A Bridge to the Comarca: Chucunaque River Footbridge
iDesign 2013

Del Puente Engineering
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Mission Statement

“As a global firm in consulting and design, Del Puente Engineering has the human and technical resources design safe, economical river crossings with minimal environmental impact, along with the depth of knowledge and experience to help clients achieve successful projects in the complex social and political climate of the Embera-Wounaan Comarca of Panama.”
Outline

- Our Experiences
- Community Background
- Design Requirements
- Data Collection
- Final Design
- Cost Estimate
- Schedule
- Summary
- Questions
Destination: Panama
Community Background
Community Background
Community Background

http://panamatourismtravel.blogspot.com/2012/01/embera-baskets.html
Festival
Festival
Reasons for a Bridge
Chucunaque Watershed

- River Length: 134 miles
- Watershed Area: 4118 square miles
- 100-year Flood Line
Design Challenges
Design Challenges
Surveying
Surveying
Alternatives

- Vehicular Bridge
- Removable Deck
- Cable Running Barge
- Suspension Bridge
Design Loads

- People
- Horse
- Motorcycle
- Wind
- Earthquake
Site Survey

PORT SIDE
CHUCUNAQUE RIVER
FLOW
DENSE JUNGLE

CONTOUR INTERVAL = 2 FT.

BRIDGE SITE SURVEY
SCALE: 1/2" = 1'-0"
Plan

1 PLAN: BRIDGE LAYOUT
SCALE 1/33 = 1'-0"
Tower Details

1. ELEVATION: TOWER
   SCALE: 1/4" = 1'-0"

2. SECTION: TOWER
   SCALE: 1/4" = 1'-0"

3. DETAIL: TOP CONNECTION/SADDLE
   SCALE: 1" = 1'-0"

4. DETAIL: BRACING CONNECTION
   SCALE: 1" = 1'-0"
Approach and Slope Details

1. SECTION: PLAN VIEW EAST BANK
   SCALE: 1/16" = 1'-0"

2. SECTION: PROFILE VIEW A-A
   SCALE: 3/32" = 1'-0"

3. SECTION: PROFILE VIEW B-B
   SCALE: 3/32" = 1'-0"
Decking Details

**BRIDGE DECKING – SECTION VIEW**
Scale: 1-1/2” = 1’-0”

**BRIDGE DECKING – PROFILE**
Scale: 1-1/2” = 1’-0”
Cable Walkway Assembly
Anchor Block Details

(4) 1 1/2" DIA. MAIN CABLE WITH TURNBUCKLE

SECTION: CABLE ANCHORAGE
SCALE: 1/4" = 1'-0"

DETAIL: TURNBUCKLE ASSEMBLY
SCALE: 1" = 1'-0"
Tower Footing Details

Plan: Tower Foundation
Scale: 3/8" = 1'-0"

Section: Tower Foundation
Scale: 3/8" = 1'-0"

Length as Required

Detail: Cable Anchorage Hook
Scale: 1/2" = 1'-0"
Cost Estimate

- Total Estimated Cost: $418,000

<table>
<thead>
<tr>
<th>Bridge Item</th>
<th>Estimated Cost</th>
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<tr>
<td>Anchor Block</td>
<td>$54,800</td>
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<tr>
<td>Approach</td>
<td>$300</td>
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<tr>
<td>Cables</td>
<td>$88,100</td>
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<td>Gabions</td>
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http://coalcliff.com/wp-content/uploads/2012/04/Cat_970F_Front_End_Loader.jpeg
# Construction Schedule

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<th>Preliminary Phase</th>
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<tr>
<td>Task Name</td>
<td>Duration</td>
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<tr>
<td>Permitting</td>
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<td>Order Materials</td>
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<td>Mobilization</td>
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<tr>
<td>Port Slope Construction</td>
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<tr>
<td>Jungle Slope Construction</td>
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<td>Port Approach</td>
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<tr>
<td>Port Foundation</td>
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<tr>
<td>Jungle Approach</td>
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<tr>
<td>Jungle Foundation</td>
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<tr>
<td>Demobilization</td>
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<tr>
<td>Port Anchor Excavation</td>
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<td>Jungle anchor Excavation</td>
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Construction and Constructability
Conclusion

- Alto Playón
- Suspension Bridge
- Construction Duration - 6 months
- Estimated Cost - $418,000
Acknowledgements

- International Senior Design Advisors:
  - Mr. Michael T. Drewyor, P.E., P.S.
  - Dr. David Watkins, PhD., P.E.
- Peace Corps Volunteers:
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  - Amber Naylor, Alto Playón, Panama
- Others:
  - Larry Belken - CH2M Hill
  - Clinton Donnelly - President, Engineers Without Borders-Panama
Questions?