

## TRIENNIAL STRATEGIC PLAN (TSP)

**Evaluation Period: February 1, 2017 to January 31, 2020**

*Please note that rows and boxes below expand as you enter the information*

### PART 1: Committee Name and Scope

*This is an opportunity to review the officially approved name and scope that are posted on the TRB website and consider any necessary changes. If changes are needed, include the proposed scope statement and/or name and justification for the changes.*

**NOTE: A proposed committee name and/or scope change must have the approval of 2/3 of the official members of the committee. The balloting done at a committee meeting that has less than 2/3 of the members in attendance must be augmented with e-mail balloting of the members not in attendance.**

|   |  |
|---|--|
| Committee Code *  | AFH10  |
| Committee Name *  | Standing Committee on Construction Management  |
| - Date(s) reviewed  | January 15, 2020   |
| - Change, if proposed***  | Standing Committee on Construction Management  |
| - No. of official members approving change/total number of members ** |  |
| Committee Scope *   | This committee is concerned with management of construction for all types of transportation facilities. This includes the integration of construction management in planning, design, and construction for the performance of projects for the purpose of meeting or exceeding requirements related to quality, scope, cost, schedule, context, variable financing, and worker safety. |
| - Date(s) reviewed  | January 15, 2020   |
| - Change, if proposed ***   | No change is proposed.   |
| - No. of official members approving change/total number of members ** |  |
|   |  |

\* Show current, as it currently appears in the [TRB Online Directory](#)

\*\* Includes Chair, Standing Committee Members, Emeritus Members, and Young Members

\*\*\* Show proposed, or Not Applicable

**PART 2: Committee Accomplishments**

NOTE: We have provided much of the information you need for boxes 2.2, 2.4, and 2.7 below and in attachments A, B, and C. We ask that you provide the remaining information.

**2.1**

| Year   | 2017 | 2018 | 2019 | 2020 |
|--|------|------|------|------|
| Number of Members in Attendance at Annual Meeting  |      | 22   | 20   | 18   |
| Number of Visitors in Attendance at Annual Meeting |      | 47   | 61   | 36   |
| Number of Papers Reviewed                          |      | 19   | 17   | 16   |
| Total Number in Attendance at Mid-Year Meeting     | NA   | 21   | 12   |      |

**2.2**

Sessions and workshops sponsored/cosponsored at the Mid-Year meeting, including name of co-sponsoring committee(s) if applicable (by year):

**2018**  
 Mid-year AFH-10 meeting held via webinar  
 Joint mid-year AFH10/ABJ50 subcommittee meeting held via webinar

**2019**  
 Mid-year AFH-10 meeting held via webinar  
 Joint mid-year AFH10/ABJ50 subcommittee meeting held via webinar

**2020**  
 Mid-year AFH-10 meeting held via webinar  
 Joint mid-year AFH10/ABJ50 subcommittee meeting held via webinar

**2.3**

**Provide** title(s) and presenter(s) for informal presentations made at Annual Meeting and Mid-Year Committee meetings (by year):

**2018 Annual Presentations**

- “Staffing for Alternative Contracting Methods (ACMs)” by Dan Tran (University of Kansas), Chris Harper (Louisiana State University) and Doug Gransberg (Iowa State University)

**2019 Annual Presentations**

- “Sustainable Highway Construction Practices,” by Steve Muench (University of Washington) and Amlan Mukherjee (Michigan Technological University)
- “Cost Risk Estimating Management (CREM) Community of Practice,” by Stuart Anderson (Texas A&M)
- “Emerging Technologies in Construction Delivery,” by Chris Harper (Colorado State University)

**2020 Annual Presentations**

- “Guidebook for Implementing Constructability Across the Entire Project Development Process: NEPA to Final Design” by Ed Minchin, University of Florida.
- “Systematic Approach for Determining Construction Contract Time: A Guidebook” by David Jeong, Texas A&M.

