

**American Society of Civil Engineers/Master Builders, Inc.  
National Concrete Canoe Competition**



**2004 Rules and Regulations**

# TABLE OF CONTENTS

<b>Introduction</b>	<b>ii</b>
<b>I. General Rules and Eligibility Requirements</b>	<b>1</b>
<b>II. Design and Construction Requirements</b>	<b>4</b>
<b>III. Academic Requirements</b>	<b>13</b>
<b>IV. Race Rules and Regulations</b>	<b>25</b>
<b>V. National Qualifying Rules</b>	<b>31</b>
<b>VI. Overall Scoring</b>	<b>32</b>
<b>VII. Scoring Overview</b>	<b>35</b>
<b>VIII. Awards and Recognition</b>	<b>40</b>
<b>IX. Past Winners and Host Schools</b>	<b>41</b>
<b>X. Corporate Profiles</b>	<b>44</b>

# Introduction

ASCE Student Chapters and Clubs have been involved in constructing and racing concrete canoes on the local and regional level since the early 1970's. The first National Competition came to fruition in the summer of 1988 after almost two years of discussion between representatives from the American Society of Civil Engineers (ASCE) and Master Builders, Inc.

The objectives of the National Competition are as follows:

- To provide civil engineering students an opportunity to gain hands-on, practical experience and leadership skills by working with concrete mix designs and project management.
- To increase awareness of the value and benefits of ASCE membership among civil engineering students and faculty in order to foster lifelong membership and participation in the Society.
- To build awareness of the versatility and durability of concrete as a construction material among civil engineering students, educators and practitioners, as well as the general public.
- To build awareness of concrete technology and application among civil engineering students, educators and practitioners, as well as the general concrete industry.
- To increase awareness among industry leaders, opinion makers and the general public of civil engineering as a dynamic and innovative profession essential to society.
- To generate and increase awareness of ASCE and Master Builders, Inc. commitment to civil engineering education among civil engineering students, educators and practitioners, as well as the general public.

While the intent of the competition is to learn and to create a forum for interaction both technically and socially, the students are a short step from being practicing engineers involved in projects that are critical to society's welfare. Hence, we shall expect professional conduct from all participants. In order to preserve the quality of this competition and to improve the quality of future competitions, we shall demand high standards, which shall be enforced under the Spirit of the Competition in Section I.O.

Each year the competition is held in a new location and hosted by an ASCE Student Chapter. The rules are modified from year to year to address concerns that have developed from the Regional and National Competitions. This year's rules have undergone significant changes, which are designed to challenge not only the students' engineering prowess, but also their creativity. Please read the rules carefully.

The rules are divided into ten sections; please review each section thoroughly.

**Good luck, have fun and be safe! May the best team win!**

# I. General Rules and Eligibility Requirements

- A. A student team shall have qualified as a first place winner or designated alternate in conjunction with one of the eighteen (18) nationwide ASCE Student Regional Conferences, as an international entry upon approval of the Committee on National Concrete Canoe Competitions (CNCCC), or as the host school of the National Competition. The host school for the National Competition has the choice of competing in the current year or delaying their entry until the next year.
- B. In order to earn an invitation to the National Concrete Canoe Competition (NCCC), a student team shall qualify through participation in an ASCE Regional Concrete Canoe Competition. There must be at least three eligible Student Chapters/Clubs participating in the concrete canoe races in order to constitute a qualified Regional Concrete Canoe Competition. If a school's Region does not have a Regional Concrete Canoe Competition that school shall qualify in a competition in another Region as designated by the school's Regional Conference Host School. School(s) participating as visiting teams in another Region must earn the equivalent of second or better in the overall competition to be invited to attend the National Competition. The points for the visiting team shall be tallied separately and the visiting team shall not displace the winner, or second place team if eligible, of the Host Regional Competition. A school cannot qualify for the National Competition in more than one Region. Only one team from any given university can qualify for the National Competition.
- C. If any of the top five placed teams from the previous year's National Competition qualify for the current year's National Competition, the second place team from the respective Region will be invited to attend. This does not apply to invited guests.
- D. Teams interested in participating in the American Society of Civil Engineers/Master Builders, Inc. National Concrete Canoe Competition as international entries must contact CNCCC via the Student Services Department of ASCE (student@asce.org) by March 1<sup>st</sup> of the competition year. International teams shall submit a brief proposal discussing the skills, abilities, and accomplishments of the team and documenting that the team has already or is capable of competing in all facets of the competition (paper, oral presentation, final product, races). Final approval or denial will be issued upon review of the proposal.
- E. ASCE Student Chapters or Clubs cannot qualify for the National Competition if on probation or suspension (i.e. Annual Report and/or Annual Dues not received at Headquarters by May 14<sup>th</sup> of the competition year).
- F. A team shall register up to five (5) male and five (5) female participants. These registered participants are the only persons eligible to present or answer questions for the oral presentation or compete in the races. Substitutions of registered participants will be allowed up to the time of on-site registration. No substitutions shall be permitted after on-site registration. Each team shall designate two (2) of the ten (10) registered participants to act as team captains. **Only team captains are eligible to file appeals/protests on behalf of the school.**

Registered participants at Regional and National Competitions shall be undergraduate engineering students during the academic year in which the canoe was constructed, be members of an ASCE Student Chapter or Club in good standing and have contributed to the design and construction of the canoe. Registered participants are required to be National Student Members of ASCE in order to participate at the National Competition. ASCE student membership numbers shall be required upon registration. Registered participation shall not exceed three (3) years (consecutive or non-consecutive). There are no term limits for participation in other roles.

- G. There shall be no limit to the number of support personnel permitted to prepare the design report, oral presentation, and assist at the races. All students are encouraged to participate in their school's canoe project (concrete and materials design and testing, canoe design and construction, design paper, fundraising, presentation, etc.), including canoe competitions.
- H. For publicity purposes, American Society of Civil Engineers and/or Master Builders, Inc. may use any or all canoes, papers, and displays entered in the National Competition for a period of one year from the date of the competition. All associated transportation costs, etc. shall be paid for by American Society of Civil Engineers and/or Master Builders, Inc.
- I. As primary corporate sponsor of the National Concrete Canoe Competition, Master Builders, Inc. is committed to providing admixture samples and technical assistance with concrete mixture proportions to all competitors. Student Chapters/Clubs are encouraged to contact the Master Builders, Inc. Technical Information Group at 1-800-MBT-9990 to request admixture samples and/or mixture proportion assistance from a local Master Builders, Inc. sales representative. Students are also encouraged to visit the Master Builders' home page (<http://www.masterbuilders.com>) for product information.
- J. Use of trade and company names for services, products, and intellectual property shall be permitted for informational purposes only. Sponsorship recognition shall be limited to T-shirts or other apparel.
- K. Questions regarding national race qualifying procedures, etc. should be directed to the Student Services Department of ASCE via email ([student@asce.org](mailto:student@asce.org)) or phone 1-800-548-ASCE or 703-295-6000.
- L. Questions regarding rule interpretations prior to the National Competition should be directed via email to the CNCCC ([cnccc@ermail.asce.org](mailto:cnccc@ermail.asce.org)). Responses may take up to two weeks. Questions along with their official responses will be broadcast to the NCCC list server unless a specific request is made for privacy. Private questions will be published in a generic format so as to keep private any specific innovative use of materials or ideas. Teams are encouraged to contact the CNCCC to avoid misinterpretation of rules at the Regional Competitions. Please note that only questions directed to [cnccc@ermail.asce.org](mailto:cnccc@ermail.asce.org) will receive an official response from the CNCCC. The cut-off date for submitting a question to the CNCCC is February 15. Questions received after this date will not be acknowledged or addressed. All questions (except private) and official responses will be accumulated and published to the NCCC list server in an FAQ document by the CNCCC on November 1 and March 1 during the academic year.

The NCCC list server is available as a forum for general questions and answers for anyone to use. Students are required to subscribe to the list server. Teams are also responsible for all information provided in the rules, the general questions and answers [from the list server], and information given at competitions from the date of the release of the information. Students may join the [canoe@ftl.com](mailto:canoe@ftl.com) <mailto:canoe@ftl.com> list server by sending an email to [majordomo@ftl.com](mailto:majordomo@ftl.com) with a body of “subscribe canoe” or “subscribe canoe <your email address>”. For more information, send an email to [majordomo@ftl.com](mailto:majordomo@ftl.com) with a body of “HELP”.

- M. General information on the concrete canoe competition as well as registration information for the National Concrete Canoe Competition each spring is located on the ASCE website ([http://www.asce.org/inside/stud\\_chapacts.cfm](http://www.asce.org/inside/stud_chapacts.cfm)). Students shall be responsible for registration materials and technical paper submittal deadlines published on these websites.
- N. It is the responsibility of the participating schools to remove their entire canoe and any associated debris from the host school site after the competition. The host school has the option to remove any remaining canoe debris from the site and bill the responsible school.
- O. Under the Spirit of the Competition, the Judges and/or CNCCC may take disciplinary action, including warnings, point deductions, or disqualification of a team or entry for inappropriate use of materials, language, alcohol, uncooperativeness, or general unprofessional behavior of team members or persons associated with a team. The judges have the final authority to determine what constitutes a violation of the “spirit of the competition” and may take appropriate action towards point deduction or disqualification.
- P. Appeals at the regional level shall be filed on the “Appeals Form” provided by the host school. At the Regional Competition, regional judges will make every effort to resolve an appeal with direct assistance from the CSA Representative or through contact with the CNCCC. All appeals shall be resolved at the Regional Competition before the awards ceremony.

Judges’ original score sheets and final electronic score sheets will be checked and ratified by the Head Judge before the awards ceremony.

## II. Design and Construction Requirements

### A. The Canoe

1. From herein the term “canoe” shall be defined as a watercraft designed for paddlers using single-blade paddles.
2. The canoe shall be built within the current academic year of the National Competition. The same canoe shall be used at both the Regional and National Competitions and must be built with durability required to perform in both races and to be transported to the competition sites. In the event that the qualifying canoe is damaged between the Regional and National Competitions, the Chapter/Club may patch, repair, and refinish the canoe. For any repairs made between the Regional and National Competitions, a “Repair Procedures Report” form must be completed and signed by the team captain and the faculty advisor. Hereafter, the faculty advisor may be either the faculty member who serves as a technical advisor to the team or the advisor of the school’s ASCE Student Chapter/Club. This “Repair Procedures Report” must be submitted by the team captain and received by the CNCCC within five (5) business days of the Regional Competition.

If a canoe is damaged beyond repair during Regional Competition, the team captain shall submit a “Reconstruction Request” to CNCCC to rebuild the canoe. The “Reconstruction Request” can be obtained via an email request to [cnccc@ermail.asce.org](mailto:cnccc@ermail.asce.org). The “Reconstruction Request” must be signed by the team captain and faculty advisor and received by the CNCCC within five business days of the completion of the Regional Competition. The “Reconstruction Request” must contain sufficient information (including pictures of the damaged canoe) to enable the CNCCC to make a decision regarding the cause and extent of the catastrophic damage. The CNCCC will review the request and provide a decision as to whether or not the Chapter/Club shall be allowed to rebuild their canoe.

The catastrophic damage to the canoe that occurs at the Regional Competition shall result in a review of the durability and design of the canoe by CNCCC. If it is determined by CNCCC that poor design resulted in the damage to the canoe, the “Reconstruction Request” will be denied and the 2<sup>nd</sup> place team will be invited to the National Concrete Canoe Competition.

If a canoe is accidentally damaged beyond repair after the completion of the Regional Competition, the Chapter/Club shall submit a “Reconstruction Request” to CNCCC. The Chapter/Club must submit the “Reconstruction Request,” signed by the faculty advisor, within five (5) business days of the accident. Catastrophic damage to the Chapter/Club’s canoe that occurred as a result of an accident shall result in a review of the durability and design aspects of the canoe by the CNCCC. If it is determined by CNCCC that poor design contributed to the damage, the “Reconstruction Request” shall be denied and the 2<sup>nd</sup> place team shall be invited to the National Concrete Canoe Competition.

In both of the aforementioned cases, if it is determined that the canoe may be rebuilt, the resulting canoe shall be of the same hull design, materials, concrete mix design, proportions, and performance characteristics of the original canoe. If this requirement is not possible, the Chapter/Club shall forfeit to the designated alternate Chapter/Club concrete canoe team within their Region. No new flotation shall be allowed between the Regional and National Competitions without point deduction.

