ENVIRONMENTAL IMPACT CONCERNS
LONG BEACH HARBOR

DRAFT REPORT
(Work in Progress)
Addendum 1

By

C. P. "BUD" JOHNSON

February 2, 2009

ADDENDUM
(Summary)

The primary purpose of this study is to reach conclusions and/or solutions to reduce surface fresh water pollution in Long Beach Harbor. The polluted freshwater originates in the 53 miles of channel, created by the County, called the Los Angeles Flood Control System.

A. For decades there have been macro-studies involving increased water pollution and decreased water circulation in the Harbor. Some studies conclude the Long Beach Breakwater is the primary reason for a polluted beachfront and could take in excess of $100 million dollars for modifications.

   This study takes a different view. For too many days in a year, including the summer months, no swimming signs are posted on the beachfront because of polluted waters. During the summer months, because there is low water flow in the Los Angeles River bed, pollutants build up in the River, without reaching Queensway Bay. However, there are numerous dams, levies, water-holding areas, etc., up the River that are periodically opened in the course of a year. This action sends fresh water down the river bed that can pick up other chemical pollutants along the way. When this fresh water flow reached Queensway Bay, the lighter fresh water rides on top of the salt water and the outgoing ocean tide carries the pollutants into the Harbor beachfront.

B. This study has taken a micro-economic approach toward a specific problem, freshwater pollution in the Harbor. The Plan involves creating a new Breakwater opening (Gate) that allows polluted fresh water from the Los Angeles River to flow though the Gate and out to sea. This is the water flow action that occurred through Queen's Gate before the Port development of Pier J infrastructure obstructed the water flow patterns.

   The plan also recommends that a "Restricted Water Area" be designated on the landward side of the new Gate. This designated area would have a line of lighted and unlighted buoys with attachments at each end of the Gate. The buoy line also serves a navigational and safety barrier for local mariners.

   The Restricted Water Area could also become a candidate for a "shallow water habitat and/or kelp bed"; a valuable commodity for mitigation purposes. This plan will require an Environmental Impact Report (EIR) and has a total estimated cost of $10-12 million dollars.

ADDENDUM

This addendum pertains to Recommendation 1 of the Draft Report entitled "Environmental Impact Concerns", Long Beach Harbor, dated February 2, 2008. The purpose of the addendum is to provide a more detailed understanding of Recommendation 1, which involves a specific modification of the Long Beach Breakwater.

INTRODUCTION

Physical growth of the Los Angeles River/Channel and its tributaries has resulted in debris and pollution to be deposited on the beachfront of Long Beach Harbor. Water area acreage in the Harbor has been reduced by City and Port infra-structure, resulting in the modification of incoming (flood) and outgoing (ebb) tidal action, including the direction of water flow and circulation patterns in the Harbor.

Recommention No. 1 (Review)
Breakwater Modification (2/02/2008)

Recommendation No.1 requires creating two 1800 foot openings in the Breakwater. The two new openings would be the same width as Queens Gate. The rocks would be removed such that the new openings would be at 0 tidal level or about 15 feet below the normal breakwater height.

Recommention No. 1 (Addendum)
Breakwater Modification (02/02/2009)

The purpose of this addendum is to recommend a more efficient out-going water flow circulation pattern in the Harbor. From recent computer modeling information, obtained via a large study conducted by the "Los Angeles Regional Containment Task Force (LACSTF)", the author has concluded that only one1800 feet opening in the Breakwater is now recommended. The rational for this conclusion is presented in the section to follow. Before we discuss details of the Breakwater modification outlined in this report, there needs to be clarification of marine terminology associated with this project. In discussions with various organizations and individuals, the proposed opening in the Breakwater has been identified by verbiage such as shoals, watercourse, reef, and other identifiers. The reality is that these identifiers would have individual marine requirements, as described in the following statements:

1. Shoal "Applies to any place in a sea, river, etc. where the water is difficult to navigate." The design criteria for the new opening will require that no navigation of vessels through the opening would be permitted.

2. Watercourse "A stream, river, etc., or a channel for water as in a canal." There is no river or water channel involved with the proposed Breakwater opening construction plan.

3. Reef is identified as "A line of rock, coral or sand lying at or near the surface of the water." This is a closer match to the breakwater opening, but reefs do not have a 14 foot wall at each end of the underwater structure.

4. Gate "A structure controlling the flow of water".

Therefore, for future reference and clarity involving this study, the Long Beach Breakwater opening will be identified as Johnson's Gate or Gate; although there are those who might call it Johnson's Folly.

