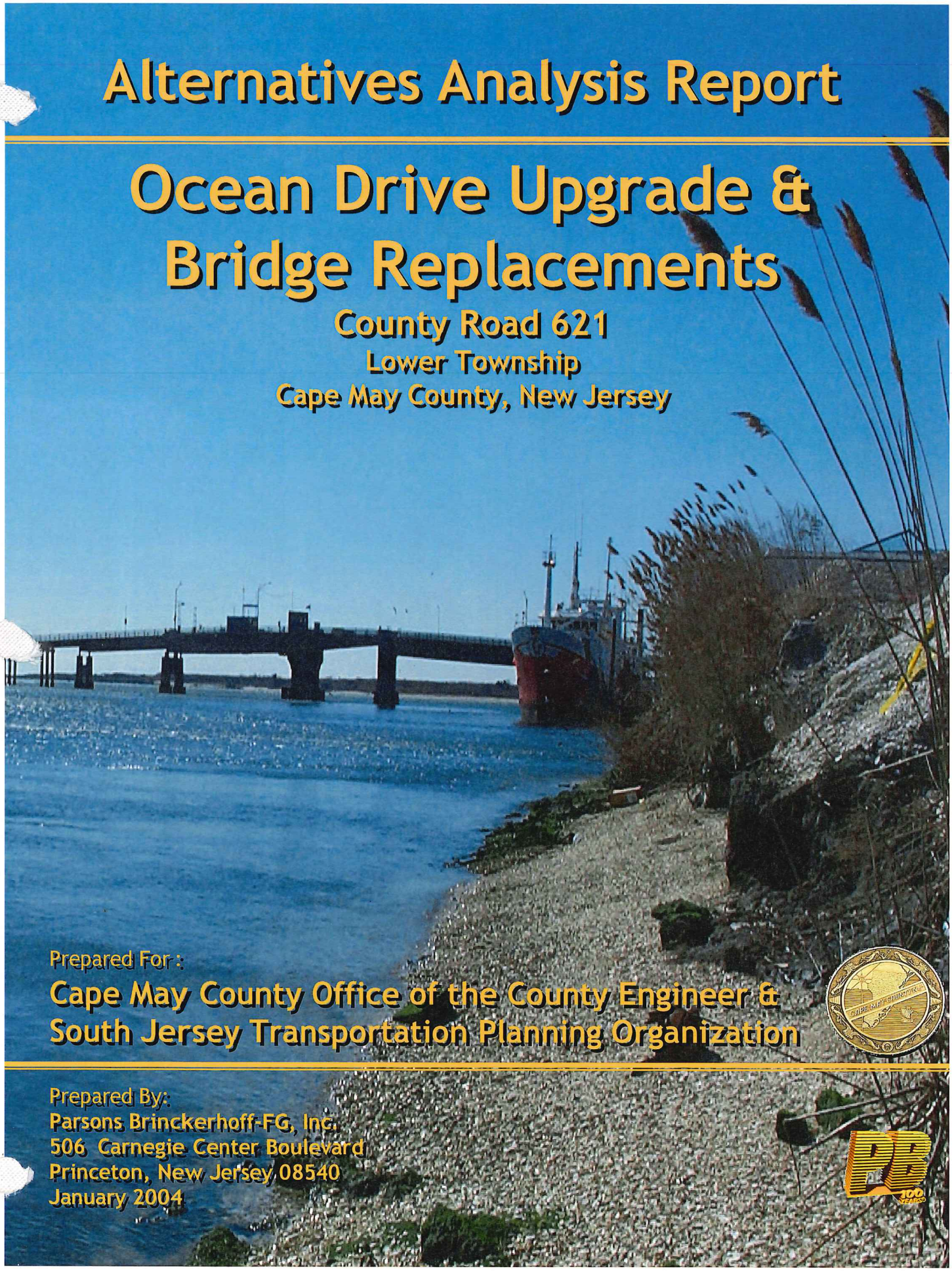
Alternatives Analysis Report

Ocean Drive Upgrade & Bridge Replacements

County Road 621
Lower Township
Cape May County, New Jersey



Prepared For :

Cape May County Office of the County Engineer & South Jersey Transportation Planning Organization

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January 2004

ALTERNATIVE ANALYSIS REPORT FOR

OCEAN DRIVE UPGRADE AND BRIDGE REPLACEMENTS

(County Road 621)

Lower Township
Cape May County
New Jersey

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Table of Contents

I. PROJECT ORIGIN AND HISTORY (PROJECT NEEDS) 5
II. EXISTING CONDITIONS 7
A. ROADWAYS 7
Existing Roadway 7
Elevation of the Roadway Surface 7
Travel Lane Width 7
Horizontal Curvature 7
Profile Grades 8
B. STRUCTURES (BRIDGES AND CULVERTS) 8
Mill Creek Bridge 8
Upper Thorofare Bridge 10
Middle Thorofare Bridge 12
Old Lower Thorofare Culvert 16
C. GEOTECHNICAL 16
D. UTILITIES 16
E. TRAFFIC 17
F. ACCIDENT HISTORY 17
G. NAVIGATION 19
H. SOCIO-ECONOMIC AND ENVIRONMENTAL CONDITIONS 19
Noise-Sensitive Receptors 19
Air Quality Sensitive Receptors 19
Socioeconomics and Land Use 19
Environmental Conditions 20
Hazardous Waste Study 20
Historic Architectural/Archeological Investigation 21
III. SINGLE OCCUPANCY VEHICLE ANALYSIS 22
IV. HYDRAULIC ANALYSIS 23
V. PRESENTATION OF PROJECT ALTERNATIVES 24
A. EXISTING CONDITION (NO-BUILD ALTERNATIVE) 24
B. EXISTING CONDITION (REHABILITATION ALTERNATIVE) 24
C. OCEAN DRIVE IMPROVEMENTS 25
Alternative 1 25
Alternative 2 27
Alternative 3 27
D. OCEAN DRIVE IMPROVEMENTS AND MIDDLE THOROFARE BRIDGE REPLACEMENT 27
Existing Condition (Replace In-Kind Alternative) 27
Alternative 3A 29
Alternative 3B 30
Alternative 3C 31
Alternative 3D 35
Alternative 3E 36
Alternative 3F 37
Alternative 3G 38
E. ROADWAY EMBANKMENT DESIGN 40
F. FOUNDATION DESIGN 41
G. CULVERT DESIGN 41
H. HYDRAULIC DESIGN & SCOUR ANALYSIS 41
I. TOLL PLAZA DESIGN 43
J. TRAFFIC ANALYSIS 43
K. CONCEPTUAL CONSTRUCTION STAGING 47

VI. COMPARISON OF IMPACTS AND COSTS 48
A. COST/CONSTRUCTABILITY 48
B. RIGHT-OF-WAY AND ACCESS 49
C. TRAFFIC 50
D. SOCIO-ECONOMICS 50
E. CULTURAL RESOURCES 52
F. ENVIRONMENTAL 53
G. DESIGN EXCEPTIONS 57
H. PERMITS AND CLEARANCES 58
VII. EVALUATION AND RECOMMENDATIONS 59
A. EVALUATION 59
B. RECOMMENDATIONS 61

List of Figures

Figure 1 – Project Location Map 6
Figure 2 – Aerial Project Location Map 19
Figure 3 – Area of Potential Affect & Alternative Alignments 21
Figure 4 – 1983 FEMA Map 23
Figure 5 – Plan of Alternative 3A 29
Figure 6 – Mill Creek Cross Section & Span Layout 30
Figure 7 – Upper Thorofare Cross Section & Span Layout (South Shift) 30
Figure 8 – Middle Thorofare Cross Section & Span Layout for Alternative 3A 30
Figure 9 – Plan of Alternative 3B 30
Figure 10 – Upper Thorofare Cross Section & Span Layout (North Shift) 31
Figure 11 – Middle Thorofare Cross Section & Span Layout for Alternative 3B 31
Figure 12 – Plan of Alternative 3C 31
Figure 13 – Segmental Concrete Cross Sections 33
Figure 14 – Erection of Precast Segments Using Overhead Gantry 34
Figure 15 – Middle Thorofare Cross Section & Span Layout for Alternative 3C 34
Figure 16 – Plan of Alternative 3D 35
Figure 17 – Middle Thorofare Cross Section & Span Layout for Alternative 3D 35
Figure 18 – Plan of Alternative 3E 36
Figure 19 – Middle Thorofare Cross Section & Span Layout for Alternative 3E 37
Figure 20 – Plan of Alternative 3F 37
Figure 21 – Middle Thorofare Cross Section & Span Layout for Alternative 3F 38
Figure 22 – Plan of Alternative 3G 38
Figure 23 – Middle Thorofare Cross Section & Span Layout for Alternative 3G 38
Figure 24 – Single Cable Plane Cross Sections 38
Figure 25 – Dual Cable Plane Cross Sections 39
Figure 26 – Representative Cable Stay Tower Configurations 40
Figure 27 – Conceptual Roadway Staged Construction 47
Figure 28 – Alternatives Comparison and Evaluation Matrix 59

List of Tables

Table I – Crash Data Summary 18
Table II – Summary of Alternatives & Middle Thorofare Bridge 28
Table III – Preliminary Results of Settlement Analysis 41
Table IV – Preliminary Results of Settlement Analysis with Surcharge & Wick Drains 43
Table V – Estimated Scour Depths 44
Table VI – Existing (2002) Summer Traffic Volumes 43
Table VII – Summer Weekday & Weekend Bridge Openings at Middle Thorofare 45
Table VIII – Existing & Future Hourly Summer Traffic Volumes at Middle Thorofare 45
Table IX – Average Vehicles in Queue at Termination of Summer Bridge Openings (2002) 46
Table X – Average Queue Dissipation Following a Summer Bridge Opening (2002) 46
Table XI – Conceptual Cost Estimates 49
Table XII – Potentially Impacted Active Businesses 50
Table XIII – Summary of Wetland and Open Water Impacts 54
Table XIV – Required Permits and Approvals 58

List of Photographs

Photo 1 – Mill Creek Bridge 8
Photo 2 – Mill Creek Bridge Underside of Deck with Spalls and Exposed Reinforcements 8
Photo 3 – Mill Creek Bridge Deteriorated Railing 9
Photo 4 – Mill Creek Bridge Undermined North Abutment 9
Photo 5 – Upper Thorofare Bridge 11
Photo 6 – Upper Thorofare Bridge Pier Caps with Wide Vertical Cracks 11
Photo 7 – Upper Thorofare Bridge Horizontal Curvature 11
Photo 8 – Middle Thorofare Bridge 12
Photo 9 – Middle Thorofare Bridge East Bascule Girder Collision Damage 13
Photo 10 – Middle Thorofare Bridge Bottom Flange 100% Section Loss 13
Photo 11 – Middle Thorofare Bridge Heavily Deteriorated Pile Repair Sleeves with Exposed Rebar. 13
Photo 12 – Middle Thorofare Bridge Timber Fender Damage 14
Photo 13 – Middle Thorofare Bridge Pin and Hanger Detail 15
Photo 14 – Old Lower Thorofare Culvert 16

List of Appendices

Appendix A – Traffic Analysis Data
Appendix B – Community Involvement Data
Appendix C – Cost Estimates
Appendix D – Project Correspondence & Coordination
Appendix E – Alternative Analysis Plans *(Under separate cover)*

Technical Addendum *(Under separate cover)*

Addendum A – Bridge Field Condition and Appraisal Reports
Addendum B – Geotechnical Report
Addendum C – Accident Data Reports
Addendum D – Navigation Study Report
Addendum E – Environmental Documentation Report
Addendum F – Hazardous Waste Screening Report
Addendum G – Area of Potential Effects Report
Addendum H – Hydraulic Analysis Report
Addendum I – Toll Plaza Relocation Study
Addendum J – Economic Impact Study
Addendum K – Tax Maps & Mailing List

I. PROJECT ORIGIN AND HISTORY (PROJECT NEEDS)

Ocean Drive (County Road 621) connects numerous coastal barrier islands along the southernmost coastline of the Atlantic Ocean in Cape May, New Jersey. A 2.7-mile stretch of the roadway from its terminus at Route 109 and intersection with Madison Avenue connects the towns of Cape May and Wildwood Crest through Lower Township. The roadway serves as the primary link between these popular communities as well as for the main route servicing local businesses, including many restaurants, marinas and fisheries, which are indicative of the area's maritime environment. A project location map is shown in Figure 1 on the following page.

Additionally, this stretch of Ocean Drive serves as an emergency evacuation route for the barrier island on which the heavily populated and developed resort towns of Wildwood Crest and Wildwood and the Diamond Beach section of Lower Township are located. The road has been prone to occasional flooding in the past due to its elevation, which is below the 100-year flood elevation. This elevation serves as the current design standard for emergency evacuation routes. As it exists today, in the event of a major coastal storm, this roadway could become impassible, leaving the barrier island communities isolated until the floodwaters recede. This section of Ocean Drive is the last of the three accesses to the Wildwoods to become impassible during a storm.

There are three existing bridges located in this stretch of Ocean Drive. These bridges include a 300-foot long bridge over Mill Creek, a 350-foot long bridge over Upper Thorofare, and a 1,039-foot long bridge over Middle Thorofare, which includes a functioning movable span as its main span. The Middle Thorofare Bridge is also referred to as the "Two Mile Bridge" and serves as the gateway to the Intracoastal Waterway. The Middle Thorofare Bridge experiences anywhere from 20 to 40 bridge openings each day, with approximately 1,650,000 vehicles crossing the bridge each year. The numerous bridge openings for the passage of boats cause significant backups of traffic traveling between the Wildwoods and Cape May, particularly during the summer months when the road is traveled by the many patrons visiting the resort towns. Additionally, the narrow horizontal clearance of the channel at the bridge results in the restriction of large vessels entering the Intracoastal Waterway. Vessels attempting to navigate the narrow opening frequently impact the bridge structure.

The Mill Creek and Upper Thorofare Bridges are currently deemed functionally obsolete due to their narrow widths and also have low sufficiency ratings - 46.8 for Mill Creek and 47.3 for Upper Thorofare. The sufficiency rating is the grade of the bridge using a 100-point system with 100 being a perfect bridge and 0 being a collapsed bridge. The sufficiency rating consists of three components – structural adequacy and safety (55%), serviceability and functional obsolescence (30%) and essentiality for public use (15%). The Middle Thorofare Bridge is deemed functionally obsolete due to its narrow width and structurally deficient due to its inability to carry loads greater than 15 tons. The movable span with a 50 feet distance between fenders limits the size of the vessels that can use the Middle Thorofare waterway beyond the bridge, therefore restricting the economic growth of the commercial fishing industry in this area. The movable span also causes considerable traffic backups during the busy summer season. With these items considered, the Middle Thorofare Bridge has a very low sufficiency rating of approximately 4 out of 100 points.

In late 1999 this study commenced with the project limits extending from Route 109 to just west of the Middle Thorofare Bridge. This study was expanded in 2002 at the request of the local community to include the Middle Thorofare Bridge and the section of Ocean Drive to Madison Avenue at the southern edge of Diamond Beach in Lower Township. The study was performed to determine the extent of improvements that would be required to accommodate the following items:

- Allow safe passage of vehicular traffic from the barrier island to Route 109 during a 100-year flood,

- Rehabilitate or replace the existing structures to correct all existing deficiencies, accommodate safe vehicular travel during a 100-year flood, and reduce the traffic delays and vessel restrictions which occur at the movable span of the Middle Thorofare Bridge.

As part of this study, an alternative analysis was developed to explore feasible alternatives for the project improvements and develop a recommendation that not only satisfies the project needs but also does so while minimizing various types of impacts including those to the sensitive environmental, cultural, and socio-economic aspects of the area.

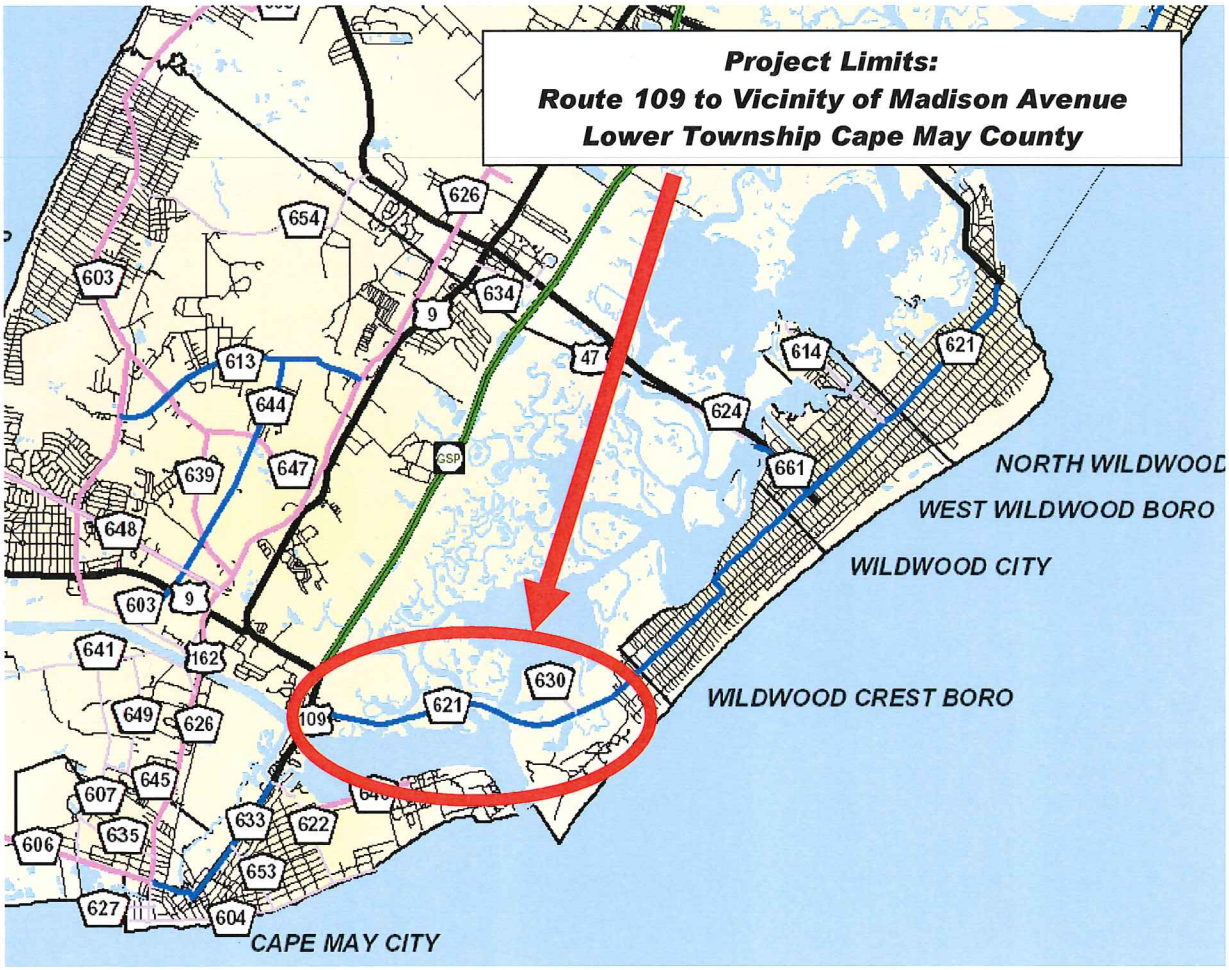

Figure 1
Project Location Map

II. EXISTING CONDITIONS

A. ROADWAYS

The existing roadway contains several deficiencies, including insufficient travel lane width, substandard horizontal curvature, substandard profile grades and an elevation below the 100-year floodplain.

Existing Roadway

The existing bituminous roadway extends east approximately 2.7 miles from Route 109 to the southern edge of Diamond Beach in Lower Township, Cape May County. The roadway is important as an 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, and for emergency vehicle access to the southern section of the island. The existing roadway was constructed within a 120-foot right-of-way by placing fill in the higher areas of an existing floodplain. The two-lane road 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 a 0% profile at an elevation of 7.5 feet, with the top of deck of the bridges set at elevation of 11.0 feet. The posted speed limit on the roadway is 45 mph from Route 109 to just east of the Upper Thorofare Bridge. Between the Upper and Middle Thorofare bridges, the posted speed limit is reduced to 40 mph and on the Middle Thorofare Bridge itself, the speed limit is posted at 25 mph. Finally, the posted speed limit is increased to 50 mph from the east end of the Middle Thorofare Bridge to the eastern end of the project. North of the project limits the posted speed limit is reduced to 25 mph in the residential areas.

Elevation of the Roadway Surface

Most notable of those deficiencies is the elevation of the roadway surface. The original roadway has settled since its construction to an approximate elevation of 6.0 feet, placing it well below the 100-year flood elevation of 9.1 feet (See Section IV for a discussion on the 100-year flood elevation). Because of this low elevation, the entire roadway is susceptible to flooding, possibly making the evacuation route impassible to navigate during a flood. The proposed project will raise the entire length of Ocean Drive within the project limits above the 100-year floodplain.

Travel Lane Width

Second among the deficiencies is the substandard travel lane width of 10 feet. Current design standards are determined by the 2001 edition of AAHSTO's "*A Policy on Geometric Design of Highways and Streets,*" which indicates that a 55 mph design speed requires a travel lane width of 12 feet for safe vehicular movement. The proposed roadway will widen the travel lanes to the 12-foot width by utilizing the excess shoulder width of the existing roadway. The proposed shoulders will be reduced to 8 feet wide, which is considered the minimum acceptable shoulder width for the project's design speed. The overall width of the paved surface will remain unchanged.

Horizontal Curvature

At the westernmost section of the roadway, there is a substandard 1000-foot radius horizontal curve. For the roadway's design speed, the minimum horizontal radius of curvature required is 1065 feet. The radius of the deficient curve will be corrected by the project along with related superelevation requirements. At the easternmost limit of the project, there is a substandard 900-foot radius horizontal curve which becomes a tangent at Raleigh Avenue, where Ocean Drive enters Diamond Beach. This curvature does not meet design standards for a 55 mph design speed. However, the design speed of Ocean Drive changes in this vicinity from 55 mph to 30 mph. Depending on the exact location of the speed change, the curve may meet 30 mph design standards. Because of the minor change in radius required to meet 55 mph design standards (a 1065-foot radius is required), and local complaints regarding insufficient sight distance for pedestrian traffic at this location, the

curve will be improved to meet the 55 mph design standard. It is likely, however, that reduced speed limit signs will be posted to slow traffic prior to reaching the curve in its final design.

Profile Grades

The existing 0% profile grade of the roadway is also substandard. Current design guidelines require a minimum profile grade of 0.3% for sufficient surface drainage. This too will be corrected by the project with vertical curves and tangents meeting or exceeding the 0.3% grade required.

B. STRUCTURES (BRIDGES AND CULVERTS)

Each structure is described in general below. A cursory field inspection and a technical evaluation for each structure are also provided.

Mill Creek Bridge

Description

This bridge was constructed in 1940 and 1941 to connect Cape May to the Wildwoods and consists of 12 spans, each 25'-0" with a total length of 300'-0". The bridge carries two 10'-0" wide lanes and 1'-6" safety walks on both sides and is on a tangent section of roadway. The superstructure is composed of four reinforced concrete T-beams with a monolithic 7½" thick deck. The beams are spaced at approximately 6'-0" on center and provide a total deck width of 23'-0". The substructure consists of reinforced concrete pile bents and stub abutments on timber piles. Based on the 8th Cycle Re-evaluation Bridge Survey and Rating Report dated April 1997 and the June 2000 Field Condition and Appraisal Survey Report (See Addendum A), the overall condition of the bridge is fair. The structure is functionally obsolete due to the narrow deck width.

Field inspection

A limited field inspection of the Mill Creek and Upper Thorofare Bridges was conducted on June 2, 2000, to verify the current condition of the bridges. The observations made during this field inspection support the 8th Cycle Report and are presented below.

Photo 1 – Mill Creek Bridge

Superstructure and Deck

The existing Mill Creek Bridge consists of 12 spans, each 25'-0" in length with a total length of 300'-0". The superstructure is composed of four Reinforced Concrete T-Beams with a monolithic 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 both armored and non-armored deck joints over the piers. The fill material is deteriorated in most of these joints.

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

The bottoms 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.

Photo 2 – Mill Creek Bridge Underside of Deck with Spalls and Exposed Reinforcements

The bridge railing is severely deteriorated as shown in Photo 3 and is substandard since it does not meet strength or geometric requirements. 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.

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

Photo 3 – Mill Creek Bridge Deteriorated Railing

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 end of the north 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 the Mean high water level within the second span from the north abutment.

Photo 4 – Mill Creek Bridge Undermined North Abutment

Approaches
Both approach roadways are paved with bituminous concrete. There is no guide rail along the SE approach to the bridge and the existing guide rails show signs of vehicular impact. The safety sidewalks on the approaches have also settled at all four corners of the bridge.

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

Technical Evaluation
Load Carrying Capacity
The 8th Cycle Report (1997) indicates Load Factor Inventory and Operating ratings of 18 tons and 30 tons, respectively for the H15 truck. The controlling design load on the bridge corresponds to a Load Factor Inventory rating of 27 tons for the HS-20 truck, which equates to an overstress of 33%.

Earthquake Resistance
The structure was constructed by 1941, well before the use of seismic standards. In the structure's present condition, it provides little resistance to lateral forces per present seismic requirements. Seismic site characterization parameters for present day standards are:

- Peak Acceleration Coefficient (Av) = 0.10
- Soil Profile Type = S3
- Site Soil Coefficient (S) = 1.5

The connections between the superstructure and the substructure are inadequate to transfer seismic forces. The existing piers appear to be lightly reinforced and not properly confined within the plastic hinge zones as per AASHTO Div. 1A, Chapter 6.6.2. Based on the limited soil information from the 1939 design plans, the soil is comprised of loose granular material and there may be a potential for liquefaction during a seismic event. The existing bridge seat widths may not be adequate to catch the superstructure during such a seismic event.

Wind Loadings on the Existing Structure
Due to the proximity of the bridge site to the coastline of the Atlantic Ocean, the site is subject to hurricane force winds. The basic wind speed used in determining design wind loads at this site is therefore 110 mph, as shown in Figure 6.1 of ASCE Standard, "Minimum Design Loads for Buildings and Other Structures". This is slightly higher than the normal wind design velocity of 100 mph defined by AASHTO.

Safety Features
The safety features of this bridge are below current NJDOT standards. There are 1'-6" safety walks on both sides of the bridge with a current roadway width of 10'-0" for each lane. The narrow roadway width eliminates the possibility of providing barrier curbs or railings and forces bicyclists that frequent the bridge to ride in the travel lanes. Pedestrians regularly utilize the safety walk. The approach guiderail terminations do not meet current standards and require an additional stiffening post along the length with resetting of the height. There is no guide rail at the SE corner of the bridge.

Maintenance Requirements
Considering the age of this structure and the severe coastal environment, maintenance is extremely important in preserving the structure. The abutment and pier seats require periodic cleaning since the debris buildup and direct exposure to salt laden water contributes to the extensive deterioration to the substructure elements.

Upper Thorofare Bridge
Description
This bridge was constructed in 1940 and 1941 to connect Cape May to the Wildwoods and consists of 14 spans, each 25'-0" in length with a total length of 350'-0". The bridge carries two 10'-0" wide lanes and 1'-6" safety walks on both sides and is on a horizontal curved section of roadway that does not have proper superelevation. The superstructure is composed of four reinforced concrete T-beams with a monolithic 7-1/2" thick deck. The beams are spaced at approximately 6'-0" on center and provide a total deck width of 23'-0". The substructure consists of reinforced concrete pile bents and stub abutments on timber piles. Based on the 8th Cycle Re-evaluation Bridge Survey and Rating Report dated April 1997 and the June 2000 Field Condition and Appraisal Survey Report (See Addendum A), the overall condition of the bridge is fair. The structure is deemed to be functionally obsolete due to the narrow deck width.

Field Inspection
A limited field inspection of the Upper Thorofare Bridge was conducted on June 2, 2000 to verify the current condition of the bridge. The observations made during this inspection support the 8th Cycle Report and are presented below.

Superstructure and Deck

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

Photo 5 – Upper Thorofare Bridge

The superstructure (deck slab and beams) is in fair condition. The concrete T-beams typically have wide cracks and efflorescence at the bearing locations. The deck has both armored and non-armored joints over the piers. The filler material in most of these joints is deteriorated.

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

Substructure

The substructure construction is similar to the Mill Creek Bridge and is in fair condition overall. The abutments were inspected during low tide. The north abutment apron is heavily undermined due to erosion. The south abutment apron showed no signs of erosion. The wingwalls have map cracks and wide cracks with efflorescence.

Photo 6 – Upper Thorofare Bridge Pier Caps with Wide Vertical Cracks

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 the mean high water level within the first and second span from the north abutment.

Approaches

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 north abutment. The guide rails show signs of vehicular impact. The horizontal sight distance on the Upper Thorofare Bridge is restricted due to horizontal curvature. There are markings for an underground utility belonging to Verizon on the North side of the Upper Thorofare Bridge.

Photo 7 – Upper Thorofare Bridge Horizontal Curvature

Deck Geometry

The curb-to-curb width of 20'-0" is inadequate, leading to the bridge being classified as functionally obsolete. The bridge is on a horizontal curve and has no superelevation on the deck which is substandard.

Technical Evaluation
Technical concerns for the Upper Thorofare Bridge are the same as those previously defined for Mill Creek Bridge.

Middle Thorofare Bridge
Description
This bridge was constructed in 1940 and 1941 to connect Cape May with the Wildwoods and consists of 21 fixed spans and one movable span that permits passage of vessels with unlimited height and a maximum width of 50 feet. The fixed spans vary in length from 35 feet to 110'-9 1/8" and the movable span is a single leaf bascule bridge with a span of 64'-5" between the centerline of the trunnion and centerline of bearing at the toe. The total length of the bridge is 1039'-3 15/16" and it carries two 10'-0" lanes and 1'-6" safety walks on both sides of the bridge. There are seventeen 35'-0" long spans that consist of three continuous steel stringers supporting an 8" reinforced concrete deck slab. The other four approach spans are two girder, floorbeam/sub-stringer structures with an 8" reinforced concrete deck slab that is supported on the two girders and central sub-stringer. This structure is on a tangent section of roadway. The overall condition of the structure is critical due to its low ratings. The bridge is deemed functionally obsolete due to its narrow width, and structurally deficient due to its inability to carry loads greater than 15 tons. These findings are based upon the 7th Cycle Re-evaluation Bridge Survey and Rating Report dated October 2001 and the June 2002 Field Condition and Appraisal Survey Report (See Addendum A). The Structural Inventory and Assessment (SI&A) sheet indicates a structural sufficiency rating of 4 out of a possible 100. Since the sufficiency rating is extremely low, the bridge is classified as structurally deficient and functionally obsolete, and is eligible for the NJDOT "select list". This list identifies the most deficient bridges in the state. Also, since the sufficiency rating is below 50, the bridge is automatically eligible for federal funding for replacement.

Photo 8 – Middle Thorofare Bridge

In addition, the movable span limits the size of vessels that can enter the Intracoastal Waterway beyond the bridge to 50 feet in width. The bridge opens about 7500 times annually. During the summer months, the movable span opens as much as 40 times per day to allow the passage of marine vessels. This number of openings is excessive and causes traffic delays that at times are approximately one mile in each direction.

Field Inspection
A limited field inspection of the Middle Thorofare Bridge was conducted on June 18-19, 2002 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 observations made during this inspection support the 7th Cycle Report. The bridge is currently appraised "Serious" based on the 7th Cycle Report dated October 2001.

Superstructure and Deck
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 1,039 feet.

The concrete deck on the approach spans is in fair condition due to the wide cracks (approximately 30 feet long) and spalls on the underdeck with exposed corroded reinforcement. Spall sizes range

from approximately 1 to 6 square feet. There are large wide cracks and incipient spalls at the sidewalk brackets. The overlay on the headers at both approaches have several potholes and old deteriorated patches. The deck of the movable span was replaced along with the supporting stringers in 1992 and is in good condition.

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.

Photo 9 – Middle Thorofare Bridge East Bascule Girder Collision Damage

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

Photo 10 – Middle Thorofare Bridge Bottom Flange 100% Section Loss

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

The substructure's overall condition is fair. To facilitate the inspections, the abutments were inspected during low tide. 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. 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.

Photo 11 – Middle Thorofare Bridge Heavily Deteriorated Pile Repair Sleeves with Exposed Rebar

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 and timber fender system are generally in fair condition. There is moderate damage to the east side of Column E1 on Pier S10. The timber fender system has heavy damage to the northeast corner as shown in Photo 12.

Photo 12 – Middle Thorofare Bridge Timber Fender Damage

Approaches

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 20'-0" is inadequate, requiring the bridge to be classified as functionally obsolete. This configuration changes at the centrally located toll house where two 10'-0' lanes traverse around the toll house.

Electrical and Mechanical Systems

The original electrical system was replaced in 1992 with a Benshaw System during the deck replacement of the movable span. The system continues to work well and is in good condition. The mechanical system consists of a gear driven trunnion. Most of the equipment is original except the rack which was replaced during a mechanical overhaul in 1985-86.

Toll House and Operators House

The toll house is a small building located on the approach span just north of the movable span. The building is centrally located between the north and south bound lanes and was used for taking tolls in each direction. A one-way toll in the south bound direction was instituted in May 2003. The toll attendant also operates the bridge and controls the signals for the gates from the toll house. During openings and closings the toll attendant walks to the operator's house located on the northwest corner of the bascule pier in order to operate the bridge. The bridge is attended 24 hours a day and is subject to openings upon request with no scheduled openings at any particular time of day.

Bridge Scour

Ocean Drive and the bridges over Mill Creek, Upper Thorofare, and Middle Thorofare were analyzed 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. At the Middle Thorofare crossing, the highest amounts of scour are estimated to occur at Piers 10, 11, and 12.

Technical Evaluation

Load Carrying Capacity

The original design live load for this bridge was H-17.5. Inspection ratings have regularly decreased. The controlling ratings are due to the advanced section loss in the stringers in the approach spans and the fact that the bridge was only designed for H-17.5. The Seventh Cycle Report (October, 2001) indicates Load Factor Inventory and Operating ratings of 13 tons and 22 tons, respectively for the Type 3 truck. This equates to 417% and 208% overstressed for the inventory and operating levels, respectively. The bridge is presently posted for 15 tons. The recommended posting of 12 tons is found in the Field Condition and Appraisal Report dated June 2002.

Earthquake Resistance
The structure was constructed by 1941, well before the use of seismic standards. In the structure's present condition, little resistance to lateral forces is present per Seismic Requirements. Seismic site characterization parameters for present day standards are:

- Peak Acceleration Coefficient (Av)= 0.10
- Soil Profile Type = S3
- Site Soil Coefficient (S) = 1.5

The pin and hanger detail located on the approach span girders is inadequate to transfer seismic forces. Similar to the other bridges, the connections between the superstructure and the substructure are also inadequate to transfer the seismic forces. The existing piers also appear to be lightly reinforced and not properly confined within the plastic hinge zones as per AASHTO Div. 1A, Chapter 6.6.2. Based on the limited soil information from the 1939 design plans, the soil is comprised of loose granular material and there may be a potential for liquefaction during a seismic event. The existing bridge seat widths may not be adequate to catch the superstructure during this seismic event.

Photo 13 – Middle Thorofare Bridge Pin and Hanger Detail

Fatigue Life
The bascule span and two adjacent flanking spans on either side are fracture critical. The structure has been in service for approximately 63 years (22,995 days). No fatigue life calculations have been performed for this study. The fracture critical components are composed of built-up riveted girders with rolled stringers and floorbeams on the bascule span and sway frames on the adjacent flanking spans. The worst fatigue prone detail would be Category "E" for the base metal at the pin plate connection. The pin and hanger connections were inspected in the 7th Cycle Report and no fatigue cracking was noted. The field condition and appraisal report confirms light rusting at these pin and hanger connections. Given the above information and the current live load restrictions on the structure, it is likely that retrofit for fatigue is not required. However, if the vehicular restrictions are removed from this structure, then fatigue should be considered. Periodic inspections of this structure should continue in order to insure continued safety. This review is in accordance with the "AASHTO Guide Specification for Fatigue Life Evaluation of Existing Steel Bridges."

Wind Loadings on the Existing Structures
Due to the proximity of the bridge site to the coastline of the Atlantic Ocean, the site is subject to hurricane force winds. The basic wind speed used in determining design wind loads at this site is therefore 110 mph, as shown in Figure 6.1 of ASCE Standard, "Minimum Design Loads for Buildings and Other Structures". This is slightly higher than the normal wind velocity of 100 mph defined by AASHTO.

Safety Features
The safety features of this bridge are below current NJDOT standards. There are 1'-6" safety walks on both sides of the bridge with a current roadway width of 10'-0" for each lane. The narrow roadway width eliminates the possibility of providing barrier curbs or railings. Pedestrians regularly utilize the safety walks while bicyclists ride in the travel lanes since there are no shoulders on the bridge. The approach guide rail terminations do not meet current standards and require an additional stiffening post along the length with resetting of the height.

Maintenance Requirements
Considering the age of this structure and the severe coastal environment, maintenance is extremely important in preserving the structure. The abutment and pier seats should be periodically cleaned

since the debris buildup and direct exposure to salt laden water contributes to the extensive deterioration to the substructure elements. In addition, the Middle Thorofare Bridge has a narrow channel width that contributes to impacts on the fender system. The fender system should be repaired periodically in order to protect the substructure units. The mechanical/electrical systems of the bridge operate well, but will deteriorate over time, especially with the frequent opening (7500 per year) of the bridge. The frequency of replacing parts for the bridge will therefore increase and thus increase the possibility of a mechanical malfunction that would prevent the safe and effective operation of the bridge.

Old Lower Thorofare Culvert

This culvert is not inspected on a regular basis since it is presently a 5 foot diameter pipe. The flow of water through this pipe is typically very swift during tide changes due to the fact that it appears to be undersized for the flow. The County views this as a safety hazard as people frequent the area for crabbing and fishing.

Photo 14 – Old Lower Thorofare Culvert

C. GEOTECHNICAL

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. A detailed evaluation of borings taken along the corridor is presented in the geotechnical report in Addendum B.

D. UTILITIES

Several utility companies maintain facilities along Ocean Drive in the project vicinity. Based on a preliminary investigation by Gibson Associates, the following utilities are located along the corridor:

Conectiv- Conectiv maintains aerial electric lines primarily along the south side of the roadway, with additional areas containing poles on both sides of the roadway. Highway luminaries are present on Connectiv poles at Route 109 and at bridge approaches.

Verizon and Comcast – Verizon and Comcast utilize Conectiv's poles throughout the project area and Verizon may also have an underground line throughout the project site as well.

South Jersey Gas Company – Underground gas distribution lines are located at the western end of the project. Just east of Route 109, the gas line crosses from the north side of Ocean Drive to the south side, where it continues to approximately Station 21+00. No additional gas lines were located in the investigation.

The Lower Township Utilities Authority - The local utility authority maintains a sanitary force main along the entire length of the project from Route 109 to Madison Avenue, where a pump facility is located. This main runs primarily along the south side of the roadway, except for in the vicinity of Route 109, where it parallels the roadway's north side. The utility also maintains water mains at the extreme northern end of the project location. The water mains will not be affected by this project. Local businesses and residences elsewhere in the project limits are provided drinking water through wells.

E. TRAFFIC

Existing traffic conditions feature moderate traffic volumes with a significant seasonal peak in the summer months due to tourists and vacationers that access the barrier island towns and beaches.

Traffic operates at acceptable levels of service on the roadway sections, independent of the bridge and toll operations, during many hours of the day. However, the toll plaza and bridge openings for navigation on the waterway at the Middle Thorofare Bridge cause excessive motor vehicle queues, particularly in the summer evenings and on weekends. The queues cause congestion and delay, as well as disruption for the residential area located roughly one mile north of the Middle Thorofare Bridge, referred to as Diamond Beach. The queues extend into Diamond Beach during critical summer periods. The frequency of bridge openings is more than doubled in the summer due to the significant increase in the passage of party boats and pleasure craft. The coupling of the increased traffic volumes in the summer and the doubling of bridge openings significantly increases the inconvenience to the residents/vacationers/home owners in the Diamond Beach area and the traveling public along this corridor. There is also a 15-ton weight limit on the Middle Thorofare Bridge which limits the truck volumes.

There are relatively few intersections along Ocean Drive within the study area. The southerly terminus of Ocean Drive, at State Route 109, is controlled by a traffic signal. Within Diamond Beach, there is a traffic signal located at Austin Avenue, 1.3 miles north of Middle Thorofare Bridge. There are driveways to developments sparsely located along Ocean Drive between Route 109 and Diamond Beach. There is one additional roadway intersection between Route 109 and Diamond Beach, at Fish Dock Road (County Route 630), located approximately one half mile north of Middle Thorofare Bridge. This T-intersection operates with a Stop sign on the Fish Dock Road approach. Traffic volumes entering Ocean Drive at the driveways and Fish Dock Road are very light.

The only accommodations for bicyclists or pedestrians along Ocean Drive in the study area are the shoulders of the roadway and a 1.5 foot wide safety walk on the bridges. Bicyclists ride in the shoulders on the roadways and within the roadway on the bridges. Pedestrians also walk in the shoulder on the roadway but utilize the safety walk on the bridges. Considering the narrow width of the existing bridges, 20 feet from curb to curb, the existing conditions for bicyclists and pedestrians are not safe and do not meet design standards.

At the beginning of this study, the Middle Thorofare Bridge was operating with two-way toll collection. However, the toll was converted to a one-way southbound toll during the latter part of this study. The evaluations in this report are based on two-way toll collection and are still applicable for the one-way toll collection in the southbound direction.

F. ACCIDENT HISTORY

Cape May County and the Lower Township Police Departments supplied crash data for the years 1999, 2000, and 2001. These were reviewed to determine frequency, type and crash severity along Ocean Drive (CR 621) between Rt.109 and Fish Dock Road. Crash collision diagrams and summaries for each year are included in Addendum C.

During the three-year period between January 1999 and December 2001, there were a total of 21 crashes within the project area. No fatalities were reported, eleven (11) crashes resulted in injuries,

and ten (10) resulted in property damage only. A majority of the crashes experienced over the three-year period were same direction rear-end type and crashes involving fixed objects (light poles, bridge curbing, etc.).

Most notable percentages of the crashes in the study area are as follows:

1. 14.3% (3) involved in opposite direction which is greater than the 1997 statewide average of 2.8%.
2. 28.6% (6) involved Fixed Objects, which is greater than the 1997 statewide average of 10.5%.
3. 52.4% (11) resulted in injury, which is greater than the 1997 statewide average of 31.1%.
4. 95.2% (20) occurred during dry conditions, which is greater than the 1997 statewide average of 76.9%.

The most notable discrepancies between the actual rate and the statewide average regarding crash types and conditions were those crashes involving fixed objects, opposite direction crashes, and those involving injuries. The percentages of all three of these crash types were significantly higher than the statewide averages. All of the crashes involving a fixed object or opposite direction collision occurred during dry and daylight conditions. Narrow lane widths and lack of shoulders are existing deficiencies known to be potential contributing factors for fixed object and opposite direction accidents.

Table I summarizes the study area crash data in detail. The crash data occurring on the Mill Creek, Upper Thorofare, and Middle Thorofare Bridges are noted by the "bold" text.

Table I
Crash Data Summary

Type	Location	Number of Accidents		
	Year	1999	2000	2001
Rear End	Intersection of Ocean Drive (C.R. 621) and Route 109		1	1
	On Upper Thorofare Bridge		**1**	
	Ocean Drive (C.R. 621) between Upper and Middle Thorofare	1		
	On Middle Thorofare Bridge	**1**		
	Ocean Drive (C.R. 621) north of Middle Thorofare		1	2
Right Angle	Ocean Drive (C.R. 621) south of Mill Creek Bridge	1		
	On Upper Thorofare Bridge	**1**		
	Ocean Drive (C.R. 621) north of Middle Thorofare Bridge		1	
Head-On	**On Upper Thorofare Bridge**		**1**	**1**
	Ocean Drive (C.R. 621) between Upper and Middle Thorofare		1	
Fixed Object	Ocean Drive (C.R. 621) south of Mill Creek Bridge		1	
	On Mill Creek Bridge	**3**		**1**
	Ocean Drive (C.R. 621) between Mill Creek and Upper Thorofare		1	
Pedestrian	**On Middle Thorofare Bridge**		**1**	
TOTAL		7	9	5

G. NAVIGATION

A navigation study was conducted to determine the height of vessels using the waterway, their frequency of traversing the bridge site, and the dimensional needs for future vessels within the waterway. This data was then utilized to determine the horizontal and vertical clearances required for any new bridge at this site, whether movable or fixed. The entire Navigation Study Report is included in Addendum D of this report. The conclusions from the report are presented below:

1. Alignments that are parallel and adjacent to the existing bridge and include a movable span should have a clear channel opening of 130 feet and be placed 45 feet above mean high water (MHW). Raising the bridge to 45 feet above MHW reduces the number of bridge openings in a year by approximately 30%. Raising the bridge to 55 feet above MHW reduces the number of openings by an additional 12.7% which is not 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 at approximately 225 feet over the channels.

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 at about 180 feet over the channel.

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 a span of 350 feet 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.

H. SOCIO-ECONOMIC AND ENVIRONMENTAL CONDITIONS

Noise-Sensitive Receptors

Noise-sensitive receptors would consist of areas of concentrated population or recreation. There are no such areas in the project area. There is one residence on Ocean Drive between Upper and Middle Thorofares, the Hinchcliffe residence, which could be of concern if the profile is significantly raised.

Air Quality Sensitive Receptors

A project that results in changes to vehicular traffic volumes, vehicle speeds, travel patterns or types of vehicles would affect localized or regional pollutant levels. Pollutants of concern for this type of project are carbon monoxide, on a localized basis, and ozone on a regional basis. The proposed project is located in Cape May County, New Jersey, which is designated by the EPA as a moderate non attainment area for ozone and an attainment area for carbon monoxide.

Socioeconomics and Land Use

A majority of the property along the project corridor is undeveloped coastal wetlands owned largely by New Jersey Department of Environmental Protection, the US Coast Guard and Two Mile Associates. Several marinas for pleasure craft are located along the corridor and include Canyon Club Marina, Snug Harbor Marina, Mill Creek Marina, Bree-z-lee Marina, Hinch Marina, Dolphin Cove and Two Mile Marina. These are identified in Figure 2. The commercial fishing industry is a key employer in the Cape May/Wildwood area and has several key facilities along the corridor that are essential to the vitality of this industry. These facilities include Snow's/Doxsee canning plant, Lund's

FIGURE 2
AERIAL PROJECT LOCATION MAP

Fisheries (includes port facilities, processing/freezing and distribution facility), and Atlantic Cape Fisheries Marina (a dock and port facility including vessel maintenance and offloading, processing and distribution of seafood catches). Several commercial fishing boats are docked at Otten's Harbor in Wildwood, but use the facilities mentioned above to unload and process their catch.

There are also three restaurants along the corridor that depend upon reservations and drive-by patrons. These are Two Mile Inn and The Crabhouse (both on lands of Two Mile Associates Block 820, Lot 3.01) and The Blue Claw (Block 793, Lot 15.03).

Two locations along the corridor include residences - Canyon Club Marina (Block 823.01 Lot 3.01) has 73 completed units with a total build-out of 144 units; and the Hinchcliffe residence at Hinch Marina (Block 793 Lot 15.04). A large residential community does exist just north of the project limits.

Environmental Conditions

The project is located in a sensitive environmental region consisting largely of tidal wetlands. These wetlands were delineated by Amy S. Greene Environmental Associates in December 1999 and March 2002 as part of this study. The tidal wetlands that parallel the project alignments are comprised of a mix of high marsh and low marsh, depending on the elevation.

Limited areas of beaches and dunes were identified in the project area. There is a small beach located on the western end of the Middle Thorofare Bridge and there is a small beach area on the eastern side of the bridge with small dunes behind the beach.

The project area is located along the north side of Cape May Harbor and the US Coast Guard Base to the east of Cape May Inlet. Mill Creek, Upper Thorofare and Middle Thorofare begin at Cape May Harbor and meander through an expansive tidal marsh in a northerly direction, connecting with Jarvis Sound. Lower Thorofare provides another connection between Middle Thorofare and Jarvis Sound. Cape May Harbor is connected to the Atlantic Ocean via the Cape May Inlet.

The project is located within the Coastal Plain Sole Source Aquifer region. Acid-producing soils are not expected to be a concern on this project.

Numerous agencies were contacted to identify endangered and threatened species which are present within the project area. Fifteen(15) species are potentially present in the project area. They include various species of birds, sea turtles, fish and plants. A detailed description of each species and its particular habitat is included in the Amy S. Greene Environmental Consultants Environmental Documentation Report, dated May 7, 2003. The report is located in Addendum E.

Hazardous Waste Study

A hazardous waste screening was performed as part of this study. There are no ongoing hazardous waste cases, though there have been incidents related to underground storage tanks and/or soil contamination at the former Borden Clam Products Facility, Lund's Fisheries, Bree-z-lee Yacht Basin, Harbortowne Resort Marina, and the US Coast Guard Electronic Engineering Center. Because of these previous incidents, soil sampling is recommended prior to any 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. Demolition of the bridges (particularly the Middle Thorofare Bridge) may encounter potentially contaminated materials.

Proper procedures should be taken to store, test, and dispose of any material that may be uncovered and suspected of being hazardous. Liabilities associated with this project appear relatively low, but should consider protectionary language in parcel acquisition contracts.
The complete Hazardous Waste Screening Report is included in Addendum F.

Historic Architectural/Archeological Investigation

The Area of Potential Effects Report by Richard Grubb and Associates, dated July 2000 and revised in January and March 2003, delineates the geographic area or areas within which the project may directly or indirectly cause changes in the character or use of historic properties. This area is known as the Area of Potential Effect (APE), and there are varying APE's for archaeological and architectural resources. The APE-Archaeology includes the areas which will be directly impacted by the disturbance of ground. The APE-Architecture is bounded to the west by the eastern edge of US Route 109/ Garden State Parkway, to the south by several marinas and the irregular coastline along Cape May Harbor, and to the east by Madison Avenue in the Diamond Beach area of Lower Township. The northern boundary follows the irregular course of Mill Creek, Upper Thorofare, Middle Thorofare and Lower Thorofare, encompassing extensive areas of salt marsh. This is shown in Figure 3.

The Middle Thorofare Bridge, completed in 1941, was determined to be eligible for the National Register. There are no other resources identified. However, for one alternative (Alternative 3G), the potential viewshed would encompass a 2.5 mile radius, including the following resources which have been previously determined as eligible for the National Register by the New Jersey State Historic Preservation Office:

- Cape May Historic District
- Hornbeam (Buoy Tender)
- Cold Spring Historic District
- Historic Cold Spring Village Railroad Station
- Historic Cold Spring Village Junction Control Tower
- Garden State Parkway Historic District

The sensitivity of the APE-Archaeology to contain significant prehistoric resources is considered low.

The full report is included in Addendum G.

FIGURE 3
AREAS OF
POTENTIAL EFFECT

PB

OCEAN DRIVE UPGRADE
& BRIDGE REPLACEMENTS
COUNTY OF CAPE MAY IN CONJUNCTION WITH SOUTH JERSEY TRANSPORTATION PLANNING ORGANIZATION
NOVEMBER 2003

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III. SINGLE OCCUPANCY VEHICLE ANALYSIS

A Single Occupancy Vehicle Capacity Adding Project (SOVCAP) is defined by the Federal Highway Administration (FHWA) as providing a significant increase in SOV capacity in Transportation Management Areas (TMAs) as per these examples:

- a new facility (bypass, interchange, access road, bridge)
- widening of an existing facility that adds one or more general purpose lanes for one mile or more
- a widening project less than one mile in length that has the potential to significantly increase SOV capacity (bridge or roadway widening to accommodate new development or other traffic generator)

In air quality non-attainment areas, projects that provide a significant increase in SOV capacity must undergo Congestion Management System (CMS) planning analyses as per ISTEA and FHWA/FTA Regulations.

Since the proposed new facilities consist of low-volume access roads, and do not include widening of existing facilities in any of the alternatives, the SOVCAP criteria do not apply, and no further SOV analysis is required.

IV. HYDRAULIC ANALYSIS

A hydraulic analysis was performed to determine the 100-year flood elevation for Ocean Drive. In order to preserve the integrity of the emergency evacuation route, the entire length of Ocean Drive's travel lanes from Route 109 to Madison Avenue (Diamond Beach) must be above this elevation 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. For the purposes of this study, a minimum baseline elevation of approximately 11.0 feet was assumed, allowing for the accommodation of roadway, cross slope, superelevation and any error between the interpolated and actual flood elevations.

The complete analysis is included in Addendum H.

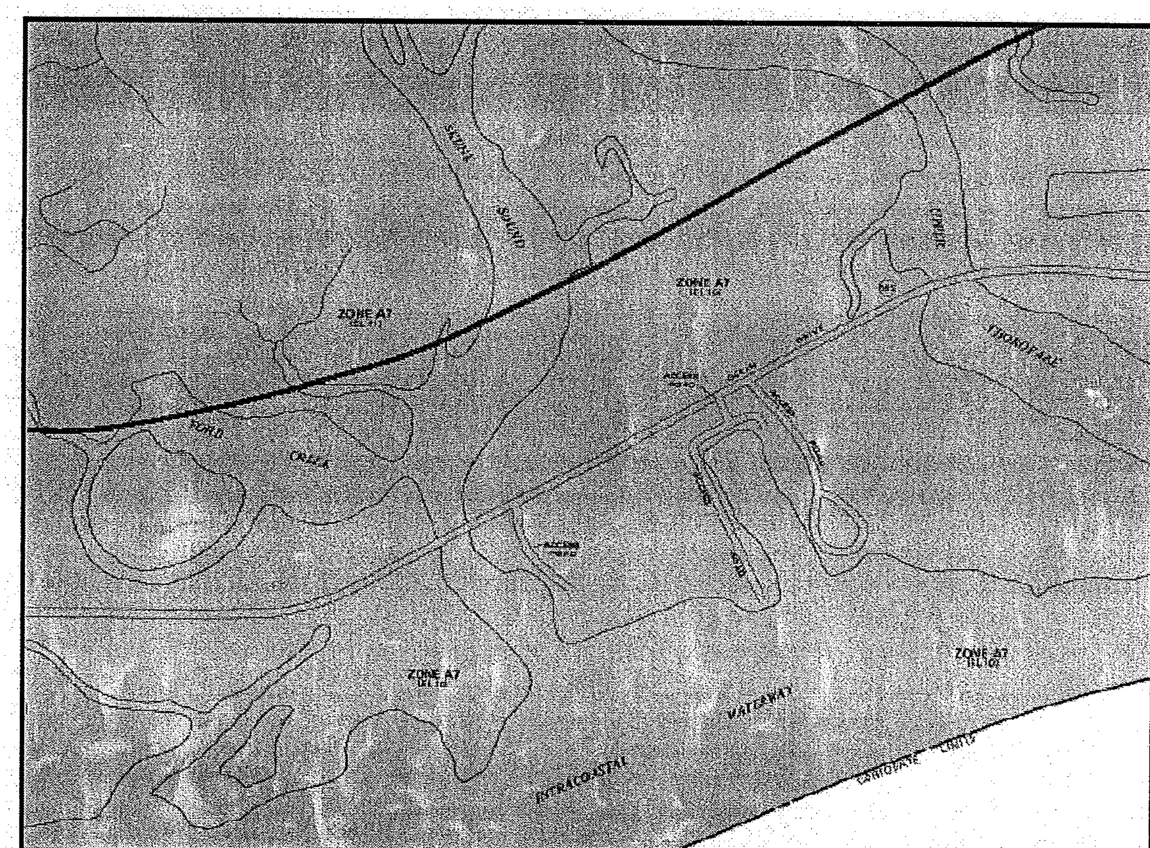


Figure 4
1983 FEMA MAP

V. PRESENTATION OF PROJECT ALTERNATIVES

Alternatives for this project were evaluated in two separate phases corresponding to the initial project limits defined in 2000 and the revised project limits defined in 2002. A "no-build" alternative, which maintains the existing conditions, was also considered. Described below are the distinguishing features of each alternative. Proposed conceptual improvements which are common to all alternatives, such as roadway embankment, culverts and toll facilities, are described in additional subsections. Presentations of Hydraulic, Scour and Traffic Analyses, as well as a detailed comparison of the various impacts and costs of the alternatives follow these descriptions. The section is completed with a discussion of required permits, clearances and anticipated design exceptions.

A. EXISTING CONDITION (NO-BUILD ALTERNATIVE)

Maintaining the existing conditions of the roadway and bridges would cause Ocean Drive to remain well below the 100-year flood elevation, would not correct the deficiencies of the three bridges, and would not reduce the traffic delays and vessel restrictions resulting from the conditions at the existing Middle Thorofare Bridge. The roadway would continue to flood, and other elements requiring upgrades, such as the culvert near Fish Dock Road, will remain substandard.

Leaving the bridges, particularly the Middle Thorofare Bridge, unaltered will allow their deterioration to continue and will assuredly result in future repairs or replacements. The condition of the Middle Thorofare Bridge is such that it could fail in the event of a major storm causing an immediate closure of the bridge and substantial disruption to the surrounding community and businesses.

B. EXISTING CONDITION (REHABILITATION ALTERNATIVE)

A second option which would maintain the existing condition would involve the rehabilitation of the existing structures, leaving all other roadway elements in place and undisturbed. In a major rehabilitation contract, the NJ Department of Transportation requires that the resulting rehabilitated structure be designed such that no reduced load posting would be necessary. In other words, the bridge would have to be made capable of carrying the current national minimum standard design load specified by AASHTO (HS20), which is a 36-ton vehicle. The current NJDOT standards design for a 25% heavier vehicle (HS20 + 25%, a 45-ton vehicle). Criteria for minimum clear roadway widths for new and reconstructed bridges require the width of the bridge to be the width of the traveled way plus 3 feet on each side.

The existing Mill Creek and Upper Thorofare Bridges were designed to accommodate a 17.5-ton vehicle and are therefore not capable of supporting the 36-ton design vehicle. The structures consist of simply supported T-Beams with a 7½" thick reinforced concrete deck. Since it is not possible to replace or place additional beams with the deck in place, the entire deck must be removed in order to carry the approved design load.

The existing structural steel for the Middle Thorofare Bridge (even before it was severely corroded) was not capable of supporting a 36-ton vehicle, and it is not possible to increase the strength on the majority of the structure without replacing or supplementing that steel. Therefore, the main longitudinal beams, which run the length of the structure, must be replaced or supplemented with additional beams. The remainder of the bridge, which is comprised of the girder spans approaching the bascule span and the bascule span itself, is supported on only two longitudinal girders.

To satisfy the HS20 (36 tons) load criteria, all of the stringers, floorbeams, and roadway gratings of the bascule span will need to be replaced. In order to increase the capacity of the main bascule girders, all of the flange cover plates would have to be removed, and new larger flange

plates constructed of higher strength steel would need to be added. In addition, the existing web plate of the existing girder is not thick enough to satisfy current design standards for local buckling, and therefore it will also be necessary to add a longitudinal stiffener to the web. All of this work will be extremely difficult and costly, because it would involve the removal of many rivets connecting the existing girder web to the existing cover plates.

In summary, to upgrade the bascule span to HS20 loading, the entire bascule span, except for the web plate of the bascule girder itself, would need to be replaced. It would be much more cost effective to replace the entire bascule girder with a new girder. However for the comparative cost included in this study we have considered the alternative where the existing web of the bascule girder is left in place. Because the existing bascule girder and other steel members will be heavier, the counterweight that balances the bascule span will also need considerable retrofitting to maintain the span in balance.

Similar to the Mill Creek and Upper Thorofare Bridges, the minimum acceptable lane width on the Middle Thorofare Bridge during construction would be 10'-0" in each direction. Since the existing roadway is only 20'-0" wide in most locations, the only viable way of rehabilitating this structure is to provide a detour during construction. This would make the emergency evacuation detour route inaccessible during the entire duration of construction.

The final result of the rehabilitated bridges would be structures with substandard widths, and a system which requires constant maintenance and repairs in addition to operation costs and inconveniences to both vehicular and navigational traffic at the Middle Thorofare Bridge. The existing roadway will remain below the 100-year flood elevation and will perhaps be completely unavailable for the entire construction duration while the bridges are closed for rehabilitation.

C. OCEAN DRIVE IMPROVEMENTS

As previously discussed, alternatives were developed in two phases, with Alternatives 1 –3 being developed when the project limits spanned from Route 109 to just west of the Middle Thorofare Bridge. These alternatives were dismissed when the project was expanded, but were used as the basis for developing new alternatives for the expanded project. These alternatives are described in the following subsections.

Alternative 1

The horizontal alignment of Alternative 1 shifts the centerline of the existing roadway approximately 8 feet to the south to allow for staged construction of the roadway while maintaining traffic in both directions. The existing pavement will be completely removed and replaced with a new roadway above the 100-year flood elevation. The profile begins above the flood elevation at approximately Station 8+15, near the intersection of Route 109. The intersection with Route 109 itself is not modified. The roadway's travel lanes remain above the flood elevation, utilizing alternating longitudinal grades of 0.35% which will improve longitudinal roadway drainage. Use of minimal vertical curve lengths will lessen the height by which the roadway is raised, and thereby diminish the amount of borrow fill required to raise the roadway. Approach grades at the Mill Creek and Upper Thorofare bridges increase slightly to no more than 1.5%. At Station 145+34, a -1.5% grade returns the profile to the existing elevation, just west of the Middle Thorofare Bridge.

The cross section of the proposed roadway would feature 12-foot travel lanes, an 8-foot paved shoulder, a 4-foot berm and embankments with slopes graded at a 1½:1 ratio to minimize impacts to bordering wetlands. The new embankments will be high enough to be considered critical slopes, and therefore will require guiderail to be placed at the edge of the berm.

Despite keeping the roadway completely within the existing Right-of-Way, the shift in the alignment results in impacts to driveways servicing several marinas and a residential community

between Route 109 and Upper Thorofare. A total of 9 driveways require regrading to meet the new roadway profile.

Structures

In this alternative, the Mill Creek and Upper Thorofare Bridges will be completely replaced with "jointless" bridges with integral abutments as described in Section 15 of the NJDOT Bridge Design Manual. This is an economical type of structure that can be built quickly. The presence of bearings and expansion joints in a superstructure within a corrosive marine environment are associated with an increased cost for inspection, maintenance and eventual replacement. By eliminating the presence of the expansion joints and bearings, as a jointless bridge would, the maintenance and replacement costs of the structure would be significantly reduced. Moreover, the integral abutment construction provides added redundancy and capacity to resist seismic loadings. A 312'-0"" long structure is proposed for the Mill Creek Bridge, since it will place the abutments approximately 6'-0" inland of the existing ones. For the Upper Thorofare Bridge, a 365'-0" long structure is proposed and will place the abutments approximately 7'-0" inland of the existing ones.

Because of the marine environment, galvanized reinforcement would be utilized for all concrete components for the entire structure. As an added measure of corrosion protection, corrosion inhibitor admixture would be used for all of the concrete components of the bridge including piles, pier caps, abutment walls, wingwalls, prestressed concrete beams, deck slabs, and barrier curbs.

The superstructure for both bridges would consist of 48" wide x 42" deep prestressed concrete box beams made continuous for live load with a 5" thick minimum reinforced concrete topping and 2'-10" utility bays at each end. This would increase the existing profile on the bridge by an average of 5'-6" on the Mill Creek Bridge and the Upper Thorofare Bridge. Sidewalks would be included on both sides of these bridges to promote recreational fishing.

With the proposed integral abutment bridge, a moment connection would be provided from the ends of the superstructure girders to the abutments. Expansion joints are thus eliminated at these locations. Rotation of the superstructure is accommodated by the flexibility of the abutment. To provide the required flexibility, a single row of vertical piles at the abutments is proposed. The continuous superstructure would act as a strut between the abutments. The longitudinal forces (earth pressure, thermal, braking, seismic) would be resisted by all of the substructure units in proportion to their respective stiffness. An appropriate modulus of subgrade reaction for the abutment backfill would be used to model the contribution of passive pressure resistance behind the abutments. The thermal movements of the superstructure, with no deck joints at the piers and abutments, would take place at the end of the approach slabs. The use of a 1" expansion joint at this location, sealed with a 1¾-inch by 1¾-inch preformed elastomeric joint sealer is proposed.

U-shaped wingwalls on piles are also proposed. The wingwalls would be isolated from the abutment by an expansion joint material in order to accommodate thermal movements from the superstructure.

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 would corrode in the marine environment, vinyl sheeting is recommended. Alternatively, steel sheeting coated with coal tar epoxy may be used. In addition to protecting against scour in front of the abutments, the sheeting would also protect against erosion of the approach embankments due to settlement and water intrusion in the embankment fill.

A flexible pile bent-type pier with a single row of vertical piles is proposed. Temporary lateral bracing would need to be evaluated during final design to see if it would be required during construction. To minimize the effect of unbalanced dead load on the pier during construction, the contractor would be instructed to alternate the placement of the beams in each span, so that at any given time not more than a single beam is contributing to the unbalanced dead load.

Based on a preliminary evaluation of the available subsurface information, 20-inch square prestressed concrete piles are recommended for support of the abutments and piers. Concrete filled steel pipe piles were considered but not selected because of the corrosive marine environment.

Alternative 2

All major aspects of Alternative 2 are the same as Alternative 1, except that the horizontal alignment of the road is shifted 8 feet to the north. Again, the shift will accommodate the same staged construction, but this time will impact various commercial properties on the north side of Ocean Drive just west of the Middle Thorofare Bridge. The proposed design of the Mill Creek and Upper Thorofare bridges does not differ from Alternative 1, except for the shift of alignment which may alter some dimensions slightly.

Alternative 3

A June 2000 public information center resulted in the formation of a third alternative, which revised the horizontal alignments proposed in Alternatives 1 and 2 to reduce the overall number and severity of driveway impacts. Alternative 3 mimics the alignment of Alternative 1, shifting the roadway to the north from Route 109 to just east of the Mill Creek Bridge. At this point, the alignment then shifts to the south of the existing baseline, as proposed in Alternative 2. The alignment continues exactly the same as Alternative 2 to its termination just west of the Middle Thorofare Bridge. As in Alternative 2, the proposed design of the Mill Creek and Upper Thorofare Bridges are not significantly different from the description provided in Alternative 1, except for minor variations in dimensions due to the alignment shift.

D. OCEAN DRIVE IMPROVEMENTS AND MIDDLE THOROFARE BRIDGE REPLACEMENT

As previously mentioned, Alternatives 1-3 were dismissed when the project was extended to include the Middle Thorofare Bridge and roadway to Wildwood Crest. The new alternatives developed for the expanded project, however, built directly upon Alternative 3. For this reason, the new alternatives are entitled Alternative 3A through Alternative 3G. The development of these seven alternatives, along with the major features of each, is described in the following sections. A summary of the alternatives is shown below in Table II. The colors in the table correspond to the colors used to depict each alternative in Figure 3. Also, an additional Existing Conditions Alternative (Replace In-Kind) was considered for the Middle Thorofare Bridge.

Existing Condition (Replace In-Kind Alternative)

The Replace In-Kind Alternative would retain the historic character of the existing Middle Thorofare Bridge by constructing a replacement bridge "in-kind", keeping the character, type, and style of the existing bridge intact while increasing its load carrying capacity to current standards, providing a scour resistant subsurface and improving operating and safety conditions where possible. In order to maintain the appearance of the existing bridge to the largest extent possible, it is estimated that the replacement bridge in this alternative would be reconstructed with the same span lengths while the bridge width would be increased to accommodate two 12-foot travel lanes and 8-foot shoulders, consistent with the approach roadways.

To replace the bridge in its present location, the existing structure would have to be closed in its entirety for a period of time of at least 24 months and all traffic detoured. Maintenance of traffic is not feasible on the bridge due to the narrow width of the existing structure which will not accommodate even one lane of traffic during construction. The fact that the bridge is supported by only three longitudinal beams and three piles at each pier also complicates the staged construction operation.

Replicating the existing bridge would not be a cost effective design. The steel superstructure of such a low level bridge would be a constant source of maintenance problems, even with current state-of-the-art steel coating systems.

The redesigned trestle spans would be supported on 14-inch square prestressed concrete piles driven to a sufficient depth to ensure that they would not be subject to scour, erosion or shifting of the ocean floor. Protective measures would have to be used with these slim piles, to minimize problems associated with wave action. Precast pile caps grouted in place would be used to minimize construction in the water. The structural members would be similar to the existing plans, but would be designed to carry an HS20 + 25% (45 tons) vehicle. The additional roadway width would increase the number of girders and make the two girder spans non-redundant.

While the in-kind replacement mitigates the loss of the original historic bridge by providing a "look alike" replacement designed to current load standards and future anticipated scour conditions, the end result of this alternative would be a costly bridge, both in terms of construction and user and life cycle costs. Additionally, the bascule span would be constructed to match the existing navigational channel and therefore would still be substandard from a vessel safety, maintenance, and socio-economic standpoint while the community would still be faced with the inconvenience of the movable span, single lane toll booths, and related traffic delays. This alternative will not meet the future requirements of the Commercial Fishing Industry due to the 50 feet wide channel opening which is not acceptable to the US Coast Guard.

Table II
Summary of Alternatives & Middle Thorofare Bridge

Alternatives Summary			
Alternative	**Bridge Type & Description**	**Alignment Shift**	**Bridge Design & (Vertical Clearance)**
3A	**Movable on Shifted Alignment**	**South**	**Bascule (45 ft)**
3B	**Movable on Shifted Alignment**	**North**	**Bascule (45 ft)**
3C	**Fixed on New Alignment**	**North**	**Segmental (116 ft)**
3D	**Fixed on New Alignment**	**North**	**Segmental (116 ft)**
3E	**Fixed on Shifted Alignment**	**South**	**Segmental (116 ft)**
3F	**Fixed on New Alignment**	**South**	**Segmental (116 ft)**
3G	**Fixed on New Alignment**	**South**	**Cable Stayed (116 ft)**

Alternative 3A

Alternative 3A replicates Alternative 3 from Route 109 to the Upper Thorofare crossing. At this point, however, the roadway varies from the alignment of Alternative 3 and maintains its shifted alignment south of the existing centerline to a new Middle Thorofare Bridge, constructed approximately 30 feet south of and parallel to the existing bridge. This alignment is shown in Figure 5. The roadway in the area between Upper and Middle Thorofares would now also be maintained above the 100-year flood elevation. The approach to the new bridge, which has a 45-foot minimum vertical clearance at the navigation channel, causes a significant increase in the roadway profile at the western edge of Middle Thorofare, resulting in 9 driveway adjustments and 2 driveway closures in that area. Maintaining access to the numerous, remaining driveways in this area during construction would be extremely difficult due to their close proximity and the amount of embankment required in this area. Maintenance of access is a critical issue for this area of the project, as many of these driveways service fishing-related businesses with time-sensitive products. To maintain access to Lund's Fisheries, a new, realigned driveway supported on both sides by retaining walls would need to be constructed. Access impacts are described and compared in more detail in Section VI.