3. A full-scale cutaway section not less than three feet in length, representative of both the raw and finished canoe shall be judged as part of the final product. This typical cutaway section shall demonstrate the forming, casting, finishing, and reinforcement techniques used to construct the canoe.
4. Fixed paddler restraints, such as straps, seatbelts, Velcro, or any other item that attaches the paddler to the canoe or that interferes with the paddler safely exiting the canoe in the event of capsizing, are not permitted. The judges shall prohibit the use of any paddler restraints if, in their judgment, safety is an issue.
5. Use of structural elements (ribs, gunwales, thwarts, and bulkheads) shall be permitted as long as they do not impede paddlers from exiting the canoe.
6. All concrete, regardless of density, shall comply with Sections II.B.1. through II.B.4. All material not part of a concrete mixture shall be classified as reinforcing material and shall comply with Sections II.B.5.
7. Structural elements shall be constructed of a reinforced concrete as defined in Section II.B. The reinforcement used in structural elements must comply with the thickness (Section II.B.5.c.) and Ottawa sand test (Section II.B.5.b.) rules.
8. The gunwale shall be finished in such a way as to prevent injury to the paddlers (i.e. no exposed reinforcing or sharp edges). Gunwale caps or coverings that are not cast as an integral part of the original canoe shall not introduce a structural element to the canoe. Exterior gunwale caps that could provide any element of rigidity (e.g., wood strips, plastic channels, or other rigid materials) shall be cut into sections no longer than two (2) feet each. Typical pipe insulation foam used as gunwale protection shall be permitted and is not considered as providing rigidity.
9. All canoe components and external protrusion(s) shall be made of the same materials as the hull.
10. The canoe shall pass a flotation test whereby the canoe floats horizontally, ends out of the water, when filled with water and shall be certified as safe before entering any race.
11. Externally applied flotation materials shall be permitted, shall not be permanent, and if required to pass the flotation test, shall be present in their respective locations in the canoe during final product aesthetics judging.



## B. Materials

### 1. Binders

- a. Binders are defined as cementing materials, either hydrated cements or products of cement or lime and reactive siliceous materials; also, materials such as asphalt, resins, and other high molecular-weight polymers and materials which bind the matrix of concretes, mortars, and sanded grouts. Binders include, but are not limited to, hydraulic cements, ground granulated blast-furnace slag, pozzolans (such as fly ash, silica fume, and metakaolin), resins (such as acrylic, phenolic, and polystyrene resins), and polymers in latex form. Curing agents (i.e., hardeners/catalysts) that are required for use by resins shall be considered as binders.
- b. The weight of a binding material is defined as the weight of the non-water portion of the binder(s) and therefore does not include mix water, slurry water, or water serving as the dispersing medium of an emulsion.
- c. Except for mixtures containing a blend of cementitious materials that include Portland cement, fly ash and ground granulated blast-furnace slag (see Rule B.1.d.), a minimum of 70% (by weight) of the binding material of each concrete mixture used in the canoe shall be Portland cement of Type I, Type II, Type III, or a combination of these types. The Portland cement shall meet the requirements of the latest version of ASTM C 150, 'Standard Specification for Portland Cement,' and shall be reacted with water to form a binder.
- d. The binding material of any concrete mixture used in the canoe shall also consist of a minimum of either 15% fly ash (Class F, Class C or combination thereof) or a minimum of 25% ground granulated blast-furnace slag, or a combination thereof. If a concrete mixture contains a blend of cementitious materials that include Portland cement, fly ash and ground granulated blast-furnace slag, the binding material shall consist of a minimum of 50% Portland cement, a minimum of 15% fly ash and a minimum of 25% ground granulated blast-furnace slag, all percentages by weight. The fly ash shall meet the requirements of the latest version of ASTM C 618, 'Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete,' and the ground granulated blast-furnace slag shall meet the requirements of the latest version of ASTM C 989, 'Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars.'
- e. If the only binding materials are a combination of Portland cement, fly ash, silica fume, and slag, there is no minimum water-cementitious materials ratio. If other binding materials are used, the minimum ratio of water to Portland cement shall be 0.24. The maximum allowable water-cementitious materials ratio for any concrete mix is 0.50.

2. Aggregates

A minimum of 15% by volume of the aggregate particles is to consist of any natural sand meeting the specifications for fine aggregate as defined in the latest version of ASTM C 33, 'Standard Specification for Concrete Aggregates.' The volume of the aggregate particles herein referred to include the volume of the particles and their permeable and impermeable voids but does not include the volume of the voids between particles. (See ASTM C 127.)

3. Concrete

- a. Pre-packaged or pre-mixed concrete, mortar, or grout is not permitted.
- b. The proportions of each mixture of concrete used in building and repairing the canoe shall be summarized in a copy of Table II.B.1., and shall be included in Appendix B of the Design Paper according to Section III.A.5.i.

4. Filler and Patching Materials

Filler and patching material shall be a Portland cement based concrete, meeting the requirements of Sections II.B.1. through 3. Bondo, epoxy or similar materials are not permitted as patching or filler material at any time. Duct tape will be the only material allowed to repair a canoe during race competition.

5. Reinforcing

- a. Solid mats or plates for reinforcing are not permitted. Solid mats and plates are described as reinforcing materials that require additional bonding agents or post-manufacturer perforations to keep the reinforcement from delaminating from the concrete composite (i.e., there is a lack of open space between the reinforcement sufficient for mechanical bonding to the concrete composite).
- b. Students shall be prepared and able to demonstrate reinforcement acceptance to the judges. A 100 by 200 mm (4" by 8") cylinder mold shall be filled with one cup of "Graded Standard Sand" as described in ASTM C 778 (Ottawa sand). The reinforcement shall be placed over the cylinder in the same configuration (layers, layer orientation, and spacing) that will be used in the canoe. When the cylinder is inverted, the sand shall take less than five (5) seconds to pass through the reinforcement scheme. Any combination used and single layers of reinforcement must comply.
- c. The thickness of a layer of reinforcing is defined as follows: a single layer of the reinforcing is to be placed on a flat surface, a piece of plate glass, 6 mm (~1/4") or thinner, is to be placed on the reinforcing, the distance from the bottom of the plate to the top of the supporting flat surface is the thickness of a single layer. When subjected to the weight of the glass alone, the sum of all such measured thickness divided by the total thickness of the canoe wall (prior to painting) at any point in the canoe shall not exceed 50%. These measurements and calculations shall be included in the Engineer's Notebook

(see Section III.C.7.) presented during Final Product judging. All canoe elements, including but not limited to walls, ribs, gunwales, thwarts, bulkheads, are subject to this rule. If individual rods or reinforcing bars are used in such a way that they cross each other, this use constitutes at least two layers of reinforcing.

- d. All reinforcement shall be covered in concrete.

**TABLE II.B.1.—SUMMARY OF MIXTURE PROPORTIONS**  
**MIXTURE DESIGNATION: \_\_\_\_\_**

AIR AND CEMENTITIOUS MATERIALS				
Component	Quantity (whether base or batch)			Units
Air content by volume of concrete			<i>AIR</i>	%
Cement (plain),	ASTM Type:		<i>c</i> :	kg/m <sup>3</sup>
Other cementitious material 1*	Description:		<i>m</i> <sub>1</sub> :	kg/m <sup>3</sup>
Other cementitious material 2*	Description:		<i>m</i> <sub>2</sub> :	kg/m <sup>3</sup>
Other cementitious material 3*	Description:		<i>m</i> <sub>3</sub> :	kg/m <sup>3</sup>
Other cementitious material 4*	Description:		<i>m</i> <sub>4</sub> :	kg/m <sup>3</sup>
Mass of all cementitious materials	<i>cm</i> :			kg/m <sup>3</sup>
Cement to cementitious materials ratio	<i>c/cm</i> :			
AGGREGATES / FIBERS				
Aggregates / Fibers	Base Quantity (SSD aggregates) (kg/m <sup>3</sup> )	ASTM C 127 BSG (SSD) (unitless)	Agg. Volume (m <sup>3</sup> )	Batch Quantity (At stock moisture content) kg/m <sup>3</sup>
1.	<i>W</i> <sub>SSD,1</sub> :			<i>W</i> <sub>stk,1</sub> :
2.	<i>W</i> <sub>SSD,2</sub> :			<i>W</i> <sub>stk,2</sub> :
3.	<i>W</i> <sub>SSD,3</sub> :			<i>W</i> <sub>stk,3</sub> :
4.	<i>W</i> <sub>SSD,4</sub> :			<i>W</i> <sub>stk,4</sub> :
Combined	<i>W</i> <sub>SSD,agg</sub> :			<i>W</i> <sub>stk,agg</sub> :
WATER				
Water †	<i>W</i> :		<i>w</i> <sub>batch</sub> :	kg/m <sup>3</sup>
Vol. of admixture #1	<i>x</i> <sub>1</sub> :			ml/m <sup>3</sup>
Vol. of admixture #2	<i>x</i> <sub>2</sub> :			ml/m <sup>3</sup>
Vol. of admixture #3	<i>x</i> <sub>3</sub> :			ml/m <sup>3</sup>
Vol. of admixture #4	<i>x</i> <sub>4</sub> :			ml/m <sup>3</sup>
Water from admixture #1			<i>w</i> <sub>adm,1</sub> :	kg/m <sup>3</sup>
Water from admixture #2			<i>w</i> <sub>adm,2</sub> :	kg/m <sup>3</sup>
Water from admixture #3			<i>w</i> <sub>adm,3</sub> :	kg/m <sup>3</sup>
Water from admixture #4			<i>w</i> <sub>adm,4</sub> :	kg/m <sup>3</sup>
Total of free (surplus) water from all aggregates			$\sum w_{free}$ :	kg/m <sup>3</sup>
Total water	<i>w</i> :		<i>w</i> : ‡	kg/m <sup>3</sup>
Concrete density §				kg/m <sup>3</sup>
Water to cement ratio	<i>w/c</i> :			
Water to cementitious material	<i>w/cm</i> :			

\* If the binder comes from the manufacturer mixed with water, include only the weight of the binder here.

† 1<sup>st</sup> column is used for the desired total water; the 2<sup>nd</sup> column is for water added directly to batch.

‡ *w* in this column = *w*<sub>batch</sub> + *w*<sub>adm,1</sub> + *w*<sub>adm,2</sub> + *w*<sub>adm,3</sub> + *w*<sub>adm,4</sub>. This value should match the value for *w* in the previous column.

§ The sum of items in rows (1), (2), and (3)

## TERMS AND FORMULAS FOR TABLE II.B.1.

- $A$  = absorption of an aggregate, whether taken as a whole, the coarse, or the fine aggregate, %.
- $MC_{total}$  = total moisture content referenced to the oven-dried condition of the aggregate, %.
- $MC_{free}$  = free moisture content, referenced to the saturated, surface-dry condition, of the aggregate, %.
- $W_{SSD}$  = mass, in the saturated, surface-dry condition, of aggregate per unit volume of concrete,  $\text{kg/m}^3$ .
- $W_{stk}$  = mass, in the stock moisture condition, of the aggregate per unit volume of concrete,  $\text{kg/m}^3$ .
- $w_{batch}$  = the mass of water to be batched per unit volume of concrete when the aggregates are in a stock moisture condition,  $\text{kg/m}^3$ .
- $w_{free}$  = free water carried into the batch by a wet per unit volume of concrete,  $\text{kg/m}^3$ .

