

**Solicitation
for
Research Fellowship Applications for 2020-2021**

The **Precast/Prestressed Concrete Institute** is pleased to announce that a \$40,000 award for the 2020-2021 academic year will be offered under the Dennis R. Mertz Bridge Research Fellowship program. This fellowship is intended primarily for support of candidates for master's degree level research related to precast, prestressed concrete in bridge applications. Ph.D. candidates will also be considered.

You are invited to submit one or more applications for this fellowship. If part of a larger research program, the work to be covered by the PCI fellowship must be clearly delineated. The PCI fellowship cannot be contingent upon the subsequent approval of funding for related research.

The proposal submittal shall include the following information:

1. Title page with the names of the university and the research team including all contact information and signatures of the advising professor and department chair.
2. Description of the proposed research program (3 pages maximum).
3. Time and cost schedule, including any additional support.
4. Brief résumé of the faculty advisor (2 pages maximum)
5. A minimum of a brief statement by student candidate describing personal objectives and interest in the subject of the proposed research (1 page maximum).
6. Evidence of precast industry support.

Three attachments are provided for the benefit of the proposer. The first is a summary of the rules of the PCI Research and Development Council for the fellowship program. The second is the Review and Rating form used by the PCI Research and Development Council to evaluate all proposals submitted. Please note the weighting of the five evaluation criteria. Of significance is the relevancy of the proposed research to improving the state of the art of precast, prestressed concrete bridge design, materials and/or construction. In parallel is the potential for market impact as a result of the research. Innovative ideas are viewed very positively. The proposed research must be primarily related to prestressed concrete bridges. However, proposers may address how the research may benefit the prestressed concrete industry as a whole.

Please note the supplemental support criterion. The intent is that the proposer will solicit support from one or more precast producer members of PCI. See the rules attached for a further explanation. Though not weighted the highest, final award deliberations will be significantly influenced by this criterion. If any assistance is required in locating a potential industry partner, please use the contact information below.

The third attachment is a list of research topics of interest to the industry. This list is provided only for guidance on topics and proposals need not be limited to these topics.



Proposals are due at PCI headquarters no later than **August 17, 2020**. The PCI Research and Development Council will meet in September 2020 to decide on the awards. Results will be available by October 31, 2020. Please submit electronically to:

technical@pci.org

PCI is a non-profit organization, and the projects funded by the Institute do not cover overhead costs. Therefore, the approved amount of \$40,000 should be exclusively used for supporting a graduate student and should not include any indirect costs.

We are excited to be able to offer this program and encourage your participation.

Very truly yours,

Greg Force
Chair
PCI Research and Development Council

cc: PCI Research and Development Council
PCI Staff Managers
PCI Regional Directors

Dennis R. Mertz Bridge Research Fellowship

Goal: To engage the interest of young engineering students in the precast concrete bridge industry while providing a research experience of value to both the student and PCI.

Rules:

Eligibility: The fellowship program is open to any university in North America with the facilities to conduct structural research. Students may be PhD candidates, but Masters students are preferred. Competition is restricted to North America to ensure interaction with one or more PCI Producer members in the development and execution of the project.

Grant: The amount of the fellowship will be established by the PCI Research and Development Council as part of the budgeting process. The funds will be provided to the advising professor with the stipulation that they are an unrestricted grant and, therefore, no university overhead may be taken from the funds. All funds are to be used in support of the student and the project.

Solicitation: A solicitation shall be distributed by PCI staff in July of each year with a due date for applications established to allow six weeks for council review prior to the fall meeting of the council. The solicitation shall include a listing of research topics identified as being high priority for the institute.

Applications: Applications shall be submitted electronically no later than the due date established in the solicitation. Applications submitted after the due date will not be considered. Application shall include the following minimum information:

1. Title page with the names of the university and the research team including all contact information and signatures of the advising professor and department chair.
2. Description of the proposed research program (3 pages maximum).
3. Time and cost schedule, including any additional support.
4. Brief résumé of the faculty advisor (2 pages maximum)
5. Brief statement by student candidate describing personal objectives and interest in the subject of the proposed research (1 page maximum).
6. Evidence of precast industry support.

Project: It is intended that the project would be relevant to design, materials, or construction of precast concrete bridges. Where the proposed project is part of a larger project, the work proposed for fellowship funding shall be clearly identified. Applications that are contingent on approval of other funding will be rejected.

Industry support: Applicants are encouraged to solicit support for the proposed project from members of PCI. Support requested could range from a letter endorsing the project to financial



participation. Letters of support must address the merits of the proposal. Specifically, the letters must address why the problem is of interest to PCI or the precast concrete industry and how this proposal will address that problem. If possible, the industry support letters should state why the approach has a reasonable chance of success. Industry support letters which simply support the researcher, the student or the University and do not address the merits of the proposal will not be considered.

