MEETING MINUTES

Committee Meeting- AKG70
Foundations of Bridges and Other Structures
Date: Tuesday, January 09, 2024
Time: 08:00 AM – 12:00 PM (ET)
Location: Marriott Marquis, Marquis Salon 2 (M2)

Chairman, Sharid K. Amiri

Committee Scope: This committee is concerned with the local and global behavior, stability, and interaction of structural foundations, and their supporting materials, for permanent and temporary transportation structures.

I- Welcome (10 minutes; 08:00 am – 08:10 am)

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Attendance & Committee Membership – Recognition of former members and new members

- Member Rotation discussed.
- Sign-up Sheet passed around (attached).

Murad Abu-Farsakh	J. Erik Loehr
Victor Aguilar	Nick Machairas
Sharid Amiri	Mohammed Mulla
Prasenjit Basu	Joseph Nietfeld
Tejo Bheemasetti	Masoud Nobahar
Jan Cermak	Kathryn Petek
ZhiQiang Chen	Monica Prezzi
Ross Cutts	Matthew Riegel
Shaoyang Dong	Kyle Rollins
Christopher Dumas	Heather Shoup
Mostafa Ebrahimi	Timothy Siegel
Ken Fishman	Hisham Sunna
Evan Garich	Gerald Verbeek
Peggy Hagerty Duffy	Ann Walters
Fei Han	Negin Yousefpour
	Aaron Zdinak

II- General Items (35 minutes; 08:10 am – 08:45 am)

• Approval of January 2023 Committee's (in person and virtual) Annual Meeting Minutes (PART II)- (5 mins) Approved
• Review of Committee Name and Scope (5 mins)

Proposed: “This committee is concerned with the local and global behavior, stability, resiliency sustainability and interaction of structural foundations, and their supporting materials, for permanent and temporary transportation structures”.

Vote: (2/3 of the members approval is required to revise the scope) Votes of those in attendance below:

Yes Y	Murad Abu-Farsakh	Yes	J. Erik Loehr
	Victor Aguilar		Nick Machairas
Yes e s E S e	Sharid Amiri	Yes	Mohammed Mulla
	Prasenjit Basu	Yes	Joseph Nietfeld
	Tejo Bheemasetti	Yes	Masoud Nobahar
	Jan Cermak	Yes	Kathryn Petek
	ZhiQiang Chen		Monica Prezzi
	Ross Cutts	Yes	Matthew Riegel
	Shaoyang Dong	Yes	Kyle Rollins
	Christopher Dumas	Yes	Heather Shoup
	Mostafa Ebrahimi		Timothy Siegel
Yes	Ken Fishman	Yes	Hisham Sunna
Yes	Evan Garich	Yes	Gerald Verbeek
Yes	Peggy Hagerty Duffy		Ann Walters
	Fei Han		Negin Yousefpour
		Yes	Aaron Zdinak

16/31 at the time of the meeting (not all members present).
A subsequent email will be sent to poll all members.

- TRB Announcements (Nancy Whiting)- (5 min) – Later in the meeting
- TRB 2024 Online Program- Online Program (mytrb.org)
- AKB50(1) Geoseismic Subcommittee Chair Update- Kyle Rollins (5 mins)

Monday January 08, 2024, 07:30 PM- 10:00 PM (ET)- Geoseismic Issues of Bridges, Joint Subcommittee Meeting, Marriott Marquis, Marquis Salon 10 (M2)

- TSP (Sharid Amiri)- (5 min)
- FHWA Update- Silas Nichols (5 mins) - Gave update

- TRR Artificial Intelligence Select Papers (Chad Harden)- (5 min)

III- Technology Transfer (35 minutes; 08:45 am – 09:20 am)

- Papers (9 papers reviewed by AKG70, 8 Lectern presentations for AKG70, 2 being considered/recommended for publication)
- Summary of AKG70 Sponsored Activities in 2024 (M – meeting, L- lectern session, W- Workshop) – Sponsor for 2-lectern sessions, (highlighted in yellow) and 1 workshop (highlighted in blue), Co-Sponsored 1 Lectern Session (highlighted in gray) - Nick Machairas gave an update on the Workshop.

