49th Annual

MICHIGAN

CEW 2015

County Engineers' Workshop

CRA County Road Association OF MICHIGAN

Michigan's Local Technical Assistance Program

Center for Technology & Training

Agenda

Tuesday, February 3

Bridge & Road Design with Geosynthetic Materials
Moderator: Chris Byrum, Soil and Materials Engineers, Inc.

7:45 **Registration and Continental Breakfast**

9:00 **Welcome & Introductions**

9:05 **Geogrids & Geotextiles in Roads, Bridges, Slope Stabilization & Retaining Walls**
Chris Byrum, Geotechnical Engineer
Soil and Materials Engineers, Inc.

9:45 **GRS-IBS: Overview, Design, Case Studies & MDOT's Perspective**
Chris Johnecheck, Geotechnical Engineer
Michigan Department of Transportation

10:05 **GRS-IBS: Project Planning from Owner Perspective**
Paul Spitzley, County Highway Engineer
Ionia County Road Commission

10:25 **Break**

10:40 **GRS-IBS: Site Design & Challenges in Material Acquisition**
Roger Johr, Senior Project Manager
Williams & Works

11:00 **GRS-IBS: Geotechnical Aspects, Abutment Design & Construction**
Chris Byrum, Geotechnical Engineer
Soil and Materials Engineers, Inc.

11:30 **GRS-IBS: Superstructure Construction & Post-Construction Update**
Roger Johr, Senior Project Manager
Williams & Works

12:00 **Lunch**

1:00 **Designing & Constructing Roads with Geogrid**
John Cima, Transportation Engineer
Houghton County Road Commission

1:50 **AC & PCC Trafficked Structure Design Using Geogrids**
John Price, Senior Engineered Products Manager
Hanes Geo Components

2:40 **Geotextile Use in Drainage Applications**
Mark Cavanaugh, Regional Representative
Hanes Geo Components

3:30 **Adjourn**

5:00 **Social Hour**

6:00 **Dinner**

7:00 **Engineering Committee Report**
Bob Lindbeck, Engineer/Manager

Wednesday, February 4

Morning Session

Moderator: Larry Hummel

7:25 **Registration and Continental Breakfast**

8:25 **Welcome and Introductions**

1 **8:30** **Panel: Using Asset Management Data to Support Road Millages**

Moderator: Monica Ware, CRA of Michigan

Rick DeVries, Assistant City Engineer
City of Grand Rapids
Matt Hannahs, Assistant County Engineer
Eaton County Road Commission
Larry Brown, Managing Director
Allegan County Road Commission
Jim Cook, Manager
Grand Traverse County Road Commission

2 **9:45** **County Experiences Inside Illinois**

Paula Trigg, County Engineer
Lake County Department of Transportation

10:25 **Break**

3 **10:40** **Dealing with Composite Pavements**

Tim O'Rourke, Manager
Roscommon County Road Commission

4 **11:20** **Taking a Project through the Local Agency Program (LAP) Process**

Bruce Kadzban, Manager
Michigan Department of Transportation

12:00 **Lunch**

Afternoon Session

Moderator: Joe Wisniewski

5 **1:00** **MDOT Research Programs**

Steve Bower, Engineer of Research
Michigan Department of Transportation

6 **1:15** **Full Depth Reclamation and Chemical Stabilization**

Rick Wadel, President
Wadel Stabilization
Don Dunkin, E.I.T
Soil and Materials Engineers, Inc.
Jayson Graves, Project Engineer
Soil and Materials Engineers, Inc.

7 **1:55** **Updates on E-projects and MDOT Admin Updates**
Jason Clark, Construction Contracts Engineer
Michigan Department of Transportation
Cliff Farr, Field Manager
Michigan Department of Transportation

2:35 **Break**

8 **2:50** **Green Technology - Recycle in Place Options**
Dan Troia, Design Engineer
Ingham County Road Department

9 **3:30** **Federal Requirements on ADA**
Kurt Zachary, Local Program Manager
Federal Highway Administration

10 **4:10** **Toward Zero Deaths**
Tracie Leix, Safety Programs Unit Manager
Michigan Department of Transportation

4:40 **Adjourn**

Awards Banquet & Special Presentation

5:00 **Social Hour**

6:00 **Dinner**

7:00 **Awards Ceremony**

7:30 **Comedian Chuck King**
Entertainment Sponsored by CRA of Michigan
Chuck King is a Master Certified Stage Hypnotist and a World Champion Magician, having won both National and International Sleight of Hand Championships. A 20-year veteran of corporate events, comedy clubs, and colleges, Chuck has performed over 5,000 shows in his illustrious career. Known as the king of clean comedy, Chuck's show features a unique blend of comedy, magic, and hypnosis.

