridge opening. When the bridge is opened to marine traffic, all vehicular traffic will wait in queue behind the roadway gates located approximately 100 feet from the moveable span. In an effort to convey messages concerning the bridge operations, variable message signs should be located on the bridge roadway approaches at the gates and approximately one-half mile in advance of the gates. Typical messages for these variable message signs could include the following:

- STOP AHEAD/BRIDGE OPEN
- REDUCE SPEED/BRIDGE OPEN AHEAD
- PROCEED WITH CAUTION

The variable message signs would be controlled from the main toll booth and in the office of the bridge Administration Building.

Communications System

Communication needs to be maintained between the toll booths and the Administration Building and with approaching marine traffic. Communications can be provided by intercom between the toll booths and the office in the Administration Building. However, a two-way radio/scanner will be required for radio communications between the toll facility and approaching marine traffic.

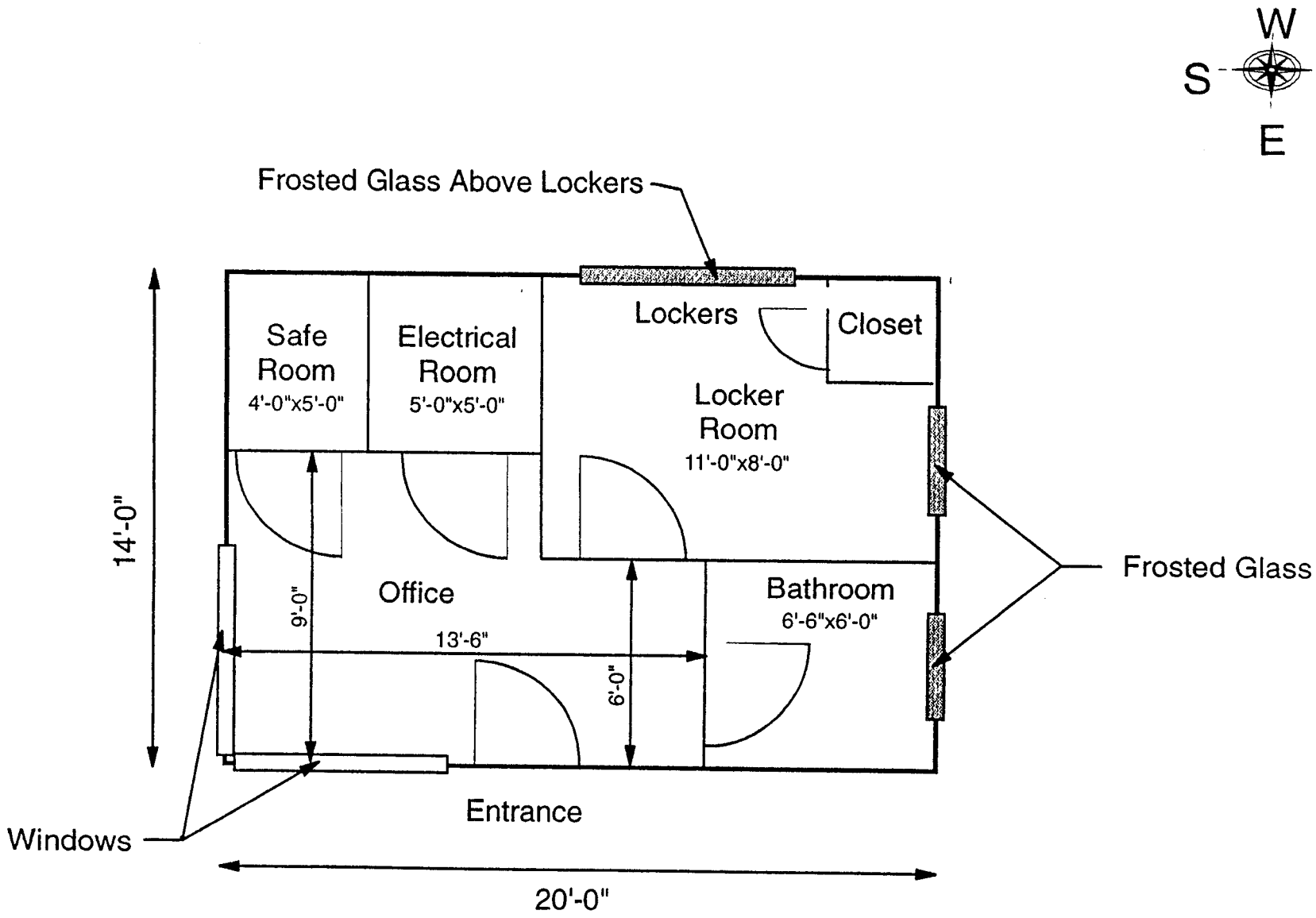
Bridge Controls

The bridge controls will be located in the toll booth between Lanes 2 and 3 and in the office of the Bridge Administration Building. The bridge controls will activate the bridge opening and closing operations. The bridge opening sequence will include changing the message on the variable message roadway approach signs and closing the approach roadway gates prior to the opening of the bascule leaf to permit marine traffic to pass the bridge. The bridge closing sequence will close the bascule leaf prior to opening the approach roadway gates and changing the messages on the variable message signs.

Bridge Administration Building

The following is the proposed program for the toll administration building. The proposed program was developed to include the minimum functional areas required for the toll collection and mechanical operations of the bridge as well as providing a lunch room, a change room and toilet facilities for the toll collectors. The net total anticipated area for the proposed Administration Building is 280 square feet, and includes the following elements:

- Office 108.6 s.f.



ADMINISTRATION BUILDING FUNCTIONAL LAYOUT

- Safe Room 20.0 s.f.
- Bathroom 36.6 s.f.
- Locker Room 71.5 s.f.
- Electrical Room 71.5 s.f.

The functional layout of the Bridge Administration Building is illustrated in Figure 7.

Preliminary Cost Estimate

Preliminary cost estimates have been developed for the new roadway alignment, the proposed toll collection facilities and operational components discussed for the Middle Thorofare Bridge toll plaza relocation and expansion. The estimated preliminary cost estimate totals $1,030,000. The table on the following page breaks down the preliminary costs of each major component of the proposed toll facility and highway improvements.

PRELIMINARY TOLL FACILITY AND ROADWAY IMPROVEMENT COST ESTIMATE

Canopy	4 LANES	@	$25,000 PER LANE	=	$100,000
Concrete Slab and Toll Islands	4 LANES	@	$55,000 PER LANE	=	$220,000
Impact Attenuator	5 UNITS	@	$15,000 PER UNIT	=	$75,000
Toll Booth	2 UNITS	@	$50,000 PER UNIT	=	$100,000
Toll Equipment [1] **(includes peripherals)**	4 LANES	@	$30,000 PER LANE	=	$120,000
Automatic Toll Collection Machine	2 UNITS	@	$40,000 PER UNIT	=	$80,000
CCTV System	1 UNIT	@	$10,000 PER UNIT	=	$10,000
Approach VMS	4 UNITS	@	$10,000 PER UNIT	=	$40,000
Communications	1 UNIT	@	$10,000 PER UNIT	=	$10,000
Bridge Controls	1 UNIT	@	$200,000 PER UNIT	=	$200,000
Administration Building	1 UNIT	@	$75,000 PER UNIT	=	$75,000
Roadway Pavement [2] **and Earthwork**				=	$116,000
Roadway Drainage and Incidentals				=	$98,000
Roadway Lighting @ Toll Plaza				=	$68,000
Roadway Miscellaneous and Contingency [3]				=	$153,000
TOTAL					$1,___,___

(1) toll terminal, lane controller, receipt printer, patron fare indicator, island traffic light, automatic gate system, canopy lane use signal, treadle, and loop detector

(2) The roadway costs for the south and north alignments are essentially equal ± 5% roadway

(3) Miscellaneous includes striping, signing, maintenance of traffic, mobilization, utility relocations, etc.

Technical Addendum J
Economic Impact Study

ECONOMIC IMPACTS STUDY

FOR

OCEAN DRIVE UPGRADE AND BRIDGE REPLACEMENTS

(County Road 621)

Lower Township
Cape May County
New Jersey

Submitted to:

Cape May County
Office of the County Engineer
4 Moore Road
Cape May Courthouse, New Jersey 08210

Prepared by:

Parsons Brinckerhoff-FG, Inc.
506 Carnegie Center Boulevard
Princeton, New Jersey 08540

May, 2003

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Appendix A – Economic Impacts Matrix
Appendix B – Meeting Minutes
Appendix C – Survey Instrument
Appendix D – Completed Surveys

I. INTRODUCTION

As part of an ongoing feasibility assessment study, this analysis was performed to investigate potential economic impacts resulting from upgrades and bridge replacements proposed for Ocean Drive (County Road 621) in Cape May County between State Route 109 and the southernmost portion of Wildwood Crest. The project proposes to raise the entire length of the roadway above the 100-year floodplain and replace bridges over Mill Creek, Upper Thorofare and a major structure over Middle Thorofare. Between Route 109 and Mill Creek, impacts to businesses will be limited to the regrading or reconstruction of existing driveways, and is expected to have little or no effect on the businesses since access will be maintained during construction. This area was not considered in this study. East of Mill Creek, however, seven alternative alignments, Alternatives 3A-3G shown in Figure 1, are being studied and could have varying amounts of economic impacts to 8 active businesses, including but not limited to, physical plant impacts, access impacts, and loss of drive-by revenue due to Ocean Drive's realignment. The eight businesses are listed and briefly described below:

Breezlee Marina (Block 822.02, Lots 2 & 3)– The Breezlee marina is a major marina with 500+ slip docks for primarily recreational vessels. The property also includes a large area dedicated to the storage of dredged materials. The property is owned and operated by Mr. Harry Colson.

Hinch Marina (Block 793, Lots 15.04 & 15.05) – Owned and operated by Mary and Chuck Hinchcliffe, this marina features 110 slips, a bait and tackle shop and the owner's primary residence.

Axelsson's Blue Claw Restaurant (Block 793, Lot 15.03) – The Blue Claw is an upscale restaurant which seats approximately 200 parties on an average weekend, year-round. Typically, one-third of their patrons arrive without reservations. The restaurant, owned and operated by Kurt and Cecelia Axelsson, utilizes a portion of nearby property owned by Harry Magck (Block 793, Lot 15.07) for overflow parking. They employ approximately 75 people.

Lund's Fisheries (Block 793, Lot 15.01) – Lund's is the cornerstone of the major fishing industry present in the project area. Collectively, this industry represents one of the largest fishing seaports of the eastern coast of the United States. Lund's is home to approximately 14 fishing vessels and a processing and freezing facility. Additional facilities are located on lands owned by Two Mile Associates (Block 820, Lot 4.02). They employ approximately 230 people.

Atlantic Cape Fisheries (Block 793, Lot 15.06) – Atlantic Cape is also a major component of the local fishing industry, with processing facilities. They employ approximately 220 people. Atlantic Cape utilizes the freezing facilities owned and operated by Lund's Fisheries.

Snow's/Doxsee (Block 822.01, Lot 1.01) – Snow's/Doxsee is a major manufacturer of canned and bottled food products, primarily seafood related goods. They employ approximately 138 people at this major processing plant. Goods are shipped to the plant via trucks. No active fishing vessels dock at this facility.

Dolphin Cove Marina (Block 820, Lot 8) – Owned and operated by Mr. and Mrs. Richard Ryder, this marina features slips dedicated to recreational vessels. The marina is also home to the Yankee Clipper, recreational tall sailboat.

Two Mile Associates (Block 820, Lot 2.01) – This complex contains two restaurants, four bars, a gift shop, an arcade and a 62 slip marina for recreational vessels. The restaurant seats a maximum of approximately 700 people during the summer season. The facility is closed in the off-season.

II. SURVEY INSTRUMENT AND METHODOLOGY

In March of 2003, Parsons Brinckerhoff, under the guidance of Cape May County, prepared a simple economic impact survey, which is included in Appendix B. This survey requested each of the eight aforementioned businesses to individually assess the proposed improvements and subsequent impacts that each alternative may have on their business. The property owners were provided color graphics depicting each alternative in relation to their business.

In the weeks immediately following the dispersal of the surveys, members of Parsons Brinckerhoff visited each of the business owners and operators to answer questions and provide a personal overview of the project and the alternatives under consideration. Meeting minutes from each meeting are included in Appendix C.

Results of the completed surveys are tabulated in the Economic Impacts Matrix, Appendix A, and are discussed in the following section. Individual responses provided by the businesses are compiled in Appendix D. Financial values provided from the business owners were not independently verified and were assumed to be acceptable for purposes of comparison only.

III. RESULTS

Detailed results of the survey are tabulated in the Economic Impacts Matrix, included in Appendix A. Collectively, the eight businesses employ a total of 789 full-time and seasonal employees, and generate an approximate $125 million of annual revenue, making this area a major contributor to the economic well-being of Cape May County. Equipment and facilities are estimated to be worth $81 million.

The main result to be garnered from this survey is the overall impact to annual revenues and loss of manpower resulting from the implementation of each alternative. Table I summarizes those impacts. A brief description of the impacts for each alternative follows.

Table I.
Possible Impacts to Annual Revenues and Workforce

Alternative	Estimated Reduction in Annual Revenues ($)	Estimated Reduction in Annual Revenues (%)	Estimated Loss of Manpower (no. of employees)	Estimated Loss of Manpower (%)
3A	$ 45,430,000	37%	152	17%
3B	$ 119,550,000	96%	660	72%
3C	$ 3,340,000	3%	143	16%
	$ 3,340,000	3%	143	16%
3E	$ 1,270,000	1%	58	6%
3F	$ 420,000	1%	22	2%
3G	$ 420,000	0.4%	22	2%

Alternative 3A – This alternative could have significant impacts on the local businesses due primarily to the closure of Snow's/Doxsee driveway controlling their shipping and receiving facilities.

The closure is required due to the shift of the Middle Thorofare Bridge to the south. The Snow's site cannot accommodate truck circulation to a relocated driveway, therefore no mitigation is possible.

Alternative 3B – Shifting the Middle Thorofare Bridge to the north creates the largest number of potential impacts, which would be very substantial. The large number of impacts are due to the required demolition of the Lund's fisheries freezing plant, which also would affect Atlantic Cape Fisheries. Axelsson's Blue Claw Restaurant would possibly lose all access and Hinch Marina would also be affected. None of these facilities can be relocated, therefore mitigation is not possible.

Alternatives 3C and 3D – Realigning the Middle Thorofare Bridge to the north would alleviate some of the major impacts to local fisheries, but would likely add negative impacts to the Two Mile Landing restaurant and facilities due to loss of direct access and drive-by business. Axelsson's Blue Claw Restaurant would suffer similar impacts. Impacts to the restaurants in Alternative 3C could be lessened by the construction of signage on the realigned Ocean Drive. Alternative 3D's impacts to Two Mile Restaurant would be less recoverable due to the imposing presence of the bridge to the restaurant's otherwise unobstructed sunset view of coastal wetlands.

Alternative 3E – While this alignment works for the fisheries and Two Mile Restaurant, it presents significant impacts to Axelsson's Blue Claw Restaurant and the Hinch Marina. Low visibility and loss of drive-by business coupled with the unattractive presence of an overhead bridge will significantly impact the business. Hinch Marina also maintains a residence on the second story of the business, which would now have a large structure directly in front of it. While these impacts could be lessened with signs and other mitigations, it is likely that Axelsson's will still be severly impacted by this alternative.

Alternatives 3F and 3G – These alternatives seem to minimize the potential economic impacts to the local business community. Only Axelsson's restaurant would be negatively affected by the loss of drive-by business. This could potentially be mitigated through the construction of signage for the restaurant.

It is important to note that the numbers upon which this analysis are based were provided by owners of the businesses, have not been independently verified, and are for comparison purposes only.

The survey was also utilized to gather additional information about the project site as well as general concerns about the project. This information and concerns are summarized below.

- Maintenance of truck access to fishing industries is critical due to the perishable nature of the goods and limited storage capabilities of the businesses.

- Access, parking and visibility to local restaurants are critical to their operations. Loss of drive-by business will have negative impacts to their operations. Additionally, viewsheds from their facilities are important to their operations. High roadway embankments and unattractive or obtrusive structures in close proximity to their buildings will also result in lost patrons.

- The Upper Thorofare Bridge is regularly used by local residents for fishing and crabbing. Local business owners have serious concerns about the safety of these individuals due to the bridge's narrow width and high volume of truck traffic. Similar safety concerns were voiced about the existing culvert in the proximity of Fish Dock Road. The flows through the culvert are rapid, and dangerous to recreational fishermen.

- Restriction of vessels by a new Middle Thorofare Bridge is a paramount concern of the industries which operate fishing vessels in the vicinity. They are most concerned with proposed fixed, high level structures whose vertical clearances could ultimately limit the size and type of vessels that access their facility.

- Maintenance of access to their facilities during construction is of key concern to all owners, regardless of the alternative selected.

IV. CONCLUSION

This economic impact analysis clearly demonstrates that the subject project will have some level of impact upon the surrounding business community. More importantly, however, it demonstrates that the level of impact varies with the seven alignments under consideration, ranging from minor impacts, to very substantial impacts that will be extremely detrimental to the overall community.

Alternatives 3F and 3G have the least amount of potential economic impacts. Impacts for these alternatives are related to the loss of drive-by business for Axelsson's Blue Claw Restaurant only. These impacts can be reasonably mitigated through the use of appropriate signing and other accommodations that direct traffic to the restaurant from the realigned Ocean Drive. The addition of such features will minimize all impacts, while still accommodating all project needs.

Appendix A
Economic Impacts Matrix

Ocean Drive Improvements and Middle Thorofare Bridge Replacement
Economic Impacts Matrix

Ocean Drive Improvements & Middle Thorofare Bridge Replacement (All Alts.)	General Information	3A	3B	3C	3D	3E	3F	3G
Snow's/Doxsee, Inc.								
- Property use & description	Manufacturing of canned and bottled foods	-	-	-	-	-	-	-
- Estimated number of employees at facility	138	-	-	-	-	-	-	-
- Estimated annual revenue in dollars	$45,000,000	-	-	-	-	-	-	-
- Estimated value of equipment and facilities	$30,000,000	-	-	-	-	-	-	-
- Property uses of impacted areas	-	truck access	truck access	no impacts	no impacts	no impacts	no impacts	no impacts
- Impacted area critical to operations	-	yes - no alternate truck access	yes - no alternate truck access	N/A	N/A	N/A	N/A	N/A
- Estimated annual loss of revenue	-	$45,000,000	$45,000,000	$0	$0	$0	$0	$0
- Estimated loss of manpower (in no. of employees)	-	138	138	0	0	0	0	0
- Concerns and issues	-	truck access critical due to perishable goods	truck access critical due to perishable goods	none	none	none	none	none
Two Mile Landing Restaurant								
- Property use & description	Two Restaurants (700 seats), four bars, gift shop, arcade & 62 slip marina	-	-	-	-	-	-	-
- Estimated number of employees at facility	250	-	-	-	-	-	-	-
- Estimated annual revenue in dollars	$5,000,000	-	-	-	-	-	-	-
- Estimated value of equipment and facilities	$4,200,000	-	-	-	-	-	-	-
- Property Uses of impacted areas	-	no impacts	no impacts	highway & navigational access	highway & navigational access	no impacts	no impacts	no impacts
- Impacted area critical to operations	-	N/A	N/A	Yes	Yes	N/A	N/A	N/A
- Estimated annual loss of revenue	-	$0	$0	$2,500,000	$2,500,000	$0	$0	$0
- Estimated loss of manpower (in no. of employees)	-	0	0	100	100	0	0	0
- Concerns and issues	-	maintenance of access during construction	maintenance of access during construction	limited visibility and access would reduce patronage	loss of patrons; road would interrupt popular unobstructed view	maintenance of access during construction	maintenance of access during construction	maintenance of access during construction
Axelsson's Blue Claw Restaurant								
- Property use & description	Restaurant and parking	-	-	-	-	-	-	-
- Estimated number of employees at facility	72	-	-	-	-	-	-	-
- Estimated annual revenue in dollars	$1,400,000	-	-	-	-	-	-	-
- Estimated value of equipment and facilities	$4,000,000	-	-	-	-	-	-	-
- Property Uses of impacted areas	-	access and parking	access and parking	remote parking	remote parking	no impact	no impact	no impact
- Impacted area critical to operations	-	yes	yes	yes	yes	N/A	N/A	N/A
- Estimated annual loss of revenue (See Note 1)	-	$280,000	$1,400,000	$840,000	$840,000	$1,120,000	$420,000	$420,000
- Estimated loss of manpower (in no. of employees) (See Note 1)	-	14	72	43	43	58	22	22
- Concerns and issues	-	embankments	site circulation; embankments	loss of patrons and parking; directional signs requested	loss of patrons and parking; directional signs requested	loss of patrons; restaurant under bridge	loss of patrons; directional signs requested	loss of patrons; directional signs requested
Hinch Marina, Inc.								
- Property use & description	110 slip marina; bait and tackle shop; residence	-	-	-	-	-	-	-
- Estimated number of employees at facility	4	-	-	-	-	-	-	-
- Estimated annual revenue in dollars	$235,000	-	-	-	-	-	-	-
- Estimated value of equipment and facilities	$200,000	-	-	-	-	-	-	-
- Property Uses of impacted areas	-	parking, boat storage	parking, boat storage	access road to dock & parking	access road to dock & parking	no impact	no impact	no impact
- Impacted area critical to operations	-	yes	yes	no	no	N/A	N/A	N/A
- Estimated annual loss of revenue	-	$150,000	$150,000	$0	$0	$150,000	$0	$0
- Estimated loss of manpower (in no. of employees)	-	0	0	0	0	0	0	0
- Concerns and issues	-	none	visual impact of roadway to residence	concerns of erosion of west bank of marina	concerns of erosion of west bank of marina	visual impact of roadway to residence; loss of driveby patronage	narrow width of Upper Thorofare Bridge	narrow width of Upper Thorofare Bridge
Lund's Fisheries, Inc.								
- Property use & description	commercial fishing port; processing & freezing facility	-	-	-	-	-	-	-
- Estimated number of employees at facility	230	-	-	-	-	-	-	-
- Estimated annual revenue in dollars	$55,000,000	-						
- Estimated value of equipment and facilities	$28,000,000	-						
- Property Uses of impacted areas	-	storage; power	cold storage and freezing facility	no impact	no impact	no impact	no impact	no impact
- Impacted area critical to operations	-	yes	yes	N/A	N/A	N/A	N/A	N/A
- Estimated annual loss of revenue	-	$0	$55,000,000	$0	$0	$0	$0	$0
- Estimated loss of manpower (in no. of employees)	-	0	230	0	0	0	0	0
- Concerns and issues	-	storage & power could be relocated	cannot relocate facilities	restrictions of vessels	restrictions of vessels	restrictions of vessels; dredging	restrictions of vessels; dredging	restrictions of vessels; dredging
Atlantic Cape Fisheries, Inc.								
- Property use & description	commercial fishing port and processing facility	-	-	-	-	-	-	-
- Estimated number of employees at facility	220	-	-	-	-	-	-	-
- Estimated annual revenue in dollars	$18,000,000	-	-	-	-	-	-	-
- Estimated value of equipment and facilities	$14,500,000	-	-	-	-	-	-	-
- Property Uses of impacted areas	-	no impact	no impact	parking and storage	parking and storage	parking and storage	no impact	no impact
- Impacted area critical to operations	-	N/A	N/A	no	no	no	N/A	N/A
- Estimated annual loss of revenue	-	$0	$18,000,000	$0	$0	$0	$0	$0
- Estimated loss of manpower (in no. of employees)	-	0	220	0	0	0	0	0
- Concerns and issues	-	none	impact to freezer utilized at Lund's	restrictions of vessels	restrictions of vessels	restrictions of vessels; dredging	restrictions of vessels; dredging	restrictions of vessels; dredging

Ocean Drive Improvements and Middle Thorofare Bridge Replacement
Economic Impacts Matrix

	General Information	3A	3B	3C	3D	3E	3F	3G
BreezLee Marina, Inc.								
- Property use & description	1000 slip marina; dredge spoil depository	-	-	-	-	-	-	-
- Estimated number of employees at facility	6	-	-	-	-	-	-	-
- Estimated annual revenue in dollars	N/A	-	-	-	-	-	-	-
- Estimated value of equipment and facilities	N/A	-	-	-	-	-	-	-
- Property Uses of impacted areas	-	access	access	access	access	access	access	access
- Impacted area critical to operations	-	yes	yes	yes	yes	yes	yes	yes
- Estimated annual loss of revenue	-	N/A	N/A	N/A	N/A	N/A	N/A	N/A
- Estimated loss of manpower (in no. of employees)	-	N/A	N/A	N/A	N/A	N/A	N/A	N/A
- Concerns and issues	-	loss of patrons, structure will look out of place	loss of patrons, structure will look out of place	loss of patrons, structure will look out of place	loss of patrons, structure will look out of place	loss of patrons, structure will look out of place	loss of patrons, structure will look out of place	loss of patrons, structure will look out of place
Dolphin Cove Marina (No Data Provided)								
- Property use & description		-	-	-	-	-	-	-
- Estimated number of employees at facility		-	-	-	-	-	-	-
- Estimated annual revenue in dollars		-	-	-	-	-	-	-
- Estimated value of equipment and facilities		-	-	-	-	-	-	-
- Property Uses of impacted areas	-							
- Impacted area critical to operations	-							
- Estimated annual loss of revenue	-							
- Estimated loss of manpower (in no. of employees)	-							
- Concerns and issues	-							
TOTALS								
						-	-	-
						-	-	-
						-	-	-
						$1,270,000	$420,000	$420,000
						58	22	22

NOTES:
1. All data was provided by businesses, with the exception of lost revenue and manpower for Axelsson's Blue Claw Restaurant.
2. Estimates do not include mitigations which could lessen individual impacts

Appendix B
Survey Instrument

Ocean Drive Upgrade & Bridge Replacement Project Economic Impact Survey

Name of Company:_____

Please complete the following survey. Please note that this survey is for comparison purposes only and has no bearing upon future Right-Of-Way acquisition or any other project related compensation. The related graphics are for informational purposes only and are subject to change.