MEETING MINUTES

AKG70 Committee on Foundations of Bridges & Other Structures- 2024 TRB Annual Meeting

Type	Prog #	Title	Sponsors	Date/Time	Hotel/Room
M		Foundations of Bridges and Other Structures Committee	**AKG70**	Tuesday, Jan 09, 2024, 08:00 AM – 12:00 PM (ET)	Marriott Marquis, Marquis Salon 2 (M2)
M		Geoseismic Issues of Bridges and Other Structures, AKB50(1), Joint Subcommittee of AKB50, AKG70	**AKG70, AKB50**	Monday, January 08, 2024, 07:30 PM-10:00 PM (ET)	Marriott Marquis, Marquis Salon 10 (M2)
W	1020	The Use of Artificial Intelligence for Site Characterization and Pile Design	**AKG70**	Sunday, Jan. 07, 2024, 09:00 AM – 12:00 PM (ET)	Convention Center 204C
L	2074	Machine Learning Applications in Foundation Design and Performance: Site Variability in Load and Resistance Factor Design	**AKG70**	Monday, Jan. 08, 2024, 10:15 AM – 12:00 PM (ET)	Convention center 209AB
L	4014	Innovative Solutions, Applications, and New Advances in Foundation Design, Performance, and Integrity	**AKG70**	Wednesday, Jan 10, 2024, 08:00 AM-09:45 AM (ET)	Convention Center 207B
L	3134	Next Steps in Seismic Research and Bridge Element Performance	**AKB50,** AKG70	Tuesday January 09, 2024, 1:30 PM- 3:15 PM (ET)	Convention Center, 202A

- Section Activities and cosponsored events – AKG00 – Geology and Geotechnical Engineering Section. - Soheil Nazarian provided an update later in the meeting.

- Geotechnical Asset Management- Subcommittee, AKG00(1); Meeting- Monday, January 08, 2024, 7:30 PM- 10:00 PM (ET)- Marriott Marquis, Marquis Salon 2 (M2) - Scott Anderson provided an update.

- Performance of Geomaterials Supporting Transportation Infrastructure, AKG00, Monday January 08, 2024, 3:45 PM- 5:30 PM (ET), Poster Session 2219,Convention Center Hall A. – No posters this year.

- <u>Webinar</u>

- TRB Webinar: Innovation in Geoseismic Foundation Design and Performance, May 23, 2023, Kevin Franke, Kyle Rollins, Arash Khosravifar
- Upcoming TRB Webinar in 2024: Innovation and the State of Practice: Foundations in Shrink Swell Soil , TBA, Jean-Louis Briaud, Sai Vanapalli, Shailendra Endley.

- Visit Suggest a Webinar (mytrb.org).Forms are evaluated by TRB staff three times a year.
- Forms submitted from March 2 to July 1 are processed and webinars are scheduled from September 1 to December 31.
- Forms submitted from July 2 to November 1 are processed and webinars are scheduled from January 1 to April 30.
- Forms submitted from November 2 to March 1 are processed and webinars are scheduled from May 1 to August 30.
- Research Need Statement (RNS)

- Effects of Construction Installation Methods on the Design and Performance of Drilled Shaft Foundations- NCHRP (Submitted, Funded 2019/2020)

Eric Lohr: Started in the fall. ETA 2026

- Design Specifications for the Static and Seismic Design of Piles for Downdrag.NCHRP (Submitted, Funded 2019/2020)

