Design Project #1

Replacement of Vehicle Bridge over Spring Creek

Centre County, PA

Introduction to Engineering Design

EDGSN 100 Section 001

Team Money Team

Team 5

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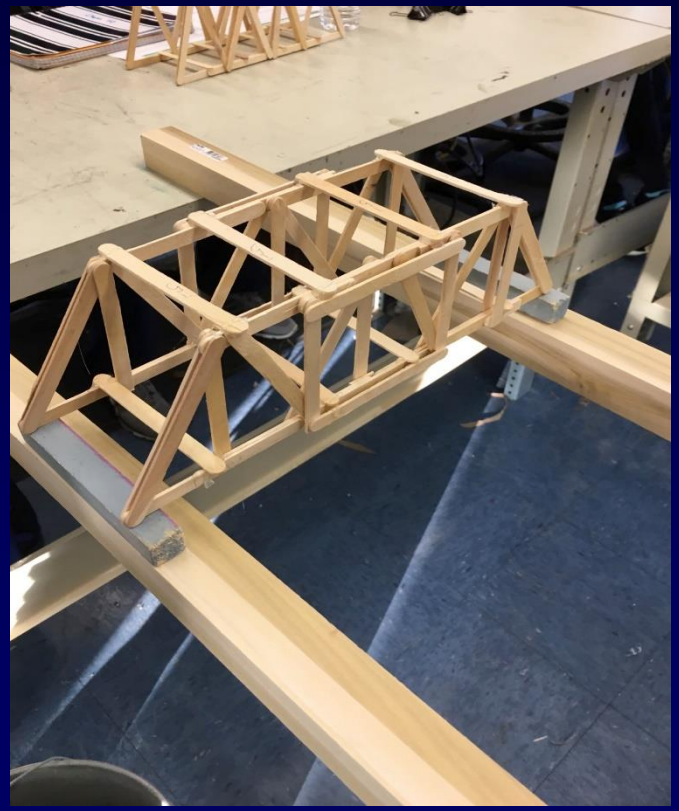

Presented to:

Prof. Berezniak

Fall 2015

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Statement of Problem

Problem:

-Local flooding from a recent 100-year flood event has completely destroyed a structurally deficient vehicle bridge

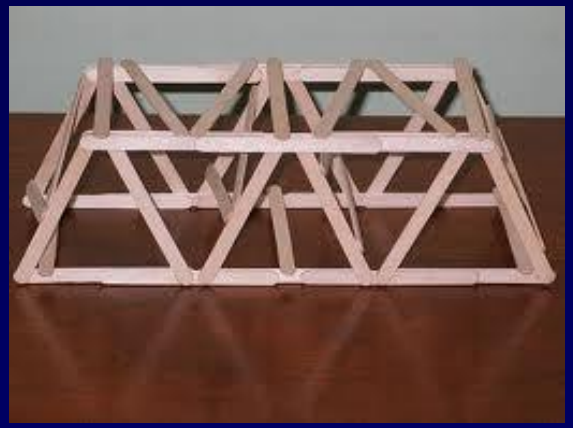
-location: Spring Creek along Puddintown Road in College Township, Centre County, PA. (to Medical Center)

Objective

- (PennDOT) Engineering District 2-0 has initiated an emergency, fast-track project to expedite the design a new vehicle bridge over Spring Creek to replace the bridge destroyed by the recent extreme flood event.

Design Criteria

- Standard abutments
- No piers (one span)
- Deck material
- No cable anchorages
- Load size
- Bridge elevation
- Deck span
- Both Warren and Howe



Technical Approach Phase 1: Economic Efficiency

In Bridge Designer:

Tubes used:

