Design Project #1

Replacement of Vehicle Bridge over Spring Creek

Centre County, PA

Introduction to Engineering Design

EDGSN 100 Section 001

Bob the Builder

Design Team #1

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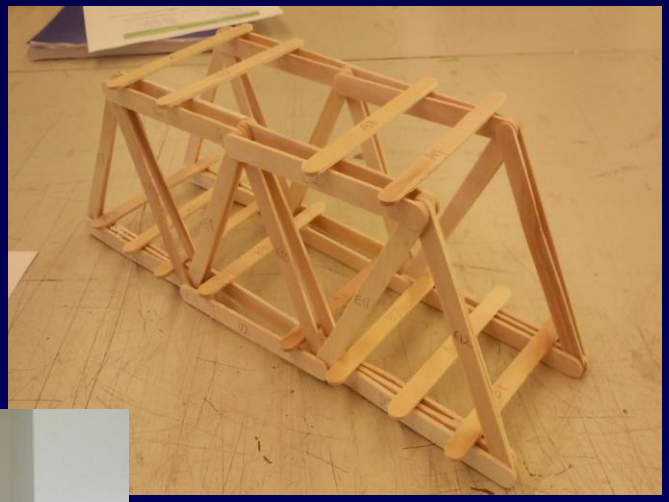
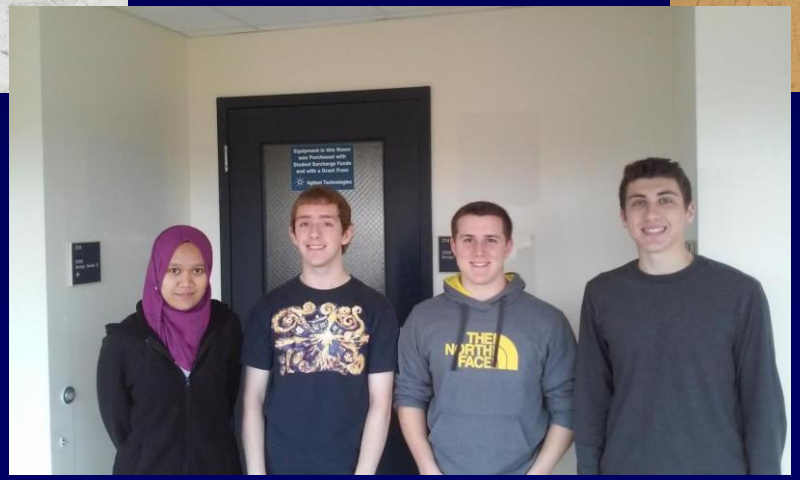




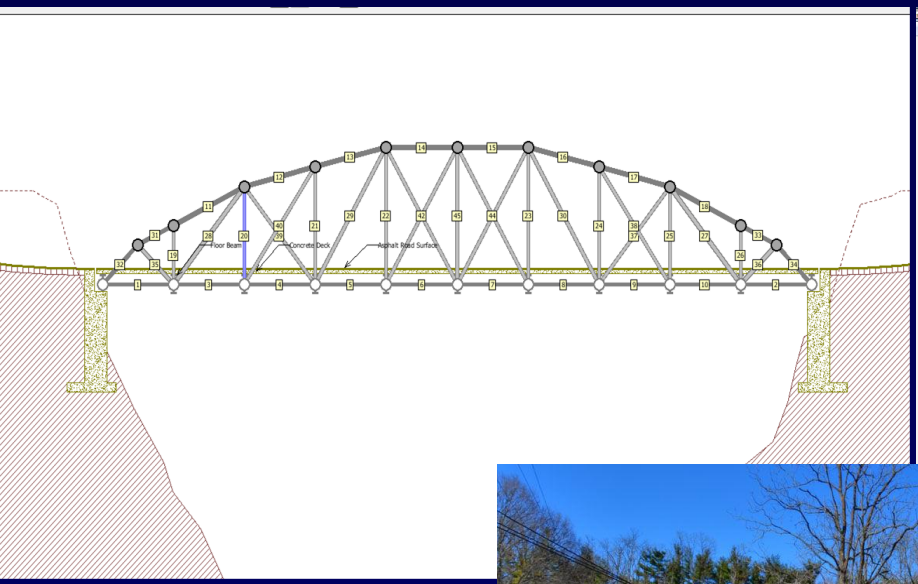
Presented to:

