

The West Point Bridge Design Contest 2010

Instructions for Organizing a Local Contest

A. Introduction

The West Point Bridge Design Contest (<http://bridgecontest.usma.edu>) is a nationwide Internet-based competition intended to provide middle school and high school students with a realistic, engaging introduction to engineering. The contest infrastructure includes a mechanism for organizing and running local bridge design contests in conjunction with the national competition. Using this system, each organization that establishes a local contest will receive its own web-based Local Contest Scoreboard, which allows the contest organizers to monitor the level of participation and the performance of local contest participants on a daily basis. Procedures for establishing, organizing, and running local contests are described below.

B. National Contest Basics

1. Anyone can enter the West Point Bridge Design Contest; however, only U.S. students, age 13 through Grade 12, are eligible to compete for national-level recognition.
2. Students may compete individually or in teams of two.
3. The West Point Bridge Design Contest consists of Qualifying, Semi-Final, and Final Rounds. Each finalist will receive a notebook computer, and each member of the top team in the Final Round will win a \$10,000 savings bond.
4. Participation in the contest is entirely free.
5. The national contest begins on February 1 and ends on May 8. The on-line registration and automated judging features of the contest website will remain active until July 1, 2010, to facilitate the completion of local contests.
6. During the national contest, there are no restrictions on collaboration. Students may freely gather information from and share ideas with their peers, teachers, parents, and contest volunteers.

C. How Students Enter the National Contest

As soon as possible after the contest begins on February 1, 2010, a student who wishes to enter the West Point Bridge Design Contest should do the following:

1. **Form a team.** A team may consist of either one or two students, though teams of two are strongly encouraged. A student who wishes to compete individually should register as a one-person team.
2. **Download the West Point Bridge Designer 2010 software** from the contest website at <http://bridgecontest.usma.edu/download.htm>. The software is free!
3. **Install the West Point Bridge Designer 2010** on a Windows computer running Windows 98 or better.
4. **Use the West Point Bridge Designer 2010 to design a bridge.** To be eligible for submission to the contest, the design must pass the WPBD simulated load test and should

be as inexpensive as possible. Once the design is complete, save it as a “bridge design file.”

5. **Register for the contest** at <http://bridgecontest.usma.edu/login.htm>. During registration, the team creates a Team Name and password and then receives its own Team Home Page on the contest website.
6. **Log in to the Team Home Page and upload the bridge design file for judging.** As soon as the upload is complete, the web-based judging system checks to ensure that the bridge design passes the WPBD load test and then determines the team’s contest standing, based on the cost of the design. The Team Home Page is immediately updated to display the team’s current contest standing.
7. **Use the West Point Bridge Designer 2010 to improve the design, and then submit improved designs for judging.** Again, the team logs in and submits all designs through the Team Home Page. There is no limit to the number of designs a team may submit.

D. Planning Your Local Contest

If you or your organization would like to run your own local contest in conjunction with the West Point Bridge Design Contest, begin by planning the scope and structure of your contest. Specifically, your planning should include the following tasks:

1. **Identify your target audience.** Determine what ages/grades will be allowed to participate. If possible, identify the specific schools that your potential contestants are attending.
2. **Decide on the Bridge Design Project you would like to use for your local contest.** Unlike previous editions of the WPBDC, each local contest must now use a single Bridge Design Project, consisting of a specific bridge site configuration and load case. For detailed guidance on selecting a Bridge Design Project, see Appendix A of this document.
3. **Decide on the local contest start and end dates.** These do not need to correspond to the national contest dates; however, the local contest may not start any sooner than February 1, 2010 and should end no later than July 1, 2010.
4. **Decide if your local contest will offer prizes.** It is not essential to offer local prizes; however, given that the national contest is not offering prizes this year, appropriate incentives at the local level will likely have a very positive impact.
5. **Decide whether or not you will run a local Final Round to determine your winners.** If you are offering substantial prizes, then we strongly recommend that you organize and conduct a local Final Round, in which finalists compete under the direct supervision of the contest organizers or judges. Such events provide excellent opportunities for local media coverage and for publicly honoring the winners. More important, a local Final Round will ensure that your local winners actually deserve to win. Recall that the national contest places no restrictions on collaboration. Thus, if you award prizes solely on the basis of performance in the national contest, there is a possibility that you will be rewarding teams that obtained their ideas—perhaps even their designs—from others. By using a supervised Final Round, with no collaboration authorized, you can ensure that your winners have actually created their own designs.