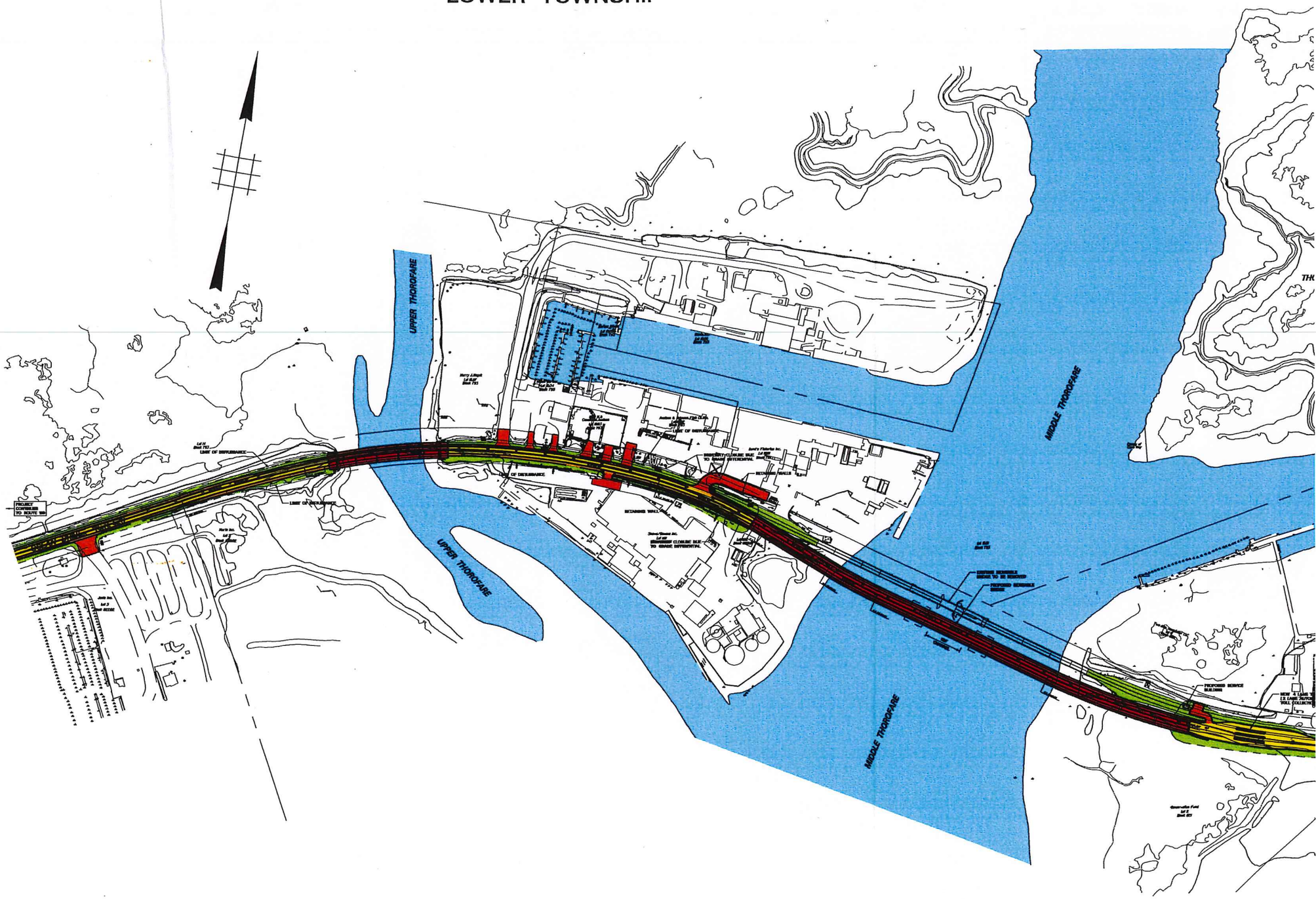
An extensive vessel survey was completed as part of this study to determine the optimum vertical and horizontal clearances for each bridge type considered among the various alternatives. The study is included in Addendum D. The study concluded that proposed movable spans should have a clear channel opening of 130 feet and be placed 45 feet above mean high water. Such clearances would reduce the number of openings by approximately 30%. The alignment of the roadway across Middle Thorofare is primarily a tangent section. Horizontal curves connect the structure to the proposed roadway's otherwise shifted alignment. To obtain the required vertical clearance, the roadway features steep approach grades of 6% on either side of the bridge. The steep grades are required to minimize Right-of-Way and access impacts to neighboring businesses. The existing Middle Thorofare Bridge and vacated approach roadways would be demolished.

A new toll plaza facility is proposed immediately adjacent to the Middle Thorofare Bridge's eastern abutment. The design of this toll facility is based upon a separate study by Parsons Brinckerhoff entitled, "Toll Plaza Relocation Study," dated February 2001. The facility would feature four lanes of toll collection. Also proposed at the toll facility is a small service building and parking for toll and bridge operations staff. The study is included in Addendum I. The facility is located on both horizontal and vertical curves, neither of which is ideal. The location of the facility was dictated by the need to preserve existing toll collection patterns. Had the toll facility been located at a different location on Ocean Drive, motorists traveling to local businesses adjacent to the bridge would ultimately either cross the bridge for free, or pay a toll to reach a destination without crossing the bridge. Because of the toll plaza's location, the driveway to the Dolphin Cove Marina will be relocated approximately 100 feet north of its current location. The relocated driveway will be immediately adjacent to the toll facility. Though an improvement from its existing location, this is still not completely desirable due to potential left-turn conflicts with queued traffic from the toll facility. Traffic operations related to the toll facility are discussed in Article J of this section.

The alignment continues to the north, offset from the existing Ocean Drive alignment by approximately 8 feet, and raised above the existing roadway by approximately 5.5 feet. At approximately Station 127+50, an existing pipe culvert carrying flows from Old Lower Thorofare will be replaced with a concrete box culvert. Hydraulic design is discussed in Article H of this section.

At Station 132+00, Fish Dock Road (CR 630) intersects Ocean Drive with a T-intersection. The configuration of this intersection will remain unchanged, though approximately 100 feet of Fish Dock Road will be regraded to meet the raised profile of Ocean Drive. At approximately Station

LOWER TOWNSHIP



PLANS FOR THIS ALTERNATIVE ARE INCLUDED IN APPENDIX "E"

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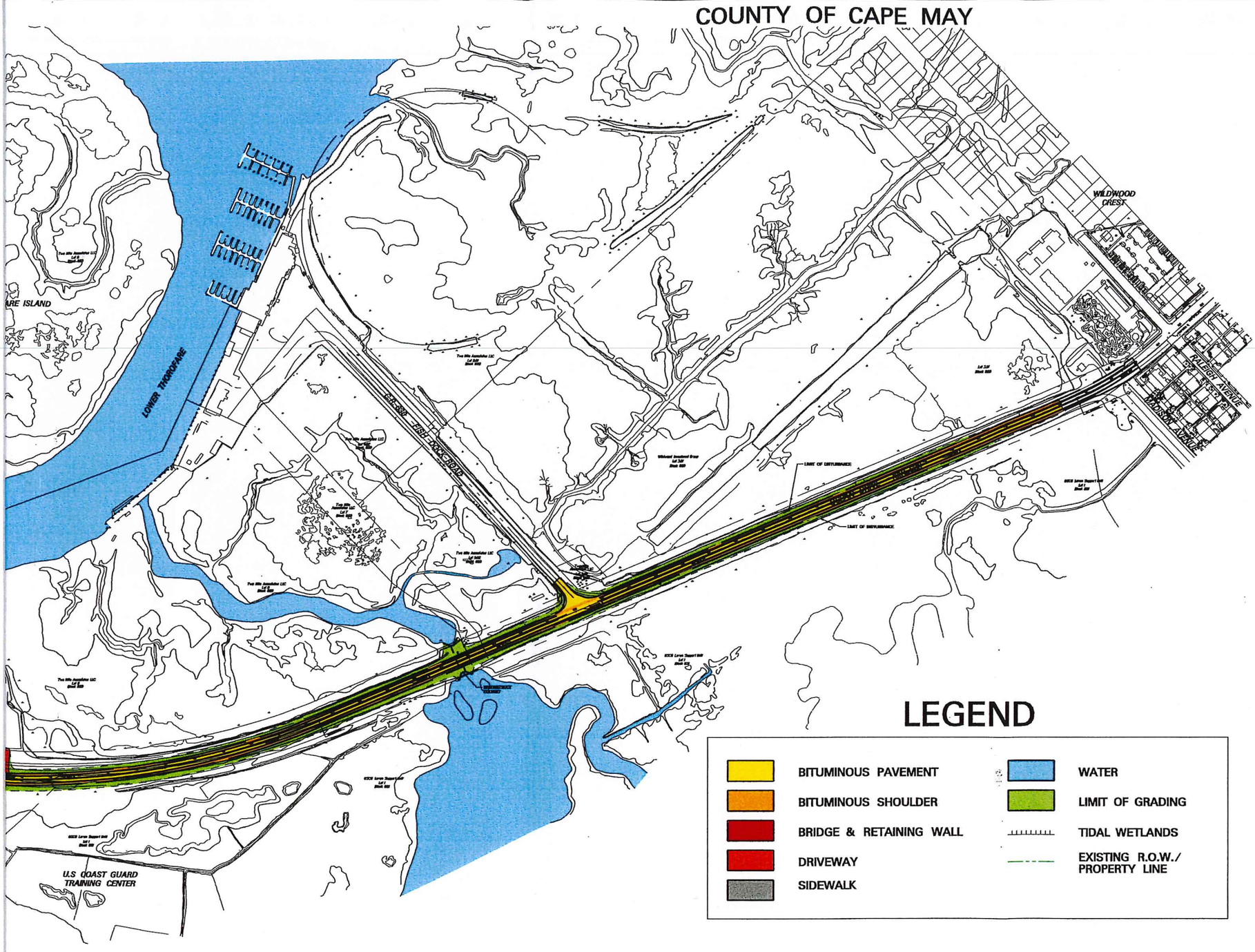


ALTERNATIVE 3A

FIGURE 5

PB 100 YEARS

OCEAN DRIVE UPGRADE & BRIDGE REPLACEMENTS

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

NOVEMBER 2003

144+00, Ocean Drive's profile begins to descend at 1.5% to meet the existing roadway profile at Station 150+00, approximately 150 feet south of Madison Avenue. An additional 300 feet of resurfacing is required to correct the deficient horizontal curvature at this location. The limit of paving is located just east of Madison Avenue at Station 153+00.

Utility relocations would be required throughout the project. Most notable among the relocations is the need to relocate poles carrying aerial electric and telephone lines. The poles are located along the north side of Ocean Drive between Route 109 and approximately Station 38+00, where the lines cross to the south side of the roadway. Additional relocations of poles located along the south side of Ocean Drive will be required from the Mill Creek Bridge through to the project terminus at Diamond Beach. An existing gas main will likely need to be raised from Route 109 to approximately Station 18+50 due to the extra embankment. A major relocation of the existing underground sanitary sewer force main will be required from just east of the Upper Thorofare Bridge to the project's easterly limits, where a pumping facility is located. It is possible that this relocation could be shortened to end just east of the proposed toll plaza, depending upon the exact depth of the main.

Structures

The proposed Mill Creek and Upper Thorofare Bridges are identical to those proposed in Alternative 1 and are shown in Figures 6 and 7. The proposed Middle Thorofare Bridge is discussed in more detail below.

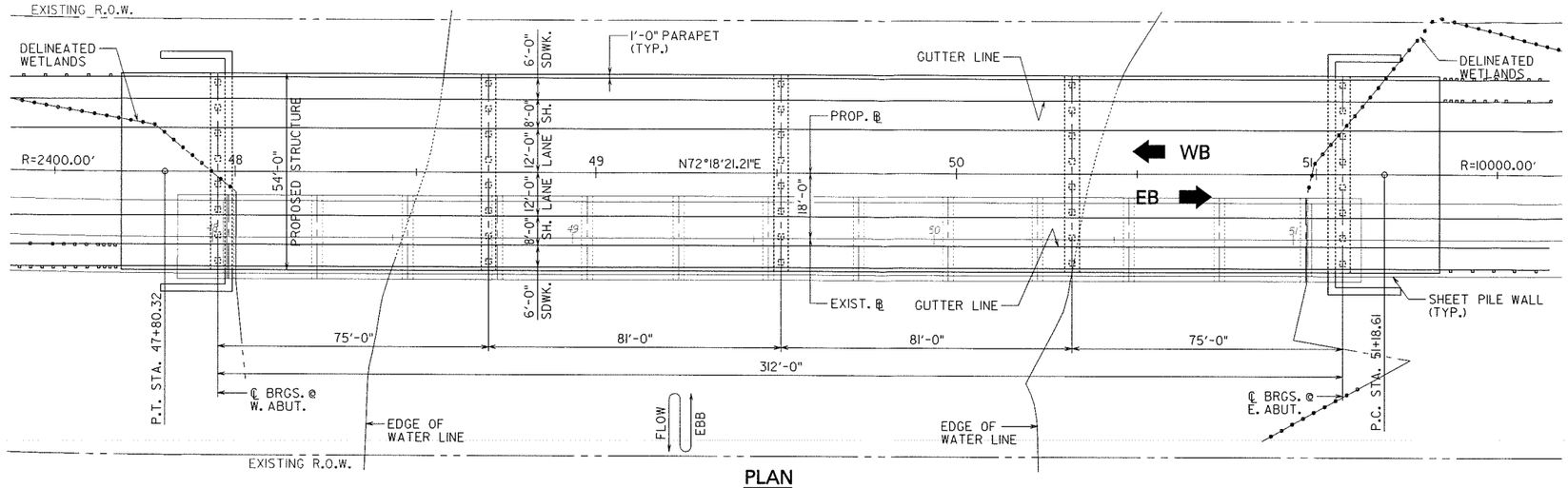
The existing Middle Thorofare Bridge was built in 1940 and includes a movable span consisting of a single-leaf bascule bridge with a 50-foot wide navigational channel with a 26-foot vertical clearance in the closed position. The proposed movable structure will consist of a double-leaf bascule bridge with an increased vertical clearance of 45 feet in the closed position and a 130-feet wide horizontal opening between fenders at the navigation channel. The approach spans will consist of AASHTO Type VI Prestressed Concrete Girders with a conventional concrete deck with span lengths of 124.5 feet. The bridge will accommodate two 12-foot travel lanes, two 8-foot shoulders, and 6-foot sidewalks. A plan of this alternative with cross sections of the approach and bascule spans is shown in Figure 8. Foundations would consist of large cylinder piles or drilled shafts with a pier table at the waterline and piers with single shaft hammerheads or multi-column configuration. The bascule pier can be an open type configuration instead of a closed pit pier since the span would be high above the waterway.

Several retaining walls totaling 920 feet in length will be required for this alternative with 690 feet of these walls located adjacent to the west abutment of the Middle Thorofare Bridge and the remainder required for a relocated driveway for Lund's Fishery. The use of prefabricated MSE retaining walls will reduce Right of Way acquisitions and wetlands impacts.

Alternative 3B

This alternative differs from Alternative 3A only by the location of the Middle Thorofare Bridge. In Alternative 3B, the proposed bridge also includes the double leaf bascule bridge, but is located 30 feet north and parallel to the existing bridge as shown in Figure 9. Because of this offset, the roadway's alignment differs from Alternative 3A beginning at the Mill Creek Bridge. In Alternative 3A, the alignment shifted from a north offset to a south offset. Alternative 3B preserves the northern offset across Upper Thorofare towards Middle Thorofare. The Upper Thorofare Bridge, despite being offset to the north, is otherwise similar to that described in Alternative 1. East of Upper Thorofare, the roadway's alignment continues on a horizontal curve through lands of Axelsson & Johnson Fish Co., and Lund's Fisheries. Two structures (a storage shed and refrigerated fish processing building) on these properties would require demolition.

As with Alternative 3A, the alignment creates significant access issues for businesses located in this vicinity, with 4 driveways being closed, and 6 being regraded. Access to Lund's Fisheries



PLAN

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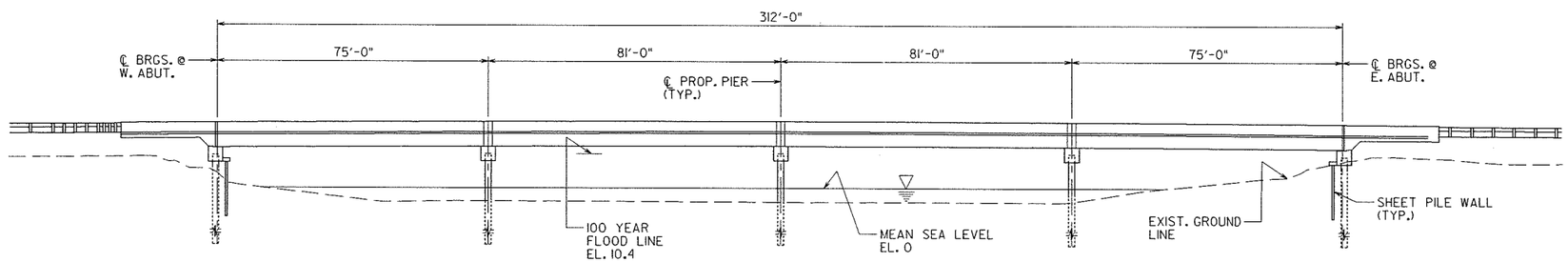

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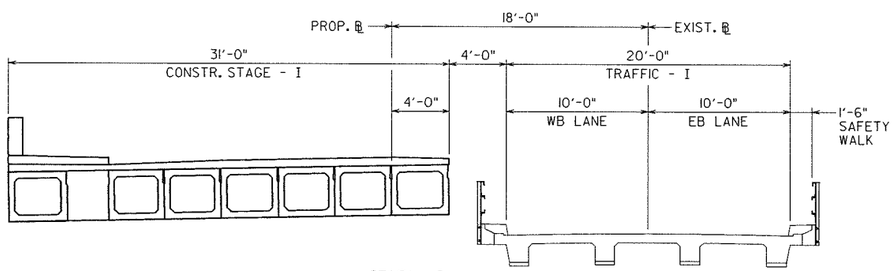
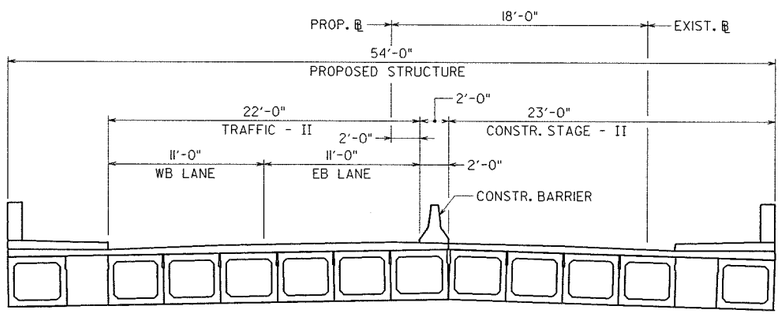


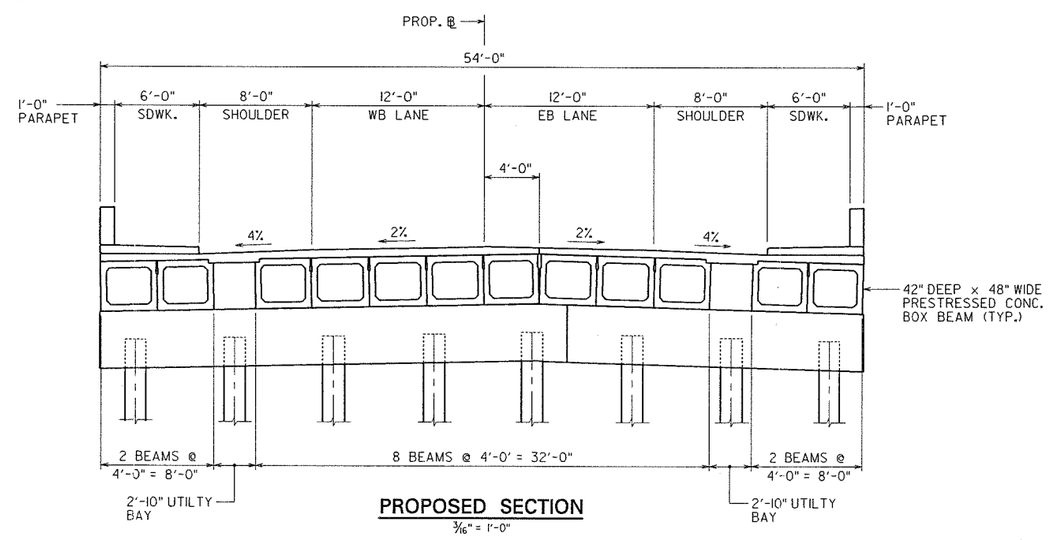
STAGE – I



STAGE – II

CONSTRUCTION SEQUENCE

3/16" = 1'-0"



PROPOSED SECTION

3/16" = 1'-0"

MILL CREEK

FIGURE 6

PB 100 YEARS

OCEAN DRIVE UPGRADE & BRIDGE REPLACEMENTS

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

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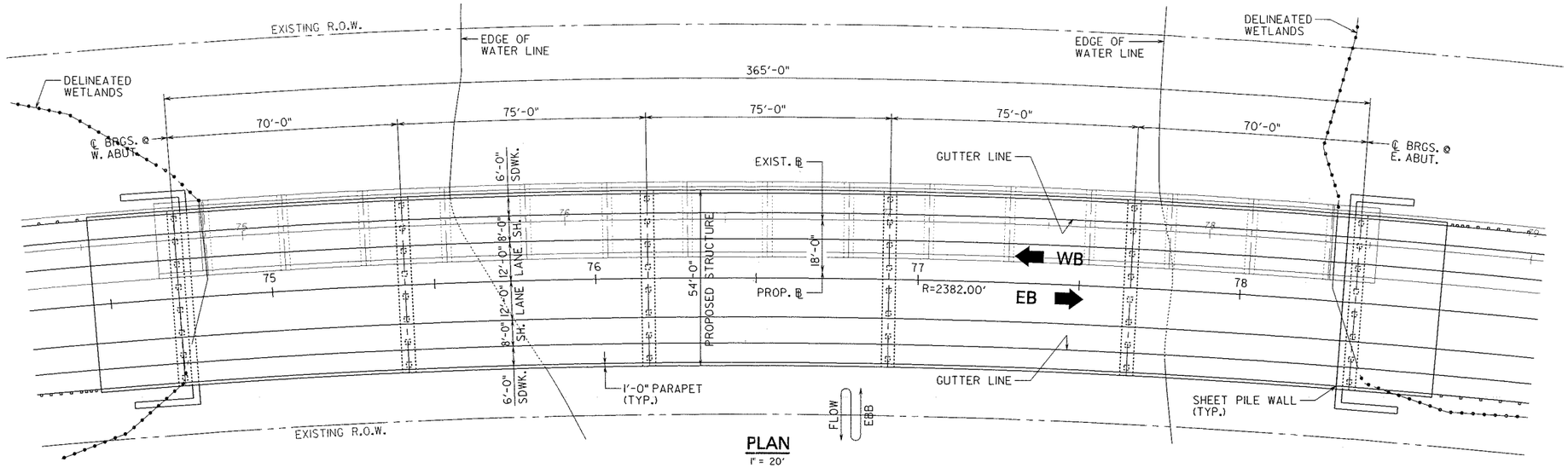

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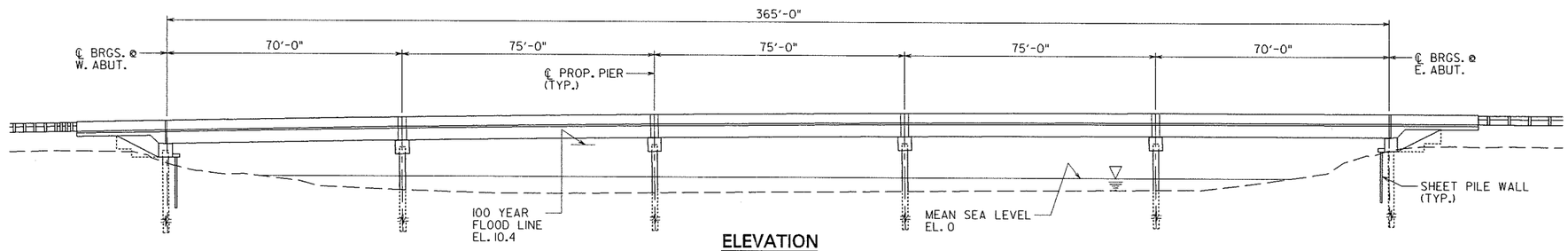

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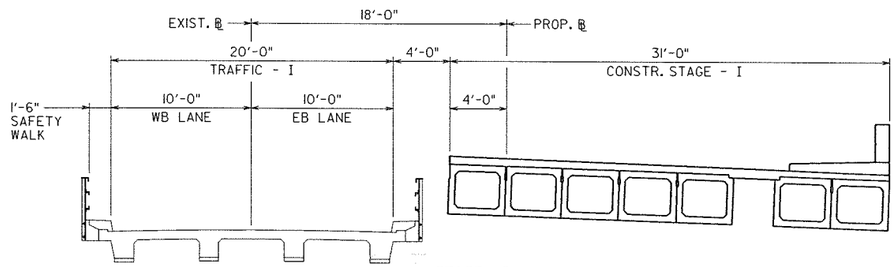

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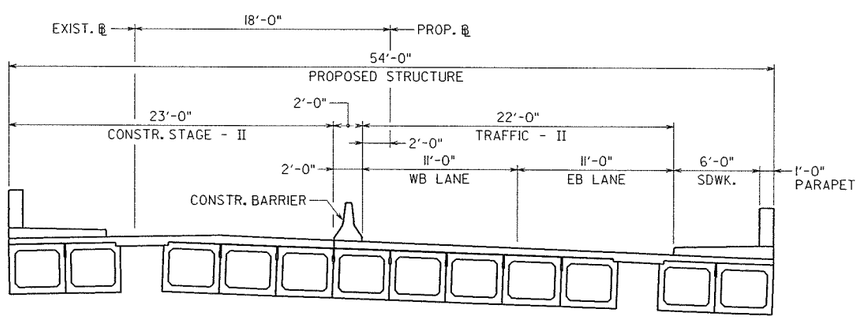
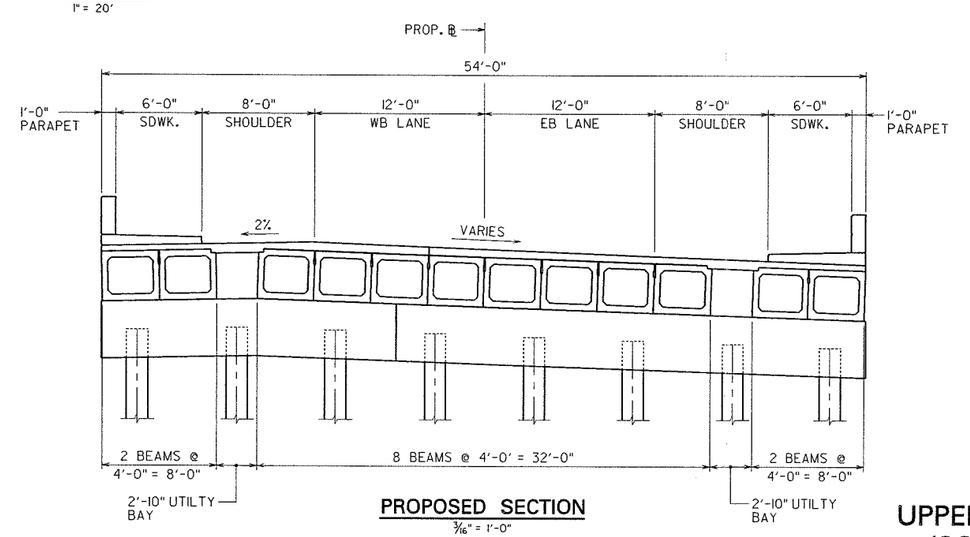


STAGE - II

CONSTRUCTION SEQUENCE
3/16" = 1'-0"



PROPOSED SECTION
3/16" = 1'-0"

UPPER THOROFARE
(SOUTH SHIFT)

FIGURE 7

PB 100 YEARS

OCEAN DRIVE UPGRADE
& BRIDGE REPLACEMENTS

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

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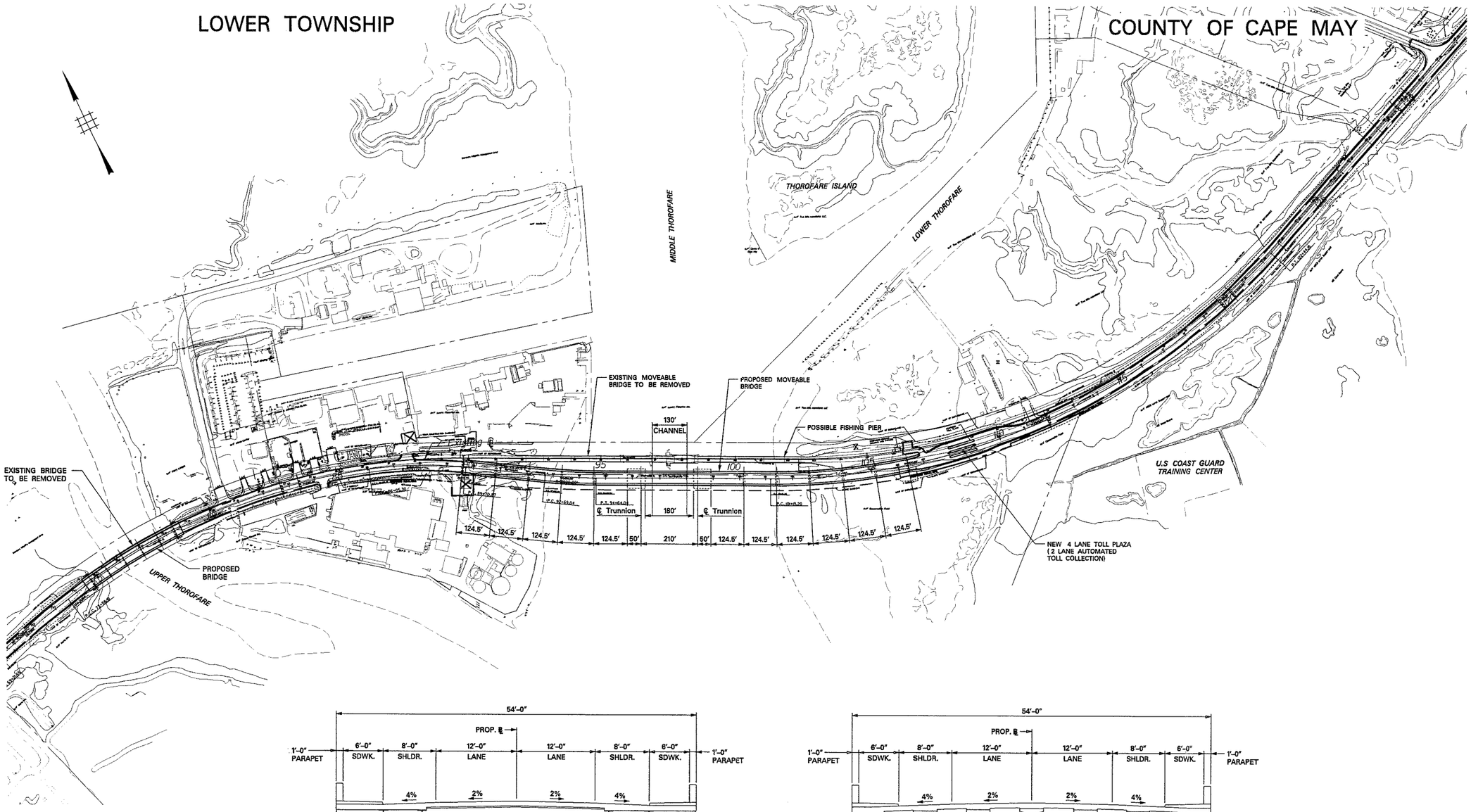

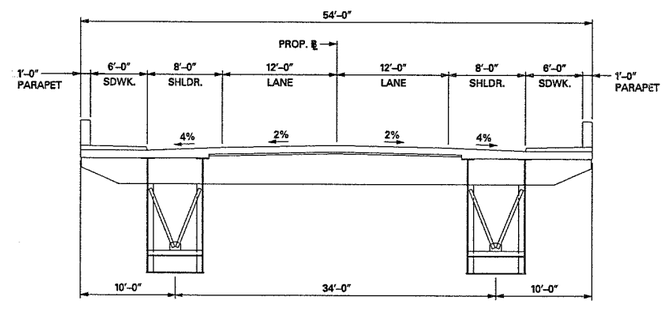

TYPICAL BASCULE SECTION

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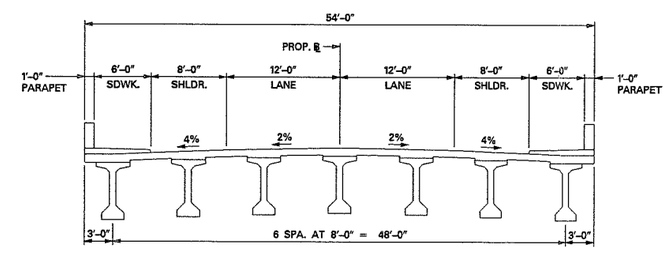

TYPICAL APPROACH SECTION

N.T.S.

SCALE IN FEET

400' 200' 0 400' 800'

ALTERNATIVE 3A

FIGURE 8

PB 100 YEARS

OCEAN DRIVE UPGRADE & BRIDGE REPLACEMENTS

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

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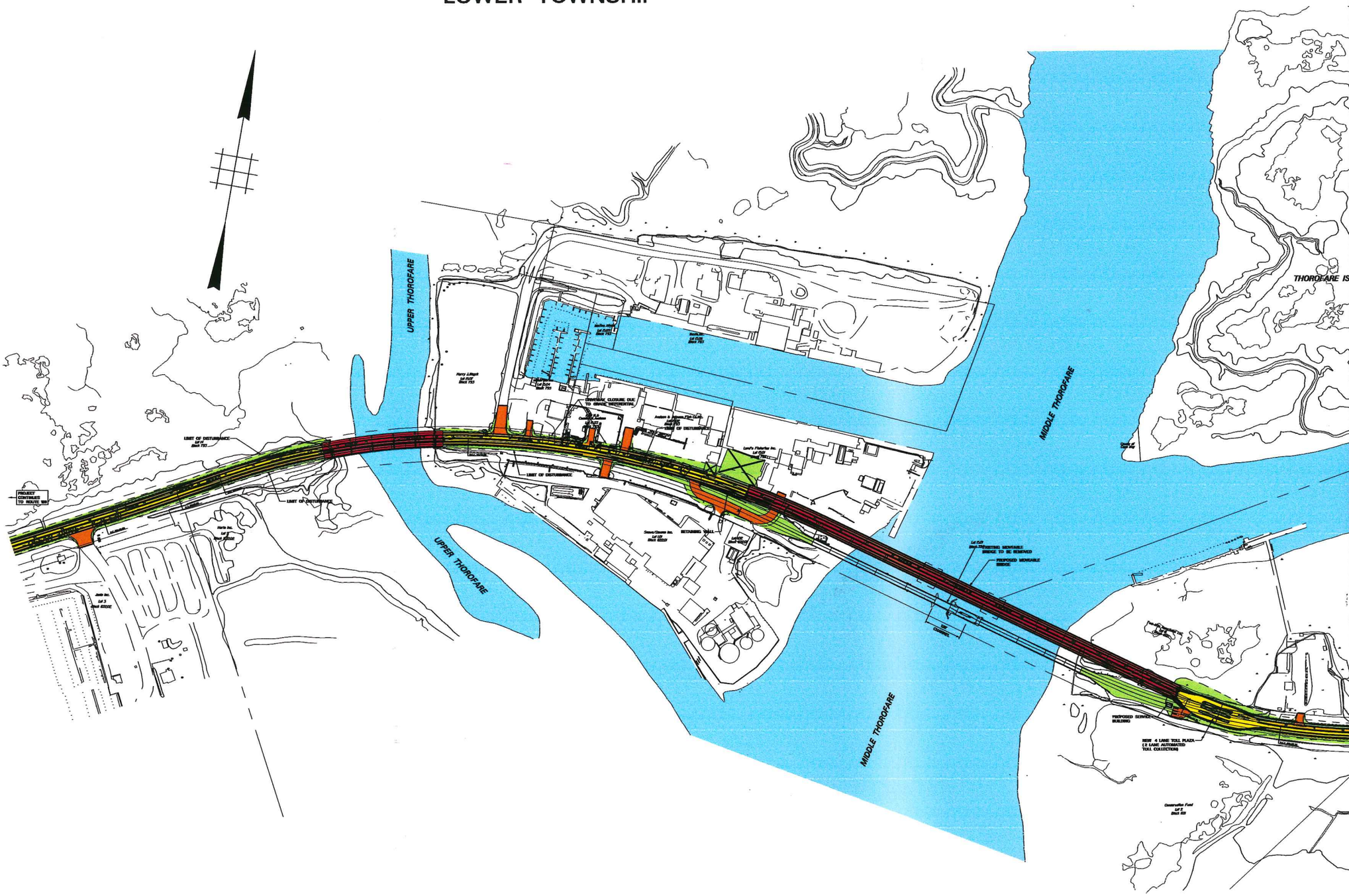
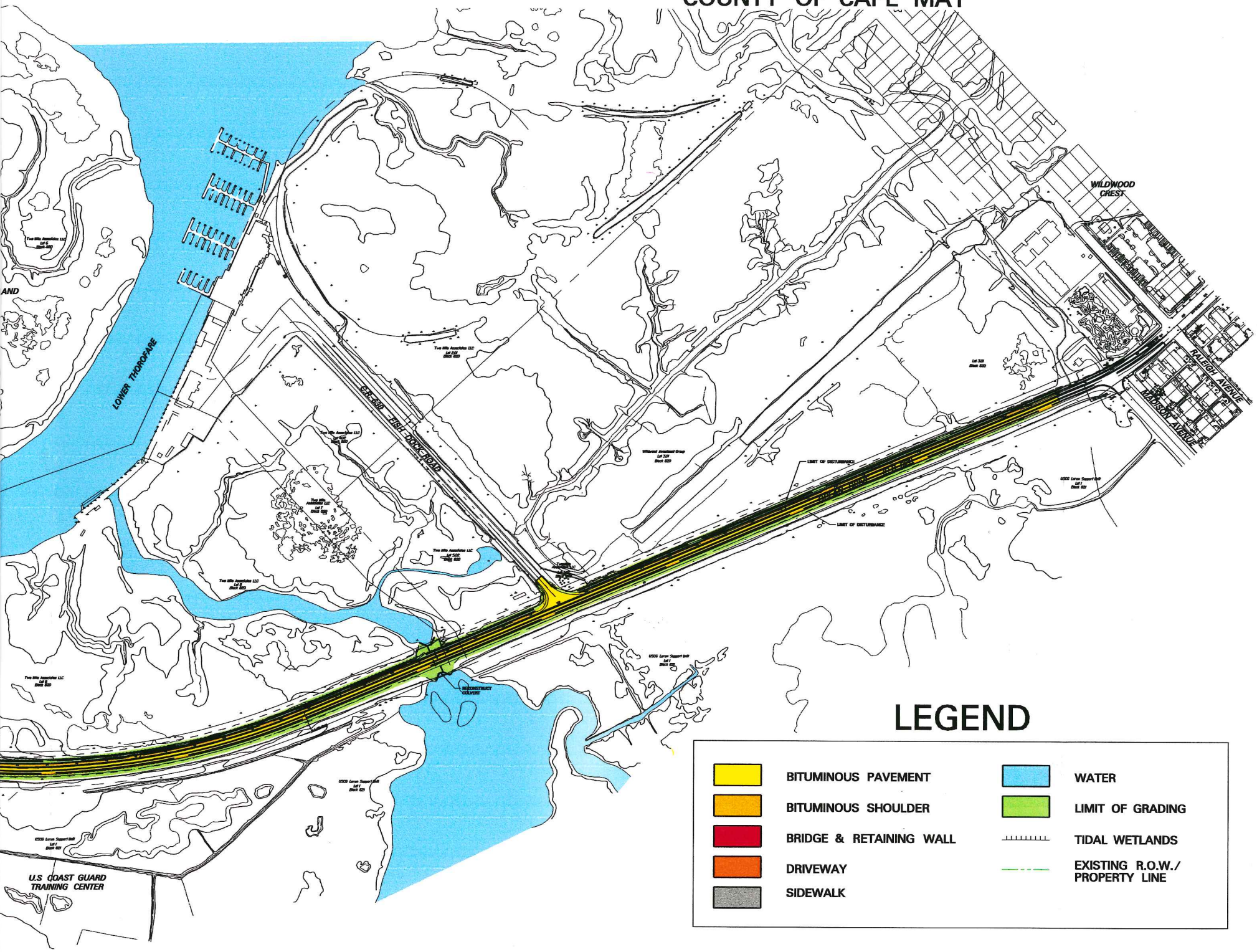


PLANS FOR THIS ALTERNATIVE ARE INCLUDED IN APPENDIX "E"

COUNTY OF CAPE MAY



LEGEND

- BITUMINOUS PAVEMENT
- BITUMINOUS SHOULDER
- BRIDGE & RETAINING WALL
- DRIVEWAY
- SIDEWALK
- WATER
- LIMIT OF GRADING
- TIDAL WETLANDS
- EXISTING R.O.W./ PROPERTY LINE

ALTERNATIVE 3B

FIGURE 9

PR 100 YEARS

OCEAN DRIVE UPGRADE & BRIDGE REPLACEMENTS

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

NOVEMBER 2003

(Block 793, Lot 15.01) and Snow's/Doxsee (Block 822.01/Lot 1.01) will be through a new driveway constructed along the existing Ocean Drive. The driveway will extend under the proposed bridge to Lund's. As with Alternative 3A, there are serious concerns regarding the ability to construct the roadway while maintaining access to these properties during construction.

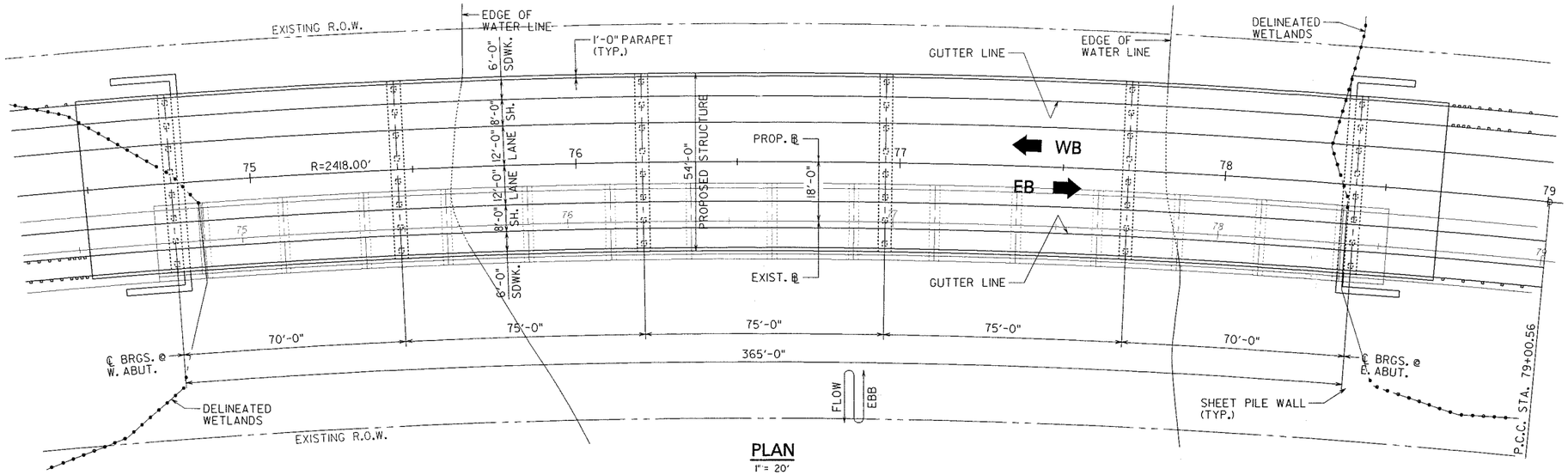
The approaches to the bridge are similar to those presented in Alternative 3A. The approach grades are a steep 6% to provide the same 45-foot vertical clearance for the navigational channel. The roadway connects to the existing Ocean Drive to the east of the bridge through a horizontal curve. The proposed toll facility is located within this curve. Similar to Alternative 3A, the toll facility is also located on a vertical curve. The driveway to the adjacent Dolphin Cove Marina (Block 820, Lot 8) does not need to be relocated as in Alternative 3A and it is more than 100 feet from the toll facility, lessening the concern over left-turn conflicts through queued traffic. From this point, through to the project's terminus, the Alternative is similar to Alternative 3A.

Alternative 3B features similar utility conflicts as Alternative 3A from Route 109 to Mill Creek. It does, however, eliminate the need to relocate poles along the south side of Ocean Drive from Mill Creek through the project's easterly limits. Also eliminated by this alternative's northern shift is the relocation of the sanitary sewer main.

Structures
The bridges in Alternative 3B differ from Alternative 3A mainly by their location. The length of retaining walls is significantly reduced to only a 150 foot extension of the southwest wing wall. The structures for Upper Thorofare and Middle Thorofare are shown in Figures 10 and 11, respectively. The Mill Creek Bridge would be as shown in Figure 6.

Alternative 3C
Having presented two alternatives with moveable bridges on a parallel alignment at Middle Thorofare, Alternative 3C presents a high-level fixed bridge on a new alignment. Much like Alternative 3B, this alignment preserves the northern offset east of Mill Creek. At approximately Station 63+50, the roadway curves to the left, through the lands of the Marmora Wildlife Center (Block 793, Lot 14) as shown in Figure 12, crossing Upper Thorofare on a new structure to lands behind Atlantic Cape Fisheries (Block 793, Lot 15.06). After the Upper Thorofare Bridge, the road curves to the right, and intersects a new service road at Station 83+40. This two lane service road connects the realigned Ocean Drive with the existing section of Ocean Drive between Upper and Middle Thorofares. This service road will not be above the 100-year flood elevation, but will feature the same cross section as Ocean Drive – one 12-foot lane and an 8-foot shoulder in each direction. It generally follows the alignment of the driveway currently servicing Atlantic Cape Fisheries, and meets existing Ocean Drive at a T-intersection. Existing driveways for Atlantic Cape Fisheries and Hinch Marina (Block 793, Lot 15.04) will be realigned to meet the new service road. A 200 foot long retaining wall will be required on the roadway's eastern side parallel to the existing marina. Both the existing Upper and Middle Thorofare Bridges will be demolished, and a vehicular turnaround and related retaining wall will be constructed immediately west of the existing bridge to form a cul-de-sac. The remaining pavement of Ocean Drive will be milled and resurfaced.

Once beyond its intersection with the new service road, the realigned Ocean Drive travels on a 5% upgrade over uplands along the edge of the Atlantic Cape Fisheries' property. The structure begins approximately at Station 91+10, and provides a vertical clearance of 75 feet over Middle Thorofare and the Intracoastal Waterway channel. The 75-foot clearance is consistent with the findings of the navigational study which concluded that no vessels taller than 75 navigate beyond this point in Middle Thorofare. The alignment continues across Thorofare Island on structure, crossing Lower Thorofare with a vertical clearance of 116 feet clearance over the channel. This vertical clearance will allow for a 108' refrigeration vessel to dock at Lund's



PLAN
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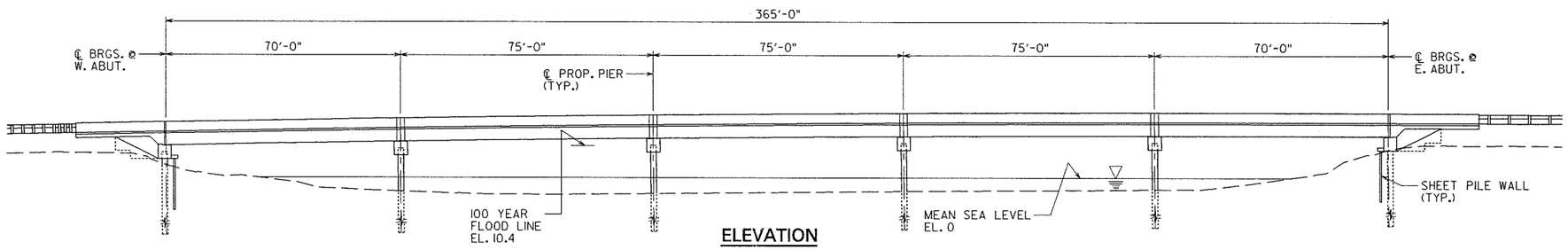

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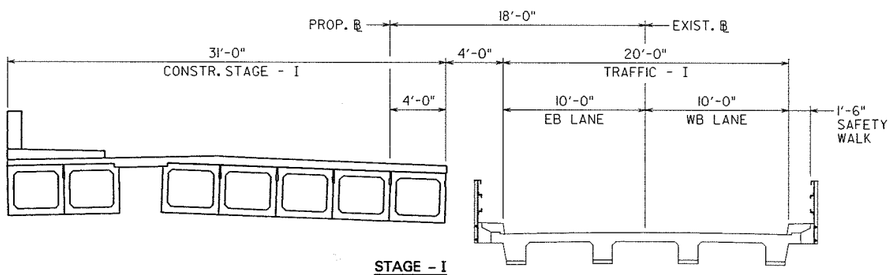
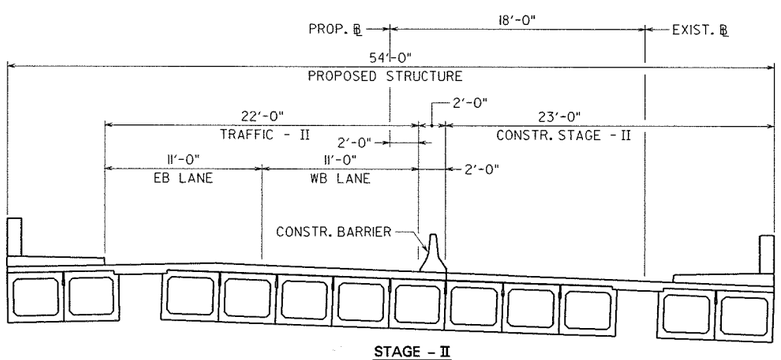
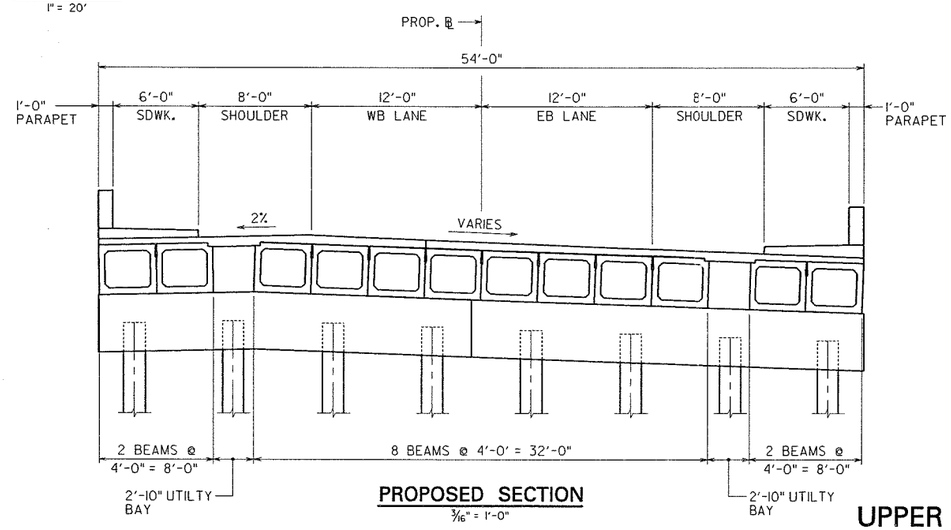


STAGE - I



STAGE - II

CONSTRUCTION SEQUENCE
3/16" = 1'-0"



PROPOSED SECTION
3/16" = 1'-0"

UPPER THOROFARE (NORTH SHIFT)

FIGURE 10

PB 100 YEARS

OCEAN DRIVE UPGRADE & BRIDGE REPLACEMENTS

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

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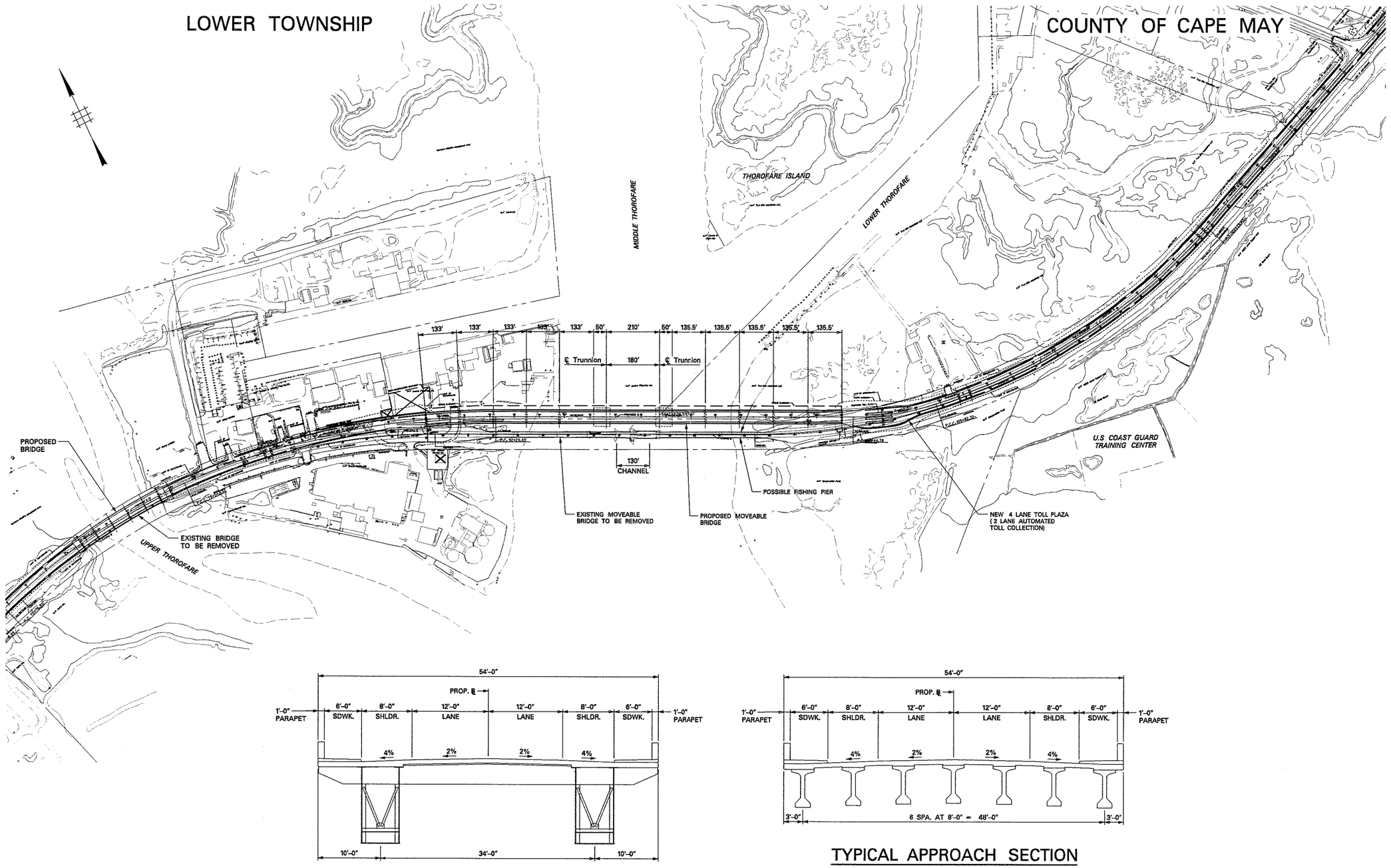

TYPICAL BASCULE SECTION
N.T.S.

TYPICAL APPROACH SECTION
N.T.S.

SCALE IN FEET
400' 200' 0 400' 800'

ALTERNATIVE 3B

FIGURE 11

PB 100 YEARS

OCEAN DRIVE UPGRADE
& BRIDGE REPLACEMENTS

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

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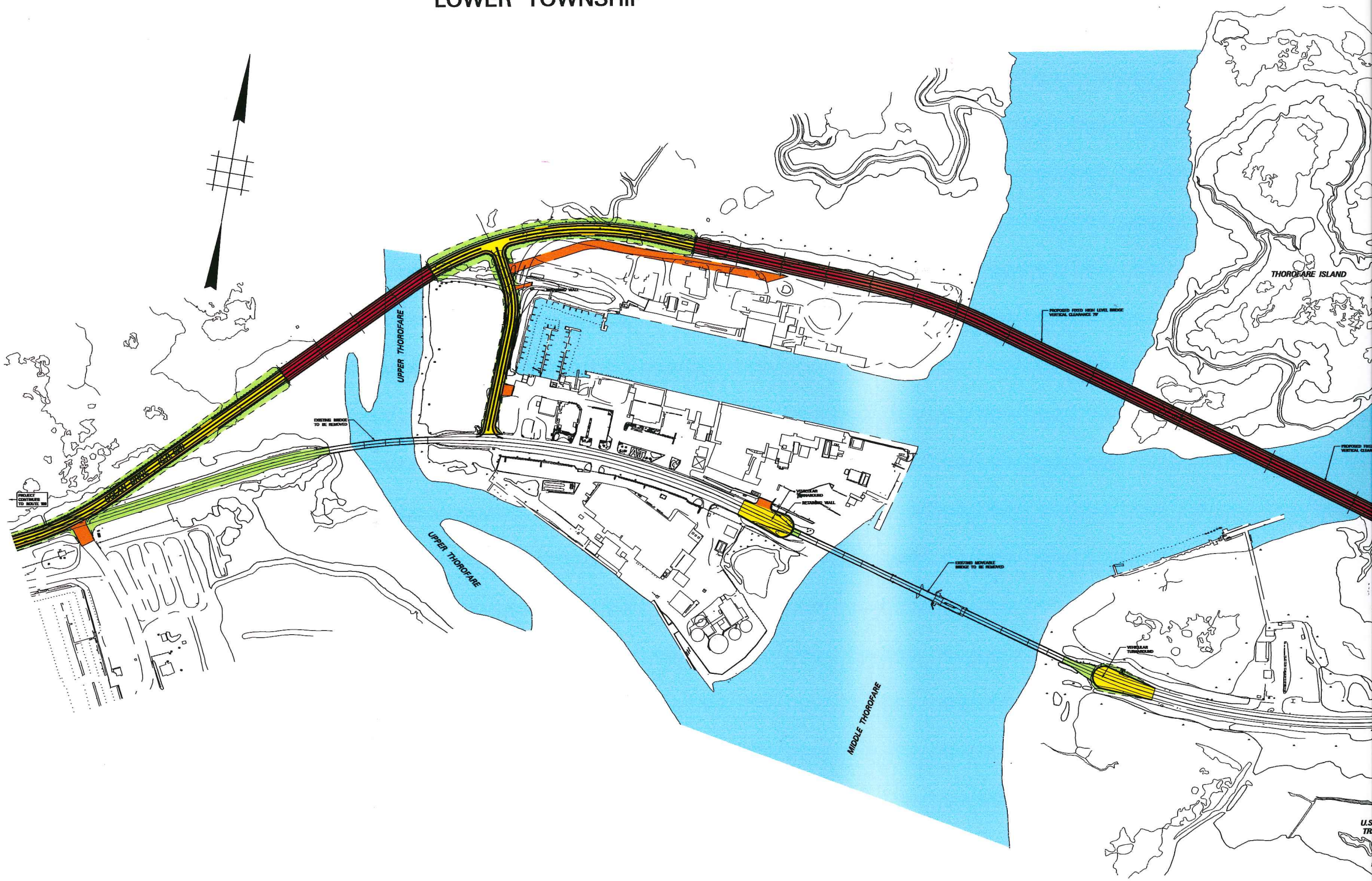
LOWER TOWNSHIP



PLANS FOR THIS ALTERNATIVE ARE INCLUDED IN APPENDIX "E"

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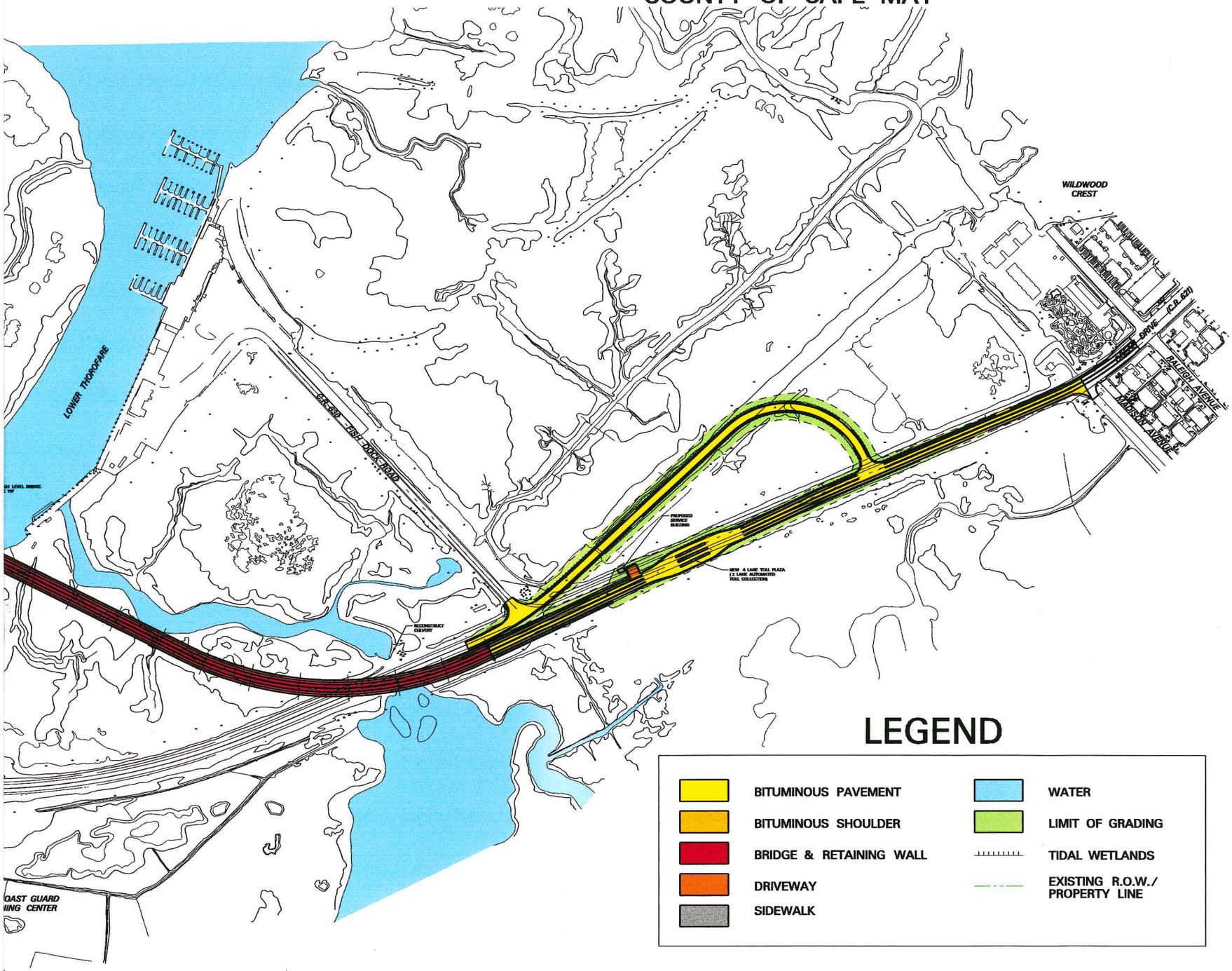
COUNTY OF CAPE MAY



ALTERNATIVE 3C

FIGURE 12

PB 100 YEARS

OCEAN DRIVE UPGRADE & BRIDGE REPLACEMENTS

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

NOVEMBER 2003

facilities located at Two Mile Associates (Block 820, Lot 8). Provision for all fishing vessels, presently and in the future, is a requirement of the US Coast Guard (See Meeting Minutes in Appendix D). Having crossed Lower Thorofare, the roadway continues on a 6% downgrade towards the existing Ocean Drive. Curving to the left, the roadway crosses over the existing Ocean Drive, slightly onto the lands belonging to the US Coast Guard (Block 821, Lot 1). The bridge ends at Station 134+00, but continues to be supported by retaining walls through Station 136+00 on the left, and Station 138+00 on the right. From the terminus of the bridge through Station 145+00, the roadway is on a tangent, approaching the existing Ocean Drive's alignment. This tangent section also features the proposed toll facility. By Station 147+00, the alignment of Ocean Drive is parallel to existing Ocean Drive, offset to the south by 8.5 feet, as with previous alternatives. The proposed roadway again meets the existing roadway profile approximately 150 feet west of Madison Avenue and proposed paving terminates just west of Raleigh Avenue at Station 157+00.

Because of the substantial difference in grade, a direct intersection between Fish Dock Road and the realigned Ocean Drive is not possible. A new service road connecting the existing Ocean Drive and Fish Dock Road with the relocated Ocean Drive is proposed. The service road would utilize existing uplands along a previously abandoned alignment of Ocean Drive. Much like the service road west of Middle Thorofare, this roadway would not be above the 100-year flood elevation, but will feature the same cross section as Ocean Drive – one 12-foot lane and an 8-foot shoulder in each direction. The service road connects with existing Ocean Drive approximately 200 feet east of Fish Dock Road via a 0.5% grade. The existing pipe culvert would be reconstructed with a new box culvert and the remaining section of existing Ocean Drive would be milled and resurfaced. A vehicular turnaround would be constructed immediately east of Middle Thorofare at the end of the existing Ocean Drive alignment. This service road would preserve access to the marinas and fisheries located in this vicinity, as well as waterfront access to Middle Thorofare which is utilized for recreational fishing and crabbing.

Utility relocations would be similar to Alternative 3A from Route 109 to Upper Thorofare. Because of the roadway's new alignment, no additional relocations would be required until the road realigns with its existing alignment near Station 129+00. Between this point and the project's easterly limits, all poles would require relocation.

Structures

The Mill Creek Bridge design will be similar to that proposed in Alternative 1. A multi-girder spliced girder alternative was compared to a segmental concrete alternative for the Upper Thorofare and Middle Thorofare Bridges. A multi-girder alternative similar to the Ocean City Longport (OCLP) Bridge was initially considered. The superstructure would have consisted of AASHTO Type VI girders with a maximum of 225'-0" spans supported on hammerhead type piers. The foundation would consist of prestressed concrete hollow cylinder piles up to the water level, where a pile cap would be built using precast concrete cofferdams, with hammerhead piers forming the shaft. This bridge type would have comfortably met a channel width of 130'-0", but would not minimize the number of piers in the waterway due to the limited span lengths and would have excessive foundation costs, principally due to the high cost of constructing water piers.

Given the large volume of superstructure work in this project, precast segmental box girders were ultimately proposed for this alternative to benefit from the economy associated with the industrialized mode of producing and erecting along the entire 4640 feet of the superstructure. The economical span range of this type of construction, being 160 feet to 450 feet, will satisfy the required minimum 130 feet horizontal clearance over the navigational channel and make it a viable option for the entire bridge, from abutment to abutment. It should be noted that, beyond meeting the basic requirements of function and economy, the segmental alternative also offers an aesthetically pleasing structure that has relatively low maintenance costs.

The overall deck width of the proposed precast box girder would be approximately 54'-0" in order to accommodate two 12'-0" lanes, two 8'-0" shoulders, and two 6'-0" sidewalks. Studies indicate that an economical superstructure cross-section would be comprised of a single-cell

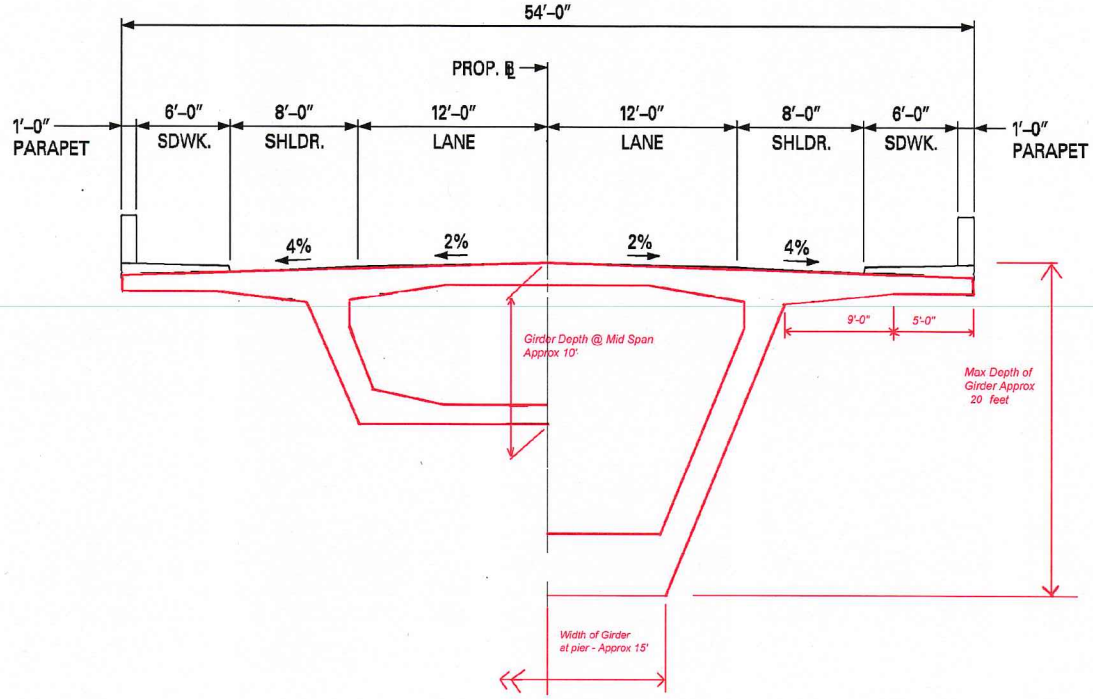


Figure 13 – Segmental Concrete Cross Section

segmental box girder. The girder depth will be a constant 10'-0" for spans that are less than 200 feet, but variable to a depth of approximately 20'-0" at the piers for spans up to 350 feet. The bottom soffit of the box girder will be made parabolic toward the piers for an increased girder depth, which inherently provides for an efficient structural system as well as a pleasing appearance. See Figure 13 for a principal configuration of this cross-section.

Spans of around 180'-0" are suitable for the approach spans at each end of the bridge. These spans would be erected by the span-by-span method of erection. For a scheme where the entire crossing would be supported on segmental girders, the span over the channel and a number of side spans would be set longer than the approach spans in order to minimize the number of water piers. These spans are envisioned to be at a maximum of 350'-0" and they will be erected by the balanced cantilever method of erection. While the span layout will be finalized in preliminary design, increasing the span lengths of the channel spans for a precast segment alternative is deemed undesirable from several perspectives:

1. Longer channel spans will result in deeper precast segments that increase the cost of the superstructure without reducing the number of water piers and cost of the foundations.
2. The corresponding increase in structural depth will make the channel spans look overly massive in contrast with the approach spans.

Erection of the precast segments would most likely be accomplished with a self-launching overhead gantry that can handle both span-by-span and balanced cantilever type construction. Depending on where the precast segments are fabricated and the means of transport from the precasting yard to the bridge site, erection may commence from the channel span in cases when segments arrive by barge, or sequentially from one abutment to the other abutment if the

segments are to delivered by trucks. The requirement for staging areas is often reduced with the use of overhead gantries since segments are often "stockpiled" over the partially completed

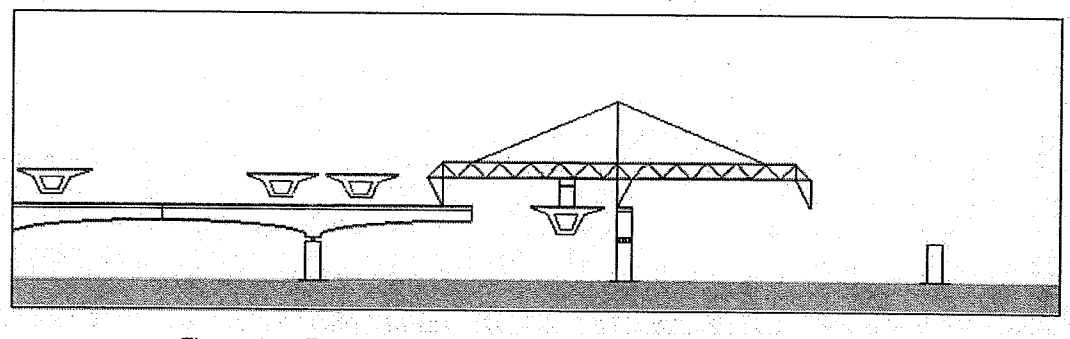


Figure 14 – Erection of Precast Segments Utilizing Overhead Gantry

structure. See Figure 14 for a schematic view of the erection process utilizing an overhead gantry. Various methods of erection, their demands on staging areas, and impact on surrounding communities must be further assessed in future studies.

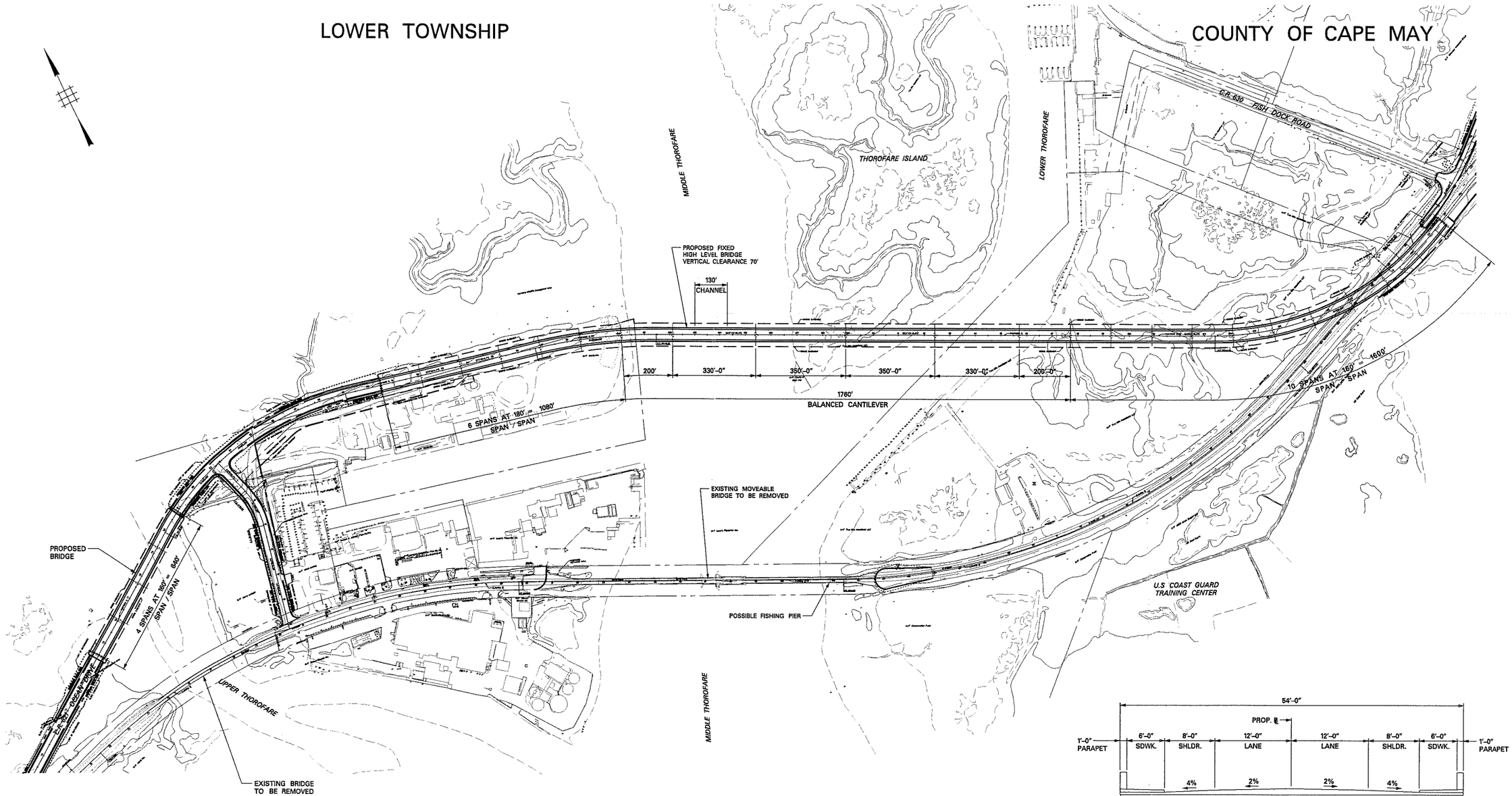
Segmental bridges have been accepted as a viable structural system by the FHWA as well as the majority of state transportation agencies. While some of the older, and not so old, conventional reinforced concrete bridge decks have seen the need for a deck replacement, the experience of 30 years of segmental bridges has not seen a single case where such a need was warranted. The segmental bridge deck is durable because of the fact that the deck is post-tensioned in both the transverse and the longitudinal directions. Recent developments in concrete technology and corrosion resistance methods have also been instrumental in its increased utilization. With durability being one of the expressed desires of the Cape May County Bridge Commission, and the fact that the bridge is located in a coastal environment, the choice of materials, such as the use of fly-ash and micro silica, to produce high performance post-tensioning grout and long term durable concrete must be studied thoroughly to develop a set of cost-effective solutions that ensures a trouble-free structure with a low cost of maintenance. An overlay of high performance concrete or latex modified concrete that could have a 30-40 year life should be considered. As it becomes necessary to replace this overlay, two lanes of traffic can be maintained while the overlay is replaced.

The Upper Thorofare Bridge will now be a four-span bridge on a new alignment approximately 650 feet long using a single cell precast concrete segmental box girder that will also be used for the Middle/Lower Thorofare Bridge. A plan and cross section of the Upper and Middle Thorofare Bridges for Alternative 3C are shown in Figure 15.

The foundations will be comprised of prestressed concrete hollow cylinder piles up to the water level, where a pile cap can be built. The pier shaft is then built on this water line pile cap. The shaft could either be cast-in-place or in precast box segments.

The pile cap over deep water could be constructed using precast concrete forms, floated or barged into its final location. The cylindrical 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.

The pipe culvert just west of Fish Dock Road on the existing Ocean Drive will be replaced with a box culvert properly sized to handle the tidal flows presently observed at this location. Numerous retaining walls are required for this alternative with a total length of approximately



TYPICAL SECTION

N.T.S.

SCALE IN FEET

400' 200' 0 400' 800'

ALTERNATIVE 3C

FIGURE 15

OCEAN DRIVE UPGRADE & BRIDGE REPLACEMENTS

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

NOVEMBER 2003

PB 100 YEARS

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1120 feet. A 200 feet long wall is required to retain fill for the service road near Hinch Marina; 600 feet wing wall extensions are required at the east abutment and 340 feet of wall is needed at the turnaround on existing Ocean Drive, just west of Middle Thorofare.

Alternative 3D

Alternative 3D was originally conceived in June 2000 by members of the local business community attending a public information center where Alternatives 1 and 2 were presented. This alternative is identical to Alternative 3C from Route 109 up to and including the proposed service road just east of Upper Thorofare. The alternative's alignment then continues across Middle Thorofare, over Thorofare Island, across Lower Thorofare, around Two Mile Associates and ties into the existing Ocean Drive alignment about 500 feet south of Madison Avenue. This alignment is shown in Figure 16 and eliminates all bridge limitations for the commercial fishing industry at Lund's, Atlantic Cape Fisheries and Two Mile Landing.

Because of the proximity of the tie-in location to Madison Avenue and Diamond Beach, the toll facilities for this alternative are located adjacent to the western abutment of the Middle Thorofare Bridge between the service road intersection at Station 83+50 and the bridge's abutment at Station 90+75. The service building and parking spaces are located adjacent to the service road.

As with Alternative 3C, the bridge features a northbound approach grade of 5% and a vertical clearance of 75 feet over Middle Thorofare. A horizontal clearance of 155 feet is provided over the Intracoastal Waterway (Navigation channel). However, because the structure passes north of Two Mile Associates and its marina and fishing facilities, no particular vertical clearance is required over Lower Thorofare. Approximately 50 feet of vertical clearance is provided over this section of Lower Thorofare. The structure continues across tidal wetlands with an approximate 2% downgrade to Station 143+00. At Station 144+00, existing Ocean Drive is realigned to form a T-intersection with the new alignment. This realignment will preserve access to Dolphin Cove Marina located just east of the existing Middle Thorofare Bridge and Two Mile Landing. Similar to Alternative 3C, vehicular turnarounds will be constructed on either side of the existing Middle Thorofare Bridge, which will be demolished and the culvert near Fish Dock Road will be reconstructed. Approximately 500 feet of existing Ocean Drive pavement will be removed in the vicinity of the tie-in. The existing profile of Ocean Drive is met at Station 153+00, and paving ends at Station 156+50, the western edge of Raleigh Avenue.

Utility relocations would be nearly identical to Alternative 3C, except less pole relocations between Fish Dock Road and the easterly project limits since the roadway rejoins the existing alignment closer to the limit.

Structures

The Mill Creek Bridge design will be similar to that proposed in Alternative 1. The Upper Thorofare Bridge will now be a four-span bridge as defined in Alternative 3C. A plan and cross section of the Upper Thorofare Bridge are shown in Figure 15. The Middle Thorofare Bridge and its approaches will be a single cell precast concrete segmental box girder that will also be used for the Upper Thorofare Bridge. This type of structure is recommended because of the uniformity of the cross section along the entire 5220 feet of structure. Span lengths for the Middle Thorofare Bridge will be 175 feet and are constructed by the span-by-span method. A plan and cross section of this structure is shown in Figure 17. The foundations, piers and deck construction for this alternative are the same as defined in Alternative 3C. The pipe culvert just west of Fish Dock Road will also be replaced as stated for Alternative 3C. This alternative has 535 feet of retaining walls with a majority of the length along the new western access road and the turnaround on the west side of Middle Thorofare. The walls will most likely be MSE Walls or other type of prefabricated wall as defined for the previous alternatives.

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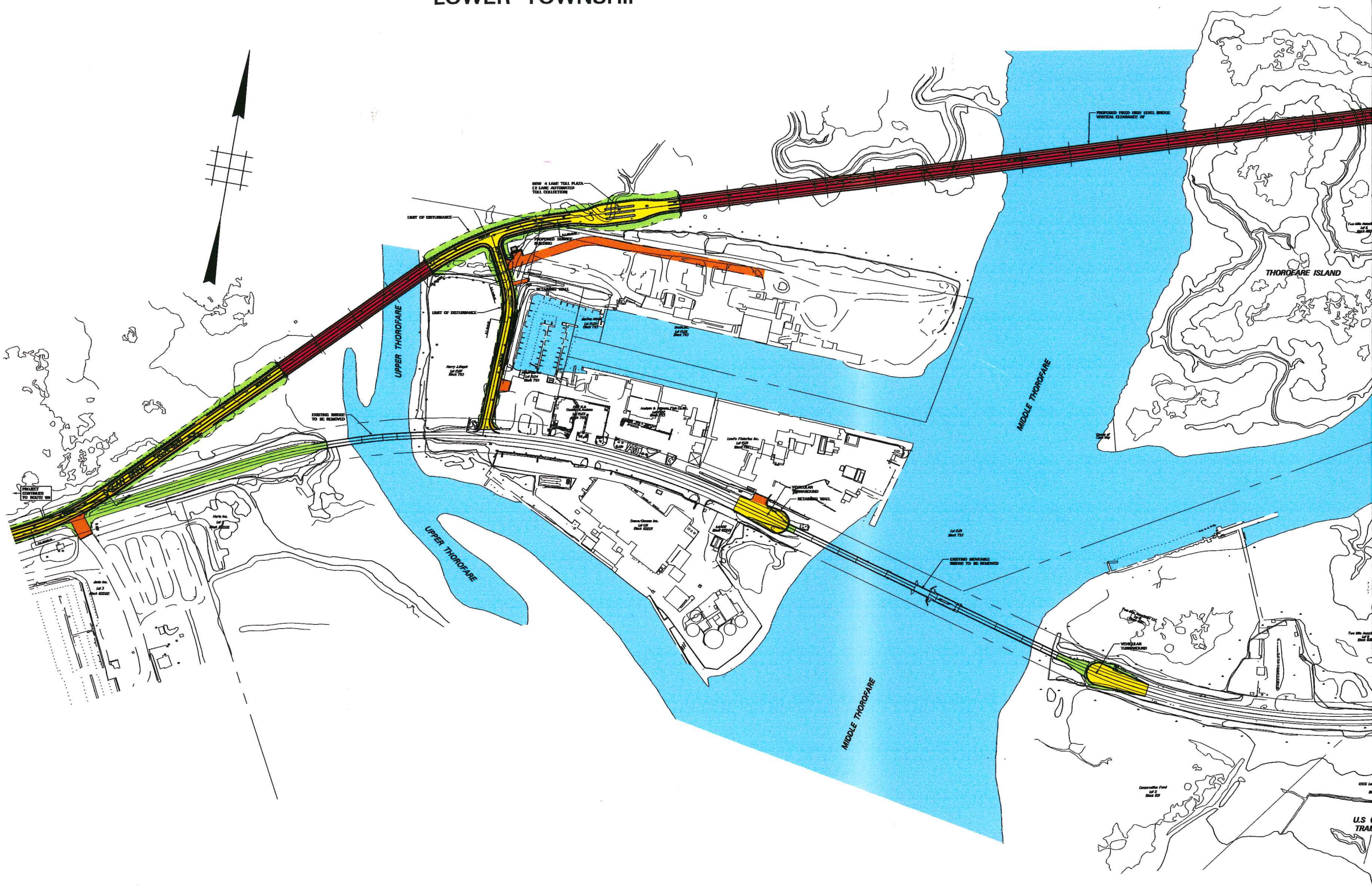
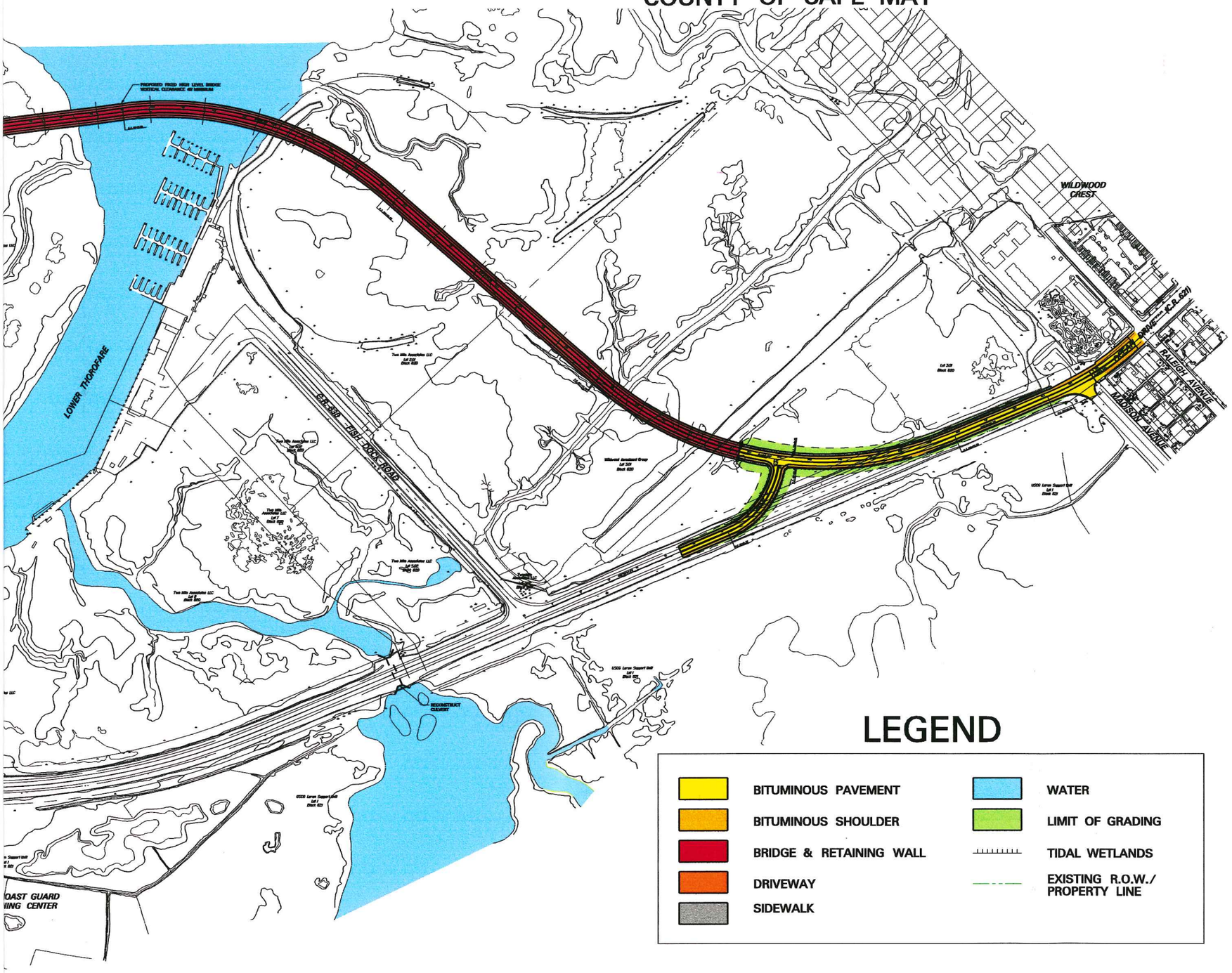


PLANS FOR THIS ALTERNATIVE ARE INCLUDED IN APPENDIX "E"

COUNTY OF CAPE MAY



ALTERNATIVE 3D

FIGURE 16

PB 100 YEARS

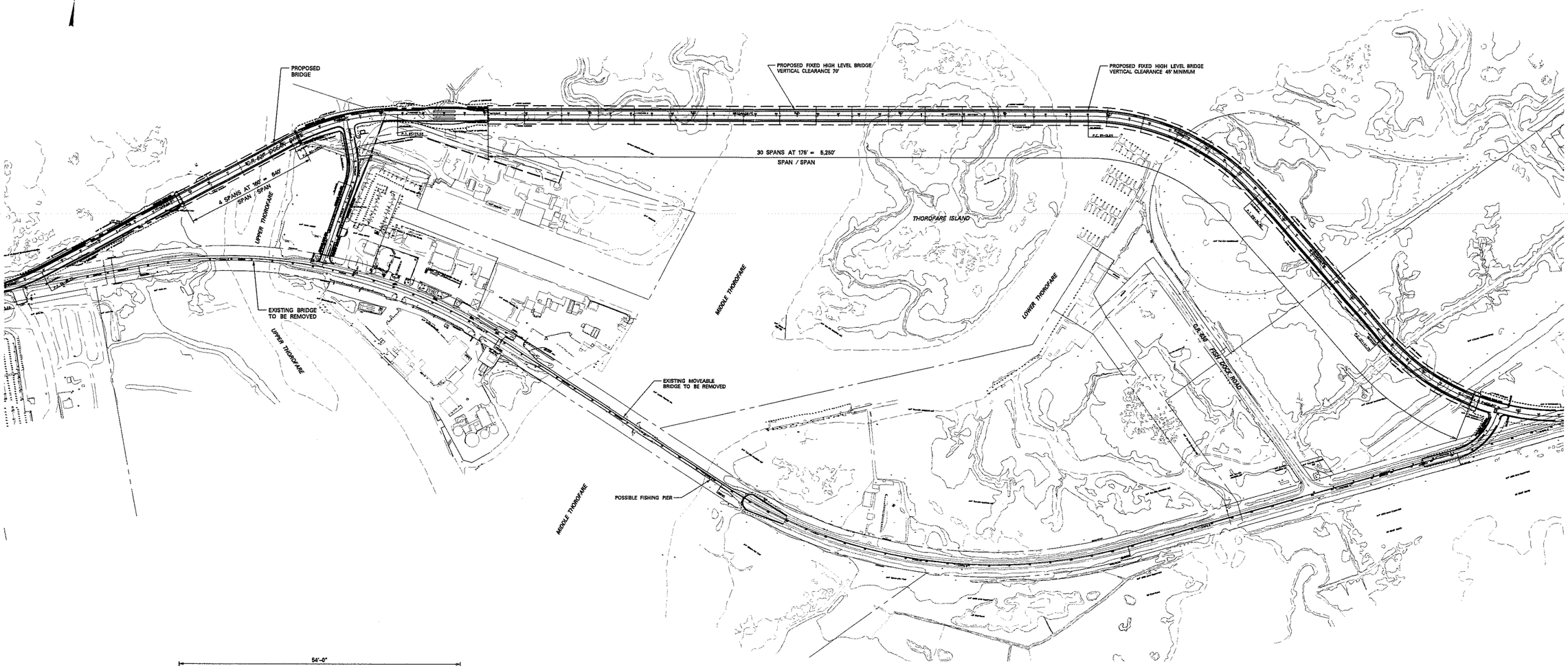
OCEAN DRIVE UPGRADE & BRIDGE REPLACEMENTS

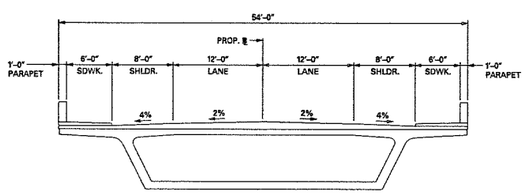
COUNTY OF CAPE MAY IN CONJUNCTION WITH SOUTH JERSEY TRANSPORTATION PLANNING ORGANIZATION

NOVEMBER 2003

LOWER TOWNSHIP

COUNTY OF CAPE MAY





TYPICAL SECTION

N.T.S.

SCALE IN FEET

500' 0 500' 1000'

ALTERNATIVE 3D

FIGURE 17

PB 100 YEARS

OCEAN DRIVE UPGRADE & BRIDGE REPLACEMENTS

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

NOVEMBER 2003

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Alternative 3E

This alternative presents an option featuring a fixed, high-level bridge over Middle Thorofare on an alignment shifted south of the existing bridge, similar to the alignment for Alternative 3A. The alignment is shown in Figure 18 and is identical to Alternative 1 from Route 109 through the Mill Creek Bridge, where the alignment shifts 8.5 feet to the south beginning at the eastern abutment. At Station 65+50, the roadway intersects with the driveway servicing the Bree-z-lee Marina (Block 822.02, Lot 3) to the right and a new service road to the left. This new service road travels in jug-handle like form through the lands belonging to the Marmora Wildlife Preserve (Block 793, Lot 14) and connects to the existing Ocean Drive alignment just east of the existing Upper Thorofare Bridge. Existing Ocean Drive between this point and Middle Thorofare completes the alignment of the new service road, maintaining access to local businesses. The existing Upper Thorofare Bridge will be reconstructed to accommodate local and truck traffic from these businesses. Similar to other alternatives, a vehicular turnaround with retaining walls will be constructed at the terminus of the service road.

After its intersection with the service road, the alignment of Ocean Drive curves slightly to the right to form an alignment more or less parallel to the existing roadway. The roadway ascends at a steep 6% grade, and a new structure begins at Station 73+00. The structure continues over Upper Thorofare, with piers offset by approximately 25 feet to the south of the existing structure. Once beyond Upper Thorofare, the roadway's alignment shifts closer to the existing Ocean Drive, so that piers can be placed in the existing shoulder of the roadway, and the bridge itself can remain a safe distance from the Snow's/Doxsee facility (Block 822.01, Lot 1.01). As it approaches Middle Thorofare, the roadway and structure curves further to the right, to remain horizontally clear of the existing bridge. The proposed bridge has a 116-foot minimum vertical clearance and has a 330-foot horizontal clearance for the channel. The roadway declines at a 6% downgrade to the bridge's eastern abutment at Station 116+90. The roadway then continues, supported on either side by retaining walls, to Station 121+50 where the toll facilities are located. The toll facility is located mostly on a tangent, relatively flat alignment offset 8.5 feet to the south of the existing Ocean Drive baseline. The retaining walls terminate at Station 122+30 on the right and 124+00 on the left. A new access driveway intersects Ocean Drive at Station 125+50. The driveway services only one property (Dolphin Cove Marina) and waterfront access where existing Ocean Drive meets Middle Thorofare. Because this driveway would carry such low volume, the pavement will be only 24 feet wide, with no shoulders. The driveway, similar to the service road west of Upper Thorofare, has a jug-handle type alignment, curving to the left, and then following parallel to the Ocean Drive alignment to Station 111+50, where it meets the existing Ocean Drive pavement. A vehicular turnaround is proposed at the terminus of this driveway. A 1278 feet long retaining wall is required along the north side of the driveway to support the roadway and minimize wetland impacts.

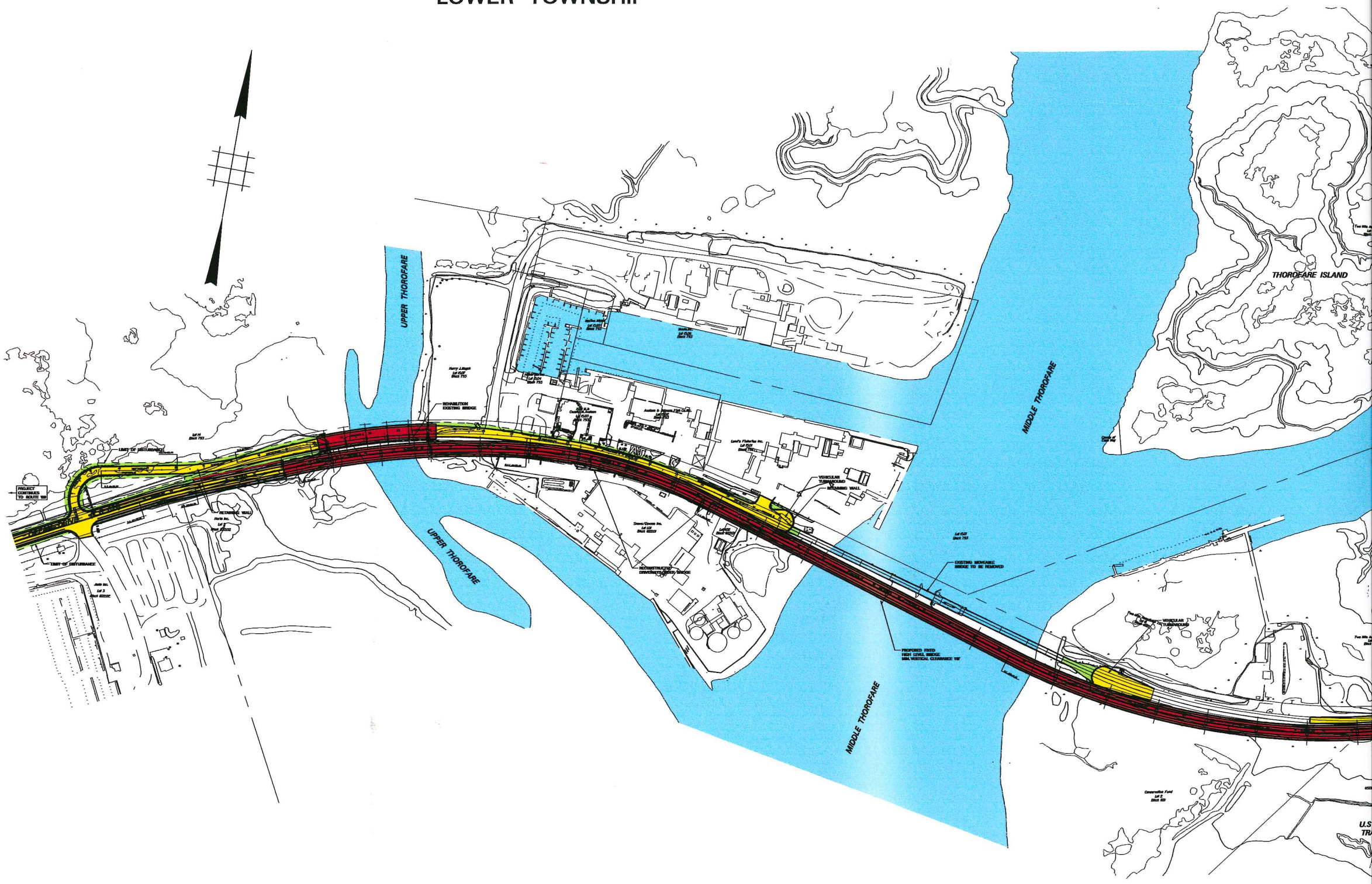
East of the roadway's intersection with the driveway, the alignment of Ocean Drive continues offset to the south of the existing roadway. The proposed roadway meets the existing roadway approximately 150 feet west of Madison Avenue. Similar to previously described alternatives, the existing culvert near Fish Dock Road will also be reconstructed.

Utility relocations required for Alternative 3E would be identical to Alternative 3A, except an additional length of sanitary sewer would require relocation. The additional length requiring relocation is considerable, now beginning well west of Upper Thorofare at Station 57+00, instead of east of the Upper Thorofare Bridge. This additional relocation is required to accommodate the additional shift and structure length featured in Alternative 3E.

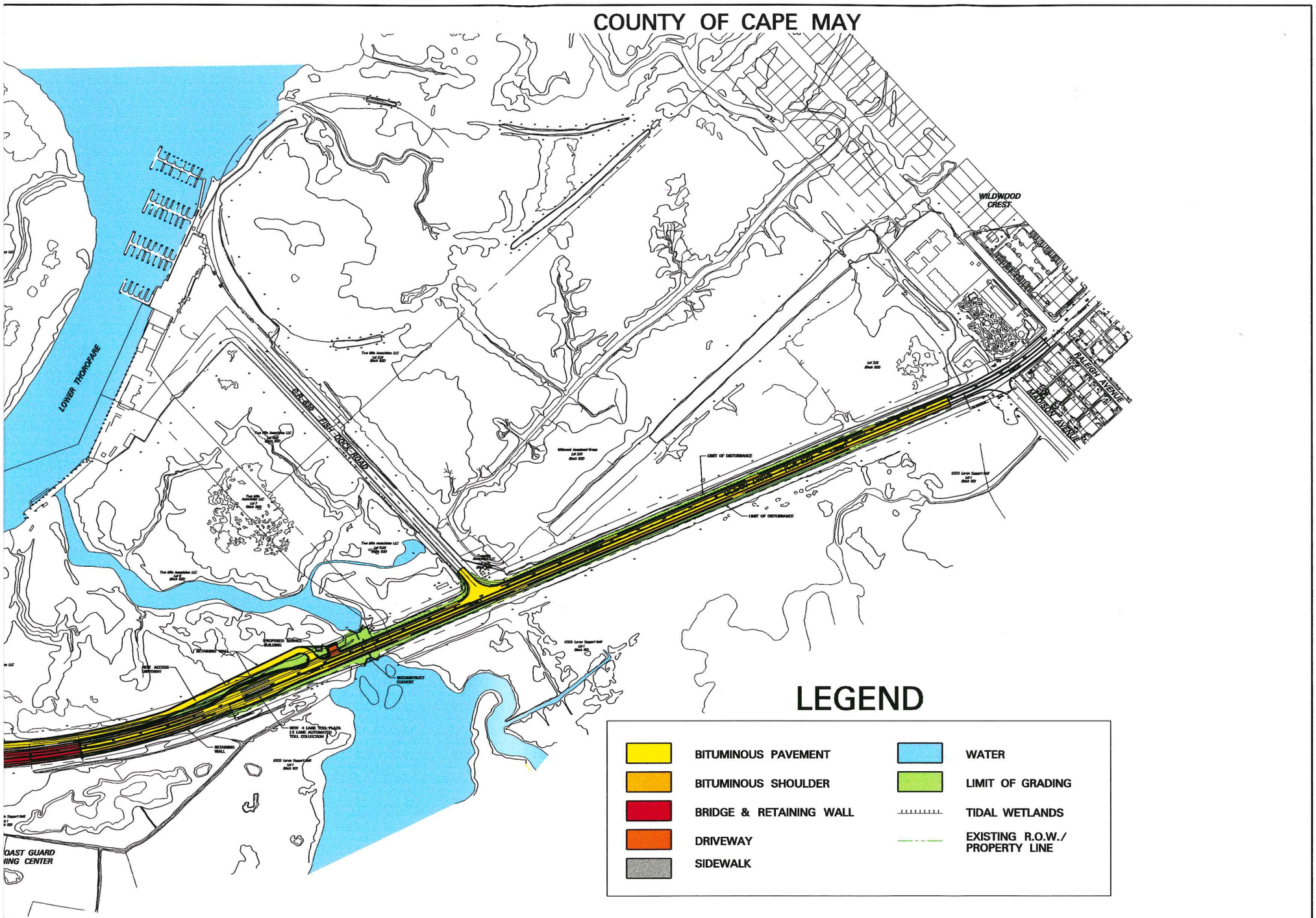
Structures

Again, the Mill Creek and Upper Thorofare designs will be similar to those proposed in Alternative 1. Plans and cross sections of these bridges can be seen in Figures 6 and 7. Because of the substantial number of piers, and related high foundation costs, a concrete

LOWER TOWNSHIP



PLANS FOR THIS ALTERNATIVE ARE INCLUDED IN APPENDIX "E"



ALTERNATIVE 3E

FIGURE 18

PB 100 YEARS

OCEAN DRIVE UPGRADE & BRIDGE REPLACEMENTS

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

NOVEMBER 2003

segmental type bridge is proposed for the new Middle Thorofare Bridge and its approaches. A plan and cross section of this bridge is presented in Figure 19. Span lengths for this bridge vary from 175 feet to 350 feet. As before, the shorter spans will be erected by the span-by-span method and the longer spans by the balanced cantilever method. The foundations, piers and deck construction for this alternative are the same as defined in Alternative 3C. There are 3870 linear feet of retaining walls required for this alternative with 2250 feet required as extensions of the abutment wing walls, 340 feet for the turnaround on existing Ocean Drive and 1280 feet required for the eastern access driveway.

Alternative 3F

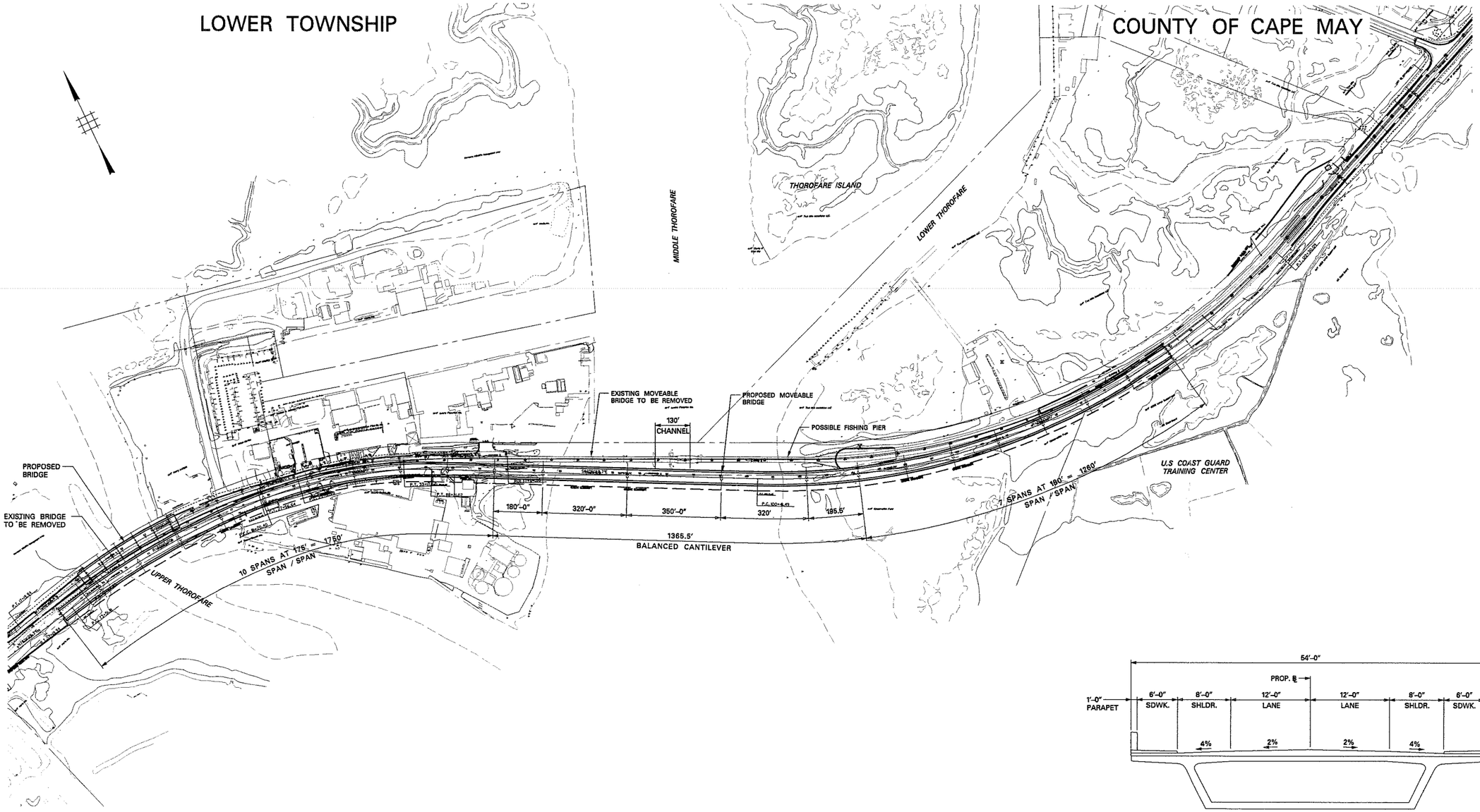
Like Alternative 3E, this alternative also features a fixed, high-level bridge over Middle Thorofare, though on a new alignment. East of the Mill Creek Bridge, the proposed alignment curves to the right into lands of the Bree-z-lee Marina (Block 822.02, Lots 2 and 3). This alignment is shown in Figure 20. The lands impacted do include a small area of the active marina, but mostly consist of dredge spoils. At Station 68+40, existing Ocean Drive is realigned to form a T-intersection with the new alignment. The remaining portion of existing Ocean Drive between this point and Middle Thorofare will be used as a service road, just as in Alternative 3E, though this alternative does not impact lands belonging to the Marmora Wildlife Management Area. The existing Upper Thorofare Bridge will be replaced to the south of its current location. Traffic traveling west on the service road can continue through a channelized portion of the intersection and merge directly with southbound Ocean Drive traffic.

A 525 foot long retaining wall is proposed along the right side of Ocean Drive to minimize impacts to the Bree-z-lee Marina. The roadway continues on a 4.5% approach grade to the bridge's western abutment at Station 70+50. From that point, the bridge completes its curve to the right, and follows a small strip of vegetated uplands to avoid wetlands impacts. The alignment in this area generally resembles a reverse-curve alignment, though there is adequate length of tangent between the reverse curves to allow for the required superelevation transitions. At Station 79+50, the alignment curves to the left, and by Station 85+00, the roadway has entered a 2600 foot long tangent section which crosses Upper and Middle Thorofares. The proposed roadway maintains a minimum offset of 20 feet from the bulkhead protecting lands of Snow's/Doxsee, the southernmost portion of land between Upper and Middle Thorofares. The roadway maintains the same 116-foot vertical clearance over Middle Thorofare's navigable channel (Intracoastal Waterway) as other alternatives and provides 330 feet horizontal clearance. The vertical clearance over Upper Thorofare is in excess of 90 feet, much higher than the 75 feet required for maintenance vessels which dock at Snow's/Doxsee just north of the bridge and spans the entire waterway of Upper Thorofare.

The 2600-foot tangent section continues beyond Middle Thorofare across lands belonging to Conservation Fund, Inc. (Block 821, Lot 2) to a point at Station 110+86 where the roadway begins to curve to the left to reconnect with existing Ocean Drive. This curve continues slightly through lands belonging to the U.S. Coast Guard (Block 821, Lot 1), to just beyond the bridge's eastern abutment, which is approximately located at Station 119+50. Similar to Alternative 3E, the proposed toll facility is located immediately east of the eastern abutment. The facility features the same configurations as Alternative 3E, including retaining walls, and the proposed driveway to service the marina and beach area on the eastern banks of Middle Thorofare.

Similar to other alternatives, the proposed roadway alignment continues at an 8.5 foot south offset to the existing baseline to approximately 150 feet west of Madison Avenue, where the profile alignment is met. Paving continues to Station 153+00.

Again, utility relocations would be similar to Alternative 3A through Mill Creek. As with Alternative 3E, the sanitary sewer main would require relocation from Station 57+00, though only to east of Upper Thorofare. The main would again require relocation east of Middle Thorofare when the



TYPICAL SECTION

N.T.S.

SCALE IN FEET

400' 200' 0 400' 800'

ALTERNATIVE 3E

FIGURE 19

PB 100 YEARS

OCEAN DRIVE UPGRADE
& BRIDGE REPLACEMENTS

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

NOVEMBER 2003

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roadway's alignment rejoins the existing, beginning at approximately Station 108+00. Poles in this vicinity through to the project's easterly limits would also require relocation.

Structures

Again, the Mill Creek and Upper Thorofare designs will be similar to those proposed in Alternative 1. Plans and cross sections of these bridges can be seen in Figures 6 and 7. Because of the substantial number of piers, and related high foundation costs, a concrete segmental type bridge is proposed for the new Middle Thorofare Bridge and it's approaches. A plan and cross section of this bridge is presented in Figure 21. Span lengths for this bridge vary from 175 feet to 350 feet. As before, the shorter spans will be erected by the span-by-span method and the longer spans by the balanced cantilever method. The foundations, piers and deck construction for this alternative are the same as defined in Alternative 3C. There are 2920 linear feet of retaining walls required for this alternative with 1305 feet required as extensions of the abutment wing walls, 340 feet for the turnaround on existing Ocean Drive and 1280 feet required for the eastern access road.

Alternative 3G

Alternative 3G features the exact same alignments, features and utility impacts as Alternative 3F, with the exception of the channel crossing for the Middle Thorofare Bridge. Instead of a Concrete Segmental Bridge for the entire length, Alternative 3G features a Cable-Stayed Bridge as the main crossing of the Intracoastal Waterway within the 2600 feet tangent section previously defined in Alternative F. This alignment is shown in Figure 22.

Structures

A Cable Stayed Bridge option was considered for the main spans of the bridge and is shown in Figure 23. A viable cable-stayed structure has an overall length of approximately 1600'-0" with a main span of 860'-0" and side spans of 370'-0" each. Towers will be located at each end of the main span. The towers will be approximately 180'-0" above the top of the finished deck. The overall width of the roadway will be approximately 54'-0" wide in order to accommodate two 12'-0" lanes, two 8'-0" shoulders, and 6'-0" sidewalks.

The tower height will increase the visual impact of this structure. Aesthetically, they should be pleasing, well proportioned, and balanced to the span configuration of the structure. Several possible tower configurations and the issue of whether there should be one or two cable planes have been considered. The single cable plane design promises to reduce the cost of the

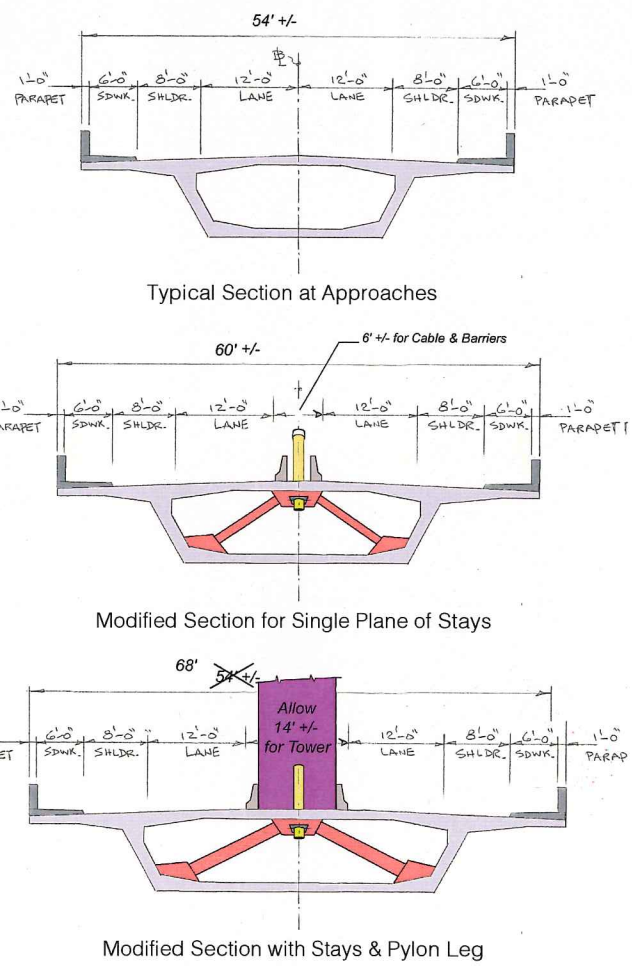
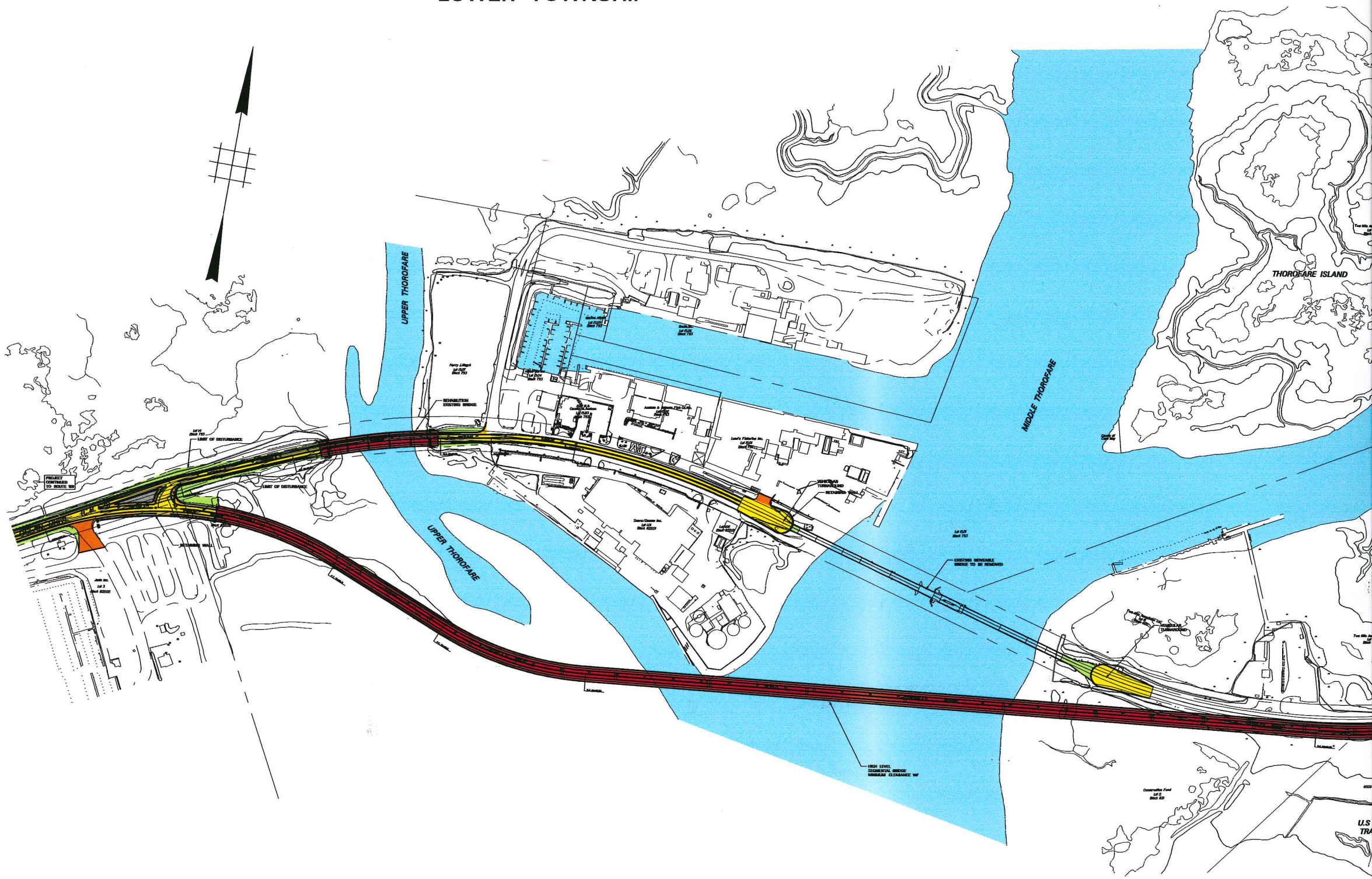


Figure 24 – Single Cable Plane Cross Sections

LOWER TOWNSHIP



PLANS FOR THIS ALTERNATIVE ARE INCLUDED IN APPENDIX "E"

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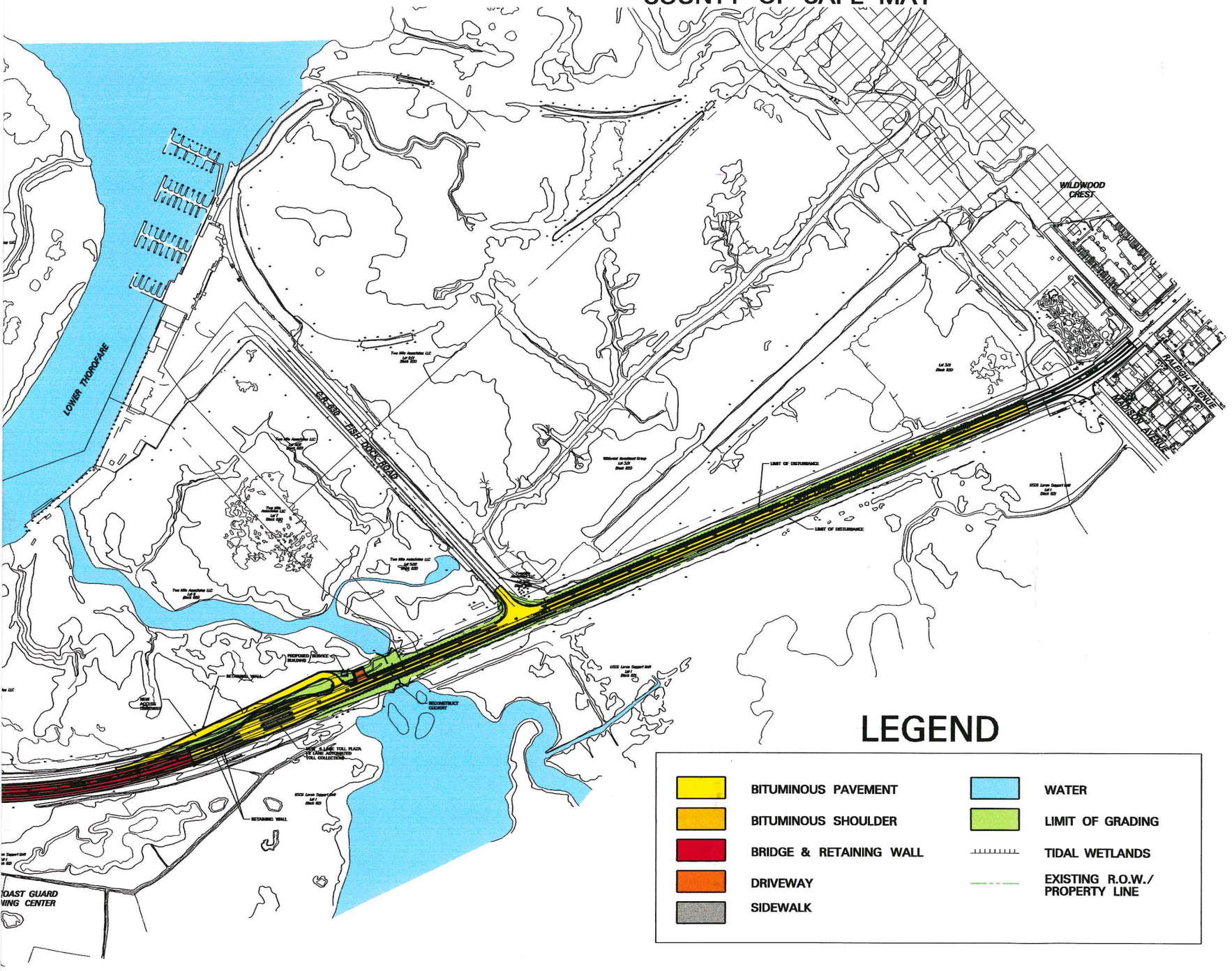
COUNTY OF CAPE MAY



LEGEND

- BITUMINOUS PAVEMENT
- BITUMINOUS SHOULDER
- BRIDGE & RETAINING WALL
- DRIVEWAY
- SIDEWALK
- WATER
- LIMIT OF GRADING
- TIDAL WETLANDS
- EXISTING R.O.W./ PROPERTY LINE

ALTERNATIVE 3F

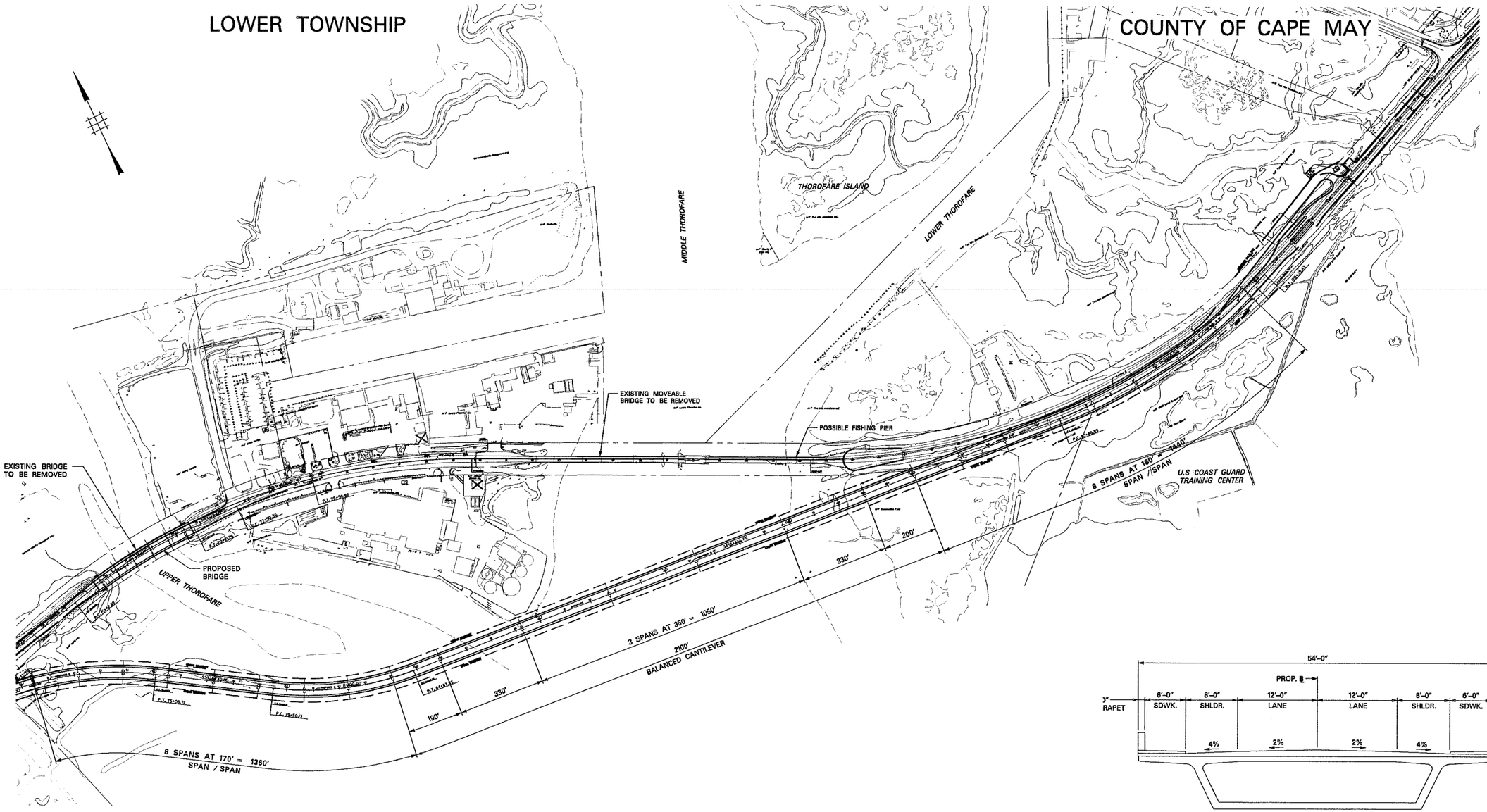
FIGURE 20

PB 100 YEARS

OCEAN DRIVE UPGRADE & BRIDGE REPLACEMENTS

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

NOVEMBER 2003



TYPICAL SECTION

N.T.S.

SCALE IN FEET

400' 200' 0 400' 800'

ALTERNATIVE 3F

FIGURE 21

PB 100 YEARS

OCEAN DRIVE UPGRADE & BRIDGE REPLACEMENTS

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

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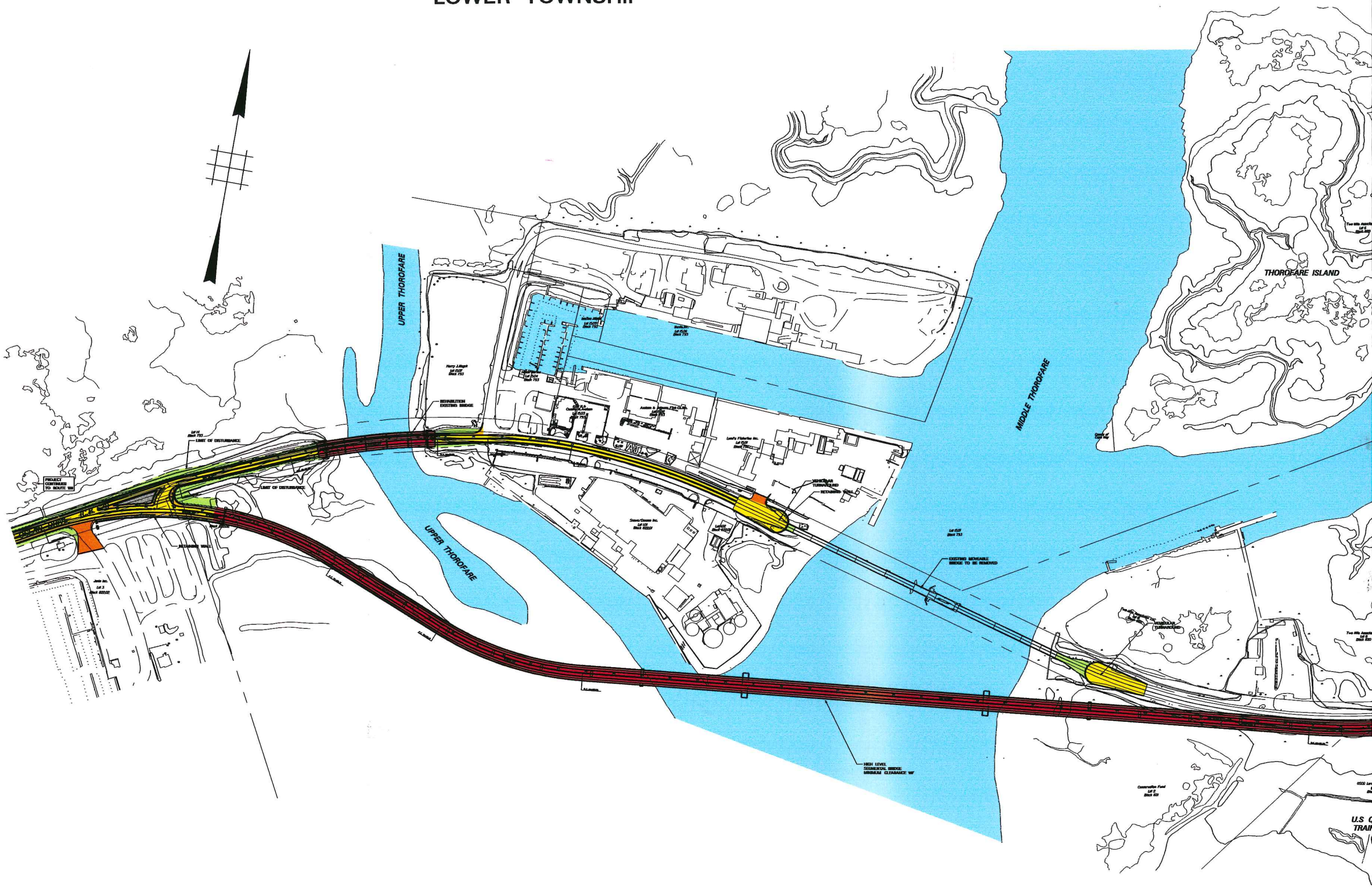
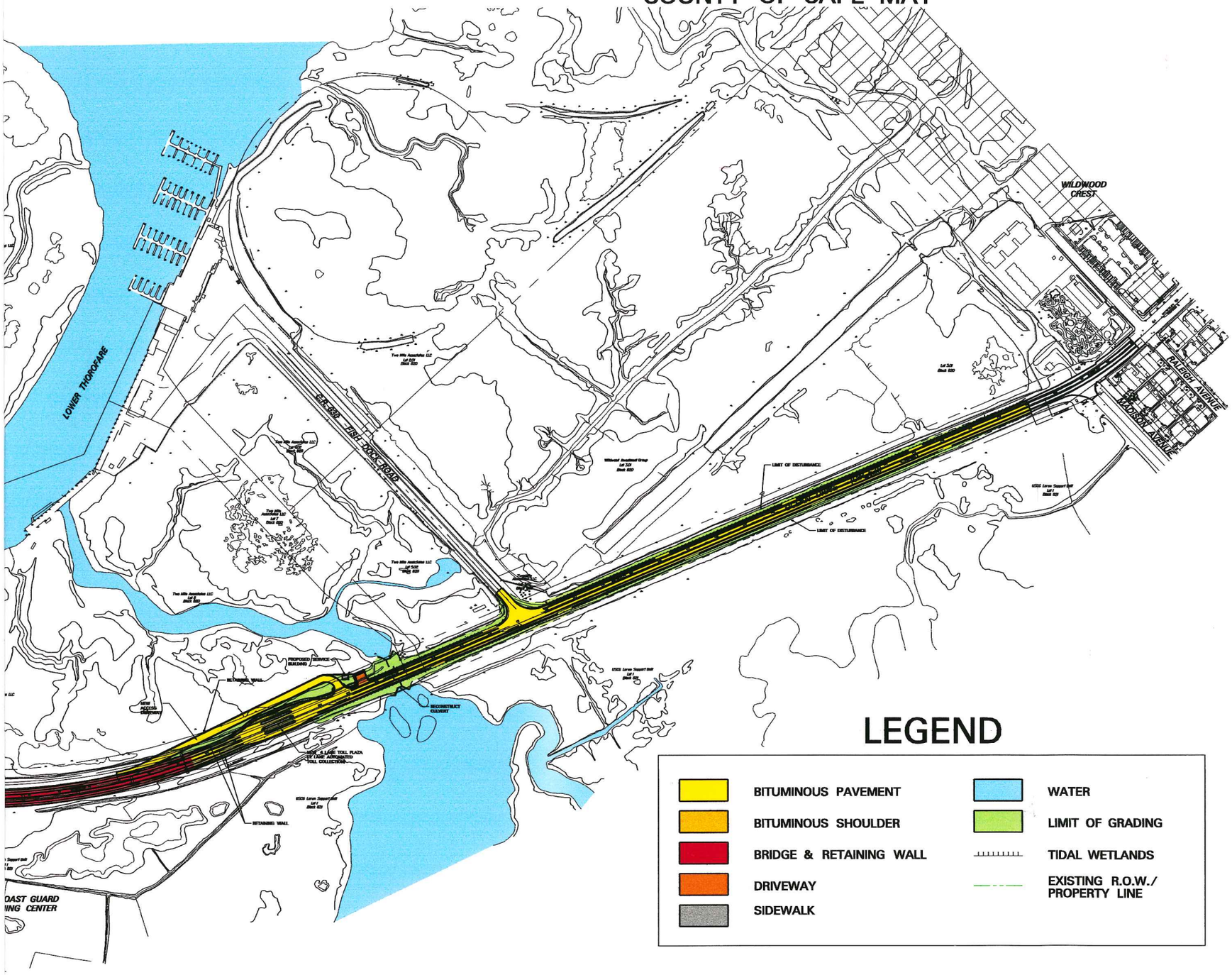
LOWER TOWNSHIP



PLANS FOR THIS ALTERNATIVE ARE INCLUDED IN APPENDIX "E"

COUNTY OF CAPE MAY



LEGEND

- BITUMINOUS PAVEMENT
- BITUMINOUS SHOULDER
- BRIDGE & RETAINING WALL
- DRIVEWAY
- SIDEWALK
- WATER
- LIMIT OF GRADING
- TIDAL WETLANDS
- EXISTING R.O.W./ PROPERTY LINE

ALTERNATIVE 3G

FIGURE 22

PB 100 YEARS

OCEAN DRIVE UPGRADE & BRIDGE REPLACEMENTS

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

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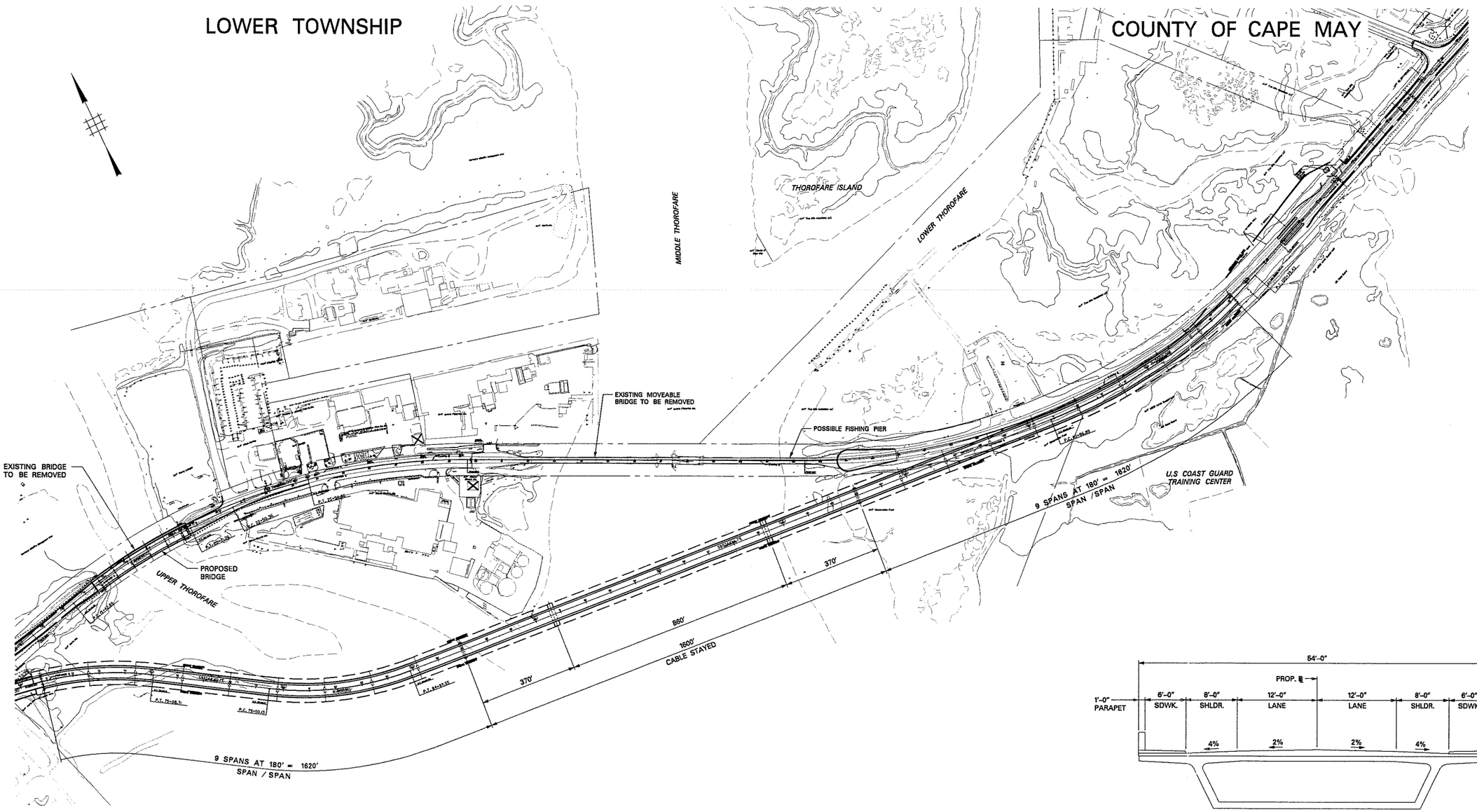

TYPICAL SECTION
N.T.S.

SCALE IN FEET
400' 200' 0 400' 800'

ALTERNATIVE 3G

FIGURE 23

PB 100 YEARS

OCEAN DRIVE UPGRADE
& BRIDGE REPLACEMENTS

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

NOVEMBER 2003

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stay cables, the number of stays, and the associated labor cost for installing fewer anchors and cable stay hardware. However, the single cable plane design requires a wide box for torsional stability and to accommodate the anchorages of the center plane cables as shown in Figure 24. The cost of the wider box will more than offset any saving that could be realized with the single plane of cables. For this reason, the single plane design was not considered a viable alternative.

There are a number of available options for designs involving dual planes of cables. Figures 25 and 26 show, respectively, a number of deck and tower configurations. The deck may be precast or cast-in-place. A precast option would most likely use the same basic cross-section as the segmental approaches with struts and cable anchorages added to the outside of the box. A cast-in-place cross-section will be stream-lined, constructed with form travelers and concrete supplied by a batch plant mounted on a barge. Among the different tower configurations, the ones that provide greatest aerodynamic stability are the Diamond and the A-Frame type configurations. The Diamond shape is considered a favorite because the tower legs come together at the base, enabling a cost-effective design for the foundation. The Diamond tower configuration, with a cast-in-place deck was selected for Alternative 3G. Other items to consider in future studies or designs include air beacons, and access inside/outside the pylon legs for inspection and maintenance.

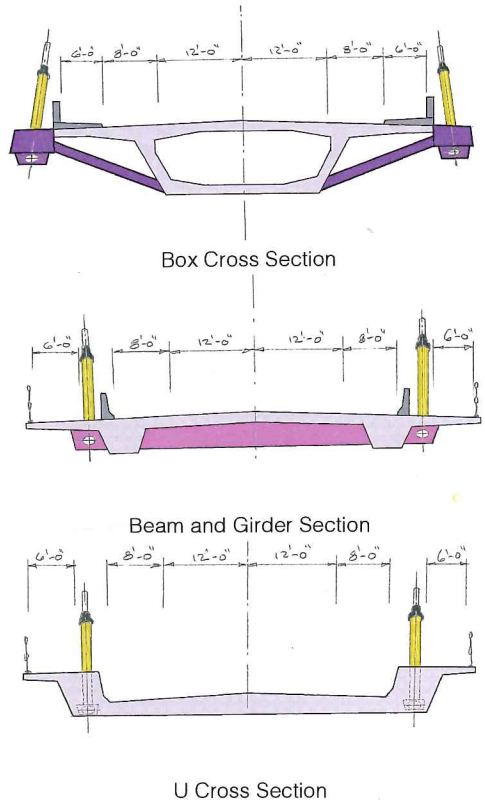


Figure 25 – Dual Cable Plane Cross Sections

Cables are the most important elements in cable stayed structures. Careful consideration should be given to principal details at the level of conceptual design that would ensure longevity and serviceability. There are several cable arrangements that could be utilized, namely Fan, Harp, Semi-Harp, and Asymmetric, to name a few. A cable-stayed bridge would undoubtedly attract the fascination of many of its users. Consideration should be given to aesthetic bridge lighting and constructing scenic overlooks along the sidewalks. Should Alternative 3G be selected as the preferred alternative, further evaluations should be conducted to select the appropriate combination of deck cross-section and tower that would provide the best balance between economy and aesthetics.

Goal Post Diamond A-Frame

Figure 26 – Representative Cable Stay Tower Configurations

As previously mentioned, the approach spans at each end of the bridge would consist of precast concrete segmental box girders utilizing a span-by-span construction method with a maximum span length of 180'-0". The approach foundations will be comprised of prestressed concrete hollow cylinder piles up to the water level, where a pile cap can be built. The pier shaft is then built on this water line pile cap. The shaft could either be cast-in-place or precast box pier cap segments.

E. ROADWAY EMBANKMENT DESIGN

Due to relatively poor soil conditions in the project area, special consideration was given to the construction of the roadway embankments that will raise the roadway above the flood elevation. Analysis was performed to determine the amount of consolidation settlement and the time required for the consolidation to occur. (See Addendum B) 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.

In order to lessen the time required for the settlements to occur and to reduce the magnitude of post-construction settlement the use of preloading and wick drains are recommended. With a surcharge height of approximately 7 feet above finished grade and the use of wick drains spaced at 5 feet, the time required for the settlement to occur would be three months. Surcharge heights would be greater at the bridge approaches, and the required time for the settlement to occur would be 6 months. The results of the analysis are summarized in the tables below. Further study and analysis will be required to analyze potential settlement of temporary pavements placed on unloaded soils during construction.

Table III
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.

Table IV
Preliminary Results of Settlement Analysis with Surcharge and Wick Drains

				Consolidation Time - Stratum C	
Location	**Embankment Height (ft)**	**Surcharge Height (ft)**	**Wick Drain Spacing (ft)**	**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.

F. FOUNDATION DESIGN

The new Mill Creek and Upper Thorofare Bridges that are along parallel alignments 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 a segmental concrete bridge or cable stayed bridge. In both cases the pier foundations will be comprised 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. Bridge abutments are expected to be supported on square prestressed concrete piles for all alternatives.

G. CULVERT DESIGN

The existing pipe culvert just west of Fish Dock Road is a gathering place for recreational fishing and crabbing. This culvert is the only waterway that permits water to flow from the east side of Ocean Drive to the west side during tidal changes. The pipe is undersized and typically has water flowing through it at a high velocity. The County considers it a safety hazard and has identified it for replacement within this project. The new box culvert that will replace this will be properly sized to reduce the velocity of flow to acceptable levels that are not viewed as safety concerns. The box culvert will most likely consist of precast concrete units that can be installed in stages while traffic and flow through the existing pipe is maintained.

H. HYDRAULIC DESIGN &SCOUR ANALYSIS

A detailed hydraulic analysis was performed to determine if the raising of Ocean Drive would impact any flow patterns during a storm surge or modify daily tidal flow circulation. Changes in storm surge flow could increase coastal flooding and bridge scour due to the damming effect of the raised roadway profile. Changes in tidal circulation could impact wetland hydrology due to culvert and bridge replacements.

Two-dimensional hydraulic modeling was used to evaluate potential hydraulic impacts that raising Ocean Drive could have on normal tidal circulation, storm surge flooding, and the bridge scour potential. The model was run for existing and proposed conditions using the existing 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 (MLW), 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.

Results from the hydraulic analysis of Ocean Drive 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.

The study, attached in Addendum H, revealed the following conclusions:

- Raising the roadway to an elevation above the 100-year floodplain 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.
- Estimated scour depths are listed in the table below.

Table V
Estimated Scour Depths

Alternative(s)	Estimated Scour Depth Range (ft.)		
	Mill Creek	Upper Thorofare	Middle Thorofare
Existing	4.2 – 5.0	8.6 – 11.2	5.4 – 30.3
3A & 3B	6.2 – 7.9	12.2 – 15.9	16.7 – 66.1
3E & 3C	6.1 – 7.7	5.4 – 33.8	
3F & 3D	6.2 – 7.7	4.6 – 36.6	
3G	6.2 – 7.7	5.2 – 53.6	

I. TOLL PLAZA DESIGN

The proposed toll plaza facilities are based upon recommended designs originally developed in a February 2001 study completed by Parsons Brinckerhoff. The study recommended locating the new facilities adjacent to the structure, and widening the toll collection area to accommodate four lanes. The plaza would be approximately 71 feet wide, consisting of two 15-foot wide outer lanes, two 10-foot inner lanes and three 7-foot wide islands. Toll booths would be 4.5 feet wide by 16 feet long. The four lanes would be configured to include the following payment methods as shown in the report (See Addendum I):

- Lane 1 – southbound manual and automatic toll collection
- Lane 2 – northbound and southbound manual toll collection
- Lane 3 – northbound manual toll collection; and,
- Lane 4 – northbound automatic toll collection.

The Cape May County Bridge Commission implemented one-way toll collection operations in early 2003, with tolls no longer being collected in the northbound direction. It is possible that the above configuration could be revised to accommodate similar one-way toll collection.

In addition to the toll collection lanes and booths, a 280 square foot bridge administration building is proposed. The building will house a locker room, bathroom, office, safe room and electrical room. Three parking spaces for bridge staff will be located directly adjacent to the administration building.

J. TRAFFIC ANALYSIS

Existing Traffic Data

Traffic data was provided by the Cape May County Department of Public Works, Office of the County Engineer to assess the existing conditions, conditions during construction and future conditions through various alternatives. Traffic data included both vehicular traffic and boat traffic.

The County provided PB with printouts of hourly vehicle toll payment transactions throughout the month of July 2002. These transactions also represent the number and type of vehicles that traverse the Middle Thorofare Bridge. The data provided the number of vehicles using tickets and various cash payment tolls per type of vehicle classifications. The County provided a copy of the Cape May County Bridge Commission's toll schedule as shown in Appendix A. From the data provided, the period of July 15-21, 2002 was used to determine the AM and PM peak hour volumes for the weekday and mid-day peak for the weekend during the summer season. Peak hours are weekdays 8:00 – 9:00 a.m. and 5:00 – 6:00 p.m. and Saturday 12:00 noon – 1:00 p.m., based on toll transaction records.

Summary tables of the existing hourly and daily traffic volumes, based on the toll transaction records, are provided below.

Table VI
Existing (2002) Summer Traffic Volumes

Summer Period	NB	SB	Two-Way
AM Peak Hour	128 vph*	161 vph	289 vph
PM Peak Hour	333 vph	405 vph	738 vph
Saturday Peak Hour	398 vph	312 vph	710 vph
Daily Weekday	4,612 veh.	4,690 veh.	9,302 veh.
Daily Weekend	4,937 veh.	5,131 veh.	10,068 veh.

* vph = vehicles per hour

With a weight restriction of 15 tons posted on the bridge, heavy vehicles were limited to class two type vehicles that are two axle, six tire trucks and buses. The heavy vehicle percentages during the AM, PM and Saturday peak hours are approximately 1.6%, 0.5%, and 0.7%, respectively.

The County provided 2000, 2001 and 2002 bridge-opening yearly summaries for the Middle Thorofare Bridge. It categorized five classifications of vessels that require bridge openings: Charter/Party, Commercial, Pleasure Craft, Sailing Vessel, and US Coast Guard ships. These summaries, showing the 2002 Middle Thorofare Bridge Openings broken down by the number of ship types during each month of 2002, are included in Appendix A. The summaries also provide the comparison between the non-summer and summer season. The County provided bridge tender logs for the entire year of 2002. It identified the number of openings per day, the names of the vessels, the classification of the vessel, and the actual date and time of the opening. The number of openings that occurred during the peak hours in the period of July 15-21, 2002 is shown in the table below. During the week of July 15-21, 2002, the daily average number of weekday bridge openings was 34 while the weekend total was 42.

Table VII
Summer Weekday and Weekend Bridge Openings at Middle Thorofare Bridge

Peak Hour	Number of Openings	Percentage of Daily Openings
AM	1	2.9%
PM	2	5.9%
Sat	1	2.4%

Future Traffic Data

To develop construction year 2007 and future year 2027 volumes, a 1.46 percent (%) per annum growth rate was applied to the 2002 traffic counts. The growth rate of 1.46 % was from the Cape May County Bridge Commission *One-Way Toll Study* report (Oct. 2001). A summary of existing and future traffic volumes is provided below.

Table VIII
Existing and Future Hourly Summer Traffic Volumes at Middle Thorofare Bridge

	Existing 2002 (vph)			Construction Year 2007 (vph)			Future Year 2027 (vph)		
Peak Hour	**NB**	**SB**	**Two-Way**	**NB**	**SB**	**Two-Way**	**NB**	**SB**	**Two-Way**
AM	128	161	289	138	173	308	184	231	415
PM	333	405	738	358	435	793	478	582	1060
Sat	398	312	710	428	335	763	572	448	1020

Existing Traffic Operations

According to the criteria set forth in the *2000 Highway Capacity Manual (HCM), Two-Lane Highways*, and the peak hour bridge volumes, Ocean Drive currently operates at a level of service (LOS) D during the summer AM weekday peak hour and LOS E (unacceptable) during the summer PM weekday and weekend peak hours. This LOS is for the existing roadway independent of the bridge openings and toll operations. The Highway Capacity Analysis outputs are included in Appendix A.

The primary traffic consideration for replacing the Middle Thorofare Bridge is the ability to reduce congestion pertaining to the bridge openings by raising the elevation of the bridge. Currently, the toll facility also restricts the ability for vehicle queues created by the bridge opening to dissipate. Independently, the toll facility would not necessarily create an excessive queue, but when exacerbated by the bridge opening, the toll facility hampers the dissipation of traffic. At the start of this study, two-way toll operations were in effect. This was recently converted to a one-way southbound toll collection operation. For purposes of this study, the two-way operation was evaluated and presented. The two-way traffic queues created by the bridge openings presented for both northbound (NB) and southbound (SB) Ocean Drive still apply. However, the northbound queues will dissipate quickly since the northbound traffic is unimpeded by the toll plaza. The southbound queue dissipation will be the same as indicated for the two-way toll operation.

The 2000 HCM has no method for determining levels of service associated with bridge openings or toll facilities. If the vehicle delay for a bridge opening was compared to the delay used for determining levels of service, it would operate well into the LOS F range. Without a LOS service rating, the traffic operations were evaluated from a queuing standpoint. PB estimated the number of vehicles queued at the Middle Thorofare Bridge during the peak summer hours immediately following a bridge opening, the length of that queue, and the ability for the queue to dissipate. The dissipation of the queue is expressed either in minutes, if the queue is dissipated during the peak hour (amount of time for toll facility to have no residual queue after the bridge opening), or in number of vehicles and length of queue in feet remaining at the conclusion of the peak hour, if the queue did not fully dissipate.

The Cape May County Office of the County Engineer indicated that a typical bridge opening duration is about 10 minutes per vessel. The duration of the bridge openings could be shorter or longer depending on vessel activity, as in some cases there are multiple vessels per opening. These bridge openings translate to the amount of delay a vehicle has to wait before being processed in the toll plaza and crossing the bridge.

The number of vehicles in queue, at the termination of the bridge openings (formed at the toll plaza during the summer AM, PM and Saturday peak hour periods) were calculated. For the

calculations it is assumed that the bridge openings occur at the beginning of the peak hour, with the queue dissipation to occur for the remainder of the sixty minutes. The number of openings per peak hour is provided in the *Summer Weekday and Weekend Bridge Openings at Middle Thorofare Bridge* Table in the Existing Traffic Data section. The number of queued vehicles based on 10-minute bridge openings is provided below.

Table IX
Average Vehicles in Queue at the Termination of Summer Bridge Openings (Year 2002)

Peak Hour	Vehicles in Queue		Queue Length (ft.) (Based on 25 feet/vehicle)	
	NB	SB	NB	SB
AM	21	27	525	675
PM	111	135	2775	3375
Saturday	66	52	1650	1300

According *to NCHRP Synthesis 194*, dated 1993, the average capacity for a manual lane is 350 vehicles per hour (vph), an automated lane is 500 vph, a mixed Automated Vehicle Identification (AVI) lane is 700 vph, a dedicated AVI lane is 1200 vph, and an express AVI lane is 1800 vph. There are many factors that can shorten or prolong a transaction rate per type of toll transaction. Some of these factors are driver's familiarity with the toll facility, payment method available and amount of toll, attitude and efficiency of individual toll collectors. The Middle Thorofare Toll Bridge is a manual coin and ticket toll operation with one or two toll collectors for two-way toll operations (one toll collector for one-way operations). Based on the provided information by the County for the Middle Thorofare Bridge Daily Staffing Schedule; the maximum number of toll collectors were two per shift for the peak summer months from Memorial Day weekend and June 15 through Labor Day for the two-way toll collection. During the rest of the year, one person per shift was scheduled. The Middle Thorofare Bridge Daily Staffing Schedule can be found in the Appendix A. Based on peak hour volumes with two toll collectors and each having a manual lane capacity of 350 vehicles per hour, the bridge opening queues dissipated during the summer AM peak hour, but did not dissipate within the one hour for the PM and Saturday peak hours. The results are summarized below. NB Ocean Drive has significant storage capacity, but SB Ocean Drive storage capacity is limited to one mile prior to reaching Diamond Beach. A description of the location of the end of the SB queue is provided.

Table X
Average Queue Dissipation Following a Summer Bridge Opening (Year 2002)

Peak Hour	Time Following Opening to Dissipate Queue (minutes)		Vehicles in Queue at End of Peak Hour		Queue Length		Location of End of SB Queue
	NB	SB	NB	SB	NB	SB	
AM	6	9	0	0	0'	0'	No queue
PM	*	*	101	172	2525'	4300'	mid way between Fish Dock Rd and Diamond Beach
Saturday	*	*	106	20	2650'	500'	North end of bridge

* Queue did not dissipate by end of Peak Hour.

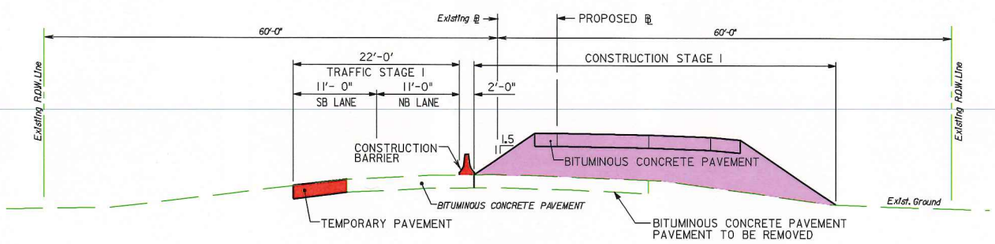
K. CONCEPTUAL CONSTRUCTION STAGING

Construction of the new roadway will be performed in two main stages, with approximately one side of the roadway being constructed per stage. To maintain two lanes of traffic at all times temporary pavement will be utilized on one side of the existing roadway during stage one. In the first stage of work traffic would shift, utilizing the temporary pavement, while embankment is placed to raise approximately half of the roadway. The new embankment, separated from the travel lanes by temporary construction barrier, would then be compacted with surcharge over a period of three to six months time. In the area of driveways, embankment would not be placed until the end of the settlement period, at which time it would be added and mechanically compacted in an overnight period. This methodology will preserve access to bordering properties throughout construction. After compaction, the surcharge would be removed and the new pavement would be constructed. The second stage will shift traffic to the newly constructed roadway section, remove the temporary pavement, and complete the remaining portions of the roadway in a similar sequence. This sequence is shown in Figure 27.

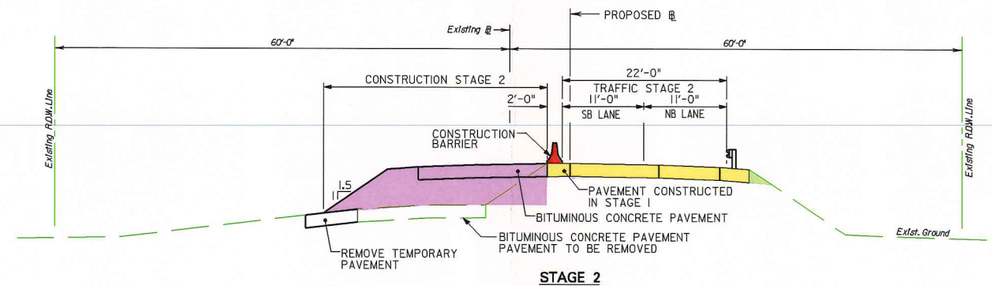
For Alternatives 3A and 3B, in the area between Upper and Middle Thorofare, a large number of driveways in close proximity to each other, combined with a significant amount of embankment required for the bridge approaches would not allow the surcharge method described above to be used without temporary driveway closures. Temporary driveways would be required to maintain access for these properties. In several cases, temporary access through neighboring parcels would be required. Additionally, the driveways for Lund's Fisheries, Atlantic Cape Fisheries and Snow's/Doxsee would need to accommodate trailers which regularly access the site.

Structures

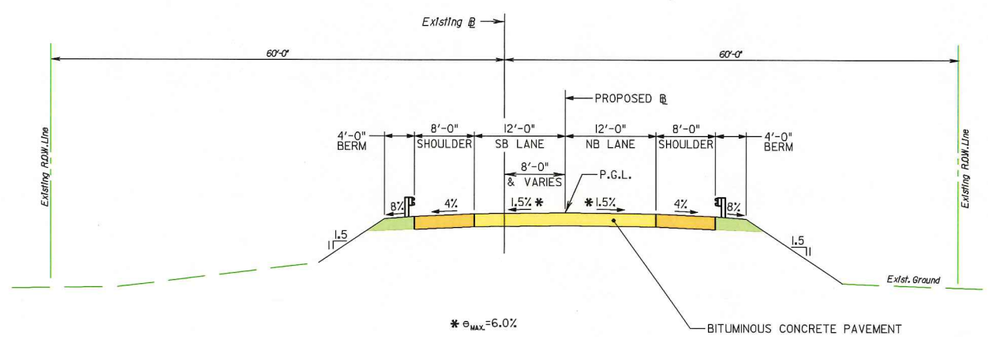
For the alternatives that construct new Mill Creek and Upper Thorofare Bridges immediately adjacent to their existing locations, the structures would be built in conjunction with the roadway staging sequence described above. In all cases, the Middle Thorofare Bridge would be built offline while the existing bridge remains in service. It is likely that the roadway construction can be completed before the new Middle Thorofare Bridge has been constructed and thus the existing Middle Thorofare Bridge would have to be accessible from the raised Ocean Drive. The staged construction of the tie-in areas between the new and old alignments of Ocean Drive and the Middle Thorofare Bridge will therefore need to be highly developed once the Preferred Alternative is defined.



STAGE 1



STAGE 2



TYPICAL ROADWAY SECTION

OCEAN DRIVE

(SOUTH SHIFT)

FINAL CONDITION

LEGEND

- BITUMINOUS PAVEMENT
- BITUMINOUS SHOULDER
- TEMPORARY PAVEMENT
- STAGE CONSTRUCTION
- BERM
- EXISTING R.O.W.

SCALE IN FEET

20' 10' 0 20' 40'

FIGURE 27

PB 100 YEARS

OCEAN DRIVE UPGRADE & BRIDGE REPLACEMENTS

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

NOVEMBER 2003

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VI. COMPARISON OF IMPACTS AND COSTS

Because of the complex nature of this project and the sensitive environment in which it is located, there is a multitude of potential impacts which have been evaluated to ensure that the chosen alternative meets the project needs while minimizing impacts. There are six general categories of impacts, listed here in no particular order:

- Cost/Constructability
- Right-of-Way and Access
- Traffic
- Socio-Economic
- Cultural Resources
- Environmental

Each of these categories is discussed in the following subsections, however, a detailed compilation of impact-related data is presented in an Alternatives Comparison Matrix included in Figure 28 following page 59. This matrix provides a user-friendly format in which to present and compare tabulated impacts and general information amongst the alternatives. It also provides a means by which to evaluate the seven viable alternatives (3A-3G). An evaluation of the alternatives, including the dismissal of Alternatives 1-3 which are not included in the matrix or the discussions below, is presented in the next section.

A. COST/CONSTRUCTABILITY

Cost and constructability represent impacts to the general taxpaying and traveling public. Considered in this category of impacts are the cost and time to construct, bridge life-cycle costs, traffic disruption, and construction staging.

The time to construct the various alternatives ranges from 2.5 to 3.5 years and is generally controlled by the time to construct the Middle Thorofare Bridge. Alternatives which feature bridges on new alignments will take considerably less time to construct than those with parallel alignments. Complexity of the construction also affects its duration. Complex maintenance of access issues for Alternatives 3A and 3B and the large number of in-water piers for Alternative 3D add time to the construction duration.

Traffic disruption during construction will be high for Alternatives 3A and 3B because of the maintenance of access issues. Alternatives 3F and 3G have the lowest level of disruption because they affect existing Ocean Drive the least.

The costs for all project elements (roadway, bridges, utilities, etc.) have been based upon appropriate unit prices for similar projects in the region or other appropriate areas of the country. The cost to construct any of the alternatives is high, but reasonable given the magnitude and complexity of the project. The overall conceptual cost estimates are listed in the table below. Detailed cost estimates are included in Appendix C.

Table XI
Conceptual Cost Estimates

Alternative	Highway Related Subtotal ($ Million)	Bridge Related Subtotal ($ Million)	Construction Subtotal ($ Million)	Utilities, Escalation, Engineering & Contingencies ($ Million)	Right of Way ($ Million)	Total Cost ($ Million)
3A	$ 23.4	$ 43.2	$ 66.6	$ 20.1	$ 0.3	$ 87.0
3B	$ 24.3	$ 44.2	$ 68.5	$ 20.6	$ 0.2	$ 89.3
3C	$ 32.9	$ 60.6	$ 93.6	$ 28.2	$ 2.7	$ 124.4
3D	$ 34.4	$ 64.6	$ 99.0	$ 29.7	$ 1.8	$ 130.5
3E	$ 38.2	$ 56.4	$ 94.6	$ 28.4	$ 0.4	$ 123.4
3F	$ 34.5	$ 64.0	$ 98.5	$ 29.6	$ 0.6	$ 128.7
3G	$ 34.5	$ 64.0	$ 98.5	$ 29.6	$ 0.6	$ 128.7

The proposed bridge types vary by alternative and differ not only in their construction costs, but also in the costs associated with operating and maintaining them through their entire life-cycles. For this reason, a comparison of total life-cycle costs, in 2003 dollars, for the structures in each alternative was completed. The results reveal that costs for operating and maintaining the bridges in the different alternatives vary from $5.9 million to $7.8million – a range of approximately $1.9 million. Given the overall magnitude of the project, $1.9 million represents only 1.4% to 2.1% of the overall project costs. The evaluation of life-cycle costs as they relate to selection of the preferred alternative for this project is therefore not significant.

The cost for the operator of the movable span has not been separated from the life cycle costs for any alternatives because the toll booth attendants also operate the movable span and are on duty 24 hours a day.

B. RIGHT-OF-WAY AND ACCESS

Preliminary estimates of required Right-of-Way and easements were tabulated for each of the alternatives. The values ranged from 0.16 acres of required Right-of-Way for Alternative 3B to 8.61 acres for Alternative 3C, which has the greatest length of new roadways. Required easements, which primarily consist of new bridge easements, vary from 2.40 acres for Alternative 3B to 14.35 acres for Alternative 3D, which has the greatest length of new structures. The total number of properties impacted was also tabulated, ranging from 3 properties for each of Alternatives 3B, 3F and 3G to 7 properties for Alternatives 3A and 3C. An impacted property is defined as one from which Right-of-Way or easements are required to construct the project. Riparian grants will also be required for each alternative.

Maintenance of access is a critical issue. Because the roadway is being raised over 5 feet, any driveway adjacent to a raised portion of the roadway will require modifications to meet the raised roadway. In the area between the existing Upper and Middle Thorofare Bridges, there are a significant number of driveways servicing the four commercial properties and one mixed use property in the area. Because they not only raise the roadway in this area, but also construct approaches to a new Middle Thorofare Bridge, Alternatives 3A and 3B severely impact these driveways, forcing some to be closed simply because the roadway will be raised too high for a new driveway to be constructed. Alternative 3A would force three driveways to close while Alternative 3B would force two to close. However, it should be noted that despite closing one less driveway, Alternative 3B would require the demolition of a large refrigeration facility belonging to Lund's Fisheries. It is anticipated that such a closure would require acquisition of the entire business. Impacts to local businesses are discussed in the Socio-Economic subsection. Alternatives 3C – 3G will not close any driveways and will only require modifications

of 7 driveways as opposed to 13 for Alternative 3B and 15 for Alternative 3A. None of the driveways in the area between Upper and Middle Thorofares will require modifications in Alternatives 3C-3G.

C. TRAFFIC

There are three general factors which provide a basis for comparison of traffic impacts amongst the various alternatives. They consist of the approximate reduction of bridge openings, the level of service and queues resulting from the toll plaza facility.

Alternatives 3A and 3B would eliminate just less than a third of all openings of the Middle Thorofare Bridge. Community feedback indicated that this percentage was unfavorable. Alternatives 3C through 3G, with their fixed high-level bridges, eliminate 100% of the bridge openings.

Levels of service for each of the alternatives were analyzed independent of the toll plaza queues. Every alternative resulted in a LOS of C for the summer AM weekday peak period and D for the summer Saturday and PM peak periods in the design year of 2027.

Toll plaza queuing was analyzed to determine the length of queues for each alternative. Only Alternatives 3A and 3B resulted in queues, because of interruptions in service due to bridge openings. Alternatives 3C-3G would not queue and would eliminate the unfavorable backups which frequent the roadway today.

D. SOCIO-ECONOMICS

Potential socio-economic impacts were examined and quantified to the extent possible to assess the affects that the constructed project might have on the surrounding community. Impacts to businesses, aesthetics, community support and parkland resources were all considered in this effort. Each is discussed below.

Economic Impacts

An economic impact study was conducted in early 2003 to assess potential impacts to businesses located along Ocean Drive in the study area. Businesses west of Mill Creek were not included in this study as impacts will be limited and will not vary among the alternatives. However, impacts to 8 active businesses east of Mill Creek were examined. Impacts included but were not limited to, physical plant impacts, access impacts, and loss of revenue due to Ocean Drive's potential realignment. The active businesses are listed in the Table below.

Table XII
Potentially Impacted Active Businesses

Business Name	Block and Lot	Business Description
Bree-z-lee Marina	Block 822.02, Lots 2 & 3	Recreational marina; dredge spoil storage
Hinch Marina	Block 793, Lots 15.04 & 15.05	Recreational marina, bait & tackle store, residence
Axelsson's Blue Claw Restaurant	Block 793, Lot 15.03	Upscale, year-round restaurant
Lund's Fisheries	Block 793, Lot 15.01	fishery & processing plant
Atlantic Cape Fisheries	Block 793, Lot 15.06	Fishery & processing plant
Snow's/Doxsee	Block 822.01, Lot 1.01	Canned/bottled food processing plant
Dolphin Cove Marina	Block 820, Lot 8	Recreational slip marina
Two Mile Landing Restaurant & Marina	Block 820, Lot 2.01	700 seat restaurant complex and 62 boat slips

The study collected financial and other data from business owners and/or operators and solicited direct input from the businesses regarding the various alternatives being studied. This data was not independently verified and was used for comparison purposes only.

The results of the economic impact analysis clearly demonstrate that the 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 would be extremely detrimental to the overall community. According to the study, 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.

The estimated approximate reduction in annual revenues ranged from $420,000 to nearly $120 million for Alternative 3B which would likely close Lund's Fisheries. Similarly, estimated loss of manpower, measured by the number of employees, ranged from 22 to 660 employees. Again, these values did not include mitigations, and were based on unverified data provided by the businesses.

Local business concerns during and after construction included the following:

- Maintenance of truck access to the fishing industry facilities 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, view-sheds from their facilities are important to their operations. High roadway embankments and unattractive or obtrusive structures in close proximity to their buildings may also result in lost patrons.
- The Upper Thorofare Bridge is regularly used by local residents for fishing and crabbing. Local business owners have 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 and children.
- 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. They are also concerned with the horizontal clearance provided by a new movable span if that is selected.
- Maintenance of access to their facilities during construction is of key concern to all owners, regardless of the alternative selected.

The full Economic Impact Study is included in Addendum J.

Community Support

Community involvement in this project has been ongoing and productive since the project's inception in 2000. A June 2000 public meeting led directly to the development of Alternative 3. Subsequent input from the business community and Cape May County Chamber of Commerce led directly to the expansion of the project from Upper Thorofare to Wildwood Crest to include the Middle Thorofare Bridge and the development of Alternatives 3A-3D. A June 5, 2002 public information center which presented those Alternatives revealed strong community support for the project both from the traveling public, who sought to eliminate traffic backups from bridge openings, as well as the local fishing industry which sought to have the Middle Thorofare Bridge replaced to improve the horizontal and vertical clearances at the bridge and to improve the navigability of the waterway.

After the 2002 public information center, minimum vertical clearance requirements for the navigational channels were clarified, resulting in the revision of Alternative 3C and the development of Alternatives 3E-3G. During this time, the project's community involvement efforts also included one-on-one meetings with representatives from eight local businesses in very close proximity to the bridge as part of an Economic Impact Study. Each of the representatives was given an overview of the alternatives and was invited to provide direct input on each.

On June 14, 2003, a third public information center was conducted at Wildwood Crest Memorial Elementary School, just northeast of the project site. Alternatives 3A-3G were individually presented along with a preliminary impacts matrix and renderings of two possible bridge types (Concrete Segmental and Cable-Stayed). At this meeting, the public overwhelmingly supported the alignment which is utilized by Alternatives 3F and 3G. The primary reason of support was the elimination of bridge openings, minimal impacts to local businesses, and minimal impacts to wetlands. The fishing industry and other businesses also expressed support for the alignment.

Support between Alternatives 3F and 3G has been slightly in favor of Alternative 3G. Many individuals felt that the cable-stayed structure would be an attractive new landmark for the community, while others who live on Madison Avenue, facing the bridge, feared that the bridge's height would be obtrusive or unsightly.

All documents related to community involvement are included in Appendix B.

Aesthetics
As stated above, the aesthetic value of the constructed roadway can be considered as a positive or negative impact to the surrounding community. In general, the impact has been associated with the relocation of the roadway's alignment in relation to an existing perspective. The perspectives considered included the Ocean Drive corridor, the Diamond Beach area of Lower Township, Wildwood Crest and Cape May. This qualitative assessment revealed no significant differences, except for Alternative 3D, which significantly relocates the road closer to residential areas.

Parkland, Waterfront Access and Navigable Channel
Finally, impacts to neighboring parkland resources and waterfront access were tabulated. The Marmora Wildlife Management Area borders the north side of Ocean Drive through most of the project area. Impacts to this property range from 0 to 4.4 acres. These impacts occur due to the realigning of Ocean Drive in Alternatives 3C and 3D, as well as by the proposed access road in Alternative 3E.

Waterfront access currently exists on the eastern bank of Middle Thorofare, east of Ocean Drive, where recreational fishing and crabbing occurs. The proposed alternatives either eliminate or enhance access to this location. Alternatives 3A and 3B would no longer provide access, while the remaining alternatives would maintain access through an access road. In addition to the waterfront access, recreational activities in the community will be improved by the widening of the navigable channel from its existing 50-foot horizontal clearance. The additional width will improve the efficiency by which multiple vessels navigate the channel. Alternatives 3A-3B will provide a 130-foot horizontal clearance, Alternatives 3C and 3D provide 225 feet, Alternative 3E and 3F provide 330 feet and Alternative 3G provides 840 feet.

E. CULTURAL RESOURCES

An April 2003 report prepared by Richard Grubb Associates (Addendum G) assessed the effects of the proposed alternatives on potential historic and prehistoric resources, as well as historic architectural resources within the Area of Potential Effect (APE). The APE varies by alternatives and is dependent upon local view-sheds. Alternative 3G has an APE with an

approximate 2.5 mile radius, extending into Wildwood Crest and Cape May because of the height of the towers for the cable stayed bridge. The APE for all other alternatives encompasses a much smaller area, consisting mainly of wetlands and open waters. Graphical depictions of the two APEs are included in Addendum G, as is related documentation from the New Jersey State Historic Preservation Office, which has concurred with the delineated APE, and has provided initial consultation on the Section 106 process.

The existing Middle Thorofare Bridge is eligible for the National Register of Historic Places, and its replacement will be considered an adverse effect for all alternatives. No other historic resources were identified within the APE for Alternatives 3A-3F. The APE for Alternative 3G, however, contains the following resources:

- Cape May Historic District
- Hornbeam (Buoy Tender)
- Cold Spring Historic District
- Historic Cold Spring Village Railroad Station
- Historic Cold Spring Village Junction Control Tower
- Garden State Parkway Historic District

No effects on the above resources are anticipated, with the exception of the Cape May Historic District. This district may have possible visual impacts. A detailed survey of properties within the APE for Alternative 3G was not undertaken as part of this study. A more detailed survey will be conducted in following stages of work to identify specific, affected resources within this district.

It is unlikely that archaeological deposits of historical significance exist within the APE, and therefore no effects on historic or prehistoric archaeology are anticipated.

F. ENVIRONMENTAL

Amy S. Greene Environmental Consultants prepared an environmental documentation report to inventory resources in the project area as well as to identify potential impacts to those resources. The study concludes that any of the proposed alternatives will result in impacts to ecological resources in the project area. The extent of the impacts varies for each alternative and is described below. The report is included in Addendum E.

Water Quality

Because there will be no additional travel lanes added to the roadway, and runoff will continue to leave the roadway via sheet flow, no impacts to groundwater, surface water or sole source aquifers are anticipated.

Floodplain

The placement of fill within a floodplain of tidal waters, in which the project is located, is not regulated under the Flood Hazard Control Act Rules. No impact to the floodplain is anticipated.

Wetlands

The raising of Ocean Drive will result in unavoidable wetland encroachment as will the roadway's realignment. Each of the seven alternatives evaluated would result in different levels of impacts to wetlands and open waters, as summarized in Table XIII. Temporary impacts, which have not been calculated, would also occur during construction and are expected to be a minor component of overall wetland disturbance.

Table XIII
Summary of Wetland and Open Water Impacts

Impact Type	3A	3B	3C	3D	3E	3F	3G
Total Wetland & Open Water Impacts from Fill (Ac.)	2.66	2.92	7.29	6.54	2.82	2.22	2.22
Wetland & Open Water Impacts from Piers (Ac.)	*0.31*	*0.29*	*0.36*	*0.75*	*0.25*	*0.40*	*0.40*
Number of Piers in Wetlands & Open Water	*18*	*14*	*19*	*35*	*23*	*29*	*27*
Total Wetland Shading Impacts (Ac.)	0.68	0.61	3.10	5.87	1.70	3.10	3.09
Total Disturbance (Ac.)	3.34	3.54	10.16	11.65	4.77	5.32	5.31

As evidenced in the table above, Alternatives 3C and 3D would have significant impacts to tidal waters and coastal marshes. These impacts would occur not only to the fringes of the tidal marshes, but would also impact portions of the marsh interior which is of highest ecological value. These alternatives also involve the placement of piers on Thorofare Island, which is currently undeveloped and consists of a mosaic of low and high marsh.

Alternatives 3A, 3B and 3E limit wetland impacts to the fringes of the tidal marshes along the existing Right-of-Way of Ocean Drive. Alternative 3E would involve additional wetland impacts to accommodate access to a portion of Ocean Drive.

Alternatives 3F and 3G have nearly identical impacts because they follow the same roadway alignment. The majority of wetland and open water fill proposed is associated with the reconstruction of the roadway. Differences between these alternatives are related to slight differences in the number, locations and sizes of piers. The portion of the roadway that would be realigned in 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 associated with an existing dredge disposal site. 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 and has been avoided to the extent possible.

Both the US Army Corps of Engineers Section 404 Permit and the combined NJ Coastal Wetlands Permit will require mitigation of wetland and open water impacts. Impacted areas can require mitigation from a 1:1 ratio to a 2:1 ratio, depending on the areas and types of wetlands impacted. Additional studies in future phases of work will be required to determine exact mitigation requirements.

Endangered and Threatened Species
Several threatened and endangered species are known to utilize the marshes and open water complexes in the vicinity of the project area, and impacts to those species vary by alternative. Breeding osprey, which currently nest approximately 420 feet north of the Upper Thorofare Bridge, would require construction activities to cease within 1000 feet of the nest between April 1 and July 15 to avoid disturbing the osprey. The current staged construction sequence may allow for such a stoppage for Alternatives 3A, 3B, and 3E-3G. Alternatives 3C and 3D realign Ocean Drive closer to the nest and would likely be considered a permanent impact. The nest could be relocated prior to construction to avoid such an impact. Alternatives 3F and 3G avoid the nesting area.

Sea turtles may be present in the project area, but it is not likely that they would be impacted. The turtles would only be impacted if the area they utilize for breeding were to be subjected to blasting or dredging. The existing Middle Thorofare Bridge may be subject to such activity during demolition, but is outside of the breeding area. Pile driving would not impact the turtles as they would be able to relocate from areas of pile construction.

Alternative 3G would directly impact 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 routes across the United States. The birds, which migrate largely at night are attracted to sources of artificial light similar to those proposed to light the roadway, cables and FAA required beacons. This attraction is particularly true during periods of inclement weather. Lights disorient night-flying migratory songbirds which rely on the subtle glimmer of stars and 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. The height of the bridge adds to the threat to the birds. Altitudes of migrating birds are highly variable, although most nocturnal birds are thought to migrate at altitudes between 164 and 3280 feet. Coastlines have all been shown to concentrate migratory birds, often in relatively low flight above the ground. The US Fish and Wildlife Service has suggested that birds may be adversely affected by the project and that the risk of collision would be relatively high.

Little data is available on flight patterns of the migratory birds in the project area, and specifically in the vicinity of the Middle Thorofare Bridge. Additional studies would be required in future phases of work to determine the extent to which the area surrounding the bridge is traveled by migratory birds. Additionally, mitigations are available. For example, white FAA strobe lights are less attractive to the birds than the traditional red, and bridge lighting can be directed downwards.

No endangered plants have been identified in the project area.

Wildlife Habitats

There are important wildlife habitats present in the project site which are considered concentration sites for raptors, waterfowl, shorebirds, wading birds, and migratory birds. These habitats are located in the Marmora Wildlife Management Area, Thorofare Island and the Two Mile Beach National Priority Site. There are also essential fish habitats located in the project area.

Alignments 3A, 3E, 3F and 3G cross the northwestern corner of the Two Mile Beach National Heritage Priority site and would result in minor disturbances to beach, dune and tidal marsh. There would be no disturbance to coastal scrub or forest communities.

Alternatives 3C and 3D would impact Thorofare Island, and may deter the common tern from continuing to nest there.

Alternatives 3C, 3D and 3E impact the Marmora Wildlife Management Area.

Disturbances to tidal waters and coastal marshes, which are important fish and wildlife habitat, and serve as important migratory pathways and spawning areas, would be limited to the removal and replacement of bridge piers. This work would cause siltation and turbidity, which are expected to be localized and temporary. Such activities are not expected to impede fish migration, but may be subject to timing restrictions. Of particular concern is spawning winter flounder, which could restrict work from January 1 to May 31. Peak spawning periods for other fish range from April 1 through June 30.

Impacts to Diamondback Terrapins nesting or migrating are not anticipated in any of the alternatives.

Section 4(f) & Parkland Resources
As a wildlife management area, the Marmora Wildlife Management Area (MWMA) and Two Mile Beach Unit of the Cape May National Wildlife Refuge (CMNWR) are Section 4(f) resources. A Section 4(f) review would be required to obtain approval to utilize these lands for the project. It is anticipated that impacts to the CMNWR can be avoided. Alternatives 3C-3E would directly impact the lands of the MWMA. As Green Acres Funds were used to obtain the MWMA, approval from the New Jersey Statehouse Commission would also be necessary.

Air & Noise
Aspects of the project alternatives that may affect air quality include:

1. A shift in the roadway alignment or in the toll plaza location that locate roadway emission sources closer to sensitive land uses (i.e., residences, parks, etc)

The proposed toll configuration (i.e., 4 lanes vs. 2 lanes in the current condition) would tend to increase localized pollutant concentrations above existing conditions for all alternatives. However, no sensitive land uses would be affected.

2. A shift in the roadway alignment that would lengthen the average trip.

Changes in the length of the alternative roadway alignments result in increases in vehicle miles traveled in all alternatives except 3A and 3B. The largest increase is in Alternatives 3C (534 miles per day mpd), and 3D (320 mpd).

3. Changes in the number of idling vehicles

Alternatives that reduce (3A and 3B) or eliminate (3C, 3D, 3E, 3F, and 3G) vehicular queuing during periods of bridge openings would reduce vehicular emissions and benefit air quality.

4. Changes in Travel speeds

All alternatives would decrease local travel speeds from those in the current condition. This would likely provide a small benefit to air quality.

5. Changes in vehicle volumes.
None of the project alternatives are expected to generate new vehicle trips. Traffic analyses indicates that 1068 daily vehicle trips (peak weekend) would occur in the future with or without the implementation of any of the alternatives.

Factors that most affect air quality, and distinguish between alternatives are changes in vehicular speed, queuing, and alignment length. The best performing alternatives from an air quality perspective are those that include a high level bridge, eliminate queuing and have the least increase in vehicle miles traveled (VMT) (3E, 3F, 3G).

The potential for changes in noise would relate to:

- Shifts in roadway alignment physically closer to a sensitive receptor
- Changes in roadway elevation that would increase the number of receptors with a line-of-sight connection to the roadway.
- Changes in speed that would affect noise levels at existing receptors.

No significant increases in noise levels are expected for any alignment as none of the alignments would encroach on sensitive land uses. Because of its raised profile, Alternative 3E would encroach on the Hinchcliffe residence. While not an impact which would require abatement, this makes the alternative less desirable from a noise perspective.

Hazardous Materials
No hazardous materials impacts are anticipated for any of the proposed alternatives despite previous incidences of hazardous materials found at various locations within the project site. See Addendum F.

G. DESIGN EXCEPTIONS

Alternatives 3A, 3B, and 3E-3G will require a design exception for insufficient stopping sight distance in the vicinity of the proposed toll plaza east of the proposed Middle Thorofare Bridge. The proposed alignments, the proximity of a culvert carrying flows from Old Lower Thorofare, and the necessity to minimize wetlands impacts have dictated the location of the driveway servicing the Dolphin Cove Marina (Block 820, Lot 8). Alternatives 3A and 3B realign the driveway slightly to the north, while Alternatives 3E-3G construct a new driveway connecting to the proposed Ocean Drive in the vicinity of the culvert. In all cases, the new driveway is constructed immediately adjacent to the proposed toll plaza, whose toll booths and structures limit the sight distance for vehicles exiting the driveway onto northbound Ocean Drive.

The severity of the situation is lessened by the fact that the driveway has low volumes of traffic, and by the fact that traffic passing through the toll plaza will likely be traveling less than the design speed which dictates the required sight distance. These items, along with the restrictions to the driveways location will likely result in an approved design exception.

Several citizens in the Diamond Beach section of Lower Township have expressed some concern for the safety of pedestrians crossing traffic at the curve near the miniature golf course just north of the project limits. This should be investigated during the preliminary design phase since tolls in the northbound direction have been eliminated and the posted speed for Ocean Drive north of the new bridge will be 50 mph.

No structural design exceptions are anticipated.

H. PERMITS AND CLEARANCES

The location and magnitude of this project will necessitate several permits, approvals and clearances prior to construction. Anticipated permit requirements are summarized in the table below.

Table XIV
Required Permits and Approvals

Act	Agency*	Approval	Alternative						
			3A	3B	3C	3D	3E	3F	3G
National Environmental Policy Act (NEPA)	FHWA	Categorical Exclusion Documentation	X	X			X	X	
National Environmental Policy Act (NEPA)	FHWA	Environmental Assessment			X	X			X
Department of Transportation Act	FHWA	Section 4(f) Evaluation			X	X	X		
NJ Waterfront Development Act	NJDEP	Waterfront Development Permit	X	X	X	X	X	X	X
NJ Wetlands Act of 1970	NJDEP	Coastal Wetlands Permit	X	X	X	X	X	X	X
Clean Water Act	NJDEP	Section 401 Water Quality Certification	X	X	X	X	X	X	X
Clean Water Act	USACOE	Section 404 Permit	X	X	X	X	X	X	X
Rivers and Harbors Act	UASCOE & USCG	Section 9 and Section 10 Permits	X	X	X	X	X	X	X
Historic Preservation Act	NJDEP SHPO	Section 106 Consultation for Historic Resources	X	X	X	X	X	X	X
Magnuson-Stevens Fishery Conservation and Management Act	NMFS	Endangered Marine Species and Essential Fish Habitat Consultation	X	X	X	X	X	X	X
Coastal Area Facility Review Act (CAFFRA)	NJDEP	CAFRA Permit			X	X		X	X
Tidelands Management Act	NJDEP	Riparian Grant	X	X	X	X	X	X	X
Green Acres	NJDEP	State House Commission Approval			X	X	X		

* *FHWA = Federal Highway Administration*
NJDEP = New Jersey Department of Environmental Protection
USACOE = United States Army Corps of Engineers
USCG = United States Coast Guard
NJDEP SHPO = NJDEP State Historic Preservation Office
NMFS = National Marine Fisheries Service

Figure 28
Ocean Drive Improvements and Middle Thorofare Bridge Replacement
Alternatives Comparison Matrix

Ocean Drive Improvements & Middle Thorofare Bridge Replacement Alternatives	3A		3B		3C		3D		3E		3F		3G	
1A. Engineering - Roadway														
- Proposed Travel Lane and Shoulder Width (each direction)	12 ft. travel lane & 8 ft. shoulder		12 ft. travel lane & 8 ft. shoulder		12 ft. travel lane & 8 ft. shoulder		12 ft. travel lane & 8 ft. shoulder		12 ft. travel lane & 8 ft. shoulder		12 ft. travel lane & 8 ft. shoulder		12 ft. travel lane & 8 ft. shoulder	
- Total Project Length (miles)	2.7		2.7		3.2		3.0		2.9		2.8		2.8	
- Total Length of Roadway not including bridges (miles)	2.2		2.2		2.1		1.8		1.9		1.7		1.7	
- Design Speed & (Posted Speed Limit)	55 mph (40-50 mph)		55 mph (40-50 mph)		55 mph (40-50 mph)		55 mph (40-50 mph)		55 mph (40-50 mph)		55 mph (40-50 mph)		55 mph (40-50 mph)	
- Raises Roadway Above 100-year Flood Elevation	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
- Roadway Shift to Accommodate Traffic During Construction	Varies		North		North		North		Varies		Varies		Varies	
- Alignment of Ocean Drive in the Vicinity of Middle Thorofare	Parallel (South)		Parallel (North)		Shifted (North)		Shifted (North)		Parallel (South)		Shifted (South)		Shifted (South)	
- Access to Businesses Between Upper Thorofare & Wildwood Crest	via existing Ocean Drive		via existing Ocean Drive		via new access road		via new access road		via existing Ocean Drive		via existing Ocean Drive		via existing Ocean Drive	
- Middle Thorofare Bridge Toll Facility	New 4-lane Toll Facility, Semi-Automated, Constructed Adjacent to Middle Thorofare Bridge		New 4-lane Toll Facility, Semi-Automated, Constructed Adjacent to Middle Thorofare Bridge		New 4-lane Toll Facility, Semi-Automated, Constructed Adjacent to Middle Thorofare Bridge		New 4-lane Toll Facility, Semi-Automated, Constructed Adjacent to Middle Thorofare Bridge		New 4-lane Toll Facility, Semi-Automated, Constructed Adjacent to Middle Thorofare Bridge		New 4-lane Toll Facility, Semi-Automated, Constructed Adjacent to Middle Thorofare Bridge		New 4-lane Toll Facility, Semi-Automated, Constructed Adjacent to Middle Thorofare Bridge	
1B. Engineering - Structures														
- Total Length of Bridge Structures (feet)	2357		2320		5592		6202		5053		5577		5517	
- Retaining Walls (feet)	920		150		1140		535		3870		2920		2920	
- Culvert Near Fish Dock Road	New Concrete Box Culvert		New Concrete Box Culvert		New Concrete Box Culvert		New Concrete Box Culvert		New Concrete Box Culvert		New Concrete Box Culvert		New Concrete Box Culvert	
- Mill Creek Bridge	Replacement		Replacement		Replacement		Replacement		Replacement		Replacement		Replacement	
- Proposed Bridge Type	Prestressed Concrete Box Beam		Prestressed Concrete Box Beam		Prestressed Concrete Box Beam		Prestressed Concrete Box Beam		Prestressed Concrete Box Beam		Prestressed Concrete Box Beam		Prestressed Concrete Box Beam	
- Total Structure Length (feet)	312		312		312		312		312		312		312	
- Total Number of Piers	3		3		3		3		3		3		3	
- Upper Thorofare Bridge	Replacement		Replacement		New Bridge On New Alignment		New Bridge On New Alignment		Replacement		Replacement		Replacement	
- Proposed Bridge Type	Prestressed Concrete Box Beam		Prestressed Concrete Box Beam		Segmental Box Beams (Span-by-Span)		Segmental Box Beams (Span-by-Span)		Prestressed Concrete Box Beam		Prestressed Concrete Box Beam		Prestressed Concrete Box Beam	
- Total Structure Length (feet)	365		365		640		640		365		365		365	
- Total Number of Piers	4		4		3		3		4		4		4	
- Middle Thorofare Bridge	New Bridge On Parallel Alignment		New Bridge On Parallel Alignment		New Bridge On Shifted Alignment		New Bridge On Shifted Alignment		New Bridge On Parallel Alignment		New Bridge On Shifted Alignment		New Bridge On Shifted Alignment	
- Proposed Bridge Type	Mid-level Bascule (Moveable) Bridge		Mid-level Bascule (Moveable) Bridge		High-level Segmental (Fixed) Bridge		High-level Segmental (Fixed) Bridge		High-level Segmental (Fixed) Bridge		High-level Segmental (Fixed) Bridge		High-level Cable-Stayed (Fixed) Bridge	
- Construction (main span / approaches)	Open Pier / Prestressed I-Girders		Open Pier / Prestressed I-Girders		Balanced Cantilever / Span-by-Span		Span-by-Span		Balanced Cantilever / Span-by-Span		Balanced Cantilever / Span-by-Span		Cable-Stayed / Span-by-Span	
- Maximum Structure Height (feet)	55		55		126		85		126		126		126 (300 - Top of Tower)	
- Maximum Structure Grade	6%		6%		5%		5%		6%		4.5%		4.5%	
- Approximate Reduction in Bridge Openings	30%		30%		100%		100%		100%		100%		100%	
- Horizontal Clearance at Upper Thorofare Channel (feet)	N/A		N/A		N/A		N/A		N/A		150		150	
- Minimum Vertical Clearance at Upper Thorofare Channel (feet)	N/A		N/A		N/A		N/A		N/A		90		90	
- Horizontal Clearance at Middle Thorofare Channel (feet)	180		180		310		155		330		330		840	
- Minimum Vertical Clearance at Middle Thorofare Channel (feet)	45		45		75		75		116		116		116	
- Horizontal Clearance at Lower Thorofare Channel (feet)	N/A		N/A		215		N/A		N/A		N/A		N/A	
- Minimum Vertical Clearance at Lower Thorofare Channel (feet)	N/A		N/A		116		N/A		N/A		N/A		N/A	
- Total Structure Length (feet)	1680		1643		4640		5250		4376		4900		4840	
- Total Number of Piers	11		10		21		29		21		22		20	
		Rank		Rank		Rank		Rank		Rank		Rank		Rank
2. Cost/Constructibility														
- Approximate Construction Duration (years)	3.5	2	3.5	2	3	3	3.5	2	3	3	2.5	4	2.5	4
- Traffic Disruption	High (access impacts)	1	High (access impacts)	1	Low (Shifted Alignment)	4	Low (Shifted Alignment)	4	Moderate	2	Low (Shifted Alignment)	4	Low (Shifted Alignment)	4
- Constructibility	Complex (maintenance of access)	1	Complex (maintenance of access)	1	Moderate (some offline construction)	3	Complex (mod. Wetland constraints)	2	Complex (piers in existing shoulder)	1	Moderate (offline construction)	4	Moderate (offline w/ min.piers in water)	4
- Cost to Construct	$87,042,139	4	$89,304,307	4	$124,384,914	2	$130,516,548	1	$123,369,396	2	$128,645,695	1	$128,627,938	1
- Total Life Cycle Cost (Bridges Only, 2003 dollars)	$49,105,000	4	$50,098,000	4	$67,176,000	2	$71,991,000	2	$62,388,000	3	$70,725,000	2	$71,888,000	2
3. Right-of-Way & Access														
- Right-of-Way Acquisition (acres)	0.56	5	0.16	5	8.61	1	4.50	2	0.84	4	0.67	4	0.67	4
- Easements (Bridge, Slope, Construction) (acres)	2.44	3	2.40	3	10.65	1	14.35	1	3.43	3	7.90	2	7.90	2
- Riparian Grants	Yes	3	Yes	3	Yes	3	Yes	3	Yes	3	Yes	3	Yes	3
- Impacted Properties (Requiring ROW Acquisition or Easement)	7	2	3	1	7	3	5	2	6	3	4	4	4	4
- Driveway Closures	3	2	3	1	0	3	0	3	0	3	0	3	0	3
- Driveway Modifications	15	1	13	1	7	2	7	2	7	3	7	4	7	4
4. Traffic														
- Approximate Reduction in Bridge Openings	30%	2	30%	2	100%	5	100%	5	100%	5	100%	5	100%	5
- Design Year (2027) Level of Service (Summer AM/Summer PM & Sat.)	C/D	3	C/D	3	C/D	3	C/D	3	C/D	3	C/D	3	C/D	3
- Toll Plaza Queueing	Yes	1	Yes	1	No	3	No	3	No	3	No	3	No	3
5. Socio-Economic														
- Potential Business Impacts	1	2	5	1	2	3	2	2	3	3	1	4	1	5
- Estimated Loss of Annual Revenues	$45,000,000	2	$119,550,000	1	$3,340,000	3	$3,340,000	3	$1,270,000	4	$420,000	5	$420,000	5
- Estimated Loss of Employees of Impacted Businesses	152	2	660	1	143	2	143	2	58	3	22	4	22	4
- Aesthetics														
- Ocean Drive Corridor	+	3	+	3	-	2	--	1	-	2	-	2	-	2
- Wildwood Crest	+	3	+	3	-	2	--	1	-	2	-	2	--	1
- Cape May	+	3	+	3	+	3	+	3	-	2	-	2	-	2
- Community Support	--	1	--	1	+	3	--	1	-	2	++	4	+++	5
- Parkland Resources														
- Marmora Wildlife Management Area (acres)	No Impact	4	No Impact	4	4.2	1	4.4	1	0.6	2	No Impact	4	No Impact	4
- Two Mile Unit, Cape May National Wildlife Refuge	No Impact	4	No Impact	4	No Impact	4	No Impact	4	No Impact	4	No Impact	4	No Impact	4
- Public Waterfront Access	--	1	-	2	++	4	++	4	-	2	++	4	++	4
- Navigation Channel (Middle Thorofare)	130	3	130	3	130	3	130	3	130	3	130	3	130	3
- Horizontal Clearance at Middle Thorofare Channel (feet)	130	3	130	3	310	4	155	3	330	4	330	4	840	5

Ranking order is 1 to 5, with 1 being worst and 5 being best.

Figure 28
Ocean Drive Improvements and Middle Thorofare Bridge Replacement
Alternatives Comparison Matrix

Ocean Drive Improvements & Middle Thorofare Bridge Replacement Alternatives	3A		3B		3C		3D		3E		3F		3G	
6. Cultural Resources														
- Historic Architecture														
- Middle Thorofare Bridge	Adverse Effect	2	Adverse Effect	2	Adverse Effect	2	Adverse Effect	2	Adverse Effect	2	Adverse Effect	2	Adverse Effect	2
- Cape May Historic District	No Effect	3	No Effect	3	No Effect	3	No Effect	3	No Effect	3	No Effect	3	Possible Adverse Effect	2
- Hornbeam (Bouy Tender)	No Effect	3	No Effect	3	No Effect	3	No Effect	3	No Effect	3	No Effect	3	No Effect	3
- Cold Spring Historic District	No Effect	3	No Effect	3	No Effect	3	No Effect	3	No Effect	3	No Effect	3	No Effect	3
- Historic Cold Spring Village Railroad Station	No Effect	3	No Effect	3	No Effect	3	No Effect	3	No Effect	3	No Effect	3	No Effect	3
- Historic Cold Spring Village Junction Control Tower	No Effect	3	No Effect	3	No Effect	3	No Effect	3	No Effect	3	No Effect	3	No Effect	3
- Garden State Parkway Historic District	No Effect	3	No Effect	3	No Effect	3	No Effect	3	No Effect	3	No Effect	3	No Effect	3
- Archaeology														
- Historic	No Effect	3	No Effect	3	No Effect	3	No Effect	3	No Effect	3	No Effect	3	No Effect	3
- Prehistoric	No Effect	3	No Effect	3	No Effect	3	No Effect	3	No Effect	3	No Effect	3	No Effect	3
7. Environmental														
- Wetlands/Open Water Impacts						-								
- Total Wetland/Open Water - Fill (Acres)	2.66	5	2.92	5	6.93	1	6.54	2	2.82	3	2.22	5	2.22	5
- Wetland/Open Water Impacts From Piers (Acres)	0.31	4	0.29	4	0.36	4	0.75	4	0.25	3	0.40	3	0.40	2
- Number of Piers in Wetlands/Open Water	18	2	14	2	19	2	35	2	23	2	29	3	27	4
- Total Wetland Shading (Acres)	0.68	5	0.61	5	2.88	3	5.10	1	1.70	4	3.10	2	3.09	2
- Coastal/Aquatic Resources														
- Submerged Aquatic Vegetation	No	3	No	3	No	2	No	1	No	3	No	3	No	3
- Shellfish	Prohibited	3	Prohibited	3	Prohibited	2	Prohibited	1	Prohibited	3	Prohibited	2	Prohibited	2
- Beaches/Dunes	Yes	2	Yes	2	Yes	2	Yes	1	Yes	2	Yes	2	Yes	3
- Subtidal/Inter-tidal Shallows	Yes	3	Yes	3	Yes	2	Yes	2	Yes	3	Yes	3	Yes	3
- Natural Heritage Priority Site	Yes	2	No	3	No	3	No	3	Yes	2	Yes	2	Yes	2
- Fish/Wildlife Resources														
- Raptor Concentration Sites	Yes	3	Yes	3	Yes	2	Yes	1	Yes	3	Yes	3	Yes	3
- Waterfowl Concentration Sites	Yes	3	Yes	3	Yes	2	Yes	1	Yes	3	Yes	3	Yes	3
- Shorebird Concentration Sites	Yes	3	Yes	3	Yes	2	Yes	1	Yes	3	Yes	3	Yes	3
- Wadingbird Concentration Sites	Yes	3	Yes	3	Yes	2	Yes	1	Yes	3	Yes	3	Yes	3
- Essential Fish Habitat	Yes	3	Yes	3	Yes	2	Yes	1	Yes	3	Yes	2	Yes	3
- Migratory Birds	Yes	3	Yes	3	Yes	2	Yes	1	Yes	3	Yes	3	Yes	1
- Endangered Species	No	3	No	3	Yes	2	Yes	1	Yes	2	No	3	No	3
- Hydraulic & Hydrology	No Impact	3	No Impact	3	No Impact	3	No Impact	3	No Impact	3	No Impact	3	No Impact	3
- Maximum Scour Depth (Feet)	66	1	66	1	35	3	35	3	35	3	36	3	54	2
- Air & Noise	No Impact	3	No Impact	3	No Impact	3	No Impact	3	No Impact	3	No Impact	3	No Impact	3
- Hazardous Materials	No Impact	3	No Impact	3	No Impact	3	No Impact	3	No Impact	3	No Impact	3	No Impact	3
Total Rank		151		148		145		125		157		171		171

Ranking order is 1 to 5, with 1 being worst and 5 being best.

VII. EVALUATION AND RECOMMENDATIONS

A. EVALUATION

Prior to discussing the evaluation of the alternatives studied for this project, it is worthy to reiterate that Alternatives 1, 2 and 3 did not meet the project needs, once the project was expanded to Wildwood Crest in 2000. No further evaluations were conducted on these alternatives. The remaining study of alternatives focused only on Alternatives 3A-3G, as well as the no-build, rehabilitate and replace-in-kind alternatives.

No-Build Alternative

The no-build alternative does not meet the project needs or purpose. The existing roadway will continue to be susceptible to flooding in major storms, possibly leaving the barrier island of Wildwood disconnected from the evacuation route. Additionally, the functionally and structurally obsolete bridges will continue to deteriorate, ultimately requiring rehabilitation and replacement. For these reasons, the no-build alternative was dismissed from further consideration.

Rehabilitation Alternative

Similar to the no-build alternative, this option will leave the roadway below the floodplain and leave the evacuation route incomplete. It will extend the life span of the existing bridges, but will still ultimately require their replacement. For these reasons, the rehabilitation alternative would not meet the project's need and purpose, and was dismissed from further consideration.

Replace-In-Kind Alternative

This alternative, while replacing the deficient bridges, would still not complete the evacuation route or reduce the traffic congestion caused by the many bridge openings, thereby not fulfilling the project needs or purpose. This alternative was also dismissed from further consideration.

Alternatives Comparison Matrix

The evaluation of the remaining seven alternatives required a complex compilation of critical data to determine which alternative not only meets the project's need and purpose, but also does so while minimizing the impacts discussed in the previous section. To complete this evaluation, an Alternatives Comparison Matrix was developed as an analytical tool and information repository. It is presented in Figure 28. The matrix is an effective tool for side-by-side comparison of each alternative's features and impacts. Roadway and structural features are listed in the first two sections. The impacts are classified among six general categories, listed below in the order which they appear in the matrix:

- Cost & Constructability
- Right-of-Way and Access
- Traffic
- Socio-Economic
- Cultural Resources
- Environmental

Each of the seven alternatives is a viable alternative which replaces the structures and provides a viable evacuation route above the 100-year floodplain. Therefore, all seven alternatives (3A-3G) appear in the matrix.

The matrix performs its analytical function through the use of a point system. The six categories listed above are expanded to include all applicable impacts. A numerical value designating the level of impact for each alternative was assigned based on quantifiable data. The ranking values range from 1 (negative impact) to 5 (positive impact). Values of 3 designate neutral or no relative

impact. In cases where quantifiable data was not available, aesthetic impacts for example, a relative plus/minus system (ranging from - - to ++) was used to determine the numerical ranking. The numerical values were then totaled, with the highest total representing the alternative which minimizes impacts. It is important to note that each type of impact carried equal weight. The absence of weighted impacts assures that subjectivity is minimized, if not eliminated, from the evaluation of the alternatives.

The following paragraphs discuss the findings of the matrix.

Alternative 3A - Total Points: 151

Alternative 3A, while having few environmental impacts, has significant impacts in the areas of traffic, right-of-way/access, socio-economic and constructability. These impacts are all associated with the proposed moveable bridge and its close proximity to the businesses located between Upper and Middle Thorofares. The bridge still requires a significant number of openings (Approximately 5250 per year) which will disrupt traffic. The bridge's west side approach would also permanently close many driveways and would be difficult to construct while maintaining access to the businesses. The potential damages for the businesses would be large.

Alternative 3B - Total Points: 148

Alternative 3B's point assignments were nearly identical to those of Alternative 3A. The few differences included lower point assignments for the severity of the driveway closures, and its extremely low level of community support.

Alternative 3C - Total Points: 145

Alternative 3C's point assignments varied greatly from Alternative 3A's. The alternative's new alignment improved point assignments for constructability, access, and socio-economic categories. The elimination of the moveable span increased traffic point assignments. However, the new alignment results in an increase in environmental impacts.

Alternative 3D - Total Points: 125

Alternative 3D's extended alignment, and subsequent increased costs and environmental impacts resulted in its low point total, despite its approach, which was similar to Alternative 3C. This alternative also received poor scores for aesthetics and very low community support due to its substantial realignment towards Wildwood Crest.

Alternative 3E - Total Points: 157

With its alignment along the existing roadway, and fixed, high-level bridge, Alternative 3E improves upon the previous alternatives by lessening the environmental impacts of Alternatives 3C and 3D, and removing the constructability and access impacts of Alternatives 3A and 3B. Subsequent to these improvements, Alternative 3E's accumulated point total is significantly higher than the previous four alternatives. The Alternative does, however, require a service road to maintain access to existing Ocean Drive between Upper and Middle Thorofares through the lands of the Marmora Wildlife Management Area (MWMA). These lands, in addition to being wetlands, are also subject to a Section 4(f) review. Community support for this alternative is also low.

Alternative 3F - Total Points: 171

Similar to Alternative 3E, this alternative lessens wetland impacts and solves access and constructability issues between Upper and Middle Thorofares. Unlike Alternative 3E, however, it avoids encroachment on the lands of the MWMA. By realigning Ocean Drive through dredge spoils and low quality wetlands south of Upper Thorofare, this alignment decreases wetlands impacts, and minimizes traffic disruption, while maintaining the positive features of Alternative

3E. Thus, Alternative 3F's accumulated point total is significantly higher than Alternative 3E's. The alignment of this alternative received very high community support.

Alternative 3G – Total Points: 171

Alternative 3F and 3G are identical except for the Middle Thorofare Bridge design. The proposed cable-stayed bridge in Alternative 3G has inherent advantages and disadvantages over the segmental concrete bridge proposed in Alternative 3F. The primary benefit of the cable-stayed bridge is the reduction of the number of piers necessary within Middle Thorofare. The reduction of piers significantly simplifies construction within the waterway, reducing impacts to aquatic resources and maximizes the width of the navigable channel of Middle Thorofare. Changes in cost, wetlands and other impacts are negligible, with the exception of potential impacts to migratory birds. Community support demonstrated a slight preference for Alternative 3G over all other alternatives. These differences offset each other in terms of point assignments on the matrix and result in identical scores for Alternatives 3F and 3G.

B. RECOMMENDATIONS

Alternatives 3A, 3B, 3C, 3D and 3E are dismissed, despite meeting the project needs, because they do not minimize the overall impacts.

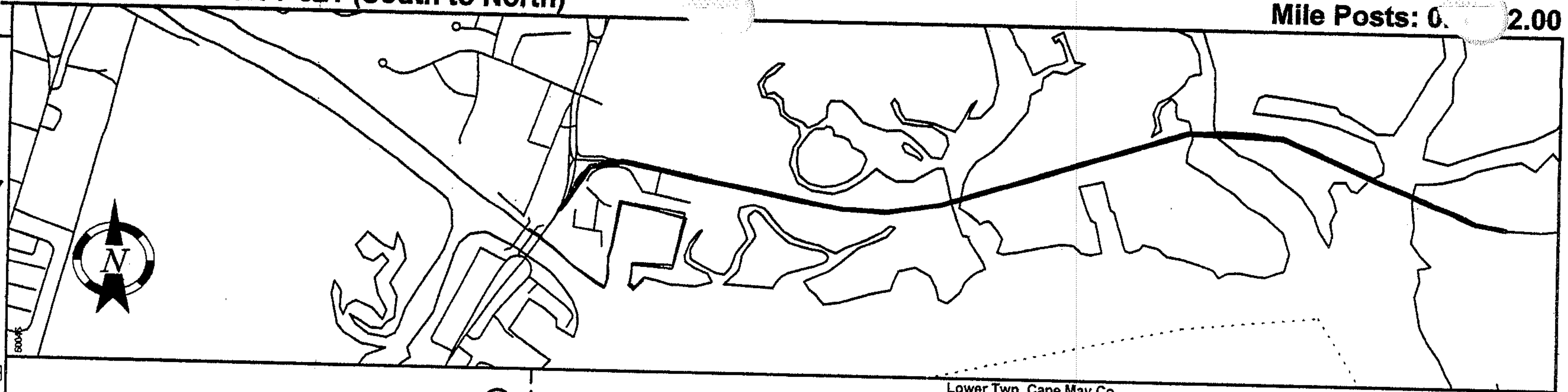
The choice between Alternatives 3F and 3G remains challenging as either could be identified as the Initially Preferred Alternative (IPA). Alternative 3G does, however, present the possibility of additional minimization of impacts to Middle Thorofare. Minimization of migratory bird impacts would need to be offered through the development of specific design elements during preliminary design. ***Because Alternative 3G, with the proposed Cable-Stayed Bridge at Middle Thorofare, meets the project needs and minimizes impacts, and has potential to further minimize impacts, it is recommended as the Initially Preferred Alternative (IPA) for this project.*** It should be noted that Alternative 3F is also feasible and may also be considered the Initially Preferred Alternative if so deemed by the County.

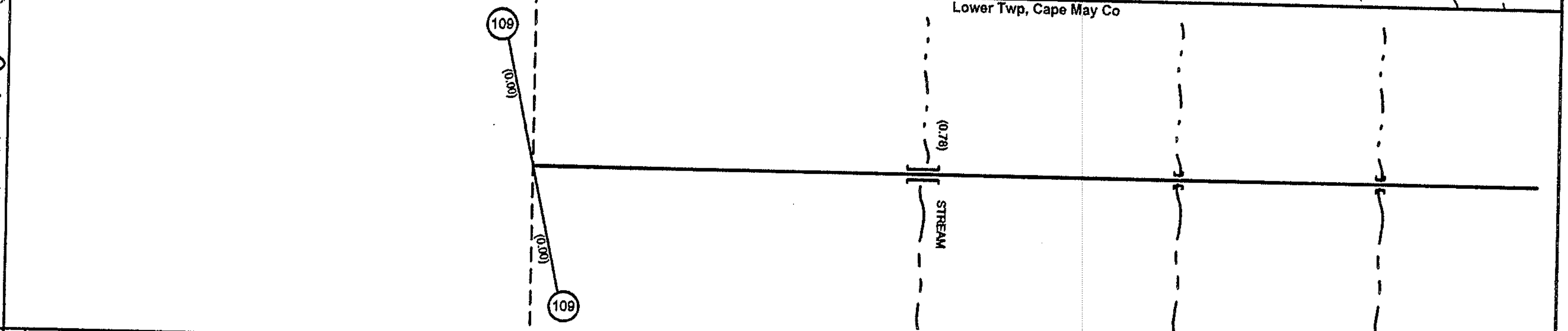
Appendix A
Traffic Analysis Data

CAPE MAY COUNTY 621 (South to North)

Mile Posts: 0.[illegible] 2.00

Legend
- Interstate Route (287)
- US Route (22)
- NJ Route (21)
- County Road (689)
- Interchange Number (2)
- Grade Separated Interchange
- Traffic Signal
- Toll Plaza
- Traffic Monitoring Sites (WIM, AVC, VOL)
- Undivided Highway
- Divided Highway
- Dualized Hwy (Exp & Local)
- Road Underpass
- Road Overpass





MILES: -1.0, 0.0, 1.0, 2.0

KILOMETERS: -1.0, 0.0, 1.0, 2.0, 3.0

Begin Cape May County 621 MP=0.00

Street Name	Ocean Drive
Jurisdiction	County
Functional Class	Rural Major Collector
Federal Aid Sys	STP
Control Section	
Speed Limit	45 | 40 | 25
Number of Lanes	4 | 2
SB/WB Shou.	0 | 1 | 9 | 7 | 14 | 9
SB/WB Pave.	
Med. Type	None
Med. Width	0
NB/EB Pave.	65 | 50
NB/EB Shou.	7 | 1 | 11 | 7 | 14 | 7 | 15 | 8
Traffic Volume	4,500 (00)
Traffic Sta. ID	8-2-009
Structure No.	
Contract No. & Date	
Enlarged Views	

(Divided: SB/WB Shou. through Med. Width; Undiv.: NB/EB Pave., NB/EB Shou.)

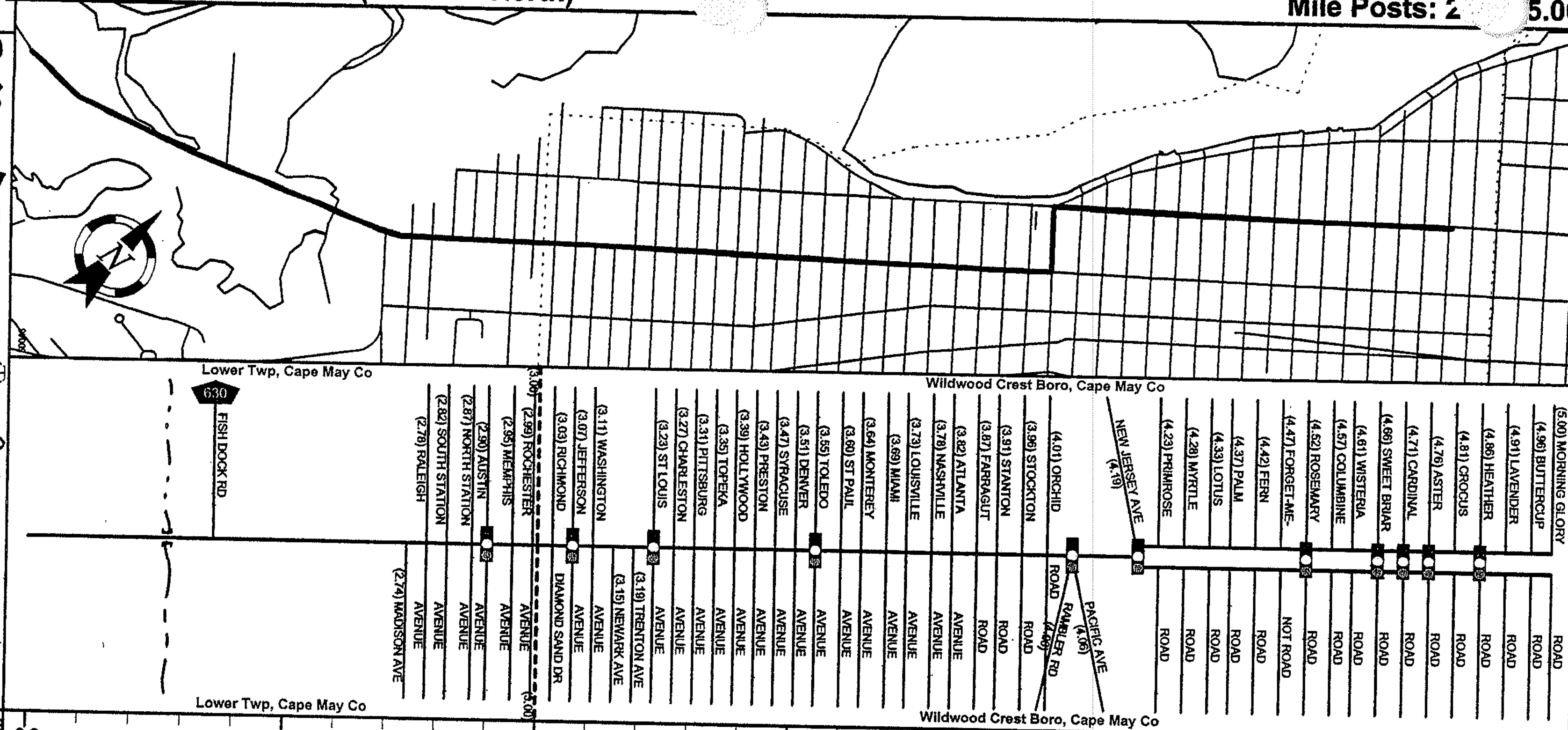
SRI = 05000621

Date last inventoried: August 1999

CAPE MAY COUNTY 621 (South to North)

Mile Posts: 2 … 5.00

Legend	
Interstate Route	287
US Route	22
NJ Route	21
County Road	689
Interchange Number	2
Grade Separated Interchange	
Traffic Signal	
Toll Plaza	
Traffic Monitoring Sites	WIM, AVC, VOL
Undivided Highway	
Divided Highway	
Dualized Hwy (Exp & Local)	
Road Underpass	
Road Overpass	



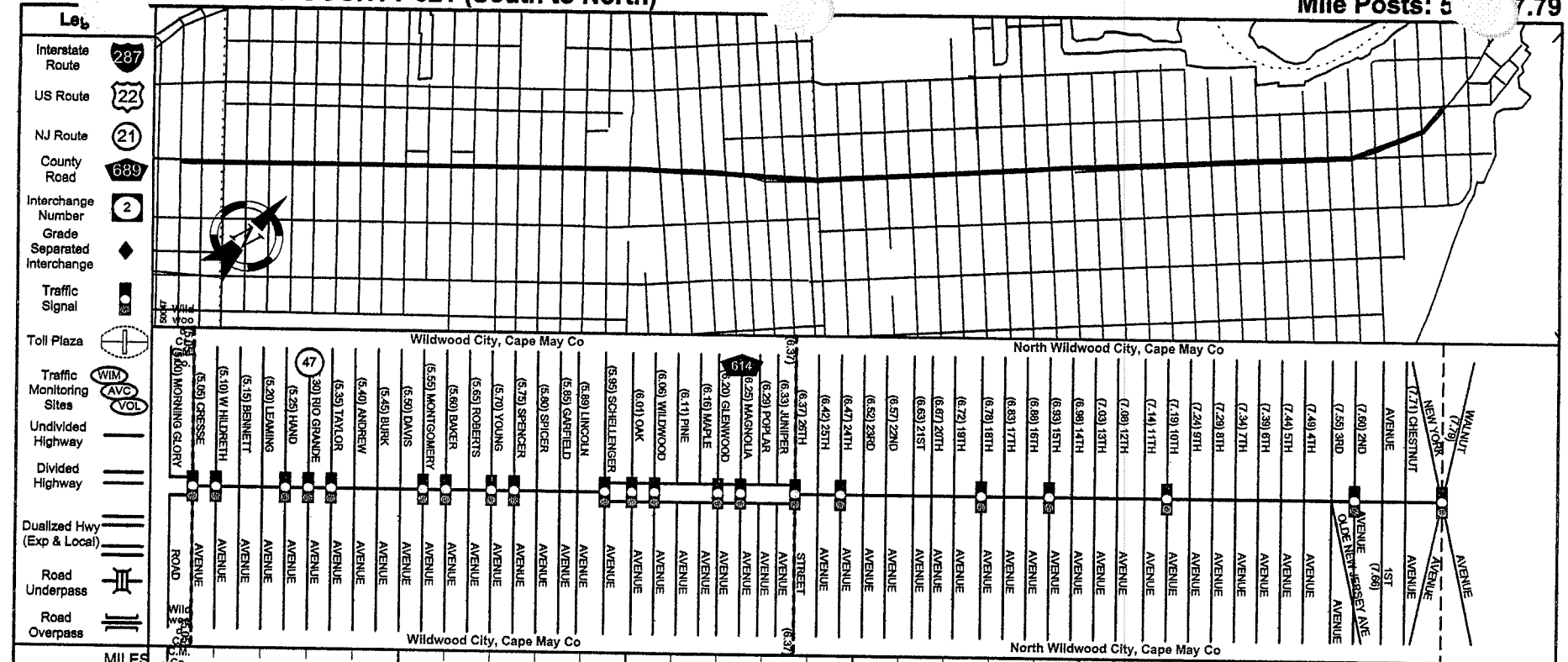
Item	Values (south to north)
Street Name	Ocean Drive; Pacific Avenue; Orchid Road; New Jersey Avenue
Jurisdiction	County
Functional Class	Rural Major Collector
Federal Aid Sys	STP
Control Section	
Speed Limit	25
Number of Lanes	2; 3; 4; 2; 4
Divided – SB/WB Shou.	9; 0
Divided – SB/WB Pave.	
Divided – Med. Type	None; 28
Divided – Med. Width	0; Unprotected
Undiv. – NB/EB Pave.	50; 60; 51; 11
Undiv. – NB/EB Shou.	8; 42; 0; 49; 28
Traffic Volume	
Traffic Sta. ID	
Structure No.	
Contract No. & Date	
Enlarged Views	

SRI = 05000621

Date last inventoried: August 1999

CAPE MAY COUNTY 621 (South to North)

Mile Posts: 5 7.79



Street Name	New Jersey Avenue				
Jurisdiction	County				
Functional Class	Rural Major Collector	Rural Minor Arterial		Urban Collector	
Federal Aid Sys	STP				
Control Section					
Speed Limit	25				
Number of Lanes	4			2	4
Divided: SB/WB Shou.	0				
Divided: SB/WB Pave.	28	29			
Divided: Med. Type	Unprotected	None	Unprotected	None	
Divided: Med. Width	11	0	10	0	
Undiv.: NB/EB Pave.	28	51	29	49	
Undiv.: NB/EB Shou.	0				
Traffic Volume	6,671 (01)				
Traffic Sta. ID	8-4-632				
Structure No.					
Contract No. & Date					
Enlarged Views					

End Cape May County 621 MP=7.79

SRI = 05000621

Date last inventoried: August 1999

Done by: R Pascual 4/8/03
Checked by: P. Lachmanowicz 6/19/03

Middle Thorofare Bridge Existing and Future Hourly Summer Traffic Volumes

Growth Rate 1.46% *

	Peak Hour Volumes per direction	Existing 2002	Construction 2007	Design 2027
AM	NB	128	138	184
	SB	161	173	231
PM	NB	333	358	479
	SB	405	435	582
SAT	NB	398	428	572
	SB	312	335	448

(*) Growth Rate Source: Cape May County Bridge Commission, " One Way Toll Study" Report, dated October 10,2001.

Done by: R Pascual 4/8/03
Checked by: D. DeAngelo 6/14/03

2002 Two Mile Bridge (Middle Thorofare) Tender Openings from July 15, 2002 to July 21, 2002

Date	Time	Type
7/14/02	01:10:00 PM	Commercial
7/14/02	05:50:00 PM	Commercial
7/16/02	10:42:00 AM	Commercial
7/16/02	11:17:00 AM	Charter/Party
7/16/02	11:45:00 AM	Charter/Party
7/16/02	11:47:00 AM	Charter/Party
7/16/02	01:28:00 PM	Charter/Party
7/16/02	01:29:00 PM	Charter/Party
7/16/02	01:29:00 PM	Charter/Party
7/16/02	01:48:00 PM	Pleasure Craft
7/16/02	02:02:00 PM	Sailing Vessel
7/16/02	02:39:00 PM	Charter/Party
7/16/02	03:25:00 PM	Charter/Party
7/16/02	03:33:00 PM	Sailing Vessel
7/16/02	03:39:00 PM	Charter/Party
7/16/02	04:30:00 PM	Commercial
7/16/02	04:32:00 PM	Commercial
7/16/02	04:53:00 PM	Pleasure Craft
7/16/02	05:13:00 PM	Charter/Party
7/16/02	06:11:00 PM	Sailing Vessel
7/16/02	07:17:00 PM	Charter/Party
7/16/02	07:19:00 PM	Commercial
7/16/02	07:21:00 PM	Pleasure Craft
7/16/02	08:29:00 PM	Sailing Vessel
7/16/02	08:46:00 PM	Charter/Party
7/16/02	09:11:00 PM	Commercial
7/16/02	09:17:00 PM	Commercial
7/16/02	10:08:00 PM	Commercial
7/17/02	12:30:00 AM	Commercial
7/17/02	02:10:00 AM	Commercial
7/17/02	03:54:00 AM	Commercial
7/17/02	05:46:00 AM	Commercial
7/17/02	05:48:00 AM	Commercial
7/17/02	07:50:00 AM	Sailing Vessel
7/17/02	07:50:00 AM	Commercial
7/17/02	08:52:00 AM	Commercial
7/17/02	10:55:00 AM	Commercial
7/17/02	11:10:00 AM	Charter/Party
7/17/02	11:55:00 AM	Charter/Party
7/17/02	01:28:00 PM	Charter/Party
7/17/02	01:30:00 PM	Charter/Party
7/17/02	02:12:00 PM	Commercial
7/17/02	02:21:00 PM	Sailing Vessel
7/17/02	02:44:00 PM	Charter/Party
7/17/02	03:02:00 PM	Pleasure Craft
7/17/02	03:24:00 PM	Commercial
7/17/02	03:24:00 PM	Charter/Party
7/17/02	03:40:00 PM	Pleasure Craft
7/17/02	03:40:00 PM	Charter/Party
7/17/02	04:26:00 PM	Pleasure Craft
7/17/02	04:28:00 PM	Pleasure Craft
7/17/02	04:35:00 PM	Sailing Vessel
7/17/02	04:42:00 PM	Commercial
7/17/02	04:55:00 PM	Sailing Vessel
7/17/02	04:59:00 PM	Charter/Party
7/17/02	06:14:00 PM	Sailing Vessel
7/17/02	06:27:00 PM	Pleasure Craft

Date	Time	Type
7/17/02	06:47:00 PM	Commercial
7/17/02	07:21:00 PM	Pleasure Craft
7/17/02	07:26:00 PM	Charter/Party
7/17/02	08:14:00 PM	Pleasure Craft
7/17/02	08:34:00 PM	Sailing Vessel
7/17/02	09:06:00 PM	Charter/Party
7/17/02	10:11:00 PM	Pleasure Craft
7/17/02	10:29:00 PM	Commercial
7/17/02	10:30:00 PM	Pleasure Craft
7/18/02	12:24:00 AM	Sailing Vessel
7/18/02	12:44:00 AM	Commercial
7/18/02	02:33:00 AM	Commercial
7/18/02	03:15:00 AM	Pleasure Craft
7/18/02	05:30:00 AM	Commercial
7/18/02	05:40:00 AM	Commercial
7/18/02	05:44:00 AM	Commercial
7/18/02	07:20:00 AM	Commercial
7/18/02	09:30:00 AM	Commercial
7/18/02	11:05:00 AM	Charter/Party
7/18/02	11:52:00 AM	Charter/Party
7/18/02	12:12:00 PM	Commercial
7/18/02	12:21:00 PM	Commercial
7/18/02	12:50:00 PM	Commercial
7/18/02	01:20:00 PM	Charter/Party
7/18/02	02:22:00 PM	Sailing Vessel
7/18/02	02:33:00 PM	Commercial
7/18/02	02:50:00 PM	Charter/Party
7/18/02	02:51:00 PM	Commercial
7/18/02	03:21:00 PM	Pleasure Craft
7/18/02	03:33:00 PM	Charter/Party
7/18/02	03:33:00 PM	Charter/Party
7/18/02	04:12:00 PM	Commercial
7/18/02	04:27:00 PM	Charter/Party
7/18/02	04:39:00 PM	Sailing Vessel
7/18/02	04:52:00 PM	Charter/Party
7/18/02	04:53:00 PM	Pleasure Craft
7/18/02	05:07:00 PM	Sailing Vessel
7/18/02	05:39:00 PM	Sailing Vessel
7/18/02	06:08:00 PM	Sailing Vessel
7/18/02	06:17:00 PM	Pleasure Craft
7/18/02	06:48:00 PM	Charter/Party
7/18/02	07:14:00 PM	Charter/Party
7/18/02	08:13:00 PM	Sailing Vessel
7/18/02	08:28:00 PM	Charter/Party
7/18/02	09:13:00 PM	Sailing Vessel
7/18/02	09:20:00 PM	Commercial
7/19/02	04:54:00 AM	Pleasure Craft
7/19/02	05:10:00 AM	Commercial
7/19/02	05:25:00 AM	Commercial
7/19/02	06:11:00 AM	Commercial
7/19/02	06:23:00 AM	Pleasure Craft
7/19/02	07:07:00 AM	Commercial
7/19/02	08:13:00 AM	Commercial
7/19/02	08:38:00 AM	Sailing Vessel
7/19/02	10:06:00 AM	Commercial
7/19/02	11:05:00 AM	Charter/Party
7/19/02	11:44:00 AM	Charter/Party

Date	Time	Type
7/19/02	11:55:00 AM	Commercial
7/19/02	12:09:00 PM	Commercial
7/19/02	01:21:00 PM	Pleasure Craft
7/19/02	02:01:00 PM	Sailing Vessel
7/19/02	02:03:00 PM	Pleasure Craft
7/19/02	02:04:00 PM	Sailing Vessel
7/19/02	02:13:00 PM	Commercial
7/19/02	02:40:00 PM	Charter/Party
7/19/02	02:53:00 PM	Sailing Vessel
7/19/02	03:07:00 PM	Charter/Party
7/19/02	03:20:00 PM	Pleasure Craft
7/19/02	03:45:00 PM	Commercial
7/19/02	04:05:00 PM	Sailing Vessel
7/19/02	04:07:00 PM	Sailing Vessel
7/19/02	04:15:00 PM	Commercial
7/19/02	04:16:00 PM	Pleasure Craft
7/19/02	04:45:00 PM	Charter/Party
7/19/02	05:26:00 PM	Charter/Party
7/19/02	06:07:00 PM	Commercial
7/19/02	06:47:00 PM	Charter/Party
7/19/02	06:56:00 PM	Charter/Party
7/19/02	07:00:00 PM	Pleasure Craft
7/19/02	07:14:00 PM	Charter/Party
7/19/02	07:15:00 PM	Charter/Party
7/19/02	08:38:00 PM	Sailing Vessel
7/19/02	08:47:00 PM	Charter/Party
7/19/02	08:48:00 PM	Charter/Party
7/20/02	04:49:00 AM	Pleasure Craft
7/20/02	05:00:00 AM	Pleasure Craft
7/20/02	08:11:00 AM	Pleasure Craft
7/20/02	09:10:00 AM	Pleasure Craft
7/20/02	10:24:00 AM	Commercial
7/20/02	10:54:00 AM	Sailing Vessel
7/20/02	11:10:00 AM	Charter/Party
7/20/02	11:35:00 AM	Sailing Vessel
7/20/02	11:42:00 AM	Charter/Party
7/20/02	12:09:00 PM	Sailing Vessel
7/20/02	01:21:00 PM	Sailing Vessel
7/20/02	02:08:00 PM	Sailing Vessel
7/20/02	02:31:00 PM	Sailing Vessel
7/20/02	02:42:00 PM	Charter/Party
7/20/02	03:28:00 PM	Pleasure Craft
7/20/02	03:33:00 PM	Charter/Party
7/20/02	03:41:00 PM	Sailing Vessel
7/20/02	04:00:00 PM	Commercial
7/20/02	04:00:00 PM	Sailing Vessel
7/20/02	04:21:00 PM	Sailing Vessel
7/20/02	04:30:00 PM	Pleasure Craft
7/20/02	04:41:00 PM	Sailing Vessel
7/20/02	04:51:00 PM	Pleasure Craft
7/20/02	04:51:00 PM	Charter/Party
7/20/02	04:52:00 PM	Charter/Party
7/20/02	04:58:00 PM	Commercial
7/20/02	05:03:00 PM	Charter/Party
7/20/02	05:21:00 PM	Pleasure Craft
7/20/02	05:33:00 PM	Commercial
7/20/02	05:52:00 PM	Pleasure Craft

Date	Time	Type
7/20/02	06:04:00 PM	Sailing Vessel
7/20/02	06:21:00 PM	Pleasure Craft
7/20/02	06:21:00 PM	Pleasure Craft
7/20/02	06:50:00 PM	Charter/Party
7/20/02	06:51:00 PM	Charter/Party
7/20/02	07:20:00 PM	Charter/Party
7/20/02	07:26:00 PM	Charter/Party
7/20/02	08:00:00 PM	Charter/Party
7/20/02	08:13:00 PM	Commercial
7/20/02	08:30:00 PM	Sailing Vessel
7/20/02	08:32:00 PM	Pleasure Craft
7/20/02	08:41:00 PM	Charter/Party
7/21/02	02:12:00 AM	Commercial
7/21/02	04:49:00 AM	Sailing Vessel
7/21/02	04:50:00 AM	Pleasure Craft
7/21/02	06:26:00 AM	Commercial
7/21/02	07:30:00 AM	Pleasure Craft
7/21/02	08:15:00 AM	Charter/Party
7/21/02	08:55:00 AM	Commercial
7/21/02	10:52:00 AM	Sailing Vessel
7/21/02	11:02:00 AM	Pleasure Craft
7/21/02	11:08:00 AM	Sailing Vessel
7/21/02	11:10:00 AM	Charter/Party
7/21/02	11:35:00 AM	Charter/Party
7/21/02	11:45:00 AM	Sailing Vessel
7/21/02	12:42:00 PM	Commercial
7/21/02	12:42:00 PM	Sailing Vessel
7/21/02	12:45:00 PM	Commercial
7/21/02	12:47:00 PM	Commercial
7/21/02	01:00:00 PM	Sailing Vessel
7/21/02	01:45:00 PM	Commercial
7/21/02	02:14:00 PM	Sailing Vessel
7/21/02	02:20:00 PM	Pleasure Craft
7/21/02	02:44:00 PM	Charter/Party
7/21/02	02:51:00 PM	Pleasure Craft
7/21/02	03:00:00 PM	Pleasure Craft
7/21/02	03:26:00 PM	Pleasure Craft
7/21/02	03:56:00 PM	Sailing Vessel
7/21/02	04:22:00 PM	Sailing Vessel
7/21/02	04:33:00 PM	Commercial
7/21/02	04:35:00 PM	Charter/Party
7/21/02	04:37:00 PM	Sailing Vessel
7/21/02	04:49:00 PM	Charter/Party
7/21/02	05:09:00 PM	Pleasure Craft
7/21/02	06:14:00 PM	Sailing Vessel
7/21/02	06:49:00 PM	Charter/Party
7/21/02	06:49:00 PM	Charter/Party
7/21/02	07:13:00 PM	Charter/Party
7/21/02	07:24:00 PM	Charter/Party
7/21/02	08:14:00 PM	Commercial
7/21/02	08:28:00 PM	Sailing Vessel
7/21/02	08:31:00 PM	Charter/Party
7/21/02	08:49:00 PM	Charter/Party
7/21/02	09:29:00 PM	Commercial
7/22/02	01:22:00 AM	Commercial
7/22/02	03:23:00 AM	Pleasure Craft
7/22/02	04:34:00 AM	Commercial

Date	Time	Type
7/22/02	05:37:00 AM	Commercial
7/22/02	05:55:00 AM	Commercial
7/22/02	06:26:00 AM	Commercial
7/22/02	07:48:00 AM	Commercial
7/22/02	08:31:00 AM	Charter/Party
7/22/02	09:02:00 AM	Commercial
7/22/02	09:20:00 AM	Commercial
7/22/02	09:32:00 AM	Commercial
7/22/02	10:15:00 AM	Sailing Vessel
7/22/02	11:19:00 AM	Charter/Party
7/22/02	11:19:00 AM	Commercial
7/22/02	11:55:00 AM	Commercial
7/22/02	11:56:00 AM	Charter/Party
7/22/02	12:25:00 PM	Commercial
7/22/02	02:01:00 PM	Commercial
7/22/02	02:12:00 PM	Sailing Vessel
7/22/02	02:15:00 PM	Sailing Vessel
7/22/02	02:51:00 PM	Charter/Party
7/22/02	03:20:00 PM	Charter/Party
7/22/02	03:46:00 PM	Sailing Vessel
7/22/02	04:01:00 PM	Commercial
7/22/02	04:15:00 PM	Sailing Vessel
7/22/02	04:16:00 PM	Commercial
7/22/02	06:03:00 PM	Sailing Vessel
7/22/02	06:25:00 PM	Commercial
7/22/02	06:55:00 PM	Charter/Party
7/22/02	07:05:00 PM	Pleasure Craft
7/22/02	07:21:00 PM	Charter/Party
7/22/02	07:22:00 PM	Charter/Party
7/22/02	07:48:00 PM	Sailing Vessel
7/22/02	07:50:00 PM	Charter/Party
7/22/02	08:05:00 PM	Sailing Vessel
7/22/02	08:30:00 PM	Charter/Party
7/22/02	08:45:00 PM	Charter/Party
7/22/02	09:14:00 PM	Commercial
7/22/02	10:20:00 PM	Charter/Party
7/22/02	11:37:00 PM	Commercial
7/22/02	11:39:00 PM	Commercial
7/23/02	01:24:00 AM	Sailing Vessel
7/23/02	03:31:00 AM	Commercial
7/23/02	05:37:00 AM	Commercial
7/23/02	05:38:00 AM	Commercial
7/23/02	07:34:00 AM	Commercial
7/23/02	08:11:00 AM	Charter/Party
7/23/02	08:32:00 AM	Pleasure Craft
7/23/02	09:39:00 AM	Commercial
7/23/02	09:42:00 AM	Commercial
7/23/02	10:06:00 AM	Commercial
7/23/02	10:35:00 AM	Commercial
7/23/02	11:02:00 AM	Charter/Party
7/23/02	11:31:00 AM	Commercial
7/23/02	11:45:00 AM	Charter/Party
7/23/02	12:17:00 PM	Commercial
7/23/02	12:43:00 PM	Pleasure Craft
7/23/02	12:58:00 PM	Sailing Vessel
7/23/02	01:58:00 PM	Commercial
7/23/02	02:07:00 PM	Sailing Vessel
7/23/02	02:37:00 PM	Charter/Party
7/23/02	03:01:00 PM	Sailing Vessel

Done by: R Pascual 4/9/03
Checked by: B. DeAngelo 6/19/03

Maximum Peak Hour Weekday and Weekend Openings
Middle Thorofare Bridge Openings during the week of July 15-21, 2002

		Total Openings per Day	Maximum Peak Hour Openings 8-9 am AM	5-6 pm PM	12-1 pm SAT
Tues.	16-Jul-02	26	0	1	
Wed.	17-Jul-02	38	1	0	
Thurs.	18-Jul-02	37	0	2	
Sat.	20-Jul-02	42			1
Maximum Peak Hour Weekday Openings		34.0	1.0	2.0	
Percentage		100.0%	2.9%	5.9%	
Maximum Peak Hour Weekend Openings		42.0			1.0
Percentage		100.0%			2.4%

Note:
This week of July 15-21, 2003 coincides with the vehicular peak hours assumed as a typcial summer week.
Monday, Friday, and Sunday of the week was not included in the total because of the non-resident activity (tourist)

Duration of per bridge opening is assumed 10 minutes typical.
Source: Dale Foster, County Engineer of Cape May County, Department of Public Works, 4/9/03.

Done by: R Pascual 4/8/03
Checked by: P. Lachmanowicz 6/19/03

Middle Thorofare Bridge Peak Hour Toll Schedule Distribution by Direction

Middle Thorofare Bridge Summer Peak Hour

AM	8-9 am
PM	5-6 pm
Sat	12-1 pm

Based on high peak on tickets

Cape May County Toll Schedule at Middle Thorofare Bridge (from July 16-18,2003 & July 20, 2003)

AM			tickets	$0.50	$3.50	$1.25	$1.00	$0.75	$2.00	$2.75	$4.25	$5.50	total	Percentage Distribution per direction
tue	16-Jul-02	nb	31	94	0	4							129	44.6%
		sb	35	123		2							160	55.4%
		total	**66**	**217**	**0**	**6**	**0**	**0**	**0**	**0**	**0**	**0**	**289**	
wed	17-Jul-02	nb	27	92		2							121	43.1%
		sb	34	124		1			1				160	56.9%
		total	**61**	**216**	**0**	**3**	**0**	**0**	**1**	**0**	**0**	**0**	**281**	
thu	18-Jul-02	nb	44	90					1				135	45.3%
		sb	39	121		3							163	54.7%
		total	**83**	**211**	**0**	**3**	**0**	**0**	**1**	**0**	**0**	**0**	**298**	
Sat	20-Jul-02	nb	30	367		1							398	56.1%
12-1 pm		sb	26	282		2		2					312	43.9%
		total	**56**	**649**	**0**	**3**	**0**	**2**	**0**	**0**	**0**	**0**	**710**	

PM			tickets	$0.50	$3.50	$1.25	$1.00	$0.75	$2.00	$2.75	$4.25	$5.50	total	Avg. Percent Distribution per direction
tue	16-Jul-02	nb	27	305		3		1					336	46.9%
		sb	32	346		2		0					380	53.1%
		total	**59**	**651**	**0**	**5**	**0**	**1**	**0**	**0**	**0**	**0**	**716**	
wed	17-Jul-02	nb	28	282		3	0						313	41.3%
		sb	45	398		0	1						444	58.7%
		total	**73**	**680**	**0**	**3**	**1**	**0**	**0**	**0**	**0**	**0**	**757**	
thu	18-Jul-02	nb	34	314		2			0				350	47.2%
		sb	30	361		0			1				392	52.8%
		total	**64**	**675**	**0**	**2**	**0**	**0**	**1**	**0**	**0**	**0**	**742**	

Existing Peak Hour Toll Distribution per direction

AM Peak
8-9 am

		tickets	$0.50	$3.50	$1.25	$1.00	$0.75	$2.00	$2.75	$4.25	$5.50	Total
Average Total per schedule		70	215	0	4	0	0	1	0	0	0	289
Per direction	nb	31	95	0	2	0	0	0	0	0	0	128
	sb	39	119	0	2	0	0	0	0	0	0	161
	% of Total	24.2%	74.2%	0.0%	1.4%	0.0%	0.0%	0.2%	0.0%	0.0%	0.0%	100.0%
	Tickets	24.2%				Non-Tickets		75.8%				

PM Peak
5-6 pm

		tickets	$0.50	$3.50	$1.25	$1.00	$0.75	$2.00	$2.75	$4.25	$5.50	Total
Average Total per schedule		65	669	0	3	0	0	0	0	0	0	738
Per direction	nb	29	302	0	2	0	0	0	0	0	0	333
	sb	36	367	0	2	0	0	0	0	0	0	405
	% of Total	8.8%	90.6%	0.0%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
	Tickets	8.8%				Non-Tickets		91.2%				

Sat Peak
12-1 pm

		tickets	$0.50	$3.50	$1.25	$1.00	$0.75	$2.00	$2.75	$4.25	$5.50	Total
Average Total per schedule	nb	56	649	0	3	0	2	0	0	0	0	710
Per direction	nb	31	364	0	2	0	1	0	0	0	0	398
	sb	25	285	0	1	0	1	0	0	0	0	312
	% of Total	7.9%	87.9%	0.0%	0.4%	0.0%	0.3%	0.0%	0.0%	0.0%	0.0%	96.2%
	Tickets	7.9%				Non-Tickets		92.1%				

TOLL SCHEDULE

CAPE MAY COUNTY BRIDGE COMMISSION

CLASS	RATE
1. Passenger Cars, Motorcycles, Mo-peds, Two axle Pick Up Trucks, Two axle four tire Mini Buses, all School Buses and all Motorhomes.	.50
Class one vehicles discount tickets [$40.00/100 Tickets]	One Ticket
Class one vehicles with one axle trailer, cash or two discount tickets	.75
Class one vehicles with two axle trailer, cash or three discount tickets	1.00
Class one vehicles with three or more axle trailer, cash or four discount tickets	1.25
Two axle, six tire Trucks and Buses	1.25
Class two Trucks with one axle trailer	2.00
Class two Trucks with two axle trailer	2.75
Class two Trucks with three or more axle trailer	3.50
3. Three axle Trucks	2.00
Class three Trucks with one axle trailer	2.75
Class three Trucks with two axle trailer	3.50
Class three Trucks with three or more axle trailer	4.25
All Trucks with four or more axles	3.50
Class four Trucks with all trailers	5.50

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

DANIEL BEYEL
Freeholder

DALE M. FOSTER
Engineer

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

MEMO

April 9, 2003

To: Dale Foster, County Engineer

From: Jerry Jamison, CMC/CMCBC

Re: Middle Thorofare Scheduling
Two Way Tolls VS One Way Tolls

Dale,

Below are the man-hours and shift requirements currently in use at Middle Thorofare Bridge along with those projected under the One Way Toll scenario:

Current Daily Staffing - Two Way Tolls

Winter Schedule – October 31 to Easter Weekend
32 Man-Hours – 3 Eight (8) Hour Shifts – 11 to 7, 7 to 3, and 3 to 11
1 Eight (8) Hour Overlap – 10 to 6

Spring and Fall – Easter Weekend to April 30 and September 30 to October 30
32 Man-Hours – Sunday Through Thursday as above
40 Man-Hours – Friday and Saturday – 2 Eight Hour Overlaps – 7 to 3 and 3 to 11

Summer 1 – May 01 to June 14 and Day after Labor Day to September 30
40 Man-Hours – 3 Eight (8) Hour Shifts – 11 to 7, 7 to 3, and 3 to 11
2 Eight (8) Hour Overlaps – 7 to 3 and 3 to 11

Summer 2 – Memorial Day Weekend and June 15 through Labor Day
58 Man-Hours – 3 Eight (8) Hours Shifts – 11 to 7, 7 to 3, and 3 to 11
(2 Men Per Shift)
1 Ten (10) Hour Overlap – 10 to 8

Projected Daily Staffing – One Way Tolls

Winter Schedule – October 16 to April 14
24 Man-Hours – 3 Eight (8) Hour Shifts – 11 to 7, 7 to 3, and 3 to 11

Summer Schedule – April 15 to October 15
28 Man-Hours – 3 Eight (8) Hour Shifts – 11 to 7, 7 to 3, and 3 to 11
1 Four (4) Hour Overlap – 1 to 5

PARSONS BRINCKERHOFF COMPUTATION SHEET

Page _____ of _____ 20020

Made by R. Pascual

Date 6/18/03

Checked by P. LACHMANOWICZ

Date 6/25/03

Subject Mill Creek HCS 2000 SUMMARY FOR YEARS 2002, 2007 & 2027

EXISTING 2002 (10' shoulder & 10' travel lane per direction) Speed: 45 mph

	Two-way Volume	Percent (%) Time following	Average Travel Speed (mi/h)	LOS
AM	289	25.2 %	40.6 mi/h	D
PM	738	51.4 %	36.8 mi/h	E
SAT	710	50.1 %	37.0 mi/h	E

CONSTRUCTION 2007 (10' shoulder & 10' travel lane per direction) Speed: 45 mph

EXISTING GEOMETRY

AM	311	26.7%	40.4 mi/h	D
PM	793	53.9%	36.3 mi/h	E
SAT	763	52.6 %	36.6 mi/h	E

FUTURE 2027 WITH EXISTING GEOMETRY Speed: 45 mph

AM	415	33.6%	44.5 mi/h	D
PM	1060	64.5 %	39.0 mi/h	E
SAT	1020	63.1 %	39.3 mi/h	E

FUTURE 2027 WITH PROPOSED GEOMETRY: 8' SHOULDER + 12' TRAVEL LANE PER DIRECTION

Speed: 50 mph

AM	415	33.6%	45.6 mi/h	C
PM	1060	64.5 %	40.1 mi/h	D
SAT	1020	63.1 %	40.4 mi/h	D

HCS2000: Two-Lane Highways Release 4.1d

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Two-Way Two-Lane Highway Segment Analysis

Analyst	R. Pascual
Agency/Co.	Parsons Brinckerhoff
Date Performed	4/9/03
Analysis Time Period	AM Peak Period 8-9 am
Highway	Ocean Drive CR 621
From/To	At Middle Thorofare Bridge
Jurisdiction	Cape May County
Analysis Year	Existing 2002
Description	20020A-Middle Thorofare Bridge

Input Data

Highway class	Class 1				
Shoulder width	10.0	ft	Peak-hour factor, PHF	0.90	
Lane width	10.0	ft	% Trucks and buses	2	%
Segment length	2.0	mi	% Recreational vehicles	0	%
Terrain type	Level		% No-passing zones	0	%
Grade: Length		mi	Access points/mi	3	/mi
Up/down		%			

Two-way hourly volume, V 289 veh/h
Directional split 56 / 44 %

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.7	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.986	
Two-way flow rate,(note-1) vp	326	pc/h
Highest directional split proportion (note-2)	183	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	45.0	mi/h
Adj. for lane and shoulder width, fLS	1.1	mi/h
Adj. for access points, fA	0.8	mi/h
Free-flow speed, FFS	43.2	mi/h
Adjustment for no-passing zones, fnp	0.0	mi/h
Average travel speed, ATS	40.6	mi/h

EXISTING - 2002

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	0.998	
Two-way flow rate,(note-1) vp	322	pc/h
Highest directional split proportion (note-2)	180	
Base percent time-spent-following, BPTSF	24.7	%
Adj.for directional distribution and no-passing zones, fd/np	0.6	
Percent time-spent-following, PTSF	25.2	%

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.10	
Peak 15-min vehicle-miles of travel, VMT15	161	veh-mi
Peak-hour vehicle-miles of travel, VMT60	578	veh-mi
Peak 15-min total travel time, TT15	4.0	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

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Two-Way Two-Lane Highway Segment Analysis

Analyst	R. Pascual
Agency/Co.	Parsons Brinckerhoff
Date Performed	4/9/03
Analysis Time Period	PM Peak Period 5-6 pm
Highway	Ocean Drive CR 621
From/To	At Middle Thorofare Bridge
Jurisdiction	Cape May County
Analysis Year	Existing 2002
Description	20020A-Middle Thorofare Bridge

Input Data

Highway class	Class 1				
Shoulder width	10.0	ft	Peak-hour factor, PHF	0.90	
Lane width	10.0	ft	% Trucks and buses	1	%
Segment length	2.0	mi	% Recreational vehicles	0	%
Terrain type	Level		% No-passing zones	0	%
Grade: Length		mi	Access points/mi	3	/mi
Up/down		%			

Two-way hourly volume, V	738			veh/h
Directional split	55	/	45	%

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.2	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.998	
Two-way flow rate,(note-1) vp	822	pc/h
Highest directional split proportion (note-2)	452	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	45.0	mi/h
Adj. for lane and shoulder width, fLS	1.1	mi/h
Adj. for access points, fA	0.8	mi/h
Free-flow speed, FFS	43.2	mi/h
Adjustment for no-passing zones, fnp	0.0	mi/h
Average travel speed, ATS	36.8	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	0.999	
Two-way flow rate,(note-1) vp	821	pc/h
Highest directional split proportion (note-2)	452	
Base percent time-spent-following, BPTSF	51.4	%
Adj.for directional distribution and no-passing zones, fd/np	0.0	
Percent time-spent-following, PTSF	51.4	%

Level of Service and Other Performance Measures

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.26	
Peak 15-min vehicle-miles of travel, VMT15	410	veh-mi
Peak-hour vehicle-miles of travel, VMT60	1476	veh-mi
Peak 15-min total travel time, TT15	11.2	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

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Two-Way Two-Lane Highway Segment Analysis

Analyst	R. Pascual
Agency/Co.	Parsons Brinckerhoff
Date Performed	4/9/03
Analysis Time Period	Sat Peak Period 12-1 am
Highway	Ocean Drive CR 621
From/To	At Middle Thorofare Bridge
Jurisdiction	Cape May County
Analysis Year	Existing 2002
Description	20020A-Middle Thorofare Bridge

Input Data

Highway class	Class 1				
Shoulder width	10.0	ft	Peak-hour factor, PHF	0.90	
Lane width	10.0	ft	% Trucks and buses	1	%
Segment length	2.0	mi	% Recreational vehicles	0	%
Terrain type	Level		% No-passing zones	0	%
Grade: Length		mi	Access points/mi	3	/mi
Up/down		%			

Two-way hourly volume, V 710 veh/h
Directional split 56 / 44 %

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.2	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.998	
Two-way flow rate, (note-1) vp	790	pc/h
Highest directional split proportion (note-2)	442	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	45.0	mi/h
Adj. for lane and shoulder width, fLS	1.1	mi/h
Adj. for access points, fA	0.8	mi/h
Free-flow speed, FFS	43.2	mi/h
Adjustment for no-passing zones, fnp	0.0	mi/h
Average travel speed, ATS	37.0	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	0.999	
Two-way flow rate,(note-1) vp	790	pc/h
Highest directional split proportion (note-2)	442	
Base percent time-spent-following, BPTSF	50.1	%
Adj.for directional distribution and no-passing zones, fd/np	0.0	
Percent time-spent-following, PTSF	50.1	%

Level of Service and Other Performance Measures

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.25	
Peak 15-min vehicle-miles of travel, VMT15	394	veh-mi
Peak-hour vehicle-miles of travel, VMT60	1420	veh-mi
Peak 15-min total travel time, TT15	10.6	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

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Two-Way Two-Lane Highway Segment Analysis

Analyst	R. Pascual
Agency/Co.	Parsons Brinckerhoff
Date Performed	4/10/03
Analysis Time Period	AM Peak Hour
Highway	Ocean Drive CR 621
From/To	At Middle Thorofare Bridge
Jurisdiction	Cape May County, NJ
Analysis Year	Construction Yr 2007
Description	20020A-Mill Creek/ Middle Thorofare Bridge

Input Data

Highway class	Class 1				
Shoulder width	10.0	ft	Peak-hour factor, PHF	0.90	
Lane width	10.0	ft	% Trucks and buses	2	%
Segment length	2.0	mi	% Recreational vehicles	0	%
Terrain type	Level		% No-passing zones	0	%
Grade: Length		mi	Access points/mi	3	/mi
Up/down		%			

Two-way hourly volume, V	311	veh/h		
Directional split	56 /	44	%	

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.7	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.986	
Two-way flow rate,(note-1) vp	350	pc/h
Highest directional split proportion (note-2)	196	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	45.0	mi/h
Adj. for lane and shoulder width, fLS	1.1	mi/h
Adj. for access points, fA	0.8	mi/h
Free-flow speed, FFS	43.2	mi/h
Adjustment for no-passing zones, fnp	0.0	mi/h
Average travel speed, ATS	40.4	mi/h

CONSTRUCTION - 2007

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	0.998	
Two-way flow rate,(note-1) vp	346	pc/h
Highest directional split proportion (note-2)	194	
Base percent time-spent-following, BPTSF	26.2	%
Adj.for directional distribution and no-passing zones, fd/np	0.5	
Percent time-spent-following, PTSF	26.7	%

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.11	
Peak 15-min vehicle-miles of travel, VMT15	173	veh-mi
Peak-hour vehicle-miles of travel, VMT60	622	veh-mi
Peak 15-min total travel time, TT15	4.3	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

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Two-Way Two-Lane Highway Segment Analysis

Analyst	R. Pascual
Agency/Co.	Parsons Brinckerhoff
Date Performed	4/10/03
Analysis Time Period	PM Peak Hour 200~~6~~7
Highway	Ocean Drive CR 621
From/To	At Middle Thorofare Bridge
Jurisdiction	Cape May County, NJ
Analysis Year	Construction Yr 2007
Description	20020A-Mill Creek/ Middle Thorofare Bridge

Input Data

Highway class	Class 1				
Shoulder width	10.0	ft	Peak-hour factor, PHF	0.90	
Lane width	10.0	ft	% Trucks and buses	1	%
Segment length	2.0	mi	% Recreational vehicles	0	%
Terrain type	Level		% No-passing zones	0	%
Grade: Length		mi	Access points/mi	3	/mi
Up/down		%			

Two-way hourly volume, V 793 veh/h
Directional split 55 / 45 %

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.2	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.998	
Two-way flow rate,(note-1) vp	883	pc/h
Highest directional split proportion (note-2)	486	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	45.0	mi/h
Adj. for lane and shoulder width, fLS	1.1	mi/h
Adj. for access points, fA	0.8	mi/h
Free-flow speed, FFS	43.2	mi/h
Adjustment for no-passing zones, fnp	0.0	mi/h
Average travel speed, ATS	36.3	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	0.999	
Two-way flow rate,(note-1) vp	882	pc/h
Highest directional split proportion (note-2)	485	
Base percent time-spent-following, BPTSF	53.9	%
Adj.for directional distribution and no-passing zones, fd/np	0.0	
Percent time-spent-following, PTSF	53.9	%

Level of Service and Other Performance Measures

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.28	
Peak 15-min vehicle-miles of travel, VMT15	441	veh-mi
Peak-hour vehicle-miles of travel, VMT60	1586	veh-mi
Peak 15-min total travel time, TT15	12.1	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

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Two-Way Two-Lane Highway Segment Analysis

Analyst	R. Pascual
Agency/Co.	Parsons Brinckerhoff
Date Performed	4/10/03
Analysis Time Period	Sat Peak Hour 200~~6~~7
Highway	Ocean Drive CR 621
From/To	At Middle Thorofare Bridge
Jurisdiction	Cape May County, NJ
Analysis Year	Construction Yr 2007
Description	20020A-Mill Creek/ Middle Thorofare Bridge

Input Data

Highway class	Class 1				
Shoulder width	10.0	ft	Peak-hour factor, PHF	0.90	
Lane width	10.0	ft	% Trucks and buses	1	%
Segment length	2.0	mi	% Recreational vehicles	0	%
Terrain type	Level		% No-passing zones	0	%
Grade: Length		mi	Access points/mi	3	/mi
Up/down		%			

Two-way hourly volume, V 763 veh/h
Directional split 56 / 44 %

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.2	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.998	
Two-way flow rate,(note-1) vp	849	pc/h
Highest directional split proportion (note-2)	475	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM___	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	45.0	mi/h
Adj. for lane and shoulder width, fLS	1.1	mi/h
Adj. for access points, fA	0.8	mi/h
Free-flow speed, FFS	43.2	mi/h
Adjustment for no-passing zones, fnp	0.0	mi/h
Average travel speed, ATS	36.6	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	0.999	
Two-way flow rate,(note-1) vp	849	pc/h
Highest directional split proportion (note-2)	475	
Base percent time-spent-following, BPTSF	52.6	%
Adj.for directional distribution and no-passing zones, fd/np	0.0	
Percent time-spent-following, PTSF	52.6	%

Level of Service and Other Performance Measures

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.27	
Peak 15-min vehicle-miles of travel, VMT15	424	veh-mi
Peak-hour vehicle-miles of travel, VMT60	1526	veh-mi
Peak 15-min total travel time, TT15	11.6	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

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Two-Way Two-Lane Highway Segment Analysis

Analyst	R. Pascual
Agency/Co.	Parsons Brinckerhoff
Date Performed	4/10/03
Analysis Time Period	AM Peak Hour 2027
Highway	Ocean Drive CR 621
From/To	At Middle Thorofare Bridge
Jurisdiction	Cape May County, NJ
Analysis Year	Build Yr 2027 Exist. Geometry
Description	20020A-Mill Creek/ Middle Thorofare Bridge

Input Data

Highway class	Class 1				
Shoulder width	10.0	ft	Peak-hour factor, PHF	0.90	
Lane width	10.0	ft	% Trucks and buses	2	%
Segment length	2.0	mi	% Recreational vehicles	0	%
Terrain type	Level		% No-passing zones	0	%
Grade: Length		mi	Access points/mi	3	/mi
Up/down		%			

Two-way hourly volume, V 415 veh/h
Directional split 56 / 44 %

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.7	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.986	
Two-way flow rate,(note-1) vp	468	pc/h
Highest directional split proportion (note-2)	262	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	50.0	mi/h
Adj. for lane and shoulder width, fLS	1.1	mi/h
Adj. for access points, fA	0.8	mi/h
Free-flow speed, FFS	48.2	mi/h
Adjustment for no-passing zones, fnp	0.0	mi/h
Average travel speed, ATS	44.5	mi/h

2027- NO BUILD

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	0.998	
Two-way flow rate,(note-1) vp	462	pc/h
Highest directional split proportion (note-2)	259	
Base percent time-spent-following, BPTSF	33.4	%
Adj.for directional distribution and no-passing zones, fd/np	0.2	
Percent time-spent-following, PTSF	33.6	%

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.15	
Peak 15-min vehicle-miles of travel, VMT15	231	veh-mi
Peak-hour vehicle-miles of travel, VMT60	830	veh-mi
Peak 15-min total travel time, TT15	5.2	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

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Two-Way Two-Lane Highway Segment Analysis

Analyst	R. Pascual
Agency/Co.	Parsons Brinckerhoff
Date Performed	4/10/03
Analysis Time Period	PM Peak Hour 2027
Highway	Ocean Drive CR 621
From/To	At Middle Thorofare Bridge
Jurisdiction	Cape May County, NJ
Analysis Year	Build Yr 2027 Exist. Geometry
Description	20020A-Mill Creek/ Middle Thorofare Bridge

Input Data

Highway class	Class 1				
Shoulder width	10.0	ft	Peak-hour factor, PHF	0.90	
Lane width	10.0	ft	% Trucks and buses	1	%
Segment length	2.0	mi	% Recreational vehicles	0	%
Terrain type	Level		% No-passing zones	0	%
Grade: Length		mi	Access points/mi	3	/mi
Up/down		%			

Two-way hourly volume, V 1060 veh/h
Directional split 55 / 45 %

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.2	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.998	
Two-way flow rate,(note-1) vp	1180	pc/h
Highest directional split proportion (note-2)	649	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	50.0	mi/h
Adj. for lane and shoulder width, fLS	1.1	mi/h
Adj. for access points, fA	0.8	mi/h
Free-flow speed, FFS	48.2	mi/h
Adjustment for no-passing zones, fnp	0.0	mi/h
Average travel speed, ATS	39.0	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	0.999	
Two-way flow rate,(note-1) vp	1179	pc/h
Highest directional split proportion (note-2)	648	
Base percent time-spent-following, BPTSF	64.5	%
Adj.for directional distribution and no-passing zones, fd/np	0.0	
Percent time-spent-following, PTSF	64.5	%

Level of Service and Other Performance Measures

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.37	
Peak 15-min vehicle-miles of travel, VMT15	589	veh-mi
Peak-hour vehicle-miles of travel, VMT60	2120	veh-mi
Peak 15-min total travel time, TT15	15.1	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

HCS2000: Two-Lane Highways Release 4.1d

Parsons Brinckerhoff Inc

506 Carnegie Center Drive
Princeton, NJ 08540

Phone: 609-734-7000 Fax: 609-734-6900
E-Mail:

Two-Way Two-Lane Highway Segment Analysis

Analyst	R. Pascual
Agency/Co.	Parsons Brinckerhoff
Date Performed	4/10/03
Analysis Time Period	Sat Peak Hour 2027
Highway	Ocean Drive CR 621
From/To	At Middle Thorofare Bridge
Jurisdiction	Cape May County, NJ
Analysis Year	Build Yr 2027 Exist. Geometry
Description	20020A-Mill Creek/ Middle Thorofare Bridge

Input Data

Highway class	Class 1				
Shoulder width	10.0	ft	Peak-hour factor, PHF	0.90	
Lane width	10.0	ft	% Trucks and buses	1	%
Segment length	2.0	mi	% Recreational vehicles	0	%
Terrain type	Level		% No-passing zones	0	%
Grade: Length		mi	Access points/mi	3	/mi
Up/down		%			

Two-way hourly volume, V 1020 veh/h
Directional split 56 / 44 %

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.2	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.998	
Two-way flow rate,(note-1) vp	1136	pc/h
Highest directional split proportion (note-2)	636	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	50.0	mi/h
Adj. for lane and shoulder width, fLS	1.1	mi/h
Adj. for access points, fA	0.8	mi/h
Free-flow speed, FFS	48.2	mi/h
Adjustment for no-passing zones, fnp	0.0	mi/h
Average travel speed, ATS	39.3	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	0.999	
Two-way flow rate,(note-1) vp	1134	pc/h
Highest directional split proportion (note-2)	635	
Base percent time-spent-following, BPTSF	63.1	%
Adj.for directional distribution and no-passing zones, fd/np	0.0	
Percent time-spent-following, PTSF	63.1	%

Level of Service and Other Performance Measures

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.35	
Peak 15-min vehicle-miles of travel, VMT15	567	veh-mi
Peak-hour vehicle-miles of travel, VMT60	2040	veh-mi
Peak 15-min total travel time, TT15	14.4	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

HCS2000: Two-Lane Highways Release 4.1d

Parsons Brinckerhoff Inc

506 Carnegie Center Drive
Princeton, NJ 08540

Phone: 609-734-7000 Fax: 609-734-6900
E-Mail:

Two-Way Two-Lane Highway Segment Analysis

Analyst	R. Pascual
Agency/Co.	Parsons Brinckerhoff
Date Performed	4/10/03
Analysis Time Period	AM Peak Hour 2027
Highway	Ocean Drive CR 621
From/To	At Middle Thorofare Bridge
Jurisdiction	Cape May County, NJ
Analysis Year	Build Yr 2027
Description	20020A-Mill Creek/ Middle Thorofare Bridge

Input Data

Highway class	Class 1				
Shoulder width	8.0	ft	Peak-hour factor, PHF	0.90	
Lane width	12.0	ft	% Trucks and buses	2	%
Segment length	2.0	mi	% Recreational vehicles	0	%
Terrain type	Level		% No-passing zones	0	%
Grade: Length		mi	Access points/mi	3	/mi
Up/down		%			

Two-way hourly volume, V 415 veh/h
Directional split 56 / 44 %

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.7	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.986	
Two-way flow rate,(note-1) vp	468	pc/h
Highest directional split proportion (note-2)	262	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	50.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	0.8	mi/h
Free-flow speed, FFS	49.3	mi/h
Adjustment for no-passing zones, fnp	0.0	mi/h
Average travel speed, ATS	45.6	mi/h

2027- Proposed

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	0.998	
Two-way flow rate,(note-1) vp	462	pc/h
Highest directional split proportion (note-2)	259	
Base percent time-spent-following, BPTSF	33.4	%
Adj.for directional distribution and no-passing zones, fd/np	0.2	
Percent time-spent-following, PTSF	33.6	%

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.15	
Peak 15-min vehicle-miles of travel, VMT15	231	veh-mi
Peak-hour vehicle-miles of travel, VMT60	830	veh-mi
Peak 15-min total travel time, TT15	5.1	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

HCS2000: Two-Lane Highways Release 4.1d

Parsons Brinckerhoff Inc

506 Carnegie Center Drive
Princeton, NJ 08540

Phone: 609-734-7000 Fax: 609-734-6900
E-Mail:

Two-Way Two-Lane Highway Segment Analysis

Analyst	R. Pascual
Agency/Co.	Parsons Brinckerhoff
Date Performed	4/10/03
Analysis Time Period	PM Peak Hour 2027
Highway	Ocean Drive CR 621
From/To	At Middle Thorofare Bridge
Jurisdiction	Cape May County, NJ
Analysis Year	Build Yr 2027
Description	20020A-Mill Creek/ Middle Thorofare Bridge

Input Data

Highway class	Class 1				
Shoulder width	8.0	ft	Peak-hour factor, PHF	0.90	
Lane width	12.0	ft	% Trucks and buses	1	%
Segment length	2.0	mi	% Recreational vehicles	0	%
Terrain type	Level		% No-passing zones	0	%
Grade: Length		mi	Access points/mi	3	/mi
Up/down		%			

Two-way hourly volume, V 1060 veh/h
Directional split 55 / 45 %

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.2	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.998	
Two-way flow rate,(note-1) vp	1180	pc/h
Highest directional split proportion (note-2)	649	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	50.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	0.8	mi/h
Free-flow speed, FFS	49.3	mi/h
Adjustment for no-passing zones, fnp	0.0	mi/h
Average travel speed, ATS	40.1	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	0.999	
Two-way flow rate,(note-1) vp	1179	pc/h
Highest directional split proportion (note-2)	648	
Base percent time-spent-following, BPTSF	64.5	%
Adj.for directional distribution and no-passing zones, fd/np	0.0	
Percent time-spent-following, PTSF	64.5	%

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.37	
Peak 15-min vehicle-miles of travel, VMT15	589	veh-mi
Peak-hour vehicle-miles of travel, VMT60	2120	veh-mi
Peak 15-min total travel time, TT15	14.7	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

HCS2000: Two-Lane Highways Release 4.1d

Parsons Brinckerhoff Inc

506 Carnegie Center Drive
Princeton, NJ 08540

Phone: 609-734-7000 Fax: 609-734-6900
E-Mail:

Two-Way Two-Lane Highway Segment Analysis

Analyst	R. Pascual
Agency/Co.	Parsons Brinckerhoff
Date Performed	4/10/03
Analysis Time Period	Sat Peak Hour 2027
Highway	Ocean Drive CR 621
From/To	At Middle Thorofare Bridge
Jurisdiction	Cape May County, NJ
Analysis Year	Build Yr 2027
Description	20020A-Mill Creek/ Middle Thorofare Bridge

Input Data

Highway class	Class 1				
Shoulder width	8.0	ft	Peak-hour factor, PHF	0.90	
Lane width	12.0	ft	% Trucks and buses	1	%
Segment length	2.0	mi	% Recreational vehicles	0	%
Terrain type	Level		% No-passing zones	0	%
Grade: Length		mi	Access points/mi	3	/mi
Up/down		%			

Two-way hourly volume, V 1020 veh/h
Directional split 56 / 44 %

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.2	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.998	
Two-way flow rate,(note-1) vp	1136	pc/h
Highest directional split proportion (note-2)	636	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	50.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	0.8	mi/h
Free-flow speed, FFS	49.3	mi/h
Adjustment for no-passing zones, fnp	0.0	mi/h
Average travel speed, ATS	40.4	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	0.999	
Two-way flow rate,(note-1) vp	1134	pc/h
Highest directional split proportion (note-2)	635	
Base percent time-spent-following, BPTSF	63.1	%
Adj.for directional distribution and no-passing zones, fd/np	0.0	
Percent time-spent-following, PTSF	63.1	%

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.35	
Peak 15-min vehicle-miles of travel, VMT15	567	veh-mi
Peak-hour vehicle-miles of travel, VMT60	2040	veh-mi
Peak 15-min total travel time, TT15	14.0	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

Appendix B
Community Involvement Data

File

Cc: JAF, SB
J. Maloney,
MS.

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

MEMO

June 16, 2003

To: *File*

From: *Dale M. Foster, P.E., County Engineer* Dale

Re: *Ocean Drive (CR 621) Upgrade and Bridge Replacement*
Lower Township
June 14, 2003 Public Information Meeting

On June 14, 2003 a public information meeting was held at the Wildwood Crest Memorial Elementary School in the Borough of Wildwood Crest to discuss the Ocean Drive (CR 621) Upgrade and Bridge Replacement project in Lower Township. Fifty-five (55) people attended the meeting. Gerard Desiderio, Chairman Cape May County Bridge Commission, six members of the Parsons Brinckerhoff design team, Suzie Hoffman and myself staffed the meeting. There was approximately 14 boards on display along with a continuously running powerpoint presentation available for the attendees to review. In addition all attendees were provided with a 4-page color handout and comment sheet (attached). The comment sheet was setup so that attendees could check their preference for alignments and bridge types and if they desire any comments about the project.

Thirty-six (36) comment sheets were returned during the public information meeting. Two (2) of the sheets were signed by husband and wife together. The preference of alignments based upon the comment sheets returned was as follows:

Alignment	Description	
3A	Movable bridge southern parallel alignment	0
3B	Movable bridge north parallel alignment	0
3C	High level fixed span north alignment	1
3D	High level fixed span northern most alignment	0
3E	High level fixed span south parallel alignment	1
3F	Concrete segmented southern alignment	15
3G	Cable-stayed southern alignment	26

RECEIVED
JUN 18 ....
PARSONS BRINCKERHOFF

Some comment sheets offered more than one alignment preference. Two (2) comment sheets had no alignment preference. One (1) comment sheet had indicated "no cable stay" but also did not provide an alignment preference.

Attendance at this June 14, 2003 public information meeting far exceeded the public information meetings held in the two previous years in June on a weekday.

Several attendees requested additional information concerning the project be posted on the web.

Should you have any questions, please do not hesitate to contact me.

DMF/ja

cc: Freeholder Director Beyel
Stephen O'Connor, County Administrator
Cape May County Bridge Commission
Thomas Fisher, Parsons Brinckerhoff

Ocean Drive Upgrade & Bridge Replacements
Public Information Session
Saturday June 14th 2003

Your Input Is Appreciated:

Community input is a critical element in evaluating project alternatives. Please utilize this form to provide your views and opinions about this project. Submit this form to us before you leave today, or mail the completed form to:

Mr. Dale Foster
Cape May County Engineer
4 Moore Road
Cape May Courthouse, NJ 08210

Part 1: Please Check your Preferred Alternative and Bridge Type below:

- ☐ Alternative 3A
- ☐ Alternative 3B
- ☐ Alternative 3C
- ☐ Alternative 3D
- ☐ Alternative 3E
- ☐ Alternative 3F
- ☐ Alternative 3G

- ☐ Moveable Bascule Bridge
- ☐ High Level Fixed Segmental Bridge
- ☐ High Level Fixed Cable-Stayed Bridge

Part 2: Please write any additional comments below:

Continue On Back If Necessary

200205
J. Maloney

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

June 16, 2003

Thomas A. Fisher
Parsons Brinckerhoff-FG, Inc.
Consulting Engineers
506 Carnegie Center, 2nd Floor
Princeton, NJ 08540

Re: Ocean Drive (CR 621) Upgrade and Bridge Replacement Project
June 14, 2003 Public Information Meeting

Dear Mr. Fisher:

Enclosed, for your information and files, please find a copy of the sign-in sheets and comment sheets from the June 14, 2003 public information meeting. It appears that 55 people attended the meeting.

My office will collect any comments, about the project received either through the post office or by e-mail and forward the same to your firm at the end of July 2003.

Should you have any questions, please do not hesitate to contact me.

Very truly yours,

Dale M. Foster, P.E.
County Engineer

DMF/ja

enc.

cc: CMCBC w/enc.

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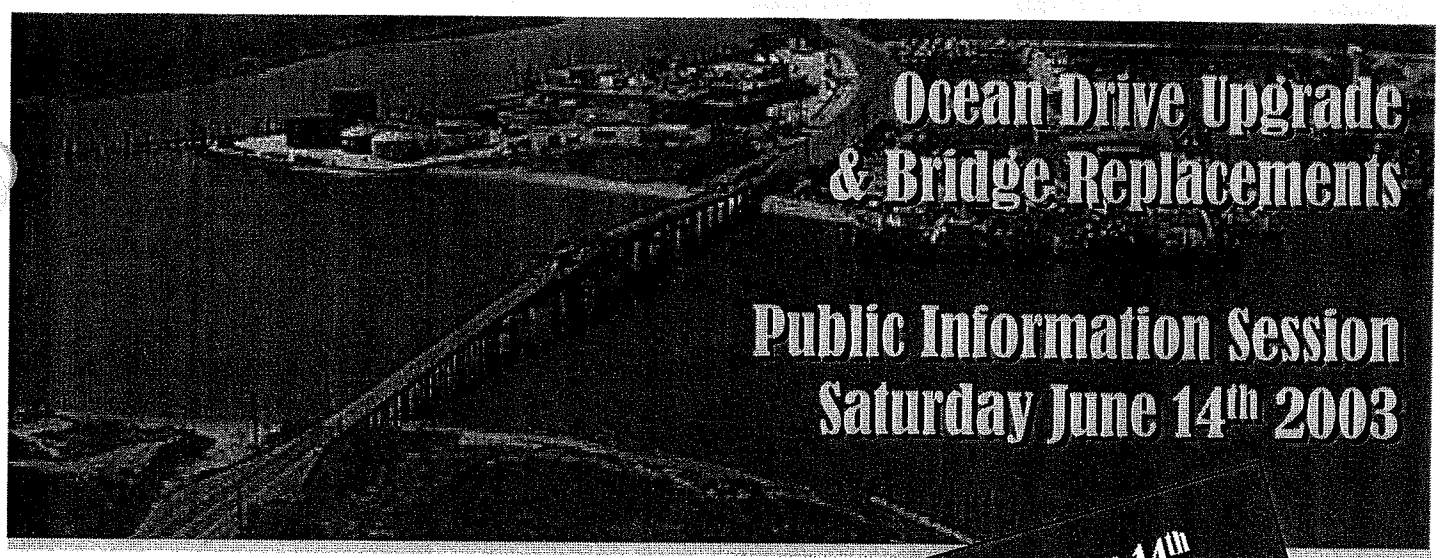
JUN 17 2003



Ocean Drive Upgrade & Bridge Replacements

Public Information Session
Saturday June 14th 2003

When: Saturday June 14th
Time: 10am – 2pm
Where: Wildwood Crest Memorial Elementary School
New Jersey Avenue
at St. Louis Avenue
Wildwood Crest, NJ

Cape May County, in conjunction with the South Jersey Transportation Planning Organization, invites you to attend a Public Information Session for this project which will raise the portion of Ocean Drive (County Road 621) between Madison Avenue and Rt. 109 in Lower Township above the 100-year flood elevation and replace three obsolete bridges: Ocean Drive over Mill Creek, Upper Thorofare and the existing moveable structure over Middle Thorofare.

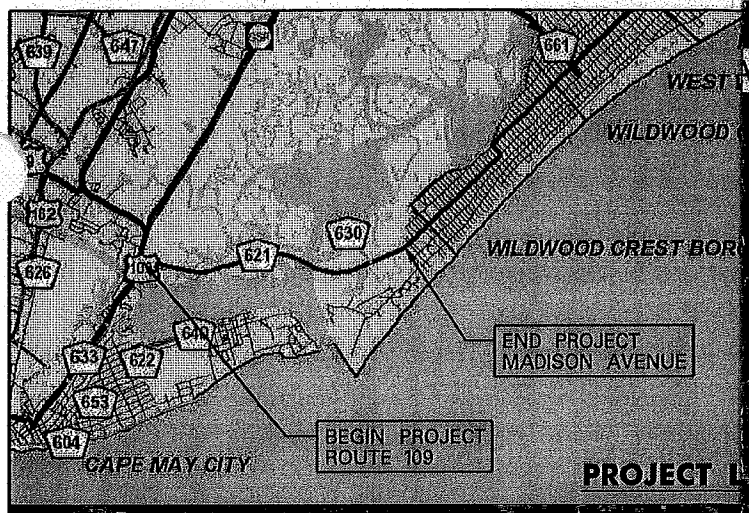
The project, currently in the study phase, is evaluating seven alternatives which consider a number of roadway alignments and bridge types for a new Middle Thorofare Bridge. The project will also construct a new toll facility at the Middle Thorofare Bridge. The alignments (Alternatives 3A-3G) and possible bridge types are shown on the following pages. The project's goal is to upgrade the roadway to a viable evacuation route for nearly any type of storm and replace the obsolete structures with minimal disruption to the surrounding community and environment. The seven alternatives include three new options which have been added since the last public information session in June of 2002.

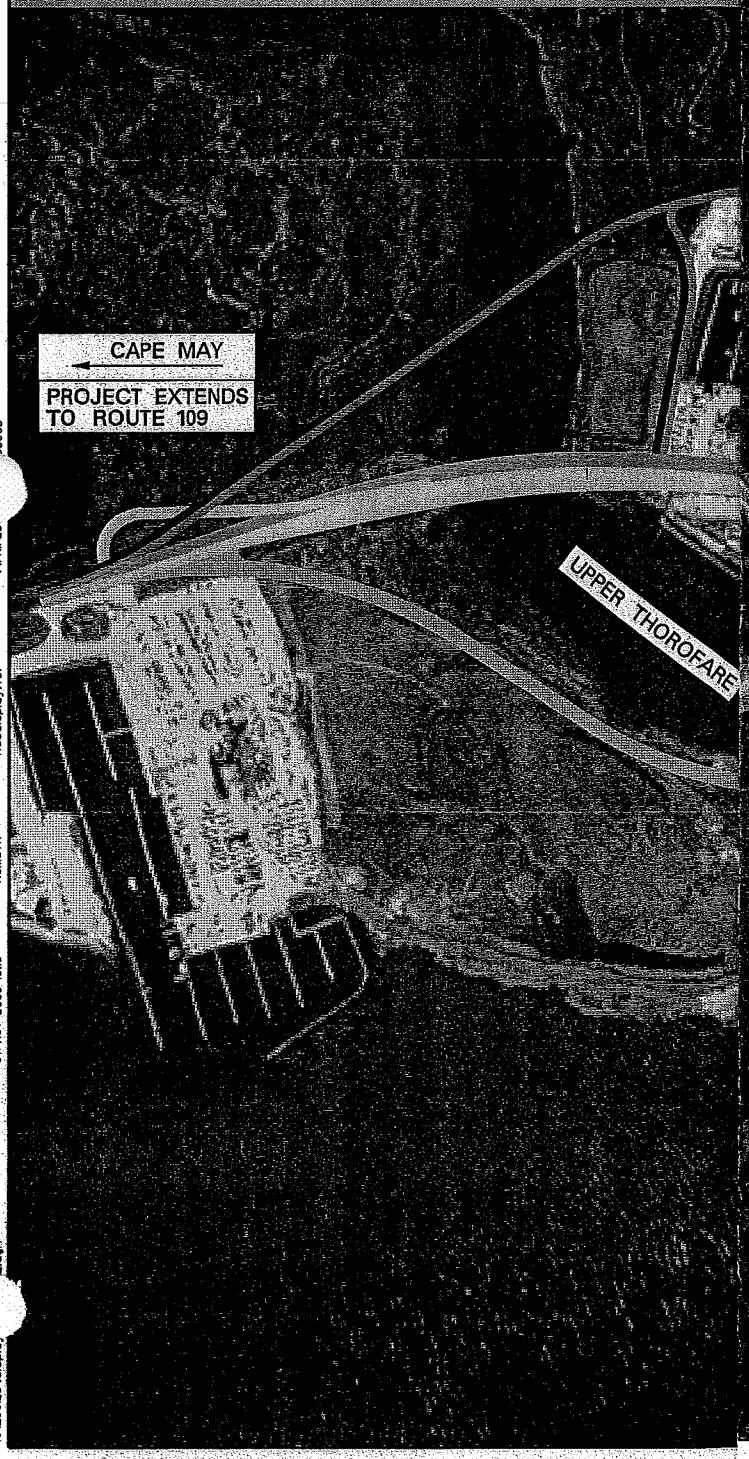
The project is currently in the study phase, which is expected to conclude at the end of 2003 with one alternative selected as the Initially Preferred Alternative. The project will continue through preliminary and final design, and construction could begin as early as 2006.

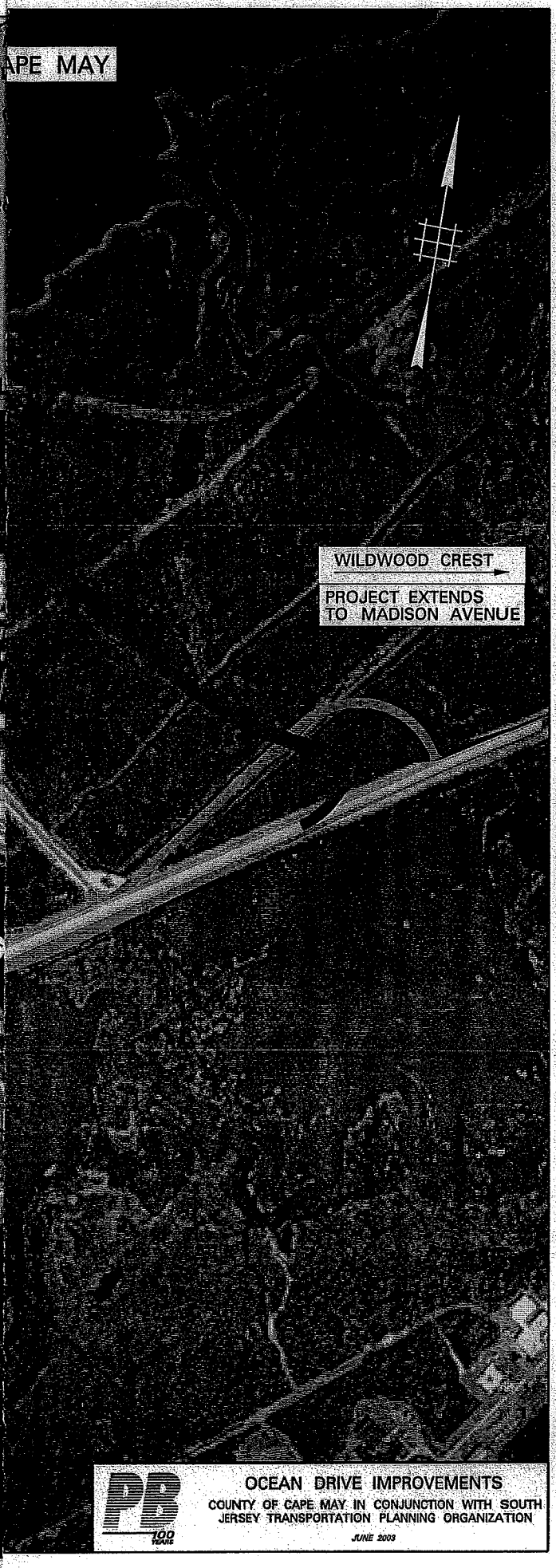
At the public information session, you can learn about the various alternatives, meet and talk to the project team and hear how the project will progress through the design and construction phases. More importantly, the public information session provides you with an opportunity to provide input to the project. Your input is critical in assuring that the best overall alternative is selected.

For More Information:

Visit the Cape May County website, **www.co.capemay.nj.us** and click on *Departments*, select *Public Works* and then *Public Works Structures/Project Overview*. You can also email countyengineer@cape-may.nj.us or call (609)-465-1035.







PB 100 YEARS

OCEAN DRIVE IMPROVEMENTS

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

JUNE 2003

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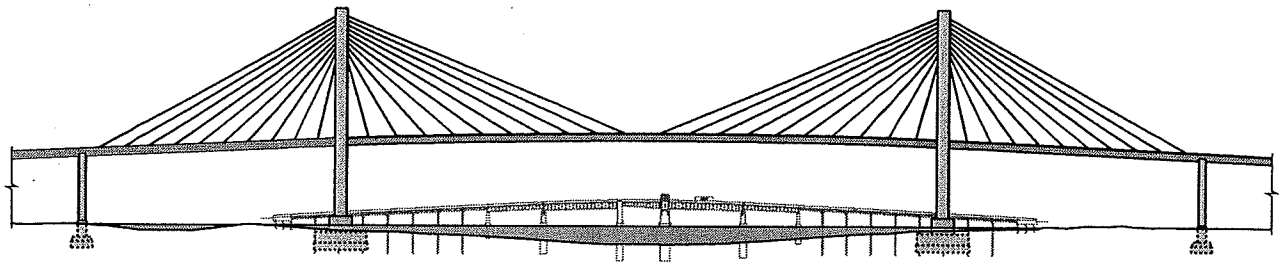
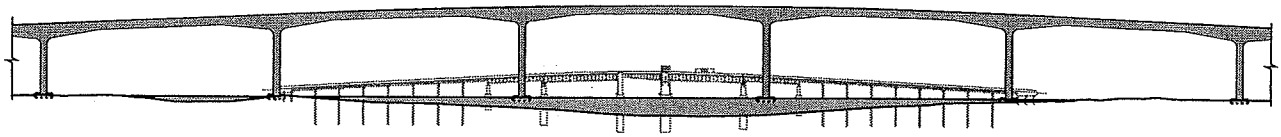
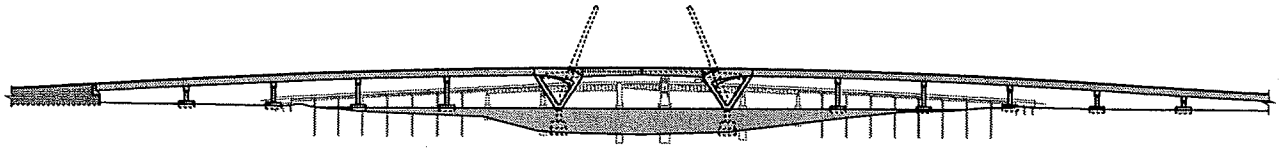


CABLE STAYED BRIDGE
(ALIGNMENT ALTERNATIVE 3G)



SEGMENTAL BRIDGE
(ALIGNMENT ALTERNATIVES 3C, 3D, 3E & 3F)



MOVABLE BRIDGE
(ALIGNMENT ALTERNATIVES 3A & 3B)

EXISTING BRIDGE SHOWN FOR COMPARISON PURPOSES.

TYPICAL BRIDGE ELEVATIONS

PB 100 YEARS

OCEAN DRIVE IMPROVEMENTS

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

JUNE 2003

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June 14, 2003
Informal Public Information Meeting
Ocean Drive (CR621) Upgrade and Bridge Replacement Project
Sign In Sheet

Name	Address	Telephone Number	e-mail address
Fran Ascoli	954 Ocean Dr.	609-884-8069	
TOM LEVINS	211 E. MADISON	609-523-6444	
George Danson	New Brunswick	732-249-2670	
Harry Colsey	400 Pacific Ave Cape May	609 884-4819	
FRANK GUBLER	213 MADISON AVE	609 523-2199	
Don & Gerry Buchheim	229 Madison Ave	609-522-5807	
MICHAEL BENSE	105 E. MEMPHIS	609-522-6569	
Peggy Kelly	100B Mephis	610-909-9944	
Joe & Antoinette	100A Mephis Ave	610-459-1523	
Barbara Gubler	213 Madison Ave	609-523-2199	
Don. Twiss	C.P.W.M	WILDWOOD CREST	609-522-7446
JOHN PATAFIO	101 W. RICHMOND WILDWOOD CREST		JPATAFIO@OPTONLINE.NET
CHRIS PATAFIO	6 WATERFORD CT RINGWOOD NJ 07456		
Kathy Carlson	308 E. Louisville W.C	523-2581	KCARLSON@BTHosp.Co
Damon Varady	116 North Station	973-427-4575	
GLENN MODICA	30 NORTH MAIN ST (RCA)	609-655-0692	gmodica@richardsrubb.com
KARL P SUELKE	1308 MISSOURI AVE	CAPE MAY	
TIM SALASIN	302 N BROADWAY	CAPE MAY NJ	
Bob & Sue Patterson	8405 Seaview Ave	Wildwood Crest	

June 14, 2003
Informal Public Information Meeting
Ocean Drive (CR621) Upgrade and Bridge Replacement Project
Sign In Sheet

Name	Address	Telephone Number	e-mail address
Jim Bradley	Wildwood Crest	408-1987	
Bob Di Angelo	Wildwood Crest	729-2382	
Joseph Cook	100A Memphis Ave	609-846-9159	
Sue Schilling	6407 Main St Voorhees, NJ		
Joyce & Joe MacDougall	207 E Madison - Wildwood Cr	609846054	
Dennis Anderson	196 Stagecoach Rd.	CMCH, NJ	
Will Morey	8500 Bayview D. Wildwood Crest	729-4100	
Ronald Sinin	207 E 104 US RD	WWC	
Ron Knight	300 E Raleigh Ave	WWC	
Bill Godfrey	Cape May Star & Wave,	WCM	884.3466
Mary F. Fox	934 Rte 109, Lower	884-7995	foxMBF@aol.com
Cliff Heckman, Jr.	407A E. Raleigh Ave	573-7139	
Dorothy F. Heckman	" Diamond	Beach "	"
Nick Pituch	203 Diamond Sand Dr.	Diamond Beach	
Chris Farschon	796 Dennisville Rd	CMCH	374.7305
Tony & Phyllis Catanoso	- 401 N. 18th Ave - 1st Fl -	South Wildwood	
Joseph C Salerno	6601 Atlantic Ave	Wildwood Crest	5221
Olfgang Zehe	124 S. Station Rd.	Wildwood Crest	
Diane Chesna	29E Florida Villas.		

June 14, 2003
Informal Public Information Meeting
Ocean Drive (CR621) Upgrade and Bridge Replacement Project
Sign In Sheet

Name	Address	Telephone Number	e-mail address
Bob Humphries	30 SPRINGERS MILL, CMCH	HL 54542	HumphriesRP@Hot Mail.com
Fred Schmidt	P.O. Box 120 CMCH 08210	fws.law@Verizon.net	
Jim Johnson	214 E. Trenton Ave	W.W.C.	
Donna Groon	118 E Washington WWC	dgroon@comcast.net	
John Burns	52 ~~EASY ST.~~ EASY ST., CMCH, NJ 08240	609-861-5909	JBURNS@COMCAST.NET
Daniel Cohen	Atlantic Capes Fisheries Inc.	dcohen@atlanticcapes.com	
Jeffrey Reichle	Lund's Fisheries	jreichle@lundsfish.com	
Bill Morey	120 W Jefferson Ave	bmorey231@Comcast.net	
Russ Boschetti	218 N. Station	Wildwood Crest NJ	
Will Morey	8500 Bayview Dr.	Will@Moreyspiers.com	
Pete Holmes	215 Raleigh Ave	PHolmes619@AOL.com	
Bill Henfey	233 E 9th Ave	N. Wildwood, NJ	
Janice Morey	8500 Bayview Dr.	Wildwood Crest	
Jim Yost	9901 Seapointe Blvd	YostPMC@AOL.com	

Ocean Drive Upgrade & Bridge Replacements
Public Information Session
Saturday June 14th 2003

Your Input Is Appreciated:

Community input is a critical element in evaluating project alternatives. Please utilize this form to provide your views and opinions about this project. Submit this form to us before you leave today, or mail the completed form to:

Mr. Dale Foster
Cape May County Engineer
4 Moore Road
Cape May Courthouse, NJ 08210

Part 1: Please Check your Preferred Alternative and Bridge Type below:

- ☐ Alternative 3A
- ☐ Alternative 3B
- ☐ Alternative 3C
- ☐ Alternative 3D
- ☐ Alternative 3E
- ☒ Alternative 3F
- ☒ Alternative 3G

- ☐ Moveable Bascule Bridge
- ☒ High Level Fixed Segmental Bridge
- or ☒ High Level Fixed Cable-Stayed Bridge

Part 2: Please write any additional comments below:

IMPORTANT PROJECT FOR IMPROVING TRANSPORTATION INFRASTRUCTURE IN CAPE MAY COUNTY

- IMPROVES EVACUATION IN EVENT OF EMERGENCY
- IMPROVES COMMERCIAL FISHING INDUSTRY
- IMPROVES GENERAL TRAFFIC FLOW FOR LOWER TWP/WILDWOODS/CAPE MAY
-

Continue On Back If Necessary

Ocean Drive Upgrade & Bridge Replacements
Public Information Session
Saturday June 14th 2003

Your Input Is Appreciated:

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Mr. Dale Foster
Cape May County Engineer
4 Moore Road
Cape May Courthouse, NJ 08210

Part 1: Please Check your Preferred Alternative and Bridge Type below:

- ☐ Alternative 3A
- ☐ Alternative 3B
- ☐ Alternative 3C
- ☐ Alternative 3D
- ☐ Alternative 3E
- 2 ☒ Alternative 3F
- 1 ☒ Alternative 3G

- ☐ Moveable Bascule Bridge
- 2 ☒ High Level Fixed Segmental Bridge
- 1 ☒ High Level Fixed Cable-Stayed Bridge

Part 2: Please write any additional comments below:

WE would PREFER THE FIXED CABLE-STAYED Bridge then the FIXED SEGMENTAL.
THE SOONER THE EXISTING STRUCTURE CAN BE ELIMINATED THE BETTER.

Jeff & Dorothy Heckman

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- ☒ Alternative 3G

- ☐ Moveable Bascule Bridge
- ☒ High Level Fixed Segmental Bridge
- ☒ High Level Fixed Cable-Stayed Bridge

Part 2: Please write any additional comments below:

Maintaining access to property during construction major concern
Harbor View Marina
South [redacted] side of Mill Creek bridge

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- ☐ Moveable Bascule Bridge
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Part 2: Please write any additional comments below:

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- ☐ Moveable Bascule Bridge
- ☐ High Level Fixed Segmental Bridge
- ☑ High Level Fixed Cable-Stayed Bridge

Part 2: Please write any additional comments below:

This seems to be the best alternative with the least impact, and would have the capability for bringing in maritime, and fishing fleets with no tie up.

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- ☐ High Level Fixed Segmental Bridge
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Part 2: Please write any additional comments below:

it about time

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Part 2: Please write any additional comments below:

Project should have the least impact on environment and business

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- ☐ High Level Fixed Segmental Bridge
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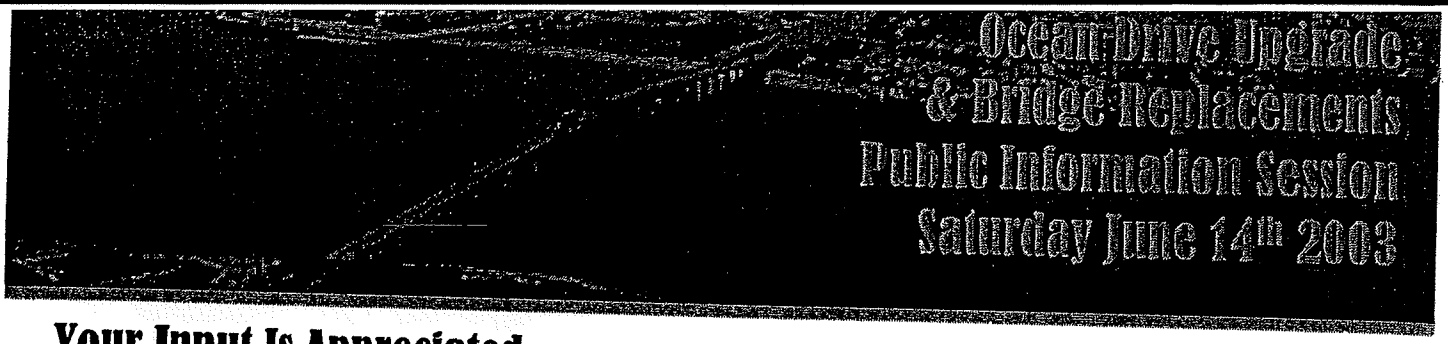
Part 2: Please write any additional comments below:

- Aesthetics
- Limited impact on fishing industry
- Elimination of bridge openings
- Ease of evacuation in time of storm
- Limited disturbance of wetlands

Continue On Back If Necessary



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Joseph R. Cook
609-846-9159

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Part 2: Please write any additional comments below:

All other alternatives would be too impactful to the wetlands and/or the fishing businesses.
The F and G would have little or no such impacts however consider putting the booth gate on the south side, collecting south bound. This would prevent any gate back up into the crest area. (traffic would back up on the bridge first.

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Ocean Drive Upgrade
& Bridge Replacements
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Part 2: Please write any additional comments below:

The Cable-Stayed Bridge will be an archetectual marvel that people will appreciate & picture for years to come Cable Stayed will also provide better access for larger and more volume of traffic Plan 3F & G will also be the least environmental damagers & also have least negative effect on the surrounding businesses & community

Thanks

Continue On Back If Necessary

Ocean Drive Upgrade & Bridge Replacements: Public Information Session Saturday June 14th 2003

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Mr. Dale Foster
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Cape May Courthouse, NJ 08210

Dolly Cook
609-886-9159

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Part 2: Please write any additional comments below:

I hope That The area will be Considered especially The area of Cape May with its beautiful Victorian look.

Thanks for having This meeting for us -

God Bless

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Part 2: Please write any additional comments below:

SPEED LIMIT – North Bound on Ocean Highway;
BIKE PATH –

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Part 2: Please write any additional comments below:

LEAST ENVIRONMENTAL + ECONOMIC IMPACT TO SURROUNDING AREA + BUSINESSES.

I OWN A RESTAURANT AND MARINA COMPLEX ACCESSED FROM OCEAN DRIVE + FISHDOCK ROAD.

THE ROAD ELEVATION IS OF A CONCERN AND SHOULD BE CONSIDERED AND KEPT AT A MINIMUM.

NEW SIGNAGE FOR MY BUSINESSES WOULD HAVE TO BE PROVIDED FOR

Continue On Back If Necessary

TIM SALASIN
2 MILE LANDING

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- ☐ Alternative 3G

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- ☑ High Level Fixed Segmental Bridge
- ☐ High Level Fixed Cable-Stayed Bridge

Part 2: Please write any additional comments below:

① Keep communication open for the residents in the area.

② Totally opposed to the cable stayed bridge. A height of 300 ft. is reducible

3 - Impact on wetlands would be substantial if 3C & 3D were chosen.

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Peggy Kelly.
100 B Memphis Ave
Wildwood Crest. N.J.

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- ☒ Alternative 3G

- ☐ Moveable Bascule Bridge
- ☒ High Level Fixed Segmental Bridge
- or
- ☒ High Level Fixed Cable-Stayed Bridge

Part 2: Please write any additional comments below:

I appreciate the ability to view the designs and voice our opinion.

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- ☐ Alternative 3C NO
- ☐ Alternative 3D NO
- ☐ Alternative 3E
- ☒ Alternative 3F
- ☐ Alternative 3G

- ☐ Moveable Bascule Bridge
- ☒ High Level Fixed Segmental Bridge
- ☐ High Level Fixed Cable-Stayed Bridge

Part 2: Please write any additional comments below:

1. Why not fix present bridge? Flooding on this part of the island has never flooded!
2. Who is making the decision - THE FISHING INDUSTRY!!
3. Why still have a toll? — This will add to traffic problems.
4. Have you sent input comments to all Diamond Beach — ?? This meeting is being held while most people are not here.
5. What about the enviroment! What will happen to wet lands, Coast Guard property?
6. A terrible view for the Crest.

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TAF

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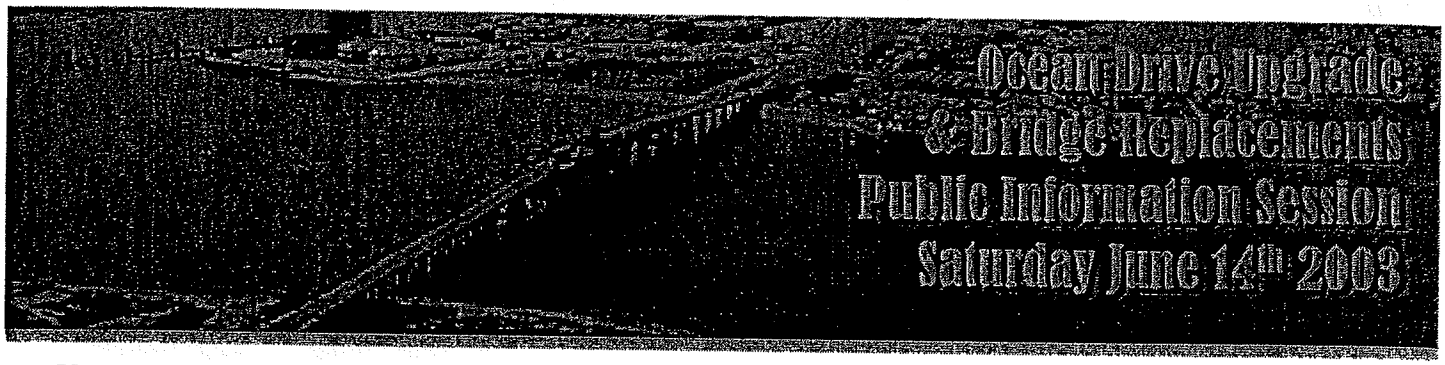
Part 2: Please write any additional comments below:

place Matrix on website

Continue On Back If Necessary



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Part 2: Please write any additional comments below:

VERY INFORMATIVE - THANK YOU - GOOD LUCK.

TOM LEVINS

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Part 2: Please write any additional comments below:

SAFETY Concern for Crest:
Speeding
flooding from raised road for people living close by
View

I believe this is being proposed - NOT for Flooding but for The fishing industry!

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Part 2: Please write any additional comments below:

PLEASE PUT THE COST ANALYSIS MATRIX ON THE WEB SITE

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Part 2: Please write any additional comments below:

1 less environmental impact.
2 Both Seg Bridges on Ocean Drive
3 less costly —

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Part 2: Please write any additional comments below:

Please Keep Residents Informed of decision making

Least Amount of wetland impact is a plus

Any type of moveable bridge will not solve traffic problem during Summer

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Part 2: Please write any additional comments below:

Care should to avoid any large disruption of mudflats at mouth of Upper Thoro for important feeding area for plovers, sandpipers & other shore birds during spring & fall migrations

access to Mill Creek & Upper Thoro River should be maintained for fishers & birders

Present bridge over Upper Thoro River should be maintained for access to fisheries, restaurant

Continue On Back If Necessary

George Dawson
New Brunswick

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- ☐ High Level Fixed Segmental Bridge
- ☐ High Level Fixed Cable-Stayed Bridge

Part 2: Please write any additional comments below:

This type would be the best asset to the entire Wildwood & Cape May area - less impact on wetlands & be able to be opened the day after completion.
"Go for it!"

Continue On Back If Necessary

Ocean Drive Upgrade & Bridge Replacements
Public Information Session
Saturday June 14th 2003

Your Input Is Appreciated:

Community input is a critical element in evaluating project alternatives. Please utilize this form to provide your views and opinions about this project. Submit this form to us before you leave today, or mail the completed form to:

Mr. Dale Foster
Cape May County Engineer
4 Moore Road
Cape May Courthouse, NJ 08210

Part 1: Please Check your Preferred Alternative and Bridge Type below:

- ☐ Alternative 3A
- ☐ Alternative 3B
- ☐ Alternative 3C
- ☐ Alternative 3D
- ☐ Alternative 3E
- ☐ Alternative 3F
- ☒ Alternative 3G

- ☐ Moveable Bascule Bridge
- ☐ High Level Fixed Segmental Bridge
- ☒ High Level Fixed Cable-Stayed Bridge

Part 2: Please write any additional comments below:

As residents of the lower end of Wildwood Crest (33 years) We prefer the alternate route over the east side of existing road + bridge. A high level fixed span bridge is an absolute must. The Stayed Cable is the most attractive & functional for marine + road traffic

Robert + Suzanne Patterson

Continue On Back If Necessary

& Bridge Replacements
Public Information Session
Saturday June 14th 2003

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- ☐ Alternative 3D
- ☐ Alternative 3E
- ☒ Alternative 3F
- ☐ Alternative 3G

- ☐ Moveable Bascule Bridge
- ☒ High Level Fixed Segmental Bridge
- ☐ High Level Fixed Cable-Stayed Bridge

Part 2: Please write any additional comments below:

① Adamently opposed to 3C & 3D for the following reasons:

a. Safety - increased speed of vehicles exiting bridge area.

b. Impact on wetlands

c. Destroys view of surrounding area

d. Would alter drainage, which is presently poor.

e. Increased inconvenience during construction

Continue On Back If Necessary

f. Increased vehicle noise, which presently is a problem

Also, opposed to cable stayed bridge due to height (300')

Monster created in pristine wetland setting!

Ocean Drive Upgrade
& Bridge Replacements
Public Information Session
Saturday June 14th 2003

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- ☐ Alternative 3B
- ☐ Alternative 3C
- ☐ Alternative 3D
- ☐ Alternative 3E
- ☒ Alternative 3F
- ☐ Alternative 3G

- ☐ Moveable Bascule Bridge
- ☒ High Level Fixed Segmental Bridge
- ☐ High Level Fixed Cable-Stayed Bridge

Part 2: Please write any additional comments below:

1) What will be the Environmental impact on the area during the Construction Stage?
2) I agree the existing bridges are antiquated and in need of repair, etc. They should be replaced!
3) Let's be honest! This whole proposal and future construction is not for a exit during a emergency storm. It's being done for the fishing industry and the U.S. Coast Guard
4) Send representatives (interview) to talked to the residents of Diamond Beach (especially Madison and Raleigh Aves.)
5) Bridges 3C and 3D Although aestically (and) beautiful

Continue On Back If Necessary

are grotesque and have a greater impact on the environment and the skyline. Increased danger from ~~motorist and the (speeding)~~ ~~and~~ speeding cars and careless drivers.

(6) There will be additional flooding along Madison Ave because of existing poor drainage and lack of cooperation from the township's engineers to correct the problem!

(7) Cooperation & communication, at each phase of this process, between the residents of Diamond Beach, the Township, the Fed. Gov. and the engineering firms, etc. should be mandatory. It should be done by mail or telephone! A small article on the Herald will not suffice!

(8) I am going to communicate these issues to Greenspan and the DEP!

(9) Bigger ships means bigger channels! Bigger channels means expensive dredging! Dredging impacts the environment, etc

(10) Opposed to <u>Cable Stayed Bridge</u> because of 300' height!

County wants 3 new bridges in Lower Twp.

ATLANTIC CITY PRESS
REGION SECTION
JUNE 13, 2003

By RICHARD DEGENER
Staff Writer, (609) 463-6711

LOWER TOWNSHIP — Lund's Fisheries trucks thousands of tons of fish every year from its Ocean Drive dock to a port in Salem County where it is loaded onto boats and shipped all over the world.

It doesn't make a lot of sense when you consider that Lund's dock is within sight of the Atlantic Ocean. But between Lund's and the ocean is the Middle Thorofare Bridge, an old drawbridge too narrow for many boats to navigate.

"It's costing us a lot of money and making us less competitive at times," said Lund's owner Jeff Reichle.

Relief could be on the way. The Port of Cape May fishing industry has complained for years about the narrow Middle Thorofare Bridge, also known as Two-Mile Bridge. Some fishing boats can't fit through the 50-foot opening. Many run into it.

A previous study ruled out widening the bridge, but now there is a proposal to construct a larger bridge. A fixed-span bridge would eliminate the traffic congestion that occurs when the drawbridge goes up. It would also have a wider opening for boats.

"It would increase businesses and jobs," Reichle said.

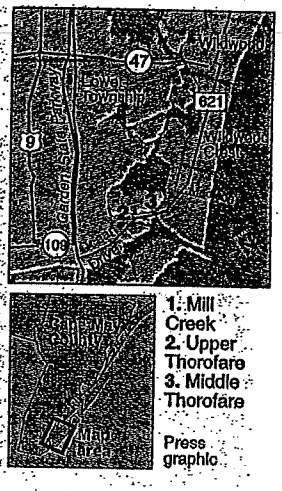
There are many alternatives on the table, but Reichle said one of the possible bridges has a 120-foot-wide opening. It is also high enough to allow large refrigerated cargo ships to come to Lund's and other Port of Cape May fish docks.

Reichle said the dock would also get more transient fishing boats. These are boats from other states working East Coast waters that unload their catch at the nearest dock. Reichle said many of these captains are "scared to death" of the Middle Thorofare Bridge, so they don't come here.

Cape May County Engineer Dale Foster said the fishing industry would be the main beneficiary of the new bridge, but he noted that the project would help a lot of other people. It would also elevate the section of Ocean Drive from

☐ See Bridges, Page C5

Cape May County is studying plans to upgrade Ocean Drive in Lower Township from Route 109 to Madison Avenue, raising the roadway above flood levels. The project would also rehabilitate or replace three bridges, including the drawbridge over Middle Thorofare.



1. Mill Creek
2. Upper Thorofare
3. Middle Thorofare

Press graphic

PUBLIC MEETING

A public information session on Ocean Drive improvements is set for 10 a.m. to 2 p.m. Saturday at the Wildwood Crest Memorial Elementary School, New Jersey Avenue at St. Louis Avenue. Visit Cape May County's Web site to learn more at: www.co.cape-may.nj.us

Bridges

(Continued from Page C1)

Route 109 in Cold Spring to Madison Avenue in Diamond Beach by about 5 feet. This would help evacuate people in coastal storms.

The project, estimated to cost between $85 million and $105 million, would also replace two smaller Ocean Drive bridges at Mill Creek and Upper Thorofare. Both are so narrow that they are unsafe for motorists. The bridges now have two lanes for traffic that are less than the required 10-foot-width. Foster said the new bridges would have 12-foot-wide travel lanes, full shoulders, and a sidewalk. All three bridges have been deemed "functionally obsolete" under a bridge rating system.

A number of different bridge types and road alignments, seven alternatives in all, are under consideration. The various alternatives will be explained to the public at a meeting on Saturday from 10 to 2 p.m. at the Wildwood Crest Memorial Elementary School in Wildwood Crest. Foster said the county wants comments on the path of an elevated and newly aligned Ocean Drive and on the type of bridge that should be constructed. The choices include another drawbridge or several different types of fixed-span bridges.

Foster said a drawbridge, or movable bridge, is cheaper but costs more to operate because it requires a bridge operator. He also noted the federal government is trying to eliminate movable bridges and federal transportation grants are being sought for the project, which is not yet funded for the construction phase.

Reichle said a double-opening drawbridge would be best for the fishing industry because it eliminates any vertical clearance limitations.

"We could bring in refrigerated cargo ships. Bigger vessels mean more business, more jobs and more (transient) fishing boats coming to Cape May," Reichle said.

One of the fixed-span bridges under consideration has a vertical clearance of about 120 feet. Reichle said this would allow most boats to pass. Reichle actually thinks the best-looking bridge is a fixed-span suspension bridge, which is also known as a cable-stayed bridge.

"We'd be happy with a fixed-span. It's better for traffic. A suspension bridge would be extremely practical and it would look beautiful. It would really add something to Cape May Harbor," Reichle said.

A fixed-span bridge would eliminate a motorist headache that happens between 20 and 40 times a day. When a boat passes, the drawbridge is raised and traffic stops. Approximately 1.65 million vehicles use the bridge each year, since Ocean Drive is a major link between Cape May and the Wildwoods.

The project would also include construction of a new toll facility at the Middle Thorofare Bridge, which is part of the Cape May County Bridge Commission's Ocean Drive network. The project's study phase, funded by the federal government through the South Jersey Transportation Planning Organization, ends this year, and Foster said a "preferred alternative" should be selected. The alternative selected would then go to the design phase. If funding is secured, construction could begin as early as 2006.

To e-mail Richard Degener at The Press:
RDegener@pressofac.com

Public session Saturday on alternatives for Ocean Drive upgrades

CAPE MAY STAR & WAVE
JUNE 12, 2003

By BILL GODFREY
Cape May Star and Wave

WILDWOOD CREST — Cape May County, in conjunction with the South Jersey Transportation Planning Organization, invites all concerned citizens to attend a Public Information Session to discuss Ocean Drive Upgrade and Bridge Replacements.

The public session is scheduled for Saturday, June 14, from 10 a.m. to 2 p.m. at the Wildwood Crest Elementary School, New Jersey Avenue at St. Louis Avenue, here in Wildwood Crest.

The goal of the upgrade and replacement project is to upgrade County Road 621 to a viable evacuation route for nearly any type of storm and replace the obsolete structures with minimal disruption to the surrounding community and environment. The project is currently in the study phase and the county is evaluating seven alternatives which consider a number of roadway alignments and bridge types for a new Middle Thorofare Bridge. The project will also consider a new toll facility at the Middle Thorofare Bridge.

The seven alternatives include three new options which have

Please see **Upgrades,** *page A11*

WHAT: Public Information Session to discuss Ocean Drive Upgrade and Bridge Replacements

WHEN: Saturday, June 14, from 10 a.m. to 2 p.m.

WHERE: Wildwood Crest Elementary School, New Jersey Avenue at St. Louis Avenue in Wildwood Crest.

Upgrades

Continued from page A1

been added since the last public information session in June, 2002.

The study phase is expected to conclude at the end of 2003 with the selection of the Initially Preferred Alternative. After preliminary and final design phases are complete, construction could begin as early as 2006.

The information session will provide an opportunity to learn about the project, but a press release announcing the event urges the public to provide input to the project, and said that input is critical to assure the best overall alternative is selected.

For more information those interested may go to www.capemaycountygov.net and click on events.

Info Saturday On $90M Ocean Drive Project

THE HERALD
JUNE 11, 2003

By AL CAMPBELL

WILDWOOD CREST — What will replac Middle Thorofare bridge, perhaps by 2008?

The major part of a $90-million Ocean Driv project that includes roadway realignments an two other bridge replacements, could be:

• A stylish, European-inspired cable-stayed version.

• A plain, simple segmental model.

• A movable, traffic-stopping bascule type.

Motorists, mariners and others who care about the evacuation route south off Five Mile Beach if storms flood northern and central exits, are invited to an information session from 10 a.m. to 2 p.m. Saturday at Wildwood Crest Memorial School, 9100 Pacific Ave.

"More alternatives" have surfaced since four were discussed last year, said County Engineer Dale Foster.

Those include the three listed above, all

Info Saturday

(From Page 1)

providing 116 feet clearance.

The plans look to the future, both for the motoring public and the commercial fishing industry, a heavy user of the channel to docks west of the bridge and in Wildwood.

"The biggest boats now require under 80 feet of clearance," said Foster, "but the fishing industry is looking at bringing in factory ships that put fish on ice at sea. Those are the vessels where we need the height."

Such a height will mandate alignment changes, starting farther away than at present, he said.

"Providing a 116-foot clearance means quite an approach to the bridge," said Foster.

The "best alignment is below the Borden plant," he said, since it would cause "least disruption to the fishing fleet."

Other alignments, all of which will be detailed at the information session, would "have some impact" in the Two Mile Landing area, he added.

Bigger bridges mean heftier — and more costly — foundation piers, Foster said.

Such was an issue with the Ocean City-Longport Bridge, said Foster. Those structures had to be designed for potential major storm loss.

While Middle Thorofare is somewhat inland, and therefore protected from ocean waves, Foster said early test borings show it will have to be designed for considerable storm-caused loss.

Foster said representatives of Parsons Brinckerhoff, bridge consultants, will be present at the session, to answer questions from the public. In addition, Power Point presentations will be made.

While some have projected a completion in 2007, Foster believes "that consultant is very optimistic. I could envision 2008 or later. Some of the issues include permitting for this, which would be quite extensive."

Last, but not least is funding.

It's expected the federal government will provide "80-90 percent" of funds with some provided by the county Bridge Commission.

As with other projects, Middle Thorofare bridge must compete for funding dollars.

"It's a matter of priorities," said Foster, "We're competing with other projects in New Jersey that are just as important. The state has to prioritize, and we are working with (U.S. Rep.) Frank LoBiondo's (R-2nd) office to help with federal funds," Foster said.

"The fishermen are out there helping us sound the horn to try to get money for the project," said Foster.

That's because of the major economic significance that shell and fin fish, landed in Lower Township and Wildwood, have to the county.

The project will raise the portion of Ocean Drive (CR 621) between Madison Avenue and Route 109 in Lower Township above the 100-year flood elevation and replace three obsolete bridges: Ocean Drive over Mill Creek, Upper Thorofare and the Middle Thorofare bridge.

June 2, 2003

Ion Williams
Cape May County Historical and Genealogical Society
504 Route 9
Cape May Court House, NJ 08210

RE: Cultural Resources Investigation for Ocean Drive Upgrade and Bridge Replacements, Lower Township, Cape May County, New Jersey

Dear Ms. Williams:

Cape May County is proposing improvements to Ocean Drive (County Route 621) and the replacement of three bridges: Ocean Drive over Mill Creek, Upper Thorofare and Middle Thorofare. In advance of proposed improvements, Richard Grubb & Associates is conducting a cultural resources investigation to assess project effects to significant architectural, historic and archaeological resources in the project area. This correspondence is submitted for your review and comments in accordance with Section 106 of the National Historic Preservation Act, which entitles organizations with a demonstrated interest in history or historic preservation to participate in the Section 106 consultation process as an interested or consulting party.

The New Jersey Historic Preservation Office has determined that the Middle Thorofare Bridge, a significant movable bridge built in 1940, is eligible for listing in the National Register of Historic Places. If the Middle Thorofare Bridge is replaced, the new bridge design should be historically and aesthetically compatible with the surrounding environment (see enclosure for proposed bridge alternatives). The "Cable Stayed Bridge" is appreciably taller than the existing bridge and may be visible from parts of the Cape May Historic District.

Please plan on attending the Public Information Center on June 14, 2003 to raise any concerns or questions regarding the proposed project. Before we complete our cultural resources survey, we would like your input regarding project impacts to properties that may be locally significant. If you are unable to attend the meeting, please complete and return the enclosed comment sheet. Should you have any questions or require additional information feel free to contact me at 609-655-0692 x313.

Yours very truly,

Glenn R. Modica
Senior Historian

cc: Tom Fisher, Parsons Brinckerhoff-FG (w/o enclosures)
Dale Foster, Cape May County (w/o enclosures)

RICHARD GRUBB & ASSOCIATES, INC.
CULTURAL RESOURCE CONSULTANTS
30 NORTH MAIN STREET
CRANBURY, NEW JERSEY 08512
(609) 655-0692

June 2, 2003

Down Jersey Marine Museum
P.O. Box 1031
Delran, NJ 08075

RE: Cultural Resources Investigation for Ocean Drive Upgrade and Bridge Replacements, Lower Township, Cape May County, New Jersey

Dear Sir or Madam:

Cape May County is proposing improvements to Ocean Drive (County Route 621) and the replacement of three bridges: Ocean Drive over Mill Creek, Upper Thorofare and Middle Thorofare. In advance of proposed improvements, Richard Grubb & Associates is conducting a cultural resources investigation to assess project effects to significant architectural, historic and archaeological resources in the project area. This correspondence is submitted for your review and comments in accordance with Section 106 of the National Historic Preservation Act, which entitles organizations with a demonstrated interest in history or historic preservation to participate in the Section 106 consultation process as an interested or consulting party.

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Senior Historian

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Dale Foster, Cape May County (w/o enclosures)

RICHARD GRUBB & ASSOCIATES, INC.
CULTURAL RESOURCE CONSULTANTS
30 NORTH MAIN STREET
CRANBURY, NEW JERSEY 08512
(609) 655-0692

June 2, 2003

Sue Jacobson, Director
Cape May County Department of Culture and Heritage
4 Moore Road
Crest Haven Complex
Cape May Court House, NJ 08210

RE: Cultural Resources Investigation for Ocean Drive Upgrade and Bridge Replacements, Lower Township, Cape May County, New Jersey

Dear Ms. Jacobson:

Cape May County is proposing improvements to Ocean Drive (County Route 621) and the replacement of three bridges: Ocean Drive over Mill Creek, Upper Thorofare and Middle Thorofare. In advance of proposed improvements, Richard Grubb & Associates is conducting a cultural resources investigation to assess project effects to significant architectural, historic and archaeological resources in the project area. This correspondence is submitted for your review and comments in accordance with Section 106 of the National Historic Preservation Act, which entitles organizations with a demonstrated interest in history or historic preservation to participate in the Section 106 consultation process as an interested or consulting party.

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Dale Foster, Cape May County (w/o enclosures)

RICHARD GRUBB & ASSOCIATES, INC.
CULTURAL RESOURCE CONSULTANTS
30 NORTH MAIN STREET
CRANBURY, NEW JERSEY 08512
(609) 655-0692

June 2, 2003

Mary Rothwell, Secretary
Cape May Historic Preservation Commission
643 Washington St.
Cape May, NJ 08204

RE: Cultural Resources Investigation for Ocean Drive Upgrade and Bridge Replacements, Lower Township, Cape May County, New Jersey

Dear Ms. Rothwell:

Cape May County is proposing improvements to Ocean Drive (County Route 621) and the replacement of three bridges: Ocean Drive over Mill Creek, Upper Thorofare and Middle Thorofare. In advance of proposed improvements, Richard Grubb & Associates is conducting a cultural resources investigation to assess project effects to significant architectural, historic and archaeological resources in the project area. This correspondence is submitted for your review and comments in accordance with Section 106 of the National Historic Preservation Act, which entitles organizations with a demonstrated interest in history or historic preservation to participate in the Section 106 consultation process as an interested or consulting party.

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Yours very truly,

Glenn R. Modica
Senior Historian

cc: Tom Fisher, Parsons Brinckerhoff-FG (w/o enclosures)
Dale Foster, Cape May County (w/o enclosures)

RICHARD GRUBB & ASSOCIATES, INC.
CULTURAL RESOURCE CONSULTANTS
30 NORTH MAIN STREET
CRANBURY, NEW JERSEY 08512
(609) 655-0692

June 2, 2003

Harry Savage, President
Greater Cape May Historical Society
P.O. Box 495
Cape May, NJ 08204

RE: Cultural Resources Investigation for Ocean Drive Upgrade and Bridge Replacements, Lower Township, Cape May County, New Jersey

Dear Mr. Savage:

Cape May County is proposing improvements to Ocean Drive (County Route 621) and the replacement of three bridges: Ocean Drive over Mill Creek, Upper Thorofare and Middle Thorofare. In advance of proposed improvements, Richard Grubb & Associates is conducting a cultural resources investigation to assess project effects to significant architectural, historic and archaeological resources in the project area. This correspondence is submitted for your review and comments in accordance with Section 106 of the National Historic Preservation Act, which entitles organizations with a demonstrated interest in history or historic preservation to participate in the Section 106 consultation process as an interested or consulting party.

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Glenn R. Modica
Senior Historian

cc: Tom Fisher, Parsons Brinckerhoff-FG (w/o enclosures)
Dale Foster, Cape May County (w/o enclosures)

RICHARD GRUBB & ASSOCIATES, INC.
CULTURAL RESOURCE CONSULTANTS
30 NORTH MAIN STREET
CRANBURY, NEW JERSEY 08512
(609) 655-0692

20020B
J. Maloney

June 2, 2003

B. Michael Zuckerman, Director
Mid-Atlantic Center for the Arts
P.O. Box 340
1048 Washington Street
Cape May, NJ 08204

RE: Cultural Resources Investigation for Ocean Drive Upgrade and Bridge Replacements, Lower Township, Cape May County, New Jersey

Dear Mr. Zuckerman:

Cape May County is proposing improvements to Ocean Drive (County Route 621) and the replacement of three bridges: Ocean Drive over Mill Creek, Upper Thorofare and Middle Thorofare. In advance of proposed improvements, Richard Grubb & Associates is conducting a cultural resources investigation to assess project effects to significant architectural, historic and archaeological resources in the project area. This correspondence is submitted for your review and comments in accordance with Section 106 of the National Historic Preservation Act, which entitles organizations with a demonstrated interest in history or historic preservation to participate in the Section 106 consultation process as an interested or consulting party.

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Glenn R. Modica
Senior Historian

cc: Tom Fisher, Parsons Brinckerhoff-FG (w/o enclosures)
Dale Foster, Cape May County (w/o enclosures)

JUN - 5 2003

RICHARD GRUBB & ASSOCIATES, INC.
CULTURAL RESOURCE CONSULTANTS
30 NORTH MAIN STREET
CRANBURY, NEW JERSEY 08512
(609) 655-0692

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

June 21, 2002

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

Re: Mill Creek, Upper Thorofare and Middle Thorofare Bridges and Ocean Drive (CR621) Upgrade Project

Dear Mr. Fisher:

Enclosed herewith please find the June 13, 2002 article from the Cape May County Gazette newspaper and also the June 12, 2002 article from the Cape May County Herald. Also enclosed is a letter dated June 10, 2002 with comments concerning the project from a J. Eric Gundrum. Mr. Gundrum at one time worked for the Cape May County Planning Department and currently works for the Mercer County Planning Department.

Also enclosed is the entire list to whom the flyer for the Public Information Center was mailed. We have indicated by orange highlighter those addresses for which the flyers were returned. The flyers were sent regular mail without return receipt. As other information and comments are furnished to my office, we will forward them to your attention.

Should you have any questions or require any additional information, please do not hesitate to contact me.

Very truly yours,

Dale M. Foster, P.E.
County Engineer

DMF/jm

enc.

RECEIVED
JUN 26 2002
PB - PRINCETON

CAPE MAY COUNTY HERALD

Inside... SKIMME Weekend

Plus... Dining & Entertainm

Vol. 38 No. 24 Copyright 2002 Seawave Corp. All rights reserved. June 12, 2002 PUBLISHED EVERY WEDNESDAY BY THE SE... P.O. BOX 200, RIO GRAN...

Rile 2-Mile Move Ocean Drive?

By JACK FICHTER

ERMA — Proposed changes to the Middle Thoroughfare Bridge could eliminate traffic delays caused by bridge openings and allow larger fishing vessels to use the waterway, but also impact a large area of wetlands and cut off Two Mile Landing restaurants and Ocean Drive marinas from tourist traffic.

County Engineer Dale Foster, the South Jersey Transportation Planning Organization, along with engineers from Parsons Brinckerhoff of Princeton, held a public information session in the Lower Cape May Regional High School Auditorium June 5 to show proposed plans for upgrading Ocean Drive and replacing three bridges along the route.

During the first hour, most attendees were Diamond Beach and Wildwood Crest residents whose fears were eased after hearing Ocean Drive renovations would only raise the height of the road five-feet and not alter their neighborhoods.

Ocean Drive, which is below flood elevation, provides the major link between Cape May and the Wildwoods and

(Page 6 Please)

Ocean Drive

(From Page 1)

is an evacuation route.

Four alternatives are being proposed to replace the 1,000-foot Middle Thoroughfare Bridge, which has 26 feet of clearance, the reason for so many openings, and thus traffic delays.

Two plans would move the bridge northwest of its current location into an area of wetlands with the current bridge demolished. A new non-movable bridge proposed to be 75-feet high above the waterway would allow tall boats to pass underneath.

Traffic would be routed away from a stretch of Ocean Drive that passes Lund's Seafood, Snow's Doxsee Seafood, a restaurant and three marinas. A connector road would allow access to the new Ocean Drive.

With a new portion of Ocean Drive going directly through wetlands, new wetlands would have to be created elsewhere as a replacement, said Thomas A. Fisher, assistant vice president of Parsons Brinckerhoff's structural department.

He noted an old railroad bed in Wildwood Crest that could be turned into wetlands.

A less radical approach would build a new movable bridge parallel to the current Middle Thoroughfare Bridge. The boat channel would be widened to 130 feet and a new bridge could be as high as 55 feet, according to Fisher.

A higher bridge would reduce the number of bridge openings, he said.

Replacing Middle Thorofare Bridge with another movable span close to its current location would be less costly and not involve using a large portion of wetlands, said Miguel Santiago, an engineer with Parsons Brinckerhoff.

At this point, all alternatives are open for discussion.

"We're still in the early stages, this is as early as it gets as far as planning," said Santiago. "We want to see what the feedback is from the residents and the businesses that would be affected, and all the fishing companies."

"We hope to come out of the study stage with a preferred alternative, which has a general consensus of elected officials and the people impacted by the project, and that is buildable and can receive permits," said Foster. "That's going to be a big issue..."

Views of pristine salt marsh and Jarvis Sound from the restaurants at Two Mile Landing would be changed. With one of the proposed plans, diners would look at piers of the new Middle Thorofare Bridge, according to Curtis Helm, a environmental specialist with the firm of Amy S. Greene Environmental Consultants of Flemington.

The Mill Creek and Upper Thoroughfare bridges are slated for replacement. Both bridges have been deemed too narrow and functionally obsolete. Foster said there have been a number of accidents on the bridges that are only 20 feet wide.

To accommodate a new Mill Creek Bridge, the roadway would be shifted four feet to the north, according to Foster.

Detailed designs of the project would not begin until 2004, with construction set to begin in 2007, said Foster. He said the $100 million cost would probably split in two parts.

Middle Thoroughfare Bridge would be one, Ocean Drive from Route 109 to the fishing industry, would be the other, said Foster.

Storm Outages

COURT HOUSE — The powerful storms that rumbled through June 6 knocked out power to 10,000 Connectiv customers, according to spokesperson Betty Kennedy. Outages were reported in Cape May, Cold Spring, Villas, Town Bank, Stone Harbor, Avalon, Swainton, Erma, Petersburg and Ocean City. Power was restored in most areas by midnight. Kennedy said, "crews were on the road as soon as it was possibly safe to do so and they worked through the night to restore power to our customers."

Millions worth of bridge work planned

By JANUARY M. BAKER
Correspondent

Alternatives for planned improvements to Ocean Drive in Lower Township, including the stretch's three bridges, were presented to the public during a Public Information Center June 6 at Lower Cape May Regional High School.

The session was hosted by Cape May County in conjunction with the South Jersey Transportation Planning organization in order to gain public input for the upgrades to the Mill Creek, Upper Thorofare and Middle Thorofare bridges on Ocean Drive as well as to the rest of the road between Route 109 in Lower Township and Jefferson Avenue in Wildwood Crest. Middle Thorofare is also known as the Two Mile Bridge.

Meeting attendees were able to view display boards with plans of possible alignments and alternatives of the four options, ask questions and discuss critical issues with one-on-one consultants such as Project Manager Dale Foster, who says the overall estimated cost of the project is about $100 million.

There are existing problems with these bridges. They currently cannot carry loads greater than 15 tons. In addition, the span limits the size of vessels that can use the Middle Thorofare waterway beyond the bridge. The bridge openings also cause considerable traffic back ups during the busy summer, about 20 to 40 a day.

Foster says this route is very important because the new plans will create a viable evacuation route in case a storm were to strike Cape May County. About 1.65 million vehicles use the two bridges each year.

The Mill Creek and Upper Thorefare bridges are also too narrow.

"The new bridges will have a 40-foot width instead of the now existing 20-foot width that causes accidents when cars ride over the yellow line, causing other vehicles to hit the railings," Foster said.

Environmental consultants were also available to answer any questions.

Consultant Beth Chudy said, "The wetlands environment will be affected no matter what option is chosen."

However, the various alternatives will be considered and evaluated for their affects on wetlands.

There were four options displayed, and each one affected businesses and fishermen differently. The first two options consisted of replacing the Middle Thorofare bridge with a fixed height of about 70-feet across Thorefare Island. There would no longer be any bridge openings, and the new model looks similar to the Route 147 bridge into North Wildwood.

These two options benefit fishermen in the area because they would no longer have to wait for bridge openings, and they would also be able to bring in larger vessels such as ships equipped with refrigeration units so they can begin their fish processing immediately. However, these options take away all drive-by business on Ocean Drive such as Axelsson's Blue Claw Restaurant. A separate road would be build in order to access them.

The third and fourth options consist of constructing a bridge adjacent to the existing Two Mile bridge, however, it would have a height of about 50 feet. The bridge would require fewer bridge openings, and slightly larger vessels would also be able to pass through.

The alternatives will be evaluated based on impacts on traffic, right-of-way issues, visual impacts, cost of construction, impact on shipping and fishing, contructability, historic preservation, project need and most importantly community impact. Once the preferred alternative is identified the project will then progress to the environmental assessment phase. The study phase for this project should be completed February 2003, however, a project of this complexity and size takes about five to seven years until it reaches the construction phase.

Written comments regarding this project may be sent to the Cape May County Engineer's Office, 4 Moore Road, Cape May Court House, 08210; or e-mail to countyengineer@co.cape-may.nj.us.

June 10, 2002

Mr. Timothy Chelius, Executive Director
South Jersey Transportation Planning Organization
1173 E. Landis Avenue
Vineland, NJ 08360

Mr. Dale Foster, County Engineer
Cape May County
Crest Haven Complex
Cape May Court House, NJ 08210

RE: Bridge Work, southern Cape May County

Dear Sirs:

I take notice your wish to solicit comments concerning the bridge planning/reconstruction along Ocean Drive between the Two Mile Toll Bridge and Garden State Parkway. I unfortunately could not attend the workshop session at Lower cape May regional High School on June 5, 2002.

My general comment concerns fishing access. Currently, the bridge(s) in question do not provide safe and adequate mean of access for recreational fishing. Currently members of the public either fish illegally or are unsafe in fishing the respective bridge(s). In your planning study and bridge design phases, some mean of access either on the bridges or beside the bridges should be afforded to the fishing public. Either a separated catwalk/sidewalk from vehicular traffic lanes or reusing the old bridge structure for a new fishing pier should be used. I take note of the excellent design of the Rush Chattin Bridge, south of Ocean City, New Jersey, as the model bridge design for providing fishing access.

As a recreational fisherman and NJ licensed Professional Planner, I hope my comments can be incorporated into the design of the new bridges.

If you have any questions or need additional information, please do not hesitate to contact me at 609-278-8118 (day) or by email at surfrat245@aol.com.

Sincerely,
J. Eric Gundrum

J. Eric Gundrum, AICP, PP
116 E. 22nd Street
N. Wildwood, NJ 08260

C: Recreational Fishing Alliance, NJ Chapter
Commissioner, NJDOT

Meeting Minutes

To: Dale Foster, Cape May County Engineer
PB Team
File – 20050B 5.0, 5.2

From: Tom Fisher

Date: June 05, 2002

Subject: **Ocean Drive Improvements**
Lower Township, Cape May County
Public Information Center

A public information center was held for the above project at the Lower Cape May Regional High School in Erma, NJ from 3-7:00pm on June 5, 2002. Representatives from PB and the Cape May County Engineer's Office were available to explain the four alternatives currently being studied. A list of attendees is attached to this document.

The following is a summary of the meeting:

- Most residents seemed to prefer a fixed, high-level alignment since it would eliminate bridge openings. They did, however, understand that a new moveable bridge would decrease the number of required openings and noted that the new alignments would incur more severe impacts to surrounding wetlands. Several residents expressed concern over environmental impacts.
- At least one fishery owner (Jeff Reichle of Lund's Fisheries) preferred Alt 3A. He said the realigned driveway with retaining walls shown on the plan would be acceptable. He did ask if he could regain the space taken for the new driveway (currently used for storage) in the area of the old alignment which will be vacated (a ROW swap). It was explained that this is something which might be possible, but that it would be negotiated at a later stage of the project. He also indicated that power transformers, which serve his business, would need to be relocated for the driveway.
- At least one comment was made about the aesthetic appearance of the propsosed berm near AJ's restaurant. The berm would essentially be located directly in front of the restaurant's windows. It was explained that the alignment, was shifted to the south in Alternative 3A to minimize the impact on the restartaunt. Also explained was that landscape treatments would be investigated later in the project process.
- Several comments were voiced about the response time of the fire trucks coming over the bridge from Cape May. It was explained to residents that the fire trucks servicing the lower end of Wildwood Crest were actually not supposed to cross the Middle Thorofare bridge due to its current condition. It was further explained that all of the proposed alternatives would allow for trucks, such as fire trucks, to cross the bridge.
- One resident spoke of an ill placed "To Cape May" sign at the corner of Atlantic and Rochester that apparently misdirects traffic, resulting in traffic backups in a residential neighborhood. She suggested it be moved to Jefferson and Pacific. It was explained that signing is typically reviewed and designed at a later stage of the project, but that the suggestion would be noted.
- M/M Joseph Orlando of 105 W. Rochester Avenue requested that they be added to the mailing list.

Middle Township
Public Information Center

SIGN IN SHEET 6/5/02

NAME	ADDRESS	PHONE
PAT Loughran	125 N Station Ave	729-9141
Joanne Jankowski	122 N. Station Ave	522-1978
Pat McEvoy	124 N. Station Ave	729-2348
M.H. Orlando	105 W. Rochester Ave	729-5832
Jad Tadlock	Herald	886-8600 ext 30
WALTER SURRAN	GIBSON ASSOC.	609-263-3178
Joanne Flynn	722 Maple Ave. W.C. May, N.J. 08204	609-898-1160 / 884-04
NICK Bibernak	204 E. Memphis, Wildwood Crest	609-729-5547
BILL GALESTON	LOWER TWP	886-1492
CHARLES RONN	108 E ROCHESTER AVE	522-4771
Jeff Reichle / Lund's Fisheries	Box 830	8847600
Marilyn + Bob McDonald	300 E. Raleigh Ave.	523-0093
January Bolles	708 Sixth Ave	523-0825
Carmen Shuck	231 South Station	846-1138
CARMEN AXMANN	211 E RALEIGH	(856)-566-0475
DANIEL COHEN / ATLANTIC CAPES FISHERIES, INC.		609. 884-3000
Frank + Barbara Peter	210 E. Rochester Ave Diamond Beach	729-7371
John McDowell	205 E. Memphis Ave.	522-7684
Stan Nifin	207 E. Memphis Ave	523-6455
Paula + Phil Marder	122 Austin Ave	609-827-8782
WALTER SHERATON	215 DUNE DR	523-8635
Jim Yost	9901 Seapointe Blvd	729-9090

RECEIVED
JUN 10 2002

PUBLIC INFORMATION INPUT SHEET

June 5, 2002

PROPOSED SCOPE DEVELOPMENT
MILL CREEK, UPPER THOROFARE, AND MIDDLE THOROFARE BRIDGES
AND OCEAN DRIVE (COUNTY ROAD 621) UPGRADE PROJECT
LOWER TOWNSHIP, CAPE MAY COUNTY

TO THE COMMUNITY: In the space below, please provide any comments you may have or define your concerns. Please send your written response to:

Thomas A. Fisher, P.E.
Parsons Brinckerhoff-FG, Inc.
506 Carnegie Center
Princeton, New Jersey 08540
Or e-mail your response to: fishert@pbworld.com

The people of Diamond Beach need a traffic light at Rochester and Pacific.
Rochester Ave. is the main street for everyone to make a left to go to Cape May. All coming or Seaview and Atlantic Avenues point to Rochester Ave. On Rochester Ave. West - trying to make a right is also impossible.
The newspaper said the 1.65 million cars, trucks and buses use Pacific Ave. in that area.
Please see if you can help.

Thank you
Mrs. Frank Potter

Meeting Info	**PUBLIC INFORMATION CENTER** 3:00 PM to 7:00 PM, Wednesday, June 5, 2002 **Lower Cape May Regional High School** **US Highway 9, Erma, New Jersey 08204** **Lower Township**

Proposed Scope Development
Mill Creek, Upper Thorofare, and Middle Thorofare Bridges
and Ocean Drive (County Road 621) Upgrade Project
Lower Township, Cape May County

Cape May County, in conjunction with the South Jersey Transportation Planning Organization, cordially invites you to attend an informal Public Information Center, which is being held to gain public input for the upgrade of Mill Creek, Upper Thorofare and Middle Thorofare Bridges and associated roadway improvements to Ocean Drive, County Road No. 621, from Route NJ 109 to Jefferson Avenue. The public information center is scheduled for Wednesday, June 5, 2002 from 3:00 PM to 7:00 PM. Please plan to attend the meeting at a time convenient for you.

THE MEETING

At the Information Center, the public will be able to view display boards with conceptual plans of possible alignments and alternatives, ask questions and discuss critical issues one on one with the consultant. The purpose of this Information Center is to provide local residents, officials, and the business community with the opportunity to view and comment on the proposed plan to upgrade the bridges and Ocean Drive in Lower Township.

Cape May County and South Jersey Transportation Planning Organization are committed to developing transportation improvements that best balance transportation needs (both marine and land), environmental issues, community concerns and costs. This meeting is specifically set up to talk to you, the community. You are encouraged to actively participate by attending and providing comments.

EXISTING CONDITIONS

Ocean Drive in Lower Township provides the major link between historic Cape May City and the Wildwoods and also provides the landside access for Cape May County's fishing industry, which is considered to be the tenth largest in the United States. The Mill Creek and Upper Thorofare Bridges currently are deemed functionally obsolete due to the narrow width. The Middle Thorofare Bridge is deemed functionally obsolete due to its narrow width, and structurally deficient due to its inability to carry loads greater than 15 tons. In addition, the movable span limits the size of the vessels that can use the Middle Thorofare waterway beyond the bridge. During the summer months, the movable span of the Middle Thorofare opens as much as forty (40) times in a day to allow the passage of boats. The number of bridge openings causes traffic back-ups that at times exceed one mile in each direction.

PROPOSED IMPROVEMENTS

The upgrade project consists of improving the three bridges and Ocean Drive to create a viable emergency evacuation route for almost any type of storm that would strike Cape May County. Bridges improvements would involve rehabilitating, modifying, or replacing the existing bridges. Various alternatives that are being considered for the Middle Thorofare Bridge consist of rehabilitation and modifications of the existing bridge, new movable span with a wider navigational channel on a parallel alignment, new movable span on a new alignment or a high-level, fixed span on a new alignment that would allow boats to proceed unimpeded through the channel. The proposed roadway improvement will consist of a two-lane section with shoulders.

The various alternatives will be considered and evaluated for their effects on wetlands, impacts on wildlife, impacts on traffic, right-of-way issues, visual and aesthetics impacts, cost of construction, impact on shipping and fishing, constructability, historic preservation, project need and most importantly community impact. The goal of the current study phase is to define a preferred alternative that has community support and is constructable.

PROJECT SCHEDULE

Once the preferred alternative is identified, the project will then progress to the environmental assessment phase. The current study phase for this project should be completed February 2003.

Typically a project of this complexity and size takes about five to seven years from the time the project begins the study phase until it reaches the construction phase.

A public information center was held on June 14, 2000 for the Mill Creek and Upper Thorofare Bridges study phase, which resulted in including the Middle Thorofare Bridge as part of the study due to its alignment impacts on the Upper Thorofare Bridge. The project is only beginning the study phase for the Middle Thorofare Bridge portion, and therefore no cost estimates have been generated for the improvement project. All three bridges and the roadway improvements are to be discussed at this Public Information Center.

If you have any questions, please contact the County Engineers Office (see back page).

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

Mill Creek, Upper Thorofare and Middle Thorofare Bridges and Ocean Drive (County Road No. 621 Upgrade Project

Cape May County, with federal funds that have been garnered by the South Jersey Transportation Planning Organization, is beginning the study phase of an improvement project on Ocean Drive (County Road No. 621) in Lower Township. The project consists of upgrading Ocean Drive from the intersection of Route NJ 109 in Lower Township to Jefferson Avenue in the Borough of Wildwood Crest into a viable emergency evacuation route for almost any type of storm that would strike Cape May County and to either rehabilitate, modify or replace three bridges along this alignment. Those bridges are a 300-foot long bridge over Mill Creek, a 350-foot long bridge over Upper Thorofare, and a 1,038-foot long bridge over Middle Thorofare having a movable span as its main span. The Middle Thorofare Bridge is also referred to as the "Two Mile Bridge".

The Mill Creek and Upper Thorofare Bridges currently are deemed functionally obsolete due to the narrow width. The bridges also have low sufficiency ratings, 46.8 for Mill Creek and 47.3 for Upper Thorofare. The sufficient rating is the grade of the bridge using a 100-point system with 100 being a perfect bridge and 0 being a collapsed bridge. The sufficient rating consists of three components – structural adequacy and safety (55%), serviceability and functional obsolescence (30%) and essentiality for public use (15%). The Middle Thorofare Bridge is deemed functionally obsolete due to its narrow width and structurally deficient due to its inability to carry loads greater than 15 tons. In addition, the movable span limits the size of the vessels that can use the Middle Thorofare waterway beyond the bridge. The movable span also causes considerable traffic backups during the busy summer season. The Middle Thorofare Bridge has a very low sufficiency rating of approximately 4 out of 100 points.

The narrow width of the navigational channel provided through the Middle Thorofare Bridge has resulted in the bridge being frequently impacted by large marine vessels. Middle Thorofare experiences anywhere from 20 to 40 bridge openings a day. Approximately 1,650,000 vehicles use the bridge each year. The numerous bridge openings for the passage of boats causes extensive backup of traffic traveling between the Wildwoods and Cape May.

As part of this study phase, the consultant, Parsons Brinckerhoff of West Windsor, will perform an alternative analysis to determine a preferred alternative. The alternatives that potentially would be considered for the Middle Thorofare Bridge consist of the following:

1. Rehabilitation and modification of the existing bridge.
2. New movable span with a wider navigational channel and a potentially higher vertical underclearance on a parallel alignment.
3. New movable span on another alignment.

4. A high-level, fixed span on different alignments that would allow vessels to proceed unimpeded through the Middle Thorofare navigational channel.

The benefits of the high-level, fixed crossing include the elimination of shipping limitations on the fishing industry due to navigational restrictions of the existing bridge, the elimination of traffic backups due to bridge openings, and the elimination of the need for a bridge operator for the movable span. In addition, a fixed span has reduced maintenance costs in comparison to a movable bridge. Also having a high-level fixed span and a wide navigational channel would reduce the damages to the bridge resulting from vessels impacting it, as is the case with the existing movable bridge. However, any new alignment has potential environmental impacts such as the filling in of coastal wetlands in addition to the need to purchase right-of-way. Other impacts of a new alignment consists of esthetics, access for existing businesses and infrastructure services.

The various alternatives will be considered and evaluated for their effects on wetlands, impacts on wildlife, impacts on traffic, right-of-way issues, visual and esthetics impacts, cost of construction, impact on shipping and fishing, constructability, historic preservation, project need and most importantly community impact. The goal of the study phase is to define a preferred alternative that has community support and is constructable. Once the preferred alternative is identified, the project will then progress to the environmental assessment phase. The study phase for this project should be completed February 2003.

At this time, several subconsultants working for Parsons Brinckerhoff, such as Amy S. Greene Environmental Consultants, Inc., Flemington, NJ, are performing the wetland delineation and other environmental studies. Gibson Associates, PA , Sea Isle City, NJ, are performing topographical and control surveys for this study phase. BET Consultants, East Hanover, NJ, are providing the aerial mapping of the area. Richard Grubb & Associates, Inc., Cranbury, NJ are performing the cultural resources investigation.

The project is only beginning the study phase for the Middle Thorofare Bridge portion, and therefore no cost estimates have been generated for the improvement project. Typically a project of this complexity and size takes about five to seven years from the time the project begins the study phase until it reaches the construction phase.

The community's input is being sought for this project. The County is planning to hold a public information meeting in early June. Further information in regards to this meeting will be forthcoming in the near future.

Written comments regarding this project shall be sent to the Cape May County Engineer's Office, 4 Moore Road (DN-402), Cape May Court House, NJ 08210 or e-mail to countyengineer@co.cape-may.nj.us.

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

Control
File 20520 GI, DSB, FL, TAF
(All copies w/ Enclosures.) GJS

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

DANIEL BEYEL
Freeholder

DALE M. FOSTER
Engineer

I will talk to Dale about the extent of the proposal. It seems that this proposal should include the Middle Thorofare Scoping effort too.
JE

RECEIVED
SEP 13 2000
PB - PRINCETON

September 11, 2000

Joe Mumber, P.E.
Parsons Brinckerhoff - FG, Inc.
506 Carnegie Center, 2nd Floor
Princeton, NJ 08540

Re: Mill Creek and Upper Thorofare Bridges
Scoping Project

Dear Mr. Mumber:

I met with Daniel Cohen, President Atlantic Capes Fisheries concerning the referenced project. Mr. Cohen came to discuss the project as a representative of the local fishing community. Mr. Cohen and others representing the fishing interest did not attend the June 14, 2000 public information meeting regarding the project.

Mr. Cohen and his associates are supportive of the upgrading of Ocean Drive and in particular addressing the bridges. Mr. Cohen presented a new alignment for the Middle Thorofare Bridge that impacts the Upper Thorofare Bridge. As you are aware of the Middle Thorofare Bridge is a single leaf bascule span bridge that is beyond the eastern limits of the referenced project. The County in conjunction with South Jersey Transportation Planning Organization is proceeding shortly with the scoping phase for the replacement of the Middle Thorofare Bridge. Mr. Cohen has presented his proposed alignment to the County Chamber of Commerce and received their endorsement to have the new alignment studied.

The proposed alignment as shown on the attached aerial plan has Ocean Drive veering to the north so as to pass on the north side or behind the docks for the fisheries. The alignment would then cross the Middle Thorofare waterway and use an abandon rail right-of-way just north of the Two Mile Landing area and eventually connect with Ocean Drive just west of Diamond Beach.

Originally, it was anticipated that the Middle Thorofare Bridge would be replaced with a wider and slightly higher bridge that provided more underclearances on an alignment either to the immediate north or south of the existing structure. The replacement bridge would most likely be a double-leaf bascule bridge due to the inability to provide a fix span bridge. In order to meet the required vertical underclearance (55 feet to 65 feet) the western touchdown would be located somewhere in the vicinity of the Upper Thorofare and thus bypass or prevent access to the existing development between the Middle Thorofare and Upper Thorofare Bridges.

The beauty of Mr. Cohen's proposed alignment is that a high-level fixed-span bridge can be constructed thus eliminating traffic congestion, both vehicular and marine, associated with the bridge openings. A fixed-span bridge is very desirable because due to the frequent openings at the existing bridge traffic often times backs up for over a mile in each direction. Steven O'Connor, Executive Director of the Cape May County Bridge Commission, favors a high-level fixed-span bridge.

The down side to the new alignment is the environmental impacts such as filling-in of coastal wetlands and the need to purchase right-of-way. Some of the alignment falls within the wildlife refuge area.

Timothy Chelius, Executive Director of South Jersey Transportation Planning Organization has suggested a scope modification to review this proposed alignment. Please provide a letter addressed to Mr. Chelius of your proposal to include the necessary review of the alignment. I realize this is problematic because of the lack of mapping, survey and other key data east of Upper Thorofare Bridge that is necessary for the study and would be best if it was part of the Middle Bridge scoping project. This scoping project is expected to begin sometime during this upcoming federal fiscal year.

Should you have any questions, or require additional information, please do not hesitate to contact me.

Very truly yours,

Dale M. Foster, P.E.
County Engineer

enc.

cc: Freeholder Director Beyel
Timothy Chelius, SJTPO w/enc.
Steven O'Connor, CMCBC

DMF/jm

CAPE MAY COUNTY CHAMBER OF COMMERCE

Phone: (609) 465-7181 FAX: (609) 465-5017

P.O. Box 74 • Exit 11 Garden State Parkway • Cape May Court House, New Jersey 08210-0074

July 20, 2000

Dale Foster
Cape May County Engineer
4 Moore Road
DN 402
Cape May Court House, NJ 08210

Dear Dale;

The Chamber's Transportation and Executive Committees have both asked me to contact you relevant to future improvement plans along the Ocean Drive in Lower Township.

They would like to see a re-evaluation of the possibility of a fixed span bridge over the Middle Thoroughfare with a new alignment. We have also been advised that the Commercial Fisheries in that area would support and prefer the same as well.

Your consideration would be appreciated.

Sincerely,

Robert C. Patterson, Jr.
Executive Director

RCP/hk

cc: Joe Lomax
Jan Byrne

RECEIVED

JUL 21 2000

CAPE MAY COUNTY ENGINEER

File # 20020 Central 5.12, 058

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

DANIEL BEYEL
Freeholder

DALE M. FOSTER
Engineer

Re: Mill Creek and Upper Thorofare Bridge Replacements

June 15, 2000

Joseph Mumber, P.E.
Project Manager
Parsons Brinckerhoff-FG, Inc.
506 Carnegie Center Boulevard
Princeton, New Jersey 08540

RECEIVED
JUN 21 2000
PB - PRINCETON

Dear Mr. Mumber:

Enclosed herewith please find a copy of the sign-in sheet for the June 14, 2000 public information meeting for the referenced project. Also enclosed is a copy of the June 13, 2000 Atlantic City Press article regarding the project and the public information meeting.

Very truly yours,

Dale M. Foster, P.E.
County Engineer

DMF/lah

MILL CREEK AND UPPER THOROFARE BRIDGE REPLACEMENTS AND OCEAN DRIVE (County Road 621) UPGRADE TOWNSHIP OF LOWER

PUBLIC INFORMATION MEETING
JUNE 14, 2000

NAME	ADDRESS
[illegible]	25 Philadelphia Rd. Tower Bank NJ
Cecelia Axelsson	Axelsson's Blue Claw Restaurant
[illegible] Axelsson	Axelsson's Blue Claw Rest
David Bond	814 Heather Lane Cape May NJ
BOB DIETZ	USCG TRAINING CTR., 1 MUNRO AVE, CAPE MAY NJ 08204-5015
LCDR GARY THOMAS	USCG LORAN SUPPORT UNIT, 12001 PACIFIC, WILDWOOD
Bill Galbestok	Lower Township
Peter Johnson	Lower Twp
Carol Webster	Axelsson's Blue Claw Rest.
Ted Peters	104 LANGS AVE VILLAS
[illegible]	Axelsson's Blue Claw Rest.
Tim Chelius	SJTPO - 18 N East Ave/Vineland 08360
Scott Carman	Lund's Fisheries 997 Ocean Drive
[illegible]	Axelsson's Blue Claw Rest
AL CAMPBELL	HERALD NEWSPAPERS
MIKE WEBER	CANYON CLUB MARINA 900 OCEAN DRIVE
CHUCK WEBER	"
Craig M. Lawrence & Fthr	Cedar Creek Marina
JOE BRANDT	USCG LORAN SUPPORT UNIT 12001 PACIFIC AV, WILDWOOD NJ 08260
Jim Smith	Cape May County Planning

ion of Ocean Drive, widen bridges

While most residents would be thinking of leaving the islands on Route 47, Foster noted Ocean Drive is already a higher road and the project would raise it another five feet or so.

"This is the last road to flood in a normal high tide event. Route 47 has closed before this. We're trying to make it convenient," said Foster.

The road would be elevated an average of five feet so it could be above the water in what is known as a 100-year storm, or the worst storm during a century.

The other problem with the road is that it is too narrow, especially over two small bridges that cross Mill Creek and Upper Thorofare. Foster said curb-to-curb the bridges are 20 feet wide and the project would double this to 40 feet.

Huge trucks carrying seafood — the port moved 94 million pounds in 1998 — and buses traveling between the Wildwoods and Cape May have been known

See Road, Page C3

Appendix C
Cost Estimates

Classification Number 2 - RECONSTRUCTION, WIDENING & DUALIZATION - English

Route	Ocean Drive - Alternative 3a	Section/Contract #	
PM	Dale Foster, PE	UPC No.	

EARTHWORK (must be calculated)

	Unit	Quantity	x Unit Price	Amount
Stripping (4 - 6" Depth)	Acre	6.6	4050.00	$26,730
Roadway Exc. Unclassified, **See (J)**	C.Y.	191541	20.00	$3,830,820
Removal of Conc. Base & Conc. Surface Courses	S.Y.	0	15.00	$0
Channel Excavation	C.Y.	0	12.25	$0
Ditch Excavation	C.Y.	0	10.00	$0
Borrow Excavation Zone 3, **See (J)**	C.Y.	329377	16.00	$5,270,032
				$0
EARTHWORK TOTAL	=			$9,127,582

Suggested procedure for calculating earthwork:
A) Determine Typical section (number of lanes, median widths, side slopes, etc.).
B) Get latest topography map available.
C) Plot proposed alignment on topo map.
D) Develop profile using topo controls such as existing roads, streams, rivers and design manual.
E) Calculate Areas for the typical section in 1 foot increments of cut or fill.
F) At 10 to 60 foot intervals (depending on frequency of X-section changes) calculate the earthwork.
G) Calculate any other significant earthwork (ramps, cross-roads, etc.).
H) Make appropriate earthwork corrections for the pavement box and striping. Use 21 inch depth for rigid pavement, 26 inch depth for all flexible pavement and 4 inch depth for stripping.
I) Deduct any roadway excavation from borrow required to calculate Borrow Excavation Zone 3.
J) See Construction Cost Estimate Work Sheet (Section 3.1). This worksheet must be utilized for the most recent price information.

PAVEMENT

12 FOOT WIDE LANE (from subgrade up)

Pav't. Type	Description of Pavement	Cost/Linear Foot
A	10 inch R.C. Pavement	156.00
B	2 inch HMA Surf. Crs. & 8 inch HMA Base	61.00
C	3 inch HMA Surf. Crs. & 4 inch HMA Base	46.00
D	2 inch HMA Surf. Crs. & 2 inch HMA Base	22.00
E	Bridge Approach & Transition Slabs	156.00
	(Resurfacing Portion only F & G)	
F	2 inch HMA Surface Course	8.25
G	3 inch HMA Surface Course	12.00
H	Milling 2 inch	3.00

Computation Table for Pavement. Cost

Type	Cost from table above	x Length	x Pavement *W.F.	= Amount
C - Ocean Drive	46	12000	3.33	$1,838,160
C - Access Rd A	46	300	2.91	$40,158
D - Driveways	22	3165	1.00	$69,628
D - Temporary Pavement	22	12000	0.92	$242,880
				$0
				$0
				$0
				$0
				$0

PAVEMENT TOTAL = $2,190,826

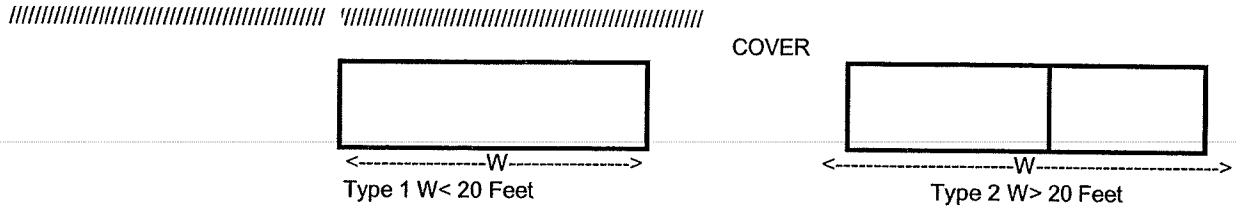
*Width Factors = Ratio of 12 foot wide lane to actual pavement width.

Example = actual pavement width = 25 foot = 25/12 = 2.08 W.F.

CONTEXT SENSITIVE DESIGN

Attach additional sheet detailing items and costs of context sensitive design work = $100,000

CULVERTS



Type	Layout (3)	Skew (1)	Cover (2)	Cost Per Sq. Foot
Type 1	Area w x L exceeds 1000 Sq. Feet	0-60 degrees	0 to 10'	114.75
			10' to 20'	147.25
	Short Culverts Difficult Conditions under 1000 Square Feet	0-60 degrees	0 to 10'	203.50
			10' to 20'	235.00
Type 2	Area w x L exceeds 1000 Sq. Feet	0-60 degrees	0 to 10'	121.75
			10' to 20'	152.50
	Short Culverts Difficult Conditions under 1000 Square Feet	0-60 degrees	0 to 10'	203.50
			10' to 20'	235.00

For skews over 60 degrees it will be necessary to make a special analysis and establish a square meter price comparable to above.

Description	Area Computation	x Cost per Sq. Foot	= Amount
Sta. 127+ 50, Type 1	1386	114.75	$159,044
			$0
			$0
			$0
		Culvert Total =	$159,044

BRIDGES

For the Bridge Sketch see the Construction Cost Estimation Preparation Manual

1 to 3 spans and 2 side spans (Max. Span 100 feet)

H = Clear Height 14 To 23 feet (4)

L = 100 to 400 feet & all viaducts over 400 feet (5)

Class	Layout	Skew (1)	Foundation (2)	Cost per Sq.Foot
I	Width at Least 45 feet	0 to 40 Degrees	No Piles	134.75
			Piles at Stub Abut.	159.75
			Piles at Piers & Stu	174.75
		40 to 60 Degrees	No Piles	145
			Piles at Stub Abut.	168.25
			Piles at Piers & Stu	181.25

For the Bridge Sketch see the Construction Cost Estimation Preparation Manual

1 to 3 spans and 2 side spans (Max. Span 100 feet) (3)
H = Clear Height 14 feet (4)
L = under 400 feet

Class	Layout	Skew (1)	Foundation (2)	Cost per Sq.Foot
II	L exceeds W Area L x W exceeds 4500 Sq. Feet	0 to 40 Degrees	No Piles	176.5
			On Piles	187.25
		40 to 60 Degrees	No Piles	219.75
			On Piles	273.25
III	W exceeds L Area L x W exceeds 4500 Sq. Feet	0 to 40 Degrees	No Piles	226.75
			On Piles	299.25
		40 to 60 Degrees	No Piles	241.5
			On Piles	310
IV	Width 30 - 45 feet Area W x L under 4500 Sq. Foot	0 to 40 Degrees	No Piles	295.5
			On Piles	396.75
		40 to 60 Degrees	No Piles	318.25
			On Piles	416.25

For the Bridge Sketch see the Construction Cost Estimation Preparation Manual
1 to 2 spans (Max. Span 125 feet)
H = Clear Height 14 feet (4)
L = 100 to 250 feet

Layout	Skew (1)	Foundation (2)	Cost/ Sq. Foot
Width at Least 40 feet	0 to 40 Degrees	No Piles	157.00
		Piles at Semi-Stub Abut.	182.00
		Piles at Piers & Semi-Stub Abut.	204.50
Minimum Length 100 feet	40 to 60 Degrees	No Piles	166.50
		Piles at Semi-Stub Abut.	194.75
		Piles at Piers & Semi-Stub Abut.	217.50

Length	Width	Cost per SF	Bridge Total
			0

1. For skews over 60 degrees it will be necessary to make a special analysis and establish a square foot price comparable to above.

2. For very bad foundation conditions requiring unusual lengths or spacing of piles, it will be necessary to establish a square foot price.

3. For longer spans, adjust the cost per square foot to reflect increased cost of structural members.

4. For span bridges, it is expected the length of the side span will be in- creased in proportion to any increase in height. Because of the resultant increase in deck area, the square foot price will remain approximately the same in the range of heights shown. For extremely high structures (particularly for viaducts), square foot prices will have to be increased.