Tidal Flow Conditions

Computer modeling information, depicted in Figures 4.2, 4.3 and 4.4 of this addendum, was taken from the LACSTF (previously mentioned) final draft dated October 19, 2004.

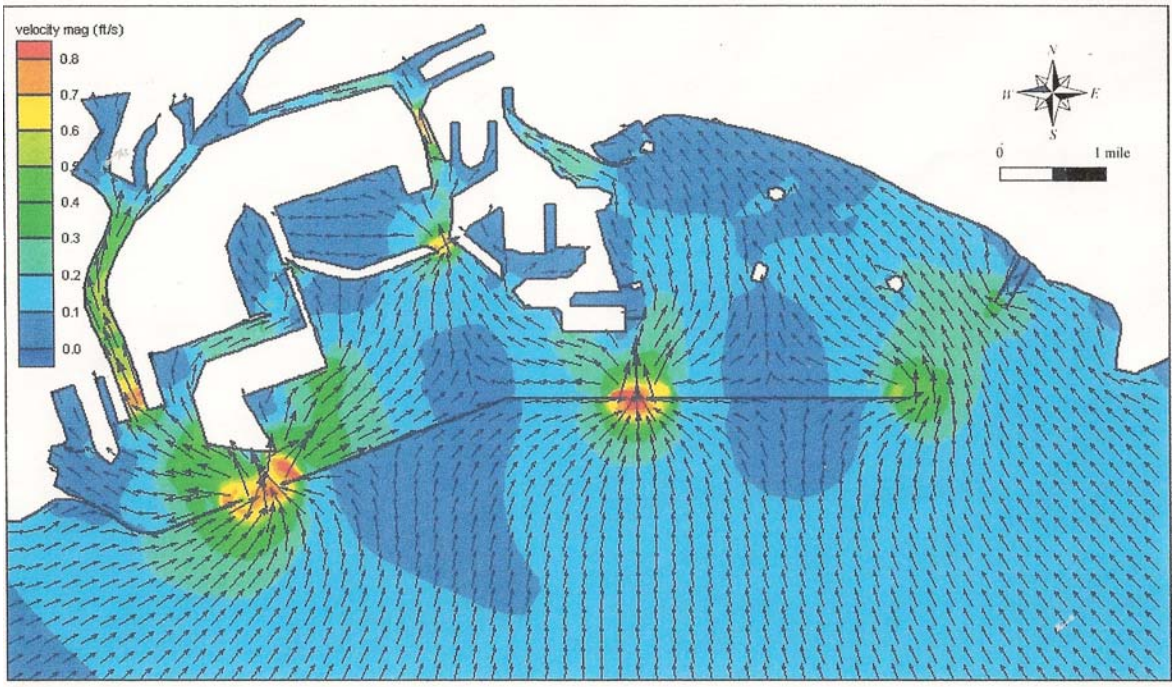

Figure 4-2 Maximum Flood Current during Typical Tide Condition

The heart of this study involves incoming (flood) and outgoing (ebb) tidal current that occurs twice a day in the Long Beach Harbor. Of equal importance is the understanding of water circulation patterns generated in the Harbor. Figure 4-2 shows the flow direction and circulation patterns for a typical incoming tidal current. Although the Long Beach Breakwater allows some water flow through the rocks, the incoming and outgoing water flow from the Harbor is partially blocked by the Breakwater. There are two primary tidal water flow entrance/exit paths in the Harbor; Queen's Gate and the water area between the east end of the Breakwater and the Alamitos Bay jetties.

The water flow strength, using the color velocity scale located on the left side of Figure 4-2, shows the incoming tidal water flow velocity (red and yellow) accelerates through the smaller width (1800feet) of Queen's Gate. This water flow velocity is nearly twice as fast, when compared to the flow velocity (dark green, light green) at the eastern end of the Breakwater. Incoming tidal current also forces water through Queensway Bay and up the Los Angeles River. Note that the dark blue areas on the drawing represent slow water flow and circulation.

