

Triennial Self-Evaluation of Committee Activities
TRB Committee A2K03
Foundations of Bridges and Other Structures
Christopher Dumas, Chairman

This triennial self-evaluation report covers the period from 2000 through 2003. To facilitate effective administration, the TRB Staff postponed the date of submittal of the current Triennial Self-Evaluation Report by a year that is one year prior to the year when the current chair completes his term as chair.

This report shows that Committee A2K03 has continued to accomplish activities consistent with the Group 2 objectives, that is:

- suggest research projects;
- encourage, correlate and evaluate research;
- assist in outlining sound procedures for the conduct of research;
- encourage the reporting and discussion of research findings before the open forum of TRB meetings;
- assist in the preparation of synthesis information;
- develop plans for effective dissemination and utilization of research findings;
- suggested to TRB any actions that should be taken to improve TRB's capability to administer and carry out its function.

In the course of preparing this Triennial Report, a survey was made of committee members to obtain comments regarding the scope of the committee activities and areas of interest on which to focus during the next triennial period. These responses have been incorporated into this report where appropriate.

1. Committee Scope

Currently the committee's scope is "concerned with the behavior and stability of foundation soils supporting bridges, retaining walls, box culverts, buildings, overhead signs, and other transportation structures; and earth pressures exerted against these structures and against temporary structures used in construction."

The scope of the committee has been discussed periodically and as part of the preparation of this report, a survey of the membership was conducted with regards to scope and future goals. While there continues to be a general consensus that the current scope broadly defines its activities, several comments were submitted regarding the scope of the committee's efforts. The committee has noted that more emphasis has been placed in recent years on understanding the interaction between foundations and the structure it is supporting (i.e., soil-structure interaction) as with the development and

implementation of LRFD methods. A number of computer programs are being, or have been, developed to model this interaction (e.g. , Florida Pier, Strudl soil-structure models and many others) with a goal to provide more efficient and effective designs that take into account this interaction. In addition, definition of materials providing foundation support should likely include rock and may possibly be broadly defined as geo-materials.

As a result of this survey and previous discussions, a modification of the committee scope to account for these and similar issues has been proposed. The modified scope would allow greater effort to be focused on the soil-structure interaction aspects of design. The modified scope would be as follows:

The Scope of the A2K03 Committee activities will be concerned with the local and global behavior, stability, and interaction of structural foundations, and their supporting materials, for permanent and temporary transportation structures (bridges, retaining walls, box culverts, buildings, overhead signs, and other transportation structures).

Part II Performance Evaluation

From the committee's previous 1999 Self Evaluation Report (TSE):

The fundamental future goal for A2K03 is to advance knowledge concerning the nature and performance of foundation related systems by defining research needs, encourage research in those areas, evaluate research activities and providing a forum for the dissemination of this information to practitioners in the transportation industry. Specific focus will be placed upon a better understanding of existing technologies (e.g. liquefaction), as well as to recognize and foster emerging technologies (e.g., soil mixing, nondestructive testing methods, etc.)

The evaluation of the performance of the committee in achieving its goals are divided into three primary categories:

1. Technology Transfer
2. Research Needs
3. Committee Interactions

Technology Transfer

Technology transfer (T2) is considered by the committee to be one of the primary vehicles for successfully achieving its fundamental and specific goals. During the evaluation period of 2000 to 2003, A2K03 has far exceeded its TRB T2 requirements in both quantity and quality. T2 activities included: sponsoring and *co-sponsoring* sessions and workshops at the annual TRB meeting; committee meetings and presentations; membership review of papers; publishing of papers; developing special TRB publications; co-sponsoring conferences with other professional organizations; and the internet. Specific details of A2K03's T2 activities are presented below.

Annual Meeting Sessions and Workshops

In the four year evaluation period-2000 through 2003-A2K03 has sponsored/cosponsored twenty two sessions and two Sunday Workshop. Total attendance for these technology transfer activities is estimated to be approximately 1,580. A detailed summary of the session are listed below.

