Santa Lucia River Crossing

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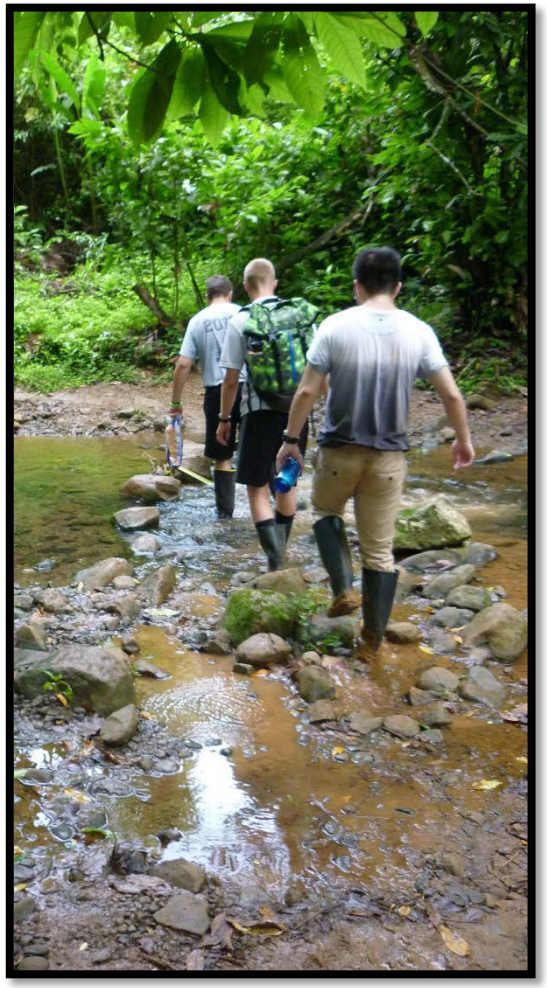
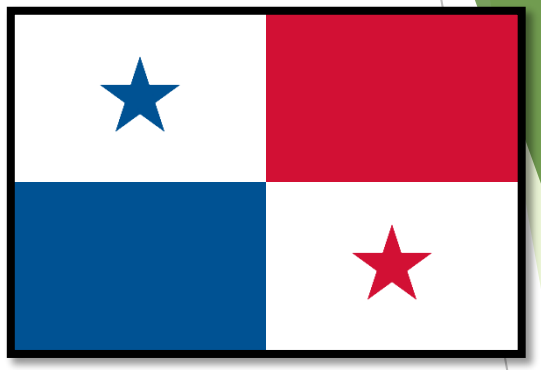
Outline

- Introduction
- Experiences in Country
- Community Background
- Design Requirements
- Data Collection
- Bridge Design
- Cost Estimate
- Construction Schedule
- Summary
- Questions





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Timeline of Trip

- Arrived in Panama City, Panama (PTY)
- Stayed in City of Knowledge
- Traveled to our community
- Collected data from proposed bridge location
- Experienced community culture
- Traveled back to the City of Knowledge
- Departed Panama City, Panama

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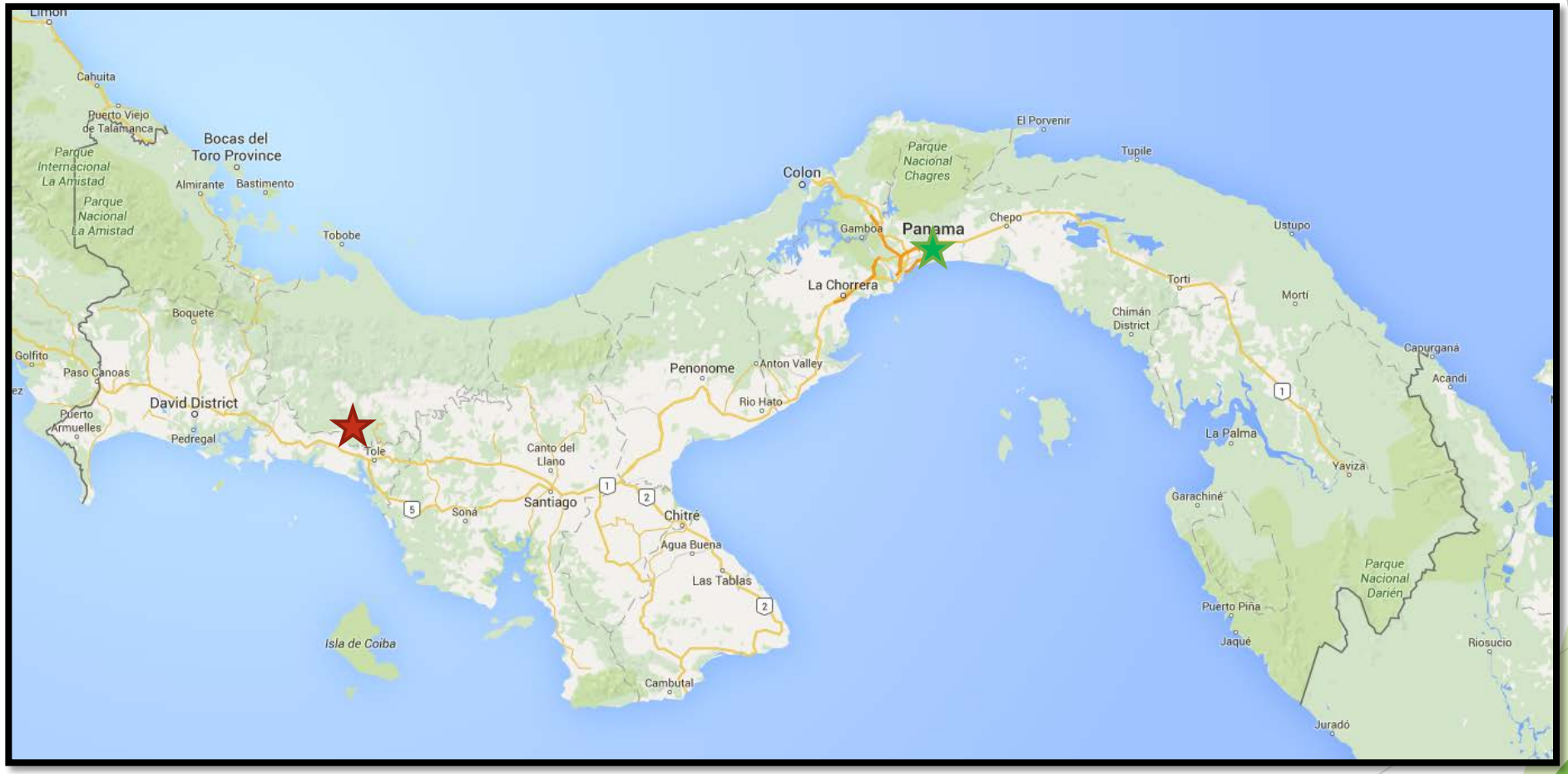
Quebrada Caracol



