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Committee Note 10/16/2023

Hi Competition Teams!

We hope your projects are well underway and you're enjoying this competition year.

In the past few weeks, the committee has received many product compliance requests that we recognize are in response to Section 6.5.2: "Questions, clarifications, and equivalent products may be submitted via RFI to the C4 for consideration as an approved equal."

The key verbiage here is "as an approved equal," and we want to clarify the intent of using RFI's for product compliance.

The RFI process is not intended to serve as a means to review and approve your products under consideration. The RFI process for product compliance should only be used when the team has a specific question about a specific product and how it relates to the required ASTM standards.

For example, a team has a product manufactured in a different country and is therefore not bound by the ASTM standards. The team can show that the product meets the native country's standards that appear equal to the ASTM standard. The team wants to know if the committee sees these two standards (not products) as "approved equals" and is, therefore, allowed—this type of RFI we will review and answer.

An RFI that merely provides a product data sheet and requests confirmation of compliance will be sent back to the team with a request for a specific element of the data sheet that requires review as an approved equal.

Remember, this competition is about learning the planning, design, and construction aspects of the profession you are about to enter. One important part of your responsibility as an engineer is verifying that the right tools, materials, and elements are used during construction based on design intent. Therefore, the ability to review a data sheet and determine if it meets an authority's (city's or state's) specifications is required for professional engineers. One purpose of including restrictions and regulations in the RFP is to allow teams to learn this skill.

Be specific with your questions. Show us from where in the rules your question stems. Give us all the information you can about your product and how it will be used. The more information we have, the faster and better we can answer your questions. Help us help you.

We hope this clarifies the intent and use of the RFI process for product compliance, and we will look to clarify this in the rules for future years.

In the meantime, happy compliance reviewing!

C4

RFI No: 01- Flotation Encasement Length

Section: 6.4

Date Issued: 9/29/23

QUESTION: Section 6.4 reads: "Flotation material shall be limited to within 3 feet of the bow and stern sections and encased in concrete." Is the three-foot restriction a combined length for both the bow and the stern? Or does each section have a maximum of 3 feet?

RESPONSE: The bow and the stern have separate 3-foot length restrictions. So, in theory, it would be possible for the bow of the canoe to comply with 3' or less of concrete-encased flotation while the stern of the canoe is out of compliance with greater than 3 feet of concrete-encased flotation.

RFI No: 02- Gunwale Protection

Section: 6.2.1

Date Issued: 9/29/23

QUESTION: The RFP has raised new requirement on the gunwale to prevent injury to paddlers (6.2.1 Gunwale). We are wondering if we can only wrap the gunwale using materials like Foam pipe insulation foam, and still keep the sharp edge of the wrapped concrete inside? And, is the gunwale cap and the gunwale protection the same thing? Following the last question, if we used such wrapping material, can we remove the gunwale protection and cap(if any) during the aesthetics judging?

RESPONSE: There is no new requirement regarding preventing injury to paddlers. This requirement has been in place for sharp gunwales with visible reinforcement, 3D concrete for aesthetics, or any other element that could cause injury. If the gunwale is not a flat, smooth surface with no protruding elements, foam may be used as protection and may be taped, per section 6.2.1. This may be at the determination of the head judge as it can be safety issue. Teams will also add gunwale protection to help prevent damage to their canoe while paddling.

The intent of that protection extends to the racing of the canoe so if the gunwale requires protection, the protection may be removed for aesthetic judging and shall be removed for the flotation/swamp test. The term gunwale cap and gunwale protection in the rules refer to the same removable foam protection, which can be products such as pipe insulation foam or pool noodles.

RFI No: 03- Bondo/Epoxy on Mold

Section: Exhibit 5

Date Issued: 9/29/23

QUESTION: Can Bondo/Epoxy or similar materials be used on the mold surface to create a better surface?

RESPONSE: Bondo/Epoxy or similar materials on the mold is allowed. Bondo/Epoxy used on or in the canoe is prohibited.

RFI No: 04- Post-Symposium Sanding

Section: Exhibit 10 & Repair Procedure

Date Issued: 9/29/23

QUESTION: Can the team sand the canoe between the Regional Symposium and the Society-Wide Finals? This would not be because of cracks needing repair or a concrete patch.

RESPONSE: No. Altering the canoe between the regional symposium and society-wide finals would fall under the Request to Repair as outlined in Exhibit 10, which states: "Refinishing (such as, but not limited to, additional sanding, repairing minor dents and cracks, and the reapplication of sealers) constitutes a repair and is subject to this section."

RFI No: 05- Aggregates- Particle Size

Section: Exhibit 5

Date Issued: 9/29/23

QUESTION: Can the fines of aggregates (particles of size less than the 200 sieve) be considered part of the aggregates, or must those particles be sieved out.

RESPONSE: In past years, particles passing the #200 sieve were considered a "mineral filler" and not considered part of the aggregates. Last year's rules removed this limitation. Particles passing the #200 sieve are considered part of the aggregates and would count towards the total aggregate volume. In addition, per Exhibit 5 under the Aggregates heading, the gradation limits from last year have been removed. However, teams are still required to test and provide a particle size distribution table for each individual aggregate as received and composite aggregate for each mix by following ASTM

RFI No: 06- Activated Charcoal Powder

Section: Exhibit 5

Date Issued: 9/29/23

QUESTION: Would the use of activated charcoal powder, such as the one in the link I listed below, be acceptable to utilize as a cementitious material? I have attached a pdf of the technical data provided, which I obtained from the technical data tab on the product page.

<https://buyactivatedcharcoal.com/.../bitumi.../category/630/>

RESPONSE: Based on the information provided, this product doesn't meet the specifications for supplementary cementitious materials or cements and would not be acceptable for use as a cementitious material.

RFI No: 07- Slag Cement

Section: Exhibit 5

Date Issued: 9/29/23

QUESTION: We intend to apply a new type of cementitious material to the canoe, which has not been evaluated by the provisions of ASTM, so we'd like to ask for your approval before using. The material is a kind of commercial hydraulic slag cement. The specific testing report is attached.

RESPONSE: This product would be acceptable to use as a slag cement.

RFI No: 08- Anti-Foaming Admixture

Section: Exhibit 5

Date Issued: 9/29/23

QUESTION: In terms of admixtures, we intend to use anti-foaming agent which has also not been evaluated by the provisions of ASTM. The testing report of it was made by Shandong Provincial Center for Quality Supervision and Test Of Building Engineering, which will also be at the end of this letter.

RESPONSE: This product would be acceptable to use as a specialty admixture

RFI No: 09- Reusing Hull Design

Section: 6.0 & 5.3

Date Issued: 9/29/23

QUESTION: In the section outlining the hull design requirements, it was specified that there are no dimensional constraints for the canoe. Our team is contemplating reusing last year's designs to submit for this year's competition, as the dimensions of our previous canoe were effective. However, we do intend to modify the mold and construction approach.

We reviewed the plagiarism guidelines, which state that we would have to cite any reused files or images for this year's competition. Still, we seek your confirmation on whether this approach is allowed or if we must start anew with the design and analysis despite retaining the same dimensions.

RESPONSE: Reuse of a previous design, mold, construction approach, and other design-related elements may be reused from year to year.

The plagiarism guidelines restrict teams from using language, images, and other narrative and data-driven elements in their proposal in a way that implies this current year's team performed the work. Any work performed by another year's team or an outside vendor must be cited. If the team wishes to use a previous team's design in either part or whole, any testing, data, and/or design provided by previous teams MUST be cited as such. This year's team cannot, intentionally or not, take credit for design elements they, themselves, did not create, test, design.

RFI No: 10- Mix Design Spreadsheet

Section: Section 5.5

Date Issued: 9/29/23

QUESTION: Regarding the mix design spreadsheet we submit, should we include only the mixes we will use for the competition? Or should we include every trial mix we have made along the way?

RESPONSE: The mix design spreadsheet should only contain mixes used in the submitted prototype. Any mixes the team tests to arrive at a final mix should be discussed in the mix design portion of the proposal.

RFI No: 11- Thickness of Foam Bulkheads

Section: Exhibit 5

Date Issued: 10/10/2023

QUESTION: Would the thickness requirement apply to the bulkhead, even though it is being utilized for floatation, and not for reinforcement?

RESPONSE: A bulkhead is a bulkhead is a bulkhead. The use of the bulkhead does not change what it is or the rules it's governed under.

RFI No: 12- Material Eligibility

Section: Exhibit 5

Date Issued: 10/10/2023

QUESTION: We want to ask about the eligibility of the following materials.

1. Fiber optics as a choice for secondary reinforcement within the concrete matrix
2. Rice husk ash as a cementitious material and if our team can manufacture it or it has to be obtained through a manufacturer
3. Used coffee grounds obtained by our team as an aggregate

RESPONSE: So long as the team can produce appropriate documentation in their proposal that proves each material meets the restrictions in the RFP, they would be allowed.



RFI No: 13- Recycle Unused Theme

Section: Section 5.3

Date Issued: 10/10/23

QUESTION: Can a theme from last year's competition in which the team was unable to compete at a symposium be used again by this year's team.

RESPONSE: So long as no prototype, proposal, or presentation was previously given that applied the theme in question, this would be permissible. Be mindful to adhere to this year's rules, however, and be certain the theme does not infringe on a copyright.