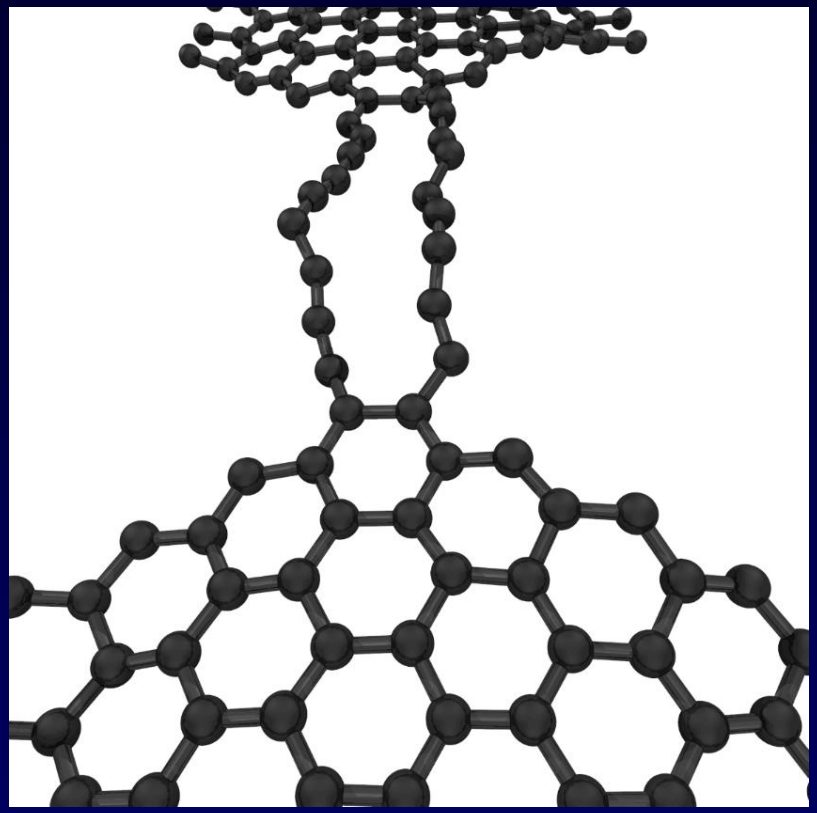
-Carbon Hollow Steel

-High-Stength Low-Alloy Steel

-Quenched and tempered Steel Hollow

Size of Tubes:

-Varied depending on force

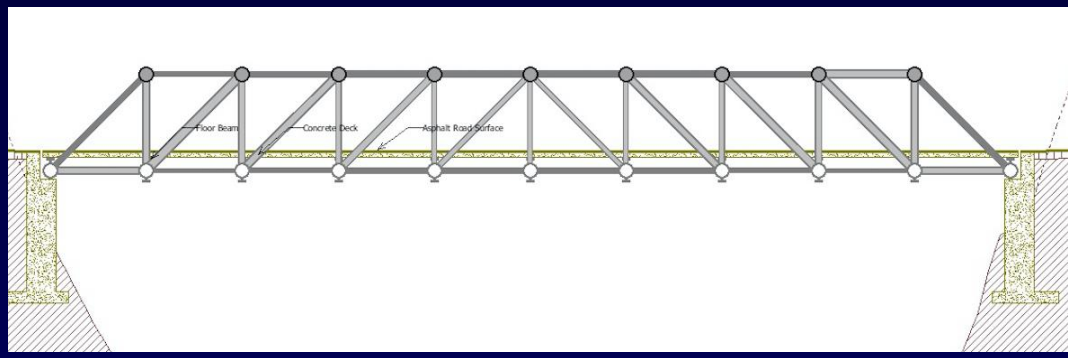


Benefits of using same type & size

Technical Approach Phase 2: Structural Efficiency

In Bridge Designer:

-Certain metals used depending on Compression Force or Tension Force



On the Model Bridges:

-Popsicle Stick beams used to reinforce key beams

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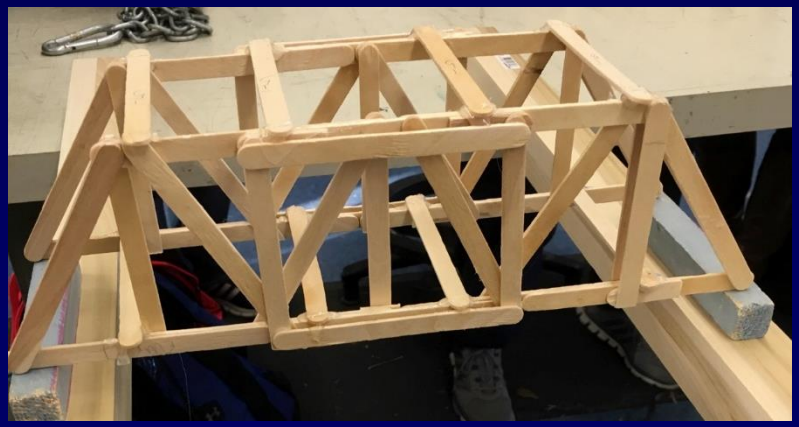

