Chichica Footbridge Team

iDesign: Panama 2011

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Michigan Technological University

Michael Rood
Deanna Larson
Yingying Jin
Haobo Ma
Stephanie Watts-Garcia

36 SB CONSULTING

Outline

- Background
- Project Scope
- While We Were There
- Design Considerations
- Components
- Logistics
- What Happens Next
- Conclusion

Where We Were

http://www.justmaps.org/

Regions of Panama

Panama – 9 provinces & 3 Comarcas

http://www.lonelyplanet.com/maps/central-america/panama

Project Location

http://www.lonelyplanet.com/maps/central-america/panama

CHICHICA
1300 inhabitants
Government Offices
High school and University
Road to Tole
Crossing
TIJERA
700 inhabitants
Elementary school
Main trail from Tijera to Chichica
CROQUIS COMUNIDAD TIJERA SÜRÜ
RÍO CUBIVORA
CERRO MONO
CERRO PIFA
LAS TRANCAS
QUEBRADA SALITRE

People of Tijera and Chichica

Why a Bridge?

- Water level fluctuates
- Rainy season
- School
- Government offices

Project Goals

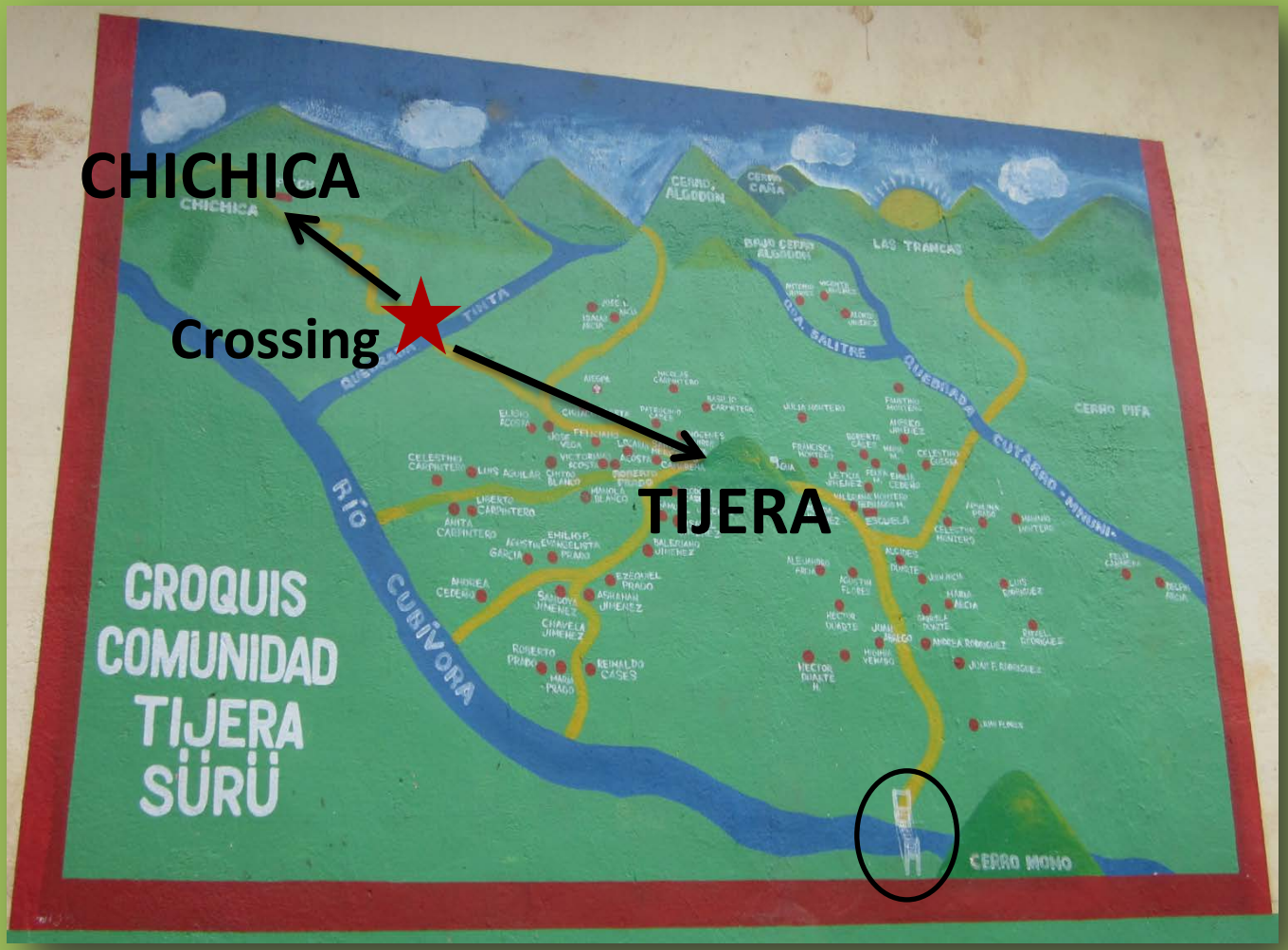
"… to design a sustainable and inexpensive footbridge for the communities of Chichica and Tijera."