1. General Information

Please provide a general description of the property in the space provided below.

_____

_____

_____

_____

2. Financial Information

Please provide the following data.

Estimated number of employees on subject property: _____

Estimated annual revenue in dollars: _____

Estimated value of equipment and facilities on subject property: _____

3. Property Uses

For the following section, please review the attached sketches for Alternatives 3A through 3G. On the sketches, proposed improvements are shown in color. Each drawing features a legend.

Alternative 3A

1. Please describe the existing use of the impacted areas.

_____

_____

2. Is the impacted area critical to the maintenance of current or future operations? If so, please explain.

_____

_____

(continued)

Alternative 3B

1. Please describe the existing use of the impacted areas.

2. Is the impacted area critical to the maintenance of current or future operations? If so, please explain.

Alternative 3C

1. Please describe the existing use of the impacted areas.

2. Is the impacted area critical to the maintenance of current or future operations? If so, please explain.

Alternative 3D

1. Please describe the existing use of the impacted areas.

2. Is the impacted area critical to the maintenance of current or future operations? If so, please explain.

(continued)

Alternative 3E

1. Please describe the existing use of the impacted areas.

2. Is the impacted area critical to the maintenance of current or future operations? If so, please explain.

Alternative 3F

1. Please describe the existing use of the impacted areas.

2. Is the impacted area critical to the maintenance of current or future operations? If so, please explain.

Alternative 3G

1. Please describe the existing use of the impacted areas.

2. Is the impacted area critical to the maintenance of current or future operations? If so, please explain.

(continued)

4. Alternative Impacts

For the following section, please review the attached sketches for Alternatives 3A through 3G. On the sketches, proposed improvements are shown in color. Each drawing features a legend. Please fill in appropriate values in the table below.

Alternative	**Estimated Annual Loss of Revenue** (in dollars)	**Estimated Loss of Manpower** (in number of employees)
3A		
3B		
3C		
3D		
3E		
3F		
3G		

5. Concerns and Issues

In the space provided below, please list any concerns or issues. Please clearly indicate if a concern or issue is related to a particular alternative.

Appendix C
Meeting Minutes

Meeting Minutes

Attendees: Kurt Axelsson, Sr. – Blue Claw Restaurant
Kurt Axelsson Jr. – Blue Claw Restaurant
Michael Axelsson – Blue Claw Restaurant
Tom Fisher – Parsons Brinckerhoff Project Manager
Jim Maloney – Parsons Brinckerhoff Civil/Highways

Date: March 28, 2003, 9:30 AM

Location: Blue Claw Restaurant, Lower Township, NJ

Subject: **Ocean Drive Improvements and Bridge Replacements**
Lower Township, Cape May County
Coordination Meeting

A Scoping Study is currently being performed on Ocean Drive in Lower Township, Cape May County. The proposed project will raise the roadway and upgrade it to a viable evacuation route. The project will also replace three functionally and/or structurally obsolete bridges, including the major structure over Middle Thorofare. This meeting was conducted to introduce the project to the attendees, assess potential economic impacts of each alternative on their business, and gather additional community input.

- The meeting began with a brief introduction by Tom Fisher who presented an overview of the project's development with specific attention given to the development of the 7 alternatives currently under consideration.
- The Axelsson's reported that they receive a substantial amount of drive-by business. They cited a recent weekend evening where they seated 180 parties, of which 120 had reservations. Mr. Axelsson Sr. indicated that this was typical of their business.
- The Axelsson's indicated that they employ approximately 75 people. They operate their business throughout the year.
- The Axelsson's expressed concerns for each of the alternatives. Specifically, they were concerned about Alternatives 3A and 3B because of the raised roadway and embankment that would be constructed in front of their restaurant. They had concerns about each of the other alternatives because each would remove drive-by business from passing directly in front of their facility.
- The Axelsson's also had concerns regarding access during construction. Jim Maloney explained the process by which the roadway would be constructed. Jim also explained that regraded driveways would feature 8% grades to minimize disruption to parking, etc.
- The Axelsson's noted that they utilize property to dredged spoils belonging to Harry Mogck (Block 15.07 Lot 793) for overflow parking. Several of the alternatives would impact this parking.
- Tom Fisher asked the Axelsson's to complete the economic impact survey to the best of their abilities within two weeks. After explaining that impacts to their business could possibly be mitigated as part of the project, Tom requested that the Axelsson's list specific impacts for each of the alternatives as well as possible mitigations. As an example, Tom noted that new signage could be placed on a realigned Ocean Drive to help direct lost drive-by business to the facility.
- Tom provided an overview of the project's schedule, noting that certain variables could extend the schedule. The current schedule is as follows:

  Fall 2003- Selection of Initially Preferred Alternative
  Spring 2004 – Begin Design
  Spring 2006 – Begin Construction
  2009 – Construction Completed

NOTE: subsequent to the meeting, Dale Foster informed Tom Fisher that the Upper Thorofare Bridge would be rehabilitated and widened with a sidewalk, for Alternatives 3E, 3F and 3G.

cc: JEM, MAS, SAB, Dale Foster (Cape May County Engineer); file- 20020b, 6.0,6.2

RECORD OF ATTENDANCE

Ocean Drive Upgrade and Bridge Replacements
Meeting with Potentially Impacted Business
March 28, 2003

Location: Blue Claw Restaraunt Time: 9 30 AM

NAME	COMPANY/ORGANIZATION	TELEPHONE NO.
Jim Maloney	PB	609-734-7013
Michael Axelsson	Blue Claw	884-5878
Kurt Axelsson Jr	Blue Claw	463-1918
Kurt Axelsson Sr	Blue Claw.	886-1346.
Tom Fisher	PB	609-734-7046

Meeting Minutes

Attendees: Jeffrey Reichle – Lund's Fisheries
Daniel Cohen – Atlantic Cape Fisheries
Tom Fisher – Parsons Brinckerhoff Project Manager
Jim Maloney – Parsons Brinckerhoff Civil/Highways

Date: March 28, 2003, 10:30 AM

Location: Lund's Fisheries, Cape May, NJ

Subject: **Ocean Drive Improvements and Bridge Replacements**
Lower Township, Cape May County
Coordination Meeting

A Scoping Study is currently being performed on Ocean Drive in Lower Township, Cape May County. The proposed project will raise the roadway and upgrade it to a viable evacuation route. The project will also replace three functionally and/or structurally obsolete bridges, including the major structure over Middle Thorofare. This meeting was conducted to introduce the project to the attendees, assess potential economic impacts of each alternative on their business, and gather additional community input.

- The meeting began with a brief introduction by Tom Fisher who presented an update of the project's development with specific attention given to the development of new alternatives which would relocate Ocean Drive to a new alignment south of its current location.
- Mr. Cohen and Mr. Reichle stated that they found the new alternatives preferable since they minimize disruption to their facilities. They did suggest that the vehicular turnaround be shifted closer to Middle Thorofare to improve the access to Lund's Fisheries. Similarly, they suggested the vehicular turnaround on the east side of Middle Thorofare be shifted closer to the existing marina so the remaining lands could be used for wetlands mitigation. They noted that the operator of the marina (MAR-Ryder LLC) is Mr. Frank Mariner. His phone number is 609-886-1086. Mr. Mariner is a principal of Two Mile Associates, which own the land surrounding the marina.
- Tom requested that they complete the economic impact survey within two weeks to help expedite the study.
- Mr. Cohen and Mr. Reichle expressed strong support for the project and asked how quickly it could be constructed. Tom provided an overview of the project's schedule, noting that certain variables could extend the schedule. The current schedule is as follows:

  Fall 2003- Selection of Initially Preferred Alternative
  Spring 2004 – Begin Design
  Spring 2006 – Begin Construction
  2009 – Construction Completed
- Mr. Cohen and Mr. Reichle requested an updated plan of each alternative.

  NOTE: subsequent to the meeting, Dale Foster informed Tom Fisher that the Upper Thorofare Bridge would be rehabilitated and widened with a sidewalk, for Alternatives 3E, 3F and 3G.

cc: JEM, MAS, SAB, Dale Foster (Cape May County Engineer); file- 20020b, 6.0,6.2

RECORD OF ATTENDANCE

Ocean Drive Upgrade and Bridge Replacements
Meeting with Potentially Impacted Business
March 28, 2003

Location: Lund's Fisheries / Atl. Cape Time: 10^50

NAME	COMPANY/ORGANIZATION	TELEPHONE NO.
Jim Maloney	PB	609 734 7013
Daniel Cohen	Atlantic Capes Fisheries, Inc.	609-884-3000
Jeffrey Reichle	Lund's Fisheries	609-884-7600
Tom Fisher	PB	609-734-7046

Meeting Minutes

Attendees: Gary Dietze – Snow's / Doxsee Engineering
Steve Kowalski – Snow's Doxsee General Manager
Tom Fisher – Parsons Brinckerhoff Project Manager
Jim Maloney – Parsons Brinckerhoff Civil/Highways

Date: March 28, 2003, 1:00 PM

Location: Snow's/Doxsee, Lower Township, NJ

Subject: **Ocean Drive Improvements and Bridge Replacements**
Lower Township, Cape May County
Coordination Meeting

A Scoping Study is currently being performed on Ocean Drive in Lower Township, Cape May County. The proposed project will raise the roadway and upgrade it to a viable evacuation route. The project will also replace three functionally and/or structurally obsolete bridges, including the major structure over Middle Thorofare. This meeting was conducted to introduce the project to the attendees, assess potential economic impacts of each alternative on their business, and gather additional community input.

- The meeting began with a brief introduction by Tom Fisher who presented an overview of the project's development with specific attention given to the development of the 7 alternatives currently under consideration.
- Mr. Dietze provided an overview of Snow's/Doxsee's facilities. He noted that the facility is used soley for processing. All materials are transported via trucks. No goods are transported via ships. The facility processes clams and other goods which are transported from another facility located in Port Norris, NJ. He explained that they practice "just in time" processing which allows foods to be processed and directly shipped to stores. No materials are warehoused at the facility, making maintenance of access a critical issue for them. The volume of their production is seasonal and is dependent upon the weather. Their facility processes food for the majority of each day. During the remaining time maintenance activities are ongoing, making the location a 24-hour facility.
- Mr Dietze presented the completed economic survey. The facility generates $40M to $45M in annual revenue and has facilities valued at approximately $30M. They employ 138 people. Trucks regularly access the site via the eastern gate located close to the Middle Thorofare Bridge. Mr. Dietze explained that any alternative that closed that access point, even temporarily, could jeopardize their business since alternate access points cannot accommodate truck traffic throughout the site.
- Mr. Deitze explained that alternatives 3C, 3D, 3F and 3G have no impact on their business, and alternative 3E would not impact their business provided that access be maintained. He reiterated that maintenance of access is critical to their acceptance of the project. He said that driveways could be relocated provided they maintain current traffic patterns throughout the site.
- Mr. Deitze explained that the small building on the northeast corner of the lot used to be owned by the Munipal Water Authority, but is now owned by Snow's and is used for storage.
- Mr. Deitze noted that he should be the primary contact for future coordination.
- Tom provided an overview of the project's schedule, noting that certain variables could extend the schedule. The current schedule is as follows:
  Fall 2003- Selection of Initially Preferred Alternative
  Spring 2004 – Begin Design
  Spring 2006 – Begin Construction
  2009 – Construction Completed

  NOTE: subsequent to the meeting, Dale Foster informed Tom Fisher that the Upper Thorofare Bridge would be rehabilitated and widened with a sidewalk, for Alternatives 3E, 3F and 3G.

cc: JEM, MAS, SAB, Dale Foster (Cape May County Engineer); file- 20020b, 6.0,6.2
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RECORD OF ATTENDANCE

Ocean Drive Upgrade and Bridge Replacements
Meeting with Potentially Impacted Business
March 28, 2003

Location: Snows Doxsee Time: 1pm

NAME	COMPANY/ORGANIZATION	TELEPHONE NO.
Jim Maloney	PB	609 734 7013
Gary Dietze	Snow's/Doxsee	609-884-0440 ext 407
Steve Kwalski	" " VP & Gen Mgr.	
Tom Fisher	PB	609-734-7046

Meeting Minutes

Attendees: Mary Hinchcliffe – Hinch Marina
Chuck Hinchcliffe – Hinch Marina
Tom Fisher – Parsons Brinckerhoff Project Manager
Jim Maloney – Parsons Brinckerhoff Civil/Highways

Date: March 28, 2003, 2:00 PM

Location: Hinch Marina, Cape May, NJ

Subject: **Ocean Drive Improvements and Bridge Replacements**
Lower Township, Cape May County
Coordination Meeting

A Scoping Study is currently being performed on Ocean Drive in Lower Township, Cape May County. The proposed project will raise the roadway and upgrade it to a viable evacuation route. The project will also replace three functionally and/or structurally obsolete bridges, including the major structure over Middle Thorofare. This meeting was conducted to introduce the project to the attendees, assess potential economic impacts of each alternative on their business, and gather additional community input.

- The meeting began with a brief introduction by Tom Fisher who presented an overview of the project's development with specific attention given to the development of the 7 alternatives currently under consideration.
- The Hinchcliffe's did not have an major concerns about the project since the alternatives no longer directly impact their parking lot. They expressed a preference for alternatives 3C or 3D. Jim pointed out that each of those alternatives would require a retaining wall along the proposed connector road to avoid their marina.
- The Hinchcliffe's pointed out that dredged materials are typically pumped from the water across the driveway of Altantic Cape Fisheries to the dredged spoils area along Upper Thorofare.
- The Hinchcliffe's noted that people regularly crab and fish on the Upper Thorofare bridge. They felt that the project should safely accommodate fishing and crabbing in this area, either by a widened bridge or new fishing pier. They noted that such accommodation would be beneficial to their business.
- The Hinchcliffe's noted that they also reside on the property.
- Tom Fisher asked the Hinchcliffe's to complete the economic impact survey to the best of their abilities within the next two weeks.
- Tom provided an overview of the project's schedule, noting that certain variables could extend the schedule. The current schedule is as follows:

  Fall 2003- Selection of Initially Preferred Alternative
  Spring 2004 – Begin Design
  Spring 2006 – Begin Construction
  2009 – Construction Completed

  NOTE: subsequent to the meeting, Dale Foster informed Tom Fisher that the Upper Thorofare Bridge would be rehabilitated and widened with a sidewalk, for Alternatives 3E, 3F and 3G.

cc: JEM, MAS, SAB, Dale Foster (Cape May County Engineer); file- 20020b, 6.0,6.2

RECORD OF ATTENDANCE

Ocean Drive Upgrade and Bridge Replacements
Meeting with Potentially Impacted Business
March 28, 2003

Location: Hinch Marina Time: 2PM

NAME	COMPANY/ORGANIZATION	TELEPHONE NO.
Jim Maloney	PB	609 734 7013
MARY HINCHCLIFFE	HINCH MARINA	609-884-7289
Chuck Hinchcliffe	Hinch Marina	609-884-7289
Tom Fisher	PB	609-734-7046

Meeting Minutes

Attendees: Harry Colson – Breezee Lee Marina
Tom Fisher – Parsons Brinckerhoff Project Manager
Jim Maloney – Parsons Brinckerhoff Civil/Highways

Date: April 15, 2003, 10:00 AM

Location: Breezee Lee Marina, Lower Township, NJ

Subject: **Ocean Drive Improvements and Bridge Replacements**
Lower Township, Cape May County
Coordination Meeting

A Scoping Study is currently being performed on Ocean Drive in Lower Township, Cape May County. The proposed project will raise the roadway and upgrade it to a viable evacuation route. The project will also replace three functionally and/or structurally obsolete bridges, including the major structure over Middle Thorofare. This meeting was conducted to introduce the project to the attendees, assess potential economic impacts of each alternative on their business, and gather additional community input.

- The meeting began with a brief introduction by Tom Fisher who presented an overview of the project's development with specific attention given to the development of the 7 alternatives currently under consideration.
- Mr. Colson explained that his facility hosts approximately 1000 vessels. He explained that his property has also been used as a depository for dredge spoils for the last 15 years. He noted, however, that he is severely restricted as to when he can deposit the dredged materials.
- Mr. Colson stated that he prefers a new fixed structure on the existing alignment of Ocean Drive, and that he does not like the cable stayed bridge, as it does not match the landscape of Cape May. Mr. Colson showed pictures of a segmental bridge in Florida, which he feels would be more aesthetically pleasing in Cape May. Mr. Colson stated that he prefers a fixed bridge that would not impede the movement of fishing vessels.
- Tom provided an overview of the project's schedule, noting that certain variables could extend the schedule. The current schedule is as follows:
  Fall 2003- Selection of Initially Preferred Alternative
  Spring 2004 – Begin Design
  Spring 2006 – Begin Construction
  2009 – Construction Completed

cc: JEM, MAS, SAB, Dale Foster (Cape May County Engineer); file- 20020b, 6.0,6.2

RECORD OF ATTENDANCE

Ocean Drive Upgrade and Bridge Replacements
Meeting with Potentially Impacted Business
April 15, 2003

Location: Breezee Lee Marina Time: 10 AM

NAME	COMPANY/ORGANIZATION	TELEPHONE NO.
Jim Maloney	PB	609-734-7013
[illegible]		609 884-4895
Tom Fisher	PB	609-734-7046

Meeting Minutes

Attendees: Richard and Mrs. Ryder – Shellbay Campgrounds
Tom Fisher – Parsons Brinckerhoff Project Manager
Jim Maloney – Parsons Brinckerhoff Civil/Highways

Date: April 15, 2003, 11:30 AM

Location: Shellbay Campgrounds, NJ

Subject: **Ocean Drive Improvements and Bridge Replacements**
Lower Township, Cape May County
Coordination Meeting

A Scoping Study is currently being performed on Ocean Drive in Lower Township, Cape May County. The proposed project will raise the roadway and upgrade it to a viable evacuation route. The project will also replace three functionally and/or structurally obsolete bridges, including the major structure over Middle Thorofare. This meeting was conducted to introduce the project to the attendees, assess potential economic impacts of each alternative on their business, and gather additional community input.

- The meeting began with a brief introduction by Tom Fisher who presented an overview of the project's development with specific attention given to the development of the 7 alternatives currently under consideration.
- The Ryders explained that they own the marina immediately east of the Middle Thorofare bridge, as well as a portion of the docks at Two Mile Landing. They explained that they recently had wetlands mitigation performed on their property, and wish to preserve it.
- The Ryders support the project, preferring Alternatives 3D, 3F and 3G. They were concerned with the proximity of the proposed toll facility to their business, as well as the raising of the roadway immediately in front of their business. Jim explained that the toll plaza would be located such that no one coming from Wildwood would have to pay a toll to reach their facility – maintaining the existing scenario. Jim further explained that a new driveway would be constructed to reach their facility in several of the alternatives and
- Tom provided an overview of the project's schedule, noting that certain variables could extend the schedule. The current schedule is as follows:
  Fall 2003- Selection of Initially Preferred Alternative
  Spring 2004 – Begin Design
  Spring 2006 – Begin Construction
  2009 – Construction Completed

cc: JEM, MAS, SAB, Dale Foster (Cape May County Engineer); file- 20020b, 6.0,6.2

RECORD OF ATTENDANCE

Ocean Drive Upgrade and Bridge Replacements
Meeting with Potentially Impacted Business
April 15, 2003

Location: Shellbay Campgrounds Time: 4/15/03

NAME	COMPANY/ORGANIZATION	TELEPHONE NO.
Jim Maloney	PB	609-734-7013
Richard Ryder		609-465-4770
Tom Fisher	PB	609-734-7046

Nelson & Johnson Fish Company, Inc.
Owner: Block 793 Lot 15.02
993 Ocean Drive
Cape May, New Jersey 08204
UNDER FORECLOSURE TO PNC BANK

Lund's Fisheries, Inc.
Owner: Block 793 Lot 15.01
997 Ocean Drive
Cape May, New Jersey 08204
Jeff Reichl 609-884-7600

Hinch Marina
Owner: Block 793 Lot 15.04
989 Ocean Drive
Cape May, New Jersey 08204
Chuck and Mary Hinchcliffe 609-884-7289

Kurt M. & Cecelia M. Axelsson
Owner: Block 793 Lot 15.03
919 Myrna Road
Cape May, New Jersey 08204
Blue Claw Restaurant 609-884-5878

Snows/Doxsee, Inc.
Owner: Blcok 822 Lot 1.01
994 Ocean Drive
Cape May, New Jersey 08204
Gary Dietze 609-884-0440 x407

Two Mile Associates, LLC
Owner: Block 820, Lot 2.01
P.O. Box 1528
Wildwood Crest, NJ 08260
James Salosin 609-884-8511

Maxie, Inc.
Owner: Block 793, Lot 15.06
744 New York Avenue
Cape May, NJ 08204
Atlantic Cape Fisheries—Dan Cohen 609884-3000

Jenlo Corp.
Owner: Block 822.02, Lot 3, 4
400 Portsmouth Road
Cape May, NJ 08204
Breezey Lee Marina—Harry Colsen 609-884-4849

Harlo, Inc.
Owner: Block 822.02, Lot 6
400 Portsmouth Road
Cape May, NJ 08204
Breezey Lee Marina

MAR-RYDER LLC
C/o Richard Ryder
227 West Shellbay Avenue
Cape May Courthouse, NJ 80210
Frank Mariner & Richard Ryder
609- 886-1086// 609-465-4770

Appendix D
Completed Surveys

20080

SNOW'S/DOXSEE

MAR 27 2003

Ocean Drive Upgrade & Bridge Replacement Project
Economic Impact Survey

CC: TM[redacted], S. Belzong
M. Santiago
Proj. File

Please complete the following survey. Please note that this survey is for comparison purposes only and has no bearing upon future Right-Of-Way acquisition or any other project related compensation. The related graphics are for informational purposes only and are subject to change.

1. General Information

Please provide a general description of the property in the space provided below.

Manufacturer of canned and bottled food products

2. Financial Information

Please provide the following data.

Estimated number of employees on subject property: 138

Estimated annual revenue in dollars: $40,000,000 to 45,000,000

Estimated value of equipment and facilities on subject property: $30,000,000

3. Property Uses

For the following section, please review the attached sketches for Alternatives 3A through 3G. On the sketches, proposed improvements are shown in color. Each drawing features a legend.

Alternative 3A

1. Please describe the existing use of the impacted areas.

Truck access to shipping and receiving

2. Is the impacted area critical to the maintenance of current or future operations? If so, please explain.

By cutting off existing access we would be put out of business.

There appears to be no access during construction which will also put us out of business.

(continued)

Alternative 3B

1. Please describe the existing use of the impacted areas.

Plant access for employees as well as trucks for shipping and receiving.

2. Is the impacted area critical to the maintenance of current or future operations? If so, please explain.

Yes, there appears to be no access to plant during construction

Alternative 3C

1. Please describe the existing use of the impacted areas.

N/A

2. Is the impacted area critical to the maintenance of current or future operations? If so, please explain.

N/A

Alternative 3D

1. Please describe the existing use of the impacted areas.

N/A

2. Is the impacted area critical to the maintenance of current or future operations? If so, please explain.

N/A

(continued)

Alternative 3E

1. Please describe the existing use of the impacted areas.

Providing that access is maintained during construction there appears to be no impact.

2. Is the impacted area critical to the maintenance of current or future operations? If so, please explain.

There appears to be no impact.

Alternative 3F

1. Please describe the existing use of the impacted areas.

N/A

2. Is the impacted area critical to the maintenance of current or future operations? If so, please explain.

N/A

Alternative 3G

1. Please describe the existing use of the impacted areas.

N/A

2. Is the impacted area critical to the maintenance of current or future operations? If so, please explain.

N/A

(continued)

4. Alternative Impacts

For the following section, please review the attached sketches for Alternatives 3A through 3G. On the sketches, proposed improvements are shown in color. Each drawing features a legend. Please fill in appropriate values in the table below.

