

## Domestic Scan Proposal Form

AASHTO is now soliciting proposals for the **US Domestic Scan Program** (NCHRP Panel 20-68A).

Selected scan topics will be investigated by one of three ways: (type 1) site visits to three to six locations for approximately a two week period or less, by webinar; (type 2) peer exchange; or (type 3) conducted by a group of eight to 12 transportation professionals with expertise in the selected topic area. Proposed topics should meet the following criteria:

- Address an important and timely need for information by transportation agencies;
- Are of interest to a broad national spectrum of people and agencies;
- Are complex and also “hands-on,” meaning they lend themselves particularly well to exploration through on-site visits; and
- Are sufficiently focused that the tour participants are able to investigate and understand key issues in the limited time available on the tour.

Before submitting your proposal it is highly recommended that you read [What Makes a Good Scan Topic Proposal](http://www.domesticscan.org/what-makes-a-good-scan-topic-proposal)  
<http://www.domesticscan.org/what-makes-a-good-scan-topic-proposal>

This form is designed to collect the full length of your proposal. Sections requiring essays have unlimited space for you to use. Contact information has some limited text. **Click on the highlighted boxes to advance to the area where you need to complete information.**

**Proposals should be returned no later than date list on NCHRP website.**

**IMPORTANT NOTE on How to save your document:** *LastNameFirst Initial, underscore\_Organization Acronym \_CY2021*  
*Saved Document Name Example: NgetheP\_AASHTO\_CY2021*  
*If you have more than one, add a number after first initial: NgetheP1\_AASHTO\_CY2021*

### Domestic Scan Proposal Contact Information

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Michigan Dept of Transportation

**AASHTO Committee**

**Date of submission**

10/26/2021

☐ Please **check** this box if your proposal has been endorsed or is being requested through an AASHTO Committee.  
List the AASHTO Committee(s) that endorsed this proposal: [Click or tap here to enter text.](#)

**Title of Proposed Scan:** Structural performance monitoring of Bridges constructed off-site and moved into place

**Problem Statement** (What topic is to be examined? What drives the need for the scan? Why now?)

Due to the recent advancement in material properties, construction methodologies (ex: accelerate bridge construction) precise mobility equipment & technologies, efficient analysis/design resources (ex: finite element analysis softwares) it is becoming more feasible and practical to have the entire bridge to be constructed off-site and moved into place. When compared to traditional ways of constructing the bridge on-site, the off-site bridge construction would have the dual benefit of not only providing the owner agency the advantage to minimize the traffic closure for a short duration but also alleviate the construction(&detour) inconvenience to the travelling public. This could potentially lead to significant amount of budget savings directly and also the indirect savings in terms of detour/standing traffic fuel saving, travellers inconvenience. Further, availability of non-congested and tightly constrained space off-site can lead to higher degree of quality control on how the bridge elements are cast, fabricated and constructed.

However, when the final bridge is moved into place, the realistic interaction(s) between the bridge/bridge components with the in-situ components can be totally different from the ideal construction conditions the bridge experienced during off-site construction. These in-situ interactions can create different restraint conditions at the supports leading to different boundary conditions than those used for design and/or analysis. If the in-situ conditions result in rigid boundary conditions than those

considered during design/analysis, then the bridge (& its components) can experience higher stresses (axial, bending, fatigue) and strains that might lead to premature and catastrophic failure. On the other hand, if the in-situ conditions result in flexible boundary conditions compared to design, the bridge components will be overdesigned leading to use of excessive materials and thereby indirectly increasing the dead load i.e., the optimal/efficient design has not been achieved.

Therefore, it is imperative to understand and possibly quantify the in-situ interactions (i.e., restraints/boundary conditions) of the bridges that were built off-site and moved into place. A scan on the structural performance of off-site constructed and moved into place bridges will help the bridge designers, construction companies & the transportation industry as a whole to understand (a) what issues were encountered during the entire process starting from off-site construction to moving the bridge to final place (b) what lessons were learnt from the past/current practices and (c) what design/construction issues that we need to pay attention for in future design of these bridges. This will lead to optimal use of materials, efficient design of bridge components (& bridge itself) and possibly optimizing the construction & mobility technique(s) for moving the bridge. Successful and efficient use of materials, application

**Scan Scope** (What specific subject areas are to be examined? Which cities and states might be visited? Which agencies/organizations (including specific departments or types of staff if applicable)?

The scope of the proposed scan is to (a) conduct a thorough review of the state of the art pertaining to the number of off-site constructed and moved into place bridges throughout the US, (b) short & long term structural performance monitoring of these bridges, (c) past & ongoing structural issues (if any) experienced by the bridge, (d) repairs (if any) that were carried out to fix any structural issues, and (e) any specific design considerations that have to be addressed for future design of these bridges

**Anticipated Scan Results** (What key information is to be gained? What information is to be shared after the scan? Who would the audience be for this information?)

The scan results will provide information about (a) types & geometrical configurations of bridges constructed using this technique (b) best and novel construction practices that were used during off-site bridge construction (c) novel and/or efficient mobility technique(s) used to transport the bridge from off-site to its final place (d) data on new and innovative materials (if any) used in the bridge (e) performance monitoring history (f) identifying any barriers that are preventing the wide spread use of constructing such type of bridges, and (g) lessons learned.

**Benefits Expected** (Including potential impacts on current technology or procedures) Gaining a fundamental understanding about the structural performance of off-site constructed and moved in place bridges can lead to advancement of current design/construction techniques as well as develop more efficient bridges. This could result into direct cost saving (optimal use of materials, detour, maintenance of traffic, road closure duration) as well as indirect cost savings (by reducing inconvenience to travelling public, fuel cost saving etc).