RFI No: 14- Shotcrete

Section: 6.0 Concrete Hull Design Prototype

Date Issued: 10/12/2023

QUESTION: Can shotcrete be considered a casting method in the construction of the canoe?

RESPONSE: Yes, shotcrete is an acceptable casting method assuming all other requirements are met.

RFI No: 15- 50% Hydraulic Cement

Section: Exhibit 5

Date Issued: 10/12/2023

QUESTION: As we were reading this year's concrete canoe competition request for proposals rules, we encountered a section saying that we need to increase the hydraulic cement to 50%. What is the 50% referring to ? such as 50% from what it was last year? or 50% of the canoes total weight or 50% of the canoes total volume?

RESPONSE: The maximum amount of hydraulic cement by mass is 50% of the total cementitious material per this year's RFP and any hydrated lime needs to be included in that 50% calculation. The increase you mention in your question was referenced in the cover letter as a change from last year, but is not the requirement, which is stated above.

RFI No: 16 - Slag Cement

Section: Exhibit 5

Date Issued: 10/12/2023

QUESTION: In the request for proposals, it is stated that total amount of hydraulic cement shall not be greater than fifty percent of the total mass of cementitious materials. Our team would like to know if slag cement is defined as a hydraulic cement by the committee.

RESPONSE: Slag cement that meets ASTM C989 is not defined as hydraulic cement by the RFP.

RFI No: 17- Slag Cement ECC Concrete

Section: Exhibit 5

Date Issued: 10/12/2023

QUESTION: We intend to apply a type of slag cement to the ECC concrete, but this type material has been identified by China's provisions. The standard of it will be equal to a grade of the ASTM C989. We're wondering if we could use it as the only hydraulic material on ECC concrete to meet the request for 50% hydraulic cement.

RESPONSE: The 50% hydraulic cement requirement is a maximum, not minimum. It is acceptable for 0% hydraulic cement to be used in the mixture.

RFI No: 18- Exhibit 6 Calculation Typo

Section: Exhibit 6

Date Issued: 10/12/2023

QUESTION: We noticed potential typos in the Exhibit 6 calculations. Can you confirm if these are typos?

RESPONSE: You are correct. Thank you for catching this and bringing it to our attention. The corrected Exhibit 6 can be found at this link, and the updated values have been highlighted.

RFI No: 19- Compliant Concrete Materials

Section: Exhibit 5 - Technical Specifications for Concrete and Reinforcement

Date Issued: 10/12/2023

QUESTION: Is it okay to use coffee grounds as an aggregate?

RESPONSE: It is the team's responsibility to verify that a material and/or product is compliant. If the team can prove that the material and/or product meets or exceeds the requirements in the RFP regarding supplementary cementitious materials and aggregates, then that material and/or product can be used.

RFI No: 20- Paddler Positioning in Canoe

Section: N/A

Date Issued: 10/12/2023

QUESTION: Are there any restrictions regarding the paddlers' position in the canoe?

RESPONSE: The only restriction on paddler positioning in the canoe is that the paddlers must be positioned in the canoe.

RFI No: 21- Compliant Stains/Sealers

Section: 6.5.3

Date Issued: 10/23/23

QUESTION: Our team has recently researched a product, Lastiseal Concrete Color Stain and Sealer, and would like to ask for an approved equal review on the product as it stains and seals in the same product. Our concern with this product is due to sections 6.5.2 and 6.5.3.

According to section 6.5.2, the product meets the specifications for "The stain(s) must generally be transparent in nature, and the volatile organic content (VOC) of any given stain used shall be less than or equal to 350 g/L".

However, According to section 6.5.3, the product's sealing capabilities falls under a "penetrative sealer with a VOC of less than or equal to 350 g/L" but do not meet the requirement for a "clear non-pigmented concrete sealer" due to this also acting as the team's stain.

Our intended use for this product is to apply two coats on the outside of the canoe to act as a stain to fit our theme, and a sealer for the canoe. The final product is a transparent stain on the surface of the concrete.

Would this product be acceptable as an approved equal for both sealers and stains?

RESPONSE: Thank you for the detailed product compliance question. Unfortunately, we have determined that the product is not compliant as it does not meet the requirements for stains or sealers and aggregating stain/sealer requirements does not make it an approved equal.

RFI No: 21- Compliant Stains/Sealers

Section: 6.5.3

Date Issued: 10/12/2023

QUESTION: Is the stain and sealing product - LastiSeal Brick and Concrete Sealer an acceptable product to use?

RESPONSE: It is the team's responsibility to verify that a material and/or product is compliant. If the team can prove that the material and/or product meets or exceeds the requirements in the RFP regarding sealers, then that material and/or product can be used.

RFI No: 22- Using Stock Images in Design/Image Licensing  
Section: Section 5.2 and Exhibit 3 - Ethics and the Competition

Date Issued: 10/12/2023

QUESTION: Can our team use vector images that are not copyrighted to create a 3D printed design mold for inlays? The images do require a license to use. Would the use of these vector images break any rules of the competition?

RESPONSE: While the use of stock images is typically fair game for many applications, it is dependent upon the license that governs the image. Consult the license holder and license agreement for the repository that you are using to ensure it is an acceptable use case. The use of stock images would not break any rules of the competition, provided you have confirmed that your intended use case is actually an acceptable use case, per the license holder/agreement.

RFI No: 23- Compliant Fiber Reinforcing  
Section: Exhibit 5 - Technical Specifications for Concrete and Reinforcement

Date Issued: 10/12/2023

QUESTION: Are chopped basalt fibers permitted to be used for the competition?

RESPONSE: It is the team's responsibility to verify that a material and/or product is compliant. If the team can prove that the material and/or product meets or exceeds the requirements in the RFP regarding fiber reinforcing/secondary reinforcing, then that material and/or product can be used.

RFI No: 24- What to include in the Manufacturing Cost Estimate  
Section: 1.1, 5.4.4.4, 5.4.4.5

Date Issued: 10/12/2023

QUESTION: In Section 5.4.4.4, it is required for us to discuss the cost of making 100 concrete canoes. Do we need to include the aesthetic costs such as the fabrication of the display in the manufacturing cost?

RESPONSE: Yes. Aesthetic costs need to be considered and accounted for in the manufacturing cost estimate as there is labor and materials associated with incorporating aesthetics. Section 1.1 states that the C4 is asking for teams to construct a concrete canoe prototype and a product display. These are two distinct deliverables. Section 5.4.4.4 asks for a Manufacturing Cost Estimate to be included in your Production Proposal that discusses the cost of mass-producing 100 canoes. Section 5.4.4.5 asks for a fee schedule that breaks down the costs of labor, mixture materials, and all construction materials associated with the fabrication of each canoe as well as the costs of mold fabrication and re-use. The C4 is not asking for costs related to mass-producing your product display.

RFI No: 25- Seats/Mats

Section: Exhibit 9

Date Issued: 10/16/2023

QUESTION: Are there any restrictions regarding saddles fixation on the canoe, except they must not avoid paddlers to freely get out of the canoe?

RESPONSE: Paddlers are allowed the use of items as described under the "Equipment" heading in Exhibit 9. A typical canoe saddle would fall under the Seats and Mats portion and would be subject to the dimensional requirements listed. Seats and mats cannot be attached to the canoe itself.

RFI No: 26- CSA Cement

Section: Exhibit 5

Date Issued: 10/16/2023

QUESTION: Is CSA Cement conforming to ASTM C1600 permitted for use in this year's competition? If so, does it count towards the 50% of total cementitious materials content?

RESPONSE: Yes, CSA cement is permitted to be used. Even though CSA is not a Portland clinker-based cement, but based on sulfolaurinate clinker with small percentage of belite, it is still a hydraulic cement (c) and would count towards the 50% maximum amount of hydraulic cement (c) as outlined in Exhibit 5.

RFI No: 27- Standard Hull Design

Section: N/A

Date Issued: 10/23/23

QUESTION: In previous years a standard hull design for a canoe was posted for teams to use. Could the committee consider posting this hull shape again to help with teams designing their canoe this year?

RESPONSE: The standard hull design from a previous year's competition is located in the following folder. Please note that it may be utilized and/or modified, but is in now way required to be used.

RFI No: 28- Slag Cement Grade

Section: Exhibit 5

Date Issued: 10/23/23

QUESTION: Per exhibit 5 of the 2024 Request for Proposals, it states that slag cement must meet the requirements of ASTM C989 and shall be "Grade 80 minimum." In reviewing ASTM C989/C989M-22, it appears that the lowest grade available under this standard is Grade 80. Given this, is it adequate for material data sheets to state that the material conforms to ASTM C989, or must the grade be stated as well?

RESPONSE: Thank you for the detailed compliance question! Your point is valid, if a material data sheet states that it conforms to ASTM C989 it is compliant. The committee would recommend knowing what grade the material is, however, as certain committee members may have been asked about what grade 80/120 slag cement means during previous canoe competitions...and not known at the time.

RFI No: 29 - Pigments and the Maximum Number of Concrete Mixtures

Section: Exhibit 5 and Section 6.5.2

Date Issued: 10/27/2023

QUESTION: The rules state that a mix can be produced in a multitude of colors. If nothing in the mix design changes except the inclusion of pigments in varying concentrations, does that still count as one mix?

