From the Director

The Center for Underground Infrastructure Research and Education (CUIRE) is pleased to present its first edition of *Currently at CUIRE*. It is our hope that you find this quarterly e-newsletter both informative and interesting, as we strive to bring the latest in underground infrastructure research and education to you. CUIRE’s mission is to provide national and international leadership in research, outreach and educational activities which enhance cost-effectiveness, construction productivity, environmental improvement and renewal of the aging underground infrastructure. CUIRE was founded in 2002 at Michigan State University (MSU) with the goal of promoting research, development and training in underground infrastructure construction and renewal technologies. MSU provides excellent resources to the Center, including faculty with a variety of backgrounds for interdisciplinary research and over 30,000 square feet of laboratory space.

CUIRE is organized in a university-government-industry partnership with two lines of authority: Michigan State University and the Industry Board (IB). MSU provides an oversight committee who supervises the everyday endeavors of the Center’s research agenda, which is developed by the IB. The IB is composed of a variety of people with backgrounds in the infrastructure industry, including utility companies, contractors, public agencies, academics, and engineers. The IB strives to provide policy and research direction, maintain budgets within the center, and monitors the progress of research endeavors.

Aside from research, education and outreach programs are essential to the success of CUIRE. The CUIRE puts on training schools and seminars for Auger Boring, Horizontal Directional Drilling, and Inspector Training at least once a year. These Schools benefit anyone working in the trenchless industry and are open to everyone.

This newsletter aims to inform you of CUIRE’s research, outreach, and educational endeavors. Each quarter, we will bring highlights of our center to you, including information on staff members, board members, and research projects so that you can become better acquainted with CUIRE and its mission. If you would like to comment or make suggestions on our newsletter, please contact Amanda Simpson, CUIRE research assistant, at simps117@msu.edu. Enjoy!
Inspector Training and Engineering School  
January 23-24, 2005  

In conjunction with the UCT Conference, ASCE TIPS and PINS Committees, and Underground Construction Magazine, CUIRE is offering this school at the Houston UCT Conference. The course is open to all and is designed for engineers, inspectors and public agencies. The second day will have two tracks, one on pipeline renewals and another on new installations. Industry experts will teach the classes, and the faculty have extensive knowledge in their area of expertise, creating a large degree of experience in the classroom. You will find this course very informative.

Horizontal Directional Drilling School  
January 27-28, 2005  

In conjunction with the UCT Conference, ASCE TIPS and PINS Committees, and Underground Construction Magazine, CUIRE is offering this school at the Houston UCT Conference. The course is open to all and is designed for engineers, inspectors and public agencies. Classes are taught from industry experts, and the faculty have extensive knowledge in their area of expertise, creating a large degree of experience in the classroom. You will find this class to be very informative. The same class will also be offered March 7-8, 2005 in Novi, Michigan.

Both classes will be offered during the UCT Conference in Houston, TX and registration in the class grants you admission to UCT events all week. For more information on registration, class schedules, and accommodations, please contact Cathy Morrison at 517.432.2096 or by e-mail at morris12@msu.edu.

Become a CUIRE Board Member!  

CUIRE is always looking to expand its knowledge and experience base with industry professionals. We welcome your input and support regarding our research endeavors, and invite you to join our Board of Directors.

As a board member you will:

• Serve on the advisory board to develop guidelines and plans to operate the Center.
• Have access to the results of core research programs, technology reviews, market studies and overall activities of the Center.
• Receive the Center’s newsletter and the technical journal.
• Receive free or discounted rates to conferences and educational programs.
• Be recognized and promoted as leaders of the industry supporting activities of the Center.
• Be featured and linked at CUIRE’s website with a profile of your company and representative.

Board Members contribute $2,000 per year in support of the general activities of the center and are recognized as such. Associate Board Members contribute $500 per year in support of the general activities of the Center. The Associate Board Members are recognized as such and are non-voting board members.

