YOU Can Make This

Presentation Module for Engineers Who Visit Classrooms K-12
To Promote Careers in Design Professions

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Note to the Engineer Presenter/Parent:

- This is an outline for a 45-60 minute module for ANY age remote classroom visit.
- The ten content segments can be expanded or collapsed depending on the age and interests of the students.
    - ***You will change the vocabulary, examples, and level of detail/sophistication depending on the age of the students. Have a short conversation to get advice from the classroom teacher or the person who invites you to speak for ways to adjust your remarks and activities for the specific grade level and experience level of the students.***
- You can ***add your own*** photos for the opening montage. Use your own projects or those of your colleagues that inspire or intrigue – the "wow" effect. Or if you prefer, shows a short video to achieve the same effect.
- You should find or create a 15-minute hands-on activity that is age-appropriate. Go to www.discoverE.org or contact Reed Brockman at reed.brockman@aecom.com.

Note to the Engineer Presenter/Parent, Part 2:

When you are invited to speak at a school, you are not expected to know how to tailor your presentation to be age-appropriate or interest-area targeted.

THEREFORE, IN ADVANCE, ask the person who organized your school visit (or the classroom teacher) questions so you can make your remarks suitable and engaging!

- 1. how does my presentation fit into what you are already doing in your classroom?
- 2. what do the students already know about STEM subject areas and careers?
- 3. how have you prepared the students for my visit?
- 4. for remote interactive instruction, do the students prefer group discussion or hands-on activities? For hands-on activity kits, coordinate with the classroom teacher for supply distribution, if applicable, before the visit.
- 5. in science and math, what seem to be the students' areas of interest?
- 6. what type of follow-up do you anticipate you will do following my school visit?
- 7. does your school have science fairs? Shadow-a-professional-day? After-school science, technology, math clubs or activities?
- 8. describe what you think is your students' level of understanding about the professions of engineering and the field of civil engineering, in particular.

Note to the Engineer Presenter/Parent, Part 3:

Presentation Hints:

- Act like you love it! Be comfortable as you explain in what ways the profession of engineering creates all the places where we live, visit, work, study, play, hang-out.
- Engage the students! Stay on screen (see Part 4), ask questions, and present the profession in an approachable manner to avoid unintentionally discourage interest by focusing on the challenges to become an engineer.
- Be lively! Use your voice as a presentation "tool" to encourage enthusiasm for your work, for the profession, for their ideas. Add vocal emphasis and liveliness!
- Be succinct! More talking is not better – long explanations put kids in a stupor. Be aware to use short, dynamic sentences, and ask questions that are answered either by yourself or the students.
- Think big picture. You are an ambassador! You are representing not only your own job, but also your firm and the entire engineering professions – civil, structural, aeronautical, transportation, chemical, mechanical, electrical, robotics, and all the others.

Note to the Engineer Presenter/Parent, Part 4:

Remote Presentation Recommendations:

- Stay on Screen! Convert the powerpoint slides into individual Jpeg files. Use these files as your background for whichever virtual platform being used (Zoom, Teams, etc.). The background may appear as mirrored to you, but not to worry, it will look correct to the viewers. Switch "slides" by switching backgrounds. Name the backgrounds in the order of the slides so that you can easily find what comes next.
- Keep it simple! Don't overestimate the students' technology savviness. Any remote hands-on activities should be simple to use with minimal instructions required. For example, don't expect that every student knows how to use Google My Maps if you are planning a virtual interactive activity that involves mapping out points of interest and draw various paths to and from these points.
- Plan ahead! Virtual classroom visits certainly present a new set of challenges relative to a traditional classroom visit. But with a bit of planning, you can achieve the same results! You can make this!

Now, the classroom powerpoint starts on the next slide.

Items in purple are directions to YOU the presenter. Do what these things say and then delete the purple words.