**2.4**

**Provide** titles of new research need statements (RNS) posted in TRB’s RNS database (by year):

NOTE: Attachment B shows all statements currently posted in TRB’s RNS database.

**2.5**

**Provide** title(s) of RNS submitted for funding consideration:

| <b>Year Funded</b> | <b>Title</b>   | <b>Authors</b>   | <b>Project No.</b>          | <b>Funds</b> | <b>Duration (months)</b> | <b>Start Date</b> | <b>End Date</b> |
|--------------------|--|--|-----------------------------|--------------|--------------------------|-------------------|-----------------|
| 2020               | Application of RFID and Wireless Technologies for Highway Construction   | Deepak Sharma (CSU-Fullerton)<br>Katherine Holtz (TxDOT)             | 2020 NCHRP project 03-140   | \$370,000    | 30                       | TBD               | TBD             |
| 2019               | Workforce 2030 – Attracting, Retaining, and Developing the Transportation Workforce: Design, Construction, and Maintenance | Paul Goodrum (CU)<br>Tim Taylor (UK)<br>Roy Sturgill (KTC)           | 2019 NCHRP project 02-25    | \$700,000    | 24                       | 5/15/19           | 5/15/21         |
| 2019               | A Guidebook for Risk-Based Inspection  | Jorge A. Rueda (Auburn)<br>Keith Molenaar (CU)<br>Dan D'Angelo (ARA) | 2019 NCHRP project 10-102   | \$450,000    | 37                       | 6/18/19           | 7/17/22         |
| 2018               | Alternative Technologies for Mitigating the Risk of Injuries and Deaths in the Work Zone                                   | Behzad Esmaeili (GMU)  | NCHRP 20-7 Program/Task 416 | \$75,000     | 12                       | TBD               | TBD             |
| 2018               | Guidebook for Data and Information Systems for Transportation Asset Management   | David Jeong (ISU)<br>Dan Tran (KU)                                   | 2018 NCHRP project 08-115   | \$400,000    | 16                       | 8/1/18            | 10/31/19        |

|      |   |  |                           |           |    |         |         |
|------|---|--|---------------------------|-----------|----|---------|---------|
| 2018 | Approach for Estimating Construction Contract Time: A Guidebook   | Tim Taylor (UK)<br>Roy Sturgill (KTC)<br>Richard Duval (FHWA)<br>Paul Goodrum (CU) | 2018 NCHRP project 08-114 | \$500,000 | 20 | 4/2/18  | 12/1/19 |
| 2017 | Guidebook for Implementing Alternative Technical Concepts into All Types of Highway Project Delivery Methods    | Doug Gransberg (ISU)   | 2017 NCHRP project 08-112 | \$450,000 | 21 | 6/1/17  | 3/1/19  |
| 2017 | Guidebook for Implementing Constructability Across the Entire Project Development Process: NEPA to Final Design | Doug Gransberg (ISU)<br>Rob Wight (UDOT)   | 2017 NCHRP project 10-99  | \$450,000 | 24 | 5/24/18 | 5/31/20 |

**2.6**

**Provide** titles of synthesis topics submitted (by year):

NOTE: **List** any synthesis topic(s) funded in a research program.

2019 NCHRP Synthesis Topics

1. Get Out and Stay Out! Closing out Projects from Substantial Completion to Final Document Receipt: Synthesis 51-17

2018 NCHRP Synthesis Topics

1. Electronic Ticketing of Materials for Construction Management: Synthesis 20-05/Topic 50-07.
2. Development and Use of As-Built Plans by State DOTs: Synthesis 20-05/Topic 50-12.

**2.7**

Membership Make-up: Please see Attachment C provided by TRB for summary details.

**NOTE: Comment** on demographics, balance or lack of balance of membership. Provide an action plan to address any deficiencies. See attachment C for summary details.