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Mission Statement

- “Lucia Associates aims to present a practical, economical, and sustainable design to the community which they can then implement and take ownership of. The designs will aim to ensure the safety of every one of its users. Each design will take into careful consideration the finances, resources and values of the community.”

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Community Background

- PCV: Leigh Miller
- Quebrada Caracol, located in Comarca Ngabe-Bugle
- No road access, electricity, little running water, and few latrines
- Houses in the community are relatively far apart
- People travel by foot or horse on steep muddy trails that can get slippery

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Community Background

- Subsistence farming in community, many people find work outside of the community
- 233 community population, 103 people living out of the community
- Long hikes required to get to school, few children continue after middle school

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Personal Experiences

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Personal Experiences

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Personal Experiences

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Design Requirements

- Current suspension bridge is unreliable
- The bridge is required so children can cross the river and travel to school safely

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Site Conditions

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Site Conditions

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Data Collection

- Topography data
- River Flow rates
- Cross sections and Slope of the river
- Soil type and soil layers were observed
- Recorded GPS coordinates

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Proposed Bridge Location

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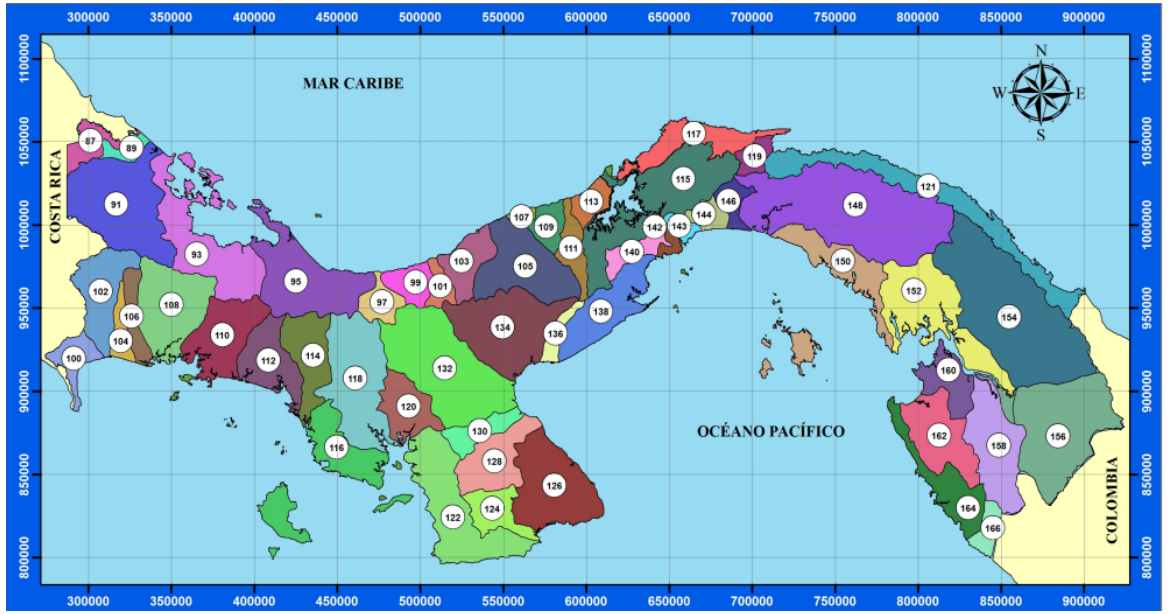
Site Hydrology

- Methods to calculate and analyze flood flow rate and high water level
  - Scale from historic flood flow rates Q = 1,770 ft^3/s
  - RCN method Q = 3,033 ft^3/s



