



Frequently Asked Questions March 2008

General

- A. The 2008 Rules and Regulations allow for a higher degree of flexibility in design, material, and reinforcement choices.

If you are unsure whether something is permissible, assume that it is permissible ONLY if:

1. it does not compromise safety
2. the rules and regulations do not specifically state that what you would like to do is not allowed

- B. A question to the CNCCC will not receive a response if the rules and regulations related to the question are specific in what is required and obvious in what is not said.

The following are examples:

"The rules don't mention a thing about Displays. Are there displays this year?"

"I can't find anything restricting the use of end-caps. Are end-caps allowed?"

Apply the general guideline (1 and 2 above) and you will have the answers to these questions and others like them.

Section 1. General Rules and Eligibility Requirements

Section 1.2 - Registered Participants

1.2.1 Eligibility Requirements

QUESTION 1: Section 1.2.1.a states that registered participants "Be an undergraduate student majoring in engineering..." Section 1.2.2 states that "...All students, both undergraduate and graduate, are strongly encouraged to actively participate..." Since graduate students are encouraged to participate, are they eligible to paddle in competition?

RESPONSE 1: The rules and regulations are very clear on this matter and have been enforced for quite some time now. Section 1.2.1, "Eligibility Requirements," state that the registered participants must be undergraduate students majoring in engineering (along with some other requirements) and Section 1.2, "Registered Participants" define these persons as the only ones eligible to present at the oral presentation and/or compete in the races.

Section 1.2.2, "Term Limits," encourages all students, both undergraduate and graduate, to actively participate in the project. Graduate students can be vital team members in the concrete canoe project - writing the paper, working on mix designs and constructing the canoe, help in preparing the oral presentation, etc. However, the rules limit their participation in actually giving the presentation and paddling in the races.

QUESTION 2: One of the co-chairs of our concrete canoe competition has recently decided to switch majors from civil engineering to industrial engineering. We were planning on having her be a registered participant. Is it still possible to have her be a registered participant?

RESPONSE 2: The rules and regulations are very clear on this matter. Section 1.2.1, "Eligibility Requirements," state that the registered participants must be undergraduate students majoring in **engineering** (along with some other requirements). Although it is primarily a civil engineering competition, students in other engineering disciplines may compete as a registered participant as long as they meet all of the other eligibility requirements.

QUESTION 3: Do you have to be a civil major to be a national member of ASCE?

RESPONSE 3: No.

Section 1.4 - Technical Assistance

QUESTION 1: We are currently looking for some help in finding some construction and engineering companies that have been known to donate admixtures and ready mix for concrete canoe participants. I tried to find maybe a list of sponsors on the concretecanoe.org website and failed. Therefore, we were hoping that you may have a list of some suppliers of the past that would like to donate to participants. Any help or suggestions would be greatly appreciated!

RESPONSE 1: As always, the founding sponsor of the competition (BASF Construction Chemicals, LLC) is committed to supporting the teams with technical advice and products such as admixtures. Please refer to the rules and regulations for contact information. Other national sponsors pledge their support for the national competition by providing products as well (some are in the concrete/aggregate industry; while others are engineering firms and consultants that probably do not have products). There are also many companies and firms that sponsor individual teams through their efforts, however, there is no guarantee that teams get support year in and year out.

In order to be fair to all competitors as well as potential team sponsors in the concrete industry, the CNCCC does not make recommendations on which companies and products a team can/should use, outside of referring to national competition sponsors.

Section 2. Canoe

Section 2.6 - Seats and Mats

QUESTION 1: We are designing the seats/ mats for the canoe. We would like to inquire about the usage of knee pads, and catcher wedges in regards to their concurrent use with seats and mats. If we design a seat to support our knees must it also support our rear end? Can you please clarify the definition of a seat and a mat? Can we design a mat for each leg or should they be an attached unit?

