



2022 ASCE Palm Beach Branch Bridge Design Competition

Competition Information

What: Local Palm Beach County High School and Middle School ASCE Palm Beach Branch Engineering Encounters Bridge Competition

When: March 18, 2022 to May 18, 2022

Where/Who: Palm Beach County/ All Palm Beach County High School and Middle School students are eligible to compete.

Rules and Prizes

You will be given from March 18, 2022 to May 18, 2022 to complete the design of your bridge. The bridge that safely carries the design load with the lowest final cost wins. Designs will not be accepted after May 18, 2021. **Site condition 34A must be used to design your bridge (See below for directions).** The final bridge design must be sent to the following email address for scoring: ascepb.bridge@gmail.com. The top 3 teams for high school and middle school will be announced prior to May 25, 2022. Awards will be presented to the winning entries. Please email questions to ascepb.bridge@gmail.com.

You will compete in one of two contest categories, depending on your current grade level:

- Middle School Category | Grades 6-8
- High School Category | Grades 9-12

Teams

You may compete individually or in teams of two members each. Competing in teams of two is strongly encouraged. There is no limit on the number of teams from a given school.

You may create more than one bridge design by using the "save as" function, you may submit more than 1 bridge design per team. Ties will be broken based on time of delivery.

Prizes for this competition are as follows:

- 1st Place Team/Contestant - \$100*
- 2nd Place Team/Contestant - \$60*
- 3rd Place Team/Contestant - \$40*



The winning contestant/team will be invited to attend the **Florida Section ASCE competition** (State) on Thursday, July 15th, 2022. The state contest will be in-person in Orlando, FL at the ASCE FL Section Annual Meeting. If the winner is not available to attend, the second-place contestant/team will be invited to represent the ASCE Palm Beach Branch. The winners will be announced at the luncheon.

Prizes for the **Florida Section ASCE competition** are as follows:

Junior Division

- 1st Place Team/Contestant - \$1000*
- 2nd Place Team/Contestant - \$300*
- 3rd Place Team/Contestant - \$200*

Senior Division

- 1st Place Team/Contestant - \$1100*
- 2nd Place Team/Contestant - \$400*
- 3rd Place Team/Contestant - \$300*

***Prizes subject to change based on sponsorship**

Download Program

Download the software program. If you don't have it, first download the 2016 Bridge Designer Software from the ASCE Florida Section Competition webpage:

<https://www.asceflbridge.org/software>

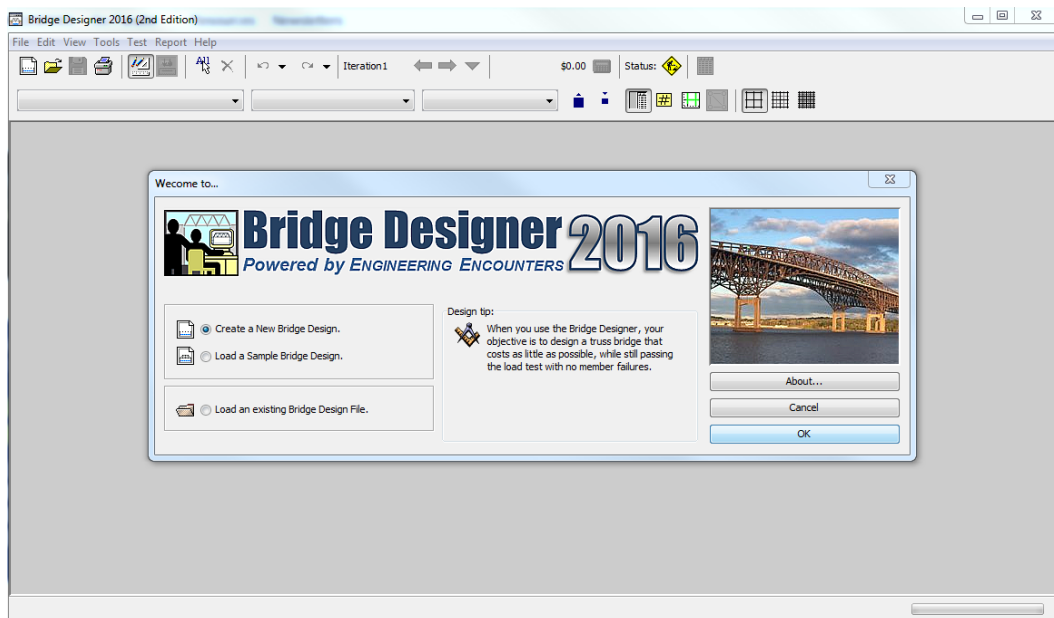
Please scroll down to the bottom of the page and download the software, versions for both Apple and Windows are provided.