Contact Cathy Morrison at 517.432.2096 or at morris12@msu.edu for more information or to register your membership today!
Fall Featured Board Member

Mark Dionise
Manager
Utility Coordination & Permits Section
Michigan Department of Transportation

Mark graduated with his bachelors degree in Civil Engineering in 1986 from Michigan State University. He worked for the Federal Highway Administration (FHWA) from 1986 to 1989. During his stay with the FHWA he worked in the Wisconsin, Arizona, Texas, Virginia and Indiana. Most of this time was spent in design review and construction inspection of bridge projects.

In 1989 he began his career with the Michigan Department of Transportation (MDOT) and worked in a variety of areas including the Road Design and Local Services Division. For the last four years Mark has been MDOT’s Statewide Utility Coordination and Permits Engineer. Mark is also the current chairman of the Center for Underground Infrastructure Research and Education (CUIRE).

2004 CUIRE Board Members

The Board has contributed their time, resources and expertise to the advancement and establishment of CUIRE. If you or your company would like to join the CUIRE Board of Directors, please contact Cathy Morrison at 517.432.2096.

Jim Barbera; Barbco, Inc.
Leo Barbera; Horizontal Holes International, Inc.
Jeff Bistodeau; Premier Events
Lori Burgett; Kokosing Construction Co.
Frank Canon; Baroid IDP
John Capocci; Barbco
Robert Carpenter; Underground Construction
Ben Cocogliato; TT Technologies, Inc.
Mark Dionise; MI Dept of Transportation
Troy Freed; SOS Service Group, Inc.
Peter Funkhouser; MI Dept of Transportation
Mark Gallucci; Digital Control, Inc.
Daniel Hanson; Hanson Engineering
John Heiberger; Consumers Energy
Cliff Henderson; Hobas Pipe, USA
Mark J. Holbrook; Hamburg Township DPW Admin.
Larry W. Johnson; Hobas Pipe USA
G. Alan Johnson; Wade & Associates, Inc.
David Kozman; American Water Services
Steve Kramer; Jacobs Civil Inc.
Bruce Kuffer; Fishbeck Thompson Carr & Huber
Nick Lefke; MDOT
Dan Liotti; Midwest Mole, Inc.
William (Tim) Mahon; Consultant
Mike Moore; McLaughlin Mfg Co.
Mohammad Najafi; Michigan State University
Carl M Pearson; Kenny Construction Company
Gaylord Richey; Astec Underground
Jim Rush; Benjamin Media Inc (Trenchless Technology)
Jim Scott; Proline Technologies, NA, LLC
Gary M. Soper; Benton Charter Township
Jeff Sowers; TBE Group, Inc.
Jamie Taggert; Peninsular Technologies
Abdelkader Tayebi; CUIRE
Kevan Taylor; ProLine Technologies, NA LLC
Rob Tumbleson; Akkerman, Inc.
Dr. Mohammad Najafi, P.E.
Director, CUIRE

Dr. Najafi, P.E., received his degrees of higher education from South Plains College, Texas Tech University; Purdue University; and Louisiana Tech University. His specialty is in Trenchless Technology and Construction Engineering & Management. Dr. Najafi, recognized as an "Industry Leader" by the publisher of the Trenchless Technology Magazine in 1998, has been a pioneer in trenchless technology research, education and training. He was the first faculty member in the United States to introduce and teach a course in trenchless technology as the curriculum of an ABET accredited college program. He also was the first in the U.S. to provide a series of "Certification Schools"; beginning in 1998. Dr. Najafi has offered more than 45 trenchless and pipeline courses throughout the country and in the Midwest. He has design experience in pipeline renewal systems and specifically in cured-in-place-pipe. He helped establish the North American Society for Trenchless Technology in 1990 and has been an active member of NASTT. He was on the program committee of No-Dig 2004.