8:15 **Adjourn**

Thursday, February 5

Partner Updates

Moderator: Craig Atwood

7:00 Continental Breakfast

11 **8:00 Update from FHWA**
Kurt Zachary, Local Program Manager
Federal Highway Administration

12 **8:25 MDOT Program Updates**
Larry Doyle, Manager
Michigan Department of Transportation
Bruce Kadzban, Local Agency Program Engineer
Michigan Department of Transportation
Teresa Vanis, Local Agency Coordinator, Relocation Specialist
Michigan Department of Transportation

13 **8:50 Update from DEQ**
Jerry Fulcher, Chief
Michigan Department of Environmental Quality

14 **9:15 Update from MITA**
Douglas Needham, Vice President of Industry Relations
Michigan Infrastructure and Transportation Association

9:40 Break

15 **9:50 Update from NACE**
Wayne Schoonover, Managing Director
Mason County Road Commission

16 **10:00 Update from CRA of Michigan**
Denise Donohue, Director
County Road Association of Michigan

17 **10:25 Update from LTAP**
John Kiefer, Research Engineer
Michigan's Local Technical Assistance Program/Center for Technology & Training

10:35 Panel Discussion & Question/Answer Session
All Partners

11:05 Closing Announcements

11:25 Adjourn

Attendee Workbook

Day 1: Bridge & Road Design with Geosynthetic Materials

Tuesday, February 3

Day 1: Bridge & Road Design with Geosynthetic Materials

Tuesday, February 3

Presentation Summary

Geosynthetic materials increase the subgrade load-bearing capacity for bridge and pavement designs, leading to versatile applications in civil engineering. Among these are geosynthetic-reinforced soil (GRS) integrated bridge systems (IBS), where geosynthetic material is used to create stronger bridge structures in less time; and geogrid, which can increase subgrade load-bearing capacity and reduce the pavement design thickness.

The first half of this agenda will focus on Ionia County's recent GRS-IBS project, Keefer Highway over Sebewa Creek. Beginning in July 2014, this project was the first in Michigan to use GRS-IBS technology, which has proven to require less construction time and funding than traditional construction methods.

The afternoon session will examine other GRS-IBS case studies from around the country, and various methods of using geosynthetics in road construction.

Presenters

Chris Byrum, Ph.D., P.E., is a Senior Project Engineer at Soil and Materials Engineers, Inc. Chris holds a B.S. in Civil/Structural Engineering from Michigan Technological University, and he earned both his M.S. in Civil-Geotechnical Engineering and Ph.D. in Civil-Materials Engineering from the University of Michigan. In his career, he acts as both a Pavement Design Engineer on projects utilizing destructive and nondestructive testing, and as a Geotechnical Engineer for a broad spectrum of transportation infrastructure projects in Michigan.
Chris is a specialist regarding transportation geotechnical engineering, and is experienced in the evaluation and design of pavements. His expertise spans design and construction of embankments, walls, and shallow and deep foundations; design, installation and interpretation of geotechnical instrumentation systems; research level numerical methods and data management; and field and laboratory testing of construction materials.
Phone: (734) 454-9900 **Email:** byrum@sme-usa.com

Chris Johnecheck is a Geotechnical Engineer with the Geotechnical Services Section at MDOT.
He currently works with in-house design groups to provide geotechnical recommendations and also manages Geotechnical Engineering Services contracts for statewide geotechnical projects as need. Chris has a B.S. degree in Civil Engineering from the University of North Dakota and has been practicing Geotechnical Engineering for 15 years.
Phone: (517) 373-9686 **Email:** johnecheckc@michigan.gov