RESPONSE: Yes, any given concrete mix design produced in a multitude of colors (by varying pigment concentration) counts as one mix design (Exhibit 5).

RFI No: 30- Use of pigments as well as stains

Section: Exhibit 5 and Section 6.5.2

Date Issued: 10/27/2023

QUESTION: Is the use of pigmented concrete and stain allowed, provided we follow the rules for both as outlined in Section 6.5.2?

RESPONSE: Yes. Teams may integrate pigments/coloring agents directly into their mix and apply stain to the surface of the concrete. Teams should keep in mind that though color may be applied using both pigment/coloring agents and also concrete stain, each application of color must adhere to the restrictions and test standards for the material(s) as listed in Exhibit 5 and Section 6.5.2.

RFI No: 31- Mix Design Changes after Deadline

Section: Exhibit 1

Date Issued: 10/27/2023

QUESTION: Can we alter any aspect of our mix designs after the November 3rd Submission Date, and, if we do, will there be any deduction for doing so?

RESPONSE: Yes the mix can be altered after the November 3rd deadline with no deduction. Please review Section 4.0 of the RFP, Exhibit 1, and Exhibit 4 in their entirety for submission requirements and deadlines. For the Student Symposia Competitions, digital versions of a team's Mix Design Sheets are to be uploaded to the team's respective folder no later than 5:00PM EST (Eastern) Friday February 17, 2024 (Section 4.2.3, Exhibit 1, and Exhibit 4). November 3, 2023 is the deadline for submitting a team's Letter of Intent, Pre-Qualification Form, and Preliminary Project Delivery Schedule (Section 4.2.1 and Section 4.2.2).

RFI No: 32- Pitching Bulkheads to Deter Water

Section: Exhibit 5

Date Issued: 10/31/2023

QUESTION: Can we pitch the bulkheads of the bow and stern in an attempt to alleviate water coming into the canoe?

RESPONSE: Yes. Bulkheads are permitted to be pitched provided the requirements noted in Exhibit 5 are satisfied.

RFI No: 33- Use of Perlite as an Aggregate

Section: Exhibit 5

Date Issued: 10/31/2023

QUESTION: Is the aggregate Perlite from Perlite Canada permitted if we manage to determine it's gradation? Is Perlite from Perlite Canada natural, manufactured, or recycled?

RESPONSE: Any natural, manufactured, or recycled aggregate is permitted to be used provided it meets the requirements for aggregates laid out in Exhibit 5. Teams should be reminded that they can and should consult the manufacturer to assess a specific product's use and make-up (in this case, whether the product is a natural, manufactured, or recycled material).

RFI No: 34- Sponsor Names/Logos on Canoe

Section: 7.2

Date Issued: 10/31/2023

QUESTION: Can sponsor names or logos be painted on the side of the canoe

RESPONSE: Firstly, paint is prohibited, per section 6.5.2. So, don't paint anything on your canoe. Secondly, no sponsor logos or names can be on any part of the display, which includes the canoe, per Section 7.2.d.

RFI No: 35- Stamps/impressions

Section: 6.5.1

Date Issued: 11/3/2023

QUESTION: Can stamps/impressions display the school and canoe name?

RESPONSE: The restrictions surrounding the school and the canoe name on the canoe itself are outlined in Section 6.5.1.

So long as the criteria are met, the committee considers the application or construction of the canoe/school name "means and methods" and does not offer approval or denial of means to attach letters or methods to construct them other than those outlined in Section 6.5.1.

RFI No: 36- Reinforcement Layers

Section: 6.3 and Exhibit 5

Date Issued: 11/3/2023

QUESTION: Can the primary reinforcement be folded to create more structural stability without being considered as another layer of reinforcement?

RESPONSE: Any alteration of the "as-delivered" product (in this case, folding it to form two layers) must adhere to the reinforcement post-manufacturer criteria outlined in Exhibit 5. In addition, all reinforcement layers shall also meet the POA and thickness requirements at all times.

So, reinforcement can be folded, but it will be considered two layers, and teams should be cautioned to consider delamination in such cases.

That all being said, no rule limits the number of layers a team can use so long as it meets the other requirements.

RFI No: 37- Reinforcement Layers

Section: 6.3 and Exhibit 5

Date Issued: 11/3/2023

QUESTION: Can the primary reinforcement of a thwart be tied in with the canoe's primary reinforcement within and be considered as one layer of primary reinforcement?

RESPONSE: This type of connection would be considered two layers. However, no rule limits the number of layers a team can use so long as it meets the reinforcement post-manufacturer criteria, and the POA and thickness requirements at all times, as outlined in Exhibit 5.

RFI No: 38- Schedule Page Orientation

Section: 5.4.3.1.VII

Date Issued: 11/3/2023

QUESTION: Can the project schedule within the RFP be submitted in portrait orientation?

RESPONSE: Generally, schedules are presented in landscape format; however, there is no restriction to submitting in portrait orientation so long as all other criteria are met.

RFI No: 39- Additional Appendices

Section: 5.4.5

Date Issued: 11/3/2023

QUESTION: Can we include additional appendices containing any supporting documentation not required or listed in article 5.4.5

RESPONSE: No.



RFI No: 40- RHA as SCM

Section: Exhibit 5

Date Issued: 11/3/2023

QUESTION: Is it okay to use RHA as a SCM?

RESPONSE: The team may use it so long as they can prove it meets ASTM C618 Class N

RFI No: 41- Reused Theme

Section: 5.3

Date Issued: 11/7/2023

QUESTION: A few years ago, we had a Peach-themed canoe that was created and presented in a competition. This year, we would like to do a Peach & Magnolia theme. Is this theme different enough for it to be used this year?

RESPONSE: The team can use the theme. However, previously built, constructed, drawn, painted, or otherwise created product display elements must be noted clearly, in the manner of the team's choosing, that this team did not create them. If the previous elements were refurbished or upcycled, the team can also note that.

The canoe, obviously, would need to be a brand-new canoe.

RFI No: 42- Eligible undergraduates

Section: Exhibit 3

Date Issued: 11/7/2023

QUESTION: Regarding the rules on registered participants, would an undergraduate architecture student meet the requirement of studying a major "related to engineering"?

RESPONSE: Yes.

RFI No: 43- Pigment Color and Amount Differing in Mixes

Section: Exhibit 5

Date Issued: 11/7/2023

QUESTION: As stated in the RFP, "Mixtures that differ in only color shall be considered as one mixture." If several mixes differ in either pigment color or amount of pigment used, or a combination of both, are these mixes considered one mix?

RESPONSE: Yes. Mixes that differ only in pigment or amount of pigment are considered one mix.

RFI No: 44- Welded Metal Mesh

Section: 6.3 and Exhibit 5

Date Issued: 11/7/2023

QUESTION: Is welded wire mesh allowed

RESPONSE: Metal mesh (welded or otherwise) is acceptable if it is used the way it comes from a commercially available and not as a custom order product. Teams are not allowed to take a metal mesh and weld it together themselves.

RFI No: 45- Sponsor Logos on Infographic

Section: 5.4.3.1, 7.2.d

Date Issued: 11/15/2023

QUESTION: Are sponsor logos allowed on the Organizational Chart and Infographic?

RESPONSE: Sponsor Logos are not allowed on or in any project deliverables.

RFI No: 46- Captain Eligibility

Section: Exhibit 3

Date Issued: 11/16/23

QUESTION: Is there a rule right now that makes only civil engineering students captains? Can a business major be a captain?

RESPONSE: Any student, regardless of major, who adheres to the eligibility requirements in Exhibit 3 is eligible to be a team captain. Therefore, a business student may be a team captain if they adhere to the eligibility requirements outlined in Exhibit 3.

RFI No: 48- Opaque Stain or Paint

Section: 6.5.2, 6.5.3

Date Issued: 11/27/2023

QUESTION: What the limitations on paints or stains were for the canoe design. I saw in the rules that transparent stains were allowed, but I saw no mention of opaque paints or stains. We were planning on using a pigment to dye the canoe a base color and add details in paint/stains on top. Would this be possible?

RESPONSE: Opaque stains and paints are not allowed. The concrete may have an integral dye, and stains can be used on one side (inside or outside) even if an integral color is used, but must be generally transparent in nature and not form a membrane or film. Other requirements are found in section 6.5.2 for stains and for sealers 6.5.3.

RFI No: 47- Outside Consultant Contribution

Section: Exhibit 8

Date Issued: 11/16/23

QUESTION: How much can an Outside Consultant contribute to the project? In accordance with the Concrete Canoe (CC) Rules, an outside consultant is defined as anyone contributing to the project who is not a student. Could you please provide more information on the specific roles and contributions that an Outside Consultant can make within the framework of the CC Rules?

RESPONSE: We are assuming this question comes from the language found in Exhibit 8, Fee Schedule. In that section is a subsection titled "Outside Labor Costs."

You are correct that this section is meant to encapsulate any individual who is not a student team member, no matter how they are utilized.

The intent of adding this to the fee estimate is to demonstrate the team's understanding that there is no free labor. All work and hours must be accounted for. For the purposes of this project, these hours are typically donated, but in the workforce, each phone call, every material provided, and every hour spent costs money. The committee encourages teams to utilize outside consultants, professionals, faculty advisors, material donors, etc. We merely want you to account for how much they helped you by "paying them" in your reports.

