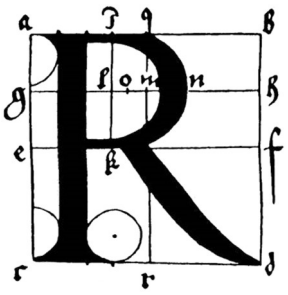


Teacher Resource Guide

Richmond Joint Engineers' Council

PO Box 8988, Richmond, VA 23225
https://rjec.org

This document is meant to inform Richmond area teachers about the activities and services offered by the Richmond Joint Engineers' Council (RJEC). Many of these can be used in your coursework or contribute to your continuing educational requirements.

Most of this can be found on the web site: **https://rjec.org**

For questions or more information, contact the chairman of RJEC at **chair@rjec.org**.

Contents

What is the RJEC?

The Richmond Joint Engineers' Council is an all-volunteer coalition of engineering, scientific and technical societies in the Richmond / Petersburg Metropolitan Areas of Virginia.

- RJEC promotes Engineering Education, and provides a vehicle to disseminate knowledge and information relating the art and science of engineering to its member societies and the general public. We provide speakers to Central Virginia schools and educational associations for in-class discussions on technical subjects related to engineering and what engineers do.
- RJEC publishes an electronic newsletter, holds monthly meetings, and sponsors several events for students and others in the Greater Richmond STEM community. Monthly meetings are held virtually the second Thursday of each month. All members of Richmond area technical societies are invited to attend and paid member societies can send voting delegates.
- RJEC as a part of the nationwide annual Engineers Week, hosts the Annual Engineers' Banquet, conducts other activities to promote National Engineers' Week, sponsors several contests including an Essay and Video Contest, and hosts an Engineering Ingenuity Day at the Science Museum of VA where contests are held and engineering careers are discussed with prospective students.
- RJEC sponsors several scholarships at VCU and VSU, and sponsors a Speakers' Bureau, as well as hosting an Annual Leadership Forum for all area Engineering Societies. If you are interested in becoming a speaker or would like to request one, contact our Speaker Coordinator at Speakers@rjec.org.
- RJEC is also a sponsor of the FIRST Lego League competition in conjunction with the Science Museum of Virginia and promotes their annual contest. This annual competition is designed to challenge students in grades four through eight.

Annual Engineers' Week (EWEEK) Activities

RJEC Engineers' Week Banquet Student Essay Contest

Each year the RJEC holds an awards banquet honoring significant contributions to industry and the general community. Every year RJEC holds a student competition where student can submit a written essay or a short video. We award cash prizes and a certificate. All Middle and High School students are encouraged to enter, and the winners are invited to attend the banquet for free and present their papers or videos.

The banquet will be held this year:

The Jefferson Hotel
101 W. Franklin Street
Richmond, VA 23220

Thursday, February 20, 2025
5:00 PM to 8:30 PM

Please see **Appendix 1** for the essay contest rules.

Celebrating Engineering Ingenuity (CEI) Day

CEI Day is an annual event where students learn more about careers and educational opportunities available to them in the field of science and engineering. Many of the engineering societies and some universities will have tables at the event where students can learn about the various disciplines and as questions. The details are:

The Dewey Gottwald Center
Science Museum of Virginia
2301 W. Leigh Street
Richmond, VA 23220

Sunday, February 23, 2025
11:30 AM to 3:00 PM

Beginning this year (2025), RJEC will be handing out check sheets to the students that they can have initialed at each table. A drawing will be held among the students with completed check sheets, and a door prize will be awarded to the winner. As a teacher, you could encourage your students to visit all the tables, and **perhaps ask the students to give a presentation for extra credit about the one that they found most interesting**.

Several societies run contests at CEI Day for the students. Prizes are awarded in various age groups. **One thing that some teachers have done in the past is to require that every student participate in at least one of the contests for credit**. All of the contests provide proof of participation in the form of certificates, registration, etc. Rules and instructions for all the contests are available at the RJEC web site (rjec.org)

American Society of Mechanical Engineers (ASME) Egg Drop Contest

ASME Central Virginia Section has for decades held Egg Drop Contests for high school and middle school students at the RJEC Celebrating Engineering Ingenuity (CEI) Day event in the Richmond area. The Egg Drop Rules are very simple. The objective is to design the lightest possible device that will prevent a medium size egg from breaking or cracking when it is dropped from different heights to the ground floor below. The height increases with age group.

Please see the detailed contest rules in **Appendix 2**.

ASM Foam Plate Airplane Contest

ASM International (ASM) is a professional organization dedicated to the dissemination of information about materials and education on the subject of materials. This includes their properties, uses, behavior, how they are manufactured, how new materials are created, surface treatments (to improve hardness, corrosion resistance or to reduce friction) and to a lesser extent how to design using specific materials. This contest is meant to engage students and get them to think about engineering and materials through in-person interaction with engineers and materials scientists in a way that is simple, interesting, and fun for the students.

The students will be building gliders (airplanes) from simple supplies, a foam plate that you might use at a picnic, some tape, scissors, a marker, and a penny. **Note that this is a simple project that could easily be used in class, and the AMA will even provide supplies for free**.

Please see the detailed contest rules in **Appendix 3**.

American Society of Civil Engineers (ASCE) Popsicle Stick Bridge Contest

The Richmond Branch of the American Society of Civil Engineers (ASCE) is pleased to sponsor the 2025 Popsicle Stick Bridge Contest. Students will design and build their own bridges out of popsicle sticks and will compete for several awards.

Please see the detailed contest rules in **Appendix 4**.

RJEC Speakers' Bureau

The RJEC provides speakers to Central Virginia schools and educational associations for in-class discussions on what engineers do, to assist with special classroom activities related to engineering, and for special events where an engineer speaker is wanted. The Speakers Bureau's overall goal is to better inform students, teachers, and the public about opportunities in math, science, and engineering careers. Speakers consist of members of many engineering societies who are available to speak on topics such as civil, structural, mechanical, nuclear, industrial, chemical, biomedical, and electrical engineering, among others. Speakers are arranged free of charge upon request.

