


# AASHTO-TRAC Project-Based Transportation and Engineering Outreach Program



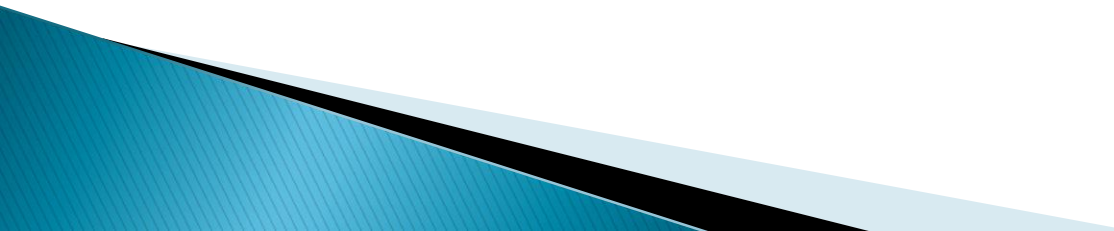
# TRAC–AASHTO

- ▶ Transportation and Civil Engineering (TRAC) of the American Association of State Highway and Transportation Officials (AASHTO)
  - ▶ An educational outreach program to interest high school students in careers in engineering and transportation
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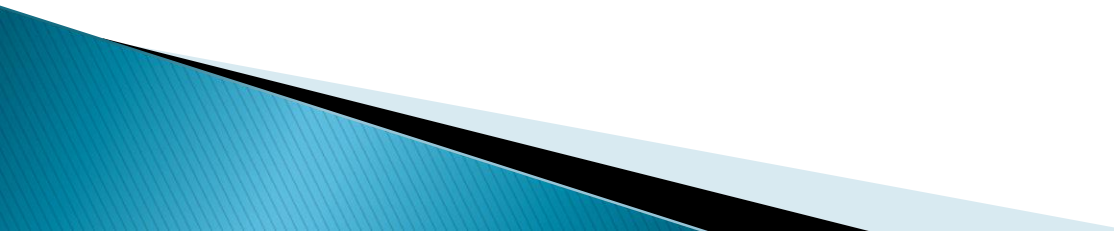
# Outlook for Civil Engineering Profession

- ▶ BLS: Data about Civil Engineering
  - 2015 Median Pay was \$82,220 nationally
  - Predict 23,600 new jobs in next decade
- ▶ Forbes:
  - Civil engineering employs more than other engineering professions in the U.S.
  - Aging/retirements will create new opportunities. Roughly  $\frac{1}{4}$  of all engineers are Baby Boomers and are over 55.

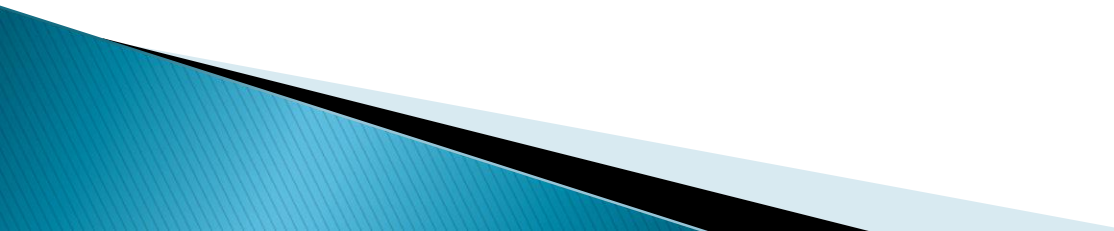
# Benefits of TRAC

- ▶ TRAC is a hands-on, project based curriculum for use in science, math, engineering and social studies courses.
  - ▶ Students learn how to apply your regular course skills/lessons to solve real world problems.
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# TRAC Modules 2017-18

- ▶ Bridge Builder
  - ▶ Roadway Design and Construction
  - ▶ Magnetic Levitation
  - ▶ Environmental Engineering
  - ▶ Highway Safety
  - ▶ Traffic Technology
  - ▶ Planning/Sim City (under development)
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# Curriculum: 8–12th Grade

- ▶ Math: Algebra, trigonometry, probability and statistics
  - ▶ Physics: Motion, force, magnetism, friction and sound
  - ▶ Technology Education: Maglev trains, bridge design and construction and SimCity.
  - ▶ Social Studies: Civics, government and transportation in society
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# Bridge Builder

- ▶ Two Software Programs
    - Model Smart 3-D
    - Bentley MicroStation PowerDraft
  - ▶ Module addresses comprehensive aspects of design and building model bridge structure
  - ▶ Module addresses National Council of Teachers of Mathematics and National Science Teacher Association standards through hands-on projects and computer-based simulations
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# Introduction to Computer-Based Design

Students examine main challenge facing a bridge designer: different types of loads a bridge must be capable of withstanding:

- ▶ Dead Load – weight of the structure
- ▶ Live Load – weight of things on the bridge (cars, people, snow, etc.)
- ▶ Other Loads – earthquakes, stresses due to temperature fluctuations




# Introduction to Computer-Based Design

- Types of Forces
    - Tension
    - Compression
    - Bending
  
  - Types of Bridges
    - Suspension
    - Girder
    - Arch
    - Truss
    - Bascule
    - Cable-Stayed
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# AASHTO Bridge Competition (not required)

TRAC schools are eligible to compete  
Students

- ▶ Design required bridge following instructions for a particular type of bridge, length, width, height
  - ▶ Construct bridge
  - ▶ Draw bridge in Bentley MicroStation PowerDraft
  - ▶ Write portfolio about bridge building experience
  - ▶ Submit by deadline for judging
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# AASHTO Bridge Competition

Three Competition Classes (3 students to a team)

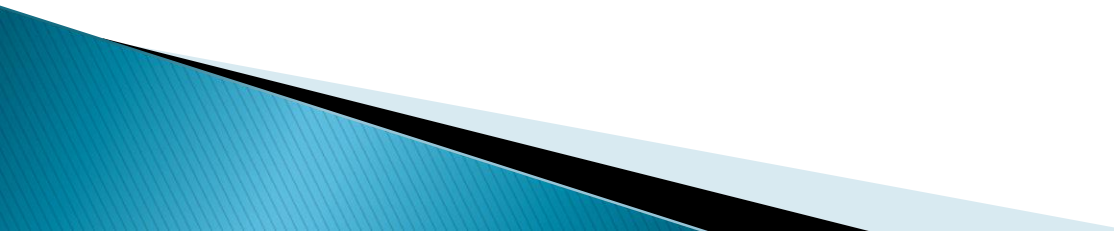
- ▶ 7<sup>th</sup> and 8<sup>th</sup> Graders
- ▶ 9<sup>th</sup> and 10<sup>th</sup> Graders
- ▶ 11<sup>th</sup> and 12<sup>th</sup> Graders

If invited to national competition, all expenses are paid for 3 students and advisor (airfare, hotel, food, etc.)

Students make a presentation and then the bridge is tested.



# AASHTO Bridge Competition

- ▶ First Place: \$1,400
  - ▶ Second Place: \$900
  - ▶ Third Place: \$600
  - ▶ Teachers get recognition.
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# Maglev

## Pros:

- ▶ Moves many people at once
- ▶ Environmentally friendly
- ▶ High speed
- ▶ Quiet

## Cons:

- ▶ Expensive to develop and build
- ▶ Geometric problems
  - High speed turns
  - Acceleration/Deceleration Distace

# Questions?

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