E. Setting Up Your Local Contest

Once you have a plan for your local contest, use the following procedure to set it up:

1. Request a “Local Contest Code” by sending an e-mail message to wpbedc1@gmail.com. Provide your name, e-mail address, phone number, selected Bridge Design Project (see D.2 above), and a brief description of your proposed local contest. As a minimum, describe the target audience, sponsoring organization or school, prizes (if any), and relevant dates.
2. The national Contest Coordinator will assign you a unique 6-character Local Contest Code. The final three characters of the Local Contest Code identify your selected Bridge Design Project.
3. Publicize your local contest. As part of your local contest publicity, provide the following information:
 - a. Provide the Local Contest Code to all potential local contest participants.
 - b. Ask your local contest participants to register for the West Point Bridge Design Contest by accessing <http://bridgecontest.usma.edu> and hitting the “Enter the Contest” tab. Participants who are not eligible to compete for national recognition in the WPBDC may still participate in your local contest by registering in the Open Competition.
 - c. As part of the on-line registration process, your contest participants will be asked to enter the Local Contest Code. (This occurs on the final registration page—the same page on which the registrant enters his or her e-mail address and password.)
 - d. If the registrant enters a valid Local Contest Code, he or she will receive a confirmation on the Team Home Page.
 - e. By entering the Local Contest Code during registration, a team is registering for *both* the national contest and the local contest.
4. At start-up, the West Point Bridge Designer 2010 will prompt the user to enter the Local Contest Code. When your contestants enter your Local Contest Code, WPBD 2010 will automatically configure itself for the selected Bridge Design Project. (Recall that the Bridge Design Project, consisting of the load case and site configuration, is embedded within the Local Contest Code.) This process ensures that your contestants all use the designated Bridge Design Project for their designs.
5. Once the Local Contest Code is in our system, our server will generate a Local Contest Scoreboard automatically every 24 hours and post it to a web page. You will be able to access this page to get up-to-date information about participation in your contest. The URL for the Local Contest Scoreboard is <http://bridgecontest.usma.edu/standings/local/#####.htm>. The symbol “#####” refers to your unique six-character Local Contest Code.
6. The Scoreboard will not display contestants' last names or personal contact information. Contact information for local contest winners will be supplied only to the local contest organizer, if requested.
7. After the national contest ends on May 8, the contest website will remain fully operational until July 1, 2010. Thus, local contests do not need to end on May 8 and may run through the remainder of the standard school year--but no later than July 1.

F. Frequently Asked Questions

Q1: What if a team forgets to enter the Local Contest Code during registration?

A1: If a team does not enter the Local Contest Code, then that team will not appear on the Local Contest Scoreboard. However, a team can add the Local Contest Code to its registration *at any time*—even after the initial registration has been completed

Q2: What if a team forgets to enter the Local Contest Code into the West Point Bridge Designer 2010 when designing their bridge?

A2: Any team that is registered in a particular local contest may only submit designs that are based on the Bridge Design Project designated for that local contest. At start-up, the West Point Bridge Designer 2010 prompts the user to enter the Local Contest Code. The Code sets up WPBD 2010, such that all bridge designs will be based on the correct Bridge Design Project for your contest. If the contestant does not enter the code or enters it incorrectly, the design will be rejected when it is submitted to the contest website.

Q3: Can a team enter a local contest and the national contest at the same time?

A3: Any design submitted as an entry in a local contest is automatically entered in the national contest as well. Contestants who wish to enter the national contest with a Bridge Design Project that is different from the one designated for their local contest may form a new team to do so. The new team should *not* be registered in the local contest.

Q4: Can a team enter more than one local contest at the same time?

A4: At the present time, our registration system can only accommodate one code per team. However, contestants are permitted to form two or more teams, with each team entering a different Local Contest.

Q5: Can my local contest begin prior to February 1, 2010?

A5: No. The contest registration system will not be activated until that date.

Q6: May I request a Local Contest Code from wpbedc1@gmail.com prior to February 1, 2010?

A6: Yes. You may request a Local Contest Code at any time. We will normally provide the code within one week.

Q7: May I publicize my Local Contest prior to February 1, 2010?