Alternative	Estimated Annual Loss of Revenue (in dollars)	Estimated Loss of Manpower (in number of employees)
3A	$40,000,000-$45,000,000	138
3B	$40,000,000-$45,000,000	138
3C	0	0
3D	0	0
3E	0	0
3F	0	0
3G	0	0

5. Concerns and Issues

In the space provided below, please list any concerns or issues. Please clearly indicate if a concern or issue is related to a particular alternative.

3A is totally unacceptable as this will deny truck access after completion.

Further it is unacceptable during the construction.

3B appears to deny plant access during construction which is unacceptable.

3C,3D,3F,3G - No impact

3E is acceptable providing that adequate access can be maintained.

J. Mahoney

Fax

Please deliver immediately to:	Thomas Fisher
of:	Parsons Brinkerhoff-FG, Inc.
Fax number:	734-6955
Voice number:	734-7000
Fax received from:	James J. Salasin
of:	
Fax number:	609-884-8220
Voice number:	609-884-8511
Date:	4/3/03
Time:	7:45:31 PM
Number of Pages:	3
Subject:	Ocean Drive Economic Impact Survey

Message:

Attached is the Economic Impact Survey requested. What is not presented in your sketches is the location of each alternative's toll booths. Their location could impact the business and therefore is of concern to me. Any booth location East of Fishdock Road will impact my business.
In addition any Fishdock Road access other than directly off of Ocean Drive will also have an impact.. Please let me know. Thanks

Ocean Drive Upgrade & Bridge Replacement Project - Economic Impact Survey
Two Mile Landing - Ocean Drive and Fishdock Rd. - Jim Salasin

1. The property consist of 100+ acres of mostly wetlands encompassing lands adjacent to Ocean Drive, both sides of Fish Dock Road and all of Thorofare Island. The improvements consist of two restaurants, four bars, a gift shop, an arcade and a 62 slip marina with parking for all.

2. We employ 250 persons in mid season.
Average annual revenues are in excess $5,000,000.00.
Value of equipment and facilities excluding land is approximately $4,200,000.00

3. Alternative 3A
   1. Highway access and exposure as well as navigational access
   2. Yes. Need continuity of access and exposure. 3A appears to be of no impact on my business providing accessibility and exposure are not affected.

   Alternative 3B
   1. Highway access and exposure as well as navigational access
   2. Yes. Need continuity of access and exposure. 3B appears to be of no impact on my business providing accessibility and exposure are not affected.

   Alternative 3C
   1. Highway access and exposure as well as navigational access
   2. Yes. Need continuity of access and exposure. Depending where the toll booths are located 3C may have a severe impact on my business. If the toll booths are located East of Fishdock Rd., the great majority of my customers and employees will have to pay a toll in order to dine or work at my restaurants. 90% of my customers as well as employees are from the Wildwoods. Toll booths East of Fishdock Rd. would discourage diners and employees from using my facility. A bypass of Fishdock Road and my main entrance would limit visibility and accessibility further reducing patronage.

      In addition, I cater to sailing vessels with mast in excess of 90' and would need a vertical bridge clearance of at least 95' to continue servicing these vessels.

   Alternative 3D
   1. Highway access and exposure as well as restaurant view.
   2. Yes. Need continuity of access and exposure. Our exposure to heavily traveled Ocean Drive provides us with our greatest source of new business - the "drive by" customer. Alternative 3D will completely bypass my business limiting visibility and isolating me from my market resulting in drastic reductions in revenues.

      In addition and more importantly our waterfront location and the direct western exposure of our 700 dining seats offers our customers uninterrupted sunsets across a pristine meadow teaming with wildlife and wetlands. Needless to say this is the biggest attraction for our restaurant and marina patrons. A large bridge with an elevated roadway would disrupt that setting forever resulting in even further and mostly likely permanent loss of revenues.

Ocean Drive Upgrade & Bridge Replacement Project - Economic Impact Survey
Two Mile Landing - Ocean Drive and Fishdock Rd. - Jim Salasin

Alternate 3D continued

Alternative 3D crosses over a great deal of wetlands of which much is located on my property. Because of the wetland's value to my business, I will resist their development as I have done in the past.

Alternative 3E

1. Highway access and exposure as well as navigational access
2. Yes. Need continuity of access and exposure. 3E appears to be of no impact on my business providing accessibility and exposure are not affected.

Alternative 3F

1. Highway access and exposure as well as navigational access
2. Yes. Need continuity of access and exposure. 3F appears to be of no impact on my business providing accessibility and exposure are not affected.

Alternative 3G

1. Highway access and exposure as well as navigational access.
2. Yes. Need continuity of access and exposure. 3G appears to be of no impact on my business providing accessibility and exposure are not affected.

4. Alternative Impacts

Alternative	Est. Annual Loss of Revenue	Estimated Loss of Manpower
3A	None	None
3B	None	None
3C	Amt. dictated by toll booth location, property visibility and accessibility - $ amount may be significant	No. Dictated by Toll Booth Location
3D	Significant - as much as $2,500,000	100 employees
'3E	None	None
3F	None	None
3G	None	None

5. Other than what I have already mentioned above, my concerns are what most should be; what impact would an alternative have on the area economics, cost of construction and the environment? It appears to me that a moveable bridge immediately to the south of the existing moveable bridge would present the least impact. Therefore alternative 3A would be my choice.

I understand that moveable bridges are not the preferred type of span and may lack Federal support. In this case alternative 3G or 3F are the only practical options. These alternative have the least effect on the environment. They involve a minimum number of property owners and appear to have little if no economic impact on the area. From an esthetic standpoint the cable stayed bridge, although probably more costly, would be the preferred choice.
What is not presented is the locations of the toll booths for all of the alternatives. I would like to reserve the right to further comment when known.

ATLANTIC CAPES FISHERIES, INC.
P.O. BOX 555
CAPE MAY, NEW JERSEY 08204

April 21, 2003

Thomas Fisher, Project Manager
Parsons Brinckerhoff
506 Carnegie Center
Princeton, NJ 08540 - 6243

Via Fax: 609-734-6900

Re: Ocean Drive Upgraded Bridge Replacement Project

Dear Mr. Fisher,

Please accept this letter as our response to your economic impact study for the Middle Thororfare Bridge and Ocean Drive Upgrade. My answers are keyed to your questions.

I. General Information –

This response is written by Atlantic Capes Fisheries, Inc. on behalf of Maxie, Inc. and Ship Ltd. Atlantic Capes Fisheries, Inc. is the tenant and operator of a facility managed by Ship Ltd. on behalf of Maxie, Inc. the owner of the real estate. This property is about sixteen acres total (about six acres of water and ten acres of uplands). We utilize the dock and port facility for commercial fishing vessels; maintenance of commercial fishing vessels; offloading, processing and distribution of seafood catches. Also it is used as a base for sand, fuel and barge loading.

II. Financial Information

About one hundred twenty fishermen work full-time on the commercial fishing vessels ported at Atlantic Capes Fisheries, Inc. Our shoreside employment fluctuates with the season and processing. A core staff of about twenty-five employees operate year-round with additional seasonal employment of about fifty - seventy additional employees.

Estimated Gross Revenues: $18,000,000.00 (eighteen million dollars)

Estimated Value of Equipment & Facilities $12,000,000.00 of commercial fishing vessel, hull value, homeport at Atlantic Capes Fisheries, Inc.

Capital Investments & Improvements on the real estate - about $2,500,000.00

III. Impacts to Property Uses

Alternative 3A: Alternative 3A will not negatively impact our property or operations.

Alternative 3B: Alternative 3B will negatively impact the freezer at Lund's Fisheries, Inc. which we use for freezing.

Alternative 3C: Currently the existing impacted area is used as a parking lot and equipment storage. While we could possibly accommodate the impact of having the road and bridge so close to our property we believe that Alternative 3C is our least desirable alternative in terms of impacts to our property. Moreover it does not allow unimpeded access to Two Mile Dock by larger vessels.

Alternative 3D: Alternative 3D has significantly less impact on our property than 3C. Additionally 3C will allow unimpeded access to Two-Mile Dock for commercial and deep draft vessels. Alternative 3D is preferable, in our eyes, to 3C. The impacted areas on our property on 3D relate to storage and access, but would not be a problem. In many ways this might be the best alternative since the fixed height bridge would only have to allow for fishing boats and not over 100 feet for reefer vessels. Reefer vessels would not have to go under or through any bridge.

Alternative 3E: Alternative 3E has no negative impacts on our operations or property. Alternative 3E is acceptable provided the fixed height of 3E is sufficient for all anticipated reefer vessels and other cargo traffic. If the height were not sufficient for 3E we would prefer 3D or the dual horizontal opening bridge of 3A.

Alternative 3F & 3G: Both Alternatives 3F & 3G have no negative impacts to the operation of Atlantic Capes Fisheries, Inc. property. There are positive impacts to accessibility of vessels. Alternatives 3F&G are acceptable provided the fixed height of either is sufficient for all anticipated reefer vessels and other cargo traffic. If the height were not sufficient we would prefer 3D or the dual horizontal opening bridge of 3A.

Concerns and Issues:

1) If 3D is chosen the fixed height must only accommodate fishing vessel traffic to Wildwood. This is probably 75 feet.

2) If 3F or 3G is chosen the fixed height must allow for all possible commercial traffic of reefer vessels in the future. Currently reefer vessel and commercial vessel size is limited not only by the bridge, but also by the depth of the inlet. The final design of the bridge should anticipate utilization of commercial vessels which can utilize the inlet, if the inlet is maintained to 25 foot depth at low water. Congress has authorized maintenance dredging of the inlet to 25 feet, but the Army Corp does not maintain to that depth because the harbor cannot accommodate this deep draft vessel (due to the bridge size limitations). In effect it is which comes first, the bridge replacement or the dredging. Clearly the bridge must be completed first for the dredging to be maintained. If the bridge were not an impediment to vessel traffic we can obtain naturally 25 foot depth in Middle Thorofare. The fixed height should be designed in the final analysis to accommodate the vessels which could use the harbor if the inlet was maintained as authorized.

Thank you for your consideration of our views. We would like to see the bridge replaced as soon as possible.

Sincerely yours,

Daniel Cohen, President

A:\042106tfisherbridge.doc

Maloney, Jim E.

From: Fisher, Thomas

Sent: Tuesday, April 22, 2003 9:18 AM

To: Maloney, Jim E.; Balzano, Steve; Santiago, Miguel; Keiser, Janet; Pascual,

Subject: FW: SPAM: Middle Thorofare Bridge Replacement

Here is Lund Fisheries response to our survey, for your info.
Tom
-----Original Message-----
From: Jeff Reichle [mailto:jreichle@lundsfish.com]
Sent: Tuesday, April 22, 2003 9:05 AM
To: Fisher, Thomas
Cc: Dan Cohen
Subject: SPAM: Middle Thorofare Bridge Replacement

Thomas Fisher
Parsons Brinckerhoff
506 Carnegie Center
Princeton, NJ 08540

Dear Mr. Fisher

Please accept this email as our response to your Economic Impact Survey for the Ocean Drive Upgrade & Bridge Replacement Project at Middle Thorofare.

I. General Information

Lund's Fisheries Inc. is a commercial fishing company processing approximately 80 million pounds of fish each year. The property is utilized as a processing/freezing facility as well as a port facility for approximately 14 fishing vessels. Lund's Fisheries operates from two locations, one at 997 Ocean Drive (west of the existing bridge), the other at Two Mile Dock (east of existing bridge, adjacent to the Two Mile Restaurant facility).

II. Financial Information

We employ about 150 people in our factory. There are approximately 80 people employed on the fishing vessels that home port at this facility.

Annual revenue of this company is approximately 35 million dollars. There is an additional 20 million dollars in revenues generated by the vessels.

Estimated value of the equipment and facilities on this property is 16 million dollars. There is additional investment of approximately 12 million dollars in the fishing vessels.

III. Impacts to Property Uses

Alternative 3A: Currently storage area for racks and vats at Ocean Dr location. Also location for main power transformers. This area is critical to our operations but could be relocated to land abandoned by current highway/bridge. No impact at Two Mile site.

Alternative 3B: Cold Storage and Blast Freezing facility at Ocean drive location. Also parking space. This area is critical to maintaining our business at this location. Loss of this areas and these improvements would result in closing of this business and loss of all jobs at the site. Economic impact would be disastrous. No room on either site to relocate these facilities. Cannot relocate business as access to deep water and dockage is critical to this business. Since both our sites are inter dependent this alternative would also force the Two Mile facility to close.

Alternative 3C: There would be no impact at the Ocean Drive site other than loss of flower beds. This alternative would, however, negatively impact the Two Mile site by restricting the size of vessel that could fit under the proposed bridge.

Alternative 3D: There would be no impact at the Ocean Drive site other than loss of flower beds. This alternative is our preferred alternative as it allows unrestricted access to both facilities in terms of width and height of vessels. Since our plans are to start to bring large reefer ships to this port this alternative gives us the most options.

Alternative 3E: There would be no impact at the Ocean Drive site other than loss of flower beds. This alternative is our second choice as it allows unrestricted access to both facilities in terms of width and height of vessels. We rate this second to alternative 3D because we will still have to contend with bridge openings.

Alternatives 3F and 3G: There would be no impact at the Ocean Drive site other than loss of flower beds. This alternative would be our third choice as it allows unrestricted access to both facilities in terms of width of vessels. However, this option could still restrict the height of vessels coming to our facilities.

IV. Alternative Impacts

3A: This alternative **would** result in increased revenues
3B: 55 million loss of revenue and 230 jobs
3C: 10 million loss of revenue and 30 jobs
3D: This alternative **would** result in increased revenues
3E: This alternative **would** result in increased revenues
3F and 3G: This alternative ***may*** result in increased revenues

V. Concerns and Issues

1) 3D would accommodate all of our concerns. The only vessels that would be impacted are those currently using Wildwood as home port. We believe that most existing vessels would fit under this alternative and the few that will not could be modified with financial assistance.

2) If 3F or 3G is chosen the fixed height must allow for all possible commercial traffic of reefer vessels in the future. Currently reefer vessel and commercial vessel size is limited not only by the bridge, but also by the depth of the inlet. The final design of the bridge should anticipate utilization of commercial vessels which can utilize the inlet, if the inlet is maintained to 25 foot depth at low water. Congress has authorized maintenance dredging of the inlet to 25 feet, but the Army Corp does not maintain to that depth because the harbor cannot accommodate this deep draft vessel (due to the bridge size limitations). In effect it is which comes first, the bridge replacement or the dredging. Clearly the bridge must be completed first for the dredging to be maintained. If the bridge were not an impediment to vessel traffic we can obtain naturally 25 foot depth in Middle Thorofare. The fixed height should be designed in the final analysis to accommodate the vessels which could use the harbor if the inlet was maintained as authorized. \

Best Regards

Jeff Reichle, President

F A X

Hinch Marina, Inc.
989 Ocean Drive
Cape May, NJ 08204

To:	Tom Fisher
Fax number:	609-734-6900
From:	Mary Jane Hinchcliffe
Fax number:	609-884-0204
Business phone:	609-884-7289
Home phone:	
Date & Time:	4/24/2003 12:34:45 PM
Pages:	6
Re:	Survey

Sorry we took so long in completing. I tried to complete financial end as best I could. Let me know if you need anything else.

Thanks,
Mary Hinchcliffe

Ocean Drive Upgrade & Bridge Replacement Project Economic Impact Survey

Please complete the following survey. Please note that this survey is for comparison purposes only and has no bearing upon future Right-Of-Way acquisition or any other project related compensation. The related graphics are for informational purposes only and are subject to change.

1. General Information

Please provide a general description of the property in the space provided below.

Hinch Marina, A full service marina - 110 Boat slips, Bait & Tackle, and ships store in business since 1971 Boat storage & parking in yard. Owners residence in main building second floor.

2. Financial Information

Please provide the following data.

Estimated number of employees on subject property: 4

Estimated annual revenue in dollars: $235,000

Estimated value of equipment and facilities on subject property: $300,000

3. Property Uses

For the following section, please review the attached sketches for Alternatives 3A through 3G. On the sketches, proposed improvements are shown in color. Each drawing features a legend.

Alternative 3A

1. Please describe the existing use of the impacted areas.

Parking in Summer, Winter Storage of Boats in Winter (Revenue Source), Display of Brokerage Boats

2. Is the impacted area critical to the maintenance of current or future operations? If so, please explain.

Yes Storage is a main revenue source

(continued)

Alternative 3B

1. Please describe the existing use of the impacted areas.

PARKING, STORAGE, BROKERAGE

2. Is the impacted area critical to the maintenance of current or future operations? If so, please explain.

MUCH GREATER LOSS OF AREA, PLUS CONCERN OF VISIBILITY FROM ROAD DUE TO GRADE

Alternative 3C

1. Please describe the existing use of the impacted areas.

ACCESS ROAD TO REAR DOCK & PARKING

2. Is the impacted area critical to the maintenance of current or future operations? If so, please explain.

CONCERNS OVER EROSION OF WEST BANK OF MARINA CAUSING FILL IN

Alternative 3D

1. Please describe the existing use of the impacted areas.

SEE ABOVE

2. Is the impacted area critical to the maintenance of current or future operations? If so, please explain.

SEE ABOVE

(continued)

Alternative 3E

1. Please describe the existing use of the impacted areas.

SAME AS 3A, 3B

2. Is the impacted area critical to the maintenance of current or future operations? If so, please explain.

Greatly hinders visibility, drive by access, and aesthetics least desirable plan

Alternative 3F

1. Please describe the existing use of the impacted areas.

No direct property impact

2. Is the impacted area critical to the maintenance of current or future operations? If so, please explain.

Main concern involves widening of upper thoroughfare bridge due to Tractor Trailer and boat trailer traffic

Alternative 3G

1. Please describe the existing use of the impacted areas.

Same as 3F

2. Is the impacted area critical to the maintenance of current or future operations? If so, please explain.

Same as 3F

(continued)

PB 100 YEARS

4. Alternative Impacts

For the following section, please review the attached sketches for Alternatives 3A through 3G. On the sketches, proposed improvements are shown in color. Each drawing features a legend. Please fill in appropriate values in the table below.

Alternative	Estimated Annual Loss of Revenue (in dollars)	Estimated Loss of Manpower (in number of employees)
3A	$20,000.00 - $150,000	0
3B	$20,000.00 - $150,000	0
3C	0	0
3D	0	0
3E	$20,000.00 - $150,000	0
3F	0	0
3G	0	0

5. Concerns and Issues

In the space provided below, please list any concerns or issues. Please clearly indicate if a concern or issue is related to a particular alternative.

Above numbers are based on water storage only. Loss of parking from these three plans, however, will also impact summer business & that can be anywhere from $50,000 to $100,000 in loss depending upon number of customers that would not return due to the inconvenience.

Our other issues w/ these 3 plans are that we do live on the property as well year-round and would not like to have the bridge directly in front of our home.

We would like to note that we are ~~in~~ front of the bridge especially since Ocean Drive in recent years has become a Major thoroughfare.

Over a Century of Engineering Excellence

→ over

Ocean Drive has many people that use it as a bike path, running path, along w/ people that fish on both the small bridges. We're hoping that widening those bridges will also be part of this due to the danger that the congestion on both the small bridges present.

We are grateful for the opportunity to relay our concerns and would love to help in any way to advise in the future.

Thank Hinchcliff

200205-510

CLIPPER SHIP P·U·B

Axelsson's
Blue Claw
Restaurant

April 24, 2003

APR 29 2003
PB - PRINCETON

To: Tom Fisher

From: Axelsson's Blue Claw
991 Ocean Drive
Cape May, N.J. 08204

Re: Ocean Drive Upgrade & Bridge Replacement Project Economic Impact Survey.

The following are our concerns and issues with regard to the proposed project.

Kurt & Cecelia Axelsson

991 Ocean Drive, Cape May, New Jersey 08204

(South of Crest Toll Bridge) (609) 884-5878

Fax: 609·884·1684

Ocean Drive Upgrade & Bridge Replacement Project Economic Impact Survey

Please complete the following survey. Please note that this survey is for comparison purposes only and has no bearing upon future Right-Of-Way acquisition or any other project related compensation. The related graphics are for informational purposes only and are subject to change.

1. General Information

Please provide a general description of the property in the space provided below.

A restaurant, Applebee's Blue Claw Lot size: 190' x 110' Block 793 Lot 15.03, Tax Map South Township, with additional parking - 18 spaces - 10' x 18' - easement with 25 wide access road - as depicted on 1988 site plans with Lower Twp.

2. Financial Information

Please provide the following data.

Estimated number of employees on subject property: 72 - full & part-time

Estimated annual revenue in dollars: $1,400,000.00

Estimated value of equipment and facilities on subject property: $4,000,000.00

3. Property Uses

For the following section, please review the attached sketches for Alternatives 3A through 3G. On the sketches, proposed improvements are shown in color. Each drawing features a legend.

Alternative 3A

1. Please describe the existing use of the impacted areas.

Access & egress to parking area ramps.

2. Is the impacted area critical to the maintenance of current or future operations? If so, please explain.

Yes. Access to restaurant for customers, delivery vehicles, employees, etc.

(continued)

Alternative 3B

1. Please describe the existing use of the impacted areas.

Same as 3A. Except, showing only one access & egress. Completely unacceptable. Driveway closure shown.

2. Is the impacted area critical to the maintenance of current or future operations? If so, please explain.

Yes. If one driveway is closed it would be impossible to operate. Need free flow of traffic to parking areas. It would also violate fire codes.

Alternative 3C

1. Please describe the existing use of the impacted areas.

It would do away w. additional remote parking under contract w. Harry Mogck. Approx. 50 Parking spaces along west side of dirt road.

2. Is the impacted area critical to the maintenance of current or future operations? If so, please explain.

Yes. A loss of parking critical to operating our restaurants.

Alternative 3D

1. Please describe the existing use of the impacted areas.

Same as 3C.

2. Is the impacted area critical to the maintenance of current or future operations? If so, please explain.

Same as 3C.

(continued)

Alternative 3E

1. Please describe the existing use of the impacted areas.

Would have an elevated roadway connecting to Bridge right outside of restaurant windows 30 to 40' high E. No direct access - except new access road.

2. Is the impacted area critical to the maintenance of current or future operations? If so, please explain.

Yes. It would be a restaurant under a bridge.

Alternative 3F

1. Please describe the existing use of the impacted areas.

Not impacted - except no drive-by traffic - would require extensive signage (on top of restaurant) and going North and South for restaurant.

2. Is the impacted area critical to the maintenance of current or future operations? If so, please explain.

Cable bridge more attractive to entire area - less impact on environment and Foundations & current draw bridge. Don't want existing bridge closed for safety concerns while new bridge under construction. Ex: Ocean City Longport Bridge. This would put us out of business!

Alternative 3G

1. Please describe the existing use of the impacted areas.

Same as 3F.

2. Is the impacted area critical to the maintenance of current or future operations? If so, please explain.

Same as 3F.

(continued)

4. Alternative Impacts

For the following section, please review the attached sketches for Alternatives 3A through 3G. On the sketches, proposed improvements are shown in color. Each drawing features a legend. Please fill in appropriate values in the table below.

Alternative	Estimated Annual Loss of Revenue (in dollars)	Estimated Loss of Manpower (in number of employees)
3A	Impossible for us to estimate	for us to estimate 3C - 3G.
3B		
3C		
3D		
3E		
3F		
3G		

5. Concerns and Issues

In the space provided below, please list any concerns or issues. Please clearly indicate if a concern or issue is related to a particular alternative.

3C & 3B - Ramps going into restaurant parking area must have drain off grids in order not to flood restaurant parking areas. Nelson's Blue Claw is the only 2 car fire business that relies on the public for daily operation during proposed construction.

3F and 3G would have the least impact on our restaurant. Proper signs would be a must to let people know how to get to us. We requested a sign on top of our restaurant and signal on the proposed bridge etc. Also 3F and 3G should have the least impact on wetlands and the environment.

(continued page 5)

Concerns and Issues continued:

We request a legal document and/or contract from both the State and Federal governments in regard to these issues:

Loss of Income Insurance
Loss of Rental Income
Loss of Income for all of our salaried employees.

In addition, a binding legal document covering on-going operating expenses such as:

property taxes, liquor license renewals, sewerage, electric, gas, building and liquor liability.

Our chefs, managers and owners require this income for their well being for their survival. They have mortgages, pensions and children's issues including education, etc. They depend on the Blue Claw for their future.

We have been in business for 3 years as a takeout and 33 years as an award-winning restaurant. We have fought many hurdles to achieve an excellent reputation. Our State and Federal governments have an obligation to support our survival as small business owners who put their employees first. In the off season, we pay our employees before we pay us.

We desperately need legal guarantees to assure all of us an income during the 5 years? overhaul of Ocean Drive.

In all of the years we have lived here, the Ocean Drive has never been flooded. We think that this project is totally unnecessary for our area and another thing that the governments cannot afford.

In closing, the only bridge we would agree with is the Cable Stayed Bridge. 3 E. Economically,

environmentally and aesthetically, it would be the best choice for our area.

Thank you for your attention to the future of the Blue Claw Restaurant. We await your reply and your agreement to the governments' legalities needed for our survival.

We are a small business - the strength of our country's economics

Sincerely

Kurt Wm. Gelsson

Cecelia M. Gelsson

20020B
J Mal.