Paul Spitzley is the County Highway Engineer for the Ionia County Road Commission, where he has worked for two years. Before Ionia County, Paul was the Project Engineer at the Kalamazoo County Road Commission where he worked on road and bridge projects after graduating from Michigan State University. Paul is from Ionia County and glad to be back home working on the roads he grew up with.
Phone: (616) 527-1700 **Email:** spitzleyp@ioniacountyroads.org

NOTES

Bridge & Road Design with Geosynthetic Materials

Tuesday, February 3

Presenters

Roger C. Johr, P.E., received his B.S. in Civil/Structural Engineering from Michigan State University in 1975. Since that time he has served as project manager and construction manager on numerous bridge and transportation projects. He has extensive design and construction experience in bridges, highways and large public works projects. He is a registered Professional Engineer in five states and has twice been presented the National Award of merit by the Lincoln Arc Welding Foundation for his contribution to the advancement of the state-of-art arc welding related to steel bridges. He is a past president of the American Council of Engineering Companies-Michigan and the Western Michigan Chapter of ASCE. Roger is the former Principal in Charge of Engineering for Williams & Works, Inc.; he is currently semi-retired and works part time as the QA/QC Engineer for Williams & Works.
Phone: (616) 224-1500 **Email:** johr@williams-works.com

John Cima, P.E., has been with Houghton County Road Commission since 2005, where his responsibilities include project design, project construction management, project on-site inspection, materials testing, office technician, bridge inspection, DEQ permitting, and other related duties. Prior to this position, John worked as a Design Engineer for eight years with MDOT, and also had experience in construction inspection, materials testing, construction surveying, and construction engineering. John is a certified bridge inspector and licensed Professional Engineer in Michigan, and he holds both an A.S. in Civil Engineering Technology, and a B.S. in Civil Engineering from Michigan Technological University.
Phone: (906) 482-3600 **Email:** john@houghtonroads.org

John Price, P.E., is a licensed engineer in both North Carolina and Michigan after earning a B.S. in Civil Engineering from the University of Idaho, and an M.S. in Civil Engineering from Purdue University. His diversified career of nearly 35 years, spanning geotechnical consulting, product development, and sales/marketing of geosynthetics, erosion and sediment control materials and stormwater quality improvement systems, requires him to routinely develop and present training sessions to project owners, designers, contractors and regulators. He has served on the industry advisory board to the Civil-Environmental Department of Michigan Technological University. Also, John has served on the Board of the International Erosion Control Association, including being its President, and he continues to serve the erosion control industry as an instructor for both the Certified Professional in Erosion and Sediment Control (CPESC) and Certified Inspector of Sediment and Erosion Control (CISEC) certification programs.
Phone: (336) 747-1645 **Email:** john.price@hanescompanies.com

Mark Cavanaugh, C.P.E.S.C., is currently employed by Hanes Geo Components, a Winston-Salem South Carolina firm which acquired Price and Company three years ago. Mark began his 24-year career in the soil erosion and sediment control industry with Price and Company in January 1990. He has earned the Certified Professional in Erosion and Sediment Control (CPESC) designation through the International Erosion Control Association and currently serves as a Board Member of the West Michigan Soil Erosion Control Network (WMSECN). He has been delivering sales and CPE certified presentations for private companies as well as industry organizations and conference attendees for the past ten years. Mark lives in Grand Rapids with his wife and two high school-aged children.
Phone: (616) 530-8230 **Email:** mark.cavanaugh@hanescompanies.com

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GRS-IBS References

Federal Highway Administration

As part of its Every Day Counts (EDC) initiative, the Federal Highway Administration has provided an extensive article explaining the benefits of GRS-IBS, and the basic science behind the process. The article is available at:

https://www.fhwa.dot.gov/everydaycounts/technology/grs_ibs/

Wisconsin Department of Transportation

The Wisconsin DOT performed a GRS-IBS pilot project in Spring, 2012 in Chippew County, and created a short YouTube video outlining the project:

https://www.youtube.com/watch?v=frxx9J7qiWU

Florida Department of Transportation

The Florida DOT uses GRS abutments wherever they are cost effective and appropriate. Their website provides an overview of GRS-IBS as well as informational photos and videos, design criteria and standards, and other useful information:

http://www.dot.state.fl.us/structures/innovation/GRS-IBS.shtm

Michigan Department of Transportation

The document on the following pages of this workbook, provided by MDOT, is the special provision for GRS; it contains useful definitions and standard specifications for designing and implementing GRS abutments.