How We Lived

On Location

Community Requests

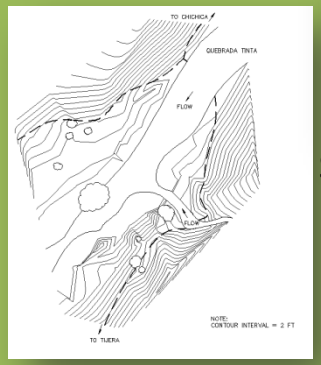
Community Requests



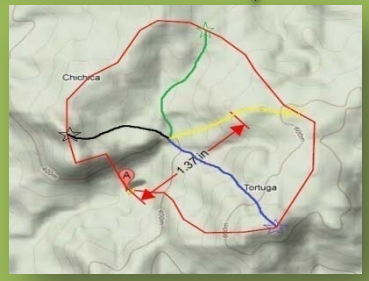
Data Collection

Design Process

START

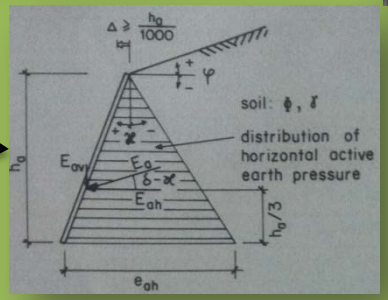


Site & River Conditions



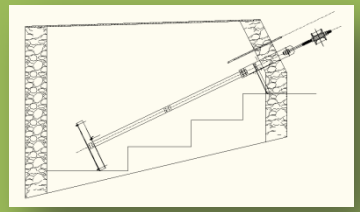
Constraining Parameters

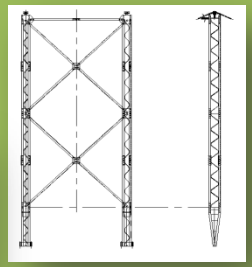
LRFD Guide Specifications for Design of Pedestrian Bridges



Survey, Design and Construction of Trail Suspension Bridges for Remote Areas.