Dr. Najafi is the vice-chairman of the ASCE task force to revise design guidelines for pipeline renewal systems. In addition, he is the chair of ASCE task force for the ASCE Manual of Practice (MoP) for Auger Boring Systems, chair of the ASCE Pipe Bursting and Pipe Ramming task force and vice-chair of task force for the ASCE Manual of Practice for Horizontal Directional Drilling. Pipe Bursting MoP is scheduled for completion in August, 2005. He is currently the Pipeline Editor of the ASCE Journal of Transportation Engineering, and was technical chair and editor of the ASCE International Pipeline Conference held July 13-16, 2003 in Baltimore where more than 200 technical papers were presented and published in a two-volume book of proceedings of more than 2000 pages. From 1999 through 2002, Dr. Najafi was the executive director of the Midwest Society for Trenchless Technology (MSTT) where, in conjunction with major universities, he offered more than 17 trenchless technology symposiums; he is presently the secretary and member of the Board of Directors of the MSTT.

Dr. Najafi is the author of a state-of-the-art review and co-author of several manuals on trenchless pipeline construction and renewal. He has many published papers (70+) on various aspects of trenchless technology and has provided short courses and presentations at major conferences. From 1994 through 2000, Dr. Najafi was the technical editor of No-Dig Engineering Journal. He is the author of the first text book in trenchless technology entitled "Trenchless Technology: Pipeline and Utility Design, Construction & Renewal," which is scheduled for publication in summer of 2004 by McGraw-Hill. Dr. Najafi is contributor to many pipeline and trenchless technology books, and has prepared design guidelines for a major pipeline rehabilitation company in United Kingdom.
Meet the CUIRE Staff

CUIRE has two permanent staff members, a research director and research associate. The rest of CUIRE is staffed by graduate students that have acquired funding from various projects in the infrastructure industry. Please take the time to learn about our staff, as their research efforts and dedication are moving the infrastructure industry forward!

Oleh Kinash, Ph.D.; CUIRE Research Associate

Dr. Kinash received both his MSE in precision devices and his Ph.D. in mechanics of solids degrees from Lviv State Polytechnic University in Lviv, Ukraine. He has more than 10 years of experience working as a Research Associate at Lviv State Polytechnic University on scientific projects for the Friendship oil pipeline.

Hosun Lee; Research Assistant

Hosun has both a bachelor’s and a master’s degree in civil engineering. He is currently working as a grader in the Cost Estimating and Analysis course and is also preparing a paper for the cost comparison of the pipeline construction on Service Rd. at MSU.

Roy Luo; Research Assistant

Roy is in second semester of graduate work at MSU and has a compound background in a range of landscape architecture, urban and regional planning, and construction management. Currently, he is working as a teaching assistant for Construction Estimation and Cost Analysis. Roy’s interest lies in Computer Information System for Construction Cost and Methods, especially in Trenchless Technology. Roy also maintains CUIRE’s website.

Alhad A. Panwalkar

Alhad did his bachelors degree in India from Pune University. He came to MSU in the Fall of 2001 to do his masters in Civil Engineering, which he finished in the Fall of 2003. Currently, he is doing a masters degree in Construction Management, and working as a research assistant for CUIRE.

Amanda Simpson; Research Assistant

Amanda is a first semester graduate student in the construction management program. She graduated in May 2004 with her B.A. in Advertising from Michigan State University. Amanda’s interests lie in the marketing and education portion of trenchless technology. She is also responsible for most of CUIRE’s marketing endeavors, including this newsletter!

Abdelkadar Tayebi, Ph.D.; CUIRE Research Director

Dr. Tayebi graduated from Cornell University with a PhD in Structural Engineering with emphasis on earthquake engineering and applied mechanics. He was subsequently assistant professor of civil engineering at Louisiana Tech University for three years during which he developed a research program on composite materials and sensors for civil infrastructure. He then joined the Center for Underground Infrastructure Research and Education as a research manager where he is continuing his original line of research in addition to recent interests in asset management, culverts, and land use.