YOU Can Make This

Presented by: insert your name and credentials here

Prepared by Joanne Linowes, Leadership Educator

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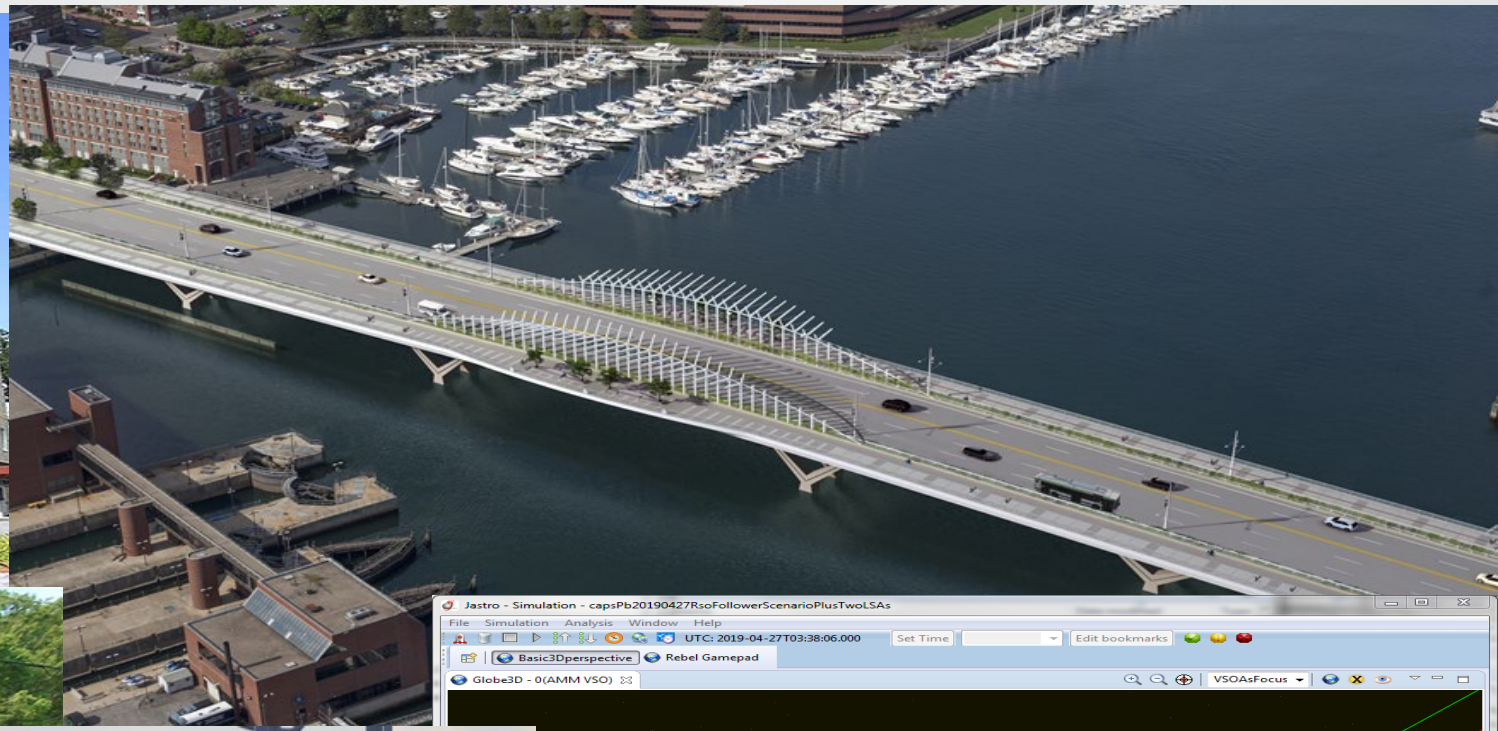
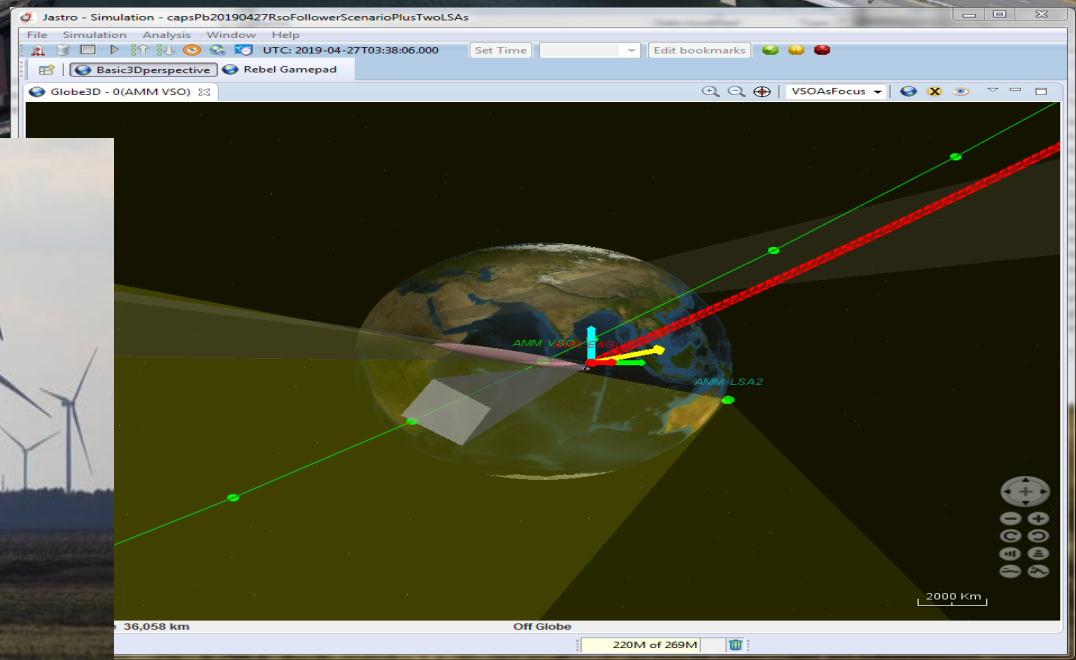
Opening montage. We need tons of photos of exciting finished projects! Please send in your photos! We want several slides of many projects!!





