

2021

American Society of Civil Engineers®
Concrete Canoe Competition™

REQUEST FOR PROPOSALS



ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

Date: September 9, 2020

To: ASCE Student Chapters and Concrete Canoe Teams

Subject: Request for Proposal – 2021 Concrete Canoe

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Dear ASCE Student Chapters and Concrete Canoe Teams:

When the Committee on Concrete Canoe Competitions began formulating the 2021 rules in June of 2020 we were amidst a global pandemic (COVID-19) and a time when civil rights movements were surging to new levels, demanding justice like nothing we've seen since the Civil Rights Act of 1964. Recognizing these changing and challenging times, we set a goal to provide participants with opportunities in this year's competition that will enlighten student experiences and will be possible in a format that is independent of COVID-19 restrictions. This resulted in this RFP (rules) that supports a 100% remote format competition while also allowing an option for in-person components if that is possible next spring and summer.

One of the new parts of the competition was developed to increase student engagement by allowing flexibility in a new submittal called "Enhanced Focus Areas." This will allow participants to dig deeper into an area of interest and add a new and interesting component to the competition. This year's addition of a new presentation that honors the spirit of R. John Craig will also provide opportunities to establish stronger relationships with past alumni of the competition.

It was not easy for the committee to remove building a full-scale prototype canoe this year. We did so with the deepest respect for students. We know that the experiential hands-on components are one of the most valuable and rewarding learning experiences. When looking back at previous competitions, we have seen teams create spectacular canoes while gaining immense knowledge about project management, construction and working with concrete materials. We have seen the years and years of dedication, we have seen trial and error, we have seen trial and success, and we have seen so many other instances of growth that goes into that 20-foot-long concrete canoe. Many of you have figured it out over the years, and then you have shared your journeys with other universities, with your fiercest competitors, so now they have figured it out too.

So, let this year be of growth in ways that you would not typically see. Let your goals drive you! We have found that all goals have obstacles and those obstacles will take different forms along the way. We know that you will find new obstacles and opportunities this year and I encourage you to use these to grow in ways beyond the usual. We are civil engineers after all, and our world needs us in extraordinary ways.

Good luck this year. We are counting on you all! We also look forward to meeting many of you throughout the year as we offer a series of webinars to expand opportunities to engage with the committee and learn more about this year's competition. Lots has changed in the rules and we encourage all teams to take the time to thoroughly read the rules early, establish your milestones and develop your questions for the committee.

COMMITTEE ON CONCRETE CANOE COMPETITIONS

Andres Guerra, PhD, PE, M. ASCE

Chair, Committee on Concrete Canoe Competitions (2021)

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1.0 REQUEST FOR PROPOSAL

1.1 Introduction

Since the early 1970s, American Society of Civil Engineers (ASCE) student chapters have been constructing and racing concrete canoes. During that time, canoe mixtures and designs have varied, but the long-established tradition of teamwork, camaraderie, and spirited competition has been constant. Teams, their associates, judges, and all other participants are expected to maintain and build upon this tradition.

The objectives of the Society-wide Competition are as follows:

- Providing civil engineering students an opportunity to gain hands-on, practical experience and leadership skills by working with concrete mix designs and project management.
- Building awareness of the versatility and durability of concrete as a construction material among civil engineering students, educators and practitioners, as well as the general public.
- Creating awareness of concrete technology and application among civil engineering students, educators and practitioners, as well as the general concrete industry.
- Generating and increasing awareness of ASCE's and national sponsors' commitment to civil engineering education among civil engineering students, educators and practitioners, as well as the general public.
- Increasing awareness of civil engineering as a dynamic and innovative profession essential to society among industry leaders, opinion makers and the general public.
- Increasing awareness of the value and benefits of ASCE membership among civil engineering students, professionals, faculty to foster lifelong membership and participation in the Society.

While the intent of the competition is to learn and build experience both technically and socially, students are a short step from being practicing engineers involved in projects that are critical to society's welfare. Ethics, professionalism, civility and respect are the cornerstone of every successful competition, and ASCE expects professional conduct from all participants. To preserve the quality of this competition and to improve the quality of future competitions, ASCE enforces high standards.

1.1.1 ASCE Corporate Profile

ASCE is the oldest national engineering society in the United States. Founded in 1852 with 12 members, the Society was created to disseminate information among engineers who were building the roads, canals, bridges and railroads of a young nation.

Today, ASCE has more than 150,000 members, including some 15,000 of whom are international members residing outside the United States. Individual professional engineers rather than companies or organizations hold membership. The members are organized geographically into ten regions, 76 sections, 160 branches, 130 Younger Member Groups, and 393 student chapters in North America and around the world. Student Chapters sponsor meetings, educational outreach, conferences, student competitions, social events and other activities to help future engineers become better prepared for their careers. Numerous scholarships and awards are made available for deserving students of civil engineering.

A Board of Direction governs the Society. The Board, which includes ASCE officers and representatives elected by the membership, establishes all policy for the organization. A staff of 250 implements the policies; the vast majority of staff work at ASCE Global Headquarters located in Reston, Virginia.

For more information, visit <http://www.asce.org>.



1.1.2 R. John Craig Legacy Award

Dr. R. John Craig was a professor at the New Jersey Institute of Technology and a member of the former ASCE Committee on Student Services. Dr. Craig worked throughout the mid-1980s to formulate plans for more uniform regional concrete canoe competitions and championed the formation of a national competition. In the fall of 1987 the final rules for the National Concrete Canoe Competition were approved. In the winter of 1987, just as the first national competition was in sight, Dr. Craig was diagnosed with a rare, inoperable brain tumor. He passed away just two months before his dream of a National Concrete Canoe Competition came to fruition.

Normally, the winner of the Co-ed Sprint Race at the Society-wide Final Competition is awarded the *R. John Craig Award* because this part of the competition best exemplifies the spirit and cooperative ideals of the competition that Dr. Craig envisioned.

For the 2021 Society-wide Final Competition, because there will not be a winner declared in this race, a new competition – the ***R. John Craig Legacy Competition*** – will be held. Please refer to Section 11.0 for details pertaining to this competition.

1.1.3 Problem Statement

The Concrete Canoe Competition Committee (C4), a committee of the American Society of Civil Engineers (ASCE), is considering the use of a standardized design for future concrete canoe competitions. As such, we are soliciting pre-qualified ASCE student chapters, hereinafter referred to as “Teams,” to submit both a *Technical Proposal* and an *Enhanced Focus Area Report* in response to this Request for Proposal. Part of this proposal will include a prototype design with the intention of having teams construct full-scale versions for the 2022 competition. The prototype should be designed with the durability to withstand the rigors of a series of races consisting of 200- and/or 400-meter sprints with 180-degree hairpin turns, and a 200-meter slalom course, taking into consideration the specifications, constraints, and other requirements as presented in this Request for Proposal.

Teams shall provide their *Technical Proposal* and *Enhanced Focus Area Report* to be evaluated by a panel of judges and will follow up by meeting regionally (either in person or remotely) to provide a technical presentation, and if possible, some select onsite competition activities (see Section 10.0 for additional details).

ASCE will then invite qualifying teams to a Society-wide Final Competition held at the University of Wisconsin-Platteville in June 2021 (if feasible given the COVID-19 pandemic) to

present their project, where a panel of judges will evaluate and award the winning team. Please note that ASCE leadership will make decisions about in-person competitions at a later date and updates will be posted at https://www.asce.org/student_conferences/.

Engaging with local ASCE professional chapters is highly encouraged to promote impactful contributions to the development of project deliverables. ASCE and the C4 are committed to assisting teams in facilitating these engagements and developing the necessary contacts.

**Note, 2022 competition rules and information are not yet determined. Teams should not use this Problem Statement for 2022 planning. Please consider this problem statement as hypothetical.*

1.2 COVID-19 Implications and Remote vs. In-Person Competition

The COVID-19 pandemic continues to wreak havoc on the ability to plan for future in-person events, and this reality impacts ASCE student competitions. The world may have changed, but civil engineering work does not stop and has even shown to be increasingly important to be adaptable and overcome new and unique obstacles. Conference and Society-wide Concrete Canoe Competitions will be conducted to their conclusion with the declaration of championship teams at all levels. The C4 has concluded that defaulting to remote competition is the best choice for the 2020-21 competition activities, particularly for Conference Competitions. In-person activities may be possible if conditions warrant, but decisions will be made as the situation evolves. Final decisions about in-person versus remote competition for Student Conferences will be made by the end of January 2021. The deliverables proceeding remotely will differ from those required if in-person activities are able to resume. The decision to advance remotely or in-person for the Society-wide Final Competition slated for Platteville, WI, June 26-28, 2021, will be made by the end of March 2021.

The ASCE Concrete Canoe Competition rules are intended to engage, challenge, and excite students. The competition this year is written with the ability to be fully experienced using remote platforms. Students are expected to follow school, public health officials, and CDC guidelines pertaining to safe social distancing and mitigation of virus transmission on and off campus as it relates to student competitions activities. ASCE Student Conference hosts will likewise plan remote or in-person events according to ASCE guidelines and/or local conditions to ensure the health and safety of all students, faculty, and volunteers involved.

1.3 RFP Documents

The following documents, as part of this RFP will be provided to proposers:

Request for Proposal – Release early September 2020

On-Site Competition Addendum – Release January 2021

Request for Information (RFI) Summary – Release early February 2021

If there are any major clarifications needed, additional RFP addendums may be released. Release announcements would take place on the ASCE Concrete Canoe Facebook page, at <https://www.facebook.com/ASCENCCC>, as well as the ASCE Concrete Canoe website at <https://www.asce.org/concrete-canoe-rules-regulations/>.

1.4 2020 Technical Proposals

For your convenience, digital versions in Adobe Acrobat PDF of the 2020 Technical Proposals have been uploaded and are available for viewing or download at [2020 Technical Proposals](#).

1.5 Request for Information (RFI)

Requests for Information (RFI) are to be directed via email to concretecanoe@asce.org. Official responses will be posted to the ASCE Concrete Canoe Facebook page. ***The cut-off date for submitting an RFI is Friday, January 22, 2021.***

– End of Section –

2.0 WEBINARS

The C4 will host a series of live/recorded webinars over the course of the academic year to engage and communicate with the teams and provide them with the support they need to be successful. Participation in these webinars are not mandatory but highly encouraged. Information regarding registration will be posted to the ASCE Concrete Canoe Competition Facebook Page. Webinars will be recorded and uploaded to the ASCE Concrete Canoe website for future reference.

2.1 Competition Kick-Off

The C4 will host a *Kick-Off Webinar* on Thursday, September 24, 2020 at 4:00 (EDT) which will include a synopsis of the information provided in this RFP followed by a question and answer period. Interested teams must register for this event. Click [Kick-Off Webinar](#) to register.

2.2 Concrete Mixture Design Calculations

The C4 will host a webinar regarding how to perform concrete mixture design calculations in mid-October 2020, which will include tips and tricks, followed by a question and answer period.

2.3 Peer Review & Comment Resolution Process

The C4 will host a webinar regarding how to perform a thorough peer review in mid-January 2021 which will include a short presentation followed by a question and answer period.

2.4 Miscellaneous

The C4 may schedule additional webinars depending on their necessity. Any additional webinars will be posted to the ASCE Concrete Canoe Facebook page.

– End of Section –

3.0 ELIGIBILITY

A team may register up to a maximum of ten (10) participants. The requirements set herein strive for gender diversity by making the team composed of no more than five (5) participants that identify with pronouns *she/her/hers* and no more than five (5) participants that identify with pronouns *he/him/his*. When a team includes participants that identify as *they/them/their* or participants that do not distinctly identify with *she/her/hers* or *he/him/his*, the difference in the number of participants that identify with pronouns *she/her/hers* and *he/him/his* should aim to achieve a difference that is NOT greater than one. The following table illustrates a few examples of possible team compositions, but this does not disclude teams that only contain participants that identify with *she/her/hers* or *he/him/his* as long as the number of participants in each of the binary genders does not exceed five (5). Teams of ten (10) may be composed entirely of participants that identify with pronouns *they/them/their*.

Number of Participants that Identify with each Pronoun (Example)			
<i>they/them/their</i>	<i>she/her/hers</i>	<i>he/him/his</i>	<i>Total Participants</i>
1	4	5	10
1	5	4	10
1	4	4	9
1	3	4	9
1	4	3	8
...
2	4	4	10
2	3	4	9
2	4	3	9
2	2	2	6
...
10	0	0	10

Participants who identify with a gender may register in accordance with their gender identification, with no requirements for submitting requests, obtaining approvals, or notifying anyone. Participants will be expected to apply this policy in good faith and in accordance with the Spirit of the Competition; this does not give every person the option to choose any gender identification, but to promote inclusion and access regardless of where a participant lies on the gender spectrum.

For other components of the competition that specify gender requirements (i.e., men's sprint, women's sprint, co-ed sprint, co-ed slalom, or other components), participants that do not identify with *she/her/hers* or *he/him/his* can fill either spot at their choosing while keeping in mind the Spirit of the Competition and competing fairly. They do not need to notify anyone of this choice but once they fill either spot, they must fill that spot for the entire Conference or Society-wide Competition. No other team, judge, host, etc., shall dispute or appeal the choice that a participant makes.

Registered participants are eligible to present at the *Technical Presentation*, participate in races and/or any other activities. Substitutions are allowed up to the time of on-site registration. No substitutions shall be permitted afterwards. Each team shall designate two (2) registered participants as team captains.

Teams may be invited to the Society-wide Final Competition by placing as the top qualified team at one of the nineteen (19) ASCE Student Conference Concrete Canoe Competitions (Conference Competitions), as the host school of the Society-wide Final Competition, or as a designated Wildcard.

All qualifying teams must represent an ASCE Student Chapter and shall meet the requirements outlined in ***Exhibit 3 – Student Chapter and Participant Eligibility.***

– End of Section –

4.0 SUBMISSION REQUIREMENTS AND DEADLINES

4.1 Conference / Team Folders

ASCE is using a new submission platform called *Cerberus Web Client*. All competition deliverables must be submitted in this platform. Submissions outside of this platform will be considered non-responsive and will not be considered. The main folder contains a sub-folder for each Student Conference, and within each Conference Folder is a folder for each school in that conference. This is a Read/Write link (no delete). Refer to *Exhibit 2 – How to Navigate Folders and Upload Submissions* for directions.

Click the following hyperlink to access: [Conference Folders](#)

4.2 Required Submissions and Schedule

Teams shall meet all submission deadlines listed below. Submissions not received by the deadlines or partial/incomplete submissions will be considered non-responsive and subject to deduction. ***Conference host schools shall not change or amend any of the submission requirements.*** If a host school does, teams are directed to only follow the requirements listed below. Refer to *Exhibit 1 – Summary of Important Dates/Deadlines*.

4.2.1 Letter of Intent & Pre-Qualification Forms

Teams shall submit a *Letter of Intent* along with their *Pre-Qualification Forms* which acknowledges receipt of the Request for Proposal solicitation and shall provide a synopsis of their understating of the project. The letter must be signed by at least one (1) team captain and ASCE Student Chapter Faculty Advisor. The phone number and email address for both the team captain and faculty advisor shall be provided.

The *Pre-Qualification Forms* (see *Exhibit 4*) are required to be completed and signed off by each team including initialing off on each line item and providing signatures from the team's team capatin and the ASCE Student Chapter Faculty Advisor.

Adobe PDF versions of the *Letter of Intent* and *Pre-Qualification Forms* are to be uploaded to the team's respective folder **no later than 5:00 pm [Eastern] Friday, October 16, 2020.** ***Late submissions and documents missing any of the required signatures, initials, and email addresses will be considered non-responsive and subject to deduction.***

4.2.2 Technical Proposal & Enhanced Focus Area Report

The following formats and number of documents are required:

4.2.2.1 Digital Format (PDF Version)

- For Conference Competitions, digital versions of the *Technical Proposal* and the *Enhanced Focus Area Report* are to be uploaded to their respective folder **no later than 5:00 pm [Eastern] Friday, February 19, 2021.**

- For the Society-wide Final Competition, digital versions of *Technical Proposal* and the *Enhanced Focus Area Report* are to be uploaded to their respective folder according to the instructions in their Letter of Invitation **no later than 5:00 pm EDT, Thursday, May 20, 2021.**
- File names shall be in the form of “School Name – Canoe Name – Document – Year” (examples: *South Central Louisiana State University – Mud Dawg – Tech Proposal – 2021*)

4.2.2.2 Hard Copies

- We encourage digital copies of the *Technical Proposal* and the *Enhanced Focus Area Report* be submitted for the Conference Competitions. Conference judges may request hard copies and we encourage shipping from each team to the judge directly at the discretion of the Conference host school with hard copy due dates as assigned by the host school and conference judges. However, this does not change the online due date and any late online submittals will be penalized.
- For the Society-wide Final Competition, six (6) bound hard copies of the *Technical Proposal* and the *Enhanced Focus Area Report* received **no later than 5:00 pm EDT, Thursday, May 20, 2020** at the following address:

ASCE Student Services
1801 Alexander Bell Drive
Reston, VA 20191
Attn: 2021 ASCECCC

4.2.3 Peer Review Comments of Technical Proposals

Following the submission of the *Technical Proposals*, teams will conduct peer reviews of three (3) randomly assigned *Technical Proposals*. Teams are required to upload both Adobe PDF and Microsoft Word versions of their *Peer Review* to the other team’s respective folder **no later than 5:00 pm [Eastern] Friday, March 12, 2021.** For example, if Team A is conducting peer reviews for Team X, Team Y, and Team Z, Team A will upload their review of Team X’s proposal to Team X’s folder, so on and so forth. A peer review is not to be conducted on the *Enhanced Focus Area Report*. Refer to Section 8.0 for additional details pertaining to peer reviews.