RESPONSE 1: For all intents and purposes, seats and mats are defined by their size for the competition. Technically, you can kneel, sit or stand on a mat, and while seats are primarily for sitting, one can kneel or stand on one as well.

Please refer to Section 2.6, "Seats and Mats," which state that seats can not exceed a 20" x 20" x 20" maximum and mats can not exceed a 20" x 30" x ½" thick maximum. These dimensional constraints have been put in place in order to nullify or limit any structural enhancement that seats and mats could give to a canoe, assuming that they are removable objects from the canoe. The overall unit must fit within these dimensional parameters.

Paddlers may wear knee pads, regardless of whether or not they are using a seat or mat.

Section 2.10 - Flotation

2.10.3 Additional Flotation

QUESTION 1: "All reinforcement shall be covered in concrete. All material not part of a concrete mixture shall be classified as reinforcing material and shall comply with all of the specifications outlined below. This does not apply to materials that are used for flotation purposes."

Since this year the flotation must be encased with concrete, we would like to spread the flotation throughout the canoe in the form of a styrofoam core (versus just having styrofoam in the tips). This will provide some element of structural stability. If we do this, is the styrofoam exempt from the reinforcement rules because it is being used as flotation?

RESPONSE 1: The primary purpose of the foam is to serve as flotation material and it is understood that its encasement would provide some form of structural stability. All flotation material allowed in the competition (foam, wood, etc.) will have some amount of structural capacity; the question is whether or not it is 1 psi or 1000 psi. There are no rules restricting the amount or placement of flotation material within the canoe, outside of the requirement that it be encased. The foam is flotation and, therefore, not considered reinforcement.

Section 3. Concrete

Section 3.2 - Materials

3.2.1 Cementitious Materials

QUESTION 1: The team has been trying to come up with a mix design that fits the rules given for the competition and has received advice from a professor to use lime in our mix in order to gain workability. Lime is the only name I know of for the product, and is the printed name on the package. I have not been able to find anything specifically addressing this material in the rules. The professor says it is used in masonry to cause the mortar to be much easier to spread. This is a desirable property when making a thin wall as in the canoe. What can you tell me about it?

RESPONSE 1: How the lime is classified depends on its form.... If it's hydraulic lime then it will react upon contact with water and as such has to be considered a part of the cementitious materials system. If it's hydrated lime, then it would generally be considered a powdered admixture used for the purposes of improving plasticity, workability, water retention, etc. Note that hydrated lime can also be used in concrete to improve pumpability. According to Section 3.3 of ACI 524R - Guide to Portland Cement-Based Plaster - "the lime used in a portland-cement based plaster mixture should be a hydrated lime conforming to ASTM C 206 or ASTM C 207, Type S, or Type S with air entrainment. Hydrated lime promotes plasticity, water retention, and workability, and aids in controlling shrinkage cracking. Air-entrained lime should not be used in conjunction with air-entrained cement."

The rules and regulations require that MTDS be provided for the materials that you are using in your canoe, and the MTDS should tell you what type of lime you have.

QUESTION 2: Section 3.2.1 requires that cement must meet ASTM C 150. This would preclude the use of ASTM C 595 and C 1157 cements that are often more environmentally conscious with less CO₂ emissions. Is this correct?

RESPONSE 2: ASTM C 595 and C 1157 cements do not meet the requirements of C 150.

QUESTION 3: Is an ASTM C 595 Type IS(20) cement allowed? Section 3.2.1.1 (Hydraulic Cement) of the Rules and Regulations lists only ASTM C 150 portland cement. However, Section 3.2.1.4 (Slag Cement) allows ASTM C 989 slag cement (Grade 100 or higher); and, Section 3.3.1 (Mass of Cementitious Materials) requires that at least 60% of the mass of cementitious materials be portland cement. This ASTM C 595 Type IS(20) cement has 20% slag, well under that required by the rules.

