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ACCRA BEACH HOTEL  
JUNE 25 - 27**

Existing Conditions - Rockley to Hastings




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Existing Conditions - Hastings to Coconut Court




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Understanding the Shoreline

- Observations
- Field work
- GIS Analysis
- Physical Modeling
- Numerical Modeling
- Sediment Balance with and without the project

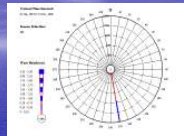



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Nearshore Wave Climate


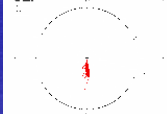

♦ “Normal” conditions:

- SSE direction
- $H_s < 0.5$  m,  $T_p = 6-8$  s



♦ “Extreme” conditions generated by tropical storms, but:

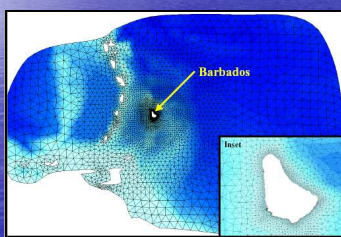

- wave height is depth-limited by shelf
- water level (tide + surge) controls design  $H_s$

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Storm Surge Modeling


♦ Two Dimensional ADCIRC 2DDI was employed to simulate the impact of surge.

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Summary of Estimated Hurricane Surge by Return Period

Return Period (yrs)	Surge (m)					
	Rockley	Welches	Crane	Holetown	Woman's Bay	Tent Bay
50	0.45	0.52	0.45	0.36	0.32	0.27
100	0.64	0.67	0.70	0.56	0.54	0.55
150	0.73	0.77	0.80	0.64	0.62	0.67
200	0.74	0.82	0.85	0.68	0.66	0.72





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**Water Level Variation**

- ◆ Project Sites are located in shallow nearshore waters
- ◆ Waves are depth limited
- ◆ Estimation of water level variation is a critical aspect of the design wave climate definition



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**Water Level Variation**

- ◆ Three major components
  - Tidal Variation
  - Long Term Sea Level Rise
  - Wave Set-up



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**Water Level Variation**

- ◆ Tidal Variation
  - The tidal range of Barbados varies from 0.3 to 1.0m.
- ◆ Wave Set-up
  - Estimated using sediment transport model COSMOS and physical modeling.



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**Water Level Variation**

- ◆ Long Term Sea Level Rise
  - Rates of sea level rise was explored using a variety of technical data as well as comparisons of regional water level records.
  - A rate of 6.5mm per year has been assumed.



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**Calculation of the 50-year Static Water Level**

Calculation of the 50-year Static Water Level Allowance

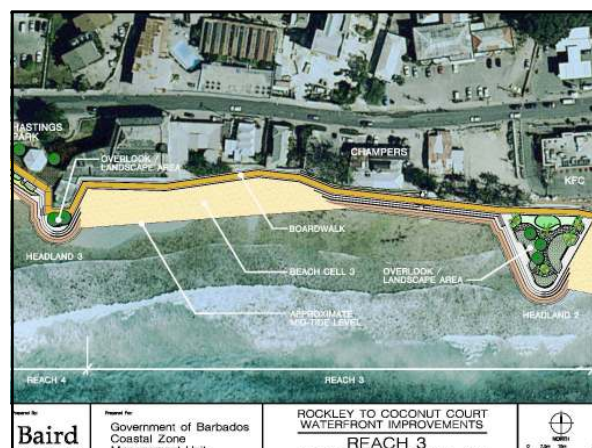
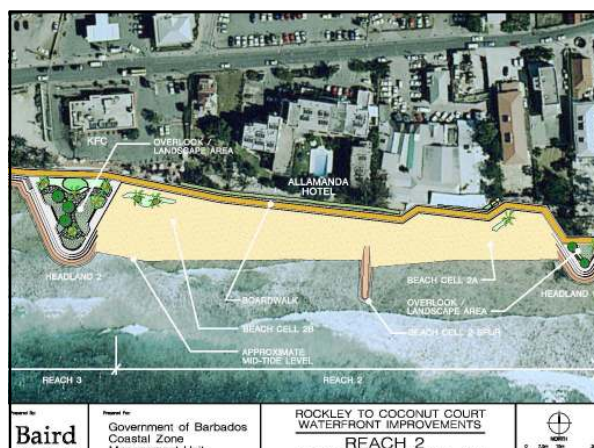
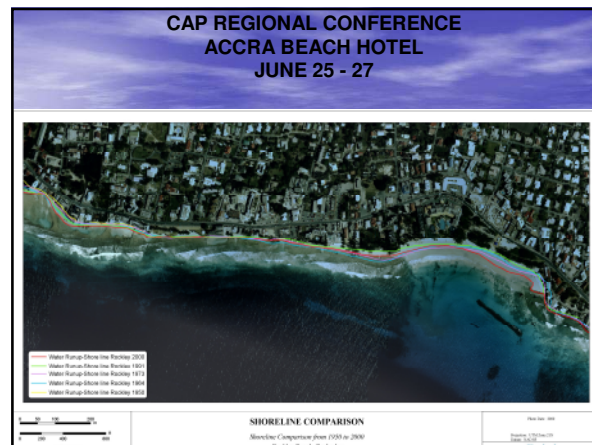
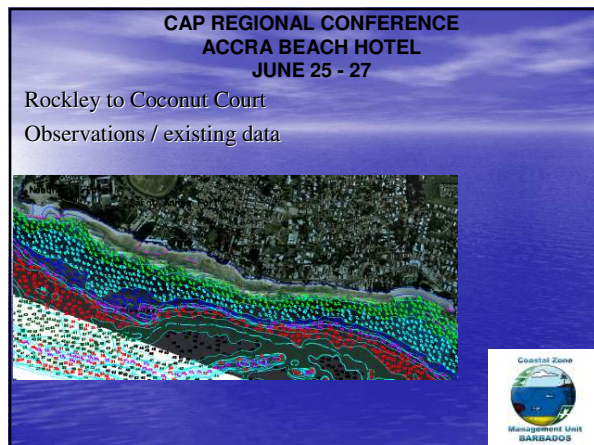
Physical Property	Allowance (m)
Tide (MHHW Lamont)	0.60
Hurricane Surge	0.45
Sea Level Rise	0.16
Wave Set-up*	
Total Static Level (w/ Wave Setup)	
Total Static Level (w/o Wave Setup)	1.21