RFI No: 49- Guar Gum

Section: Exhibit 5

Date Issued: 11/27/2023

QUESTION: May Guar Gum be used as a rheology modifier? Although it is widely used in concrete designs, it is not ASTM C494 Type S certified. We have attached the ASTM C494 Standard. The requirements are in Table 1: Physical Requirements. We have conducted research that confirms that guar gum meets the physical requirements. Due to its wide industry use and the research that aligns with the motivation of ASTM C494, we would like to use guar gum as an environmentally-friendly alternative viscosity-modifying admixture.

RESPONSE: You would need to test, or have the material tested, to show that the particular material or guar gum you wish to use meets the ASTM C494 Type S requirements. This would include, among other things, measuring the change in set time provided by the additive. While papers may show that, in general, a guar gum may meet some of the requirements, you have to show that your particular material from the source you get it from will meet the requirements. If you can do this and provide proof, you may use it.

RFI No: 50- Plant-Based Material Approval

Section: Exhibit 5

Date Issued: 11/27/2023

QUESTION: We are considering testing plant-based materials (rice husk ash, sugar ash, etc.) with the concrete mix. Our team selected plant-based materials that do not meet ASTM standards because they are in the research phase. Some plant-based materials are not commercially available in the ash form. How should we get approval on using a plant-based material that does not meet ASTM Standards and is a non-commercially available product? Is there a specific form to fill out?

RESPONSE: If the material is meant to be used as a supplementary cementitious material, it could meet ASTM C618 Class N (for example, rice husk ash or sugar bagasse ash would normally fall under Class N) and be used or could be used if it meets ASTM C1709 requirements. These ashes would need to be tested by either the team or an outside company to show compliance with either of these ASTMs, and if they meet either, they could be used. The team would need to show documentation of the compliance - i.e. certificate of compliance with the ASTM or test results for ALL of the ASTM requirements for that class of material.

RFI No: 51- Dilatation of Stains

Section: 6.5.2

Date Issued: 11/27/2023

QUESTION: Can a liquid stain be diluted with water if the manufacturer's directions for use say that is best? Our team would dilute the stain in order to reach the desired color, according to the directions on the product. Section 6.5.2 in the Request for Proposals explains that stain cannot be diluted with any liquid, such as water.

RESPONSE: Stains that come in powdered dyes to be reconstituted with water or other liquid mediums are permitted, and teams must follow the manufacturer's directions for their proportioning and mixing. Liquid stains may not be diluted.

RFI No: 52- Mix Design Equation

Section: 5.5

Date Issued: 11/27/2023

QUESTION: Using the provided mix design worksheet it states "Enter SGOD and AmountOD, The values of SGSSD, AmountSSD and Volume will be automatically computed" however there is not a preset equation in the excel for these values. Can you please provide a formula or update the excel?

RESPONSE: No. The students must review the provided examples in the RFP, consult professors, textbooks, and other online resources, and/or do their own research to determine these equations. Once the team inputs an equation, the value will be automatically calculated. The committee asked for equations to be used by the students in the Excel spreadsheet for the reasons stated in the conceptual comment provided in the rules that this also provided below. Additionally, a mix design webinar was provided earlier this fall, and the recording is provided on the competition website.

Contextual Comment: Using Excel (and other Microsoft products) to create, revise, fill out, and update forms and tables is vital for the engineering industry. City, county, state, and federal governments, as well as developers, all have their own versions of various Excel-created data inputs (cost estimates, schedules, memoranda, meeting notes etc) that civil engineers must use expertly every day.

To incorporate this vital skill, streamline the judging process, and reduce minor errors resulting in appeals, the committee provides an Excel file void of any calculated equations. Teams are responsible for educating themselves on Excel equations and cell formatting for their given mix needs and providing correct equations, calculations, and formatting in the submitted Excel file, which will simulate the real-world experience of submitting project calculations. - Section 5.5 of the 2024 Request for Proposals.

RFI No: 53- Use of Foreign Language

Section: N/A

Date Issued: 11/27/2023

QUESTION: Can the name of the canoe be written in a language other than English? For example, French.

RESPONSE: There are no restrictions on the name of a team's canoe being in a language other than English.

RFI No: 54- Knee Pads and Knee Savers

Section: Exhibit 9

Date Issued: 12/4/2023

QUESTION: In Exhibit 9, under the equipment section, it states that knee pads may be used. two questions related to this. First, may knee pads be used in combination with seats/mats? And second, the team is contemplating using "knee savers," padding attached to the calves, as used by catchers in baseball. Would this be allowed?

RESPONSE: Knee pads may be used in combination with seats and mats. Knee savers are acceptable for use as well with seats and mats

RFI No: 55- Clarification of c/cm ratio

Section: Exhibit 5

Date Issued: 12/4/2023

QUESTION: In the materials section of Exhibit 5, specifically in the Cementitious Materials section, it states, "The maximum amount of hydraulic cement (c) is 50% (by mass) of the total cementitious materials (cm) content in any given concrete mixture (e.g., c/cm ratios shall be less than 0.50 for any given concrete mixture)." Was it intended to mean that the ratio could be less than or equal to 0.50 or that it needed to be less than 0.50?

RESPONSE: C/CM ratios less than or equal to 0.50 are acceptable.

RFI No: 56- Compliant Fiber Reinforcing

Section: Exhibit 5 - Technical Specifications for Concrete and Reinforcement

Date Issued: 12/5/2023

QUESTION: Are chopped basalt fibers with the attached MTDS permitted for the competition? We have contacted the manufacturer for compliance twice through their website, but they have not responded yet. I have attached an image of the correspondence form I filled out and submitted to the website. Additionally, I called their customer support, but they informed me that they could not provide compliance.

RESPONSE: In typical engineering contractor/owner discourse, it is incumbent upon the engineering contractor (in this case, the ASCE Student Teams) to show the owner (in this case, C4 and the Judges) that the materials utilized meet the specifications required.

When there is uncertainty in the material's compliance, a great first approach is reaching out to the material manufacturer to discuss. However, as you have encountered, not all manufacturers are responsive or have the answer you seek.

At this point, an engineer must weigh the pros and cons of doing the additional analysis to verify compliance or switch to a different material provider.

Of particular note; you stated above that the manufacturer could not provide compliance. In industry, this type of statement would more than likely call for another material that can prove compliance. Generally, if the manufacturer can't prove compliance, it's very difficult for others to – after all they know their product best.

In this case, there are many examples of basalt fibers that are very similar products that have MTDS sheets that state ASTM C1116 compliance, which is the governing specification, that you could switch to or perform the additional analysis.

Below, the committee has used your particular example to show what we expect teams to step through to determine compliance of material. Additionally, providing an analysis to an owner and asking for concurrence is reasonable and acceptable.

ASTM C1116 Statement:

"Contains synthetic fibers for which documentary evidence can be produced confirming their resistance to deterioration when in contact with the moisture and alkalis present in cement paste and the substances present in admixtures throughout the anticipated useful life of the structure (see Note 2 and 4.2)."

4.2 states: "The manufacturer or supplier shall show evidence satisfactory to the purchaser that the type of fiber proposed for use shows resistance to deterioration when in contact with the moisture and alkalis present in cement paste and the substances present in admixtures throughout the anticipated useful life of the structure."

The two pieces used for analysis here are:

1. Resistance to deterioration when in contact with the moisture and alkalis present in cement paste.
2. Anticipated useful life of the structure.

Analysis

Point 1: The data sheet shows the mass loss after boiling in acid, base, or water. As the ASTM doesn't have limits or specify a test method, one could argue that the manufacturer showed evidence of resistance to moisture and alkalis.

Point 2: Because the service life is rather short, it is not a stretch to state that this is sufficient for the canoe service life. Basalt fibers are commonly used in concrete, so this is also not a stretch.

The committee (in this case, the "owner") has done the above analysis of the MTDS provided for ASTM C1116 compliance. Typically this would be done by the engineering contractor (in this case, the ASCE Student Teams). These two points of analysis would typically favor approving the material.

The short answer is the material is acceptable for use.

RFI No: 58- Failure Envelope Analysis Critical Stress Circle

Section: 5.4.3.2.II

Date Issued: 12/18/2023

QUESTION: During the Failure Envelope Analysis section of the Structural Analysis Webinar, teams were directed to draw a single Mohr's circle using stress values taken from two distinct points on the canoe (the keel amidships and the gunwale amidships); however a Mohr's circle can only be drawn with the stress values for a single point, so we would appreciate clarification regarding what teams are expected to plot on their Failure Envelope Analysis figures.

RESPONSE: Mohr's Circle is used to illustrate a "state of stress" at a single point, as you noted in your question.

You're thinking of the single point in question as being a specific location within the critical cross-section of the canoe, but you need to try to think about it on a more global scale.

In this example, the single point you want to determine the stress state for is along the longitudinal length of the canoe beam at the location of your critical cross-section (in the webinar, this was at midspan), not within the critical cross-section itself.

Now at that point along the length of the canoe, we have our critical section properties which define what our maximum compressive and tensile stresses will be (your stress state at the critical section). Use those maximum stresses to plot your Critical Section Stress Circle as shown in the Failure Envelope Analysis section of the webinar.