Session Independently Sponsored by A2K03

Year 2000

- **Workshop - *Design of Mechanically Stabilized Earth Walls (MSEW) and Reinforced Soil Slopes (RSS)*** held on Sunday January 9, 2000 from 1:30P.M. to 5:00P.M. Moderator was Jerry DiMaggio. Attendance had been limited to 40 maximum by design but 75 registered and more than 90 attended.
- **Session 11 - *Micropiling Research, Design and Construction*** - Monday, 8:00A.M. to 9:45A.M., Marriott, Virginia A, Sunil Sharma (A2K03) presiding, estimated attendance 100
- **Session 76 - *Cap-Pile-Soil Interaction, Part 1***, Monday, 1:30P.M. to 3:15P.M., Marriott, Cotillion South, Chris Dumas (A2K03) presiding, estimated attendance 90
- **Session 111 - *Cap-Pile-Soil Interaction, Part 2***, Monday, 3:45P.M. to 5:30P.M., Marriott, Cotillion South, Jim Sheahan (A2K03) presiding, estimated attendance 80

Year 2001

- **Session 164 – *Micropile Research and International State of Practice***, Sponsored by A2KO3, Tom Cooling presiding, estimated attendance 90
- **Session 201 – *Seismic Performance of Micropiles: Research and Case Studies of Geotechnical and Structural Performance***, Sponsored by A2KO3, Tom Cooling presiding, estimated attendance 80
- **Session 457 – *Drilled Shafts and Other Foundation Issues***, Sponsored by A2KO3, Jim Sheahan presiding, estimated attendance 30

Year 2002

- **Session 104 – *Composite Piling***, Sponsored by A2KO3, Arnie Aronowitz presiding, estimated attendance 150
- **Session 138 – *Analysis and Design of Integral Bridge Abutment Foundations***, Jim Sheahan presiding, estimated attendance 100.
- **Session 171 - *Geotechnical Aspects of Design-Build, Part 1***, Tom Pelnik presiding, Estimated attendance 80
- **Session 213 – *Geotechnical Aspects of Design-Build, Part 2***, Tom Pelnik presiding, Estimated attendance 60

Year 2003

- **Sunday Workshop 116: Innovative Technology for Construction of Bridge and Embankment Foundations**, Randy R. Cannon - Presiding, Estimated Attendance 50
- **Session 404: Analysis, Design, And Testing of Deep Foundations, Part 1**, Michael W. O'Neill Presiding, estimated Attendance 50
- **Session 447: Analysis, Design, And Testing of Deep Foundations, Part 2**, James J. Brennan Presiding, Estimated Attendance 60

Co-Sponsored Sessions

In addition to the session listed above which were independently sponsored A2K03, the committee jointly sponsored an additional 10 sessions over the evaluation period with TRB committees A2K01, A2K02, A2K05, A2K07, and A2LO2. A detailed summary of the session are listed below.

Year 2000

- **Session 218 -Foundation Analysis for Historic Structures and Construction Impacts**, Jointly sponsored with A2K05 Committee on Modeling Techniques in Geomechanics, Conrad Felice (A2K05) presiding, estimated attendance 50

Year 2001

- **Session 71 – Geomedia Databases: Development, Applications, and Future Research, Part 1**, Co-sponsored by A2KO3 and A2LO2, Sunil Sharma presiding, estimated attendance 100
- **Session 106 – Geomedia Databases: Development, Applications, and Future Research, Part 2** Co-sponsored by A2KO3 and A2LO2, Sunil Sharma presiding, estimated attendance 60

Year 2002

- **Session 401 – Geotechnical Engineering in Transportation, Part 2**
- **Session 446 – Uncertainty in Geotechnical Design**, Co-sponsored by A2KO5/A2KO3, Mike McVay, presiding, Estimated attendance 50

Year 2003

- **Session 353: Fiber Reinforced Polymer Piles**, Co-Sponsored by A2K01 and A2K03, Thomas C. Sheahan - Presiding, Estimated Attendance 25,

- **Session 602: New Developments in Load and Resistance Factor Design (LRFD) Research and Design, Part 1**, Co-sponsored by A2KO5 and A2KO3, Conrad W. Felice Presiding, estimated Attendance 50,
- **Session 641: New Developments in Load and Resistance Factor Design (LRFD) Research and Design, Part 2**, Co-sponsored by A2KO3 and A2KO5, Edward Kavazanjian, Jr. – Presiding, estimated Attendance 55
- **Session 646: Embankment Support and Deep Ground Improvement**, Co-sponsored by A2KO2 and A2KO3, Thomas Cooling Presiding, estimated attendance 50
- **Session 727: Mechanically Stabilized Earth (MSE) Bridge Abutments**, Co-sponsored by A2KO2, A2KO7 and A2KO3, David J. Elton presiding, estimated Attendance 30.