Committee is currently undergoing membership rotation, which will slightly increase the percentage of female participation from 31% to 38%. At 56.3%, majority of the membership is still academic. Academic membership did increase from 53.1% after the last rotation, but this was partly done to increase female representation on the committee. Furthermore, 28.1% of the members are from state or federal transportation agencies, and the remaining 15.6% of the membership includes industry members. The committee will continue to increase representation from both transportation agencies and industry companies through interim appointment (currently vacant slots for international members still exist), but the committee leadership acknowledges the continued strong contributions of its academic members in both the development of successful RNS, webinars, conference sessions, and collaborations with the AASHTO Committee on Construction.

**2.8**

Provide any of the following:

- Any special publications, such as TR circular, and conference proceedings

**Straight to Recording Webinars**

1. 2019 (December) TRB Straight to Recording for All: E-Construction: Analyzing and Utilizing Nongraphical Construction Data for Smarter Project Delivery
2. 2018 (December) TRB Straight to Recording for All: Challenges in Using Big Data Analytics for Transportation Project Delivery
3. 2017 (October) TRB Straight to Recording for All: Opportunities and Challenges of Digital Data Applications in Transportation Project Delivery and Management.

**Paper Awards**

1. 2019 Fred Burggraf Award : “Development of a Hot Mix Asphalt Location Cost Index for the Alabama Department of Transportation” by Keren Xu, Jorge Rueda-Benavides, and Karthik Chowdary Pakalapati
  2. 2019. K. B. Woods Award: “Ontology-Based Knowledge Management System for Digital Highway Construction Inspection” by Xin Xu, Chenxi Yuan, Yuxi Zhang, Hubo Cai, Dulcy M. Abraham, and Mark D. Bowman
- Sponsored or co-sponsored specialty conferences, symposia, workshops, webinars or other joint efforts with other TRB committees, other TRB entities, or other organizations (i.e. AASHTO, FHWA, State DOTs, ASTM, ASCE, and/or other modes of transportation)

**Workshops**

1. Workshop 1022: Evolution of Project Delivery Information Systems: Where We Were and Where We Are Headed, Sunday, Jan 12, 2020, 9AM-12PM. (AFH10, ABJ50, and AFH10(1)).
2. Workshop 1071 - e-Construction: Analyzing and Utilizing Nongraphic Construction Data for Smarter Project Delivery, Jan 13th, 2019. 1:30PM-4:30PM – David Jeong - Presiding) (AFH10, ABJ50, and AFH10(1))
3. Workshop 166 – Pain Points in the Use of Big Data Analytics for Transportation Project Delivery Jan 7th, 2018. 1:30PM-4:30PM – Amlan Mukherjee and Nora El-Gohary Presiding) (AFH10, ABJ50, and AFH10(1)).

**PART 3: Committee Future Outlook Statement and Committee Three-Year Plan (Limit 1,500 words total)**

**Committee Future Outlook Statement**

*The committee future outlook statement should include a discussion of the primary factors and influences that will shape the transportation community and topic(s) within the committee's scope over the short- (one to three years) and long-term (four to seven years). This statement should include:*

**Current and Emerging Critical and Cross-Cutting Technical Concerns**

**1. Concerns regarding workforce supporting construction management and execution of transportation projects**

- A recurring challenge is the availability of an experienced construction and maintenance workforce within State Transportation Agencies (STA). Nationwide, the STA workforce is aging and entry rates of new workers into the industry are not keeping pace with retirement. The next-generation STA workforce must be more efficient, while adapting to rapid technical changes across infrastructure, project delivery, and information systems that will require markedly different skill sets compared to the current workforce.
- To manage the dynamics of meeting tomorrow's construction and maintenance demands with a smaller workforce, STAs need robust workforce management programs that can attract, train, and retain engineers, technicians, and maintenance workers needed to maintain the U.S. highway infrastructure. If the industry receives increased infrastructure spending to address infrastructure deficiencies, there is a general feeling that STAs do not have the staffing capabilities to execute this increased spending level.
- STAs are increasingly tasked with constructing and maintaining more complex transportation networks with uncertain funding models, new project delivery approaches, and increasing regulatory requirements. At the same time, STAs are faced with changes in agency construction staff in regards to age, experience level, turnover, retirement, and increasing levels of consulting services to manage STA construction operations. Because of this new environment, STAs need guidance on effectively and efficiently balancing construction oversight responsibilities with STA construction staffing resources through such practices as risk-based inspection.
- The construction and management of so called "smart infrastructure" to support autonomous vehicles, infrastructure monitoring, etc. will require knowledge and skill sets markedly different than those of existing construction personnel. The future STA workforce will need to expand beyond the traditional scope of primarily hiring civil engineers but to also include data scientists, construction managers, and other disciplines to develop a more technical diverse workforce.