Then install the program on your computer by clicking the provided setupbdv16j.exe file.

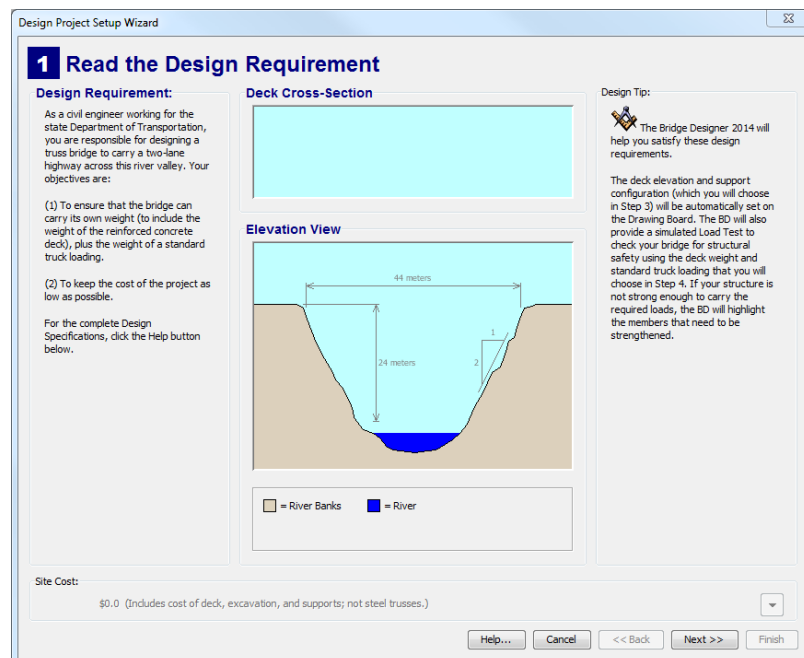
Once installed open the program and please use the following instructions to configure your bridge for the local competition to Site Condition **34A**. Additional information can also be found on the State website.

Bridge Design Instructions

#1 – Open Bridge Designer 2016 Program, select 'Create a New Bridge Design', select ok, then next



#2- Read the Design Requirement and select Next



#3 - Select 'No' for local contest and select Next.

Design Project Setup Wizard

2 Enter Local Contest Information

Local Contest Code

Are you participating in a local bridge design contest?

☒ No

☐ Yes, with a 4-character Local Contest Code

☐ Yes, with a 6-character Local Contest Code

Enter the Local Contest Code:

Deck Cross-Section

Elevation View

Design Tip:

If you are participating in a local contest using a 6-character Local Contest Code, you may only use the specific design project (i.e., site configuration and load case) designated for that particular local contest. When you enter the Local Contest Code here, the specified site configuration and load case will be automatically set on the Drawing Board.

If you enter a valid Local Contest Code and click the Next button, the Design Project Setup Wizard will advance to Step 5 because the site configuration and load case are already set.

If you click No, or if you have a 4-character Local Contest Code, you will be able to choose any one of 392 available design projects.

Site Cost:

\$0.0 (Includes cost of deck, excavation, and supports; not steel trusses.)

Help... Cancel << Back **Next >>** Finish

#4 – Specify the following: deck elevation 16m, Arch abutments (Height of Arch: 8 meters), No Pier, No Cable Anchorages. (Site Condition 34A). Verify your Site Condition is **34A**, look on the bottom right part of the screen and it will have your site condition. Then select Next.

Design Project Setup Wizard

3 Select the Deck Elevation and Support Configuration

Deck Elevation

24 meters

Support Configuration

☐ Standard abutments

☒ Arch abutments

Height of Arch: 4 meters

☒ No Pier (One Span)

☐ Pier (Two Spans)

Height of Pier: 0 meters

☒ No Cable Anchorages

☐ One Cable Anchorage

☐ Two Cable Anchorages

Deck Cross-Section

Elevation View

Design Tip:

The total cost of the design is the Site Cost plus the Truss Cost. The Site Cost is shown below. The Truss Cost will be computed when you design the truss.