A7: Yes. As soon as you have received an approved local Contest Code from the national Contest Coordinator, you may publicize your local contest.

Q8: Can my local contest run beyond the end of the national contest on May 8, 2010?

A8: Yes. The contest registration system will not be deactivated until July 1, 2010.

Q9: This local contest system seems like a lot of work. Why can't the national Contest Coordinator just send me a list of all contest participants who registered from my town or zip code?

A9: The national contest typically draws over 15,000 registered teams. This project is run by three volunteers who also have other full-time jobs. It is simply not possible for us to provide

customized data queries for hundreds of local contests. Use of the Local Contest Code allows you to gain real-time access to the contest database without direct intervention by the contest staff.

Q10: How should I publicize my local contest?

A10: In the past, our most successful local contests have been publicized primarily by *direct, personal contact* between contest organizers and local math, science, and technology teachers. Another effective technique is to hold a public event, at which students can try out the West Point Bridge Designer software on a computer workstation. Simply posting a notice on your organization's website is not likely to be effective.

Q11: I am a high school teacher. Can I organize a Local Contest just for a project in my math or science classes?

A11: Yes. Even if you are doing a bridge design project that isn't really a contest, you may use our local contest system to keep track of your students' participation and standings.

Q12: Can participants in my Local Contest practice for the 2010 West Point Bridge Design Contest prior to the official start date of February 1, 2010?

A12: Yes. Participants can download the West Point Bridge Designer 2007 from our website at <http://bridgecontest.usma.edu/download2007.htm> and can practice designing bridges in preparation for the contest.

Q12: How can I obtain an electronic copy of this document, "How to Organize a Local Contest," to share with others?

A12: You can download a copy of this document in .pdf format from <http://bridgecontest.usma.edu/local.htm>.

G. Conclusion

A local contest is a great way to facilitate participation in the national West Point Bridge Design Contest, while also providing a mechanism for keeping track of and recognizing the achievements of contest participants in your local area, organization, school, or course. If you have any questions about the local contest system, please send e-mail to wpbedc1@gmail.com. Good luck!

--The Contest Team

Appendix A

West Point Bridge Design Contest

BRIDGE DESIGN PROJECTS

A Bridge Design Project consists of two components—the **load case** and the **site configuration**. There are four available load cases and 98 available site configurations. When a local contest organizer requests to set up a local contest, that request should include:

- The desired load case (specify **Load Case A, B, C, or D**)
- The desired site configuration (specify **Site Configuration #1 - #98**)

If you have no preference for a particular load case or site configuration, simply note this in your request and the national Contest Coordinator will choose them for you.

NOTE: Your selected load case and site configuration will be embedded in the Local Contest Code that is provided to you by the national Contest Coordinator. For example, if your Local Contest Code is “XYZ38B”, then your local contest will be using Site Configuration #38 and Load Case B. Local contest participants must know their Local Contest Code in order to enter the local contest; however, it is not necessary for contestants to know the specific load case and site configuration which are being used in the local contest. At start-up, the West Point Bridge Designer 2010 software will prompt the user for the Local Contest Code and, based on that code, will automatically configure itself for the correct load case and site configuration.

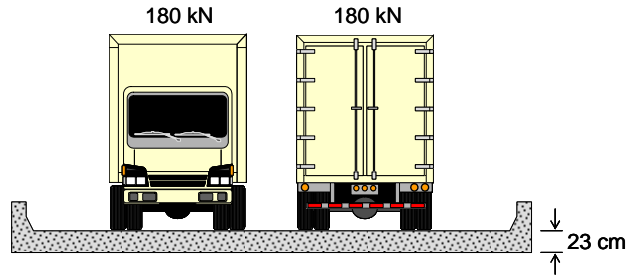
Some Considerations for Selecting a Load Case and Site Configuration

1. In general, a greater *deck height* (i.e., a longer span) will result in a more complex and challenging design. Thus, consider using a lower deck height for younger students or for projects that must be completed in a limited period of time.
2. Site configurations that include *cable anchorages* offer opportunities to explore many unique and interesting bridge types—suspension bridges and cable-stayed bridges, for example. Consider using cable anchorages as a stimulus for contestants’ development of creative design concepts. It is important to note that the inclusion of cable anchorages in the site configuration adds to the total cost of the bridge design, regardless of whether the anchorages are actually used.
3. In deciding on a load case, recognize that the weight of the concrete deck is a *static load*—it doesn’t move—while the weight of the truck is a *moving load*. In general terms, load cases with relatively larger moving load and relatively smaller static load tend to be somewhat more challenging. The moving load will cause the internal force in some structural members to vary considerably—sometimes from tension to compression and vice versa—as the truck crosses the bridge. The design of members subjected to load reversals is somewhat more difficult than the design of members subjected to tension alone or compression alone. Thus, Load Case D will tend to be the most challenging, while Load Case A will tend to be the most straightforward.