RESPONSE 2: ASTM C 595 covers blended cements - portland cement with various percentage of slag or other pozzolans. However, the rules do not allow you to use a C 595 cement (we will note that this was allowed last year, but not this year). You may take separate components, say 80% portland cement that meets C 150 and 20% slag that meets C 989, and blend them together.

3.2.2.1 Hydraulic Cement

QUESTION 1: Under the requirements of Section 3.2.1.1, the rules state that the cement must meet the requirements of ASTM C150. Our cement meets this requirement (it states the specification clearly on the bag), but it does not specifically state the ASTM requirement on the MTDS sheet. Will this be acceptable in the Engineer's Notebook?

RESPONSE 1: The manufacturer should be able to provide you with a mill report which will state which ASTM standard their cement meets.

3.2.2 Aggregates

QUESTION 1: According to Section 3.2.2, 'Aggregate': "The aggregate(s) selected shall constitute a minimum of 15% of the total weight of any concrete mixture. This weight percentage shall be based on a comparison of the total weight of all aggregates in the oven-dry condition, to the total weight of the concrete (using yielded proportions). The composite gradation of the aggregates selected shall have no more than 5% (by weight) passing the No. 100 sieve (0.15 mm)." Is the 5% by weight passing the No. 100 sieve 5% of the total mix weight or 5% of the aggregate weight?

RESPONSE 1: The first two sentences of the section provide the amount of aggregate needed in relation to the overall concrete mixture. The last sentence deals specifically with the gradation requirement for the aggregate(s) and is only applicable to the aggregate(s). Therefore, the 5% is for the aggregate weight.

QUESTION 2: Is the staining of the aggregates with the use of conventional acid stains or a similar dying formula, prior to their introduction into the concrete mixture permitted? For example, would it be allowed if we soaked Perlite in red clothing dye?

RESPONSE 2: We see no issues with staining aggregate prior to its batching into the concrete.

QUESTION 3: Section 2.10.1 states that "flotation material in the final form of particulates (such as foam peanuts, sawdust, and similar products) is not permitted. One of our team members suggested that crumb rubber be used in the final mix as over the summer that individual witnessed an asphalt mixture containing crumb rubber be installed on a local street. Is crumb rubber considered an aggregate or a flotation material?

RESPONSE 3: Materials such as crumb rubber are considered to be aggregate if integrated (i.e., batched and mixed) into any given concrete mixture. As such, the materials used must be in compliance with the rules and regulations regarding aggregate gradation and proportioning. The rules as written prevent cavities in the canoe (such as flotation tanks) from being filled with particulate materials that could possibly flow out in the event that the tank/cavity is damaged, and could lead to the canoe not being able to float when submerged.

QUESTION 4: Is Styrofoam allowed as part of the concrete mixture?

RESPONSE 4: Yes. As in the case of crumb rubber (RESPONSE 3) the use of low-density materials such as foam (i.e., Styrofoam) are considered to be lightweight aggregate if integrated (i.e., batched and mixed) into any given concrete mixture. As such, the materials used must be in compliance with the rules and regulations regarding aggregate gradation and proportioning.

QUESTION 5: Would recycled concrete count as an aggregate or a cementitious material?

RESPONSE 5: Teams may create customized aggregates, and cementitious and/or non-cementitious materials may be used in the manufacturing of these aggregates. Recycled (crushed) concrete may be used as an aggregate source. Recycled concrete and any other custom-made aggregate can be used in the concrete as long as the following criteria are met:

1. Teams shall ensure that any concrete used as aggregate is INERT; that is, all cementitious materials are completely hydrated prior to crushing, processing, and eventual incorporation into the concrete mix design(s) used in the canoe. In the case of non-cementitious materials, the binders used are cured and inert to possible reactivation prior to crushing, processing and incorporation into the concrete mix designs.
2. The process used to ensure inertness shall be fully documented in the design paper.
3. The relevant properties of the aggregate (absorption, specific gravity, etc.) must be determined for the customized aggregate according to applicable ASTM standards.

