College of Engineering, Forestry and Natural Resources
Civil and Environmental Engineering & Construction Management

2015 NAU ASCE Concrete Canoe Proposal

Prepared for Mark Lamer, P.E.

High Altitude Engineering
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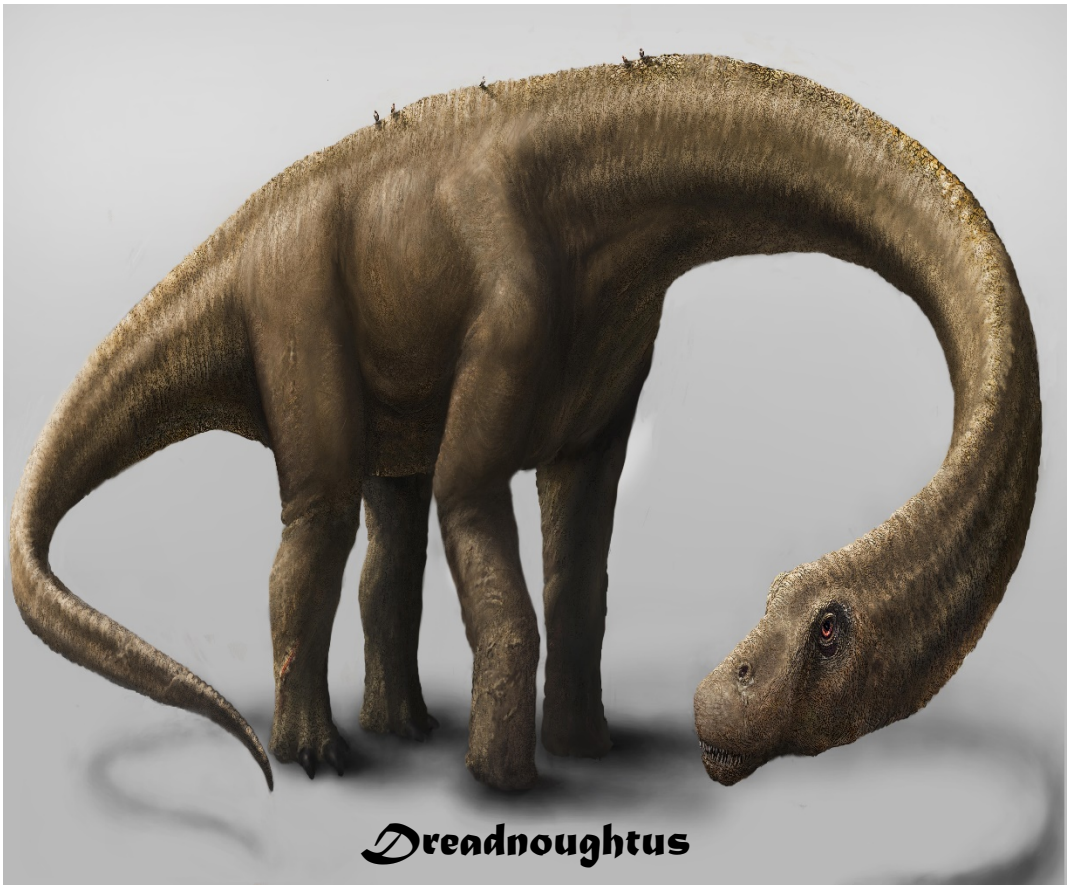

December 10, 2014

High Altitude Engineering
Jeremy DeGeyter
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P.O. Box 15600
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December 10, 2014

Mark Lamer, P.E.
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Flagstaff, Arizona, 86011

Dear Mr. Lamer,

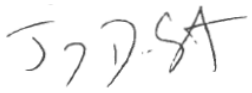
High Altitude Engineering is excited to submit their proposal for the 2015 Northern Arizona University Concrete Canoe. The team has enjoyed meeting with you throughout the semester and is proud to deliver a top quality concrete canoe upon being accepted for the job.

Last year's Concrete Canoe, "Spirit" finished 13th at PSWC 2014 held in San Diego, California. The 2015 Concrete Canoe Regional Competition will be held in Tucson, AZ, in April of 2015. This year the Concrete Canoe Team will start over, construct a new mold and consider all new concrete mixes, structural analysis, and reinforcement options. The team will be based at NAU in Flagstaff, AZ, where all analysis, testing and construction will take place. The team, consisting of Cynthia Alvarez, Ramon Aguilar, Jeremy DeGeyter, Matt Snyder, and Kristin Van Sciver, is prepared to successfully undertake this project.

Attached is our proposal for the 2015 concrete canoe outlining our understanding of the project, detailing the scope, along with a schedule, and finally, an estimated cost of engineering services.

We appreciate the time you have given us this semester and look forward to working together. If you would like additional information, or if you have any questions concerning this memo, please feel free to contact us. Thank you.

Sincerely,



Jeremy DeGeyter
NAU Concrete Canoe Project Manager

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1 PROJECT UNDERSTANDING

The Concrete Canoe Project is being completed in order to provide engineering students with "hands-on, practical experience and leadership skills by working with concrete mix designs and project management" (ASCE & NCCC). This hands-on experience develops the students' ability to work in teams and to provide a finished product that is functional and aesthetically pleasing. This experience is necessary for students to be able to demonstrate that the knowledge they have gained throughout the years can be put into applicable use. For this project, the applicable use is in developing a functional concrete mix that works well for the purposes it will be used for. In addition, the students gain an understanding of the importance of scheduling and professionalism for team and client interaction. A final purpose for this project is to have the students research the most current methods of practice and put them into use.

1.1 Background Information

This project consists of three steps; design, construction, and competition. The design process will begin immediately and continue until the end of January. At this time, construction of the canoe will begin; although this is only one day, curing time for the concrete will require 4 weeks. The competition will begin April 9th and continue through the 11th. Beginning now and until these dates, other deliverables for the competition will be completed such as the submittal of the concrete mix in early March, design report, and a presentation at the competition.

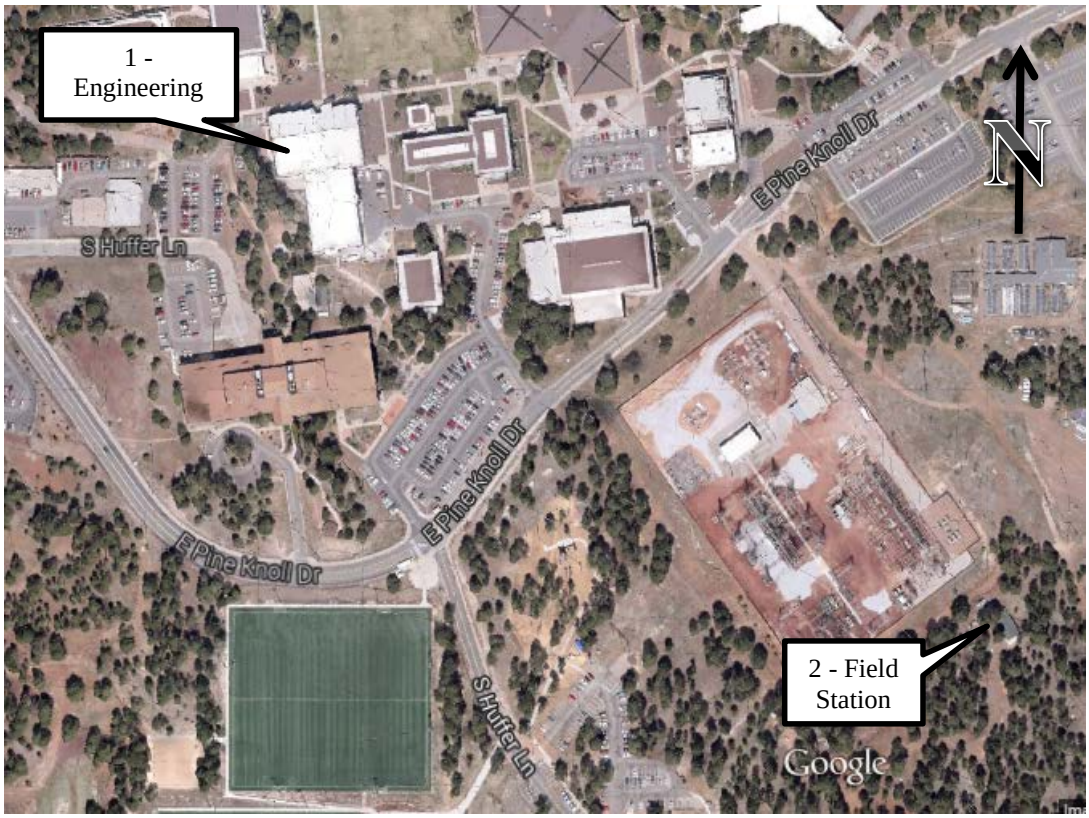


Figure 1.1: Project Site Map (Imagery ©2014 Google)

The primary location of this project will be Northern Arizona University (NAU) in Flagstaff. All calculations and analyses will be completed at NAU's Engineering Building using the provided software and materials (Location 1 on Figure 1.1). Testing will primarily be done in the labs at NAU, but some will occur at NAU's Field Station, also known as Trotta's Farm (Location 2 on Figure 1.1). The construction of the canoe will take place at the Field Station.

The University of Arizona, in Tucson (Figure 1.2), will be hosting the annual American Society of Civil Engineers (ASCE) Pacific Southwest Conference 2015 (PSWC) in which the canoe will be entered for competition. The final product will be displayed and used for racing at Sahuarita Lake during this conference.

Figure 1.2: Locations for Flagstaff and Tucson (Arizona Map)

1.2 Stakeholders

Several stakeholders expect an optimal concrete canoe. The main stakeholder, NAU, has trusted the team to represent NAU at the 2015 ASCE PSWC. ASCE also has professional expectations the canoe team is expected to maintain. Within NAU, Mark Lamer (client and capstone professor) will help better define the project statement and set deadlines for deliverables. Also, Professor Thomas Nelson, P.E. from Hubbard Merrell Engineering has agreed to participate as the team's technical advisor to help with any analysis related items. Through the fundraising process, companies that provide donations for the canoe will have their own professional expectations for the canoe team to uphold.

1.3 Existing Conditions

Last's years Concrete Canoe "Spirit" finished 13th at PSWC 2014 held in San Diego, California (See Figure 1.3). The wood strip mold that was reused for "Spirit" will not be used for this year's Canoe. Different mold options, such as male vs. female, and mold materials are being investigated. Hull design is not regulated in the 2015 Concrete Canoe Competition

Figure 1.3: Last Year's Canoe, "Spirit" (NAU ASCE)

Rules, other than overall length and width. Paddles for the canoe races will need to be upgraded as there are currently only 6 and they are in bad condition. Last year's concrete mix weighed approximately 100 pcf and will not be reused. Last year's conference rankings for "Spirit" are shown in Appendix A, such as design paper, races, and presentation results. An attempt to significantly reduce the unit weight will be made during mix design and testing. The Canoe project does have a substantial supply of lightweight aggregate, fiberglass reinforcement, and various admixtures leftover from previous years.

1.4 Technical Requirements

To complete a successful project, the team will follow the ASCE National Concrete Canoe Competition rules and regulations. The rules regulate the maximum length and width that the canoe can be. The team must decide whether to use a male or female mold to construct the canoe. Also, the aggregates to be used in the cement mix have to be decided. Research on reinforcement for post-tensioning or pre-stressing will be undertaken in order to determine what would work best for this project before the concrete is poured. Once the shape of the hull has been decided, structural analysis will be performed on it in order to determine the maximum tension and compression forces that the canoe will have to withstand in order to be strong enough to compete in the required races. When the required strengths are known, the concrete mix will be proportioned until the parameters are reached. The tests that will be performed on the concrete include shrinkage, compression, and tension tests. Additional tests will be performed in order to ensure that the reinforcement selected will bond well with the concrete. Since the unit weight of water is 62.4 pcf, the concrete should be around or preferably below this value in order to float. If the concrete unit weight comes out higher than the unit weight of water, foam will need to be added to the bulkheads in order to overcome the difference. The unit weight of the concrete will be adjusted based on the proportions of the ingredients.

The team will also need to write two technical reports that have to be submitted to the ASCE conference judges and to the capstone professors. These reports will vary from each other on some content such as how in depth the construction process is explained. In addition to the report, two PowerPoints need to be created which will be presented at the conference and for the final presentation of the class. The final step for this project is to compete with the canoe in the race at the ASCE conference in April.

All technical documents will be also submitted to the assigned Technical Advisor. The role of the technical advisor is to provide feedback on the documents and provide assistance during design. The team will meet with the technical advisor once a week to discuss progress as well as to ask any questions pertaining to design and calculations. The agreement between the team and technical advisor is included as Appendix B. Meeting minutes are also provided from some of the meeting with the technical advisor as well as the client and internal team meetings in Appendix C.

1.5 Challenges

A challenge that will surface during the timeline of this project and have major influence is the time constraint. Developing and testing concrete mixes takes several weeks at a minimum. The constructed canoe will take four weeks to cure. In order to overcome this, the concrete mixes must be designed and tested early. A specific schedule will be required to keep the team on track. The schedule will need defined deadlines. Other challenges faced include a lack of funding. Money will be needed in order to develop multiple concrete mixes, fabricate a mold, construct the final product, etc. Fundraising and sponsorships are crucial to address the lack of funds. Specific goals for each team member to request donations from businesses are set. Requesting support must be performed in a courteous, professional, and timely manner. Due to the lack of funds, the resources available for the project are limited. Any resources necessary for a successful project will have to be determined early, so actions might be taken to obtain the required items. Due to the competitive nature of this project, a certain level of athleticism is required. This challenge can be overcome by practicing the maneuvers the canoe will require during the races. Workouts will be followed to target the muscles used during the racing activities. A final challenge is the swamp test which the canoe must pass before being allowed to race. This test will be accounted for during the analyses of the canoe. Being aware of the tests required will diminish this challenge.

2 SCOPE OF SERVICES

The concrete canoe project starts in September 2014 when the rules are released and continues until the ASCE PSWC competition, April 9th – 11th. During this timeframe, the selected team must design all physical aspects of the canoe such as shape, materials, and theme. In addition to these physical aspects, the selected team must develop a design report, engineering notebook for calculations, presentation, and a display. Any requirements to complete these aspects will be outlined below.

2.1 Overall Goal

The overall task for the canoe team is to have 90% design completion by the start of the 2015 spring semester, as requested by the client. Each portion of the design (structural analysis, concrete mix, reinforcement, hull design, project report, etc.) will be 90% complete and ready for final revisions by January 12th. This will be completed by meeting at-least two or more times a week to discuss project updates and tasks. Deadlines will be established within the group for the different phases of work. In order to have 90% for each portion complete, the following tasks will need to be accomplished.

2.2 Project Startup

Before the team can begin working on the design, analysis, and construction of the project itself, certain background aspects must be organized. These include safety training, fundraising, an inventory of available resources, establishment of paddling practice, review of the rules put out by the ASCE NCCC and background research for the project in general.

2.2.1 Safety Training:

For the concrete mixing and testing portions of the project, safety training classes will be taken to ensure lab and field safety. Team members will complete the classes on their own time before a specified deadline. The training required for the canoe project is as follows:

- Field safety – Online through NAU
- Chemical hygiene – Online through NAU
- Tool SOP check off – Through NAU Lab Manager

2.2.2 Fundraising:

The team will seek financial support from companies, family, and friends to raise money for materials, technical support, and paddles. Each team member will contact a minimum of 10 different sources. A generic sponsorship letter will be sent out featuring rewards for donations. The leading sponsor will receive Ponderosa¸ the 2010/2011 NAU Concrete Canoe, if meeting the minimum donation requirement.

2.2.3 Inventory:

Any items needed for use throughout the project will be accounted for. The ASCE trailer will be organized and cleaned for future use. A paddling supply inventory will be taken immediately so paddling practice can begin as soon as possible. The paddling inventory includes paddles, practice canoes, and life jackets. A concrete supply inventory will be taken at NAU's Concrete Lab. All aggregates and reinforcement from previous years will be accounted for. With the old concrete supplies, the team can begin familiarizing itself with the mixing and testing process. The teams chosen mix design need-not utilize all the findings.

2.2.4 Paddling Practice:

In previous years, the races have been worth 25% of the overall project score, so it is important paddlers are well-practiced, well-conditioned, and most importantly team oriented. It is assumed the races will be worth a similar proportion in this year's competition as well. Paddling practice will be held weekly at either Lake Mary (weather permitting) or the NAU Wall Aquatic Center (winter training). Paddling experts will be contacted to teach the team proper canoe paddling techniques and fundamentals. Paddlers will also meet weekly in the classroom to watch instructional videos and races as well as exercise paddling muscles. Paddlers outside of the canoe team will be recruited from the ASCE student chapter and the classroom. Based on attendance and physical proficiency, the competition paddlers will be chosen.

2.2.5 Rule Review:

Pending the release of the 2014/2015 concrete canoe rules, the team will familiarize itself with each section. Each section of the rules will be carefully reviewed. The team will meet as a group to go over each section and discuss any confusing areas. The rules will

constantly be referenced to ensure every aspect of the project is following the specified guidelines.

2.2.6 Background Research:

In order to ensure a successful project background research will be required. The Concrete Canoe Team will conduct background research in the following areas from previous NAU teams and top placing national teams: concrete canoe designs, concrete mix designs, reinforcement, aggregates, fabrication techniques, and mold types.

2.3 Project Design

In order to have a successful project, the optimum canoe will need to be designed. Many aspects are included in design such as structural design, mix design, reinforcement design, environmental impact, and the overall theme attached to the canoe.

2.3.1 Structural Analysis:

The first step for structural analysis is hull design. Upon determining the limiting dimensions from the rules and researching the hull design of schools that have won in the past, a hull shape can be selected. The important parameters that will be considered in the design include length, width, thickness, and the addition of rocker. The hull design will affect the maneuverability and speed of the canoe and therefore will play a significant role in the success of the team in the races.

Structural analysis will include many different stages. The structural analysis will begin as a simple two-dimensional beam analysis with conservative point loads for paddlers and an opposing distributed load to represent the water. A moment diagram will be produced and the maximum internal moment will be found. This will clarify the stresses the canoe will experience when loaded in the water. The minimum compressive strength of concrete will be calculated by analyzing a simplified cross-section of the canoe. The neutral axis will be found to determine the moment of inertia of the section. Compressive stress will be calculated using the $\sigma = Mc/I$ equation which considers the maximum moment the canoe is experiencing and the geometrical properties of the canoe hull design. After determining relevant design standards, speaking with canoe experts, and analyzing past years winning canoes, a hull shape will be chosen. Using Excel and the hull design software, Prolines, the ideal hull dimensions will be established. Once the optimized dimensions are determined, the resulting canoe will be modeled in a 3-dimensional software to ensure accuracy through calculations of added stresses. This software can include ANSYS and/or RISA-3D.

2.3.2 Concrete Designs:

In order to determine the concrete mix that will be used in the canoe, multiple steps must take place and are explained below. The concrete mix design will require the research and purchase of cementitious materials, lightweight aggregates, and property enhancing admixtures. Research on previously used aggregates and admixtures will aid the team in

narrowing their selection and will allow them to see how well the aggregate worked for the canoe. Cement will be provided by others outside of the concrete canoe team. Although cost will be considered, material selection will be based on how well it functions with our design and its sustainability. This consideration is to minimalize the impact to the environment and maximize the resources we have available. After basic structural analysis is completed and concrete property requirements are identified, mixing and testing of sample mixes will commence until desired properties are achieved. The mixes will include various reinforcement for testing. A concrete mix table will be created and Material Technical Data Sheets (MTDS) will be gathered. A final mix design will be selected and finalized for use on the concrete canoe. Mix design will consider different applications such as structural mix, finishing mix, and 3D Element mixes.

2.3.3 Reinforcement Design:

Reinforcement will be a crucial part of the canoe design. Research will be performed to identify and obtain reinforcement samples to determine suitability for the project. Primary factors affecting final choice are reinforcement material, tensile and flexural strength, Percent Open Area (POA), thickness, and suitability for current project. Reinforcement properties and the quality of the interaction between the concrete and reinforcement will be established through compression, tension, bending, and shrinkage tests.

Post Tensioning will also be used in the canoe to provide additional reinforcement. Past methods of post tensioning will be researched and considered when designing for post tensioning. The tendon material will be tested and friction losses along the length of it will be calculated. The tendons will be placed within a casing to avoid direct contact with the canoe and will be anchored at the ends of the canoe once the necessary tension has been applied.

2.3.4 Broader Impact Evaluation:

Once the project is finished, the canoe will be either be displayed until a new canoe replaces it or it is auctioned off. Once removed from service, the canoe can be recycled. Due to the focus on sustainable materials within the concrete mix design, the impact on the surrounding environment will be minimized. This includes the extraneous use of materials as well. Through every stage of the project, efforts will be taken to reduce the amount of material waste generated. The most harmful aspect of the project will most likely be the stain and sealant applied to coat the concrete as well as the foam mold. Efforts will be taken to reduce this impact.

In addition to the environmental impacts, how well the team performs will affect NAU's standings within the ASCE competition, the precedence set for future canoe team members, and sponsor support. If the team does poorly, each of these will be negatively impacted and make it difficult for future NAU canoe teams to get the support they need.

2.3.5 Theme:

The canoe theme will be coordinated with the steel bridge team as well as other miscellaneous projects at conference. This will add cohesiveness to the canoe design and display. The canoe team and steel bridge team will all vote on the overlying theme. Canoe team members will vote on a name for the canoe. The canoe theme will be applied with stain to the canoe itself. The canoe theme will be integrated into the product display at the conference in April.

2.4 Construction

There are three steps when performing the construction of the canoe. These include: pre-construction where the mold is fabricated, construction where the concrete is poured and the physical shape of the canoe is developed, and post-construction where the concrete is being cured and finished.

2.4.1 Fabrication:

Once the final optimal dimensions of the canoe hull have been determined, the mold for the canoe can be fabricated. The team has researched both mold types, male and female and will create a decision matrix to determine the best mold type. The criteria to consider includes ease of construction, innovation, cost, and suitability. Mold fabrication by the team will be an exclusion depending on funding.

2.4.2 Casting:

The concrete and reinforcement will be added to the hull mold layer by layer. For example, there would be a layer of concrete, then reinforcement, then concrete, then reinforcement, etc. Post-tensioning will also occur in which tendons are laid along the length of the canoe and put in tension.

2.4.3 Curing and Finishing:

After the casting is complete, the concrete will be monitored on a daily basis to ensure it is kept moist at all times to avoid loss of internal moisture and prevent cracking. Once the 28 day strength of the concrete has been reached, the concrete will be sanded down, stained, and sealed. The stain applied to the canoe is required to have a volatile organic content of less than 350g/L, with a maximum of two coats. The staining will be done by others outside of the canoe team for maximized artistic effect. After the stain has been applied, the lettering for the school name and canoe name will be added.

2.5 Project Deliverables

Throughout this project, there are multiple deliverables required for the ASCE canoe competition. The client will also receive their own deliverables in the form of a project report and presentation. These deliverables are discussed in the following paragraphs.

2.5.1 Design Report:

A design paper will be compiled for submittal at the PSWC 2015 Concrete Canoe Competition. Several revisions and formatting will be required before a final design report is submitted. The design report will need to include:

- Organization Chart.
- Project Schedule.
- Design Drawings.
- Appendices of Materials and Calculations.

2.5.2 Engineer's Notebook:

The engineer's notebook is a document that will be displayed at the conference along with a copy of the design paper. It will also be submitted with the design paper for judging. The engineer's notebook will include the following information:

- School Name and Canoe Name.
- Statement of Certification.
- Name and ASCE National Member ID Numbers.
- Table with the Dimensions and Parameters of the Canoe and Concrete.
- Eight Pictures of Mold Construction.
- Eight Pictures of the Canoe Construction.
- Four Pictures of Finishing Techniques.
- Hull/Thickness and Reinforcement.
- Material Technical Data Sheets.
- The document must also be signed by the team captain and a faculty advisor to certify the documents.

2.5.3 Conference Oral Presentation:

The conference oral presentation will consist of the concrete canoe team providing an overview of the project through a presentation at PSWC 2015. Preparation will include creating the slides and practicing the speeches. The presentation has a time limit maximum of five minutes and a minimum of two team members that must present. Members must speak live during presentation. Videos are allowed, but no recordings of the speaking parts are permitted.

2.5.4 Product Display:

For the display of the final product there are certain parameters that have to be met. The display table can only be 30in by 96in by 29in. The height of the display must not surpass 48 inches. At the display, the following items are required:

- Engineer's Notebook.
- Design Paper.
- Two 3 in. or 4 in. diameter cylinders from each mix used in the concrete, one whole and one tested or split.
- 500 ml samples of aggregate and 12 in. by 12 in. samples of the reinforcement used in the mix design.
- A full size cutaway section modeling the canoe layers.
- Paddling seats or mats to be used while racing – provided for compliance verification.

2.5.5 ASCE PSWC Conference (Tucson, AZ):

The final canoe product will be tested and evaluated at the conference in April 2015. It will consist of 4 categories each worth 25 conference points which include:

- Design Paper.
- Oral Presentation.
- Final Product.
- Races (the canoe must pass a swamp test to test flotation ability). There are five different races (ASCE and NCCC):
  - Women's Sprint (2 women).
  - Women's Slalom Endurance (2 women).
  - Men's Sprint (2 men).
  - Men's Slalom Endurance (2 men).
  - Coed Sprint (2 men, 2 women).

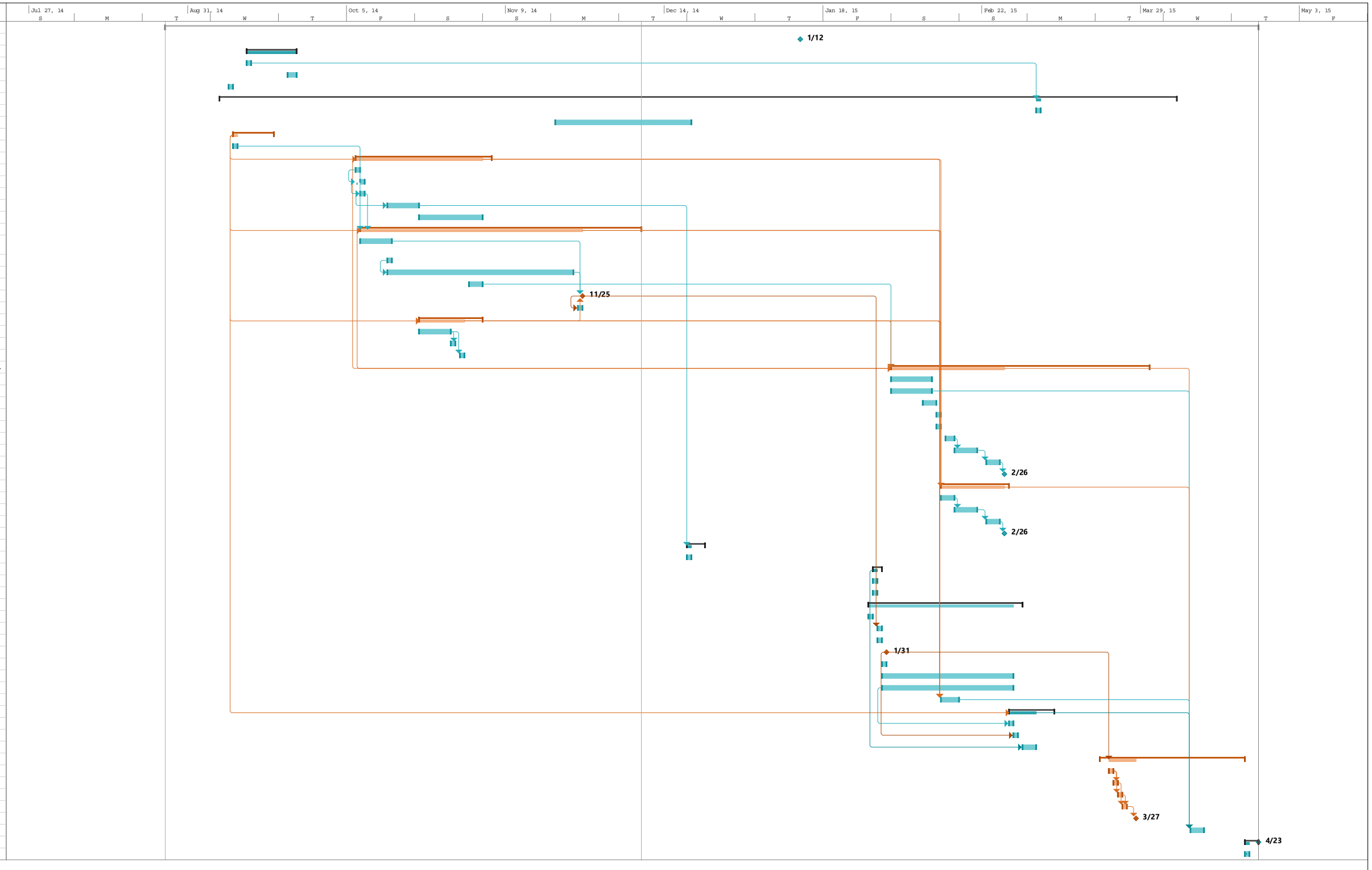
2.5.6 Final Project Deliverables:

For the final deliverables of the project, the team will provide the canoe, the final design paper, and an oral presentation to the client.

3 PROJECT SCHEDULE

The estimated time for each section of this project is provided on the following page. The schedule shows the order in which the tasks will be completed and the timeframe allotted to each one. Any deliverables required throughout the project are displayed as well.

ID	Task Name	Duration	Start	Finish	Predecessors
3	**14-15 Concrete Canoe Schedule2**	**173 days**	**Tue 8/26/14**	**Thu 4/23/15**	
4	**1 90% Project Completion**	**25 days**	**Tue 8/26/14**	**Mon 1/12/15**	
5	**2 Inventory**	**8 days**	**Sat 9/13/14**	**Tue 9/23/14**	
6	2.1 Paddling Supplies	1 day	Sat 9/13/14	Sat 9/13/14	
7	2.2 Concrete Supplies	2 days	Mon 9/22/14	Tue 9/23/14	
8	**3 Safety Training**	**1 day**	**Tue 9/9/14**	**Tue 9/9/14**	
9	**4 Paddling Practice**	**152 days**	**Sun 9/7/14**	**Sun 4/5/15**	**3**
10	4.1 Determine Paddlers	1 day	Fri 3/6/15	Fri 3/6/15	
11	**5 Fundraising**	**22 days**	**Thu 11/20/14**	**Fri 12/19/14**	
12	**6 Rule Review**	**7 days**	**Wed 9/10/14**	**Thu 9/18/14**	
13	6.1 RFI	1 day	Wed 9/10/14	Wed 9/10/14	
14	**7 Structural Analysis**	**22 days**	**Tue 10/7/14**	**Wed 11/5/14**	**9SS**
15	7.1 Identify Design Standards	1 day	Tue 10/7/14	Tue 10/7/14	
16	7.2 Decide General Canoe Properties	1 day	Tue 10/7/14	Wed 10/8/14	12SS
17	7.3 Determine Minimum f'c required	1 day	Wed 10/8/14	Wed 10/8/14	13SS
18	7.4 Determine optimal dimensions	5 days	Tue 10/14/14	Mon 10/20/14	14SS
19	7.5 2D/3D Analysis	10 days	Tue 10/21/14	Mon 11/3/14	
20	**8 Mix Designs**	**44 days**	**Wed 10/8/14**	**Mon 12/8/14**	**9SS,10,14**
21	8.1 Research and Determine final reinforcement, aggregates, fibers	5 days	Wed 10/8/14	Tue 10/14/14	
22	8.2 Purchase Materials	1 day	Tue 10/14/14	Tue 10/14/14	
23	8.3 Cylinder Testing	30 days	Tue 10/14/14	Sun 11/23/14	19SS
24	8.4 Material Technical Data Sheets (MTDS	2 days	Sat 11/1/14	Mon 11/3/14	
25	8.5 Finalize mix	2 days	Mon 11/24/14	Tue 11/25/14	24,18,20
26	8.6 Concrete Mixture Data Table	1 day	Tue 11/25/14	Tue 11/25/14	22SS
27	**9 Reinforcement Design**	**10 days**	**Tue 10/21/14**	**Mon 11/3/14**	**9SS**
28	9.1 Research	5 days	Tue 10/21/14	Mon 10/27/14	
29	9.2 Test thicknesses	1 day	Tue 10/28/14	Tue 10/28/14	25
30	9.3 Calculate POA	1 day	Thu 10/30/14	Thu 10/30/14	25
31	**10 Design Paper**	**41 days**	**Mon 2/2/15**	**Mon 3/30/15**	**17SS,11SS,24,21**
32	10.1 Organization Chart	7 days	Mon 2/2/15	Tue 2/10/15	
33	10.2 Project Schedule	7 days	Mon 2/2/15	Tue 2/10/15	
34	10.3 Design Drawing w/ bill of materials	3 days	Mon 2/9/15	Wed 2/11/15	
35	10.4 Appendix C - Bill of Materials	1 day	Thu 2/12/15	Thu 2/12/15	
36	10.5 Appendix D - Example Structural Calc	1 day	Thu 2/12/15	Thu 2/12/15	
37	10.6 Assemble Format	1 day	Fri 2/13/15	Sun 2/15/15	
38	10.7 Revision 1	5 days	Mon 2/16/15	Fri 2/20/15	34
39	10.8 Revision 2	3 days	Mon 2/23/15	Wed 2/25/15	35
40	10.9 Final Copy	1 day	Thu 2/26/15	Thu 2/26/15	36
41	**11 Engineer's Notebook**	**11 days**	**Fri 2/13/15**	**Fri 2/27/15**	**17,24,11**
42	11.1 Assemble Format	2 days	Fri 2/13/15	Sun 2/15/15	
43	11.2 Revision 1	5 days	Mon 2/16/15	Fri 2/20/15	39
44	11.3 Revision 2	3 days	Mon 2/23/15	Wed 2/25/15	40
45	11.4 Final Copy	1 day	Thu 2/26/15	Thu 2/26/15	41
46	**12 Mold Fabrication**	**2 days**	**Fri 12/19/14**	**Mon 12/22/14**	**15**
47	12.1 3D Elements	1 day	Fri 12/19/14	Fri 12/19/14	
48	**13 Theme**	**2 days**	**Thu 1/29/15**	**Fri 1/30/15**	
49	13.1 Canoe Design	1 day	Thu 1/29/15	Thu 1/29/15	
50	13.2 Theme Name	1 day	Thu 1/29/15	Thu 1/29/15	
51	**14 Pour Day Preparation/Monitoring**	**24 days**	**Wed 1/28/15**	**Mon 3/2/15**	
52	14.1 Material and Personnel	1 day	Wed 1/28/15	Wed 1/28/15	
53	14.2 Final Mix Preparation	1 day	Fri 1/30/15	Fri 1/30/15	22
54	14.3 Obtain Form Oil	1 day	Fri 1/30/15	Fri 1/30/15	
55	14.4 Pour Day	1 day	Sat 1/31/15	Sat 1/31/15	
56	14.5 Post-Tensioning	1 day	Sat 1/31/15	Sat 1/31/15	
57	14.6 Curing & Daily Monitoring	22 days	Sat 1/31/15	Sat 2/28/15	
58	14.7 Finished Cylinders for Display	22 days	Sat 1/31/15	Sat 2/28/15	
59	**15 Conference Oral Presentation**	**2 days**	**Fri 2/13/15**	**Mon 2/16/15**	11,17,24
60	**16 Product Display**	**7 days**	**Sat 2/28/15**	**Mon 3/9/15**	**9SS**
61	16.1 Tested/Split Cylinders	1 day	Sat 2/28/15	Sat 2/28/15	55SS
62	16.2 Cutaway Section	1 day	Sun 3/1/15	Sun 3/1/15	52SS
63	16.3 Canoe Stands	3 days	Tue 3/3/15	Thu 3/5/15	45SS
64	**17 Canoe Finishing**	**22 days**	**Fri 3/20/15**	**Mon 4/20/15**	**52**
65	17.1 Sanding	1 day	Sun 3/22/15	Sun 3/22/15	
66	17.2 Staining	1 day	Mon 3/23/15	Mon 3/23/15	62
67	17.3 Lettering	1 day	Tue 3/24/15	Tue 3/24/15	62
68	17.4 Sealing	1 day	Wed 3/25/15	Wed 3/25/15	63,64
69	17.5 Finishing Touches	1 day	Fri 3/27/15	Fri 3/27/15	65
70	**18 ASCE PSWC Conference (Tucson, AZ)**	**3 days**	**Thu 4/9/15**	**Sat 4/11/15**	38,28,57,30,56
71	**19 Final Project Presentation/Deliverable**	**3 days**	**Tue 4/21/15**	**Thu 4/23/15**	
72	19.1 Broader Impact Consideration	1 day	Tue 4/21/15	Tue 4/21/15	



Project: 14-15 Concrete Canoe

Task | Split | Milestone | Summary | Project Summary | Inactive Task | Inactive Milestone | Inactive Summary | Manual Task | Duration Only | Manual Summary Rollup | Manual Summary | Start-only | Finish-only | External Tasks | External Milestone | Deadline | Progress | Manual Progress

4 COST OF ENGINEERING SERVICES

Design and construction of the concrete canoe requires full involvement by the project team members. The time and cost required to complete the project on schedule has been estimated and includes staffing, overhead, and benefits. The time spent by mentees, the members of the team filling the roles of interns, will be included in the total hours and cost. Costs associated with travel to the competition location are also included in the total cost.

4.1 Qualifications

In order to demonstrate the ability of the team members to complete the project on time and to provide credentials that allow them to set a billing rate, each team member has provided their qualifications in reference to the project requirements. Four generic positions have been created in order to determine staffing; this includes a senior engineer (SENG), engineer (ENG), lab technician (LAB), and engineering intern (INT). The senior engineer position is given to the project manager who is in charge of overseeing the project and ensuring all components are completed in a timely manner. All other personnel, including the mentees, will work as engineers, lab technicians and engineering interns as applicable.

Jeremy DeGeyter- Project Manager

Jeremy DeGeyter is a senior civil engineering student at Northern Arizona University. He is the Project Manager for the 2014-15 NAU Concrete Canoe Team and will serve as the senior engineer. As project manager he will be responsible for overseeing general project progress and holding the team to the deliverable schedule, while overseeing the paddling program. The project manager will also be the primary contact to the client. Jeremy is qualified for this position because he has helped pour the past 4 NAU Concrete Canoes and was a mentee for last year's team. He has seen various techniques used for construction and has observed successes and failures. He has paddled in the canoe races for the past two years. Jeremy has experience in the construction industry as a stonemason and general contractor in the residential sector. Jeremy currently works as a lab technician for Speedie and Associates, Inc. performing soils and materials testing.

Kristin Van Sciver-Concrete Lead

Kristin Van Sciver is a senior civil engineering student at Northern Arizona University. She is an engineer specializing as the concrete lead for this project. The concrete lead will be responsible for managing concrete mix design program. She will manage the concrete curing and testing program. Kristin has taken design classes for reinforced concrete in addition to analyses classes such as finite element analysis, statics, mechanics of materials, and structural analysis. Kristin has had an internship for the past two summers where she calculated load paths in residential homes.

Matt Snyder- Structural Analysis Lead

Matt Snyder is a senior civil engineering student at Northern Arizona University. Matt is an engineer focusing on the structural analysis component of the 2014-15 NAU Concrete Canoe.

The structural analysis lead will be responsible for creating spreadsheets and formulating methods to perform analysis of canoe design. This includes any software that will be used for design such as for the hull and website. Matt has taken structural analysis and reinforced concrete classes making him qualified for this position. Matt has practical experience in the landscape-construction trade.

Cynthia Alvarez- Reinforcement Lead

Cynthia Alvarez is a senior civil engineering student at Northern Arizona University. She is an engineer working on reinforcement design for the concrete canoe. As the reinforcement lead, she will be responsible for researching and developing reinforcement options for the canoe. Cynthia has gained experience with reinforcement as a mentee for the 2013-14 Concrete Canoe team in addition to her attendance at the pour day last year in which she aided in reinforcement placement. Cynthia has taken mechanics of materials and reinforced concrete design which have provided the knowledge to test and analyze reinforcement samples.

Ramon Aguilar- Quality Control and Safety Officer

Ramon Aguilar is a senior civil engineering student at Northern Arizona University. He is an engineer specializing in quality control and safety for the 2014-15 Concrete Canoe team. The quality control and safety officer will be responsible for the team's Safety Plan and creating quality control protocols. He is also an assistant concrete lead and is conference lead. Ramon was a mentee for the 2013-14 Concrete Canoe team and helped with structural analysis. Ramon has experience with Risa 3-D and AutoCAD from his internship with ARQ Engineering LLC.

The four mentees for the 2014-15 Concrete Canoe team will aid during all steps of the design process in hopes of becoming part of the team next year. They will use their experience as mentees to improve the project for the upcoming year.

4.2 Engineering Services

Table 4.1 below shows the tasks, as detailed in the scope, which will need to be completed in order to produce a successful canoe as well as the number of hours that will be allotted by the staff for the specified task. An estimation of hours spent on each task for the various staff positions was created first for the team members. The number of hours spent by the mentees was calculated as 50% of the time spent by the team members.

Table 4.1: Tasks vs Staff Position

Task	SENG (hrs)	ENG (hrs)	LAB (hrs)	INT (hrs)
Safety Training	0	0	0	10
Fundraising	10	45	0	80
Inventory and Field Station Set Up	20	80	0	80
Paddling Practice	0	0	0	500
Rule Review	4	16	0	0
Structural Analysis	25	100	120	60
Concrete Design/Mixing	20	40	200	100
Reinforcement Design	5	20	0	0
Canoe Mold and Prep	25	100	100	50
Pour Day	8	8	24	32
Project Deliverables	75	300	0	20
Meetings	50	200	0	100
Material Procurement	20	0	0	0
Conference Prep	20	80	0	0
Subtotal Hours	282	989	444	1032
Total Hours	**2747**			

Approximately 2800 hours will be spent on the project by the five team members and four mentees. The tasks include all those associated with preparation, design, and construction of the canoe as well as any tasks associated with conference. As mentioned above, the SENG position consists of work done strictly by the project manager for each task. The ENG, LAB, and INT positions include hours spent by the remaining members and are divided based on the specified task. During concrete mixing for Concrete Design in Table 1, the hours for the staff were billed as LAB while the hours spent on concrete mix preparation for that same task were billed as ENG. This method was used in order to create a more accurate representation of how the team is allotting their time and the appropriate billing for their work. It is also important to note that for non-technical tasks such as paddling and fundraising, all team members and mentees billed their time as interns in order to reduce the total billing.

4.3 Summary of Costs

A summary of the cost estimate for engineering services is included in Table 4.2 below. It utilizes the hours spent by the staff on each task and the billing rate for the staff position to determine the total cost for personnel. The billing rate was determined using a percent of the profit and overhead which includes office/lab space, liability insurance, lab/office supplies, software and testing equipment. The total cost also considers the cost of travel for conference and any direct costs.

Table 4.2 Summary of Cost for Engineering Services

1.0 Personnel	Classification	Hours	Rate, $/hr	Cost
	SENG	282	100	$28,200
	ENG	989	80	$79,120
	LAB	444	62	$27,528
	INT	1032	52	$53,664
	Total Personnel			$188,512
2.0 Travel	Lodging/Food	per person		$250
	Registration	per person		$120
	Mileage	$0.56/mi	520 miles	$291
	Total Travel			$2,141
3.0 Direct Costs	Materials			$4,000
	Total Direct Costs			$4,000
4.0 Total				**$194,653**

Based on the hours spent by the team and mentees for each staff position and the billing rate, the total cost of personnel was determined to be approximately $189,000. The total cost for travel, food, lodging and registration for the conference in Tucson was approximately $2,150. The only direct cost associated with the project was materials. It was determined that approximately $4,000 were needed for materials including the stain and sealer, post-tensioning materials, display, concrete cylinders, curing system and mold fabrication. After considering all costs associated with this project, the total cost was calculated to be approximately $195,000.

5 CONCLUSION

High Altitude has researched and considered all aspects of the project in order to provide a comprehensive proposal. Based on their prior experience and success, the team will aim to produce a design that meets the client's request. The proposal includes background research and the team's understanding of the project. The scope of the project has also been clarified and a schedule created to provide an estimated time of completion. The final part of this proposal explains the estimated cost of the project including the cost of personnel, travel, and direct costs. The goal of High Altitudes engineering is to design a canoe that allows them to be successful at the competition. All members are prepared to put in all their time and effort to accomplish this and deliver a top-placing canoe for Northern Arizona University and the client.

6 REFERENCES

Imagery ©2014 Google, Map Data ©2014 Google. Retrieved 16 September 2014.

Arizona Map - ©2006 Destination360. Retrieved 16 September 2014.

ASCE, and NCCC. 2015 ASCE National Concrete Canoe Competition Rules & Regulations. p.3, 2015. Print.

NAU ASCE. 2014. “Spirit” Results.

7 APPENDICES

The following appendices are to provide additional information on the team’s progress. Appendix A is the 2014 NAU “Spirit” results. Appendix B and C are the technical advisement agreement and meeting minutes with the technical advisor, respectively.

7.1 Appendix A: 2014 “Spirit” PSWC Results

Design Paper

Rank	Comp. Pnts	School
1	25.0	Drexel University
2	22.5	University of Nevada, Reno
3	20.0	Utah State University
4	17.5	California State Polytechnic University, Por
5	15.0	Universite Laval
6	12.5	California Polytechnic State University, SLO
7	10.0	Tongji University
8	7.5	University of Akron
9	5.0	University of Puerto Rico, Mayaguez
10	2.5	Michigan Technological University
11		University of Washington
12		University of Wisconsin - Madison
13		Clemson University
14		Cornell University
15		University of Kansas
16		University of Florida
17		New Mexico State University
18		Fairmont State University
19		University of Pittsburgh at Johnstown
20		Louisiana Tech University
21		University of Wisconsin - Platteville
22		Texas A&M University
23		City College of New York, CUNY

Oral Presentation

Rank	Comp. Pnts	School
1	25.0	California Polytechnic State University, SLO
2	22.5	University of Nevada, Reno
3	20.0	University of Wisconsin - Madison
4	17.5	Michigan Technological University
5	15.0	Utah State University
6	12.5	California State Polytechnic University, Pomo
7	10.0	Universite Laval
8	7.5	University of Puerto Rico, Mayaguez
9	5.0	University of Pittsburgh at Johnstown
10	2.5	New Mexico State University
11		University of Florida
12		University of Washington
13		Fairmont State University
14		Clemson University
15		Tongji University
16		University of Akron
17		University of Wisconsin - Platteville
18		Texas A&M University
19		University of Kansas
20		Cornell University
21		Louisiana Tech University
22		Drexel University
23		City College of New York, CUNY

Final Product

Rank	Comp. Pnts	School
1	25.0	Utah State University
2	22.5	California Polytechnic State University, SLO
3	20.0	Universite Laval
4	17.5	Clemson University
5	15.0	University of Puerto Rico, Mayaguez
6	12.5	University of Wisconsin - Madison
7	10.0	University of Akron
8	7.5	University of Nevada, Reno
9	5.0	New Mexico State University
10	2.5	Drexel University
11		University of Florida
12		Fairmont State University
13		Louisiana Tech University
14		Michigan Technological University
15		California State Polytechnic University, Pomona
16		University of Kansas
17		Tongji University
18		University of Wisconsin - Platteville
19		Texas A&M University
20		University of Washington
21		City College of New York, CUNY
22		Cornell University
23		University of Pittsburgh at Johnstown

Final Summary—Sorted by Rank

Sorted Rank	School Name	Points
1	University of Nevada, Reno	75.9
2	California Polytechnic State University, SLO	73.3
3	Universite Laval	63.7
4	Utah State University	61.5
5	University of Wisconsin - Madison	50.5
6	California State Polytechnic University, Pom	37.1
7	Clemson University	34.9
8	Michigan Technological University	30.1
9	University of Puerto Rico, Mayaguez	28.9
10	Drexel University	27.5
11	University of Akron	19.9
12	University of Florida	13.4
13	New Mexico State University	12.3
14	Tongji University	10.0
15	University of Pittsburgh at Johnstown	6.4
16	University of Wisconsin - Platteville	2.2
17	Louisiana Tech University	1.0
18	University of Washington	0.9
19	Fairmont State University	0.0
20	University of Kansas	0.0
21	Cornell University	0.0
22	Texas A&M University	0.0
23	City College of New York, CUNY	0.0

Standings—Women's Final Sprints

Place	Time	Comp. Pnts	School
1	01:14.23	4.5	University of Nevada, Reno
2	01:17.47	4.0	University of Florida
3	01:17.84	3.6	University of Wisconsin - Madison
4	01:18.61	3.1	Clemson University
5	01:21.77	2.6	Universite Laval
6	01:21.58	2.2	California Polytechnic State University, SLO
7	01:24.81	1.8	California State Polytechnic University, Por
8	01:30.02	1.4	Michigan Technological University
9	01:30.55	0.9	University of Puerto Rico, Mayaguez
10	01:37.68	0.4	University of Akron

Standings—Men's Final Sprints

Place	Time	Comp. Pnts	School
1	01:06.26	4.5	Universite Laval
2	01:07.42	4.0	University of Nevada, Reno
3	01:08.99	3.6	Clemson University
4	01:11.17	3.1	Michigan Technological University
5	01:11.76	2.6	University of Wisconsin - Madison
6	01:11.81	2.2	California Polytechnic State University, SLO
7	01:18.82	1.8	New Mexico State University
8	01:20.26	1.4	University of Pittsburgh at Johnstown
9	01:24.49	0.9	University of Washington
10	01:50.14	0.4	University of Florida

Standings—Coed Final Sprints

Place	Time	Comp. Pnts	School
1	02:38.72	6.0	University of Florida
2	02:39.32	5.4	University of Nevada, Reno
3	02:42.83	4.8	University of Wisconsin - Madison
4	03:09.12	4.2	Clemson University
5	03:12.83	3.6	Universite Laval
6	02:50.02	3.0	New Mexico State University
7	02:51.62	2.4	California Polytechnic State University, SLO
8	02:54.86	1.8	California State Polytechnic University, Pomona
9	03:14.03	1.2	University of Wisconsin - Platteville
10	05:00.00	0.6	Michigan Technological University

Standings—Women's Slalom/Endurance Race

Rank	Time	Comp. Pnts	School
1	04:01.50	5.0	University of Wisconsin - Madison
2	04:05.96	4.5	University of Nevada, Reno
3	04:10.37	4.0	Universite Laval
4	04:17.86	3.5	California State Polytechnic University, Por
5	04:25.86	3.0	California Polytechnic State University, SLO
6	04:30.03	2.5	Michigan Technological University
7	04:39.12	2.0	Clemson University
8	04:52.28	1.5	University of Akron
9	05:10.84	1.0	University of Wisconsin - Platteville
10	05:12.60	0.5	University of Puerto Rico, Mayaguez
11	05:14.27		University of Florida
12	05:25.28		Utah State University
13	05:50.46		Tongji University
14	06:15.86		City College of New York, CUNY
15	06:31.38		Louisiana Tech University
16	06:33.35		University of Kansas
17	06:52.87		Cornell University
18	06:52.88		New Mexico State University
19	07:03.68		Fairmont State University
20	07:29.09		University of Washington
21	07:29.58		Drexel University
22	07:31.16		Texas A&M University

Standings—Men's Slalom/Endurance Race

Place	Time	Comp. Pnts	School
1	03:18.80	5.0	University of Nevada, Reno
2	03:35.26	4.5	Clemson University
3	03:38.67	4.0	Universite Laval
4	03:42.67	3.5	California Polytechnic State University, SLO
5	03:49.73	3.0	University of Florida
6	03:51.08	2.5	Michigan Technological University
7	03:54.05	2.0	University of Wisconsin - Madison
8	04:06.37	1.5	Utah State University
9	04:16.27	1.0	Louisiana Tech University
10	04:18.60	0.5	University of Akron
11	04:22.62		University of Puerto Rico, Mayaguez
12	04:22.86		New Mexico State University
13	04:25.71		California State Polytechnic University, Pomo
14	04:52.38		Tongji University
15	04:55.27		University of Kansas
16	05:18.75		Fairmont State University
17	05:22.57		University of Wisconsin - Platteville
18	05:50.85		City College of New York, CUNY
19	05:58.83		University of Pittsburgh at Johnstown
20	06:18.48		University of Washington
21	06:20.59		Cornell University
22	07:03.41		Drexel University

Race Points—Sorted by Race Points

Rank	Race Points	School
1	23.4	University of Nevada, Reno
2	18.7	Universite Laval
3	18.0	University of Wisconsin - Madison
4	17.4	Clemson University
5	13.4	University of Florida
6	13.3	California Polytechnic State University, SLO
7	10.1	Michigan Technological University
8	7.1	California State Polytechnic University, Pomona
9	4.8	New Mexico State University
10	2.4	University of Akron
11	2.2	University of Wisconsin - Platteville
12	1.5	Utah State University
13	1.4	University of Pittsburgh at Johnstown
13	1.4	University of Puerto Rico, Mayaguez
15	1.0	Louisiana Tech University
16	0.9	University of Washington
17	0.0	City College of New York, CUNY
17	0.0	Cornell University
17	0.0	Drexel University
17	0.0	Fairmont State University
17	0.0	Texas A&M University
17	0.0	Tongji University

7.2 Appendix B: Technical Advisor Agreement

CENE 476 / 486 Technical Advising Requirements

An essential element in the education of engineering students is their culminating senior design experience, also known as capstone. In Civil and Environmental Engineering, students work in teams of three or four with a client, usually external to the department, to develop a real-world engineered design. Each student team will work with their client and technical advisor first to develop a proposal for the project due at the end of CENE476, then to complete the full design and develop a design report and associated documents (e.g. plans, specifications, etc.), due near the end of CENE486C. This document provides a framework for the responsibilities of the student team to the technical adviser, and explanation of the technical adviser's responsibilities.

The student team agrees to:

- Interact with their technical adviser in a professional manner at all times.
- Prepare for meetings with their tech adviser so that the adviser's time is used efficiently and effectively.
- Provide meeting agendas at least three business days in advance for any meetings between the team and tech adviser.
- Keep detailed meeting minutes (date, time spent, items discussed, etc.) from meetings with their technical adviser.
- Follow all recommendations made by the tech adviser with respect to technical aspects of their design. Where a team does not adhere to their adviser's advice, they must justify and document reasons why they chose to not follow to the adviser's input.
- Not request reviews of submittals for grammar, punctuation, spelling, etc.

The technical adviser agrees to:

- Interact with their student team in a professional manner at all times.
- Be available to the student team for at least one hour each week.
- Prepare for meetings with their team in advance (e.g. review documents for technical soundness, review upcoming meeting agenda, etc.)
- Provide input to the team with respect to the technical approaches used on their project. This is the PRIMARY role of the tech adviser – one of expert who can help students avoid critical mistakes (incorrect assumptions, analyses methods, etc.) that have the potential to derail the design solution.
- Provide honest yet constructive feedback to their student team on performance, professionalism, etc.
- Provide assessments of various team activities including: team preparedness for TA meetings, 50% design deliverable, and 100% design deliverable.

Signatures:

Technical Advisor: _____ Date: 9/4/14

Print Name: THOMAS NELSON

Student: Kristin Van Sciver Date: 9/4/14

Print Name: Kristin Van Sciver

Student: Cynthia Alvarez Date: 9/4/14

Print Name: Cynthia Alvarez

Student: Ramon Aguilar Date: 9/4/14

Print Name: Ramon Aguilar

Student: Jeremy DeGeyter Date: 9/4/14

Print Name: Jeremy DeGeyter

Matt Snyder

9/4/14

7.3 Appendix C: Meeting Minutes

MEETING MINUTES

2014 CONCRETE CANOE
Meeting with Technical Advisor
Thursday, September 4, 2014
6:00 pm to 7:00 pm

Minutes recorded by: Cynthia Alvarez

Meeting called by: Jeremy DeGeyter

Attendees: Ramon Aguilar, Cynthia Alvarez, Jeremy DeGeyter, Matt Snyder, Kristin VanSciver, Thomas Nelson

MEETING SUMMARY

- Caught up technical advisor on what was spoken of at previous group meetings
- Canoe competition rules released September 10, 2014
- Determine what technical analysis needs to be done
    - Consider using Pro-Lines
    - Shape/hull design
    - Reinforcement
        - Lateral and longitudinal strength
    - Pre-stressing/Post-tensioning
    - Cost benefit analysis
    - Structural Design
        - Finite element analysis
    - 3 point bend test
- Established a starting point
    - Work on improving previous concrete mixes
        - Workability
        - Bonding with reinforcement
    - Use Ponderosa for general measurements to begin water calculations

Assigned Tasks

Task	Person Assigned	Due Date
Complete Safety Training	All	9/9/14

MEETING MINUTES

2014 CONCRETE CANOE
Meeting with Technical Advisor
Thursday, October 23, 2014
12:30pm – 1:30pm

Minutes recorded by: Ramon Aguilar

Meeting called by: Kristin Van Sciver

Attendees: Ramon Aguilar, Cynthia Alvarez, Jeremy DeGeyter, Matt Snyder, Kristin Van Sciver, Thomas Nelson

MEETING SUMMARY

- New updates
  - Farm set up-Saturday
  - 3M bubbles
  - Fibers from DASN
  - Fly ash and liquids shipped from Ceretech: Dr. T is meeting with them
  - Cemex will be giving us mix design
    - Asked if we could not share with other companies: proprietary info
    - Contacted Cemex and Ceretech: they are hooking us up with shockcreek machines
- Budget
  - Reviewed by Mark
  - Will submit tomorrow
- Supplies
  - Will contact CRE to start ordering process for paddles
  - QuickCreek will be donating some supplies
    - Sealers, stain and colors, etc.
- Kickstarter
  - Letter came in
  - Waiting for final answer
  - Deadline within 30 days
- Structural analysis
  - Talked to Dr. T about structural analysis: he says its basic hand calculations level and need to find a way to take it to the next level
  - Four research items: creep, shrinkage, friction loss and temperature
  - Create spreadsheet with results
    - Meet one day to help Matt: 10/28 @ 11:15a
- Samples
  - Stucco
  - Petula: hard to work with because its so stiff

    - Geo grid: strong but not bendable so hard to turn
    - Spreadsheet on standard hull, build off spreadsheet
- Aggregates
    - Pour aver
    - Glass bubbles: larger range of sizes
- Hull Design
    - Hull deign outside structural analysis
    - Test with sand bags
    - 17 foot canoe instead of 18ft
    - See if Ponderosa Canoe can be used for practice and weighing
    - Winona suggested doing by hand is easier and better than with CNC
- Mentees
    - Those who are interested are welcome to help in any way possible
    - Canoe names
    - Team names
    - Hull design
    - Design team polos
    - Canoe theme ideas
    - Canoe 3D elements

Assigned Tasks

Task	Person Assigned	Due Date
Send privy link to Kickstarter	Jeremy	10/24/14
Structural analysis research	All	10/28/14
Mentees focus on design	All	ASAP
Locate Canoes	All	ASAP

