



## TRANSPORTATION

**Competition Date:** Thursday, April 19, 2018

**Competition Location:** Sacramento State Campus

**Summary:**

The purpose of the Transportation Competition is to provide students with a practical transportation engineering problem. This challenge requires students to apply methods of intersection design, geometric design, pavement design, and traffic engineering along with the application of surveying and drafting techniques.

**Contact:**

Any questions regarding the Transportation Competition may be sent to:

Michael Almazan

[2018midpactransportation@gmail.com](mailto:2018midpactransportation@gmail.com)

## RULES

### Problem Statement

The City of Sacramento is implementing a “streetcar” trolley system in the downtown Sacramento area. The trolley will operate from West Sacramento to Midtown, traveling through the heart of downtown Sacramento. One of the main sections where the trolley system will be installed is across Tower Bridge at the 3<sup>rd</sup> Street and I Street intersection.

The “streetcar” is powered by an electrical grid and it is attached to a track. The firms are responsible for designing the rail layout of the streetcar, electric grid pole locations, streetcar stops at the Embassy Suites on Capitol Mall and the Holiday Inn on 3<sup>rd</sup> St., pedestrian and bike facilities, signage, striping, pavement cross sections, signal timing for vehicles and the “streetcar,” and construction phasing of the streets.

The city will only allow road widening to the right-of-way to accommodate design improvements.

Firms are in charge of controlling the directional layout of the “streetcar.” The firms have multiple options of designing the track (i.e. one/two way track with/without vehicles able to drive over the track).

### Boundaries

The firms are responsible for the western edge of the Tower Bridge to the 3<sup>rd</sup> Street / Capitol Mall intersection then north on 3<sup>rd</sup> Street to the 3<sup>rd</sup> Street/I Street Intersection.

Firms are only allowed to design the track within the boundaries of the basemap which is found in the boundaries map. Firms cannot alter any freeway/highway entrances, buildings and parking structures. The basemap can be found at the following link:

<http://midpac2018.weebly.com/documents.html>

Firms are only allowed to start construction at the western edge of the Tower Bridge or the I Street and 3<sup>rd</sup> Street intersection. Assume there is a “streetcar” stop at the Sacramento Valley Station on I Street.

### Specifications

The City of Sacramento has provided the as-built plans (Basemap), recent traffic counts and dimensions of the track and “streetcar.” These documents can at the following link:

<http://midpac2018.weebly.com/documents.html>

These documents must be referenced in the submitted plans as the existing surface and existing right-of-way limits. Any design changes to the surface or right-of-way must be clearly noted.

Posted Speed Limit:	25 mph on the Tower Bridge Gateway/Capitol Mall 30 mph on 3 <sup>rd</sup> St.
Expected Design Level-of-Service:	C
Traffic Growth:	1%
Annual Design Life:	20 years

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## **SUBMITTALS**

The plan documents, written summary, calculations, and opinion of probable cost must be combined into one PDF and submitted by March 17, 2018 at 11:59 PM PST to 2018midpactransportation@gmail.com and include the following:

- Site Plan of the proposed area
- Roadway profiles
- Construction Phasing Schedule
- Signal timing and phasing figure or justification for an unsignalized intersection
- Typical cross sections sheet
- Opinion of Probable Cost
- Project Summary

All figures and plans must be computer drafted in the format of ANSI B (11"x17").

All Request for Information (RFI) must be sent to 2018midpactransportation@gmail.com prior to December 10, 2017 11:59 PM PST.

The PDF file must be named "<SchoolName> Transportation 2018 MidPac Report Submittal." Late submissions will incur a 3% penalty per 24 hours.