Manufactured aggregate (including crushed concrete) is considered "aggregate" in the final concrete mixture. **The concrete that is being used for the aggregate does not need to meet the specifications outlined in**

Section 3 of the 2008 Rules and Regulations. The concrete mix design that incorporates the recycled concrete (or other customized aggregate) must meet the specifications of Section 3.0. With that being said, the ingredients used in the creation of the aggregate shall not be included in the summary of mixture proportions. Teams cannot count the ingredients used to make the aggregate as ingredients to make the concrete mix design (for example, if you are using cement in the creation of the aggregate, you cannot account for that cement in the final mix design proportioning).

3.2.3 Fibers

QUESTION 1: Would the use of milled carbon fibers in our mix count as aggregate or fibers? Section 3.2.3 of the rules states that fibers “Shall meet the requirements of ASTM C 1116 and shall be dispersed within the concrete matrix. Fibers shall not be considered an aggregate in any concrete mixture (Section 4.2).”

RESPONSE 1: The answer you seek is within the question you ask.

3.2.4 Admixtures

QUESTION 1: Is it legal to a polymer modifier to improve bonding of fresh to hardened concrete, ASTM C 1059, during the construction of our inlays. The only thing that has been noted in the rules about bonding agents is in 3.0 General, stating the prohibited use of epoxy and Bondo® as follows:

3.0 GENERAL

Concrete mixtures, regardless of their use in the canoe, are defined as unique and independent mixes and shall comply with all of the requirements of this section. Pre-packaged or pre-mixed concrete, mortar, or grout is not permitted in the construction or repair of the canoe. Bondo®, epoxy or similar materials are not permitted at any time during the casting of the canoe (i.e., placement of concrete, reinforcement and flotation) but may be used in the construction of the canoe mold. Mixtures used as filler and patching materials during the construction or repair of the canoe (i.e., used for cracks, “bug holes,” low spots, etc.) shall be portland cement-based meeting all of the requirements of this section.

RESPONSE 1: Section 3.2.4.4, Polymer Modifier, states that it shall be a latex or re-dispersible powder formulated for use with hydraulic cements that meets the requirements of ASTM C 1438, Type II. Section 3.0, General, states that the patching materials must meet the requirement of the section. The rules do not permit the use of any material to improve bonding between fresh and hardened concrete.

Section 3.3 - Requirements

3.3.1 Mass of Cementitious Materials

QUESTION 1: Does cement kiln dust count toward the 60% cement?

RESPONSE 1: Cement kiln dust (CKD) will not meet the requirements of ASTM C 150 and therefore will not count towards the requirement of 60% of the cementitious materials meeting that standard. However, it is possible that CKD could be considered to meet the other 40% of the cementitious materials.

3.3.3 Allowable Water-Cementitious Materials Ratio

QUESTION 1: Regarding the water cement ratio, would the use of acetone or isopropyl alcohol, which would evaporate out before affecting the chemical reaction of the cement and water, as a liquid in the mix be included in the water-cement ratio.

RESPONSE 1: The inclusion of acetone or alcohol does have an effect on the chemical reaction of cement and water. For example, acetone is used to stop the hydration process in order to determine the degree of hydration and the hydration products that would have been formed at that specific point in time. Also, using the example of shrinkage-reducing admixtures, which are 100 percent active alcohols, the inclusion of such a material does have a profound effect. Any acetone or alcohol that is added to the concrete would be considered part of the mixing water and, hence, should be considered in calculation of the w/cm ratio.

Section 3.4 - Documentation

3.4.1 Mixture Proportioning Table

QUESTION 1: Which units should be used in Table 3.1 - Concrete Mixture Data Table? In the General Guidelines for Concrete Mixture Data Table appendix it is stated that: "The density of the admixtures shall be provided in lb/gal." In the case of a 100% solids pigment should lb/gal (U.S. dry) be used instead of lb/gal (U.S. liquid)?

