2nd INTERNATIONAL CONFERENCE
TIMBER BRIDGES
LAS VEGAS 2013

CASE STUDY: Design of pedestrian timber bridges in an AE Studio

CAL POLY POMONA

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UNIVERSITY OF OREGON

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Department of Architecture
University of Oregon

ABOUT THE COURSE

AE Studio: Interdisciplinary Design - Pedestrian Timber Bridges

COURSE OBJECTIVES



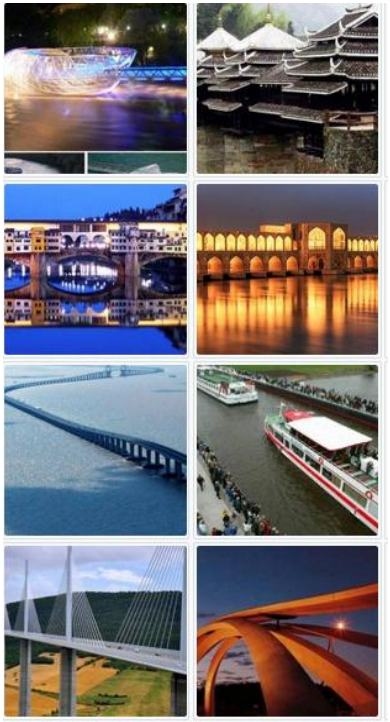

AE COLLABORATION IN EDUCATIONAL SETTING

CREATIVE USES OF TIMBER AS STRUCTURAL MATERIAL

STUDIO FORMAT FOR ENGINEERING EDUCATION

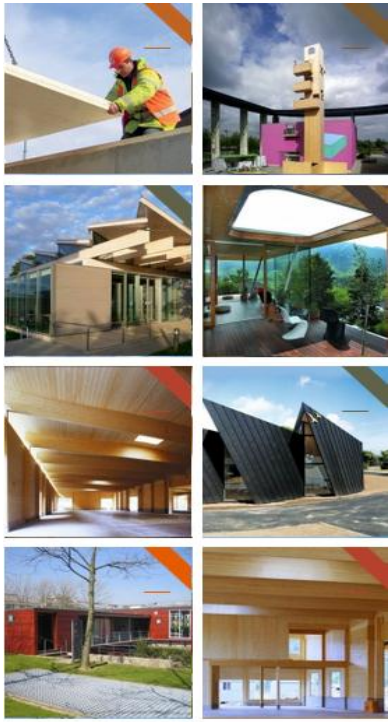
COURSE FOCUS

BRIDGES



PEDESTRIAN

TIMBER



AE COLLABORATION

SIMPLE LOADING

UNIQUE CONSTRAINTS

COURSE STRUCTURE

PROGRESSIVE COMPETITION

CONCEPT REVIEW
MID-REVIEW
FINAL-REVIEW

PROGRESSIVELY INCREASING A/E TEAMS

CASE STUDIES
PRELIMINARY DESIGN
DESIGN DEVELOPMENT

PROFESSIONAL PANEL REVIEW

ARCHITECTS
ENGINEERS
A/E FACULTY

COURSE STRUCTURE

CE471/471L (4-units) , ARC 402/406/L (9-units) 10-week course

WEEK	ACTIVITIES	TEAM COMPOSITION
1-2	Case Study, Concept Design and Concept Selections	6-8 case study teams, 12-18 individual concepts
	Faculty Review	**8-10 concepts progress**
3-6	Preliminary Design	8-10 teams
	Professional Panel Review	**4-5 designs progress**
7-10	Design Development	4-5 teams
	Professional Panel Review	**1 design selected**

14-22 architectural students
11-18 engineering students

CASE STUDIES

CASE STUDIES

CAL POLY POMONA

UNIVERSITY OF OREGON

Case Study 1
Madison Bridge
Madison, WI
GLB beam

Case Study 2
Da Vinci Bridge
Akershus, Norway
Arch-deck supported

Case Study 3
Reuss River Bridge
Flüelen, Switzerland
Arch- deck suspended

Case Study 4
Travesina Bridge
Viamala, Switzerland
Truss

CASE STUDIES

CAL POLY POMONA

UNIVERSITY OF OREGON

Case Study 5
Far Moor Bridge
Yorkshire, UK
Stress-Laminated Arch

Case Study 6
Zappalar Bridge
Zappalar, Chile
Beam/Arch

Case Study 7
Martigny Bridge
Restaroute, Switzerland
Suspension

WINTER 2010
Cal Poly Pomona Engineering Bldg 17 to Bldg 9

SITE/PROJECT

IMPROVE ADA-COMPLIANT ACCESS BETWEEN BUILDINGS

CREATE ICONIC STRUCTURE FOR COLLEGE OF ENGINEERING

CREATE STUDENT CONGREGATION AREA BETWEEN CLASSES

BRIDGE AS A LEARNING TOOL

SPAN 75 FT (MIN 25 FT CLEAR)

2-3 FT ELEVATION DIFFERENCE

DESIGNS

1st place

Space Truss

Architects: Nathan Houck, Greg Sagherian, Robert Yamnitz, Elane Yiu,
Engineers: Bethany Lopez, Daniel Mourad, Ryan Turner, Samson Wong.

Original design concept by Robert Yamnitz.

2nd place

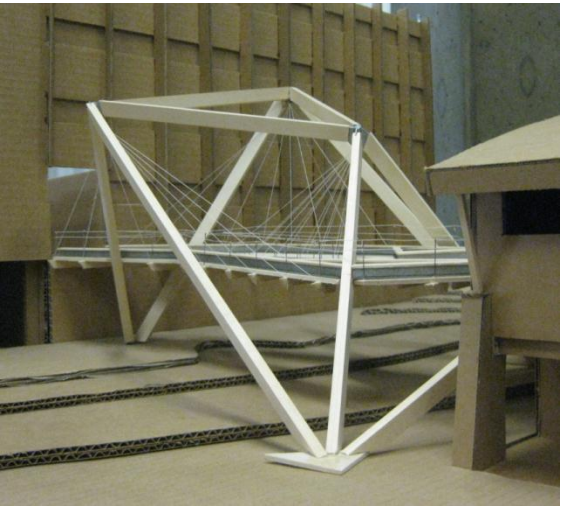
The Ridge

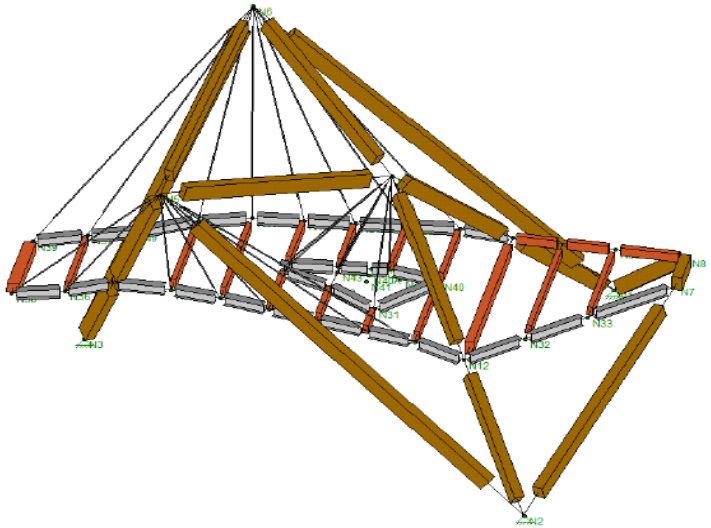
Architects: Bridget Flecky, Eubie Han, Edward Kang
Engineers: Gean Na, Alex Quinonez, Fernando Sesma.

