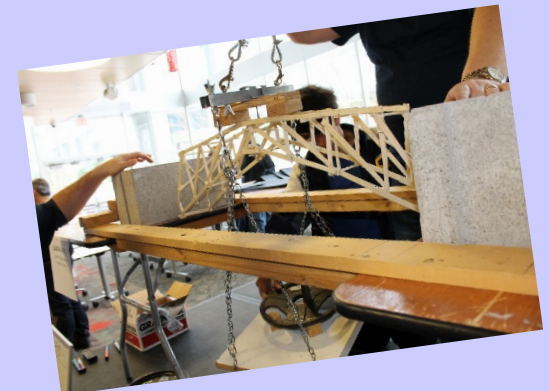


# Know your Audience: How to Present your Profession to K-12 Students

Presented by:

Reed Brockman, PE *BSCES Outreach Committee Chair, past*

Olivia Richards, PE *BSCES Outreach Committee Chair, current*



# Presenters



## Reed Brockman

- Associate Vice President, Structures Inspection Program Manager & Senior Structural Engineer, *AECOM*
- Future City Regional Co-Coordinator 2009 – present
- Chair of the BSCES Public Awareness and Outreach Committee 2004 – 2015
- Author, *From Sundae to Space Stations: Careers in Civil Engineering*, Bonamy Press 2010
- Co-host, *Civil Engineering Today*, BNN-TV and YouTube, 2006 – present
- Founder / Organizer of ThinkFest 2005 – 2015
- Co-founder / Co-Organizer of Infrastructure Day 2015 – present
- Founder / leader, Boston Bridge Tours, 2004 – present.
- Creator, Ralph Salvucci Online Bridge Design Contest

# Presenters



Olivia Richards

- Structural Engineering, *Gill Engineering*
- Future City Regional Co-Coordinator 2013 – present
- Chair of the BSCES Public Awareness and Outreach Committee 2015 – present
- BSCES Model Bridge Competition Coordinator 2014 – 2015
- Volunteer Coordinator for BSCES Outreach activities, 2013-2015
- BSCES Younger Member Group Liaison to Worcester Polytechnic Institute Student Chapter, 2012-2016

# Topic Overview

1. Speaking to K-12 Students in a Classroom
2. Mentoring a Team of K-12 Students
3. Recommended Activities for K-12 Students
4. How to Get Involved in Volunteering with K-12 Students

# Speaking to K-12 Students in a Classroom

# Prepare your Presentation

- Presenting to kids is very different from presenting to professionals
- Discuss the students' interests and capabilities with teacher
- Use minimal words on slides & many pictures
- Insert videos to break up the presentation
- Minimize handouts, 1-2 pages
- Keep the presentation short
- Include stories from work
- Use props to explain engineering concepts

# Adjusting for Age Groups

- Elementary School Level
  - Minimize presentation time (15 minutes max.)
  - Do hands on activities with students
  - Limit to a few topics for the students
- Middle School Level
  - Challenge them – developing critical thinking skills
  - Longer presentation, many visuals
  - Hands on activity that can be challenging
- High School Level
  - Understand basic physics and advanced math
  - Engaging presentation with discussion and video
  - End with a competitive challenge

# Mind your Words!

- Avoid industry jargon!
- Avoid elaborate explanations of theoretical ideas
- Avoid tangents – kids can have questions that may distract from your main point
- Be animated while speaking!
- Relate to them (e.g. “have you ever looked up when your parents drove under a bridge?”)
- Don’t try to use words that “kids say these days”, avoid patronizing



# Use Many Visuals

- Pictures help them to visualize and understand
- Videos capture their attention
- Include as many pictures as you can of yourself at work or in the field
- Draw on the blackboard
- Call up volunteers to help you demonstrate
- If showing clips of plans, highlight important pieces, don't overwhelm

# Repeat Repeat Repeat!

- Echo your message at the end of your presentation
- Try to bring up previously mentioned concepts to reiterate
- Have the students say important words with you to help them remember
- Associate new terms with an action (e.g. tension force with pulling your arm)

# Mentoring a Team of K-12 Students

# Mentoring Overview

- Many STEM programs include professional engineers as mentors for student teams
- Mentors visit with a student team and provide guidance through a project or competition
- BSCES Model Bridge Competition and Future City Competition provide engineers as mentors to the student teams from September through January