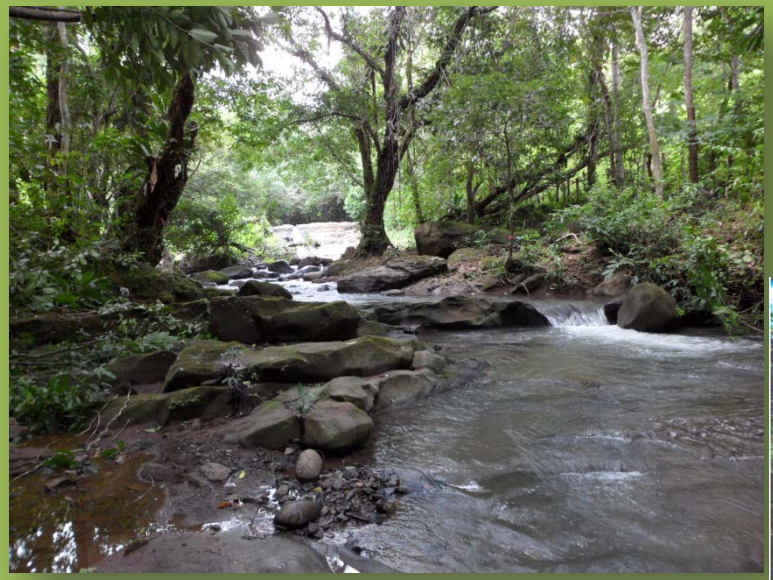
Component Design





FINISH

Site & River Conditions

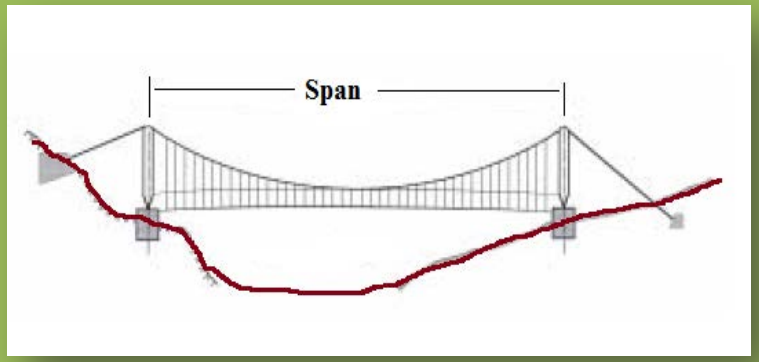


UPSTREAM VIEW

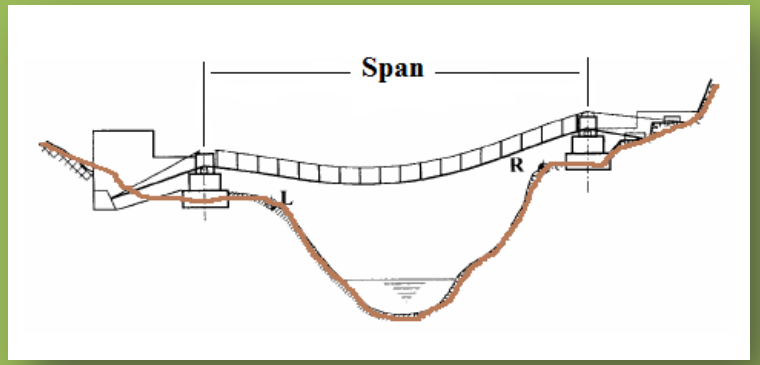
DOWNSTREAM VIEW

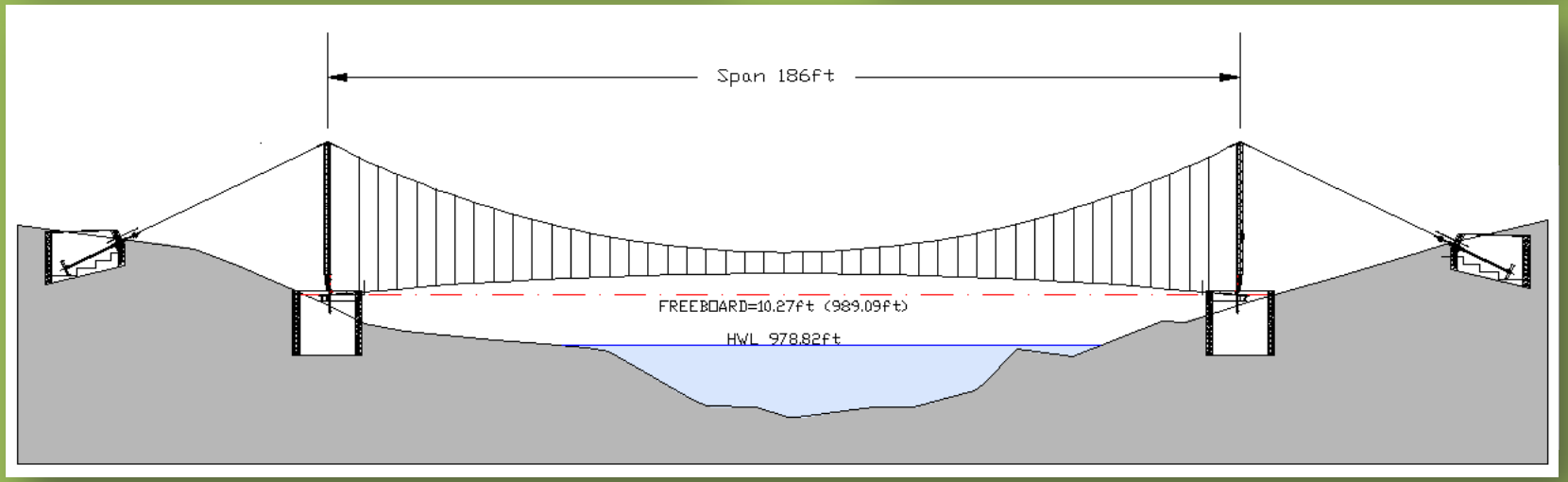
Bridge Type

Suspension Bridge