PB 100 YEARS ®

Ocean Drive Upgrade & Bridge Replacement Project Economic Impact Survey

MAY 1 - 2003

Breezee Lee Marina

Please complete the following survey. Please note that this survey is for comparison purposes only and has no bearing upon future Right-Of-Way acquisition or any other project related compensation. The related graphics are for informational purposes only and are subject to change.

1. General Information

Please provide a general description of the property in the space provided below.

Marina located on Ocean Drive covering apx. 50 Acres and having over 1000 slips. One House, Three shops - two hifts - and boundary Ramp, open to Public.

2. Financial Information

Please provide the following data.

Estimated number of employees on subject property: six

Estimated annual revenue in dollars: _____

Estimated value of equipment and facilities on subject property: _____

3. Property Uses

For the following section, please review the attached sketches for Alternatives 3A through 3G. On the sketches, proposed improvements are shown in color. Each drawing features a legend.

Alternative 3A

1. Please describe the existing use of the impacted areas.

All Alternatives except one endanger the use of our entrance

2. Is the impacted area critical to the maintenance of current or future operations? If so, please explain.

All Traffic coming in and out of Marina exits at the foot of the Bridge over 1000 slips

(continued)

Plus - Ramp traffic.

Alternative 3B

1. Please describe the existing use of the impacted areas.

2. Is the impacted area critical to the maintenance of current or future operations? If so, please explain.

Alternative 3C

1. Please describe the existing use of the impacted areas.

2. Is the impacted area critical to the maintenance of current or future operations? If so, please explain.

Alternative 3D

1. Please describe the existing use of the impacted areas.

2. Is the impacted area critical to the maintenance of current or future operations? If so, please explain.

(continued)

Alternative 3E

1. Please describe the existing use of the impacted areas.

2. Is the impacted area critical to the maintenance of current or future operations? If so, please explain.

Alternative 3F

1. Please describe the existing use of the impacted areas.

2. Is the impacted area critical to the maintenance of current or future operations? If so, please explain.

Alternative 3G

1. Please describe the existing use of the impacted areas.

2. Is the impacted area critical to the maintenance of current or future operations? If so, please explain.

(continued)

PB 100 YEARS

4. Alternative Impacts

For the following section, please review the attached sketches for Alternatives 3A through 3G. On the sketches, proposed improvements are shown in color. Each drawing features a legend. Please fill in appropriate values in the table below.

Alternative	Estimated Annual Loss of Revenue (in dollars)	Estimated Loss of Manpower (in number of employees)
3A	This is an unknown	
3B	if you don't	
3C	get to a business	
3D	the Bottom line	
3E	is you out of	
3F	Business -	
3G		

5. Concerns and Issues

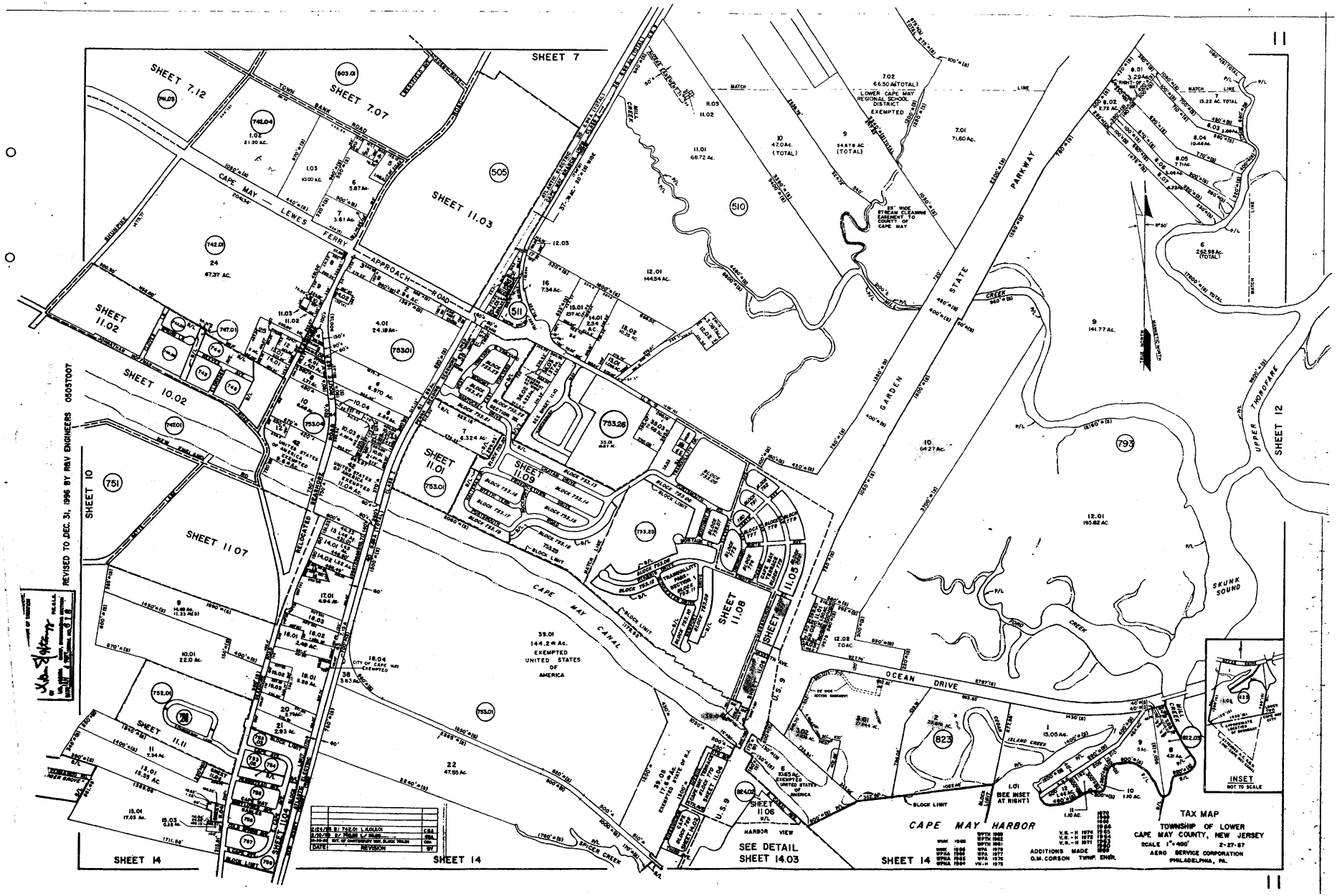
In the space provided below, please list any concerns or issues. Please clearly indicate if a concern or issue is related to a particular alternative.

All proposals except one seem to be very costly, environmentally unsound, detrimental to the business on Ocean Drive. Also the structure would look out of Place.

I think the Bridge should follow the old Foot print, it should conform to the standard I.C.W. height with a draw Bridge That would give unrestricted access. The increased height should make fewer openings - and a shorter Bridge would give the Business on ocean Dr access. Also eliminate one Bridge over upper Thoroughfare.

I Traveled over this Bridge every day for 30 yrs. and the Biggest Problem with delays seems to be the Tolls.

Technical Addendum K
Tax Maps & Mailing List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SHEET 11.01
SHEET 11.09
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SHEET 11.05
SHEET 11.06
SHEET 11.11
SHEET 14
SHEET 12
CAPE MAY — LEWES FERRY
APPROACH ROAD
TOWN BANK ROAD
RELOCATED RAILROAD
CAPE MAY CANAL
GARDEN STATE PARKWAY
OCEAN DRIVE
U.S. 9
SKUNK SOUND
CAPE MAY HARBOR
HARBOR VIEW
SEE DETAIL SHEET 14.03
SEE INSET AT RIGHT
INSET
NOT TO SCALE
LOWER CAPE MAY REGIONAL SCHOOL DISTRICT EXEMPTED
39.01 144.2 ac. EXEMPTED UNITED STATES OF AMERICA
REVISED TO DEC. 31, 1996 BY RBV ENGINEERS 0505TOOT
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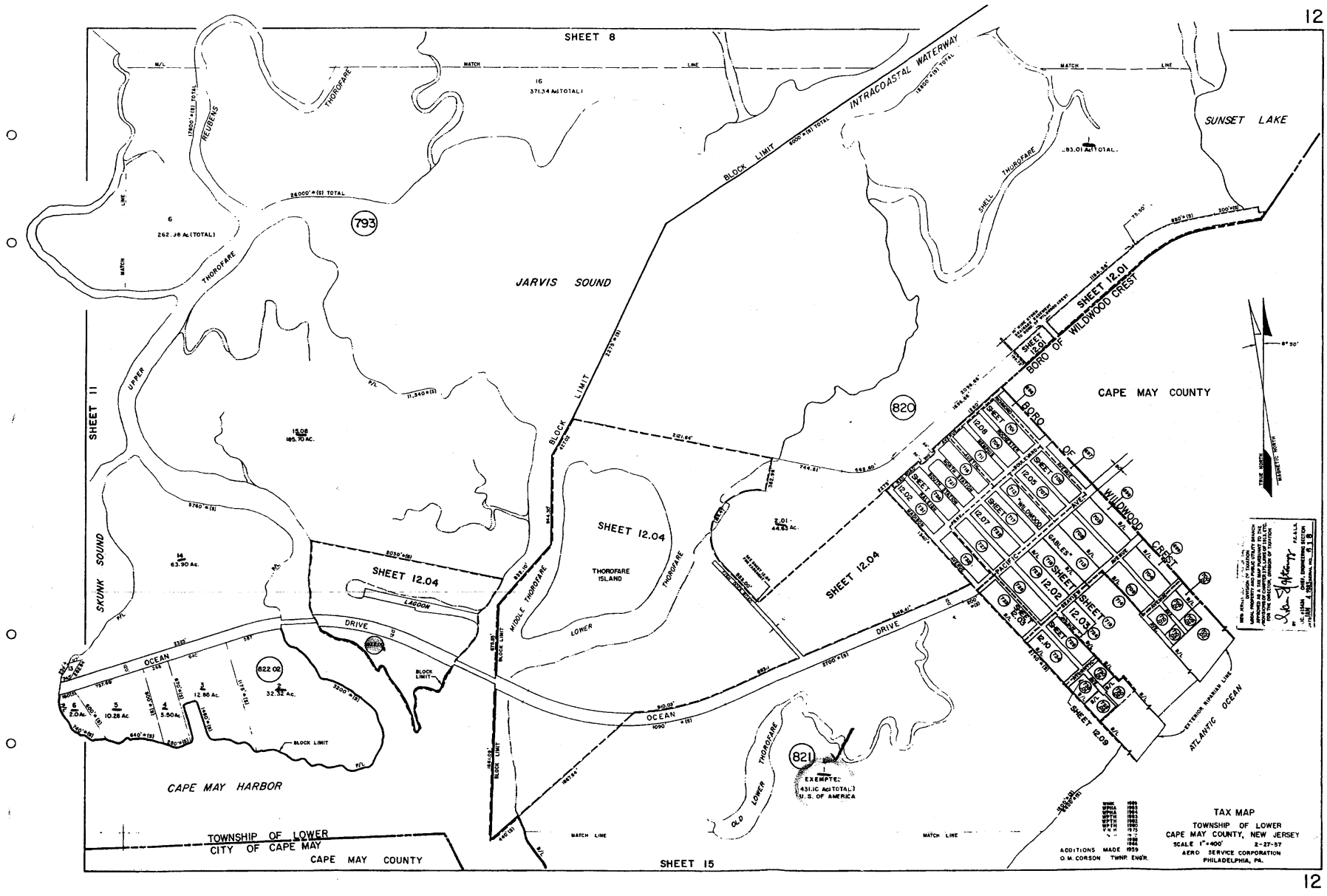
TOWNSHIP OF LOWER
CAPE MAY COUNTY, NEW JERSEY
SCALE 1"=400'
2-27-67
AERO SERVICE CORPORATION
PHILADELPHIA, PA.



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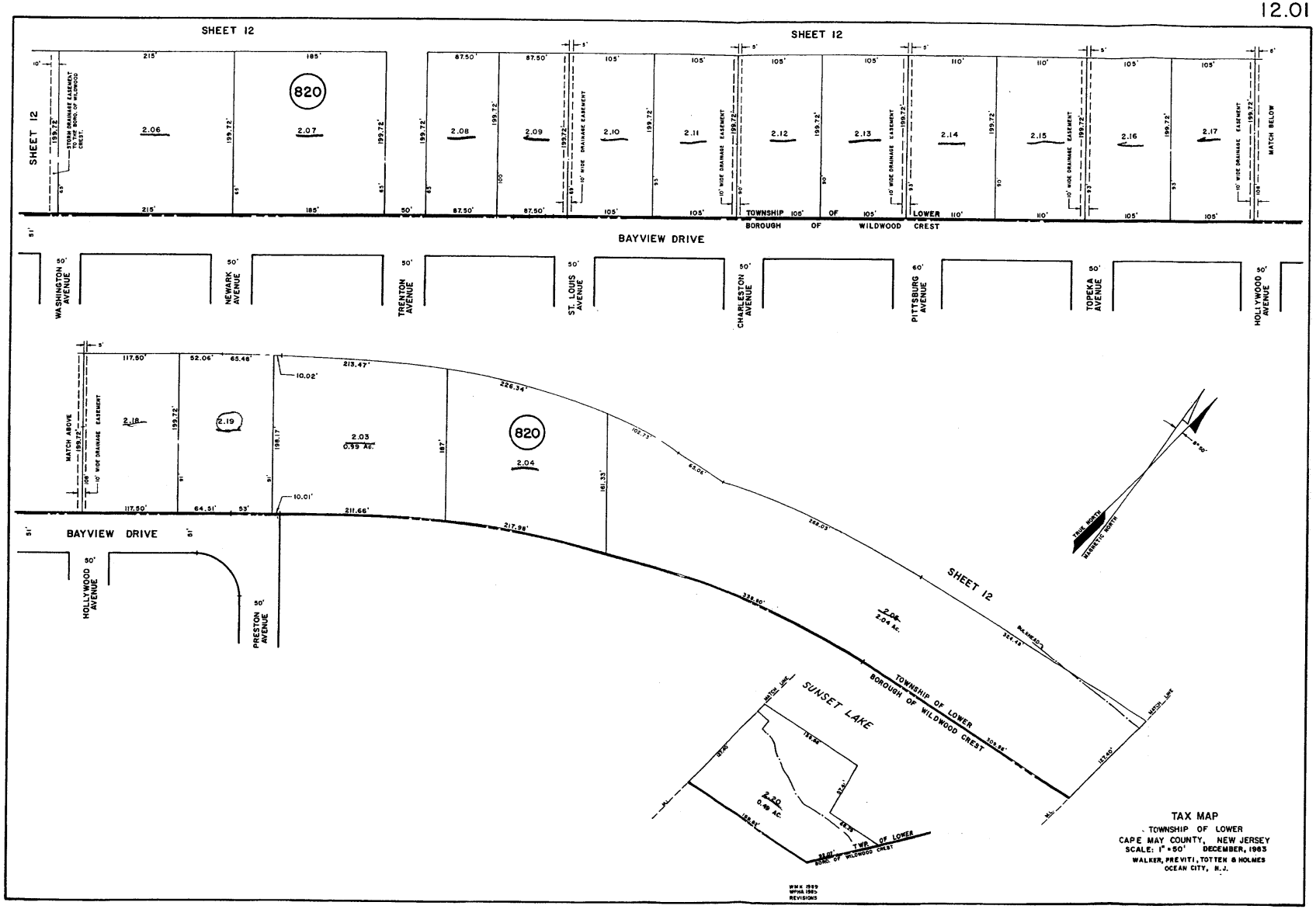
12.01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SHEET 12
SHEET 12
820
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2.08
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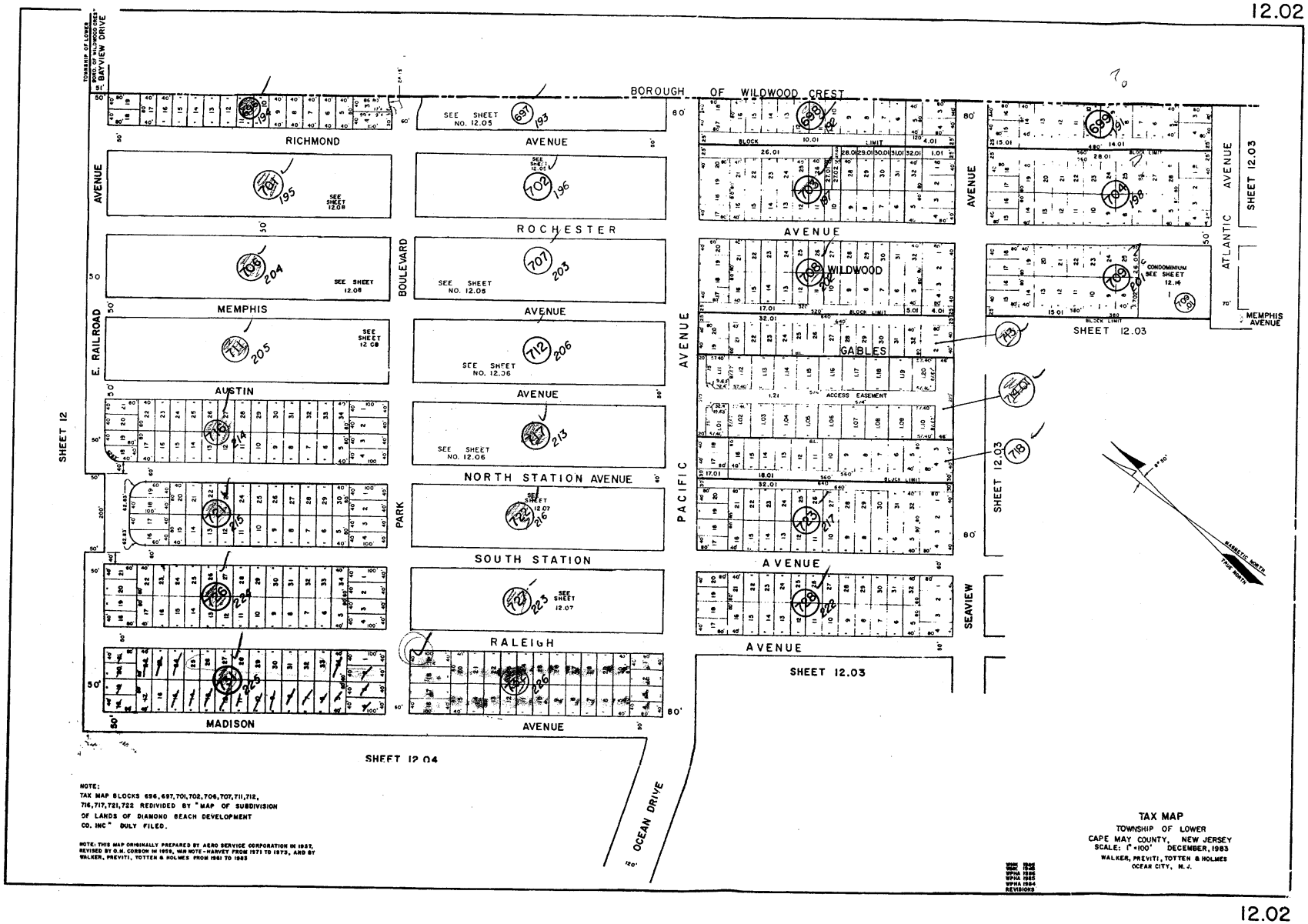
2.10
2.11
2.12
2.13
2.14
2.15
2.16
2.17
TOWNSHIP OF LOWER BOROUGH OF WILDWOOD CREST
BAYVIEW DRIVE
WASHINGTON AVENUE
NEWARK AVENUE
TRENTON AVENUE
ST. LOUIS AVENUE
CHARLESTON AVENUE
PITTSBURG AVENUE
TOPEKA AVENUE
HOLLYWOOD AVENUE
2.18
2.19
2.03
0.99 Ac.
820
2.04
BAYVIEW DRIVE
HOLLYWOOD AVENUE
PRESTON AVENUE
SHEET 12
2.04
2.04 Ac.
SUNSET LAKE
2.20
0.99 AC.
TOWNSHIP OF LOWER
BOROUGH OF WILDWOOD CREST
TRUE NORTH
MAGNETIC NORTH
TAX MAP
TOWNSHIP OF LOWER
CAPE MAY COUNTY, NEW JERSEY
SCALE: 1" = 50' DECEMBER, 1963
WALKER, PREVITI, TOTTEN & HOLMES
OCEAN CITY, N.J.

12.01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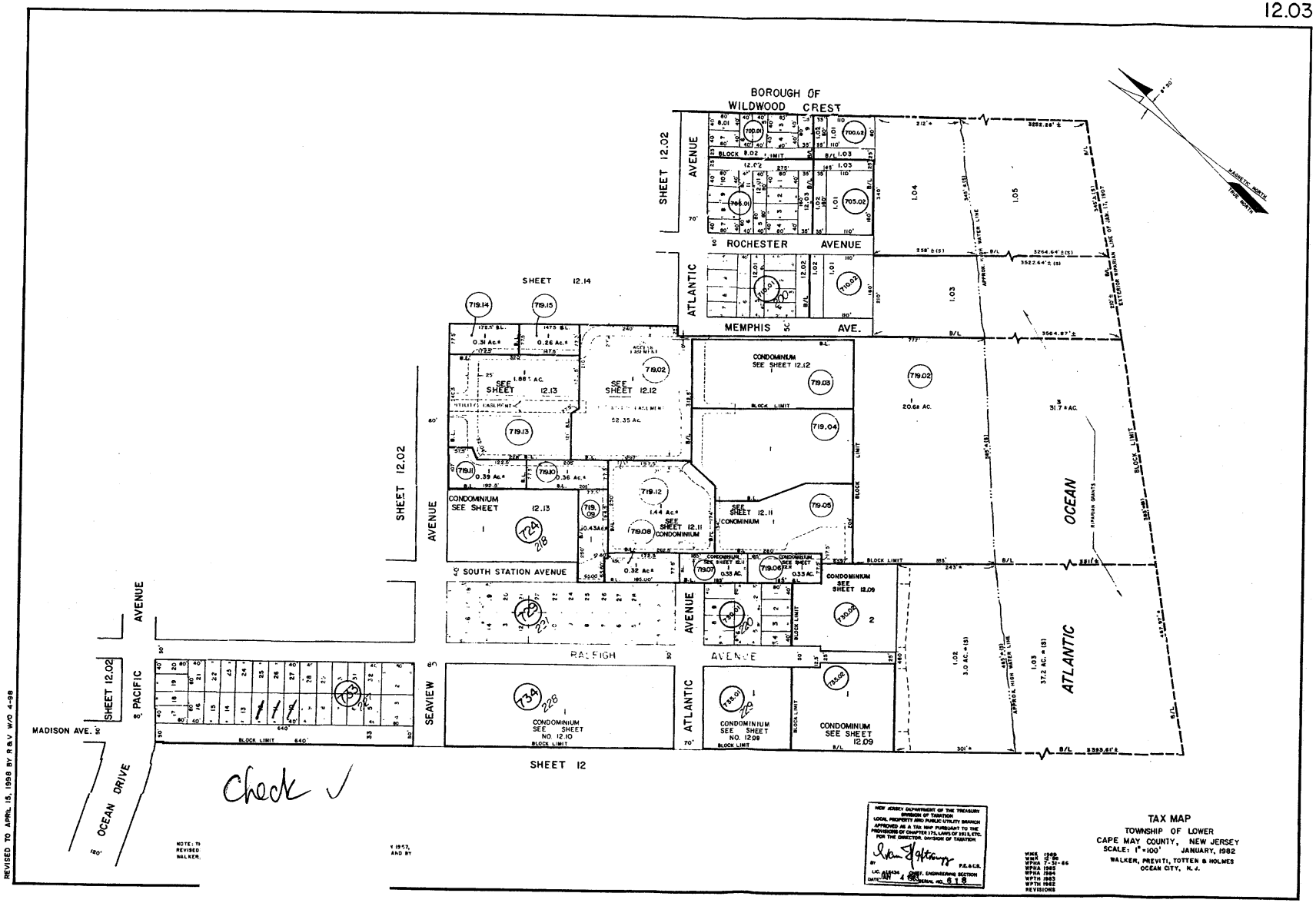
TOWNSHIP OF LOWER
BORO. OF WILDWOOD CREST
E. BAYVIEW DRIVE
BOROUGH OF WILDWOOD CREST
SEE SHEET NO. 12.05
RICHMOND AVENUE
ROCHESTER AVENUE
MEMPHIS AVENUE
AUSTIN AVENUE
NORTH STATION AVENUE
SOUTH STATION AVENUE
RALEIGH AVENUE
MADISON AVENUE
E. RAILROAD AVENUE
BOULEVARD
PARK
PACIFIC AVENUE
WILDWOOD AVENUE
GABLES
SEAVIEW AVENUE
ATLANTIC AVENUE
MEMPHIS AVENUE
CONDOMINIUM SEE SHEET 12.14
ACCESS EASEMENT
SHEET 12
SHEET 12.03
SHEET 12.04
OCEAN DRIVE
MAGNETIC NORTH
NOTE:
TAX MAP BLOCKS 696, 697, 701, 702, 706, 707, 711, 712, 716, 717, 721, 722 REDIVIDED BY "MAP OF SUBDIVISION OF LANDS OF DIAMOND BEACH DEVELOPMENT CO. INC" DULY FILED.
NOTE: THIS MAP ORIGINALLY PREPARED BY AERO SERVICE CORPORATION IN 1957, REVISED BY O.N. CORSON IN 1959, VAN NOTE-HARVEY FROM 1971 TO 1973, AND BY WALKER, PREVITI, TOTTEN & HOLMES FROM 1981 TO 1983
TAX MAP
TOWNSHIP OF LOWER
CAPE MAY COUNTY, NEW JERSEY
SCALE: 1" = 100' DECEMBER, 1983
WALKER, PREVITI, TOTTEN & HOLMES
OCEAN CITY, N.J.
REVISIONS
12.02

12.03



Check ✓

NOTE: TI REVISED WALKER.

