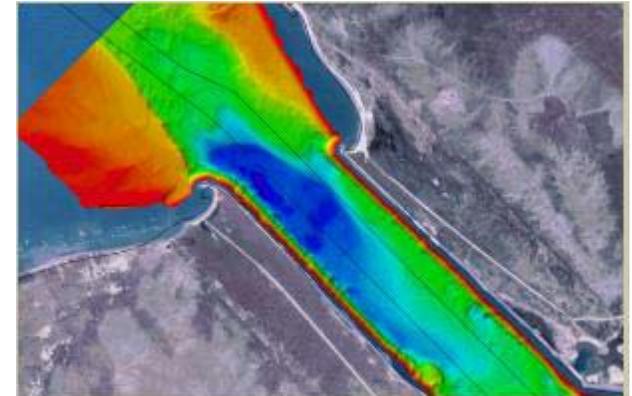


# Scour at Inlet Structures



## Inlet Structures

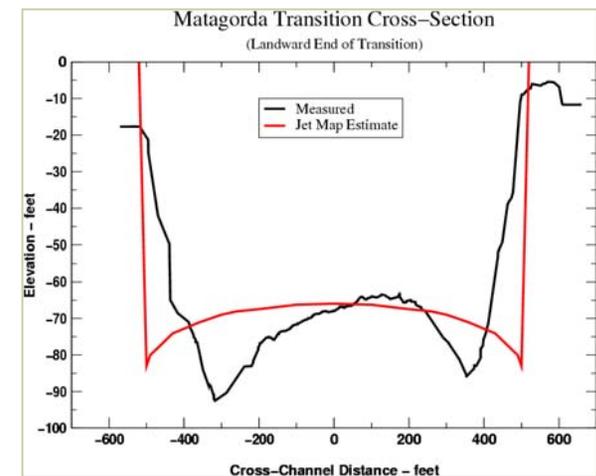
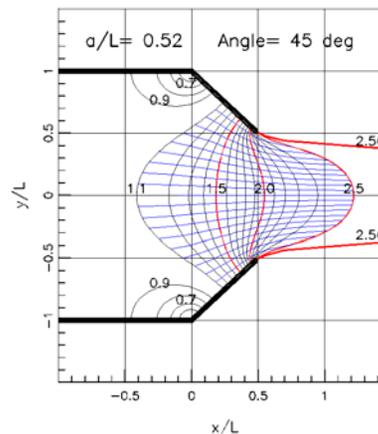
- One-layer armor repairs
- Scour risk to jetties
- New guidance for runup, overtopping, etc.

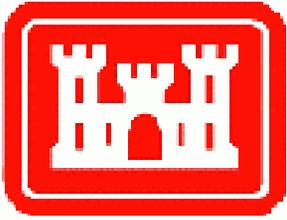


Matagorda Ship Channel

## Inlet Hydraulics

- Flow table studies to support Districts
- Flow nets





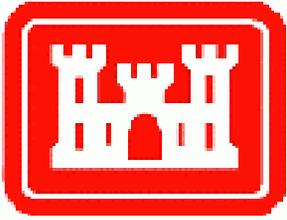
# Jetty Design Guidance



## New Wave Parameter for Coastal Structure Design

### Applications at Inlet Structures:

- Design of new jetties, groins, shore protection
- Evaluation of jetty modifications
- Force loading on structures
- Evaluation of ship-generated wave effects