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

$$A = \frac{W_{ssd} - W_{od}}{W_{od}} \times 100\%$$

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

$$MC_{free} = \frac{MC_{total} - A}{\left(1 + \frac{A}{100\%}\right)}$$

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

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

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

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

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

## C. Finishing

1. The school name (no initials) and the canoe name shall be prominently displayed on the exterior of the canoe, above the waterline, on both sides, with individual (not a continuous decal) letters. The school name shall consist of letters 4" +/- 1/4" high. The canoe name shall consist of letters 3" +/- 1/4" high. If the complete name of the college or university is 31 characters or more (including all letters and spaces between words), the name may be abbreviated. The abbreviated name must still clearly indicate the specific college or university competing, and as applicable include state or city.
2. Graphics such as logos, symbols, etc. created using concrete coloring agents and pigments within the concrete mix design shall not be limited in dimension or frequency. Any coloring agents or pigments used shall be in accordance with the latest edition of ASTM C 979, 'Specifications for Pigments for Integrally Colored Concrete.'
3. The use of paint and adhesive appliqué shall be limited to the following:
  - a. Letters used for school and canoe name
  - b. A maximum of three (3) individual (not touching each other) graphics
    - No more than two shall fit within a circle of 12" diameter
    - No more than one shall fit within a circle of 24" diameter
  - c. Placement of the graphics is at the discretion of the team.
4. Concrete sealers and stains (penetrating or surface coating) may be applied to the exterior of the canoe only. Under no circumstances will it be acceptable to apply any finish coating to the interior portion of the hull except as permitted by rule II.D.3. The exterior of the canoe includes the top of the gunwale and the deck of any concrete-encased flotation tanks at either the bow or stern. The interior of the canoe includes any bulkheads (including that used for concrete-encased flotation tanks), thwarts, ribs or other structural elements. In the event that any structural element is flush with the surface of the gunwale, only the gunwale may have sealer and stain applied.
5. Any sealer applied to the canoe must not add strength to the canoe and must meet the following requirements: in compliance with the latest edition of ASTM C 1315, 'Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete,' Type I (clear or translucent) or Type II (white pigmented); maximum percent solids of 30%; less than 700 g/L VOC; and non-epoxy. Pigmented colors other than white (see Note 2 of ASTM C 1315) shall be permitted. The application of any sealer shall not exceed the manufacturer's recommendation for items such as, but not limited to, number and thickness of coats.
6. Any stain applied to the canoe must not add strength to the canoe and must meet the following requirements: maximum percent solids of 30%; less than 700 g/L

VOC; and non-epoxy. The stain may be clear or pigmented. The application of any stain shall not exceed the manufacturer's recommendation for items such as, but not limited to, number and thickness of coats.

#### D. Equipment

1. Coast Guard approved life jackets shall be required for all paddlers at all times during the competition. Wet suit buoyancy pads shall not be used as a substitute for the Coast Guard approved life jacket.
2. Canoes shall be paddled and not rowed. Paddles shall be single-bladed and may be straight bladed or bent.
3. Seats, if you choose to use them, are required to be 20" x 20" x 20", maximum, or a mat 20" x 30" x 1/2" thick, maximum. They cannot be used together, at the same time, by one paddler. Each paddler may use one of the types of seats described above, but not both. The paddlers do not have to use the same types of seats when paddling in the same race.
4. The use of non-skid tape or other slip resistant material is not permitted.
5. Post-construction applied devices that prevent water from entering the canoe are not permitted. This includes any flotation material that is required to pass the flotation test.

#### E. Safety

1. It is the responsibility of all participants to be knowledgeable of Occupational Safety and Health Administration (OSHA) policies. See [www.osha.gov](http://www.osha.gov) for more information.
2. It is the responsibility of all participants to know about the materials with which they are working. (See the "Laboratories" and "Hazard Communication" Safety and Health Topics at [www.osha.gov](http://www.osha.gov).) Participants should obtain and read material safety data sheets (MSDS) for each material with which they will be working.
3. MSDS for each material used in the construction of the canoe shall be available to judges in the Engineer's Notebook during Final Product aesthetics judging according to Section III.C.7.g.
4. It is the responsibility of all participants to work in a safe manner in a safe workplace environment. (See the "Construction: Concrete and Masonry," "Personal Protective Equipment," and "Ventilation" Safety and Health Topics at [www.osha.gov](http://www.osha.gov). Also see the "Silicosis Fact Sheet for Construction Workers" at [www.osha.gov](http://www.osha.gov).)

### III. Academic Requirements

#### A. Design Paper

1. Except for the design drawings and the project schedule, the design paper shall be presented on 8 ½” by 11” pages in portrait orientation. The design drawings and project schedule shall be presented on 11” by 17” pages in landscape orientation and folded to fit within the report. All pages shall maintain a minimum of 3/4” margins on all sides. Body text shall be in English and use 12-point, normal width, Times New Roman or Arial font. Section headings and subheadings shall be considered part of the body text, shall adhere to the margin requirements and may be of any font type or size.
2. The report shall consist of a report cover, single-sided pages for the body and any appendices, and a back cover page. No additional pages separating the appendices are permitted. Body pages, with the exception of the Table of Contents and Executive Summary, shall be numbered beginning with the number one (1). The Table of Contents and Executive Summary shall be limited to a total of one page and numbered with the lowercase Roman numeral *i*. Pages located in the appendices shall be numbered as A-1, A-2, B-1, B-2, etc., as appropriate.
3. Photographs, tables, line drawings, graphs, headers, and footers shall be permitted and shall be counted as part of the page limit defined herein. Captions used for any photographs, tables, line drawings, graphs or other figures shall be no less than 10-point, normal width, Times New Roman or Arial font. These items, with the exception of the headers and footers, shall be restricted to the margin and body text described herein. Material on the covers or on the accompanying compliance certification may not be referred to in the body pages.
4. Only the body pages and appendices will be used for scoring. There is no requirement to fill a page. The optimum balance between being thorough and being concise is desired.
5. The reports must adhere to the following format, and the following must be included at a minimum:
  - a. Cover Page
  - b. Table of Contents (Page *i*)
  - c. Executive Summary (Page *i*): At a minimum, the executive summary shall contain basic information about the school, region, and competition history and performance level. List at a minimum, the canoe name, weight, length, width, depth, thickness, and color, as well as the engineering properties of the concrete (unit weight and strength) and the type(s) of reinforcement used. Significant innovative features of the canoe’s design, construction and project management shall be summarized here.



- d. Hull Design (Page 1): At a minimum, the hull design section shall provide a description and justification for the designs considered and indicate if it is a direct copy of an existing canoe, a minor modification of an existing canoe, or a new design. Provide a description of and the reasons for the selected hull geometry (rocker, chine, shape, etc.) including all applicable dimensions.
- e. Analysis (Page 2): Present the method(s) of analysis used to determine the structural and material design requirements. Include quantitative results from your analysis of forces, stresses, etc. Describe loading cases, support conditions, assumptions, and analysis tools used. Include the material property values for the concrete, reinforcement and composite that must be achieved according to your structural analysis. If applicable, discuss how requirements for bulkheads, thwarts or other structural elements are determined.
- f. Development & Testing (Pages 3 and 4): Present concrete and reinforcement materials considered, tested, and actually used in the construction of the canoe. Describe the method(s) used for testing. Use and refer to standard test methods where possible. Describe the initial (e.g. the baseline) concrete and reinforcement materials considered and why. Include quantitative test results from this baseline. If this is not the final mix and reinforcement used in the construction of the canoe, discuss the adjustments in material types and proportions considered and why. Describe the iterative process of going from your baseline to achieving the desired material and composite properties. Include the final concrete, reinforcement and composite test results. Compare the final material properties and proportions to the design specifications determined from your analysis presented on page one of this report.
- g. Project Management & Construction (Page 5): Present the method(s) of project management and construction used. List major milestone activities and how these were achieved. Compare the planned dates with the actual dates for these major milestone activities and discuss the variances (if any). Present critical path activities and describe how this critical path was determined. Describe the organizational structure of project team and why this structure was chosen. Provide the number of man-hours dedicated to the design, testing and construction of the canoe. Describe the process used for form material selection, form construction, placement of concrete and reinforcement, form removal and concrete finishing. Include the manufacturer's recommendations for items such as, but not limited to, the application of paints, stains, and sealers.
  - 1) Organization Chart (Page 6): Include a project team organization chart with team member names, role(s), tasks, or areas in which they made contributions at any time during the project.
  - 2) Project Schedule (Page 7): Include a project schedule with all major activities and milestones and clearly denote all activities on the Critical Path.

- 3) Design Drawings with Bill of Materials (Pages 8 and 9): Include one design drawing and bill of materials for the form and another for the hull. (Examples are given in Figures III.A.5.a and III.A.5.b. The title block and bill of materials can differ in appearance as long as they are in a standard engineering format.) The canoe/school name is not required to appear on the hull drawing.
- Page eight (8) – The drawing shall show elevation, plan, and typical cross-section views of the form or formwork with dimensions and other detail as desired. A bill of materials listing all material quantities used to construct the form shall also be displayed on this page. Up to five (5) general notes highlighting specific details relevant to the form or formwork may be added. The optimum balance between being thorough and being concise is desired.
  - Page nine (9) - The drawing shall show elevation, plan, and typical cross-section views of the hull with dimensions and other detail as desired. If a bulkhead, thwart, rib or similar structural element is used the cross-section shall be at a location with the structural element present. Show hull thickness, reinforcement, concrete, spacing, and connections. A bill of materials listing all material quantities used to construct the hull shall also be displayed on this page. Up to five (5) general notes highlighting specific details relevant to the hull design, concrete, reinforcement, and/or construction of the canoe may be added. The optimum balance between being thorough and being concise is desired.
- h. Appendix A – References: Parenthetical references following the format of *ASCE Author’s Guide to Journals, Books and Reference Publications* shall be used to document the sources of material not the author’s own such as facts, ideas, quotations and paraphrases. Papers using plagiarized material or failing to document sources appropriately shall be disqualified without appeal.
- i. Appendix B – Mixture Proportions: For each of the final concrete mixture(s) used in the actual construction of the canoe, a “Summary of Mixture Proportions” (Table II.B.1.) shall be provided. Summaries of trial designs not used in the construction of the canoe are not permitted. One separate page for each summary shall be used.
- j. Appendix C – Repair Procedures Report or Reconstruction Request (*if necessary*): In the event that the qualifying canoe is damaged during or after the Regional Competition and if repair is required (see Section II.A.2.), either a “Repair Procedures Report” or “Reconstruction Request” shall be included as an appendix to the report. The “Repair Procedures Report” or the “Reconstruction Request” can be requested by email from [cncce@ermail.asce.org](mailto:cncce@ermail.asce.org). If a “Reconstruction Request” is required, then the CNCCC disposition and supporting documentation shall be presented in Appendix C, as well. (*Note: Reports submitted for Regional Competitions will not required this appendix*)

- k. Back Cover: This cover shall be left blank.
6. The report shall not contain any other information or documentation other than what has been outlined in Section III.A.5. (a. through k.). This includes, but is not limited to, any hand calculations, technical data sheets, material safety data sheets (MSDS), testing results, or concrete mix designs not used in the canoe.
7. Compliance Certification: Accompanying the submission of the design reports shall be original and signed copies of a single-sided, one-page compliance certification. The compliance certification is to be a separate, one page document aside from the Design Paper. The certification shall be presented on an 8 ½” by 11” page in either portrait or landscape orientation. There are no margin requirements. Body text shall be in English and use 10- or 12-point, normal width, Times New Roman or Arial font. Any headings and subheadings may be of any font type or size. The following must be included at the minimum:
- a. School Name and Canoe Name
  - b. A statement certifying at a minimum that 1) the construction of the canoe has been performed in complete compliance with the rules and regulations of the National Competition; 2) the ten (10) registered participants to be registered at the National Competition are qualified student members and National Student Members of ASCE as specified in the rules and regulations of the National Competition; and 3) the canoe has been completely built within the current academic year of the competition.
  - c. The names and ASCE National Member ID Numbers of the ten (10) registered participants. In the event that a student has not been issued a member number but has filed an application for membership, “Member Number Pending” shall be listed.
  - d. A table summarizing the following dimensions and parameters of the concrete canoe: maximum length, maximum width, maximum depth, average thickness, overall weight; concrete unit weight; and concrete compressive and tensile strengths. All dimensions shall be in English units and reported in feet and inches. The overall weight of the canoe shall be rounded to the nearest pound. The concrete unit weight and strengths shall be reported in both English and SI units to the accuracies outlined in the industry standards (e.g., ASTM C39, C138, C109 and C496, etc.). The day of testing (i.e., 7-day, 28-day, etc.) for the reported strengths shall also be denoted.
  - e. Each original copy of the compliance certification shall be signed and dated by one (1) team captain and one (1) faculty advisor verifying that the aforementioned information is valid. The phone number and e-mail address for both the team captain and the faculty advisor shall be provided. The faculty advisor may be either the faculty member that serves as a technical advisor to the team or the advisor of the school’s ASCE Student Chapter/Club.