File names for the peer reviews shall be in the form of “School Name – Document – Year” (example: *Faber College – Peer Review of Adams College – 2021*)

4.2.4 R. John Craig Legacy Competition

The submission for the *R. John Craig Legacy Award* will be a 2 to 3-minute video that fits the theme ***Persistence in the Face of Adversity.*** Participation in the *R. John Craig Legacy Award* is a requirement to advance on to Society-wide Final Competition in June. Videos will tell the story of one or more alumni who competed on your university’s concrete canoe team and how their experiences with canoe and after graduation influenced their professional life. Video submissions shall be uploaded into *Cerberus Web Client* in your team’s Student Chapter folder of the Student Conference you are attending.

The following formats are recommended: High definition video (1080p or a higher resolution) and MP4. Digital files must be uploaded **no later than 5:00 pm [Eastern] Friday, February 19, 2021.**

Additional details about the ***R. John Craig Legacy Competition*** are included in Section 11.0.

– End of Section –

5.0 HULL DESIGN PROTOTYPE REQUIREMENTS

Teams shall propose a canoe hull and conduct a structural analysis on their proposed designs to establish the minimum concrete properties required from their analysis. Teams are to design a prototype canoe with the racing capabilities, handling performance, seaworthiness, and durability to withstand the rigors of a series of races consisting of 200- and/or 400-meter sprints with 180-degree hairpin turns and a 200-meter slalom course for the following race combinations: women's slalom (2 women), men's slalom (2 men), women's sprint (2 women), men's sprint (2 men), and co-ed sprint (2 men and 2 women). Refer to **Figure 1 – Proposed Race Course Layout**.

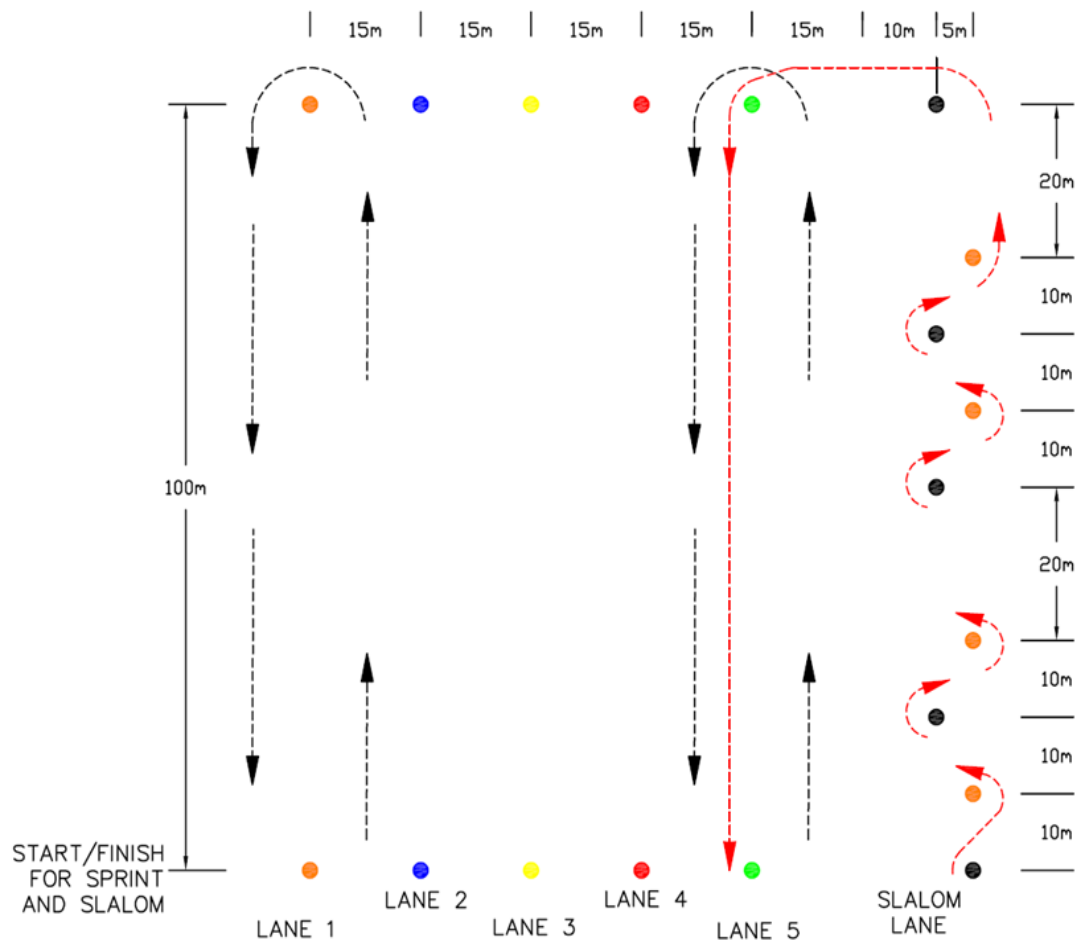


Figure 1 – Proposed Race Course Layout

5.1 Dimensional Constraints

The maximum hull length is restricted between 18 and 22 feet. All other dimensions, such as but not limited to, beam, depth, rocker, chine radii, etc. and cross-sectional and longitudinal shapes are not regulated, and their values are at the sole discretion of the team.

5.2 Allowable Concrete Materials and Reinforcement

The proposed concrete mixture and reinforced composite shall be developed using materials that comply to the specifications in **Exhibit 5 – Technical Specifications for Concrete and Reinforcement**. Teams should consider proposing a research and testing plan that is designed to test individual components/materials, concrete mixtures, and composite elements.

5.3 Flotation Requirements

Canoes shall be designed to float near the surface of the water when completely submerged. Flotation bulkheads and tanks must be encased in concrete. Hollow cavities and flotation material in the form of particulates (beads, sawdust, etc.) are not permitted in the design of the bulkheads and tanks.

5.4 Proposed Finishing & Aesthetics

5.4.1 Canoe & School Name

The name of the school and canoe shall be prominently displayed on the exterior of the canoe, above the waterline, on both sides, with individual letters. The school and canoe name shall consist of letters between 4 and 6 inches high. Recognized abbreviations for the official school name, based on the school's official website, are permitted. Adhesive lettering is permitted.

5.4.2 Graphics

Any proposed graphics and designs created using concrete coloring agents and pigments within the concrete mixture design (i.e., integrally colored concrete) are not limited in dimension or frequency. Any coloring agents or pigments used shall be in accordance with ASTM C979. The proposed use of stains and/or paints of any kind is prohibited.

5.4.3 Allowable Concrete Sealers

Only clear, non-pigmented concrete sealers may be applied to the canoe. Proposed sealer shall be either:

- a. silane- or siloxane-based penetrating sealer with a VOC of less than or equal to 350 g/L,
or
- b. liquid membrane-forming compound for curing and sealing that is compliant with ASTM C1315 requirements (there are no VOC requirement with this option)

Post-manufacturer additives such as glitter or other particulate material are not permitted. The application of sealer to any portion of the canoe shall be limited to a maximum of two (2) coats, following the manufacturer's recommended procedure for application and thickness.

– End of Section –

6.0 TECHNICAL PROPOSAL

6.1 General Requirements

Each team shall provide a *Technical Proposal* detailing their approach to meeting the requirements of the Request for Proposal solicitation, as it pertains to their proposed design and construction methodology. Information for the submission format is provided in the following subsections.

6.2 Text, Margins, Page Size and Layouts

- All body pages – 8 ½ in. by 11 in. pages
- Organization Chart – 8 ½ in. by 11 in. or 11 in. x 17 in.
- Construction Drawing & Specifications, and Project Schedule – 11 in. x 17 in. pages
- All pages – ½ in. (min.) margins on all sides
- Body text shall be in Times New Roman, Arial, or Calibri font, 12 pt. normal width character spacing, at least single spaced.
- Captions (figures, graphs) shall be Times New Roman, Arial, or Calibri font, 10 pt. (min)
- Section headings and subheadings may be of any legible font type or size.
- Headers and footers are permitted and may be of any legible font type or size and can be within the margins.
- Section and Appendix dividers are permitted but are not required.
- All dimensions and units are to be reported in English units.

6.3 Pictures, Figures, Graphics, and Infographics

Pictures, renderings, illustration, graphs, figures, etc. are permitted

- Team must avoid the use of copyrighted or trademarked materials, unless they are granted permission to use them.
- Items from publications must be properly referenced.
- Items developed and owned by the team do not need to be referenced (for example, photographs depicting a construction method can be used regardless of the year it was taken, if it is representative of what is being proposed for this submission.)

6.4 Technical Proposal Outline

The *Technical Proposal* shall adhere to the following format as described below. Sections and/or subsections may be retitled if it clearly identifies said section/subsection (e.g., “Quality Control and Quality Assurance” could be renamed “QA/QC Program”, “Introduction to QA/QC”, etc.)

6.4.1 Front Cover

The front cover shall be single-sided. The back side of the front cover shall be left blank.

6.4.2 Cover Letter

Serves as a response to the Request for Proposal solicitation and shall provide a synopsis of their understating of the project. Must include, at a minimum, statements certifying that:

- The proposed hull design, concrete mixture design, and reinforcement scheme are in full compliance with the specifications outlined in the Request for Proposal.
- All relevant Material Technical Data Sheets (MTDS) and Safety Data Sheets (SDS) for materials proposed for the construction of the canoe have been reviewed by the team.
- The team is in receipt of the *Request for Information (RFI) Summary* and that their submissions comply with the RFI responses provided.
- The anticipated registered participants are qualified student members and Society Student Members of ASCE and meet all eligibility requirements (including the names and ASCE Society Member ID Numbers).

The letter shall be signed by at least one (1) team captain and the ASCE Student Chapter Faculty Advisor certifying that the information presented in the *Technical Proposal* is valid. The phone number and email address for both the team captain and faculty advisor shall be provided. (*Page Limit – 2 max.*)

6.4.3 Table of Contents

List the various sections and appendices of the *Technical Proposal*. The pages shall be numbered. List of tables and figures may be provided but are not required. (*Page Limit – 2 max.*)

6.4.4 Executive Summary

Highlight the strengths of the proposal about each of the scored categories in this RFP exemplifying why the team and the proposed canoe prototype meets the requirements and demands outlined in this RFP. Identify and briefly describe innovative features of the hull design, structural analysis, mixture design, construction, project management, and sustainability, as applicable. Provide a summary of the prototype dimensions (at a minimum: length, width, depth, thickness, and weight) and concrete properties (wet (plastic) and oven-dried unit weights, compressive strength, tensile strength, composite flexural strength, slump/spread, and air content).

Concrete and canoe properties shall be reported in English units to the accuracies outlined in applicable industry standards (e.g., ASTM.) and as outlined in the table below.

PROPERTY	REPORTED ACCURACY (to the nearest.)
Strength	10 psi
Density (hardened concrete)	1 lb/ft ³
Density (fresh concrete)	0.1 lb/ft ³
Slump, Spread	¼ inch
Weight	1 lb
Air Content	0.1 %

Additional information deemed appropriate by the team may be incorporated as well and is at the discretion of the team (*Page Limit – 2 max.*)

6.4.5 Project Delivery Team

6.4.5.1 ASCE Student Chapter Profile

Provide a profile of your school's student chapter, brief history, highlighting its' activities, awards, outreach, size/growth, etc. as applicable (*Page Limit – 1*)

6.4.5.2 Key Team Members

List key team members, including detailed roles and responsibilities (*Page Limit – 2*)

6.4.5.3 Organizational Chart

Provide team member names, role(s), tasks, or areas in which they made contributions at any time during the project. Include the year (Fr., So., Jr., Sr., Grad) for all members. Indicate team captains. List advisors, subconsultants etc. as appropriate, (*Page Limit – 1, either 8 ½ x 11 or 11 x 17*)

6.4.6 Technical Approach to the Overall Project

Sections 6.4.6.1 through 6.4.6.5. is restricted to a total maximum page limit of ten (10). The topics below should be covered in a manner that best demonstrates to the panel of judges how the overall approach to the project and design best meets the intent of the Request for Proposal.

6.4.6.1 Design, Analysis, and Construction

Demonstrate a thorough understanding of the proposal requirements and sequence of tasks as it relates to development of a concrete canoe in terms of its hull design, structural capacity, material selection and testing protocol, and constructability.

Present the overall approach and any goals set for the hull design in relation to the RFP scored elements. Provide a description and reasoning of the selected hull geometry and general design. Discuss any structural element choices, including all applicable dimensions and any specific relevant features of the design.

Discuss the approach to structural analysis and determination of the material design requirements, including quantitative results from the analysis, loading cases, support conditions, assumptions, and analysis tools used. Describe material property values/design specifications for the concrete, reinforcement, and composite. For simplicity, structural analysis is to be limited to 2-D analysis only, based on concepts of mechanics of materials, strength of materials, and reinforced concrete design. Please note that the *Enhanced Focus Area Report* may discuss more advanced analytical structural methods, however, they should not be included or referred to in this *Technical Proposal*.

Present the general approach for how the team plans to develop and complete research and any testing, either planned or actual, along with any goals set, to meet the requirements of the RFP. Provide a description of the concrete and reinforcement materials considered and selected. As possible, include quantitative (not experimental) test results of mixtures selected. Refer to standard test methods where applicable.

Provide the physical properties and composition of the proposed aggregate sources, including specific gravity, absorption and particle size. Discuss the admixtures considered and their effects on concrete behavior to achieve design properties or complete construction of the canoe. Discuss any primary and secondary reinforcement considered and the reasons for this selection, including the layering scheme chosen. Discuss new or innovative ideas, materials, and methods that would be implemented in the development of the concrete composite and the impacts on budget, schedule, and safety.

Describe the proposed construction process including form material selection, form construction, methodology of mixing and placement of concrete and reinforcement, layering scheme, curing, form removal, concrete finishing, and aesthetics. Include discussion of new or innovative ideas to be implemented in the construction of the mold and/or canoe and their impacts on budget, schedule, quality, and safety.

6.4.6.2 Project Management: Scope, Schedule, and Fee

Present the team's project management scheme and planning process as it relates to budget, schedule, scope, and risk management. Discuss the financial and resource allocation associated with proposed material procurement and construction. List anticipated major milestone activities, along with an explanation of how these were determined and will be achieved. Present critical path activities and describe how the critical path was determined. Identify challenges that pose the most risk to critical path activities and how these challenges affect the planning process with specific consideration to the proposal reviewers (judges) in their evaluation of how feasible and timely the scope of work can be completed. Describe how the team plans to mitigate any of the higher risk hurdles as it relates to the schedule.

6.4.6.3 Quality Control and Quality Assurance

Discuss the team's quality control and quality assurance (QA/QC) practices for testing and as they apply to concrete mixing, concrete sampling, and concrete placement during construction. In addition, discuss the QA/QC plan/program as it relates to non-construction related aspects of the project. Items to consider include material procurement and compliance review, concrete lab material testing, document review, training, and work product review. Differentiate between quality assurance and quality control practices.

6.4.6.4 Sustainability

Highlight aspects of the materials being used, aspects incorporated into the construction process, and other facets of the overall project as they relate to the three pillars of sustainability: social, economic, and environmental impacts.

6.4.6.5 Health & Safety / Impact of COVID-19

Discuss the team's safety program and implementation as it applies to the overall project, including at a minimum, material testing and construction. Discuss any health and safety measures taken into consideration for COVID-19.

6.4.7 Construction Drawings & Specifications

Present isometric, elevation, plan, and typical composite cross-section views of the canoe and mold with applicable dimensions and other details as needed to construct. Additional details, cross sections, etc. may be added to clearly present construction techniques. Provide any relevant specifications as deemed essential by the team as drawing notes. (*Page Limit – 2 max., 11 x 17*)

6.4.8 Project Schedule

Provide a complete two-year project schedule (September 2020 to March 2022) which includes (1) an Engineering and Design Phase, from issuance of this Request of Proposal through the Society-wide Final Competition at the University of Wisconsin-Platteville, and (2) a Construction Phase, starting no earlier than September 1, 2021 with product deliverable date of no later than March 18, 2022. (*Page Limit – 2 max., 11 x 17*)

6.4.9 Appendices

6.4.9.1 Appendix A – Bibliography

ASTM and/or other industry standards, technical software, and any previously published material (e.g. past design reports, papers, conference proceedings, manufacturer’s literature, patent, theses, websites, online resources, etc.), as well as, sources referenced when performing calculations must be properly cited, as applicable. Any professionally acceptable reference style can be used, if the reader is able to use the citation to find the sources of original information. (*Page Limit – none*)

6.4.9.2 Appendix B – Mixture Proportions and Primary Mixture Calculation

Provide a *Concrete Mixture Data Table* (see **Exhibit 5 – Technical Specification for Concrete and Reinforcement**) for the mixture proposed to be used. Provide a detailed, step-by-step calculation of the proposed mixture proportions, including the determination of volumes of the concrete constituents, gravimetric air content, w/c and w/cm ratios, and wet unit weight, and show compliance with aggregate proportioning requirements. (*Page Limit – none*)

The table (in Word format) is available for download at <https://www.asce.org/concrete-canoe-rules-regulations/>. **The Concrete Mixture Data Table is not to be altered in any way other than adding or deleting rows for cement/pozzolans, aggregate, fibers and admixtures, or changing the color scheme or font, as needed.**

6.4.9.3 Appendix C – Material Technical Data Sheets (MTDS)

Provide a Summary Table of MTDS that summarizes all the materials (cement, pozzolans, aggregates, fibers, admixtures, sealers and curing agents, reinforcement) proposed to be used in the canoe prototype. Materials related to mold construction do not need to be provided.

At a minimum, include the manufacturer, product name, type of material (i.e.: Water Reducer, Reinforcing Mesh) and any applicable industry standard required by the RFP.