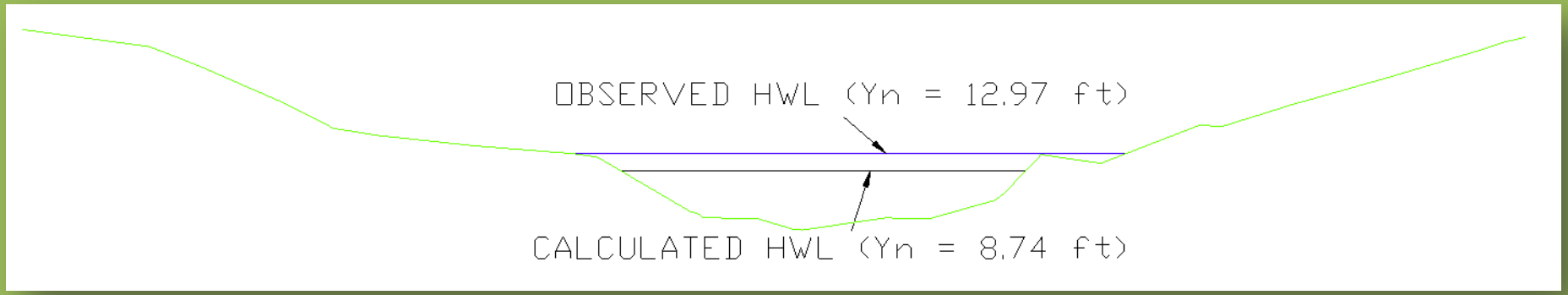
Suspended Bridge





Hydrology

- High water level
- 4,093 cfs
  - 8.74 ft vs. 12.97 ft



Erosion

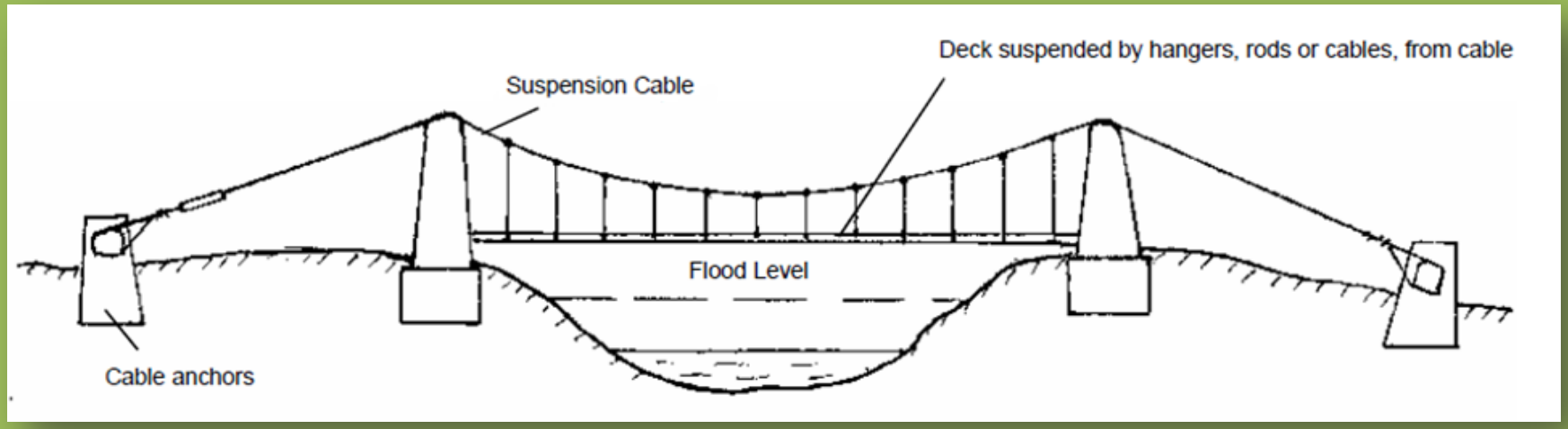
Constraining Parameters

- Anticipated loadings
- Soil capacity

LRFD Guide Specifications for Design of Pedestrian Bridges