Original Design Concept by Eubie Han

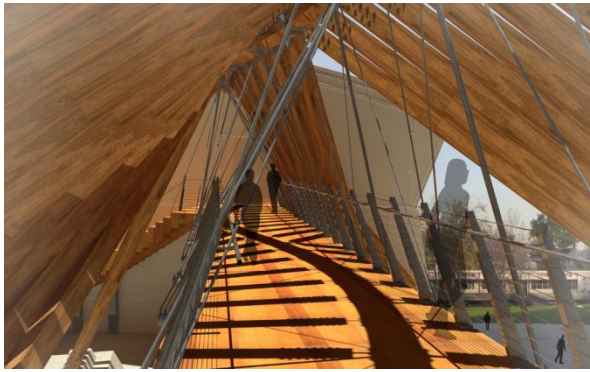
SPACE TRUSS -RENDERINGS

SPACE TRUSS - MODEL

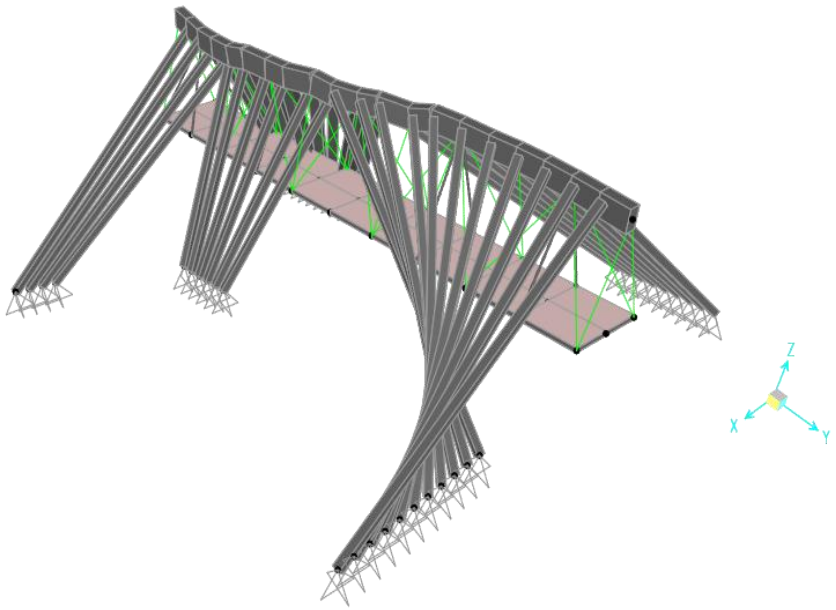




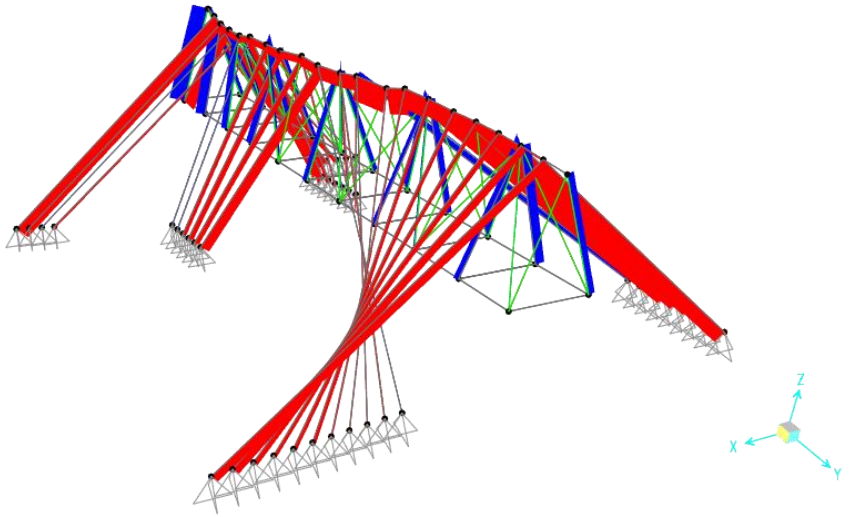
RIDGE - RENDERINGS



RIDGE – STRUCTURAL MODEL



Model

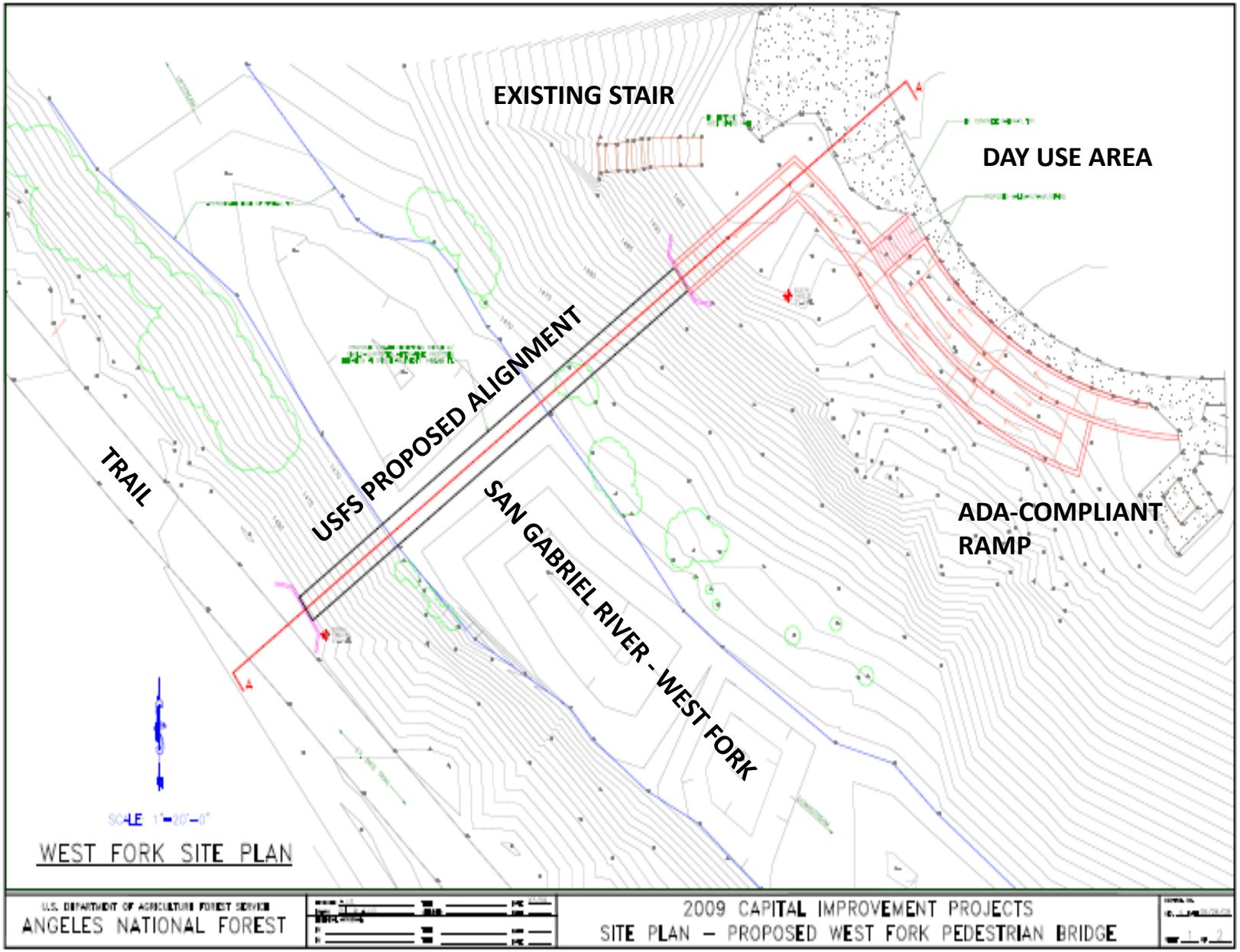


Axial Load Diagram

RIDGE - MODEL

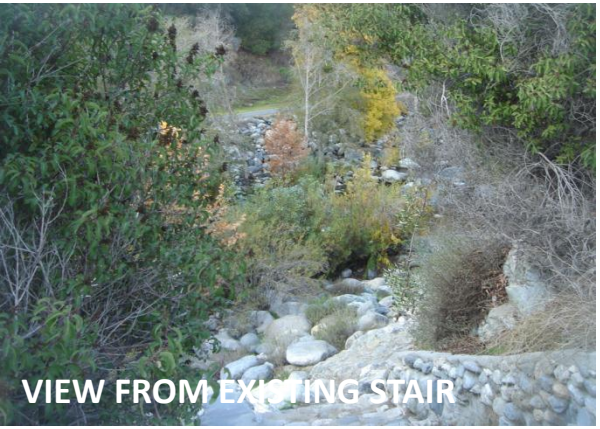
WINTER 2011
Angeles Forest , West Fork San Gabriel River