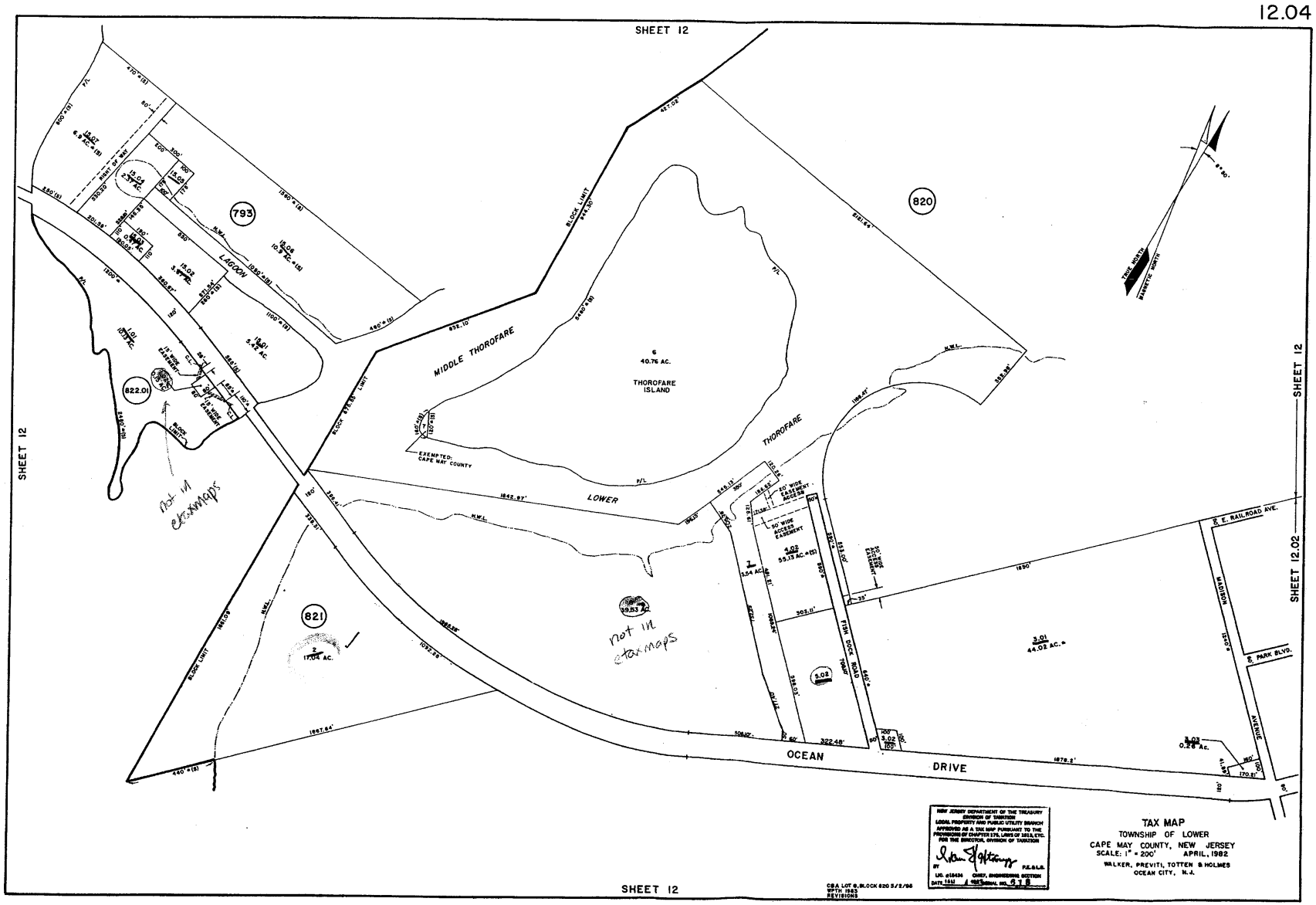
REVISED TO APRIL 15, 1998 BY R&V W/O 4-98

NEW JERSEY DEPARTMENT OF THE TREASURY
DIVISION OF TAXATION
LOCAL PROPERTY AND PUBLIC UTILITY BRANCH
APPROVED AS A TAX MAP PURSUANT TO THE PROVISIONS OF CHAPTER 175, LAWS OF 1913, ETC.
FOR THE DIRECTOR, DIVISION OF TAXATION
BY: P.E. & C.R.
DATE: JAN 4 1983
LIC. SURVEYOR, ENGINEERING SECTION
ORIGINAL NO. 618

WMS 1982
WMS 12-83
WPHA 7-12-86
WPHA 1983
WPHA 1984
WPTH 1983
WPTH 1982
REVISIONS

TAX MAP
TOWNSHIP OF LOWER
CAPE MAY COUNTY, NEW JERSEY
SCALE: 1"=100' JANUARY, 1982
WALKER, PREVITI, TOTTEN & HOLMES
OCEAN CITY, N.J.

12.03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SHEET 12
SHEET 12
SHEET 12.02
SHEET 12
793
820
821
822.01
MIDDLE THOROFARE
THOROFARE
LOWER
LAGOON
THOROFARE ISLAND
40.76 AC.
not in tax maps
not in tax maps
OCEAN DRIVE
FISH DUCK ROAD
MADISON AVENUE
E. PARK BLVD.
E. RAILROAD AVE.
TRUE NORTH
MAGNETIC NORTH
TAX MAP
TOWNSHIP OF LOWER
CAPE MAY COUNTY, NEW JERSEY
SCALE: 1" = 200'
APRIL, 1982
WALKER, PREVITI, TOTTEN & HOLMES
OCEAN CITY, N.J.
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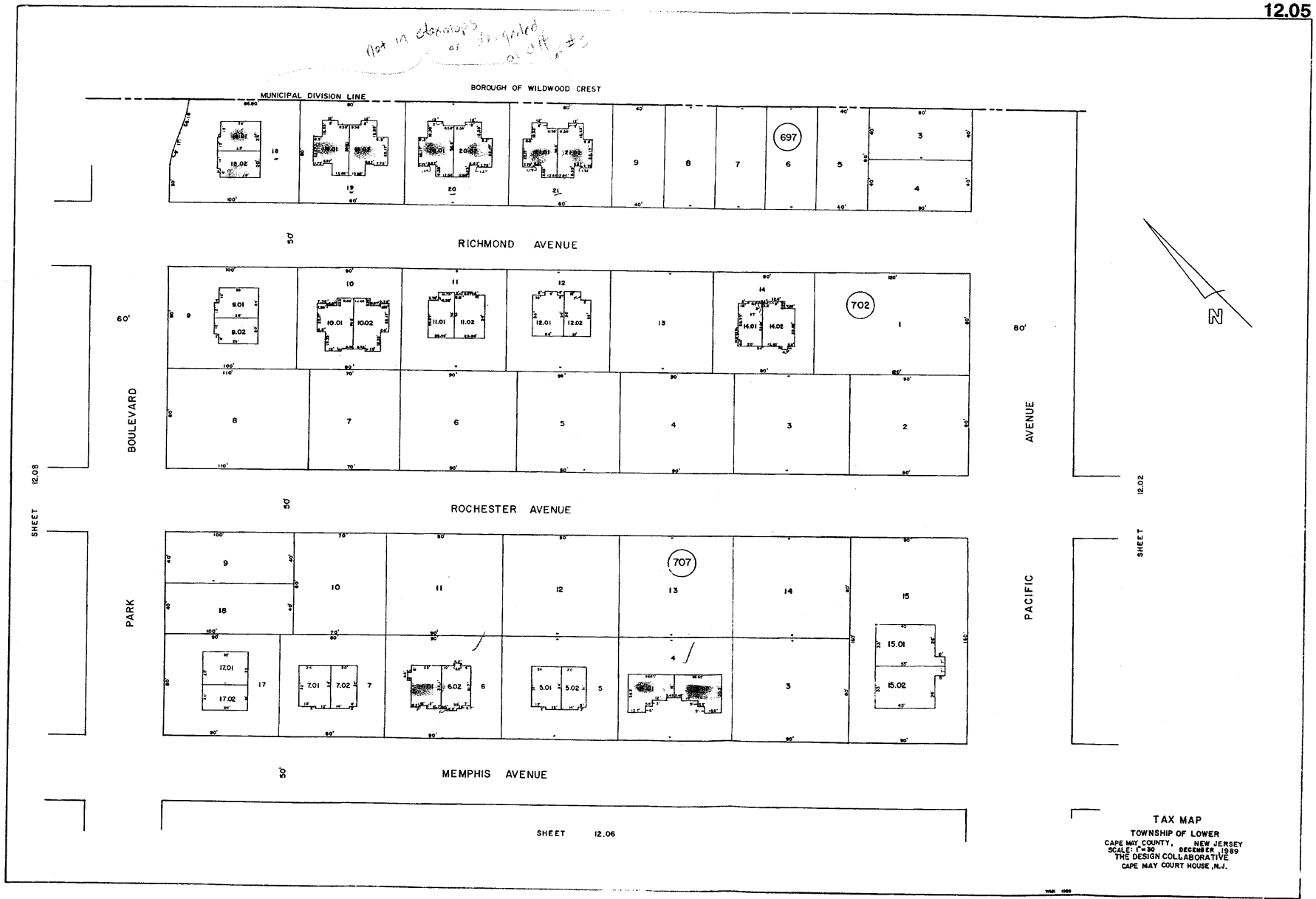
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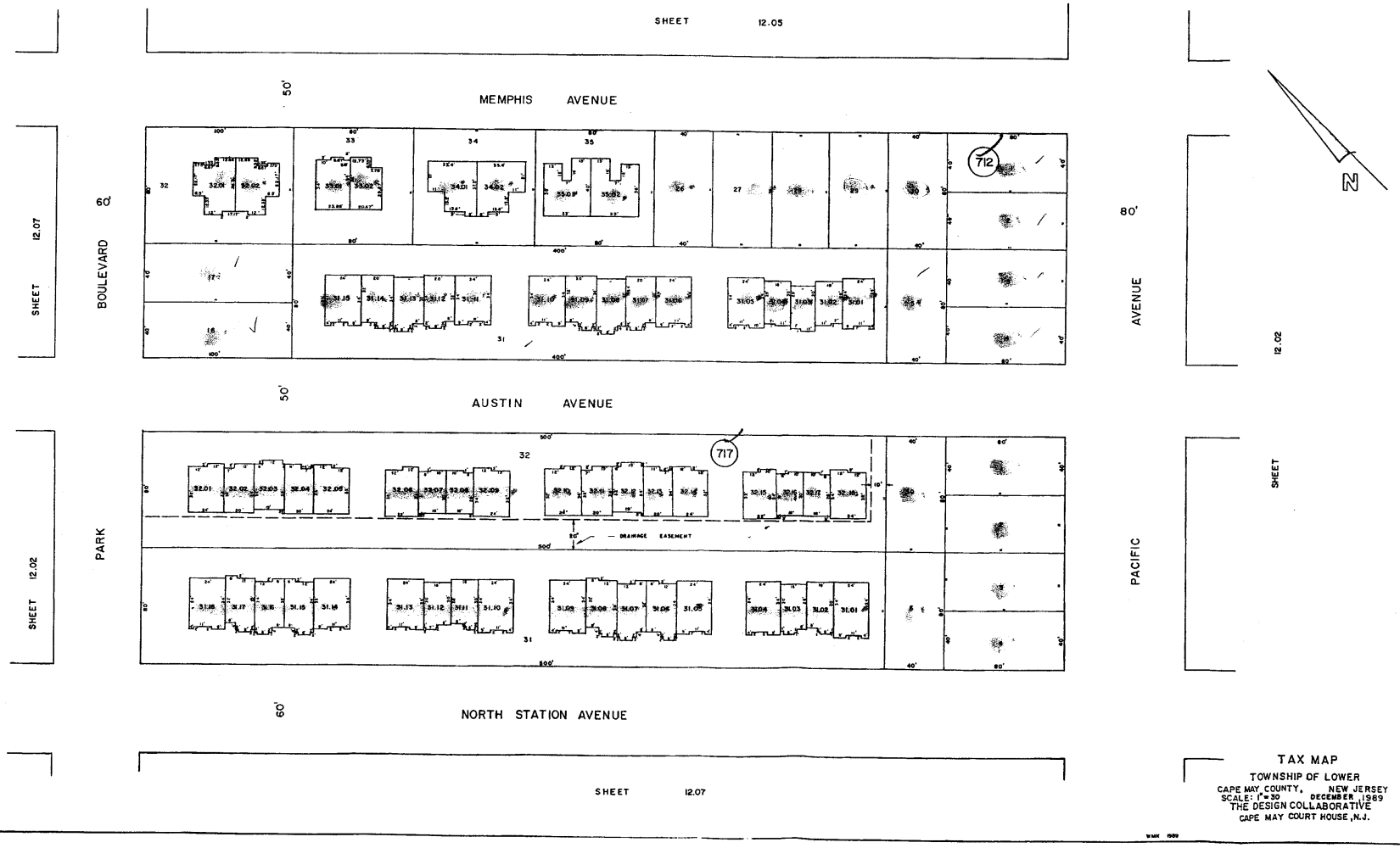
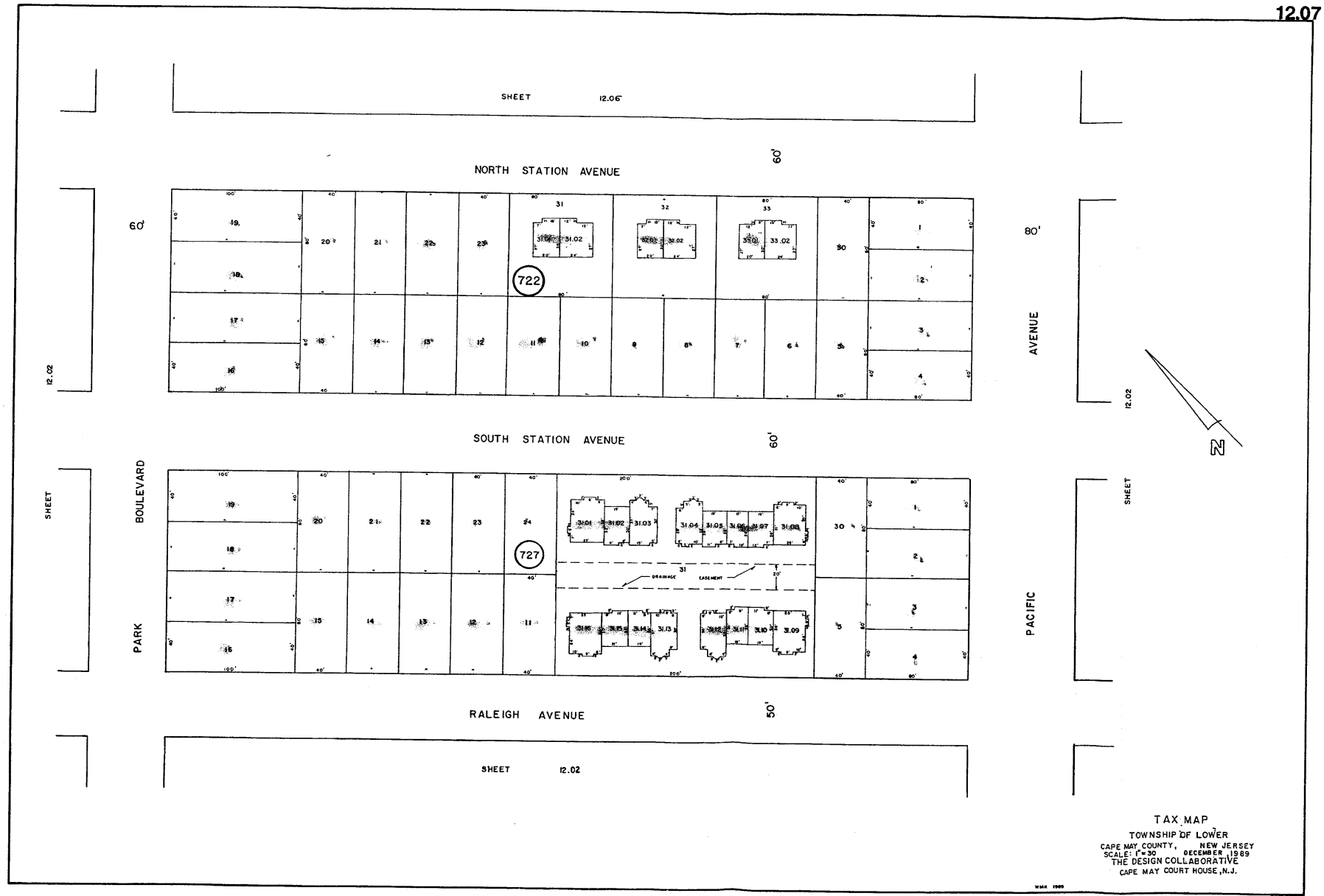
BOROUGH OF WILDWOOD CREST
MUNICIPAL DIVISION LINE
RICHMOND AVENUE
ROCHESTER AVENUE
MEMPHIS AVENUE
PARK BOULEVARD
PACIFIC AVENUE
SHEET 12.08
SHEET 12.02
SHEET 12.06
697
702
707
N
TAX MAP
TOWNSHIP OF LOWER
CAPE MAY COUNTY, NEW JERSEY
SCALE: 1"=30' DECEMBER 1989
THE DESIGN COLLABORATIVE
CAPE MAY COURT HOUSE, N.J.
12.05

12.06


SHEET 12.05
MEMPHIS AVENUE
50'
60'
BOULEVARD
SHEET 12.07
80'
AVENUE
12.02
712
N
AUSTIN AVENUE
50'
717
DRAINAGE EASEMENT
PARK
SHEET 12.02
PACIFIC
SHEET
NORTH STATION AVENUE
60'
SHEET 12.07
TAX MAP
TOWNSHIP OF LOWER
CAPE MAY, COUNTY, NEW JERSEY
SCALE: 1"=30 DECEMBER, 1989
THE DESIGN COLLABORATIVE
CAPE MAY COURT HOUSE, N.J.

12.06

12.07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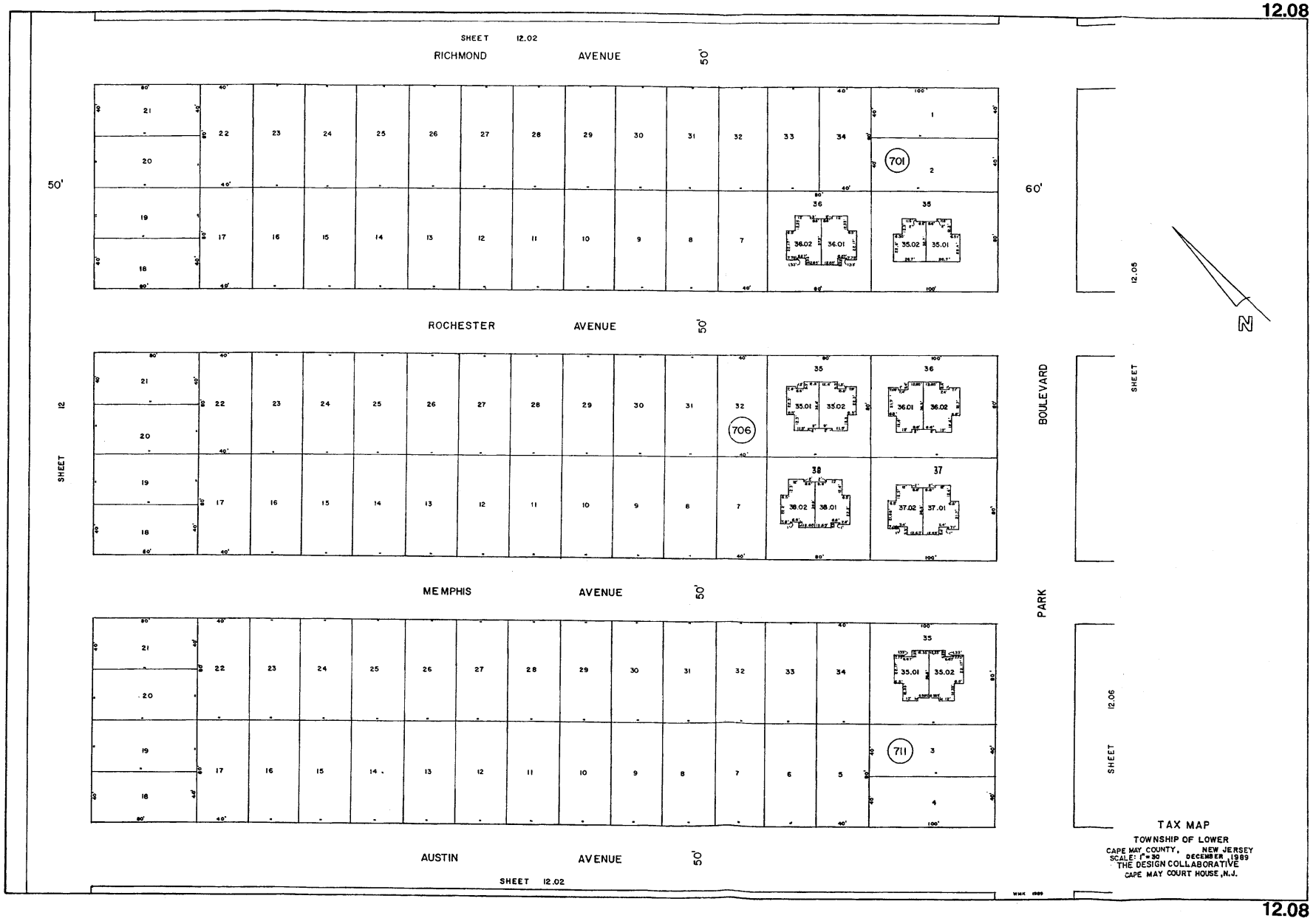
60'
722
80'
AVENUE
12.02
12.02
SOUTH STATION AVENUE
60'
SHEET
BOULEVARD
PARK
727
DRAINAGE EASEMENT
PACIFIC
SHEET
RALEIGH AVENUE
50'
SHEET 12.02
N
TAX MAP
TOWNSHIP OF LOWER
CAPE MAY COUNTY, NEW JERSEY
SCALE: 1"=30 DECEMBER, 1989
THE DESIGN COLLABORATIVE
CAPE MAY COURT HOUSE, N.J.