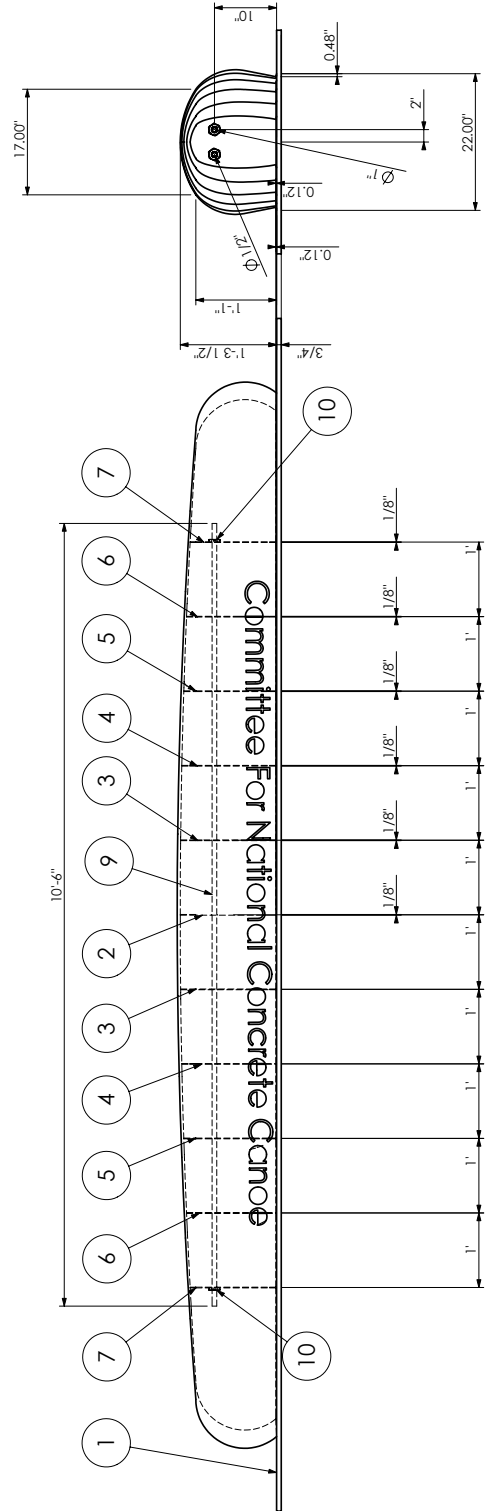
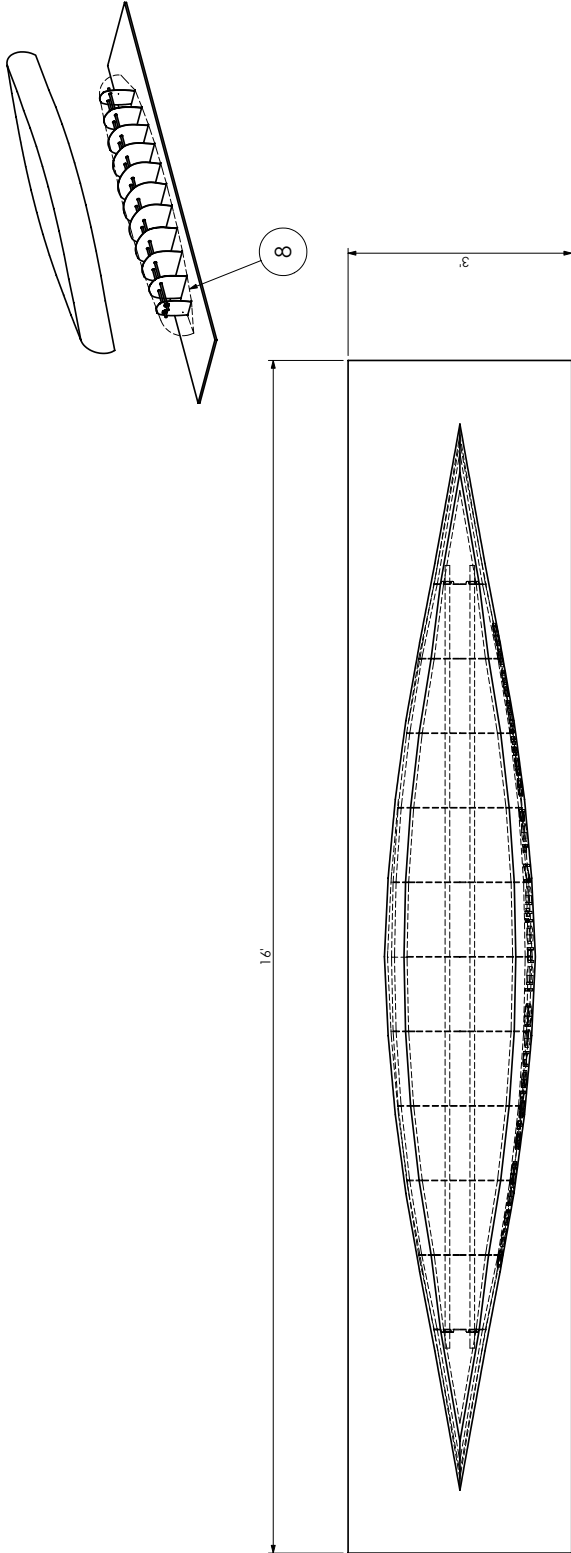
- f. Failure to include this compliance certification with the submittal of the Design Paper will result in an automatic deduction of 25-points on the Design Paper scoresheet.
8. For the National Competition, each school shall provide twelve (12) bound, one (1) unbound, and one (1) electronic copy of the design report, and two (2) unbound, original and signed copies of the compliance certification. The electronic copy of the report shall be in Adobe Acrobat PDF format and copied to a compact disc (CD). All copies of the design report and the compliance certification must be received by the date specified in the registration materials as published on the official NCCC web site. *(Note: The number of reports required and submission deadline date for the Regional Competitions shall be determined by the regional host schools.)*
9. Scoring for each of the major sections (III.A.5.a. – III.A.5.k.) comprising the body of the report shall be based on the criteria in Section VII.A.
10. All papers shall become the property of ASCE and Master Builders and may be used for publication and/or distribution.

# CNCCC

ITEM NO.	QTY.	PART NO.	DESCRIPTION
1	1	base mold	3/4" thick Plywood
2	1	m-1	Mesonite
3	2	m-2	Mesonite
4	2	m-3	Mesonite
5	2	m-4	Mesonite
6	2	m-5	Mesonite
7	2	m-6	Mesonite
8	12	Fills	Styrofoam
9	2	rod	7/8" D. Treaded rod
10	4	Nut	1.5/16" D center lock nut

REV.	DATE	REV NO.	DETAILS OF REVISIONS	BY

ENGINEER: \_\_\_\_\_ DATE: \_\_\_\_\_  
 DRAWN BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
 CHECKED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
 JOB NAME: \_\_\_\_\_

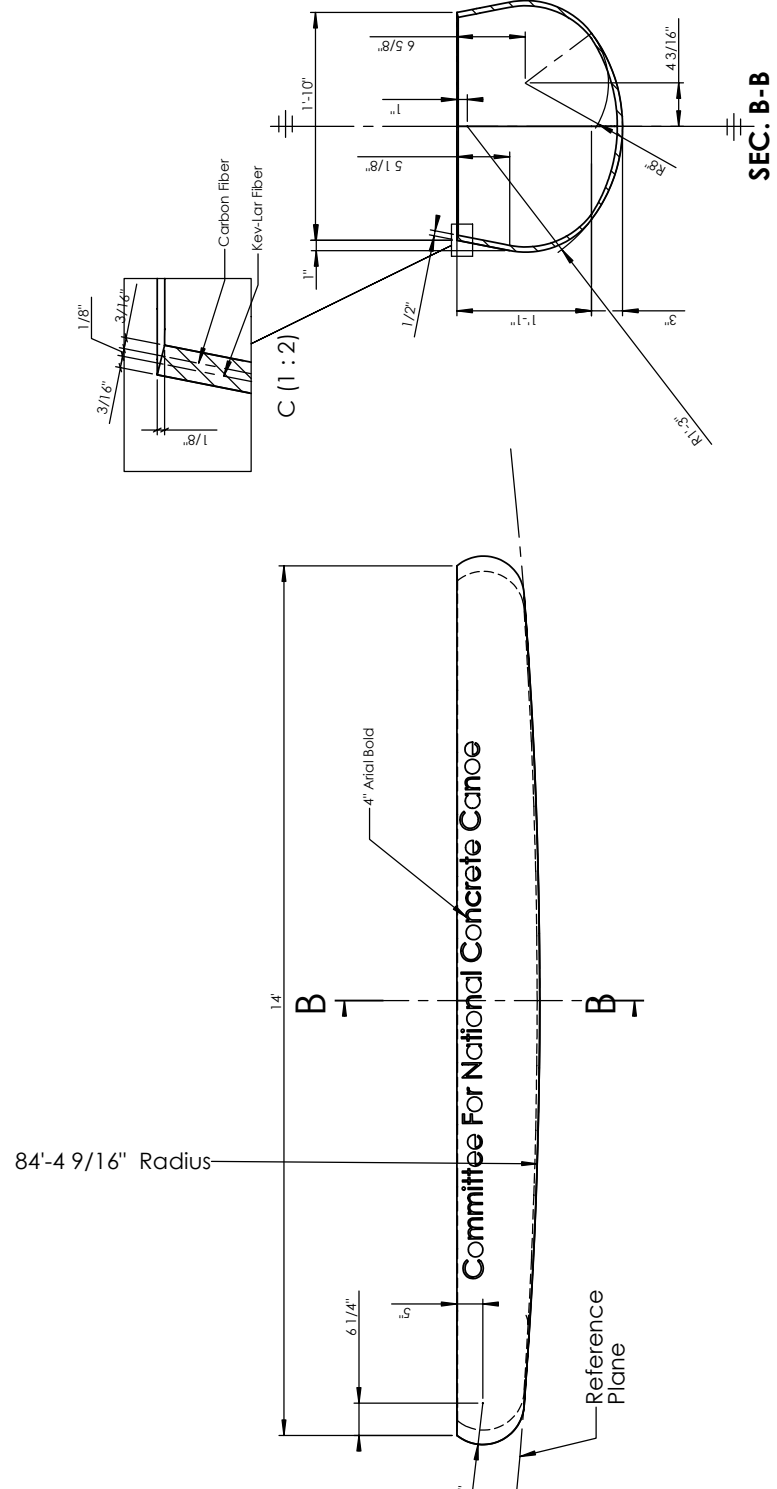
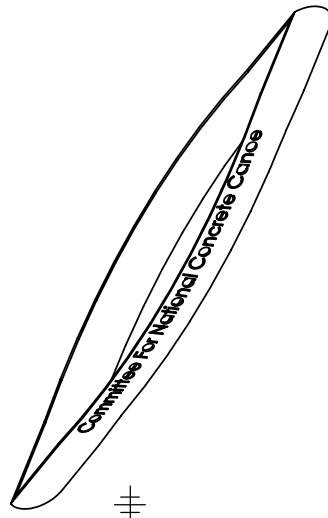
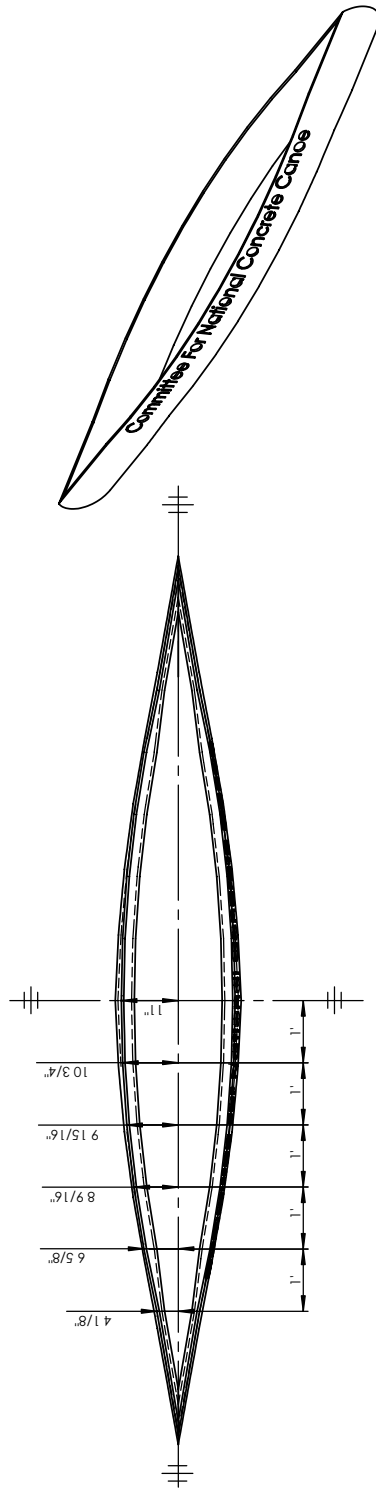