MICHIGAN
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
GEOSYNTHETIC REINFORCED SOIL ABUTMENT

a. Description. The work consists of furnishing and installing a Geosynthetic Reinforced Soil Abutment in accordance with the contract, the FHWA Geosynthetic Reinforced Soil-Integrated Bridge System Interim Implementation Guide, dated June, 2012 (Publication No. FHWA-HRT-11-026), the standard specifications, and as directed by the Engineer.

The following definitions apply when used herein and on the plans:

Geotextile Reinforcement. Biaxial geotextile reinforcement having strength and stiffness that are approximately equal in both the machine and the cross machine directions.

Geosynthetic Reinforced Soil (GRS). Alternating layers of compacted granular fill reinforced with Geotextile Reinforcement. Facing elements are connected to the reinforcement layers to form an outer GRS Wall. Facing elements must consist of segmental block units (SBUs).

GRS Abutment. A GRS retaining wall system designed to support the weight of a bridge superstructure. Usually, GRS abutments have three sides: the abutment face wall and two wing or return walls.

GRS Abutment Face Wall. The vertical or near vertical wall parallel to the center of superstructure bearing seat and designed to support the bridge superstructure.

GRS Wing Wall. A wall attached and adjacent to the GRS abutment face wall. The GRS wing walls are built at the same time as the GRS abutment face wall and at a right or other angle to the GRS abutment face wall.

Reinforced Soil Foundation (RSF). A reinforced soil mass located below the GRS. This mass consists of alternating layers of compacted well-graded aggregate and Geotextile Reinforcement.

Retained Soil. Backfill located behind the GRS wall mass.

Clear Space. The vertical distance between the top of the GRS abutment face wall and bottom of the superstructure above the wall. This distance is 3 inches or 2 percent of the GRS wall height, whichever is greater.

Beam Seat Setback. The lateral distance from the back of the GRS SBU to the front of the superstructure bearing beam seat area. This distance is a minimum of 8 inches or as shown on the plans.

b. Materials. The basis of acceptance for all materials not addressed by the standard specifications and specified herein will be a certification in accordance with the *Materials Quality*

Assurance Procedures Manual and as described herein. Provide all test data certifications by an independent testing laboratory to the Engineer prior to material use.

1. Segmental Block Units (SBU). Use SBUs from an approved segmental block wall manufacturer listed below.

Tensar Mesa Retaining Wall System
5883 Glenridge Drive, Suite 200
Atlanta, Georgia 30328
Ph. 404-250-1290

Keystone Retaining Wall System
4444 West 78th Street
Minneapolis, Minnesota 55435
Ph. 952-897-1040

Allan Block Corporation
7424 West 78th Street
Bloomington, MN 55439
Ph. 952-835-5309

SBUs from these manufacturers or an equal product from another manufacturer approved by the Engineer must meet the following requirements:

A. Lot size may not exceed 10,000 units. Provide test data certifications from a qualified independent testing laboratory for compressive strength, freeze-thaw durability and absorption testing for each lot.

B. Minimum 28 day compressive strength of 5500 psi for individual SBUs and an average of 5800 psi for three SBUs per *ASTM C 140*.

C. The SBUs must have a maximum water absorption of 6 percent when tested according to *ASTM C 140*, with a 24 hour cold water soak.

D. SBUs must meet the freeze-thaw durability requirements of *ASTM C 1262* when tested using a 3 percent NaCl solution for a minimum of 90 cycles. Material loss must not exceed 1 percent for any single sample.

E. SBUs must meet the project aesthetic requirements specified for this site as indicated on the plans.

F. Utilize SBUs with dimensions of 8 inches high by 12 inches deep (minimum) by 18 inches in length (minimum). Supply cap units for the set back block that have minimum dimensions of 4 inches high by 8 inches deep by 16 inches in length.