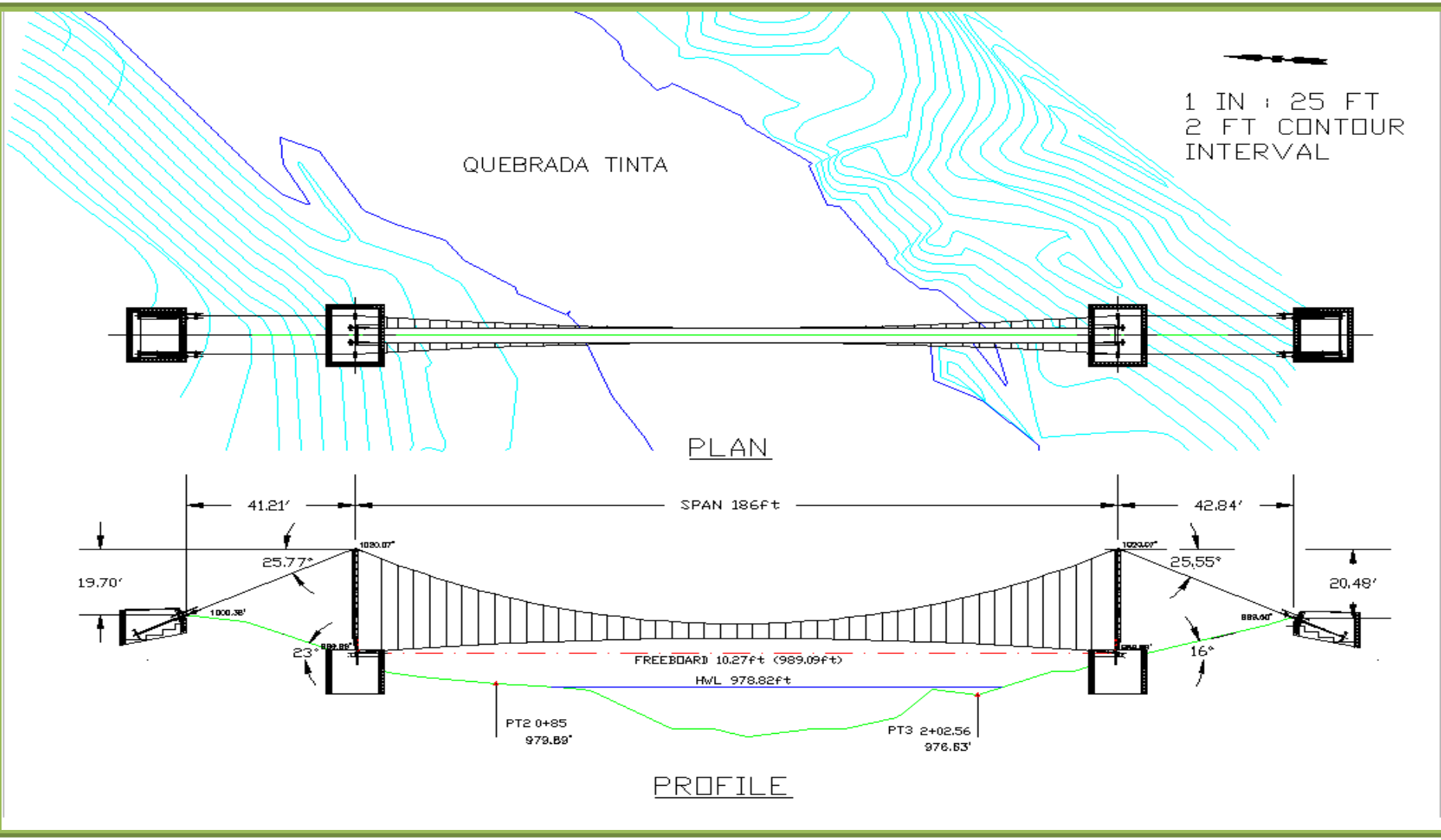
Footbridge Components

- Cables
- Towers
- Foundations & Anchorages
- Suspenders & Walkway



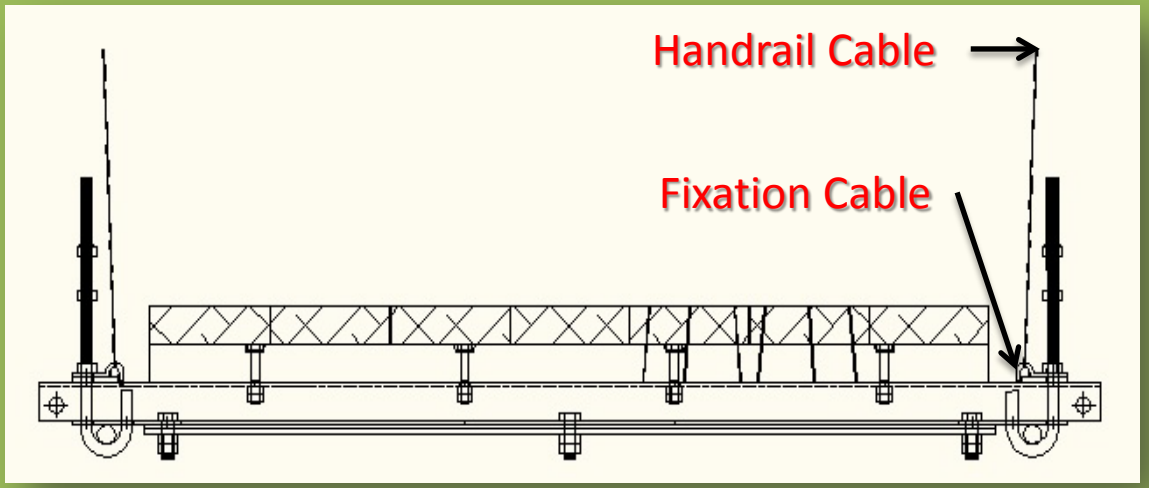
http://www.arch.cuhk.edu.hk/server1/staff1/edward/www/b2c/en/link/it_transport_manual_part1.pdf