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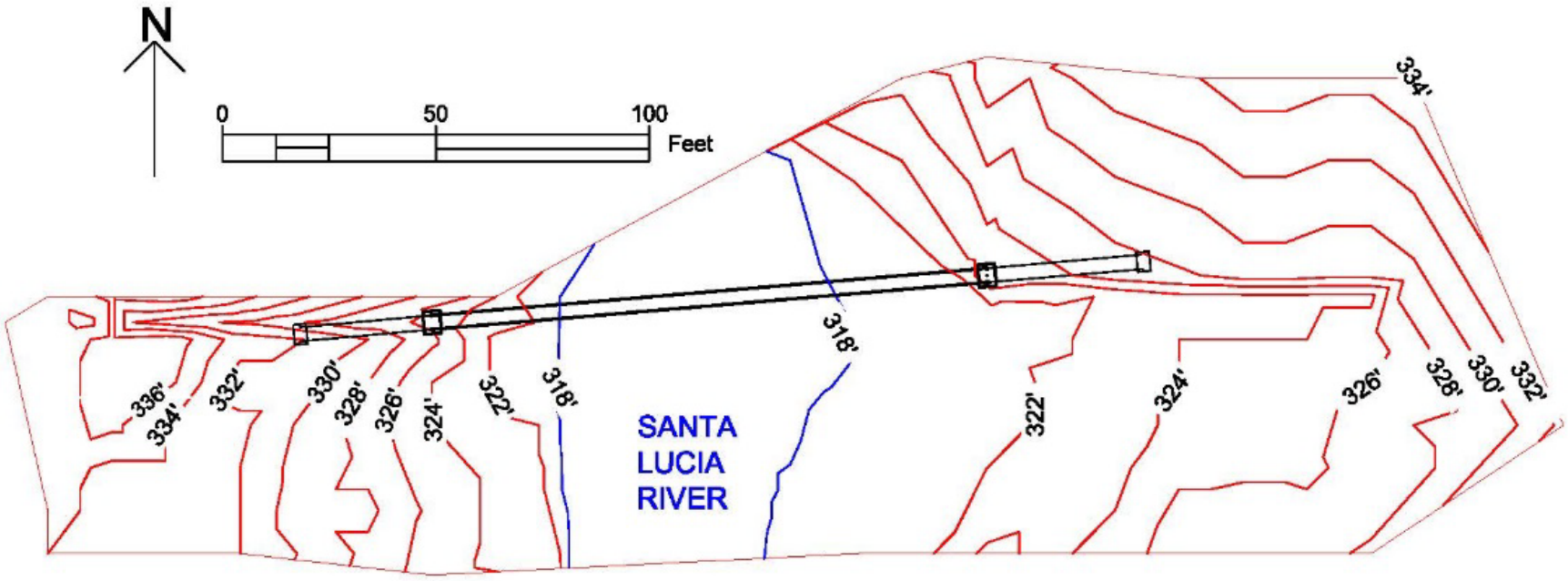
Topographic Map of Site



Plan View: Suspension Bridge

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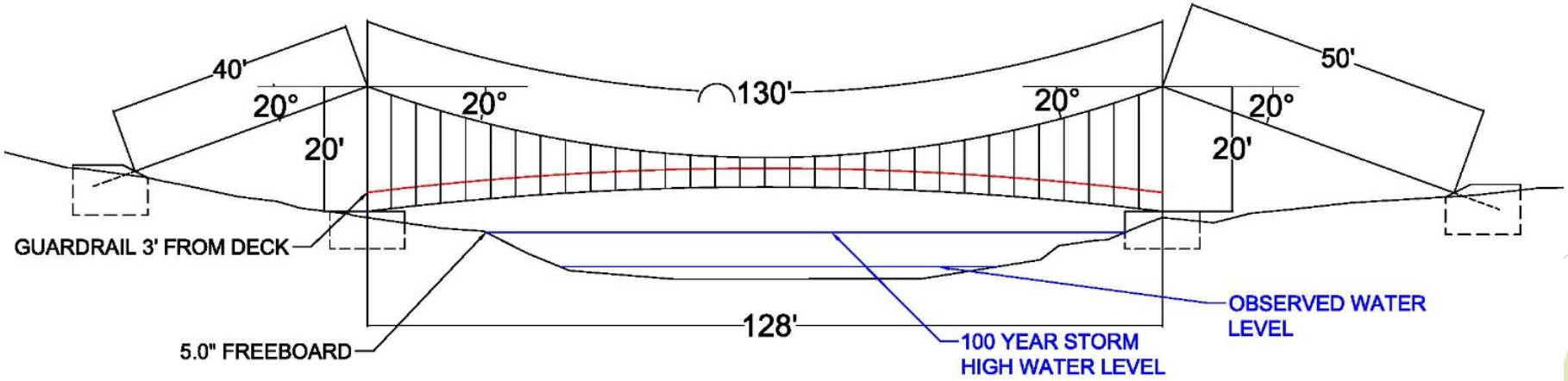
Bridge Design