Some typical examples of events the RJEC Speakers Bureau participates in include:

- Science fair judges
- Class speakers for middle and high school classes
- Engineering Field Day/ Summer Camp mentors
- Panel speakers for teacher training programs
- Graduation banquet speakers

For more information or to schedule a speaker contact the RJEC Speakers Bureau Chairperson at Speakers@rjec.org

Please see **Appendix 5** for a Speakers' Bureau flyer that you may display at your school along with a helpful page from IEEE describing many of the different engineering disciplines.

Teacher Continuing Education Opportunities

ASM Materials Camp for Teachers

This week-long, hands-on lab experience shows educators how to use applied engineering techniques in their classroom. ASM Materials Camp®-Teachers is an idea-generating workshop introducing teachers to methods that make math and core science principles more enticing and relevant to their middle and high school students. Materials topics are great motivators in any engineering, technology or science course as students learn concepts that are reflected in their everyday lives.

- **A $1,200 value, the camp is FREE for attendees.** Participants are eligible to receive four (4) Continuing Education Units (CEUs) and can opt for two (2) graduate level credits. (NOTE! Option for graduate credits is not available for Virtual Materials Camps.)

- Educators work hands-on with metals, ceramics, polymers, and composites, and develop a greater appreciation for the importance of these materials in modern life.

- Teachers Camp is a proven program that strengthens the curriculum in Science, Technology, Engineering and Mathematics (STEM).

- Post-camp evaluations reveal that 97% of participants will incorporate the experiments and concepts learned in their classrooms.

Who Should Attend?

- High School Teachers: Science (especially Chemistry and Physical Science), Engineering, and Industrial/Career and Technical Education
- Middle School Teachers: Physical Science
- Pre-Service Science Teachers
- Art, Math, and Community College Teachers as space allows

Why Attend?

- Learn how to engage your students using simple, low-cost experiments that you can integrate into your existing lesson plans.
- Help your students discover career opportunities in science and engineering.

Typical Schedule

Monday-Thursday | 8 a.m. - 5 p.m.
Friday | 8 a.m. – 3 p.m.

Please see Appendix 6 for a ASM Materials Camp flyer that you may display at your school.

Appendix 1

RJEC Student Essay Contest Rules

ichmond Joint Engineers Council (RJEC)

2025 RJEC NATIONAL ENGINEERS WEEK
ESSAY or VIDEO CONTEST

In celebration of National Engineers Week the Richmond Joint Engineers Council, RJEC, is conducting its Annual *Essay and/or Video Contest* for Greater Richmond Middle and High school students. RJEC is reaching out to area cities and counties in:

Richmond, Petersburg, Hopewell, Colonial Heights, Henrico, Chesterfield, Hanover, Goochland, Powhatan, Amelia, Dinwiddie, Prince George, Charles City and New Kent

The contest is intended to stimulate student interest in the professional field of engineering. This is an excellent opportunity for students to interact with a broad spectrum of the engineering community including future employers from the Greater Richmond area.

All essay and/or video contest prize winners and a guest will be invited to attend the Annual RJEC banquet held at The Jefferson Hotel on Wednesday, February 20, 2025. Prize winners will **be notified by February 7th** but will not know which place they won until it is announced at the banquet.

Judging: Entries will be judged by the RJEC Board for:

1. *Originality & Creativity*
2. *Accuracy*
3. *Relevance*

Prizes: 3 prize winners for each CONTEST (Written or Video):

1st * = ***$100***
2nd = ***$50***
3rd = ***$25***

* *Notes: 1st Place only winning submissions will be presented at the banquet. The 1st place "Written Essay" contest winner will read their submission aloud at the banquet and the Video contest winner will have their production played.*

STEP 1: Contest Eligibility

- Contest open to all students participating in middle and/or high school level courses at a public, private or a home school curriculum in the Greater Richmond Area listed above.

STEP 2: Contest Topic: (Student chooses type of engineer for topic)

- Research and learn what an engineer does in their daily course of work. For example students seek out and interviews a Civil or Electrical or Chemical or Nuclear or Computer or Mechanical Engineer and ask them what they do and how they do it in a day's work.

STEP 3: Contest Media: (Student chooses one media)

- **VISUAL Essay:** 3 to 4 minute Video (*MPEG-4, MPEG-3, .WMV, 3GP*)
- **WRITTEN Essay**: 500-word Microsoft Word Document *(*.doc*

STEP 4: Contest Submissions:

- Students submit their essay to their teacher; each teacher chooses their top three written essays and/or video submissions per class taught meaning multiple grades and courses allowed.
- The teacher then submits their student essays and/or video to the following email according to media type:

  written_essay@rjec.org or visual_essay@rjec.org

  Note: Video entries may be posted via **youtube.com.** If submission on **youtube.com,** then the title MUST include "RJEC19" in the title and a link sent to: visual_essay@rjec.org

Contest Rules include:

1. Student must be schooled at the middle or high school level in the following Richmond-Petersburg/ Tri-cities area:

   Richmond, Petersburg, Hopewell, Colonial Heights, Henrico, Chesterfield, Hanover, Goochland, Powhatan, Amelia, Dinwiddie, Prince George, Charles City, and New Kent

2. One entry allowed per student;

3. All essay work submitted must be the product of the student. No assistance should be used in the filming, editing, or research of the submission;

4. The sources of information, facts and figures used in the visual or written essay must be documented in a bibliography submitted with the written and/or video essay;

   Note: The bibliography is not considered part of the 500-word count of the essay.

5. Written essay limited to 500 words, double-spaced on single-sided numbered pages with 1" margins using 12 point font.

   Visual essay must not exceed 4 minutes in length - *If visual essay submitted on youtube.com, then the title MUST include "RJEC25" within the title and a link sent to: visual_essay@rjec.org*

6. All entries must be submitted by a teacher via email by the RJEC deadline, Jan 24, 2025;

   Note: Three submissions maximum per teacher per class.

7. Attention teachers: entries must include the following items in the body of the email:

   - *Title of the Essay and/or Video*
   - *Student's full name & grade*
   - *School name, address and phone number*
   - *Teacher's name and contact information (email is preferred)*
   - *Name of the class student learned and submitted entry e.g., chemistry, math, computer…*

   Note: ONLY the TITLE appears in the written essay pages or in the video essay.