In general, configurations that increase the Site Cost tend to reduce the Truss Cost and vice versa. For example, a lower deck elevation usually increases the Site Cost because it requires more excavation; but, a lower deck also reduces the Truss Cost because it shortens the span length. Try to find the best balance between these two competing costs.

For more information on selecting a site configuration, click the Help button below.

Site Cost:

\$80,200.00 (Includes cost of deck, excavation, and supports; not steel trusses.)

Site Condition: 22A

Help... Cancel << Back **Next >>** Finish

#5 - Deck material: Medium-Strength Concrete. Select loading of Standard 225kN Truck (Two Lanes). Then select Next.

Design Project Setup Wizard

4 Select the Deck Material and Truck Loading

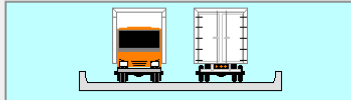
Deck Material

- ☒ Medium-Strength Concrete (0.23 meters thick)
- ☐ High-Strength Concrete (0.15 meters thick)

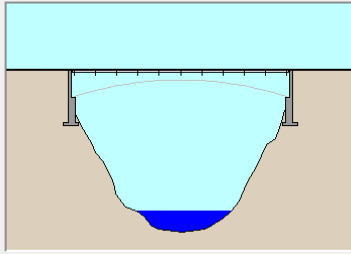
Loading

- ☒ Standard 225 kN Truck (Two Lanes)
- ☐ 480 kN Permit Loading (Centered)

Deck Cross-Section



Elevation View



☐ = River Banks ☐ = Excavation ☒ = River
☐ = Deck ☐ = Abutment

Design Tip:

Medium-strength concrete is relatively inexpensive, but its use results in a thicker deck, which adds more load to the structure. Greater load will tend to increase the truss cost.

High-strength concrete is more expensive, but because of its higher strength, the deck can be thinner and thus lighter. Lower loads associated with the deck weight will tend to decrease the truss cost.

You may also choose either of the two truck loads shown.

For more information on selecting a load case, click the Help button below.

Site Cost: \$80,200.00 (Includes cost of deck, excavation, and supports; not steel trusses.)

Site Condition: 22A

Help... Cancel << Back Next >> Finish

#6 – You may use the standard truss templates or create an original design.

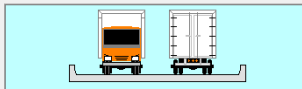
Design Project Setup Wizard

5 Select a Standard Truss Template (optional)

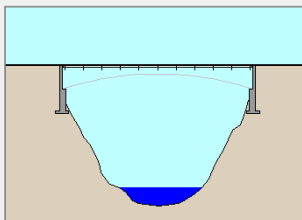
Select A Template

- collapse >
- Continuous Arch - Pratt
- Continuous Arch - Howe
- Continuous Arch - Warren
- 3-Hinge Arch - Pratt
- 3-Hinge Arch - Howe
- 3-Hinge Arch - Warren

Deck Cross-Section



Elevation View



☐ = River Banks ☐ = Excavation ☒ = River
☐ = Deck ☐ = Abutment

Design Tip:

A template is a diagram that depicts a standard truss configuration. If you select a template, it will be displayed in light dotted lines on the Drawing Board. The template will show you where to draw joints and members to ensure that your bridge design is stable.

A stable truss is one that is composed of interconnected triangles. An unstable truss cannot carry any load. For more information about structural stability, click the Help button below.

Site Cost: \$80,200.00 (Includes cost of deck, excavation, and supports; not steel trusses.)

Site Condition: 22A

Help... Cancel << Back Next >> Finish

#7 - Leave Title Block blank and select Next.

Design Project Setup Wizard

6 Fill in the Title Block (optional)

Title Block Information

Project Name:
Dennis H. Mahan Memorial Bridge

Designed By:

Project ID:
00022A-

Deck Cross-Section

Elevation View

Title Box

☐ = River Banks ☐ = Excavation ☒ = River
☐ = Deck ☐ = Abutment

Design Tip:

The title block will be displayed on the lower right-hand corner of the Drawing Board and on your printed design drawings.

Enter your name in the Designed By box, and use the Project ID box to give your design a unique name or number. You can change these items later by clicking them on the Drawing Board.

Site Cost: \$80,200.00 (Includes cost of deck, excavation, and supports; not steel trusses.)

Site Condition: 22A

Help... Cancel << Back **Next >>** Finish

#8 - Select Finish to start your design.