Source: Vanity Fair

Source: visitsingapore.com

Source: AP News

Source: Architectural Digest

1. How do things get designed?

These are examples of places, structures, systems, and products that were designed by engineers – in many different engineering fields.

2. Creating Our World!

Engineers are problem solvers! We come up with useful AND interesting ways to make our lives and environments better through what we design, and then these things get built.

What types of problems do engineers solve?

- How vehicles can cross a body of water
- The best routes to get around in an airport
- How to get pedestrians and bicyclists safely to share the roads with cars
- How to explore space
- How to explore under the oceans
- Ways to prevent floods; Ways to drain flood water
- How to protect natural habitats and wetlands
- How to build skyscrapers

These are examples. You are welcome to create your own list. Name some problems you and your firm address for your clients.

3. Kinds of Engineering

Different things are designed by different kinds of engineering expertise. What types of engineers are there?

to flesh-out this section, you should add visuals and info from both your colleagues AND different engineering disciplines. See next slide.

- MEP engineers design systems such as heating and cooling, electrical, fire protection, and plumbing to provide fresh water for drinking, cleansing and more ….
- Mechanical engineers design robots and mechanical arms, factory automation, . . .
- Electrical engineers design space aparatus, military defense apparatus, laser technology, . . .
- Chemical engineers design oil and natural gas energy systems, applications for biodegradable plastics,……
- Water/hydro engineers design water systems for cities, hydroponic greenhouses, manufacturing plants wastewater filtration, desalination systems, . . .
- Civil engineers design . . . cities, airports, housing developments, . .
- Structural engineers design bridges, buildings, tunnels, . . .
- Transportation engineers design railroads, roads, public transit systems, . . .

Add more.. Get visuals

4. Who am I?

I am a _____ Engineer. What I do is design _____.

What this means is that I use creative thinking, engineering training and experience, team conversations, technology and specific software to plan out just how something will be built, step by step, detail by detail, so the people who will construct it will do it perfectly, so it works just the way it is supposed to. It has to be perfect so you and I can use this *(road, bridge, building, park – say whatever it is that you do)* **without even thinking about how it was designed and made – it just fits into your day, safely and conveniently.**

5. How does the work happen?

To do this, I (and all engineers) work as a team . . .

. . along with people with a wide range of expertise – including other __*(name type of)*_____ engineers like myself, plus maybe architects, builders, planners, environmentalists, scientists, landscape architects, wetland specialists, land surveyors, geotechnical experts, . . . *(continue this list, as appropriate)*

Here are 7 steps in how the process works – from idea to finished project.