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Results Phase 1: Economic Efficiency

Bridge Designer:

Howe Bridge: $257,705.35

Warren Bridge: $232,745.32

Results Phase 2: Structural Efficiency

Mass of Bridges:

Warren: 0.188 lbs

Howe: 0.173lbs

Load at Failure:

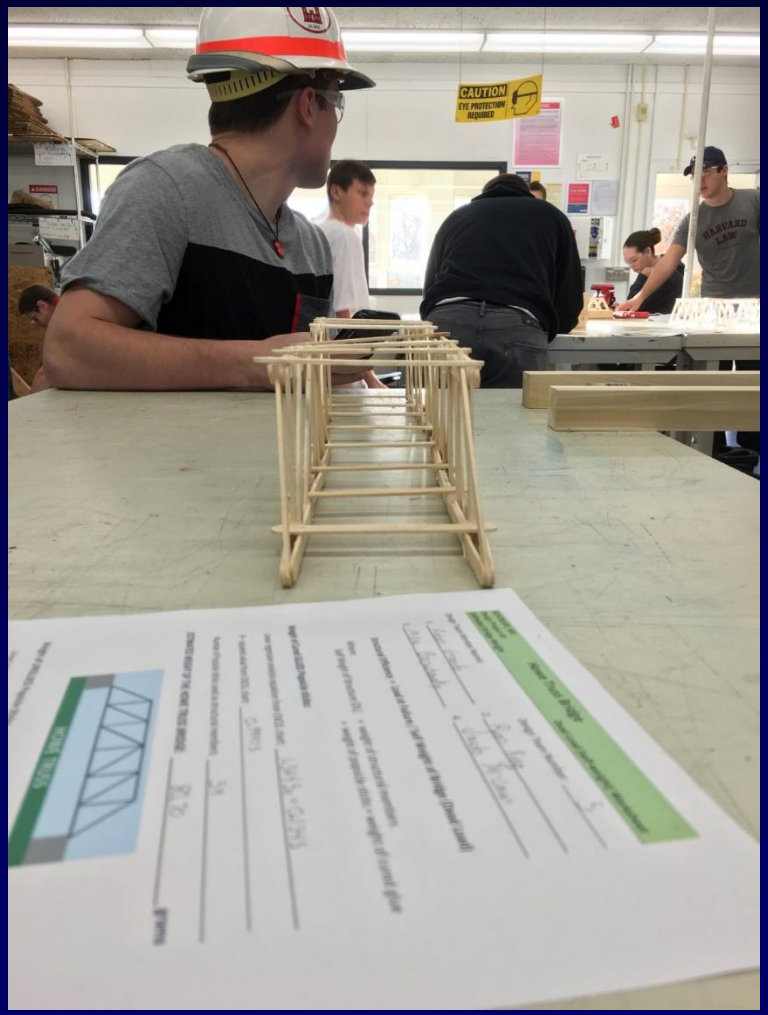
Warren: 60.8lbs

Howe: 50.8lbs

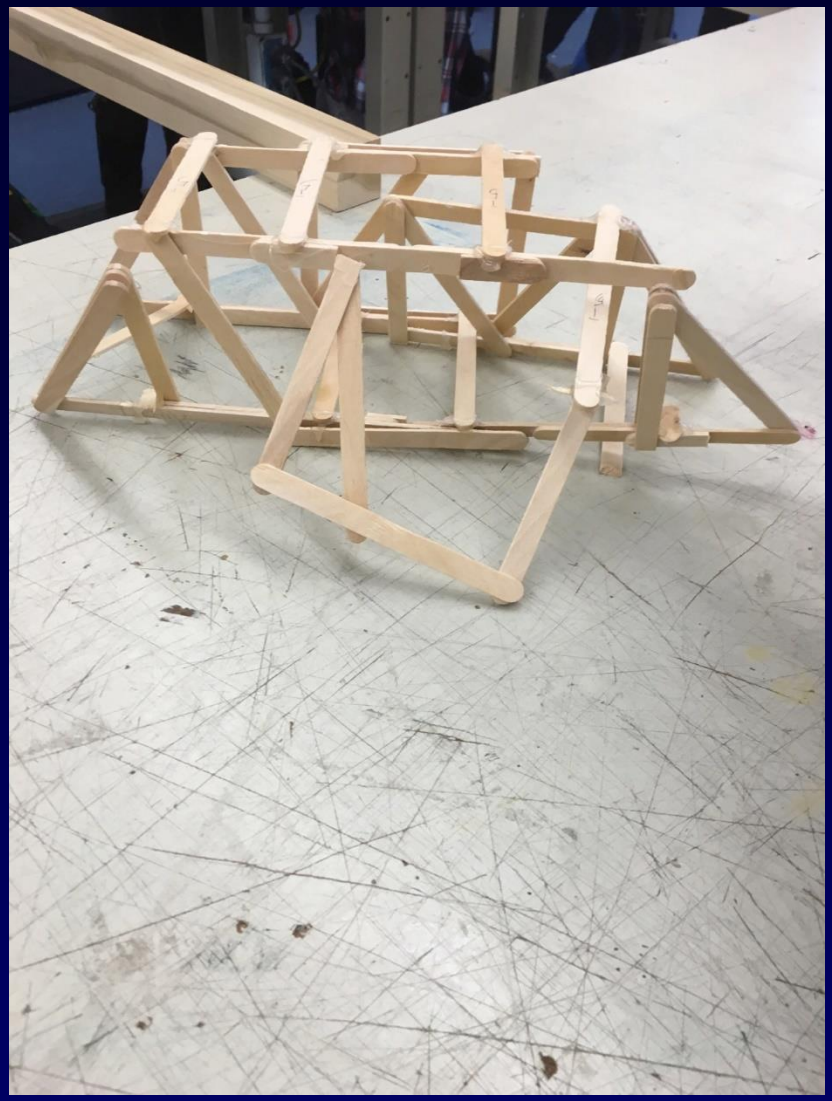
Structural Efficiency:

Warren: 323.4lbs

Howe:293.6lbs



Best Solution



-Allow MUCH more time to dry