8. All submissions will be considered an open source.

To learn more about National Engineers' Week to go www.eweek.org.

To learn more about RJEC go to http://www.rjec.org/.

Appendix 2

ASME Egg Drop Contest Rules

Egg Drop Contest

Central Virginia Section

Dear Teachers and Students:

ASME Central Virginia Section has for decades held Egg Drop Contests for high school and middle school students at the RJEC Celebrating Engineering Ingenuity (CEI) Day event in the Richmond area. This year's contest will be:

When: 11:30 AM to 3:00 PM
Sunday, February 23, 2025

Where: Science Museum of Virginia – Dewey Gottwald Center
2301 W. Leigh St.
Richmond, VA 23220

11:30 AM Start checking in your devices in at the ASME table
12:45 PM Meet back at the ASME table. Eggs will be distributed and everyone will proceed to the stairwell in the main building for the contest.
2:15 PM Meet back at the ASME table. Everyone will move to the stairwell for the awards ceremony, and you will have a chance to retrieve your device.

The Egg Drop Rules are very simple. The objective is to design the lightest possible device that will prevent a medium size egg from breaking or cracking when it is dropped from different heights to the ground floor below. The height increases with age group. There are two types of devices that may be submitted. The first utilizes a cushion design and the second uses a parachute. **No bubble wrap may be used** (it is too easy).

Students must build their devices before the contest and bring them to the event.

We will start around 11:30 AM by registering the students and their devices. Each student must have his/her own device. No group designs are allowed. The registration process entails recording the type and weight of the device along with the student's name, teacher, and school. We then keep the device until the time of the contest. The entries are divided into the different design categories and between high school and middle school students. We give the students back their devices at the time of the contest along with the eggs that they will place into their devices before they drop.

ASME will provide the eggs on the day of the contest.

Each student drops his/her device onto a 4-foot by 4-foot square target. A penalty is added to the weight of the student's design if it lands outside this target area. We also check to see if the egg survived the fall.

Winners are determined once everyone has dropped his/her device and the penalties are added to the overall weight of the device. Those devices that did not prevent the egg from breaking are still

judged in the category Most Creative Design, although they are not considered as part of the overall contest. Each student will receive a certificate of participation. Winners receive trophies and cash prizes in each category, $50 for first, $25 for second, and $15 for third place.

Please contact **Tony Marotto** at 804-459-2266 or **education@cent-va-asme.org** if you have any questions.

Appendix 3

ASM Foam Plate Airplane Contest Rules

2025 Foam Airplane Contest Rules

ASM International is a professional organization dedicated to the dissemination of information about materials and education on the subject of materials. This includes their properties, uses, behavior, how they are manufactured, how new materials are created, surface treatments (to improve hardness, corrosion resistance or to reduce friction) and to a lesser extent how to design using specific materials. This contest is meant to engage students and get them to think about engineering and materials through in-person interaction with engineers and materials scientists in a way that is simple, interesting, and fun for the students.

This contest will be held at the annual Celebrating Engineering Ingenuity (CEI) Day event sponsored by the Richmond Joint Engineering Society (RJEC). It will be held at:

The Dewey Gottwald Center
Science Museum of Virginia
2301 W. Leigh Street
Richmond, VA 23220

Sunday, February 23, 2025
11:30 AM to 2:30 PM

Enter the parking lot from DMV Dr. or W. Leigh St. E. and use the entrance on the north end of the Dewey Gottwald Center behind the museum.

For the Student:

You will be building a glider (airplane) from simple supplies, a foam plate that you might use at a picnic, some tape, scissors, a marker, and a penny. You will find the instructions, including a 10-minute video, on this Academy of Model Aeronautics web page:

https://www.amaflightschool.org/quickprojects-fpg9

The PDF download on that page has instructions and plans for the plane, and the video at the bottom of the page shows a plane being built and flown. Feel free to explore the web site for other projects.

On the Day of the Contest (CEI Day):

1. You may build your plane in advance, either at school with your teacher's supervision, or at home. You may also build your plane from materials provided by ASM on the day of the contest. Be sure to write your name on your plane.

2. This will be an informal event, so you may arrive any time after 11:30 AM, but there will be award drawings at 1:00 PM and at 2:00 PM. Be sure to allow time to build your plane if you do not bring your own.

3. You will have open time to test your plane and make it fly correctly, called trimming. We will be there to help, so ask questions.

2025 Foam Airplane Contest Rules

ASM INTERNATIONAL | Eastern Virginia Chapter

4. Once you have your plane properly trimmed, then tell one of the officials that you would like to perform your official glide attempts. We will count the best of three tries at our flight line, a box 20 feet long and 10 feet wide with lines at 10 feet and 20 feet.

    a. If your best glide is beyond the 20-foot line and in-bounds (between the side lines), then your prize will be two pieces of candy (your choice from the available selection, with sugar-free options), plus a chance to win a $20 Amazon gift card in the next drawing. Your plane will be held until the next drawing, but you will be able to keep it afterwards.

    b. If your best in-bounds glide is between 10 and 20 feet, then you will win one piece of candy.

    c. You may only participate in one of the regular drawings, either at 1:00 PM or 2:00 PM.

5. There will be two age groups, grade school (through 8th grade), and high school (9th grade or above). Drawings will be held for both age groups at 1:00 PM and 2:00 PM.

