

2019 EPDACI STUDENT BEAM COMPETITION OFFICIAL ENTRY FORM PART I

This is an application to register for the 2019 EPDACI Student Beam Competition, to be held at Widener University, Chester, PA, on April 6, 2019. This competition is for undergraduate student teams. One form is required for each entry. **Completed Part I must be received no later than March 11, 2019.**

Date of Application: _____

Name of School: _____

Faculty Advisor: _____

Phone: _____

E-mail: _____

Student Team (2 to 5 students) (Please Print)

Email

Phone No.

1. _____

2. _____

3. _____

4. _____

5. _____

SIGNATURE OF THE FACULTY ADVISOR: _____

TEAM NAME: _____

BEAM MARK: _____

PLEASE SUBMIT THIS FORM BY EMAIL TO: steve.a.cole@verizon.net

2019 EPDACI STUDENT BEAM COMPETITION OFFICIAL ENTRY FORM PART II

This form must be submitted after the beam specimen and control cylinders have been cast.
Completed PART II must be received no later than April 1, 2019.

DATE: _____ SCHOOL: _____ ASSIGNED BEAM MARK: _____

Name (Please Print)	Degree/Graduation Date	Signature
1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____
4. _____	_____	_____
5. _____	_____	_____

DATE OF CASTING BEAM & CYLINDERS: _____.

Batch weights and estimated yields for concrete used for beam & cylinders.
Weights reported must be the actual measured batch weights of all materials included in your concrete mix & must also be entered into the Cost Form.

<u>Material</u>	<u>Weight (lbs)</u>	<u>Abs. Vol. (cu. ft.)</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
Total Batch Weight	_____	Yield _____

Cylinder Size Cylinder 1 Cylinder 2

28-day cylinder strength test data (psi): _____

Number & size of steel reinforcing bars used: _____

TO BE SIGNED BY THE FACULTY ADVISOR:

To the best of my knowledge, this information is correct. The students have adhered to the official rules of the contest, and the specimens have been made and cured in compliance with the rules.

Name: _____

Signature _____ Date _____

PLEASE SUBMIT THIS FORM BY EMAIL TO: steve.a.cole@verizon.net

EPDACI STUDENT COMPETITION

CONTEST RULES - 2019

1. THE CHALLENGE:

- 1.1 Design and construct a reinforced concrete beam spanning 3'-0" to safely support a mid-span concentrated load of 3,000 pounds at the lowest possible cost and to fail at an ultimate load of 4,800 pounds.
- 1.2 Comply with the contest rules.
- 1.3 Teams must submit the following:
 - **Official Entry Form Part I** by March 11, 2019
 - **Official Entry Form Part II** by April 1, 2019
 - **Cost Form** by April 1, 2019
 - **Beam Sketch** by April 1, 2019. The Beam Sketch shall show the following:
 - Beam dimensions
 - All #3 reinforcement dimensions
 - Calculation of beam volume in cubic feet. This value must be entered as the Volume of Beam on the Cost Form.
 - Calculation of total length of all #3 bars in feet. This value must be entered as the #3 Bars Length on the Cost Form.
 - Calculation of beam formwork area in square feet. The formwork area is the sum of the areas of the bottom, sides and ends of the beam. This value must be entered as the Formwork Area on the Cost Form. (The beam top surface is not considered as formwork).

2. THE STUDENT TEAMS:

- 2.1 Each team must have a faculty advisor who will see that the student team complies with the rules of the contest. The team includes the faculty advisor.
- 2.2 Each team must consist of not less than two and not more than five students currently enrolled in an undergraduate program at any college or university worldwide. Although there are no restrictions on the geographical location of the school, all members of a given team must be from the same school. A student may not be a member of more than one team. A faculty member is permitted to advise more than one team.
- 2.3 At least one team member (student) must be present during the testing of specimens at the time and location specified for this competition. Attendance by additional team members and faculty advisor is permitted and encouraged.
- 2.4 Each school will be permitted to send no more than three teams to the competition. From a specific school, the first three properly completed applications (Parts I, Parts II, Cost Form & Beam Sketch) will be accepted as the entries from that school. Additional teams will only be accepted if an earlier entry from the same school withdraws from the competition.
- 2.5 Each team must complete and submit Parts I and II of the Official Entry Form, the Cost Form, and a Beam Sketch.