**2. Concerns regarding the adaption and maintenance of advanced technologies, both current (*Building Integrated Management (BIM) systems and mobile information technologies (IT) and future technologies (e.g. augmented reality and big data analytics)*)**

- Usage of Information Technology in Construction Management – evaluating various systems for transportation such as Building Information Modeling (BIM) and Augmented Reality (AR). How model data can be more easily shared with jobsites to: 1) provide improved visualization to support inspection and 2) support automated construction operations (e.g. automated earthmoving)

- Electronic information and even paperless plans / documents are becoming more common. How this information is reported, tracked, documented, and finalized among the parties is becoming a challenge and an opportunity. Such things as how is the data documented (what format), transferring documents between entities (firewalls, limitations on document size, etc.) and final close out documentation for as-built drawings, future permitting, and reference that can be opened and altered is concerning.
- One recurring barrier to implementing advanced technologies in transportation construction is objective data that measures improvement in project performance when new technologies are implemented. Full implementation of a new technology on live projects is fraught with risk that deter preliminary efforts. Field trials that offer opportunity to implement new technology in a controlled setting that allows a scientific approach to objectively measure their performance can be used to develop the business case to allow STAs to make informed decisions about their implementation.
- Other technologies, such as artificial intelligence (AI) and cloud based data, are transforming other industries. There is still much to be learned about the precise tenets of these technologies within transportation and how they could be applied to improve transportation construction

### **3. Concerns regarding increasing pressure for accelerated construction**

- Accelerated construction resources and training are needed. The industry as a whole is still trying to understand how to leverage technologies to aid in accelerated construction, as well as effectively transferring research to industry.
- What can we learn from other industries (e.g., software, aerospace), disciplines or sectors of construction (e.g., vertical construction) that also face similar time pressure on their projects?
- Due to demands to have the projects completed earlier, agencies are opting to deliver projects with alternative contracting methods or ACMs. This requires the agencies to increase their skills and competencies in alternative delivery such as DB, CMGC, P3, ATCs, and others.
- The demands on managing an accelerated construction project may be different than traditional projects – thus our educational system, on the job training, research and mentoring needs to advance to assist in knowledge support to meet the demands of today for managing accelerated construction projects. This factor of limited education and training, combined with the retiring workforce and new workforce with limited experience and knowledge, makes for a concern that will need to be addressed.
- Project acceleration applies not just to the construction phase but also applies to the planning and design phases as well. As design is accelerated, there is increased risk of developing projects with poor defined scopes, which can ultimately impact the quality of the detailed design that directly impact construction.
- Accelerating construction can minimize impacts to the community and traveling public. Evaluating such benefits of accelerated construction will help agencies make the case for accelerated construction (to justify potential cost increases, if any) and communicate it to the public.
- One additional concern relates to the existence (or need) of adequate management tools and decision frameworks for timely decisions in accelerated construction environments.

### **4. Stagnant construction productivity in highway construction**

- Based on new productivity estimates developed by the U.S Bureau of Labor Statistics (see 2018 BLS Monthly Labor Review), construction productivity in transportation construction lags productivity of other construction sectors, including industrial and multifamily housing. There is a need to apply lessons learned from other construction sectors that have proven effective in improving their productivity to help improve productivity of transportation construction (e.g. project scope



definition, modularization/prefabrication, advanced work packaging, and standardized site management processes).