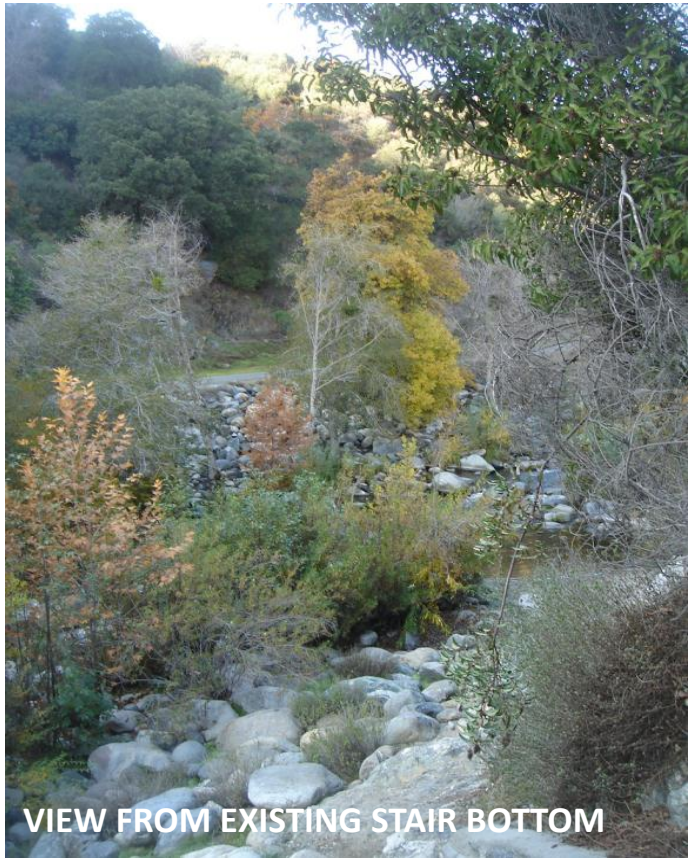
SITE

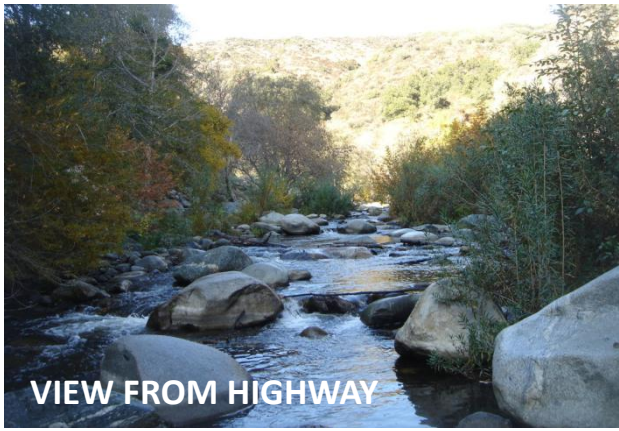

EXISTING STAIR
DAY USE AREA
USFS PROPOSED ALIGNMENT
TRAIL
SAN GABRIEL RIVER - WEST FORK
ADA-COMPLIANT RAMP
WEST FORK SITE PLAN
U.S. DEPARTMENT OF AGRICULTURE FOREST SERVICE
ANGELES NATIONAL FOREST
2009 CAPITAL IMPROVEMENT PROJECTS
SITE PLAN – PROPOSED WEST FORK PEDESTRIAN BRIDGE

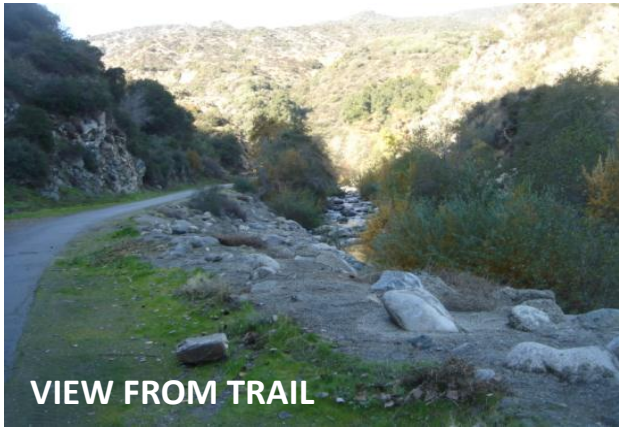
SITE


VIEW FROM DAY USE AREA


VIEW FROM EXISTING STAIR


VIEW FROM EXISTING STAIR BOTTOM


VIEW FROM HIGHWAY


VIEW FROM TRAIL

PROJECT

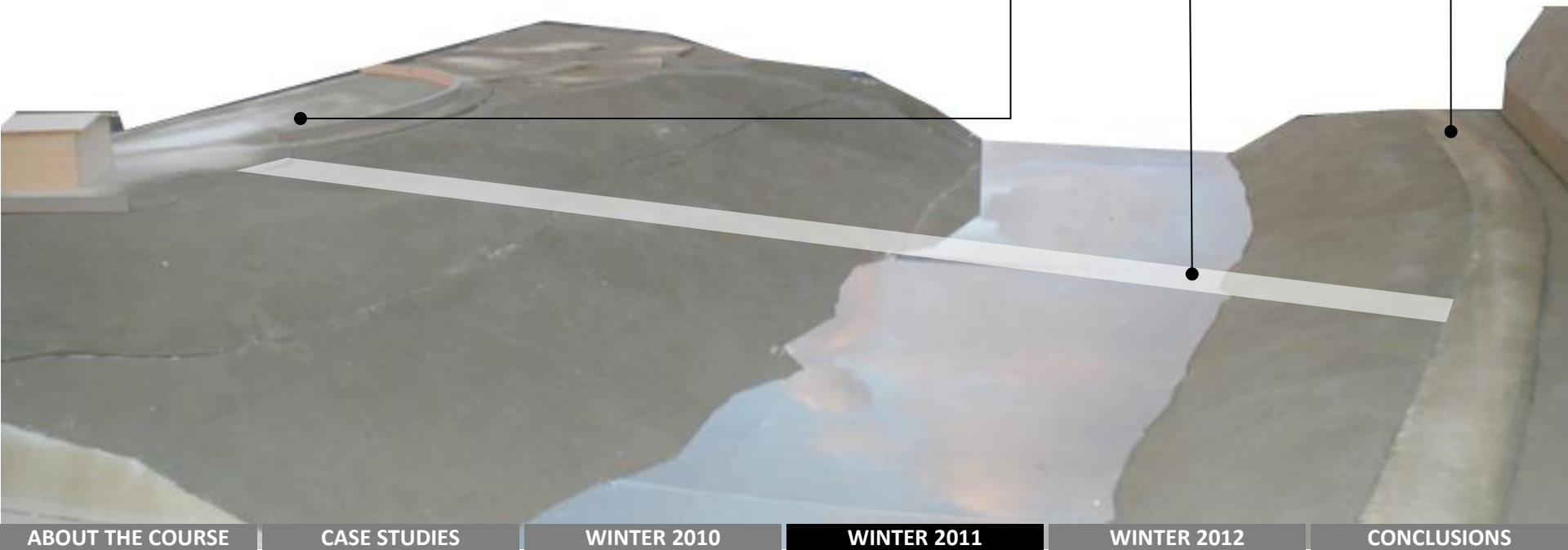
PROVIDE ADA-COMPLIANT ACCESS BETWEEN DAY-USE AREA AND TRAIL

VISUALLY ESTHETICALLY PLEASING DESIGN

PLEASANT HIKING EXPERIENCE

SPAN 100-140 FT (ALIGNMENT DEPENDENT)

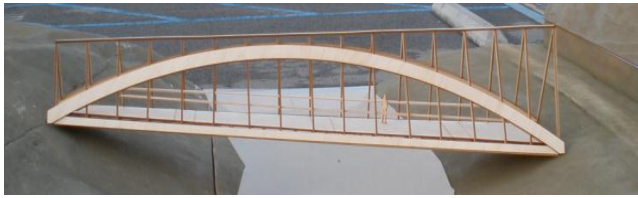
25 FT ELEVATION DIFFERENCE

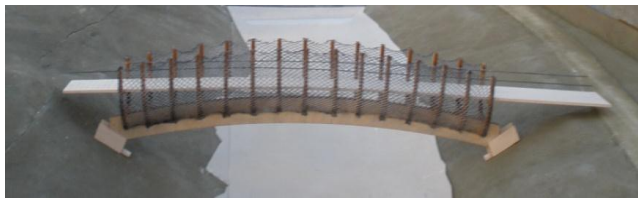
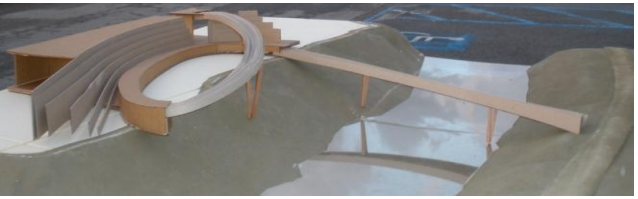