(2 weeks versus 2 days)

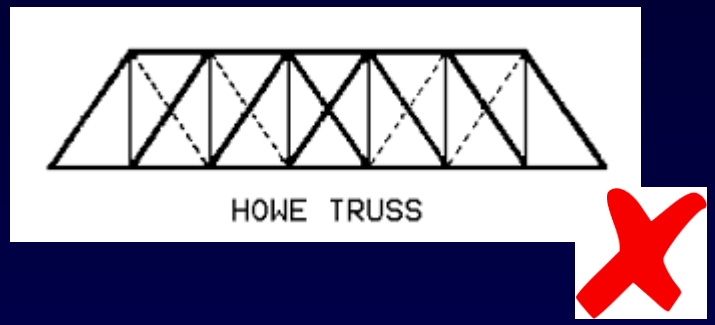
-Stronger Joints
(more time to cure as well s better construction)

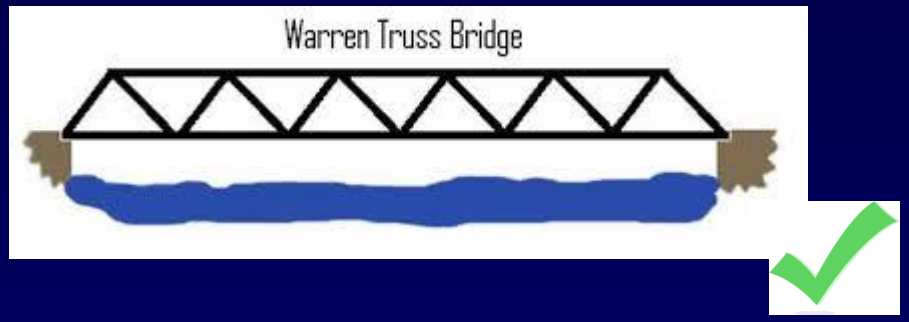
Conclusions

Economic performance: Warren

Structural performance: Warren

Ideal bridge to build: Warren





Recommendations

Based on our bridges' failure:

- **Struts are sturdily attached**
- **Members are aligned symmetrically**
- **Bridge stands up straight**

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