Step 1: Dream the Idea – Get Inspiration

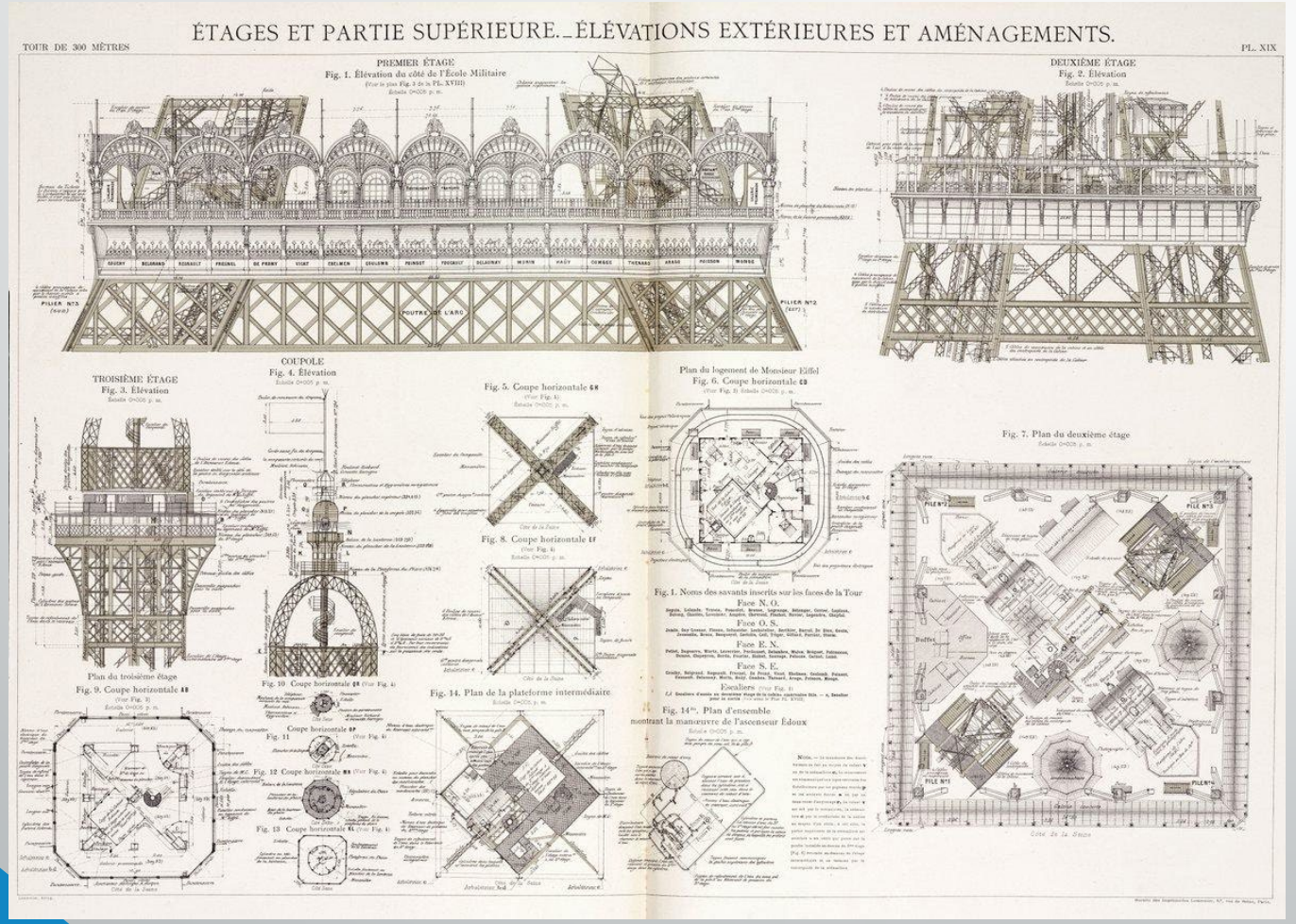
Photo courtesy of Boston Public Works Department

Step 2: Assemble Team (show an org chart or schedule or calendar of a real project)