### **Site Plan**

The site plan must show the designed intersection with roadways extending at least 100' from the stop bar or yield line in each direction (North, South, East, and West). Two centerlines (North-South direction and East-West direction) must be derived from the problem statement. All medians, turn pockets, sign locations, striping, bus stops, "streetcar" stops, electric grid pole locations, and bike and pedestrian facilities must be clearly displayed, as well as any changes to the surface or right-of-way. Additionally, any necessary detail callouts and dimensions must be shown on the plan(s). The Site Plan may be split up into multiple sheets with appropriate match line callouts. Displaying landscaping features are optional.

### **Roadway Profiles**

The profile plan must show at least two profiles, one for the north-south roadway alignment and one for the east-west roadway alignment of the designed intersection(s). The profile views must clearly display the existing ground and the designed finished grade profile. Grades, grade breaks, points of vertical intersection, and vertical curve dimensions must be clearly labeled on the finished grade profile lines.

### **Construction Phase Schedule**

During the construction, firms will plan phasing schedules for concrete paving for sidewalk and curbs, track installation, asphalt, and any other aspects included in the proposed design. Firms will decide the best options for construction phasing for traffic control, project time, and work zones. Assume that projects start at the beginning October 2018, and finish at the end of October 2019.

### **Signal Timing and Phasing or Justification for Unsignalized Intersection**

The signal timing and phasing figure must clearly display the appropriate movements for each phase, the time for each phase, and total cycle length. Any formulas and assumptions must be clearly shown. For an unsignalized intersection, a justification must be provided for why an unsignalized intersection is preferable to a signalized intersection.

Firms will control signal timing of the streetcar itself or no signal timing. If signal timing is required explain what type of timing is needed, why it is required, and how it will affect traffic at each intersection. If no signal timing is required, then provide an explanation.

### **Typical Cross Section Sheet**

Cross section sheet drawings must be combined onto the appropriate number of sheets. Any other details must be designed by the consulting firm and comply with any ADA standards. Additionally, roadway cross sections must be designed and displayed in this area. Be sure to make the appropriate call outs on the site plan that refers to the details using an organized detail numbering system (example: "See detail 3 on sheet DT-01").

### **Opinion of Probable Cost**

A construction cost estimate for the project must be established via an excel spreadsheet. All variables associated with the construction of the new intersection must be considered with an estimated cost (in USD). This includes any costs associated with expanding the right-of-way.

### **Level of Service Calculations**

Calculations are required for Capitol Mall and 3<sup>rd</sup> St., and 3<sup>rd</sup> St. and L, and 3<sup>rd</sup> St. and J St. intersections.

The calculations sheet must be organized and clearly labeled with a title and numbered steps for each formula. All appropriate calculations must be conducted for the intersections to ensure a sufficiently designed intersection. The level of service calculation must be clearly displayed and must be appropriately backed up by a transportation engineering computer software calculation. Any assumptions must be clearly noted. The calculations attached to the report must be scanned from engineering paper, in neat and clear hand writing.

### **Project Summary**

The project summary may not exceed 15 pages, double spaced, 12 point Times New Roman font, 1 inch margins, and normal width character spacing formatting. The citations, cover page, table of contents, and appendices are NOT INCLUDED in the 15-page length. The summary must review the entire project and also explain the following:

- Functionality of the intersection
- Efficiencies and benefits to the overall design
- Explanation of the chosen signal timing and phasing sequence for the vehicles and "street car"

- Explain any innovative features of the intersection
- Explain the construction phasing of the project
- Discuss the traffic and pedestrian safety aspects of the design
- Discuss the impacts this design may have on traffic
- An explanation of what methods were used to overcome the lack of specific traffic volume data.
- Any assumptions must be explained and their validity in this situation justified.

The project summary is limited to 15 pages. The entire report page limit is 80 pages. Firms may have any number of drawings and appendices but must stay within the 80 page total report limit.

## **POSTER**

All participating schools must prepare a poster that outlines the design around a final conceptual drawing of the intersection. Each poster must display (at the minimum) the school name, each participating member's name, construction phasing roadway cross section(s), phasing and signal timing diagram, and total cost estimate. The posters will be displayed on April 19, 2018. Each team must provide their own poster stand.