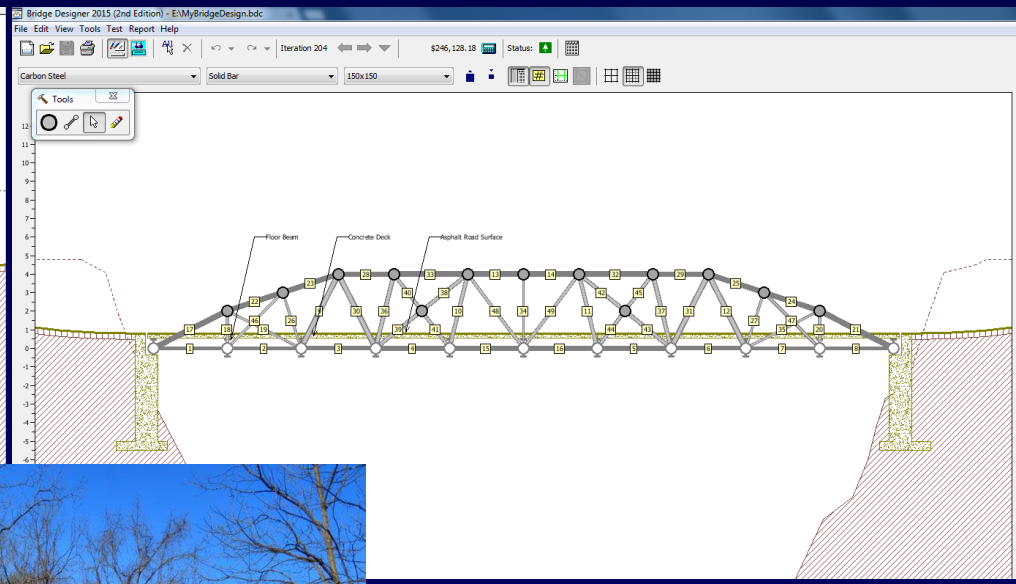
Prof. Berezniak

Fall 2015

Statement of Problem

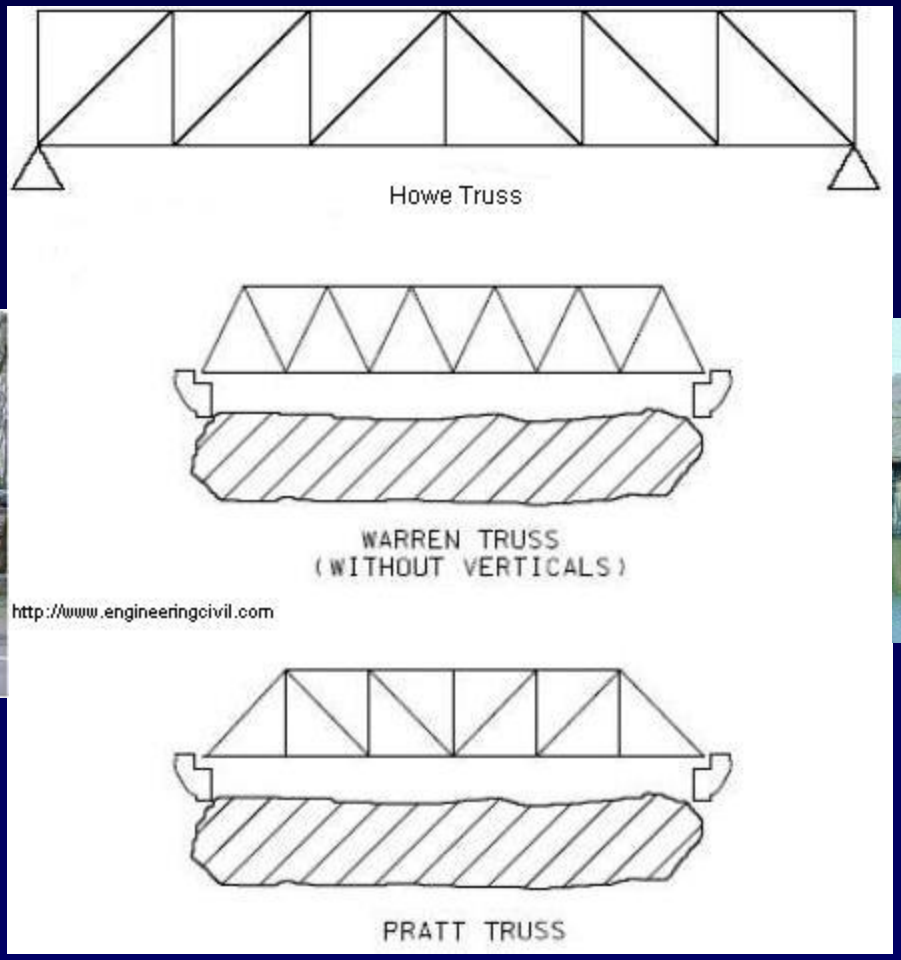
Bridge over Spring Creek destroyed via flood waters