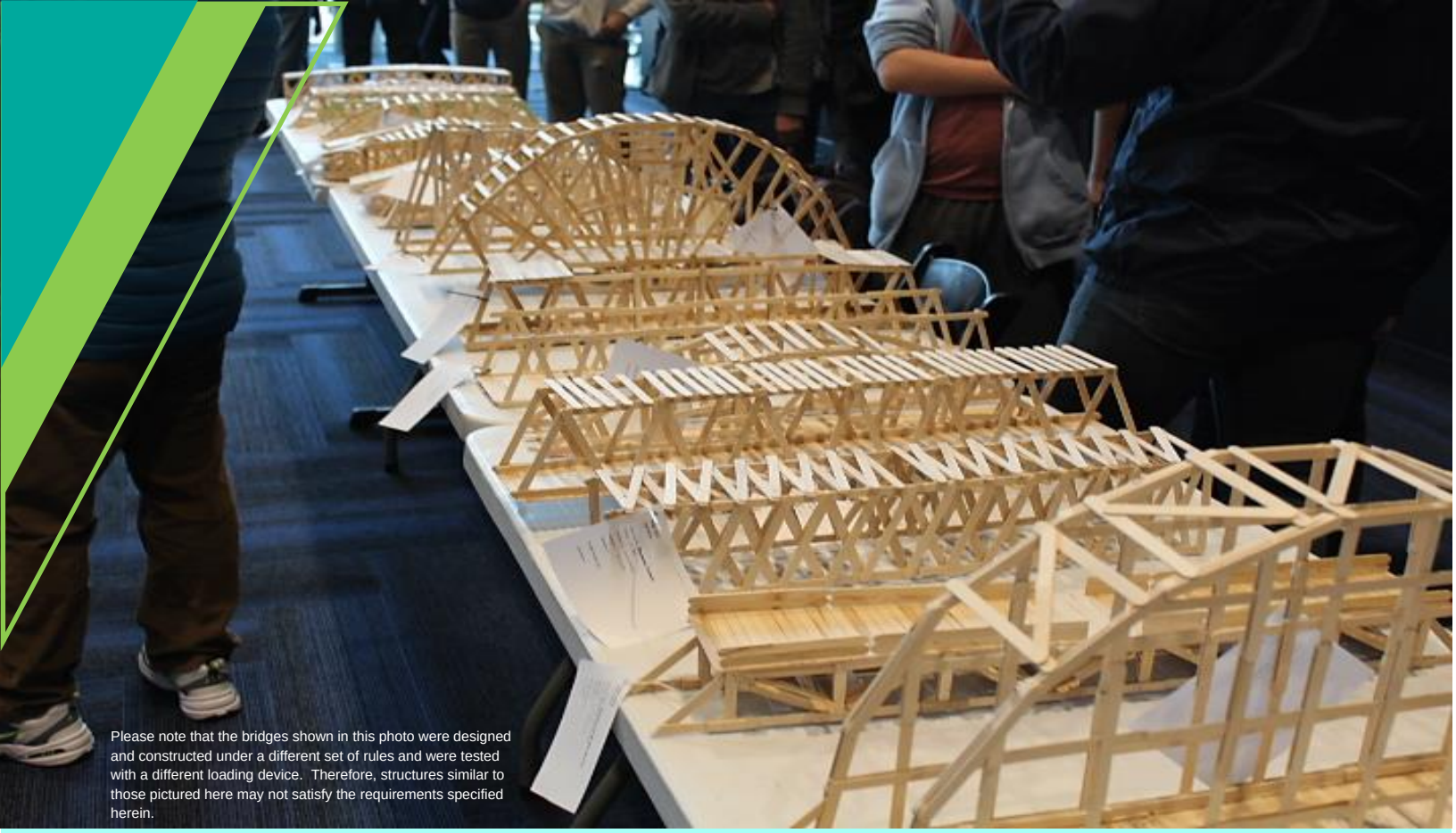
6. There will be a grand prize drawing held immediately after the 2:00 PM drawing, and everyone whose plane passed the 20-foot line within bounds is eligible to participate. The prize will be a Horizon Hobby UMX Night Vapor* ready-to-fly RC airplane as shown here: **https://tinyurl.com/nightvapor**

Let us know if you enjoy our contest, and tell us if you can think of any improvements. Good luck!

*The Horizon Hobby UMX Night Vapor was generously donated by Chris Dowd, a member of the Hanover RC Club: **https://hanoverrcclub.com**

Appendix 4

ASCE Popsicle Stick Bridge Contest Rules



Please note that the bridges shown in this photo were designed and constructed under a different set of rules and were tested with a different loading device. Therefore, structures similar to those pictured here may not satisfy the requirements specified herein.

ASCE VIRGINIA SECTION
Richmond Branch

2025 POPSICLE STICK BRIDGE CONTEST

Overview

The Richmond Branch of the American Society of Civil Engineers (ASCE) is pleased to sponsor the 2025 Popsicle Stick Bridge Contest on **Sunday, February 23, 2025**. Students will design and build their own bridges out of popsicle sticks and will compete for several awards. The competition will be held at:

Dewey Gottwald Center at the Science Museum of Virginia
2301 W. Leigh St., Richmond, VA
11:30 am to 3 pm (Competition starts at 12:30 pm)

Eligibility

The competition is open to all greater Richmond area Middle School students (grades 6th-8th) and High School students (grades 9th-12th). Students may submit entries as individuals, or as a Team. Team sizes will be limited to three (3) students per team.

Students do not need to be from the same school or in the same age group to be on a team together; however, any team consisting of both middle and high school students will have to compete in the high school division.

Registration

All students interested in competing should complete the registration form online at:

www.ascerichmond.org.

The deadline for all team registrations is **February 17, 2025**. The competition is limited to 100 submissions. If this limit is reached before the registration deadline, any additional students wishing to register will be placed on a waiting list. Please direct any questions to:

Isabelle Stern, P.E.
Simpson Gumpertz & Heger
Email: isstern@sgh.com

Competition

The competition takes place during the Richmond Joint Engineers Council's "***Celebrating Engineering Ingenuity Day***" which will include a variety of STEM-based activities by different Richmond area engineering societies.

Team check-in will start at 11:30 am on 2/23/25, and the award ceremony for the event will occur after the testing portion of the competition. Teams will bring their completed bridge to the announced location at the specified time to be inspected. After the inspection is complete, testing will begin.

Admission to the competition and the other Celebrating Engineering Ingenuity Day events, which are all in the Dewey Gottwald Center, will be free for everyone. The Science Museum is providing participants and one chaperone free admission to the Science Museum on CEI Day. Please use the Dewey Gottwald main entrance at 2301 W. Leigh Street when attending CEI Day.

Awards

The following awards will be given separately to both Middle and High School Divisions:

- **Highest Efficiency Rating:**
  $100 and Certificate
- **Second Highest Efficiency Rating:**
  $50 and Certificate
- **Third Highest Efficiency Rating:**
  $25 and Certificate

Both divisions will compete together for the following awards:

- **Most Aesthetically-Pleasing Bridge*:**
  $100 and Certificate
- **Innovation Contest**:**
  $100 and Certificate

All participants will receive a Certificate of Participation
** A team of judges will evaluate each bridge before load-testing.*
***Optional – See below for details on the Innovation Contest.*

Please note that the bridge shown in this photo was designed and constructed under a different set of rules and was tested with a different loading device. Therefore, the structure pictured here may not satisfy the requirements specified herein.