12.07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RICHMOND AVENUE
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ROCHESTER AVENUE
MEMPHIS AVENUE
AUSTIN AVENUE
SHEET 12.02
50'
60'
BOULEVARD
PARK
SHEET 12
SHEET 12.05
SHEET 12.06
701
706
711
N
TAX MAP
TOWNSHIP OF LOWER
CAPE MAY COUNTY, NEW JERSEY
SCALE: 1"=30 DECEMBER 1989
THE DESIGN COLLABORATIVE
CAPE MAY COURT HOUSE, N.J.
12.08

elson & Johnson Fish Company, Inc.
/ner: Block 793 Lot 15.02
993 Ocean Drive
Cape May, New Jersey 08204

Lund's Fisheries, Inc.
Owner: Block 793 Lot 15.01
Attn: Mr. Jeff Reichl
997 Ocean Drive
Cape May, New Jersey 08204

Hinch Marina
Owner: Block 793 Lot 15.04
Attn: Chuck and Mary Hinchcliffe
989 Ocean Drive
Cape May, New Jersey 08204

Kurt M. & Cecelia M. Axelsson
Owner: Block 793 Lot 15.03
c/o Blue Claw Restaurant
919 Myrna Road
Cape May, New Jersey 08204

Snows/Doxsee, Inc.
Attn: Mr. Gary Dietze
Owner: Blcok 822 Lot 1.01
994 Ocean Drive
Cape May, New Jersey 08204

Two Mile Associates, LLC
Owner: Block 820, Lot 2.01
Attn: Mr. Jim Salasin
P.O. Box 1528
Wildwood Crest, NJ 08260

Maxie, Inc.
Owner: Block 793, Lot 15.06
C/o Atlantic Cape Fisheries
Mr. Daniel Cohen
.4 New York Avenue
Cape May, NJ 08204

Jenlo Corp.
Owner: Block 822.02, Lot 3, 4
c/o Breezee Lee Marina
Attn: Mr. Harry Colsen
400 Portsmouth Road
Cape May, NJ 08204

Harlo, Inc.
Owner: Block 822.02, Lot 6
c/o Breezee Lee Marina
Attn: Mr. Harry Colsen
400 Portsmouth Road
Cape May, NJ 08204

Mar-Ryder LLC
c/o Richard Ryder
227 West Shellbay Avenue
Cape May Courthouse, NJ 80210

AVERY® Address Labels Laser 5162®

Mr. David Mizrahi
Cape May Bird Observatory
New Jersey Audubon Society
701 East Lake Drive
PO Box 3
Cape May Point, NJ 08212

Dr. Larry Niles
New Jersey Department of Environmental Protection
Division of Fish and Wildlife
Endangered & Non-Game Species Program
P.O. Box 400
Trenton, NJ 08625

Mr. Eric Stiles
Scherman-Hoffman Wildlife Sanctuary
New Jersey Audubon Society
11 Hardscrabble Road
PO Box 693
Bernardsville, NJ 07924

Mr. Carlo Popolizio
United States Department of the Interior
Fish and Wildlife Service
New Jersey Field Office
Ecological Services
927 North Main Street, Building D
Pleasantville, NJ 08232

AVERY® Address Labels Laser 5162®

Block 697, Lot 3, 4, 5
9510 Associates, Inc.
2010 Central Avenue N
Wildwood, NJ 08260

Block 697, Lot 6, 7
JED Enterprises LLC
9510 Pacific Avenue
Wildwood Crest, NJ 08260

Block 697, Lot 8
George M. & Dorothy E. Mitro
123 Timothy Place
Bridgewater, NJ 08807

Block 697, Lot 9
John W. & Wendy A. Amechi
692 Bridgeton Pk
Mantua, NJ 08051

Block 697, Lot 10, 11
Robert & Janet Gabel
164 San Joaquin Court
Holmdel, NJ 07733

Block 697, Lot 10, 11
James O. & Angela Pomponi III
159 Perkintown Road
Pedricktown, NJ 08067

Block 697, Lot 12, 13
Kenneth Wayne Mc Gaha
105 E. Richmond Avenue
Wildwood Crest, NJ 08260

Block 697, Lot 12, 13
James M. & Pamela S. Carroll, Jr.
4 Atlas Court
Sewell, NJ 08080

Block 697, Lot 14, 15
Frank & Helen Zappia
218 Straford Road
Glenolden, PA 19036

Block 697, Lot 14, 15
Daniel & Marion D'Egidio
615 Highland Avenue
Morton, PA 19070

Block 697, Lot 16, 17
Mayra & Richard Rivera
10 Doremus Road
Mahwah, NJ 07430

Block 697, Lot 16, 17
Gary A. & Cheryl L. Bohn
410 Trio Lane
West Chester, PA 19382

Block 698, Lot 3, 4, 4.01, 5
John J. & Joan Mullen
204 Coventry Lane
Rose Tree Media, PA 19063

Block 698, Lot 6
Eldorus & Carol A. Maynard
1674 Maxwell Drive
Yorktown Heights, NY 10598

Block 698, Lot 6
Allan M. & Patricia A. Friedman
207 Beechtree Drive
Broomall, PA 19008

Block 698, Lot 6
Carmen T. & Carolyn A. Caporusso
8 Aldridge Way
Sewell, NJ 08080

Block 698, Lot 6
Patrick L. & Karen B. Gerini
47 Briarhill Road
Cedar Grove, NJ 07009`

Block 698, Lot 6
Sandra L. Digilio
213 E. Rochester Avenue
Wildwood Crest, NJ 08260

Block 698, Lot 6
Edward J. Hegarty
242 E. Winona Avenue
Norwood, PA 19074

Block 698, Lot 6
William J. & Mary D. Broderick
194 Knickerbocker Road
Demarest, NJ 19562

Block 698, Lot 6
John L. & Beth B. Henson, Jr.
3 Parthermore Circle
Lewisberry, PA 17339

Block 698, Lot 6
Denise Perachio & Raymond Sansone
400 Cherry Street
Norristown, PA 19401

Block 698, Lot 6
Kenneth Huff & Eileen L. Scanilon
56 Hickory Hill Court
Rockaway, NJ 07866

Block 698, Lot 6
Marie M. Parent
146 Trimble Boulevard
Brookhaven, PA 19015

Block 698, Lot 6
Nicholas & Patricia A. Pituch
1402 Mauck Road
Blue Bell, PA 19422

Block 698, Lot 6
Mario & Renata Dumicic
269 Grant Avenue
Cliffside Park, NJ 07010

Block 698, Lot 6
Joseph F. & Michelle Busichio
14 University Court
South Orange, NJ 07079

Block 698, Lot 6
Myron F. & Zenia O. Olesnyckyj
31 Old Brook Lane
New Providencetown, NJ 07974

Block 698, Lot 6
Roger A. & Joanne Jensen
606 Sunrise Way
Neshanic Station, NJ 08853

Block 698, Lot 6
Robert J. & Denise L. Lawlor
12-53 4th Street
Fair Lawn, NJ 07410

Block 698, Lot 6
Susan L. & Michael Hagerty
2262 Sunrise Way
Jamison, PA 18929

Block 698, Lot 6
J. Russell & Denise Savatore
204 Monroe Avenue
Belle Mead, NJ 08502

Block 698, Lot 6
Richard & Susan Lutz
9 Eaverstown Road
Medford, NJ 08055

Block 698, Lot 6
Linda S. & Michael A. Baleno
2701 Renton Road
Pittsburgh, PA 15239

Block 698, Lot 6
Mark E. Sherman
4524 Spruce Street
Philadelphia, PA 19139

Block 698, Lot 6
Vincent G. & Evelyn H. Leone
14 Knowlton Drive
Marlton, NJ 08053

Block 698, Lot 6
Allen L. & Susan R. Dissinger Etals
25 Jefferson Avenue
Denver, PA 17517

Block 698, Lot 6
John & Constance Cerrone
7344 Revere Street
Philadelphia, PA 19152

Block 698, Lot 6
Claudio & Mari C. Roman, Jr.
488 Bristol Road West
Southampton, PA 18966

Block 698, Lot 6
Sean E. & Ann G. Mudgett
537 So Geyers Church Road
Middletown, PA 17057

Block 698, Lot 6
David M. Ritchie
15 Scott Avenue
Princeton, NJ 08550

Block 698, Lot 6
John A. & Anna L. Pigeon
2 Embassy Circle
Norristown, PA 19403

Block 698, Lot 6
Kevin L B & Deborah A. Price
4 Unneberg Avenue
Succasunna, NJ 07876

Block 698, Lot 6
Marialena Corp
T/A JR Drywall
550 Bridgeton Pike Suite 7
Mantua, NJ 08051

Block 698, Lot 6
George C. & Mary A. Meila
26 Williams Street
Rockaway, NJ 08051

Block 698, Lot 6
David & Jo Ann Kelley
1938 Muhlehberg Drive
Landale, PA 19446

Block 698, Lot 6
John W. & Wendy R. Mulford
106 Wycombe Avenue
Deptford, NJ 08096

Block 698, Lot 6
Ruth A. Dierolf
9 So Sunrise Lane
Boyertown, PA 19512

Block 698, Lot 6
Salvatore M. Verdi
300 E. Rochester Avenue
Wildwood Crest, NJ 08260

Block 698, Lot 6
Helen Lange
4 Blanchard Drive
Deptford, NJ 08096

Block 698, Lot 6
Susan D. & Joseph F. Spadafora
2597 Branch Pike
Cinnaminson, NJ 08077

Block 702, Lot 1, 2
Thomas W. Himes
9600 Pacific Avenue
Wildwood, NJ 08260

Block 702, Lot 3
Wharf Travel Services Inc.
9600 Pacific Avenue
Wildwood Crest, NJ 08260

Block 702, Lot 4
Walter R. & Doris G. Warner
119 E. Rochester Avenue
Wildwood Crest, NJ 08260

Block 702, Lot 5
Margaret Volpe
117 E. Rochester Avenue
Wildwood Crest, NJ 08260

Block 702, Lot 6
Michael David & Anita Sciarra
115 E. Rochester Avenue
Wildwood Crest, NJ 08260

Block 702, Lot 7
Michael D. & Anita Sciarra
115 E. Rochester Avenue
Wildwood Crest, NJ 08260

Block 702, Lot 8
Robert Guarini, Sr. & Robert Guarini, Jr.
846 Jordon Road
West Chester, PA 19382

Block 702, Lot 9
Diego F. & Linda A. Calderin
29 Michael Lane
West Chester, PA 19380

Block 702, Lot 9
James & Elizabeth T. Osborne
3206 Thornbrook Place
Philadelphia, PA 19114

Block 702, Lot 10
Michael & Adeline Scauzillo
7 Laurel Place
Eastchester, NY 10709

Block 702, Lot 10
Walter E. Sudol & June Etal
67 Village Road
Clifton, NJ 07013

Block 702, Lot 11
Lisa Ohlandt
325 West 3rd Avenue
Conshohocken, PA 19428

Block 702, Lot 11
Robert W. & Therese R. Young
705 Milmont Avenue
Swarthmore, PA 19018

Block 702, Lot 12
Lawrence & Catherine Campanale
653 Spotswood Englishtown
Monroe Township, NJ 08831

Block 702, Lot 12
Gerald R. & Patricia Labarca
345 Kennerly Road
Springfield, PA 19064

Block 702, Lot 13
Leslie Dannin
1015 Millbrook Avenue
Berwyn, PA 19312

Block 702, Lot 13
Leslie Dannin
1015 Millbrook Avenue
Berwyn, PA 19312

Block 702, Lot 14
William & Virginia Polihrom
310 Delaware Avenue
Union, NJ 07083

Block 702, Lot 14
Michael & Maria Panasiuk Etals
66 Kipp Avenue
Lodi, NJ 07644

Block 707, Lot 1, 2
Corino & Dwyer Real Estate Partnership
P.O. Box 849, Suite 101
Wildwood, NJ 08260

Block 707, Lot 1, 2
Guyon Pierce & Shoczolek RE Partnership
9700 Pacific Avenue, #102
Wildwood, NJ 08260

Block 707, Lot 3
George N. & Irene L. Chuchra
10 Byron Road
Short Hills, NJ 07078

Block 707, Lot 4
Frank R. & Luann Servideo
354 Copeland Avenue
Lyndhurst, NJ 07071

Block 707, Lot 4
Mario T. & Pauline J. Morrone
891 Phillips Road
Warminster, PA 18974

Block 707, Lot 5
Wm G. & Noreen M. Sims
303 Gloucester Pk
Barrington, NJ 08007

Block 707, Lot 5
Barbara A. Bergere
5808 Holger Court
Laurel, MD 20707

Block 707, Lot 6
Rosemary A. Webb
14 Albert Avenue
Morristown, NJ 07960

Block 707, Lot 6
William & Denise Nocella
2418 S. 13th Street
Philadelphia, PA 19006

Block 707, Lot 7
Eric L. & Wendy H. Digiacomo
314 Knightsbridge Way
Lititz, PA 17543

Block 707, Lot 7
Michael H. & Carolyn M. Bense
7 Grant Drive
Holland, PA 18966

Block 707, Lot 9, 18
Dennis M. & Joan E. Frist
6 Donegal Drive
Carlisle, PA 17013

Block 707, Lot 9, 18
Linda J. Shaw
100B E Rochester Avenue
Wildwood Crest, NJ 08260

Block 707, Lot 10
Louis & Joan Spagnoletti
103 Forrest Hills Drive
Voorhees, NJ 08043

Block 707, Lot 11
Christian D. Deegler
5143 Mallard Drive
Bensalem, PA 19020

Block 707, Lot 12
David S. & Marie E. Rudenstein
1364 Knorr Street
Philadelphia, PA 19111

Block 707, Lot 13
Charles & Patricia Ronn
108 E. Rochester Avenue
Wildwood Crest, NJ 08260

Block 707, Lot 14
Isabelle B. Cook Etals
432 Valley Road
Clifton, NJ 07015

Block 707, Lot 17, 18
Elizabeth D. Shea
14911 Carrolton Road
Rockville, MD 20853

Block 707, Lot 17, 18
Lee W. & Sue B. Schilling
22 Yorkshire Drive
Medford, NJ 08055

Block 712, Lot 1, 2, 30
Crest Savings & Loan Association
5406 New Jersey Avenue
Wildwood, NJ 08260

Block 712, Lot 3, 4, 5
Scott J. Maslow & Barbara J. Stokes
18 Second Avenue
Cape May, NJ 08204

Block 712, Lot 6, 7-15
Elke K. Hanner
315 Cranberry Drive
Huntingdon Valley, PA 19006

Block 712, Lot 6, 7-15
Thomas & Deborah Grillo
357 Kingsland Avenue
Lyndhurst, NJ 07071

Block 712, Lot 6, 7-15
Steven & Stacey Silvestri
610 Rock Road
Glen Rock, NJ 07083

Block 712, Lot 6, 7-15
Vincent J. & Nance J. Russo
97 Wilshire Drive
Belle Mead, NJ 08502

Block 712, Lot 6, 7-15
Roy E. & Karen A. Salley
31 Pointview Parkway
Wayne, NJ 07470

Block 712, Lot 6, 7-15
Gennaro W. & Valerie J. Tardive
4 Woods Avenue
Stanhope, NJ 07874

Block 712, Lot 6, 7-15
John H. & Kimberly R. Petell
52 Apple Tree Lane
Sewell, NJ 08080

Block 712, Lot 6, 7-15
Edward H. & Rosalia Perazzoli Etals
415 Lori Lane
King of Prussia, PA 19406

Block 712, Lot 6, 7-15
Manuela Fernandez
581 Robinson Terrace
Union, NJ 07083

Block 712, Lot 6, 7-15
Charles & Julia Skudera (IRR Trust)
165 Reid Avenue
Bergenfield, NJ 07621

Block 712, Lot 6, 7-15
Joseph & Linda Santucci
115 E. Austin Avenue
Wildwood Crest, NJ 08260

Block 712, Lot 6, 7-15
James M. & Carol A. Wilson
30 Berk Lane
Glen Gardner, NJ 08826

Block 712, Lot 6, 7-15
Richard T. Paleck & Wendy Moretti
9 Laurel Avenue
Dumont, NJ 07628

Block 712, Lot 6, 7-15
Jos A. & Mary G. Fassano
3801 Dorchester Road
Philadelphia, PA 19154

Block 712, Lot 6, 7-15
Michael Meyer
43 Main Street
Ogdensburg, NJ 07439

Block 712, Lot 16, 17
Stephen V. & Grace M. Kelly
22 Nottingham Drive
Medford, NJ 08055

Block 712, Lot 18, 19
Joseph J. & Aida Papotto, Jr.
100-A E. Memphis Avenue
Wildwood Crest, NJ 08260

Block 712, Lot 18, 19
Joseph G. Giorgio
2201 Oregon Pike
Lancaster, PA 17601

Block 712, Lot 20, 21
Edmond & Florence Niemann
6 Laurel Woods Drive
Berlin, NJ 08009

Block 712, Lot 20, 21
Michael & Dorothy Metchnik
22 Collins Street
Cranford, NJ 07016

Block 712, Lot 22, 23
John J. & Frances Mc Grody
104 E. Memphis Avenue, Unit A
Wildwood Crest, NJ 08260

Block 712, Lot 22, 23
Samuel P. & Delia P. Alfonsi
314 Hemlock Lane
Springfield, PA 19064

Block 712, Lot 24, 25
Thomas J. & Rita T. Giancanterino
2817 Sydenham Street
Philadelphia, PA 19145

Block 712, Lot 24, 25
Donato M. & Carmella R. Cristinzio
2315 S. Lambert Street
Philadelphia, PA 19145

Block 712, Lot 26
Maria Mach
728 Garrison Court
Matua, NJ 08051

Block 712, Lot 27
Toby & Jerry LLC
45 Hawthorne Drive
Edison, NJ 08820

Block 712, Lot 28, 29
Douglas & Bernadette Capece, Etals
23 Seneca Road
Cranford, NJ 07016

Block 717, Lot 1, 2, 5, 30
Giuseppe & Marie Cataldo
9860 Pacific Avenue
Wildwood Crest, NJ 08260

Block 717, Lot 6
Charles & Carol Cuccia
3 Van Dorn Court
Middletown, NJ 07748

Block 717, Lot 6
Roger T. & Barbara Feltz
47 Nickel Avenue
Sayreville, NJ 08872

Block 717, Lot 6
Frank & Christine Halpin, Jr.
9 Roger Avenue
Cranford, NJ 07016

Block 717, Lot 6
Charles & Marguerite T. Lorenz
13046 Kelvin Avenue
Philadelphia, PA 19116

Block 717, Lot 6
James T. & Ada L. Avery
1010 Ash Drive
Mahwah, NJ 07430

Block 717, Lot 6
James W. & Patricia A. Loughran
125 E. North Station Avenue
Wildwood Crest, NJ 08260

Block 717, Lot 6
Dominic J. & Charlene J. Picciocchi
90 Hollywood Avenue
Englewood Cliffs, NJ 07632

Block 717, Lot 6
Albert A. & Eileen Colacello
4 Cranbrook Road
Trenton, NJ 08690

Block 717, Lot 6
Joseph & Toinette De Furia
103 Lakeview Drive
Old Tappan, NJ 07675

Block 717, Lot 6
Theresa Mond
5237 Oleander Road
Drexel Hill, PA 19026

Block 717, Lot 6
Camille & Josephine Tanzola
7 Garden Avenue
Belleville, NJ 07109

Block 717, Lot 6
Portia G. Iverson
11312 Highway 75
Plattsmouth, NE 68048

Block 717, Lot 6
Juan & Denise Martinez
625 Forest Street
Kearney, NJ 07032

Block 717, Lot 6
Thomas Mc Cormack
109 E. North Station Avenue
Wildwood Crest, NJ 08260

Block 717, Lot 6
Mary A. Foster
120 Medinah Drive
Reading, PA 07748

Block 717, Lot 6
Lauchlin & Eleanor Mac Donald
15 Merlot Court
Marlton, NJ 08053

Block 717, Lot 6
Richard Beck
40 Robbin Road
Holland, PA 18966

Block 717, Lot 6
Thos F. & Sheila Williams
#6 Jean Court
Hopewell Junction, NY 12533

Block 717, Lot 18, 19-29
Thomas F. & Ellen Mc Nulty
73 Springward Court
Princeton, NJ 08540

Block 717, Lot 18, 19-29
Francis P. & Irma Ciccone, Jr. Etals
68 Martindale Road
Clifton, NJ 07013

Block 717, Lot 18, 19-29
Peter J. & Sarah A. King
2819 Armstrong Avenue
Holmes, PA 19043

Block 717, Lot 18, 19-29
Michael J. & Frederica R. Bizzarro
28 Beverly Road
West Caldwell, NJ 07006

Block 717, Lot 18, 19-29
John P. & Ellen M. De Chico
1451 Riverview Avenue
Peekskill, NY 10566

Block 717, Lot 18, 19-29
Frank N. & Angela M. Modica, Sr.
1 Woodland Road
Pleasantville, NY 10570

Block 717, Lot 18, 19-29
Phillip A. & Paula M. Marder
28 St. Moritz Drive
Sicklerville, NJ 08081

Block 717, Lot 18, 19-29
Margaret M. Demish
131-C Keystone Ct., Bldg 11
Woodbridge, NJ 07095

Block 717, Lot 18, 19-29
Michael & Patricia C. Swerdloff
381 Cotswold Pl
Somerset, NJ 08873

Block 717, Lot 18, 19-29
Dennis F. & Michele M. Lascala
16 Ward Place
Caldwell, NJ 07006

Block 717, Lot 18, 19-29
Michael F. & Kathy H. Traettino
126 Franklin Street
Verona, NJ 07044

Block 717, Lot 18, 19-29
Joseph J. Anzur
112 E. Austin Avenue
Wildwood Crest, NJ 08260

Block 717, Lot 18, 19-29
Francis A. & Ann Marie Baran
4 Starodub Drive
Milltown, NJ 08850

Block 717, Lot 18, 19-29
Charles R. & Rose H. Gallelli
220 Bryans Road
Norristown, PA 19401

Block 717, Lot 18, 19-29
George J. & Elizabeth Steinbronn, Jr.
8111 Albion Street
Philadelphia, PA 19136

Block 717, Lot 18, 19-29
Edward W. & Stella H. Holmes
4100 Charles St. Unit 1113
Baltimore, MD 21218

AVERY® Address Labels Laser 5162®

Block 717, Lot 18, 19-29
Rita K. Jacobs & Eleanore Kashub
26 Stagg Road
Wayne, NJ 07470

Block 717, Lot 18, 19-29
Vincent J. & Nance J. Russo
97 Wilshire Drive
Belle Mead, NJ 08502

Block 711, Lot 1, 2
Robert J. & Regina D. Brennan
109 Timber Ridge RoaD
Newtown, PA 18940

Block 711, Lot 1, 2
Raymond Rottella & Diana Zeller
53 Turnberry Road
Little Falls, NJ 07424

Block 711, Lot 3, 4
Richard T. Goodkin
5102 New Jersey Avenue
Wildwood, NJ 08260

Block 711, Lot 5, 33, 34
Township of Lower
2600 Bayshore Road
Villas, NJ 08251

Block 711, Lot 6
William F. Mc Lay, Etals
4211 Pacific Avenue
Wildwood, NJ 08260

Block 711, Lot 7
Bruce Nicholas
3143 S. Hicks Street
Philadelphia, PA 19145

Block 711, Lot 26, 27
Robert & Donna Ciampitti
11 Darlene Circle
Broomall, PA 19008

Block 711, Lot 28, 29, 30
Township of Lower
2600 Bayshore Road
Villas, NJ 08251

Block 711, Lot 31, 32
South Crest Realty Corporation
5102 New Jersey Avenue
Wildwood, NJ 08260

Block 716, Lot 1, 2-13, 17-23, 25-34
Bruce Nicholas
2143 S. Hicks Street
Philadelphia, PA 19145

Block 716, Lot 14
Township of Lower
2600 Bayshore Road
Villas, NJ 08251

Block 716, Lot 15, 16
Township of Lower
2600 Bayshore Road
Villas, NJ 08251

AVERY® Address Labels Laser 5162®

Block 716, Lot 24
Township of Lower
2600 Bayshore Road
Villas, NJ 08251

Block 721, Lot 1, 2-8, 11-30
Bruce Nicholas
2143 S. Hicks Street
Philadelphia, PA 19145

Block 721, Lot 9, 10
Township of Lower
2600 Bayshore Road
Villas, NJ 08251

Block 726, Lot 1, 2-13, 15, 17, 19-24
Bruce Nicholas
2143 S. Hicks Street
Philadelphia, PA 19145

Block 726, Lot 14, 25
Township of Lower
2600 Bayshore Road
Villas, NJ 08251

Block 726, Lot 16
Claire A. Esrey
2021 Mac Larie Lane
Broomall, PA 19008

Block 726, Lot 18
Township of Lower
2600 Bayshore Road
Villas, NJ 08251

Block 706, Lot 1, 2
Anthony J. & Rosemary C. Galella
731 Avenue E
Bayonne, NJ 07002

Block 706, Lot 1, 2
Robert F. & Nancy C. Ludden
100 W. Rochester Avenue
Wildwood Crest, NJ 08260

Block 706, Lot 3, 4
Andrew L. & Geraldine I. Muska, Jr.
101 W. Memphis Avenue
Wildwood Crest, NJ 08260

Block 706, Lot 3, 4
Michael F. & Maureen A. Walsh
23 Jacqueline Circle
Richboro, PA 18954

Block 706, Lot 5, 6
Dorothy Stolarz
28 Bogue Drive
Bloomingdale, NJ 07403

Block 706, Lot 5, 6
Deborah L. Sweeney
39 Reegan Lane
Voorhees, NJ 08043

Block 706, Lot 7, 8
George & Carolyn G. Rendell
705 Crozerville Road
Aston, PA 19014

AVERY® Address Labels Laser 5162®

Block 706, Lot 9, 10
A & E Antonelli @ Fams P & S Co.
New Jersey & Baker Avenues
Wildwood, NJ 08260

Block 706, Lot 11, 12
A & E Antonelli @ Fams P & S Co.
New Jersey & Baker Avenues
Wildwood, NJ 08260

Block 706, Lot 13
Township of Lower
2600 Bayshore Road
Villas, NJ 08251

Block 706, Lot 14, 15-27
Bruce Nicholas
2143 S. Hicks Street
Philadelphia, PA 19145

Block 706, Lot 28, 29, 30
Ronald & Barbara Kazio
816 Lincoln Drive
Brookhaven, PA 19015

Block 706, Lot 31, 32
William J. & Mary Jane Mc Groarty
18 Ridley Avenue
Aldan, PA 19018

Block 706, Lot 33, 34
Rose R. Tartini
16 W. Englewood Avenue
Bergenfield, NJ 07621

Block 706, Lot 33, 34
Salvatore & Eleanor Caccamise
24 Scranton Avenue
Staten Island, NY 10312