PROJECTS

MID-REVIEW






PROJECTS

FINAL-REVIEW





PROJECTS

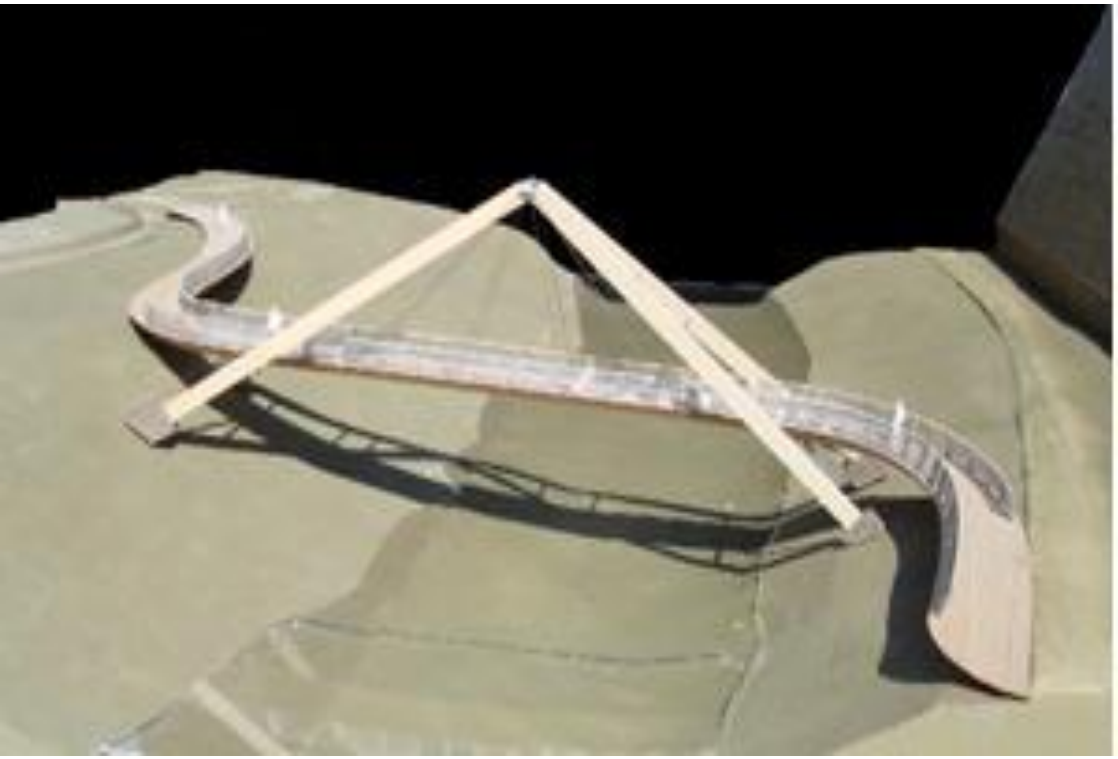
QUADRA-BRIDGE
1ST PLACE

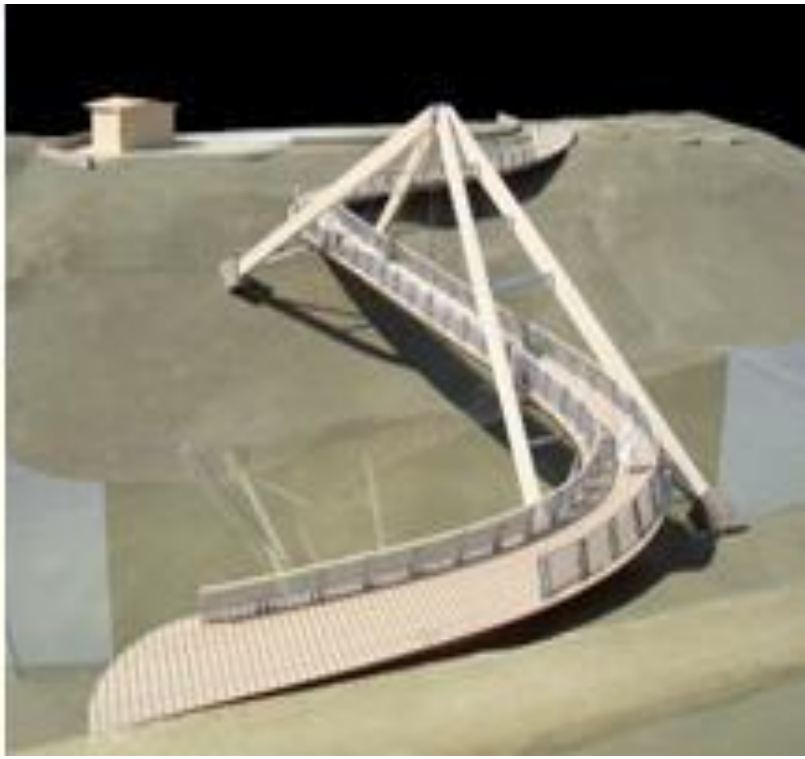
LATTICE-BRIDGE

QUADRA – 1ST PLACE (RENDERINGS)

Architects: Maro Asipyan, Matthew Terry,
Engineers: Christian Hainds, Francisco Perez, Bryan Strege.
Original Design Concept by Mathew Terry