Evaluation: The Transportation Activities Council and the PCI Research and Development Council will be expected to evaluate submitted applications. Evaluation criteria shall include relevancy, market impact, research capability, supplemental support, and overall quality. PCI Producer support is highly desirable. Evaluation criteria and scoring may be modified each year by the council, but evaluation criteria shall be distributed with the Mertz Research Fellowship solicitation.

Award: The Transportation Activities Council shall submit a recommendation to the Research and Development Council for award. A simple majority vote of attending Research and Development Council members (assuming a quorum is present) will be required to approve an award. Awarded funds shall be distributed approximately by December 1.

Advisory Committee: At the time of selection, an advisory committee shall be appointed to monitor and provide guidance to the project. The chair of the advisory committee shall be a research council member but the advisory committee can be composed of any PCI members with interest or expertise in the subject of the project and will especially include members representing transportation.

Deliverables: Because the fellowship funds are provided as an unrestricted grant, no deliverables can be required of the recipient. PCI shall request a copy of the final student report or thesis and shall encourage the student and professor to publish a summary paper in the PCI Journal. The professor and student will also be invited to present updates and final results at the education sessions at the annual PCI Convention.

PCI DENNIS R. MERTZ BRIDGE RESEARCH FELLOWSHIP PROGRAM

Proposal Review and Rating Form

Project:

	Weight	Rating	Score
Relevancy of Research: Is the research relevant to precast, prestressed concrete products or precast systems used in bridges? Will the research contribute to the state-of-the-art or advance the usage?	5		
Potential Impact on Market: Is there potential for this research to improve current products or systems or provide thrust into new markets? Are there innovative features in the application?	4		
Research Capability: Is the faculty advisor experienced in precast, prestressed concrete research or the subject matter? Are there suitable facilities and equipment available? Has the graduate student been identified?	3		
Supplemental Support: Is there support from either a producer or the regional association? Is there support from the university or other funding agencies that contributes directly to the fellowship? (Support must be financial or tangible if rating is 3 or above. On analytical applications 3 or more support letters will count as support for ratings 3 or higher.)	4		
Overall Quality: Are the objective and scope clearly identified? Is there a research plan and a budget? Can the research plan be accomplished within the budget? Is the application well written?	4		
Total Score			

Outstanding - 5 Very Good - 4 Good - 3
 Fair - 2 Poor - 1 Not Provided - 0

Rank	
Rank – relative to the other applications, rank this proposal if in the top ten with a rank of 1 being best	

If the fellowship is part of a larger project being carried out for a sponsor other than PCI, that part must be clearly identified, and the evaluation shall be made only with respect to the part that pertains to the fellowship.

PCI Transportation Research Needs List

June 2020

Category	Subject	Comments
Anchorage to Concrete	Effects of reinforcement in anchorage concrete breakout zones	
	Effect of reinforcement on side face anchorage breakout strength	Is shear friction strength provided by column ties at studs in column face plates effective in developing the anchorage strength across side face breakout failure planes?
	Simplification of anchorage calculations	Combine with a study of LW vs NW concrete
	Anchorage in lightweight concrete	
Component Design	Shear strength in end regions of pretensioned members	In particular, this should address anchorage of longitudinal reinforcement for reliable shear strength.
	Headed deformed bars as shear reinforcement	
	Effects of partial debonding of prestressing strands	Include consideration of lightweight concrete
	Release stresses in pretensioned members	Consider all sections where compression and tension must be considered
	Post cracking shear strength of bridge girders using self-consolidating concrete	
	Use of high strength reinforcement for spirals in prestressed concrete piles	Can allowable yield strength of spirals be increased to 120 or 150 ksi?
	Minimum spacing requirements for large prestressing strands	
	Detailing for durability	Girder to girder, girder to pier and girder to abutment recommended detailing to improve durability.
	Allowable compressive stress at release	Can the allowable compressive stress at release be increased from $0.6f'_{ci}$ to 0.7 or 0.75 and still be demonstrated to have reliable performance.
Materials	Cement replacement in concrete mixes	Sustainable concrete specific to precast
	Characteristics of SCC	Include creep, shrinkage, early age modulus and shear strength
	Structural design guidelines for sand lightweight concrete	
	Effects of elevated temperatures from fire on fiber reinforcement and FRP composites in precast concrete structural members	
	UHPC	Cast a prestressed pile jacket for the splash zone. This would be a 2" thick UHPC shell cast to the same outside dimensions as the pile, maybe 15 to 20 foot long. The

		reinforced concrete core and remainder of the pile would be a secondary casting. This could replace the use of SS or CF strand.
	Rate of tensile strength gain vs compressive strength gain in lightweight concrete	This information would contribute to knowledge on early age strength of anchorage in concrete
	100 year life for structure and repairs	Bridges and, eventually, parking structures will have requirements for a 100 year life. Materials and detailing need development to meet this requirement.
	Delayed ettringite formation (DEF)	This research will evaluate the use of the "delta ettringite" testing method, which was developed as part of a PCI funded study in the late 1990's. This proposed work will extend the scope to include measurements of concrete at later ages.