General Competition Requirements

- **Objective:** To span a clear distance of 19 inches using a bridge constructed of only standard, craft- variety popsicle sticks and Elmer's glue. Each bridge will be scored in accordance with an Efficiency Rating (ER), which will be calculated by the following equation:

$$ER = L + \frac{L}{W}$$

where:
L = Load to failure (lbs.)
W= Weight of structure (lbs.)

- **Maximum Weight of Bridge =** 450 g *(*about 1 pound, or approximately 250 sticks plus glue)

Minimum Length of Bridge = 21 inches (any portion of the bridge below the supports must not be longer than 18½ inches). Please note that the bridge must be designed to rest on top of the two supports, which measure 4½ inches by 1 ½ inches. Bearing against the front, rear or sides of the supports will not be allowed. Refer to the drawings for more information.

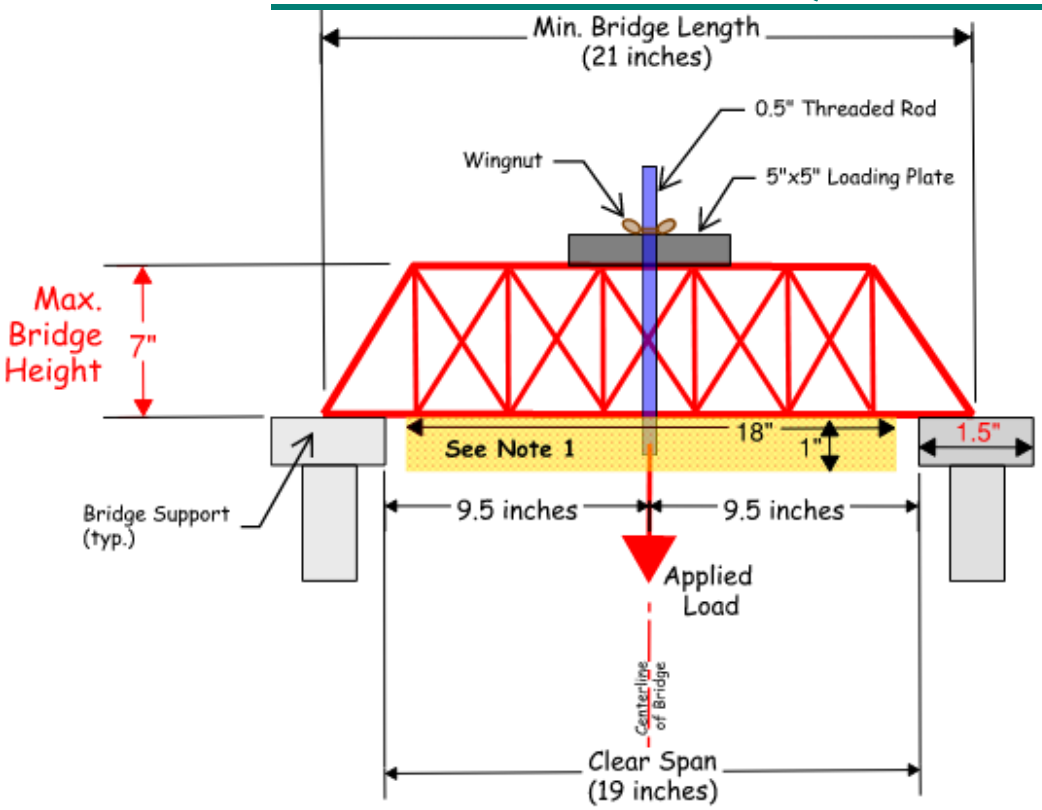
- **Required Sticks:** Standard, 4½" x 3/8" x 1/12" craft-type Popsicle sticks (readily available at all craft and department stores).
- **Required Glue:** Elmer's ® Glue-All Multi-Purpose Glue
  - This is the white, craft variety of glue. Bridges using any other glue such as wood glue, super glue, epoxy, or any other type of adhesive *will be disqualified*).
- The bridge must be able to accommodate a 5"x5" loading plate resting on top of the structure and a ½ inch diameter threaded rod extending through the center of the bridge for testing. Please refer to the drawings.
- Popsicle sticks are limited to a glued ½" overlap (maximum) at all connections. Open gaps are allowed between adjacent sticks.
- Similar to last year, bridges will be loaded from the top of the structure, not at the roadway surface using a 5"x5" loading plate connected to the tester using a ½" diameter threaded rod that freely extends through the center of the bridge. All bridges must be able to accommodate this rod and loading plate (refer to the figures and photos shown on the following pages).
- Bridges must meet the additional requirements shown on the following pages for connection and geometric limitations.
- **Disqualification:** Bridges not meeting the requirements listed in these rules will be subject to disqualification. Disqualified bridges will still be eligible for the innovation or aesthetic awards but will not be considered for the efficiency score awards. Disqualified bridges will be tested until failure as long as it remains safe to do so. The decision of the judges at the time of the event is final.

****Note:** Students and teachers may submit requests for information (RFI) to clarify the rules via email, but all RFIs must be submitted BEFORE 5 pm EST on Sunday, February 16, 2025. RFIs submitted after this time will not be reviewed.