Include web links (such as URLs) to individual pages of MTDS. Please note that Safety Data Sheets (SDS) are not equivalent documentation for MTDS. (see **Exhibit 7 – Material Technical Data Sheet Table**)

The linked MTDS must provide current information clearly verifying that the materials used in the canoe comply with all the specifications (ex: an admixture or cement MTDS should show compliance with the applicable ASTM outlined herein).

In the event that an MTDS does not exist or that the required information is not provided on an existing MTDS (such as proprietary reasons), a letter from the company (on letterhead) certifying that the materials proposed to be used follow the specifications shall suffice must be submitted to the C4 for its review and approval, prior to its inclusion in the *Technical Proposal*. Contact information of the individual providing the letter shall be included. If you are in doubt of a product or MTDS, contact the C4 for review. (Page Limit – none)

6.4.9.4 Appendix D – Structural Calculations

Provide detailed, step-by-step example calculations (showing all relevant equations, variables and inputs including proper units) for the determination of internal stresses where designated. **Teams are instructed not to provide any additional calculations in this Appendix other than those indicated in this subsection.**

The following shall be provided in the calculations:

- list of all assumptions (cite references as applicable),
- free body diagram with all relevant point and distributed loads and their respective values, resulting shear (V) and bending moment (M) diagrams, and
- cross-sectional properties including applicable dimensions

Use the principles of the mechanics of materials. For simplicity, the cross-sectional properties of the representative sections are to be approximated by hand calculations (i.e., the use of exact values from programs such as AutoCAD are not permitted). (Page Limit – 10)

6.4.9.4.1 Two-Paddlers with Cargo Load

Determine the internal stresses for the cross-section at the point of maximum moment under the following loading scenario:

- Two (2) 200 lb paddlers and a cargo load that is equivalent to a 100 lb/ft distributed load applied to a 5-ft length of the canoe that acts along the longitudinal centerline of the canoe and centered at the midpoint of the canoe.
- Paddlers are to be considered as point loads positioned at locations equal to 15% and 85% of the total length of the canoe (as measured from the bow).
- No load factors or factors of safety are to be applied to the given loads or the resulting stresses computed
- Neglect the contribution of reinforcement (i.e., use a non-transformed cross-section).

6.4.9.4.2 Four Person Co-Ed

Determine the internal stresses for the cross-section at the point of maximum shear under the following loading scenario:

- Two (2) 150 lb paddlers positioned at locations equal to 15% and 90% of the total length of the canoe and two (2) 200 lb paddlers positioned at locations equal to 30% and 75% of the total length of the canoe. All measurements are from the bow.
- Paddlers are to be considered as point loads
- No load factors or factors of safety are to be applied to the given loads or the resulting stresses computed
- Neglect the contribution of reinforcement (i.e., use a non-transformed cross-section).

6.4.9.4.3 Cracking and Ultimate Bending Moments

For the cross-section corresponding to the maximum beam of the canoe, but not specific to any load case, show the diagrams, calculations, and values for:

- The bending moment at which cracking of the concrete begins to occur
- The ultimate bending moment, including the effects of reinforcement, if applicable.

6.4.9.4.4 Freeboard Calculation

Provide estimated freeboard and draught values (in inches) for the shallowest section of the canoe, which is defined as the section with the minimum distance between a horizontal line at the bottom of the canoe and the gunwale.

- As a function of load, varying from the unloaded condition (i.e., self-weight of the canoe) to a maximum load of 1000 lbs + self-weight of the canoe
- Indicate the freeboard for the team's design male tandem, female tandem, and four-person co-ed. No load factors or factors of safety are to be applied to the given loads.
- For this calculation, teams may use outputs from naval architectural software, such as displaced volumes, in preparing these estimates.

6.4.9.5 Appendix E – Hull /Reinforcement & Percent Open Area Calculations

Present the measurements and calculations of the proposed reinforcement and hull thickness for the various canoe elements (i.e., walls, ribs, gunwales, thwart and bulkheads) and percent open area (POA) as applicable. (*Page Limit – 2 max.*)

6.4.9.6 Appendix F – Detailed Fee Estimate

Provide itemized fee summary sheet for the following:

- Projected total hours (including a breakdown of person-hours), over a two-year period, dedicated to project management, hull design, structural analysis, mixture

design development, mold construction and canoe construction, and the preparation of this *Technical Proposal*, *Enhanced Focus Area Report*, and *Technical Presentation*. Exclude any time associated with paddling practice.

- Costs of concrete, reinforcement and finishing materials based on the amounts needed to produce a single canoe.
- Lump sum fee for mold construction.
- Estimated shipping cost of a canoe (lump sum) from point of origin to the University of Wisconsin-Platteville, WI. State the type of shipping method that is used.

Hourly rates, material costs, and appropriate multipliers, are provided in *Exhibit 8 – Detailed Cost Assessment*. (Page Limit – 2 max.)

6.4.9.7 Appendix G – Supporting Documentation

Provide the completed *Pre-Qualification Forms*, *Acknowledgement of RFP Addendum(s)*, if any, as well as any additional documents required by the C4. (Page Limit – none)

6.4.9.8 Appendix H – Comment Resolution Document (National Competition only)

Provide the peer review comments given by the three teams along with the team’s responses. Please refer to *Exhibit 11 – Peer Review & Comment Resolution Form*. (Page Limit – none)

6.4.10 Back Cover

The back cover shall be single-sided. The front side of the back cover shall be left blank.

– End of Section –

7.0 ENHANCED FOCUS AREAS

7.1 Intent

The intent of this section is to provide the specifications for the Enhanced Focus Areas portion of the project. In general, the two Enhanced Focus Areas can be on any aspect of the project to provide added value to the proposal and justify the benefits of the results to help the proposal reviewers (judges) to select the best proposal and therefore product. There will be no limits on tools or advanced analysis techniques for work conducted in the Enhanced Focus Areas, however, all content presented should be targeted for an audience of engineers who may not have a specialization in the subdomain area. Some examples of potential Enhanced Focus Areas that teams can pursue are listed below, however, this list is by no means all-inclusive and teams are encouraged to select areas they deem most valuable.

Examples:

- Finite Element Analysis of proposed canoe prototype to improve the design of structural elements
- Development of full-scale drawings and specifications for fabrication of the proposed canoe
- Creation of Building Information Model of proposed canoe and the fabrication process
- Fluid dynamics analysis to optimize hull design
- Computational design optimization of concrete mixture proportions
- Development of team website for knowledge collection and transfer to future teams
- Fabrication of reduced scale prototype canoe
- Risk analysis of proposed canoe adherence to requirements
- Artistic design and rendering of canoe aesthetics and elements
- Construction of prototype canoe (full-scale or scaled version)
- Laboratory material testing.

7.2 Text, Margins, Page Size and Layouts

Refer to Section 6.2 for requirements, except Section and Appendix dividers are not permitted.

7.3 Pictures, Figures, Graphics, Infographics

Refer to Section 6.3 for requirements.

7.4 Enhanced Focus Area Report

The *Enhanced Focus Area Report* shall be limited to no more than ten (10) pages, excluding front and back covers, Table of Contents, and References. Emphasis should be placed on concisely conveying the information and effective use of graphics. As a rough guideline, 1500-2500 total words in the document would be reasonable, though evaluation of the report is left to the discretion of the judges.

7.4.1 Front Cover

The front cover shall be single-sided. The back side of the front cover shall be left blank.

7.4.2 Table of Contents

List the various sections of the *Enhanced Focus Area Report*. The pages should be numbered as appropriate. Provide List of Tables and List of Figures. (*Page Limit – 2 max.*)

7.4.3 Enhanced Focus Area Selection Process

Provide details of the process for identifying Enhanced Focus Areas. Discuss the method utilized for down selecting potential focus areas to the final two chosen. Discuss any impacts of COVID-19 on the selection process. For example, if fabrication of a prototype canoe (full-scale or scaled version) was deemed the most valuable focus area, but could not be completed because of social distancing requirements, this can be elaborated on. Determine a problem statement and goals to accomplish for each focus area selected.

7.4.4 Summary of Enhanced Focus Areas Value Added

Provide details on the value added to the team and project by working on the selected focus areas. If possible, provide quantifiable backup data for the value created, e.g. decreased proposed canoe costs, compressed time schedule, reduction of risk, reduced canoe weight, etc. Discuss any impacts of the Enhanced Focus Areas for the project to differentiate the teams proposed canoe from other team's proposals.

7.4.5 Enhanced Focus Area A

Provide a description of the problem statement. Discuss background research conducted to support the technical approach. Describe the collaborative team approach utilized for conducting work on the focus area. Detail the technical approach pursued to address the problem statement. State all assumptions made during analysis, if applicable. Describe any methods or tools utilized to aid in the technical approach. Summarize results of the focus area and whether the approach met the problem statement requirements. If not, explore how a different approach in the future may work better. Describe methods for transferring the knowledge acquired conducting work on the focus area to future teams

7.4.6 Enhanced Focus Area B

Same requirements apply from Enhanced Focus Area A.

7.4.7 References

ASTM and/or other industry standards, technical software, and any previously published material, as well as, sources referenced when performing calculations must be properly cited, as applicable. Any professionally acceptable reference style can be used, as long as the reader is able to use the citation to find the sources of original information. (*Page Limit – none*)

7.4.8 Back Cover

The back cover shall be single-sided. The front side of the back cover shall be left blank.

– End of Section –

8.0 PEER REVIEW OF TECHNICAL PROPOSALS

Immediately following the submission of the *Technical Proposals* for the Conference Competition on February 19, 2021, each team will conduct a thorough peer review of three (3) Proposals submitted by other teams. One review will be for a team within their own respective conference; the other two will be for teams outside of their conference. The purpose of the peer review is to provide useful, constructive comments to allow teams to improve their Proposals for potential submission for the Society-wide Final Competition, continued improvement from year-to-year, and to learn more about what other teams are doing. The *Technical Proposals* to be reviewed will be arbitrarily assigned to each team by ASCE by no later than Tuesday, December 1, 2020. Each team will have three (3) weeks to complete the peer reviews and upload both Adobe PDF and Microsoft Word versions of their *Peer Review* to the other team's respective folder **no later than 5:00 pm [Eastern] Friday, March 12, 2021**. For example, if Team A is conducting peer reviews for Team X, Team Y, and Team Z, Team A will upload their review of Team X's proposal directly to Team X's folder, so on and so forth.

Teams that advance to the Society-wide Final Competition shall provide as part of their Proposal a *Comment Resolution Document* (see Section 6.4.9.8) as an appendix which indicates their response to the comments they received from the other teams.

Refer to ***Exhibit 11 – Peer Review*** for an example. Teams may download a Microsoft Word version of this form at <https://www.asce.org/concrete-canoe-rules-regulations/>.

– End of Section –

9.0 TECHNICAL PRESENTATION

9.1 General Requirements

The presentations will be in a live remote format unless competitions can be held in-person. Teams must obtain their own access to video equipment (webcams, computers, quiet room, etc.) to live broadcast their presentation to the panel of judges and other competitors.

9.1.1 Time Limit

Each team will be afforded the opportunity to present a 5-minute long presentation, followed by an additional 10-minute period for questions by a panel of judges. At the end of 5 minutes (with 5 second grace period), the presenters will be cut off by a signal (alarm, gavel, etc.) The panel will evaluate the presentation based on what has been presented within that time frame.

9.1.2 Presentation Focus

The presentation should focus on the primary aspects of the proposed design, analysis, proposed construction techniques, and technical capabilities. Briefly summarize the major aspects of the project, with the intent of demonstrating why your team, design, and prototype should be selected by the panel of judges for the standardized design.

9.1.3 Language

All presentations are to be presented in English.

9.1.4 Presentation Order

Shall be randomly selected and shall be provided to the teams by the host school no later than one day before the event (if live remote) or at the time of on-site registration (if in person). The presentations, including the question and answer period, shall be open to the public for viewing.

9.1.5 Equipment

If remote, the host school will host the live remote presentation using a format that allows the judges and other competitors to view the live remote presentations and have the capabilities to record the presentations to post them online afterwards. If in-person, the host school shall provide electrical outlet access, a projection screen, and a projector unit for use during the presentations. A room diagram shall be provided by the host school a minimum of two weeks prior to the event. The individual school making a presentation shall furnish any additional equipment necessary.

9.2 Presenters

Presenters may be any of the registered team members who officially sign-in at registration. Presenters are considered those with speaking parts and individuals operating the computer or projectors. A minimum of two (2) presenters must have speaking parts.

Teams shall make a live presentation whether live remote or in-person. The use of video shall be permitted. Teams shall not pre-record any speaking parts. No handouts or other materials shall be given to the panel as part of the presentation.

Any registered participant on a team may be on stage or in the remote call to participate in the question and answer period and will be considered one of the presenters.

9.3 Q&A Session

Following the presentation, teams will need to set themselves apart by displaying their knowledge to the panel by answering questions related to their Presentation, Technical Proposal, and Enhanced Focus Area Report.

– End of Section –

10.0 ON-SITE COMPETITION

The intent of this section is to provide the specifications for the onsite portions of the competition. Due to the uncertain nature of COVID-19 and its impact in student participation in on-site activities at conferences, details for any on-site student competitions will be provided in an Addendum to be provided no later than January 15, 2021.

Examples of on-site tasks may include formulating a basic mix design, batching a small concrete mixture, sampling and testing batched concrete, project management problem solving, or other similar type tasks. Any on-site tasks outlined will not require any work prior to release of the addendum.

– End of Section –

11.0 R. JOHN CRAIG LEGACY COMPETITION

The theme of the *R. John Craig Legacy Competition* is ***Persistence in the Face of Adversity***. Teams will seek one or more alumni of their university who competed in the concrete canoe competition while an undergraduate. The alumni must have graduated no later than 2015. Teams who did not have a concrete canoe team prior to 2015 may request a waiver from the C4 to seek alumni that graduated after 2015. First-time competitors are exempt from this event. Teams will talk with the alumni about their experiences with concrete canoe, and how those experiences influenced their professional life. Teams will prepare a 2 to 3-minute video presentation in a format of the team's choosing that tells the story of the impact participating in the concrete canoe competition made in the alumni's life.

- To advance to the Society-wide Final Competition, teams must participate in the ***R. John Craig Legacy Competition*** at their Student Conference (unless granted a waiver by the C4).
- The members of each Student Conference will vote on the winner of this competition at the Student Conference. Each Student Chapter will have one vote in the Conference Competition but cannot vote for their own Chapter.
- Entries will be judged on the following criteria:
 - Adherence to the theme
 - Compelling nature of the story
 - Creativity of the presentation
 - Quality of the presentation

At the Society-wide Final Competition, the presentations of the qualified Conference winner of the Concrete Canoe Competition, Final Competition host school, and Wild-Card teams will be judged by the Finals Judges and the C4, using the same criteria above.

– End of Section –

12.0 CANOE RACES

12.1 General Requirements

Given that teams are not expected to construct canoes for the 2021 competition due to COVID-19, if Conference and/or Society-wide Final Competitions can be held in person, the host school may organize and set up a canoe race exhibition, where interested teams may compete in a series of races using concrete canoes (competition or non-competition concrete canoes) that have been previously constructed by the team, regardless of the year that they were constructed. Teams may bring multiple canoes if they so desire and may allow other teams to use them in the races. Races will not count towards the overall competition this year. The intent of holding exhibition races this year is to foster camaraderie amongst the student chapters.

It is recommended that the races follow the race course designs that have been used in past competitions, if possible. ASCE suggests a total of five (5) types of races can be held (weather and water conditions permitting): women's slalom (2 women), men's slalom (2 men), women's sprint (2 women), men's sprint (2 men), and co-ed sprint (2 men and 2 women). However, host schools may come up with alternative courses if they are of similar lengths.

Different colored buoys should mark the race course lanes. The slalom and sprint courses would ideally meet the alignment, distance, spacing, and turns as noted in *Figure 1*; however, these are subject to site-specific conditions and limitations. For Conference Competitions all sprint races shall be 200 meters. For the Society-wide Final Competition, the co-ed sprint race may be increased to 400 meters.

12.1.1 200-meter Slalom Course

The slalom course shall consist of the following, subject to site conditions:

- a. The men's and women's slalom course will nominally be a 200-meter race consisting of a slalom course through the first 100 meters out (*a little longer with the slalom turns*), a 180° turn, and 100 meters straight back.
- b. At Conference Competitions, the course shall begin with a slalom course consisting of seven (7) buoys. Each slalom buoy shall be staggered 5 meters transversely from each other. Buoys shall be longitudinally spaced at 10 meters with 20 meters between the third and fourth buoy.

12.1.2 200- and 400-meter Sprint Course

A sprint course shall consist of the following subject to site conditions:

- a. The men's and women's sprint course will be a 200-meter race consisting of a straight course 100 meters out, a 180° turn, and 100 meters back.
- b. For conference competitions, the co-ed race will also be a 200-meter race.
- c. For the Society-wide Final Competition, the co-ed race will be a 400-meter race and shall consist of two (2) laps of the sprint course.
- d. Lanes shall be no narrower than 15 meters.

– End of Section –

13.0 EVALUATION

13.1 General Requirements

The evaluation of the teams will be divided into four (4) categories:

Categories	Maximum Points
Technical Proposal	35
Enhanced Focus Areas	30
Technical Presentation	25
One-Site Competition (if held)	10
Total Possible	100

In a situation where none of the on-site competition activities can take place, the overall competition score shall be based solely on the results of the technical portion of the competition (*Technical Proposal*, *Enhanced Focus Area*, and *Technical Presentation*) with the maximum possible score being 90 points.