Load Cases

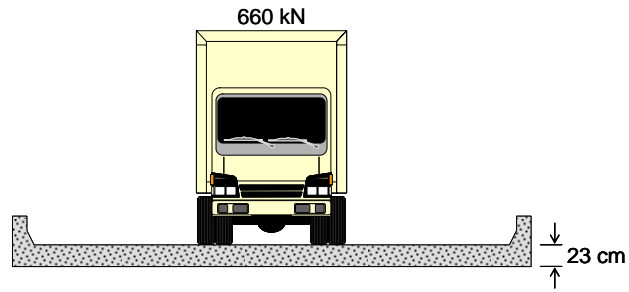
Load Case A:

- Medium-strength concrete deck (*heavier but less expensive than high-strength concrete*)
- Standard 180 kN H20-44 truck loading in two lanes



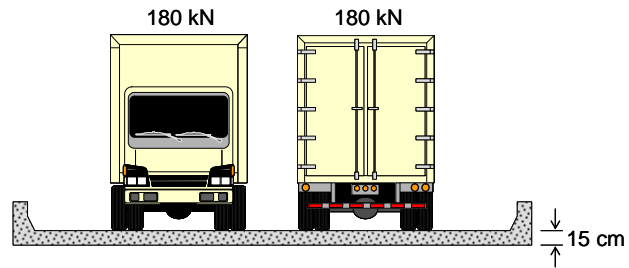
Load Case B:

- Medium-strength concrete deck (*heavier but less expensive than high-strength concrete*)
- One 660 kN permit loading on the bridge centerline



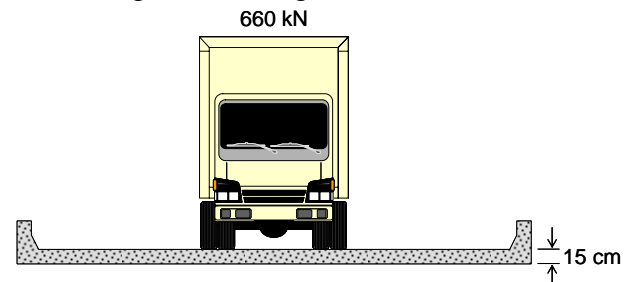
Load Case C:

- High-strength concrete deck (*lighter but more expensive than medium-strength concrete*)
- Standard 180 kN H20-44 truck loading in two lanes



Load Case D:

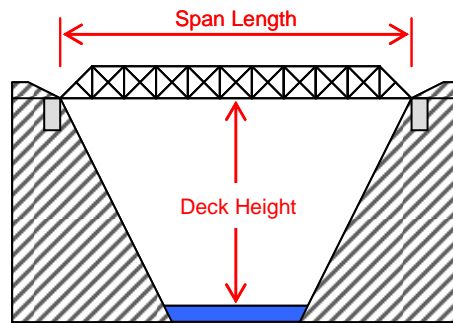
- High-strength concrete deck (*lighter but more expensive than medium-strength concrete*)
- One 660 kN permit loading on the bridge centerline



Bridge Site Configurations

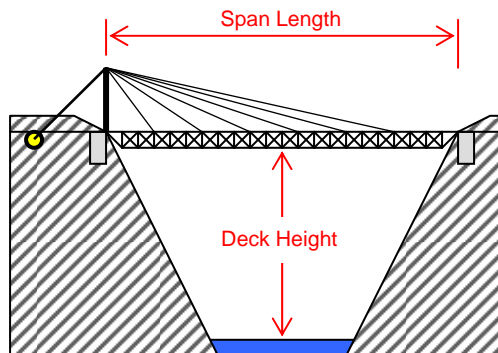
Standard Abutments

Site Config. #	Deck Height (meters)	Span Length (meters)
01	24	44
02	20	40
03	16	36
04	12	32
05	8	28
06	4	24
07	0	20