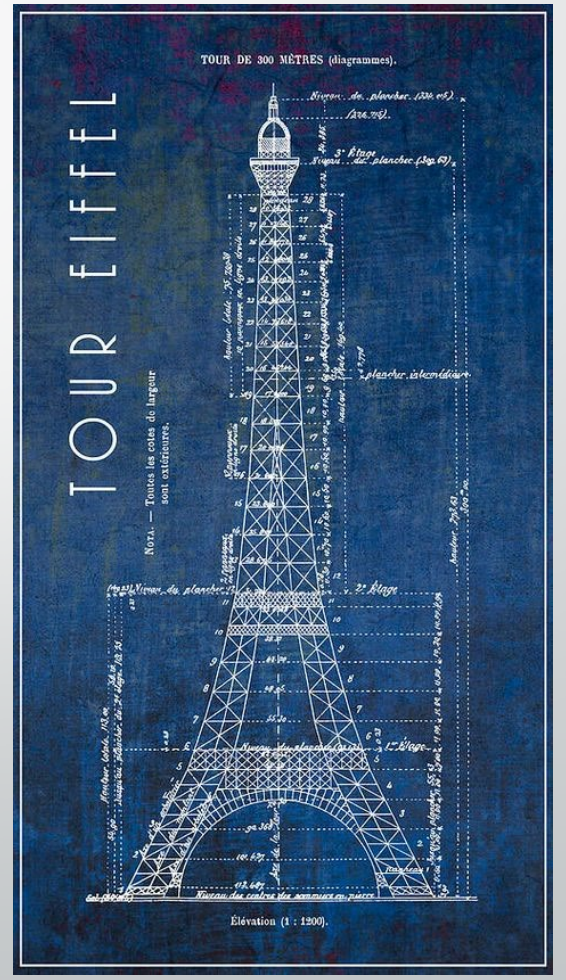
Source: Patriots.com

Step 3. Do some general sketches to get your ideas down.

(can show examples of your own sketches)