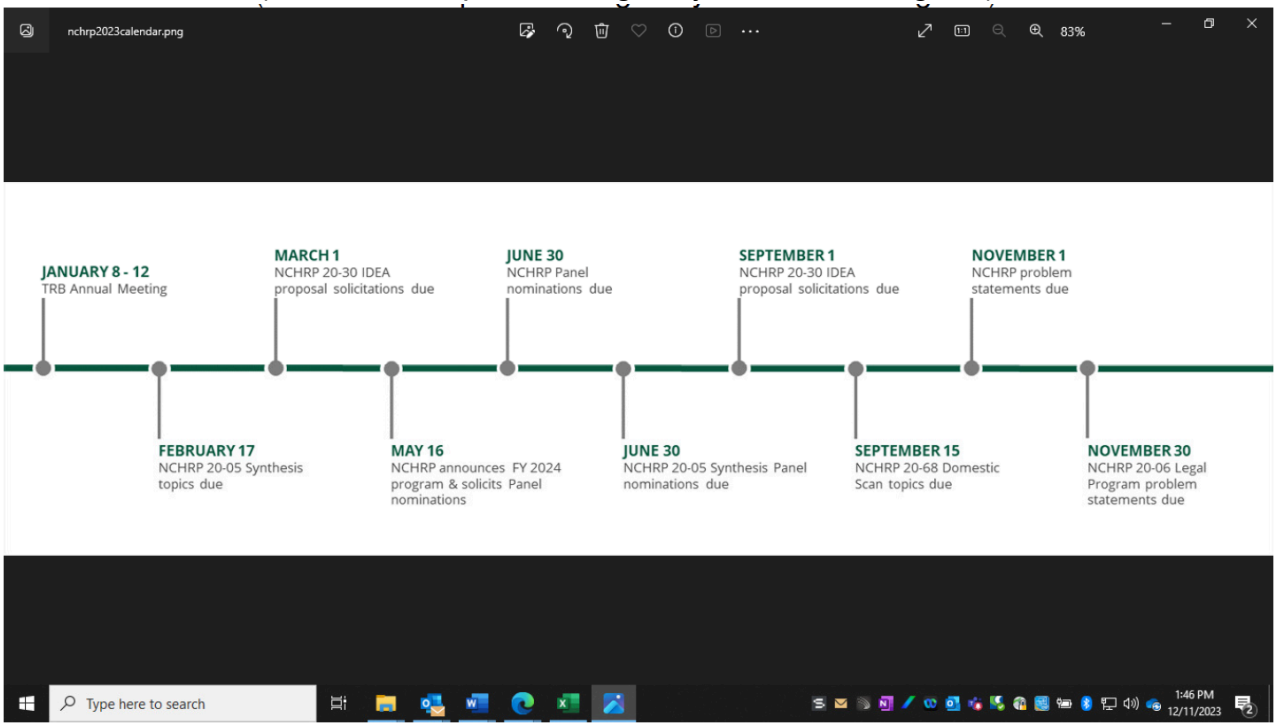
Underway

- Development of a design method for drilled shaft foundations to account for the interaction of torsion-lateral forces (2021)- Not Submitted

Ranked #2, therefore not submitted.

- Assembling Quality and Complete Databases of Deep Foundation Load Tests and Development of Machine Learning Algorithms for Geotechnical Applications, (2021) Submitted, not approved
- Development of Machine Learning Algorithms for Geotechnical Applications and Assembly of a Quality Database of Deep Foundation Load Tests" by Victor Aguilar (2022) Submitted, Not approved

NCHRP (National Cooperative Highway Research Program) Calendar



- *Synthesis:*

  - Data availability and machine learning for geotechnical applications (2023) Submitted, not approved
    Chad Harden provided an update
  - Current Practice for design of highway bridge and other structures Foundations on shrink/swell soil. (2023), submitted not approved
  - Gerald Verbeek – will write synthesis on CPT with AKG20
  - Derek Dasenbrock – E-Circular on CPT with CoSponsoring AKG20 regarding instrumentation and modeling / State Practices.

ANNOUNCEMENTS

- Propose New Topics for the NCHRP Synthesis Program

4 August 2023

Due by February 16, 2024

- You are invited to propose a new NCHRP Synthesis topic for next year's program. Upload your synthesis topic statement in a Word document to the **NCHRP Synthesis Topic Submission Portal** by February 16, 2024.

Anyone can submit a synthesis.

An outline to guide you in creating your synthesis topic statement is available here: **Synthesis Topic Outline.**

A synthesis study documents current practice for specific highway topics. The following factors are considered in the selection of a synthesis topic:

- The objective of the scope of work is to document current highway practice in state departments of transportation (DOTs);
- The synthesis documents current practice, not best practice; it is not a research project or a guidebook;
- The topic addresses an area of practice that is widespread and of general interest to state DOTs; and
- The topic should be timely and critical for expediting delivery, improving the quality, or lowering the cost of highway programs.
- New topics will be selected in May 2024 and will be posted on this website.

For further information on the NCHRP synthesis program, please see the Background section of this website. Scroll down to view links to NCHRP Synthesis topics currently under study and completed.

Questions can be directed to Jo Allen Gause by email at jagause@nas.edu.

- Conference
  - Geo-Congress 2024- February 25-28, 2024, Vancouver, Canada
  - Super Pile 2024, June 12-14, 2024, San Francisco
- National Academies Committee on Geological and Geotechnical Engineering
  - Corrosion of Buried Steel at New and In-Service Infrastructure (2023)- Ken Fishman (5 mins)

- Section Activities and cosponsored events – AKG00 – Geology and Geotechnical Engineering Section. - Soheil Nazarian provided an update
  - >12,000 attendees this year.
  - 6,379 papers (vs. 5042 last year).
  - 555 Sessions and 94 Workshops
  - Nancy Whiting also in attendance.
    - 103rd TRB will be Jan 5-9, 2025
    - TRB is growing
    - 23 webinars

- March 1 – Deadlie for webinars
- Specialty Conferences
- Synthesis Deadlines
- Anti-Harassment Policy

- Geo-seismic subcommittee update by Kyle Rollins.