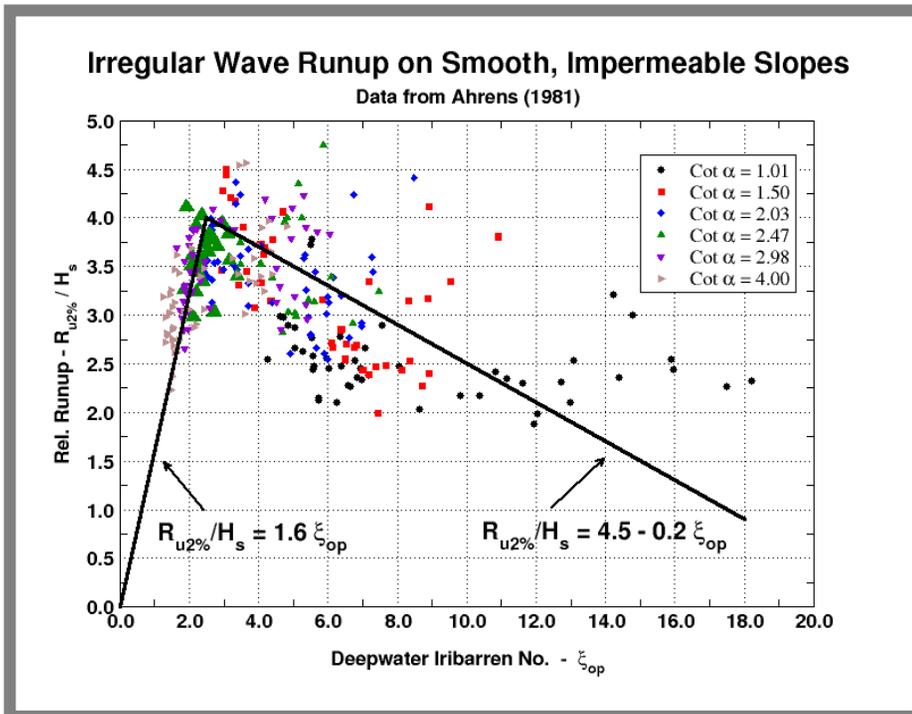
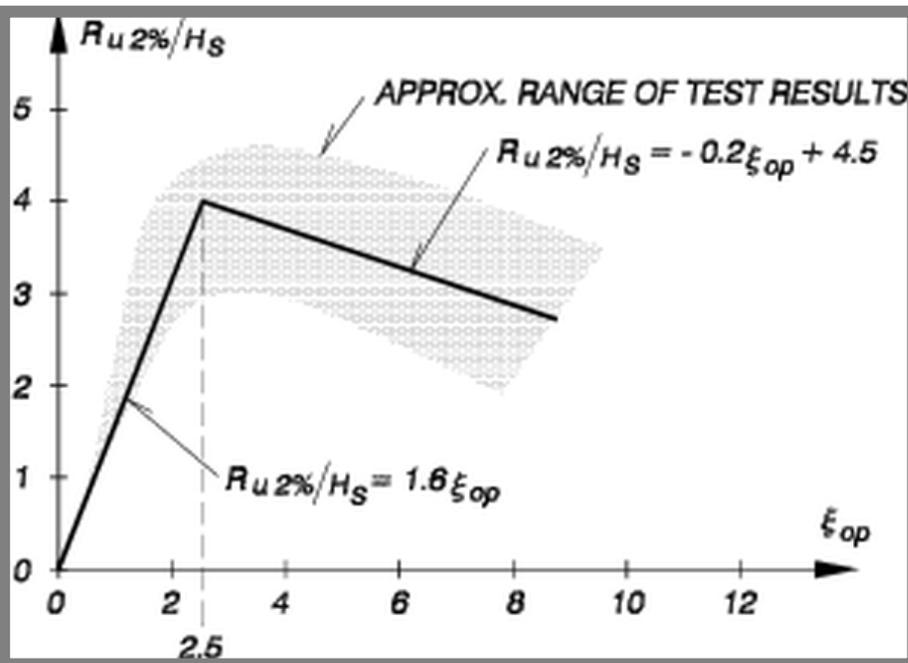


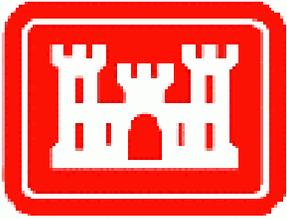
# Wave Momentum Flux Irregular Wave Runup