- 128-ft Span
- 20-ft Steel Towers
- High Strength Suspension Cables
- Wood Deck



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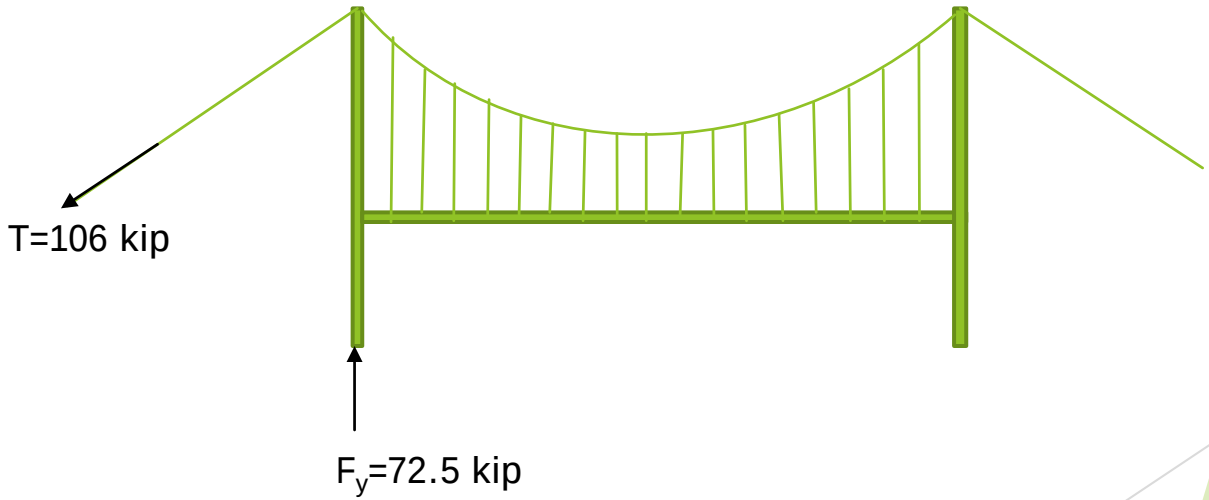
Design Loads

- Dead Load
- Pedestrian Live Load
- Equestrian Live Load
- Earthquake Load
- Wind Uplift Load



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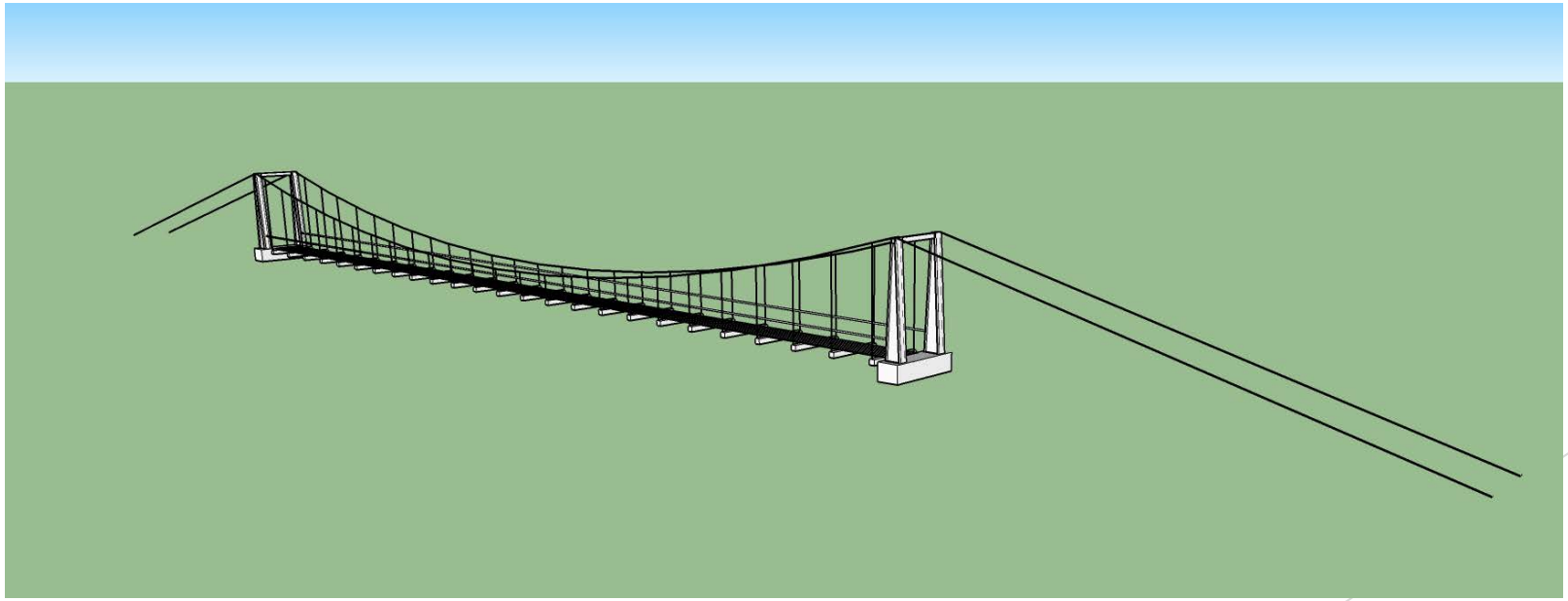
Detailed Drawings