3. THE MATERIALS AND THE BEAM SPECIMEN:

- 3.1 The beam shall be 40" long as shown in Figure 1. The dimensional tolerance is $\pm 1/8"$. Beams not meeting this requirement will be disqualified.
- 3.2 There is no restriction on beam depth and width. Teams are free to select what they believe to be the most economical section. Beam depth and width may vary along length of beam.
- 3.3 The beam specimen must be constructed using #3 steel reinforcing bars conforming to ASTM A 615 as bottom tensile reinforcement. There are no limitations on the number, length and configuration of the reinforcement. Teams are free to select what they believe to be the optimum number of bars. Only #3 bars may be used. Other reinforcing materials such as wires and fibers of any type are not allowed. #3 reinforcing bars may not be heated, prestressed or pretensioned.
- 3.4 Cementitious materials may be any combination of the following:
 - Cement per ASTM C150

- Blended Cement per ASTM C595
- Blended Cement per ASTM C1157
- Flyash per ASTM 618
- Slag Cement per ASTM 989
- Silica Fume per ASTM C1240

Teams must provide the actual measured batch weights of all materials included in their concrete mix, as specified on Part II of the Official Entry Form and on the Cost Form.

3.4 Fine and coarse aggregate must meet the requirements of ASTM C33. Metallic aggregate may NOT be used.

3.5 The following chemical admixtures may be used at the team's option:

- Normal Water Reducer ASTM C494
- Mid-Range Water Reducer ASTM C494
- High-Range Water Reducer (Non-Polycarboxylate) ASTM C494
- High-Range Water Reducer (Polycarboxylate) ASTM C494

The product name of all admixtures used (if any) must be entered on the **Cost Form**.

Epoxies and other polymers, glue, and binders may NOT be used.

3.6 Curing shall be at atmospheric pressure, and the curing temperature must not exceed the boiling point of water at atmospheric temperature.

3.7 No beam shall be more than 56 days old at the time of the test.

3.8 Reinforcement support chairs and/or masonry blocks may be used provided they are located below the reinforcement bars and in no way act to anchor the bars in the concrete or act as shear reinforcement.

3.9 At the center of the top of the beam, a large "X" shall be painted on a flat area on the compression side where the concentrated load will be applied. In addition, an identifying Beam Mark must be painted so as to be clearly visible on both sides of the beam. Teams may also apply decals of their school logo. No other paint or surface treatment shall be permitted.

4. THE TESTING PROCESS:

4.1 Before testing, each beam will be measured by the Competition Committee for conformance to the dimensions on the team's **Beam Sketch**. The dimensional tolerance is $\pm 1/8"$. Beams not meeting this tolerance will be disqualified.

4.2 The beam specimens judged acceptable by the Competition Committee will be positioned in the testing apparatus, which will apply a midspan concentrated load by means of a loading plate measuring not less than 2" by 2". The clear span is 36" and reaction forces are through bearing surfaces measuring not less than 2" by 2" and providing no restraint against rotation at the ends of the beam specimen, see Figure 1.

4.3 Once seated in the testing apparatus with a seating load of 200 lbs, additional load will be applied until the beam specimen fails. The loading rate shall be determined by the Competition Committee. In lieu of obvious physical signs of failure, failure will be assumed to have occurred when total load on the beam has decreased to 75% of the maximum load achieved by that beam specimen. Midspan deflection will be monitored throughout the loading process.

4.4 The actual ultimate load (P_{ult}), without deduction of the seating load, will be recorded as the maximum load achieved.

5. THE EVALUATION PROCESS:

5.1 Teams must provide the measured weights of all materials in the concrete batch used to cast their beam. This information must be entered in the **Cost Form** where it will be used to determine the cost of the beam.

