TURNING

# ENGINEERING CONSIDERATIONS

## DESIGN AND CONSTRUCTION

2,000' EXTENSION



OUTER ENTRANCE CHANNEL (OEC) 55'

DREDGING equipment used to deepen or widen a channel is determined by site characteristics, such as the type and location of sediments along a channel bottom. Dredging is simply the removal and disposal of materials necessary to provide the authorized depths and widths within a project footprint. Geotechnical surveys, additional field measurements such as bathymetric surveys and modeling are critical components of the project design and analysis.

## GEOTECHNICAL CONSIDERATIONS AND DATA GATHERING

1) HYDROGRAPHIC SURVEYS provide information about the characteristics of the

TYPICAL DREDGING SECTION

2) CORE BORINGS provide information about the composition of channel sediments, including rock Rock strength greater than 5,000 may require

pre-treatment. Previous testing indicated unconfined compressive strength values may exceed 10,000 psi at some locations within the Turning Basin, Entrance Channel, and South Access Channel

### 3) SHIP SIMULATORS are used to:

- Evaluate proposed modifications for improvements to navigation such as deepening and widening
- Portray currents, wind and wave conditions, shallow-water effects, bank forces, ship handling, shipto-ship interaction and tug
- Bridge controls and display mirror actual ship controls and visual scene from the Harbor being tested



## **ENVIRONMENTALLY-FRIENDLY BULKHEAD (EFB)**

To the left is a typical cross section of a submerged bulkhead with a permeable cap to allow for tidal exchange and habitat enhancement.

The general locations of the EFB are illustrated in the project map.

## DREDGING METHODOLOGIES

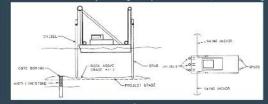
Various dredging methodologies can be employed to remove material based on its particular characteristics. Ultimately, the contractor will determine the combination of plant and equipment that will be used to accomplish the construction in the most efficient manner, and in accordance with environmental guidance.





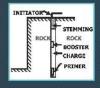
## PRETREATMENT OF ROCK

Rock pretreatment is necessary in order to remove rock with unconfined compressive strength greater than 5000 psi. Methodologies include:





is placed) is capped with an inert material, such as crushed rock (stemming). Studies have shown that



SAFETY MEASURES: A confined blasting plan includes a complex array of safety measures including operations limited to a time of year when protected observers to monitor marine species; fish scares; as well as regulated safety radii (pictured to the right) to protect marine species during blasting activity



### **DISPOSAL ALTERNATIVES**

- Confined Upland Disposal Area
- Offshore Disposal
- Beach Placement

## PORT EVERGLADES HARBOR NAVIGATION PROJECT