# CNCCC

QTY.	PART NO.	DESCRIPTION
1	Kev-Lar	664.45 sq. in.
1	Carbon Fiber	664.45 sq. in.
		Mass = 253.42 pounds
		Volume = 2919.61 cubic inches

REV.	DATE	BY	DETAILS OF REVISIONS

ENGINEER: \_\_\_\_\_ DATE: \_\_\_\_\_  
 DRAWN BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
 CHECKED BY: \_\_\_\_\_  
 JOB NAME: \_\_\_\_\_



## B. Oral Presentation

1. An oral presentation (maximum of 5 minutes) shall be required for each participating school. Oral presentations shall be presented in English. An additional seven (7) minute period shall be permitted for judges' questions immediately following the oral presentation. The time required to set up equipment shall not exceed four (4) additional minutes for each school and the time required to take down shall not exceed four (4) minutes for each school.
2. A fifteen (15)-point penalty shall be assessed when the official time exceeds 5 minutes 5 seconds (5:05) per the official timer's clock during the oral presentation. Additional fifteen (15) point deductions shall be assessed for each minute or fraction thereof the presentation extends beyond the five-minute allocation, i.e., at 6:00 minutes, 7:00 minutes, etc.
3. Presenters may be any of the ten (10) registered participants who officially sign-in at registration. Teams shall make a live presentation. The use of video shall be permitted. Teams shall not pre-record any speaking parts. No handouts or other materials shall be given to the judges as part of the oral presentation. All team members participating in the presentation shall be on stage and available for judge's questions.
4. The host school shall provide two (2) grounded power plugs, two (2) projector screens, and a computer projection unit for general use during the oral presentation. The host school shall provide a stage diagram two weeks prior to the competition. Access to the staging area may be limited. The ability to use props may be limited by this restricted access. The individual school making a presentation shall furnish any additional equipment necessary.

## C. Final Product

1. The final product and cross section shall be consistent with the design report and oral presentation.
2. Final product assessment consists of assigning a score to the canoe based on its aesthetic appeal and penalties based on durability.
3. Reconstruction Requests
  - a. In the event a school's canoe is damaged and is not usable at the National Competition, the school shall submit a "Reconstruction Request" within five (5) business days of the occurrence of the damage per Section II.A.2.
  - b. The school must justify that a complete reconstruction is required. The school shall submit the "Reconstruction Request" form and supporting documentation to the CNCCC in order to justify to the CNCCC that reconstruction is required. The supporting documentation should include pictures, signed written explanation of events, police reports (if any) and other relevant documentation.

- c. The CNCCC shall offer a disposition on the request and either grant or decline permission to reconstruct the canoe for the National Competition. The disposition of the CNCCC is final and shall not be appealed.
- d. In the event the school is declined permission to reconstruct, the designated alternate ASCE Student Chapter/Club concrete canoe team from that region will be offered an invitation to the National Competition.
- e. In the event the school is granted permission to reconstruct the following applies:
  - i. The school shall receive a 50% deduction of Final Product Points at the National Competition.
  - ii. The school shall include the “Reconstruction Request,” CNCCC disposition, and supporting documentation in the Design Paper as an appendix. Failure to include all this information will result in an additional 25-point deduction from the final Design Paper score.
- f. Failure to comply with these requirements will immediately disqualify the team from the National Competition.

#### 4. Repairs

- a. In the event that the qualifying canoe is damaged between the Regional and National Competitions, the Chapter/Club may patch, repair and refinish the canoe.
- b. For any repairs made, a completed “Repair Procedures Report” form, signed by the team captain and the faculty advisor, must be received by the CNCCC within five (5) business days of the Regional Competition. This report will include a description of why the repair is required and a description of the repair procedure that was followed as well as a description of the region that is being repaired.
- c. This “Repair Procedures Report” shall be included in the Design Paper as an appendix. Failure to include the “Repair Procedures Report” will result in a 25-point deduction from the final Design Paper score.

#### 5. Aesthetics

- a. For aesthetics judging, all canoes will be assembled in a common area. Each team shall bring its canoe cross-section and display it with the canoe at this time. Teams will also be required to bring their seats to the final product judging for measurement check. The team Engineer’s Notebook (see Section III.C.7.) shall be presented at this time and all teams will be prepared to demonstrate that their reinforcement scheme(s) is in compliance with Section II.B.5.b.



- b. Canoes shall be displayed on display stands designed to support the canoe at a clear height of 2.5 to 4 feet below the canoe. No lighting, sound, or canopies shall be permitted.
- c. Prior to aesthetics judging, each team captain will receive a rating sheet that lists each canoe in the competition with the numbers 1 through 10 to the right of each canoe name. Each team shall use this sheet to record their assessment (e.g. a value between 1 and 10) of each canoe's aesthetic appeal. A team shall not rate its own canoe.
- d. Each team shall decide for itself the criteria used to judge aesthetic appeal and how to arrive at a rating for any particular canoe. Each team shall then assess a value from 1 (least appealing) to 10 (most appealing) by circling the appropriate number. Intermediate values, such as 6.5, are not allowed on student score sheets. Completed sheets are to be turned in to the appropriate competition official at the end of aesthetics judging.
- e. Any attempt to influence the votes of other teams is not allowed and is cause for disqualification and immediate dismissal from the event. Judges' decisions regarding this are final and may not be appealed.
- f. Teams are to assess canoes for aesthetics based on aesthetic appeal of the canoe only. Criteria may include but are not limited to surface finish, hull design, quality of materials, quality of workmanship, aesthetics, innovation, and name selection. Canoe cross-sections, stands, or seats are not to be included in the team assessment
- g. Each judge shall also receive a rating sheet and shall also assess the aesthetics of a canoe based on his/her own criteria, but in accordance with the Final Product scoresheet, VII.C. The judges shall score aesthetics based on 1-100 points.
- h. For each canoe in the competition, there shall be one aesthetics score from each judge and one combined averaged score from the other teams. The score from the teams shall be calculated as the average of all team assessments submitted by the team captains for each entry. See Section VI for more on scoring of aesthetics.

6. Durability

- a. During the race event repairs can be made only with tape.
- b. If a tape repair is required to continue racing, the school will automatically receive a 25-point deduction on the Final Product Score Sheet.
- c. The CNCCC will inspect for tape usage as a repair material, this rule does not apply to a gunwale cap cover retention device.

- d. Canoes must complete all preliminary sprint and endurance events. Failure to do so will result in a 25-point deduction on the Final Product Score Sheet
- e. Canoes should be tough enough to survive the rigors of the Regional Competition, the National Competition, and transport.
- f. Should damage to canoe occur due to collision with other canoes or due to other circumstances beyond the students' control the 25-point deduction for a tape repair will not be assessed.

7. Engineer's Notebook

Each team shall provide one (1) copy of an Engineer's Notebook and present it during the judging of the Final Product. The Engineer's Notebook shall contain only the information and documentation as outlined below. No additional information such as, but not limited to, structural calculations, testing results, or concrete mix designs not used in the canoe shall be added to the notebook. All pages shall be 8 ½" x 11", with tabs (separators) and contained within a 1" or 1½", three-ring binder. The following materials in the following order shall be provided:

- a. Table of Contents (include school name and canoe name at the top of the sheet)
- b. Tab A – Compliance Certification: Provide one (1) copy of the compliance certification (see Section III.A.7.). The certification may either be an original copy or a photocopy as long as signatures of both the team captain and faculty advisor are present.
- c. Tab B – References: Provide the references used in the design report following the format outlined in Section III.A.5.h.
- d. Tab C – Construction Photographs: Provide photographs highlighting the construction of the concrete canoe. Photographs shall be limited to two (2) per single-sided page. The photographs may be color or black/white, digital or film, with captions provided. A total of sixteen (16) photographs are required with a breakdown as follows:
  - 1) Six (6) of mold construction showing the fabrication of cross sections, assembly of the mold and the application of any coatings prior to canoe construction.
  - 2) Six (6) of canoe construction showing concrete placement, reinforcement installation and if applicable, flotation placement.
  - 3) Four (4) of finishing techniques depicting any sanding/patching and the application of paint, sealer and/or graphics.

- e. Tab D – Gradation Curve for the Concrete Aggregate(s): Provide the gradation (percent finer vs. diameter) of the aggregates used in the final mix design. Gradations of several aggregates may be placed on the same figure.
- f. Tab E – Hull Thickness and Reinforcement Calculations (limit of 2 pages): Present the measurements and calculations of the reinforcement(s) and hull thickness for the various canoe elements (i.e., walls, ribs, gunwales, thwarts and bulkheads) as applicable (see Section II.B.5.c.). Provide a sample of the reinforcement(s) used. Samples may be inserted in plastic sheeting or attached to a piece of cardstock or similar backing material and placed in the notebook. Samples shall not count towards the page limit.
- g. Tab F – Material Safety Data Sheets (MSDS): Present MSDS (see Section II.E.3) for each of the materials used in the construction of the canoe, including but not limited to binders (other than cement), aggregate (other than natural or manufactured sands), chemical admixtures, paints, stains and sealers. Originals or photocopies are acceptable.
- h. Tab G – Material Technical Data Sheets (MTDS): Present MTDS for each of the materials used in the construction of the canoe, including but not limited to binders (other than cement), aggregate (other than natural or manufactured sands), chemical admixtures, paints, stains and sealers. Originals or photocopies are acceptable. Please note the Material Technical Data Sheet related to products is not the same as a Material Safety Data Sheet.
- i. Tab H – FAQ: Provide a copy of the final summary of the “Frequently Asked Questions” with responses (see Section I.L.). This summary will be sent out via the NCCC list server on or about March 1, 2004.
- j. Tab I – “Repair Procedures Report” or “Reconstruction Request”: Provide one (1) copy of either the “Repair Procedures Report” or “Reconstruction Request” (see Section II.A.2. and Section III.A.5.j.) if necessary. If a “Reconstruction Request” was required, provide a copy of the CNCCC disposition and all supporting documentation. *(Note: At Regional Competitions, Tab I is not required).*

## IV. Race Rules & Regulations

### A. General Rules

1. Five (5) races shall be held: women's slalom/endurance (2 women), men's slalom/endurance (2 men), women's sprint (2 women), men's sprint (2 men), co-ed sprint (2 men and 2 women).
  - a. Schools shall use the same team members in both the preliminary and final heats of any particular race.
  - b. In the event that a paddler is injured prior to a preliminary race, a substitution may be made. Such a substitute paddler shall be one of the original five (5) of the same gender registered on the team.
  - c. In the event of an injury that prevents a paddler from further competition after the preliminary race has been completed, the injured person or a substitute shall be in the canoe in subsequent races. However, this person or these persons shall not be allowed to paddle. Substitute paddlers shall be one of the original five (5) of the same gender registered on the team.
  - d. In the event that a team cannot field the proper number of paddlers of the required gender, substitute passengers of opposite gender shall be allowed, but these substitutes shall not be allowed to paddle. Substitute passengers shall be of the team's registered participants.
2. Presentation order, lane position and heat assignments shall be randomly selected before the competition begins and shall be provided at registration. Course and turn directions shall be announced as soon as they can be determined by the course layout and site conditions.
3. Canoes competing in the distance races shall compete against the clock in a timed single event. All other races shall include timed preliminaries, a grand final and a petite final based on the top ten qualifying times from the preliminaries. Points shall be awarded based on the finish times in the finals. In the event that finals cannot be conducted or the host school determines before the race competition starts that separate finals heats will not be run, the preliminary times shall be used as the final times. If a grand or petite final entry becomes disqualified, scratched, or cannot finish the final, all positions below that finisher shall move up one place in the ranking. This includes the next highest qualifier from the preliminaries.
4. Commonly accepted rules of sportsmanship shall prevail. Any canoe willfully interfering with the performance of any other canoe or participant in a race shall be automatically disqualified from that event.
5. If interference occurs, a team captain may protest to the CNCCC. The CNCCC will then present the information to the judges who:
  - a) Shall disqualify a team that has willfully interfered with another.