Source: Science Museum

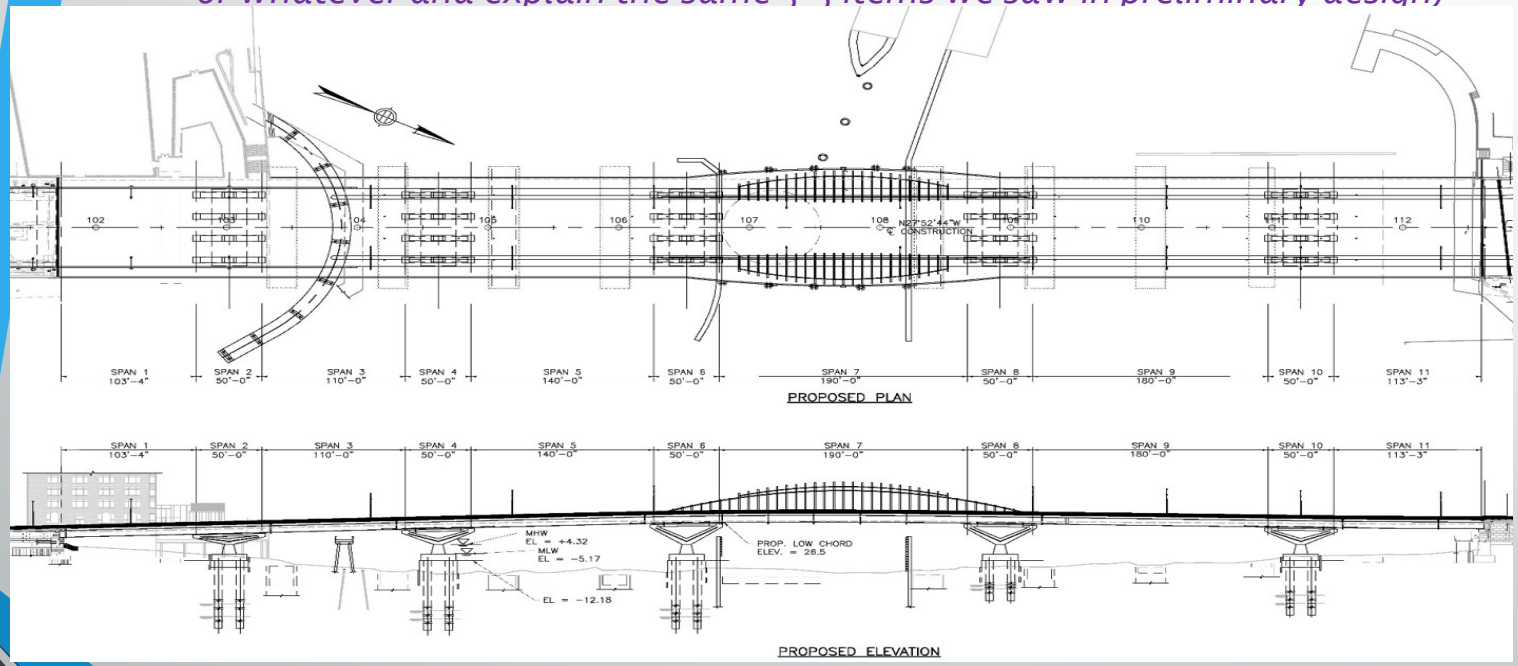


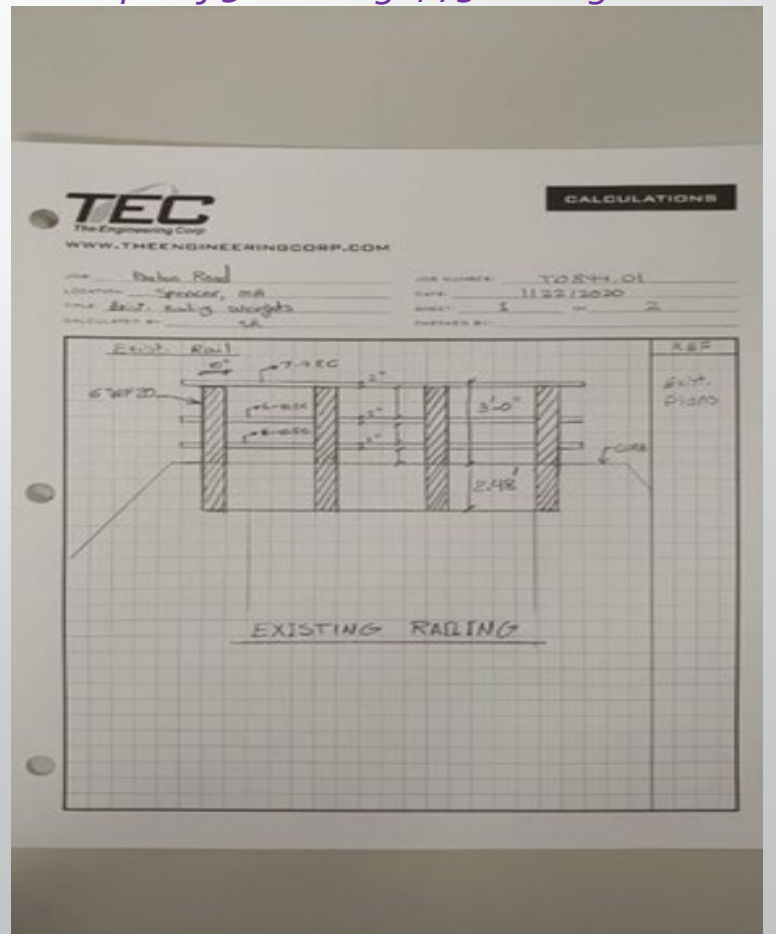
Source: Fine Art America

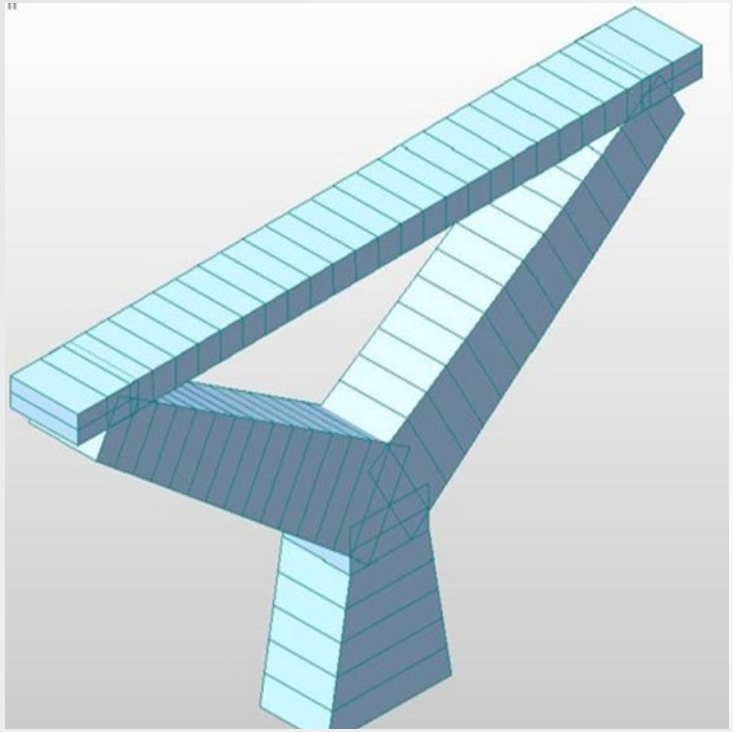
Step 4: Create Initial Model (computer or real life) *(show preliminary design examples – point out the 3-5 key items are that you will use as an example to show how an element of design evolves*

