COASTAL INFRASTRUCTURE PROGRAMME

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COASTAL INFRASTRUCTURE PROGRAMME

- JOINTLY FUNDED BY THE GOVERNMENT OF BARBADOS AND THE INTER-AMERICAN DEVELOPMENT BANK.
- US $ 24.4 MILLION DOLLARS

PRINCIPLE OBJECTIVES OF PROGRAMME

- ENSURE A HEALTHY ENVIRONMENT.
- CONTINUED ECONOMIC DEVELOPMENT OF BARBADOS THROUGH IMPROVED MANAGEMENT AND CONSERVATION OF THE COASTAL ZONE.

Project Locations

- Rockley to Coconut Court
- Crane Beach
- Holetown Beach
- Welch's Beach
- Holetown Lagoon
- Tent Bay

Project Design Components

- Wave Climate
- Tides
- Surfage
- Sea Level Rise
- Wave Set-up
- Sediment Processes
- Physical Modelling

ROCKLEY TO COCONUT COURT

Project Objectives

- Create continuous walkway / access
- Expand beach where feasible
Existing Conditions - Rockley to Hastings

Existing Conditions - Hastings to Coconut Court

Understanding the Shoreline

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

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 $H_s$

Storm Surge Modeling

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

Summary of Estimated Hurricane Surge by Return Period

<table>
<thead>
<tr>
<th>Return Period</th>
<th>Rockley</th>
<th>Watchers</th>
<th>Crane</th>
<th>Holetown</th>
<th>Woman’s Bay</th>
<th>Tent Bay</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>0.46</td>
<td>0.52</td>
<td>0.45</td>
<td>0.36</td>
<td>0.32</td>
<td>0.27</td>
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<tr>
<td>100</td>
<td>0.64</td>
<td>0.67</td>
<td>0.70</td>
<td>0.66</td>
<td>0.64</td>
<td>0.58</td>
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<tr>
<td>150</td>
<td>0.73</td>
<td>0.77</td>
<td>0.80</td>
<td>0.64</td>
<td>0.62</td>
<td>0.67</td>
</tr>
<tr>
<td>200</td>
<td>0.74</td>
<td>0.82</td>
<td>0.85</td>
<td>0.60</td>
<td>0.66</td>
<td>0.72</td>
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</table>
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

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

Tidal Variation
- The tidal range of Barbados varies from 0.3 to 0.4m.
- Wave Set-up
- Estimated using sediment transport model COSMOS and physical modeling.

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.

Calculation of the 50-year Static Water Level

<table>
<thead>
<tr>
<th>Component</th>
<th>Allowance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tidal (MLLW baseline)</td>
<td>0.60</td>
</tr>
<tr>
<td>Return Surge</td>
<td>0.45</td>
</tr>
<tr>
<td>Sea Level Rise</td>
<td>0.16</td>
</tr>
<tr>
<td>Wave Set-up</td>
<td></td>
</tr>
<tr>
<td>Total Static Level</td>
<td>0.21</td>
</tr>
<tr>
<td>Total Static Level</td>
<td>0.21</td>
</tr>
</tbody>
</table>

Physical Modeling
Observations / existing data

Rockley to Coconut Court
Welches Beach

Project Objectives
- Minimize overtopping of roadway
- Expand beach if possible

Existing Conditions

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

Proposed Plan

As Built

Architectural Rendering