- b) Shall disqualify any canoe that willfully fails to adhere to course boundaries resulting in interference with another canoe.
  - c) Shall allow any team(s) directly affected by interference the option to rerun the heat in a timed event. Times from the rerunning of the heat shall be used as the official time for the heat. Heats shall be rerun after a minimum of ten (10) minutes.
- 6. Requests for rule interpretations and/or protests during the National Competition shall be presented to the CNCCC by the designated team captain(s). Such request or protest must be lodged before the start of the next heat or in the case of the distance races, before the next three canoes finish the race. Protests shall be made by a team captain as defined in Section I.F. The CNCCC's and the judges' decisions concerning all aspects of the race and judging shall be final.
  - 7. Spectators interfering with the performance of contestants shall be asked to leave and may cause the disqualification of affiliated contestants.
  - 8. Contestants or spectators interfering with the performance of the competition, judges' ruling, or protests, may cause the disqualification of the affiliated school.

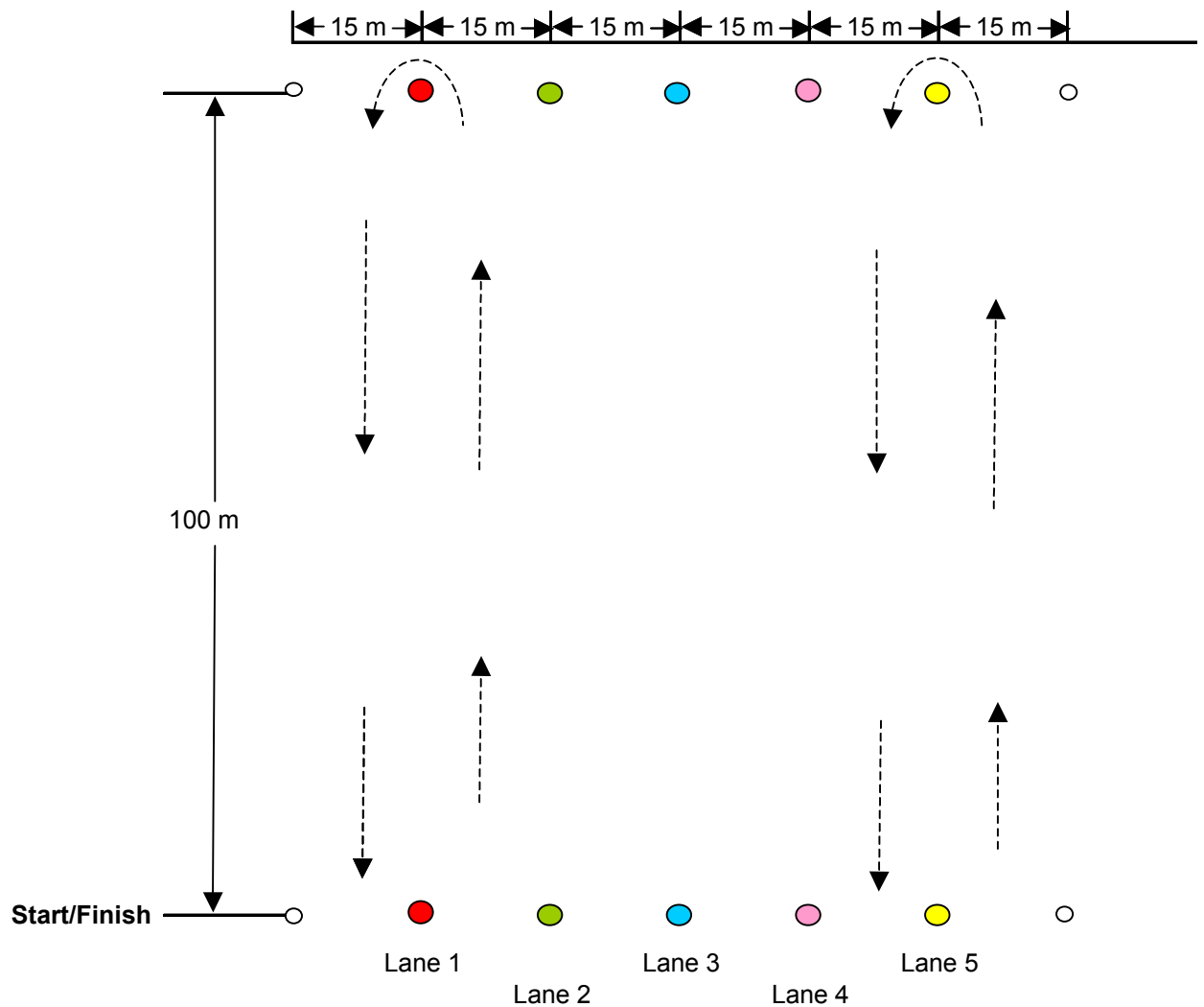
B. Safety

- 1. **A powered rescue boat shall be on the water during all the races. If a powered rescue boat is not available, the races shall not take place.**
- 2. Any entry deemed unsafe or hazardous by the judges shall not be permitted in the water unless corrective measures are taken. If corrective measures are not or cannot be made the entry shall be disqualified from further competition. If repairs must be made to an entry prior to any race, the judges may allow the entry to reschedule for a later heat, but prior to the next event.
- 3. All canoes shall be able to pass a flotation test before entry in any race. The canoe shall float when filled with water; otherwise, it shall not be permitted to compete. If flotation materials are necessary to pass the flotation test, the canoe shall contain these same flotation materials during the race.
- 4. Paddlers shall wear US Coast Guard-approved life jackets at all times while in a canoe during competition and/or practice.
- 5. There shall be strict enforcement of racing etiquette by the CNCCC and the judges. Any use of paddles to strike at an opponent's canoe, or at any person, shall cause the disqualification of the offending team from the event. Good sportsmanship, cooperation, fellowship, and the spirit of competition shall be strictly adhered to.
- 6. Containers or objects not required for canoe operations shall not be permitted in canoes. Spare paddles are permitted.

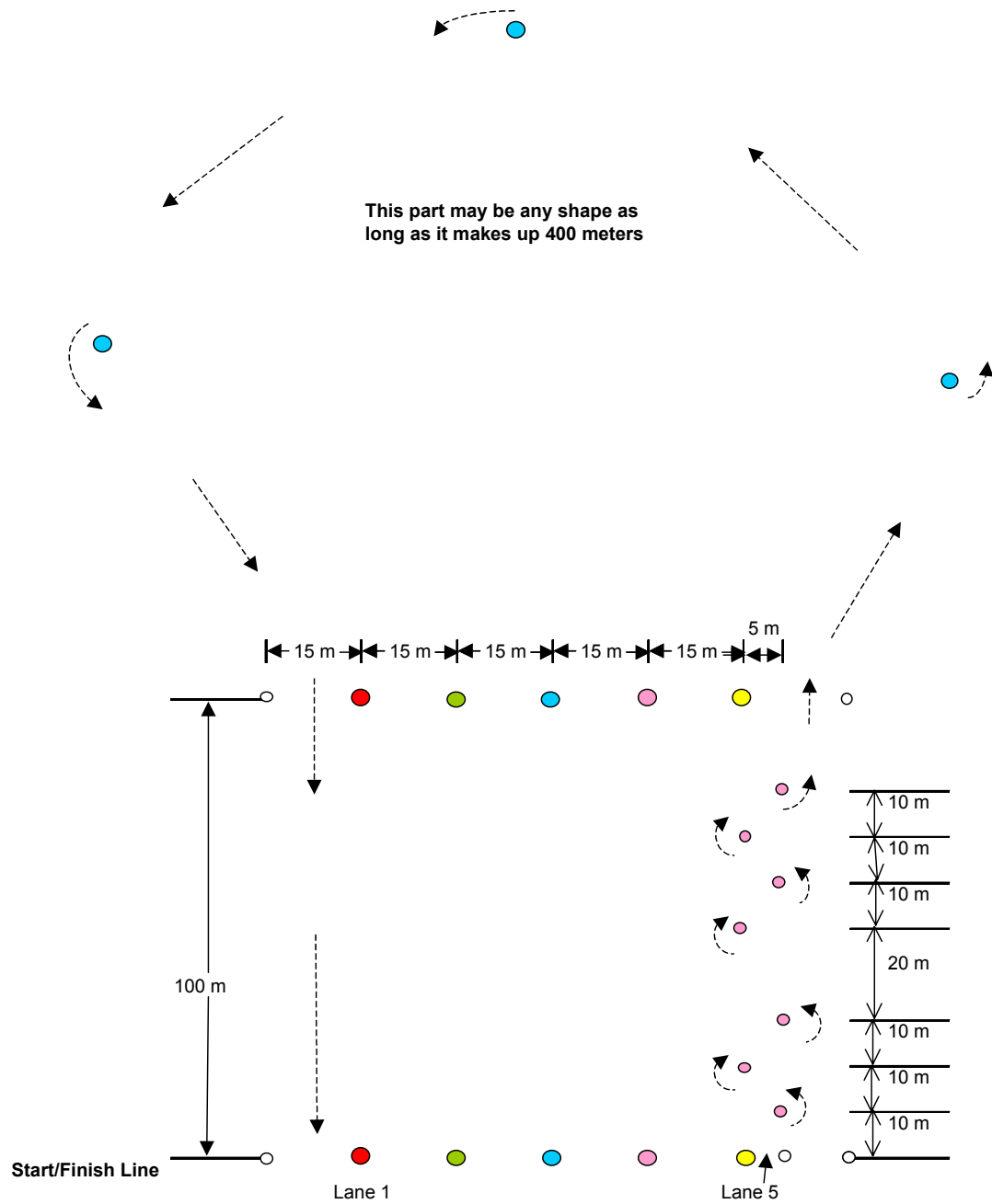
7. All paddlers shall be competent swimmers.
8. A safety director shall be located in a strategic position to observe the activities, especially those near the starting and docking area. The safety director is responsible for stopping all activities involving violations of any of the safety rules.
9. All materials used to coat the exterior of the canoe prior to racing shall be environmentally safe. The materials data sheet for any exterior coatings shall be made available to competition officials upon request.

C. Race Course

1. The slalom/endurance course shall consist of the following subject to site conditions:
  - a. A total of 600 meters in distance with a minimum of two (2) turns.
  - b. At Regional Competitions the course shall begin with a slalom course consisting of seven (7) buoys. Each slalom buoy shall be staggered 5 meters transversely from each other. Buoys shall be longitudinally spaced at 10 meters with 20 meters between the third and fourth buoy.
  - c. At the National Competition the CNCCC reserves the right to modify the location and layout of the slalom portion of the course.
2. A sprint course shall consist of the following subject to site conditions:
  - a. Straight course 100 meters out, a 180-degree turn, and 100 meters back.
  - b. Lanes shall be no narrower than 15 meters.
3. The bow of the canoe shall remain the bow of the canoe throughout each race in consideration of a successful negotiation of a turn or finish buoy.
4. Different colored buoys shall mark the race course lanes. See Figure IV.C.1. and Figure IV.C.2. for recommended course layouts subject to site specific conditions and limitations.



**Figure IV.C.1.**  
**Sprint Race Course Layout**



**Figure IV.C.2.**  
**Slalom/Endurance Race Course Layout**



#### D. Race Penalties

1. A canoe's time shall not be considered final until all buoys have been properly negotiated or the corresponding penalty has been assessed as defined below:
  - a. A canoe that crosses the finish line in the wrong lane shall be assessed a 30 second time penalty for that particular event.
  - b. A canoe that misses one or more slalom buoys may renegotiate the buoy or be assessed a 1-minute time penalty per buoy missed.
  - c. A buoy is successfully negotiated when the entire canoe passes on the proper side of the buoy. A canoe may touch a buoy but the top of the buoy must stay above the waterline on the proper side of the canoe until the canoe has entirely passed.
  - d. With the exception of the allowance to renegotiate the slalom buoy or accept a time penalty, all other turn buoys must be properly negotiated or the school shall be disqualified for that particular event. Teams must properly negotiate all turn buoys in the endurance race. A sprint turn must be negotiated within the assigned lane.
  - e. For a canoe to successfully finish a given race, the bow of the canoe must cross the finish line with the same number of paddlers (in or touching the canoe) with which the race began.
  - f. Paddlers shall remain in the boat or touching the boat throughout the race. Safety officials reserve the right to use their best judgment to remove a swamped canoe and paddlers from the race course if the situation warrants.