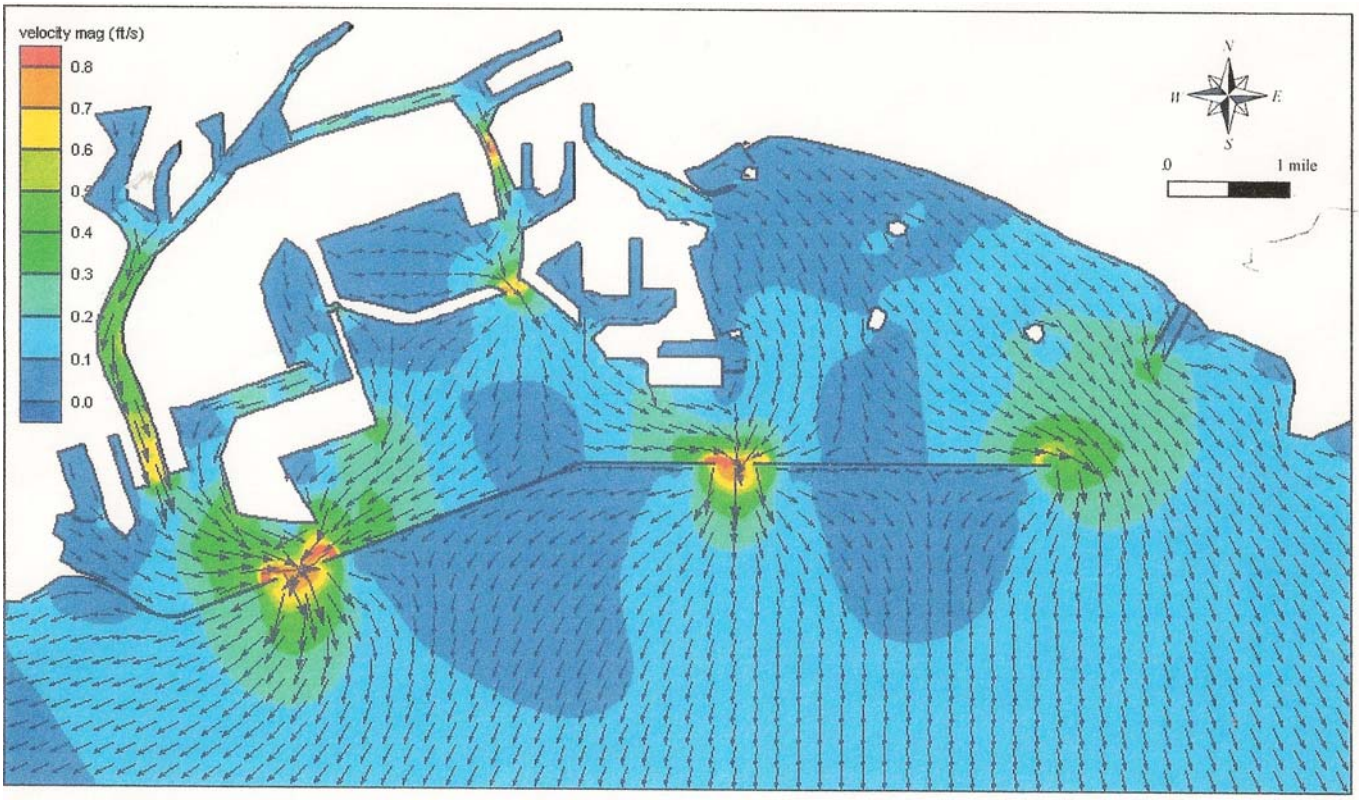

Figure 4-3 Maximum Ebb Current during Typical Tide Condition

Figure 4-3 shows the water flow direction and circulation pattern for a typical outgoing (ebb) tidal current. At first glance, the outgoing water flow pattern appears to be similar, but a reversal of the incoming pattern. There is, however, an important difference. The water area between Pier J, oil Island Freeman and Queensway Bay, during an outgoing tide, is mostly dark blue (0.0 – 0.1 feet/second). This implies that outgoing water exiting Queensway Bay, with its resulting pollutants, will tend to end up on the beach due to slow water flow and circulation patterns.