# Preparation for the First Visit

- Contact the teacher and confirm ages of the students and number of students attending
- Ask the teacher about a CORI check (background checks for working with kids), it is required in Massachusetts
- Estimate the number of visits and set milestones
- Review the competition rules or syllabus
- For the first visit, consider a quick presentation about your profession or the engineering topic to help get the brainstorming started

# Layout a Basic Schedule

- 1 hour visits go by fast! Be mindful of the time you have with them.
- Try to remain consistent with visits, same time each week.
- Keep the students committed to completing a task before your next visit.
- Provide enough guidance so they can complete the work without you there, review their accomplishments during your next visit.

# Let Them Do the Work

- Avoid implanting your ideas into their heads, let them start with the idea and you can help them refine it.
- Try not to give 1 example (e.g. “you can power your city with wind turbines!”) or else everyone will use the same example, keep the ideas diverse.
- Watching them build a model can test your patience but avoid doing the work for them. You can build example figures or draw sketches.
- When crunch time happens, try not to take over!

# Remember You Are the Mentor, not Teacher

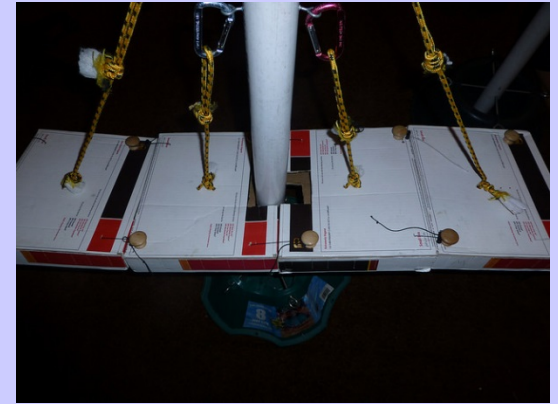
- Sometimes the mentor position could turn into more, we don't want you getting pushed into a role like this
- The teacher is in charge of supervising and reprimanding, refer to the teacher for this. The teacher should be present at every visit.
- You are not expected to be running the class or group, you provide guidance. The teacher should be keeping them on track and should know the competition rules.
- You are providing ideas, discussion topics, and guidance – not being a parent or teacher to the kids.



# Recommended Activities for K-12 Students

# Our List of Activities

1. Toothpick and gumdrops structures (middle school to high school)
2. Balloon towers (K-12)
3. Paint stirrer catapults (middle school)
4. Detour plans (high school)
5. 40" Model bridges (middle school to high school)
6. Mini-Future City (K-12, can be adjusted)
7. Water Quality Testing (high school)
8. Straw Puppets (K-12)
9. Dance-Dance Revolution Circuits (middle to high school)
10. Can Towers (K-12)
11. CD Cars (middle school)
12. Jenga Structures (K-12)
13. West Point Bridge Design (high school)
14. Card Towers
15. Dam Challenge
16. Wind Sail
17. Read a Book





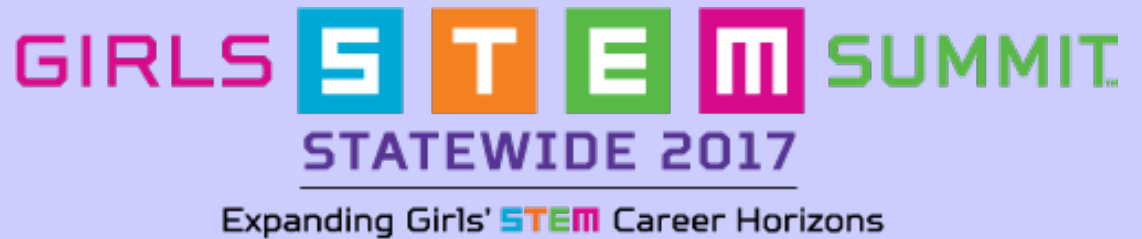
# Activity Demo



# How to Get Involved in Volunteering with K-12 Students

# Upcoming STEM Events

- Future City Competition
  - Saturday, January 20<sup>th</sup>, MassDOT HQ
- BSCES Model Bridge Competition
  - February 3<sup>rd</sup>, Wentworth
- Girls STEM Summit
  - Sunday, April 8<sup>th</sup>, Weston, MA
- Cambridge Science Festival
  - April 13<sup>th</sup> – 22<sup>nd</sup>, Cambridge Rindge & Latin
- Girl Scouts of Eastern Mass STEM Expo
  - Saturday, beginning of March, Framingham, MA
- Wellesley STEM Event
  - Saturday, Mid-April, Wellesley, MA