Design Project Setup Wizard

7 Design the Steel Truss

To Design the Truss:

- (1) Click the finish button to activate the Drawing Board.
- (2) Draw the joints.
- (3) Draw the members.
- (4) Run the Load Test to check the strength of your design.
- (5) Strengthen any members that fail during the Load Test.
- (6) Optimize the design by minimizing its cost.

For more information about the design process, click the Help button below.

Deck Cross-Section

Elevation View

Title Box

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☐ = Deck ☐ = Abutment

Design Tip:

The title block will be displayed on the lower right-hand corner of the Drawing Board and on your printed design drawings.

Enter your name in the Designed By box, and use the Project ID box to give your design a unique name or number. You can change these items later by clicking directly on the title block of the Drawing Board.

Site Cost: \$80,200.00 (Includes cost of deck, excavation, and supports; not steel trusses.)

Site Condition: 22A

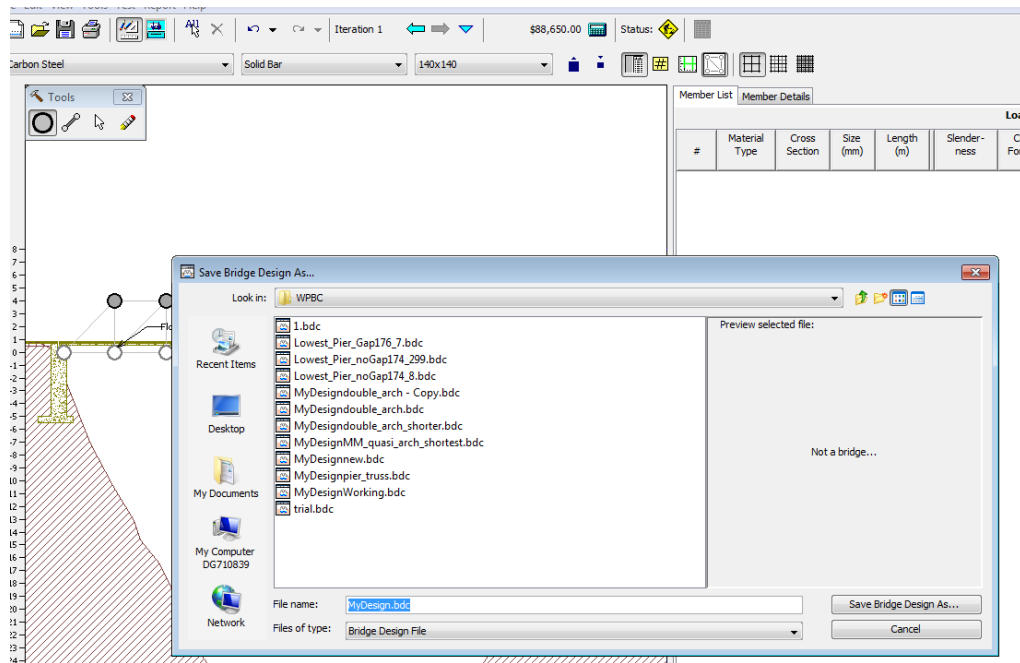
Help... Cancel << Back Next >> **Finish**



#9 – Start creating the bridge joints and members using the ‘Tools’ bar. Click Test, then ‘Load Test’ to test your bridge. If it fails, return to the ‘Drawing Board View’ to modify your design and keep improving it. Use the Help button for guidance.

#10 – Saving your bridge.

Once you have created your lowest cost bridge that passes the load test, click ‘File’, then ‘Save As’. Save the file and attach it in an email following the instructions below.



Please include the following in your submission email:

To: ascepb.bridge@gmail.com

CC: Put Your Teacher's or Parent's Email address here

Email Subject Line: Cost of Bridge (\$\$)/ Grade /Team Name

Body of Email: Name of Science Teacher (teacher's email), Grade, Names of Team Members, contact email (your email, where we can send message)

Email Attachment: Please use the naming format provided in the example below to name your bridge file.

Example :

Subject: \$500,000/9/ Bridge Blasters

Body: Mrs. Williams (Williams@polk.net), 9th Grade, John Smith and Robert Johnson, john.smith@email.com

Attachment: (Cost_Teacher_Team Name_Grade)

For example: Team Bridge Blasters is submitting a bridge that costs \$110,000 and they are in 9th grade from Mrs. Williams' Class. You would name your attachment: 110000_Williams_BridgeBlasters_9.bdc

You may now begin the competition. Good Luck!!