Block 696, Lot 3, 4
John L. & Christine L. Patafio
6 Waterford Court
Ringwood, NJ 07456

Block 696, Lot 3, 4
John L. & Christine L. Patafio
6 Waterford Court
Ringwood, NJ 07456

Block 696, Lot 3, 4
Dennis F. & Jean M. Walker
2 Waterford Court
Ringwood, NJ 07456

Block 696, Lot 3, 4
Dennis F. & Jean M. Walker
2 Waterford Court
Ringwood, NJ 07456

Block 696, Lot 5
Mark & Anne L. English
410 Crestwood Avenue
Haddonfield, NJ 08033

Block 696, Lot 6
James C. & Elda M. Buck
131 W. Gravers Lane
Phildelphia, PA 19118

Block 696, Lot 7
Edward F. & Genevieve D. Sullivan
7204 Jackson Street
Philadelphia, PA 19135

Block 696, Lot 7
Edward F. & Genevieve D. Sullivan
7204 Jackson Street
Philadelphia, PA 19135

Block 696, Lot 9, 10
Robert A. Ciampitti, Jr. & Brian Ciampitti
11 Darlene Circle
Broomall, PA 19008

Block 696, Lot 11
Joseph R. & Gayle Santarles
7 Greenhill Lane
Wynnewood, PA 19096

Block 696, Lot 12
Caroline Gliwa
1211 S Eads St., Apt 611
Arlington, VA 22202

Block 696, Lot 13
Coastal Real Estate Venture, Inc.
11 Darlene Circle
Broomall, PA 19008

Block 696, Lot 14
William M. & Marita A. Kemp
135 W. Burk Avenue
Wildwood, NJ 08260

Block 696, Lot 14, 15
William M. & Marita A. Kemp
134 W. Burk Avenue
Wildwood, NJ 08260

Block 696, Lot 16, 17
Andre P. & Mitzi Souchak
1160 Sharock Avenue
State College, PA 16801

Block 696, Lot 18
South Crest Realty Corp.
5102 New Jersey Avenue
Wildwood, NJ 08260

Block 696, Lot 19
Coastal Real Estate Venture, Inc.
11 Darlene Circle
Broomall, PA 19008

Block 701, Lot 1
Joseph M. & Ann H. Lerro
2061 Lombard Street
Philadelphia, PA 19146

Block 701, Lot 1
Richard F. & Linda A. Nase
546 Montgomery Avenue
Souderton, PA 18964

Block 701, Lot 3, 4
James & Linda Moriarty
8885 Rising Sun Avenue
Philadelphia, PA 19115

Block 701, Lot 3, 4
Richard A. & Diane D. Dunn
103 W. Rochester Avenue
Wildwood Crest, NJ 08260

Block 701, Lot 5, 6
Joseph A. & Margaret H. Orlando
1399 Bon Air Terrace
Havertown, PA 19083

Block 701, Lot 5, 6
Ralph Fabiano
302 Palisade Avenue
Union City, NJ 07087

Block 701, Lot 7, 8
Edward & Joan Roach
108 W. Tenth Avenue
North Wildwood, NJ 08260

Block 701, Lot 9, 10
Joseph & Linda Grillo, Etals
251 Hastings Boulevard
Broomall, PA 19008

Block 701, Lot 11, 12-23, 25-27
Bruce Nicholas
2143 S. Hicks Street
Philadelphia, PA 19145

Block 701, Lot 24
William F. Ciampitti, Sr. Trustee
5102 New Jersey Avenue
Wildwood, NJ 08260

Block 701, Lot 28
Frank & Julia Quattrone
1118 SE 17th Street
Cape Coral, FL 33904

Block 701, Lot 29, 30
Albert E. Morelli, III
1 Enterprise Drive
Cape May Court House, NJ 08210

Block 701, Lot 31, 32
John F. & Linda Haines
310 Albermarle Court
West Chester, PA 19382

Block 701, Lot 33, 34
Carl G. & Judith M. Aspenburg
129 W. Forget Me Not Road
Wildwood Crest, NJ 08260

Block 722, Lot 1, 2, 3, 4, 5, 30
WaWa Inc.
260 West Baltimore Pike
Wawa, PA 19063

Block 722, Lot 6
Robert & Colleen Leonetti
123 E. South Station Avenue
Wildwood Crest, NJ 08260

Block 722, Lot 7, 8
Linda Curran
121 E. South Station Avenue
Wildwood Crest, NJ 08260

Block 722, Lot 8
Robert A. Ciampitti, Jr. Etals
3133 South Broad Street
Philadelphia, PA 19148

Block 722, Lot 9, 10
Robert A. Ciampitti, Jr. Etals
3133 South Broad Street
Philadelphia, PA 19148

Block 722, Lot 11, 12
Robert A. Ciampitti, Jr. & Brian M. Ciampitti
11 Darlene Circle
Broomall, PA 19008

Block 722, Lot 13, 14
Robert A. Ciampitti, Jr. & Brian M. Ciampitti
11 Darlene Circle
Broomall, PA 19008

Block 722, Lot 15, 16, 17
Robert A. Ciampitti, Jr. & Brian M. Ciampitti
11 Darlene Circle
Broomall, PA 19008

Block 722, Lot 18, 19
Robert A. Ciampitti, Jr. & Brian M. Ciampitti
11 Darlene Circle
Broomall, PA 19008

Block 722, Lot 20, 21
Robert A. Ciampitti, Jr. & Brian M. Ciampitti
11 Darlene Circle
Broomall, PA 19008

Block 722, Lot 22, 23
Robert A. Ciampitti, Jr. & Brian M. Ciampitti
11 Darlene Circle
Broomall, PA 19008

Block 722, Lot 24, 25
Lorna Varady
23 Springbrook Avenue
North Haledon, NJ 07508

Block 722, Lot 24, 25
Frank & Maria Colacino
29 Crystal Street
North Arlington, NJ 07032

Block 722, Lot 26, 27
Joseph T., John & Despina Ioannidi
67 Medinah Drive
Shillington, PA 19607

Block 722, Lot 26, 27
Anthony & Joanne Yankovich
31 Birch Avenue
Bergenfield, NJ 07621

Block 722, Lot 28, 29
James J. & Patricia J. Mc Evoy
57 Richard Terrace
Red Bank, NJ 07701

Block 722, Lot 28, 29
Robert W. & Jeanne M. Stanton
729 S. Providence Road
Wallingford, PA 19086

Block 727, Lot 1, 2-5, 30
Roller World Properties, LLC
333 Preston Avenue
Voorhees, NJ 08043

Block 727, Lot 6, 7-10, 24-29
Alfred & Joann M. Natali
11 Beachwood Lane
East Hanover, NJ 07936

Block 727, Lot 6, 7-10, 24-29
Mary Jo Horvat & Janet M. Smalling
117 E. Raleigh Avenue
Wildwood Crest, NJ 08260

Block 727, Lot 6, 7-10, 24-29
William & Patricia Snead
885 Simmons Avenue
Bensalem, PA 19020

Block 727, Lot 6, 7-10, 24-29
Colette M. & Roy A. Walden
120 South Station Road
Wildwood Crest, NJ 08260

Block 727, Lot 6, 7-10, 24-29
Colette M. & Roy A. Walden
120 South Station Road
Wildwood Crest, NJ 08260

Block 727, Lot 6, 7-10, 24-29
Peter M. Toritto & Almeda M. Slick
12 E. Maple Avenue #C-19
Merchantville, NJ 08109

Block 727, Lot 6, 7-10, 24-29
Peter M. Toritto & Almeda M. Slick
12 E. Maple Avenue #C-19
Merchantville, NJ 08109

Block 727, Lot 6, 7-10, 24-29
Martin J. & Dolores A. Fernandi
6433 East Amber Sun Drive
Scottsdale, AZ 85262

Block 727, Lot 6, 7-10, 24-29
Wolfgang & Lois Ann Zehe
18 Ridgeview Road
Jamesburg, NJ 08831

Block 727, Lot 6, 7-10, 24-29
John G. & Janet E. Moran
4076 Sesame Path
Liverpool, NY 13090

Block727, Lot 6, 7-10, 24-29
Barbara Ann Sonzogni
2805 Willtis Road
Philadelphia, PA 19114

Block 727, Lot 6, 7-10, 24-29
Andrew A. Cassella
127 E. Raleigh Avenue
Wildwood Crest, NJ 08260

Block727, Lot 6, 7-10, 24-29
Linda & Paul Dalto
55 Tappan Street
Kearny, NJ 07032

Block 727, Lot 6, 7-10, 24-29
Angelo & Francesca Sama
11 Wheeler Road
Wayne, NJ 07470

Block 727, Lot 6, 7-10, 24-29
John C. & Mary Ann Keeley
19 Rector Place
Bloomfield, NJ 07003

Block 727, Lot 6, 7-10, 24-29
John C. & Mary Ann Keeley
19 Rector Place
Bloomfield, NJ 07003

Block 727, Lot 6, 7-10, 24-29
Roger C. & Margaret C. Blanchard, III
132 E. South Station Avenue
Wildwood Crest, NJ 08260

Block 727, Lot 6, 7-10, 24-29
Peter A. & Mary L. Beier
431 Linden Avenue
York, PA 17404

Block 727, Lot 6
John O. & Joyce M. Steele
68 Maine Trail
Medford, NJ 08055

Block 727, Lot 12, 13, 11
City of Wildwood Water Utility
4400 New Jersey Avenue
Wildwood, NJ 08260

Block 727, Lot 14, 15
William F. Ciampitti, Sr. Trustee
11 Darlene Circle
Broomall, PA 19008

Block 727, Lot 16, 17
William F. Ciampitti, Sr. Trustee
11 Darlene Circle
Broomall, PA 19008

Block 727, Lot 18, 19
William F. Ciampitti, Sr. Trustee
11 Darlene Circle
Broomall, PA 19008

Block 727, Lot 20, 21
William F. Ciampitti, Sr. Trustee
11 Darlene Circle
Broomall, PA 19008

Block 727, Lot 22
Rita Ciampitti
3133 South Broad Street
Philadelphia, PA 19148

Block 703, Lot 1, 1.1, 2, 3, 4, 5
Township of Lower
2600 Bayshore Road
Villas, NJ 08251

Block 703, Lot 6
Township of Lower
2600 Bayshore Road
Villas, NJ 08251

Block 703, Lot 7, 8
Township of Lower
2600 Bayshore Road
Villas, NJ 08251

Block 703, Lot 9, 28, 28.01
Rita & William F. Ciampitti, Sr. (Trust)
3133 South Broad Street
Philadelphia, PA 19148

Block 703, Lot 17
Helen K. Vespe
5 Domi Drive
Cape May Court House, NJ 08210

Block 703, Lot 29, 29.01-30.01
Township of Lower
2600 Bayshore Road
Villas, NJ 08251

Block 703, Lot 31, 31.01
Township of Lower
2600 Bayshore Road
Villas, NJ 08251

Block 703, Lot 32, 32.01
Township of Lower
2600 Bayshore Road
Villas, NJ 08251

Block 708, Lot 1, 2
Theodore & Novella Hinson
918 Everett Street
Camden, NJ 08104

Block 708, Lot 3
Anthony & Tina Bertino
8756 25th Avenue
Brooklyn, NY 11214

Block 708, Lot 3
John A. & Constance A. Stanchak
1314 Summerhill Drive
Malvern, PA 19355

Block 708, Lot 5
Anthony & Judith C. Pino
31 Brookside Drive
Sewell, NJ 08080

Block 708, Lot 6
Barbara J. Stier
280 Alps Road
Wayne, NJ 07470

Block 708, Lot 7
Richard H. Inacker
713 Heritage Road
Cinnaminson, NJ 08077

Block 708, Lot 8
Ralph L. & Sadie M. Berlingo
284 South Regent Street
Port Chester, NY 10573

Block 708, Lot 9
Frank L. & Catherine A. Tosti, Jr.
8 Spring Circle
Broomall, PA 19008

Block 708, Lot 10
Dennis N. & Rosalinda M. Nardantonio
2326 Magnolia Way
Jamison, PA 18929

Block 708, Lot 11
Nelson & Donata L. Brown
30 Berwick Lane
Sicklerville, NJ 08081

Block 708, Lot 12
Paul J. & Marilyn Calamita
277 Forest Glen Avenue
Franklin Lakes, NJ 07417

Block 708, Lot 13
Albert & Lorraine C. Bartocci, Jr.
14 Marshall Road
Neshanic Station, NJ 08853

Block 708, Lot 14
Jon M. Donnell
10069 Sylvan Drive
Dublin, OH 43017

Block 708, Lot 15
Stanley D. & Sandra L. Nixon, Jr.
207 E. Memphis Avenue
Wildwood Crest, NJ 08260

Block 708, Lot 16
John K. & Susan W. Mc Dowell
205 E. Memphis Avenue
Wildwood Crest, NJ 08260

Block 708, Lot 17, 18, 19, 20
Helen K. Vespe
5 Domi Drive
Cape May Court House, NJ 08210

Block 708, Lot 21
Steven L. Whitehead, Etals
60 Glenside Trail
Sparta, NJ 07871

Block 708, Lot 22
Christopher J. D'Aleo
398 Vanderveer Road
Bridgewater, NJ 08807

Block 708, Lot 23
Chester M. & Linda Kopko
12 Maple Avenue
West Orange, NJ 07052

Block 708, Lot 24
Frank & Barbara Peters
210 E. Rochester Avenue
Wildwood Crest, NJ 08260

Block 708, Lot 25
Gilbert F. Rella
1043 Gambelli Drive
Yorktown Heights, NY 10598

Block 708, Lot 26
Douglas & Deborah Dodd
26 Elmwood Avenue
Belleville, NJ 07109

Block 708, Lot 27
Nicholas & Ann Bruno
1 Fay Drive
East Hanover, NJ 07936

Block 708, Lot 28
Dwayne B. & Joanne R. Alexander
5 Casson Lane
No. Haledron, NJ 08260

Block 708, Lot 29
Zenon & Patricia A. Duda
6 Westwood Drive
Sewell, NJ 08080

Block 708, Lot 30
Randall D. & Kathleen G. Sandkuhl
33 Hollywood Drive
Woodbridge, NJ 07095

Block 708, Lot 31, 32
Robert & Grace McKenna
2152 Valley View Drive
Folcroft, PA 19032

Block 708, Lot 31, 32
Daniel G. & Suzanne Meissler, Jr.
13 Kennedy Drive E.
Laurel Springs, NJ 08021

Block 713, Lot 1
James D. & Joan Stephens
1189 Laurelwood Road
Pottstown, PA 19465

Block 713, Lot 1
Louis V. & Cheryl A. Perrochino
4 Rich Court
Lawrenceville, NJ 08648

Block 713, Lot 19
Michael A. Marrone
3471 Ernest Lane
Cedars, PA 19423

Block 713, Lot 19
Rose Savkov
8 Falcon Run
Finnelon, NJ 07405

Block 713, Lot 21
Nicholas & Zoia Bubernak
6953 Lawnton Street
Philadelphia, PA 19128

Block 713, Lot 22
Wm J. & Rebecca M. Totaro
19 Ellsworth Drive
West Windsor, NJ 08550

Block 713, Lot 23
Daniel & Gayle Gianfrancesco
6 Chamberlain Way
Martinsville, NJ 08836

Block 713, Lot 24
Stuart & Doreen A. Drik
7 Rue Monet Avenue
Jackson, NJ 08527

Block 713, Lot 25
John W. & Debora A. Pirner
113 Tudor Drive
North Wales, PA 19454

Block 713, Lot 26
David & June S. D'Zurilla
14447 Four Chimney Drive
Centreville, VA 20120

Block 713, Lot 27
John J. & Mary Ann Welz
216 E. Memphis Avenue
Wildwood Crest, NJ 08260

Block 713, Lot 28
Ronald M. & Dina M. Ronzone
638 Artwood Drive
Philadelphia, PA 19115

Block 713, Lot 29
Walter R. & Patricia M. Shenton
8 Eldorado Drive
Wayne, NJ 07470

Block 713, Lot 30
Walter R. & Patricia M. Shenton
8 Eldorado Drive
Wayne, NJ 07470

Block 713, Lot 31
Salvatore & Kathie Dellanno
3 Pin Oak Court
Howell, NJ 07731

Block 713, Lot 32
John Cosgrove & Shirley A. Alderfer
28 Penfield Avenue
Norristown, PA 19403

Block 714.01, Lot 1.01
Dr. Isidore & Markella S. Mihalakis
1024 Highland Avenue
Bethlehem, PA 18018

Block 714.01, Lot 1.02
Kevin & Christina Hoffman
58 Glenview Drive
Fleetwood, PA 19522

Block 714.01, Lot 1.03
Gary J. & Roseann Cestone
21 First Avenue
Cedar Grove, NJ 07009

Block 714.01, Lot 1.04
John R. & Margaret A. Rizzo, Jr.
5 Armour Road
Mahwah, NJ 07430

Block 714.01, Lot 1.05
Andrew & Teresa Gigante
23 17th Street
Norwood, NJ 07648

Block 714.01, Lot 1.06
William H. & Dolores A. Morey
210 Dune Drive
Wildwood Crest, NJ 08260

AVERY® Address Labels Laser 5162®

Block 714.01, Lot 1.07
Mauro J. & Ida Tucci, Etals
212 Dune Drive
Wildwood Crest, NJ 08260

Block 714.01, Lot 1.08
Carmine A. & Patricia A. De Maio, III
5 Cold Hill Road
Morris Plains, NJ 07950

Block 714.01, Lot 1.09
Paul J. Igoe & Carol E. Webster
720 Millbrook Lane
Haverford, PA 19041

Block 714.01, Lot 1.10
Alan A. & Eleanor G. Bernstein
11 Lorraine Drive
Pine Brook, NJ 07058

Block 714.01, Lot 1.11
Charles V. Magatti
63 Cumberland Avenue
Verona, NJ 07044

Block 714.01, Lot 1.12
Cestone Associates, LLC
23 Jackson Street
Little Falls, NJ 07424

Block 714.01, Lot 1.13
Frank S. & Florence M. Krempa – Trustee
1108 Daniels Davis Lane
West Chester, PA 19382

Block 714.01, Lot 1.14
Michael P. & Ellen E. Butto
27 Sycamore Drive
Reading, PA 19606

Block 714.01, Lot 1.15
Edward W. & Rita Williams
11 Glenbrooke Drive
White Plains, NY 10605

Block 714.01, Lot 1.16
Thomas E. & Mary E. Wilson
13041 Sewell Road
Philadelphia, PA 19116

Block 714.01, Lot 1.17
Ralph R. Vanore
213 Dune Drive #14
Wildwood Crest, NJ 08260

Block 714.01, Lot 1.18
Walter R. & Patricia M. Shenton
8 Eldorado Drive
Wayne, NJ 07470

Block 714.01, Lot 1.19
Richard W. & Christine M. Sherwood
67 Jefferson Avenue
New Brunswick, NJ 08901

Block 714.01, Lot 1.20
R. Scott & Angel L. Helm
9 Arbor Road
Mohnton, PA 19540

Block 714.01, Lot 1.21
Morey Development Lower Township Inc.
3501 Boardwalk
Wildwood, NJ 08260

Block 718, Lot 3.01
Raymond & Rosemarie Basili
1763 Astor Avenue
Pelham Gardens, NY 10469

Block 718, Lot 3.01
Peter & Donna Cetani
54 Brosnan Place
Yonkers, NY 10707

Block 718, Lot 5
Francis J. & Janice Gothie
1145 Edwin Circle
West Chester, PA 19382

Block 718, Lot 6
Jos. & Camille Barchetto & Mary Orlando
4 Arlene Drive
Rockaway, NJ 07866

Block 718, Lot 7
Timothy M. & Rosemary P. Rafferty
406 Wesley Drive
Newark, DE 19711

Block 718, Lot 8
Antonio & Antoinetta Rizzo
2522 Kingland Avenue
Bronx, NY 10469

Block 718, Lot 9
Pasquale & Marianna Donatiello
2245 Tiemann Avenue
Bronx, NY 10469

Block 718, Lot 10
Vincenza & Ralph Racanelli
2322 Mickle Avenue
Bronx, NY 10469

Block 718, Lot 11
Vincent P. & Kathleen Mule
520 Freedom Drive
Yardley, PA 19067

Block 718, Lot 12
Richard A. & Margaret E. Parker
213 E. North Station Avenue
Wildwood Crest, NJ 08260

Block 718, Lot 13
Russell & Nan Marshall, Etals
65 Roberts Road
Clark, NJ 07066

Block 718, Lot 14
Thomas A. & Catherine Ciampi
82 Rose Place
West Patterson, NJ 07424

Block 718, Lot 15
Ronald J. & Kathleen Wilson
53 Harvard Road
Havertown, PA 19083

Block 718, Lot 16
Frank & Lois Leone
205 E. North Station Avenue
Wildwood Crest, NJ 08260

Block 718, Lot 17
Keith K. & Dorothy I. Krick
4715 Painted Sky Road
Reading, PA 19606

Block 718, Lot 17
Massimo Rellini
211 Thompson Street
New York, NY 10012

Block 723, Lot 1.01
Anton, Catherine & Anthony Buic
1 Shetland Lane
Palisades Park, NJ 07650

Block 723, Lot 1.01
Paul J. & Madeline Brignola, Sr. Etal
20 Lee Court
Westwood, NJ 07675

Block 723, Lot 3.01
Anthony & Geraldine Piscatelli
51 Maria Lane
Yonkers, NY 10710

Block 723, Lot 3.01
Edmund & Doris Shirk
52 Rockleigh Drive
Ewing, NJ 08628

Block 723, Lot 5, 6
Harrison Family Revacable Trust
5421 N. Indian Tr
Tuscon, AZ 85750

Block 723, Lot 5, 6
Henry & Grace Lisotto
227 South Station Avenue
Wildwood Crest, NJ 08260

Block 723, Lot 7
Lawrence & Joyce Giblin
3 Reston Road
Wayne, NJ 07470

Block 723, Lot 8
Richard A. & Joyce M. Ruck
31 Howe Avenue
Wayne, NJ 07470

Block 723, Lot 9
Albert & Albina Baldino
806 Adams Drive
Brookhaven, PA 19015

Block 723, Lot 10
Robert A. & Patricia A. Parillo
1 Anthony Lane
Fairfield, NJ 07004

Block 723, Lot 11
Nelson & McCoy C/O Durem
6 Cowpath Court
Sicklerville, NJ 08081

Block 723, Lot 12
Thomas S. & Barbara J. Masapollo
1329 Maple Avenue
Haddon Heights, NJ 08035

Block 723, Lot 13
Richard Arriviello
560 Hurffville-Cross Keys
Sewell, NJ 08080

Block 723, Lot 14
Jose & Amelia Garcia, Etals
601 Fernwood Terrace
Linwood, NJ 07036

Block 723, Lot 15
Petro W. & Martha M. Kazaniwsky
1091 Pederson Boulevard
Atco, NJ 08004

Block 723, Lot 16
Raphael & Annette Tancredi
88 Gleniffer Hill Road
Richboro, PA 18954

Block 723, Lot 17
James & Cynthia Burkeitt
213 Woodchuck Way
Sewell, NJ 08080

Block 723, Lot 17
Stanley H. & Geraldine E. Foster
1181 Banes Road
Southampton, PA 18966

Block 723, Lot 19
John D. & Colleen Behm
1608 Deer Run Drive
Jamison, PA 18929

Block 723, Lot 19
Joy Hession
202 E. North Station Avenue
Wildwood Crest, NJ 08260

Block 723, Lot 21
Francis & Roseann Barnat
7 Valley Road
Kinnelon, NJ 07405

Block 723, Lot 22
Vincent J. & Patricia A. Gohl, Jr.
7826 Lexington Avenue
Philadelphia, PA 19152

Block 723, Lot 23
Robert & Judie C. Knichel, Etals
317 Jefferson Street
Carlstadt, NJ 07072

Block 723, Lot 24
Henry, Alvin, & Tanya Soohoo
30 Sealy Street
Westwood, NJ 07675

Block 723, Lot 25
Robert & Kathleen Nathan
126 Marie Drive
Richboro, PA 18954

Block 723, Lot 26
Anthony P. & Sylvia R. Ferrazza
19 Metekunk Drive
Trenton, NJ 08638

Block 723, Lot 27
Thaddeus J. & Patricia Roman
21 Mary Ellen Lane
Erial, NJ 08081

Block 723, Lot 28
Rosario J. & Barbara Lee Boschetti
15 Karen Street
Spotswood, NJ 08884

Block 723, Lot 29
Jos D. & Roberta M. Maroccia
802 Cranbury Cross Road
North Brunswick, NJ 08902

Block 723, Lot 30
Ernest M. Giordano
222 N. Station Avenue
Wildwood Crest, NJ 08260

Block 723, Lot 31
Joseph T. & Margaret B. Jakubowski
390 Leroy Street
Philadelphia, PA 19128

Block 723, Lot 32
Alan M. & Nina O. Maslin
405 Ellis Road
Havertown, PA 19083

Block 728, Lot 1.01
John F. & Maria C. Cooney
9 Hercules Court
Sewell, NJ 08080

Block 728, Lot 1.01
Carolyn S. Young
514 Chestertown Street
Gaithersburg, MD 20878