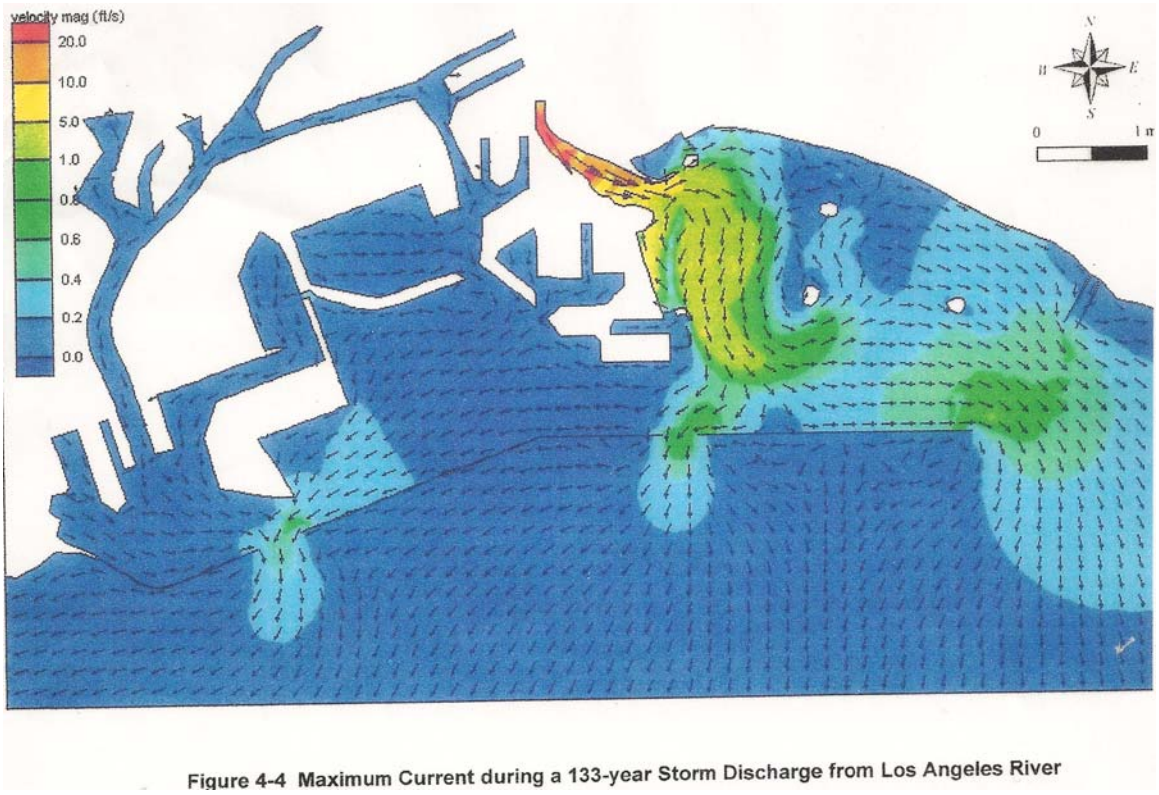

Figure 4-4 Maximum Current during a 133-year Storm Discharge from Los Angeles River

Figure 4-4 shows the water flow and circulation pattern for maximum outgoing tidal conditions during storm discharge from the Los Angeles River. Several disturbing observations may be concluded during storm conditions.

1. Freshwater flow, including pollutants from the Los Angeles River, will ride on the surface of the saltwater flow in Queensway Bay, with outgoing flow velocities exceeding 25 feet/second (15 miles/ hour).

2. Some of the water flow exiting Queensway Bay will travel South between Pier J and oil island Freeman toward Queen's Gate. This area appears green/yellow with a flow velocity of (2.0-6.0 miles/hour).

3. This South flowing salt/fresh water will begin to feel the blocking effects from the Breakwater and the existing water patterns from the Port. Following the arrowheads, the South flowing water pattern will be modified to the East, past oil island Freeman and re-directed to the beach or to the eastern end of the Breakwater.

4. Notice in Figure 4.4 that approximately one-half mile east of Queen's Gate, along the north side of the Breakwater, there is a blue area (0.1 mile/hour). This is the approximate area where the proposed Breakwater opening will be located. The author believes this proposed location for the Breakwater opening will provide a much needed additional water flow exit pattern to the South and help negate the present circulatory pattern around oil island Freeman.

5. Polluted water from the Los Angeles River, could be drawn through the new opening and out to sea, as Mother Nature has intended over the past hundreds of years prior to the creation of the Breakwater.