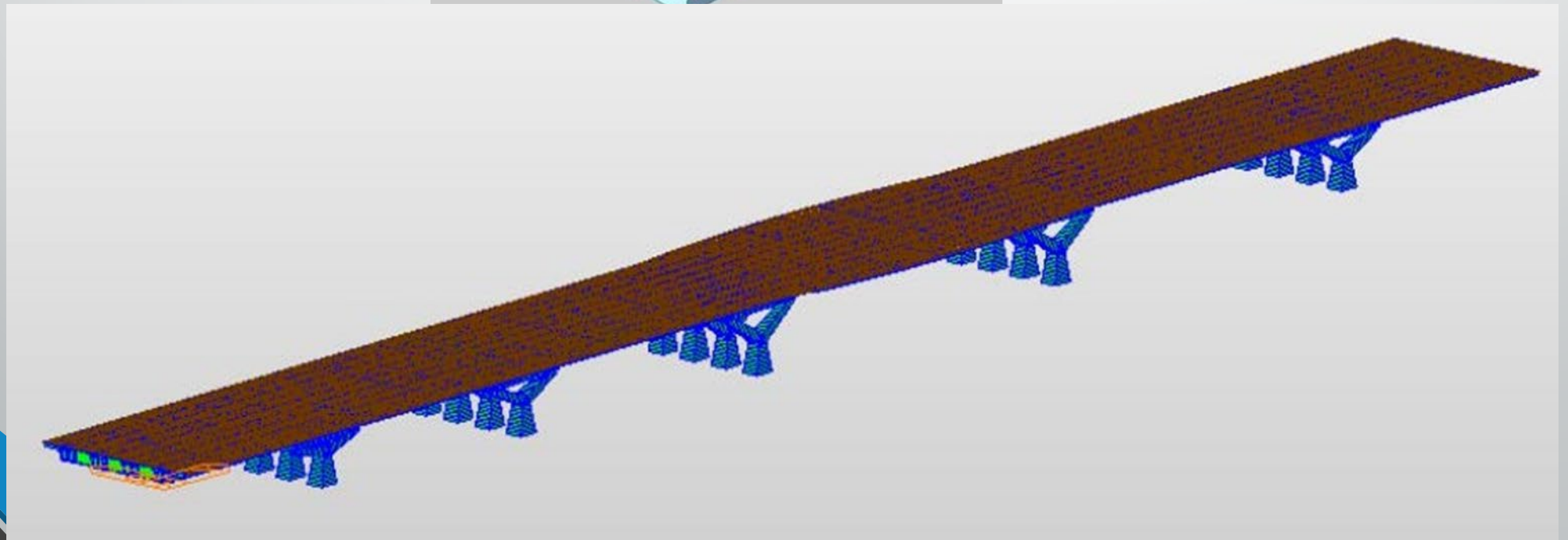
Step 5: **Find out what the neighbors, community, local businesses, local officials think of the plans.**

Step 6: **Develop the design, using calculations, brainpower, consultation with team members, . . . to get the project or idea to different levels of completion Sometimes you do hand drawings, sometimes computer design tools, sometimes BIM, sometimes animated. Designs are developed in a variety of both basic and sophisticated ways, one element at a time…** *(show an example of 30% design, 75% design or whatever and explain the same 3-5 items we saw in preliminary design)*









- **After review and continuous refinement, we get to 75% design, and you can see these same items have evolved to be more complete, sophisticated, and perfected.** *(show and explain the refinements of the same 3-5 items.)*
- **Every day we move the job along, one-step at a time, seeing progress and sometimes completely re-doing one part or another because we think of a better way to do it or we discover more complicated issues we need to address.**
- **Often what we envisioned in the preliminary design gets changed when we learn more about the project and the things that affect what we want to deliver.**
- **This is where creative thinking, trial-and-error, alternative ideas, and experimentation come in – until we get it right.**

Step 7: Complete the Project!