## Present CEM Guidance

## Reality of the Actual Data





# Wave Momentum Flux Irregular Wave Runup



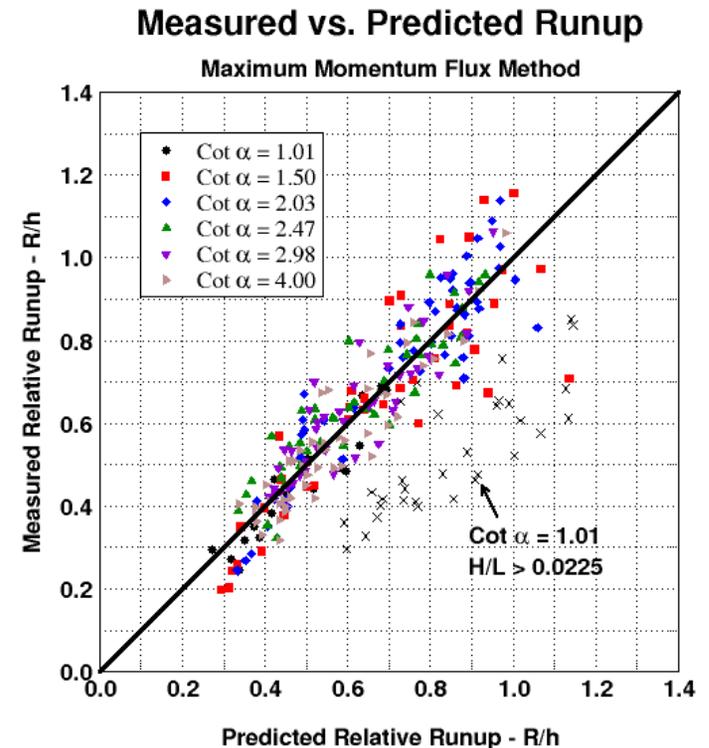
## All Runup Data

$$H/L < 0.0225$$

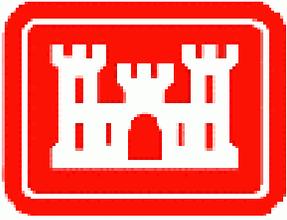
$$\frac{R_{u2\%}}{h} = 1.75 \left(1 - e^{-[1.3 \cot \alpha]}\right) \left[\frac{M_F}{\rho g h^2}\right]^{1/2} \quad \text{for} \quad 1.0 < \cot \alpha < 4.0$$

$$H/L > 0.0225$$

$$\frac{R_{u2\%}}{h} = 1.75 \left(1 + e^{-[0.47 \cot \alpha]}\right) \left[\frac{M_F}{\rho g h^2}\right]^{1/2} \quad \text{for} \quad 1.5 < \cot \alpha < 4.0$$



**Reference:** **CETN III-68:** (Available on CIRP web site)  
Estimating Irregular Wave Runup on Smooth, Impermeable Slopes