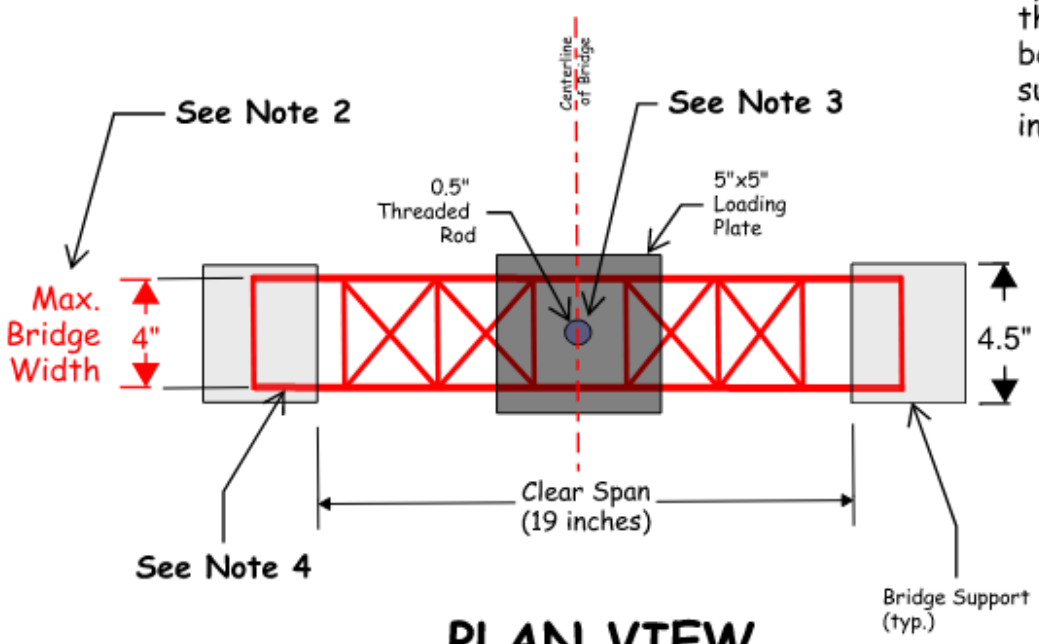
Helpful Hints

- Sticks can be cut, sanded, trimmed or colored with colored pencils but **all sticks must be visible** to inspection and **may not be painted or stained** in any way. Sticks cannot be coated with glue so as to laminate them either.
- The glued connection between the sticks is most likely the weakest link in the bridge so be sure to allow at least 24 hours before the competition for the glue to dry.
- Note that the score is influenced by the weight of the bridge. Try to maximize the strength of the bridge while keeping the weight as low as possible.

ADDITIONAL REQUIREMENTS



ELEVATION VIEW
Not to scale



PLAN VIEW
Not to scale

Notes to Bridge Designers:

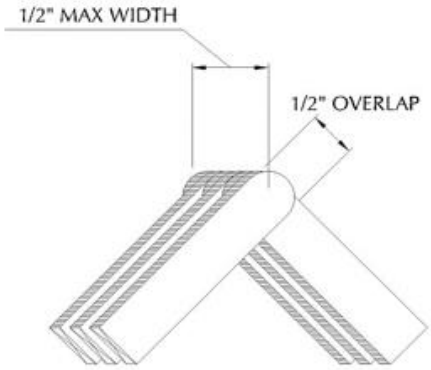
(1) A portion of the bridge may extend below the supports, provided these members are within the 18" by 1" zone shown here. No part of the bridge can bear against the front of the support.

(2) It is extremely important that the bridge be 4" in width or less, otherwise it will not fit on the supports and cannot be tested.

(3) The center of the structure must allow the 0.5" loading rod to pass freely through the center. Please make sure none of the members will impede the loading rod. Otherwise, the bridge cannot be tested.

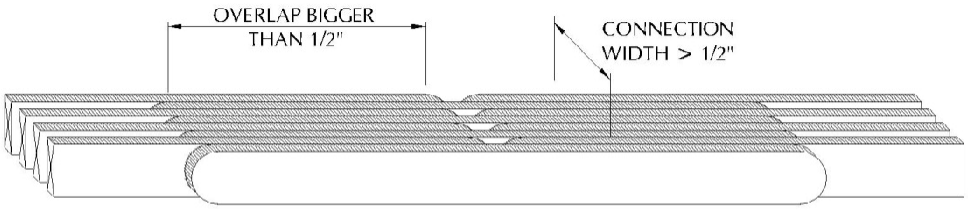
(4) Please make sure your bridge is long enough to span the clear opening PLUS the distance required to bear on both supports. Min. suggested length = 21 inches.

Additional Requirements Cont.



ACCEPTABLE CONNECTION

- 1/2" MAXIMUM WIDE FOR ANY CONNECTION
- OPEN GAPS BETWEEN ADJACENT PIECES
- 1/2" MAX. OVERLAP

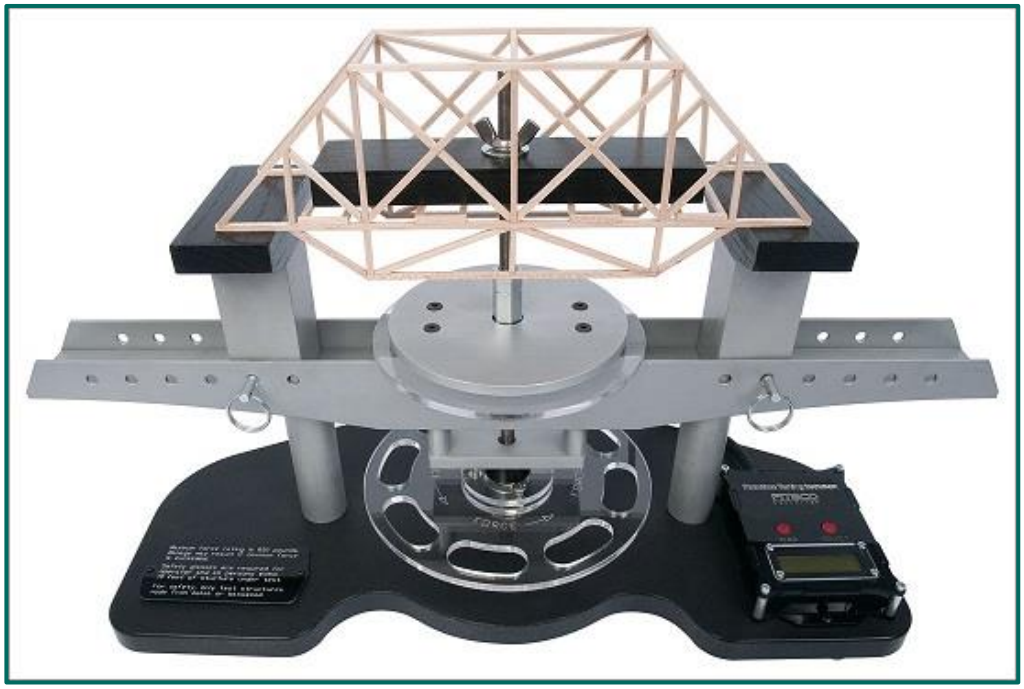


UNACCEPTABLE CONNECTION

- CONNECTION IS GREATER THAN 1/2" WIDE
- TOO MUCH OVERLAP (> 1/2")