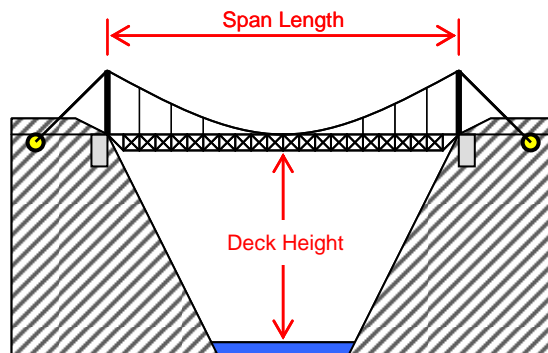
Standard Abutments with One Cable Anchorage

Site Config. #	Deck Height (meters)	Span Length (meters)
08	24	44
09	20	40
10	16	36
11	12	32
12	8	28
13	4	24
14	0	20



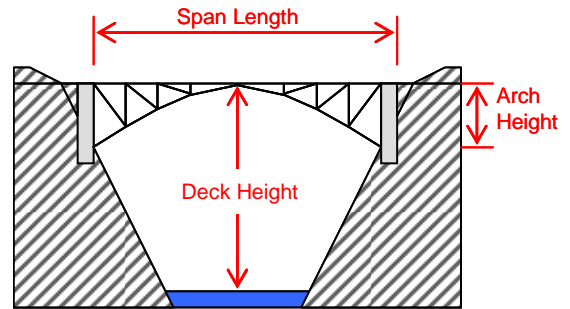
Standard Abutments with Two Cable Anchorages

Site Config. #	Deck Height (meters)	Span Length (meters)
15	24	44
16	20	40
17	16	36
18	12	32
19	8	28
20	4	24
21	0	20



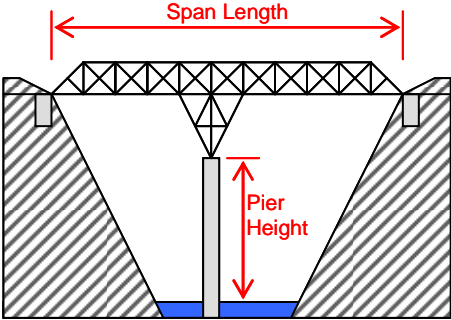
Arch Abutments

Site Config. #	Deck Height (meters)	Span Length (meters)	Arch Height (meters)
22	24	40	4
23	24	36	8
24	24	32	12
25	24	28	16
26	24	24	20
27	24	20	24
28	20	36	4
29	20	32	8
30	20	28	12
31	20	24	16
32	20	20	20
33	16	32	4
34	16	28	8
35	16	24	12
36	16	20	16
37	12	28	4
38	12	24	8
39	12	20	12
40	8	24	4
41	8	20	8
42	4	20	4



Standard Abutments with Pier

Site Config. #	Deck Height (meters)	Span Length (meters)	Pier Height (meters)
43	24	44	0
44	24	44	4
45	24	44	8
46	24	44	12
47	24	44	16
48	24	44	20
49	24	44	24
50	20	40	0
51	20	40	4
52	20	40	8
53	20	40	12
54	20	40	16
55	20	40	20
56	16	36	0
57	16	36	4
58	16	36	8
59	16	36	12
60	16	36	16
61	12	32	0
62	12	32	4
63	12	32	8
64	12	32	12
65	8	28	0
66	8	28	4
67	8	28	8
68	4	24	0
69	4	24	4
70	0	20	0



Standard Abutments with Pier and Two Cable Anchorages

Site Config. #	Deck Height (meters)	Span Length (meters)	Pier Height (meters)
71	24	44	0
72	24	44	4
73	24	44	8
74	24	44	12
75	24	44	16
76	24	44	20
77	24	44	24
78	20	40	0
79	20	40	4
80	20	40	8
81	20	40	12
82	20	40	16
83	20	40	20
84	16	36	0
85	16	36	4
86	16	36	8
87	16	36	12
88	16	36	16
89	12	32	0
90	12	32	4
91	12	32	8
92	12	32	12
93	8	28	0
94	8	28	4
95	8	28	8
96	4	24	0
97	4	24	4
98	0	20	0