Breakwater Opening Location

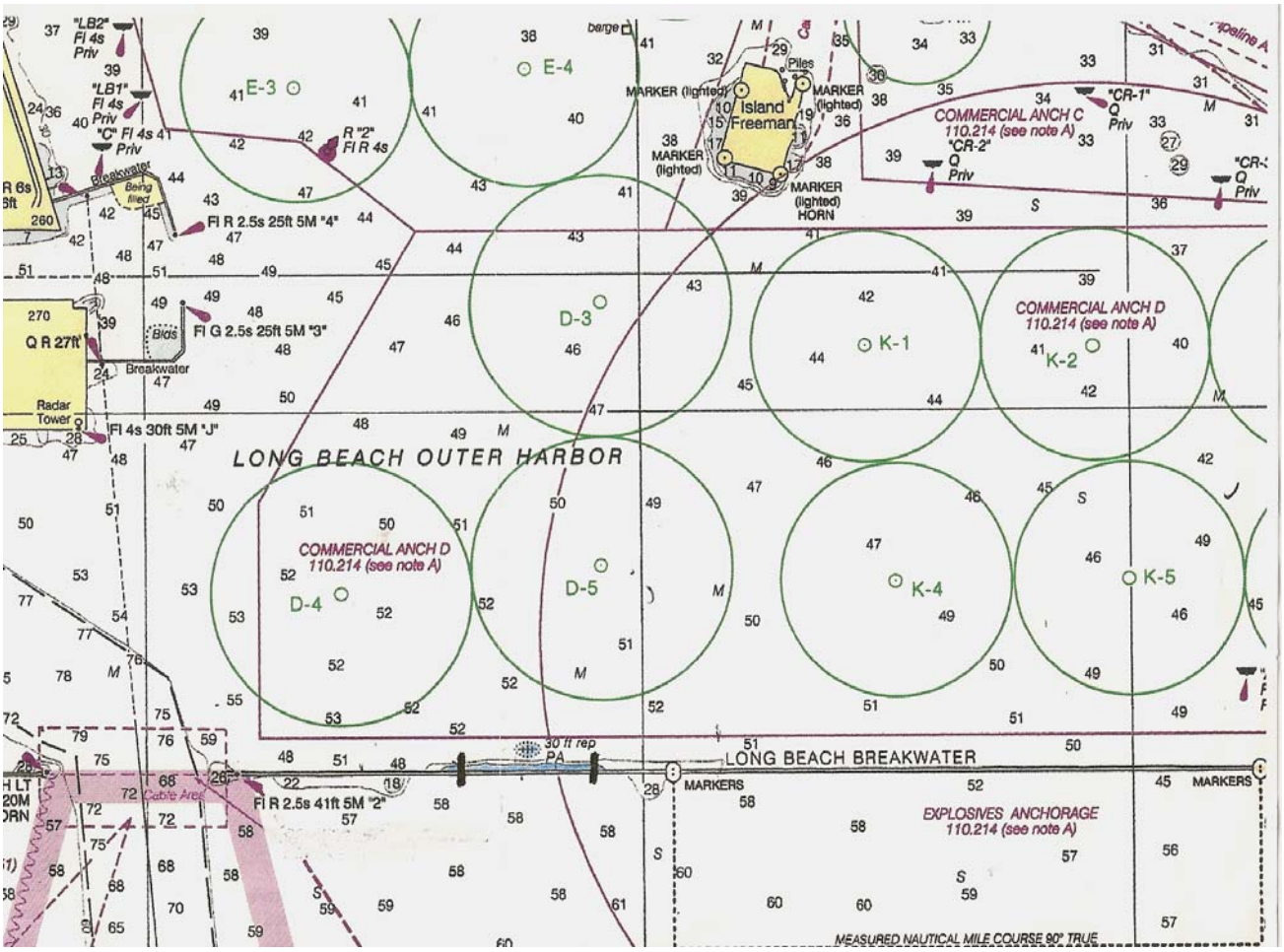

Figure 60

Figure 60 shows a small section of a navigation chart for the Long Beach outer Harbor, published by Maptec Inc., with a copywrite dated 2001. Added to this chart are two black vertical lines, placed on the Long Beach Breakwater, representing the approximate location of Johnson's Gate. As placed on the chart, the eastern end of this Gate is located approximately 900 feet west of the measured mile marker symbol on the chart. Additionally, the west end of the Gate is located approximately 0.3 miles east of Queen's Gate.

The following chart observations have been concluded:

1. With reference to Figure 60 and between the two vertical lines marking the location of the Gate, there is a narrow blue strip, which denotes a sediment build-up (sandbar) along the Breakwater and a reduced water depth of 30 feet. The surrounding water depth is typically 50 feet of greater.

2. Development of this sandbar suggests the <u>out-flow</u> pattern, loaded with sediment, is continuing to develop the length of the sandbar that has grown to about 2000 feet.