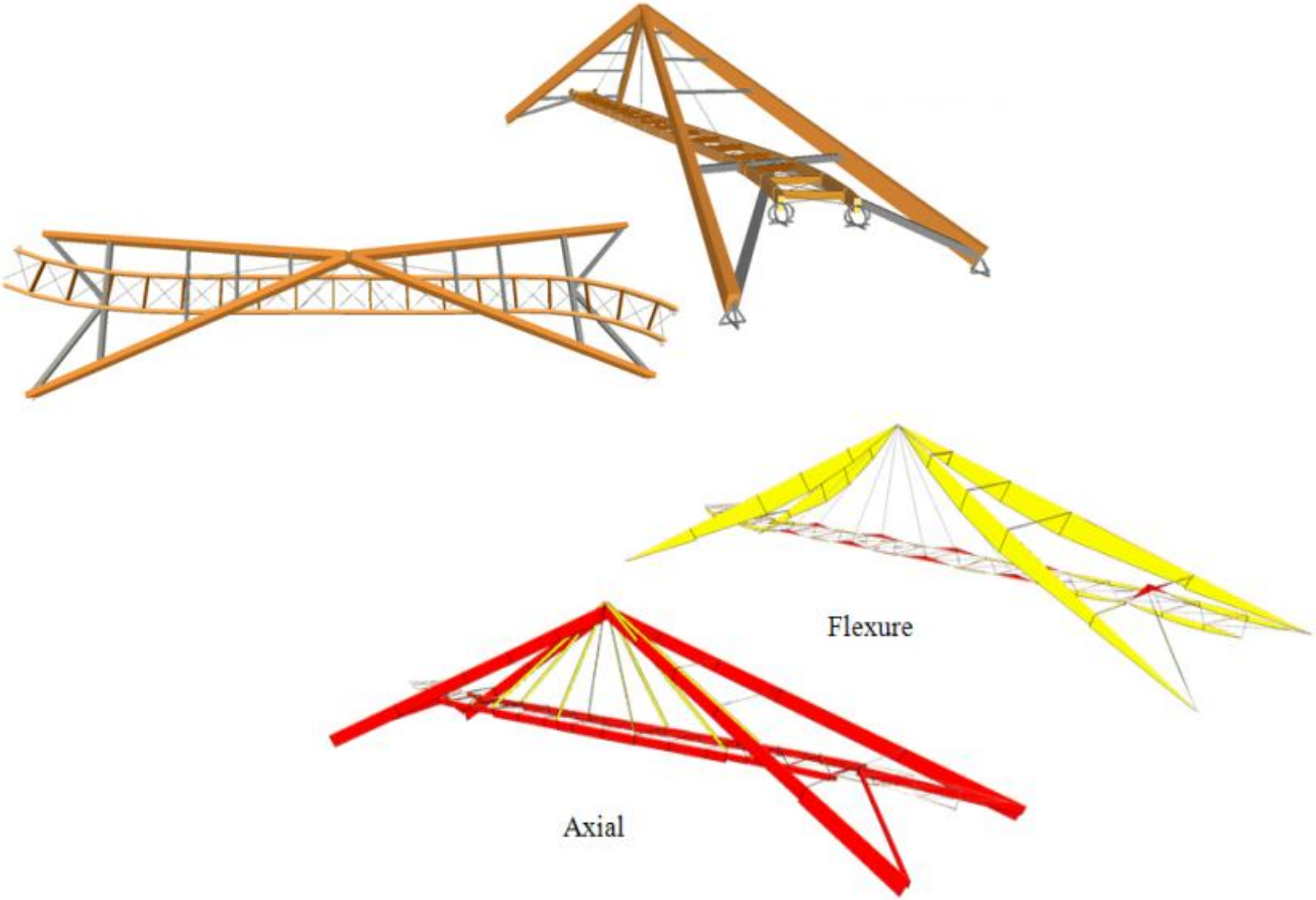
QUADRA - MODEL





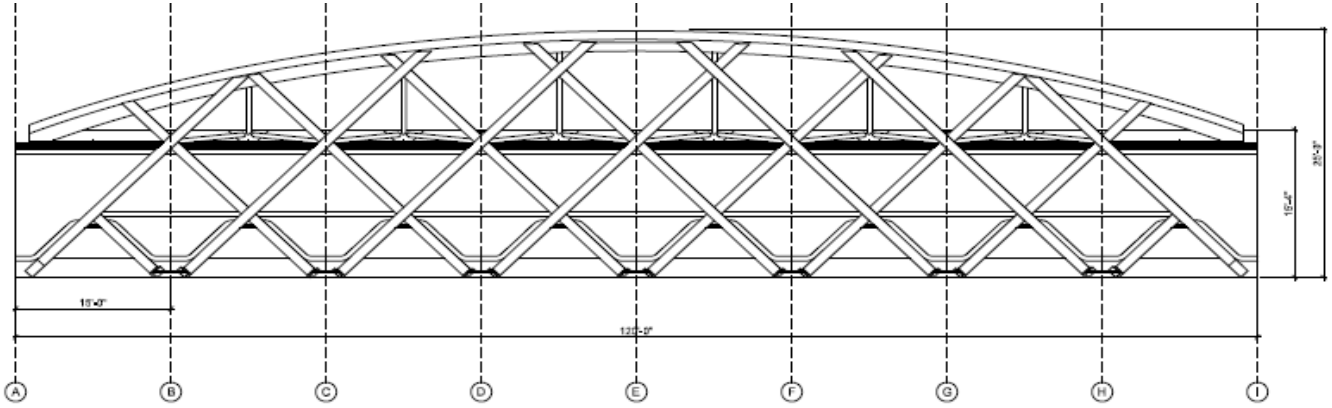
QUADRA - DETAILING

QUADRA - STRUCTURAL MODEL

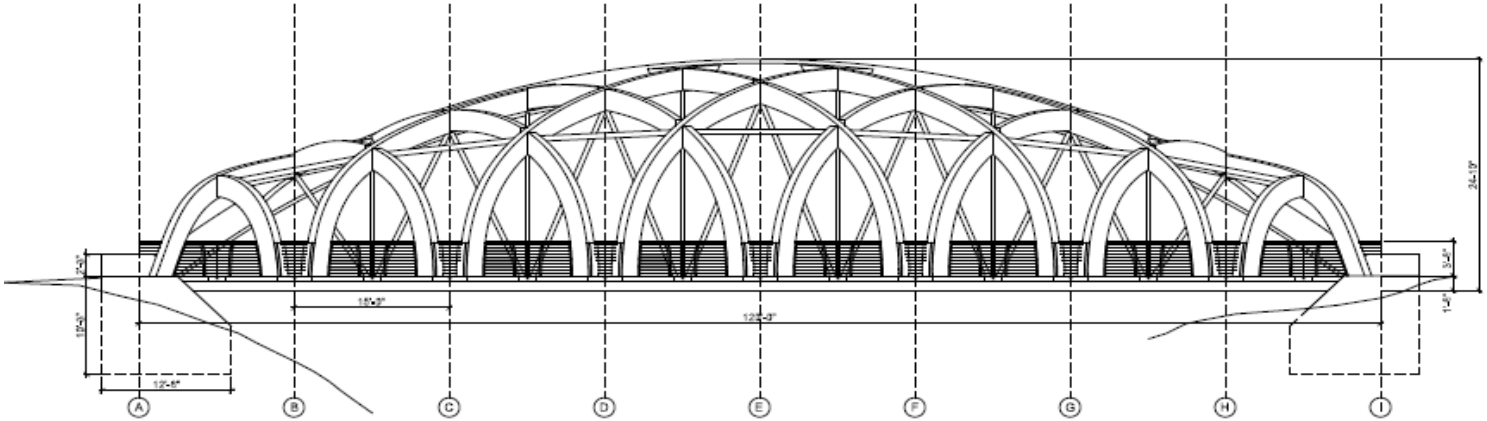


LATTICE – RENDERING/MODEL

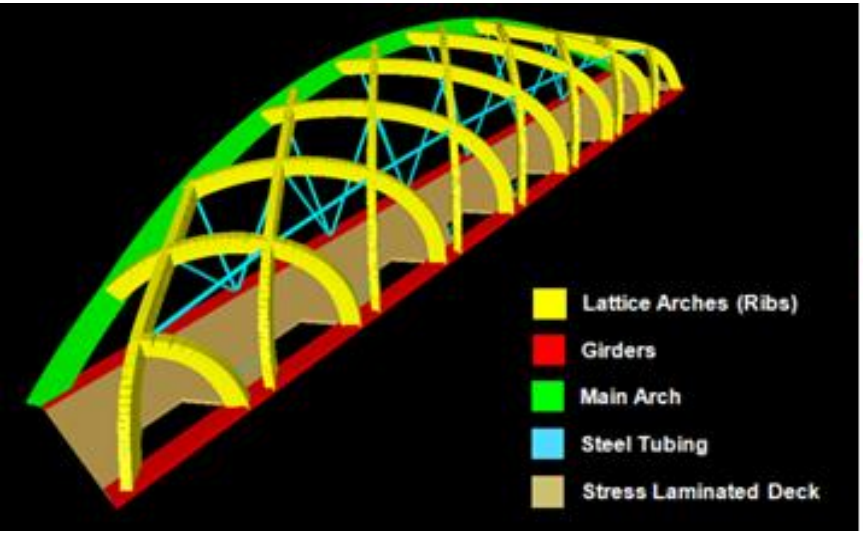
Architects: Ron Kwok, Gerardo Ramirez, Garrett Wehan,
Engineers: Daniel Bradbury, Henry Chi, Richard Hennings, Sevak Isakhanyan.
Original Design Concept by Gerardo Ramirez



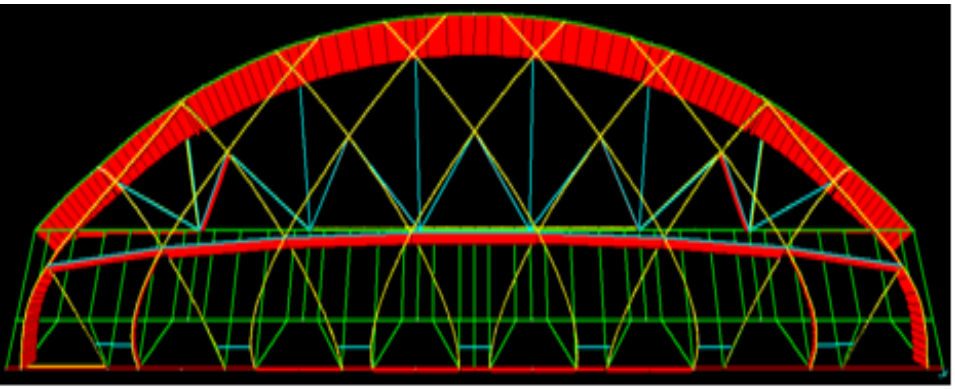
TOP PLAN - 1/4" = 1'-0"

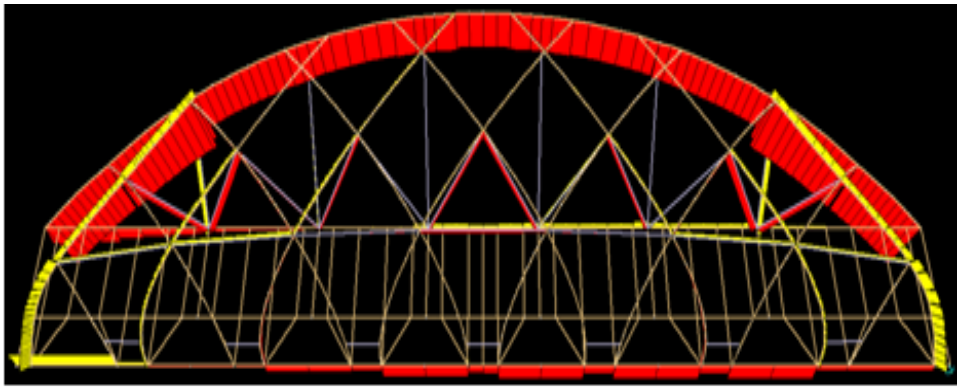


SOUTH ELEVATION - 1/4" = 1'-0"