- Anchor Details
- Foundation Details
- Deck Details
- Tower Details



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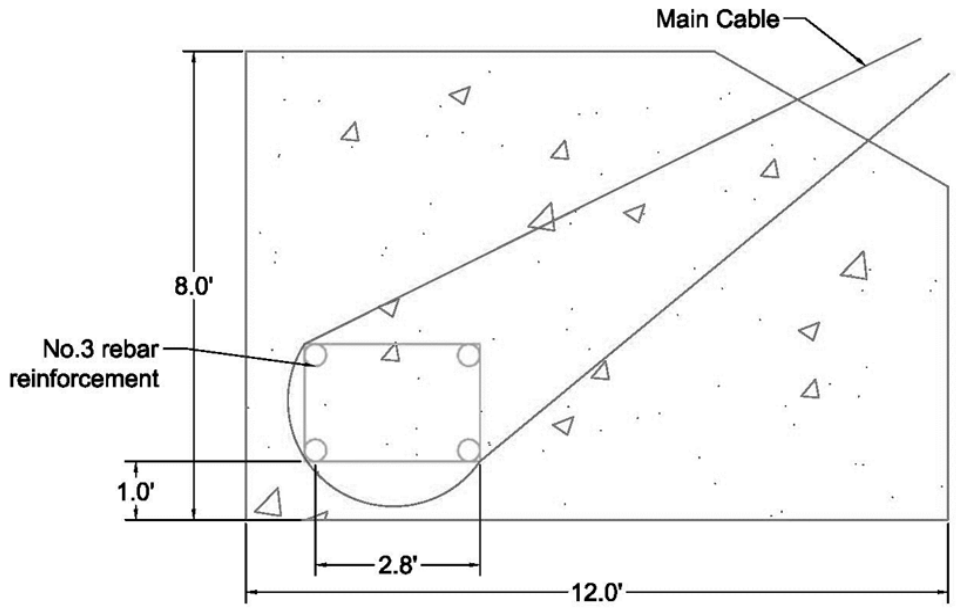
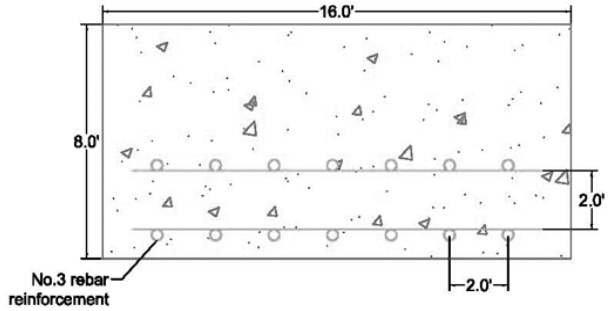
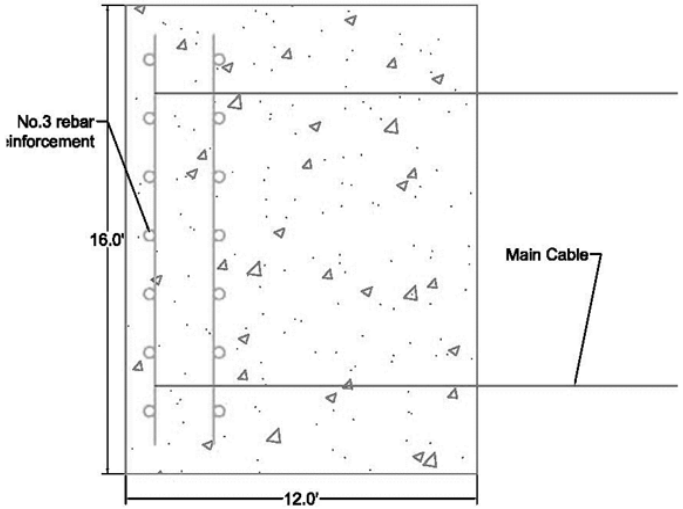
Anchor Details