RESPONSE 1: Yes.

Concrete Canoeists,

Shown below is a copy of Table 3.1 - *Concrete Mixture Data Table* in Microsoft Excel format. This table is the same one that can be found in the 2008 ASCE National Concrete Canoe Competition™ Rules and Regulations.

The table has been formatted so that it meets the margin requirements of the design paper (however, teams are strongly cautioned to check to ensure that it does). In general, volumes shall be presented to three (3) decimal places. For most other values, two (2) decimal places are appropriate. Yields only require one (1) decimal place.

Modifications to the table are permitted but there are limitations:

- Teams are permitted to add or subtract rows under *Cementitious Materials, Fibers, Aggregates* and *Admixtures* as appropriate (For example, a team uses only 2 aggregates while the standard form has up to 4 aggregates. The team can delete the two extra rows).
- Teams are permitted to change fonts, colors, etc. for presentation purposes.
- Teams **MUST** provide all the information required in the columns, absorption for the aggregates, densities for admixtures, and relevant concrete parameters (c/cm, w/cm, slump, air contents, densities and yield).
- All units must be in English.

For information on how to correctly fill out the table, please refer to Section 3 - CONCRETE and Appendix C of the Rules and Regulations. ASTM C 138 is also a pertinent document. As always, the CNCCC will provide clarifications as appropriate.

Sincerely,
CNCCC

Table 3.1 -- Summary of Mixture Proportions

Mixture: _____

Batch Size (ft³): _____

| | Specific* Gravity | Non-SSD Proportions as Designed | | Actual Batched Proportions | | Yielded Proportions | |
|----------------------------------------------|-------------------|---------------------------------|-------------------------------------------------------|----------------------------|--------------------------------------|------------------------------|-------------------------------------------------------|
| | | Amount (lb/yd ³) | Volume (ft ³) | Amount (lb) | Volume (ft ³) | Amount (lb/yd ³) | Volume (ft ³) |
| Cementitious Materials | | | | | | | |
| 1. ASTM C150 Portland Cement Type: | | | | | | | |
| 2. | | | | | | | |
| 3. | | | | | | | |
| 4. | | | | | | | |
| Total of All Cementitious Materials | | | | | | | |
| Fibers | | | | | | | |
| 1. | | | | | | | |
| 2. | | | | | | | |
| Aggregates | | | | | | | |
| 1. _____ Absorption, % | | | | | | | |
| 2. _____ Absorption, % | | | | | | | |
| 3. _____ Absorption, % | | | | | | | |
| 4. _____ Absorption, % | | | | | | | |
| Total of All Aggregates | | | | | | | |
| Water | | | | | | | |
| Batched Water [^] | | | | | | | |
| Total Water Added for Aggregate Absorption | | | | | | | |
| Total Water from All Admixtures [§] | | | | | | | |
| Total Water | | | | | | | |
| Admixtures | | | | | | | |
| | % Solids | Amount (fl oz/cwt) | Water [‡] in Admixture (lb/yd ³) | Amount (fl oz) | Water [‡] in Admixture (lb) | Amount (fl oz/cwt) | Water [‡] in Admixture (lb/yd ³) |
| 1. Air Entrainer ; Density, lb/gal | | | | | | | |
| 2. ; Density, lb/gal | | | | | | | |
| 3. ; Density, lb/gal | | | | | | | |
| 4. ; Density, lb/gal | | | | | | | |
| Cement-Cementitious Materials Ratio | | | | | | | |
| Water-Cementitious Materials Ratio | | | | | | | |
| Flow (flow table), Slump, Slump Flow, in. | | | | | | | |
| Air Content, % | | | | | | | |
| Density (Unit Weight), lb/ft ³ | | | | | | | |
| Gravimetric Air Content, % | | | | | | | |
| Yield, ft ³ | | | | | | | |

* For aggregates provide ASTM C 127 oven-dry bulk specific gravity.
[^] Excluding water added for aggregate absorption.
[‡] Water content of admixture.
[§] If impact on water-cementitious materials ratio is less than 0.01 enter zero.