Lattice Arches (Ribs)
Girders
Main Arch
Steel Tubing
Stress Laminated Deck


3
2
4
1
Z
X
Y

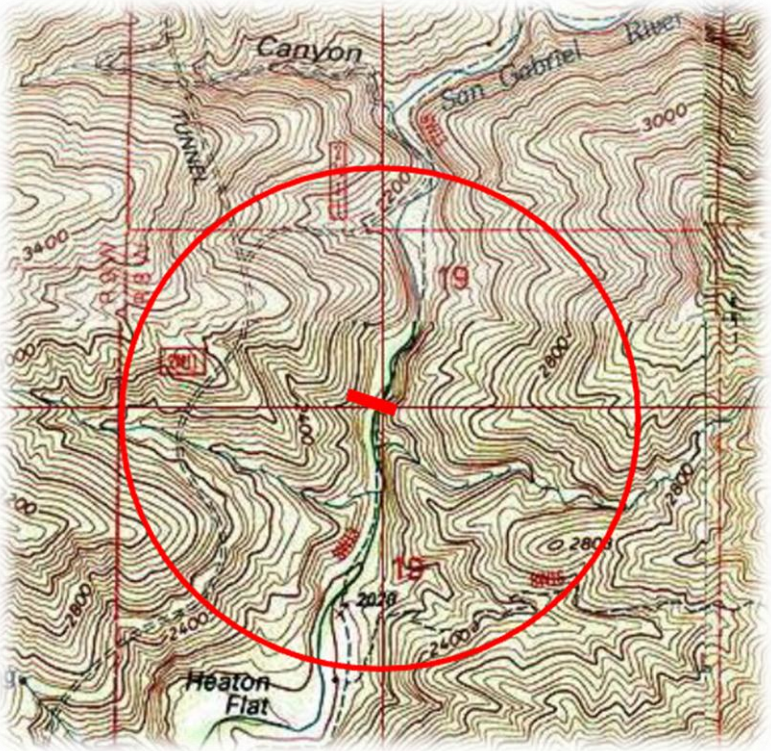


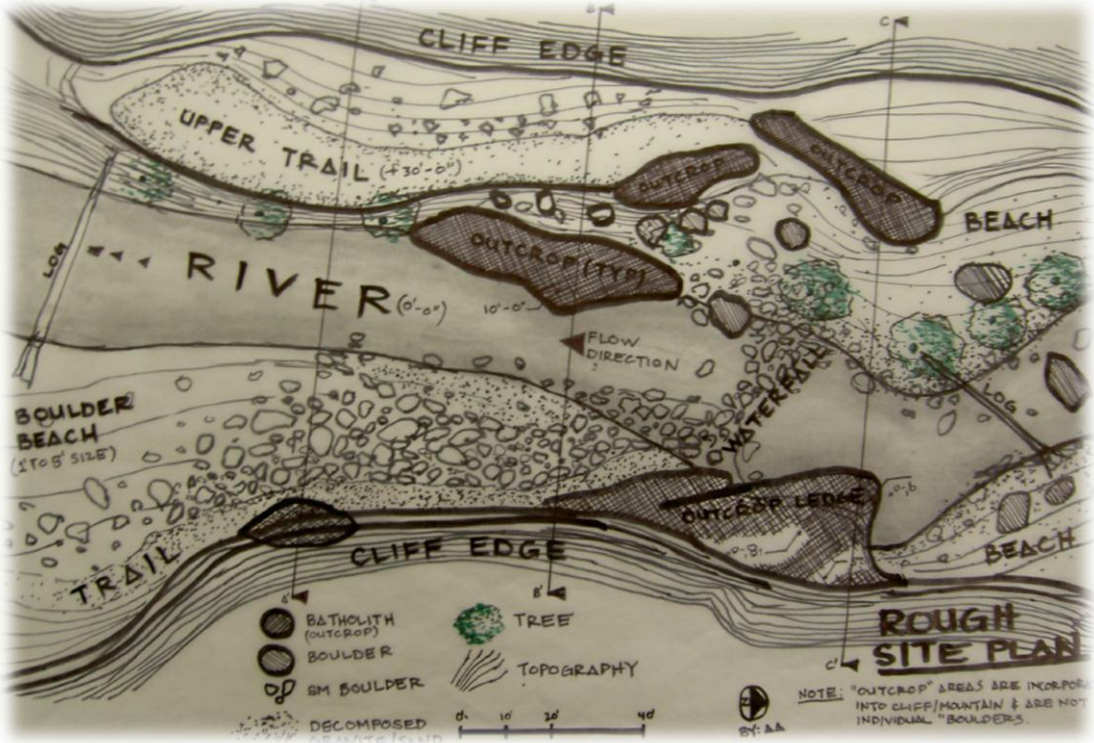


WINTER 2012

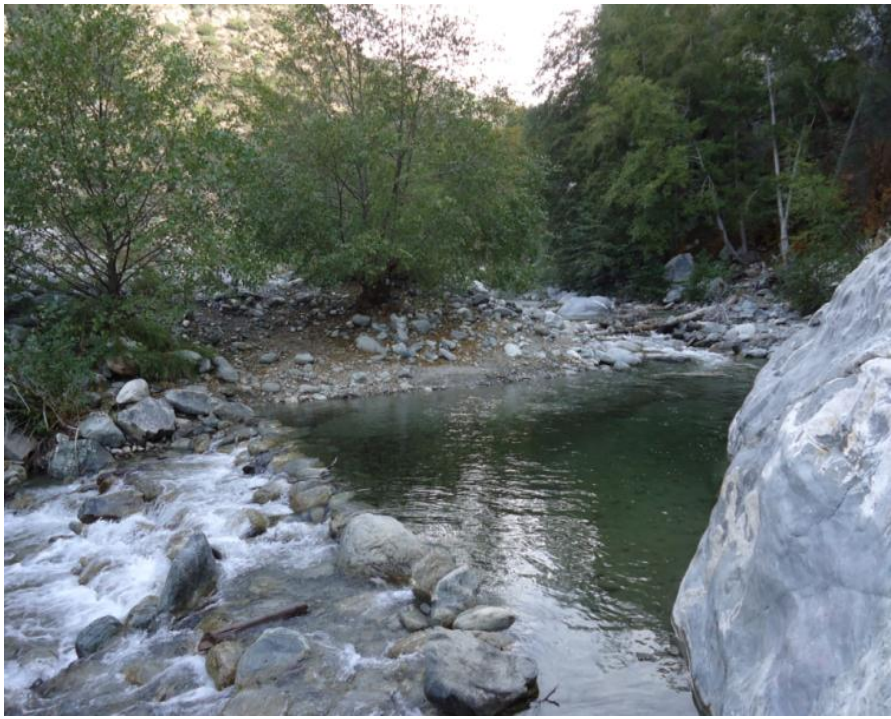
Angeles Forest , East Fork San Gabriel River

SITE


Canyon
San Gabriel River
TUNNEL
3000
3400
2800
2600
19
2803
2028
2400
Heaton Flat


CLIFF EDGE
UPPER TRAIL (+30'-0")
OUTCROP
OUTCROP (TYP.)
BEACH
RIVER (0'-0")
10'-0"
FLOW DIRECTION
WATERFALL
LOG
BOULDER BEACH
(1' TO 8' SIZE)
OUTCROP LEDGE
TRAIL
CLIFF EDGE
BEACH
BATHOLITH (OUTCROP)
BOULDER
SM BOULDER
DECOMPOSED
TREE
TOPOGRAPHY
ROUGH SITE PLAN
NOTE: "OUTCROP" AREAS ARE INCORPOR
INTO CLIFF/MOUNTAIN & ARE NOT
INDIVIDUAL "BOULDERS.

SITE



PROJECT

PROVIDE OPTIONAL DRY RIVER CROSSING (ADA COMPLIANCE NOT REQUIRED)

ESTHETICALLY PLEASING DESIGN

PLEASANT HIKING EXPERIENCE

LIMITED ACCESS

SPAN 45-75 FT

25 FT ELEVATION DIFFERENCE

PROJECTS

FINAL-REVIEW

TRUSS BRIDGE

ARCO IRIS

THE CROSSING

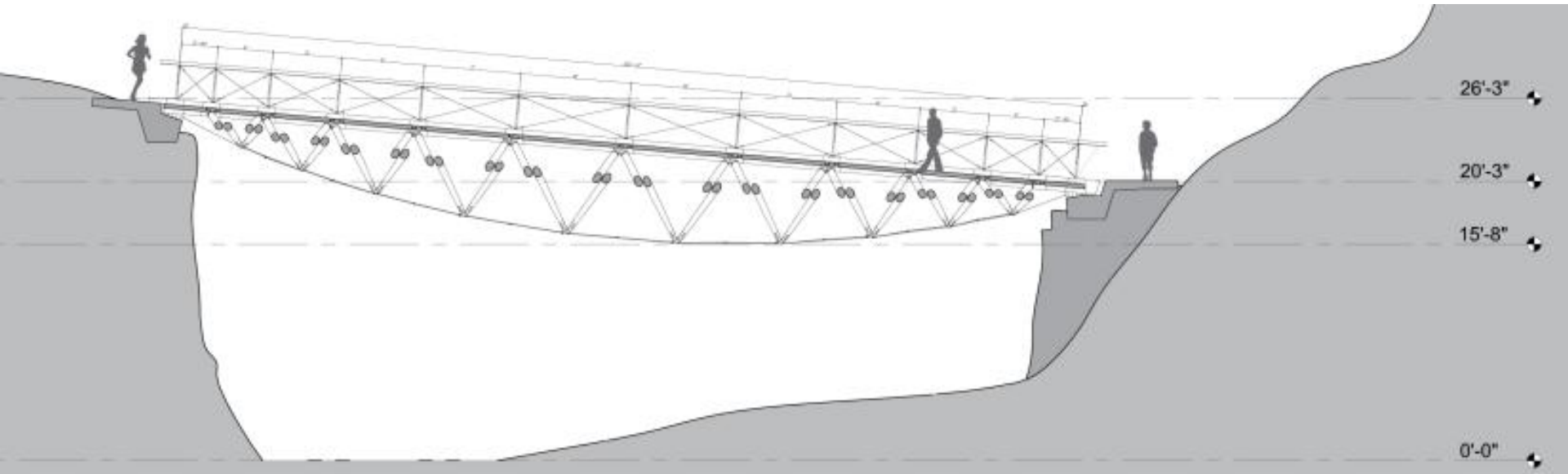
KNEE BRACE BRIDGE

NO WHERE BRIDGE

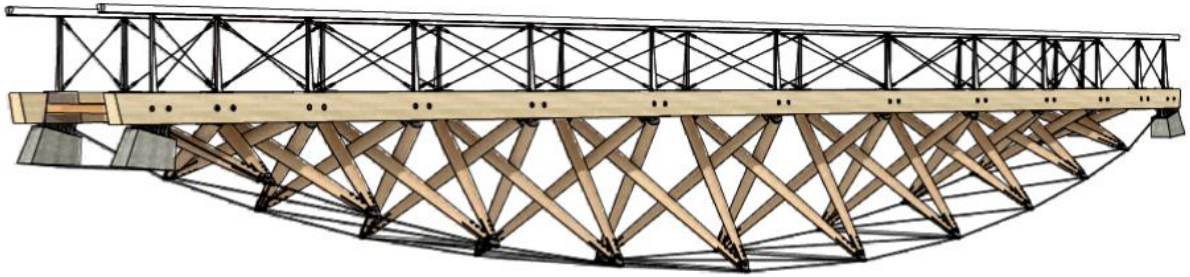
TRUSS BRIDGE - 1ST PLACE

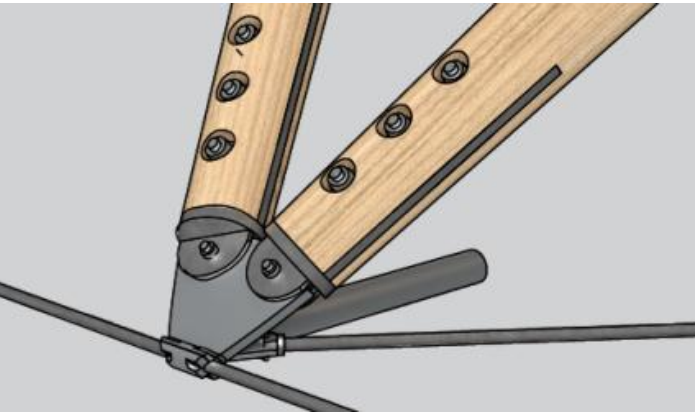
Architects: Richard Delarosa, Candice Myers, Harold Ornelas, Leo Rodriguez, Johnny Tran;
Engineers: Kun Chang, Henry Chi, Huong Vu.
Original Design Concept by Harold Ornelas