13.2 Evaluation Panel

Each event shall be evaluated by a panel of judges. The minimum number for any given event is three (3) and the maximum is five (5). It is the intent of the C4 that the same judges will evaluate each portion of the competition. If each portion of the competition is not judged by the same judges, the C4 will not consider the competition a valid competition and will not extend an offer to compete at the Society-wide Final Competition. In extenuating circumstances, the C4 will request a description to determine the validity of the competition and may invite the team to the Society-wide Final Competition. At least three of the judges shall be the same for each of the competition parts

13.3 Evaluation Scoring

Evaluation points will be allotted per placement according to the following table:

Place	Maximum Points			
	Competition Categories			
	Technical Proposal	Enhanced Focus Area	Technical Presentation	On-Site Competition
First	35	30	25	10
Second	31.5	27	22.5	9
Third	28	24	20	8
Fourth	24.5	21	17.5	7
Fifth	21	18	15	6
Sixth	17.5	15	12.5	5
Seventh	14	12	10	4
Eighth	10.5	9	7.5	3
Ninth	7	6	5	2
Tenth	3.5	3	2.5	1

Competition Points for *Technical Proposal*, *Enhanced Focus Area*, *Technical Presentation*, and *On-Site Competition* are awarded per **Exhibit 10 – Evaluation Forms**.

Placement in each category is determined by the ranking of the overall scores. In the event of a tie, the average of the raw scores will determine the actual placing. If the tie remains after averaging the raw scores, then the tie will remain.

The *Technical Proposal*, *Enhanced Focus Area*, *Technical Presentation*, and *On-Site Competition* will be ranked for each judge independently from 1st to n th place (with n being equal to the number of teams competing) for each category. The aggregate of the independent rankings of each judge will be averaged to determine the overall rank for the entry and scores will be assigned based on the scoring table for places 1 through 10. Raw scores will be used in the event of a tiebreaker for the categories.

An official electronic scoresheet is provided to host schools and shall be used at all Conference Competitions. Failure to use and submit this document may result in school(s) not qualifying for or receiving an invitation to the Society-wide Final Competition.

13.4 Summary of Deductions / Disqualification

13.4.1 General

These deductions may also be referenced in other sections of this document and/or the scoring sheets. It is highly suggested that the judges contact the C4 regarding situations that may not be covered to determine the appropriate course of action.

13.4.2 Deductions

The Deduction Scorecards determine a deduction unit that is the input into the electronic scoresheet and is used to adjust the final scores for each judge for each school. Each deduction unit is one (1) percent of the difference between the pre-deduction highest and lowest score by the judge for that portion of the competition and is calculated for each judge.

13.4.3 Disqualification

Teams may be disqualified (DQ) from the competition for the following:

- a. Failure to follow student eligibility requirements
- b. Violations under the *Spirit of the Competition* [at the discretion of the C4 and/or Judges] or under the *Ethics and the Competition*
- c. Appealing the scoring, deduction, or placement of another team
- d. Sportsmanship and interference requirements
- e. Failure to follow safety rules

13.4.4 Appeal of Deductions

During the competitions, the judges and/or C4 shall inform the team captains about the deductions that have been assessed. The team captains will then be afforded the opportunity to appeal the deductions through a written response that will then be reviewed by the judges. ***Designated team captains are the only individuals that may appeal the deductions. The***

decisions of the judges following their review are final and the judges will accept no further appeals beyond those decisions. The judges may contact the C4 to ensure that the proper deductions are made and for any additional guidance.

The C4 will not consider any appeals beyond the Conference Competition, nor will it overturn any of the conference judges' decisions regarding the deductions assessed against a given team.

The following sections detail the process of teams being informed of the deductions, the team captain's appeal (if they choose to do so), and the rendering of the final decision of the judges following their review of the appeal.

If the team chooses to appeal deductions, the team captains will have until the date/time specified to submit to the Head Judge or C4 member a completed *Deduction Scorecard* (with signature), *Appeals Form*, and any supporting documentation. The judges shall review the appeal, render their final decision, and inform the team captains of the decision. Upon being informed of the judges' decision, no further appeal may be filed.

The appeal process is not intended for teams to file an appeal regarding the scoring, the application of deductions, or lack thereof, against another team within the competition. Teams are strongly warned that doing so will result in automatic disqualification from the competition.

13.4.5 Tiebreaker (Final Overall Standings)

Ties in the final standings for the competition overall shall be broken. In such cases, a tie breaking score, *TBS*, shall be calculated according to the following formula:

$$TBS = 0.25 \left(\frac{\sum DPP}{NOJ} \right) + 0.25 \left(\frac{\sum OPP}{NOJ} \right) + 0.25 \left(\frac{\sum EFAP}{NOJ} \right) + 0.25 \left(\frac{\sum OCP}{NOJ} \right)$$

Where: *DPP* = Technical Proposal event points for each judge
OPP = Technical Presentation event points for each judge
EFAP = Enhanced Focus Area event points for each judge
OCP = Onsite Competition event points for each judge
NOJ = number of judges

The calculation of the *TBS* shall not change the standings for team placement in any given technical scoring part. Of the teams tied for overall winner or overall second place, the team with the highest *TBS* shall be awarded the place in contention.

If a tie still exists for first and/or second place after the tie breaking scores have been determined, then the judges shall determine the overall winner for the competition position. The judges may choose to base their decision on whatever criteria they deem appropriate. The judges' criteria and decision shall be final and may not be appealed.

– End of Section –

EXHIBIT 1

Summary of Important Dates/Deadlines

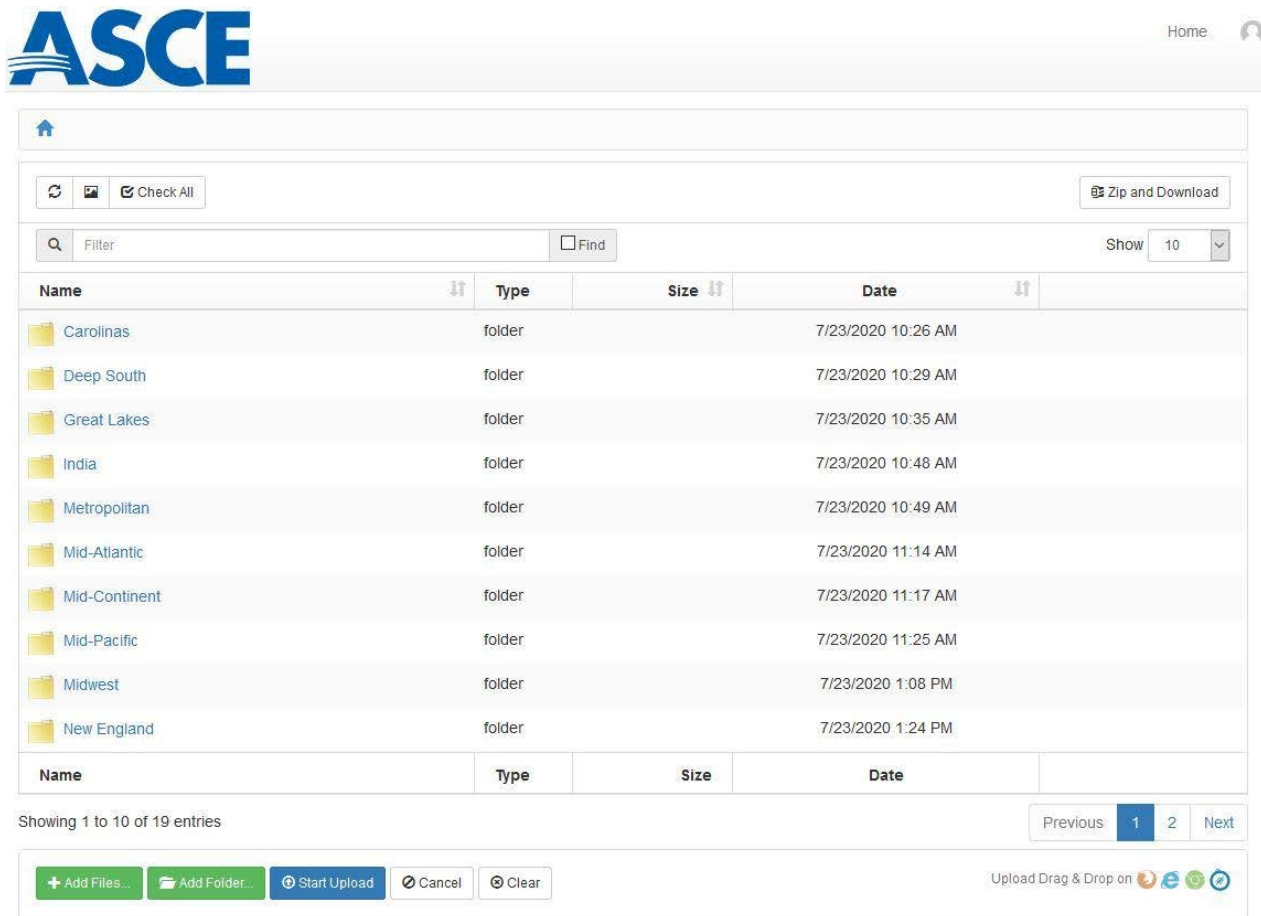
ITEM	DATE
Issuance of 2021 Request for Proposal Solicitation	September 9, 2020
Kick-Off Webinar	September 24, 2020
Concrete Mix Design Webinar ¹	mid-October 2020
Submission Deadline of <i>Letter of Intent</i> and <i>Pre-Qualification Forms</i>	October 16, 2020
Deadline to Announce Peer Review Assignments	December 1, 2020
Deadline for On-Site Competition requirements	January 15, 2021
Last Day to Submit RFIs to the C4	January 22, 2021
“How to Conduct a Peer Review” Webinar ¹	January 2021
ASCE Student Chapter Annual Reports/Dues Deadline	February 1, 2021
Issuance of RFI Summary	January 31, 2021
Submission Deadline of <i>Technical Proposal, Enhanced Focus Area Report, and R. John Craig Legacy Competition presentation</i> (Conference Competition)	February 19, 2021
Submission Deadline of <i>Peer Review of Technical Proposals</i>	March 12, 2021
ASCE Student Conference Competitions	March - April 2021
Deadline for Determination of Holding 2021 ASCE Society-wide Final Concrete Canoe Competition	End of March 2021
Submission Deadline of <i>Technical Proposal, Enhanced Focus Area Report, and R. John Craig Legacy Competition presentation</i> (Society-wide Final Competition)	May 20, 2021
2021 ASCE National Concrete Canoe Competition, hosted by University of Wisconsin-Platteville, WI	June 26-28, 2021

¹ Exact dates to be determined and will be published on the ASCE Concrete Canoe Competition Facebook Page

EXHIBIT 2

How to Navigate Folders and Upload Submissions

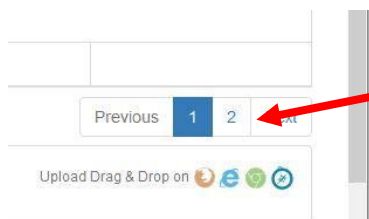
When you first arrive at the upload site, you will see folders labeled for each Student Conference:



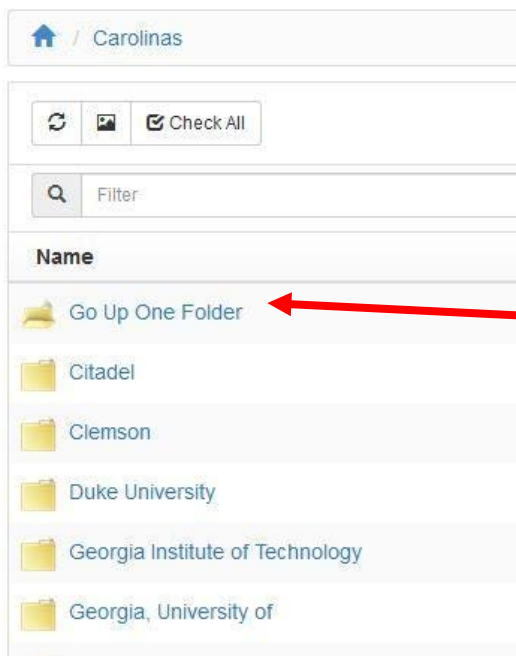
The screenshot shows the ASCE upload site interface. At the top left is the ASCE logo. In the top right corner, there is a "Home" link and a refresh icon. Below the logo is a navigation bar with a home icon. The main content area features a toolbar with icons for refresh, download, and "Check All", along with a "Zip and Download" button. A search bar with a "Filter" label and a "Find" button is present, along with a "Show" dropdown menu set to "10". The central part of the interface is a table listing folders for various student conferences. The table has columns for Name, Type, Size, and Date. Below the table, there is a pagination control showing "Showing 1 to 10 of 19 entries" and buttons for "Previous", "1", "2", and "Next". At the bottom, there is a toolbar with buttons for "+ Add Files...", "+ Add Folder...", "Start Upload", "Cancel", and "Clear", along with a "Upload Drag & Drop on" section with icons for different upload methods.

Name	Type	Size	Date
Carolinias	folder		7/23/2020 10:26 AM
Deep South	folder		7/23/2020 10:29 AM
Great Lakes	folder		7/23/2020 10:35 AM
India	folder		7/23/2020 10:48 AM
Metropolitan	folder		7/23/2020 10:49 AM
Mid-Atlantic	folder		7/23/2020 11:14 AM
Mid-Continent	folder		7/23/2020 11:17 AM
Mid-Pacific	folder		7/23/2020 11:25 AM
Midwest	folder		7/23/2020 1:08 PM
New England	folder		7/23/2020 1:24 PM

Locate your Student Conference and click the folder to open it. If you don't see the name of your Student Conference, click the page navigation to move to the second page:



When you click the folder for your Student Conference, you will see a list of the Student Chapters assigned to that Conference:

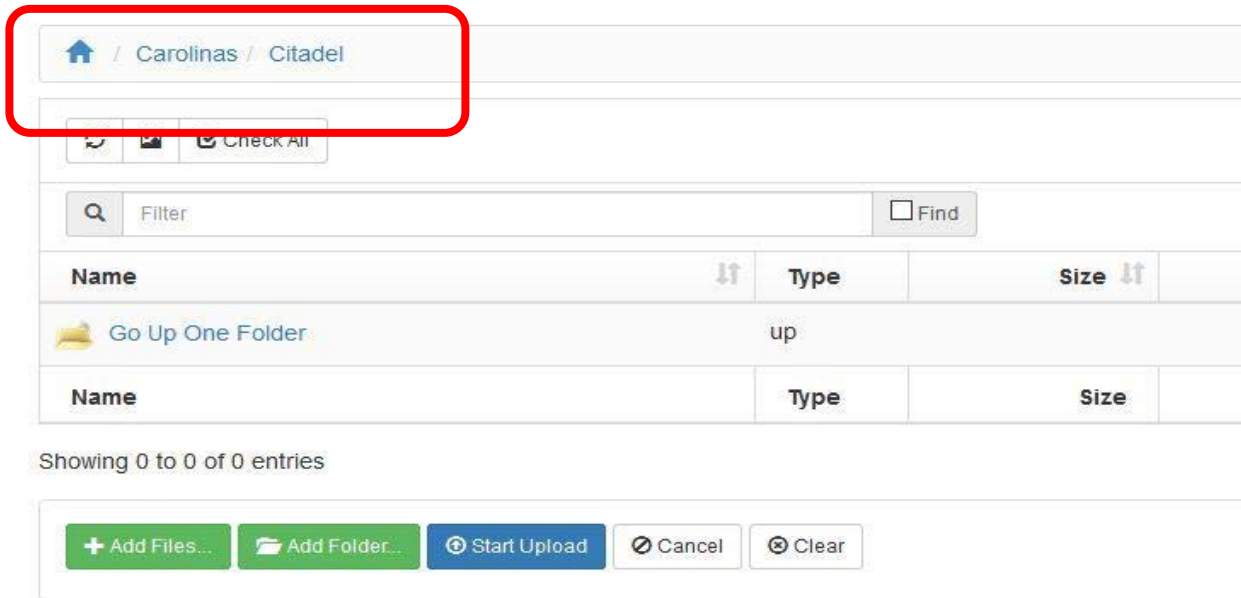


If you accidentally open the wrong folder, you can “back up” by clicking the **Go Up One Folder** folder and navigate correctly.

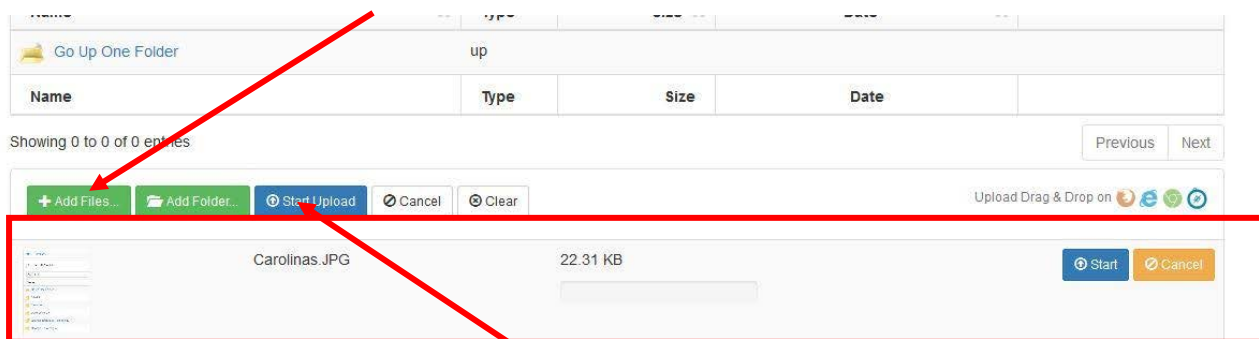
Locate the folder for your Student Chapter and click to open it. If you don’t see the name of your Student Chapter, click the page navigation to move to the second or third page:



When you have opened the folder for your Student Conference and Student Chapter, double-check that you are in the correct location before you begin uploading your files (In this case, **The Citadel** – within the **Carolinas** Student Conference):



When you have confirmed that you have navigated correctly to the proper folder, you can either click the **+Add Files** button and then browse to find the files to upload or drag and drop files to the area directly below the **+Add Files** button.