# Mentors Needed!

- Model Bridge Competition
  - Esperanza Academy, Lawrence, MA
  - Northbridge Middle School, Whitinsville, MA
  - Dupont Middle School, Chicopee, MA

- Future City Competition
  - East Hartford, CT
  - Brockton, MA
  - Chelmsford, MA
  - Somerset, MA
  - Somerville, MA
  - Fremont, MA
  - Rockland, MA
  - Salem, MA
  - Wakefield, MA
  - Provincetown, MA
  - Framingham, MA
  - Cotuit, MA
  - Westfield, MA
  - Bolton, MA



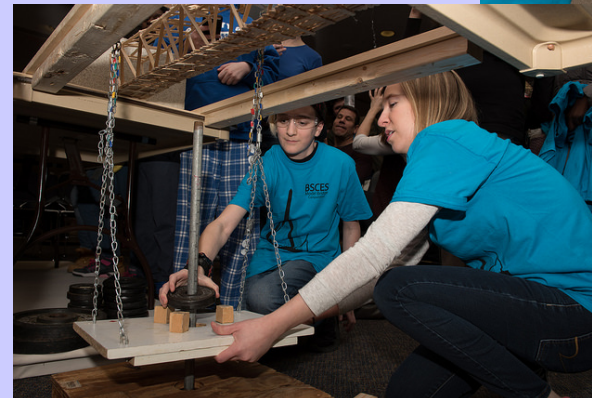
# Future City Competition

- Middle School Students
- Theme is Age-Friendly City
- Deliverables
  - SimCity Virtual City
  - Essay about City
  - Physical Model
  - Presentation
- Regional Competition is January 20<sup>th</sup> at MassDOT HQ
- Need Competition Day Volunteers!