2. Geotextile Reinforcement. The geotextile reinforcement used within the GRS and RSF must be a woven, high density polyethylene, polypropylene or high-tenacity polyester, biaxial geotextile that is resistant to UV oxidation and degradation caused by chemical and temperature exposures normally encountered in the highway environment. The weatherometer test data certification can be for the product line material type in general and does not have to be tested directly from the batch of geotextile produced for this site.

The ASTM type, class, group, grade, and category of the primary resin used in manufacturing must be identified within the test data certification as applicable.

Provide a test data certification showing that the batch of geotextile reinforcement proposed for this site meets the physical property requirements of Table 1.

Table 1: Woven Geotextile Reinforcement Properties

Property	Test Method	Minimum Value
Ultimate Tensile Strength MD(a) CMD(a)	*ASTM D 4595* Strain Rate of 10% per minute	 4,800 lb/ft 4,800 lb/ft
Tensile Strength @ 2% Strain MD(a) CMD(a)	*ASTM D 4595*	 950 lb/ft 950 lb/ft
Apparent Opening Size	*ASTM D 4751*	0.425 mm
Inherent Viscosity (PET (b) only)	*ASTM D 4603*	Minimum Number Average Molecular Weight of 25000
Carboxyl End Group (PET (b) only)	*ASTM D 7409*	Maximum of Carboxyl End Group Content of 30
UV Resistance	*ASTM D 4355*	>70% breaking strength after 500 hr

a. "MD" and "CMD" represent 'machine' and 'cross-machine' directions, referring to the principle directions of the manufacturing process.
b. PET - Polyester

In addition, Certification-Verification samples will be obtained by the Engineer from on-site material. One sample must be obtained for the first 1,200 square yards with subsequent samples every 5,000 square yards. Samples must be a minimum of 5 feet long by the full roll width, with a 6 square yard minimum.

3. GRS Granular Fill. Use either 21AA aggregate or 4G open-graded aggregate as granular fill material within the GRS wall mass as noted on the plans. In addition to the requirements for 4G open-graded aggregates described in the standard specifications, the 4G open-graded aggregate prior to placement and compaction must meet the gradation shown in Table 2. In addition, when compacted to the specified density requirements, the specified material must have a minimum angle of internal friction of 38 degrees per *AASHTO T 236* (large scale direct shear test) or *AASHTO T 296* (large scale triaxial compression test, unconsolidated undrained). Provide a test data certification from an independent testing laboratory for the angle of internal friction for the proposed aggregate source. The testing for angle of internal friction must include at least 5 tests on different samples of the proposed source material.

Table 2. 4G Open-Graded GRS Granular Fill

U.S. Sieve Size	Gradation Limits, Percent Passing
1½ inch	100
1 inch	85-100
½ inch	45-65
# 8	15-30
# 30	6-18
Loss by Wash	6.0 max

4. Retained Soil. If additional bridge approach embankment fill is required behind the GRS wall mass, provide Structure Backfill, CIP extending to at least 10 feet behind the back edges of the GRS wall reinforcement materials. Backfill, Structure, CIP will be paid for separately.

5. Reinforced Soil Foundation (RSF). Provide 21AA aggregate within the wrapped geotextile reinforcement layers for the RSF volume.

6. Reinforced Superstructure Backfill. Provide 21AA aggregate within the wrapped geotextile layers for the bridge abutment backfill material situated above the GRS wall mass and below the design pavement section for the bridge approach.

7. Concrete. Use Portland cement concrete meeting the requirements for Grade S1 concrete according to section 701 of the Standard Specifications for Construction, except as modified herein. Use coarse aggregate originating only from geologically natural sources meeting physical requirements of Class 26A.

8. Flashings. Provide grade 304 stainless steel flashings as shown on the plans. Provide long-life all-weather butyl sealants/adhesives for flashing overlaps.

c. Submittals. Provide an electronic pdf copy of all submittals to the Engineer at least 45 days prior to the start of RSF or GRS abutment construction. The Engineer will approve or reject the submittals within 14 calendar days after receipt of a complete submission. Additional time required due to incomplete or unacceptable submittals will not be justification for time extension or impact or delay claims. All costs associated with incomplete or unacceptable submittals will be borne by the Contractor.