## V. National Qualifying Rules

To maintain the competition of the event in addition to creating a more uniform system for national qualification, it shall be mandatory that the Regional Competitions adopt and comply with the following sections of the National Rules.

- A. Section I: General Rules and Eligibility Requirements; All except A - E, H.
- B. Section II: Design and Construction Requirements; All.
- C. Section III: Academic Requirements; All except A.10.
- D. Section IV: Race Rules and Regulations; All
- E. Section VI: Scoring; All. However only one canoe from a school may accumulate points for selection for the National Competition. Participation is encouraged at the Regional Competitions; however, additional canoes from one school cannot take points away from other competitors. If a school participates with more than one canoe, the canoe that will accumulate points must be so designated before any judging of any aspect of the competition and before any racing occurs.
- F. Appeal Process - The Regional Competition judges shall settle all protests from their competition, decide the Regional Competition winner, and distribute awards based on scores that have been checked and ratified by the Head Regional judge. This is the only formal appeal process available for the Regional Competition. There is no appeal process for the National Competition. (See Section I.P.)
- G. Concrete Canoe Competition team members at the Regional Conferences shall be members of an ASCE Student Chapter or Club affiliated with their university. Registered participants for the National Concrete Canoe Competition shall be National Student Members of ASCE and shall provide valid ASCE ID numbers with the submittal of the registration materials. Team members that do not provide valid ASCE ID numbers will not be allowed to participate as registered participants.

## VI. Overall Scoring

A. Scoring is divided into four events:

Event	Maximum Competition Points
1. Academic Judging - Design Paper	25
2. Academic Judging - Oral Presentations	25
3. Academic Judging - Final Product	25
4. Races (5 races)	25
	100

B. Competition Points for Events 1-3 above are awarded per Section VII, Scoring sheets.

1. For the Design Paper and the Oral Presentation events - if five (5) judges are present, then the high and low score for each entry shall be discarded and the middle three (3) scores averaged to determine the overall score for the entry. If fewer than five judges are present then all scores shall be averaged for the entry.
2. For the Final Product judging, team captains shall submit to the scorekeeper an aesthetics score for each entry, except their own, in the competition. The scores for each entry shall be averaged and this average will be multiplied by 10 for each entry to be equal in weight to a judge's score. This shall be referred to herein as the "peer average." To determine the aesthetics score the high and low score of each judge's score shall be discarded (if there are five (5) judges present – if less than 5 judges are present, all judges' scores will be used) and averaged with the peer average for each entry. For example, if there were five regional judges, the high and low judges' scores would be disregarded and the middle three scores and the "peer average" score would be averaged together. If there were four regional judges, all four scores and the "peer average" score would be averaged, discarding none. These scores are treated as equal value when averaged.

C. Placing for each event shall be determined by the ranking of the overall scores.

1. For the Design Paper and the Oral Presentation, if five judges are present and a tie occurs in any of the academic events (Events 1 through 3), then the average of all scores for those tied schools will be used in an attempt to break the tie for that event.
2. For the Final Product Judging, if a tie occurs, the average of all aesthetic scores for an entry will be used to calculate new final product points, in an attempt to break the tie for that event.
3. If the tie cannot be broken by these methods in any of these events, competition points shall be determined by dividing points for the positions involved in the tie. For example, if a second place tie occurs in the design paper event, points for second and third places will be averaged and awarded to the tied teams. The team with the next highest score will receive points for fourth place.

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

$$TBS = \frac{\frac{25}{100}(\sum DPP) + \frac{25}{100}(\sum OPP) + \frac{25}{100}(\sum FPP)}{NOJ} + RP$$

where: *DPP* = design paper product event points for a given judge (Table VII.A.), *OPP* = oral presentation event points for a given judge (Table VII.B.), and *FPP* = final product event points for a given judge (Table VII.C.), *NOJ* = number of judges, and *RP* = unmodified race points. **No judge's score shall be dropped when calculating these points even if five judges are present.** The calculation of the *TBS* shall not change the standings for team placement in any given academic scoring part. Of the teams tied for overall winner or overall second place, the team with the highest *TBS* shall be awarded the place in contention.

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

Competition points will be allotted per place according to the following table:

Place	Academic Events			Race Events		
	Design Paper	Oral Pres.	Final Product	Slalom/Endurance	Men's & Women's Sprints	Coed Sprints
First	25.0	25.0	25.0	5.0	4.5	6.0
Second	22.5	22.5	22.5	4.5	4.0	5.4
Third	20.0	20.0	20.0	4.0	3.6	4.8
Fourth	17.5	17.5	17.5	3.5	3.1	4.2
Fifth	15.0	15.0	15.0	3.0	2.6	3.6
Sixth	12.5	12.5	12.5	2.5	2.2	3.0
Seventh	10.0	10.0	10.0	2.0	1.8	2.4
Eighth	7.5	7.5	7.5	1.5	1.4	1.8
Ninth	5.0	5.0	5.0	1.0	0.9	1.2
Tenth	2.5	2.5	2.5	0.5	0.4	0.6

- E. No points shall be given for the preliminary or qualifying heats unless unforeseen circumstances prevent the running of the final heats or the host school determines before the race competition starts that separate finals heats will not be run. For the slalom/endurance race, no points are awarded a team that does not finish or does not race. For all sprint races, if a team qualifies for a final event but cannot start an event, that team does not receive points and the team's slot is conceded to the team with the next best preliminary sprint time. For final sprint races, if a team starts a race in a canoe deemed

race-worthy by the judges, but is unable to complete the race, they are awarded the points corresponding to completing the race last in their final.

- F. Summary of Deductions/Disqualification: These deductions may also be referenced in other sections of the rules and/or the scoring sheets. Moreover, in accordance with Section II.A.1., judges may make additional deductions if a situation not covered specifically by the rules arises.
1. Teams may be disqualified for the following:
    - a. Failure to follow student eligibility requirements (Sections I.E. & I.F.).
    - b. Violations under the Spirit of the Competition (at the discretion of the CNCCC and/or Judges (Section I.O.)).
    - c. Failure to follow academic year, rebuilding, and reinforcing material requirements (Sections II.A.2., II.B.1.-5.).
    - d. Sportsmanship and interference requirements (Section IV.A.4.-8.).
    - e. Failure to follow safety rules (Sections II.F. and IV.B.).
  2. Deductions from Section III.A., Design Paper (Section VII.A., Scoring Sheet): as prescribed on the scoring sheets.
  3. Deductions from Section III.B., Oral Presentation (Section VII.B., Scoring Sheet): as prescribed on the scoring sheets.
  4. Deductions from Section III.C., Final Product (Section VII.C., Scoring Sheet): as prescribed on the scoring sheets.

## **VII. Scoring Overview**

- A. Design Paper
- B. Oral Presentation
- C. Final Product
- D. Summary Score

<b>VII.A. Design Paper</b>		<b>25% of Overall Score</b>	
School Name: _____ Canoe Name: _____		<b>Possible Points</b>	<b>Score</b>
<b>Hull Design</b> Hull Description and Justification (details the dimensions of the selected hull geometry and its effect on performance) (7 points) Depth of Research (3 points)		<b>10</b>	
<b>Analysis</b> Modeling (appropriateness of loading cases, applied loads, support conditions, model geometry) (5 points) Analysis (how the modeling was done) (5 points) Conclusions (appropriateness, validity, and importance of goal properties selected) (5 points)		<b>15</b>	
<b>Testing and Development</b> Testing program (tests used for individual materials and composite action and execution and validity of those tests) (5 points) Development (understands relationship between mix component properties and proportions and achieving design goal based on analysis) (5 points) Conclusions (appropriateness, validity, and importance of test results achieved) (10 points)		<b>20</b>	
<b>Project Management &amp; Construction</b> PM Application and Innovation (effectively understands and communicates CPM) (5 points) Construction Application and Innovation (construction process and techniques) (10 points) <b>Project Schedule</b> Completeness (per Section III.5.e.1.) (5 points) <b>Organization Chart</b> Completeness (per Section III.5.e.2.) (5 points) <b>Design Drawings</b> Clarity (ease of understanding the drawings) (5 points) Completeness (per Section III.5.e.3.) (5 points)		<b>35</b>	
<b>Mixture Proportions</b> Compliance (materials and proportions match rules) (10 points)		<b>10</b>	
<b>Overall Presentation</b> Effective Use of Graphics, Tables and Charts and Quality of Writing (5 points) Conciseness and Clarity (5 points)		<b>10</b>	
<b>Subtotal</b>		<b>100</b>	
<b>Deductions:</b>			
Failure to follow format, margin, page, and/or body text requirements: 5 to 50 points at the discretion of the judges			
Design paper over specified number of pages: 10 points/page			
Received after deadline: 5 points/day (based on calendar days, not business days)			
Not Specifying all information required in the Executive Summary: 5 points			
Missing Table of Contents and/or Executive Summary: 15 points			
Failure to add Repair Report ( <i>if necessary</i> ) as Appendix: 25 points			
Failure to add Reconstruction Request ( <i>if necessary</i> ) as Appendix: 25 points			
Failure to include Compliance Certification with Design Paper submittal (as separate document): 25 points			
Other failure to comply with these rules: Up to 100 points at the discretion of the judges			
Papers using plagiarized material or failing to document sources appropriately: Automatic Disqualification			
<b>Academic Judging - Part 1 Design Paper Total</b>			

School Name \_\_\_\_\_

<b>VII.B. Oral Presentation</b>		<b>25% of Overall Score</b>	
School Name: _____ Canoe Name: _____		<b>Possible Points</b>	<b>Score</b>
<b>Presenters</b> Preparation Level (8 points) Confidence (4 points) Voice Projection (4 points) Overall Demeanor (4 points)		<b>20</b>	
<b>Presentation Quality</b> Quality of Audio/Visuals (5 points) Content (20 points) Overall Performance (5 points)		<b>30</b>	
<b>Judges Questions</b> Expertise in Answers (35 points) Preparation Level (5 points) Confidence Level (5 points) Conciseness of Answers (5 points)		<b>50</b>	
<b>Comments:</b>			
<b>Subtotal</b>		<b>100</b>	
<b>Deductions:</b> Failure to observe time limit: A 15-point penalty shall be assessed when the official time exceeds 5 minutes 5 seconds (5:05). An additional 15-point deduction shall be assessed for exceeding each additional minute or fraction thereof on the official timer's clock, i.e., 6:00, 7:00, etc. (Section III.B.2.).			
Sponsorship or commercialism violation: 15 points			
Failure to adhere to live presentation format: Up to 100 points at the discretion of the judges			
<b>Academic Judging - Part 2 Oral Presentation Total</b>			

**School Name** \_\_\_\_\_



<b>VII.C. Final Product</b>		<b>25% of Overall Score</b>	
School Name: _____			
Canoe Name: _____			
<b>Aesthetics (1 to 100 points)</b>			
<b>Canoe workmanship:</b>	<b>20 points</b>		
<b>Exterior Finish:</b>	<b>20 points</b>		
<b>Interior Finish:</b>	<b>20 points</b>		
<b>Graphics:</b>	<b>10 points</b>		
<b>Quality of Lettering:</b>	<b>10 points</b>		
<b>Cross-section workmanship</b>	<b>20 points</b>		
Average student score multiplied by 10			
Judge 1			
Judge 2			
Judge 3			
Judge 4			
Judge 5			
<b>Final Product Points (0 to 100)</b>			
<b>Deductions:</b>			
No Final Product points shall be given for any of the following:			
Not built within current academic year.			
A canoe that does not race.			
A canoe that cannot finish all races prior to sprint finals.			
A canoe that cannot be raced safely or exited safely if swamped or overturned			
Improper finishing of canoe - Paint, appliqué, coating, or other materials violation			
Failure to provide Engineer's Notebook: 25 points			
Failure to provide reinforcement sand test: 50 points			
Failure to pass reinforcement sand test: 25 points			
<b>Cross Section:</b>			
Smaller than required: 25 points			
Does not properly represent the canoe: 50 points			
Failure to provide canoe cross-section at time of aesthetics judging: 75 points.			
<b>Academic Judging - Part 3 Final Product Total</b>			

School Name \_\_\_\_\_

<b>VII.D. Summary Score</b>		<b>100% of Overall Score</b>	
School Name: _____ Canoe Name: _____		<b>Possible Points</b>	<b>Score</b>
<b>Academic Judging - Part 1 Design Paper</b>		<b>25</b>	
<b>Academic Judging - Part 2 Oral Presentation</b>		<b>25</b>	
<b>Academic Judging - Part 3 Final Product</b>		<b>25</b>	
<b>Total Race Competition</b>		<b>25</b>	
<b>TOTAL SCORE</b>		<b>100</b>	

**School Name** \_\_\_\_\_

## **VIII. Awards and Recognition**

The winners of the American Society of Civil Engineers/Master Builders, Inc. National Concrete Canoe Competition shall be determined by compiling a team's total number of points from the academic and race portions of the competition. Master Builders, Inc. shall award a total of \$9,000 in academic scholarships to the winning teams' undergraduate civil engineering program. To be eligible to receive a scholarship, the entrant school must be a recognized ASCE Student Chapter/Club.