The selected (or dragged and dropped) files will appear in the upload area. To upload the file into the folder, click **Start Upload**.

When the file has been successfully uploaded, the name of the file will appear under the **Go Up One Folder**.

The screenshot shows a file management interface. At the top, there is a table with columns for Name, Type, Size, and Date. The table contains one entry: 'Carolinas.JPG', which is a file of 22 KB, uploaded on 7/23/2020 at 4:18 PM. Below the table, there are buttons for '+ Add Files...', '+ Add Folder...', 'Start Upload', 'Cancel', and 'Clear'. A red arrow points to the 'Clear' button. Below the buttons, there is a summary row for the uploaded file 'Carolinas.JPG' (22.37 KB) with a 'Clear' button next to it.

Name	Type	Size	Date
Go Up One Folder	up		
Carolinas.JPG	file	22 KB	7/23/2020 4:18 PM

Showing 1 to 1 of 1 entries

Previous 1 Next

+ Add Files... + Add Folder... Start Upload Cancel Clear

Upload Drag & Drop on

Carolinas.JPG 22.37 KB Clear

To clear the uploaded file from the upload area, click **Clear**.

Need help?

If you uploaded a file to the wrong folder, or want to replace an uploaded file with a corrected version, send an email to concretecanoe@asce.org and ask that the incorrect file be deleted. Include both the location (folder path) and **exact name** of the file you want deleted. (Files cannot be moved – you will have to upload the file again to the correct folder after it has been deleted).

EXHIBIT 3

Student Chapter and Participant Eligibility

REGISTERED PARTICIPANTS

Registered participants (for both Conference and Society-wide Final Competitions) shall meet all the following requirements:

- a. Be an undergraduate student majoring pursuing a career in engineering or related to engineering during the 2020/21 academic year (August 2020 to June 2021). Students do not need to be enrolled during the entire year (e.g., students graduating in December, or students not in school during the fall term but in school for the spring term.) Students that graduate during the academic year and have begun graduate studies during the same academic year are eligible to compete;
- b. Be members of an ASCE Student Organization in good standing;
- c. Be Society Student Members of ASCE. ASCE student membership numbers shall be required upon registration; and
- d. Have contributed to the design of the concrete canoe during the current academic year.
- e. Students that graduated in Spring 2020 and will continue in graduate school in Fall 2020 can submit a request to the C4 to compete as a registered participant in the 2020-2021 competition and must submit a letter of no more than 300 words with the ASCE faculty advisor's signature. The letter should detail how their involvement as a participant is more valuable than having an undergraduate student fill that spot. Note that graduate students can do everything that a registered participant can do except present and race. Note that races will not count for any points this year.

Students that graduated in Spring 2020 and are not a registered student in the 2020-2021 academic year cannot be a registered participant but are encouraged to play major roles with the team as desired.

STUDENT CHAPTER ELIGIBILITY FOR NATIONAL COMPETITIONS

To facilitate broader participation by ASCE Student Chapters in Student Conference activities, ASCE Headquarters stresses the importance of the Student Conference as an event that is much more than a qualifying round for Society-wide competitions. As such, all ASCE Student Chapters must meet the following eligibility requirements to participate in an ASCE-sponsored Society-wide 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
 - b. Have submitted their student chapter full Annual Report in time to be graded (reports submitted on or before February 1, 2021 meet this qualification) AND have received a minimum score of 40 points out of a possible 100. **Student Chapters that submit an EZ annual reporting form do not qualify;** and
 - c. 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 Society-wide Final 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. Note that any papers/presentations created for any other competition **do not count** as an entry into the Student Conference Paper Competition; and
 - c. Good faith participation in the **R. John Craig Legacy Competition**.
 - d. 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.

QUALIFIERS

The Society-wide Competition host school has the choice of competing in the current year or deferring their entry until the following year. The Society-wide host school must compete at their respective Conference Competition the same year they intend to compete in the Society-wide Final Competition.

Conference level competitions are required to meet certain standards. To earn an invitation to the Society-wide Competition, a student team shall qualify through participation in its assigned Conference Competition. There must be at least three (3) eligible ASCE Student Chapters that are official members of the Conference participating in the concrete canoe competition to constitute a qualified Conference Competition. In addition, the Conference Competition must be hosted by a school that is an official member of the Conference. Only one (1) team from any given school can compete in a Conference Competition.

ASCE student chapters hosting conferences may invite Official Guest teams, which are teams from colleges or universities that have an official ASCE student chapter that is not assigned to any Student Conference. Official Guest teams are eligible (if they meet the other requirements) to be invited to the Society-wide competition. Official Guest teams may compete in only one Student Conference per year. ASCE Student Services shall be notified by the Student Conference Host School of an Official Guest team prior to the start of the Student Conference. Notification can be by e-mail to student@asce.org. Conference assignments are listed in the ASCE Official Registrar at www.asce.org/or/, and conference host chapters are listed at www.asce.org/student_conferences/.

WILD CARD TEAMS

In addition to the top qualified team from each Conference, up to six (6) teams, geographically disbursed, may also qualify to participate at the Society-wide Competition as a designated Wildcard. Wildcard teams must:

- Score in the top one-third (1/3) of all Annual Student Chapter Reports,
- Respond to a notice from ASCE with a Statement of Interest, and
- Finish overall within the top half (1/2) of their respective Conference Competition.

All student chapters that place within the top one-third (1/3) of all Annual Reports will receive an email notice immediately after the reports are scored. The notice will ask teams to respond with a Statement of Interest within two (2) weeks of receipt, signed by their Department Chair and ASCE Chapter Faculty Advisor. After all student conferences are complete, all teams that placed in the top half (1/2) of their respective competitions will be cross referenced with those that submitted a Statement of Interest. From that group, up to six (6) teams will be selected randomly to be invited to the Society-wide Competition. A given conference cannot have more than one (1) Wildcard team selected in a given year. No team can be selected as a Wildcard in consecutive years.

ETHICS AND THE COMPETITION

According to the ASCE Code of Ethics, Canon 5, “Engineers shall build their professional reputation on the merit of their services and shall not compete unfairly with others.”

In the context of this contest, “unfair competition” may include conduct such as the following:

- 1) Failure to provide proper credit for past teams, plagiarism, or any other false statements concerning the source of material used in the contest;
- 2) Taking other people’s designs, artwork, or other creative content without permission (for an overview of Intellectual Property Laws, including Trademark and Copyright, visit <http://fairuse.stanford.edu/overview/introduction/intellectual-property-laws/>); and
- 3) Any false or malicious statements about other teams, members, or others involved in the contest.

SPIRIT OF THE COMPETITION

The judges and/or the C4 may take disciplinary action, including warnings, point deductions, or disqualification of a team or entry for inappropriate use of materials, language, alcohol, uncooperativeness, or general unprofessional behavior or unethical behavior of team members or persons associated with a team. The judges and/or the C4 have the final authority to determine what constitutes a violation of the “Spirit of the Competition” and may take appropriate action towards point deduction or disqualification.

EXHIBIT 4

Pre-Qualification Forms

Teams shall submit a *Letter of Intent* along with their *Pre-Qualification Forms* which acknowledges receipt of the Request for Proposal solicitation and shall provide a synopsis of their understating of the project.

The letter must be signed by at least one (1) team captain and ASCE Student Chapter Faculty Advisor. The phone number and email address for both the team captain and faculty advisor shall be provided.

The *Pre-Qualification Forms* are required to be completed and signed off by each team including initialing off on each line item and providing signatures from the team's team captain and the ASCE Student Chapter Faculty Advisor.

Adobe PDF versions of *Letter of Intent* and *Pre-Qualification Forms* are to be uploaded to the team's respective folder **no later than 5:00 pm [Eastern] Friday, October 16, 2020.**

Late submissions and documents missing any of the required signatures, initials, and email addresses will be considered non-responsive and subject to deduction.

Click the following hyperlink to access: [Conference Folders](#)

Pre-Qualification Form (Page 1 of X)

 (school name)

We acknowledge that we have read the 2021 ASCE Concrete Canoe Competition Request for Proposal and understand the following (*initialed by team captain and ASCE Faculty Advisor*):

The requirements of all teams to qualify as a participant in the Conference and Society-wide Final Competitions as outlined in Section 2.0 and Exhibit 3. _____

The requirements for teams to qualify as a potential Wildcard team including scoring in the top 1/3 of all Annual Reports, submitting a Statement of Interest, and finish within the top 1/2 of our Conference Concrete Canoe Competition (Exhibit 3) _____

The eligibility requirements of registered participants (Section 2.0 and Exhibit 3) _____

The deadline for the submission of *Letter of Intent* and *Pre-Qualification Form* (uploaded to ASCE server) is October 22, 2020. _____

The last day to submit *ASCE Student Chapter Annual Reports* to be eligible for qualifying (so that they may be graded) is February 1, 2021. _____

The last day to submit *Request for Information* (RFI) to the C4 is January 22, 2021. _____

Teams are responsible for all information provided in this *Request for Proposal*, any subsequent RFP addendums, and general questions and answers posted to the ASCE Concrete Canoe Facebook Page, from the date of the release of the information. _____

The submission date of *Technical Proposal* and *Enhanced Focus Area Report* for Conference Competition (uploading of digital copies to ASCE server) is Friday, February 19, 2021. _____

The submission date of *R. John Craig Presentation* for Conference Competition (uploading of presentation to ASCE server) is Friday, February 19, 2021. _____

The submission date of *three (3) Peer Reviews* to the respective teams' folders (uploading of digital copies to ASCE server) is Friday, March 12, 2021. _____

The submission date of *Technical Proposal* and *Enhanced Focus Area Report* for Society-wide Final Competition (uploading of digital copies to ASCE server and mailed hard copies to ASCE Headquarters) is Thursday, May 20, 2021. _____

 Team Captain (date)

 ASCE Student Chapter Faculty Advisor (date)

 (signature)

 (signature)

Pre-Qualification Form (Page 2 of X)

(school name)

As of the date of issuance of this Request for Proposal, what is the status of your school / university's 2020-21 classroom instruction (in-person, remote, hybrid)? What is anticipated after Thanksgiving break? If in-person or hybrid, do you have access to laboratory space or other facilities outside of classes?

In 250 words or less, provide a high-level overview of the team's Health & Safety (H&S) Program. If there is currently not one in place, what does the team envision their H&S program will entail? Include a discussion on the impact of COVID-19 on the team's ability to perform work and what plans would be implemented assuming work could be performed.

In 150 words or less, provide a high-level overview of the team's current QA/QC Program. If there is currently not one in place, what does the team envision their QA/QC program will entail?

Has the team reviewed the Department and/or University safety policies regarding material research, material lab testing, construction, or other applicable areas for the project?

The anticipated canoe name and overall theme is – (please provide a brief description of the theme. The intent is to allow ASCE to follow up to determine if there may be copyright or trademark issues to contend with, as well as to provide insight). Note: teams may re-use past themes.

Has this theme been discussed with the team's Faculty Advisor about potential Trademark or Copywrite issues?

The core project team is made up of _____ number of people.

EXHIBIT 5

Technical Specifications for Concrete and Reinforcement

GENERAL

The proposed concrete mixture should be designed to comply with all the requirements of this section. The use of pre-packaged or pre-mixed concrete, mortar, or grout is not permitted in the design. Bondo®, epoxy or similar materials are not permitted during any stages of the construction of the canoe (i.e., as the component of the mixture itself, as an aid during the placement of concrete, as a modifier of the reinforcement, or as a means of attaching the flotation material).

REQUIREMENTS

Composite Thickness – the ratio of the total measured thicknesses of the primary reinforcement to the total thickness of the canoe wall or structural element at any point in the canoe shall not exceed 50%. This requirement applies to all canoe elements, including but not limited to, the hull, ribs, gunwales, thwarts, bulkheads, etc., and the connections of structural elements to the canoe wall.

Number of Concrete Mixtures – limited to a single concrete mixture design. The proposed mixture can be produced in a multitude of colors.

Primary Reinforcement – All primary reinforcement shall be covered in concrete. All materials not part of a concrete mixture or a flotation material shall be classified as reinforcing material and shall comply with the specifications outlined below.

MATERIALS

Cementitious Materials, Alternative Supplementary Cementitious Materials (ASCM) and Pozzolans – any type of commercially available, inorganic cementitious binder, either hydraulic, non-hydraulic, or a combination of these is permitted. The following constituents shall meet at least one of the listed ASTM standard(s)

- All Hydraulic Cement – ASTM C150, ASTM C595, or ASTM C1157
- Pozzolans – ASTM C618 (Class C, F, or N), ASTM C989 (Grade 100) or ASTM C1240
- Hydrated Lime – ASTM C207 (Type S or N) or ASTM C821

Alternative cementitious materials and pozzolans evaluated using provisions of ASTM C1709 are also permitted. If non-commercial products are being considered, approval by the C4 shall be obtained prior to their use.

Aggregates – The aggregate should be material meeting the definition of “fine aggregate” provided in ASTM C125 and meet the following requirements:

- The total aggregate volume shall be 30% (min.) of the total volume of the concrete mixture.
- A minimum of 50% of the total aggregate volume shall be composed of:
 - (a) commercially-available lightweight aggregate (meeting the requirements of ASTM C330),
 - (b) recycled concrete aggregate (RCA), or
 - (c) a combination of these.

- **Manufactured microspheres (e.g. expanded glass microsphere, low density hollow-glass microspheres) or cenospheres (either man-made or extracted from fly ash) are not permitted.**

Teams are permitted to blend various fraction of the aggregates to develop customized gradation curves as they see it fit for mixture optimization purposes.

Fibers – for secondary reinforcement, dispersed within the concrete, are permitted. Fibers shall meet the requirements of ASTM C1116 and be dispersed within the concrete matrix.

Admixtures – Water-Reducing and Set-Controlling Admixtures (ASTM C494), Air-Entraining Admixtures (ASTM C260.), and Coloring Admixtures/Agents and Concrete Pigments (ASTM C979) are permitted.

The use of bonding adhesives (ASTM C1059), waste latex paints, and latex emulsions (ASTM C1438) is strictly prohibited.

Specialty admixtures shall meet the requirements of ASTM C494 Type S, Specific Performance Admixtures. Epoxy resins, their curing agents, asphalt emulsions, or similar materials shall not be considered specialty admixtures and are strictly prohibited. Teams wishing to incorporate a material as a specialty admixture that does not fall under ASTM C494 Type S, is not commercially-available or specifically made for use in concrete and have questions or concerns of whether it is an acceptable material shall contact the C4 for a determination of its applicability.

The solids content of dyes and admixtures in powder form are to be accounted for in the determination of solids content. Disregard the contribution of solids from other admixtures.

Curing and Sealing Compounds – concrete may be cured using liquid membrane-forming compound (ASTM C309 and/or ASTM C1315) or C4-approved equivalent. Any compound applied is limited to a maximum of two coats following the manufacturer’s procedure for application and thickness.

Mesh and Grids – All materials serving as primary reinforcement shall have sufficient open space to allow for the mechanical bonding of the concrete composite as measured by its *percent open area* (POA). Solid mats or plates for reinforcing are not permitted. Pre-impregnated (pre-preg) materials which contain resins and require heat to complete polymerization, are not permitted. Solid mats and plates are described as materials that require additional bonding agents or post-manufacturer perforations to keep the reinforcement from delaminating (i.e., there is a lack of open space between the reinforcement sufficient for mechanical bonding).

The minimum percent open area (POA) of any layer of reinforcing material is 40%. The determination of the POA is obtained by the following equation:

$$POA = \frac{\sum Area_{open}}{Area_{total}} \times 100\%$$

where: $Area_{open}$ is the total open area (i.e., the area of the apertures)
 $Area_{total}$ is the total area of the reinforcement specimen

Teams are permitted to modify a given mesh by removing strands as needed to achieve the required POA. Teams may fabricate meshes or grids by placing (weaving, tying) material in the “as-received” condition.

Once fabricated, teams are not permitted to treat the material (e.g., apply coatings or heat). The “as-received” condition is defined as a commercially available “off the shelf” product directly available to a consumer which has not been modified by a third-party (for example, fiberglass can be used as is, but to have a third-party make a grid out of it, then “delivering” it to the team and then considering it “as-received” is not allowed).

Strands, Tendons, and Bars – are materials less than ½ inch wide used to make a reinforcement grid or used in pre- or post-tensioning. When used individually, they must meet canoe thickness requirements, but are not subject to percent open area. Grids consisting of strands, tendons, and bars are subject to thickness and percent open area requirements.

Bearing Plates and Fasteners – used for pre- or post-tensioning of tendons are permitted and are not subject to the thickness or percent open area requirements. The location of the bearing plates is limited to within 2 feet from the bow and stern sections. The thickness of any bearing plate itself is limited to ¼ inch.