Objective

Design and replace bridge over Spring Creek



ENGINEERING ENCOUNTERS

PENNSTATE

Design Criteria

Must contain:

Standard abutments

No piers

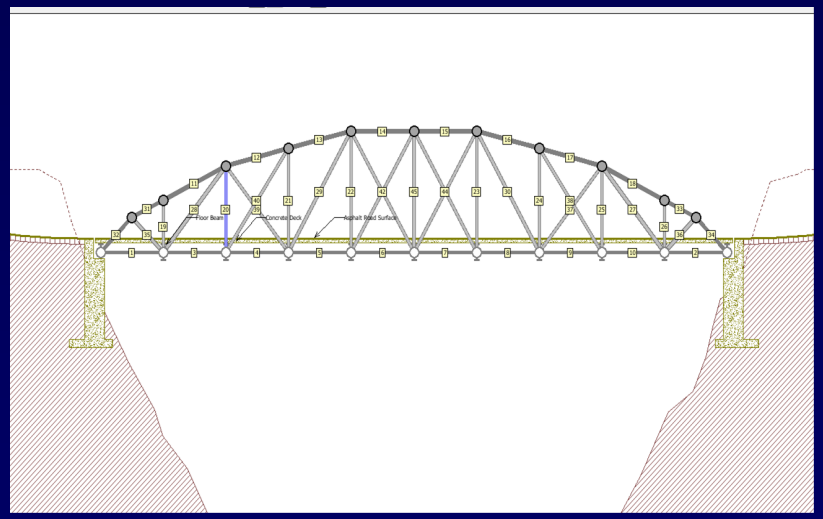
Concrete deck

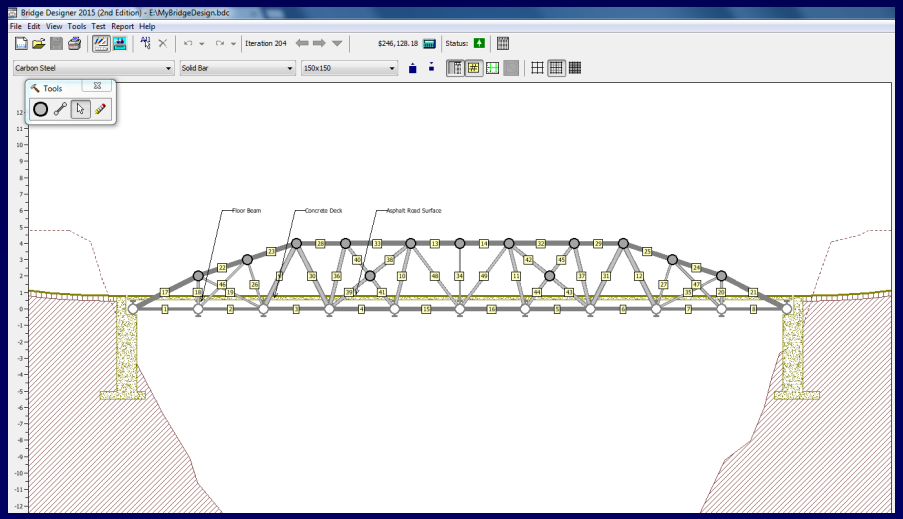
No cable anchorages

Support two trucks both 225kN

Technical Approach Phase 1: Economic Efficiency

Design a Howe bridge and Warren to determine lowest cost using the criteria (Program: Engineering Encounters Bridge Design 2015)