Section 4. Reinforcement

Section 4.0 - General

QUESTION 1: Section 4 states that all materials not part of the concrete mix shall be considered reinforcement. Therefore, we are assuming that steel 1/8" prestressing cables running along the length of the canoe count as reinforcement. If, for example, we had 10 cables running along the length of the canoe, and all the same distance from the exterior wall of the canoe, do we count the entire set of 10 cables and the space between each as one "layer" of reinforcement when calculating the POA for the prestressing system? If not, how do we calculate the POA for a reinforcement system consisting of prestressed cables?

RESPONSE 1: The POA calculation is primarily used for reinforcements that are being used in a grid pattern, with typical reinforcements being along the lines of fiber meshes, welded-wire mesh. In terms of prestressing cables that run only in one direction, the POA calculation is still applicable but would have to be modified. Basically, the spacing of the cables relative to the thickness (and number) of cables would give you a POA.

The more relevant issue with the prestressing cables is the thickness ratio between the reinforcement and the thickness of the canoe hull as it is indeed reinforcement and would constitute as a reinforcing layer.

Section 5. Finishing

Section 5.5 - Concrete Stains

QUESTION 1: Does the combined/final mixture of acid stain and thickener have to meet the 5% solids content rule or can we use an acid stain with a max solids content of 5% and then use the commercial thickener as per the manufacturer's recommendations (even if following those recommendations will create a mixture of stain and thickener that has a solids content >5%)?

RESPONSE 1: The maximum solids content of the acid stain has been limited to 5%. This maximum percentage can be obtained from the acid stain alone or in conjunction with a thickener used solely for acid stains. Such products are commercially available. The combination of stain and thickener shall not result in a solids content greater than 5%.

QUESTION 2: Section 5.5 states that "Any stains that are applied to the canoe...must be acid-based and have a maximum solids content of 5 percent..." Would an acetone-based "dye" be considered a concrete stain" and whose use would therefore violate the rules in Section 5.5? Section 5.3 states that "Any coloring agents or pigments used shall be in accordance with ASTM C979". Would the use of an acetone-based dye fall under the category of "any coloring agents or pigments" as defined in Section 5.3 (i.e., does this phrase only refer to coloring agents used to integrally color the concrete?)? Would applying an acetone-based dye to the exterior of the canoe after the canoe's uncolored concrete had cured be allowed?

RESPONSE 2: Acetone-based dye does not meet the definition of an acid-based stain and therefore would not meet the requirements of Section 5.5 and cannot be applied to the exterior or interior surface of the canoe after the concrete has set. ASTM C 979 is the *Specification for Pigments for Integrally-Colored Concrete* and it is possible that the acetone-based dye falls in that category. The product data sheet should indicate if it is in compliance with ASTM C 979.

QUESTION 3: I have some questions regarding acid-based coloring stains. Some stains which I have found are water-based and one is made with colored powder and acetone (called Dye-N-Seal). Do these qualify as acid-based stains? If not could you elaborate on what would qualify as an acid-based stain?

RESPONSE 3: As stated in RESPONSE 2, an acetone-based dye does not meet the definition of an acid-based stain and, therefore, would not meet the requirements of Section 5.5 and cannot be applied to the exterior or

interior surface of the canoe after the concrete has set. Acid-based stains are formulations that generally contain hydrochloric acid (HCl) and minerals that chemically react with the concrete thereby staining them. There are numerous acid stains on the market and are labeled as "acid stain".