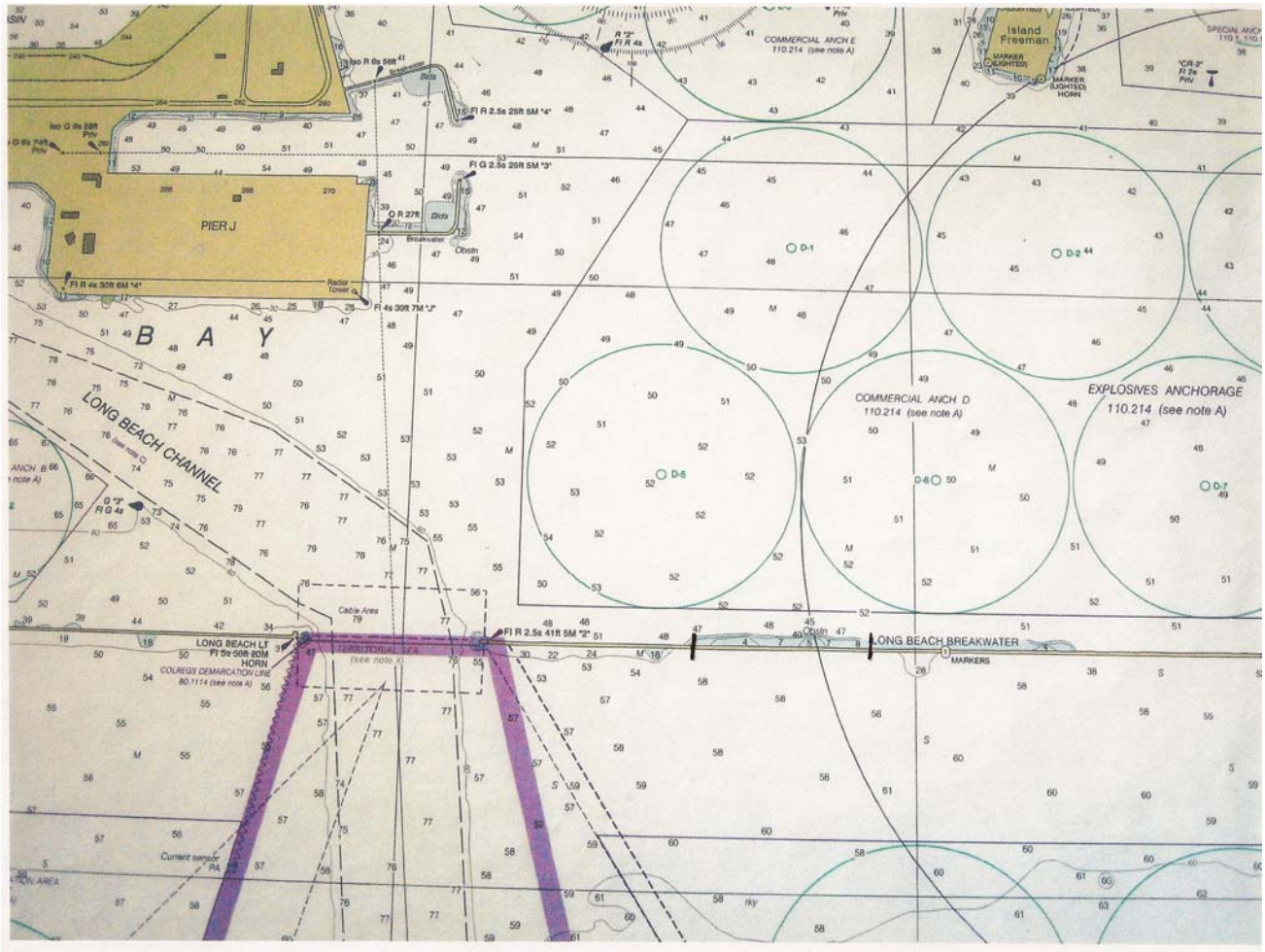

Figure 61

Figure 61 shows a small section of a more recent navigation chart for the Long Beach Harbor, published by the National Ocean and Atmospheric Administration (NOAA), 45th edition, dated November, 2007. Again added to this chart are the two vertical lines locating Johnson's Gate. The purple lines are the Queen's Gate navigational boundaries for commercial ships entering the Port. The following chart observations have been concluded:

a.) Over a period of six years the water depth contour lines, outlining the blue areas of the sandbar, have increased in length to approximately 4000 ft.

b.) Some areas within the contour lines indicate a depth of only 4-8 feet.

3. The depth of the sandbar in 2001 was 30 feet. The depth of the sandbar in 2007 in some locations is 4-8 feet. This suggests that the outgoing tidal flow patterns, in the Harbor operating twice per day and 365 days per year, are providing a continuing sediment buildup along the Breakwater.

4. In reviewing charts prior to the creation of Pier J and the Breakwater fingers in the 1990's, there was no apparent development of a sandbar along the Long Beach Breakwater. It is therefore concluded that Harbor tidal flow restrictions toward Queen's Gate, caused by the Pier J developments have changed the <u>outgoing</u> flow patterns from Queen's Gate to the sandbar location along the Breakwater.

Figure 62

Because of the physical location of Johnson's Gate, issues of safety and navigation need to be addressed. Figure 62 is a pictorial showing the Breakwater with rocks removed and creating the Gate. On a calm ocean day, mariners could assume this new Gate is an alternative harbor entrance to Queen's Gate; not realizing this opening has the equivalent of a reef just below the water surface. On weather days or whenever there is swell activity, mariners could observe breaking waves at the Gate.