Suzie von Bernuth; Research Assistant

Suzie is a second semester graduate student in the construction management program. She graduated in 1999 from University of Kentucky with a B.S. in Psychology. Suzie’s interest in trenchless technology is in the area of personnel management and safety implications.
Throughout Michigan, new developments are emerging everyday, and in many cases such developments occur in towns and communities that don’t have sufficient infrastructure already in place to accommodate incoming needs of new businesses and residents. To support each new development, developers as well as municipalities have to erect new roads, new street lights, expanded sewer pipes, and extensions of utility-related lines and infrastructure. The fiscal impacts of new developments depend on the nature of such development. Even within the category of single family homes, there are differentials in impacts associated with compactness of sewer lines, economies of scale in road construction, and economies of scale in such services as police, fire protection, libraries, and recreational park services. Density does matter, not only to communities and their residents, but also to the municipalities that bear the burden of operating and maintaining new infrastructure.

One of the most valuable pieces of information to local planners, local officials, land use professionals and developers is the fiscal impact of alternative densities. Various housing densities entail different patterns of future revenues and costs, not only for the municipalities and counties involved, but also for existing residents and businesses, including developers and realtors. It is therefore important to understand the implications of alternative densities for infrastructure costs, and to determine precisely which members of a community bear those costs.

The objective of this study is to provide a comparative analysis of the fiscal impacts of different densities in residential development. This analysis will involve case studies, with different levels of housing density within the community, from different regions of Michigan, so that the results are applicable statewide.

This study is based on a cost engineering approach that will be used to compare capital and life-cycle infrastructure costs for water, sewer and roads in high and low density developments within a given community. Eight communities in six regions of Michigan will be examined. Within each community, two developments of differing density will be chosen. The comparison of costs will be two-fold. First, using base year equalization, the costs of constructing water, sewer and road infrastructure will be figured (based on engineering plans, bid tabs, and invoices, where available). Second, measuring the dimensions of existing infrastructure, and using a multiplier based on materials and construction activities, the capital and life-cycle costs of each development will be estimated.

The community selection process has just ended and we are now in the data-gathering stage of this study. The two graduate students working on this project at CUIRE are Amanda Simpson and Suzie von Bernuth.
"Effects of Renewing Underground Utilities in Better Use of Land"
Dr. Oleh Kinash
Institute for Public Policy & Social Research (IPPSR).
This task will examine how renewal of old and deteriorating underground infrastructure will promote efficient and cost-effective use of land. The project includes Life Cycle Cost Analysis of Underground Utilities and its impact on reducing sprawl. An executive summary, report and guideline report will be developed at the beginning of December 2004.

"Fiscal and Infrastructure Implications on Alternative Housing Densities"
Amanda Simpson and Suzie von Bernuth
Land Policy Project
This study will look at the infrastructure of alternative density single-family home communities in eight different areas of Michigan. This study will be beneficial to city planners and others concerned with determining what members of the community bears the cost of infrastructure.

Michigan Department of Transportation
Roy Luo
The main goal of this project is prevention from damage of pavement and adjacent utility by Trenchless installation through a standardized systematic permit assurance procedure and documentation. Educational workshops will also be provided for MDOT inspectors.

Pipeline Infrastructure Asset Management
Hosun Lee
This study will look at the methodologies for decision making of maintenance, repair, and reconstruction along with the condition rating of the infrastructures in order to achieve an effective long-term management system at an optimum cost.

Web-Based Interactive Decision Support System for Trenchless Technologies
Alhad Panwalkar
This project deals with developing a decision support system for selection and evaluation of trenchless technologies. Currently, the existing research and literature is being surveyed regarding their relation to the above topic. The primary goal of this research is to improve and enhance the existing techniques and to implement a decision support model on a web platform.

Completed Research Projects

"Analysis and Comparison of Traffic Disruption Using Open-Cut and Trenchless Methods of Pipe Installation" by Bhavani Gangavarapu, 2003

"Cost Analysis for the Renewal Sewer System in the City of Grand Rapids, Michigan" by Kim KyongOk, 2004

"Development of a Knowledge-Based Decision Matrix for Selection of Trenchless Technology Methods" by Kalyan Gudla, 2004

"Sewer Pipeline Condition Prediction Using Neural Network Models" by Guruprakash Kulandaivel, 2004