ASCE 2018 MID-PACIFIC STUDENT CONFERENCE

MAILER I

October 14, 2017

Mid-Pacific Student Conference Participants,

The American Society of Civil Engineers Student Chapters at the University of the Pacific and California State University, Sacramento are pleased to announce the 2018 Mid-Pacific Student Conference. We are excited to welcome you all to our community and we are thankful for the chance to host this conference.

This mailer is the first of three that will be released over the next several months. Each mailer will include various information related to the competition, and will be updated with each successive mailer. ***Please do not delete this mailer***, as it contains valuable information for your various competition teams. Included in this mailer are:

- Deadline Information
- General Conference Schedule
- Receipt Confirmation
- School Registration
- Hotel Information
- Conference Scoring System
- Eligibility Requirements for Advancement to National Competitions
- Competition Rules and Contacts

Please confirm that you have received this mailer by completing the receipt confirmation form by November 13, 2017. The school registration deadline is December 3, 2017. The conference will take place on April 19 - 21, 2018. If there are any questions or comments about the content of this mailer, please feel free to email us at 2018midpachost@gmail.com.

The 2018 Mid-Pacific Conference website's link is below. This website contains vital competition information, such as mailers and rules, so please visit this site regularly.

http://midpac2018.weebly.com/

We, at Sacramento State and the University of the Pacific, are very excited to be hosting the conference this year! We hope this mailer answers all current questions and gets all of your teams excited for this year's competition. We look forward to seeing you in April!

Sincerely,

Taylor Myers
2018 Mid-Pacific Student Conference Coordinator

Daryll Mendoza
2018 Mid-Pacific Student Conference Coordinator

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DEADLINE INFORMATION

DUE DATE	INFORMATION DUE
October 14, 2017	Mailer I Released
November 13, 2017	Mailer I Receipt Confirmation
December 3, 2017	School Registration
January 22, 2018	Mailer II Released
March 4, 2018	Mailer II Receipt Confirmation
March 15, 2018	Individual Attendee Registration
March 17, 2018	Concrete Canoe Technical Paper Geo-Wall Design Paper Daniel W. Mead Paper Transportation Technical Paper Water Research Paper Water Treatment Technical Paper
March 25, 2018	Mailer III Released
April 2, 2018	Mailer III Receipt Confirmation
April 6, 2018	Late Individual Attendee Registration
April 15, 2018	Concrete Canoe Presentation Geo-Wall Design Poster Daniel W. Mead Presentation Transportation Poster Water Research Presentation Water Treatment Presentation
April 19 – 21, 2018	2018 Mid-Pacific Conference

TENTATIVE CONFERENCE SCHEDULE

Thursday, April 19, 2018	• Registration
	• Welcome Meeting
	• Captains Meetings
	• Presentations:
	  ○ Concrete Canoe
	  ○ Daniel W. Mead Paper
	  ○ Geo-Wall
	  ○ Steel Bridge Aesthetics Judging
	  ○ Transportation
	  ○ Water Treatment
	  ○ Water Research Paper

Friday, April 20, 2018	• Competitions:
	  ○ Concrete Canoe Display and Races
	  ○ Mini Games
	• YMF Social

Saturday, April 21, 2018	• Competitions:
	  ○ Geo-Wall
	  ○ Steel Bridge
	  ○ Water Treatment
	• Business Meeting
	• Awards Banquet

RECEIPT CONFIRMATION

To confirm that your school has received Mailer I for the 2018 Mid-Pacific Conference, please complete the “Receipt Confirmation” form by using the link below.

https://goo.gl/forms/R8nqrdGh804Wv8iB2

This form is due on November 13, 2017. If you have any questions regarding the “Receipt Confirmation” form, please contact us at 2018midpachost@gmail.com.

SCHOOL REGISTRATION

School registration for the 2018 Mid-Pacific Student Conference will be completed online using the following CashNet site:

https://commerce.cashnet.com/01ASCE

The deadline to register your school is December 3, 2017. There is a $100 penalty for late-registration. If you have any questions regarding school registration, please contact us at 2018midpachost@gmail.com.

HOTEL INFORMATION

Kimpton Sawyer and Vagabond Inn are the recommended hotels for the conference. There are a limited number of reserved rooms at these hotels so we recommend booking at these hotels as soon as possible.

Kimpton Sawyer Hotel
(877) 678-6255
500 J Street
Sacramento, CA 95814
https://www.kimptonhotels.com/stay/kimpton-sawyer-hotel-sacramento-ca
Details:

- Estimated price per room per night: $169
- Parking fee per car per night: $20
- To book, call and ask for the "Mid-Pacific 2018 Conference" or use the following link: https://gc.synxis.com/rez.aspx?Hotel=68506&Chain=10179&arrive=4/19/2018&depart=4/22/2018&adult=1&child=0&group=G59

Vagabond Inn
(916) 446-1481
909 3rd Street
Sacramento, CA 95814
http://www.vagabondinn.com/vagabond-inn-executive-sacramento-old-town
Details:

- Estimated price per room per night: $120
- One complimentary parking space included per room
- To book, contact Jana Gage at msacoldtown@vagabondinn.org or (916) 446-1481

If your school does not wish to book with Kimpton Sawyer or Vagabond Inn, here is a recommended available hotel. We did not reserve rooms at this hotel.

Holiday Inn Sacramento Downtown – Arena
(916) 446-0100
300 J Street
Sacramento, CA 95814
https://www.ihg.com/holidayinn/hotels/us/en/sacramento/saccp/hoteldetail?cm_mmc=YextLocal-_-USA-_-SACCP
Details:

- Estimated price per room per night: $129
- Approximately 50 rooms available
- Shared garage parking: varies from $18 - $25 per day

CONFERENCE SCORING SYSTEM

Below is the scoring system that will be used to determine the overall Mid-Pac score for each school. Points are distributed for participating and placing in each competition. The school which earns the most amount of points wins first place overall for Mid-Pac. The total amount of points possible is 145.

Event	1st	2nd	3rd
Concrete Canoe	20	15	10
Steel Bridge	20	15	10
Water Treatment	20	15	10
Geo-Wall	20	15	10
Transportation	15	10	5
Water Research Paper	15	10	5
Mead Paper	15	10	5
Concrete Frisbee	5	4	2
Volleyball	5	4	2
Tug-O-War	5	4	2
Three-Legged Race	5	4	2

Eligibility Requirements for Advancement to National Competitions

The following qualifications are required of all ASCE Student Organizations in order to participate in an ASCE-sponsored National Competition.

1. Be in good standing with ASCE:

    a. Have submitted their Annual Report and paid their Annual Dues, as received by ASCE, prior to the start of the Student Conference; and

    FOR CONCRETE CANOE ONLY - Have submitted their student chapter full Annual Report in time to be graded (reports submitted on or before February 1, 2018 meet this qualification), and have scored within the top two-thirds (2/3) of all student chapters. **Student Chapters that submit an EZ annual reporting form do not qualify**; and

    b. Act appropriately. As representatives of ASCE and the civil engineering profession, all competition and conference participants are expected to and must act professionally and courteously. The use of alcohol, marijuana, or other controlled substance is strictly prohibited.

    Note: Invitations to Conference and National Competitions are a privilege, not a right. Failure to act appropriately can result in letters of reprimand, mandatory behavior management plans, and loss of invitations to further competition for individual institutions and/or entire conferences.

2. Attend and participate in their assigned Student Conference as shown through their school's:

    a. Good faith participation in the Student Conference Business Meeting (at least one (1) student representative present at the **start** of the Business Meeting);

    b. Good faith participation in the Student Conference Paper Competition, including submission and presentation by at least one (1) member of the ASCE Student Chapter, not necessarily a member of the concrete canoe team; and

    c. Meeting any additional requirements of Student Conference participation set by the Student Conference at the previous year's business meeting or in their written and approved by-laws, standing rules, or constitution.

COMPETITION RULES AND CONTACTS

CONCRETE CANOE

Competition Date: Thursday, April 19, 2018

Friday, April 20, 2018

Competition Location: Sacramento State - Thursday

Rancho Seco Lake - Friday

Summary:

The Concrete Canoe competition provides civil engineering students an opportunity to gain hands-on experience, leadership skills, knowledge of concrete design and mixture, creativity, and stamina. Organizers, sponsors and participants are dedicated to building awareness of concrete technology and application, as well as the versatility and durability of concrete as a construction material, among civil engineering students, educators, practitioners, the concrete industry and the general public.

Rules and Resources:

For the rules and additional resources, please use the following link:

http://www.asce.org/rules-and-regulations/

The Mid-Pacific concrete canoe competition is a qualifying round to participate in the national concrete canoe competition. To participate in the national concrete canoe competition, please refer to the "Eligibility Requirements for Advancement to National Competitions" section for information.

Contact:

Any questions regarding the Concrete Canoe Competition may be sent to:

Alex Hubbell

2018midpaccanoe@gmail.com

DANIEL W. MEAD PAPER

Competition Date: Thursday, April 19, 2018

Competition Location: Sacramento State Campus

Summary:

The National Competition was established and endowed in 1939 by Daniel W. Mead, Hon.M.ASCE, a Society Past-President. The contest provides an opportunity for civil engineers to further their professional development and gain national attention.

Resources:

The National-level Daniel W. Mead student paper competition rules are published on the website located below: http://www.asce.org/mead-student/

The same topic and rules will be used at the Mid-Pacific Conference, but the Mid-Pacific Conference Competition also includes an oral presentation component.

Please be advised that the submittal to the Mid-Pacific Conference Mead Paper Competition should not be confused with the National Daniel W. Mead nomination. Although the same topic and rules are used for both competitions, they are separate competitions with separate submittal requirements for each.

Please refer to the website http://www.asce.org/mead-student/ for submittal requirements and specifications for the national Daniel W. Mead Student paper competition.

Contact:

Any questions regarding the Mead Paper Competition may be sent to:

Aimee Mahoney

2018midpacmead@gmail.com

TOPIC

"How does the personal and professional use of social media relate to the ASCE Code of Ethics?"

The following considerations can be used to stimulate, but should in no way limit, the discussion:

- Social media is used daily for sharing, marketing, networking, and providing personal comments on issues. Should your social media posts define you as a civil engineer? Should they be grounds for your employer to discipline or terminate you?
- Is it good practice to share news stories about failing infrastructure, comment about fellow engineers/contractors, post information about upcoming contracts, or send pictures of job sites or engineering plans?

MEAD PAPER RULES

1. Papers for the Mid-Pacific Student Competition shall:
    a. be limited to one paper from each Student Organization
    b. not exceed 2,000 words in length
    c. be written by only one person
    d. not have previously been published in other than school or Society publications.

2. Reference citations of the papers used should conform to official ASCE Journal Submission Guidelines, which can be found on the ASCE Publications Website: http://ascelibrary.org/page/authors

3. A complete bibliography should also be included, if appropriate. The bibliography will not count towards total word count.

4. Authors must be undergraduate students and both ASCE Student Organization members and ASCE national student members in good standing at the time of submission.

MID-PACIFIC STUDENT CONFERENCE MEAD PRESENTATION RULES

1. Each entrant must formally present his or her paper at the Mid-Pacific Conference. Presentations must be 5 minutes in duration (+/- 5 seconds without penalty.) Please see the scoring rubric for further scoring details.

2. Presentations must be accompanied by visual aids.

    a. The host chapter will provide a projector and screen.
    b. Any additional equipment shall be furnished by the presenter.
    c. The specifications of the meeting room and type of useable input for the projector will be provided in Mailer II.

3. The host school will not provide a timer for the presenter's use. The presenter may ask someone in the audience to help keep track of the time, but shall not distract the judges.

4. At the end of each presentation, the judges will have up to (5) minutes to ask questions.

Judges may choose to limit audience members to those individuals associated with the presenter's university. Audience policies will be announced at the Captains' meeting held prior to the presentations.

PAPER FORMAT

1. Use 12-point Times New Roman or Arial font, single spaced, using normal width character spacing, and 1-inch margins on all sides
2. Include paper title, author name, and university at the top of the first page.
3. Sequential page numbers shall be placed at the bottom of each page and centered.

SUBMITTAL REQUIREMENTS

The deadline for the Mid-Pacific Student Conference Mead Paper is 11:59 PM on March 17, 2018.

Submit to: 2018midpacmead@gmail.com

Submittal file format: A single PDF file that includes only the following:

1. A cover letter with the title of the paper, the author's name, the name of the school the author is competing for, a mailing address, and an e-mail address.

2. The paper being submitted.

File name format:

Mid-Pac Mead Paper – Author's last name – Name of University.pdf

SCORING AND AWARDS

1. The paper and presentation carry equal weight of 50 points each, for a maximum overall score of 100 points, as shown in the rubric below.
2. Judges will score the paper and presentation individually. The average of the judges' scores for each author/presenter will be ranked to determine final placement.
3. Awards will be given as follows:

1st place: $100
2nd place: $75
3rd place: $50

Paper Scoring Criteria	Score
1. Adherence to topic	/10
2. Evidence of original ideas and research	/10
3. Command of subject matter	/10
4. Spelling, grammar, length (2,000 word maximum)	/5
5. Overall clarity, organization, quality of paper and references	/15
Presentation Sub--Total	**/50**

Presentation Scoring Criteria	Score
1. Degree to which presentation addressed and supported key concepts of written paper and theme of contest	/10
2. Ability to communicate key concepts from written paper and to convince audience of their importance. Ability to address and answer questions effectively	/25
3. Nonverbal communications: appearance, poise, eye contact, natural speaking style	/5
4. Presentation skills: Delivery style (i.e. reading, memorized, conversational); pronunciation and proper use of technical language and grammar; enthusiasm and voice projection	/5
5. Time (5 minutes +/-- 5 seconds) (Beyond 5--second allowance: 0.05-point penalty per second difference from required 5 minutes, i.e. 5:20 or 4:40 = 1 point penalty)	/5
Presentation Sub--Total	**/50**

Errors in logic or facts (up to 10 points penalty)	/-10
OVERALL SCORE	**/100**

GEO-WALL COMPETITION

Competition Dates: Thursday, April 19, 2018

Saturday, April 21, 2018

Competition Location: Sacramento State Campus

Summary:

The objective of the Geo-Wall competition is to design and build a model mechanically stabilized earth (MSE) retaining wall using paper reinforcement attached to a poster board wall facing. Students are to design a MSE wall using the least amount of reinforcement needed to support the retained soil and design loads, and effectively communicate their analysis and design processes.

Contact:

Any questions regarding the Geo-Wall Competition may be sent to:

Robby Wikoff

2018midpacgeowall@gmail.com

DESIGN REPORT SUBMISSION:

The complete Design Report must be submitted in PDF format via email to the Mid-Pac Geo-Wall Coordinator, 2018midpacgeowall@gmail.com, by 5:00 pm PST on March 17, 2018. Subject line must include "Geo-Wall 2018 Report Submittal." The sender will receive confirmation of receipt by e-mail. Any changes or corrections made to the design report after this time will incur a penalty (see Section 11).

DESIGN POSTER SUBMISSION:

The complete Design Poster must be submitted in PDF format via email to the Mid-Pac Geo-Wall Coordinator, 2018midpacgeowall@gmail.com, by 5:00 pm PST on April 15, 2018. Subject line must include "Geo-Wall 2018 Poster Submittal." The sender will receive confirmation of receipt by e-mail. Any changes or corrections made to the design report after this time will incur a penalty (see Section 11).

RULES

1. **Objective** – The objective of the Geo-Wall competition is to design and build a model wrapped faced segmental mechanically stabilized earth (MSE) retaining wall using kraft paper. The competition objectives are for students to:
    a) Design a wrapped face segmental MSE wall using the least amount of facing and reinforcement material needed to support the retained soil plus both vertical and horizontal surcharge loads.
    b) Effectively communicate their analysis and design processes.
    c) Enjoy a friendly but spirited competition among schools.
    d) Attend a world-class professional engineering conference.
2. **Background** – MSE walls have root to prehistoric builders who used sticks and branches to reinforce soil structures. The modern use of reinforced soils dates to the 1960s and French architect Henri Vidal's development of the Reinforced Earth® system. In the US, the first MSE wall was built on California SR-39 near Los Angeles in 1971. A more recent development in MSE walls is the wrapped face segmental wall as shown in Figure 1. This year's competition will model this development of MSE walls by requiring teams to design and construct a wrapped face retaining wall.

Figure 1: Typical wrapped face MSE walls

3. **Eligibility** – Only one team per school will be allowed to compete. A team consists of a maximum of four (4) students consisting of not more than two (2) graduate students. Each team shall designate a captain who shall be the point of contact for the team. All team members must be enrolled students at the date of the national competition.

4. **Design Report Submittal** – Invitation to the National Competition will be based upon submittal and ranking of the Wrapped Face Segmental (MSE) Wall Design Report. The report must include:
    a) Cover page with name of institution; names and status (graduate, undergraduate) of each team member; identification of team captain with email address; and name, title, and email address of faculty advisor.
    b) Material properties used in design including methods (lab tests, correlations, assumptions) used to obtain the properties.
    c) Description of the engineering design and construction procedures including assumptions and equations used.

d) A complete description of the geometry and placement of all wrapped face MSE wall elements. Estimated mass of the facing and reinforcing paper in grams and total length of kraft paper required to construct the wrapped face MSE wall.
e) A safety appendix (Appendix D) which outlines the potentially hazardous tasks reasonably expected during the competition and how the team will mitigate these hazards.

Formatting requirements:

a) Length shall be a maximum of three (3) pages long (not including references, cover page, or safety appendix). *Over-length design reports will not be reviewed.*
b) One inch margins, single spaced, and 12 point Times New Roman font.
c) All pages after the cover page shall contain a header identifying the team and a footer with the page number.
d) Entire design report must be submitted in a single PDF format file with a filename of "<School Abbreviation>2018Geo-Wall.pdf".

Design reports will be judged by a panel of practicing engineers and professors. Judging will consider reasonableness of design equations, material properties, factors of safety, assumptions, and satisfaction of the objective of this competition. "Trial and error" designs will be heavily penalized. *Teams not submitting designs for a "**wrapped face segmental**" MSE wall will be disqualified*. The judging rubric is presented in Appendix C.

Complete design report must be submitted in PDF format via email to the Mid-Pac Geo-Wall Coordinator, 2018midpacgeowall@gmail.com by 5:00 pm PST March 17, 2018. The subject line must include "Geo-Wall 2018 Submittal." The sender will receive confirmation of receipt by e-mail. Any changes or corrections made to the design report after this time will incur a penalty.

5. **Sandbox** – The wrapped face segmental MSE wall will be constructed within an apparatus hereafter referred to as a sandbox. Each team shall bring their own sandbox to the competition. Painting and addition of school or sponsor logos and other decorations to the exterior of the sandbox is highly encouraged. The sandbox shall be made up of a bottom and four vertical sides with no top. The front panel will be removable as shown in Figure 2. The removable box panel will be in place during wall construction and removed after construction to expose the wrapped face segmental MSE wall. The sandbox will also include two PVC piles used to apply the horizontal load. Dimensions of the sandbox and the PVC piles are shown in Figures 2 through 4. The sandbox shall meet the following requirements:

a) Have exterior walls and base constructed of any grade of plywood not to exceed ¾ -inch (19 mm) thick.
b) Have planar inside surfaces with the natural plywood finish.
c) Have a removable front as shown in Figure 2. Panels must be flush with the base of the box and held in place with threaded inserts, screws, hinges or other easily removable fasteners.
d) Have a full-sized base such that it extends no more than ¾ inch (19 mm) beyond the base of the wall once the front panel has been removed.
e) Include a steel tie rod designed to keep the two fixed sides of the box parallel after removal of the facing panel.
f) Include circular guides to ensure bases of the PVC piles are held in the correct location. A temporary template may be used to control alignment at the top of the piles.
g) Any templates used must be removed after wall construction and before testing.
h) All dimensions of the sandbox shall be as shown in Figures 2 and 3.

For convenience, sandboxes may be designed so they can be transported as flat pieces and reassembled at the competition site.

Sandboxes and PVC piles will be checked for compliance at the pre-competition captains' meeting. Teams will have until 9:00 AM local time the day of the competition to correct any compliance issues. Any team with a sandbox and/or PVC piles out of compliance at the start of the competition will be penalized.

6. **Piles** – Two vertical piles will be used to apply the horizontal load to the backfill behind the wall. Each team will provide their own piles. Piles will be fabricated out of 1-½" schedule 40 PVC pipe. Please see Figure 2 for the pile locations and length requirements.

7. **Backfill Material** – The backfill material will be sand provided by competition organizers on site. The sand will be a clean, dry, rounded to sub-rounded sand with grain size as specified in Table 1 and Figure 5. The backfill material must be used as-is: no water, additives, or chemical stabilizers may be placed in the backfill material.

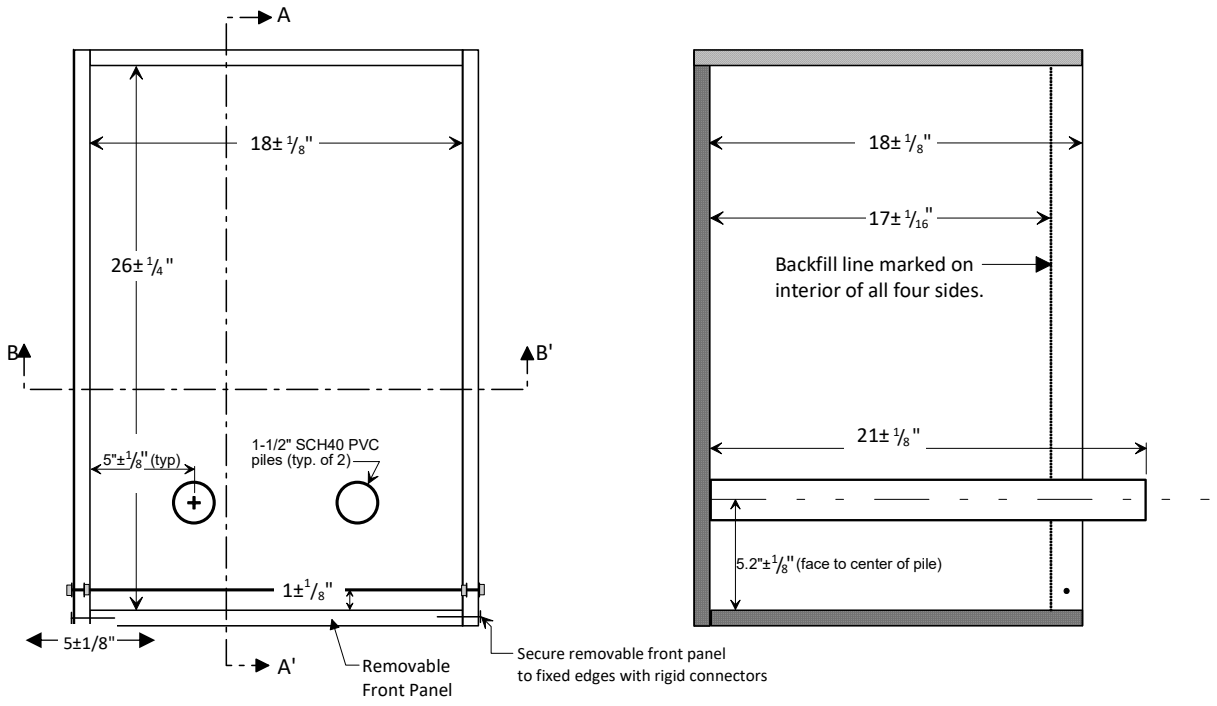
   Competition organizers will make reasonable efforts to ensure the competition backfill materials meet the specifications in Table 1 and Figure 5. Teams will be allowed to examine a sample of the competition backfill at the captains' meeting. No backfill samples may be removed from the meeting room. Teams may modify their wall design at this time if they desire. See section 11 below.

Table 1: Representative anticipated grain-size distribution for Geo-Challenge competition sand.

Typical Distribution		**Lower Bound**		**Upper Bound**	
Size (mm)	**% Passing**	**Size (mm)**	**% Passing**	**Size (mm)**	**% Passing**
2.00	100.0	1.30	100.0	2.50	100.0
1.70	96.8	1.20	96.9	2.30	96.9
1.18	41.8	1.15	93.7	2.10	93.7
1.00	15.8	0.80	38.7	1.60	38.7
0.85	3.3	0.60	12.7	1.30	12.7
		0.50	2.0	1.10	2.0

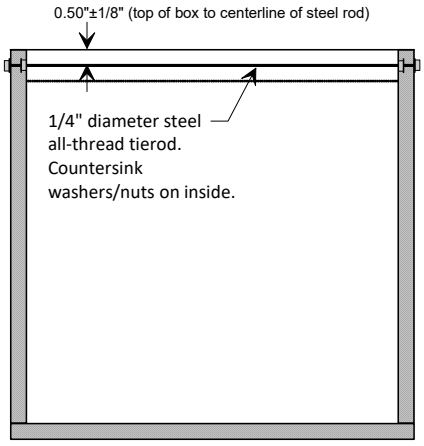
8. **Wall Materials** – Materials will be provided by competition organizers on site. See Appendix A for detailed specifications. Facing and reinforcement for the wrapped faced segmental MSE wall will be prepared from 60 lb kraft paper. Quantity of kraft paper will be measured by mass to the nearest 0.01g. There are no restrictions on the shape or geometry of the wall elements, except that all wall elements must be cut from kraft paper and must satisfy the constraints of *a wrapped face segmental* MSE wall. The teams must specify in their report the length of the 24-inch wide kraft paper required for their design during the competition.

Competition organizers will make reasonable efforts to ensure the wall materials meet the specifications in Appendix A. Teams will be allowed to examine small samples of the reinforcing material at the captains' meeting. No reinforcing material samples may be removed from the meeting room. Teams may modify their wall design at this time if they desire. See section 11 below.



Top View

Section A-A'

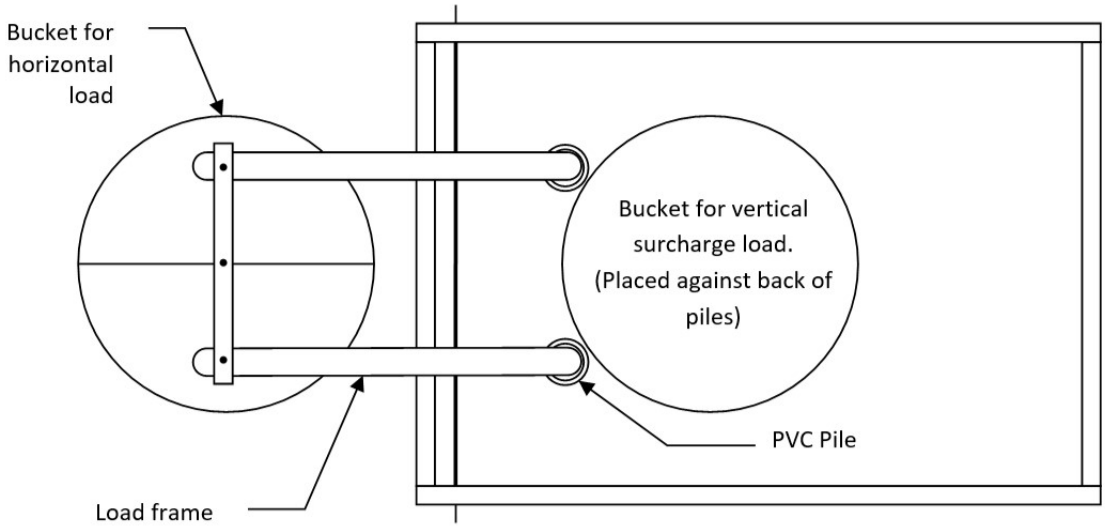


Section B-B'

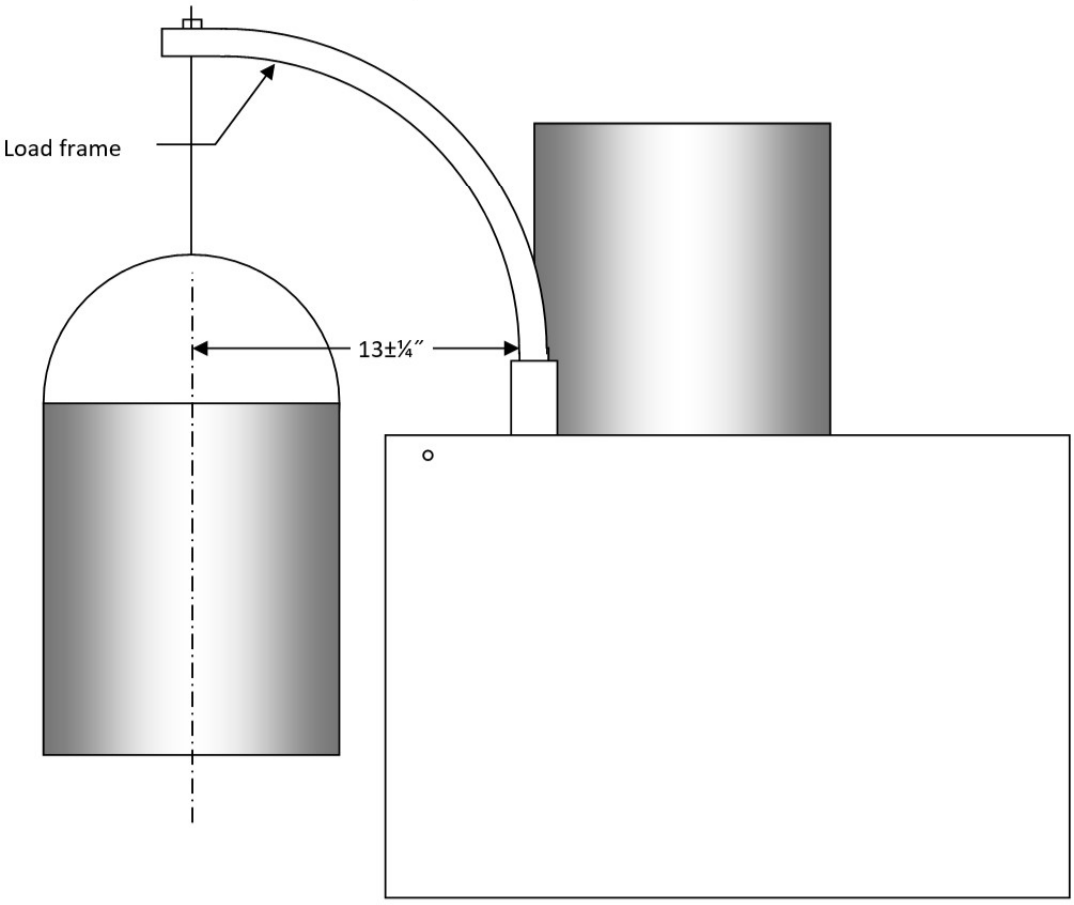
Notes:

- Box to be fabricated of 23/32" or 3/4" plywood except as noted
- Tie rod must be ¼" threaded steel rod with washers and nuts as needed
- Handles or knobs may be attached to outside of front panel to aid in removal
- Interior surface of box must be natural wood and unmodified
- Exterior of box may be painted, coated, and decorated with school logos etc.; anything goes on the outside of the box.

Figure 2: Sandbox dimensions (not to scale)



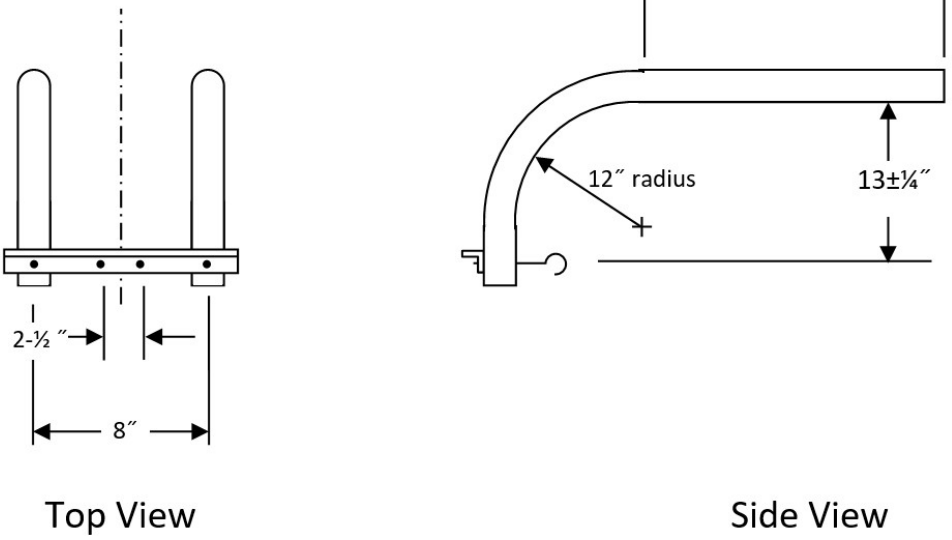
Top View

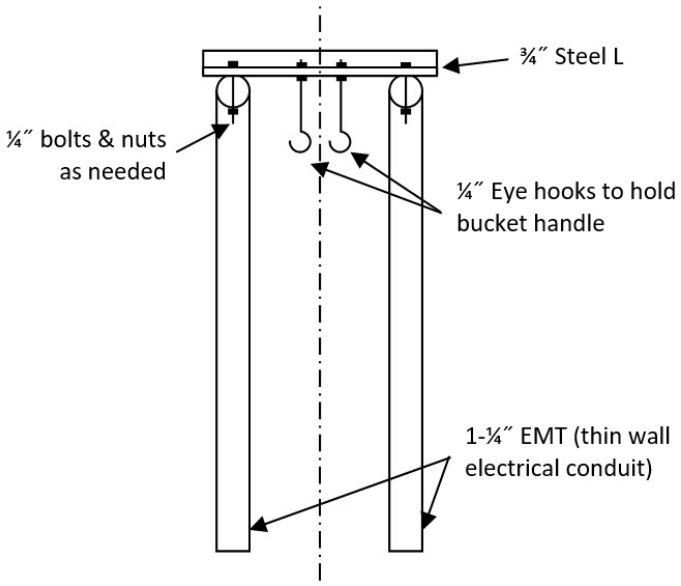


Side View

s

Figure 3: Load Placement (not to scale)





Front View

Figure 4: Dimensions of Horizontal Load Frame (not to scale)

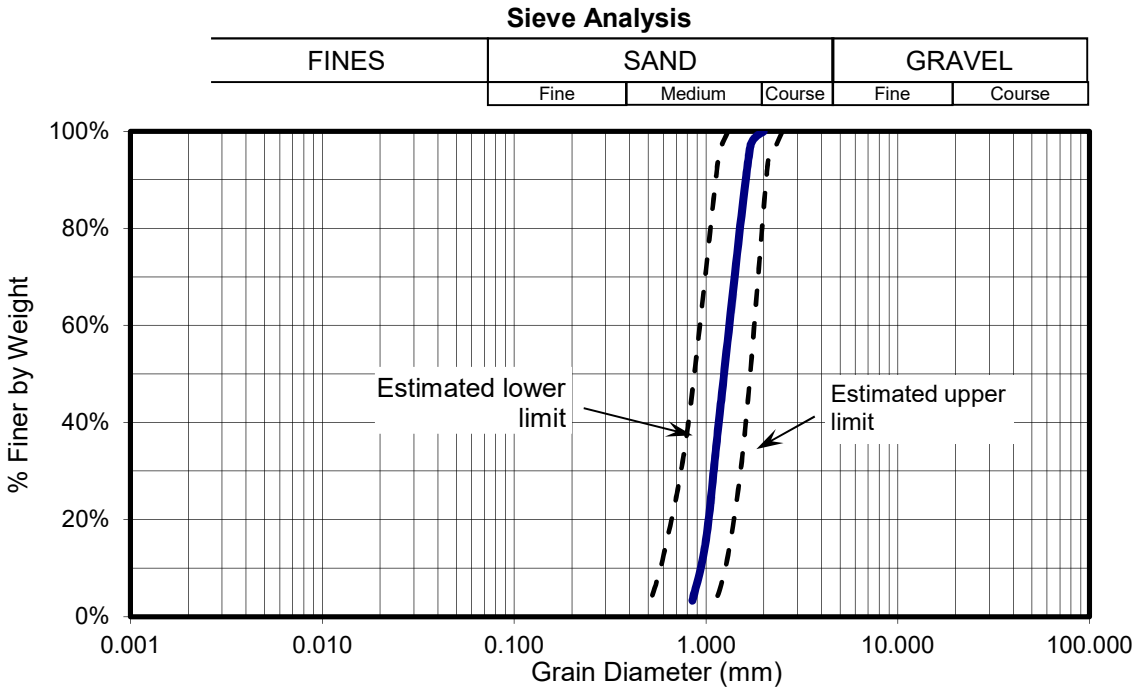


Figure 5: Estimated grain size distribution of backfill sand

9. **Construction Tools** - The following construction tools may be used and must be provided by the competing team (quantities of these items shall not be restricted):

    a) Pencils, pens, and markers
    b) Rulers and straight edges
    c) Levels
    d) Manually operated cutting instruments (e.g., scissors, utility knifes, safety razor blades, hole punch)
    e) Cutting boards or mats
    f) Design notes, calculations, and drawings
    g) Material handling and compaction tools consisting of any hand operated devices.
    h) Screwdrivers (battery operated drills or screwdrivers may be used, but only to remove fasteners when removing the facing panels)
    i) Temporary templates for use in any stage of competition. These templates may be made of any material, must not have any moving parts, and must be removed at the end of any stage in which they are used.

    Buckets and shovels will be provided by the competition organizers. It may be necessary for teams to haul backfill a distance up to 20 feet.

10. **Execution** – Construction and testing of the wall will be done in the following stages:

a) **Reinforcement Fabrication Stage** – Each team will be provided with 60 lb kraft paper (as mentioned in their design report). The team must fabricate all their wrapped face segmental MSE wall elements from those sheets using authorized construction tools. Twenty (20) minutes will be allotted for this stage. Teams will be penalized for time exceeding the time limit. After all wrapped face MSE wall elements are fabricated, excess material will be disposed of and the judges will weigh the reinforcing elements to the nearest 0.01 grams.

b) **Construction Stage** – After each team's wrapped face segmental MSE wall elements have been fabricated and weighed, the judges will instruct the team to start construction. During this stage the team constructs the wrapped face segmental MSE wall filling the box with sand so that the backfill line (see Figure 2) is covered and the backfill is level, and places the empty 5 gallon vertical surcharge bucket on top of the sand. The facing material must be in direct contact with the inside of the sandbox at all times during this stage. The tie rod may be removed from the box at the start of this stage, but it must be in place before any sand is placed in the box. Temporary templates or guides may be used during this stage so long as they are removed before the end of the stage.

   The construction stage is complete when the wall is in place, the sand backfill covers the sand fill line and is level, any temporary templates or guides have been removed, and the empty vertical surcharge loading bucket is in place. Twenty-five (25) minutes will be allotted for this stage. At the end of the phase, judges will check fill placement and the placement of the empty vertical surcharge loading bucket to ensure that they meet the requirements.

c) **Loading Stage** – Details of the load placement are shown in Figure 3. This stage occurs in three steps: 1) removal of front panel, 2) placement of vertical surcharge, and 3) placement of the static horizontal surcharge load. During each step, the wall will be checked for the following three criteria: 1) excessive deformation (any portion of the wall extending outside imaginary planes extending vertically from base of sandbox), 2) excessive soil leakage (more than 30 cm^3 of sand passing out of the sandbox), and 3) catastrophic failure. The team will be penalized for excessive soil loss and excessive deformation. The team will be disqualified for a catastrophic failure.

   i. When directed by judge, the team shall remove the front panel of the sandbox. After the panels are removed, the judge will wait one (1) minute and then check the three criteria.
   ii. If the wall does not fail catastrophically, the team will then place 50 lbs of sand in the vertical surcharge bucket. The team will have one (1) minute to place the load. After the load is placed, the judge will wait one (1) minute and then check the three criteria.
   iii. If the wall does not fail catastrophically, the team will hang an empty 5 gallon bucket on the loading frame and place 20 lb of sand in the bucket (see Figure 4). The team will have one (1) minute to complete this loading sequence. After the sequence is complete, the judge will wait one (1) minute and then check the three criteria. The horizontal load frame will be provided by the competition organizers. Teams should not bring their own load frames to the competition.

11. **Design Changes** – Teams may change their design between the time the design report is submitted and the wall is tested. The adjusted mass of the reinforcing material used for scoring, *M*, will be computed as

$$M = m_A + (m_D - m_A + 0.50)^2 \quad (1)$$

Where,

M = adjusted mass (g) rounded to two decimal places
m_D = reinforcing mass (g) reported in design report
m_A = reinforcing mass (g) used during competition

Teams may also change the requested length of the 60 lb kraft paper between the time the design report is submitted until 9:00 AM local time the day of the competition. The official length of the kraft paper used for the scoring will be computed as the greater of a) the average of the length requested in the design report and the length requested at any point after the submission of the design report until 9:00 AM local time the day of the competition or b) the length requested at any point later after the submission of the design report until 9:00 AM local time the day of the competition. The official length will be rounded up to the next half foot (6 inches).

12. **Scoring** – After completion of the loading stage, the score for each team will be computed using the following formula:

$$Score = R + 15(60 - M) + 5(10 - L) - 10N_{min} - 40N_{maj} - 2T - 20D \quad (2)$$

Where,

R = report score out of 50 points
M = adjusted mass of the wrapped face MSE elements in grams from Equation 1
L = official length of 60 lb kraft paper in feet as determined in section 11
N_{min} = number of minor rules violations
N_{maj} = number of major rules violations
T = total number of minutes over time limit for all phases each rounded up to nearest minute
D = deflection rating
8 if wall fails deflection criterion during initial loading without surcharge
6 if wall fails deflection criterion during vertical surcharge loading
4 if wall fails deflection criterion during horizontal surcharge loading
0 if wall passes deflection criterion for all loading phases

If the wall fails catastrophically during any loading step, the team will be disqualified.

a) **Minor Penalties**

i) Box dimension out of spec
ii) Pile location out of spec
iii) Any addendum to the design report required by judges which simply clarifies content but does not change the design
iv) Any other rule violation that in the opinion of the judges that has the potential to provide the team with a measurable but minor advantage

b) **Major Penalties**

i) Soil leakage greater than 30 cm^3 (volume of standard 1 oz. plastic medicine cup)
ii) Any addendum to the design report required by judges which results in a significant change to the design
iii) Any other rule violation that in the opinion of the judges has the potential to provide the team with a significant advantage, but does not warrant disqualification

c) **Disqualification** – Teams may be disqualified for the following:

i) Failure to design a *wrapped face segmental* MSE wall
ii) Failure to send a representative to the pre-competition captains' meeting
iii) Unsafe practices
iv) Design or construction techniques which violate the spirit of the competition and provide a large and/or unfair advantage
v) Catastrophic wall failure at any point during the loading

Scores will be recorded to the nearest tenth of a point. In the event of a tie the following criteria will be used, in order, to break the tie: 1) lowest actual reinforcement mass, 2) higher report score, 3) lowest deflection rating, 4) lowest length of reinforcement paper, and 5) judges' consensus of best decorated box.

The judges will follow the rules as published using reasonable judgment and interpretation. The head judge will be the arbiter of any disputes, which are to be brought forth solely by the Team Captain. Decisions of the head judge are final. Results posted at the competition are not subject to review after the competition.

Scoring Example: Assume a team constructs a wall with following characteristics

- Report Score: 48/50, R = 48
- Design report specifies 46.23 g. Reinforcement used is 47.01 g. From Equation 1,
$$M = 47.01 + (46.23 - 47.01 + 0.50)^2 = 47.53\ g$$
- Requested length in the design report was 6 feet. The requested length at the captain's meeting was 7.2 feet. Official length, L = 7.5 feet from section 12
- Minor deduction for two box dimensions out of spec, N_{min} = 2
- Execution times were
  - Reinforcement fabrication: 20:18 (18 sec over allotted time, round up to 1 min)
  - Construction: 26:05 (1:05 over allotted time, round up to 2 min)
  - Total time over: 3 min, T = 3
    Note: Only times over limit during each stage are counted. Teams get no benefit for times under the limit of any individual stage.
- Wall passed deflection test in initial loading without surcharge and during vertical surcharge loading phase, but failed deflection test during horizontal surcharge loading phase, D = 4

Using Equation 2, the final score would be

$$Score = 48 + 15(60 - 47.53) + 5(10 - 7.5) - 10(2) - 40(0) - 2(3) - 20(4) = 141.2$$

See Appendix B for scoring checklists.

13. **Pre-Competition Team Captains' Meeting** – A team captains' meeting will be held prior to the competition for the purposes of: checking sandboxes and PVC piles for compliance, establishing competition order, gathering team biographical information, and disseminating any logistical or administrative information. This is a MANDATORY meeting. Each team must have the team captain (or designee) present. All team members are encouraged to attend. Specific meeting time and location will be announced on the Geo-Wall website before the conference. Teams without a representative at the captains' meeting will be disqualified.

    Teams should bring their sandboxes, PVC piles, and any hardware or tools needed for assembly. Sandboxes and piles will be assembled and checked for compliance at the meeting. Teams will have until 9:00 AM local time of the day of the competition to correct any compliance issues identified during the captains' meeting. Any sandboxes or piles found out of compliance at the captains' meeting will be rechecked at this time.

GEOWALL COMPETITION APPENDICES

Appendix A: Material Specifications

- **Sand**:
  - Clean sand with grain size distribution as specified in Table 1 and Figure 5
  - Grain shape will be rounded to sub-rounded
- **Sandbox Material**:
  - Walls and Base: 23/32 or ¾-inch plywood, any grade
  - Pile guide: any wood material ¼-inch thick or less
  - Tie Rod: ¼-inch threaded steel rod with washers and nuts as needed
  - Fasteners: any suitable wood fasteners
- **Pile Material**: 1- ½-inch Schedule 40 PVC pipe
- **Horizontal Load Frame Materials**: These are recommended materials. Teams may fabricate their load frames out of any materials so long as they have the correct moment arm as shown in Figures 3 and 4. The load frames provided by organizers for the competition will use the following materials and meet dimensions shown in Figure 4.
  - 1 –¼-inch steel EMT conduit (thin wall electrical conduit)
  - ¾-inch steel L
  - ¼-inch bolts
  - ¼-inch eye hooks
- **Facing and Reinforcing Material**:
  - 60 lb Kraft Paper
  - Grammage: 97.7 g/m^2, 0.063 g/in^2
  - Office Depot® Postal Wrap Item # 444835 (2 ft x 50 ft roll)

Appendix B: Design Report Judging Rubric

Geo-Institute of the ASCE: GeoWall Design Paper – Scoring Form			
Reviewer Guidelines: 1) Place weight on the team ability for engineering reasoning not technical knowledge; 2) Place weight on team communication skills on procedures, findings, and observations; 3) Score in 0.5-point increments; 4) Team to be awarded higher score if design parameters were verified beyond assumptions and references			
Criterion	**Max**	**Actual**	**Notes**
1) Formatting, Mechanics, Grammar & Safety			
a. Paper length, margins & font are acceptable	2		Paper complies with specifications
b. Layout, or structure, of paper is logical	2		Paper organization is clear and supports the message
c. Grammar and punctuation are correct	2		Error free paper with writing that clearly presents design
d. Figures and tables are clear, properly numbered, captioned and referenced in the text	2		Good choice of tables vs. figures, clear presentation of data
e. References are reasonably formatted and complete	2		Quantity appropriate with correct citations and references
f. Appendix A and safety appendix (Appendix E) complete with reasonable controls	2		Clearly identifies key safety concerns and provides viable plans to keep team safe during competition
2) Experimental Methods, Analyses and Design:			
a. Methods to obtain soil properties	3		Experimental methods are reasonable and clearly described
b. Methods to determine reinforcement properties	3		Experimental methods are reasonable and clearly described
c. Methods to determine backfill-reinforcement interaction	3		Experimental methods are reasonable and clearly described
d. Engineering properties are reasonable	3		Backfill unit weight, friction angle, interface friction angle, reinforcement strength are compared to typical values

e. Earth-pressure calculations (backfill only)	3		Calculations are correct and presented in a logical, readily followed format
f. Vertical surcharge load included in the design	3		Considers both lateral loads on wall and effect on reinforcement pullout
g. Method used to compute pressure applied from laterally loaded piles addressed in report	3		Considers distribution of lateral loads on wall
h. Method used to account for segmental front face	3		Method and assumptions are reasonable
i. Determination of reinforcement length	2		Method and assumptions are reasonable
j. Determination of reinforcement spacing	2		Method and assumptions are reasonable
3) Engineering Reasoning and Communication			
The report is, on the whole, clear, precise, and well-reasoned. Engineering terms and distinctions are used effectively and in keeping with established professional usage. The report demonstrates a clear and precise analysis of the wrapped face segmental MSE wall design problem, very little or no irrelevant information is presented, key assumptions are identified, and key concepts are clarified. The authors have shown, through their report, excellent engineering reasoning and problem-solving skills.	10		Scores may range from 0 to 10. It is the opinion of the reviewer as to how the overall report measures up to the criteria listed under item 3 "engineering reasoning and communication".
Total	50		

Appendix C: Judges' Scoring Checklist for GeoWall Competition

C1: Captains' meeting—Box check

Team School:		**Deductions**	
Item	**Instruction**	**Minor**	**Major**
Plywood	☐ 23/32 or ¾-inch thickness ☐ Inside surfaces planar and natural		
Box dimensions	☐ Within tolerance ☐ Sand fill height marked		
Facing panels	☐ Flush to box base ☐ Removable fasteners ☐ Base extends to outside of vertical facing panels		
Tie rod	☐ ¼-inch diameter ☐ Located within tolerances		
Piles	☐ 1-½-inch Sch. 40 PVC ☐ Length in tolerance ☐ Base guides ≤ ¼-inch thick ☐ Locations in tolerance ☐ Upper pile template easily removable		
Tools	☐ Only authorized tools used		
Other minor, explain:			
Other major, explain:			
Disqualification, explain:			
	Total deductions		

Notes:

C2: Reinforcement fabrication

Item	Instruction	Time	
		Total	> 20:00 (min:sec)
Time	Give start command. Time ends when all elements cut to size and shape		
		Mass (g)	
		Design	Actual
Mass	Weigh reinforcement to nearest 0.01 g		
Compute official adjusted Mass, *M*, using Equation 1		*M* =	
		Length (g)	
		Design	Actual
Length	Length of 60 lb kraft paper rounded up to the nearest half foot (6 inches)		
Compute official adjusted Length, *L*, using section 11		*L* =	
		Deductions	
Deductions		Minor	Major
Tools	Only authorized tools used		
Safety	No mishaps		
Other, explain			
	Total deductions		

Notes:

C3: Construction

Item	Instruction	Time	
		Total	> 25:00 (min:sec)
Time	Give start command. Time ends when soil filled to line and empty bucket is in place		
		Deductions	
		Minor	Major
Backfill	☐ Level ☐ Filled to fill line		
Tools	☐ Only authorized tools used		
Safety	☐ No mishaps		
	Total deductions		

Notes:

C4: Loading

Team School:			
Item	**Instruction**	**Scoring Guidelines**	
Stage 1: Backfill Only	• Place clean poster board on floor in front of box • At judge's direction students remove front panel from box. Electric drills/screwdrivers may be used to remove fasteners. • Once panels are completely removed start 1 min wait period. • At end of 1 min make following checks:		
	☐ Swipe front wall front and sides with straight edge to check wall deflection	☐ Pass	☐ Fail *D* = 8
	☐ Less than 30 cm^3 sand leaked from box onto floor	☐ Pass	☐ Fail Major Ded
	☐ Catastrophic failure	☐ Pass	☐ Fail Disqualified
Stage 2: Vertical Surcharge	• Bucket pre-weighed with 50 lbs of sand should be ready. • At judge's direction students add 50 lbs of sand to surcharge bucket. Students have one minute to complete loading. • Once load is placed start 1 min wait period. • At end of 1 min make following checks:		
	☐ Loading complete within 1 minute	☐ Yes	☐ No Minor Ded
	☐ Swipe wall front with straight edge to check wall deflection	☐ Pass	☐ Fail *D* = 6
	☐ Less than 30 cm^3 sand leaked from box onto floor	☐ Pass	☐ Fail Major Ded
	☐ Catastrophic failure	☐ Pass	☐ Fail Disqualified
Stage 3: Horizontal Load	• Bucket pre-weighed with 20 lbs of sand should be ready. • At judge's direction students add 20 lbs of sand to horizontal loading bucket. Students have one minute to complete loading. • At end of 1 min make following checks:		
	☐ Loading complete within 1 minute	☐ Yes	☐ No Minor Ded
	☐ Swipe wall front with straight edge to check wall deflection	☐ Pass	☐ Fail *D=4*
	☐ Less than 30 cm^3 sand leaked from box onto floor	☐ Pass	☐ Fail Major Ded
	☐ Catastrophic failure	☐ Pass	☐ Faill ☐ Disqualified

C5: Scoring

Adjusted mass, *M*, computed by

$$M = m_A + (m_D - m_A + 0.50)^2$$

$$Score = R + 15(60 - M) + 5(10 - L) - 10N_{min} - 40N_{maj} - 2T - 20D$$

Team School:			
Item	**Score**	**Weight**	**Extended**
Report score out of 50, *R*		1	
Reinforcement mass score, enter as (60 – *M*)		15	
Official length of 60 lb kraft paper, enter as (10-L)		5	
Total # of minor deductions, N_{min}		-10	
Total # of major deductions, N_{maj}		-40	
Total time over limit rounded up to nearest whole minute, *T*		-2	
Deflection rating, *D* 8 = Deflection exceeded at Stage 1 6 = Deflection exceeded at Stage 2 4 = Deflection exceeded at Stage 3 0 = Deflection never exceeded		-20	
Catastrophic failure any stage disqualifies the team	**DQ**	**Stage #**	
		Final Score	

Notes:

Appendix D: Safety Appendix

This section is intended for each team to consider the competition steps and manage safety risk. Use rows as necessary.

Title	Work Task	Hazards	Controls

Notes:

1) Safety mishaps that result in bleeding will be classified as “major.”

MINI GAMES

Competition Dates: Saturday, April 20, 2018

Competition Location: Rancho Seco Lake

Summary:

Mini games at the 2018 Mid-Pacific Student Conference allow students to interact, compete, and enjoy the conference outside of the traditionally-hosted competitions. This year Sacramento State and the University of the Pacific have chosen the following mini games for the conference: Concrete Frisbee, Three-Legged Race, Volleyball, and Tug-O-War.

Contact:

Any questions regarding Mini Games may be sent to:

Staysha Delgado

2018midpacminigames@gmail.com

CONCRETE FRISBEE TOSS

The purpose of this design competition is to construct a sustainable concrete Frisbee incorporating recycled materials. The team's performance will be judged based on aesthetics, sustainability, weight, durability, and performance of the frisbee. Please refer to the Mid-Pac conference schedule for the competition date.

Rules

1. Each school may enter only one Frisbee in the competition.
2. Competing teams must consist of two members, one male and one female participant, who will take turns throwing the Frisbee. Each team member will have two throws.
3. Frisbee dimensions:
    - Diameter: between 8" and 10"
    - Thickness: 1.5" maximum
4. The Frisbee must be made of concrete. No resins may be used. Recycled materials may be used as "reinforcement" or "aggregate."
5. No steel reinforcement may be used (recycled or otherwise).
6. The Frisbee must be thrown using only one hand. Frisbees may not be rolled, slid, or transported using any other motion than a toss.
7. Frisbees that lose more than 25 % of their materials (by weight or volume) as a result of a toss are considered ineligible for further tosses.

Aesthetics

1. Frisbees may be decorated with paint or stain, but may not be sealed. Teams shall not use decorative materials that affect the durability of the Frisbee.
2. Each team shall prepare one 11" x 17" poster that includes:
    - School name
    - Frisbee name or theme
    - Names of team members
    - Mix design and construction techniques

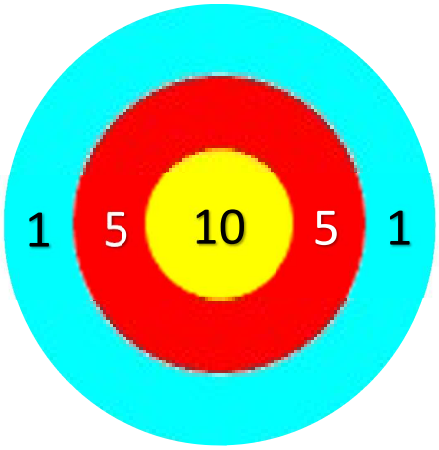
The Frisbee and poster shall be displayed near the competition area prior to the competition. Posters may be displayed on an easel or stand supplied by your team, or on the ground or table surface used as the display area. We recommend affixing the poster to a poster board, as the competition site may be windy.

Judging Criteria

Frisbees will be judged based on performance, weight, durability, aesthetics, and sustainability.

Performance: (25 pts maximum)

Performance is determined by the accuracy and precision to a target, as determined by the location at which the Frisbee stops moving. The target will be similar to a bullseye on the ground where points will be given depending on the Frisbee's location to the target. The target and points distribution is shown below:



Point distribution for performance is as follows:

1st Place = 25 points
2nd Place = 20 points
3rd Place = 15 points
4th Place = 10 points
5th Place = 5 points
6th Place and below = 1 points

Frisbees that lose more than 25% of their materials (by weight or volume) as a result of a toss are considered ineligible for further tosses.

Weight: (25 pts maximum)

The lightest Frisbee, as measured before the competition, will be awarded 25 points, all others will be awarded points based on the following ratio:

$$Weight = \frac{Weight\ of\ lightest\ Frisbee}{Weight\ of\ Frisbee}\ x\ 25$$

Durability: (30 pts maximum)

Durability shall be determined using the Frisbee weight before and after the competition. If the Frisbee is damaged during the competition, the largest piece shall be used to determine the weight ratio after the competition. The weight ratio is calculated, as follows:

$$Weight\ ratio = \frac{Weight\ of\ Frisbee\ After\ Competition}{Weight\ of\ Frisbee\ Before\ Competition}$$

The durability score is calculated as follows:

$$Durability = \frac{Weight\ Ratio\ of\ Frisbee}{Weight\ Ratio\ of\ Most\ Durable\ Frisbee}\ x\ 30$$

The "Most Durable Frisbee" is defined as the Frisbee with a weight ratio closest to 1.0.

Aesthetics and Sustainability (20 pts maximum)

Aesthetics shall be judged based on smoothness and uniformity of the Frisbee itself as well as artistic and decorative aspects. Sustainability shall be determined by use of recycled and non-toxic materials, as documented on the poster. Points will be awarded as follows:

- Visual appearance: uniformity, smoothness 1 - 10 points
- Creativity and implementation of artistic and decorative aspects 1 - 5 points
- Sustainability: use of recycled, non-toxic materials 1 - 5 points

THREE-LEGGED RACE

Each school may enter one team in the competition. A team must consist of two members, one male and one female participant per school. Please refer to the Mid-Pac conference schedule for the competition date.

Rules

1. Each team shall be provided a scarf or bandana ("scarf"). The left leg of one runner shall be tied securely to the right leg of the other runner using the scarf.
2. Teams must stop and retie the scarf if it becomes untied during the race. The starting point for continuing the race will be the location where the scarf became loose or fell off the runners' legs.
3. The total race distance shall be either one way or round trip, depending on the race course. The race distance shall be no more than 100 yards.

Scoring

1. Teams shall be scored by comparing the time required to successfully complete the competition (1^{st} place = shortest time, 2^{nd} place = next shortest time, etc.).
2. A team will forfeit if it fails to show up within 5 minutes of the scheduled time.

VOLLEYBALL

Each school may enter one team in the competition. A team must consist of 6 players, including at least 2 men and 2 women. If a school has fewer than 6 students at the Mid-Pacific Student Conference, they may invite up to two students from other schools to join their team. Please refer to the Mid-Pac conference schedule for the competition date.

Rules

1. Players may NOT:
   - Lift or catch the ball.
   - Touch the net at any time of play.
   - Touch the ball twice in succession.
   - Cross onto the opposing team's side under the net.
   - Attack a serve.
2. A team can only contact the ball a maximum of 3 times to return the ball to the other side
3. A player in the back row cannot attack the ball within 10 feet of the net.

Scoring

1. A point is earned when a team wins the rally.
2. Each game is won when a team reaches 11 points with a margin of 2 points.
3. One game per match.
4. A team will forfeit if it fails to show up within 5 minutes of the scheduled time.
5. If a match is not completed within 15 minutes from the start, then the team that has earned the highest number of points after 15 minutes of play will be declared the winner. If the score is tied after 15 minutes of play, the team that wins the next point will be declared the winner.
6. Winning teams in each bracket will play against one another to determine the teams that advance to the next bracket. Games will continue until one team emerges as the overall competition winner.
7. 1st place = winner of final game, 2nd place = runner up in final game, 3rd place shall be determined by the results of a game between the two runners up in the semi-final matches.

Tug-O-War

Rules

1. The team must consist of 6 members, 3 male and 3 female. No substitutions may be made once the game has started. If a school has fewer than 6 students at the Mid-Pacific Student Conference, they may invite up to two students from other schools to join their team.
2. A flag will indicate the center of the rope.
3. Limit lines will be marked on the ground approximately 10 feet on either side of the flag. The teams shall be positioned on opposite sides of the flag.
4. The rope must be held with the hands: participants may NOT tie it around any body parts.
5. NO knots are permitted on the rope.
6. The flag on the middle of the rope will be centered by the judge.
7. Teams may begin when the judge gives the command to "Go."

Scoring

1. The first team to pull the center flag over the ground mark nearest them, as determined by the judge(s), will be declared the winner
2. If a team drops the rope, the other team will win by default.
3. Winning teams in each bracket will play against one another to determine the teams that advance to the next bracket. Games will continue until one team emerges as the overall competition winner.
4. 1st place = winner of final game, 2nd place = runner up in final game, 3rd place shall be determined by the results of a game between the two runners up in the semi-final matches.
5. A team will forfeit if it fails to show up within 5 minutes of the scheduled time.

STEEL BRIDGE

Competition Date: Thursday, April 19, 2018

Saturday, April 21, 2018

Competition Location: Sacramento State Campus

Summary:

The steel bridge competition will consist of designing, fabricating, and constructing a bridge that meets the rule requirements and dimensions of the proposed statement and construction layout.

Rules and Resources:

For steel bridge rules and additional resources, please use the following link:

https://www.aisc.org/education/university-programs/student-steel-bridge-competition/

The Mid-Pacific steel bridge competition is a qualifying round to participate in the national steel bridge competition. To participate in the national steel bridge competition, please refer to the "Eligibility Requirements for Advancement to National Competitions" section for information.

Contact:

Any questions regarding the Steel Bridge Competition may be sent to:

Nathaniel Wilson

2018midpacsteelbridge@gmail.com

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

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 3rd 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 3rd 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 3rd Street / Capitol Mall intersection then north on 3rd Street to the 3rd 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 3rd 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 3rd St.
Expected Design Level-of-Service:	C
Traffic Growth:	1%
Annual Design Life:	20 years

**Any combined intersections must adhere to the higher LOS.*

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 3rd St., and 3rd St. and L, and 3rd 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 send to 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
Presentation	Ability to communicate key concepts from written paper and to convince audience of their importance.	20
Time	**For Presentation Only:** Beyond 5-Second Allowance: 0.05-Point Penalty per second difference from required 10 minutes	5 points max penalty
Q&A Session	Responses to questions demonstrate an excellent level understanding of key project issues. Creative solutions to all concerns are offered.	20
Presentation Quality	Delivery Style/Eye Contact/Technical Language/Enthusiasm Audience is consistently engaged and interested Presentation Attire	10
Poster	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
Total Points		**55**

Judging Criteria

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

Late submissions have a penalty of 3% per 24 hours.

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

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 (± 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 ± 10 sec)	
Paper Sub-Total	**/75**	**Presentation Sub-Total**	**/25**
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.

WATER TREATMENT COMPETITION

Competition Date: Thursday, April 19, 2018

Saturday, April 21, 2018

Competition Location: Sacramento State Campus

Summary:

The ASCE Mid-Pac Student Water Treatment Competition includes the research, design, presentation, and hands-on construction of a treatment filter made of supplies found in a hardware store. The filter is loaded with a standardized simulated wastewater to test and rank the participants.

The competition allows civil and environmental engineering students to apply principles of water and wastewater treatment to develop design alternatives in a collaborative and empirical manner. It provides students an opportunity to develop leadership and project management skills and to increase awareness of technologies and opportunities in the water/wastewater fields by way of engaging with other students, faculty, and industry professionals on a practical design project.

Contact:

Any questions regarding the Water Treatment Competition may be sent to:

Kourtnie Sicam

2018midpacwatertreatment@gmail.com

IMPORTANT DEADLINES

- Registration – See Deadline Information
- Questions and Materials Requests – E-mailed by Sunday, January 28, 2018
- Design Report – Submitted electronically (in PDF format) by 11:59 p.m. (Pacific Time) Saturday, March 17, 2018
- Presentation – Submitted electronically by 11:59 p.m. (Pacific Time) April 15, 2018

Note: Failure to comply with the deadlines listed above will result in a 5-point deduction from the team's final score.

SCENARIO

You and a group of fellow civil engineers take a vacation to the Pacific Islands. Unfortunately, you are unaware that it is the wet season and a tropical storm crashes through the islands ruining your tropical getaway. Now you're left with no power or a clean source of water.

Being very proactive, you lead your group to the highest point on the island to avoid flooded streets and contaminated water. You find an old, damaged water tank with debris in it from the storm and treat it with Bleach to kill any disease causing pathogens. Fortunately, you have taken a few water resources and environmental engineering classes and can lead the survivors in designing and building a water treatment filtration system to supply potable water for drinking and bathing. May the odds be ever in your favor.

INFLUENT CONSTITUENTS

Two (2) 5-gallon buckets total will be prepared for each team. All constituents will be added and stirred 24 hours prior to competition and stirred again 5 minutes before the construction/treatment.

Per 5-gallon bucket:

- 4.5 Gallons of Water
- 1 - 6.0 oz. can of Dole 100% Pineapple Juice
- ¼ cup (50.0 g) Kool-Aid Tropical Punch Drink Mix (Powder)
- 1-4.0 oz. container of Activia Yogurt, vanilla flavor
- ¼ cup (55.9 g) Aztec Secret Indian Healing Clay
- 1 lb. African Violet Potting Mix

COMPETITION SCORING

The point distribution is listed in Table 1 and is described in the following sections.

Table 1: Point Breakdown Summary

Category	Sub-Category	Points
Water Quality	pH	10
	Turbidity	10
	Electrical Conductivity	2
	Dissolved Oxygen	5
	Volume	8
	Subtotal	**/35**
Design Report	Filter Design & Analysis	15
	Materials /Cost Analysis	3
	Sustainability	3
	Professional Quality	4
	Subtotal	**/25**
Construction	Construction Time	8
	Cost of Materials	12
	Orderliness of Construction Site	2
	Originality of Design	1
	Overall Teamwork	2
	Subtotal	**/25**
Oral Presentation	Technical Content	5
	Visuals	2
	Oral Presentation	4
	Q&A Session	4
	Subtotal	**/15**
Total		**/100**

WATER QUALITY TESTING

Immediately after construction and loading, the final treated water will be tested using university laboratory equipment. The following five (5) water quality parameters of your final treated product will be graded based on the scoring methods described below. Water quality is worth 35 total points.

pH

pH Range	Points Allocated
$7 \leq pH \leq 7.5$	10
$6.5 \leq pH < 7$ or $7.5 < pH \leq 8$	8
$6 \leq pH < 6.5$ or $8 < pH \leq 8.5$	6
$5.5 \leq pH < 6$ or $8.5 < pH \leq 9$	4
$5 \leq pH < 5.5$ or $9 < pH \leq 9.5$	2
All other pH ranges	0

Turbidity

Target: Minimal NTU

Grading: (Your rank / number of teams) * 10 points

Teams will be ranked from worst to best, with #1 being the team with the turbidity furthest from the target value.

Electrical Conductivity

Target: Minimal µS/cm

Grading: (Your rank / number of teams) * 2 points

Teams will be ranked from worst to best, with #1 being the team with the electrical conductivity furthest from the target value.

Dissolved Oxygen

DO Range	Points Allocated
100% DO	5
$90\% \leq DO < 100\%$	4
$80\% \leq DO < 90\%$	3
$70\% \leq DO < 80\%$	2

60% ≤ DO < 70%	1
All other DO values outside of these ranges (e.g. The DO meter is out of range because an excessive quantity of oxidant was added)	0

Volume

Target: 9 gallons

Grading: (Your effluent volume (gal) / 9 gallons) * 8 points

Note: There is a maximum of 8 points allotted for volume. It is conceivable, however unlikely, that a team could have a volume greater than 9-gallons; in that case, the team would still only receive 8 points.

DESIGN REPORT

Each team is required to submit a design report detailing the overall project. The report must include a description of the design process, treatment principles utilized, environmental impacts, a cost analysis, and tables of material and operational costs. The design report is worth 25 total points. Please submit an electronic version of your report (in PDF format) via email to 2018midpacwatertreatment@gmail.com by no later than 11:59 PM Pacific Time on March 17, 2018. Hard copy submittals will not be accepted.

Formatting

The following format is required:

- **Report Cover Page:** Must contain school name, team name, and competition name: "2018 ASCE Mid-Pacific Student Water Treatment Competition"
- **Table of Contents:** Limited to a total of one (1) page.
- **Body of Work:**
  - Must be a minimum of 1,000 words
  - May not exceed eight (8) pages. Cover page, table of contents, and appendices are not included in the page count.
  - Use 12-point Times New Roman or Arial font, single spaced, using normal width character spacing, and 1-inch margins on all sides
  - Headings may be of any font, size, or color
  - Body pages shall be numbered, beginning with '1'
  - Captions used for any photographs, tables, line drawings, graphs, or other figures shall have normal width character spacing and be no less than 10-point font
  - All work, figures, or tables not generated by the authors must be cited.
  - A list of references or works cited should be included (if used). This list will not be counted as part of the report page limit.
  - Acknowledgements: any assistance received from others not on the team shall be recognized. Acknowledgements will not be counted as part of the report page limit.

- **Appendices:** Pages shall be numbered in such a way that the appendix and page number are clearly listed (i.e. A1, A2, B1, B2, etc.). There is no limit to appendix length, but it must only contain relevant materials.
- **Paper:** The report and appendices shall be presented on 8-1⁄2" x 11" pages using portrait or landscape orientation, as appropriate.
- **Miscellaneous:**
    - Photographs, tables, line drawings, graphs, headers, and footers are permitted and shall be counted as part of the page limits defined above.

One (1) point will be deducted from the team's report score for each format violation.

Report Content

The design report must include the following content. The point distribution for grading of each section is presented in Table 1.

- **Treatment System Discussion:** The body of the design report shall contain a description of the treatment system and how it works. The system design will be judged based on the approach each team used to solve the problem as well as the industry treatment principles implemented in the design process. This section must include clear descriptions of engineering design processes, lab techniques used, and test results obtained.

- **Materials and Cost Analysis:** The design report must include a material list with a brief explanation and justification of each material selected. See Appendix A for list of permitted materials. The design report must include a cost analysis, which must include both a material cost estimate and an operational cost estimate. The total cost will be taken as a sum of the material and labor costs. Teams will be ranked by lowest cost estimate.

- **Sustainability:** The design report must include an explanation of the sustainability aspects of the treatment system. This section may include the environmental impacts of materials used and decisions made regarding choices to minimize cost or reduce environmental impact.

- **Professional Quality:** Professional quality of the design report will be based on organization, presentation, quality of writing, and effectiveness of figures, tables, and other resources presented in the report.

Plagiarism of any kind will not be tolerated. Teams caught plagiarizing any portion of their design report will be disqualified.

CONSTRUCTION AND TREATMENT

Teams will construct their treatment system as described in the project report. This will include construction, chemical treatment, loading, and filtration. Construction and treatment is worth 25 total points and will be judged based on orderliness of construction site, construction and treatment time, cost of the treatment system, originality of design, and overall teamwork – see scoring and deduction methods presented below and in Table 1 for point distribution.

Construction and Treatment Time

Construction and Treatment time will include:

- Construction
- Chemical measuring and mixing (if used)
- Loading
- Filtration

Teams may choose to allocate their time to these components as they see fit.

Construction Details

Teams will each be given a 10’ x 13’ area, which will be marked on the floor as shown in Figure 1. The site limits will be measured from the inside of the boundary marker. All sites will be located on level concrete or pavement or other hard surface.

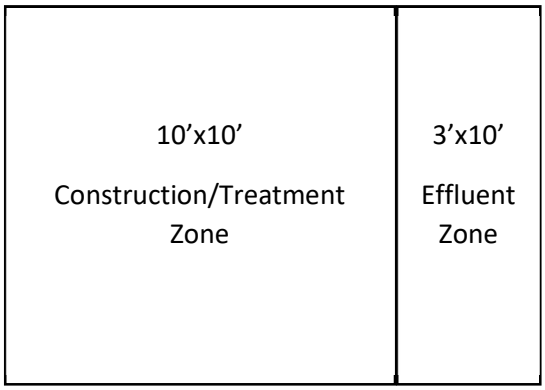


Figure 1. Construction area breakdown

- Operators must stay within the 10’x13’ area. All construction materials, equipment, chemicals must stay within the 10’x10’ construction/treatment zone. Only the effluent basin and treated water may enter the effluent zone.

- Construction/treatment time will start once the head judge says "go" at which each judge will start the clock. Construction/treatment time will end after operators move the effluent basin to the effluent zone, and once all operators leave the 10’ x 13’ space and say "time.” No further water or chemicals can be added to the basin once the basin is moved to the effluent zone.

- Once an operator leaves the 10’x13’ area, they may not re-enter the area.

- Teams will place all their unassembled raw materials and tools in their designated 10’x10’ construction/treatment zone along with two provided 5-gallon buckets of contaminated water and two provided stirring sticks. Prior to beginning the construction phase, judges will compare the provided materials list in the team's technical report to the materials present at the competition.

- Teams shall not pre-assemble, pre-cut, pre-label, or tamper with materials prior to beginning of

the construction, although decorations are encouraged. Teams must provide their own markers, tape measure, measuring cups, and scales, as needed. Items used for measuring or marking should not be included in the cost estimate.

- All prewashed materials must be dried and must be placed in their original packaging with the exception of loose sand, GAC, pebbles, and lava rocks which can be placed in clear containers based on the predetermined quantity sizes in Appendix A. (The original containers and/or bags should accompany these items.) A burlap sack may be used instead of a clear container but should be opened for judges' inspection. Packaging shall not be added to the materials list or the cost analysis portion of the design report. All materials not prewashed should be in original sealed packaging, as if purchased from the store. For example, if hydrogen peroxide is purchased, the hydrogen peroxide bottle should be sealed in the manner bought from the store.

- With the exception of materials delivered in their original packaging, all materials shall be delivered to the construction area in unit quantities that match the unit quantities provided in the Competition Rules. For example, 2" x 4" lumber is specified in 4 ft lengths in the Materials List (see Appendices). Therefore, 2" x 4" lumber placed in the competition area shall be in 4 ft sections, regardless of the initial length of purchase. Play sand is specified in a per pound basis. Therefore, if used, play sand must either be in the original packaging, or if washed, then must be delivered in 1-lb. quantities.

- Power saws or power blades are not permitted.

- Battery-powered tools are permitted, with the exception of the items listed in the above detail. Corded power tools are not permitted.

- Teams must provide their own tools based on the approved list given in the Competition Rules, Appendix B.

- There are no limits to the number of operators.

- Construction/treatment time may not exceed 40 mins.

- To avoid damage to floor materials, each team must provide a back-up basin to collect any effluent discharged after the end of the treatment system. The back-up basin will not be included in the cost of the system. Any effluent collected after the effluent basin is moved to the effluent zone will not be included in volume or water quality testing.

Scoring

The Construction category is worth 25 points out of the 100 total points in the competition and the point allocations are shown in Table 1. The orderliness of the site during the construction phase, the operators' overall teamwork, and the originality of the design will be determined based on the judge's discretion.

Points for construction time will be awarded based on the following guidelines:

Construction/Treatment Time (minutes)	Points Allocated

Construction/Treatment Time ≤ 20	8
20 < Construction/Treatment Time ≤ 22.5	7
22.5 < Construction/Treatment Time ≤ 25	6
25 < Construction/Treatment Time ≤ 27.5	5
27.5 < Construction/Treatment Time ≤ 30	4
30 < Construction/Treatment Time ≤ 32.5	3
32.5 < Construction/Treatment Time ≤ 35	2
35 < Construction/Treatment Time ≤ 37.5	1
37.5 < Construction/Treatment Time ≤ 40	0

The team with the fastest construction/treatment time will be awarded one additional point.

Any necessary point deductions shall be determined by judges, and be made as follows:

Violation	**Points Deducted**
Operator outside 10'x13'construction area	1
Material, tools, chemicals (besides effluent basin) outside construction/treatment zone	1
Any pre-assembled, pre-cut, or tampered materials	10
Operator begins constructing prior to the judge starting the stopwatch	5
Operator or material touches or enters the site boundary after time has started	3

- Any materials present in the team's construction site but not located in the team's design report will result in the removal of the material(s).
- Any materials or tools used that are not present in Competition Rules, Appendix A or B, will result in the removal of the material(s).
- Any tampering of another team's materials or operators will result in an automatic disqualification of the team.