1. Submit test data certifications for the proposed aggregates.

2. Submit test data certifications for geotextile reinforcement.

3. Submit test data certifications for the proposed SBUs.

4. Submit detailed GRS installation plan. Within the plan, indicate construction sequence for the GRS elements including width and directional placement of geotextile reinforcement layers throughout the various RSF and GRS zones.

5. Submit a sketch illustrating crane locations, including outrigger pads, in relation to

the edge of GRS walls during positioning of the bridge beams. The edge of the crane's outrigger pad mat must remain a minimum distance of 4 feet from the back of the SBUs. Crane outrigger pad sizes must result in less than a 4,000 psf bearing pressure being applied to reinforced soil areas near the GRS walls. Calculations must accompany the crane sketches indicating the resulting outrigger and load bearing system (crane, mats, beams, etc.) pressure on the underlying soil.

d. Construction. Construction procedures must adhere to the design plans, this special provision and Chapter 7 of the FHWA Geosynthetic Reinforced Soil-Integrated Bridge System Interim Implementation Guide, dated June, 2012 (Publication No. FHWA-HRT-11-026).

1. Subgrade Preparation. Excavate to the necessary elevations and dimensions shown on the plans. Provide run-off water controls to prevent excessive flow into the excavation. Provide groundwater control for the excavation. Prior to wall construction, inspect the RSF subgrade and compact, if necessary, according to subsection 205.03.I.1 of the Standard Specifications for Construction, or prepare as required in the contract. Undercut unsuitable material as directed by the Engineer. Undercutting of unsuitable material will be paid for separately as Excavation, Fdn. Unless otherwise directed by the Engineer, replace undercut soils with Backfill, Structure, CIP compacted to 95 percent of the material maximum unit weight according to section 205 of the Standard Specifications for Construction. Structure Backfill, CIP will be paid for separately.

If the base of the excavation is left open, grade the base to one end to facilitate the removal of any water intrusion with a pump. If the excavation is flooded, all water must be removed along with any unsuitable soils, as directed by the Engineer. Final subgrade must be smooth, uniform and free from irregular surface shape or protruding objects that would obstruct placement of geotextile wrapped reinforced aggregate fills for the RSF.

2. Reinforced Soil Foundation (RSF). Construct the RSF according to the plans. Place backfill in lifts measuring not more than 8 inches in thickness. Compact backfill within this zone to 98 percent of its maximum unit weight in accordance with *AASHTO T 99*. Decrease the maximum lift thickness if necessary to obtain the specified density.

The entire RSF must be completely encapsulated with Geotextile Reinforcement. The wrapped corners of the RSF must be tight and without exposed soil. Minimum shingle overlaps of 2 feet are required regardless of structure location. For GRS abutments adjacent to waterways, overlap the RSF geotextile reinforcement a minimum of 3 feet. For proper shingle flow of water over the overlaps, start with the outer layer of the overlap situated on the upstream side of the RSF. Orient overlapped sections of geotextile reinforcement to prevent water from penetrating the layers of reinforcement.

Pull the Geotextile Reinforcement taut to remove all wrinkles prior to placing and compacting the backfill. Place fill starting at the river side front face and proceeding towards the back to push out folds or wrinkles towards the free end of the reinforcement layer. The end of the overlap must be located at least 3 feet from the RSF edge.

3. Geosynthetic Reinforced Soil (GRS) Abutment. Place courses of SBUs, and GRS systematically per the contract and the approved installation procedures.

A. SBU Placement. Place each course of SBU level, even, and within plan tolerance. Adjacent blocks must be placed tightly against each other to prevent backfill

from escaping between gaps. Offset subsequent courses of block by half a block width so that vertical joints are not continuous.

Check the vertical alignment of the GRS Abutment Face Wall at least every other block layer. Correct any deviations greater than 0.25 inches. In addition, check every other row of block alignment with a string line referenced off the back of the facing block from wall corner to corner. Correct deficiencies as required.

At right-angle wall corners, stagger face wall and wing wall block courses to form a tight, interlocking, stable corner. For walls with angles larger than 90 degrees, a vertical seam or joint is formed. At these locations, install rebar and concrete as indicated on the design plans.