- **IV- Triennial Strategic Plan (TSP)- Part III-(25 minutes; 09:20 am – 09:45 am)**

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:

- Identification of emerging, critical, and cross-cutting issues within the committee scope (these issues could have been identified by the committee, Section, Group, Technical Activities Council, TRB Executive Committee, or other transportation committees and organizations);
- Identification of emerging, critical, and cross-cutting issues outside the committee scope that provide opportunities for liaison and collaborative efforts (these issues could also come from a wide range of sources).
- Where applicable, Committees are encouraged to identify areas that align with parts of:
  - TRB Critical Issues in Transportation 2019 http://www.trb.org/Main/Blurbs/178402.aspx
  - COVID-19 addendum http://www.trb.org/Main/Blurbs/181670.aspx
  - the current TRB Strategic Plan

http://onlinepubs.trb.org/onlinepubs/general/trb_strategic_plan.pdf

The primary factors that will shape the committee's scope are as follows:

1- The role of **DATA** in design and performance of foundation of bridges and other structures. Data interchange between various platforms will help to identify and establish relationships that will enable foundation and bridge designers to improve the design methodologies and enhance the performance and resiliency of the structures.

2- **Resiliency**, its role and how it is defined, characterized, and evaluated vis a vis the design and performance of foundations of bridges and other structures. Resiliency based design methodologies and contexts should be developed and innovative tools and concepts must be integrated into the newly created platforms.

An important part of incorporating resiliency into design includes addressing Climate Change. Its role,its role, and the way it should be defined, characterized, and evaluated within the foundation engineering design domain. Specifically, foundation systems with a focus on both short- and long-term performance monitoring. As a result, the following climatological impacts should be also taken into consideration: loading criteria associated with rising sea levels, high intensity short duration rainfall (or other storm types and scenarios), seasonal variations (wet-dry cycles and freeze-thaw cycles), etc. Moreover, steps must be taken to develop innovative methods for a proper design with resilient-based construction for new foundation-based infrastructure systems, and a resilient-based retrofitting plan for existing foundation-based infrastructure systems.

3- **Sustainability**, its role and how it is defined, characterized and evaluated within the domain of the foundation engineering and construction. Steps must be taken to develop innovative methods for evaluating and quantifying the sustainability of a foundation system.

4- The role of **AI (Artificial Intelligence) and ML (Machine Learning)** in capitalizing on DATA interchange to create algorithms for predicting various aspects of bridge foundation design and construction, from site variability to design methodologies, from construction feasibility to pile load testing.

5- **Transformational Technologies and Services** will challenge the use and demand on existing infrastructure. Emergence of new transportation services and connected and automated motor vehicles (CAVs) may increase roadway capacity by more than 50%, compounded with platooning of truck loads. As **funding** may shift from new construction to extend the life of existing infrastructure, the committee can help to identify research needs and technology transfer to support a greater focus on maintenance and inspection, **system performance and asset management, smart infrastructure and foundation materials**, and load rating, repair, retrofit, or replacement of bridge foundations.

Comments:

- Ken Fishman
  - Topics of the Day
    - AI
    - Transformational Technologies
    - Autonomous Vehicle Effects
- Joe Nietfeld
  - Defining Sustainability and Resilience
- Gerald Verbeek
  - ASCE and UN provide examples
  - How to implement…
- Anand Puppala
  - Sustainability
  - Foundation Re-Use
- Sharid Amiri
  - Input on task force teams to keep moving TSP forward.

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:

- projects, activities and products that the committee will undertake during the next three years to address the emerging, critical, and cross-cutting issues identified above;
- how the current or proposed changed membership composition will respond to issues identified above;
- strategies to promote viewpoint diversity through meaningful involvement by any of the committee's constituents who are underrepresented minorities, Young Members, state DOT members both during committee meetings and at other times;
- committee's communication activities, and efforts to provide assistance and technology transfer to the transportation community;
- research – for the TRB committees, "research" is a very broad concept that can begin with providing the user perspective on research needs, writing research needs statements, tracking research, understanding the funding available for research in their topic area, developing case studies, lessons learned, disseminating research, technology transfer, and other activities that will advance the state of the practice. Potential research activities are:
  - research directions, results, and needs or gaps;
  - plan for maintaining and augmenting the Research Need Statements (RNS) database;
  - efforts to address research implementation and user needs, and ways to identify research use and implementation.