3 Section B-B: Anchor Detail
SCALE: 1:1



2 DETAIL: Anchor Detail
SCALE: 1:2



1 Plan View: TOWER FOUNDATION
SCALE: 1:2

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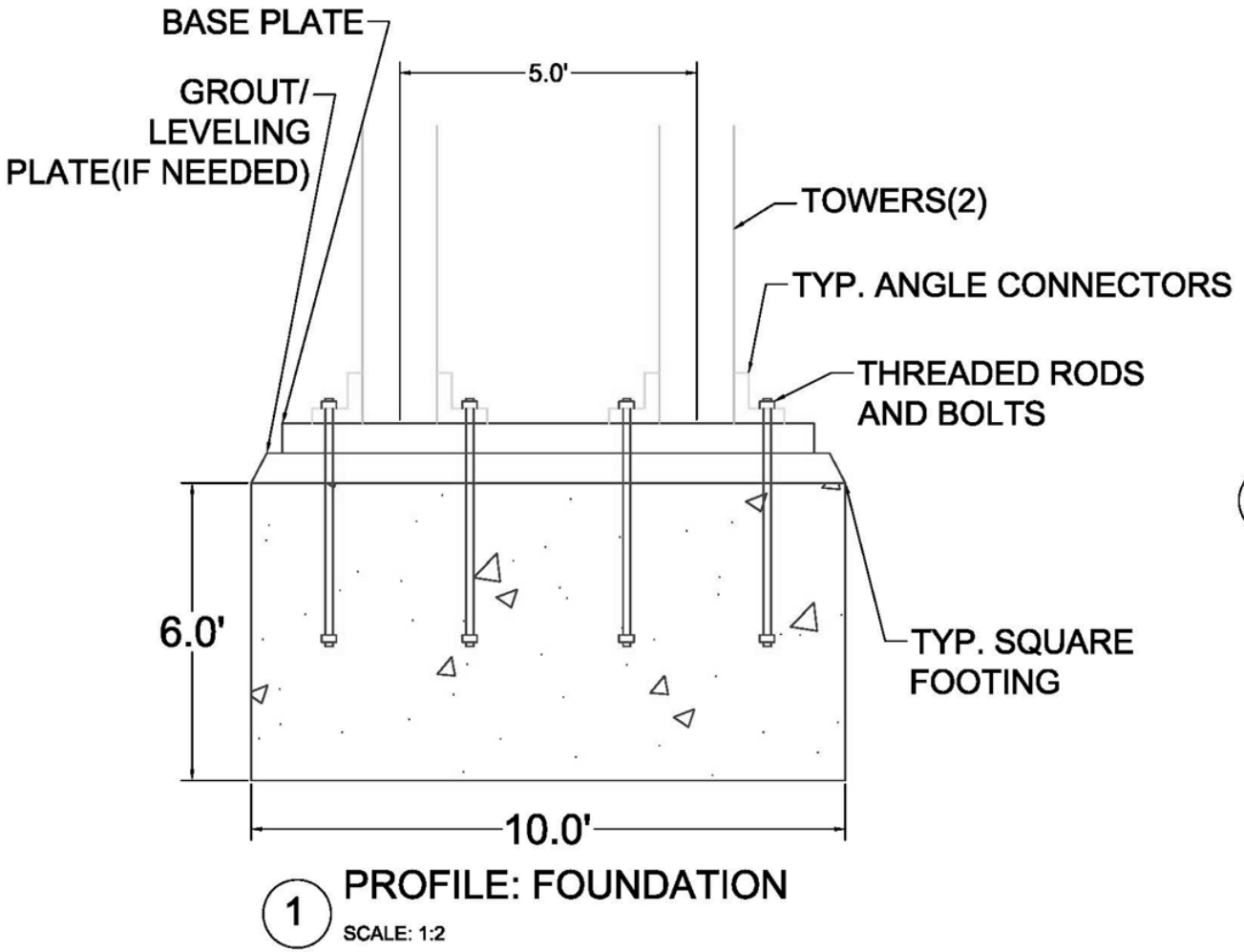
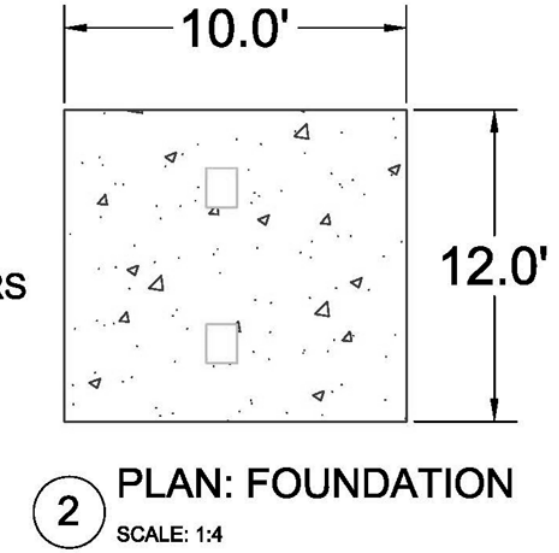
Foundation Details





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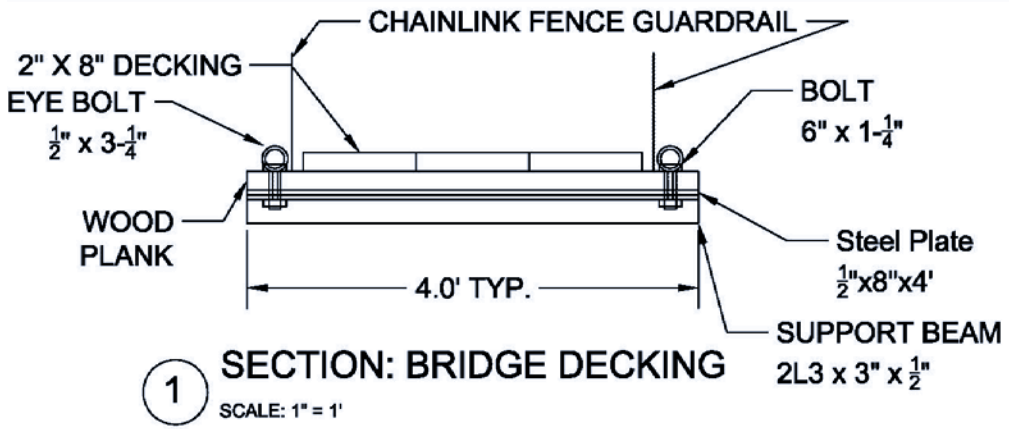
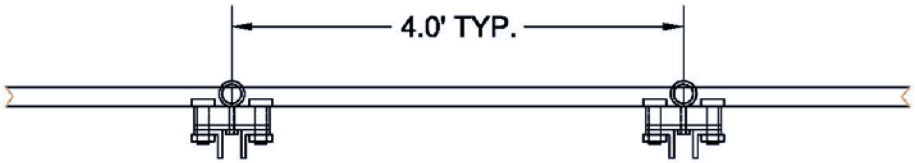
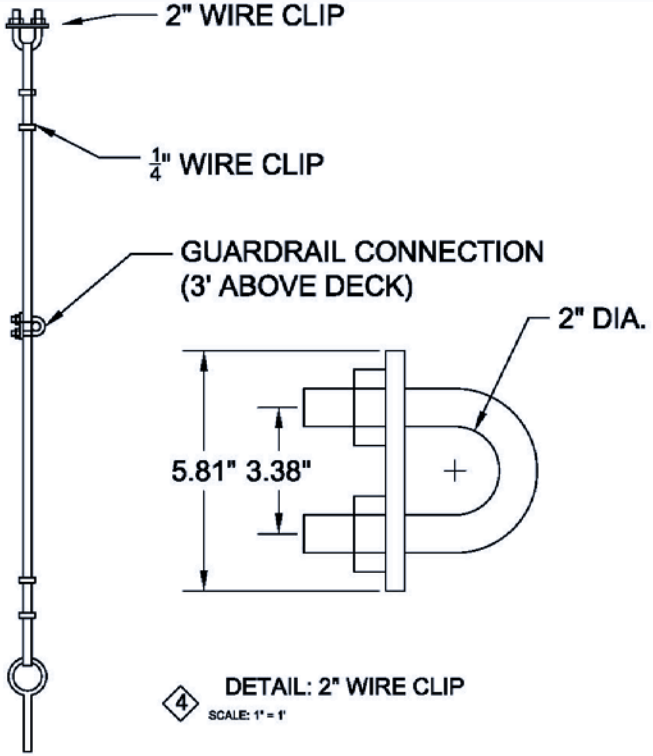
Deck Details