Technical Approach Phase 2: Structural Efficiency

Two designs: Howe and Warren

60 popsicle sticks

Bonding agents: hot glue and Elmer's glue

Test to failure

Determine which bridge performed the best

Results Phase 1: Economic Efficiency

Howe: $221,212.23

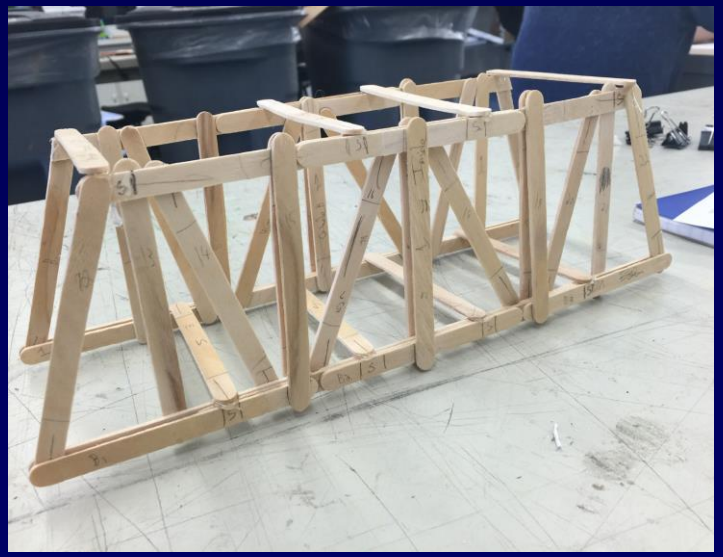
Warren: $246,128.18

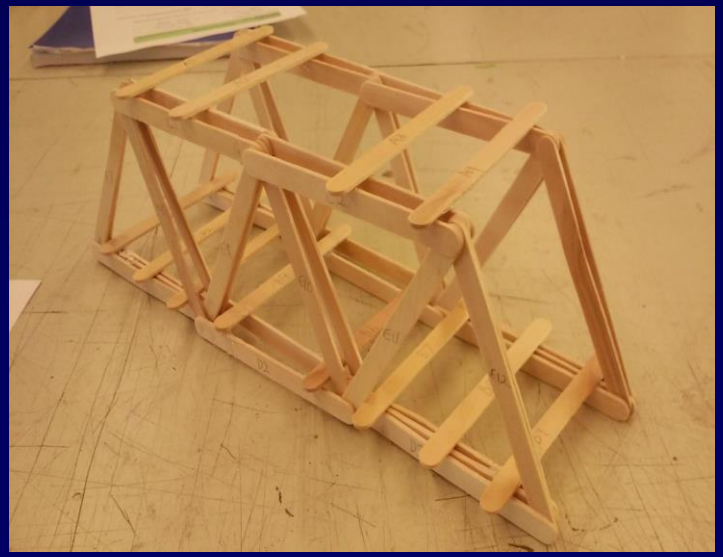
Difference: $24,915.95

Results Phase 2: Structural Efficiency

Howe: 329 (mean), 318 (geometric mean)

Warren: 353 (mean), 306 (geometric mean)