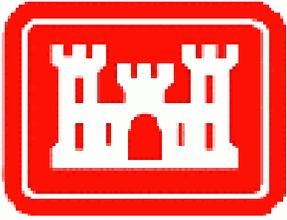
# Port of Anchorage, Cook Inlet, Alaska



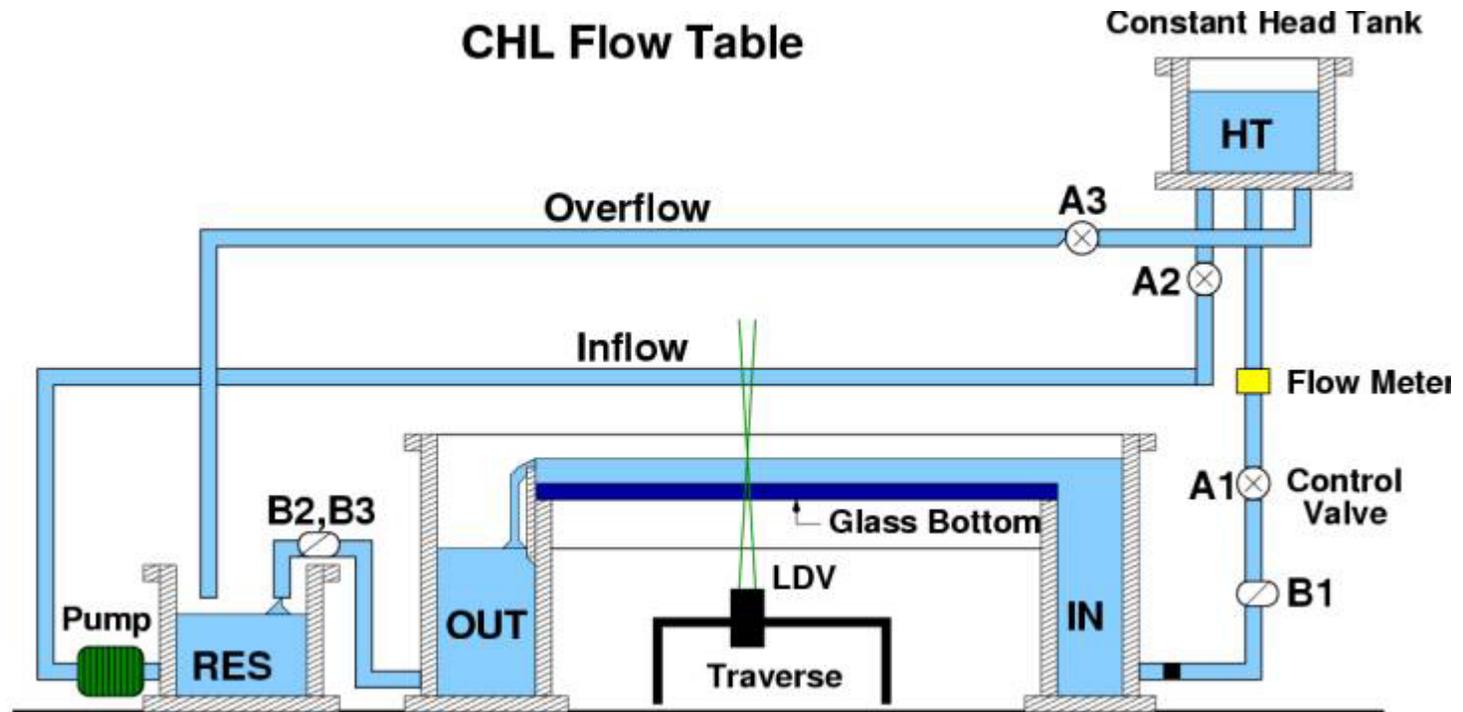
## Situation...

- Port of Anchorage
  - High annual shoaling rate (200,000 - 400,000 yd<sup>3</sup>)
  - Emergency dredging at times (800,000 - 1,000,000 yd<sup>3</sup>)
- Proposed channel deepening
- Huge tidal range (+30 ft)
- Flow turbulence significant