5.2 Teams must prepare a sketch of their beam showing all plan, elevation and cross-sectional dimensions. The **Beam Sketch** shall also show the steel reinforcement. Teams shall use the sketch dimensions to calculate the total volume of the beam, the area of vertical and horizontal formed surfaces, and the total length of all reinforcement. The calculations shall be shown on the sketch. The volume, area of formed surfaces (formwork) and length of reinforcement shall be input into the **Cost Form** to determine the cost of the beam.

- 5.3 No school may enter more than one beam of the same design in the competition. Beams will be considered to be of the same design if they have the same concrete mixture proportions, cross-section geometry and reinforcing. The judges will not test more than one beam of the same design from any school.
- 5.4 A panel of judges will be appointed by the EPDACI Competition Committee. Interpretations and decisions made by the judges will be final, and appeals will not be considered.

6. THE PRIZES:

- 6.1 \$1500 for the **LOWEST COST BEAM** (as determined from the Cost Form) **TO SUPPORT 3,000 POUNDS.**
- 6.2 \$1500 for the beam to fail at an **ULTIMATE LOAD** (P_{ult} as defined in paragraph 4.4) **CLOSEST TO 4,800 POUNDS.**
- 6.3 Each team is only eligible for one prize.
- 6.4 In the event the same team has both the **LOWEST COST BEAM TO SUPPORT 3,000 POUNDS** and **ULTIMATE LOAD CLOSEST TO 4,800 POUNDS**, they will be named the overall first place winner and receive the \$1500 prize. The second \$1500 prize will be split between the two second place teams for each category.

7. TIME AND LOCATION FOR TESTING:

- 7.1 The beam competition will be held at the Structures Lab, Widener University, 17th and Melrose, Chester, PA on April 6, 2019 at 11:30 AM.

8. ADDITIONAL INFORMATION:

- 8.1 The mailing address for all entry forms and for additional information is:

Steve Cole
EPDACI Student Beam Competition Chairman
1218 June Road
Huntingdon Valley PA 19006
Tel: (267)-280-2997
Email: steve.a.cole@verizon.net

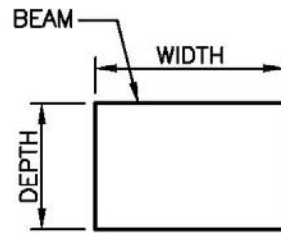
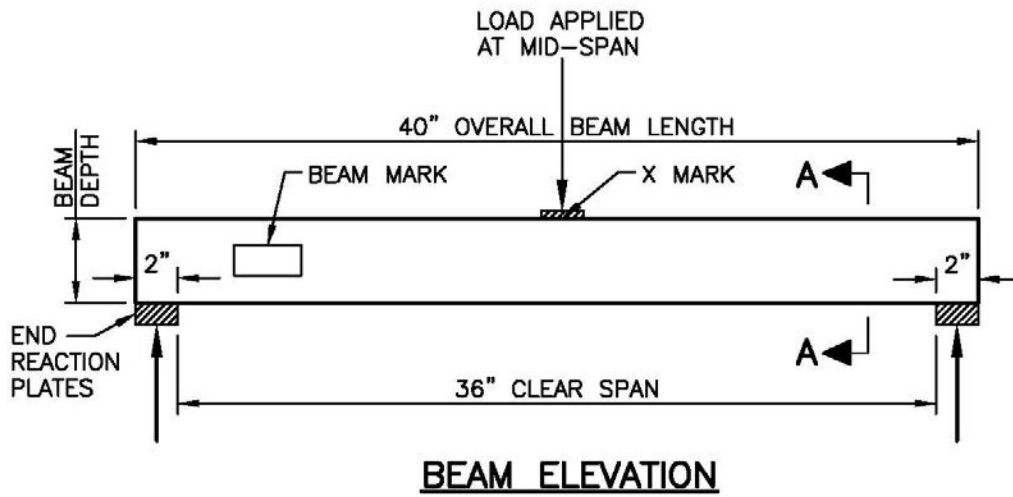


FIGURE 1