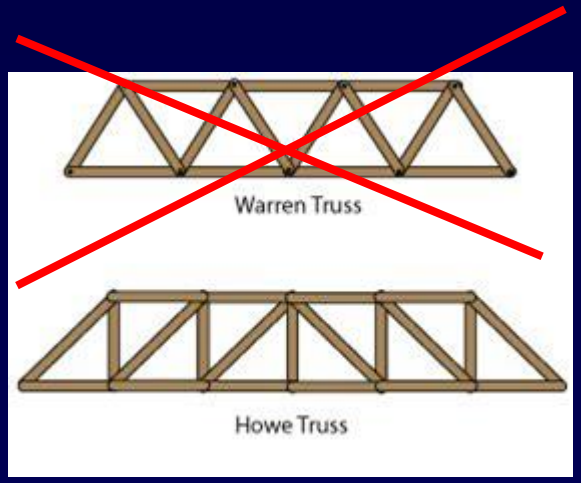


Best Solution

Howe: Economically and structurally superior

Costs were relatively similar

Howe overall is best choice



H Cost	Structural Efficiency
$221,212.23	353
$246,128.18	329

Howe

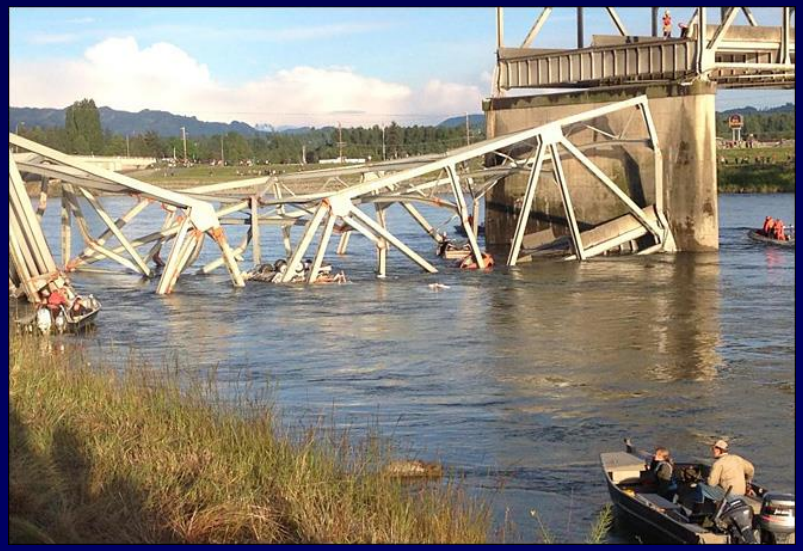
Warren

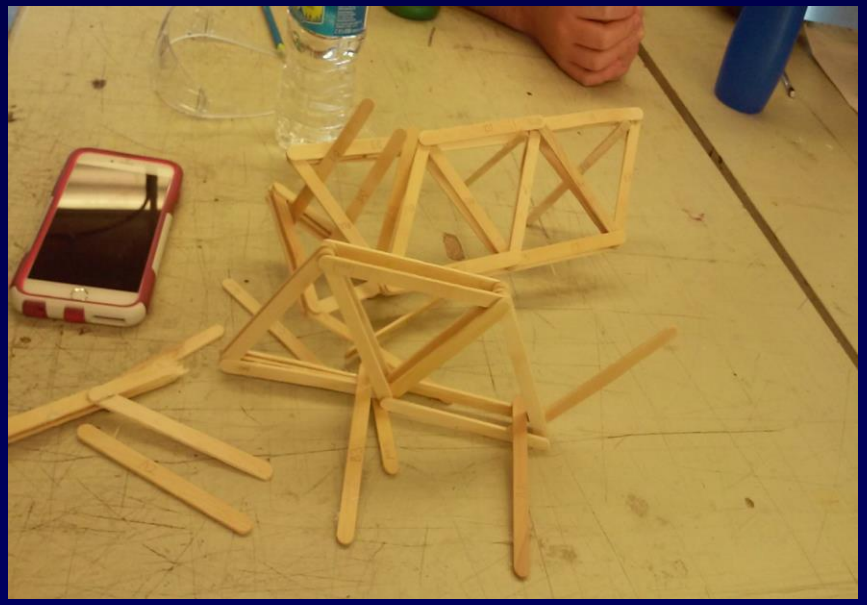
Conclusions

Bridge failure due to bad techniques and low construction skill

Gluing skills are very important

Balance glues pros and cons



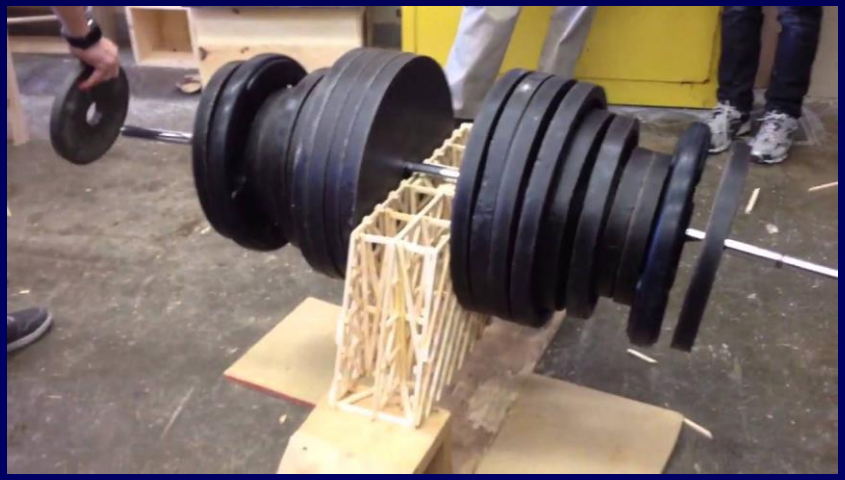


Recommendations

Howe bridge should be used in the replacement

Techniques and materials need to be improved

Improvements in these areas will lead to a better final product

Attention to allocation of popsicle sticks

Best result: When above is completed