RFI No: 57- Punching Shear Stress

Section: 5.4.3.2.II

Date Issued: 12/18/2023

QUESTION: During the Punching Shear Analysis section of the Structural Analysis Webinar, teams were directed to use the shear force developed due to global bending as the load in their punching shear analysis. Our interpretation of ACI 318 is that the load used should be the point load causing the local punching shear stress within the material which in this case should be the weight of a single paddler. We would appreciate clarification regarding whether teams are expected to use the shear force developed due to global bending or the concentrated weight of a single paddler as the load in their punching shear analysis.

RESPONSE: ACI 318 is not being used to calculate punching shear stress and the shear force used in the webinar is not due to global bending. The shear force used in the webinar is a direct load effect that accounts for the loading conditions being analyzed (weight of two paddlers, buoyancy, and self-weight). Teams should consider the real-life situation where punching shear may come into play which would be when the canoe is being paddled in the water. It may be helpful for teams to draw out free-body diagrams to better understand the interaction between the forces/reaction in this area. With this train of thought, using the full concentrated weight of a single paddler in lieu of the maximum expected shear force could be used, but would likely be overly conservative.

RFI No: 59- Punching Shear Analysis

Section: 5.4.3.2.II

Date Issued: 12/18/2023

QUESTION: During the Punching Shear Analysis section of the Structural Analysis Webinar, teams were directed to use equations from Chapter 19 of ACI 318 to calculate the two-way shear strength of our concrete as part of our punching shear analysis; however, our concrete does not meet the following requirement from section 19.2.1.1:  $f'_c \geq 2500$  psi. We would appreciate clarification regarding whether it would be appropriate for our team to use equations from Chapter 19 of ACI 318 involving  $f'_c$  despite the fact that we do not meet the minimum requirement for that variable.

RESPONSE: The punching shear analysis section of the webinar focused on equations to calculate two-way shear (punching shear) strength using ACI 318, Chapter 22.6.5. One component of the equations used to calculate punching shear strength is compressive strength,  $f'_c$ . You are correct that ACI 318, Chapter 19, Table 19.2.1.1 states a minimum  $f'_c$  value of 2,500 psi. However, the limits of Table 19.2.1.1 are intended to be applied when specifying concrete strength parameters in construction documents



(plans and specifications) for structural concrete used in the design of building structures and other appurtenances, not for lightweight concrete canoes.

Please note that the example used in the webinar also used a compressive strength less than this prescribed minimum. The methodology behind the two-way shear calculation used in ACI 318 is still a sound, rational process.

All that to say, in this instance, the C4 views it as acceptable to use ACI 318 Chapter 22.6.5 to calculate the two-way shear strength of lightweight concrete for a concrete canoe with a compressive strength,  $f_c'$  less than the prescribed minimum compressive strength for the design of structural concrete for building structures and other appurtenances.

RFI No: 60- Bulkheads Inside or Outside Face of Canoe?

Section: 6.5.2

Date Issued: 12/18/2023

QUESTION: Section 6.5.2 states "Concrete stains can be used on the canoe's inside or outside faces, but not on both." If a team were to stain the top of the bulkheads, the concrete concealing the flotation within 3 ft of the bow or stern of the canoe, would this count as the outside or inside face of the canoe?

RESPONSE: For the tops of bulkheads and rails, teams are allowed to define these surfaces as either the inside or outside of the canoe for staining purposes. However, the definition must be consistent. Either the top of the rails and the top of both the bow and stern bulkhead are defined as the inside face of the canoe or the top of the rails and the top of both the bow and stern bulkhead are defined as the outside face of the canoe.

RFI No: 61- Water Reducing Admixture

Section: Exhibit 5 - Technical Specifications for Concrete and Reinforcement

Date Issued: 12/18/2023

QUESTION: Based on the TDS for a compliant water-reducer, the recommended dosage is 3-6 fl oz/cwt with a 25-30% reduction in batch water. However, the deliverable mix design spreadsheet requests the amount of water that the admixture contains, indicating that it affects the w/cm ratio. We interpret this as an indication that the admixture is a 1:1 replacement for water, which seems to contradict the dosage recommendations from the manufacturer. Please clarify what is intended by this metric on the deliverable spreadsheet.

RESPONSE: Chemical admixtures do not contain 100% active ingredients - water is often added to these products to help with dispersion, dosing, etc.. This is similar to household chemicals you might buy such as liquid laundry soap - water is one of the ingredients in many of these products. The water in the admixture can react with the cement just like water you add from the hose and needs to be taken into account in the calculations. For example, if the admixture that you use is 50% solids, 50% water, and you use 2 oz/cwt of the admixture, then  $2 * 0.5 = 1$  oz/cwt is water. If you had 600 lb cement/ yd<sup>3</sup> of concrete, you would have  $1 \text{ oz/cwt} * (600 \text{ lb cement/ yd}^3) / 100 \text{ lb} = 6 \text{ oz/ yd}^3$  of water that is coming from the admixture. You would subtract that 6 oz of water (0.375 lb water) from the amount of water added from the tap, otherwise that 0.375 lb of water would increase the concrete w/cm. The concrete doesn't care

where the water came from - whether added as part of the admixture, added as ice, added from the tap, added as free water on the surface of the aggregates above what is needed to fill all of the aggregate pores with water - it just sees it as water in the mix available to react with the cement.

RFI No: 62- Percentage of Solids in Admixture

Section: Exhibit 5 - Technical Specifications for Concrete and Reinforcement

Date Issued: 12/18/2023

QUESTION: We have selected an admixture that complies with ASTM C494 and thus is also compliant with the regulations stated in the RFP. However, the requested mix deliverable spreadsheet indicates listing the % Solids of the admixture – an item not included in the manufacturer TDS and also unavailable from the manufacturer. How should we address the requirements of the deliverable without this information being available to us? Additionally, shall the weight of % Solids from the liquid admixtures be included in the total weight of solid admixtures (Cell J51) on the deliverable spreadsheet?

RESPONSE: Like many chemicals sold, admixtures contain active ingredients and also typically some water. For example, if an admixture was 50% active ingredients and 50% water, and you added 2 oz/cwt of the admixture, you would put in the spreadsheet 2 oz/cwt used, with 50% solids (the active non-water ingredients). There are many sources of water that affect the w/cm and can react with the cement. These include water you add from the tap, water on the surface of the aggregate that is above what is required to fill the aggregate pores, water in any ice added, or water in the chemical admixtures. All of those sources of water are included in the calculation of the water-cementitious material ratio. The % solids is used to calculate how much of the admixture is water and included in those calculations.

We are surprised that the admixture manufacturer wouldn't have this information and recommend reaching out to a sales representative who should be able to tell you how much of the admixture should be considered as water when calculating the w/cm.

Date Issued: 1/3/24

QUESTION: Can a graduate student be a concrete canoe captain? Can a graduate student paddle in the race competition? Per Exhibit 3, it says: " Students that graduate during the academic year and have begun graduate studies during the same academic year are eligible to compete."

What if the student chapters want to have graduate students on the team who are already in the second year or higher of the academic year? Since it's a student competition, why can't we have all levels of students?

RESPONSE: Nowhere in the rules does it state that graduate students cannot help with the concrete canoe competition, be a part of the broader team atmosphere, or engage in many of the benefits this competition offers, regardless of registration status. Any resource the students can use, be it their faculty advisor, industry contacts, or, in your case, a resident graduate student, is permitted and encouraged.

However, graduate students who do not qualify for the Exhibit 3 variance, which states, "Students that graduate during the academic year and have begun graduate studies during the same academic year are eligible to compete," cannot be part of the registered members who register, serve as captains, paddle, or present.

We understand that this is not the answer you were hoping to receive, and we hope you can see this situation from our perspective. Fairness is the underlying, and hopefully inherently understood, basis of this competition. The committee believes that those undergraduate programs fortunate enough to have graduate programs can and should include graduate students as a bridge between undergraduates, faculty, and industry. However, the only way to ensure fairness among our competitors is to allow for the least common denominator that each university and college has – undergraduates. Consider the unfair advantage of colleges and universities with graduate students presenting and writing papers against those that don't have those same programs.

For context, there are several colleges and universities that consistently have over 40 undergraduate students on their canoe teams. Does that somehow mean that the 30 members of those teams are less important or less "on the team" than a team of just 10 members simply because they cannot captain, register, race, and present? The committee has not seen evidence of this. In our view, registration as a member does not define a student's status, validity, or inclusion within the team structure, thereby defining the student aspect of these student competitions. Being around these competitions in any capacity, gaining valuable experience through learning the research, development, design, construction, and documentation process can, and often is, achieved by far more than the ten registered members.

With all rules and interpretations, the committee aims to create a fair environment for all 216 schools that vary widely in size, history of participation, and available support. As such, there is no intent to allow graduate students to be part of the 10-member registered team.

Date Issued: 1/3/24

QUESTION: Section 5.3 of the RFP indicates that use of AI must be cited. We interpret this as unedited text generated by AI will be cited in text with an author-date format e.g. (OpenAI 2023). We intend to use AI to edit our text, after which we will review and/or edit the document, but we will not use AI to write it for us. In this case, how should we approach citing AI's input?

RESPONSE: Teams should cite ALL usage of AI tools (whether it is to create, draft, edit, generate, etc) within the report.