1 SECTION: BRIDGE DECKING
SCALE: 1" = 1'

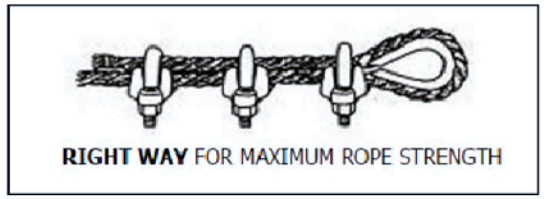


2 PROFILE: BRIDGE DECKING
SCALE: 1" = 1'



4 DETAIL: 2" WIRE CLIP
SCALE: 1" = 1'

3 DETAIL: HANGER ASSEMBLY
SCALE: 1" = 1'



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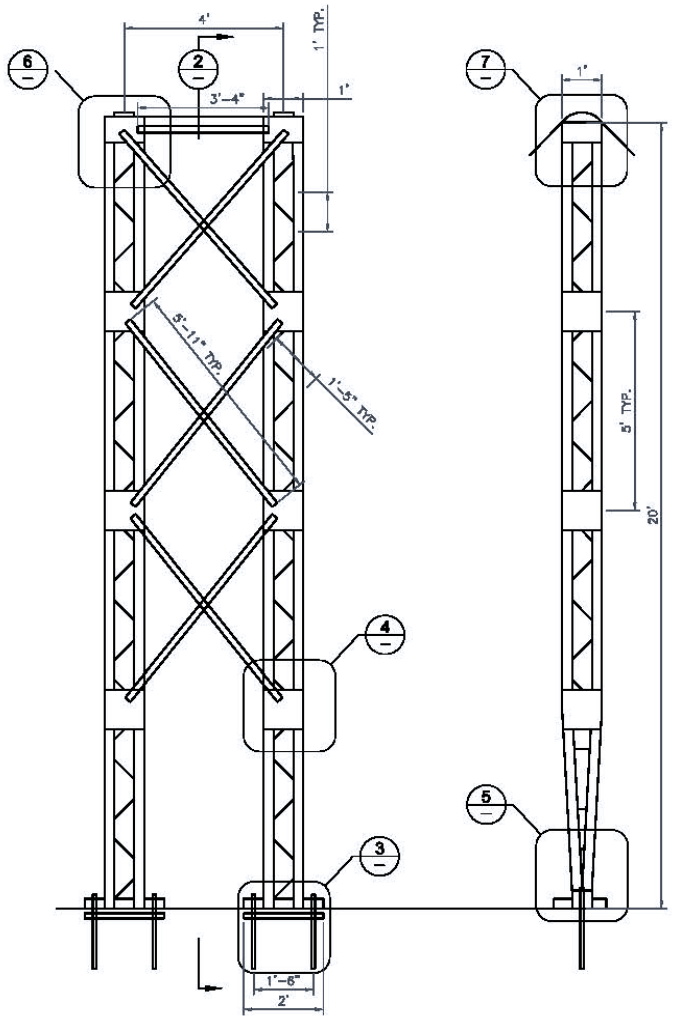
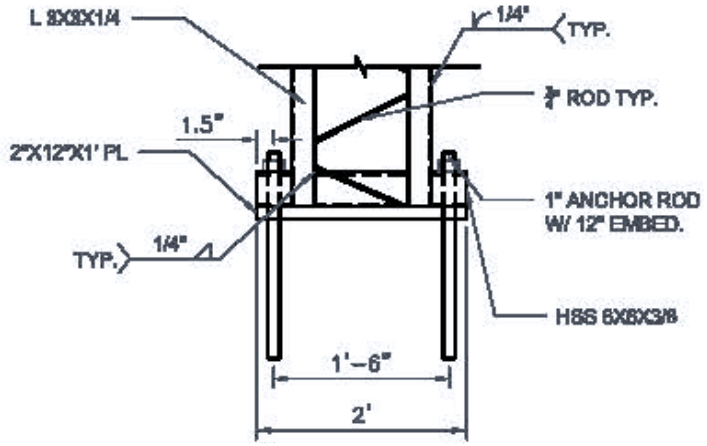
Tower Details