MIXTURE:

CEMENTITIOUS MATERIALS						
Component	Specific Gravity	Volume	Amount of CM			
Cement, <i>c</i>		ft^3	lb/yd^3	Total cm (includes <i>c</i>) lb/yd^3 <i>c/cm</i> ratio, by mass		
Cementitious Material 1, cm_1		ft^3	lb/yd^3			
Cementitious Material 2, cm_2		ft^3	lb/yd^3			
FIBERS						
Component	Specific Gravity	Volume	Amount of Fibers			
Fiber 1, f_1		ft^3	lb/yd^3	Total Amount of Fibers _____ lb/yd^3		
Fiber 2, f_2		ft^3	lb/yd^3			
AGGREGATES						
Aggregates	Abs (%)	SG _{OD}	SG _{SSD}	Base Quantity, <i>W</i>		Volume, <i>V</i> _{agg, SSD}
				<i>W</i> _{OD}	<i>W</i> _{SSD}	
Aggregate 1, agg_1	%			lb/yd^3	lb/yd^3	ft^3
Aggregate 2, agg_2	%			lb/yd^3	lb/yd^3	ft^3
Aggregate 3, agg_3	%			lb/yd^3	lb/yd^3	ft^3
LIQUID ADMIXTURES						
Admixture	lb/ US gal	Dosage (fl. oz. / cwt)	% Solids	Amount of Water in Admixture		
Liquid Dye, <i>ld</i>			%	lb/yd^3	Total Water from Liquid Admixtures, $\sum W_{adm}$ _____ lb/yd^3	
Admixture 1, adm_{x1}			%	lb/yd^3		
Admixture 2, adm_{x2}			%	lb/yd^3		
SOLIDS (DYES, POWDERED ADMIXTURES)						
Component	Specific Gravity	Volume (ft^3)	Amount (lb/yd^3)			
Solid Component of Liquid Dye, S_{ld}		ft^3	lb/yd^3	Total Solids. S_{total} _____ lb/yd^3		
Powdered Admixture, $S_p admix$		ft^3	lb/yd^3			
Powdered Admixture, $S_p admix$		ft^3	lb/yd^3			
WATER						
		Amount			Volume	
Water, <i>w</i> , [$=\sum (W_{free} + W_{adm} + W_{batch})$]		w/c ratio, by mass _____	lb/yd^3			
Total Free Water from All Aggregates, $\sum W_{free}$			lb/yd^3			
Total Water from All Admixtures, $\sum W_{adm}$		w/cm ratio, by mass _____	lb/yd^3			
Batch Water, W_{batch}		_____	lb/yd^3			
DENSITIES, AIR CONTENT, RATIOS, AND SLUMP						
Values for 1 cy of concrete	cm	Fibers	Aggregate (SSD)	Solids, S_{total}	Water, <i>w</i>	Total
Mass, <i>M</i>	lb	lb	lb	lb	lb	$\sum M$: lb
Absolute Volume, <i>V</i>	ft^3	ft^3	ft^3	ft^3	ft^3	$\sum V$: ft^3
Theoretical Density, <i>T</i> , ($=\sum M / \sum V$)	lb/ft^3		Air Content, Air, [$= (T - D)/T \times 100\%$]			%
Anticipated Density, <i>D</i>	lb/ft^3		Air Content, Air, [$= (27 - \sum V)/27 \times 100\%$]			%
Total Aggregate Ratio ($=V_{agg} / 27$)	%		Slump, Slump flow, Spread (as applicable)			in.
C330 + RCA Ratio ($=V_{C330+RCA} / V_{agg}$)	%					

TERMS AND FORMULAS

<i>Abs</i>	= absorption of an aggregate, whether taken as a whole, the coarse, or the fine aggregate, %.
<i>adm_x</i>	= admixtures
<i>air</i>	= gravimetric air content, per ASTM C138, %
<i>agg</i>	= aggregate
<i>c</i>	= cement
<i>cm</i>	= cementitious materials (including cement)
<i>c/cm</i>	= ratio of cement to cementitious materials, by mass, <i>dimensionless</i>
<i>cwt</i>	= hundred weight of cementitious material (example 750 lb/yd ³ of cm is 7.5 cwt)
<i>f</i>	= fibers
<i>ld</i>	= liquid dyes
<i>M</i>	= mass, <i>lb</i> .
<i>MC_{total}</i>	= total moisture content referenced to the oven-dried condition of the aggregate, %.
<i>MC_{free}</i>	= free moisture content, referenced to the saturated, surface-dry condition (SSD), of the aggregate, %.
<i>mf</i>	= mineral fillers (i.e., aggregate-like materials passing the No. 200 sieve (75 μm))
<i>D</i>	= measured density (wet, plastic) of concrete test cylinders, per ASTM C138, <i>lb/ft³</i> .
<i>T</i>	= theoretical density of concrete (zero air voids), per ASTM C138, <i>lb/ft³</i> .
<i>S_{ld}</i>	= solids in liquid dyes
<i>S_{p adm_x}</i>	= solids of powdered admixtures
<i>S_{total}</i>	= total solids of liquid dyes, powdered admixtures, and mineral fillers, <i>lb/yd³</i> .
<i>SG_{SSD}</i>	= specific gravity, in the saturated, surface-dry condition, of aggregate, <i>dimensionless</i> .
<i>SG_{OD}</i>	= specific gravity, in the oven-dried condition, of aggregate, <i>dimensionless</i> .
<i>V</i>	= volume, <i>ft³</i> .
<i>V_{agg,SSD}</i>	= volume, in the saturated, surface-dry condition, of aggregate, <i>ft³</i> .
<i>W_{SSD}</i>	= mass, in the saturated, surface-dry condition, of aggregate per unit volume of concrete, <i>lb/yd³</i> .
<i>W_{OD}</i>	= mass, in the oven-dried condition, of aggregate per unit volume of concrete, <i>lb/yd³</i> .
<i>W_{stk}</i>	= mass, in the stock moisture condition, of the aggregate per unit volume of concrete, <i>lb/yd³</i> .
<i>w_{adm_x}</i>	= the mass of water in the admixtures, per unit volume of concrete, <i>lb/yd³</i> .
<i>w_{batch}</i>	= the mass of water to be batched per unit volume of concrete when the aggregates are in a stock moisture condition, <i>lb/yd³</i> .
<i>w_{free}</i>	= free water carried into the batch by a wet per unit volume of concrete, <i>lb/yd³</i> .
<i>w/c</i>	= water to cement ratio, by mass, <i>dimensionless</i> .
<i>w/cm</i>	= water to cementitious material ratio, by mass, <i>dimensionless</i> .

TERMS AND FORMULAS

Each one of these formulas should be applied to each aggregate source:

$$Abs = \frac{W_{SSD} - W_{od}}{W_{od}} \times 100\%$$

$$MC_{total} = \frac{W_{stk} - W_{od}}{W_{od}} \times 100\%$$

$$MC_{free} = MC_{total} - Abs$$

$$W_{SSD} = \left(1 + \frac{Abs}{100\%}\right) * W_{OD}$$

$$w_{free} = W_{OD} \times \left(\frac{MC_{free}}{100\%}\right)$$

Note that w_{free} can be a negative number indicating a dry and absorptive aggregate.

$$W_{stk} = W_{SSD} + w_{free}$$

Then, for the mixture as a whole: $w_{batch} = w - (w_{free} + \sum w_{adm})$

The following formula should be applied to all admixtures in liquid form:

$$w_{adm} = dosage (fl\ oz/cwt) * cwt\ of\ cm * water\ content\ (\%) * 1\ gal/128\ fl\ oz * lb/gal\ of\ admixture$$

The following formula should be applied to liquid dyes only:

$$S = dosage (fl\ oz/cwt) * cwt\ of\ cm * solid\ content\ (\%) * 1\ gal/128\ fl\ oz * lb/gal\ of\ admixture$$

EXHIBIT 6

General Guidelines for Concrete Mixture Data Table

General Comments:

- This exhibit provides general guidelines and helpful hints so that teams understand what is required in the table and how it should be properly filled out.
- Under the categories of “Cementitious Materials,” “Aggregates,” “Fibers,” and “Admixtures”, provide the name of the constituents that are being used. **Commercial (trade) names should be used if it is clear what the product is.**
- Absorption and moisture content values (in percent) for the aggregates shall be provided (to the nearest 0.1%)
- Under the “Specific Gravity” column, provide the specific gravity (dimensionless) of the cementitious materials, aggregates, fibers, and water used in the concrete mix. **For aggregates, you will provide the Oven Dried (OD) and Saturated, Surface Dry (SSD) values.** Two or three decimal places are sufficient.
- The weight of the liquid admixtures shall be provided in lb/gal.

Notes:

1. The values provided in these tables are shown for MATHEMATICAL EXAMPLE purposes only.
2. Teams should not consider the mixture proportions shown to result in concrete with the needed fresh (slump, air content) and hardened (strength) characteristics required for the competition.
3. Values such as specific gravity are based on generalized numbers and should not be used for your design calculations (i.e., do not reference this document as the one you based your values on).

The following is a step-by-step example for reporting the FINAL yielded concrete mixture proportions and checks to make sure that it is theoretically and mathematically correct. This means that the reported unit weight is measured, and the values provided consider relative yield.

Proposed Mixture Proportions

Type I/II Cement	400 lb, SG = 3.15
Fly Ash (Class C)	250 lb, SG = 2.93
Blast Furnace Slag	250 lb, SG = 2.85
Fibers, Nylon	5 lb, SG = 0.92
Fibers, PVA	3 lb, SG = 1.40
w/cm ratio	0.50
Expanded Shale, aggregate	600 lbs (dry), Abs = 13%, SG _{dry} = 1.55
Pumice, aggregate	600 lbs (dry), Abs = 17%, SG _{dry} = 1.59
Admixtures:	6 fl oz/cwt HRWR Admixture (47% solids by weight, 8.5 lb/gal) 20 fl oz/cwt Liquid Dye (50% solids by weight, 10.0 lb/gal)
Design Unit Weight (wet)	99.55 lb/ft ³
Design Air Content	11.3%

ABSOLUTE VOLUME METHOD

The absolute volume of a given material is computed by dividing the mass of the material by its absolute density, which is the specific gravity (SG) times the density of water (62.4 lb/ft³), as shown by:

$$\text{Absolute Volume} = \text{mass} / (\text{SG} \times 62.4)$$

Example : How much volume does 400 lbs of portland cement occupy given that SG = 3.15?

$$\begin{aligned} \text{Volume}_{\text{cement}} &= \text{Mass}_{\text{cement}} / (\text{SG}_{\text{cement}} \times 62.4) \\ &= 400 / (3.15 \times 62.4) = 2.04 \text{ ft}^3 \end{aligned}$$

In a batch of concrete, the sum of the absolute volumes of cementitious materials, aggregate, fibers, water, solids from admixtures and air, gives the volume of concrete produced per batch. The above equation can be used to determine the volumes of the various constituents and populate the table.

Please note that there are several specific gravities reported for aggregate, depending on the condition that they are in, such as *dry* (SG_{OD}) and *saturated, surface dry* (SG_{SSD}). **The values are different** as one is obviously in the dry state and the other considers the water that is required to bring the aggregate to the SSD condition, and it can be shown that it is a function of absorption. For example, it can be shown that for the shale ($SG_{SSD} = 1.55$; $A = 13\%$), the SG_{OD} is 1.75.

The volume that the aggregate occupies between the conditions, however, can be shown to be the same. That is, the volume of aggregate in the OD condition determined by taking the amount of aggregate in the OD condition divided by SG_{OD} is equal to the volume of aggregate in the SSD condition as determined by taking the amount of aggregate in the SSD condition divided by SG_{SSD} .

WATER

Based on the final w/cm ratio, the amount of water is simply computed using the total amount of cementitious material in the mixture

$$\text{Water} = w/cm \times cm$$

Example: How much water is needed for 900 lbs of cm using a w/cm of 0.50?

$$\begin{aligned} \text{Water} &= w/cm \times cm \\ \text{Water} &= 0.50 \times 900 \text{ lb} = 450 \text{ lb} \end{aligned}$$

The water that is computed from the w/cm ratio is the water that is needed to hydrate the cementitious materials (cm). It is not used to condition the aggregate to the SSD condition.

The water (w) comes from three sources – water from the aggregate (if there is “free” water then the value of this is positive; if the aggregate is drier than the SSD condition, then the value is negative), water from the admixtures, and additional batch water, and is expressed as (or a rearrangement of this equation):

$$w_{\text{batch}} = w - (w_{\text{free}} + \sum w_{\text{admx}})$$

Compute Free Water from Aggregates

With the values previously obtained for the aggregates, the total moisture content, free moisture content and the amount of moisture available, can be computed for each aggregate using the following three equations:

$$MC_{total} = \frac{W_{stk} - W_{od}}{W_{od}} \times 100\%$$

$$MC_{free} = MC_{total} - A$$

$$w_{free} = W_{OD} \times \left(\frac{MC_{free}}{100\%} \right)$$

Aggregate	W _{OD} (lb)	Abs (%)	W _{SSD} (lb)	MC _{total} (%)	MC _{free} (%)	W _{free} (lb)
Expanded Shale	600	13	678	8	-5	-30
Pumice	550	17	643.50	12	-5	-27.5

Combined, the aggregates have -57.50 lb of free water

What does this mean? In this case, it means that the aggregates are drier than the SSD condition. So, if you added the amount of water computed above (450 lbs to get your 0.5 w/cm ratio) to a mixture with the aggregate in this condition, the aggregate would want to soak up 57.5 lbs of it to get to the SSD condition. So, in the end, your w/cm ratio is no longer 0.5. However, we must deal with water from other sources as well. See below.

Compute Water from Admixtures

The water in the various admixtures can be found from the following equation:

$$\text{Water in admixture} = \text{dosage} \times \text{cwt of cm} \times \text{water content} \times (1 \text{ gal}/128 \text{ fl oz}) \times (\text{lbs}/\text{gal of admixture})$$

From liquid dye

$$[20 \text{ fl oz}/\text{cwt} \times 8.30 \text{ cwt}] \times [(100\% - 50\% \text{ solids})/100] \times (1 \text{ gal}/128 \text{ fl oz}) \times (10 \text{ lb}/\text{gal}) = \underline{6.48 \text{ lb}}$$

From HRWR

$$[6 \text{ fl oz}/\text{cwt} \times 8.30 \text{ cwt}] \times [(100\% - 47\% \text{ solids})/100] \times (1 \text{ gal}/128 \text{ fl oz}) \times (8.5 \text{ lb}/\text{gal}) = \underline{1.75 \text{ lb}}$$

Total water from the admixtures is then 8.93 lb.

Compute Batch Water

We have computed water from two of the three sources – the aggregate and the admixtures. Based on this example, we ended up having no “free” water from the aggregate (if fact, you were in a deficit).

Since we know the amount of water needed to hydrate the cm (450 lb) based on the w/cm ratio chosen, the batch water can be computed by:

$$w_{batch} = w - (w_{free} + \sum w_{adm})$$

$$= 450 \text{ lbs} - (-57.5 + 10.34) = 497.16 \text{ lb}$$

So, you need 497 lbs of water to (1) bring the aggregate to SSD and (2) hydrate the cement to the 0.5 w/cm ratio, accounting for the 10 bs of water you have from the admixtures.

The volume of water, to hydrate cm only, ($SG_{water} = 1$) is then

$$Volume_{water} = Mass_{water} / (62.4)$$

$$= 450 / 62.4 = 7.21 \text{ ft}^3$$

SOLIDS (from liquid admixtures)

Typically, the proportional volume of the solids included in the liquid admixture is so small in relation to the size of the batch that it can be neglected. The exclusion to this includes latex admixtures (which are prohibited) and dyes (both liquid and in powder form) which can have substantial volumes.

- **For the competition, only dye solids (in the liquid medium) are to be accounted for.**
- **Disregard the contribution of solids from other admixtures.**
- If you have a powdered admixture (i.e., it is not in a liquid medium), then use the absolute volume method as previously shown.

The solids content can be computed in a fashion like the water content from admixtures

$$Solids \text{ in admixture} = dosage \times cwt \text{ of cm} \times solid \text{ content} \times (1 \text{ gal}/128 \text{ fl oz}) \times (lb/gal \text{ of admixture})$$

Based on the weight of the admixture (in lb/gal) and the percentages of water and solids within it, one can determine the SG of the solid particles (SG of water is taken as 1.0) as follows:

- If the liquid dye is 50% water by weight, the weight of water is 6 lb (0.50 x 12 lb)
- The weight of the solids is 6 lb (in a gal of admixture).
- The volume of water is then (6 / 62.4) to obtain 0.0962 ft³.
- Solids volume is 0.0375 ft³. Note: 1 gal = 0.13368 ft³.
- The unit weight of solids is then 6 lb / 0.0375 ft³ = 160 lb/ft³ and therefore its SG is determined to be 2.56.

From liquid dye

$$[20 \text{ fl oz/ cwt} \times 9 \text{ cwt}] \times [(50\% \text{ solids})/100] \times (1 \text{ gal}/128 \text{ fl oz}) \times (12 \text{ lb/gal}) = 8.44 \text{ lb}$$

From HRWR

$$[6 \text{ fl oz/ cwt} \times 9 \text{ cwt}] \times [(47\% \text{ solids})/100] \times (1 \text{ gal}/128 \text{ fl oz}) \times (8.5 \text{ lb/gal}) = 1.90 \text{ lb}$$

DENSITIES, AIR CONTENT, SLUMP and RATIOS

Note: Generally, there is another step to this problem, where the design values are mixed in the lab and the fresh unit weight (actual) is measured. At this point the actual density is compared to the design density and a ratio, known as the Relative Yield, R_y , is determined. This R_y value is then used to adjust the mixture proportions so that they match the actual fresh unit weight. Given that we are assuming that lab testing will not occur, we are only entering the design values in the table for the 2021 competition.

Now that all the amounts have been determined, the respective volumes can be computed so that theoretical densities and air content can be found. This is essentially a check of your mixture calculations.