Teams should include space in their bibliography for AI usage, though no specific format is required. Teams should name the AI tool used, the approximate date (or range of dates) the product was used, and what the tool was used for. Teams should include enough detail in their purpose that it's clear what work the AI program did and what work the team did.

If AI tools are utilized to support writing or editing entire sections of the proposal, we recommend citing at the section-by-section level. If they are used to create, draft, or generate specific sentences or paragraphs, they must be cited at that level. See the examples below with the understanding that these are merely examples and do not cover all instances that may occur. Remember that teams may use any citation standard so long as it is clear which bibliography citation belongs with each applicable portion of the report.

1. Example 1: If AI programs were used to provide calculation steps, verbiage, etc, it would look something like this...

Report Text: The stresses in the canoe were calculated using... [19]

Bibliography: [19] "How to calculate stresses in a concrete canoe" prompt. ChatGPT, 23 Mar. version, OpenAI, 4 Mar. 2023, [chat.openai.com/chat](https://chat.openai.com/chat).

2. Example 2: General editing of an entire section would look something like this...

Report Section Header: Structural Calculations [20] [Team-generated and/or AI-generated text regarding the calculations that AI then edited]

Bibliography: [20] Editing of team and ChatGPT-generated text. Grammarly, 23 Month. version, Grammarly Day Month 2023, website.

RFI No: 65- Team Eligibility and Gender

Section: 3

Date Issued: 1/3/24

QUESTION: The rules state that teams should strive for gender diversity and have a maximum of five men and five women on our team. Our team has a disproportionate amount of men and women working on the project. Many of the women working on the project's technical aspects deserve to participate in the presentation but do not have time to practice paddling. Ideally, we would like to register six women and four men. Is this team structure possible?

RESPONSE: No more than 5 participants may identify with the pronouns she/her/hers. So six registered participants that identify with those pronouns would not be allowed. Neither would the opposite of six participants who identify as he/him/his and four participants as she/her/hers be allowed.

There are many reasons for this 5 participant maximum and it remains a topic of continued discussion within the committee. However, as with all the rules the committee sets forth, this rule strives to create an equitable and fair environment. In particular, this 5 participant cap is in effect not to disadvantage smaller schools that may not have large student bodies able to have dedicated paddlers/allow ringers to come in and only paddle but not participate in technical aspects of the competition. While, we understand that that is not the case for this RFI and that there is a sincere desire to allow the technical aspect to be delivered by those the team believes are best acquainted with the material, it does not change the broader intent of the rules and their application.

For context, this happens in our industry all the time in Statement of Qualification (SOQ) interviews -- there are sometimes upwards of 15 people who worked on these pursuits, but the interviews are capped at five people, sometimes only three. Project teams must determine which of these deserving 15 professionals who've dedicated time have the opportunity to present the overall team's findings. It's a delicate and, sometimes, calculated determination.

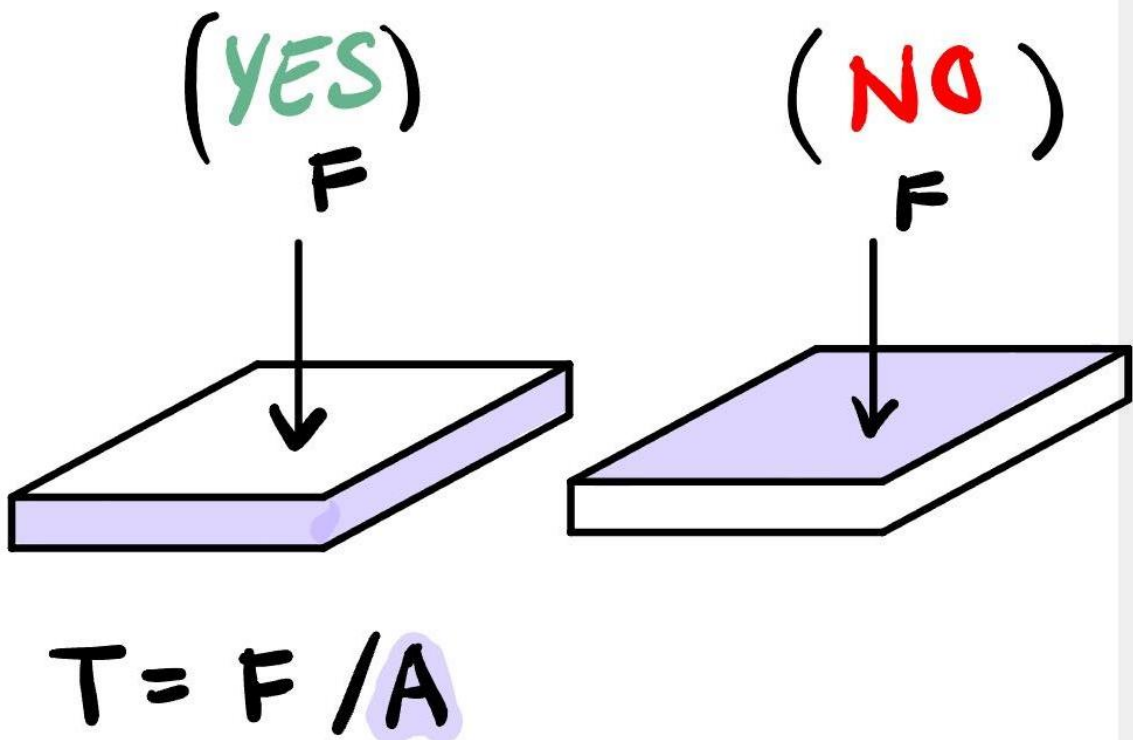
The committee would like to reiterate that this rule does not stop anyone from participating in the competition; the only thing a non-registered participant cannot do is be in the presentation or paddle.

Date Issued: 1/3/24

QUESTION: During the Structural Calculations Webinar, it was discussed that the area used to calculate the punching stress was a surface perpendicular to the direction of the shear force (a 3 in by 3 in square was considered). However, from our understanding, the area should be parallel to the force, therefore it would instead be calculated by multiplying the perimeter of said square by the thickness of the canoe. Can you confirm that the area considered for calculating the punching shear is parallel to the applied force as shown in the attached figure.

RESPONSE: The area that should be used to calculate punching shear stress is the loaded area (as shown in the webinar), not the perimeter. The example illustration submitted alongside this RFI suggests that the only effect a point load has on a given area is around its perimeter, which is not the case.

The perimeter of the loaded area and thickness of the material under load do not factor into determining your stress. They do, however, come into play when determining your cone of failure as part of the punching shear strength calculation (as shown in the webinar).



RFI No: 67- Theoretical Density

Section: 3

Date Issued: 1/3/24

QUESTION: In the Mix Design Excel Sheet, the theoretical density is identified as  $D=M/27$  instead of  $T=M/V$ . Can you confirm that for theoretical density (pcf), it should be written  $T=M/V$  instead of  $D=M/27$ ?

RESPONSE: It should be called estimated density and not theoretical density. The estimated density is what we want for this to compare to the measured density. The formula is correct as shown ( $D=M/27$ ) and the word theoretical needs to be swapped for estimated.

RFI No: 68- Outside Labor

Section: 5.4.3.1 and Exhibit 8

Date Issued: 1/9/24

QUESTION: The rules state that outside labor must be tracked. We would like to know to what extent outside labor (not a student) can contribute to the completion of the project. For example, can we use non-students/outside labor for graphics within our proposal?

RESPONSE: At the heart of this competition is students' growth, advancement, and education. This competition is for students. As such, the intent of the judged products is that students conceptualize, research, test, design, produce, and present each element. The committee is aware that safety and/or logistical elements such as CNC routing molds have long been considered an acceptable outsourced element since most schools do not have a CNC router on site, and a professional must operate most CNC routers. Items like this would be tracked under Outside Labor and considered within the realm of fairness and not impede the student's growth, advancement, and education.

However, presenting the technical findings and thematic elements (which in this RFI's case includes graphics) is considered part of the student's growth, advancement, and education. Many programs (which can and should all be cited) are available to allow students to create, generate, and edit graphics without outsourcing the conceptualization, research, design, and production needed for the proposal, presentation, and display.

The slides provided as part of the Infographic Webinar include a few of the dozens of free-to-use programs that can aid teams in any graphics they may need.

RFI No: 69- Use of Epoxy in Reinforcement

Section: Exhibit 5

Date Issued: 1/13/24

QUESTION: We are planning on fabricating our own carbon fiber rebar. Are we allowed to use epoxy to create our rebar? In no way will the epoxy be used to bond the concrete together. It will only be used to fabricate the rebar. Is this allowed per the requirements outlined in Exhibit 5?

RESPONSE: No, this is not allowed. Per Exhibit 5: "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)."

RFI No: 70- Project Proposal- Project Management Section Page Count

Section: 5.4

Date Issued: 1/13/24

QUESTION: We have a question about the page count permitted for the project management section of the proposal. The way we have interpreted the page count is that there is a 5 page maximum for the entire section. This would mean 3 pages are dedicated for Key Team Roles & Org Chart, Fee Schedule, and project schedule (one page each). Meaning we are required to discuss Project Scope, Health and Safety, PMP, QAQC, and Research and Development costs in only 2 pages. This seems like a lot to discuss in only two pages but I am assuming that is part of the challenge for this year's competition.