Block 728, Lot 3.01
Julie & Denise Marcell
43 Pine Ridge Drive
North Edison, NJ 08820

Block 723, Lot 3.01
Renaldo & Ann Rodriguez
5 Cedar Court
Boonton Twp, NJ 07005

Block 728, Lot 5
Joseph & Kelly Scardone
1140 Franklin Street
Trenton, NJ 08610

Block 728, Lot 6
James J. & Jane M. Deeney
225 E. Raleigh Avenue
Wildwood Crest, NJ 08260

Block 728, Lot 7
Robert & Edith Cielo
141 Orchid Court
Toms River, NJ 08753

Block 728, Lot 8
Louis E. & Judith A. Fante
5154 Neshaminy Boulevard
Bensalem, PA 19020

Block 728, Lot 9
James F. & Rosemary T. Gleason
4 Dalton Way
Holland, PA 18966

Block 728, Lot 10
Jeffrey A. & Justina M. Ziccardi
4301 Riders Lane
Boothwyn, PA 19061

Block 728, Lot 11
Peter D. & Louise Holmes
3156 Chatham Street
Philadelphia, PA 19134

Block 728, Lot 12
Carl M. & Charlotte M. Wolfe
4101 Colony Drive
Hatboro, PA 19040

Block 728, Lot 13
David & Carmen B. Axmann
4 Sofia Court
Blackwood, NJ 08012

Block 728, Lot 14
Edward J. & Beverly V. Borkowski
2850 Bayton Road, #2
Norristown, PA 19403

Block 728, Lot 15
Dolores J. Gesumaria
24 Tuscarora Drive
Oakland, NJ 07436

Block 728, Lot 16
Louis S. & Barbara Massad
8 Ash Lane
Randolph, NJ 07869

Block 728, Lot 17
Raymond P. & Carol Ann Martin, Sr.
2611 Skyview Avenue
Langhorne, PA 19053

Block 728, Lot 17
Marian A. & Kelly A. Doherty
1014 Poplar Avenue
Glenolden, PA 19036

Block 728, Lot 19
Michael & Michelle Zirolli
72 Brick Road
Cherry Hill, NJ 07803

Block 728, Lot 19
Anthony L. & Ann M. Ferrara
72 Brick Road
Cherry Hill, NJ 08003

Block 728, Lot 21
William J. & Carolene M. Smith
13 E. Houndpack Way
Glen Mills, PA 19342

Block 728, Lot 22
John R. & Rochelle T. Ferullo
147 Applegate Drive
West Chester, PA 19382

Block 728, Lot 23
Rita Wyrabkiewicz
208 S. Station Avenue
Wildwood Crest, NJ 08260

Block 728, Lot 24
Robert & Caroline Pyzia
210 E. South Station Avenue
Wildwood Crest, NJ 08260

Block 728, Lot 25
J. David & Jane P. Dunn
115 Fairlamb Avenue
Havertown, PA 19083

Block 728, Lot 26
Judith A. Valle & Eliz M. Eline
822 Huber Place
West Chester, PA 19382

Block 728, Lot 27
Kay, Walter, & Catherine M. Branchide
P.O. Box 1915
Bensalem, PA 19020

Block 728, Lot 28
Norman E. & Diane M. Heilenman
452 Mountainview Road
Shillington, PA 19607

Block 728, Lot 29
Graham C. G. & Barbara A. Ellison
84 Ridgecrest Road
Glastonbury, CT 06033

Block 728, Lot 30
Anthony & Barbara Labrosciano
293 Lincoln Avenue
Elmwood Park, NJ 08407

Block 728, Lot 31
Edw, A. & Diane J. Karpen
224 E. South Station Avenue
Wildwood Crest, NJ 08260

Block 728, Lot 32
Roy E. & Karen A. Salley
31 Point View Parkway
Wayne, NJ 07066

Block 731, Lot 1, 2-7, 11, 14, 15, 17-22
Bruce Nicholas
2143 S. Hicks Street
Philadelphia, PA 19145

Block 731, Lot 8
Township of Lower
2600 Bayshore Road
Villas, NJ 08251

Block 731, Lot 9, 10
Township of Lower
2600 Bayshore Road
Villas, NJ 08251

Block 731, Lot 12, 13
Township of Lower
2600 Bayshore Road
Villas, NJ 08251

Block 731, Lot 16, 23
Township of Lower
2600 Bayshore Road
Villas, NJ 08251

Block 731, Lot 24
Township of Lower
2600 Bayshore Road
Villas, NJ 08251

Block 731, Lot 34
Township of Lower
2600 Bayshore Road
Villas, NJ 08251

Block 732, Lot 1.01
Lewis & Dorann Hemingway
381 Corson Lane
Cape May, NJ 08204

Block 732, Lot 1.02
City of Wildwood
4400 New Jersey Avenue
Wildwood, NJ 08260

Block 732, Lot 1.03
City of Wildwood
4400 New Jersey Avenue
Wildwood, NJ 08260

Block 733, Lot 10
Anthony C. & Antoinette Muccilli
306 Ledden Terrace
S. Plainfield, NJ 07080

Block 733, Lot 11
Charles & Mary Jane Slugg
98 North Wayne Avenue
Hatfield, PA 19440

Block 733, Lot 12
Francis X & Barbara A. Gubler
4232 Bleigh Avenue
Philadelphia, PA 19136

Block 793, Lot 12.01, 14, 15.08
State of NJ Depe
John Fitch Plaza
Trenton, NJ 08625

Block 793, Lot 15.01
Lund's Fisheries, Inc.
997 Ocean Drive
Cape May, NJ 08204

Block 793, Lot 15.02
Axelson & Johnson Fish Co. Inc.
993 Ocean Drive
Cape May, NJ 08204

Block 793, Lot 15.03
Kurt M. & Cecelia M. Axelsson
919 Myrna Road
Cape May, NJ 08204

Block 793, Lot 15.04, 15.05
Marina Hinch
989 Ocean Drive
Cape May, NJ 08204

Block 793, Lot 15.06
Maxie, Inc.
1044 New York Avenue
Cape May, NJ 08204

Block 793, Lot 15.07
Harry J. Mogck
1211 Ohio Avenue
Cape May, NJ 08204

Block 793, Lot 16, 17, 18
State of NJ Depe
John Fitch Way
Trenton, NJ 08625

Block 820, Lot 1
State of NJ Depe
36 W. State Street, CN 112
Trenton, NJ 08601

Block 820, Lot 2.01
Two Mile Associates, LLC
P.O. Box 1528
Wildwood Crest, NJ 08260

Block 820, Lot 2.03
Will & Janice A. Morey
8500 Bayview Drive
Wildwood Crest, NJ 08260

Block 820, Lot 2.04
Barry I. & Dana M. Gehring
200 W. Denver Avenue
Wildwood Crest, NJ 08260

Block 820, Lot 2.05
Mark Platzer
1120 New Jersey Avenue
Cape May, NJ 08204

Block 820, Lot 2.06
Mariner Inn Inc.
8100 Bayview Drive, Box 445
Wildwood Crest, NJ 08260

Block 820, Lot 2.07
Michael W. Mitchel
8 Oak Hollow Drive
Voorhees, NJ 08043

Block 820, Lot 2.08
Vincent L. & Diane Ranalli
5600 Beach Avenue
Wildwood Crest, NJ 08260

Block 820, Lot 2.09
Maurice & Maryann Palmer, III
9100 Bayview Drive
Wildwood Crest, NJ 08260

Block 820, Lot 2.10
Aldo & Maria Tenaglia
219 East Trenton Avenue
Wildwood Crest, NJ 08260

Block 820, Lot 2.11
Corey Aspenburg
9000 Bayview Drive
Wildwood Crest, NJ 08260

Block 820, Lot 2.12
Marilyn Brooks Goldstein
8902 Bayview Drive
Wildwood Crest, NJ 08260

Block 820, Lot 2.13
David & Marilyn Goldstein
8902 Bayview Drive
Wildwood Crest, NJ 08260

Block 820, Lot 2.14
Harry & Silvia Nocentino
P.O. Box 279
Lahaska, PA 18931

Block 820, Lot 2.15
Kowalski C/O Snows/Doxsee
8800 Bayview Drive
Wildwood Crest, NJ 08260

Block 820, Lot 2.16
Steven & Bonnie Tecco
8702 Bayview Drive
Wildwood Crest, NJ 08260

Block 820, Lot 2.17
Rudolph & Gloria Tecco
8700 Bayview Drive
Wildwood Crest, NJ 08260

Block 820, Lot 2.18
Albert J. Mucchetti
110 W. Richmond Avenue
Wildwood Crest, NJ 08260

Block 820, Lot 2.20
Royal Industrial Contractors, Inc.
3437 Weymouth Street
Philadelphia, PA 19134

Block 820, Lot 3.01
Wildwood Investment Group
680 Middletown Boulevard
Langhorne, PA 19047

Block 820, Lot 3.02
Two Mile Associates LLC
P.O. Box 1528
Wildwood Crest, NJ 08260

Block 820, Lot 3.03
Township of Lower MUA
2900 Bayshore Road
Villas, NJ 08251

Block 820, Lot 4.02, 6
Two Mile Associates LLC
P.O. Box 1528
Wildwood Crest, NJ 08260

Block 820, Lot 7
County of Cape May
Main Street
Cape May Court House, NJ 08210

Block 821, Lot 1
USCG Loran Support Unit
12001 Pacific Avenue
Wildwood, NJ 08260

Block 821, Lot 2
CM Inlet Co. Inc. @ Lunds Fisheries
P.O. Box 180
Cape May, NJ 08204

Block 822.01, Lot 1.01
Snows/Doxsee Inc.
994 Ocean Drive
Cape May, NJ 08204

Block 822.02, Lot 2, 5
Harlo, Inc.
400 Portsmouth Road
Cape May, NJ 08204

Block 822.02, Lot 3, 4
Jenlo Corp.
400 Portsmouth Road
Cape May, NJ 08204

Block 822.02, Lot 6
Harlo, Inc.
400 Portsmouth Road
Cape May, NJ 08204

Block 194, Lot 1
Milton & Carol Rowen
179 Fries Mill Road
Turnersville, NJ 08012

Block 194, Lot 2
Ronald F. & Joanne V O'Brien
2502 Yellowstone Road
Cinnaminson, NJ 08077

Block 194, Lot 20.01, 21.01
William & Carolyn Morey, Jr.
120 W. Jefferson Avenue
Wildwood Crest, NJ 08260

Block 194, Lot 20.02, 21.02, 22
K & A Papaspanos
118 W. Jefferson Avenue
Wildwood Crest, NJ 08260

Block 194, Lot 23, 24.01
Pamela M. Yecco
116 W. Jefferson Avenue
Wildwood Crest, NJ 08260

Block 194, Lot 24.02, 25
William M. & Marita A. Kemp
135 W. Burk Avenue
Wildwood, NJ 08260

Block 194, Lot 26, 27.01
Deborah A. D'Attillo
112 W. Jefferson Avenue
Wildwood Crest, NJ 08260

Block 194, Lot 27.02, 28
William & Catherine A. Toland
48 Secluded Lane
Rio Grande, NJ 08242

Block 194, Lot 29, 30.01
Robert A. & Donna Ciampitti
108 W. Jefferson Avenue
Wildwood Crest, NJ 08260

Block 194, Lot 30.02, 31
Edward F. & Genevieve Sullivan
7204 Jackson Street
Philadelphia, PA 19135

Block 194, Lot32, 33.01
CJ & GA Firth and JM & TL Firth
262 Liberty Court
Collegeville, PA 19462

Block 194, Lot 33.02, 34
Janis L. La Monica
102 W. Jefferson Avenue
Wildwood Crest, NJ 08260

Block 193, Lot 1, 2
Edwin H. & Sandra L. Myland
9500 Pacific Avenue
Wildwood Crest, NJ 08260

Block 193, Lot 18.01, 19.01
Samuel E. & Angela Griser
9501 New Jersey Avenue
Wildwood Crest, NJ 08260

Block 193, Lot 18.02, 19.02, 20.01
John G. & Joan E. O'Shaughnessy
100 E. Jefferson Avenue
Wildwood Crest, NJ 08260

Block 193, Lot 20.02, 21
Edward A. & Mary Delemmo
918 Georgetown Road
Swarthmore, PA 19081

Block 193, Lot 22
Paul A. & Carol A. Domino
40 Sofia Drive
Blackwood, NJ 08012

Block 193, Lot 23, 24
Robert E. & Margaret M. Powell
31 Dover Road
Mount Holly, NJ 08060

Block 193, Lot 25, 26.01
Michael & Karen Veneziale
2114 Vista Street
Philadelphia, PA 19152

Block 193, Lot 26.02, 27
Robert F. & Michele M. Matthews
116 E. Jefferson Avenue
Wildwood Crest, NJ 08260

Block 193, Lot 28
Andre & Judy Orgonas
4 Fielek Terrace
Parlin, NJ 08859

Block 193, Lot 29
William C. & Rose M. Fowler
32 St. Regis Drive
Woodbury, NJ 08096

Block 193, Lot 30
Chester P. & Ida M. Jankowski
383 Cator Avenue
Jersey City, NJ 07305

Block 192, Lot 1, 2
Cesar A. & Maria H. Del Gado
9404 Seaview Avenue
Wildwood Crest, NJ 08260

Block 192, Lot 19, 20
Nicholas & Joan De Salvo
200 E. Jefferson Avenue
Wildwood Crest, NJ 08260

Block 192, Lot21, 22.01
Robert & Carol Capone and Ray Vasoli
1438 S. Clarion Street
Philadelphia, PA 19147

Block 192, Lot 22.02, 23
Nick & Adele Balestra
1012 Shadeland Avenue
Drexel Hill, PA 19026

Block 192, Lot 24, 25
Emilio & Lisa A. Ferrante
210 E. Jefferson Avenue
Wildwood Crest, NJ 08260

Block 192, Lot 26
Louis & Leah M. Satter
212 E. Jefferson Avenue
Wildwood Crest, NJ 08260

Block 192, Lot 27, 28.01
Joseph & Roselle K. D'Aulerio Jr.
1715 Golfview Drive
Kissimmee, FL 34746

Block 192, Lot 28.02, 29
James F. & Betty A. O'Hara
462 Harbor Drive N
Indian Rocks Beach, FL 33785

Block 192, Lot 30, 31.01, 31.02, 32
Randall & Karen A. Sowers
9103 Atlantic Avenue
Wildwood Crest, NJ 08260

Block 191, Lot 1, 2, 28.02
Thomas J. & Frances W. Gilloway
314 E. Jefferson Avenue
Wildwood Crest, NJ 08260

Block 191, Lot 17, 18, 19.01
Robert W. & Mary Ann Smith
163 Dunhams Corner Road
East Brunswick, NJ 08816

Block 191, Lot 19.02, 20
Josephine Patasnick & J. Pojedinec
302 E. Jefferson Avenue
Wildwood Crest, NJ 08260

Block 191, Lot 21, 22.01
Mark A. & Tina L. Thompson
1618 Muirfield Drive
Dyer, IN 46311

Block 191, Lot 22.02, 23
Pullella & Pullella Partnership
3101 Swarthmore Road
Wilmington, DE 19807

Block 191, Lot 24, 25.01
Vincent M. De Rienzo
308 E. Jefferson Avenue
Wildwood Crest, NJ 08260

Block 191, Lot 25.02, 26
Francis A. Witt
310 E. Jefferson Avenue
Wildwood Crest, NJ 08260

Block 191, Lot 27, 28.01
Gerard A. & Eileen M. Metcalf
416 Manor Drive
Kennett Square, PA 19348

Block 722, Lot 1 L2,3,4,5,30
Wawa Inc.
West Baltimore Pk
Wawa, PA 19063

Block 722, Lot 6
Robert & Coleen Leonetti
123 E South Station Ave
Wildwood Crest, NJ 08260

Block 722, Lot 7, 8
Linda Curran
121 E South Station Ave
Wildwood Crest, NJ 08260

Block 722, Lot 8
Robert A Ciampitti Jr Etals
3133 S Broad St
Philadelphia, PA 19148

Block 722, Lot 9, 10
Robert A Ciampitti Jr Etals
3133 S Broad St
Philadelphia, PA 19148

Block 722, Lot 11, 12
Robert A Ciampitti Jr Etals
3133 S Broad St
Philadelphia, PA 19148

Block 722, Lot 13, 14
Robert A Ciampitti Jr Etals
3133 S Broad St
Philadelphia, PA 19148

Block 722, Lot 15, 16,17
Robert A Ciampitti Jr Etals
3133 S Broad St
Philadelphia, PA 19148

Block 722, Lot 18, 19
Robert A Ciampitti Jr Etals
3133 S Broad St
Philadelphia, PA 19148

Block 722, Lot 20, 21
Robert A Ciampitti Jr Etals
3133 S Broad St
Philadelphia, PA 19148

Block 722, Lot 22, 23
Robert A Ciampitti Jr Etals
3133 S Broad St
Philadelphia, PA 19148

Block 722, Lot 24, 25
Lorna Varady
23 Springbrook Ave
North Haledon, NJ 07508

Block 722, Lot 24, 25
Frank & Maria Colacino
29 Crystal Street
North Arlington, NJ 07032

Block 722, Lot 26, 27
Joseph T & John & Despina Ioannidi
67 Medinah Drive
Shillington, PA 19607

Block 722, Lot 26, 27
Anthony & Joanne Yankovich
Birch Avenue
Bergenfield, NJ 07621

Block 722, Lot 28, 29
James J & Patricia J Mc Evoy
57 Richard Terrace
Redbank, NJ 70701

Block 722, Lot 28, 29
Robert W & Jeanne M Stanton
729 S Providence Rd
Wallingford, PA 19086

Block 727, Lot 1, 2-5, 30
Todd Melton
10100 PAcific Ave 202
Lower Twp NJ 08043

Block 727, Lot 6, 7-10, 24-29
Alfred & Joann M Natali
11 Beachwood Lane
East Hanover, NJ 07936

Block 727, Lot 6, 7-10, 24-29
Mary Jo Smalling, Janet M Horvat
117 E Raleigh Ave
Wildwood Crest, NJ 08260

Block 727, Lot 6, 7-10, 24-29
William & PAtricia Snead
885 Simmons Ave
Salem, PA 19020

Block 727, Lot 6, 7-10, 24-29
Colette M & Roy A Walden
120 South Station Road
Wildwood Crest, NJ 08260

Block 727, Lot 6, 7-10, 24-29
Peter M & Slick, Almeda Mtoritto
12 E Maple Ave #C-19
Merchantville, NJ 08109

Block 727, Lot 6, 7-10, 24-29
Martin J & Dolores A Fernandi
6433 East Amber Sun Drive
Scottsdale, AZ 85262

Block 727, Lot 6, 7-10, 24-29
Wolfgang & Lois Ann Zehe
18 Ridgeview Rd
Jamesburg, NJ 08831

Block 727, Lot 6, 7-10, 24-29
John G & Janet Emoran
4076 Sesame PAth
Liverpool, NY 13090

Block 727, Lot 6, 7-10, 24-29
Barbara Ann Sonzogni
2805 Willtis Rd
Philadelphia, PA 19114

Block 727, Lot 6, 7-10, 24-29
Andrew A Cassella
127 E Raleigh Ave
Wildwood Crest, NJ 08260

Block 727, Lot 6, 7-10, 24-29
Linda & Paul Dalto
TapPAn St
Kearny, NJ 07032

Block 727, Lot 6, 7-10, 24-29
Angelo & Francesca Sama
11 Wheeler Rd
Wayne, NJ 74070

Block 727, Lot 6, 7-10, 24-29
John C & Mary Ann Keeley
19 Rector Place
Bloomfield, NJ 07003

Block 727, Lot 6, 7-10, 24-29
Roger C III & Margaret C Blanchard
132 E South Station Ave
Wildwood Crest, NJ 08260

Block 727, Lot 6, 7-10, 24-29
Peter A & Mary L Beier
431 Linden Ave
York, PA 17404

Block 727, Lot 6
John P & Joyce M Steele
68 Maine Trail
Medford, NJ 08055

Block 727, Lot 12, 13,11
City Of Wildwood Water Utility
4400 New Jersey Avenue
Wildwood, NJ 08260

Block 727, Lot 14, 15
William F Ciampitti Sr Trustee
11 Darlene Circle
Broomall, PA 19008

Block 727, Lot 16, 17
William F Ciampitti Sr Trustee
11 Darlene Circle
Broomall, PA 19008

Block 727, Lot 18, 19
William F Ciampitti Sr Trustee
11 Darlene Circle
Broomall, PA 19008

Block 727, Lot 20, 21
William F Ciampitti Sr Trustee
11 Darlene Circle
Broomall, PA 19008

Block 727, Lot 22, 23
Rita Ciampitti
3133 S Broad St
Philadelphia, PA 19148

Block 753.1, Lot 39.04
Township Of Lower
2600 Bayshore Road
Villas, NJ 08251

Block 771, Lot 2, 3-6, 27-32
Mary James
1040 Rte 9
Cape May, NJ 08204

Block 771, Lot 7, 8-14
Robert E & Judith N Murphy
Spring Valley Road
ark Ridge, NJ 07656

Block 771, Lot 15, 16-20, 39-44
Thomas R & Carolmogck
1020 Route 109
Cape May, NJ 08204

Block 771, Lot 21, 22-24
Ernest III & Janice A Utsch
1008 Route 109
Cape May, NJ 08204

Block 771, Lot 33, 34-38
Paul & Jonathan C/O Paul James
4985 Sw 35th Terr
Ft Lauderdale, Fl 33312

Block 771, Lot 45, 46-48
Marine Technical
1121 Route 109
Cape May, NJ 08204

Block 772, Lot 1, 2, 3, 4, 28
Jerome T Jr & Rita Wallace
994 Route 109
Cape May, NJ 08204

Block 772, Lot 5, 6
Roger Dkleiser
984-9086 Rte 109
e May, NJ 08204

Block 772, Lot 7, 8
Robt Bell & Laura Schultz
62 Falcon Rd
Hillsborough, NJ 08876

Block 772, Lot 9, 10-14
Barbara Burris Schulz
1032 Idaho Avenue
Cape May, NJ 08204

Block 772, Lot 15, 16, 39, 40
R & C Sales Inc.
1121 Rt 109 So
Cape May, NJ 08204

Block 772, Lot 17, 18, 41, 42
Joann Assenheimer
958 Route 109
Cape May, NJ 08204

Block 772, Lot 19, 20.01
Joann Assenheimer
958 Route 109
Cape May, NJ 08204

Block 772, Lot 20.02, 21, 22
Joann Assenheimer
958 Route 109
Cape May, NJ 08204

Block 772, Lot 23, 24
Elizabeth A Mc Guidwin
948 Route 109
Cape May, NJ 08204

Block 772, Lot 25, 26, 27
Rette B & Peter A Jr Babore
' Wissahickon Avenue
Cape May, NJ 08204

Block 772, Lot 29, 30
Seth W & Joyce R Nover Etal
979 Wissahickon Ave
Cape May, NJ 08204

Block 772, Lot 31, 32-38
Matthew M Repetto
43 Berkeley Ave
Lansdowne, PA 19050

Block 772, Lot 39, 40
Marine Technical Inc..
1121 Route 109
Cape May, NJ 08204

Block 772, Lot 43, 44-48
Marine Technical Inc.orporated
1121 Rt109schellengers Ld
Cape May, NJ 08204

Block 776, Lot 1, 2
Edward C Kubeck
4021 W 137th St
Hawthorne, CA 90250

Block 776, Lot 3, 4
Albino & Klaudia Picinich
940 Rte 109 So
: May, NJ 08204

Block 776, Lot 5, 6
Roy Jennings
149 North Gross St
Philadelphia, PA 19139

Block 776, Lot 7, 8, 9, 31-33
Mary F Fox
Po Box 2063,934 Rt 109 S
Cape May, NJ 08204

Block 776, Lot 10, 11-14
Country Villas Inc.
1604 Route 47 South
Rio Grande, NJ 08242

Block 776, Lot 15, 16-20
Country Villas Inc.
1604 Route 47 South
Rio Grande, NJ 08242

Block 776, Lot 21, 22-24
Chibar Investments Llc
901 906 Route 109
Lower Twp NJ 07095

Block 776, Lot 25, 26-30
Sebastian Maugeri
939 Wissahickon Avenue
Cape May, NJ 08204

Block 776, Lot 34, 35-38
Country Villas Inc.
1604 Route 47 South
Rio Grande, NJ 08242

Block 776, Lot 39, 40-44
JJ Elek Realty Co
' Main Street
Woodbridge, NJ 07095

Block 793, Lot 10
State Of NJ Div Of Transportation
RJ Hughes Justice Cn 114
Trenton, NJ 08625

Block 0823, Lot 1
Leslie D & Joyce A Lawrence
926 Ocean Drive
Cape May, NJ 08204

Block 0823, Lot 6
USA Corps Of Eng - Custom House
2nd & Chestnut Streets
Philadelphiadelphia, PA 19106