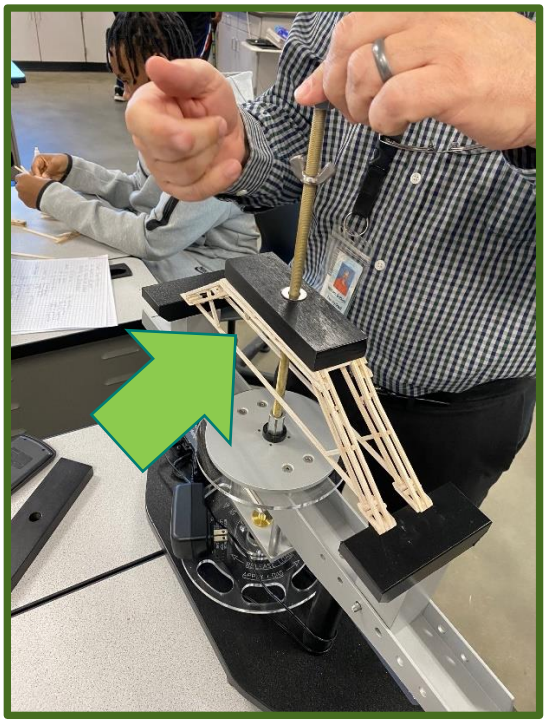
Please note that the bridge shown in this photo was designed and constructed under a different set of rules and was tested with a different loading device. Therefore, the structure pictured here may not satisfy the requirements specified herein.

Additional Information



BRIDGE TESTING APPARATUS

(Note how bridge will be supported. Required clear span of 19 inches not depicted in photograph. Also, the loading block will be positioned on top of the structure, as shown below, NOT within it, as shown above.)



PROPER POSITION OF LOADING PLATE

(Note how loading plate will be applied at the top of the bridge with a 1/2" diameter steel rod passing through the center of bridge. All bridges must be able to accommodate this rod. For load plate dimensions, please see additional drawings.)

Innovation Contest

Each team can choose to enter their bridge into a separate Innovation Contest ($100 prize). Each team wishing to take part in the Innovation Contest can explain the innovation behind their design in a typed report and turn this in on the day of the event. The report should be a **maximum of 2 pages with one additional page for sketches**. Sketches or drawings may be helpful and are encouraged to be used. Some suggestions for items to address in the report are:

- What strategies or concepts did you use when designing your bridge? Did you do supplemental research to learn these concepts? If so, which resources? (Research is encouraged!)
- Where along the bridge do you think your bridge will break and why?
- What challenges did you encounter while designing and constructing your bridge? How did you overcome them?
- If you participated in the contest before, what changes did you make to this year's design and why? How do you think this loading apparatus changes the requirements for the bridge design?
- If you were allowed to use any other materials besides Elmer's glue and popsicle sticks, which would you choose?

Frequently Asked Questions:

1. **Question:** Why is the maximum width of bridge 4” if the standard popsicle sticks come in 4.5”? Is the standard this year to cut all the popsicle sticks?

    a. **Response:** The width of the supports is 4.5”, so the width of the bridge must be narrower than that, which is why we are limiting the bridge width to 4” this year (to make sure they fit on the testing apparatus). Since we have removed the requirement to have a continuous road surface (deck) from previous years, it’s not required that the sticks be cut to accommodate a 4” bridge width.

2. **Question**: Note 1 to bridge designers (in “Additional Requirements”) states that the bridge can’t “bear” against the front of the support. Does that mean underneath the bridge the supports can’t touch the equipment at all? Prior to 2024, bridges used to be able to have supports that could touch the underneath section for additional stability.

    a. **Response:** Correct, no parts of the bridge hanging below the deck may bear against the equipment.

Appendix 5

RJEC Speakers' Bureau Flyer

ENGINEERING SPEAKERS AVAILABLE

THE RICHMOND JOINT ENGINEERS COUNCIL SPEAKERS BUREAU PROVIDES PRACTICING ENGINEERS AS CLASS SPEAKERS AND PROJECT JUDGES AVAILABLE FREE TO ALL MIDDLE AND HIGH SCHOOL CLASSES IN RICHMOND AND THE SURROUNDING COUNTIES. VIRTUAL PRESENTATIONS ARE AVAILABLE.

Represented Engineering Societies Include:

American Institute of Chemical Engineers (AIChE)

American Society of Civil Engineers (ASCE)

American Society of Highway Engineers (ASHE)

American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE)

American Society of Mechanical Engineers (ASME)

Dominion Engineers Society (DES)

Institute of Electrical and Electronics Engineers (IEEE)

National Society of Black Engineers (NSBE)

Richmond Minorities in Engineering Partnership (RMEP)

Society of Women Engineers (SWE)

Virginia Section Institute of Transportation Engineers (VASITE), and many more.

Speakers are available to give presentations, answer student questions, lead activities, and judge competitions.

FOR MORE INFORMATION
OR TO REQUEST A SPEAKER
CONTACT SARAH AT SPEAKERS@RJEC.ORG

Engineers are the inventors and problem solvers of the world. More than twenty five major specialties are recognized in the field of engineering.