Note: Clear violation of ethical practices, based on judge's discretion, will result in disqualification of the team.

Cost of Treatment System

The cost of the treatment system is worth 12 points. The lowest cost treatment system will receive 12 points. The cost of the treatment system includes the cost of materials, tools and labor ($30/operator, regardless of construction time) used for construction as listed in the Appendices. Trash or recycling receptacles do not need to be included in the cost of the treatment system. Points will be awarded based on the following equation:

(Your rank / number of teams)*12 points

Teams will be ranked from worst to best, with #1 being the team with the highest cost.

Safety

Safety is critical to any engineering project. Operators must wear personal protective equipment including hard hats, safety gloves, safety glasses, closed-toed shoes, and long pants at all times during the construction and treatment phases. Any person handling chemicals must wear a long-sleeved shirt or other article of clothing to cover arms and hands must be protected using chemical hazard protection gloves (i.e. latex or nitrile). If at any point a judge deems safety is being violated by a team, the judge may stop the team from proceeding and will review safety practices. The stopwatch measuring the team's construction time will continue running during this time.

ORAL PRESENTATION

Each team shall make an oral presentation on their treatment system. Presentations will be evaluated on the technical content and delivery. Oral presentations shall be presented in English. Presentation order shall be randomly selected before the competition begins and shall be provided at the time of on-site registration. A maximum of two team members may make the presentation. Only members of the presenters' school shall be allowed to attend the presentation of that school.

Teams are required to use PowerPoint to present their projects. Please submit your team's PowerPoint presentation via email to 2018midpacwatertreatment@gmail.com by 11:59 PM (Pacific Standard Time) on April 15, 2018. If a team chooses to make changes to the PowerPoint presentation after the deadline, they are allowed to do so, if changes are submitted no later than 24 hours before the presentation date. 2 points will be deducted from the overall Oral Presentation score for changes submitted after the deadline.

Scoring

The presentations will be scored by the parameters listed below. Point distribution is denoted in Table 1.

- **Technical Content:** Presentations must include, at least, the system design and treatment process used, materials used, a cost analysis, and a discussion of sustainability. The content may be presented in any order and is not limited to these components.
- **Oral Presentation:** The presentations shall be five (5) to six (6) minutes in duration. There will be a 5-second grace period to account for timer (stopwatch) reaction. A maximum of two team members may present the PowerPoint and answer questions.
- **Visuals:** Teams may only use PowerPoint for their presentations. Teams may use visual aids including graphs or photographs to enhance the product of the presentation. Video clips may not be included.
- **Question & Answer:** There will be a 4-minute question-and-answer session immediately following the presentation. Only the panel judges will be permitted to ask questions.

Points shall be deducted if the duration of the presentation is less than 5 minutes or more than 6 minutes,

as follows.

Presentation Time	Points Deduction
4:45 – 4:54 or 6:06 – 6:15	1
4:35 – 4:44 or 6:16 – 6:25	2
4:25 – 4:34 or 6:26 – 6:36	3
And so on…	

WATER TREATMENT COMPETITION APPENDICES

Appendix A: Materials List

Each team is permitted to submit a request to add two (2) materials or tools to this list. Please submit for approval to 2018midpacwatertreatment@gmail.com by January 28, 2018. These requests will be evaluated for appropriateness in the competition. If your suggestions are accepted, these materials will become accessible to all teams. Teams requesting additional material must also provide the unit of measure and the unit cost, which will be verified by the competition host.

Note: All items must be in its original packaging (see exceptions in construction details). For example, if a store sells hardware cloth in 10 square feet sizes, bring the unopened packaging to the competition. The hardware cloth will therefore be charged as $6.70 in the cost analysis section of the design report, regardless of how much is used during the construction phase.

Table 2: List of Eligible Materials and their Associated Costs

Number	Item	Unit	Cost ($/unit)
1	1/2" Hardware Cloth	/sq. ft.	0.67
2	1/2" I.D. Soaker Hose	/lin. ft.	0.36
3	1/4" Hardware Cloth	/sq. ft.	0.53
4	1" High Pressure Washer Hose	/lin. ft.	2.50
5	4 Gallon Trash Can	/unit	2.50
6	13 Gallon Trash Can	/unit	5.00
7	20 Gallon Trash Can	/unit	8.00
8	16 Qt. Igloo Can Cooler	/unit	23.00
9	2' Ladder	/unit	30.00
10	2" Adjustable Spring Clamp	/unit	6.00
11	2" PVC Pipe Elbow	/unit	3.00
12	2"x4" 3M Steel Wool	/unit	0.83
13	2"x4" Dimensional Lumber	/4 lin. ft.	1.70
14	2"x6" Dimensional Lumber	/4 lin. ft.	2.44
15	3/4” Black Electrical Tape	/lin. ft.	0.06
16	3/4” Thick Plywood	/4 sq. ft.	1.06
17	3/8” Nylon Roper	/lin. ft.	0.20

18	3/8” Thick Plywood	/4 sq. ft.	2.00
19	30 Gallon Tote	/unit	12.00
20	32 Gallon Trash Can	/unit	13.00
21	36 Gallon Garbage Bag	/unit	0.63
22	3M Compressed Air Dust Remover	/unit	4.67
23	4’ Ladder	/unit	40.00
24	4” x 4” Dimensional Lumber	/4 lin. ft.	3.00
25	5 Gallon Bucket	/unit	2.50
26	5 Gallon Bucket Lid	/unit	2.50
27	5/8” Carpet Pad	/sq. ft	0.44
28	5/8” I.D. Garden Hose	/lin. ft.	0.66
29	6’ Ladder	/unit	60.00
30	8” x 6” x 2” Grout Sponge	/unit	2.00
31	Alum (McCormick)	/oz.	1.60
32	All-Purpose Gravel (Quikrete)	/50 lb.	8.00
33	Aqueon Water Clarifier	/oz.	1.00
34	Vinegar	/1 cups	0.99
35	Astroturf	/sq. ft.	4.00
36	Baking Soda	/oz.	0.10
37	Bolts	/units	0.05
38	Bounce Dryer Sheets	/20 units	5.00
39	Brawny Paper Towels	/roll	3.00
40	Burlap	/sq. ft.	0.14
41	Canvas Drop Cloth	/sq. ft.	0.25
42	Charcoal	/lb.	0.50
43	Clorox Bleach, concentrated	/5 cups	1.17
44	Clorox Disinfecting Wipes	/15 units	1.50

45	Coarse Compost	/gallon	3.00
46	CoCo Liner, 18”	/unit	4.00
47	Coffee Filter	/unit	0.03
48	Commercial Grade Fine Sand	/lb.	0.16
49	Commercial Grade Sand	/lb.	0.12
50	Cotton Ball	/20 units	0.40
51	Diatomaceous Earth	/1 lb. bag	5.00
52	Duct Tape 20 yd. Roll	/unit	10.00
53	Fiber Twine	/ft.	0.01
54	Gelatin (Knox Unflavored)	/4 oz.	2.00
55	Granular Activated Carbon	/oz.	0.40
56	Gutter Insert Foam, 3’	/unit	8.00
57	Gypsum	/lb.	0.23
58	Hydrogen Peroxide	/3 cups	1.49
59	50 Qt. Igloo Cooler	/unit	70.00
60	94 Qt. Igloo Cooler	/unit	90.00
61	Lava Rock	/cu. ft.	6.00
62	Lemon Juice	5 fl. oz.	1.00
63	Mylar Emergency Sleeping Blanket	/unit	3.00
64	Nail	/unit	0.05
65	Nut	/unit	0.05
66	OxiClean Stain Remover	/lb.	1.20
67	Paint Tray	/tray	2.00
68	Peat Moss	/cu. ft.	6.50
69	Pebbles, Large	/5 lb.	2.50
70	Pebbles, Pond/Landscape	/.5 cu. ft.	4.99
71	Pickling Lime	/oz.	0.20

72	Plant Protector Bags	/bag	5.00
73	Plaster of Paris	/lb.	0.70
74	Plastic Tarp	/sq. ft.	0.20
75	Play Sand	/lb.	0.10
76	Plumbing Epoxy Putty	/putty	3.49
77	Loudwolf Potassium Permanganate	/6 oz.	12.00
78	ABS Pipe, 1-1/2” Diameter	/5 lin. ft.	1.50
79	ABS Pipe, 2” Diameter	/5 lin. ft.	20.00
80	Copper Pipe, 1/2” Diameter	/5 lin. ft.	6.00
81	Copper Pipe, 1” Diameter	/5 lin. ft.	16.00
82	Corrugated Pipe, 3” Diameter	/5 lin. ft.	2.50
83	Corrugated Pipe, 4” Diameter	/5 lin. ft.	3.00
84	PVC Pipe, 1” Diameter	/5 lin. ft.	1.00
85	PVC Pipe, 1-1/2” Diameter	/5 lin. ft.	1.50
86	PVC Pipe, 2” Diameter	/5 lin. ft.	2.00
87	Pool Filter Sand	/lb.	0.30
88	Pumice Stone (1 CF)	/cu. ft.	11.99
89	Rubbing Alcohol	/3 cups	1.49
90	Salt (Morton Iodized Table Salt)	/26 oz.	1.00
91	Screw	/unit	0.05
92	Sham-Wow	/sq. ft.	5.00
93	Stainless Steel Safety Wire	/lin. ft.	0.25
94	Standard Air Conditioner Filter	/unit	10.00
95	Terrycloth Rags	lb.	5.00
96	Tote, 5 Gallon	/unit	8.00
97	Tote Lid, 5 Gallon	/unit	1.00
98	Tote, 10 Gallon	/unit	10.00

99	Tote Lid, 10 Gallon	/unit	1.00
100	Tote, 13 Gallon	/unit	18.00
101	Tote Lid, 13 Gallon	/unit	1.00
102	Tote, 18.5 Gallon	/unit	20.00
103	Tote Lid, 18.5 Gallon	/unit	1.00
104	TSP/90	/lb.	3.00
105	Turtle Wax Hard Shell Paste Wax	/fl. oz.	0.55
106	Weed Control Fabric	/sq. ft.	0.11
107	Window Screen Mesh	/3 sq. ft.	1.00
108	Window Squeegee	/unit	6.00
109	Wood Mulch	/cu. ft.	6.00

Appendix B: Construction Costs: Labor and Tools

Table 3: Labor and Tool Costs

Number	Item	Cost ($/unit)
1	Operator	30.00/operator
2	Adjustable Wrench	3.00
3	Basic Socket Set	5.00
4	Caulking Gun	2.00
5	Channel Locks	1.50
6	Cordless Drill	10.00
7	Drill Bits (Each)	1.50
8	Hand Saw	10.00
9	Pliers	1.50
10	Scissors	2.00
11	Screwdrivers (Each)	1.00
12	Standard Builder's Hammer	5.00
13	Utility Knife	2.00
14	Wire Cutters	2.00
15	Pipe Cutters	10.00
16	Pipe Wrench	5.00