QUESTION 4: We've been trying to determine the % solids content of certain products from a manufacturer and to answer our question the manufacturer has requested the following information from us:

1. How is solids being defined - by temperature, by boiling point, what?
2. What method is being used to determine the % of solids in any given product?
3. What lab equipment is being used? (manufacturer's brand name)

The products concern Section 5.5 of the rules, regarding the maximum solids content of acid stains at 5%. Could the Committee help us with these three questions?

RESPONSE 4: Percent solids content are typical values that are reported by manufacturers on their technical data sheets (or on the product label itself). We would recommend that if the manufacturer cannot provide this information (and is asking how to get the information) that you look for another product. There are many acid stains on the market.

QUESTION 5: Section 5.5 states that "Any stains that are applied to the canoe must meet the following requirements: commercially available; acidbased; maximum solids content of 5 percent; and a volatile organic content (VOC) less than or equal to 700 g/L."

What exactly defines a solid? I am assuming that all dye particles are included, but what about the minerals that chemically react with the concrete. For example, we have an acid based stain that is a solution with 20-30 percent of the content being minerals that chemically react with the concrete. There are no solids inherent in the solution except for the reacting minerals. So I guess my question is this: Do the minerals that react with concrete in an acid stain count as solids?

RESPONSE 5: In general, all of the acid stains have minerals that chemically react with the concrete. It is these minerals that actually stain the concrete the color, be it terra cotta or aquamarine blue. The solids that some of the acid stains have (usually upwards to 3% by content) are more like dyes. Depending on the quality of the staining, you could actually see "runs" in the final product. The minerals in the acid solution are not considered in the solids content of the stain. The manufacturer's technical data sheet should distinguish between the two.

Section 6. Design Paper

Section 6.2 - Design Paper

6.2.2_Format

QUESTION 1: In the requirements for the Executive Summary of the design paper, the rules state that the "engineering properties of the concrete (unit weight and strength)" must be provided. By strength, do you mean compressive concrete strength?

RESPONSE 1: If you take notice of what is required under Section 7.1.2, Tab A - Compliance Certificate (part of the Engineer's Notebook), there are a number of items to report regarding the concrete mixture(s) used in the canoe including *concrete density(ies)*, *concrete compressive strength(s)*, *concrete tensile strength(s)*, *concrete composite flexural strength(s)* and *concrete air content(s)*.

At a minimum, the density (unit weight) and compressive strength (typical properties of concrete) should be reported in the Executive Summary. We suggest that since you would have the other properties for the Engineer's Notebook, you can provide items such as tensile and flexural strengths.

QUESTION 2: The requirements for the Executive Summary in the design paper state that the engineering properties of the concrete must be specified on page i. Does this apply to only the structural concrete mix if several mix designs are used (i.e. patch or inlay mixes)?

In addition, the requirements for the Compliance Certificate in the Engineer's Notebook states that the concrete compressive, tensile, and composite flexural strengths shall be reported. Must all of these strength properties be reported in the Engineer's Notebook for patch or inlay mixes (i.e. is it really necessary to test the composite flexural strength of a patch mix when it will only be a thin layer on the exterior of the canoe)?

RESPONSE 2: The engineering properties of ALL mixture designs used in the canoe are to be reported. This would apply to structural mixtures, patching mixtures, and inlay mixtures.

It is reasonable to assume that the concrete composite flexural strength would be for the structural mixture and the reinforcement used. The purpose for the patching material is for aesthetics and to test it for composite flexural strength is most likely not necessary. This is not to say that you could not test it for flexural only (not as a composite) if you wish to choose so. The need to test the inlay mixture would most likely depend on how significant of an inlay you are making (does it cover a large portion of the canoe or is its thickness compared to the overall thickness of the section relatively large?).

QUESTION 3: Can we have a watermark in our engineering notebook, and our design paper (throughout the entire document)? If yes, does the watermark have to fall within the page margin constraints? Does it have to follow the guidelines in the rules?