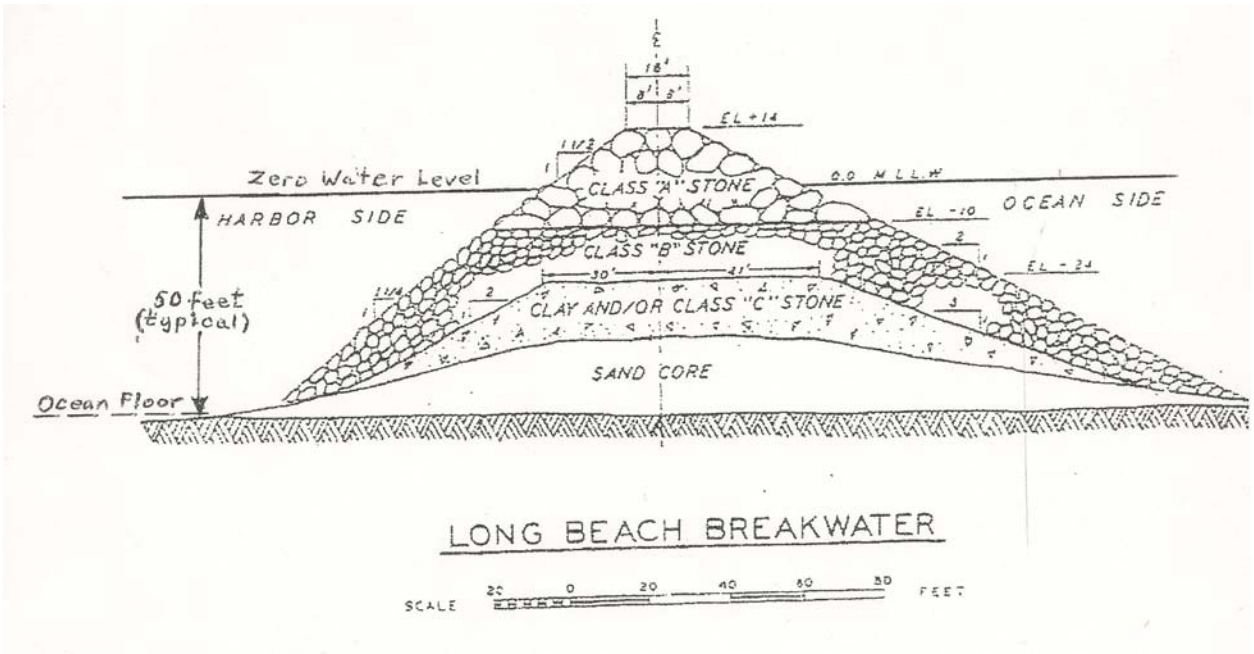

Figure 63A

Figure 63A shows the Breakwater cross- section where the rocks have not been removed. Note that the height of the Breakwater is 14 feet above 0 sea level with a width at the top about 16 feet.