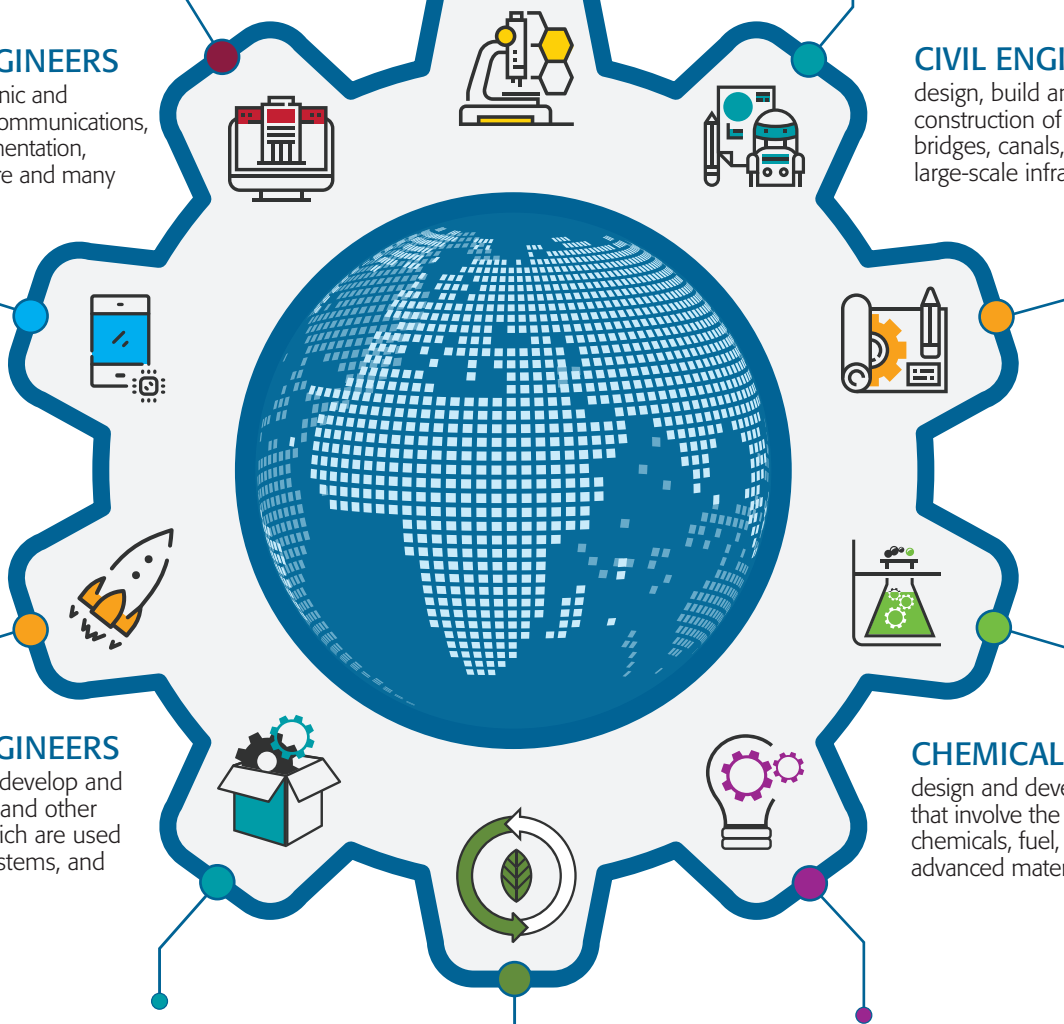
How will *you* change the world?

BIOMEDICAL ENGINEERS
conceive and design equipment, devices, and computer systems used in medical applications.

COMPUTER ENGINEERS
create computer hardware and software found in everything from automobiles, video games, medical equipment, cell phones, satellites, and other devices

MANUFACTURING ENGINEERS
develop, design and monitor equipment, tools, and machinery used in the manufacturing process.

ELECTRICAL ENGINEERS
design electrical, electronic and computer systems for communications, energy, robotics, instrumentation, transportation, healthcare and many other industries.



CIVIL ENGINEERS
design, build and supervise the construction of buildings, roads, bridges, canals, dams and other large-scale infrastructure projects.

AEROSPACE ENGINEERS
conceptualize, design, develop and test aircraft, spacecraft and other aerospace systems which are used in aviation defense systems, and space exploration.

CHEMICAL ENGINEERS
design and develop processes that involve the production of chemicals, fuel, drugs, food, and advanced materials.

INDUSTRIAL ENGINEERS
optimize processes, systems, or organizations in order to determine the most effective ways to use the basic factors of production — people, machines, materials, information, and energy.

ENVIRONMENTAL ENGINEERS
innovate solutions to environmental problems — water and air pollution, recycling, waste disposal, and public health issues.

MECHANICAL ENGINEERS
create and develop mechanical systems that apply principles of force, energy and motion in machines and devices such as vehicles, engines, heaters and air conditioners, robots, recreational equipment and power plants.

IEEE

Appendix 6

ASM Materials Camp for Teachers

JOIN US!

MATERIALS CAMP®-TEACHERS

(FREE professional development for teachers!)

ADVANCED TECHNOLOGY CENTER

VIRGINIA BEACH, VA | JULY 7-11, 2025

WHO SHOULD ATTEND

- High school and middle school teachers in science, engineering, and industrial / career and technical education
- Pre-service science teachers

WHY ATTEND

- Learn how to engage your students using simple low-cost experiments that you can integrate into your existing lesson plans
- Help your students discover career opportunities in science and engineering
- NO CHARGE, a $1200 value (made possible through generous donations to the ASM Materials Education Foundation).
- Next Generation Science Standards (NGSS) aligned curriculum.

WHAT'S INCLUDED

- Four (4) Continuing Education Units (CEUs)
- Demonstration materials; Snacks & lunch
- Option to get two (2) graduate credits through the University of Missouri-Kansas City

REGISTER TODAY!

https://app.keysurvey.com/f/41762131/11e5/

For more information and to view the 2025 ASM Materials Camp®-Teachers Summer Schedule, please visit asmfoundation.org.

SCAN ME! Or click here to watch a video about ASM Materials Camp® Teachers!

"This was one of the best teacher professional development workshops I have been to! I was amazed at how many different hands-on activities that were shared. The practical applications were the best part of this!" (Melissa E.)

"This camp is an eye-opening adventure in an oft-ignored discipline in the K-12 education system. Every day is an exploration into items you use all the time with an eye to how they were designed. It's also just a lot of fun (lab-rats dream!!!" (Kevin D.)

QUESTIONS?

Jeane Deatherage, Program Director

jeane.deatherage@asminternational.org | 440.671.3831

MATERIALS CAMP®

ASM MATERIALS EDUCATION FOUNDATION