Committee Meetings and Presentations

The committee meets once a year at the TRB annual meeting. In addition to the T2 benefits of the members and non members conducting standard committee business, each year additional speakers are invited, or offered the opportunity, to make a semi-formal presentation. This allows dissemination of information that might not be otherwise available including: works-in-progress, new, innovative methods and technology under trial; details on upcoming conferences.

In addition, these presentations have proven to be clearly the best A2K03 vehicle (quality and quantity) for interaction with other TRB committees, technical societies, and non U.S. engineers. This is demonstrated below in the detailed committee meeting for the evaluation period 2000 to 2003. Non-member presentations are shown in an *italic font*. Please note apparent influence of the meeting day and time on attendance.

2000 Meeting (9:00A.M. Wednesday)

Attendance: 50 (12 members and **38** visitors).

Presentations:

- *FHWA R&D Activities by Jerry DiMaggio*
- Review of FHWA R&D Project on Deep Mixing and status of work by Don Bruce.
- *Review of research on erosion function for prediction of scour by Dr. Jean-Louis Briaud*
- Update of A2K03's NCHRP Research Project “Static and Dynamic Testing of Deep Foundations” by Dan Brown
- *Presentation on Micropiling - State of the Practice and Ongoing Research in Japan by Dr. Fukui, Japanese Minister of Construction*

2001 Meeting (9:00A.M. Wednesday)

Attendance: 51 (16 members and **35** visitors)

Presentations:

- *Pile/Cap Connection Research by Dr. Michael Petrou, University of South Carolina*
- *Robotic Drilled Shaft Inspection System by Dr Leonhard E. Bernold, North Carolina State University*
- *NCHRP Project 24-17 “LRFD Deep Foundation Design” by Dr. Sam Paikowsky, University of Massachusetts Lowell*
- *Capacity Analysis of Large Diameter Drilled Shafts with Defects, studies by Conrad Felice and Kathryn Veteck. Presented by Kathryn Veteck*

2002 Meeting (7:30 P.M. Monday)

Attendance: 5 (13 members and **37** visitors)

Presentations:

- *Technical Summary of studies thus far on Structure Resistance Factors for Drilled Shafts - Michael W. O’Neil, University of Houston*
- *Construction of the World Trade Center – Arnold Aronowitz*
- *Case studies of Designs for Building-Foundation Interaction under Seismic Event Michael Willford, Director ARUP Consulting, London,*

2003 Meeting (1:30 P.M. Tuesday)

Attendance: 69 (17 members and 52 visitors)

Presentations:

- *ACIP (augercast) piles for foundations on a 3-span bridge in Texas – Michael W. O’Neill, University of Houston*
- *Instrumentation for cast-in-place deep foundation installations – Dr. Frank Rausche*
- *Summary Presentation on NCHRP Project 24-13: Evaluation of Metal-Tensioned Elements in Geotechnical Facilities - Ken Fishman*
- *Deep Foundation Institute (DFI) Certification Program for Dynamic Pile Testing—Richard Short, DFI President.*

Review and Publication of Papers

In the four year evaluation period (2000 through 2003) A2K03 has reviewed 71-papers, and published 20-papers. A detailed listing by year is presented below.

2000

- Twelve papers reviewed for committee sessions with four published.
- Three papers reviewed for sessions cosponsored with other TRB committees.

2001

- Fifteen papers reviewed for committee sessions with six published.
- Four papers reviewed for sessions cosponsored with other TRB committees.

2002

- Fourteen papers reviewed for committee sessions with six published.
- Three papers reviewed for sessions cosponsored with other TRB committees.

2003

- Fourteen papers reviewed for committee sessions with four published.
- Six papers reviewed for sessions cosponsored with other TRB committees.