# Model Bridge Competition

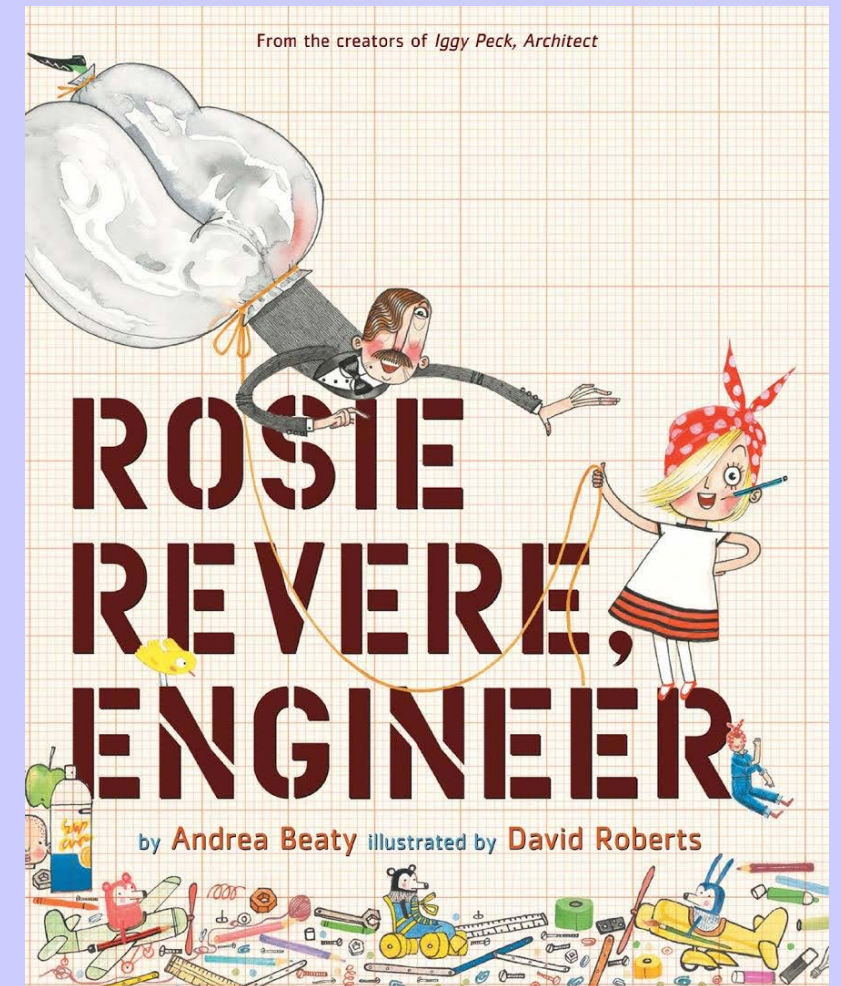
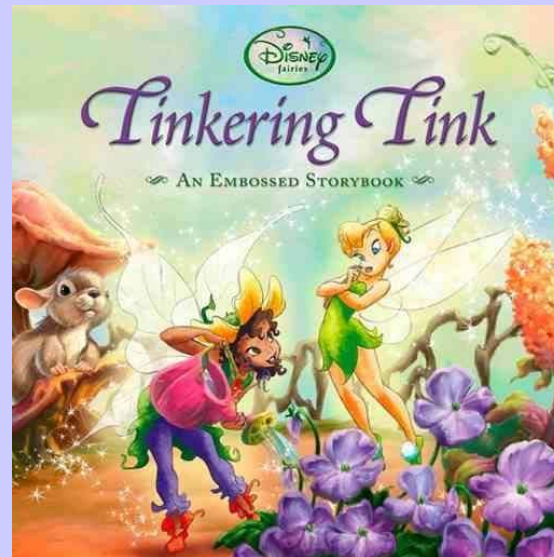
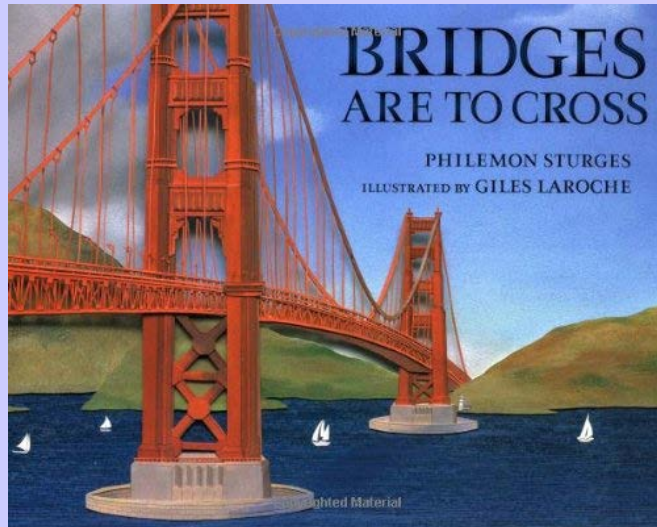
- Middle School and High School Students
- 40-inch long model
- Material varies each year
- Compete to hold the most load
- Regional Competition is February 3<sup>rd</sup> at Wentworth
- Need Competition Day Volunteers!