The local ASCE Student Chapter/Club shall determine selection of the academic scholarship winner(s). The academic scholarships shall be awarded to student member(s) within twelve (12) months of completion of the current years' national finals. The academic scholarship money shall be used toward satisfying tuition reimbursements only and shall not be used to fund current or future concrete canoe competitions. ASCE and Master Builders shall be notified in writing of academic scholarship winner(s) prior to distribution to recipients.

Total scholarship awards shall be distributed as follows:

1st place overall winner	\$5,000 scholarship and trophy
2nd place overall winner	\$2,500 scholarship and trophy
3rd place overall winner	\$1,500 scholarship and trophy

Special plaques shall be awarded to the top team in the following individual categories:

4th place overall winner	Commemorative Plaque
5th place overall winner	Commemorative Plaque
Best design paper	Women's slalom/endurance race
Best oral presentation	Men's slalom/endurance race
Best final product	Women's sprint race
Spirit of Competition	Men's sprint race

A special plaque in honor of R. John Craig, a former ASCE Committee on Student Services member who was a driving force behind the National Concrete Canoe Competition, shall be awarded to the team that has the best time in the coed race.

A special plaque in honor of Anthony P. (Tony) Chrest, a champion of the concrete canoe competitions on both the regional and national level, shall be awarded to the team that demonstrates superior and creative use of technology and materials in the construction of their concrete canoe. The winner of this award shall be selected at the sole discretion of Master Builders, Inc.

Ribbons shall be awarded to teams finishing second through fifth in each event. Each team shall receive a commemorative plaque for their participation in the National Concrete Canoe Competition. All ten registered team members in the National Concrete Canoe Competition shall receive a certificate of participation for the National Competition.

## IX. Past Winners and Host Schools

- A. 2003 hosted by Drexel University, Philadelphia, PA
  - 1. University of Wisconsin – Madison
  - 2. Université Laval
  - 3. University of California – Berkeley
  - 4. Clemson University
  - 5. University of Oklahoma
  
- B. 2002 hosted by University of Wisconsin – Madison, Madison, WI
  - 1. Clemson University
  - 2. Université Laval
  - 3. Oklahoma State University
  - 4. Western Kentucky University
  - 5. University of Wisconsin-Madison
  
- C. 2001 hosted by San Diego State University, San Diego, CA
  - 1. University of Alabama in Huntsville
  - 2. Clemson University
  - 3. Oklahoma State University
  - 4. Université Laval
  - 5. South Dakota School of Mines and Technology
  
- D. 2000 hosted by the Colorado School of Mines, Golden, CO
  - 1. Clemson University
  - 2. Oklahoma State University
  - 3. Florida Institute of Technology
  - 4. Michigan State University
  - 5. University of Washington
  
- E. 1999 hosted by Florida Institute of Technology, Melbourne, FL
  - 1. Clemson University
  - 2. University of Alabama in Huntsville
  - 3. Oklahoma State University
  - 4. University of Washington
  - 5. South Dakota School of Mines and Technology
  
- F. 1998 hosted by South Dakota School of Mines and Technology, Rapid City, SD
  - 1. University of Alabama in Huntsville
  - 2. California State University at Sacramento
  - 3. Clemson University
  - 4. Florida Institute of Technology
  - 5. University of Washington
  
- G. 1997 hosted by Cleveland State University, Cleveland, OH
  - 1. Florida Institute of Technology
  - 2. University of Alabama in Huntsville
  - 3. University of California - Berkeley
  - 4. Michigan State University
  - 5. University of California - Los Angeles

- H. 1996 hosted by University of Wisconsin – Madison, Madison, WI
1. University of Alabama in Huntsville
  2. Michigan State University
  3. University of California - Berkeley
  4. South Dakota School of Mines and Technology
  5. Clemson University
- I. 1995 hosted by George Washington University, Washington, DC
1. South Dakota School of Mines
  2. California State University at Sacramento
  3. Michigan State University
  4. Clemson University
  5. University of New Orleans
- J. 1994 hosted by the University of New Orleans, New Orleans, LA
1. University of Alabama in Huntsville
  2. University of California - Berkeley
  3. University of New Orleans
  4. South Dakota School of Mines and Technology
  5. Clemson University
- K. 1993 hosted by California State University – Sacramento, Sacramento, California
1. University of Alabama in Huntsville
  2. Michigan State University
  3. University of California - Berkeley
  4. University of New Orleans
  5. Colorado State University
- L. 1992 hosted by Colorado State University, Fort Collins, Colorado
1. University of California - Berkeley
  2. University of Alabama in Huntsville
  3. University of New Orleans
  4. University of Maryland
  5. Michigan State University
- M. 1991 hosted by University of Central Florida, Orlando, Florida
1. University of California - Berkeley
  2. University of Maryland
  3. State University of New York - Buffalo
  4. University of Illinois - Urbana/Champaign
  5. University of Texas - Austin
- N. 1990 hosted by State University of New York – Buffalo, Buffalo, New York
1. Michigan State University
  2. University of Maryland
  3. University of California - Berkeley
  4. University of Texas - Austin
  5. University of Wisconsin - Milwaukee

- O. 1989 hosted by Texas Tech University, Lubbock, Texas
  - 1. University of California - Berkeley
  - 2. Michigan State University
  - 3. University of New Hampshire
  - 4. Washington State University
  - 5. University of Houston
  
- P. 1988 hosted by Michigan State University, East Lansing, Michigan
  - 1. University of California - Berkeley
  - 2. University of New Hampshire
  - 3. University of Akron
  - 4. Portland State University
  - 5. University of Alabama in Huntsville

## **X. Corporate Profiles**

### **The American Society of Civil Engineers – Profile**

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

Today, ASCE has more than 133,000 members, including some 7,000 of whom are international members residing outside the United States in 150 countries. Individual professional engineers rather than companies or organizations hold membership. The members are organized geographically into 21 Regional councils, 87 sections, 148 branches and 259 student chapters and clubs.

The objective of ASCE is to enhance the welfare of mankind through the advancement of the science and profession of engineering. In response to these goals, more than 6,000 members voluntarily serve nearly 580 different technical, administrative and coordinating committees. Another 300 participate on 36 other professional committees. Including the activities of sections, student chapters and clubs, as well as the national and local committees, ASCE groups average 100 meetings throughout the country every day.

Educational activities extend to college campuses through 263 student chapters and clubs. These groups sponsor meetings, Regional conferences, student competitions, social events and other activities to help future engineers become better prepared for their careers. Numerous scholarships and awards are made available for deserving students of civil engineering. Additionally, career guidance is conducted to encourage primary and secondary students to study civil engineering through the following: summer institutes held on college campuses, films and videotapes, literature and lectures.

A 28-member Board of Direction governs the Society. The Board, which includes ASCE officers and representatives elected by the membership, establishes all policy for the organization. A staff of 220 implements the policies; the vast majority of staff work at ASCE International Headquarters located Reston, Virginia.

## **Master Builders, Inc. – Profile**

Founded in 1909, Master Builders, Inc. is a leading provider of innovative chemical and mineral admixtures for specialty concrete used in the ready-mix, precast, paving, manufactured concrete products and underground construction markets.

The company offers the widest range of concrete admixtures, materials and accessories available from a single source used to improve the placing, pumping, finishing and appearance characteristics of concrete. Master Builders' admixtures ensure high strength and durability, inhibit corrosion of steel embedded in concrete, reduce permeability, and improve resistance to chemical attack. New liquid color conditioning admixtures developed specifically for ready mix and precast production ensure enduring, structurally sound colored architectural concrete. Special chemistries allow effective placement of concrete in extreme weather conditions and in difficult applications, enhance surface appearance and ensure consistent quality and improved productivity.

The full line of Master Builders' products is backed by the support and service of a network of experienced local technical representatives, and a world-class research and development center dedicated exclusively to the advancement of the art and science of concrete. For more than 90 years, Master Builders has been providing solutions to construction challenges around the world.

Located in Cleveland, Ohio Master Builders, Inc. operates as part of Degussa Construction Chemicals, the largest manufacturer of construction chemicals worldwide. The parent company, Degussa AG, is a global leader within the specialty chemicals industry. Headquartered in Dusseldorf, Germany, Degussa is the world's largest specialty chemical company with sales of \$15 billion and a workforce of 64,000 employees.



## **R. John Craig Memorial Award**

The concept of a National Concrete Canoe Competition had been around for a number of years. In the mid 1980s Dr. R. John Craig, a professor at the New Jersey Institute of Technology and member of the ASCE Committee on Student Services (CSS), and other members of CSS began to formulate plans for more uniform Regional Competitions and formalized a plan to study the feasibility of a National Competition.

In the spring of 1985 Dr. Craig first brought his grand vision of a National Concrete Canoe Competition to ASCE. He was instrumental in bringing delegates from all over the country to meet one auspicious day in New York City at the executive conference of the ASCE National Headquarters. During this meeting the feasibility of conducting a National Concrete Canoe Competition was discussed, preliminary rules prepared, and a formal recommendation to proceed was drafted.

In the fall of 1985 the preliminary rules were presented to the Committee on Student Services (CSS). During the next year discussions regarding sponsorship were conducted with Master Builders and the Manager of Student Services for ASCE.

After almost two years of committee debate, while meeting at the fall 1987 ASCE National Convention the Educational Activities Committee (EdAC) adopted the preliminary rules and established a standing task committee to implement the rules and requirements.

In the winter of 1987, just as the first National Competition was in sight, Dr. Craig was diagnosed with a rare inoperable brain tumor. He passed away just two months before his dream of a National Concrete Canoe Competition came to fruition. In June of 1988 the first National Competition was held in East Lansing, Michigan hosted by Michigan State University.

In the spring of 1989, CSS approved the formation of a permanent subcommittee to ensure the execution of the National Concrete Canoe Competition. Through the efforts and dedication of individuals like Dr. R. John Craig their efforts have established this National Concrete Canoe Competition.

In that spirit ASCE and Master Builders have dedicated the Coed Sprint Race as a memorial to the teamwork and dedication of Dr. R. John Craig. It is our distinct honor to present this award to the school that best exemplifies the spirit and cooperative ideals of the Competition by placing first in the Coed Sprint Race each year.

## **Tony P. Chrest Award for Innovation**

The Tony P. Chrest Award for Innovation was established by Master Builders, Inc. in 2002 to honor Anthony P. (Tony) Chrest, a champion of the concrete canoe competitions on both the regional and national level. He served as a national concrete canoe judge in 1996, and as the first returning judge in 1997, and is remembered for challenging participants and organizers to increase the level of innovation applied to the concrete canoe project.

Senior Vice President and Corporate Chief Engineer of Walker Parking Consultants, Mr. Chrest was a fellow of both ACI and the Prestressed Concrete Institute. He acted as a senior project manager, as well as a senior structural advisor and designer on Walker's largest projects. With more than 30 years of industry experience, Mr. Chrest was responsible for project management, structural system concepts, master specification preparation, in-house education, and quality assurance.

Mr. Chrest held a BA from St. Benedicts College (1963), a BS in Civil Engineering from Colorado State University (1964), and a Master's degree in Structural Engineering from Purdue University (1966). Mr. Chrest co-authored the book, *Parking Structures*, now in its third edition, which defines the planning, design, construction, maintenance and repair of parking facilities. He also taught at North Carolina State University for two years (1972-1974).

As a tribute to Mr. Chrest, who died suddenly in the summer of 2002, Master Builders, Inc. has established the Tony P. Chrest Award for Innovation to "recognize superior and creative use of technology and materials in the construction of a concrete canoe."