Special Publications

In addition to these reviews and publications, A2K03 several committee members teamed together to author the paper “Foundations and Other Structures” which was included in the TRB compendium publication “Transportation in the New Millennium.” That paper provided a very detailed and concise discussion of historical changes in the design and of foundations in the last century as well as predicted future trends <http://gulliver.trb.org/publications/millennium/00041.pdf>

Co-sponsorship of Conferences

A2K03 was a cosponsor of the ASCE Geo-Institute International Deep Foundation Conference in Orlando Florida, February 2002. As part of the co-sponsorship, A2K03 member ship performed approximately seventeen paper reviews.

Web Page

In 2002, A2K03 established a web page that is hosted on the FHWA geotechnical web page site. The site includes call for papers, a summarized list of geo-session times and locations, and many other useful documents and links. The goal is for A2K03 members and friends to be able to access up to date committee information rapidly and easily—no need to go through your inbox to find a previous e-mail.

Internal and External Committee Interaction

Over the evaluation period of 2000 to 2003, A2K03’s Interaction (internal and external) performance has been exceptional. The justification for this assessment is clearly demonstrated in the previous Technology Transfer Section of this Report—co-sponsorship of sessions, co-sponsorship of

conferences with other technical, quantity and diversity of committee meeting attendance and presenters.

A2K03 Committee Membership Composition in 2003

Item	Federal	State	Consult	University
Member Affiliation	1	12	5	8
Membership Geography	Eastern	Midwest	West	Non-US
	10	7	7	2

In addition to A2K03 membership, all members also belong to local technical societies and/or one or more of the following national associations: AASHTO, ASTM, ASCE, Geoinstitute, USUCGAR, DFI, ADSC, and PDCA. A detailed list is located in Appendix A of this report.

Research Needs

TRB committees are required to stimulate research by developing, publishing, and publicizing research need statements (RNS), defining and publishing critical issues, and providing input to research programs at all levels. For the evaluation period of 2000 to 2003, A2K03 has directly met requirements for committee RNS, and indirectly exceeded them.

Directly, A2K03 has developed on average one RNS per year, as outlined below.

2000—NCHRP Research Proposal “Innovative Technology and Procedures for Capacity Testing of Open End Cylinder Piles.” This was submitted directly to AASHTO via committee membership. Funding was not approved.

2001—NCHRP Synthesis Request “WIDENING EMBANKMENTS OVER SOFT SOILS: UNIQUE GEOTECHNICAL CHALLENGES.” This was submitted via TRB, but was not approved for funding.

2002—NCHRP Research Proposal “Extreme Event Modeling of Deep Foundations for Rotational Stiffness.” Was developed by the committee membership, but was not formally submitted to TRB or AASHTO. Will submit in 2003-2004 cycle.

2002—NCHRP Research Proposal “LRFD Seismic Design Provisions for Free-Standing Walls and Buried Structures.” Developed by committee members and friends, and submitted directly to AASHTO. The proposal was not approved in 2002, but was approved for funding in 2003 under a revised title ‘Analysis of Retaining Walls, Buried Structures and Embankments.’

In directly, A2K03 membership has informally exceeded research requirements. Specifically, nearly all members are directly involved in numerous research projects for NCHRP, State DOTs, NSF, etc. and these members continually share this information and collaborate by phone, e-mail, committee meetings, other technical events. Unfortunately, these activities were not tracked by the chairman during the evaluation period. In future, attempts will be made to create an easy mechanism for tracking this information.

Future Goals

Using the results of the membership wide survey, the following future goals for A2K03 have been identified.

1. The committee will continue to serve the industry by maintaining diversity in the committee membership, seeking participation with other technical associations, by continued discussion of industry needs, by fostering research and by offering transfer of technology.
2. The Committee’s fundamental future goal for A2K03 will continue to be advancing knowledge concerning the nature and performance of foundation related systems by defining research needs, encourage research in those areas, and evaluate research activities and providing a forum for the dissemination of this information to practitioners in the transportation industry.
3. The specific focus of the committee will be:
 - i. Auger Cast In Place Piles (AGIP)
 - ii. Foundation Design Methods based on Cone Penetrometer Test (CPT) Data
 - iii. Load Resistance Factored Design (LRFD) of Foundations
 - iv. Advanced Real Time Monitoring of Instrumentation and Installation of Geo-Structures
 - v. Implementation and Improvement of the Proposed New Seismic Design Code relative to Geo-Structures
 - vi. New Technologies for Foundation/Underground Construction
 - vii. Standardization of Geotechnical Exploration of Design Build Projects
 - viii. In cooperation with A2C08 establish a subcommittee to address seismic concerns related to foundations.