RESPONSE 3: Watermarks are allowed to be used in the report and the Engineer's Notebook and they have been used in the past by many teams. Although there are no specific rules or regulations regarding the use of the watermarks, it would make sense that they be restricted to the margin requirements of $\frac{3}{4}$ -in.

Section 7. Engineer's Notebook

Section 7.1 - References

7.1.2 Format

QUESTION 1: Section 7.1.2 (Tab C) of the rules for the Engineer's Notebook does not specifically state that we need a reinforcement sample in the notebook. However, on Page D-3 in the Section "Formatting Electronic Deliverables" it is stated that a reinforcement sample is needed in the hard copy of the notebook, but not the electronic copy. Last year's rules specifically stated that there should be a sample in the notebook (under Section 7.1.2 Tab D). Do we need a reinforcement sample in our engineering notebook?

RESPONSE 1: The requirement for providing a sample of reinforcement in the Engineer's Notebook was removed for this competition as samples are part of the cross section that is to be provided. The inclusion of the requirement mentioned on Page D-3 was an oversight on our part. No sample is required in the Notebook.

Section 10. Final Product (Canoe and Cutaway Section)

Section 9.3 - Cutaway Section

QUESTION 1: The cutaway section has to be 3 feet long to demonstrate the various stages of the canoe, but does this section have to be the entire width of the canoe? Meaning can we cut the width in half and still have the 3 feet in length?

Also, can we modify our cross section to fit into our theme? We were wanting to put some type of decoration at the very front of the cross section, that won't be on our actual canoe. Will this be a problem?

RESPONSE 1: The cutaway section is to be representative of the construction of the mold and the casting of the canoe. There are no regulations stating that it must be representative of the entire width of the canoe. So you may cut it in half (longitudinally) and still have at least 3 feet in length.

You may add decoration to the cross section and/or the stand that it rests on.

Section 10. Product Display

Section 10.0 - General Requirements

QUESTION 1: Section 10.0 states that the Conference Table has to be a standard folding table and may include a table cloth. Can another object be used to surround the table other than a table cloth to enhance theme integration? In other words, could a prop be built to surround the table as long as it still fits within the maximum dimensions?

RESPONSE 1: The Product Display is a "table top display." Adding "props" even if it fits within the dimensional constraints of the table is, for all intents and purposes, extending the table top display below the table top. A skirt is the only item to extend below the table top.

Section 10.3 - Scoring

QUESTION 1: Section 10.3 states that "The Product Display will account for 10 percent of the Final Product (Section 9) score. Any product display that is not in compliance with this section shall be subject to a deduction in Final Product." Do the stands for the canoe (what the canoe rests on) count as part of the Product Display? (Or are the only things that count towards the display the items on the Display Table, as outlined in section 10.0?)

RESPONSE 1: Section 10 provides the requirements for the tabletop Product Display from the table that it can rest on to the items that need to be provided. The stands for the canoe and for that matter the canoe cross section are not considered part of the product display and do not count towards its scoring. Section 9.1.1 covers the general requirements for the stands for the canoe.

Section 11. Race Rules and Regulations

Section 11.2 - Safety

11.2.1 Power Rescue Boat

QUESTION 1: My question is what do I specifically need with regards to my patrol boat for the concrete canoe races? One paramedic? Two EMTs? Is there a size regulation for the boat? Thanks for your help!

RESPONSE 1: There are no regulations for the size of the boat; the only requirement was that it was motorized (outboard motor). The boat or boats that will need to be on the water during the canoe races should be based being able to adequately cover the course and to pick up individuals that tipped over or swamped their canoes. At national competitions, it is usually one boat that can hold up to 5 or 5 people. However, conditions during conference competitions (cold water) may warrant having two boats if there is a concern.

The same can be said for the number of emergency personnel on site. This may be dictated by school policies, park policies (for example if you are using a city park for the races),etc. Our past experience was to have one crew on site (usually 2 EMTs)