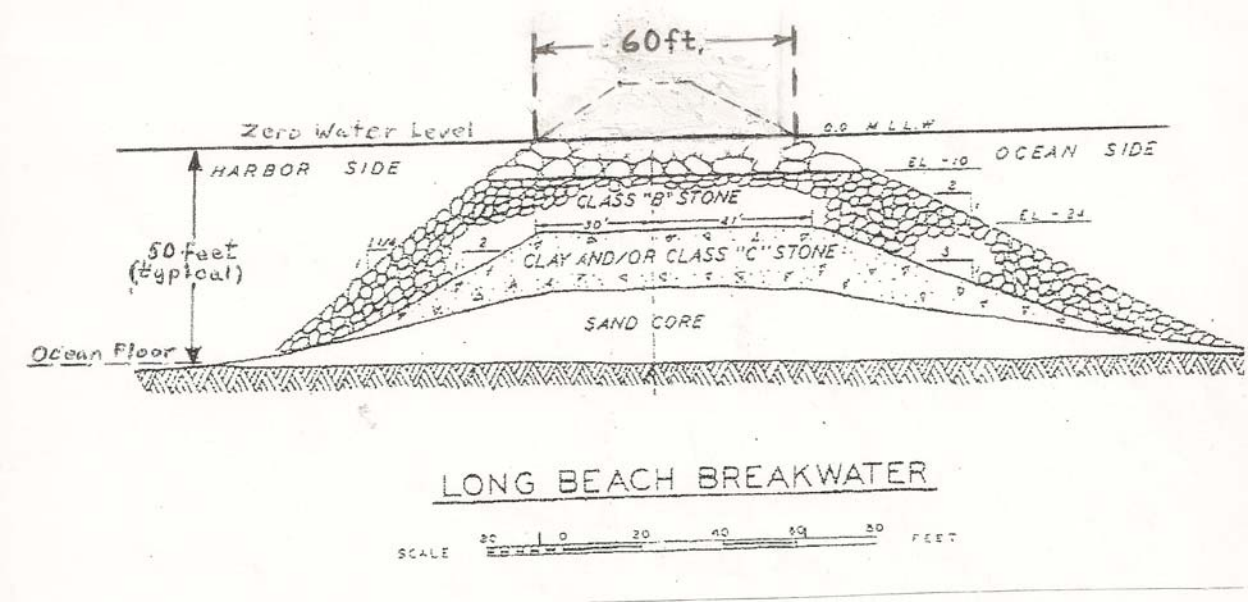

Figure 63B

Figure 63B shows the cross-section of the Breakwater where the rocks have been removed, creating the Gate. Note the Breakwater width at the Gate area has resulted in establishing a platform about 60 feet in width at the 0 feet water level. The platform will provide an excellent place to establish navigational aids such as buoys, lighted makers, etc. An additional feature is that breaking wave's energy will be reduced as waves travel across the 60 foot platform.

Figure 64

On the landward side of the Gate a different set of navigational and safety issues will be addressed because of the underwater sandbar. Figure 64 shows a string of lighted and unlighted marker buoys. The buoy string was placed by the U.S Navy to identify a Restricted Water Area. It is suggested that this type of buoy arrangement, with added attachments at each end of the Gate opening, be utilized to establish a new Restricted Water Area adjacent to Johnson's Gate.

Restricted Water Area

Establishment of a "Restricted Water Area" opens up economic possibilities for the City. During the literature study, an Environmental Impact Report (EIR) for Queensway Bay Master Plan was reviewed. In a chapter that discusses impact analysis, subjects involving shallow water habitats and kelp forests were outlined. The conclusion reached in establishing a shallow water habitat along the Breakwater, would require a construction of a sand shelf along the Breakwater. With regard to establishing a kelp forest, the conclusion reached was if a shallow water habitat was created, a kelp bed could be placed along the landward edge of the habitat.

The possibility of developing a shallow water habitat and/or kelp bed is being reinforced by Mother Nature; with the building of a natural sand bed along the Breakwater length and under Johnson's Gate. Should this study be influential toward obtaining "interest" from the Corp of Engineers, developing the Restricted Water Area could help in matters involving mitigation. Additionally, if the project mitigation requirements are minimal, the sale of mitigation rights to interested parties (e.g. Port) could generate additional revenue. This plan will require an Environmental Impact Report (EIR) and has a total estimated cost between 10-12 million dollars.

Additional Concerns

As with any study there are always stakeholder issues, as outlined in the third public workshop meeting, hosted by the City's consulting firm Moffett and Nichol. The following is a partial list of concerns with a personal/professional opinion involving Stakeholder Issues related to this Study.

Stakeholders Issues

1. **City of Seal Beach**
   No identifiable negative effects to the City

2. **Naval Weapons Station**
   No identifiable negative effects involving Navy's explosive loading anchorages, either inside or outside the Breakwater.

3. **THUMS Oil Islands**
   No identifiable effects to the Islands. Minor swell activity to the west side of island Freeman and island White.

4. **Peninsula Beach**
   No identifiable negative effects

5. **Peninsula Beach to Belmont Pier**
   No identifiable negative effects.

6. **Belmont Pier to Downtown Marina**
   Minor increases in wave activity along Bluff Park beach area, between Kennebec Avenue and Temple Avenue.

7. **Downtown Marina**
   No identifiable negative effects.

8. **Port of Long Beach**
   No identifiable negative effects

9. **Harbor Navigation**
   No identifiable negative effects involving the loading and unloading of materials, equipment or the oil island work crews.

10. **Beach Replenishment Program**
    Minor increases in wave activity at the Bluff Park beach area, with minimum negative effects because of the large beach width at this location.

Hopefully, the results of this Study will cause enough Corp of Engineers "interest" to convert opinions into facts. Should there be a need for additional discussion regarding issues with this addendum or the original Draft document, I can be reached by phone at (562) 435-1268 (business), (310) 650-6451 (cell) or by e-mail at harborlightinc.@yahoo.com.

_____

Dr. C.P. Bud Johnson, P.E.(retired)