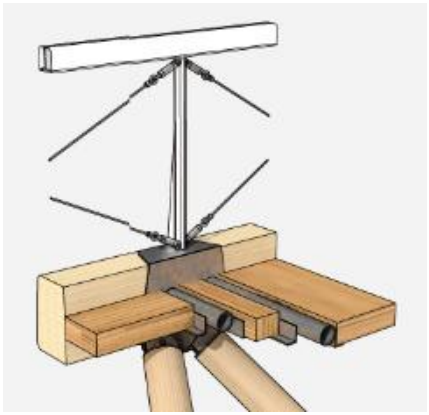


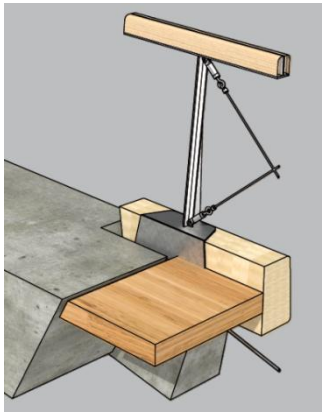



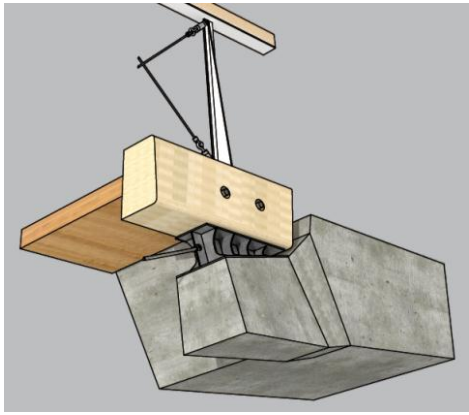
TRUSS BRIDGE - DETAILING



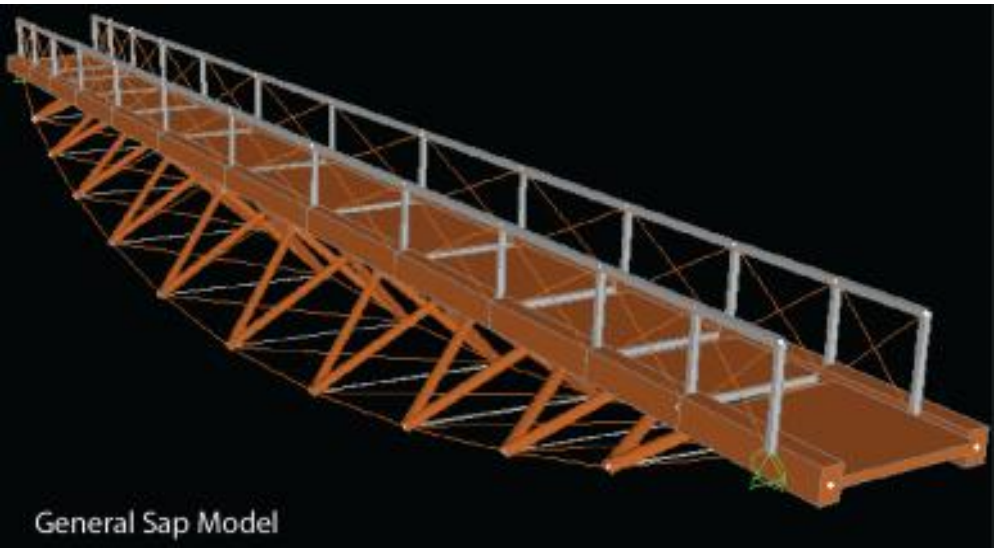


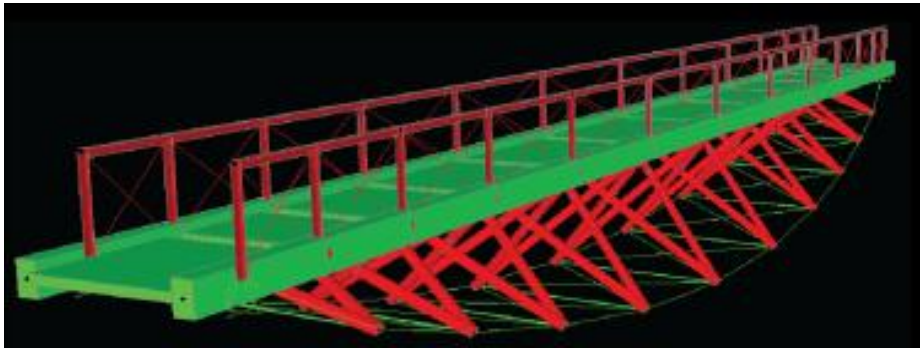


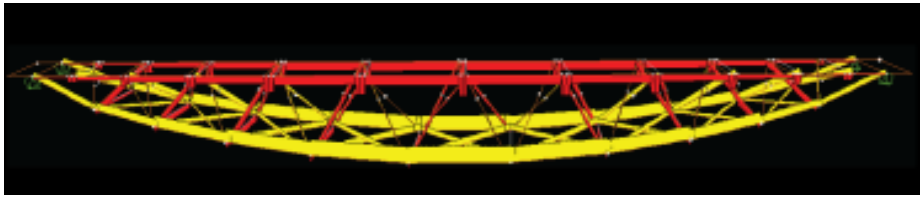




TRUSS BRIDGE – STRUCTURAL MODEL

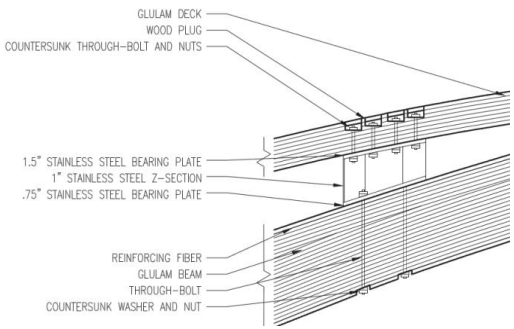


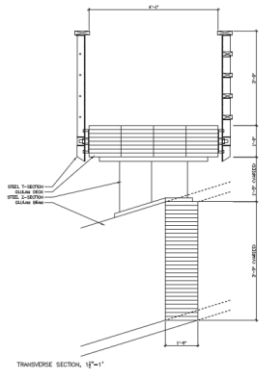




THE CROSSING

Architects: Sabrina Blackman, Brice Colton, Robert Higa, Hannah Lee
Engineers: Jonathan Quezada, Robert Veloz.
Original Design Concept by Hannah Lee.