Mass of Concrete (M) – The mass of concrete is the sum of all masses of the constituents in the mixture – cm, fiber, aggregate, water and admixture solids:

$$M = \text{Amount}_{cm} + \text{Amount}_{fibers} + \text{Amount}_{aggregate} + \text{Amount}_{water} + \text{Amount}_{solids}$$

$$M = 900.00 + 8.00 + 1321.50 + 450 + 8.44 = \underline{2687.84 \text{ lb}}$$

Absolute Volume of Concrete (V) – The absolute volume of concrete is the sum of all the constituents in the mixture. This is based on zero air content. ***This value must be less than 27 ft³ (1 yd³):***

$$V = \text{Volume}_{cm} + \text{Volume}_{fibers} + \text{Volume}_{aggregate} + \text{Volume}_{water} + \text{Volume}_{solids}$$

$$V = 4.81 + 0.12 + 11.75 + 7.21 + 0.05 = \underline{23.941 \text{ ft}^3}$$

Theoretical Density (T) – is the density of concrete with no air in it and is the mass of concrete (M) divided by the absolute volume of concrete (V):

$$T = M / V$$

$$T = 2687.84 \text{ lb} / 23.91 \text{ ft}^3 = 112.27 \text{ lb/ft}^3$$

Measured, or Anticipated, Density (D) – the density of concrete obtained from cylinders, cubes, etc. in the plastic (wet) state (i.e., immediately after casting). 99.55 lb/ft³

Air Content – The air content is computed by comparing the theoretical density (no air) to the measured density (D):

$$\text{Air content} = (T - D) / T \times 100$$

$$\text{Air content} = (112.27 - 99.55) / 112.27 \times 100 = 11.3\%$$

The value of the air content should be checked using the absolute volume method (you should come up with the same answer. If you do not, then there is an error someplace).

$$\text{Air content} = (27 - V) / 27 \times 100$$

$$\text{Air content} = (27 - 23.941) / 27 \times 100 = 11.3\% \text{ (check)}$$

Note: *If the measured density is higher than the theoretical density, the result would be a negative air content. This is not possible.*

Cement-Cementitious Materials Ratio

The c/cm ratio is a calculated value: $400 \text{ lb c} / 900 \text{ lb cm} = \underline{0.444}$

Water-Cementitious Materials Ratio

The w/cm ratio is a calculated value: $450 \text{ lb} / 900 \text{ lb cm} = \underline{0.50}$

Slump – measured value (in inches).

AGGREGATE PROPORTIONING

Total Aggregate Ratio (Volumetric) – Per **EXHIBIT 5 – Technical Specifications for Concrete and Reinforcement**, “Regardless of source, the total aggregate volume shall be 30% (min.) of the total volume of any concrete mixture.”

$$\text{Total Aggregate Ratio (\%)} = V_{\text{aggregate}} / 27 \times 100\%$$

$$= (11.75 / 27) \times 100\% = \underline{43.5\% > 30\% \text{ (OK!)}$$

C330 + RCA Ratio (Volumetric) – Per **EXHIBIT 5**, “A minimum of 50% of the total aggregate volume, shall be composed of: (a) commercially-available lightweight aggregate (meeting the requirements of ASTM C330), (b) recycled concrete aggregate (RCA), or (c) a combination of these.

In this example, both expanded shale and pumice would fall under ASTM C330. We do not have RCA in the mixture.

$$\text{C330 + RCA Ratio (\%)} = V_{\text{C330+RCA}} / V_{\text{agg}} \times 100\%$$

$$= (11.75 + 0) / 11.75 \times 100\% = \underline{100\% > 50\% \text{ (OK!)}$$

MIXTURE: COVID-19 SPECIAL

CEMENTITIOUS MATERIALS						
Component	Specific Gravity	Volume	Amount of CM			
Type I/II Cement	3.15	2.04 ft ³	400 lb/yd ³	Total cm (includes c) 900 lb/yd³ c/cm ratio, by mass 0.444		
GGBFS, Grade 120	2.93	1.37 ft ³	250 lb/yd ³			
Fly Ash, Class C	2.85	1.41 ft ³	250 lb/yd ³			
FIBERS						
Component	Specific Gravity	Volume	Amount of Fibers			
PVA Fibers	0.92	0.09 ft ³	5 lb/yd ³	Total Amount of Fibers 8 lb/yd ³		
Nylon Fibers	1.40	0.03 ft ³	3 lb/yd ³			
AGGREGATES						
Aggregates	Abs (%)	SG _{OD}	SG _{SSD}	Base Quantity, W		Volume, V _{agg, SSD}
				W _{OD}	W _{SSD}	
Expanded Shale	13	1.55	1.75	600 lb/yd ³	678 lb/yd ³	6.20 ft ³
Pumice	17	1.59	1.86	550 lb/yd ³	643.5 lb/yd ³	5.54 ft ³
LIQUID ADMIXTURES						
Admixture	lb/ US gal	Dosage (fl. oz / cwt)	% Solids	Amount of Water in Admixture		
Liquid Dye	12	20	50 %	8.44 lb/yd ³	Total Water from Liquid Admixtures, $\sum W_{adm}$ 10.34 lb/yd³	
HRWR	8.5	6	47 %	1.90 lb/yd ³		
SOLIDS (DYES, POWDERED ADMIXTURES)						
Component	Specific Gravity	Volume (ft ³)	Amount (lb/yd ³)			
Solid Component of Liquid Dye	2.56	0.05 ft ³	8.44 lb/yd ³	Total Solids, S _{total} 8.44 lb/yd³		
WATER						
	Amount			Volume		
Water, w, $[=\sum (W_{free} + W_{adm} + W_{batch})]$	w/c ratio, by mass 1.125			450 lb/yd ³	7.21 ft ³	
Total Free Water from All Aggregates, $\sum W_{free}$	w/cm ratio, by mass 0.50			- 57.50 lb/yd ³		
Total Water from All Admixtures, $\sum W_{adm}$				10.34 lb/yd ³		
Batch Water, W _{batch}				497.16 lb/yd ³		
DENSITIES, AIR CONTENT, RATIOS, AND SLUMP						
Values for 1 cy of concrete	cm	Fibers	Aggregate (SSD)	Solids, S _{total}	Water, w	Total
Mass, M	900 lb	8 lb	1321.5 lb	8.44 lb	450 lb	2687.94
Absolute Volume, V	4.81 ft ³	0.12 ft ³	11.75 ft ³	0.05 ft ³	7.21 ft ³	23.94
Theoretical Density, T, $(=\sum M / \sum V)$	112.27 lb/ft ³		Air Content, Air, $[= (T - D)/T \times 100\%]$			11.4 %
Anticipated Density, D	99.55 lb/ft ³		Air Content, Air, $[= (27 - \sum V)/27 \times 100\%]$			11.4 %
Total Aggregate Ratio $(=V_{agg} / 27)$	43.5%		Slump, Slump flow, Spread (as applicable)			4 ± 1 in.
C330 + RCA Ratio $(=V_{C330+RCA} / V_{agg})$	100%					

EXHIBIT 7

MTDS Reference Table Example

Product Name	Type	Applicable Standard	URL/Link to Datasheet
CEMENTITIOUS MATERIALS and POZZOLANS			
Cemex Type I Cement	Type I	ASTM C150	See attached mill test report
AGGREGATES			
Utelite Structural Fines	Expanded Shale	C330	https://www.utelite.com/resources/material-reports-documents/
FIBERS			
NYCON-PVA RECS100	PVA Fiber	C1116	https://cdn.shopify.com/s/files/1/0088/0764/5299/files/NyconPVARECS100Sheet042015.pdf?7980
ADMIXTURES			
Euclid – Pastol 5000	Water Reducer	C494 Type A & F	https://www.euclidchemical.com/filesshare/ProductFiles/tds/plastol_5000.pdf
REINFORCING MATERIALS			
1/16" 7x7 Galvanized Aircraft Cable	Steel Tendon	n/a	https://www.fastenal.com/content/product_specifications/WR.7X7.G.EQR.00.pdf
CURING & SEALING COMPOUNDS			
BASF MasterKure CC 1315WB	Curing and Sealing Compound	ASTM C1315	https://assets.master-builders-solutions.com/en-us/basf-masterkure-cc-1315-wb-tds.pdf
OTHER/MISCELLANEOUS			


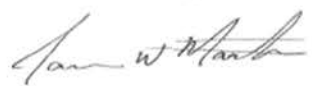
	3990 E Concourse Street Suite 200 Ontario, CA 91764 Telephone (909) 974-5469 FAX (909) 974-5525	CEMENT MILL TEST REPORT			
Cement Identified as: Plant: CEMEX Construction Materials Pacific LLC Location: Victorville, CA		Date: 3/20/2020			
	Prod dates:	Beginning: 3/6/2020 Ending: 3/12/2020			
		Ref. No 43910			
STANDARD CHEMICAL REQUIREMENTS (ASTM C114)	ASTM C150 / AASHTO M 85 SPECIFICATIONS	TYPE I	TYPE II	TYPE V	TEST RESULTS
Silicon Dioxide (SiO ₂), %	Minimum	---	---	---	20.5
Aluminum Oxide (Al ₂ O ₃), %	Maximum	---	6.0	---	3.9
Ferric Oxide (Fe ₂ O ₃), %	Maximum	---	6.0	---	3.6
Calcium Oxide (CaO), %	---	---	---	---	62.1
Magnesium Oxide (MgO), %	Maximum	6.0	6.0	6.0	4.6
Sulfur Trioxide (SO ₃), % **	Maximum	3.0	3.0	2.3	3.1
Loss on Ignition (LOI), %	Maximum	3.5	3.5	3.5	2.5
Insoluble Residue, %	Maximum	1.5	1.5	1.5	0.99
Sodium Oxide (Na ₂ O), %	---	---	---	---	0.24
Potassium Oxide (K ₂ O), %	---	---	---	---	0.42
Equivalent Alkalies (Na ₂ O+.658K ₂ O), % CO ₂ (%)	Maximum	0.60	0.60	0.60	0.52
Limestone (%)	Maximum	5.0	5.0	5.0	2.9
CaCO ₃ in limestone	Minimum	70.0	70.0	70.0	81.9
Inorganic addition	Maximum	5.0	5.0	5.0	1.5
Tricalcium Silicate (C ₃ S), %	Maximum	---	---	---	52
Dicalcium Silicate (C ₂ S), %	---	---	---	---	18
Tricalcium Aluminate (C ₃ A), %	Maximum	---	8	5	4
Tetracalcium Aluminoferrite (C ₄ AF), %	---	---	---	---	11
Heat Index (C ₃ S + 4.75C ₃ A) (C ₄ AF + 2C ₃ A) or (C ₄ AF + C ₂ F), %	Maximum	---	100	---	71
	Maximum	---	---	25	19
PHYSICAL REQUIREMENTS					
Heat of Hydration (ASTM C1702) 7 days, kj/kg (cal/g)	Informational data only Most recent value				310(74.2)
(ASTM C204) Blaine Fineness, cm ² /gm	Minimum	2600	2600	2600	4239
(ASTM C430) -325 Mesh, %	---	---	---	---	96
(ASTM C191) Time of Setting (Vicat)					
Initial Set, minutes	Minimum / Maximum	45 / 375	45 / 375	45 / 375	121
Final Set, minutes	---	---	---	---	295
(ASTM C451) False Set, %	Minimum	50	50	50	88
(ASTM C185) Air Content, %	Maximum	12	12	12	6.8
(ASTM C151) Autoclave Expansion, %	Maximum	0.80	0.80	0.80	0.10
(ASTM C87) Normal Consistency, %	---	---	---	---	26
(ASTM C1038) Expansion in Water %	Maximum	0.020	0.020	0.020	0.012
(ASTM C109) Compressive Strength, psi (MPa)					
1 Day	---	---	---	---	2150(14.8)
3 Day	Minimum	1740(12.0)	1450(10.0)	1160(8.0)	3890(26.8)
7 Day	---	2760(19.0)	2470(17.0)	2180(15.0)	4730(32.6)
28 Day (strength for Ref. No. 43882)	Minimum	---	---	3050(21.0)	5990(41.3)
<p>** The performance of CEMEX Type II, Type V has proven to be improved with sulfur trioxide levels in excess of the 2.3% limit for Type V. Note D in ASTM C150 allows for additional sulfate, provided expansion as measured by ASTM C1038 does not exceed 0.020%.</p>					
CEMEX hereby certifies that this cement meets or exceeds the chemical and physical Specifications of: ASTM C150-19A Type I, Type II, and Type V Low Alkali portland cements ASTM C1157-17 Type GU Hydraulic Cement AASHTO M 85-19 Type I, Type II, and Type V Low Alkali portland cements CalTrans, Section 90-2.01 T II Modified and Type V (2006) CalTrans, Section 90-1.02B (2) (2010-2018) Arizona DOT Standard Specification 1006-2.01 Hydraulic Cement Nevada DOT Specification 701.03.01 C465 qualification data will be made available upon request					
			By:  Quality Control Manager CEMEX - Victorville Cement Plant 16888 North "E" St., Victorville, CA 92394		

EXHIBIT 8

Detailed Cost Assessment

LABOR COSTS

Total billable Direct Labor (DL) shall be calculated using the Raw Labor Rates (RLR). Labor Hours spent on the project (HRS), and the multipliers for Direct Employee Costs (DEC), Indirect Employee Costs (IEC), and Profit (P).

The formula for Direct Labor (DL) is as follows:

$$DL = [\Sigma(RLR * HRS)] * (DEC + IEC) * (1 + P)$$

Each team shall develop a Table of Billable Direct Labor Rates for the classifications of personnel used in the project.

- **Direct Employee Costs (DEC)** are those costs associated with employee taxes, benefits, insurance, and vacation. A multiplier of 1.50 shall be used to calculate the Direct Employee Costs.
- **Indirect Employee Costs (IEC)** are all project expenses and costs incurred other than direct employee costs such as general administrative costs for office or lab space rent, vehicle use, general liability insurance, advertising to solicit participation, telephone and utilities, testing equipment rental, etc. Normally, the multiplier to determine the IEC is calculated as the sum of the actual general overhead and administrative expenses divided by the total billable direct labor. However, to simplify the calculation for the indirect employee costs, a multiplier of 1.30 shall be used.
- A **Profit Multiplier (P)** of eighteen percent (18%) shall be applied to labor.

EXPENSES

Expenses (E) shall include both materials costs and other project direct expenses not specifically covered. Total expenses shall be calculated using the Materials Costs (MC), Direct Expenses (DE) and Markup (M).

The formula for Expenses (E) is as follows:

$$E = (\Sigma MC + \Sigma DE) * (1 + M)$$

- **Materials Costs (MC)** shall be determined using the materials rates described on the following page.
- **Direct Expenses (DE)** shall include, but are not limited to, costs of outside consultants and other direct expenses related to either the research and development or construction phases of the project. This does not include costs such as transportation of canoe, race equipment, or other costs associated with racing the canoe.
- A **Markup (M)** of ten percent (10%) shall be applied to both material costs and direct expenses.

LABOR AND MATERIAL RATES

Raw Labor Rates (RLR)

Principal Design Engineer	\$50/hour
Design Manager	\$45/hour
Project Construction Manager	\$40/hour
Construction Superintendent	\$40/hour
Project Design Engineer (P.E.)	\$35/hour
Quality Manager	\$35/hour
Graduate Field Engineer (EIT)	\$25/hour
Technician/Drafter	\$20/hour
Laborer/Technician	\$25/hour
Clerk/Office Admin	\$15/hour

In the situation where one person acts to serve in multiple functions, raw labor rates shall be applied according to the task being performed.

Outside Labor Costs

Outside Consultants	\$200/hour
---------------------	------------

An outside consultant shall be defined as anyone contributing to the project that is not a student as previously defined.

Material Costs

The material costs to produce a single canoe - concrete, reinforcement, flotation, and finishing materials – are to be provided. Unit rates for materials shall be based on current market price. Cite the source of the values provided.

EXHIBIT 9

Race Regulations and Safety

GENERAL

In the event that races can be held, ASCE and the C4 suggest that the races consist of five (5) types of races: women's slalom (2 women), men's slalom (2 men), women's sprint (2 women), men's sprint (2 men), and co-ed sprint (2 men and 2 women). For the 2021 competitions, race points will not be awarded and will have no bearing on the outcome of the competition.

RACE RULES

The following general rules apply to the paddlers:

- a. Good faith efforts are made to start and finish all races. Should issues arise that may compromise the structural integrity of the canoe or the safety of the paddlers, teams must exercise good judgment in determining the safest course of action.
- b. Teams shall use the same registered individuals in both the preliminary and final heats of any race.
- c. In the event of an injury that prevents a paddler from further competition after the preliminary race has been completed, the injured person or a substitute shall be in the canoe in subsequent races. The substitute passenger shall be one of the original five (5) of the same gender registered on the team and shall not be allowed to paddle.
- d. If a team cannot field the proper number of paddlers of the required gender, registered substitute passengers of opposite gender shall be used, but substitutes shall not be allowed to paddle.

Teams competing in the slalom races shall compete against the clock in a timed single event. All other races shall include timed preliminaries and finals. The top five canoes advance to the grand final and the next five canoes advance to the petite final based on qualifying times in the preliminaries. Points shall be awarded based on the finish times in the finals. If finals cannot be conducted or the host school determines before the race competition starts that separate finals heats will not be run; the preliminary times shall be used as the final times.

For all sprint races, if a team qualifies for a final event but cannot start the event, that team does not receive points and the team's slot is conceded to the team with the next best preliminary sprint time. For final sprint races, if a team starts a race in a canoe deemed race-worthy by the judges, but is unable to complete the race, they are awarded the points corresponding to completing the race in last place in that final event.

CONFERENCE EVENTS

Depending on the number of entrants at the conference competitions, host schools shall decide on having grand and/or petite finals for the various sprint races. The host school shall inform all teams prior to the competition of the race setup.

Lane Position and Heat Assignments - Lane position and heat assignments shall be randomly selected before the competition begins and shall be provided by on-site registration. The conference and national host schools shall provide a diagram or map to the participants outlining the layout of the course prior to the races. Sprint course turn direction (left/right) shall be determined prior to races.

Interference - In situations where there is lane interference and/or when canoes collide, paddlers must immediately STOP, hold paddles above their heads and discontinue racing. If interference occurs, the team captain shall appeal directly to the head judge. Once presented with the appeal, the judges shall:

- a. Allow any team(s) directly affected by interference the option to rerun the heat in a timed event. Times from the rerunning of the heat shall be used as the official time for the heat. Heats shall be rerun after a minimum of ten (10) minutes to allow paddlers to prepare themselves.
- b. Disqualify a team that has willfully interfered with another team. (If the interference is not deliberate, then the team should not be disqualified).
- c. Disqualify a team that willfully fails to adhere to course boundaries resulting in interference with another canoe. (If the interference is not deliberate, then the team should not be disqualified).