After thinking, creating, trying ideas, designing, and testing throughout the whole design process – sometimes for months, sometimes years, here is the finished project. *(show photo with great pride and enthusiasm of the actual thing, during construction and completed!)* **The bridge you see, the road you drive on, the park you play in,** *(or whatever . . . make it appropriate to your project you are discussing) .* **the engineers made it happen!**

6. What are you good at?

- **What kinds of projects do you like to do? What are your best skills? What are you good at? How can what you like and do well help put you into the exciting innovative world of design and creation of technical and engineering projects?**
- **The skills you need to do engineering are . . .** *(fill in for whatever type of work you do)*
- **That means, in middle school, high school and college, in addition to learning to read and write well, and in additional to understanding the environment and what people need for a safe and good life, you will want to be sure to study . . .** *(fill in for whatever type of work you do)*

7. Can you learn on-the-job?

Get some good experiences! Summer programs and volunteer jobs will help you get ready for a career in all types of engineering. Find opportunities in your community. Once you have completed your studies and exams, you will have a B.S in Engineering degree. Then you will work as an Engineer-in-Training where you are part of the actual job team while getting real experience.

8. Activity Time!
Create the Problem You Can Solve

As we said at the beginning, engineers are problem solvers. Let's tackle a problem.

(Suggest using virtual break-out room consisting of 3-5 people)

- **Here's the situation.** *(describe the situation you invent or from resource materials you have from a STEM source)*
- **What problem are we trying to solve?** *? (Let THEM articulate the problem – a question that needs to be answered – such as 'how do we make cars go slower on this residential main road?". Let them hear you describe the facts, and let them define the problem to be solved.)*
- *(do the activity in the small task groups. Then bring together the whole group and ask each task group to report back how they defined the problem and how they solved it.)*
  - *Be specific and succinct in the problem you are asking them to solve – you only have 20-30 minutes for this entire activity. Take charge of the time! Make it a meaningful and MEMORABLE experience. You can do this – give specific yet simple directions.*
- **What did we learn?**
  - **Each situation presents a problem to solve.**
  - **A team works together to share ideas and skills to solve the problem.**
  - **The best solution is innovative, safe, and improves life.**

9. What I Design

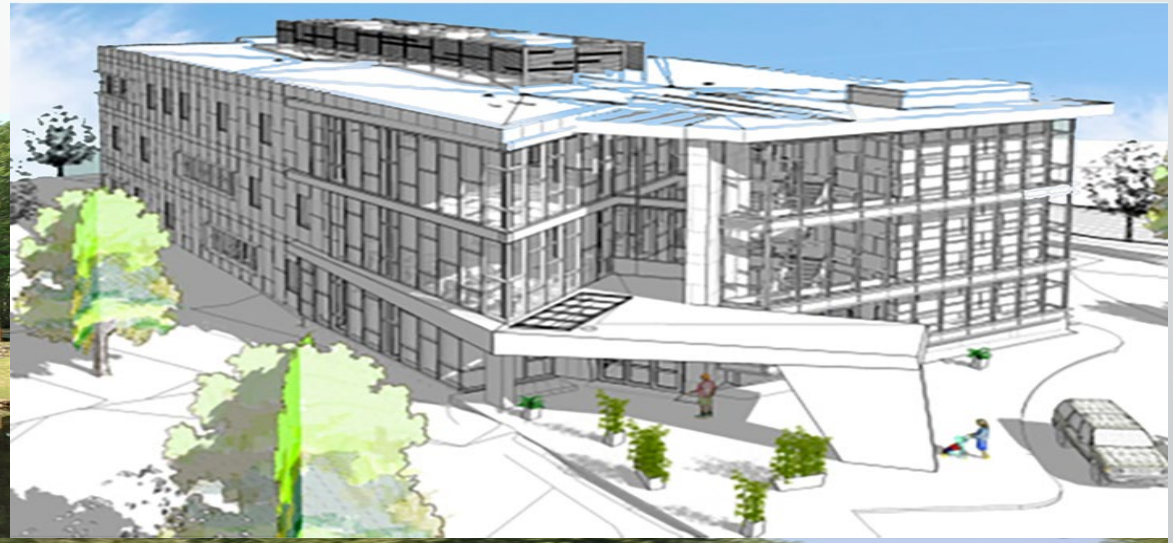
Civil and structural engineers *(or whatever kind of engineer you are)* **do this kind of work:**

(List the things you do.)

10. Look Around

Take a look at the neighborhood around you, the roads, the buildings, the parks, the water, the bridges, the shopping centers . . . a civil engineer has their hand in creating all of these things.

As you think about the work you want to do in your life, just remember as an engineer, YOU can make this!



Where is more information?

- www.acecma.org
- www.acementor.org
- www.bsces.org
- www.discovere.org
- www.futurecity.org
- www.mass-stemhub.org
- www.nspe.org
- www.nsta.org
- www.same.org