MEETING MINUTES

2014 CONCRETE CANOE
Meeting with Client
Tuesday, September 16, 2014
11:15am – 12:15pm

Minutes recorded by: Ramon Aguilar

Meeting called by: Kristin Van Sciver

Attendees: Ramon Aguilar, Cynthia Alvarez, Jeremy DeGeyter, Matt Snyder, Kristin Van Sciver, Mark Lamer

MEETING SUMMARY

- Introduction
  - Cynthia, Jeremy, Matt (late), Kristin and Ramon
- Project understanding
  - 90% of design done by start of spring semester
  - Time constraint
  - Mix design done by spring semester
  - Canoe dimensions by spring semester
  - Design should be complete by end of February
  - Final selection of reinforcement design
  - Background information about project
  - Rules: something outside rules is…BAD!
    - ACCEPT DEADLINES AND RULES!
    - Need to go over rules together
    - Gather questions about rules to send to national
- CEMEX
  - Next week
  - Contact Brent for concrete mix ideas
- Project status
  - Practice at WAC or Lake Mary
    - Sundays 2pm
    - Tuesdays 7pm
    - At conference you can have 10 registered participants for rowing: 5 males, 5 females
    - Rules for participants: they have to be involved in canoe project
- Mentee program
  - Client is making it a requirement
  - One mentee per person

    - Make a set schedule
    - Be friendly
    - Remember mentee is not *required* to do anything
- Sponsors
    - Look at Kickstarter Campaign for fundraising
    - Look at last year's sponsor list, should be first people to contact
    - Fundraising deadline #1: contact at least 10 sponsors to donate by October 7th
- Major design decisions coming soon
    - Pros and cons about design
    - Fast and maneuverable is design choice
    - Strongest person has to be front of canoe
- Main project points
    - Communication of team in all forms: email, text, phone, agendas and minutes
    - Figuring out everyone's roles
    - Conference assignments
        - Who is going to do what
- Roles
    - Jeremy: project manager
    - Ramon: quality control and safety
    - Kristin: concrete lead with assistant Ramon
    - Cynthia: structural lead
    - Matt: Reinforcement lead
    - Ramon: Conference leader
        - Display
        - Parameters for conference met
        - In charge of conference
        - One person overseeing things for conference
- Teams tasks
    - Everyone has to know what is going on with all aspects of project
    - Don't try to take on everything
    - One person dominating project=BAD!
    - We need TEAMWORK!!
- Client
    - How often should we meet?
        - 2 required meetings: this was one and one before proposal is submitted
        - Meeting at end of fall semester and beginning of spring semester
    - Client is always available for questions and advice

MEETING MINUTES

2014 CONCRETE CANOE
Meeting with Client
Tuesday, November 18, 2014
2:10pm – 3:10pm

Minutes recorded by: Kristin Van Sciver

Meeting called by: Mark Lamer

Attendees: Ramon Aguilar, Cynthia Alvarez, Jeremy DeGeyter, Matt Snyder, Kristin Van Sciver

MEETING SUMMARY

- Expectations:
    - Dilligently working towards 90% by 1/12
    - 1 month left
    - Should have (by today)
        - Mix designs moving steadily along
        - Whittling down mixes
        - Hull design done
            - Begin structural analysis on it
            - Testing reinforcement
            - Concrete shell design in FEA
- Project Standing:
    - Behind schedule, but not too deep.
    - Do not want to run out first 3 weeks of next semester catching up
        - Team dynamics fall apart under too much pressure
    - More manageable if mix is done by end of this semester
        - ekkomax arrived pretty late – delayed schedule a bit
    - Planning needs to be more established
- 476 Deliverables:
    - Qualifications – list registrations, involvements, and classes
    - Hours – Include mentees, anything that contributes to construction and design, paddling hours, conference design/report hours, and website hours
    - Benefits
        - Cost to rent farm/basic benefits
        - Add monthly total divided by team members
        - Narrative explaining why we did what we did to support the staffing, cost, overhead, and hours

MEETING MINUTES

2014 CONCRETE CANOE
Team Meeting
Tuesday, September 30, 2014
11:15am – 12:15pm

Minutes recorded by: Jeremy DeGeyter

Meeting called by: Matt Snyder

Attendees: Ramon Aguilar, Cynthia Alvarez, Jeremy DeGeyter, Matt Snyder, Kristin Van Sciver

MEETING SUMMARY

- Moved Ponderosa and stands to Farm for storage
    - Cynthia, Jeremy, Matt, Kristin and Ramon
- Canoe Theme/Names
    - Megalodon
    - Canoe Theme Song…Pick a song for practices if you want
- CEMEX Update
    - No follow up yet……
- Canoe Inventory
    - Various materials in concrete lab were inventoried…See Google Drive
- Concrete Mix
    - Meet Sunday at 10 am to pour Night Fury Mix for practice.
        - Supplies needed?
        - Portland
        - Cylinders
    - Start Mix design
    - Send Night Fury to Tommy for review
    - Get Safety Signoff to Gary by Sunday
- Structural Analysis
    - Forgot distributed load in Moment calcs
- Paddling Clinic
    - Saturday, Oct 4 at 8 am, Lake Mary
    - John and Lynn Brennard instructing
    - RSVP Emails sent
    - Food and drinks-Cynthia and Kristin
    - Sand Bags- Ramon
    - Jeremy-Trailer
- Mentee Program
    - Chelsie asked to join

    - Invite to next meeting and use as interview
    - They need to be involved
    - Don't mention paying for conference at this point
- Kickstarter
    - Kickstarter not set up yet
    - Use for fundraising, includes 10 contacts
    - Friends and family contacts can wait until after Kickstarter is set up
    - Fundraising deadline is Oct 7, 2014
- CeraTech
    - Jeremy Contacted, but have not heard anything yet.
    - 100% Fly-Ash Concrete…would be sweet!
- Teams Tasks
    - Paddling Tasks
    - Concrete Pour Sunday 10 am
    - Get Safety Sheets to Gary by Sunday

MEETING MINUTES

2014 CONCRETE CANOE
Team Meeting
Tuesday, November 18, 2014
12:20pm – 1:30pm

Minutes recorded by: Kristin Van Sciver

Meeting called by: Cynthia Alvarez

Attendees: Ramon Aguilar, Cynthia Alvarez, Jeremy DeGeyter, Matt Snyder, Kristin Van Sciver, Evan, Emily, Brent

MEETING SUMMARY

- Project Update:
  - Paddles have arrived
  - Paddling Practice 11/18 canceled
  - Behind schedule
- Kick Starter:
  - Email Gerardo about tax deductible process
  - 12 days left
  - At 649 dollars
- Concrete mix:
  - Mixes from 11/16:
    - Jeremy 1 (Mix 4) – Did not fill cylinders, needed extra water, 84 pcf
    - Jeremy 2 (Mix 5) – Needed extra water, 67pcf, too much fiber, did not fill cylinders
  - Email Ceratech with mixing questions/concerns/comments (Kristin)
  - New mix for Sunday? Need Ceratech response
  - Compile all mixes into an excel file (Kristin)
- Hull Design/Structural Analysis
  - Begin Water Level Calc (Matt)
- Testing:
  - Break 7 day from 11/11
- Reinforcement:
  - Meet with mechanic instructor tomorrow (11/19)
  - Tell requested tests
- LiDAR Scan:
  - 11/18 @ 7:15pm
- Peak Presentation:

    - Thurs. 11/20 @ 11:30
    - Polo/Casual
- Final Deliverables:
    - Presentation 12/4 @ 12pm
    - ~~o~~ Report ~~(12/4 @ 12pm) –~~ revised to 12/10 at 12pm
    - ~~o~~ Website ~~(12/4 @ 12pm) –~~ revised to 12/10 at 12pm
    - ~~o~~ Peer evals and Reflections 12/10 at 12pm
- Cost of Services Memo:
    - Review Hours/Cost
    - Qualifications

Assigned Tasks

Task	Person Assigned	Due Date
Email Gerardo	**Jeremy**	**11/25/14**
Compile Mix Summary	**Kristin**	**11/25/14**
Water Level Calc	**Matt**	**11/25/14**
Plan Reinforcement Testing + Start Testing/ Meet w/ Instructor	**Cynthia**	**11/25/14**
Deliverable schedule for Conference	**Ramon**	**11/25/14**
Email CeraTech	**Kristin**	**11/25/14**
Fundraising (Keep Working on these…)	**All**	
Cost of Services Memo Compiling	**Cynthia/Kristin**	**11/21**
Qualifications for COS Memo	**All**	**11/18**