1- Projects, activities and products: The committee will continue on its current path to organize and develop webinars, research need statements, presentations and workshops.
2- Technology Transfer Working Group (TTWG) which started its work in 2020 will be working with the committee membership and external parties such as other TRB committees, FHWA, DOTs, ASCE, DFI and other organizations to respond to the critical and emerging issues cited above.
3- The committee will continue its mid-year virtual meetings and (Annual Meeting Part I). These meetings have enabled the committee to reach out to numerous friends of the committee who historically have not

been able to attend in person during the annual meeting. These strategies will help promote viewpoint diversity and inclusion and will be utilized in future years.

4- The committee's communication activities have expanded to have a LinkedIn group dedicated to the committee, its activities and technology transfer. The LinkedIn group will continue to be used and expanded to include updates, future events, and requests for input as the need arises during the execution of the TSP.
5- Research directions will be in line with the emerging and critical issues within the scope of the committee as cited in this TSP.
6- Plan for augmenting the data base is to continue working with the committee membership and technology transfer working group.
7- Several critical issues for this committee align with topics from AKB50 Standing Committee on Seismic Design and Performance of Bridges, and our joint Subcommittee AFF50(1) on Geoseismic Issues of Bridges. The primary goal of AKB50's TSP is to promote a migration from forced-based to displacement-based specifications in the AASHTO LRFD Bridge Design Specifications and in concert with the AASHTO LRFD Guide Specifications for the Seismic Design of Bridges. There will be specific areas of collaboration in this goal for AKG70, AKB50, and the subcommittee. Two known areas of needed research include modeling and seismic performance of skewed abutments, and Geoseismic design considerations including liquefaction, slope instability and lateral spreading of soils.
8- Steps have been taken to conduct research need statements annual meetings with the committee. In addition, the technology transfer working group (TTWG) is working closely with the committee's research coordinator to develop research need statements. Efforts are also under way to reach out to AASHTO T-15 committee to exchange information on research needs that are of importance to AASHTO. This will in turn will enable the AKG70 committee to develop research need statements that are in line with the NCHRP research roadmap.

Committee's members Input on the TSP

Murad Abu-Farsakh	J. Erik Loehr
Victor Aguilar	Nick Machairas
Sharid Amiri	Mohammed Mulla
Prasenjit Basu	Joseph Nietfeld
Tejo Bheemasetti	Masoud Nobahar
Jan Cermak	Kathryn Petek
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Evan Garich	Gerald Verbeek
Peggy Hagerty Duffy	Ann Walters
Fei Han	Negin Yousefpour
	Aaron Zdinak

Comments:

- Hisham Sunna: Live Loads are getting worse (EVs, etc.)
- Gerald Verbeek: Questionable Bridges (small sized)…how to help, reuse, etc.

V- Break: (15 minutes; 09:45 am – 10:00 am)

VI- Presentations- (70 mins; 10:00 am- 11:10 am)

1- Louisiana Pile Design from Cone Penetration Test (LPD-CPT)" (Murad)
   a. Software in progress
2- Sustainability in Foundation Design- Gerald Verbeek
   a. FoundationReuse.org
3- Illustrating sustainable and resilient bridge and other structure foundations through case histories on climate, grade raises, and foundation reuse. Joseph Nietfeld
   a. FHWA “PROTECT”
4- Testing methods for geotechnical load beating capacity and structural integrity evaluations of drilled shafts and auger-cast piles deep foundations. Mohamad Hussein
5- Ten Mile Slide stabilization, Rod Kostaschuk
6- Limestone cement (IL) used with Low-Density Cellular Concrete (LDCC) as well as the incorporation of recycled plastics into LDCC. (~~Nico Sutmoller~~)Milton Gomez
7- Concrete filled steel tubes for bridge substructure and foundation components (Bijan Khaleghi)

VII- Committee discussion on Research Need Statement (RNS) sand Synthesis proposals- (i.e. New topics for 2024). (45 mins-11:10 am- 11:55 am)- Masoud Nobahar & Nick Machairas

VIII- Open Forum: (5 minutes; 11:55 am – 12:00 pm)

- Utilize:
  a. Monthly Meetings
  b. Task Teams
  c. January Meeting
     i. Leaders of the Task Teams
     ii. Topics
        1. Synthesis Feb 15…vote on existing
        2. Other ideas
  d. February
     i. NCHRP RNS ….November
     ii. Webinar Ideas
     iii. Call for Papers
  e. Virtual votes via email
     i. For Committee Scope Revision
     ii. RNS, etc.

Adjourn: