

## **2. ALTERNATIVE SOLUTIONS CONSIDERED**

### **2.1 INTRODUCTION**

Prior to the DEIS, ten Build Alternatives plus variations and a No Build option were considered and evaluated for constructibility, initial cost, life cycle cost, and environmental impacts.

Eight of the ten Build Alternatives were removed from further study because they failed to meet important environmental or feasibility goals. Two Build Alternatives plus variations of each were selected for detailed environmental evaluation. After this detailed evaluation, Alternative 9-1 was selected as the Preferred Alternative.

In addition to studying the build alternatives, a Congestion Management Study (CMS) was done to determine the feasibility of implementing non-structural measures to handle future traffic growth along the Route 52 corridor rather than the improvements and increased capacity proposed under the Build Alternatives. The results of this study indicated that non-structural measures alone would not be effective on this route.

### **2.2 PRINCIPAL CONSIDERATIONS**

The following considerations played an important role in developing the conceptual alternatives to be analyzed:

- 1) The preservation of the World War Memorial Bridge, the bascule bridge over Ship Channel, must be considered and addressed.
- 2) The impacts to existing businesses and other properties in Somers Point and Ocean City must be minimized.
- 3) Realignment of the ICWW or the dredging of a new channel could have an impact on shellfish beds, fisheries, other aquatic habitats, and water quality. Any activity of this type, if permitted, would require mitigation, such as the seeding of new shellfish beds or creation of artificial reefs as fish habitats.

- 4) Appropriate methods for the disposal of dredged material and mitigation of impacts generated by dredging must be identified.
- 5) Mitigation methods for any impacts on existing tidal marshes (wetlands) that cannot be avoided must be identified and investigated for feasibility.
- 6) Access to recreational fishing areas along the existing Route 52 Right-of-Way (ROW) should be maintained where possible.
- 7) Use of the tidal marsh islands in Green Acres areas for constructing embankments or structures would require approval from the New Jersey State House Commission. In addition, Ocean City would be required to provide replacement open space acreage in at least the same amount as the area of open space acreage impacted. This acreage must be dedicated for open space, recreation and conservation purposes.
- 8) Any wetland areas filled by new embankments or constructed on would have to be replaced by twice the acreage of wetland impacted.
- 9) Six commercial properties in Somers Point and six commercial properties in Ocean City are reported as most likely to contain hazardous waste (primarily buried tanks).

### 2.3 DESIGN CRITERIA

Route 52 is classified by NJDOT as a principal arterial highway. All safety and design criteria associated with the proposed alignment are in accordance with the NJDOT standards for bridge and highway design. The design criteria include elements such as clearances, gradients, design speed vertical and horizontal alignments and lane widths. For detailed description see section 2.3 in the DEIS.

For a high level fixed-span bridge over ICWW or Ship channel, it is desirable to achieve a 19.8-meter (65-foot) minimum vertical clearance above MHW as required by USCG guidelines. However, NJDOT has requested a waiver and proposed a 16.8 meters (55 feet) vertical clearance to avoid significant impacts to private property and businesses in Ocean City and additional impacts to wetlands and dredging in the Great Egg Harbor Bay with attendant ecological consequences the higher vertical clearance would impose. The 16.8 meters (55 feet) vertical clearance would allow 99 percent of the vessels to pass through Beach Thorofare and Ship

Channel based upon bridge opening data collected for the years 1991-1994 and supplemented by data collected in the summer months of 2001.

The relocated ICWW would have a depth of at least 3.6 meters (12.0 feet) below Mean Low Water (MLW) and 2.7 meters (9.0 feet) below MLW for Ship Channel. Bottom width of 30 meters (100 feet) would be for both navigational channels with side slopes where necessary of 1 vertical: 3 horizontal. The bottom of superstructure on causeway viaducts is to be at minimum of 0.3 meters (1 foot) above the 100-year flood level.

The proposed alignment will accommodate the projected traffic volume of 42,500 vehicles per hour (vph) in both directions in summer of 2024. Throughout the length of the causeway, from the Somers Point traffic circle to Ninth Street in Ocean City, the roadway will be comprised of two 3.6-meter (12.0-foot) wide lanes in each direction, with bicycle-compatible shoulders and a sidewalk on the northbound side of structure.

In Somers Point, the traffic circle will be replaced with a four-legged signalized intersection, and MacArthur Boulevard will be widened to four 3.6-meter (12.0-foot) wide lanes with two lanes in each direction. The roadway will be widened from two lanes to five lanes (two lanes in each direction and a center turn lane) between the Somers Point Circle and Braddock Avenue and from two lanes to three lanes (one lane in each direction and a center turn lane) between Braddock Avenue and Route 9. A (10-foot) paved shoulder and a 1.8-meter (6-foot) sidewalk will be provided on each side for the entire MacArthur Boulevard length.

#### 2.4 ALTERNATIVES CONSIDERED BUT REJECTED IN THE DEIS

Ten Build Alternatives plus four variations were initially developed and evaluated for consideration and study. Of these, two alternatives plus variations were considered for additional environmental evaluation. The alternatives that were removed from further evaluation because they did not meet project needs and/or had major environmental impacts were:

- Alternatives 1 and 2, involving high, fixed-span bridges;

- Alternatives 3 and 4, involving moderately raised bascule bridges over the existing channels;
- Alternative 6, rehabilitation of the existing causeway;
- Alternative 7, involving high fixed-span bridges over the existing channels far to the west of the existing causeway;
- Alternative 8, involving high fixed spans over the existing channels; and
- Alternative 10, a cut and cover tunnel.

## 2.5 ALTERNATIVES SELECTED FOR DETAILED ENVIRONMENTAL EVALUATION IN THE DEIS

The following alternatives were included in the environmental evaluation as well as the No Build Alternative. These alternatives have been analyzed in greater detail in the DEIS and presented to the public as viable options.

### **Alternatives 5A, 5B, and 5C**

These alignments are approximately 170 meters (570 feet) west of the existing causeway and provide either two new high bascule bridges, two high fixed-span bridges, or one of each over realigned channels. These alternatives were proposed for further environmental evaluation because they essentially meet the goals of the project with respect to the “elimination” of bridge openings. The proposed bascule bridges would be high enough to reduce substantially the number of bridge openings to approximately one or two openings a day during the peak season. However, alternative 5A does require dredging through wetlands but alternatives 5B and 5C involve no filling (or excavation) of tidal wetlands and they have only minimal impact on properties along 9<sup>th</sup> Street in Ocean City and in Somers Point.

### **Alternatives 9 and 9A**

Alternative 9, involving an alignment on the existing embankment east of the existing alignment, and with high fixed bridges at both realigned channels, was proposed for further environmental evaluation because it met the purpose and need of the project to eliminate bridge openings, had minimal impact to properties along 9<sup>th</sup> Street in Ocean City and made maximum use of the

existing wide embankment. It is the least costly of the alternatives considered and it was deemed the most suitable alignment, with the least overall impacts. This alignment is proposed to be approximately 10 meters (33 feet) east of the existing alignment. However, the exact offset from the existing alignment will be decided during the detailed design after further geotechnical evaluations.

Alternative 9A is a variation of Alternative 9, with a high bascule bridge over the ICWW instead of a high fixed bridge. Alternative 9A does not require realignment or dredging in the ICWW. Alternative 9A would require one or two bridge openings per day during the tourist season and up to 9 openings during selected summer holiday weekends. The profile and the touchdown points in Ocean City and Somers Point are the same as for Alternative 9.

In the DEIS, three variations were considered for these alternatives for the causeway portion of the island between Elbow Thorofare and Rainbow Channel, including:

- Option 1) Continuous structure (no embankment)
- Option 2) Embankment retained between edge walls
- Option 3) Embankment with side slopes

Options (1) and (2) greatly minimize direct filling of tidal wetlands, while Option (3) involves filling 1.4 hectares (3.4 acres) of tidal wetlands in a narrow strip adjacent to the existing embankment.

Alternative 9 requires realignment of the channel in Beach Thorofare for the ICWW. This is necessary because the bridge must be high enough to meet the 55-foot clearance requirement while maintaining a gradient from the top of the structure into Ocean City of five percent or less. Shifting the touchdown point of the approach further to the south in Ocean City is not feasible, as it would severely impact local businesses. Therefore, it would be necessary to move the high point of the structure further to the north in order to maintain the required clearance without increasing the gradient. This requires realignment of the channel beneath and approaching the structure. This realignment would require some dredging.

### **No Build Alternative**

The No Build Alternative would involve no new construction for the existing bridges and causeway, other than the periodic maintenance required to keep them in good repair. The No Build Alternative is further considered so as to provide a baseline for comparison of the Build Alternatives considered.

### **The Preferred Alternative**

Alternatives 5A, 5B and 5C were disqualified from further consideration primarily because the construction of the common new alignment and ramps to recreational areas would result in greater impacts to relatively pristine wetlands and aquatic habitat.

In the DEIS, Alternative 9 with Causeway Option 1 (Alternative 9-1), was identified as the Preferred Alternative. Alternative 9-1 was selected on the basis of the increased cost of operating and maintaining a bascule bridge and the queuing delays in roadway traffic during bridge openings required with Alternative 9A. Subsequent to the issuance of the DEIS, several of the cooperating agencies took exception to the selection of Alternative 9-1 on the basis of the need for dredging and the resultant environmental impacts, and advocated the selection of Alternative 9A-1 as the Preferred Alternative.

As a result of additional analysis of potential impacts and NJDOT meetings with FHWA and the Cooperating and other federal agencies, it was determined that Alternative 9-1 would remain the Preferred Alternative.

## **2.6 DESCRIPTION AND COMPARISON OF ALTERNATIVES 9 AND 9A**

The alignment of Alternatives 9 and 9A generally follow along the layout of the existing causeway with the centerline of the proposed roadway typically offset 10 meters (30 feet) to the east of the centerline of the existing roadway. The offset between the existing and the proposed alignment may vary slightly based upon more in-depth geotechnical evaluation, which will be done during the detailed design phase. For additional details see Table 2.1 and plans in Appendix D.

The preferred causeway option for Alternatives 9 and 9A for the portion of the project that traverses the island between Elbow Thorofare and Rainbow Channel is Causeway Option 1, Continuous Structure (no embankment).

### **2.6.1 Plan and Profile**

- A 4-leg signalized intersection with turning lanes would replace the Somers Point traffic circle, and MacArthur Boulevard would be widened from two lanes to three lanes between Route 9 and Braddock Avenue (one lane in each direction and a center turn lane); and from two lanes to five lanes (two lanes in each direction and a center turn lane) between Braddock Avenue and the Somers Point Circle (see Somers Point Access Plan in Appendix D).
- Under Alternatives 9 and 9A, the profile gradients are kept at 5 percent maximum at the vertical curves over the ICWW and Ship Channel. Under 9, the ICWW channel is realigned 65 meters (215 feet) further away from the shore to achieve a vertical clearance of 16.8 meters (55 feet), for a high fixed bridge. Under 9A, the ICWW channel is not realigned at all, and the vertical clearance of the proposed high bascule bridge is 13.7 meters (45 feet). Under both Alternatives 9 and 9A, Ship Channel is realigned to a point 95 meters (310 feet) further away from shore to achieve a vertical clearance of 16.8 meters (55 feet) and permit a high fixed bridge over that channel.

### **2.6.2 Effects on Vehicular and Marine Traffic**

- The delays of vehicular traffic due to bridge openings would be eliminated (Alternative 9), or drastically reduced (Alternative 9A).
- The delays to marine traffic waiting for scheduled bridge openings would be eliminated (Alternative 9), or drastically reduced (Alternative 9A).
- Travel on the route will be safer because of wider lanes, a median barrier separating opposing lanes of traffic, and paved shoulders.

- Under Alternative 9, vessels over 16.8 meters (55 feet) in height would no longer be able to pass. That represents approximately 1 percent of the total number of vessels observed based on 1993 and 2001 bridge openings data and a survey of local marinas conducted in 2000.
- Under Alternative 9A, vessels under 13.7 meters (45 feet) in height would be able to pass without opening the bridge. That represents approximately 93 percent of the total number of vessels observed based on 1993 and 2001 bridge openings data and a survey of local marinas conducted in 2000. All heights could pass if the bridge were open.
- Congestion and accidents at the Somers Point traffic circle and MacArthur Boulevard would be significantly reduced.