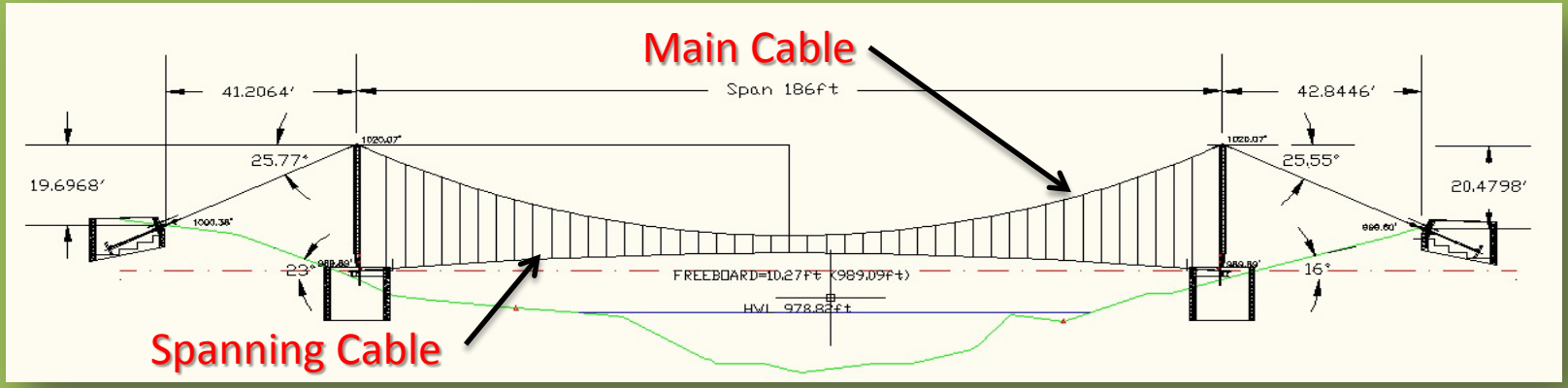
Footbridge Components



Cables

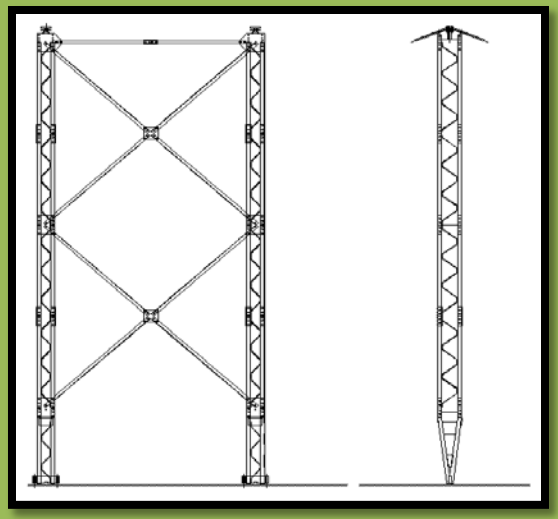
- Main
- Spanning
- Fixation
- Handrail





Towers

- Steel Towers
- Height: 30.37ft
- Loading Cases
- Tower capacity



Buckling

Yielding

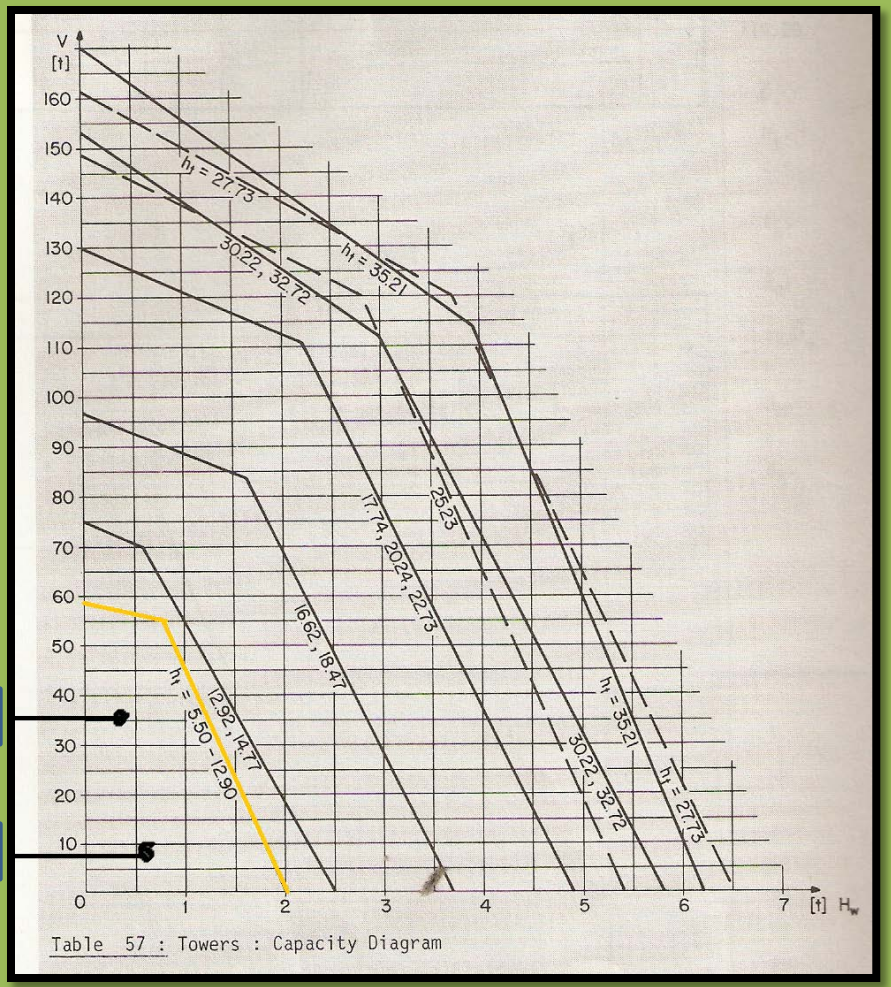


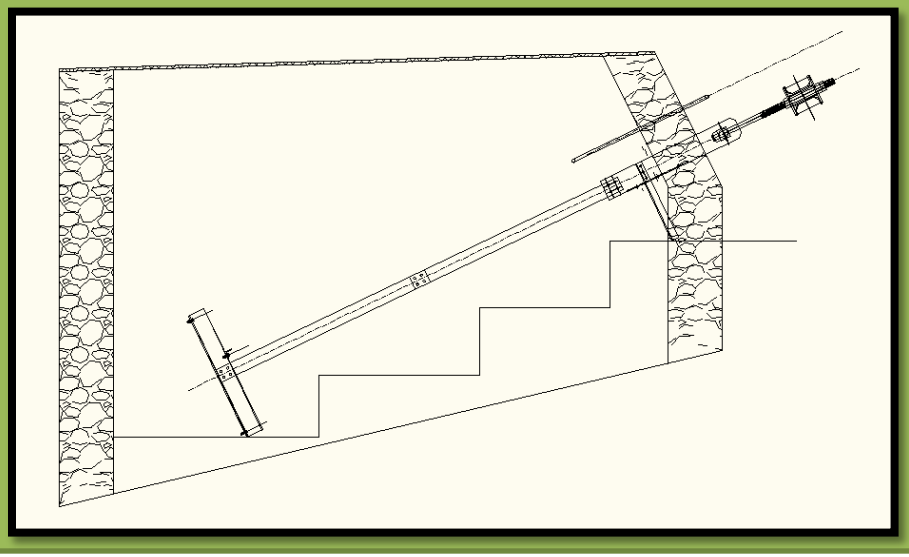
Table 57 : Towers : Capacity Diagram

Survey, Design and Construction of Trail Suspension Bridges for Remote Areas.