In the near future, the committee will move toward achieving these goals via sponsoring and cosponsoring the following 2004 and 2005 Sessions listed below, and developing sessions and research statements at our annual committee meetings.

2004 Session: Practical Applications of LRFD for Foundations and Earth Retaining Systems

2004 Session: Advances in Real Time Geo-Instrumentation

2004 Session: Condition Assessment of Buried Metal-Tension Elements

2004 Session: Recent Experiences and Advances in the Use of ACIP Piles

2005 Session: Vessel Impact/ Structure Analysis Methods

APPENDIX A

Name	Repy	AASHTO	ASTM	ASCE	Geo Inst	USU'R	DFI	ADSC	PDCA	Others
Mr. Chris Dumas (G-FHWA)										
Mr. Darrin Becket (G-KyTC)										
Dr. Ross W. Boulanger (Edu-Univ of California)										
Mr. James Joseph Brennan (G-Kansas DOT)	Yes	X	-	X	X	-	-	X	-	-
Mr. Randy Ray Cannon (Consultant-Self)	Yes	-	-	X	X	-	X	-	-	-
Mr. Tom L. Cooling (Consultant-URS Corporation)										
Mr. Richard L. Engel (Consultant-E.L. Robinson Eng Co)										
Dr. J. David Frost (Edu-GATech)	Yes	-	X	X	X	-	-	-	-	NAGS, NEES, CUREE, Sigma Xi
Dr. An-Bin Huang (Edu-Nat'l Chiao Tung University)										
Dr. Edward Kavazanjian, Jr. (Consultant-GeoSyntec Consultants)	Yes	-	-	X	X ¹	-	-	-	-	EERI, NAGS, SWANA, ISSMGE,IGS
Mr. Kyung Jun Kim (G-NC DOT)	Yes	-	-	X	-	-	-	-	-	-
Ms. Laura Krusinski (G-Maine DOT)										
Dr. San-Shyan Lin (Edu-Taiwan Ocean University)	Yes	-	-	-	-	-	-	-	-	-
Mr. Mark J. Morvant (G-Louisiana Trans Ceseach Center)	Yes	-	-	-	-	-	-	-	-	-
Dr. Michael Wayne O'Neill (Edu-University of Houston)	Yes	-	X	X	X	X	X	X	-	ISSMGE TC-18
Dr. Samuel G. Paikowsky (Edu-University of Massachusetts)										
Mr. Paul Passe (Consultant-Prof Service Industries)	Yes	-	-	X	-	-	-	-	-	-
Mr. Thomas W. Pelnik, III (G-VA DOT)										
Mr. Gary Person (G-MNDOT)	Yes	-	-	-	X	-	-	-	-	-
Dr. Anand J. Puppala (Edu-Univ Texas at Arlington)	Yes	-	X	X	X	X	-	X	-	-
Mr. Thomas Shantz (G-CALTRANS)										
Dr. Sunil Sharma (Edu-Univ of Idaho)	Yes	-	-	X	X	X	-	-	-	EERI,TRB

Mr. James M. Sheahan (Consultant-HDR Eng Inc)	Yes	-	-	X	X	-		X	-	ASHE, SAME
Mr. Jan L. Six (G-OregonDOT)	Yes	-	-	-	-	-	-	-	-	-
Tony Allen (WA DOT)		X	X	X	X					

Ed Kavy - X¹ Chair of Geo-Inst Tech'l Coord Committee
ISSMGE – Int'l Society of SM & Geotech Engr'g
IGS – International Geosynthetics Society
ASHE – Association of Highway Engineers

EERI – Earthquake Engineering Research Inst.;
NAGS – North American Geosynthetics Society
SWANA – Solid Waste Association of North America
SAME – Society of American Military Engineers

Sunil Sharma - GeoInstitute (GI) - Computer Apps Comm Mbr; Chair of TRB A2L02 and mbr of A2L05 as well as A2L03