Please clarify as to what the concrete canoe committee is expecting.

RESPONSE: You have interpreted the rules correctly. The project management section is restricted to 5 total pages, which must contain all of the bullet point subsections listed.

You are also correct that it is one of the challenges for this year's competition. Recall from the introduction paragraph of the proposal section that the ever-growing challenge of professional engineering is the art of explaining complex ideas simply and in-depth thoughts quickly. It will be important to distill all of the information you have to the information the client wants and needs to make a decision. (Hint: this is where talking to folks not on your project team may really help priorities).

RFI No: 71- Use of Epoxy on Mold

Section: Exhibit 5

Date Issued: 1/23/24

QUESTION: Our team wants to use epoxy as a mold sealant in order to reuse the mold, aid demolding, and provide a solid surface to place concrete. In no way will the epoxy aid the concrete curing process or contribute to its strength and durability. Will this be compliant per the statements in Exhibit 5?

RESPONSE: See RFI #3



RFI No: 72- Provisional Data in Proposal

Section: Section 5.3

Date Issued: 1/23/24

QUESTION: With the proposal submittal date being over six weeks from the date of our symposium, our team plans to cast the canoe after the proposal is submitted. In this scenario, some information would be provisional or impossible to include, such as the concrete strength or pictures of casting and curing. How would the committee prefer such information to be included or referenced in the proposal?

RESPONSE: In our industry, the question above is considered means and methods -- a phrase that refers to the techniques or tactics used to complete either a construction project, RFQ, Preliminary Design Report, or any number of project tasks. In the world of civil construction, it's not incumbent upon the owner to tell the contractor the means and methods. As such, the Committee's task is to outline what the need is, what elements should be provided or tasks achieved to prove compliance, and a deadline for each. The Committee does not prefer any way for any team to achieve these tasks as long as the rules of the competition are met.

The task in front of each team is to use the data available and determine the best way to present information, whether designed, tested, or assumed. It is common in industry for proposals to have "proposed/assumed" information, given that many of the engineering work could be done after a proposal has been submitted. However, it does need to be clear to any reader the fidelity of the information represented, it is not acceptable to mislead or obfuscate the veracity of the data provided.

RFI No: 73- Powdered Pigment

Section: 6.5.2

Date Issued: 1/23/24

QUESTION: Are we allowed to use powdered pigment (which we generally use to color our concrete while mixing) mixed with water to act as a concrete stain which would be applied on top of cured concrete?

If so, will that be considered as a new concrete mix (max 3 concrete mix allowed per 2024 RFP regulations) or will that be considered as a concrete stain?

RESPONSE: Mixing powdered pigments intended for integrally colored concrete with water is not allowed to be considered as a stain. To be considered as a stain, "The stain(s) must generally be transparent in nature, and the volatile organic content (VOC) of any given stain used shall be less than or equal to 350 g/L (as shown on the material data sheet(s) provided in the Materials Notebook)."

Application of colored powdered pigment as part of a concrete mixture on top of already cured concrete is acceptable but must be compliant with the concrete mix specifications in the RFP and would count towards the maximum of 3 mixtures.

RFI No: 74- Styrofoam Beads

Section: Exhibit 5

Date Issued: 1/29/24

QUESTION: Would styrofoam beads be considered flotation or an aggregate? Would the team be penalized under the 30% aggregate rule if the styrofoam was seen as flotation?

RESPONSE: Styrofoam beads may be used as an aggregate and would not be considered flotation so long as they are integrally mixed into the concrete as any other aggregate would be and the use of them follows all of the rules of a concrete mixture.

RFI No: 75- Mix Design Spreadsheet Format

Section: 5.4.3.2.III

Date Issued: 1/29/24

QUESTION: We have a question regarding the mix table formatting as it is described in the RFP. The document states "No rows, columns, or text in cells with no background color shall be deleted or altered from this provided format" (p.19).

Does this mean that we cannot remove any extra cells from the table if our mix design does not occupy all provided rows? Or can we delete the extra rows provided that all orange calculation cells remain the same? This would create a cleaner and more legible mix design table. I have included screenshots of a portion of the table in both formats for clarification.

RESPONSE: Do not modify the layout, number of rows, number of columns, or any other part of the layout of the mixed design spreadsheet in any way. Teams are asked simply to input the required data and equations. Failure to adhere to the format provided may result in a mix not being able to be verified and any resulting deductions or penalties..

RFI No: 76- Captain Quantity

Section: 3.1

Date Issued: 1/29/24

QUESTION: In the guidelines, it states "Each team shall designate two (2) registered participants as team captains". Does that mean up to 2 captains or exactly 2 captains? If so does the gender rule apply to them as well?

RESPONSE: Each team shall designate two (2) captains. This means exactly two (2) captains per team. There are no gender requirements for the two (2) captains.

RFI No: 77- Live Animals in Display

Section: All

Date Issued: 1/30/24

QUESTION: Our team plans to bring a horse for our theme and have it there for petting and display behind the table. This is not specified to be against the rules in 7.2 of the rules or any other section of the rules. Since it falls within the 4x8x7 space, and any movement is restricted to the boundary, is this allowed? Or will we have to bring smaller animals like a goat, or even smaller like a hamster?

RESPONSE: The short answer to this question is no. Your team may not have a live animal as part of your display.

The longer answer to this question is multi-faceted, but this response will focus on the two most significant contributing factors. The 4'x8'x7' space indicated in the rules is designated clearly for showcasing the materials, process, and design iterations that led to the canoe prototype. It is meant to be an educational and informative area for judges, spectators, and fellow contestants to see the engineering work and thought processes that went into the design and construction of the canoe. It is not meant to be a petting zoo. Safety and hygiene concerns with a horse or any live animal are not considered here. What happens if the horse is spooked and runs into either your canoe or another team's? Imagine if you were the other team whose year-long project was ruined by a rouge horse? What happens if the horse needs to relieve itself? What happens if the event suddenly needs to be relocated inside, where horses are typically not allowed? You must consider others and respect their 4'x8'x7' spaces as equally as you consider yours.

While the exclusion of live animals is not clearly stated in 7.2, the display components are clearly outlined in 7.3, and the intention of the display space provided is clear. As such, we encourage each team competing this year to focus on making the best canoe you can make and presenting the process behind that canoe so that the judges can see the hard work put into the already formidable challenge of designing, constructing, and ultimately racing a concrete canoe.

RFI No: 78- QA/QC Definition

Section: 5.4.3.1

Date Issued: 1/30/24

QUESTION: As stated in the RFP in section 5.4.3.1 (V), the preliminary design report requires teams to "define quality assurance and quality control." Does this mean define QA and QC per Merriam-Webster, or write our team's definition of those terms?

RESPONSE: Use your best engineering judgment.

RFI No: 79- Adhesive to Attach Lettering

Section: 6.5.1

Date Issued: 1/30/24

QUESTION: Is it acceptable to use SikaBond Construction Adhesive Heavy Duty Multipurpose Elastic Polyurethane (or equivalent) to attach precast concrete lettering to the Canoe?

As outlined in the rule section '6.5.1 Canoe & School Name' the rules clearly permit adhesive lettering. However, 'Exhibit 5 Technical Specifications for Concrete and Reinforcement states: "Bondo<sup>®</sup>, 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)." This phrasing creates a conflict in judgment for our team. Please provide clarification of intent and recommendations for proceeding.

RESPONSE: Adhesive Lettering, both in the terms of this RFP and in general terms of everyday language, refers to letters in paper, vinyl, or other sticker-type material that are manufactured with adhesive material on the back for attachment to a surface. A quick proof of this can be achieved by a simple internet search of the term "Adhesive Lettering." What populates the search response are stickers of varying materials. This is what the rules refer to, and the wording surrounding adhesive lettering is intended to allow teams to use any sticker type they can find. This language is not for using any available adhesive to bond, epoxy, or use similar materials, such as construction adhesive or polyurethane to attach anything, including letters for canoe and school name to the canoe.

In short, the team may not use SikaBond Construction Adhesive Heavy Duty Multipurpose Elastic Polyurethane or any other bondo, epoxy, or similar materials to adhere letters.

RFI No: 80- Recently Graduated Captain

Section: Exhibit 3

Date Issued: 1/30/24

QUESTION: Can a captain be a student that already graduated? They graduated during the academic school year.

RESPONSE: This question is answered clearly in Exhibit 3. Please reread the section about registered participants and review the previous RFI's pertaining to eligibility.

RFI No: 81- Outrigger Canoe

Section: 6.1.1 and Exhibit 5

Date Issued: 1/30/24

QUESTION: With significantly eased hull geometry requirements (6.1.1), our team has conceptualized an outrigger canoe which will pass the floatation test (6.4.1) and be ready for all five races. The boom would be completely encased in structural concrete and would comply with Exhibit 5 (Strands, Tendons, and Bars on page 46). Are we allowed to proceed with fabrication?

RESPONSE: An outrigger canoe is acceptable, if it meets the requirements of the RFP.

RFI No: 82- Stain Limits

Section: 6.5.2

Date Issued: 1/30/24

QUESTION: There is no specification on how many stains can be used. Is there a limit?

RESPONSE: Section 6.5.2 states "the application of any given stain to any portion of the canoe shall be limited to a maximum of two (2) coats". Whether those two coats of stain come from one or two different stains is up to the team, so long as the stain adheres to the rest of the rules governing stains.