5. For structures over 400 foot long (viaducts), reduce the cost per square foot if repetitive span length and forming can be used. Reduce by $0.50 for lengths from 400 to 600 feet and by $1.00 for lengths over 600 feet. (Do not forget adjustments (3) and (4) above on viaducts).

6. For statically indeterminate structures, square foot prices will have to be established.

Structure Description	Calculated Sq. Foot of Bridge Deck	x Cost Per Square Foot	= Amount
			0.00
			0.00
			0.00
			0.00
			0.00
			0.00

			0.00
			0.00
			0.00
			0.00
			0.00
			0.00
		Sub Total	0.00
Clearing Site Bridge *0-3% of Sub Total			0.00
	%		

BRIDGE TOTAL 0.00

*Pick appropriate percent based on the size, type and materials of existing structure

DRAINAGE (includes inlets and cross drains)

Rural	3.12	$364,356	$1,136,791
	project length (miles)	x cost per mile	= Amount
Urban	0	$544,280	$0
	project length (miles)	x cost per mile	= Amount

The above are the total costs of basins, manholes, longitudinal and transverse pipes, underdrains, headwalls, protecting curbs, aprons, etc. for a divided highway with a depressed median. The costs are assumed to apply to 4, 6 or 8 lane sections since there will be no appreciable difference in the number of basins or the sizes or lengths of pipes.

Frontage Road & Ramp Drainage

300	55	$16,500
length of ramp or frontage rd. in feet	x cost per foot	= Amount

DRAINAGE TOTAL = $1,153,291

INCIDENTAL ITEMS

Item	Cost / L.F.	x Quantity	= Amount
Beam Guide Rail	$16.75	21075	$353,006
9" X 16" Conc. Vertical Curb	$13.75	1709	$23,499
Sidewalk	$23.00	740	$17,020
Toll Plaza	$1,114,000.00	1	$1,114,000
Wetlands	$0.00	0	$857,703
Fence 6 Foot High	$18.25	0	$0
15" X 41" Conc. Barrier Curb	$50.25	0	$0
24" X 41" Conc. Barrier Curb	$73.25	0	$0
24" X Variable Conc. Barrier Curb	$46.00	0	$0
Sign Bridge	$308,000.00	0	$0
Cantilever Sign Structure	$60,500.00	0	$0
INCIDENTAL ITEMS TOTAL =			$2,365,228

LANDSCAPE

	Quantity	x Unit Prices	= Amount
Topsoil and Seeding (Mainline) Length of Project in miles	3.06	112,815	$345,214
Planting (Mainline) Length of Project in miles	0	64,500	$0
Topsoil, Seeding, Planting (Finger Ramp			

Number of Finger Ramps	0	12,500	$0
Topsoil, Seeding, Planting (Loop Ramp)			
Number of Loop Ramps	0	20,000	$0
Topsoil, Seeding (Access Road)			
Length of Access Road in Feet	0.06	7.9	$0
LANDSCAPE TOTAL =			$345,214

NOISE ABATEMENT

	Unit	Quantity	x Cost	= Amount
Noise Wall	L.F.	0	305.00	0
				0
				0
				0
NOISE ABATEMENT TOTAL =				0

GENERAL ITEMS

Item	Project Length (miles)	x Cost/Mile	= Amount
Field Office	3.12	44,260	$138,091
Materials Field Laboratory	3.12	28,970	$90,386
Erosion Control during Constructio	3.12	64,375	$200,850
GENERAL ITEMS TOTAL =			$429,328

SUMMARY

Route	Ocean Drive - Alternative 3a	Section/Proj. Id. #	0.00
PM	Dale Foster, PE	UPC No.	0.00

Work Type	Totals from other pages
Earthwork	$9,127,582
Pavement	$2,190,826
Context Sensitive Design	$100,000
Culverts	$159,044
Bridge - Mill Creek	$2,527,200
Bridge - Middle Thorofare	$37,718,300
Bridge - Upper Thorofare	$2,956,500
Retaining Wall	$286,500
Drainage	$1,153,291
Incidental Items	$2,365,228
Landscape	$345,214
Noise Abatement	$0
General Items	$429,328
Wick Drains	$2,801,724
Geotechnical Instrumentation	$853,908
PROJECT SUBTOTAL	$53,887,062

Other Items	Proj. Subtotal Range	Choice	Amount
Lighting, Traffic Stripes, Signs and Delineators	53887062.36	3% of Proj. Subtotal	$1,616,612
Maintenance of Traffic	53887062.36	7% of Proj. Subtotal	$3,772,094
Training	53887062.36	1% of Proj. Subtotal	$538,871
Mobilization	53887062.36		$5,388,706

	Project Cost < 5.0 (Mil.)	9% of Proj. Subtotal	
	Project Cost 5.0 & above	10% of Proj. Subtotal	
Progress Schedule	Project Cost(Mil.)	$	$58,000
	Less than 2.0	0	
	2.0 to 5.0	6,000	
	5.0 to 10.0	8,000	
	10.0 to 20.0	15,000	
	20.0 to 30.0	30,000	
	30.0 to 40.0	40,000	
	40.0 & above	58,000	
Clearing Site	Project Cost (Mil.)	$	$490,000
	Less than 1.0	15,000	
	1.0 to 2.0	30,000	
	2.0 to 5.0	45,000	
	5.0 to 10.0	115,000	
	10.0 to 20.0	220,000	
	20.0 to 30.0	240,000	
	30.0 to 40.0	250,000	
	40.0 & above	490,000	
Construction Layout	Project Cost(Mil.)	$	$890,000
	Less than 1.0	7,000	
	1.0 to 2.0	20,000	
	2.0 to 5.0	42,000	
	5.0 to 10.0	87,000	
	10.0 to 20.0	160,000	
	20.0 to 30.0	220,000	
	30.0 to 40.0	490,000	
	40.0 & above	890,000	
		PROJECT TOTAL	$66,641,345

CONTINGENCIES & ESCALATION

		Y	
Y = Number of Years until midpoint of construction duration plus number of years until construction start. If midpoint is less than 2 years from the date of this estimate, no escalation is required. Maximum value = 10%		5.50	
$66,641,345	1.000	1.10	$73,305,480
Project Total	Contingencies (1+C)	1 + [0.01 (Y+1) (Y-2)]	Construction Estimate for PD

Project Cost(Mil.)	Contingencies (C) Percent	Average Construction Duration in Years
0-10	3%	1
10-20	2.50%	2
Over 20	2%	3

CONSTRUCTION ENGINEERING (CE)

Project Cost (Mil.)		% of Construction Cost
Less than 1.0		31.10%
1.0 to 5.0		20.30%
5.0 to 10.0		16.20%
10.0 & above		12.20%

CONSTRUCTION ENGINEERING AMOUNT $8,943,268.56

CONSTRUCTION CHANGE ORDER CONTINGENCIES

Total Federal Participating Items in Millions of $	Construction Change Order Contingency Amount
$0 to 0.1	$6,000
0.1 to 0.5	25,000
0.5 to 5.0	25,000 + 4% of amount in excess of $500,000
5.0 to 10.0	205,000 + 3% of amount in excess of $5,000,000
10.0 to 15.0	355,000 + 2% of amount in excess of $10,000,000
15.0 and above	455,000 + 1.5% of amount in excess of $15,000,000 - max $500,000

For State Funded Projects, Contingencies for Change orders = 0

CHANGE ORDER CONTINGENCY AMOUNT $500,000

UTILITIES RELOCATIONS BY COMPANIES/OWNERS

$73,305,480	0.055	$4,031,801
	for Urban use 0.12, Rural 0.055 or + Estimate	=
Construction Cost for Initial Estimate	Use % or utilities detailed estimate	Utility Relocation Cost for Initial Estimate

If there are no utility relocations on the project indicate "No Utilities" in the box above.

RIGHT OF WAY COST $261,589

If there is no ROW cost on the project indicate "No ROW" the box
Only includes costs for acquisition of land and easements.

SUMMARY

Highway & Related Costs	$23,439,345
Bridge Costs	$43,202,000
Construction Subtotal	*$66,641,345*
Utilities Relocations	$4,031,801
Escalation	$6,664,135
Contingencies	$500,000
Construction Engineering (CE)	$8,943,269
Construction, Design & Utilities Subtotal	*$86,780,550*
Right of Way Cost	$261,589
Project Total	**$87,042,139**

Classification Number 2 - RECONSTRUCTION, WIDENING & DUALIZATION - English

Route	Ocean Drive - Alternative 3b	Section/Contract #
PM	Dale Foster, PE	UPC No.

EARTHWORK (must be calculated)

	Unit	Quantity	x Unit Price	Amount
Stripping (4 - 6" Depth)	Acre	7.3	4050.00	$29,565
Roadway Exc. Unclassified, **See (J)**	C.Y.	203,081	20.00	$4,061,619
Removal of Conc. Base & Conc. Surface Courses	S.Y.	0	15.00	$0
Channel Excavation	C.Y.	0	12.25	$0
Ditch Excavation	C.Y.	0	10.00	$0
Borrow Excavation Zone 3, **See (J)**	C.Y.	350,598	16.00	$5,609,572
				$0
EARTHWORK TOTAL	=			$9,700,756

Suggested procedure for calculating earthwork:
A) Determine Typical section (number of lanes, median widths, side slopes, etc.).
B) Get latest topography map available.
C) Plot proposed alignment on topo map.
D) Develop profile using topo controls such as existing roads, streams, rivers and design manual.
E) Calculate Areas for the typical section in 1 foot increments of cut or fill.
F) At 10 to 60 foot intervals (depending on frequency of X-section changes) calculate the earthwork.
G) Calculate any other significant earthwork (ramps, cross-roads, etc.).
H) Make appropriate earthwork corrections for the pavement box and striping. Use 21 inch depth for rigid pavement, 26 inch depth for all flexible pavement and 4 inch depth for stripping.
I) Deduct any roadway excavation from borrow required to calculate Borrow Excavation Zone 3.
J) See Construction Cost Estimate Work Sheet (Section 3.1). This worksheet must be utilized for the most recent price information.

PAVEMENT

12 FOOT WIDE LANE (from subgrade up)

Pav't. Type	Description of Pavement	Cost/Linear Foot
A	10 inch R.C. Pavement	156.00
B	2 inch HMA Surf. Crs. & 8 inch HMA Base	61.00
C	3 inch HMA Surf. Crs. & 4 inch HMA Base	46.00
D	2 inch HMA Surf. Crs. & 2 inch HMA Base	22.00
E	Bridge Approach & Transition Slabs	156.00
	(Resurfacing Portion only F & G)	
F	2 inch HMA Surface Course	8.25
G	3 inch HMA Surface Course	12.00
H	Milling 2 inch	3.00

Computation Table for Pavement. Cost

Type	Cost from table above	x Length	x Pavement *W.F.	= Amount
C - Ocean Drive	46	12000	3.33	$1,838,160
C - Access Rd A	46	1640	2.50	$188,600
D - Driveways	22	2165	1.00	$47,637
D - Temporary Pavement	22	12000	0.92	$242,880
				$0
				$0
				$0
				$0
				$0

PAVEMENT TOTAL = $2,317,277

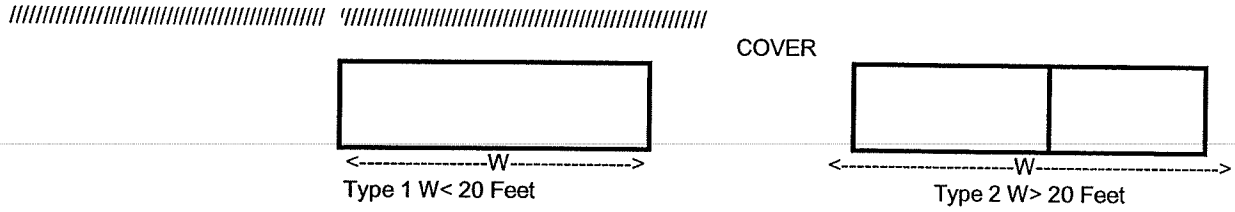
*Width Factors = Ratio of 12 foot wide lane to actual pavement width.

Example = actual pavement width = 25 foot = 25/12 = 2.08 W.F.

CONTEXT SENSITIVE DESIGN

Attach additional sheet detailing items and costs of context sensitive design work = $200,000

CULVERTS



Type	Layout (3)	Skew (1)	Cover (2)	Cost Per Sq. Foot
Type 1	Area w x L exceeds 1000 Sq. Feet	0-60 degrees	0 to 10'	114.75
			10' to 20'	147.25
	Short Culverts Difficult Conditions under 1000 Square Feet	0-60 degrees	0 to 10'	203.50
			10' to 20'	235.00
Type 2	Area w x L exceeds 1000 Sq. Feet	0-60 degrees	0 to 10'	121.75
			10' to 20'	152.50
	Short Culverts Difficult Conditions under 1000 Square Feet	0-60 degrees	0 to 10'	203.50
			10' to 20'	235.00

For skews over 60 degrees it will be necessary to make a special analysis and establish a square meter price comparable to above.

Description	Area Computation	x Cost per Sq. Foot	= Amount
Sta. 127+ 50, Type 1	1386	114.75	$159,044
			$0
			$0
			$0
		Culvert Total =	$159,044

BRIDGES

For the Bridge Sketch see the Construction Cost Estimation Preparation Manual

1 to 3 spans and 2 side spans (Max. Span 100 feet)

H = Clear Height 14 To 23 feet (4)

L = 100 to 400 feet & all viaducts over 400 feet (5)

Class	Layout	Skew (1)	Foundation (2)	Cost per Sq.Foot
I	Width at Least 45 feet	0 to 40 Degrees	No Piles	134.75
			Piles at Stub Abut.	159.75
			Piles at Piers & Stu	174.75
		40 to 60 Degrees	No Piles	145
			Piles at Stub Abut.	168.25
			Piles at Piers & Stu	181.25

For the Bridge Sketch see the Construction Cost Estimation Preparation Manual

1 to 3 spans and 2 side spans (Max. Span 100 feet) (3)
H = Clear Height 14 feet (4)
L = under 400 feet

Class	Layout	Skew (1)	Foundation (2)	Cost per Sq.Foot
II	L exceeds W Area L x W exceeds 4500 Sq. Feet	0 to 40 Degrees	No Piles	176.5
			On Piles	187.25
		40 to 60 Degrees	No Piles	219.75
			On Piles	273.25
III	W exceeds L Area L x W exceeds 4500 Sq. Feet	0 to 40 Degrees	No Piles	226.75
			On Piles	299.25
		40 to 60 Degrees	No Piles	241.5
			On Piles	310
IV	Width 30 - 45 feet Area W x L under 4500 Sq. Foot	0 to 40 Degrees	No Piles	295.5
			On Piles	396.75
		40 to 60 Degrees	No Piles	318.25
			On Piles	416.25

For the Bridge Sketch see the Construction Cost Estimation Preparation Manual
1 to 2 spans (Max. Span 125 feet)
H = Clear Height 14 feet (4)
L = 100 to 250 feet

Layout	Skew (1)	Foundation (2)	Cost/ Sq. Foot
Width at Least 40 feet	0 to 40 Degrees	No Piles	157.00
		Piles at Semi-Stub Abut.	182.00
		Piles at Piers & Semi-Stub Abut.	204.50
Minimum Length 100 feet	40 to 60 Degrees	No Piles	166.50
		Piles at Semi-Stub Abut.	194.75
		Piles at Piers & Semi-Stub Abut.	217.50

			0
Length	Width	Cost per SF	Bridge Total

1. For skews over 60 degrees it will be necessary to make a special analysis and establish a square foot price comparable to above.

2. For very bad foundation conditions requiring unusual lengths or spacing of piles, it will be necessary to establish a square foot price.

3. For longer spans, adjust the cost per square foot to reflect increased cost of structural members.

4. For span bridges, it is expected the length of the side span will be in- creased in proportion to any increase in height. Because of the resultant increase in deck area, the square foot price will remain approximately the same in the range of heights

5. For structures over 400 foot long (viaducts), reduce the cost per square foot if repetitive span length and forming can be used. Reduce by $0.50 for lengths from 400 to 600 feet and by $1.00 for lengths over 600 feet. (Do not forget adjustments (3) a

6. For statically indeterminate structures, square foot prices will have to be established.

Structure Description	Calculated Sq. Foot of Bridge Deck	x Cost Per Square Foot	= Amount
			0.00
			0.00
			0.00
			0.00
			0.00
			0.00

			0.00
			0.00
			0.00
			0.00
			0.00
			0.00
		Sub Total	0.00
Clearing Site Bridge *0-3% of Sub Total			0.00
	%		

BRIDGE TOTAL 0.00

*Pick appropriate percent based on the size, type and materials of existing structure

DRAINAGE (includes inlets and cross drains)

Rural	3.06	$364,356	$1,114,929
	project length (miles)	x cost per mile	= Amount
Urban	0	$544,280	$0
	project length (miles)	x cost per mile	= Amount

The above are the total costs of basins, manholes, longitudinal and transverse pipes, underdrains, headwalls, protecting curbs, aprons, etc. for a divided highway with a depressed median. The costs are assumed to apply to 4, 6 or 8 lane sections since th

Frontage Road & Ramp Drainage

1640	55	$90,200
length of ramp or frontage rd. in feet	x cost per foot	= Amount

DRAINAGE TOTAL = $1,205,129

INCIDENTAL ITEMS

Item	Cost / L.F.	x Quantity	= Amount
Beam Guide Rail	$16.75	21876	$366,423
9" X 16" Conc. Vertical Curb	$13.75	170	$2,338
Sidewalk	$23.00	130	$2,990
Toll Plaza	$1,114,000.00	1	$1,114,000
Wetlands	$0.00	0	$928,936
Fence 6 Foot High	$18.25	0	$0
15" X 41" Conc. Barrier Curb	$50.25	0	$0
24" X 41" Conc. Barrier Curb	$73.25	0	$0
24" X Variable Conc. Barrier Curb	$46.00	0	$0
Sign Bridge	$308,000.00	0	$0
Cantilever Sign Structure	$60,500.00	0	$0
INCIDENTAL ITEMS TOTAL =			$2,414,687

LANDSCAPE

	Quantity	x Unit Prices	= Amount
Topsoil and Seeding (Mainline) Length of Project in miles	3.06	112,815	$345,214
Planting (Mainline) Length of Project in miles	0	64,500	$0
Topsoil, Seeding, Planting (Finger Ramp Number of Finger Ramps	0	12,500	$0

Topsoil, Seeding, Planting (Loop Ramp)			
Number of Loop Ramps	0	20,000	$0
Topsoil, Seeding (Access Road)			
Length of Access Road in Feet	0.31	7.9	$2
LANDSCAPE TOTAL =			$345,216

NOISE ABATEMENT

	Unit	Quantity	x Cost	= Amount
Noise Wall	L.F.	0	305.00	0
				0
				0
				0
NOISE ABATEMENT TOTAL =				0

GENERAL ITEMS

Item	Project Length (miles)	x Cost/Mile	= Amount
Field Office	3.06	44,260	$135,436
Materials Field Laboratory	3.06	28,970	$88,648
Erosion Control during Constructic	3.06	64,375	$196,988
GENERAL ITEMS TOTAL =			$421,071

SUMMARY

Route	Ocean Drive - Alternative 3b	Section/Proj. Id. #	0.00
PM	Dale Foster, PE	UPC No.	0.00

Work Type	Totals from other pages
Earthwork	$9,700,756
Pavement	$2,317,277
Context Sensitive Design	$200,000
Culverts	$159,044
Bridge - Mill Creek	$2,527,200
Bridge - Middle Thorofare	$38,710,550
Bridge - Upper Thorofare	$2,956,500
Retaining Wall	$191,250
Drainage	$1,205,129
Incidental Items	$2,414,687
Landscape	$345,216
Noise Abatement	$0
General Items	$421,071
Wick Drains	$3,026,221
Geotechnical Instrumentation	$922,330
PROJECT SUBTOTAL	$55,396,475

Other Items	Proj. Subtotal Range	Choice	Amount
Lighting, Traffic Stripes, Signs and Delineators	55396475.34	3% of Proj. Subtotal	$1,661,894
Maintenance of Traffic	55396475.34	7% of Proj. Subtotal	$3,877,753
Training	55396475.34	1% of Proj. Subtotal	$553,965
Mobilization	55396475.34		$5,539,648
	Project Cost < 5.0 (Mil.)	9% of Proj. Subtotal	

	Project Cost 5.0 & above	10% of Proj. Subtotal	
Progress Schedule	Project Cost(Mil.)	$	$58,000
	Less than 2.0	0	
	2.0 to 5.0	6,000	
	5.0 to 10.0	8,000	
	10.0 to 20.0	15,000	
	20.0 to 30.0	30,000	
	30.0 to 40.0	40,000	
	40.0 & above	58,000	
Clearing Site	Project Cost (Mil.)	$	$490,000
	Less than 1.0	15,000	
	1.0 to 2.0	30,000	
	2.0 to 5.0	45,000	
	5.0 to 10.0	115,000	
	10.0 to 20.0	220,000	
	20.0 to 30.0	240,000	
	30.0 to 40.0	250,000	
	40.0 & above	490,000	
Construction Layout	Project Cost(Mil.)	$	$890,000
	Less than 1.0	7,000	
	1.0 to 2.0	20,000	
	2.0 to 5.0	42,000	
	5.0 to 10.0	87,000	
	10.0 to 20.0	160,000	
	20.0 to 30.0	220,000	
	30.0 to 40.0	490,000	
	40.0 & above	890,000	
		PROJECT TOTAL	$68,467,735

CONTINGENCIES & ESCALATION

		Y	
Y = Number of Years until midpoint of construction duration plus number of years until construction start. If midpoint is less than 2 years from the date of this estimate, no escalation is required. Maximum value = 10%		5.50	
$68,467,735	1.000	1.10	$75,314,509
Project Total	Contingencies (1+C)	1 + [0.01 (Y+1) (Y-2)]	Construction Estimate for PD

Project Cost(Mil.)	Contingencies (C) Percent	Average Construction Duration in Years
0-10	3%	1
10-20	2.50%	2
Over 20	2%	3

CONSTRUCTION ENGINEERING (CE)

Project Cost (Mil.)		% of Construction Cost
Less than 1.0		31.10%
1.0 to 5.0		20.30%
5.0 to 10.0		16.20%
10.0 & above		12.20%
CONSTRUCTION ENGINEERING AMOUNT		$9,188,370.06

CONSTRUCTION CHANGE ORDER CONTINGENCIES

Total Federal Participating Items in Millions of $	Construction Change Order Contingency Amount
$0 to 0.1	$6,000

0.1 to 0.5	25,000
0.5 to 5.0	25,000 + 4% of amount in excess of $500,000
5.0 to 10.0	205,000 + 3% of amount in excess of $5,000,000
10.0 to 15.0	355,000 + 2% of amount in excess of $10,000,000
15.0 and above	455,000 + 1.5% of amount in excess of $15,000,000 - max $500,000

For State Funded Projects, Contingencies for Change orders = 0

CHANGE ORDER CONTINGENCY AMOUNT $500,000

UTILITIES RELOCATIONS BY COMPANIES/OWNERS

$75,314,509	0.055	$4,142,298
Construction Cost for Initial Estimate	for Urban use 0.12, Rural 0.055 or + Estimate Use % or utilities detailed estimate	= Utility Relocation Cost for Initial Estimate

If there are no utility relocations on the project indicate "No Utilities" in the box above.

RIGHT OF WAY COST $159,130

If there is no ROW cost on the project indicate "No ROW" the box
Only includes costs for acquisition of land and easements.

SUMMARY

Highway & Related Costs	$24,273,485
Bridge Costs	$44,194,250
Construction Subtotal	*$68,467,735*
Utilities Relocations	$4,142,298
Escalation	$6,846,774
Contingencies	$500,000
Construction Engineering (CE)	$9,188,370
Construction, Design & Utilities Subtotal	*$89,145,177*
Right of Way Cost	$159,130
Project Total	**$89,304,307**

Classification Number 2 - RECONSTRUCTION, WIDENING & DUALIZATION - English

Route	Ocean Drive - Alternative 3c	Section/Contract #	
PM	Dale Foster, PE	UPC No.	

EARTHWORK (must be calculated)

	Unit	Quantity	x Unit Price	Amount
Stripping (4 - 6" Depth)	Acre	4.4	4050.00	$17,820
Roadway Exc. Unclassified, **See (J)**	C.Y.	16,170	20.00	$323,407
Removal of Conc. Base & Conc. Surface Courses	S.Y.	0	15.00	$0
Channel Excavation	C.Y.	0	12.25	$0
Ditch Excavation	C.Y.	0	10.00	$0
Borrow Excavation Zone 3, **See (J)**	C.Y.	254,416	16.00	$4,070,664
				$0
EARTHWORK TOTAL	=			$4,411,891

Suggested procedure for calculating earthwork:
A) Determine Typical section (number of lanes, median widths, side slopes, etc.).
B) Get latest topography map available.
C) Plot proposed alignment on topo map.
D) Develop profile using topo controls such as existing roads, streams, rivers and design manual.
E) Calculate Areas for the typical section in 1 foot increments of cut or fill.
F) At 10 to 60 foot intervals (depending on frequency of X-section changes) calculate the earthwork.
G) Calculate any other significant earthwork (ramps, cross-roads, etc.).
H) Make appropriate earthwork corrections for the pavement box and striping. Use 21 inch depth for rigid pavement, 26 inch depth for all flexible pavement and 4 inch depth for stripping.
I) Deduct any roadway excavation from borrow required to calculate Borrow Excavation Zone 3.
J) See Construction Cost Estimate Work Sheet (Section 3.1). This worksheet must be utilized for the most recent price information.

PAVEMENT

12 FOOT WIDE LANE (from subgrade up)

Pav't. Type	Description of Pavement	Cost/Linear Foot
A	10 inch R.C. Pavement	156.00
B	2 inch HMA Surf. Crs. & 8 inch HMA Base	61.00
C	3 inch HMA Surf. Crs. & 4 inch HMA Base	46.00
D	2 inch HMA Surf. Crs. & 2 inch HMA Base	22.00
E	Bridge Approach & Transition Slabs	156.00
	(Resurfacing Portion only F & G)	
F	2 inch HMA Surface Course	8.25
G	3 inch HMA Surface Course	12.00
H	Milling 2 inch	3.00

Computation Table for Pavement. Cost

Type	Cost from table above	x Length	x Pavement *W.F.	= Amount
C - Ocean Drive	46	9500	3.33	$1,455,210
C - Connector Rd A	46	700	3.33	$107,226
C - Connector Rd B	46	1690	3.33	$258,874
D - Driveways	22	1000	1.00	$22,000
D - Temporary Pavement	22	9500	0.92	$192,280
				$0
				$0
				$0
				$0

				$0
PAVEMENT TOTAL			=	$2,035,590

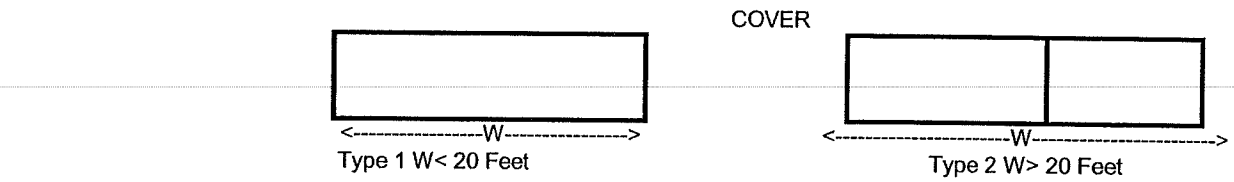
*Width Factors = Ratio of 12 foot wide lane to actual pavement width.

Example = actual pavement width = 25 foot = 25/12 = 2.08 W.F.

CONTEXT SENSITIVE DESIGN

Attach additional sheet detailing items and costs of context sensitive design work = $200,000

CULVERTS



Type	Layout (3)	Skew (1)	Cover (2)	Cost Per Sq. Foot
Type 1	Area w x L exceeds 1000 Sq. Feet	0-60 degrees	0 to 10'	114.75
			10' to 20'	147.25
	Short Culverts Difficult Conditions under 1000 Square Feet	0-60 degrees	0 to 10'	203.50
			10' to 20'	235.00
Type 2	Area w x L exceeds 1000 Sq. Feet	0-60 degrees	0 to 10'	121.75
			10' to 20'	152.50
	Short Culverts Difficult Conditions under 1000 Square Feet	0-60 degrees	0 to 10'	203.50
			10' to 20'	235.00

For skews over 60 degrees it will be necessary to make a special analysis and establish a square meter price comparable to above.

Description	Area Computation	x Cost per Sq. Foot	= Amount
Sta. 127+ 50, Type 1	1386	114.75	$159,044
			$0
			$0
			$0
		Culvert Total =	$159,044

BRIDGES

For the Bridge Sketch see the Construction Cost Estimation Preparation Manual

1 to 3 spans and 2 side spans (Max. Span 100 feet)

H = Clear Height 14 To 23 feet (4)

L = 100 to 400 feet & all viaducts over 400 feet (5)

Class	Layout	Skew (1)	Foundation (2)	Cost per Sq.Foot
I	Width at Least 45 feet	0 to 40 Degrees	No Piles	134.75
			Piles at Stub Abut.	159.75
			Piles at Piers & Stu	174.75
		40 to 60 Degrees	No Piles	145
			Piles at Stub Abut.	168.25
			Piles at Piers & Stu	181.25

For the Bridge Sketch see the Construction Cost Estimation Preparation Manual
1 to 3 spans and 2 side spans (Max. Span 100 feet) (3)
H = Clear Height 14 feet (4)
L = under 400 feet

Class	Layout	Skew (1)	Foundation (2)	Cost per Sq.Foot
II	L exceeds W Area L x W exceeds 4500 Sq. Feet	0 to 40 Degrees	No Piles	176.5
			On Piles	187.25
		40 to 60 Degrees	No Piles	219.75
			On Piles	273.25
III	W exceeds L Area L x W exceeds 4500 Sq. Feet	0 to 40 Degrees	No Piles	226.75
			On Piles	299.25
		40 to 60 Degrees	No Piles	241.5
			On Piles	310
IV	Width 30 - 45 feet	0 to 40 Degrees	No Piles	295.5
			On Piles	396.75
	Area W x L under 4500 Sq. Foot	40 to 60 Degrees	No Piles	318.25
			On Piles	416.25

For the Bridge Sketch see the Construction Cost Estimation Preparation Manual
1 to 2 spans (Max. Span 125 feet)
H = Clear Height 14 feet (4)
L = 100 to 250 feet

Layout	Skew (1)	Foundation (2)	Cost/ Sq. Foot
Width at Least 40 feet	0 to 40 Degrees	No Piles	157.00
		Piles at Semi-Stub Abut.	182.00
		Piles at Piers & Semi-Stub Abut.	204.50
Minimum Length 100 feet	40 to 60 Degrees	No Piles	166.50
		Piles at Semi-Stub Abut.	194.75
		Piles at Piers & Semi-Stub Abut.	217.50

			0
Length	Width	Cost per SF	Bridge Total

1. For skews over 60 degrees it will be necessary to make a special analysis and establish a square foot price comparable to above.

2. For very bad foundation conditions requiring unusual lengths or spacing of piles, it will be necessary to establish a square foot price.

3. For longer spans, adjust the cost per square foot to reflect increased cost of structural members.

4. For span bridges, it is expected the length of the side span will be in- creased in proportion to any increase in height. Because of the resultant increase in deck area, the square foot price will remain approximately the same in the range of heights

5. For structures over 400 foot long (viaducts), reduce the cost per square foot if repetitive span length and forming can be used. Reduce by $0.50 for lengths from 400 to 600 feet and by $1.00 for lengths over 600 feet. (Do not forget adjustments (3) a

6. For statically indeterminate structures, square foot prices will have to be established.

Structure Description	Calculated Sq. Foot of Bridge Deck	x Cost Per Square Foot	= Amount
			0.00
			0.00
			0.00
			0.00
			0.00

			0.00
			0.00
			0.00
			0.00
			0.00
			0.00
			0.00
		Sub Total	0.00
Clearing Site Bridge *0-3% of Sub Total			0.00
	%		

BRIDGE TOTAL 0.00

*Pick appropriate percent based on the size, type and materials of existing structure

DRAINAGE (includes inlets and cross drains)

Rural	1.8	364356	$655,841
	project length (miles)	x cost per mile	= Amount
Urban	0	544280	$0
	project length (miles)	x cost per mile	= Amount

The above are the total costs of basins, manholes, longitudinal and transverse pipes, underdrains, headwalls, protecting curbs, aprons, etc. for a divided highway with a depressed median. The costs are assumed to apply to 4, 6 or 8 lane sections since th

Frontage Road & Ramp Drainage

0

2390	55	$131,450
length of ramp or frontage rd. in feet	x cost per foot	= Amount

DRAINAGE TOTAL = $787,291

INCIDENTAL ITEMS

Item	Cost / L.F.	x Quantity	= Amount
Beam Guide Rail	$16.75	19000	$318,250
9" X 16" Conc. Vertical Curb	$13.75	900	$12,375
Sidewalk	$23.00	900	$20,700
Toll Plaza	$1,114,000.00	1	$1,114,000
Wetlands	$0.00	0	$2,602,125
Fence 6 Foot High	$18.25	0	$0
15" X 41" Conc. Barrier Curb	$50.25	0	$0
24" X 41" Conc. Barrier Curb	$73.25	0	$0
24" X Variable Conc. Barrier Curb	$46.00	0	$0
Sign Bridge	$308,000.00	0	$0
Cantilever Sign Structure	60,500	0	$0
INCIDENTAL ITEMS TOTAL =			$4,067,450

LANDSCAPE

	Quantity	x Unit Prices	= Amount
Topsoil and Seeding (Mainline) Length of Project in miles	1.8	112,815	$203,067
Planting (Mainline) Length of Project in miles	0	64,500	$0
Topsoil, Seeding, Planting (Finger Ramp			

Number of Finger Ramps	0	12,500	$0
Topsoil, Seeding, Planting (Loop Ramp)			
Number of Loop Ramps	0	20,000	$0
Topsoil, Seeding (Access Road)			
Length of Access Road in Feet	0.45	7.9	$4
LANDSCAPE TOTAL =			$203,071

NOISE ABATEMENT

	Unit	Quantity	x Cost	= Amount
Noise Wall	L.F.	0	305.00	0
				0
				0
				0
NOISE ABATEMENT TOTAL =				0

GENERAL ITEMS

Item	Project Length (miles)	x Cost/Mile	= Amount
Field Office	1.8	44,260	$79,668
Materials Field Laboratory	1.8	28,970	$52,146
Erosion Control during Constructic	1.8	64,375	$115,875
GENERAL ITEMS TOTAL =			247689.00

SUMMARY

Route	Ocean Drive - Alternative 3c	Section/Proj. Id. #	0.00
PM	Dale Foster, PE	UPC No.	0.00

Work Type	Totals from other pages
Earthwork	$4,411,891
Pavement	$2,035,590
Context Sensitive Design	$200,000
Bridge - Mill Creek	$2,527,200
Bridge - Middle Thorofare	$52,704,000
Bridge - Upper Thorofare	$5,415,800
Retaining Wall	$940,000
Drainage	$787,291
Incidental Items	$4,067,450
Landscape	$203,071
Noise Abatement	$0
General Items	$247,689
Wick Drains	$2,020,474
Geotechnical Instrumentation	$615,799
PROJECT SUBTOTAL	$76,176,255

Other Items	Proj. Subtotal Range	Choice	Amount
Lighting, Traffic Stripes, Signs and Delineators	76176254.67	3% of Proj. Subtotal	$2,285,288
Maintenance of Traffic	76176254.67	7% of Proj. Subtotal	$5,332,338
Training	76176254.67	1% of Proj. Subtotal	$761,763
Mobilization	76176254.67		$7,617,625
	Project Cost < 5.0 (Mil.)	9% of Proj. Subtotal	

	Project Cost 5.0 & above	10% of Proj. Subtotal	
Progress Schedule	Project Cost(Mil.)	$	$58,000
	Less than 2.0	0	
	2.0 to 5.0	6,000	
	5.0 to 10.0	8,000	
	10.0 to 20.0	15,000	
	20.0 to 30.0	30,000	
	30.0 to 40.0	40,000	
	40.0 & above	58,000	
Clearing Site	Project Cost (Mil.)	$	$490,000
	Less than 1.0	15,000	
	1.0 to 2.0	30,000	
	2.0 to 5.0	45,000	
	5.0 to 10.0	115,000	
	10.0 to 20.0	220,000	
	20.0 to 30.0	240,000	
	30.0 to 40.0	250,000	
	40.0 & above	490,000	
Construction Layout	Project Cost(Mil.)	$	$890,000
	Less than 1.0	7,000	
	1.0 to 2.0	20,000	
	2.0 to 5.0	42,000	
	5.0 to 10.0	87,000	
	10.0 to 20.0	160,000	
	20.0 to 30.0	220,000	
	30.0 to 40.0	490,000	
	40.0 & above	890,000	
		PROJECT TOTAL	$93,611,268

CONTINGENCIES & ESCALATION

Y = Number of Years until midpoint of construction duration plus number of years until construction start. If midpoint is less than 2 years from the date of this estimate, no escalation is required. Maximum value = 10%		Y 5.50	
$93,611,268	1.000	1.10	$102,972,395
Project Total	Contingencies (1+C)	1 + [0.01 (Y+1) (Y-2)]	Construction Estimate for PD

Project Cost(Mil.)	Contingencies (C) Percent	Average Construction Duration in Years
0-10	3%	1
10-20	2.50%	2
Over 20	2%	3

CONSTRUCTION ENGINEERING (CE)

Project Cost (Mil.)		% of Construction Cost
Less than 1.0		31.10%
1.0 to 5.0		20.30%
5.0 to 10.0		16.20%
10.0 & above		12.20%
CONSTRUCTION ENGINEERING AMOUNT		$12,562,632.19

CONSTRUCTION CHANGE ORDER CONTINGENCIES

Total Federal Participating Items in Millions of $	Construction Change Order Contingency Amount
$0 to 0.1	$6,000

0.1 to 0.5	25,000
0.5 to 5.0	25,000 + 4% of amount in excess of $500,000
5.0 to 10.0	205,000 + 3% of amount in excess of $5,000,000
10.0 to 15.0	355,000 + 2% of amount in excess of $10,000,000
15.0 and above	455,000 + 1.5% of amount in excess of $15,000,000 - max $500,000

For State Funded Projects, Contingencies for Change orders = 0

CHANGE ORDER CONTINGENCY AMOUNT $500,000

UTILITIES RELOCATIONS BY COMPANIES/OWNERS

$102,972,395	0.055	$5,663,482
Construction Cost for Initial Estimate	for Urban use 0.12, Rural 0.055 or + Estimate Use % or utilities detailed estimate	= Utility Relocation Cost for Initial Estimate

If there are no utility relocations on the project indicate "No Utilities" in the box above.

RIGHT OF WAY COST $2,686,405

If there is no ROW cost on the project indicate "No ROW" the box
Only includes costs for acquisition of land and easements.

SUMMARY

Highway & Related Costs	$32,964,268
Bridge Costs	$60,647,000
Construction Subtotal	*$93,611,268*
Utilities Relocations	$5,663,482
Escalation	$9,361,127
Contingencies	$500,000
Construction Engineering (CE)	$12,562,632
Construction, Design & Utilities Subtotal	*$121,698,509*
Right of Way Cost	$2,686,405
Project Total	**$124,384,914**

Classification Number 2 - RECONSTRUCTION, WIDENING & DUALIZATION - English

Route	Ocean Drive - Alternative 3d	Section/Contract #	
PM	Dale Foster, PE	UPC No.	

EARTHWORK (must be calculated)

	Unit	Quantity	x Unit Price	Amount
Stripping (4 - 6" Depth)		4.1	4050.00	$16,605
Roadway Exc. Unclassified, **See (J)**	C.Y.	141,174	20.00	$2,823,489
Removal of Conc. Base & Conc. Surface Courses	S.Y.	0	15.00	$0
Channel Excavation	C.Y.	0	12.25	$0
Ditch Excavation	C.Y.	0	10.00	$0
Borrow Excavation Zone 3, **See (J)**	C.Y.	232,694	16.00	$3,723,111
				$0
EARTHWORK TOTAL	=			$6,563,205

Suggested procedure for calculating earthwork:
A) Determine Typical section (number of lanes, median widths, side slopes, etc.).
B) Get latest topography map available.
C) Plot proposed alignment on topo map.
D) Develop profile using topo controls such as existing roads, streams, rivers and design manual.
E) Calculate Areas for the typical section in 1 foot increments of cut or fill.
F) At 10 to 60 foot intervals (depending on frequency of X-section changes) calculate the earthwork.
G) Calculate any other significant earthwork (ramps, cross-roads, etc.).
H) Make appropriate earthwork corrections for the pavement box and striping. Use 21 inch depth for rigid pavement, 26 inch depth for all flexible pavement and 4 inch depth for stripping.
I) Deduct any roadway excavation from borrow required to calculate Borrow Excavation Zone 3.
J) See Construction Cost Estimate Work Sheet (Section 3.1). This worksheet must be utilized for the most recent price information.

PAVEMENT

12 FOOT WIDE LANE (from subgrade up)

Pav't. Type	Description of Pavement	Cost/Linear Foot
A	10 inch R.C. Pavement	156.00
B	2 inch HMA Surf. Crs. & 8 inch HMA Base	61.00
C	3 inch HMA Surf. Crs. & 4 inch HMA Base	46.00
D	2 inch HMA Surf. Crs. & 2 inch HMA Base	22.00
E	Bridge Approach & Transition Slabs	156.00
	(Resurfacing Portion only F & G)	
F	2 inch HMA Surface Course	8.25
G	3 inch HMA Surface Course	12.00
H	Milling 2 inch	3.00

Computation Table for Pavement. Cost

Type	Cost from table above	x Length	x Pavement *W.F.	= Amount
C - Ocean Drive	46	8500	3.33	$1,302,030
C - Connector Rd A	46	730	3.33	$111,821
C - Connector Rd B	46	440	3.33	$67,399
D - Driveways	22	1000	1.00	$22,000
D - Temporary Pavement	22	8500	0.92	$172,040
				$0
				$0
				$0
				$0

				$0
PAVEMENT TOTAL			=	$1,675,291

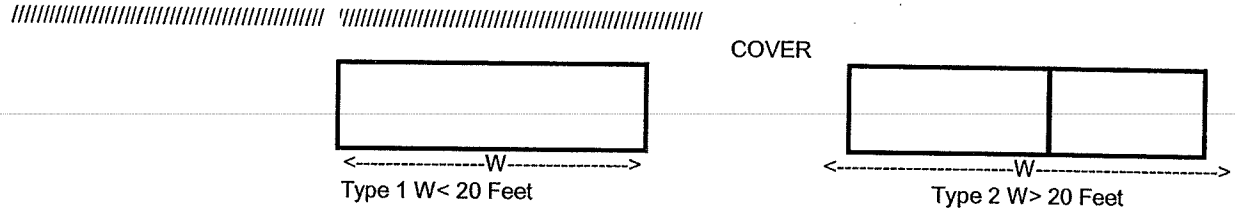
*Width Factors = Ratio of 12 foot wide lane to actual pavement width.

Example = actual pavement width = 25 foot = 25/12 = 2.08 W.F.

CONTEXT SENSITIVE DESIGN

Attach additional sheet detailing items and costs of context sensitive design work = $300,000

CULVERTS



Type	Layout (3)	Skew (1)	Cover (2)	Cost Per Sq. Foot
Type 1	Area w x L exceeds 1000 Sq. Feet	0-60 degrees	0 to 10'	114.75
			10' to 20'	147.25
	Short Culverts Difficult Conditions under 1000 Square Feet	0-60 degrees	0 to 10'	203.50
			10' to 20'	235.00
Type 2	Area w x L exceeds 1000 Sq. Feet	0-60 degrees	0 to 10'	121.75
			10' to 20'	152.50
	Short Culverts Difficult Conditions under 1000 Square Feet	0-60 degrees	0 to 10'	203.50
			10' to 20'	235.00

For skews over 60 degrees it will be necessary to make a special analysis and establish a square meter price comparable to above.

Description	Area Computation	x Cost per Sq. Foot	= Amount
Sta. 127+ 50, Type 1	1386	114.75	$159,044
			$0
			$0
			$0
		Culvert Total =	$159,044

BRIDGES

For the Bridge Sketch see the Construction Cost Estimation Preparation Manual

1 to 3 spans and 2 side spans (Max. Span 100 feet)

H = Clear Height 14 To 23 feet (4)

L = 100 to 400 feet & all viaducts over 400 feet (5)

Class	Layout	Skew (1)	Foundation (2)	Cost per Sq.Foot
I	Width at Least 45 feet	0 to 40 Degrees	No Piles	134.75
			Piles at Stub Abut.	159.75
			Piles at Piers & Stu	174.75
		40 to 60 Degrees	No Piles	145
			Piles at Stub Abut.	168.25
			Piles at Piers & Stu	181.25

For the Bridge Sketch see the Construction Cost Estimation Preparation Manual
1 to 3 spans and 2 side spans (Max. Span 100 feet) (3)
H = Clear Height 14 feet (4)
L = under 400 feet

Class	Layout	Skew (1)	Foundation (2)	Cost per Sq.Foot
II	L exceeds W Area L x W exceeds 4500 Sq. Feet	0 to 40 Degrees	No Piles	176.5
			On Piles	187.25
		40 to 60 Degrees	No Piles	219.75
			On Piles	273.25
III	W exceeds L Area L x W exceeds 4500 Sq. Feet	0 to 40 Degrees	No Piles	226.75
			On Piles	299.25
		40 to 60 Degrees	No Piles	241.5
			On Piles	310
IV	Width 30 - 45 feet Area W x L under 4500 Sq. Foot	0 to 40 Degrees	No Piles	295.5
			On Piles	396.75
		40 to 60 Degrees	No Piles	318.25
			On Piles	416.25

For the Bridge Sketch see the Construction Cost Estimation Preparation Manual
1 to 2 spans (Max. Span 125 feet)
H = Clear Height 14 feet (4)
L = 100 to 250 feet

Layout	Skew (1)	Foundation (2)	Cost/ Sq. Foot
Width at Least 40 feet	0 to 40 Degrees	No Piles	157.00
		Piles at Semi-Stub Abut.	182.00
		Piles at Piers & Semi-Stub Abut.	204.50
Minimum Length 100 feet	40 to 60 Degrees	No Piles	166.50
		Piles at Semi-Stub Abut.	194.75
		Piles at Piers & Semi-Stub Abut.	217.50

			0
Length	Width	Cost per SF	Bridge Total

1. For skews over 60 degrees it will be necessary to make a special analysis and establish a square foot price comparable to above.

2. For very bad foundation conditions requiring unusual lengths or spacing of piles, it will be necessary to establish a square foot price.

3. For longer spans, adjust the cost per square foot to reflect increased cost of structural members.

4. For span bridges, it is expected the length of the side span will be in- creased in proportion to any increase in height. Because of the resultant increase in deck area, the square foot price will remain approximately the same in the range of heights

5. For structures over 400 foot long (viaducts), reduce the cost per square foot if repetitive span length and forming can be used. Reduce by $0.50 for lengths from 400 to 600 feet and by $1.00 for lengths over 600 feet. (Do not forget adjustments (3) a

6. For statically indeterminate structures, square foot prices will have to be established.

Structure Description	Calculated Sq. Foot of Bridge Deck	x Cost Per Square Foot	= Amount
			0.00
			0.00
			0.00
			0.00
			0.00

			0.00
			0.00
			0.00
			0.00
			0.00
			0.00
			0.00
		Sub Total	0.00
Clearing Site Bridge *0-3% of Sub Total			0.00
	%		

BRIDGE TOTAL 0.00

*Pick appropriate percent based on the size, type and materials of existing structure

DRAINAGE (includes inlets and cross drains)

Rural	1.6	364356	$582,970
	project length (miles)	x cost per mile	= Amount

Urban	0	544280	$0
	project length (miles)	x cost per mile	= Amount

The above are the total costs of basins, manholes, longitudinal and transverse pipes, underdrains, headwalls, protecting curbs, aprons, etc. for a divided highway with a depressed median. The costs are assumed to apply to 4, 6 or 8 lane sections since th

Frontage Road & Ramp Drainage

0

1170	55	$64,350
length of ramp or frontage rd. in feet	x cost per foot	= Amount

DRAINAGE TOTAL = $647,320

INCIDENTAL ITEMS

Item	Cost / L.F.	x Quantity	= Amount
Beam Guide Rail	$16.75	14052	$235,371
9" X 16" Conc. Vertical Curb	$13.75	1857	$25,534
Sidewalk	$23.00	1882	$43,286
Toll Plaza	$1,114,000.00	1	$1,114,000
Wetlands	$0.00	0	$2,694,904
Fence 6 Foot High	$18.25	0	$0
15" X 41" Conc. Barrier Curb	$50.25	0	$0
24" X 41" Conc. Barrier Curb	$73.25	0	$0
24" X Variable Conc. Barrier Curb	$46.00	0	$0
Sign Bridge	$308,000.00	0	$0
Cantilever Sign Structure	60,500	0	$0
INCIDENTAL ITEMS TOTAL =			$4,113,095

LANDSCAPE

	Quantity	x Unit Prices	= Amount
Topsoil and Seeding (Mainline) Length of Project in miles	1.55	112,815	$174,863
Planting (Mainline) Length of Project in miles	0	64,500	$0
Topsoil, Seeding, Planting (Finger Ramp			

Number of Finger Ramps	0	12,500	$0
Topsoil, Seeding, Planting (Loop Ramp)			
Number of Loop Ramps	0	20,000	$0
Topsoil, Seeding (Access Road)			
Length of Access Road in Feet	0.22	7.9	$2
LANDSCAPE TOTAL =			$174,865

NOISE ABATEMENT

	Unit	Quantity	x Cost	= Amount
Noise Wall	L.F.	0	305.00	0
				0
				0
				0
NOISE ABATEMENT TOTAL =				0

GENERAL ITEMS

Item	Project Length (miles)	x Cost/Mile	= Amount
Field Office	1.6	44,260	$70,816
Materials Field Laboratory	1.6	28,970	$46,352
Erosion Control during Constructic	1.6	64,375	$103,000
GENERAL ITEMS TOTAL =			$220,168

SUMMARY

Route	Ocean Drive - Alternative 3d	Section/Proj. Id. #	0.00
PM	Dale Foster, PE	UPC No.	0.00

Work Type	Totals from other pages
Earthwork	$6,563,205
Pavement	$1,675,291
Context Sensitive Design	$300,000
Bridge - Mill Creek	$2,527,200
Bridge - Middle Thorofare	$56,700,000
Bridge - Upper Thorofare	$5,415,800
Retaining Wall	$218,750
Drainage	$647,320
Incidental Items	$4,113,095
Landscape	$174,865
Noise Abatement	$0
General Items	$220,168
Wick Drains	$1,589,440
Geotechnical Instrumentation	$484,429
PROJECT SUBTOTAL	$80,629,562

Other Items	Proj. Subtotal Range	Choice	Amount
Lighting, Traffic Stripes, Signs and Delineators	80629561.94	3% of Proj. Subtotal	$2,418,887
Maintenance of Traffic	80629561.94	7% of Proj. Subtotal	$5,644,069
Training	80629561.94	1% of Proj. Subtotal	$806,296
Mobilization	80629561.94		$8,062,956
	Project Cost < 5.0 (Mil.)	9% of Proj. Subtotal	

	Project Cost 5.0 & above	10% of Proj. Subtotal	
Progress Schedule	Project Cost(Mil.)	$	$58,000
	Less than 2.0	0	
	2.0 to 5.0	6,000	
	5.0 to 10.0	8,000	
	10.0 to 20.0	15,000	
	20.0 to 30.0	30,000	
	30.0 to 40.0	40,000	
	40.0 & above	58,000	
Clearing Site	Project Cost (Mil.)	$	$490,000
	Less than 1.0	15,000	
	1.0 to 2.0	30,000	
	2.0 to 5.0	45,000	
	5.0 to 10.0	115,000	
	10.0 to 20.0	220,000	
	20.0 to 30.0	240,000	
	30.0 to 40.0	250,000	
	40.0 & above	490,000	
Construction Layout	Project Cost(Mil.)	$	$890,000
	Less than 1.0	7,000	
	1.0 to 2.0	20,000	
	2.0 to 5.0	42,000	
	5.0 to 10.0	87,000	
	10.0 to 20.0	160,000	
	20.0 to 30.0	220,000	
	30.0 to 40.0	490,000	
	40.0 & above	890,000	
		PROJECT TOTAL	$98,999,770

CONTINGENCIES & ESCALATION

		Y	
Y = Number of Years until midpoint of construction duration plus number of years until construction start. If midpoint is less than 2 years from the date of this estimate, no escalation is required. Maximum value = 10%		5.50	
$98,999,770	1.000	1.10	$108,899,747
Project Total	Contingencies (1+C)	1 + [0.01 (Y+1) (Y-2)]	Construction Estimate for PD

Project Cost(Mil.)	Contingencies (C) Percent	Average Construction Duration in Years
0-10	3%	1
10-20	2.50%	2
Over 20	2%	3

CONSTRUCTION ENGINEERING (CE)

Project Cost (Mil.)		% of Construction Cost
Less than 1.0		31.10%
1.0 to 5.0		20.30%
5.0 to 10.0		16.20%
10.0 & above		12.20%
CONSTRUCTION ENGINEERING AMOUNT		$13,285,769.13

CONSTRUCTION CHANGE ORDER CONTINGENCIES

Total Federal Participating Items in Millions of $	Construction Change Order Contingency Amount
$0 to 0.1	$6,000

0.1 to 0.5	25,000
0.5 to 5.0	25,000 + 4% of amount in excess of $500,000
5.0 to 10.0	205,000 + 3% of amount in excess of $5,000,000
10.0 to 15.0	355,000 + 2% of amount in excess of $10,000,000
15.0 and above	455,000 + 1.5% of amount in excess of $15,000,000 - max $500,000

For State Funded Projects, Contingencies for Change orders = 0

CHANGE ORDER CONTINGENCY AMOUNT $500,000

UTILITIES RELOCATIONS BY COMPANIES/OWNERS

$108,899,747	0.055	$5,989,486
Construction Cost for Initial Estimate	for Urban use 0.12, Rural 0.055 or + Estimate Use % or utilities detailed estimate	= Utility Relocation Cost for Initial Estimate

If there are no utility relocations on the project indicate "No Utilities" in the box above.

RIGHT OF WAY COST $1,841,546

If there is no ROW cost on the project indicate "No ROW" the box
Only includes costs for acquisition of land and easements.

SUMMARY

Highway & Related Costs	$34,356,770
Bridge Costs	$64,643,000
Construction Subtotal	*$98,999,770*
Utilities Relocations	$5,989,486
Escalation	$9,899,977
Contingencies	$500,000
Construction Engineering (CE)	$13,285,769
Construction, Design & Utilities Subtotal	*$128,675,002*
Right of Way Cost	$1,841,546
Project Total	**$130,516,548**

Classification Number 2 - RECONSTRUCTION, WIDENING & DUALIZATION - English

Route	Ocean Drive - Alternative 3e	Section/Contract #	
PM	Dale Foster, PE	UPC No.	

EARTHWORK (must be calculated)

	Unit	Quantity	x Unit Price	Amount
Stripping (4 - 6" Depth)	Acre	4.4	4050.00	$17,820
Roadway Exc. Unclassified, **See (J)**	C.Y.	163,962	20.00	$3,279,236
Removal of Conc. Base & Conc. Surface Courses	S.Y.	0	15.00	$0
Channel Excavation	C.Y.	0	12.25	$0
Ditch Excavation	C.Y.	0	10.00	$0
Borrow Excavation Zone 3, **See (J)**	C.Y.	276,708	16.00	$4,427,330
				$0
EARTHWORK TOTAL	=			$7,724,385

Suggested procedure for calculating earthwork:
A) Determine Typical section (number of lanes, median widths, side slopes, etc.).
B) Get latest topography map available.
C) Plot proposed alignment on topo map.
D) Develop profile using topo controls such as existing roads, streams, rivers and design manual.
E) Calculate Areas for the typical section in 1 foot increments of cut or fill.
F) At 10 to 60 foot intervals (depending on frequency of X-section changes) calculate the earthwork.
G) Calculate any other significant earthwork (ramps, cross-roads, etc.).
H) Make appropriate earthwork corrections for the pavement box and striping. Use 21 inch depth for rigid pavement, 26 inch depth for all flexible pavement and 4 inch depth for stripping.
I) Deduct any roadway excavation from borrow required to calculate Borrow Excavation Zone 3.
J) See Construction Cost Estimate Work Sheet (Section 3.1). This worksheet must be utilized for the most recent price information.

PAVEMENT

12 FOOT WIDE LANE (from subgrade up)

Pav't. Type	Description of Pavement	Cost/Linear Foot
A	10 inch R.C. Pavement	156.00
B	2 inch HMA Surf. Crs. & 8 inch HMA Base	61.00
C	3 inch HMA Surf. Crs. & 4 inch HMA Base	46.00
D	2 inch HMA Surf. Crs. & 2 inch HMA Base	22.00
E	Bridge Approach & Transition Slabs	156.00
	(Resurfacing Portion only F & G)	
F	2 inch HMA Surface Course	8.25
G	3 inch HMA Surface Course	12.00
H	Milling 2 inch	3.00

Computation Table for Pavement. Cost

Type	Cost from table above	x Length	x Pavement *W.F.	= Amount
C - Ocean Drive	46	9300	3.33	$1,424,574
C - Access Rd	46	2300	2.50	$264,500
D - Long Driveway	46	1500	2.08	$143,520
D - Driveways	22	1237	1.00	$27,214
D - Temporary Pavement	22	9300	0.92	$188,232
				$0
				$0
				$0
				$0

				$0
PAVEMENT TOTAL			=	$2,048,040

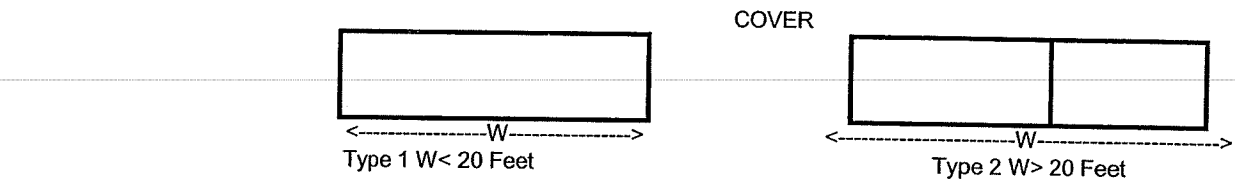
*Width Factors = Ratio of 12 foot wide lane to actual pavement width.

Example = actual pavement width = 25 foot = 25/12 = 2.08 W.F.

CONTEXT SENSITIVE DESIGN

Attach additional sheet detailing items and costs of context sensitive design work = $200,000

CULVERTS



Type	Layout (3)	Skew (1)	Cover (2)	Cost Per Sq. Foot
Type 1	Area w x L exceeds 1000 Sq. Feet	0-60 degrees	0 to 10'	114.75
			10' to 20'	147.25
	Short Culverts Difficult Conditions under 1000 Square Feet	0-60 degrees	0 to 10'	203.50
			10' to 20'	235.00
Type 2	Area w x L exceeds 1000 Sq. Feet	0-60 degrees	0 to 10'	121.75
			10' to 20'	152.50
	Short Culverts Difficult Conditions under 1000 Square Feet	0-60 degrees	0 to 10'	203.50
			10' to 20'	235.00

For skews over 60 degrees it will be necessary to make a special analysis and establish a square meter price comparable to above.

Description	Area Computation	x Cost per Sq. Foot	= Amount
Sta. 127+ 50, Type 1	1398	114.75	$160,421
			$0
			$0
			$0
		Culvert Total =	$160,421

BRIDGES

For the Bridge Sketch see the Construction Cost Estimation Preparation Manual

1 to 3 spans and 2 side spans (Max. Span 100 feet)

H = Clear Height 14 To 23 feet (4)

L = 100 to 400 feet & all viaducts over 400 feet (5)

Class	Layout	Skew (1)	Foundation (2)	Cost per Sq.Foot
I	Width at Least 45 feet	0 to 40 Degrees	No Piles	134.75
			Piles at Stub Abut.	159.75
			Piles at Piers & Stu	174.75
		40 to 60 Degrees	No Piles	145
			Piles at Stub Abut.	168.25
			Piles at Piers & Stu	181.25

For the Bridge Sketch see the Construction Cost Estimation Preparation Manual
1 to 3 spans and 2 side spans (Max. Span 100 feet) (3)
H = Clear Height 14 feet (4)
L = under 400 feet

Class	Layout	Skew (1)	Foundation (2)	Cost per Sq.Foot
II	L exceeds W Area L x W exceeds 4500 Sq. Feet	0 to 40 Degrees	No Piles	176.5
			On Piles	187.25
		40 to 60 Degrees	No Piles	219.75
			On Piles	273.25
III	W exceeds L Area L x W exceeds 4500 Sq. Feet	0 to 40 Degrees	No Piles	226.75
			On Piles	299.25
		40 to 60 Degrees	No Piles	241.5
			On Piles	310
IV	Width 30 - 45 feet Area W x L under 4500 Sq. Foot	0 to 40 Degrees	No Piles	295.5
			On Piles	396.75
		40 to 60 Degrees	No Piles	318.25
			On Piles	416.25

For the Bridge Sketch see the Construction Cost Estimation Preparation Manual
1 to 2 spans (Max. Span 125 feet)
H = Clear Height 14 feet (4)
L = 100 to 250 feet

Layout	Skew (1)	Foundation (2)	Cost/ Sq. Foot
Width at Least 40 feet	0 to 40 Degrees	No Piles	157.00
		Piles at Semi-Stub Abut.	182.00
		Piles at Piers & Semi-Stub Abut.	204.50
Minimum Length 100 feet	40 to 60 Degrees	No Piles	166.50
		Piles at Semi-Stub Abut.	194.75
		Piles at Piers & Semi-Stub Abut.	217.50

			0
Length	Width	Cost per SF	Bridge Total

1. For skews over 60 degrees it will be necessary to make a special analysis and establish a square foot price comparable to above.

2. For very bad foundation conditions requiring unusual lengths or spacing of piles, it will be necessary to establish a square foot price.

3. For longer spans, adjust the cost per square foot to reflect increased cost of structural members.

4. For span bridges, it is expected the length of the side span will be in- creased in proportion to any increase in height. Because of the resultant increase in deck area, the square foot price will remain approximately the same in the range of heights

5. For structures over 400 foot long (viaducts), reduce the cost per square foot if repetitive span length and forming can be used. Reduce by $0.50 for lengths from 400 to 600 feet and by $1.00 for lengths over 600 feet. (Do not forget adjustments (3) a

6. For statically indeterminate structures, square foot prices will have to be established.

Structure Description	Calculated Sq. Foot of Bridge Deck	x Cost Per Square Foot	= Amount
			0.00
			0.00
			0.00
			0.00
			0.00

			0.00
			0.00
			0.00
			0.00
			0.00
			0.00
			0.00
		Sub Total	0.00
Clearing Site Bridge *0-3% of Sub Total			0.00
	%		

BRIDGE TOTAL 0.00

*Pick appropriate percent based on the size, type and materials of existing structure

DRAINAGE (includes inlets and cross drains)

Rural	1.8	364356	$655,841
	project length (miles)	x cost per mile	= Amount
Urban	0	544280	$0
	project length (miles)	x cost per mile	= Amount

The above are the total costs of basins, manholes, longitudinal and transverse pipes, underdrains, headwalls, protecting curbs, aprons, etc. for a divided highway with a depressed median. The costs are assumed to apply to 4, 6 or 8 lane sections since th

Frontage Road & Ramp Drainage

0

3800	55	$209,000
length of ramp or frontage rd. in feet	x cost per foot	= Amount

DRAINAGE TOTAL = $864,841

INCIDENTAL ITEMS

Item	Cost / L.F.	x Quantity	= Amount
Beam Guide Rail	$16.75	15255	$255,521
9" X 16" Conc. Vertical Curb	$13.75	2681	$36,864
Sidewalk	$23.00	2681	$61,663
Toll Plaza	$1,114,000.00	1	$1,114,000
Wetlands	$0.00	0	$1,160,830
Fence 6 Foot High	$18.25	0	$0
15" X 41" Conc. Barrier Curb	$50.25	0	$0
24" X 41" Conc. Barrier Curb	$73.25	0	$0
24" X Variable Conc. Barrier Curb	$46.00	0	$0
Sign Bridge	$308,000.00	0	$0
Cantilever Sign Structure	60,500	0	$0
INCIDENTAL ITEMS TOTAL =			$2,628,878

LANDSCAPE

	Quantity	x Unit Prices	= Amount
Topsoil and Seeding (Mainline) Length of Project in miles	1.76	112,815	$198,554
Planting (Mainline) Length of Project in miles	0	64,500	$0
Topsoil, Seeding, Planting (Finger Ramp			

Number of Finger Ramps	0	12,500	$0
Topsoil, Seeding, Planting (Loop Ramp)			
Number of Loop Ramps	0	20,000	$0
Topsoil, Seeding (Access Road)			
Length of Access Road in Feet	0.72	7.9	$6
LANDSCAPE TOTAL =			$198,560

NOISE ABATEMENT

	Unit	Quantity	x Cost	= Amount
Noise Wall	L.F.	0	305.00	0
				0
				0
				0
NOISE ABATEMENT TOTAL =				0

GENERAL ITEMS

Item	Project Length (miles)	x Cost/Mile	= Amount
Field Office	1.8	44,260	$79,668
Materials Field Laboratory	1.8	28,970	$52,146
Erosion Control during Constructio	1.8	64,375	$115,875
GENERAL ITEMS TOTAL =			$247,689

SUMMARY

Route	Ocean Drive - Alternative 3e	Section/Proj. Id. #	0.00
PM	Dale Foster, PE	UPC No.	0.00

Work Type	Totals from other pages
Earthwork	$7,724,385
Pavement	$2,048,040
Context Sensitive Design	$200,000
Bridge - Mill Creek	$2,527,200
Bridge - Middle Thorofare	$50,942,250
Bridge - Upper Thorofare	$2,956,500
Retaining Wall	$2,309,900
Drainage	$2,309,900
Incidental Items	$2,628,878
Landscape	$198,560
Noise Abatement	$0
General Items	$247,689
Wick Drains	$2,226,939
Geotechnical Instrumentation	$678,748
PROJECT SUBTOTAL	$76,998,989

Other Items	Proj. Subtotal Range	Choice	Amount
Lighting, Traffic Stripes, Signs and Delineators	76998989.42	3% of Proj. Subtotal	$2,309,970
Maintenance of Traffic	76998989.42	7% of Proj. Subtotal	$5,389,929
Training	76998989.42	1% of Proj. Subtotal	$769,990
Mobilization	76998989.42		$7,699,899
	Project Cost < 5.0 (Mil.)	9% of Proj. Subtotal	

	Project Cost 5.0 & above	10% of Proj. Subtotal	
Progress Schedule	Project Cost(Mil.)	$	$58,000
	Less than 2.0	0	
	2.0 to 5.0	6,000	
	5.0 to 10.0	8,000	
	10.0 to 20.0	15,000	
	20.0 to 30.0	30,000	
	30.0 to 40.0	40,000	
	40.0 & above	58,000	
Clearing Site	Project Cost (Mil.)	$	$490,000
	Less than 1.0	15,000	
	1.0 to 2.0	30,000	
	2.0 to 5.0	45,000	
	5.0 to 10.0	115,000	
	10.0 to 20.0	220,000	
	20.0 to 30.0	240,000	
	30.0 to 40.0	250,000	
	40.0 & above	490,000	
Construction Layout	Project Cost(Mil.)	$	$890,000
	Less than 1.0	7,000	
	1.0 to 2.0	20,000	
	2.0 to 5.0	42,000	
	5.0 to 10.0	87,000	
	10.0 to 20.0	160,000	
	20.0 to 30.0	220,000	
	30.0 to 40.0	490,000	
	40.0 & above	890,000	
		PROJECT TOTAL	$94,606,777

CONTINGENCIES & ESCALATION

		Y	
Y = Number of Years until midpoint of construction duration plus number of years until construction start. If midpoint is less than 2 years from the date of this estimate, no escalation is required. Maximum value = 10%		5.50	
$94,606,777	1.000	1.10	$104,067,455
Project Total	Contingencies (1+C)	1 + [0.01 (Y+1) (Y-2)]	Construction Estimate for PD

Project Cost(Mil.)	Contingencies (C) Percent	Average Construction Duration in Years
0-10	3%	1
10-20	2.50%	2
Over 20	2%	3

CONSTRUCTION ENGINEERING (CE)

Project Cost (Mil.)		% of Construction Cost
Less than 1.0		31.10%
1.0 to 5.0		20.30%
5.0 to 10.0		16.20%
10.0 & above		12.20%
CONSTRUCTION ENGINEERING AMOUNT		$12,696,229.50

CONSTRUCTION CHANGE ORDER CONTINGENCIES

Total Federal Participating Items in Millions of $	Construction Change Order Contingency Amount
$0 to 0.1	$6,000

0.1 to 0.5	25,000
0.5 to 5.0	25,000 + 4% of amount in excess of $500,000
5.0 to 10.0	205,000 + 3% of amount in excess of $5,000,000
10.0 to 15.0	355,000 + 2% of amount in excess of $10,000,000
15.0 and above	455,000 + 1.5% of amount in excess of $15,000,000 - max $500,000

For State Funded Projects, Contingencies for Change orders = 0

CHANGE ORDER CONTINGENCY AMOUNT $500,000

UTILITIES RELOCATIONS BY COMPANIES/OWNERS

$104,067,455	0.055	$5,723,710
Construction Cost for Initial Estimate	for Urban use 0.12, Rural 0.055 or + Estimate Use % or utilities detailed estimate	= Utility Relocation Cost for Initial Estimate

If there are no utility relocations on the project indicate "No Utilities" in the box above.

RIGHT OF WAY COST $382,002

If there is no ROW cost on the project indicate "No ROW" the box
Only includes costs for acquisition of land and easements.

SUMMARY

Highway & Related Costs	$38,180,827
Bridge Costs	$56,425,950
Construction Subtotal	*$94,606,777*
Utilities Relocations	$5,723,710
Escalation	$9,460,678
Contingencies	$500,000
Construction Engineering (CE)	$12,696,230
Construction, Design & Utilities Subtotal	*$122,987,394*
Right of Way Cost	$382,002
Project Total	**$123,369,396**

Classification Number 2 - RECONSTRUCTION, WIDENING & DUALIZATION - English

Route	Ocean Drive - Alternative 3f	Section/Contract #
PM	Dale Foster, PE	UPC No.

EARTHWORK (must be calculated)

	Unit	Quantity	x Unit Price	Amount
Stripping (4 - 6" Depth)	Acre	4.5	4050.00	$18,225
Roadway Exc. Unclassified, **See (J)**	C.Y.	139,312	20.00	$2,786,230
Removal of Conc. Base & Conc. Surface Courses	S.Y.	0	15.00	$0
Channel Excavation	C.Y.	0	12.25	$0
Ditch Excavation	C.Y.	0	10.00	$0
Borrow Excavation Zone 3, **See (J)**	C.Y.	230,182	16.00	$3,682,916
				$0
EARTHWORK TOTAL	=			$6,487,372

Suggested procedure for calculating earthwork:
A) Determine Typical section (number of lanes, median widths, side slopes, etc.).
B) Get latest topography map available.
C) Plot proposed alignment on topo map.
D) Develop profile using topo controls such as existing roads, streams, rivers and design manual.
E) Calculate Areas for the typical section in 1 foot increments of cut or fill.
F) At 10 to 60 foot intervals (depending on frequency of X-section changes) calculate the earthwork.
G) Calculate any other significant earthwork (ramps, cross-roads, etc.).
H) Make appropriate earthwork corrections for the pavement box and striping. Use 21 inch depth for rigid pavement, 26 inch depth for all flexible pavement and 4 inch depth for stripping.
I) Deduct any roadway excavation from borrow required to calculate Borrow Excavation Zone 3.
J) See Construction Cost Estimate Work Sheet (Section 3.1). This worksheet must be utilized for the most recent price information.

PAVEMENT

12 FOOT WIDE LANE (from subgrade up)

Pav't. Type	Description of Pavement	Cost/Linear Foot
A	10 inch R.C. Pavement	156.00
B	2 inch HMA Surf. Crs. & 8 inch HMA Base	61.00
C	3 inch HMA Surf. Crs. & 4 inch HMA Base	46.00
D	2 inch HMA Surf. Crs. & 2 inch HMA Base	22.00
E	Bridge Approach & Transition Slabs	156.00
	(Resurfacing Portion only F & G)	
F	2 inch HMA Surface Course	8.25
G	3 inch HMA Surface Course	12.00
H	Milling 2 inch	3.00

Computation Table for Pavement. Cost

Type	Cost from table above	x Length	x Pavement *W.F.	= Amount
C - Ocean Drive	46	8680	3.33	$1,329,602
C - Access Rd	46	600	3.17	$87,492
D - Long Driveway	46	875	2.08	$83,720
D - Driveways	22	1638	1.00	$36,036
D - Temporary Pavement	22	8680	0.92	$175,683
				$0
				$0
				$0
				$0

				$0
PAVEMENT TOTAL			=	$1,712,534

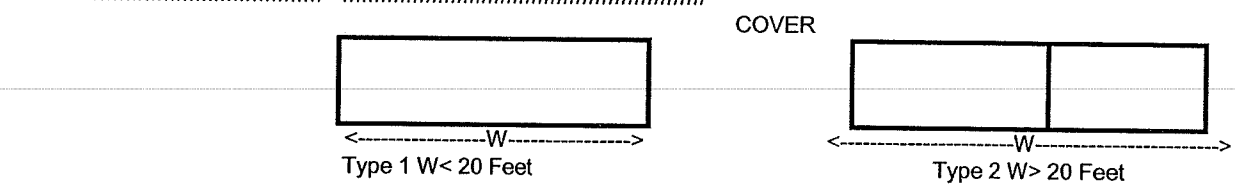
*Width Factors = Ratio of 12 foot wide lane to actual pavement width.