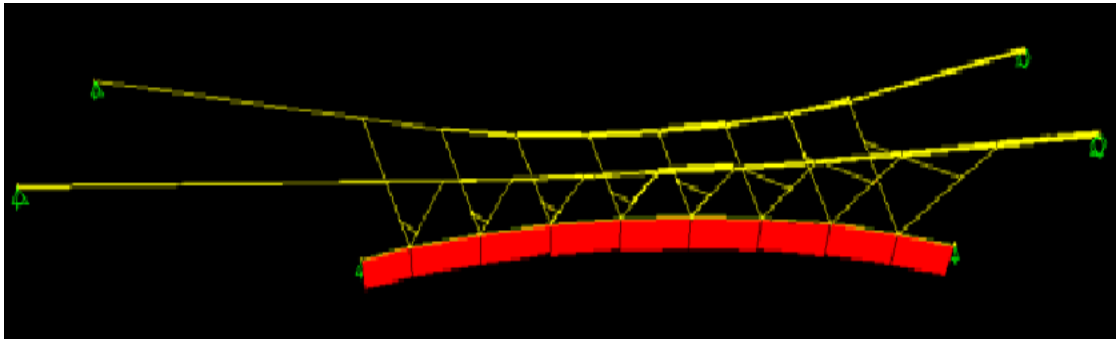


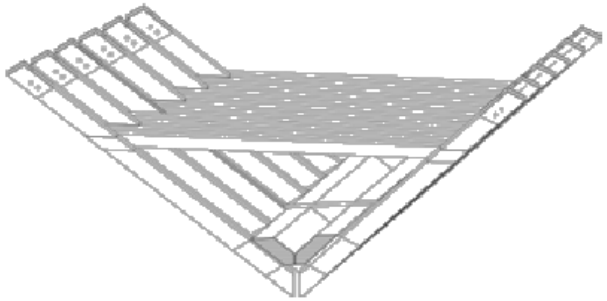
ARCO IRIS

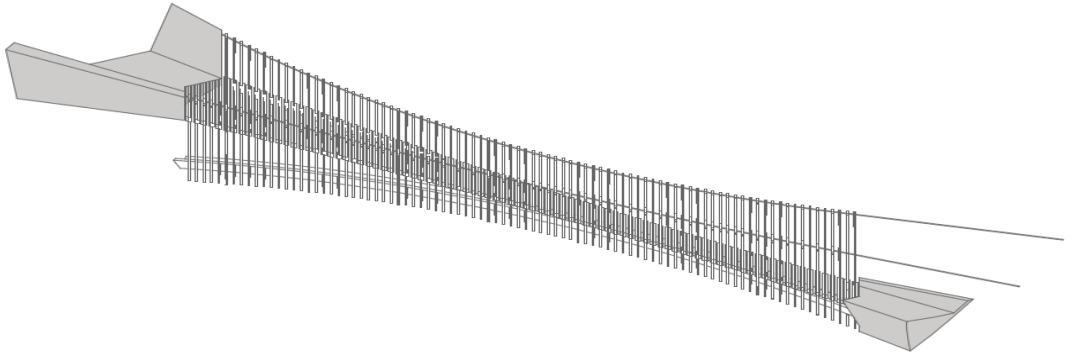
Architects: Juan Delgado, Hector Ruvalcaba, Sevan Simonian, Blake Thompson
Engineers: Marcos Avalos, Nhan Mai.
Original Design by Sevan Simonian.

NO WHERE BRIDGE

Architects: Dana Falk, Alice Liang, Marcus Richeson, Annabelle Rigg
Engineers: Mathew Archer, James Ferguson.
Original Concept by Marcus Richeson.

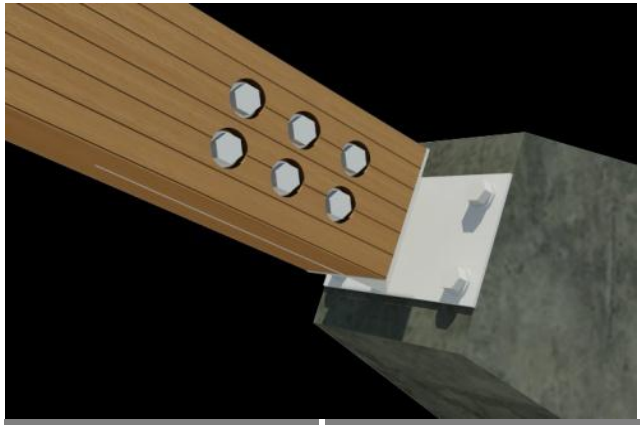


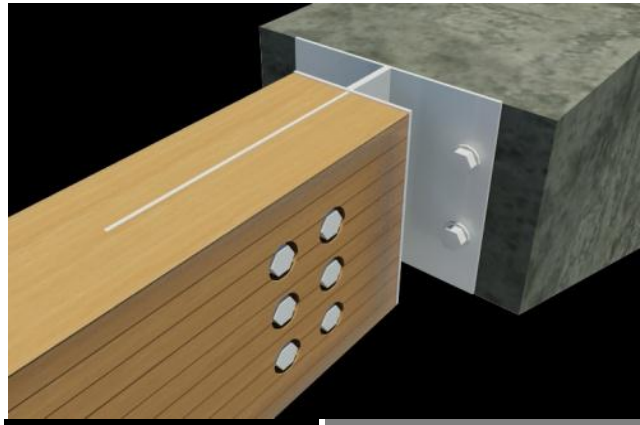




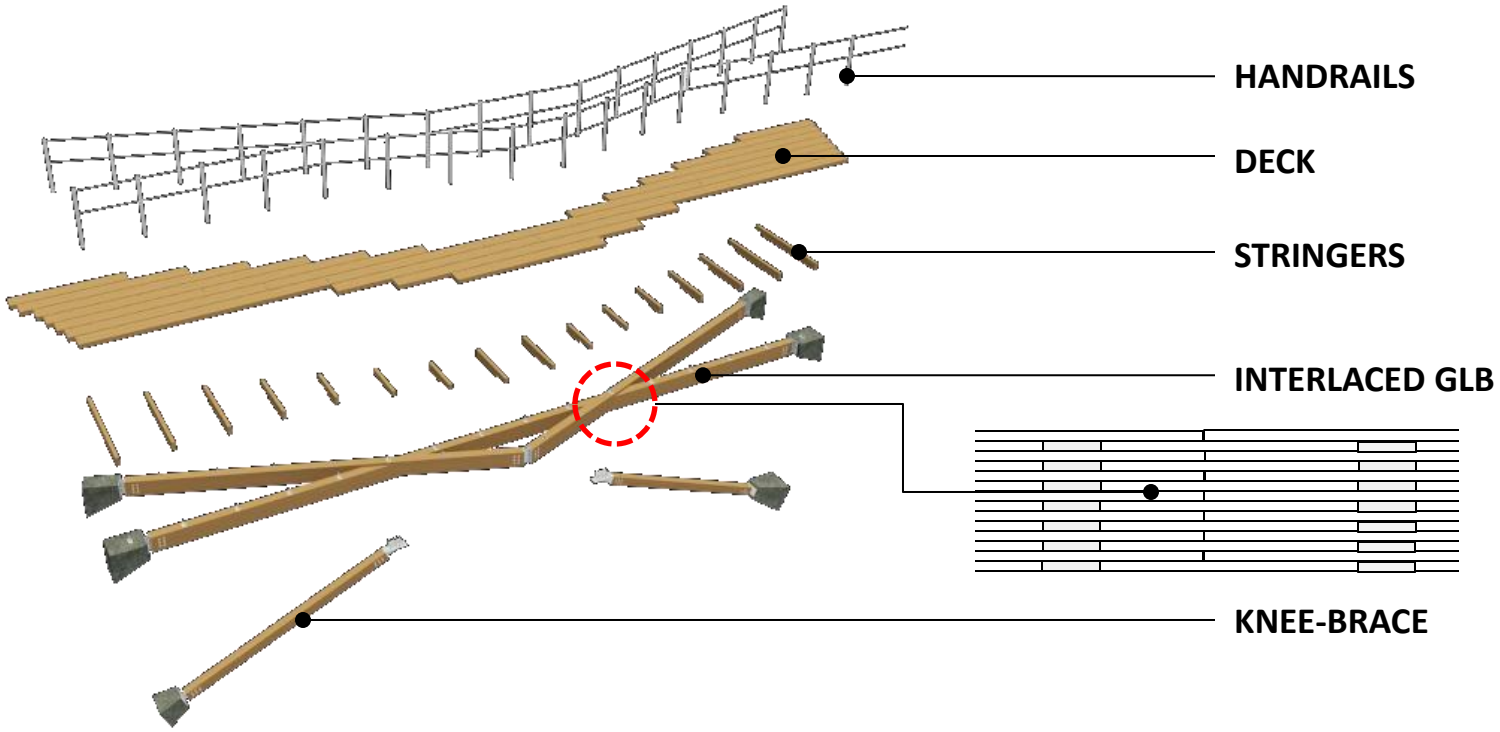
KNEE-BRACE

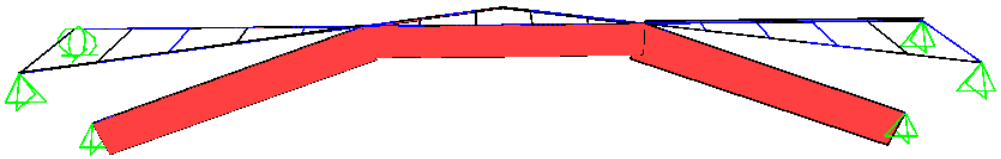
Architects: Maro Asipyan,, Abner Morales, Fabian Rosales, Matthew Terry,
Engineers: Vahe Heyrapetian, Vache Heyrapetian.
Orginal Design Concept by Matthew Terry



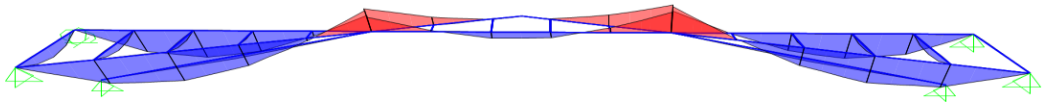


KNEE-BRACE





AXIAL LOAD DIAGRAM



MOMENT DIAGRAM

CONCLUSIONS

CONCLUSIONS

EFFECTIVE USE OF WOOD AS STRUCTURAL MATERIAL STARTS WITH EDUCATION OF ARCHITECTS AND ENGINEERS

COLLABORATION BETWEEN THE TWO IS IMPORTANT TO CREATING AESTHETICALLY PLEASING DESIGNS

THE WOOD INDUSTRY ACTIVE SUPPORT OF THIS TYPE OF EDUCATIONAL ACTIVITIES IS IMPORTANT FOR INDUSTRY GROWTH

2nd INTERNATIONAL CONFERENCE

TIMBER BRIDGES

LAS VEGAS 2013

CASE STUDY: Design of pedestrian timber bridges in an AE Studio

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