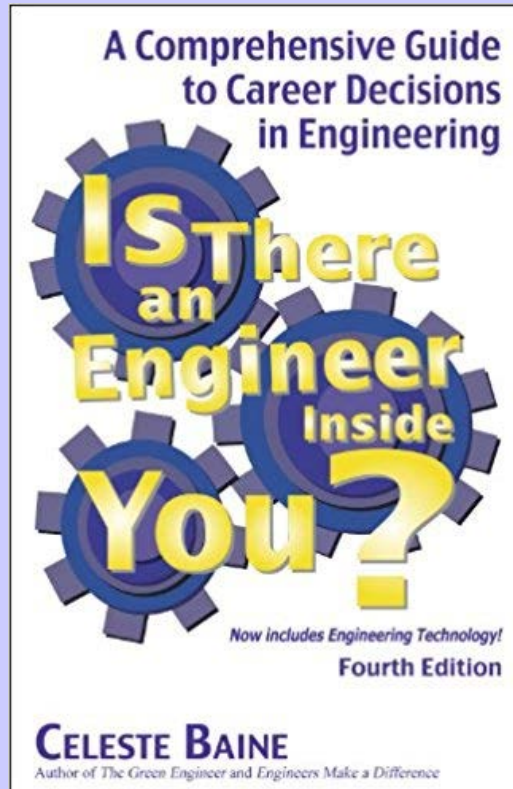


# Recommended Books for Elementary School Students

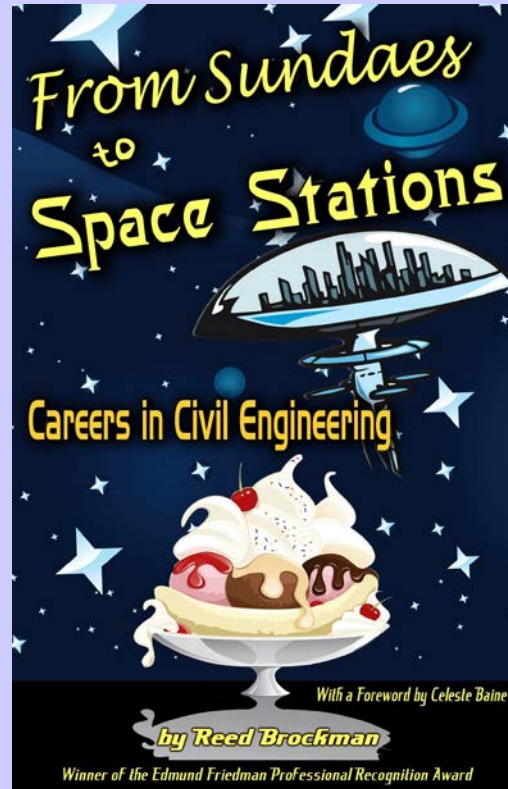
- Tinkering Tink (Disney Press)
- Rosie Revere Engineer (Andrea Beaty)  
(Has an activity book, too!)
- Bridges are to Cross (Philemon Sturges)



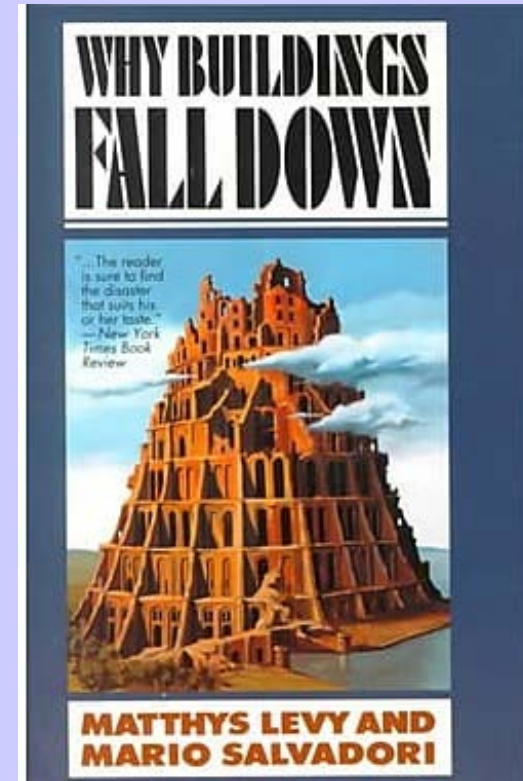
# Recommended Books for Middle / High School Students



Is There an Engineer Inside You?



From Sundae to Space Stations



Why Buildings Fall Down

# Resources and Questions

- BSCES Outreach Committee's list of activities
  - <https://docs.google.com/spreadsheets/d/1ngFzyPxFlm8vV3MkOsKaQSKLsA-M62DifSUkLw2NP34/edit?usp=sharing>
- BSCES Volunteer Call, Winter 2017-2018
  - [https://drive.google.com/file/d/1wv0M0FqbGyqek-LxjfOoP86UFt\\_TvE-/view?usp=sharing](https://drive.google.com/file/d/1wv0M0FqbGyqek-LxjfOoP86UFt_TvE-/view?usp=sharing)
- Future City Competition Day Volunteer Sign Up:
  - <https://goo.gl/forms/BYicrGS83K8uoxUt1>
- Model Bridge Competition Day Volunteer Sign Up:
  - <https://goo.gl/forms/EGRerWHQVxIMRy0m1>