Example = actual pavement width = 25 foot = 25/12 = 2.08 W.F.

CONTEXT SENSITIVE DESIGN

Attach additional sheet detailing items and costs of context sensitive design work = $250,000

CULVERTS



Type 1 W< 20 Feet

Type 2 W> 20 Feet

Type	Layout (3)	Skew (1)	Cover (2)	Cost Per Sq. Foot
Type 1	Area w x L exceeds 1000 Sq. Feet	0-60 degrees	0 to 10'	114.75
			10' to 20'	147.25
	Short Culverts Difficult Conditions under 1000 Square Feet	0-60 degrees	0 to 10'	203.50
			10' to 20'	235.00
Type 2	Area w x L exceeds 1000 Sq. Feet	0-60 degrees	0 to 10'	121.75
			10' to 20'	152.50
	Short Culverts Difficult Conditions under 1000 Square Feet	0-60 degrees	0 to 10'	203.50
			10' to 20'	235.00

For skews over 60 degrees it will be necessary to make a special analysis and establish a square meter price comparable to above.

Description	Area Computation	x Cost per Sq. Foot	= Amount
Sta. 126+ 50, Type 1	1374	114.75	$157,667
			$0
			$0
			$0
		Culvert Total =	$157,667

BRIDGES

For the Bridge Sketch see the Construction Cost Estimation Preparation Manual

1 to 3 spans and 2 side spans (Max. Span 100 feet)

H = Clear Height 14 To 23 feet (4)

L = 100 to 400 feet & all viaducts over 400 feet (5)

Class	Layout	Skew (1)	Foundation (2)	Cost per Sq.Foot
I	Width at Least 45 feet	0 to 40 Degrees	No Piles	134.75
			Piles at Stub Abut.	159.75
			Piles at Piers & Stu	174.75
		40 to 60 Degrees	No Piles	145
			Piles at Stub Abut.	168.25
			Piles at Piers & Stu	181.25

For the Bridge Sketch see the Construction Cost Estimation Preparation Manual
1 to 3 spans and 2 side spans (Max. Span 100 feet) (3)
H = Clear Height 14 feet (4)
L = under 400 feet

Class	Layout	Skew (1)	Foundation (2)	Cost per Sq.Foot
II	L exceeds W Area L x W exceeds 4500 Sq. Feet	0 to 40 Degrees	No Piles	176.5
			On Piles	187.25
		40 to 60 Degrees	No Piles	219.75
			On Piles	273.25
III	W exceeds L Area L x W exceeds 4500 Sq. Feet	0 to 40 Degrees	No Piles	226.75
			On Piles	299.25
		40 to 60 Degrees	No Piles	241.5
			On Piles	310
IV	Width 30 - 45 feet	0 to 40 Degrees	No Piles	295.5
			On Piles	396.75
	Area W x L under 4500 Sq. Foot	40 to 60 Degrees	No Piles	318.25
			On Piles	416.25

For the Bridge Sketch see the Construction Cost Estimation Preparation Manual
1 to 2 spans (Max. Span 125 feet)
H = Clear Height 14 feet (4)
L = 100 to 250 feet

Layout	Skew (1)	Foundation (2)	Cost/ Sq. Foot
Width at Least 40 feet	0 to 40 Degrees	No Piles	157.00
		Piles at Semi-Stub Abut.	182.00
		Piles at Piers & Semi-Stub Abut.	204.50
Minimum Length 100 feet	40 to 60 Degrees	No Piles	166.50
		Piles at Semi-Stub Abut.	194.75
		Piles at Piers & Semi-Stub Abut.	217.50

			0
Length	Width	Cost per SF	Bridge Total

1. For skews over 60 degrees it will be necessary to make a special analysis and establish a square foot price comparable to above.

2. For very bad foundation conditions requiring unusual lengths or spacing of piles, it will be necessary to establish a square foot price.

3. For longer spans, adjust the cost per square foot to reflect increased cost of structural members.

4. For span bridges, it is expected the length of the side span will be in- creased in proportion to any increase in height. Because of the resultant increase in deck area, the square foot price will remain approximately the same in the range of heights

5. For structures over 400 foot long (viaducts), reduce the cost per square foot if repetitive span length and forming can be used. Reduce by $0.50 for lengths from 400 to 600 feet and by $1.00 for lengths over 600 feet. (Do not forget adjustments (3) a

6. For statically indeterminate structures, square foot prices will have to be established.

Structure Description	Calculated Sq. Foot of Bridge Deck	x Cost Per Square Foot	= Amount
			0.00
			0.00
			0.00
			0.00
			0.00

			0.00
			0.00
			0.00
			0.00
			0.00
			0.00
			0.00
		Sub Total	0.00
Clearing Site Bridge *0-3% of Sub Total			0.00
	%		

BRIDGE TOTAL $0

*Pick appropriate percent based on the size, type and materials of existing structure

DRAINAGE (includes inlets and cross drains)

Rural	1.65	364356	$601,187
	project length (miles)	x cost per mile	= Amount
Urban	0	544280	$0
	project length (miles)	x cost per mile	= Amount

The above are the total costs of basins, manholes, longitudinal and transverse pipes, underdrains, headwalls, protecting curbs, aprons, etc. for a divided highway with a depressed median. The costs are assumed to apply to 4, 6 or 8 lane sections since th

Frontage Road & Ramp Drainage

0

1475	55	$81,125
length of ramp or frontage rd. in feet	x cost per foot	= Amount

DRAINAGE TOTAL = $682,312

INCIDENTAL ITEMS

Item	Cost / L.F.	x Quantity	= Amount
Beam Guide Rail	$16.75	15810	$264,818
9" X 16" Conc. Vertical Curb	$13.75	935	$12,856
Sidewalk	$23.00	882	$20,286
Toll Plaza	$1,114,000.00	1	$1,114,000
Wetlands	$0.00	0	$1,113,667
Fence 6 Foot High	$18.25	0	$0
15" X 41" Conc. Barrier Curb	$50.25	0	$0
24" X 41" Conc. Barrier Curb	$73.25	0	$0
24" X Variable Conc. Barrier Curb	$46.00	0	$0
Sign Bridge	$308,000.00	0	$0
Cantilever Sign Structure	60,500	0	$0
INCIDENTAL ITEMS TOTAL =			$2,525,627

LANDSCAPE

	Quantity	x Unit Prices	= Amount
Topsoil and Seeding (Mainline) Length of Project in miles	1.64	112,815	$185,017
Planting (Mainline) Length of Project in miles	0	64,500	$0
Topsoil, Seeding, Planting (Finger Ramp			

Number of Finger Ramps	0	12,500	$0
Topsoil, Seeding, Planting (Loop Ramp)			
Number of Loop Ramps	0	20,000	$0
Topsoil, Seeding (Access Road)			
Length of Access Road in Feet	0.28	7.9	$2
LANDSCAPE TOTAL =			$185,019

NOISE ABATEMENT

	Unit	Quantity	x Cost	= Amount
Noise Wall	L.F.	0	305.00	0
				0
				0
				0
NOISE ABATEMENT TOTAL =				0

GENERAL ITEMS

Item	Project Length (miles)	x Cost/Mile	= Amount
Field Office	1.65	44,260	$73,029
Materials Field Laboratory	1.65	28,970	$47,801
Erosion Control during Constructic	1.65	64,375	$106,219
GENERAL ITEMS TOTAL =			$227,048

SUMMARY

Route	Ocean Drive - Alternative 3f	Section/Proj. Id. #	0.00
PM	Dale Foster, PE	UPC No.	0.00

Work Type	Totals from other pages
Earthwork	$6,487,372
Pavement	$1,712,534
Context Sensitive Design	$250,000
Bridge - Mill Creek	$2,527,200
Bridge - Middle Thorofare	$58,590,000
Bridge - Upper Thorofare	$2,956,500
Retaining Wall	$1,858,400
Drainage	$682,312
Incidental Items	$2,525,627
Landscape	$185,019
Noise Abatement	$0
General Items	$227,048
Wick Drains	$1,724,138
Geotechnical Instrumentation	$525,482
PROJECT SUBTOTAL	$80,251,631

Other Items	Proj. Subtotal Range	Choice	Amount
Lighting, Traffic Stripes, Signs and Delineators	80251631.33	3% of Proj. Subtotal	$2,407,549
Maintenance of Traffic	80251631.33	7% of Proj. Subtotal	$5,617,614
Training	80251631.33	1% of Proj. Subtotal	$802,516
Mobilization	80251631.33		$8,025,163
	Project Cost < 5.0 (Mil.)	9% of Proj. Subtotal	

	Project Cost 5.0 & above	10% of Proj. Subtotal	
Progress Schedule	Project Cost(Mil.)	$	$58,000
	Less than 2.0	0	
	2.0 to 5.0	6,000	
	5.0 to 10.0	8,000	
	10.0 to 20.0	15,000	
	20.0 to 30.0	30,000	
	30.0 to 40.0	40,000	
	40.0 & above	58,000	
Clearing Site	Project Cost (Mil.)	$	$490,000
	Less than 1.0	15,000	
	1.0 to 2.0	30,000	
	2.0 to 5.0	45,000	
	5.0 to 10.0	115,000	
	10.0 to 20.0	220,000	
	20.0 to 30.0	240,000	
	30.0 to 40.0	250,000	
	40.0 & above	490,000	
Construction Layout	Project Cost(Mil.)	$	$890,000
	Less than 1.0	7,000	
	1.0 to 2.0	20,000	
	2.0 to 5.0	42,000	
	5.0 to 10.0	87,000	
	10.0 to 20.0	160,000	
	20.0 to 30.0	220,000	
	30.0 to 40.0	490,000	
	40.0 & above	890,000	
		PROJECT TOTAL	$98,542,474

CONTINGENCIES & ESCALATION

		Y	
Y = Number of Years until midpoint of construction duration plus number of years until construction start. If midpoint is less than 2 years from the date of this estimate, no escalation is required. Maximum value = 10%		5.50	
$98,542,474	1.000	1.10	$108,396,721
Project Total	Contingencies (1+C)	1 + [0.01 (Y+1) (Y-2)]	Construction Estimate for PD

Project Cost(Mil.)	Contingencies (C) Percent	Average Construction Duration in Years
0-10	3%	1
10-20	2.50%	2
Over 20	2%	3

CONSTRUCTION ENGINEERING (CE)

Project Cost (Mil.)		% of Construction Cost
Less than 1.0		31.10%
1.0 to 5.0		20.30%
5.0 to 10.0		16.20%
10.0 & above		12.20%
CONSTRUCTION ENGINEERING AMOUNT		$13,224,400.00

CONSTRUCTION CHANGE ORDER CONTINGENCIES

Total Federal Participating Items in Millions of $	Construction Change Order Contingency Amount
$0 to 0.1	$6,000

0.1 to 0.5	25,000
0.5 to 5.0	25,000 + 4% of amount in excess of $500,000
5.0 to 10.0	205,000 + 3% of amount in excess of $5,000,000
10.0 to 15.0	355,000 + 2% of amount in excess of $10,000,000
15.0 and above	455,000 + 1.5% of amount in excess of $15,000,000 - max $500,000

For State Funded Projects, Contingencies for Change orders = 0

CHANGE ORDER CONTINGENCY AMOUNT $500,000

UTILITIES RELOCATIONS BY COMPANIES/OWNERS

$108,396,721	0.055	$5,961,820
Construction Cost for Initial Estimate	for Urban use 0.12, Rural 0.055 or + Estimate Use % or utilities detailed estimate	= Utility Relocation Cost for Initial Estimate

If there are no utility relocations on the project indicate "No Utilities" in the box above.

RIGHT OF WAY COST $562,754

If there is no ROW cost on the project indicate "No ROW" the box
Only includes costs for acquisition of land and easements.

SUMMARY

Highway & Related Costs	$34,468,774
Bridge Costs	$64,073,700
Construction Subtotal	*$98,542,474*
Utilities Relocations	$5,961,820
Escalation	$9,854,247
Contingencies	$500,000
Construction Engineering (CE)	$13,224,400
Construction, Design & Utilities Subtotal	*$128,082,941*
Right of Way Cost	$562,754
Project Total	**$128,645,695**

Classification Number 2 - RECONSTRUCTION, WIDENING & DUALIZATION - English

Route	Ocean Drive - Alternative 3g	Section/Contract #	
PM	Dale Foster, PE	UPC No.	

EARTHWORK (must be calculated)

	Unit	Quantity	x Unit Price	Amount
Stripping (4 - 6" Depth)	Acre	4.5	4050.00	$18,225
Roadway Exc. Unclassified, **See (J)**	C.Y.	139,312	20.00	$2,786,230
Removal of Conc. Base & Conc. Surface Courses	S.Y.	0	15.00	$0
Channel Excavation	C.Y.	0	12.25	$0
Ditch Excavation	C.Y.	0	10.00	$0
Borrow Excavation Zone 3, **See (J)**	C.Y.	230,182	16.00	$3,682,916
				$0
EARTHWORK TOTAL	=			$6,487,372

Suggested procedure for calculating earthwork:
A) Determine Typical section (number of lanes, median widths, side slopes, etc.).
B) Get latest topography map available.
C) Plot proposed alignment on topo map.
D) Develop profile using topo controls such as existing roads, streams, rivers and design manual.
E) Calculate Areas for the typical section in 1 foot increments of cut or fill.
F) At 10 to 60 foot intervals (depending on frequency of X-section changes) calculate the earthwork.
G) Calculate any other significant earthwork (ramps, cross-roads, etc.).
H) Make appropriate earthwork corrections for the pavement box and striping. Use 21 inch depth for rigid pavement, 26 inch depth for all flexible pavement and 4 inch depth for stripping.
I) Deduct any roadway excavation from borrow required to calculate Borrow Excavation Zone 3.
J) See Construction Cost Estimate Work Sheet (Section 3.1). This worksheet must be utilized for the most recent price information.

PAVEMENT

12 FOOT WIDE LANE (from subgrade up)

Pav't. Type	Description of Pavement	Cost/Linear Foot
A	10 inch R.C. Pavement	156.00
B	2 inch HMA Surf. Crs. & 8 inch HMA Base	61.00
C	3 inch HMA Surf. Crs. & 4 inch HMA Base	46.00
D	2 inch HMA Surf. Crs. & 2 inch HMA Base	22.00
E	Bridge Approach & Transition Slabs	156.00
	(Resurfacing Portion only F & G)	
F	2 inch HMA Surface Course	8.25
G	3 inch HMA Surface Course	12.00
H	Milling 2 inch	3.00

Computation Table for Pavement. Cost

Type	Cost from table above	x Length	x Pavement *W.F.	= Amount
C - Ocean Drive	46	8680	3.33	$1,329,602
C - Access Rd	46	600	3.17	$87,492
D - Long Driveway	46	875	2.08	$83,720
D - Driveways	22	1638	1.00	$36,036
D - Temporary Pavement	22	8680	0.92	$175,683
				$0
				$0
				$0
				$0

				$0
PAVEMENT TOTAL			=	$1,712,534

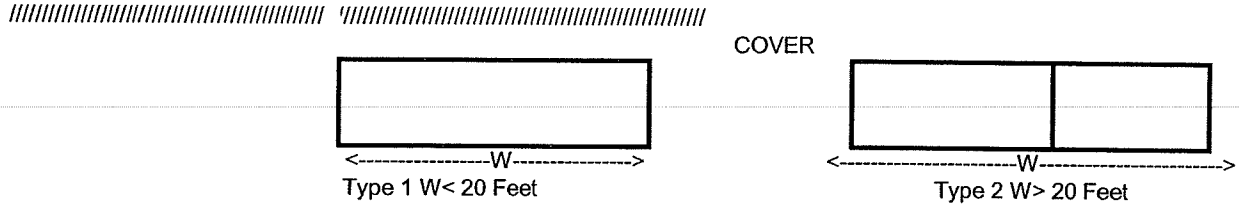
*Width Factors = Ratio of 12 foot wide lane to actual pavement width.

Example = actual pavement width = 25 foot = 25/12 = 2.08 W.F.

CONTEXT SENSITIVE DESIGN

Attach additional sheet detailing items and costs of context sensitive design work = $250,000

CULVERTS



Type	Layout (3)	Skew (1)	Cover (2)	Cost Per Sq. Foot
Type 1	Area w x L exceeds 1000 Sq. Feet	0-60 degrees	0 to 10'	114.75
			10' to 20'	147.25
	Short Culverts Difficult Conditions under 1000 Square Feet	0-60 degrees	0 to 10'	203.50
			10' to 20'	235.00
Type 2	Area w x L exceeds 1000 Sq. Feet	0-60 degrees	0 to 10'	121.75
			10' to 20'	152.50
	Short Culverts Difficult Conditions under 1000 Square Feet	0-60 degrees	0 to 10'	203.50
			10' to 20'	235.00

For skews over 60 degrees it will be necessary to make a special analysis and establish a square meter price comparable to above.

Description	Area Computation	x Cost per Sq. Foot	= Amount
Sta. 126+ 50, Type 1	1374	114.75	$157,667
			$0
			$0
			$0
		Culvert Total =	$157,667

BRIDGES

For the Bridge Sketch see the Construction Cost Estimation Preparation Manual

1 to 3 spans and 2 side spans (Max. Span 100 feet)

H = Clear Height 14 To 23 feet (4)

L = 100 to 400 feet & all viaducts over 400 feet (5)

Class	Layout	Skew (1)	Foundation (2)	Cost per Sq.Foot
I	Width at Least 45 feet	0 to 40 Degrees	No Piles	134.75
			Piles at Stub Abut.	159.75
			Piles at Piers & Stu	174.75
		40 to 60 Degrees	No Piles	145
			Piles at Stub Abut.	168.25
			Piles at Piers & Stu	181.25

For the Bridge Sketch see the Construction Cost Estimation Preparation Manual
1 to 3 spans and 2 side spans (Max. Span 100 feet) (3)
H = Clear Height 14 feet (4)
L = under 400 feet

Class	Layout	Skew (1)	Foundation (2)	Cost per Sq.Foot
II	L exceeds W Area L x W exceeds 4500 Sq. Feet	0 to 40 Degrees	No Piles	176.5
			On Piles	187.25
		40 to 60 Degrees	No Piles	219.75
			On Piles	273.25
III	W exceeds L Area L x W exceeds 4500 Sq. Feet	0 to 40 Degrees	No Piles	226.75
			On Piles	299.25
		40 to 60 Degrees	No Piles	241.5
			On Piles	310
IV	Width 30 - 45 feet Area W x L under 4500 Sq. Foot	0 to 40 Degrees	No Piles	295.5
			On Piles	396.75
		40 to 60 Degrees	No Piles	318.25
			On Piles	416.25

For the Bridge Sketch see the Construction Cost Estimation Preparation Manual
1 to 2 spans (Max. Span 125 feet)
H = Clear Height 14 feet (4)
L = 100 to 250 feet

Layout	Skew (1)	Foundation (2)	Cost/ Sq. Foot
Width at Least 40 feet	0 to 40 Degrees	No Piles	157.00
		Piles at Semi-Stub Abut.	182.00
		Piles at Piers & Semi-Stub Abut.	204.50
Minimum Length 100 feet	40 to 60 Degrees	No Piles	166.50
		Piles at Semi-Stub Abut.	194.75
		Piles at Piers & Semi-Stub Abut.	217.50

			0
Length	Width	Cost per SF	Bridge Total

1. For skews over 60 degrees it will be necessary to make a special analysis and establish a square foot price comparable to above.

2. For very bad foundation conditions requiring unusual lengths or spacing of piles, it will be necessary to establish a square foot price.

3. For longer spans, adjust the cost per square foot to reflect increased cost of structural members.

4. For span bridges, it is expected the length of the side span will be in- creased in proportion to any increase in height. Because of the resultant increase in deck area, the square foot price will remain approximately the same in the range of heights

5. For structures over 400 foot long (viaducts), reduce the cost per square foot if repetitive span length and forming can be used. Reduce by $0.50 for lengths from 400 to 600 feet and by $1.00 for lengths over 600 feet. (Do not forget adjustments (3) a

6. For statically indeterminate structures, square foot prices will have to be established.

Structure Description	Calculated Sq. Foot of Bridge Deck	x Cost Per Square Foot	= Amount
			0.00
			0.00
			0.00
			0.00
			0.00

			0.00
			0.00
			0.00
			0.00
			0.00
			0.00
			0.00
		Sub Total	0.00
Clearing Site Bridge *0-3% of Sub Total			0.00
	%		

BRIDGE TOTAL $0

*Pick appropriate percent based on the size, type and materials of existing structure

DRAINAGE (includes inlets and cross drains)

Rural	1.65	364356	$601,187
	project length (miles)	x cost per mile	= Amount
Urban	0	544280	$0
	project length (miles)	x cost per mile	= Amount

The above are the total costs of basins, manholes, longitudinal and transverse pipes, underdrains, headwalls, protecting curbs, aprons, etc. for a divided highway with a depressed median. The costs are assumed to apply to 4, 6 or 8 lane sections since th

Frontage Road & Ramp Drainage

0

1475	55	$81,125
length of ramp or frontage rd. in feet	x cost per foot	= Amount

DRAINAGE TOTAL = $682,312

INCIDENTAL ITEMS

Item	Cost / L.F.	x Quantity	= Amount
Beam Guide Rail	$16.75	15810	$264,818
9" X 16" Conc. Vertical Curb	$13.75	935	$12,856
Sidewalk	$23.00	882	$20,286
Toll Plaza	$1,114,000.00	1	$1,114,000
Wetlands	$0.00	0	$1,113,151
Fence 6 Foot High	$18.25	0	$0
15" X 41" Conc. Barrier Curb	$50.25	0	$0
24" X 41" Conc. Barrier Curb	$73.25	0	$0
24" X Variable Conc. Barrier Curb	$46.00	0	$0
Sign Bridge	$308,000.00	0	$0
Cantilever Sign Structure	60,500	0	$0
INCIDENTAL ITEMS TOTAL =			$2,525,111

LANDSCAPE

	Quantity	x Unit Prices	= Amount
Topsoil and Seeding (Mainline) Length of Project in miles	1.64	112,815	$185,017
Planting (Mainline) Length of Project in miles	0	64,500	$0
Topsoil, Seeding, Planting (Finger Ramp			

Number of Finger Ramps	0	12,500	$0
Topsoil, Seeding, Planting (Loop Ramp)			
Number of Loop Ramps	0	20,000	$0
Topsoil, Seeding (Access Road)			
Length of Access Road in Feet	0.28	7.9	$2
LANDSCAPE TOTAL =			$185,019

NOISE ABATEMENT

	Unit	Quantity	x Cost	= Amount
Noise Wall	L.F.	0	305.00	0
				0
				0
				0
NOISE ABATEMENT TOTAL =				0

GENERAL ITEMS

Item	Project Length (miles)	x Cost/Mile	= Amount
Field Office	1.65	44,260	$73,029
Materials Field Laboratory	1.65	28,970	$47,801
Erosion Control during Constructic	1.65	64,375	$106,219
GENERAL ITEMS TOTAL =			$227,048

SUMMARY

Route	Ocean Drive - Alternative 3g	Section/Proj. Id. #	0.00
PM	Dale Foster, PE	UPC No.	0.00

Work Type	Totals from other pages
Earthwork	$6,487,372
Pavement	$1,712,534
Context Sensitive Design	$250,000
Bridge - Mill Creek	$2,527,200
Bridge - Middle Thorofare	$58,579,200
Bridge - Upper Thorofare	$2,956,500
Retaining Wall	$1,858,400
Drainage	$682,312
Incidental Items	$2,525,111
Landscape	$185,019
Noise Abatement	$0
General Items	$227,048
Wick Drains	$1,724,138
Geotechnical Instrumentation	$525,482
PROJECT SUBTOTAL	$80,240,315

Other Items	Proj. Subtotal Range	Choice	Amount
Lighting, Traffic Stripes, Signs and Delineators	80240315.33	3% of Proj. Subtotal	$2,407,209
Maintenance of Traffic	80240315.33	7% of Proj. Subtotal	$5,616,822
Training	80240315.33	1% of Proj. Subtotal	$802,403
Mobilization	80240315.33		$8,024,032
	Project Cost < 5.0 (Mil.)	9% of Proj. Subtotal	

	Project Cost 5.0 & above	10% of Proj. Subtotal	
Progress Schedule	Project Cost(Mil.)	$	$58,000
	Less than 2.0	0	
	2.0 to 5.0	6,000	
	5.0 to 10.0	8,000	
	10.0 to 20.0	15,000	
	20.0 to 30.0	30,000	
	30.0 to 40.0	40,000	
	40.0 & above	58,000	
Clearing Site	Project Cost (Mil.)	$	$490,000
	Less than 1.0	15,000	
	1.0 to 2.0	30,000	
	2.0 to 5.0	45,000	
	5.0 to 10.0	115,000	
	10.0 to 20.0	220,000	
	20.0 to 30.0	240,000	
	30.0 to 40.0	250,000	
	40.0 & above	490,000	
Construction Layout	Project Cost(Mil.)	$	$890,000
	Less than 1.0	7,000	
	1.0 to 2.0	20,000	
	2.0 to 5.0	42,000	
	5.0 to 10.0	87,000	
	10.0 to 20.0	160,000	
	20.0 to 30.0	220,000	
	30.0 to 40.0	490,000	
	40.0 & above	890,000	
		PROJECT TOTAL	$98,528,782

CONTINGENCIES & ESCALATION

Y = Number of Years until midpoint of construction duration plus number of years until construction start. If midpoint is less than 2 years from the date of this estimate, no escalation is required. Maximum value = 10%		Y 5.50	
$98,528,782	1.000	1.10	$108,381,660
Project Total	Contingencies (1+C)	1 + [0.01 (Y+1) (Y-2)]	Construction Estimate for PD

Project Cost(Mil.)	Contingencies (C) Percent	Average Construction Duration in Years
0-10	3%	1
10-20	2.50%	2
Over 20	2%	3

CONSTRUCTION ENGINEERING (CE)

Project Cost (Mil.)		% of Construction Cost
Less than 1.0		31.10%
1.0 to 5.0		20.30%
5.0 to 10.0		16.20%
10.0 & above		12.20%

CONSTRUCTION ENGINEERING AMOUNT $13,222,562.48

CONSTRUCTION CHANGE ORDER CONTINGENCIES

Total Federal Participating Items in Millions of $	Construction Change Order Contingency Amount
$0 to 0.1	$6,000

0.1 to 0.5	25,000
0.5 to 5.0	25,000 + 4% of amount in excess of $500,000
5.0 to 10.0	205,000 + 3% of amount in excess of $5,000,000
10.0 to 15.0	355,000 + 2% of amount in excess of $10,000,000
15.0 and above	455,000 + 1.5% of amount in excess of $15,000,000 - max $500,000

For State Funded Projects, Contingencies for Change orders = 0

CHANGE ORDER CONTINGENCY AMOUNT $500,000

UTILITIES RELOCATIONS BY COMPANIES/OWNERS

$108,381,660	0.055	$5,960,991
Construction Cost for Initial Estimate	for Urban use 0.12, Rural 0.055 or + Estimate Use % or utilities detailed estimate	= Utility Relocation Cost for Initial Estimate

If there are no utility relocations on the project indicate "No Utilities" in the box above.

RIGHT OF WAY COST $562,725

If there is no ROW cost on the project indicate "No ROW" the box
Only includes costs for acquisition of land and easements.

SUMMARY

Highway & Related Costs	$34,465,882
Bridge Costs	$64,062,900
Construction Subtotal	*$98,528,782*
Utilities Relocations	$5,960,991
Escalation	$9,852,878
Contingencies	$500,000
Construction Engineering (CE)	$13,222,562
Construction, Design & Utilities Subtotal	*$128,065,213*
Right of Way Cost	$562,725
Project Total	**$128,627,938**

Appendix D
Project Correspondence & Coordination

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 #	

portunity Employer
aper

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

cc: TAF, S. Belz, J. Mc
M. Sand
File

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

June 2, 2003

Thomas A. Fisher
Parsons Brinckerhoff-FG, Inc.
Consulting Engineers
506 Carnegie Center, 2nd Floor
Princeton, NJ 08540

Re: Ocean Drive (CR 621) Upgrade and Bridge Replacement Project

Dear Mr. Fisher:

Enclosed, for your records, please find a copy of NJ Department of Transportation Bureau of Environmental Services letter dated May 16, 2003 to NJ State Historic Preservation Office regarding consultation on area of potential effects for the referenced project.

Should you have any questions, please do not hesitate to contact me.

Very truly yours,

Dale M. Foster, P.E.
County Engineer

DMF/ja

enc.

JUN 4 2003

State of New Jersey
DEPARTMENT OF TRANSPORTATION
P.O. BOX 600
TRENTON, NJ 08625-0600

RECEIVED
MAY 2 3 2003
CAPE MAY COUNTY
ENGINEER

JAMES E. MCGREEVEY
Governor

JOHN F. LETTIERE
Acting Commissioner

May 16, 2003

Dorothy P. Guzzo, Administrator
NJ Department of Environmental Protection
Historic Preservation Office
P.O. Box 404
Trenton, NJ 08625-0404

Attn: Transportation and Planning Group

Re: Ocean Drive Upgrage and Bridge Replacements
Lower Township, Cape May County, New Jersey
Consultation on Area of Potential Effects

Dear Ms Guzzo:

Cape May County is proposing improvements to Ocean Drive the following bridges: Ocean Drive over Mill Creek (Structure No. 0500029), Ocean Drive over Upper Thorofare(Structure No. 0500030), and Ocean Drive over Middle Thorofare(Structure No. 3100006) using funds provided by the Federal Highway Administration (FHWA) via the New Jersey Department of Transportation (NJDOT) and the South Jersey Transportation Planning Organization, Inc. (SJTPO). Cultural resources studies will be initiated by Richard Grubb & Associates, Inc. Prior to initiating this work, I am writing to you to seek your concurrence on three items in accordance with the provisions of the revised 36 CFR Part 800 regulations–the definition of the areas of potential effects (APEs), lists of interested historic preservation groups and consulting parties, and the public outreach plan.

The area of potential effects for both the historic architecture and archeological studies was defined on the basis of the proposed scope of work, the alternatives under consideration and an understanding of the potential for effects. An *Area of Potential Effects Report* has been prepared by the consultant for your review and concurrence. For your convenience, a concurrence line has been provided at the conclusion of this letter.

The consultants have researched information previously provided by your staff and others, and have compiled a list of local historic preservation groups and individuals with an identified interest in preservation who may be concerned about the project. I would appreciate it if you

would review your files to see if any additional individuals/groups should be included on this list. It is intended that the individuals/groups included on this list be invited to future public outreach efforts for the project, and the public outreach plan is included with the report. Consulting parties will be provided an opportunity to formally comment on the cultural resources studies and mitigation measures should they become necessary.

As the county is anxious to move forward with these studies, I would appreciate your review of the enclosed information, being informed of any necessary changes and receiving your concurrence with the definition of the APE within the 30 day time frame allowed for project reviews. Should you have any questions during the course of your review, please call Christina McClelland at (609) 530-6690.

Very truly yours,

Manager
Bureau of Environmental Services

Enclosure

Cc:	Tom Chelius, SJTPO	w/o enclosure
	Dale Foster, Cape May County	"
	Lourdes Casteneda, FHWA	"
	Steven Moy, NJDOT Local Aid	"

_____ I concur with the Area of Potential Effects as described in the July 2000 (revised January 2003 and March 2003) *Area of Potential Effects Report* prepared by Richard Grubb & Associates, Inc., the list of consulting parties, and public outreach plan, as described in the enclosures to this letter.

_____ I concur on the condition that the following modifications are made:

_____ _____

Dorothy Guzzo
Deputy State Historic Preservation Officer

Date

20020B
File
cc: TAF, SB, J Maloney, MS

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:

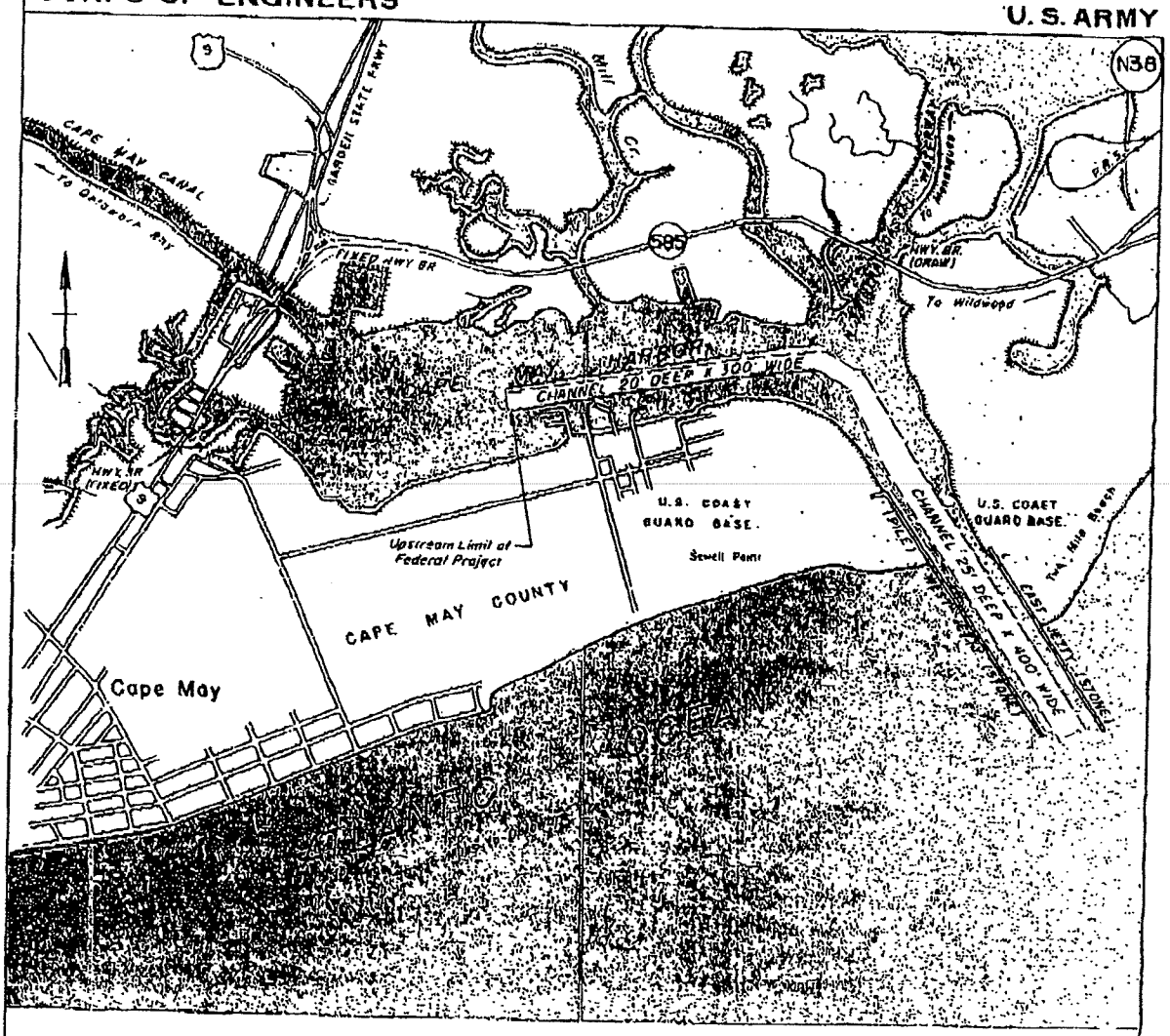
	New Work	Maintenance	Rehabilitation	Total
United States Funds	$929,275 1/	$6,411,612	$1,134,346	$8,475,233
Contributed Funds	100,000	-		100,000
Total Costs	$1,029,275 1/	$6,411,612	$1,134,346	$8,575,233

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.

cc: TAF, JEM, SB, MAS
c. klm
ASGE

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-03/186

APR 15 2003

APR 14 2003

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.

Parsons Brinckerhoff
506 Carnegie Center
Princeton, NJ 08540-6243
609-734-7000
Fax: 609-734-6900

March 6, 2003

Clifford Day, Supervisor
US Fish and Wildlife Service
Ecological Services
927 North Main St. (Bldg. D1)
Pleasantville, NJ 08232

RE: Request for Technical Assistance – Migratory Birds
CR 621 - Ocean Drive Upgrade and Middle Thorofare Bridge Replacement
Lower Township and Wildwood Crest Borough, Cape May County, NJ
ES-02/192

Dear Mr. Day:

On behalf of Cape May County and the South Jersey Transportation Planning Organization, Parsons Brinckerhoff – FG, Inc. is conducting an Alternatives Analysis (AA) for the above referenced project. The purpose of the AA is to evaluate the environmental, economic and social implications of each project alternative so that a preferred alternative can be selected that avoids and/or minimizes adverse impacts to the maximum extent practicable pursuant to the National Environmental Policy Act of 1969 as amended (83 Stat. 852; 42 U.S.C. 4321 *et seq.*). I am writing to request USFWS technical review and comment, regarding potential for impact to Migratory Birds resulting from the proposed Cable Stayed Alternative.

Project Description
The project consists of the proposed reconstruction of Ocean Drive (County Route 621) for approximately 2.8 miles extending from NJ Route 109 (a.k.a. southern terminus of the Garden Sate Parkway) to the Borough of Wildwood Crest in Cape May County. The location of the study area is shown in Figure 1.

The project will raise the elevation of Ocean Drive, a major coastal evacuation route, above the 100-year floodplain. The project will also entail the replacement and/or reconstruction of three (3) existing bridge structures crossing over Mill Creek, Upper Thorofare and Middle Thorofare. The existing bridge structures are currently functionally deficient and structurally obsolete.

The existing Middle Thoroughfare Bridge is a movable, bascule structure with a vertical clearance of 26 feet. In accordance with Federal Highway Administration Guidance at 23 CFR 650H Section 650.809, the Alternative Analysis is evaluating the feasibility of replacing the existing movable bridge with a fixed structure. The height of the fixed structure is established to accommodate the boats that utilize the navigable channel in accordance with guidance obtained by the US Coast Guard.

Administrative History
Your office previously provided technical information regarding the potential for involvement of federally listed endangered and threatened species within the vicinity of

the project area in a letter dated March 6, 2002 (ES-02/192). Additionally, representatives of your office provided review comments during a Joint Agency Meeting held on November 13, 2002.

Subsequent to the above agency coordination and in response to comments received from the public, the Federal Highway Administration and US Coast Guard, additional project alternatives have been included, hereafter alternative 3F and 3G.

Middle Thorofare Bridge Replacement Project Alternatives
Seven (7) alternative alignments and three (3) structure designs for the Middle Thorofare bridge replacement are currently under consideration (Figure 2, 3 and 4). The alternatives were developed to address concerns raised during public meetings and agency coordination summarized as follows:

- Provide sufficient vertical clearance necessary to maintain navigation
- Minimize impact to existing fishing industry
- Reduce disruption to traffic resulting from the existing bascule bridge openings
- Minimize impact to significant cultural resources, and
- Minimize impact to significant coastal resources including, but not limited to, placement of fill within wetlands and waters.

The alternatives currently under consideration include the following:

Alternative	Bridge Type and Description	Alignment	Design (Vertical Clearance)
3A	Bascule on Shifted Alignment	South	Movable (45 ft)
3B	Bascule on Shifted Alignment	North	Movable (45 ft)
3C	Fixed on New Alignment	North	Segmental (116 ft)
3D	Fixed on New Alignment	North	Segmental (75 ft)
3E	Fixed on Shifted Alignment	South	Segmental (116 ft)
3F	Fixed on New Alignment	South	Segmental (116 ft)
3G	Fixed on New Alignment	South	Cable Stayed (116 ft)

Alternatives 3F and 3G results in minimal loss to wetlands and waters of all the alternatives under consideration (Table 1). Both alternative 3F and 3G are proposed along the same alignment. Alternative 3F is a segmental structure with a minimum of 116 feet of vertical clearance above the navigable channel and a total maximum structure height of approximately 125 feet. Alternative 3G is a Cable Stayed design with a maximum structure height of 300 feet.

Alternative 3G (Cable Stayed)
Alternative 3G consists of a Cable Stayed bridge design located along a new alignment to the south of the existing Middle Thorofare Bridge. This alternative consists of an 860 foot horizontal span across Middle Thorofare adjoined by two, 370-foot approach spans. Cables extending from two main towers would support the structure. The main towers extend approximately 180 feet above the proposed roadway elevation. The roadway would allow a minimum of 116 feet vertical clearance to accommodate passage of tail

ships that require access to the commercial fishing industry located along the Upper, Middle and Lower Thorofare. The total height of the structure would be 300 feet.

Alternative 3G has the following environmental, economic and social benefits:

- Replaces the movable structure across Middle Thorofare with a fixed bridge
- Allows for minimum 116 foot vertical clearance and maximizes the width of the navigable channel of Middle Thorofare
- Avoids and/or minimizes disruption and/or loss to existing business
- Minimizes traffic disruption during and following construction
- Reduces impacts to wetlands and waters
- Utilizes an existing dredge spoils area adjacent to Upper Thorofare
- Minimizes impacts to Essential Fish Habitat and other coastal resources
- Avoids encroachment within adjacent Marmora Wildlife Management Area

Request for Technical Assistance

We would appreciate your review of the Alternatives 3F and 3G with respect to potential for impacts to federally listed species. We would also appreciate your technical assistance regarding the following:

1. The potential for adverse impact to migratory birds as a result of the cable stayed design alternative across Middle Thorofare, and

2. Measures that can be taken into consideration during design of the cable stayed alternative that may minimize potential for adverse impact to migratory birds and/or federally listed species.

Any additional comment you can provide regarding the other alternatives under consideration would be welcome. Thank you for your time and attention. If you have any questions please contact me at 609-734-7012.

Very truly yours,
Parsons Brinckerhoff-FG-Inc.

Steven Balzano
Principal Environmental Scientist

Enclosures

Table 1 Wetland and Open Water Impact Summary
Figure 1 USGS Project Location Map
Figure 2 Project Location/Alternatives
Figure 3 Middle Thorofare Bridge Alternatives
Figure 4 Bridge Design Alternatives

Cc: CF 20020B-6.0
C/H 20020B-6.2
TAF, SB, JEM
D. Foster, Cape May County

Meeting Minutes

Attendees: Representatives from NJDOT, NJDEP-HPO, Cape May County, PB, and Grubb (See attached attendance sheet)

Date: February 25, 2003

Location: NJDOT Local Aid Office, Cherry Hill, NJ

Subject: **Ocean Drive Improvements and Bridge Replacements**
Lower Township, Cape May County
SHPO and Cultural Resource 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 for almost any type of storm in Cape May County. The project will also replace three functionally and/or structurally obsolete bridges, including the major structure over Middle Thorofare. This meeting was conducted to determine additional or specific requirements for the scoping study's Alternative Analysis that may be necessary due to the significant environmental and social issues associated with the project vicinity.

The meeting began with brief introductions and a history of the project by Dale Foster (Cape May County). Tom Fisher (PB) then presented an overview of the project's development with specific attention given to the development of 6 alternatives and the existing Middle Thorofare Bridge which is both functionally obsolete and structurally deficient. The existing bridge features a 50-foot wide channel and a 26-foot vertical clearance, which substantially impedes the operations of the local fishing industry. Tom gave a brief description of each alternative's alignment, profile, and proposed bridge type. They are listed below:

Alt. 3A – Existing Alignment, Proposed Bascule Bridge, 45-foot vertical clearance
Alt. 3B – Existing Alignment, Proposed Bascule Bridge, 45-foot vertical clearance
Alt. 3C – New Alignment, Fixed Bridge, 116-foot vertical clearance
Alt. 3D – New Alignment, Fixed Bridge, 75-foot vertical clearance
Alt. 3E – Existing Alignment, Fixed Bridge, 116-foot vertical clearance
Alt. 3F – New Alignment, Fixed Bridge, 116-foot vertical clearance
(Note: Following the meeting, Alternative 3F was subsequently changed to 3F – Segmental Structure and 3G – Cable Stayed Structure).

Tom explained the history of the project and the involvement of the local fisheries and community, which have led to the development of these alternatives. He stated that the key interest of the general public in the area was eliminating the traffic disruptions caused by the frequent openings of the movable bridge. There are about 7500 openings per year that are "on demand" and the USCG is hesitant to develop a new regulation to change this.

The fishing industry's main concern is future growth of the fishing industry that is presently limited by the horizontal clearance at the movable span that is presently 50 feet between fenders. Vessels typically hit the bridge about 7 times per year. These hits are due to the narrow opening and the skew of the water flow to the bridge. PB has been given detailed dimensions of a refrigeration vessel that the industry would like to be able to dock at Atlantic Cape Fisheries and/or Lund Fisheries in the future. This vessel is 108 feet tall, 59 feet wide and 400 feet long. Dock access by this vessel would minimize the handling of the fish and thus improve efficiency of the industry in this port.

Tom reported that the fisheries and community did not support Alternatives 3B and 3D due to their severe impacts to local businesses and wetlands. He also discussed the in-progress vessel height survey, which will be used to determine the ideal vertical clearances required for each of the proposed structures being considered. He stated that raising the movable bridge to 45 feet would eliminate approximately 30% of the openings and that while raising it to 55 foot would eliminate approximately 40% of the openings based on the data available at this time, it would result in substantial ROW and economic impacts. He reported that the US Coast Guard has expressed preference for any alternative in which the structures do not impede the present or future needs of the local fishing industries. He also informed the attendees that a kick-off meeting with the USCOE and other environmental agencies was already conducted with a primary concern being impact to wetlands.

Alignment 3F was introduced at this meeting. The alignment is approximately 350 feet south of the existing bridge. This alignment will be able to accommodate either a segmental bridge with spans of 350 feet or a cable stayed bridge with a main span of 860 feet. The cable stayed span would likely have a tower 300 foot above the water (180 feet above the roadway).

Several comments and questions were raised. They are listed below.

- Glenn (Grubb) stated that the cable stayed bridge would have a 2.5 mile view shed. A map was distributed with the previously identified historic resources. He asked what type of survey would be required for the cable stayed option.

- Andrea (NJDEP-HPO) suggested a balloon test or a crane test at 300 foot above the water. She stated that there was a current survey of the Hotels in Wildwood.

- Tom re-stated that FHWA does not favor movable bridges and pointed to the smaller view shed for the segmental bridge option.

- Steve (PB) then gave a brief overview of the various impacts associated with the alternatives, noting that the tabulated Wetlands impacts that were provided to the attendees. In particular, Alternative 3F was tabulated to have the least amount of impacts and could be easily mitigated. No other major environmental impacts were expected, with the exception of possible construction activity restrictions to protect endangered sea turtles. Other species are present in the vicinity, but no adverse impacts are anticipated. Steve noted that the cable stayed option might be of concern since the Cape May area is a major migratory bird flyway.

- Tom said the borings are being performed to determine relative construction cost and will be shown in the alternative analysis and used to select an IPA.

- Tom noted that a socio-economic study needs to be incorporated into the alternative analysis report and shown on a matrix. A meeting with the local businesses is scheduled in the near future

- Dale informed everyone that the substructure cost for the OCLP bridge was approximately 65% of the overall cost.

- Sal asked on the frequency of the 108 foot tall refrigerated vessel. Tom responded that the vessel would likely be once a month but could not confirm that at this time. Tom also stated that even with a new movable bridge the openings would only be reduced by a maximum 40 percent at this time.

- Steve asked if SHPO would find a phased approach acceptable to address cultural resource impacts attributed to the cable stayed alternative.
- Andrea agreed to waive all identifications in the yellow and green areas as shown on the Grubb map and requested that the lighthouse be included in the map.
- Lauralee asked if there has been a coastguard evaluation. (yes in 1994)
- Andrea is concerned with the areas that were not previously studied. Lauralee added that she feels there will not be a need for ships and the parkway to be studied. Andrea stated she was not concerned with the parkway.
- Lauralee suggested that there would not be a need for a big survey if the cable stayed option is not feasible due to the migratory bird issue. The issue should be pursued with the proper agency such as Fish and Wildlife. Lauralee also suggested that PB explore how the bird issue was addressed for the C&D Canal Bridge.
- Andrea requested that Glenn identify buildings over 50 years old within the viewshed of alternative 3F for the cable stayed option. She also wanted to proceed with intensive level architectural survey for the segmental bridge in alignments E and F (see Fig. 4 in the APE document).
- Andrea suggested looking at the edges of the red and in marshy areas for the cable stayed bridge option. She said to compare 1950 vs. 1995 aerial surveys to see scope of surveyed area. Need to take photos, base survey form, and assign an internal number and locations for each property on a big map in order to only have to map the area once.
- Glenn asked if Cape May should be treated as a district and a windshield study be performed.
- Lauralee said there would be a need for a windshield study but not in the district.
- Lauralee requested that the APE be revised
- Steve said that figure 4 in the APE would include 3F (non-cable stayed). He asked if a movable structure survey would still be required since there are no displacements or additional impacts.
- Andrea agreed that a survey would not be required, but PB must look at the vessels associated with buildings. She suggested PB ask the fisheries if they are there.
- Laura stated that a vessel survey for boats over 50 years old is not required since it is not changing any relationships.

Local Aid Meeting: Mill Creek, Upper Thorofare, and Middle Thorofare Bridges and Ocean Drive (CR 619) Upgrade Project

Distribution List

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Mill Creek, Upper Thorofare and Middle Thorofare Bridges
And Ocean Drive (CR 619) Upgrade Project
Lower Township, Cape May County

Meeting of 2/25/03; Local Aid, Cherry Hill Office

Name	Affiliation	Telephone No.	E-Mail Address
Chris Bergeman	NJDOT - Local Aid	(856) 486-6714	chris.bergeman@dot.state.nj.us
Dale Foster	Cape May County	609 465-1035	countyengineer@co.cape-may.nj.us
SAL MIKHAEL	NJDOT - LOCAL AID	(856) 486-6787	Salim.Mikhael@dot.state.nj.us
Glenn Modica	Richard Grubb	609-655-0692	gmodica@richardgrubb.com
Lauralee Rappleye	NJDOT - Environ Services	609-530-2990	lauralee.rappleyemarsett@dot.state.nj.us
Steven Balzano	PB	609-734-7012	balzano@pbworld
Tom Fisher	PB	609-734-7046	fisher@pbworld.com
Jim Maloney	PB	609-734-7013	maloneyj@pbworld.com
Miguel Santiago	PB	609-734-6957	santiagom@pbworld.com
Andrea Tingey	NJDEP - HPO	609-984-0539	Andrea.tingey@dep.state.nj.us
Steve May	NJDOT - Local Aid	856-486-6618	Steve.May@dot.state.nj.us

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.)

J. Maloney

Meeting Minutes

Attendees: Representatives from FHWA, NJDOT, NJDEP-HPO, Cape May County, Cape May County Bridge Commission, PB (See attached attendance sheet)

Date: January 13, 2003

Location: FHWA Offices, West Trenton, 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 for almost any type of storm in Cape May County. 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, seek critical flaws, and determine additional or specific requirements for the scoping study's Alternative Analysis that may be necessary due to the significant environmental, economic and social issues associated with the project vicinity.

The meeting began with brief introductions by Christopher Bergeman (NJDOT) and Dale Foster (Cape May County). Tom Fisher (PB) then presented an overview of the project's development with specific attention given to the development of 5 alternatives and the existing Middle Thorofare Bridge which is both functionally and structurally obsolete. The existing bridge features a 50-foot wide channel and a 26-foot vertical clearance, which substantially impedes the operations of the local fishing industry. Tom gave a brief description of each alternative's alignment, profile, and proposed bridge type. They are listed below:

Alt. 3A – South Shift, Proposed Bascule Bridge, 45-foot vertical clearance
Alt. 3B – North Shift, Proposed Bascule Bridge, 45-foot vertical clearance
Alt. 3C – New Alignment, Fixed Bridge, 70-foot vertical clearance
Alt. 3D – New Alignment, Fixed Bridge, 70-foot vertical clearance
Alt. 3E – South Shift, Fixed Bridge, 70-foot vertical clearance

Tom explained the history of the project and the involvement of the local fisheries and community, which have led to the development of these alternatives. He stated that the key interest of the general public in the area was eliminating the traffic disruptions caused by the frequent openings of the movable bridge. There are about 7500 openings per year that are "on demand" and the USCG is hesitant to develop a new regulation to change this.
The fishing industry's main concern is future growth of the fishing industry that is presently limited by the horizontal clearance at the movable span that is presently 50 feet between fenders. Vessels typically hit the bridge about 7 times per year. These hits are due to the narrow opening and the skew of the water flow to the bridge. PB has been given detailed dimensions of a refrigeration vessel that the industry would like to be able to dock at Atlantic Cape Fisheries and/or Lund Fisheries in the future. This vessel is 108 feet tall, 59 feet wide and 400 feet long. Dock access by this vessel would minimize the handling of the fish and thus improve efficiency of the industry in this port.
Tom reported that the fisheries and community did not support Alternatives 3B and 3D due to their severe impacts to local businesses and wetlands. He also discussed the in-progress vessel height survey, which will be used to determine the ideal vertical clearances required for each of the proposed structures being considered. He stated that raising the movable to 45 feet would eliminate about 1500 openings a year, based on the data available at this time. He reported that the US Coast Guard has expressed preference for either Alternative 3A or 3C, given that the structures do not

impede the present or future needs of the local fishing industries. He also informed the attendees that a kick-off meeting with the USCOE and other environmental agencies was already conducted.

Steve Balzano (PB) then gave a brief overview of the various impacts associated with the alternatives, noting that the tabulated Right of Way impacts that were provided to the attendees, did not accurately assess access impacts to the properties. In particular, Alternative 3B was tabulated to have less ROW impacts than Alternative 3A, however Alternative 3B would more severely impact the operations of local businesses, causing more significant economic impacts to the area. Steve also noted that other than substantial wetland impacts, no other major environmental impacts were expected, with the exception of possible construction activity restrictions to protect endangered sea turtles. Other species are present in the vicinity, but no adverse impacts are anticipated.

Several comments and questions were raised. They are listed below.

- Shay Burrows (FHWA) inquired about Alt 3E. Tom Fisher presented the alternative, and explained that it was not acceptable because it limits the future growth of the fishing industry. Shay then asked if Alt. 3E was prepared with a 110' vertical clearance. After being informed that this alternative had not been prepared using 110 feet, he stated that it should be as part of the Alternatives Analysis. Detailing the actual impacts and cost for this alternative would be necessary to substantiate Alternative 3A or 3C.
- Tom Fisher noted that the Middle Thorofare Bridge is one of four identical bridges that may be eligible as a historic bridge. Two of the other three bridges are on low volume roadways and Dale intends to maintain these two in their present configuration. At this time the Middle Thorofare Bridge is the only one that the County seeks to replace (due to high volume and geometric and structural deficiencies).
- Shay clarified FHWA's policy on constructing new moveable bridges. The regulations specify that no new moveable structures should be built unless severe social, economic, environmental or engineering concerns would result from constructing a fixed bridge. He provided copies of the regulations to interested attendees. He further explained that a life cycle cost analysis should be included in the analysis along with a thorough social impact analysis that would detail the loss of jobs, etc. as a result of a fixed structure.
- Lourdes Castaneda (FHWA) asked if Alternative 3C would impede fishing operations at the Two Mile Docks along Lower Throrofare. Tom Fisher noted that it would prevent the proposed 108-foot high vessel from docking at that location, however he also noted that the owners of the fisheries said that the vessel could dock at the Middle Thorofare location, and that Alternative 3C was acceptable to them.
- Shay asked if the fisheries in Wildwood were planning to expand. Dale explained that the fisheries in Wildwood were actually contracting due to increased commercial and residential development in that area.
- Shay inquired about the current and future jurisdiction of the Middle Thorofare Bridge. Dale replied that the Commission owns and operates the bridge and the County maintains the bridge. This arrangement will continue to operate the same way after the new bridge is constructed.
- Fred Sia (NJDOT) asked if Federal monies can be used to pay for the construction of a toll bridge. Shay explained that it can with the adoption of a third-party agreement. Dale indicated that such an agreement was already in place for the Middle Thorofare Bridge and had been for the Ocean City/Longport Bridge.
- Andrea Tingey (NJDEP-HPO) asked if any additional cultural resources were identified since the original project in 2000. Tom replied that no additional cultural resources were identified and noted that an updated APE report was being submitted. Further discussion revealed that an eligibility evaluation for moveable resources (vessels) may be required.

- Shay asked if there was a preferred alternative. Tom replied that while no alternative has been formally identified as preferred, Alternative 3A would probably require a CED, while Alternative 3C would probably require a full EA. Noting the significant additional time needed to begin construction of Alternative 3C, along with the apparent justification for a moveable structure, he indicated that Alternative 3A seems to be preferred. Dale Foster indicated that he still needs to evaluate which alternative would be preferred from the Commission's and County's viewpoint.
- Shay inquired how trucks currently enter Wildwood, since the Middle Thorofare Bridge is load posted. Dale explained that they use Rte. 47. He added that the Middle Thorofare Bridge traditionally has 7 vessel impacts per year due to its channel width. He indicated that Ocean Drive is the last roadway serving Wildwood to flood, demonstrating the importance of raising the roadway above the 100 year flood (from its current 25-year+/- flood elevation).
- Steve Moy (NJDOT) asked what year construction was expected to begin. Dale estimated 2007 or 2008.
- Shay asked if timed openings were considered. Dale replied that the Coast Guard will not permit them so as not to impede fishing operations which are determined by specific days and times. He added that most of the congestion (openings) is caused by sport fishermen and sailboats primarily on the weekends and during the summer season.

Attendance Sheet 1/13/03

Name	Organization	Phone
Tom Fisher - PM	PB	609-734-7046
Chris Bergeman	NJDOT-Local Aid	(856) 486-6114
LOURDES CASTANEDA	FHWA	609.637.4237
Sitan Burrows	FHWA	(609) 637-4239
Gerard A. Desiderio	CAPE MAY COUNTY BRIDGE COMMISSION	(609) 465-7806
Miguel SANTIAGO	PB	(609) 734-6957
Jim Maloney	PB	(609) 734-7013
Steven Balzano	PB	609-734-7012
Tom Fisher	PB	609-734-7046
Dale Foster	Cape May County	609 465-1035
Nicole Einthoven	DOT, Structures	609 530-5781
Steve May	NJDOT - Local Aid	856-486-6618
KUANGYU YANG	DOT - GEOTECH. ENGR	609-530-5302
FRED SIA	DOT STRUC. DESIGN	609-530-2566
JULES OROSZVARY	DOT - Env. Services	609-530-2729
Andrea Tingey	NJDEP-HPO	609-984-0539

TAF

Meeting Minutes

MILL CREEK/UPPER THOROFARE/MIDDLE THOROFARE BRIDGE REPLACEMENT SCOPING

Meeting Information:	**Date:**	December 12, 2002	**Time:**	1:00 pm
	Subject:	USCG Requirements Meeting	**Location:**	USCG OFFICE 431 Crawford St. Portsmouth, VA

Attendees:	Waverly Gregory	USCG	757.398.6629
	Bill H. Brazier	USCG – Bridges	757.378.6422
	Dale Foster	Cape May County	609.465.1035
	Gerard A. Desiderio	Cape May County	609.465.7806
	Tom Fisher	Parsons Brinckerhoff	609.734.7046

Minutes:

The purpose of the meeting was to introduce the project to the USCG and obtain their insight into the requirements to justify an Initially Preferred Alternative. Mr. Waverly Gregory chaired the meeting for the USCG. Waverly turned the meeting over to Dale Foster and Tom Fisher for their presentation.

Mr. Foster provided a brief history of Ocean Drive, the 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 Township (Wildwood). 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. There are 6 to 10 boat impacts with the bridge piers and fenders annually. The narrow bridge width reportedly limits the growth of the Cape Fisheries industry. The proposed movable bridge will have a width of 130 feet that will safely accommodate the broad-beamed fishing vessels and future use of the marina by larger vessels that may be 108 feet tall, 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 and have gotten significant assistance from Atlantic Cape Fisheries and the local people to obtain accurate information. Mr. Fisher said that if the Middle Thorofare bridge is raised to a height of 45 feet there may be a reduction of about 2500 openings per year. The current vertical clearance in the navigational channel 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. 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.

Alternatives A, B, C and D were described and discussed. The USCG liked Alternative C as a fixed alternative with 75 feet vertical clearance and a channel span over Middle Thorofare of 225 feet. The horizontal clearance at Lower Thorofare for this alternative was defined as about 130 feet with the bridge skewed to the waterway and the vertical clearance also set at 75 feet. Alternative A with a double leaf bascule span set at 130 feet fender to fender and 45 feet above MHW in the closed position was also viewed as acceptable to the USCG. If a fishing pier was to be included in these alternatives, then the plans for Alternative A would need to include the fishing pier since it is so close to the bridge. The fishing pier would not have to be shown on the plans for Alt. C since it is far from the existing bridge. Placing a fishing pier at the location of the old Upper Thorofare Bridge, instead of the Middle Thorofare Bridge may be acceptable too. A permit for the Fishing Pier would be required by the USACOE and not the USCG.

The USCG stated that the bridge should be as aesthetically pleasing as possible. All agreed that this would be a priority for the designer.

The one issue that the "public" had at the Public Information Center in June was the traffic backups that occur in the summer (as long as a mile in each direction) due to the bridge openings that are "on demand". Some of the public hoped that the new bridge would be a fixed bridge to eliminate the disruption to traffic. Dale stated that we informed the public that the new bridge, whether movable or fixed would have a new toll facility off of the bridge, probably on the east approach roadway and would have four lanes, two in each direction. One would be exact change and the other would be a manned booth.

The discussion then focused on setting "scheduled openings" for the movable bridge in order to alleviate conflict with periods of high traffic volumes. Dale stated that in the past the USCG did not like to control the openings in order to provide total access to the commercial fishing fleet. It was thought that since they typically go out very early, regulations could be set to provide scheduled openings at 15 minutes before and after the hour as is done in north central New Jersey locations, especially during the summer season—May thru September. The USCG does prefer not to do this if at all possible.

Closure of the bridge during construction of the new, and demolition of the old is a concern to the USCG. We will have to provide a reasonable window of time for the closure and prior notification of these closures. One leaf of the new double leaf bascule bridge that is away from the existing channel could be constructed in the down position and would not affect vessel traffic at all. Construction of the new leaf over the existing channel could be done in the up position, but the new concrete deck (if used) for that span would have to be poured in the down position, thus adversely affecting navigation. High early strength concrete could be used to reduce the duration, but those details would be defined in the Final Design phase.

20020B
File

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
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DANIEL BEYEL
Freeholder

DALE M. FOSTER
Engineer

CC: TAF J Mombee, [redacted] Mahoney, M. Santiago, R. Mankbadi, R. Fischer, S. Balzano, T. Stanford, J. Keiser, Curtis Helm (Amy Greene), Glenn Modica (GroI

October 28, 2002

Stephen G. Moy, Manager
Region IV Local Government Services
New Jersey Department of Transportation
3906 Church Road
Mt. Laurel, NJ 08054

Re: Mill Creek, Upper Thorofare and Middle Thorofare Bridges
And Ocean Drive (CR 619) Upgrade
Township of Lower
Scoping Project
Federal Project No. STP-2001 (105) PE

Dear Mr. Moy:

The consultant, Parsons Brinckerhoff-FG, Inc. is in the process of developing a draft of Alternatives Analysis Report for the referenced project. Any replacement structure for the existing Middle Thorofare Bridge will be a complex bridge with several design issues.

The existing Middle Thorofare Bridge spans the Intercoastal Waterway with a 56-foot single leaf bascule. The majority of the Cape May Harbor fishing fleet passes through the bridge to the docks. The current fishing vessels are upwards of 34 feet wide and 72 feet high. The economic growth in the fishing industry is limited by the size of vessels that can transit through the bridge. Representatives of the fishing industry have expressed an interest in using refrigerated fishing vessels that are approximately 100 feet high and 59 feet wide. A high level fixed span bridge would be the ideal structure, however given the clearance required for the vessels and the site constraints make a movable bridge reasonable. First blush after reviewing data gathered and comments received as the result of the June 2002 public information center, a double leaf bascule bridge on a parallel alignment to the existing crossing that provides more under clearance than the existing bridge may be the preferred alternative. A high level fixed span structure would require 75 feet under clearance based upon existing vessels and 108 feet under clearance based upon reproposed refrigerated vessels. This high level crossing would be approximately 8500 feet long on a new alignment and would involve substantial wetlands and other related environmental impacts. The Middle Thorofare Bridge has also been deemed historical significant due to it's age, movable bridge technology and significances and the broad pattern of civil improvements constructed with funds from the Federal Administration of Public Works.

OCT 30 2002

Given the issues associated with the replacement of the Middle Thorofare Bridge I respectfully request your office arranges a meeting with the appropriate personnel to discuss the expectations of the Alternatives Analysis Report. As a minimum you may want to consider having the following representatives present:

- Federal Highway Administrator Bridge Engineer
- NJDOT Bureau of Environmental Services
- NJDOT Bridge Design
- NJDOT Geotechnical Design
- State Office of Historical Preservation

This meeting should be scheduled as soon as possible so that work on the project can proceed without delays.

Should you need any information or have any questions, please do not hesitate to contact me.

Very truly yours,

Dale M. Foster, P.E.
County Engineer

DMF/ja

cc: Freeholder Director Beyel
Stephen O'Connor, Executive Director, CMCBC
Timothy G. Chelius, Executive Director, SJTPO
Thomas Fisher, Parsons Brinckerhoff-FG, Inc.
CMCBC

Member

File 20020 5.3, TES, DSG

State of New Jersey

DEPARTMENT OF TRANSPORTATION
P.O.Box 600
Trenton, New Jersey 08625-0600

RECEIVED
SEP 21 2000
PB - PRINCETON

CHRISTINE TODD WHITMAN
Governor

JAMES WEINSTEIN
Commissioner

September 18, 2000

Tim Chelius
Executive Director
South Jersey Transportation Planning Organization
18 N. East avenue
Vineland, NJ 08360

Re: Mill Creek and Upper Thorofare Bridges
Lower Township, Cape May County
Definition of Area of Potential Effects

Dear Mr. Chelius:

We have just received the concurrence of the New Jersey State Historic Preservation Officer (SHPO) with the definition of the areas of potential effects and consulting parties for the Mill Creek and Upper Thorofare Bridges project. Additionally, the SHPO did not suggest any other organizations which should be contacted during the course of the cultural resources studies.

Now that we have received this approval, the consultant may complete their investigations. However, they should be reminded that prior to completing their work, they need to contact the individuals/groups who may have an interest in the project area as listed in the attachment to the letter to the SHPO to determine if they have any information which should be considered during the investigations and/or any opinions about the effect of the project on identified historic properties, and they must document these contacts in the text of the report.

I look forward to working with you and the County to complete the Section 106 consultation process. Should you or anyone else have any questions, please do not hesitate to contact me directly at 609-530-2990.

Very truly yours,

Lauralee Rappleye-Marsett

Lauralee Rappleye-Marsett
Bureau of Environmental Services

Enclosure

cc: Dale Foster, Cape May County	w/ enclosures
Gene Amparano, FHWA	"
Joe Mumber, Parsons	"
Rich Grubb, Richard Grubb & Assoc.	"

State of New Jersey

DEPARTMENT OF TRANSPORTATION
P.O.Box 600
Trenton, New Jersey 08625-0600

CHRISTINE TODD WHITMAN
Governor

JAMES WEINSTEIN
Commissioner

00-2108AT
HPO - I2000-80

August 9, 2000

Dorothy P. Guzzo, Administrator
NJ Department of Environmental Protection
Historic Preservation Office
P.O. Box 404
Trenton, NJ 08625-0404

RECEIVED
AUG 10 2000
HISTORIC PRESERVATION OFFICE

Attn: Transportation and Planning Group

Re: Mill Creek and Upper Thorofare Bridges
Lower Township, Cape May County
Local Scoping Project
Initiation of Section 106 Consultation

Dear Ms Guzzo:

Cape May County is proposing to make improvements to Ocean Drive (County Route 621) from its intersection with NJ Route 109 to just east of the Upper Thorofare bridge in Lower Township, Cape May County using funds provided by the Federal Highway Administration (FHWA) via the New Jersey Department of Transportation (NJDOT) and the South Jersey Transportation Planning Organization (SJTPO). The proposed work includes elevating the existing roadway above the 100 year flood elevation and replacing the Mill Creek and Upper Thorofare bridges. Cultural resources studies will be undertaken by Richard Grubb and Associates. Prior to initiating this work, I am writing to you to seek your concurrence on three items in accordance with the provisions of the revised 36 CFR Part 800 regulations–the definition of the areas of potential effects (APEs), and lists of interested historic preservation groups and consulting parties.

The area of potential effect for both the historic architecture and archeological studies was defined on the basis of the proposed scope of work, the alternatives under consideration and an understanding of the potential for effects. At the outset of the project there was generally agreement among SHPO, NJDOT and others that the definition of the APE for the project could be problematic given the low-lying topography of the area and the maritime resources which are contiguous to the project. Consequently staff from the SHPO, NJDOT and consultant met in the field to jointly define the APE. The results of that effort are documented in an *Area of Potential Effects Report* which has been prepared by the consultant for your review and concurrence. For

your convenience, a concurrence line has been provided at the conclusion of this letter.

We have researched information previously provided by your staff and others, and have compiled a list of local historic preservation groups and individuals with an identified interest in preservation who may be concerned about the project. I would appreciate it if you would review your files to see if any additional individuals/groups should be included on this list. It is expected that the cultural resources consultant will contact these individuals/groups directly, as well as others associated with or who may have knowledge of historic vessels and the local fisheries industry to seek information pertinent to the identification of significant resources. In addition, these individuals/groups were included in a much more extensive mailing prior to a June 14 public information meeting. The meeting information sheet, a list of those invited to the meeting and a memo to record of the meeting, etc. are enclosed for your information. This list will again be used should additional public meetings be scheduled in the future.

We have also developed a list of consulting parties for your review and concurrence. Consulting parties will be provided an opportunity to formally comment on the cultural resources studies and any proposed mitigation measures, should they become necessary.

As the County is anxious to move forward with the cultural resources studies, I would appreciate your review of the enclosed information, being informed of any necessary changes, and receiving your concurrence with the definition of the APE within the 30 day time frame allowed for project reviews. Should you have any questions during the course of your review, please call Dale Foster at 609-465-1035 or Lauralee Rappleye-Marsett at 530-2990.

Very truly yours,

Andras Fekete, Manager
Bureau of Environmental Services

Enclosures

cc:	Tim Chelius, SJTPO	w/ enclosures
	Dale Foster, Cape May County	"
	Joe Mumber, Parsons Brinckerhoff,	w/o enclosures
	Richard Grubb, Richard Grubb & Associates, Inc.	w/o enclosures
	Gene Amparano, FHWA	w/enclosures
	Charles Scott, NJ SHPO	"
	Jules Oroszvary, NJDOT	"
	Lauralee Rappleye-Marsett, NJDOT	"

✓ I concur with the Area of Potential Effects as described in the July, 2000 *Area of Potential Effects Report* prepared by Richard Grubb and Associates, Inc., and the list of consulting parties as described in the enclosures to this letter.

_____ I concur on the condition that the following modifications are made:

Dorothy Guzzo
Deputy State Historic Preservation Officer

9-12-00
Date

8/7/00

Mill Creek and Upper Thorofare Bridges
Lower Township, Cape May County
Local Scoping Project

1. Identified Local Historic Preservation Groups/Local Individuals with an Identified Interest in Preservation

Cape May County Historical and Genealogical Society
504 Route 9
Cape May Courthouse, NJ 08210
609-465-3535

Cape May Historic Preservation Commission
643 Washington St.
Cape May, NJ 08204
Mary Rothwell, Secretary
609-884-9530 609-884-8589[Fax]

Lower Township Historic Preservation Commission
2600 Bay Shore Road
Villas, NJ 08251
Mary Stewart, Chair
609-886-2005 609-886-9488[Fax]

Cape May County Department of Culture and Heritage
4 Moore Road
Crest Haven Complex
Cape May Court House, NJ 08210
Jennie Ayres Snyder, Exec. Director
609-465-1005 609-465-6189[Fax]

Mid-Atlantic Center for the Arts
P.O. Box 340
1048 Washington Street
Cape May, NJ 08204
B. Michael Zuckerman, Director
609-884-5404

***ALL ADDRESSES AND TELEPHONE NUMBERS SHOULD BE VERIFIED PRIOR TO USING THIS LIST FOR NOTIFICATION OF PUBLIC MEETINGS

2. **Consulting Parties**

A. **Persons Entitled**

NJ Divisions Office, FHWA
NJ SHPO
NJDOT
Cape May County
Lower Township

B. **Other Consulting Parties** - None have been identified at this point

Appendix E
Alternative Analysis Plans
(under separate cover)