If paddlers fail to immediately stop, raise paddles and continue to race, they cannot claim interference and will not be granted an opportunity to rerun their race.

EQUIPMENT

Paddles - shall be single-bladed and may be straight bladed or bent. Spare paddles are permitted in the canoe during the race demonstration.

Seats and Mats - dimensions of seats and mats are regulated to prevent them from serving as a structural component. Seats cannot exceed a 20" x 20" x 20" maximum. Mats cannot exceed a 20" x 30" x ½" thick maximum. Seats and mats can be used together, at the same time, by one paddler. Alternatively, knee pads are permitted.

Fixed Paddler Restraints - Straps, seatbelts, Velcro®, suction cups or any other item that attaches the paddler to the canoe or that interferes with the paddler safely exiting the canoe in the event of capsizing, are not permitted. The judges and/or CNCCC will prohibit the use of any paddler restraints if safety is deemed an issue.

Slip Resistant Materials - Use of non-skid tape or other slip resistant material is not permitted.

Spray Skirts - Post-construction applied devices that prevent water from entering the canoe, such as spray skirts, are not permitted.

SAFETY

Below are safety protocols which shall be followed for the canoe prototype race demonstration, followed by safety guidelines to consider for both the participants and host schools.

Powered Rescue Boat - At least one and preferably two powered rescue boats shall be on the water during all the races. If a powered rescue boat is not available, the races shall not take place.

If sustained winds at the race site are greater than 25 miles per hour or if wave heights are greater than 1 foot, the races shall not take place.

If the water temperature is less than or equal to 35°F and/or the combined air and water temperatures are less than or equal to 85°F, the races shall not take place. If the combined air and water temperatures are between 85°F and 120°F, the races may take place at the discretion of the safety director. However, there must be a warming area at the race site which holds a constant temperature of greater than 75°F, and two powered rescue boats shall be on the water during all the races.

If lightning is encountered within 15 miles of the race site, the races shall not take place until there is at least 30 minutes of elapsed time since the last recorded strike within the 15-mile distance.

Any entry deemed unsafe or hazardous by the judges shall not be permitted in the water unless corrective measures are taken. If corrective measures are not or cannot be made the entry shall be disqualified from further competition. If repairs must be made to an entry prior to any race, the judges may allow the entry to reschedule for a later heat, but prior to the next event.

Safety Director

A safety director shall be in a strategic position to observe the activities, especially those near the starting and docking area. The safety director is responsible for stopping all activities involving violations of any of the safety rules.

In addition, the safety director is responsible for briefing paddlers on all known hazards prior to any paddling or racing, and as conditions warrant throughout the race competition.

Paddler Safety

All paddlers shall be competent swimmers. All Paddlers shall wear a US Coast Guard-approved inherently buoyant (no inflatables) Type I, II or III Personal Flotation Device (life jacket) always while in a canoe during competition and/or practice. Wet suit buoyancy pads shall not be used as a substitute for the Coast Guard approved Personal Flotation Device.

Safety Guidelines

Participant safety is always the first priority. When scheduling and planning the races, consider all safety hazards, depending on location and circumstances, plan accordingly to mitigate them and decide what conditions would cause races to be cancelled. Each competition host has the authority to require safety equipment or procedures beyond the general requirements established for the National Competition. The recommendations below identify many common hazards, but not all eventualities are covered. It is strongly recommended that each hosting site perform a comprehensive evaluation of specific hazards and develop their own safety plan.

Cold water can cause impaired judgment, loss of coordination and hypothermia within minutes. Paddlers, already excited about the races, may make unreasonably poor decisions when cold and becoming hypothermic. Being immersed in water as warm as 60°F can initiate Cold Water Shock. The American Canoe Association (reference below) recommends wetsuits for water temperatures less than 60°F and/or if the combined air and water temperatures are less than 120°F. Consider requiring wetsuits (full-body, sleeveless, or shortie depending on severity) and more safety boats to get paddlers out of the water quickly.

Wind and waves, currents, obstruction and other rough water can more easily swamp and break canoes. Carefully evaluate the proposed race site during a variety of weather conditions to have a good sense for how the water behaves. Depending on seasonal weather conditions, water may be higher or lower. For the canoes, consider requiring integrated grab handles, provisions for tied-in air bags (common flotation for whitewater canoes), and more stringent flotation requirements. Just like cold water, more safety boats may be required.

Hazardous wildlife in and out of the water can cause anything from skin irritations and allergic reactions to more serious lacerations. Be sure to alert participants and monitor activities carefully.

Lightning and storms are also very dangerous. Monitor the weather and remove everyone from the water when lightning and/or strong storms threaten.

Additional Safety References

Following are a couple references to documents from the American Canoe Association (www.americancanoe.org) for further reading and planning race day safety.

American Canoe Association (2014). Best Practices for Paddlers and Paddlesport Programs [PDF document] URL

http://c.ymcdn.com/sites/www.americancanoe.org/resource/resmgr/sei-educational_resources/brochure_best_practices.pdf.

American Canoe Association (2014). Cold Water Survival [PDF document]

http://c.ymcdn.com/sites/www.americancanoe.org/resource/resmgr/sei-educational_resources/brochure_cold_water_survival.pdf

EXHIBIT 10

Evaluation Forms

GENERAL

The scoresheets will be filled out by the judges individually. The individual judges' scoresheets shall not be requested or given out during the competition. The judges will come to a consensus on the deductions applicable to each team and complete (1) one deduction scoresheet to be given to each team. The Evaluation Forms for the Technical Proposal, Technical Presentation, and Enhanced Focus Area Report are included in this Exhibit. If a determination is made to have an On-Site Competition, the Evaluation Form for that event will be sent as an Addendum to this RFP.

INSTRUCTIONS - DEDUCTION SCORE CARDS

1. The Conference/Society-wide Final Judges shall come to a consensus on the determination of any infractions made by the team regarding the competition event.
2. Judges shall circle the unit value of the deduction in the "Deduction" column. The units of the deductions for the infractions are standardized (i.e., cannot be higher or lower than what is prescribed).
3. The Head Judge shall tally the deductions and initial his/her name next to it. At the Final Competition, a C4 member may tally the deductions in lieu of the Head Judge; however, the judges will make the determination of the infractions.
4. The Head Judge (or C4 member) shall provide all team captains with these forms to inform them of the deductions being assessed against them. Teams with no deductions will also be provided with these forms to assure anonymity.
5. The team captains shall indicate if they agree with the infractions and deductions or if they wish to appeal any of the infractions by signing the form. Teams that wish to appeal the infractions shall be given a reasonable amount of time to review the rules, obtain their supportive documentation, and provide the judges with their response. Teams are cautioned to be able to substantiate their appeals.
6. The Head Judge (or C4 member) shall indicate the day and time (deadline) that the team captains must submit the completed and signed form to the judges or C4 member.
7. Following the receipt of the form, the judges shall re-evaluate any infractions that the teams may appeal given the supportive documentation and render their final decision on the form. The Head Judge shall input the official total deduction, sign off on the form, and inform the team captains of the judges' decision. Once this is done, no further appeals regarding this matter will be entertained.
8. All appeals shall be handled prior to the Awards Ceremony. The final tally shall be inputted on the paper copy of the score sheet and in the electronic score sheet which is then officially ratified by the Head Judge. At the Final Competition, the Head Judge and the C4 will ratify the scores.

Members of the C4 will be on-call and are available to provide guidance, clarification, and interpretation of the rules and regulations for the judges. During the competitions, teams are given the option to request that the judges contact the C4 for rule interpretation (see *Request for Clarifications and Appeals*).

Technical Proposal		35% of Overall Score	
School Name: _____		Possible Points	Score (whole numbers)
Canoe Name: _____			
Cover Letter, Table of Contents, Executive Summary, Intro to Project Team Completeness, Clarity, Quality of Writing, Overall Layout & Format		10	
Technical Approach – Completeness and applicability to the response of the RFP as it related to the requested information for the following areas: Hull Design (10 points) Structural Analysis (15 points) Approach to Research & Testing Concrete Materials and Final Mix Selection, Reinforcement and Final Composite Material Selection (25 points) Construction Process (10 points)		60	
Scope, Schedule, and Fee – Completeness and applicability of the requested information Scope & Project Management (5 points) Schedule (Critical path, milestones, etc.) (5 points) Fee Summary Sheet (Appendix F) (5 points)		15	
Health & Safety – Overall, Material Testing & Construction, COVID-19		10	
Quality Control & Quality Assurance Construction Related (5 points) Non-Construction Related (5 points)		10	
Sustainability – Completeness and applicability to the response of the RFP		5	
Construction Drawings & Specifications (11x17) – Clarity & Ease of Understanding		10	
Project Schedule (11x17) – Completeness & Ease of Understanding		5	
Concrete Mixture Materials and Proportions Compliance of Materials to Proposal Specifications (Appendix C) (5 points) Completeness of Mixture Design Table (5 points) Correct Math (all mixtures) & Thoroughness of Sample Mix Calculation (10 points)		20	
Structural Calculations (Appendix D) Thoroughness & Clarity of Calculation and Correct Math		15	
Hull Thickness/Reinforcement and Percent Open Area (Appendix E) Thoroughness & Clarity of Calculation and Correct Math		5	
Innovation - Incorporation of new, innovative ideas and concepts in the development of the prototype design, material testing, concrete mixture, construction, etc.		15	
Overall Conciseness and Clarity (5 points) Presentation of Information (5 points) Overall Layout and Format (5 points) Quality of Writing (5 points)		20	
Subtotal		200	
Academic Judging – Technical Proposal Total			

Technical Presentation		20% of Overall Score	
School Name: _____ Canoe Name: _____		Possible Points	Score (whole numbers)
Presenters Preparation Level (10 points) Confidence/Voice Projection (6 points) Overall Demeanor (4 points)		20	
Presentation Quality of Audio/Visuals (10 points) Content (20 points) Professionalism (10 points)		40	
Judges' Questions Preparation/Expertise in Answers (20 points) Confidence Level (10 points) Conciseness of Answers (10 points)		40	
Comments:			
Subtotal		100	
Deductions: Sponsorship or commercialism violation: 15 units Less than two (2) speakers: 15 units Failure to adhere to live presentation format: No Presentation Points			
Academic Judging - Technical Presentation Total			

Enhanced Focus Area Report		30% of Overall Score	
School Name: _____		Possible Points	Score (whole numbers)
Canoe Name: _____			
Selection Process for Enhanced Focus Areas Explanation of Selection Method and Process (10 points) Justification of Expected Value Added (10 points)		20	
Summary of Enhanced Focus Areas Evaluation of Technical Results Value Added (10 points) Proposed Product Differentiation (10 points)		20	
Enhanced Focus Area 1 Problem Statement (10 points) Technical Solution / Work Conducted (30 points) Results (10 points) Knowledge Transfer / Team Collaboration (10 points)		60	
Enhanced Focus Area 2 Problem Statement (10 points) Technical Solution / Work Conducted (30 points) Results (10 points) Knowledge Transfer / Team Collaboration (10 points)		60	
Presentation Conciseness and Clarity (10 points) Effective Use of Visual Aids and Graphics (10 points) Overall Layout and Format (10 points) Quality of Writing (10 points)		40	
Subtotal		200	
Academic Judging – Enhanced Focus Area Report Total			

TECHNICAL PROPOSAL DEDUCTION SCORE CARD

School: _____

Infraction

Deduction
(Circle those that apply)

A. Use of plagiarized material		No Technical Proposal Points
B. <i>Technical Proposal</i> over specified number of pages	(____ page(s))	x 10 units/page ____ Units
C. <i>Technical Proposal</i> received after deadline (uploaded to ASCE server)	(____ days)	x 10 units/day ____ Units
D. Failure to submit complete <i>Pre-Qualification Form & Letter of Intent</i> by deadline		10 Units
E. Appendix H – Comment Resolution Document Missing (<i>Society-wide Final Competition Only</i>)		10 Units
Total Deductions (Technical Proposal)		_____ Units

Please provide information on the infraction(s) being applied:

Teams shall have until (day/time) _____ to either agree with the infractions listed above or to appeal the decision and provide supportive documentation.

FOR TEAM CAPTAINS ONLY

- We agree with the infractions and deductions applied to the Technical Proposal
- We wish to appeal the following infractions (*circle those that apply*):

A B C D E

Team Captain

Team Captain

FOR COMPETITION OFFICIAL USE ONLY

Upon review of the Appeal Form (and any supportive documentation) provided by the team captain:

- The deductions originally determined by the judges shall stand.
- The deductions for the following infractions shall be rescinded (*circle those that apply*):

A B C D E

The total deduction for the Technical Proposal is _____ Units.

_____ **Head Judge**

ENHANCED FOCUS AREA DEDUCTION SCORE CARD

School: _____

Infraction

Deduction

(Circle those that apply)

- A. Use of plagiarized material No Technical Proposal Points
 - B. *Enhanced Focus Area Report* over specified number of pages (____ page(s)) x 10 units/page ____ Units
 - C. *Enhanced Focus Area Report* received after deadline (uploaded to ASCE server)
(____ days) x 10 units/day ____ Units
- Total Deductions (Enhanced Focus Area)** _____ Units

Please provide information on the infraction(s) being applied:

Teams shall have until (day/time) _____ to either agree with the infractions listed above or to appeal the decision and provide supportive documentation.

FOR TEAM CAPTAINS ONLY

- We agree with the infractions and deductions applied to the Enhanced Focus Area Report
- We wish to appeal the following infractions *(circle those that apply)*:

A B C

_____ **Team Captain**

_____ **Team Captain**

FOR COMPETITION OFFICIAL USE ONLY

Upon review of the Appeal Form (and any supportive documentation) provided by the team captain:

- The deductions originally determined by the judges shall stand.
- The deductions for the following infractions shall be rescinded *(circle those that apply)*:

A B C

The total deduction for the Enhanced Focus Area Report is _____ Units.

_____ **Head Judge**

REQUEST FOR CLARIFICATIONS AND APPEALS

Instructions: Completed forms must be submitted by a Team Captain to the Head Judge. Requests will not be considered once the competition has concluded. All decisions of the judges are final.

School Name:

Team Captain(s):

Nature of Inquiry:

- () Technical Proposal
- () Enhanced Focus Area Report
- () Technical Presentation
- () On-Site Activity
- () Other: _____

Briefly Describe Nature of Inquiry or Appeal: (Continue on reverse side if more space is needed).

[Conference Only] We formally request that the C4 member on-call be contacted in order to obtain an official interpretation or clarification regarding this matter.

Rules & Regulations Section(s) Referenced:

Team Captain's Signature: _____

Team Captain's Signature: _____

EXHIBIT 11

Peer Reviews & Comment Resolution Form

The purpose of the peer review is to provide useful, constructive comments to allow teams to improve their Proposals for potential submission for the Society-wide Final Competition, continued improvement from year-to-year, and to learn more about what other teams are doing. The feedback provided can be about any topic that the reviewer deems crucial. For example, comments can be about compliance with the RFP, any glaring omissions, helpful suggestions, etc.

Teams can have multiple reviewers providing comments.

Teams do not need to agree with the comments that have been provided but should justify their response to such comments.

Teams may download a Microsoft Word version of this form [here](#).

<i>Comment No.</i>	<i>#</i>	<i>By:</i>	<i>Reviewer's Name</i>	<i>School:</i>	<i>Reviewer's School</i>	<i>Date:</i>	<i>MM/DD/YY</i>
<i>Section:</i>	Indicate the section of the RFP						
<i>Subject:</i>	Indicate the subject matter of the comment						
<i>Comment:</i>	Provide comment in detail						
<i>Response:</i>	The team will provide its response prior to submission of the Technical Proposal for the Finals, otherwise this would be left blank. Teams will check one of the boxes below to indicate if the comment was addressed or if they determined that no action was necessary.						
				<input type="checkbox"/> COMMENT RESOLVED		<input type="checkbox"/> NO ACTION REQUIRED	

Example

<i>Comment No.</i>	<i>#</i>	<i>By:</i>	<i>Reviewer's Name</i>	<i>School:</i>	<i>Reviewer's School</i>	<i>Date:</i>	<i>MM/DD/YY</i>
	1	J. Q. Public		Hard Knocks		3/30/21	
<i>Section:</i>	6.2 – Text, Margins, Page Size and Layouts						
<i>Subject:</i>	Margin Requirements						
<i>Comment:</i>	Per the above referenced section, the margins for the main body of the proposal are to be ½ inch (min.) on all sides. There appears to be less than that on several of the pages. Please ensure that the margins are consistent and meet the minimum requirements.						
<i>Response:</i>	Agreed. Margins will be corrected.						
				<input checked="" type="checkbox"/> COMMENT RESOLVED		<input type="checkbox"/> NO ACTION REQUIRED	

RFP Embedded Document Hyperlinks

The below URLs are the hyperlinks provided in the RFP document sections listed below. This is intended so readers can see the full URL in printed copies of this document.

Rules and Regulations

<https://www.asce.org/concrete-canoe-rules-regulations/>

Conference Folders

[https://upload.asce.org/public/folder/f0jc-j7fi0eL06Z1Wr9YvA/2021 Concrete Canoe Submissions](https://upload.asce.org/public/folder/f0jc-j7fi0eL06Z1Wr9YvA/2021%20Concrete%20Canoe%20Submissions)

2020 Technical Proposals

[https://upload.asce.org/public/folder/jvfT2RdobEy-vdPYMG7_XA/2020 Conference Canoe Submissions](https://upload.asce.org/public/folder/jvfT2RdobEy-vdPYMG7_XA/2020%20Conference%20Canoe%20Submissions)

Kick-Off Webinar

https://zoom.us/webinar/register/WN_NVSgLoarS2Sb_sKHIRiLbg