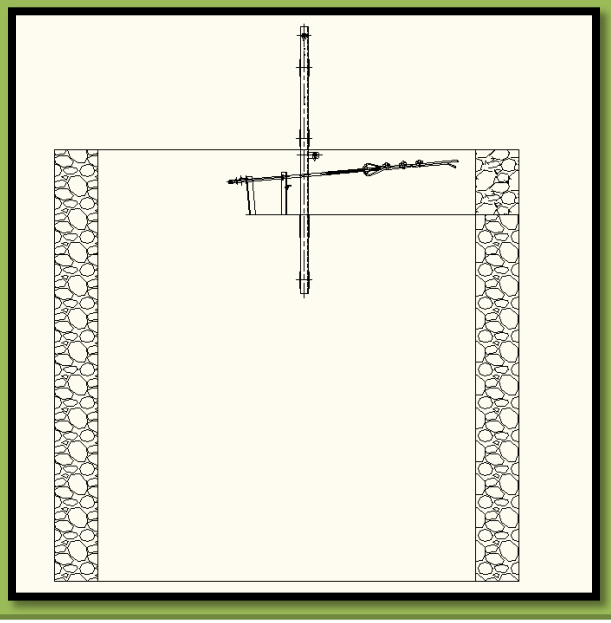
Foundations & Anchorages

- Masonry and Concrete
- Block size
  - Safety against Sliding and Bearing failure

Size: 14.5’ x 16’ x 10’ (4’)

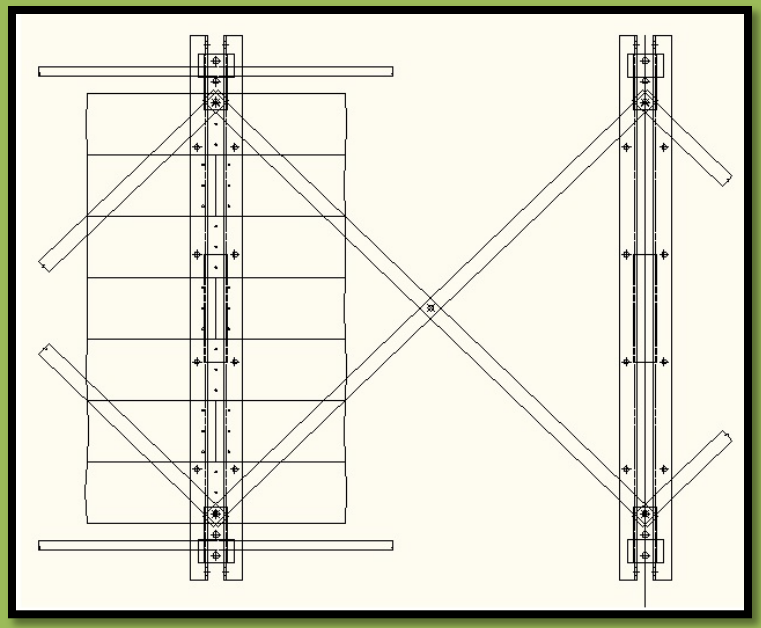


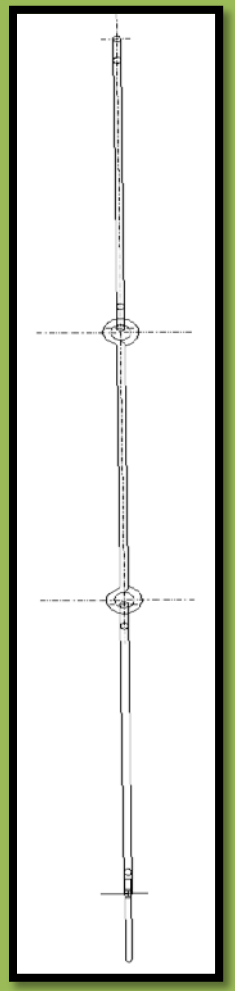
Size: 14’ x 18.5’ x 13’