RFI No: 83- Bulkhead Location

Section: 6.5.2

Date Issued: 1/30/24

QUESTION: Are the bulkheads considered the outside or inside of the canoe? Per the guidelines in section 6.5.2 " Concrete stains can be used on the canoe's inside or outside faces, but not on both". We would like to know what the bulkheads are considered, inside or outside?

RESPONSE: Where the team chooses to place bulkheads and if they are used at all is entirely up to the team. Where the team places those bulkheads will determine the inside or outside designation. The rules do not mandate the use of or location of bulkheads.

RFI No: 84- Seat Dimensions

Section: Exhibit 9

Date Issued: 1/30/24

QUESTION: Are the maximums given intended to be the max in each dimension? Or are they intended to be the maximum volume of the seat?

RESPONSE: The measurements are given in the standard dimension format of L x W x H. The volume of the seat is in no way discussed, described, or calculated in the rules.

RFI No: 85- Seats and Mats Used Concurrently

Section: Exhibit 9

Date Issued: 1/30/24

QUESTION: When the RFP says "Seats and mats can be used together, at the same time, by one paddler," does this mean that a combination of both seats and mats can be used by each paddler?

RESPONSE: "Seats and mats can be used together, at the same time, by one paddler" means that one paddler may use both a seat and mat simultaneously.

RFI No: 86- Display Stands

Section: 7.3.3

Date Issued: 2/5/24

QUESTION: As stated in the RFP, "the underside of the displayed canoe shall be available and visible for judging and inspection". The team aims to construct multiple canoe stands, specifically two stands to support the canoe, two "mock" stands, and a stand-alone feature for aesthetic purposes. The "mock" stands and stand-alone feature will not support any of the canoe's weight and will serve only as an aesthetic feature. If necessary, the three add-ons can be easily removed for inspection. Is this permitted?

RESPONSE: Use your best engineering judgment and the following snippet from section 7.3.3: "Contextual Comment: The height requirement intends to allow judging to occur from a generally upright standing position. The judges shouldn't be required to climb a step stool or kneel to get a full view of the entire canoe. The 4' list height is an approximate value to aid the students in planning their display to accomplish this intent. It will be up to the judges if this intent is achieved."

RFI No: 87- Gypsum

Section: Exhibit 5

Date Issued: 2/5/24

QUESTION: Our team has been using gypsum as an important ingredient in our ultra-low-carbon concrete mix to enhance the performance of concrete by providing an additional source of sulfate. Use of gypsum was approved by the Concrete Canoe Competition Committee (C4) before. Please see attached RFI No. 45 approved by C4 on 1/26/2022 for reference.

RESPONSE: Since no question was asked as part of this RFI, the committee will say that teams should not cross-reference the previous year's rules, RFIs, or decisions when attempting to prove compliance with the current year's rules. A previous decision, RFI response, or rule does not in any way prove compliance with this year's competition. Teams are responsible for proving to the judges that the material they use complies with the 2024 Request for Proposals.

RFI No: 88- Mixing Stains

Section: 6.5.2

Date Issued: 2/5/24

QUESTION: In order to create a color needed, the team aims to mix together stains like how an artist would mix together red and blue paint to create purple. Is this permitted?

RESPONSE: To use a mix of stains, the team would need to prove that the composite stain meets the requirements of the RFP to the satisfaction of the judges.

RFI No: 89- Mixes Differing Only in Pigment

Section: 5.5

Date Issued: 2/5/24

QUESTION: We intend to use different amounts of powdered pigment in our concrete mix which will be used for different areas of our canoe. One part of the mix will have pigment and the other part will have none. According to section 5.5, we should record these as a single mix on the Excel sheets. However, due to the high specific gravity of the pigment, there will be a difference in density between them both. Which of the two densities should be reported on the mix design sheets?

RESPONSE: The team should submit this as one mix. The team can choose which density they supply that best represents their canoe.

RFI No: 90- Mesh Reinforcement Requirement

Section: Exhibit 5

Date Issued: 2/8/24

QUESTION: Our team has tested an advanced concrete mix that uses fibers as reinforcement to achieve a tension hardening behavior so that it fails in a ductile mode. Our preliminary tests and analysis demonstrated that using this tension-hardening concrete without mesh reinforcement to fabricate a concrete canoe is structurally adequate and safe, thereby greatly simplifying the construction process and saving time and labor. We would like to know if constructing a concrete canoe without using mesh reinforcement is permitted.

RESPONSE: This is permitted. The team should consider the effect this has on the POA calculation required in the RFP.3

FI No: 91 Stain Product Verification

Section: Exhibit 5

Date Issued: 02/19/2024

QUESTION: In preparing our Proposal and canoe design idea for the competition, we would like to request verification if the below concrete stain is approved for use in our design (the attached link includes manufacturer information if so desired):

- Tentative Colors: Granite Green, Cedar Blush
- VOC Level: 95 g/l
- Base Material: Latex
- Transparency: Semi-transparent
- Stain and Sealer in One: No
- Paint/Stain Features: Chemical resistant, durable, UV/fade resistant
- Product description: "Weather resistant finish"

Based on the "2024 ASCE Concrete Canoe Competition Request for Proposals - Rules (PDF)", "any commercially available stain(s) specifically formulated for concrete may be applied to the canoe."

While the stain is available at Home Depot, our main concerns are the base material being latex and that the product description including a comment about it having a "weather resistant finish".

We appreciate your help in verifying if this stain is compliant with the given requirements.

RESPONSE: This material is acceptable for use.

RFI No: 92- Clarifications on RFIs #57, 58, and 66 related to structural analysis

Section: 5.4.3.2.II

Date Issued: 2/20/24

QUESTION: Can the Committee please clarify the response to RFI #57? RFI #57 was submitted by our team to request clarification regarding what force should be used in the punching shear stress calculation, as the structural calculations webinar used the maximum shear force obtained from the longitudinal analysis. It is our understanding that the shear force calculated in the longitudinal analysis section of the webinar generates shear stresses which vary throughout the cross section, reaching a maximum at the neutral axis and decreasing to zero at the gunwale and keel; therefore the maximum magnitude of the shear force from the longitudinal analysis cannot be used to calculate the punching shear stress around a paddler's knee in the bottom of the canoe near the keel. We originally asked if we should use the total paddler load as the force to calculate punching shear demand.

Can the Committee revisit the response to RFI #66? Per ACI 318 Chapter 22.6.1.4, two-way shear shall be resisted by a section with a depth  $d$  and an assumed critical perimeter  $b(0)$  as defined in 22.6.4. It is our understanding that the area used for punching shear stress calculations should be the product of the perimeter and depth referred to in ACI 318.

Can the Committee revisit the response to RFI #58? This RFI was submitted by our team to confirm that teams are expected to draw a single Mohr's Circle for the critical section stress circle using a tensile



stress taken from the gunwale and a compressive stress taken from the keel. It is our understanding that Mohr's Circle can only be drawn to represent the stresses at a single point within a solid body and not from two distinct and distant points within the canoe's cross section.

RESPONSE: Regarding RFI #57, the structural calculations webinar used the maximum shear force determined from the longitudinal analysis in the calculation for punching shear stress as you noted above. Using the maximum shear force from the longitudinal analysis was done as a "quick and dirty" simplification to account for the effects of buoyancy on the total paddler load but this was not clearly communicated during the webinar. Our apologies for that!

Please note that the solution presented in the webinar is not as conservative as using the total paddler load minus the effects of buoyancy under just the critical perimeter.

Per the response to your original question in RFI #57, using the total paddler load would still be an acceptable, albeit overly conservative solution.

Please note that the structural calculations webinar was a condensed-for-time example and there is no requirement that teams follow the procedures in that webinar exactly. With that being said, the Committee appreciates you asking this again. Peer review is a good thing! We'll amend our response to RFI #57 to direct teams to also read the response to this RFI and we will revise our webinar to clarify this topic for next year.

Regarding RFI #66, you are correct. This was an oversight (we're human too - see above regarding peer review). The response to RFI #66 will be amended to state the following: The area that should be used to calculate punching shear demand is the section thickness ( $d$ ) multiplied by the critical perimeter,  $b(0)$ .

Regarding RFI #58, the original response to this RFI still applies. The critical section stress circle should be drawn using the principal stresses associated with your critical section. Other solutions could be to plot separate Mohr's circles for each of your principal stresses, although the resulting stress envelope would not be as conservative as drawing a singular circle for both.

RFI No: 93- Special Admixture Approval

Section: Exhibit 5

Date Issued: 2/20/24

QUESTION: We were wondering if we could gain approval to involve Xypex as a part of our mix design within the specialty admixtures category. It does fall within C494 Type S; it also does not include any prohibited items or standards. It is made for use within concrete. The data sheet is attached.

RESPONSE: From the information provided in the RFI above and the provided data sheet, the team has apparently already done the work required to prove compliance via the statement, "It does fall within C494 Type S." Upon review, the committee agrees that the team's engineering judgment was correct and the material can be used as a specialty admixture.

However, since the material data sheet does not explicitly state C494 Type S, it is in the team's best interest to be prepared to show how compliance is met either at the competition or in the appropriate section/appendix of the proposal and not rely on this RFI's approval as proof of compliance.