### **2.6.3 Construction Feasibility**

- Piles or caissons can be driven down into the compact sands that can be used to support structures. Precast cylinder piles would require the use of timber matting to protect wetland vegetation when piles are being driven in those areas and, in open water locations turbidity curtains would be provided around each pier driving area. During construction, vibration-monitoring equipment would be utilized to monitor impact to the adjacent existing structures.
- The use of precast pier caps is viewed as an economical and rapid method for erection of the piers.
- A proposed span of approximately 27 meters (90 feet) will achieve minimum costs per linear meter when using precast box beams or precast bulb tees.
- Precast concrete beams and pier caps will allow construction to continue through most or all of the winter without interruption. Such construction has the added benefit that it can be opened to traffic during the winter season even without the cast-in-place wearing course concrete in place.



- The use of precast concrete components during construction will permit the most rapid completion of the new structures. It also can produce an aesthetically pleasing structural finish. The use of precast box beams would be particularly “clean looking” when viewed from boats passing below structures.

#### **2.6.4 Maintenance of Traffic**

- The first stage of work would involve reconstructing the Somers Point traffic circle. This should be done in the non-tourist season when traffic can be reduced to one lane in each direction to facilitate maintenance of traffic.
- The realigned channels for the ICWW and Ship Channel, and the high level bridges must be in place before the existing bascule bridges can be removed and marine traffic rerouted.
- Construction stages for the causeway reconstruction would be:
  - 1) Build new northbound half on the east side, including northbound and southbound structures that do not overlap existing Route 52.
  - 2) Build the southbound half and then the northbound half of the fixed span bridges to the traffic circle at Somers Point and to 9th Street at Ocean City in the off-season using staged construction. Divert traffic from the southbound half of the fixed bridge to the new northbound half that, without sidewalks in place, is able to handle four lanes of traffic.
  - 3) Dredge for ICWW realignment except at the existing facility.
  - 4) Build new southbound half over the current Route 52 roadbed, including the remaining portions of the southbound structures.
  - 5) Direct southbound traffic onto the southbound roadway, complete the installation of the median barrier and construct the sidewalk adjacent to the northbound roadway.

### 2.6.5 Estimated Cost of Construction

The year 2004 estimated costs (in \$1000) for Alternatives 9-1 and 9A-1 are:

<u>Item</u>	<u>9-1</u>	<u>9A-1</u>
Dredging	\$266	\$0
Roadway & Misc.	\$27,215	\$27,215
Structures	\$117,337	\$128,925
Demolition	\$8,100	\$8,100
CONSTRUCTION		
TOTAL	\$152,918	\$164,240
Contingencies &		
Escalation	\$16,386	\$21,386
Utility Relocation	\$1,700	\$1,700
ROW Cost	\$794	\$794
TOTAL*	\$171,798	\$188,120

- Total does not include MacArthur Boulevard widening, which is common to both alternatives.

Table 2.1

**COMPARISON OF ALTERNATIVES 9 AND 9A**  
**NJ Route 52(1) Causeway between Somers Point, Atlantic County**  
**And Ocean City, Cape May County**

ISSUES		ALTERNATIVE	
		9-1	9A-1
Description	Causeway Structure Type	On Continuous Structure	On Continuous Structure
	Alignment	Generally Parallel to and 8 Meters (26 feet) East of Existing Alignment *	
	Profile Gradient	5%	
	ICWW Channel Span	Fixed Span Bridge	Bascule Bridge
	ICWW Realignment	65m* (215 ft)	None
	Ship Channel Span	Fixed Span Bridge	
	Ship Channel Realignment	95 m (310 ft)* (Channel Marker Shift - No Dredging)	
Cost (X \$1,000,000)	Construction	\$153	\$164
	Life Cycle**	\$171	\$188
Vertical Clearances Meters (Feet)	Ship Channel	16.8 m (55 ft)	13.7 m (45 ft)
	ICWW	16.8 m (55 ft)	13.7 m (45 ft)
	% of Marine Traffic Passing without Opening	99%	93%
Touchdown Locations	Ocean City	Approx. 55 meters (180 feet) south of Pleasure Avenue	
	Somers Point	Approx. 60 meters (200 feet) south of the traffic circle	

\* Approximate distances

\*\* Life cycle cost is based on an 80 - year project life. The value of money is discounted at an annual rate of 6%. The cost includes initial construction cost, the cost of wetland mitigation, and maintenance and repair costs.