**5. *Concerns regarding the CM discipline at large***

- Alternative project financing (e.g., PPP) and delivery methods are changing the roles of owners on projects. Understanding how these changes influence core competencies and personnel needs will be critical.
- Rapidly changing environments produce uncertain information, but agencies are often tasked with rapid decision making nonetheless. Risk based approaches towards uncertainty have proven effective at assisting with project-level decision making. Future expansion of risk-based approaches to support programmatic decisions will be needed.
- The changes in the required workforce skills sets, methods of project delivery, and technologies will require adapting construction management curricula at universities.

**Committee Three-Year Plan**

*The committee plan is a short, focused statement of where the committee wants to go and how to get there. The committee plan may include, but is not limited to:*

**To assist the transportation community in meeting these technical concerns and cross-cutting issues, the committee will direct its short-term plans to (next three years)**

1. Advance and facilitate TRB Sessions and Workshops to address emerging issues such as workforce shortages, accelerating project delivery, and integrating new information systems into the project during the full cycle of project delivery (from scoping through close out).
2. Annually prepare RNS and Synthesis Topics on high impact / critical problems and / or cutting edge issues such as successfully integrating computer applications and technology into management of construction projects, advancing assessment of skills and competency needs for managing a successful project during construction including gaps in today's workforce and the projected workforce available.
3. Collaborate with the AASHTO Committee on Construction (COC) in identifying research needs and developing appropriate RNS or synthesis topic statements.
4. Continue to update the committee RNS database with draft statements in critical areas. Annually review the database based on committee member input to remove outdated RNS, and or update the existing RNS to reflect current and/or emerging issues and add new RNS to reflect key future issues.
5. Continue to develop strategies to increase contractor/subcontractor or supplier involvement in the CM committee
6. Continue conducting mid-summer meeting through Zoom (web meeting software) to help plan both engagement with the AASHTO COC at their annual meeting and to plan for annual conference activities.
7. Continue the committee's subcommittee (AFH-10(1)) role in successfully conducting a workshop on the use of information technology in construction at the TRB Annual Conference, and TRB's Straight to Recording webinars.

8. Develop a new joint subcommittee on workforce development focusing on construction and maintenance and preservation. A potential co-sponsor for this subcommittee was identified through AHD15 (Committee on Maintenance and Operations Personnel, however this committee was sunset during the TRB re-organization, so another sponsoring parent committee will be sought). This collaboration ties in with the breaking down of silos between construction and maintenance organizations within STAs and points to a shifting focus on infrastructure life cycle costs.
9. Continue implementing the committee's best poster award to be presented during the annual conference.
10. Continue to maintain the committee's Linked-In group.

**The Committee's long-term plans include:**

1. Align the Committee's actions to be consistent with the today's issues and the committee's identified scope by developing research need statements, synthesis topics, workshops, sessions, E-circulars and other committee activities.
2. AFH10 has been very successful in working with AASHTO Committee on Construction to develop a number of successful NCHRP research statements. In efforts to expand the portfolio of research that has been successful in developing guidance documents based on current practices, AFH10 will explore how it can help expand the technology frontier of transportation construction by promoting research that scientifically explores the use of advanced technologies that are not already widely used in transportation construction to ultimately develop the business cases based on scientifically validated data to support widespread implementation.
3. Develop strategies to promote and advocate with other groups to market Construction Management into an attractive profession for the future by focusing on training, education, certification, skills, and experience by engaging in both K-12 and undergraduate student outreach.
4. Advocate for participation into the CM committee to individuals who are working within other modes of transportation other than highways/ roadways.
5. Proactively review and update the committee's short and long-term plans between annual and mid-year meetings.
6. Future committee rotations will focus on increasing DOT and gender representation.