Suspenders & Walkway

- Steel and Timber
- Suspenders sized for cable shape
- Walkway decking check



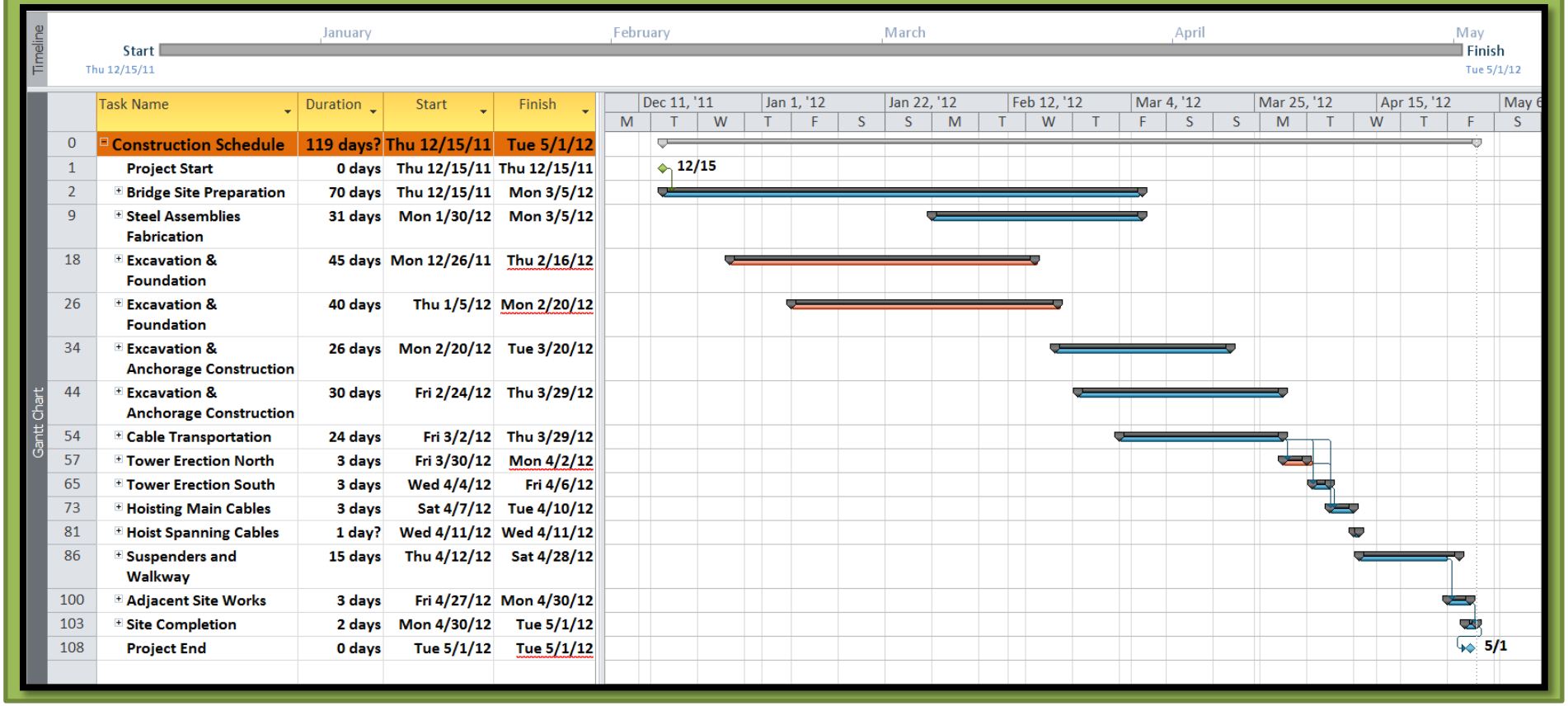


Logistics

http://maps.google.com

Construction Schedule

- **119 Days *(20 weeks,5 months)***



	Task Name	Duration	Start	Finish
0	Construction Schedule	119 days?	Thu 12/15/11	Tue 5/1/12
1	Project Start	0 days	Thu 12/15/11	Thu 12/15/11
2	Bridge Site Preparation	70 days	Thu 12/15/11	Mon 3/5/12
9	Steel Assemblies Fabrication	31 days	Mon 1/30/12	Mon 3/5/12
18	Excavation & Foundation	45 days	Mon 12/26/11	Thu 2/16/12
26	Excavation & Foundation	40 days	Thu 1/5/12	Mon 2/20/12
34	Excavation & Anchorage Construction	26 days	Mon 2/20/12	Tue 3/20/12
44	Excavation & Anchorage Construction	30 days	Fri 2/24/12	Thu 3/29/12
54	Cable Transportation	24 days	Fri 3/2/12	Thu 3/29/12
57	Tower Erection North	3 days	Fri 3/30/12	Mon 4/2/12
65	Tower Erection South	3 days	Wed 4/4/12	Fri 4/6/12
73	Hoisting Main Cables	3 days	Sat 4/7/12	Tue 4/10/12
81	Hoist Spanning Cables	1 day?	Wed 4/11/12	Wed 4/11/12
86	Suspenders and Walkway	15 days	Thu 4/12/12	Sat 4/28/12
100	Adjacent Site Works	3 days	Fri 4/27/12	Mon 4/30/12
103	Site Completion	2 days	Mon 4/30/12	Tue 5/1/12
108	Project End	0 days	Tue 5/1/12	Tue 5/1/12

Cost Estimate

- **Total Cost--$67,000**
  - Material Cost
  - Labor
  - Equipment
- **With Donations--$43,000**

Overall Estimate		
Item	Total Cost	Actual Cost (Donations Subtracted)
Materials	$40,418	$35,381
Labor	$22,028	$2,720
Equipment	$4,626	$4,626
Total	**$67,000**	**$43,000**

What Happens Next

- Report
- Construction Schedule
- Construction Reference Material
- Design Drawings
- Parts Lists

http://jr1212.wordpress.com/

Conclusion

"… to design a sustainable and inexpensive footbridge for the communities of Chichica and Tijera."

Acknowledgements

ISD Advisors:

Dr. David Watkins

Michael T. Drewyor, PE, PS

Peace Corps Volunteers:

Jessica Rudder

Chris Kingsley

Others:

Dr. Stanley J. Vitton

References

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Questions???