A PDF of the poster must be sent to [2018midpactransportation@gmail.com](mailto:2018midpactransportation@gmail.com) on April 15, 2018 11:59 PM PST. The PDF file must be named "<SchoolName> Transportation 2018 MidPac Poster Submittal." Late submissions will incur a 3% penalty per 24 hours.

## **PRESENTATION/Q&A SESSION**

All schools will provide a 10 minute presentation, followed by a 10 minute question-and-answer session, to a panel of judges. The 10 minute presentation must provide an overview of the project. The question-and-answer session will be conducted by the judges with team specific questions. Up to 3 members from each firm will be allowed to present and all project manager(s) must be included in each presentation group. Presentation quality and attire will be judged as well. See rubric for scoring of the presentation and question-and-answer session.

**Presentation/Q&A Session/Poster Rubric**

Category	Description	Possible Score
<b>Presentation</b>	Ability to communicate key concepts from written paper and to convince audience of their importance.	20
<b>Time</b>	<b>For Presentation Only:</b> Beyond 5-Second Allowance: 0.05-Point Penalty per second difference from required 10 minutes	5 points max penalty
<b>Q&amp;A Session</b>	Responses to questions demonstrate an excellent level understanding of key project issues. Creative solutions to all concerns are offered.	20
<b>Presentation Quality</b>	Delivery Style/Eye Contact/Technical Language/Enthusiasm Audience is consistently engaged and interested Presentation Attire	10
<b>Poster</b>	Poster has: name, each participating member's name, construction phasing roadway cross section(s), phasing and signal timing diagram, and total cost estimate. Firm utilizes the poster during the presentation.	5
<b>Total Points</b>		<b>55</b>

### Judging Criteria

Category	Possible Score
<b>Final Report</b>	
<b>Site Plan</b>	20
<b>Roadway Profiles</b>	10
<b>Construction Phase Schedule</b>	10
<b>Signal Timing and Phasing or Justification for Unsignalized Intersection</b>	10
<b>Typical Cross Section Sheet</b>	10
<b>Opinion of Probable Cost</b>	10
<b>Level of Service Calculations</b>	10
<b>Project Summary</b>	20
<b>Presentation/Q&amp;A Session</b>	50
<b>Poster</b>	5
<b>Overall Formatting/Completeness</b>	5
<b>Total Points</b>	<b>160</b>

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## **WATER RESEARCH PAPER**

**Competition Date:** Thursday, April 19, 2018

**Competition Location:** Sacramento State Campus

**Summary:**

The Mid-Pacific Student Water Research Competition is an initiative to promote the education of undergraduate/graduate students in various water and wastewater related topics. Winners of the competition receive a cash prize.

**Submission Deadline:**

Please submit your paper (in PDF format) and an oral presentation PowerPoint (or equivalent) by Saturday, March 17, 2018 at 11:59 PM PST.

**Contact:**

Any questions regarding the Water Research Paper Competition may be sent to:

Stefanos Word

[2018midpacwaterresearch@gmail.com](mailto:2018midpacwaterresearch@gmail.com)

## TOPIC

This year's topics should focus on research relating to sustainable water infrastructure.

Examples include:

- Research findings, including literature reviews, field studies, experimental work, or mathematical modeling studies on sustainable water infrastructure.
- "Water infrastructure" can include, but not limited to, infrastructure related to management, collection, storage, treatment, or distribution, for example, as applied to water supply, storm water, groundwater, or water/wastewater treatment, and flood control.
- Topics related to sustainable water infrastructure such as asset management, surface water or ground water resources management, policies, regulations, small- or large-scale collection and treatment systems.
- Papers or research describing alternative methods for water/wastewater treatment infrastructure that reduce the need for large, costly systems. A focus could be directed towards green technologies.
- Papers describing strategies for storm water planning and management. Focus could be directed towards low-impact development (LID) strategies/"sponge" cities, green infrastructure, or methods to decrease the imperviousness of an urban environment.