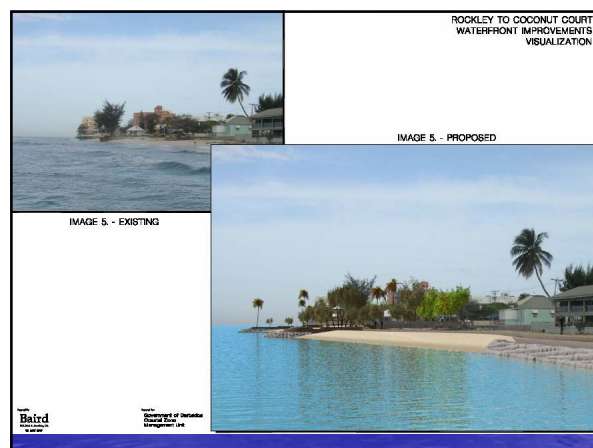
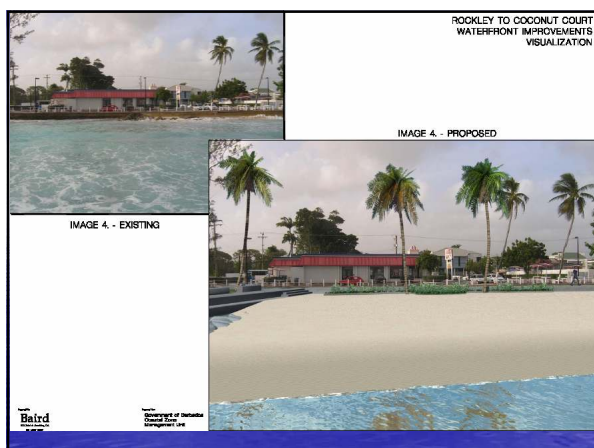
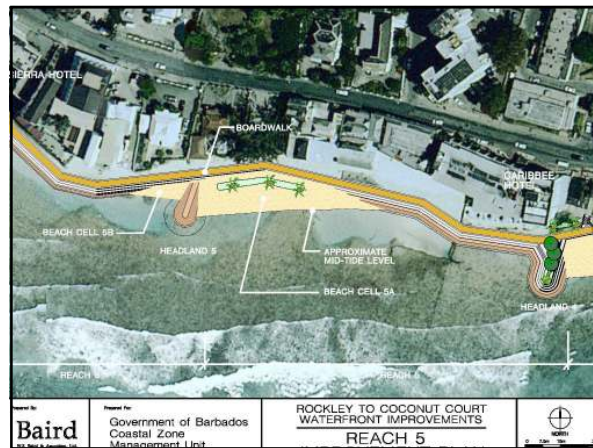
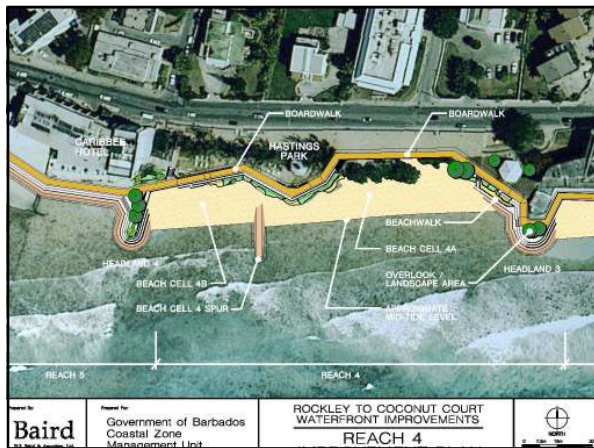
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**Physical Modeling**









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## Welches Beach



**Project Objectives**

- Minimize overtopping of roadway
- Expand beach if possible



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**Existing Conditions**



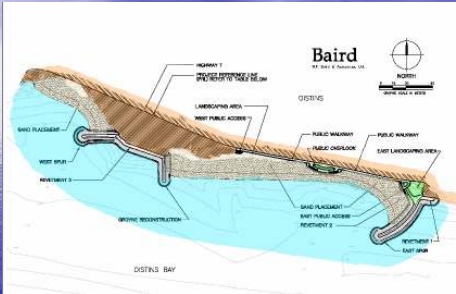
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### COMPONENTS OF PROJECT


- Construct 40m Groyne to East of Site
- 5500 Cubic Meters of Sand west of Eastern Groyne
- Construct Concrete Outlook
- Refurbish Existing Groyne and extend by 10m
- Construct 40m Groyne to West of Site
- 1500 Cubic Meters of Sand west of Eastern Groyne



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**Proposed Plan**



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**As Built** **Architectural Rendering**