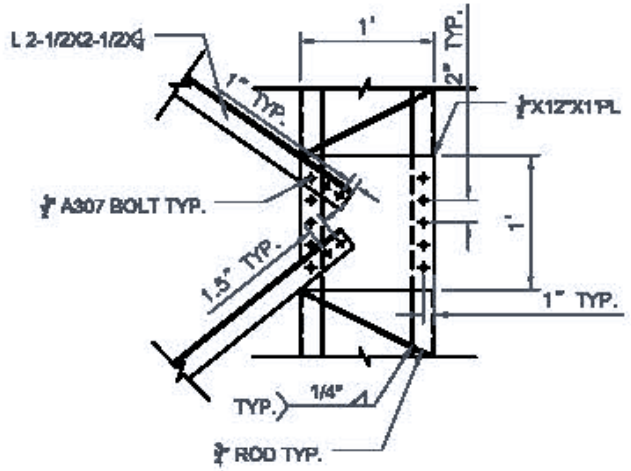


1 ELEVATION: TOWER
SCALE: 1/4" = 1'-0"

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



3 DETAIL: TOWER ANCHORAGE
SCALE: 1" = 1'-0"



4 DETAIL: BRACING CONNECTION
SCALE: 1" = 1'-0"

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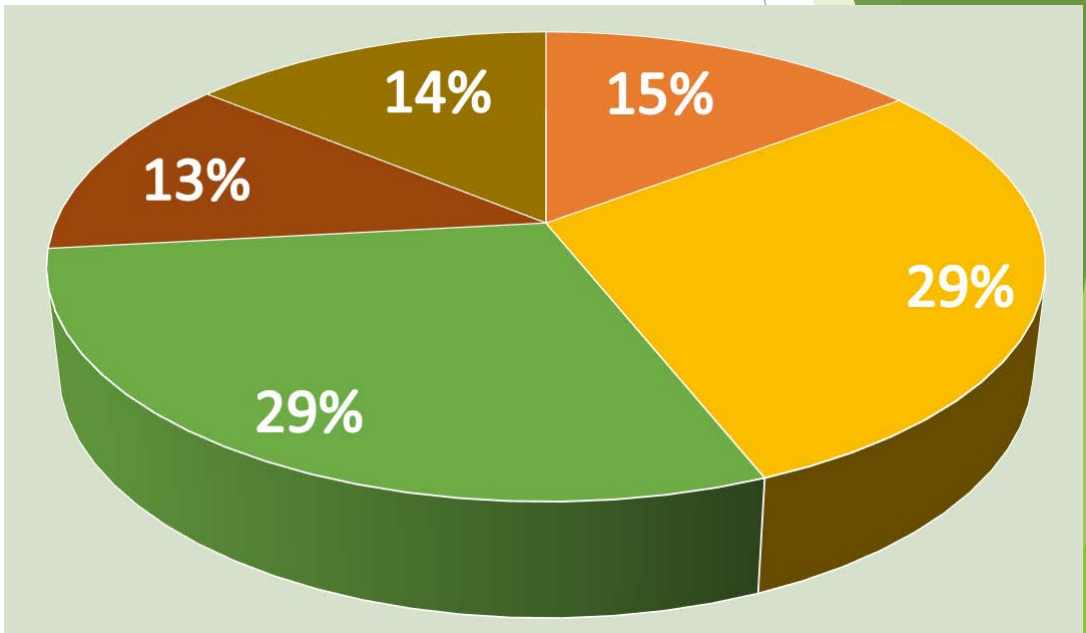
Cost Estimate

- Costs were estimated using U.S. material costs
  - Towers - $12,400
  - Anchor Blocks - $24,600
  - Walkway - $11,800
  - Cables - $24,600
  - Tower Foundation - $10,700
  - **Total Estimate- $85,900**



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Construction Schedule

- Construction will begin after road is completed
- Construction to be completed in the dry season (January—May)
- Estimate of about 124 work days to complete the project

Task Name	Duration
Mobilization	5 days
Clearing and Grubbing at Site	2 days
Gather Material for Foundations and Anchor blocks	10 days
Foundations	8 days
Anchor blocks	10 days
Gather Materials for Tower Assembly	10 days
Towers	37 days
Gather Materials for Decking Assembly and Fencing	10 days
Decking	15 days
Adjust Main Cables to level Bridge Deck	1 day
Fencing	2 days
Pathway	2 days
Demobilization	2 days
Bridge Opening Ceremony	1 day
Bridge Maintenance	

Bridge Maintenance

- Paint towers to prevent rusting
- Check:
  - Cables for stretching or rust spots
  - Bolts
  - Deck boards for rotting
  - Possible erosion around foundations

Summary

- Experiences
- Community Background
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- Construction Schedule

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Acknowledgments

- Advisors: Michael T. Drewyor, P.E. & P.S.
  David Watkins, Ph.D., P.E.
- Peace Corps Volunteer: Leigh Miller, BEng, FE
- Dr. Tess Ahlborn, PhD. – Michigan Tech Professor
- Del Puente Engineering – International Senior Design Team Fall 2013

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Questions

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