## PAPER

The paper must include/will be:

- Limited to 8 total typed pages, including an abstract of no more than 350 words.
  - An appendix, if included, will not count against either the final page or word count; however, the appendix should be clearly marked as such in the report.
  - Any Bibliography or References section is excluded from the final page count.
- 1" margins, 12-point Times New Roman font, with line spacing set to 1.5. Pages must be numbered.
- A descriptive title.
- Author's full name, department and university address, and email.
- Name(s), title(s), and role(s) of any individual(s) who reviewed, supervised, or contributed to the work

The paper should generally include the following, although not all may be applicable to a given topic:

- An introduction, which should include citations of published related work to assess previous research and identify the gaps in knowledge of the topic, as well as a statement of the objectives of the work.

- Sections on methods, results, discussion, and conclusions, and an appendix (appendices will not count against page count).
- An acknowledgment section following the conclusions, which may include any credits for funding or for assistance in the study. Faculty advisors cannot be listed as coauthors; however, they may act in an advisory capacity, and should be listed in an acknowledgment. A list of references, alphabetized by the last name of the first author cited. Students are encouraged to use Water Environment Research reference formatting guidelines, which can be found at the following website:

<https://wef.org/resources/publications/journals/water-environment-research/guidelines-for-submitting/>

The references section will not count against the final page or word count. References must be cited in the paper as follows: (last name(s), year of publication), e.g., (Vargas, Roberts, and Lee, 2017) or “Vargas, Roberts, and Lee (2017) evaluated...”

## ORAL PRESENTATION

- Each paper must be presented at the conference.
- Presentations must be no longer than 5:30 minutes in duration ( $\pm$  10-seconds without penalty).
  - Presentations that go beyond the 10-second allowance will receive a 0.05-point penalty per second difference from the buffer, i.e. a final time of 6:00 or 5:00 would each receive a 1-point deduction for being 30 seconds outside of the buffer.
- A 5-minute question and answer period will immediately follow the presentation.
- Presentations should be accompanied by a visual aid of some kind (e.g. PowerPoint). The laptop that will be available at Mid-Pac 2018 will be able to open Microsoft PowerPoint and Word files, but specialized software such as Prezi or video players may not be available.

## COMPETITION SCORING

Scoring will be out of 100 points total, with a maximum of 75 points for the paper and a maximum of 25 points for the oral presentation, as follows:

Paper Scoring Criteria	Score	Presentation Scoring Criteria	Score
Technical content and adherence to topic	/45	Technical content and adherence to topic	/10
Use of prior research and references	/5	Organization of presentation, use of appropriate visuals and tables	/5
Clarity, format, professional quality, and organization of paper	/10	Quality of oral presentation	/5
Writing quality: mechanics, grammar, sentence structure, interesting to read	/10	Ability to answer questions	/5
Use of visuals, tables, supporting data or information	/5	Time penalty (5:30 min $\pm$ 10 sec)	
<b>Paper Sub-Total</b>	<b>/75</b>	<b>Presentation Sub-Total</b>	<b>/25</b>
Overall Score		/100	

The overall scores will be tallied and the papers ranked accordingly. Prizes will be awarded as follows:

1st place: \$100

2nd place: \$75

3rd place: \$50

## AUTHORSHIP AND SUBMISSION REQUIREMENTS

### Authorship

Only one contestant from each participating school may enter the competition and write the paper. The paper must be written and presented by the same individual unless warranted by extenuating circumstances (e.g., documented health emergency). Authors must be registered as an undergraduate or graduate student at the time of submittal and presentation of the paper.

### Submission Requirements

The paper shall be sent electronically (PDF format) to [2018midpacwaterresearch@gmail.com](mailto:2018midpacwaterresearch@gmail.com).