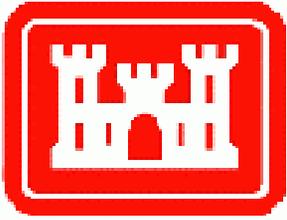




# CHL Precision Flow Table



**Reference:** **CHETN IV-55:** (available on CIRP web site)  
CHL Precision Flow Table - Description and Applications

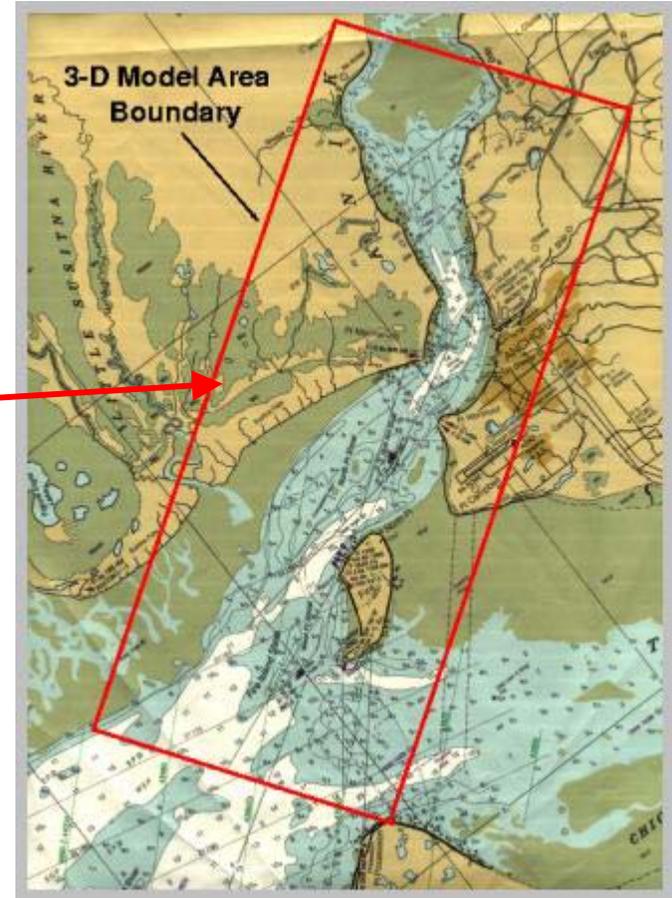


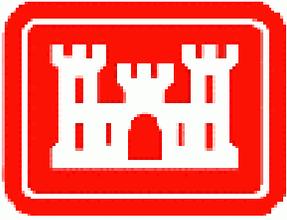
# Flow Table Study of Cook Inlet, Alaska



## 3-D Model Parameters:

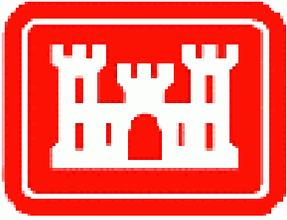
- Distorted physical model
- Modeled 11 mi X 31 mi Area
- Scales: 1:15,000 horiz ; 1:1,000 vert.
  - Horizontal.....1,250 ft = 1 in.
  - Vertical.....83 ft = 1 in.
  - Velocity.....1.6 m/s = 5 cm/s





# Flow Table Study of Cook Inlet, Alaska





# Flow Table Study of Cook Inlet, Alaska



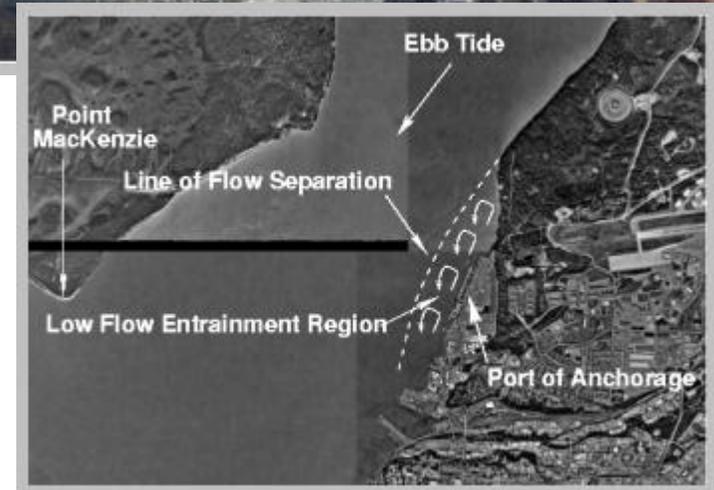
## Study Findings...

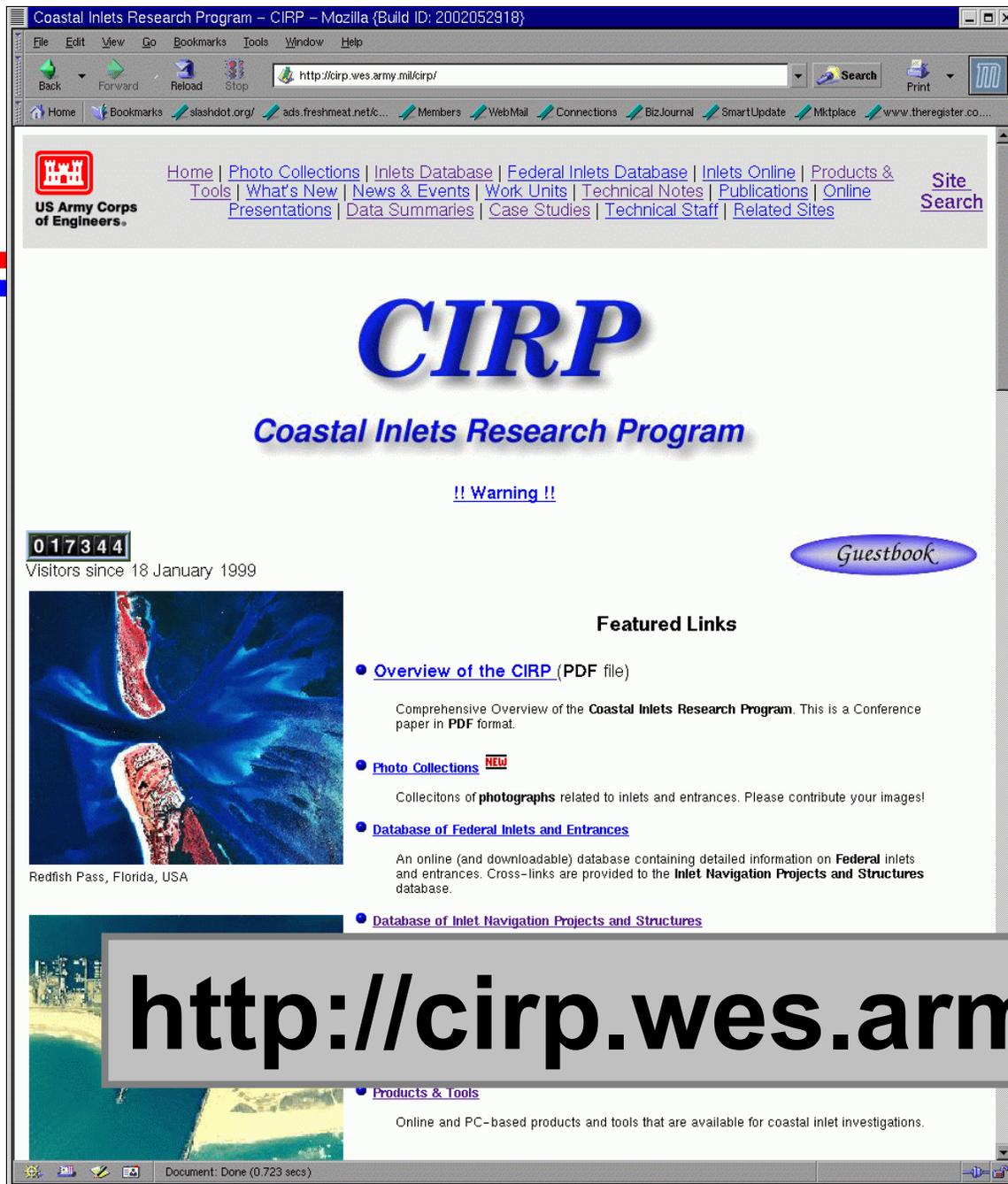
- Shoaling due to ebb flow separation at Cairn Point
- Dredge disposal practices improved



## Potential Follow-on Study

- \$1.5 M physical model
- Additional numerical modeling





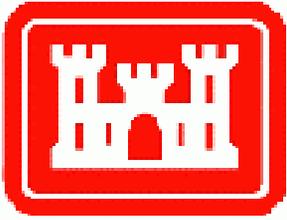
# Home Page



## Web Site Objectives:

- Information about CIRP
- Technology Transfer
- Simple Online Tools
- Easy Site Navigation

<http://cirp.wes.army.mil/cirp/>



# CIRP Web Site Content



## Information:

- CIRP Research
- Upcoming Events
- Past Presentations
- Photo Collections

## Publications:

- CHETNs (Tech Notes)
- Technical Reports
- Journal Articles
- Conference Papers