B. GRS Wall Granular Fill. Follow the placement of each course of block closely with granular fill. Carefully place granular fill so as to avoid any damage or disturbance of the wall materials or any misalignment of the block units or soil reinforcement. Remove and replace any wall SBUs and Geotextile Reinforcement that become damaged or misaligned during granular fill placement at no cost to the Department. Any depressions present behind the SBUs must be filled level to the top of the SBU prior to placing the Geotextile Reinforcement.

Compact the GRS Wall Granular Fill to a minimum 95 percent of its maximum unit weight per *AASHTO T 99* or to the minimum density required to achieve the minimum angle of internal friction of 38 degrees for the GRS if higher than 95 percent. For aggregate placed within the RSF, Beam Seat Zone, and Integrated Wrapped Approach Zone, compact the soil to 98 percent of its maximum unit weight per *AASHTO T 99*. Do not use sheep's foot or grid-type rollers for compaction within the reinforced soil mass.

Since the SBUs are not rigidly connected to the geotextile reinforcement, perform compaction within 3 feet of the back face of the SBU utilizing lightweight, hand operated compaction equipment (e.g., a lightweight mechanical tamper, plate, or roller). Adjust granular fill lift heights in order to achieve the compaction requirements. Check the position of the SBUs after compaction. Any elements that have been displaced should be removed and reset into their proper location and position.

Ensure uniform moisture content throughout each layer of the granular fill prior to and during compaction. Place the granular fill at a moisture content that is within two percentage points of the optimum moisture content percentage, or at a moisture content and density that is uniform and acceptable to the Engineer, throughout the entire lift.

At the end of each day's operation, slope the last layer of the granular fill away from the wall face and cover with a suitable water-resistant tarp, to rapidly direct runoff away from the wall face. Do not allow surface runoff from adjacent areas to enter the wall construction site.

C. Geotextile Reinforcement. Place geotextile reinforcement in continuous full-length strips from the wall face to the design strip lengths without use of overlap or factory seam splices in the critical load bearing dimensions. Place the strong direction (typically the machine direction) of the geosynthetic perpendicular to the GRS abutment and wing/return wall faces, unless otherwise directed by the Engineer. Extend the geotextile reinforcement so that it is situated between layers of SBU to provide a

frictional connection. The geotextile reinforcement must extend to within 1 inch of the wall face. Remove all excess geotextile reinforcement extending beyond the wall face by cutting with a razor knife or other means approved by the Engineer.

Uniformly tension geotextile reinforcements to remove any slack in the connections or materials, so that geotextile reinforcements are taut, free of wrinkles, and flat. Where overlaps exist on top of the SBU, trim as necessary to prevent varying geotextile reinforcement thickness or excessive gaps between adjacent blocks.

Place granular fill starting at the wall face and moving backwards to remove and prevent the formation of wrinkles in the geotextile reinforcement. Correct any misalignment or distortion of the wall face in excess of the tolerances specified herein at no additional cost to the Department.

Driving equipment directly on the geotextile reinforcement is prohibited. Place a minimum 6 inch layer of granular fill prior to operating any vehicles or equipment over the geotextile reinforcement. Tracked vehicles are not allowed above the geotextile reinforcement.

D. Superstructure Backfill and Approach Integration. Construct reinforced superstructure backfill approach zone per the plans. Wrap the superstructure approach fill with geotextile reinforcement on three sides. Multiple sheets are allowed along the width of the approach, as long as all seams are kept perpendicular to the wall face. Wrap geotextile reinforcement on the roadway sides to prevent lateral spreading of the backfills. The superstructure backfill geotextile reinforcement must be placed so that the strong direction is parallel to the roadway.

E. The Engineer is responsible for performing field density tests.

For each layer of granular fill placed behind an GRS abutment, the Engineer must perform at least three field density tests. Do not penetrate the geotextile reinforcement with field density equipment. If the granular fill is such that it cannot be tested accurately with a nuclear gauge, then a procedural specification will be developed by the Engineer at the time of construction. The procedural specification will develop a certain number of passes required based on the Contractor's compaction equipment and visual movement of the aggregate. The developed specification will address a procedure near the wall surface (within 3 feet) for smaller hand operated equipment and larger ride-on rollers further away from the wall, as necessary.

e. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay items:

Pay Items	**Pay Unit**
Geotextile Reinforcement	Square Yard
Geosynthetic Reinforced Soil Granular Fill	Cubic Yard
Reinforced Soil Foundation Aggregate	Cubic Yard
Beam Seat Construction	Lump Sum
Superstructure Backfill	Cubic Yard
Segmental Block Units	Square Foot

1. **Geotextile Reinforcement** will be paid for by the square yard for material placed. Overlaps are included when determining the final as placed quantity. Payment for **Geotextile Reinforcement** includes furnishing all material, providing submittals, and all equipment, labor, testing and miscellaneous hardware required for placing all types of geotextile reinforcement used in the GRS Abutments.

2. **Geosynthetic Reinforced Soil Granular Fill** will be paid for by the cubic yard for material placed. Payment for **Geosynthetic Reinforced Soil Granular Fill** includes furnishing all of the aggregates, conducting angle of friction testing, providing submittals, and equipment, labor and miscellaneous hardware necessary for placing this material at the GRS Abutments.

3. **Reinforced Soil Foundation Aggregate** will be paid for by the cubic yard for material placed. Payment for **Reinforced Soil Foundation Aggregate** includes furnishing all of the 21AA aggregate used in the RSF, testing, providing submittals, and all equipment, labor, and miscellaneous hardware necessary for placing the material. Payment for **Reinforced Soil Foundation Aggregate** also includes any dewatering materials equipment and labor necessary to place the RSF for the GRS Abutments.

4. **Beam Seat Construction** is paid as a lump sum pay item for the entire project and includes furnishing all materials not included in other pay items including but not limited to foam, concrete, stainless steel flashing, sealant, rebar and joint filler, needed to complete the beam seat detailed on the plans. Payment for **Beam Seat Construction** also includes providing submittals and all labor and equipment for constructing these items as indicated on the plans.

5. **Superstructure Backfill** will be paid for by the cubic yard for material placed. Payment for **Superstructure Backfill** includes furnishing the 21AA aggregate used in the reinforced backfills placed immediately behind the ends of the superstructure, and below the typical pavement section. The pay item also includes providing submittals and all equipment, labor, testing, and miscellaneous hardware necessary for placing this material.

6. **Segmental Block Units** will be paid for by the square foot of finished wall face area, based on material placed. Payment includes all compensation for furnishing the SBUs and all equipment, labor, testing, and miscellaneous hardware necessary for placing the blocks. Payment for **Segmental Block Units** also includes any wasted or rejected blocks, providing submittals, and incorporation of aesthetic details (block style and color) required in the contract.

Underdrains, if required on the plans or by the Engineer, will be paid for separately according to the standard specifications.

Excavation, Fdn and **Structure Backfill, CIP** required for undercutting unsuitable subgrade soils below the plan RSF elevation will be paid for separately according to the standard specifications. The bottom of the RSF reinforced soil mass shown on the plans will be considered the bottom of footing for measurement purposes.

If the Engineer determines that a sheet pile type **Cofferdam** or use of **Temporary Sheeting** is necessary to adequately complete construction of the RSF, and these items are not shown on the construction plans, these items will be paid for separately as extra work and according to the standard specifications. The Contractor should expect that shallow earth berm type cofferdams

will be necessary for RSF construction. The costs associated with establishing earth berm type groundwater control and use of submersible pumps and other dewatering equipment for RSF construction will be included in the items covering the general foundation excavation of the GRS abutment volume and in the item **Reinforced Soil Foundation Aggregate.**

Attendee Workbook

Day 2: General Sessions

Wednesday, February 4

1 Panel: Using Asset Management Data to Support Road Millages

Wednesday, February 4, 8:30 AM

Presentation Summary

Over the past decade, the Michigan Legislature has not filled the road funding gap, but countywide road millages have helped patch some holes. From 1936 through the early 2000s, only twelve counties approved road millages. In the last eight years, however, sixteen counties have adopted a countywide road millage. Today, twenty-eight counties have countywide millages in their toolboxes. Millages may stop the bleeding, but they will never replace adequate state funding! Approximately 85% of Michigan road funding comes from state or federal sources.

This panel will discuss the use of road millages in four Michigan counties, and the successful strategies they used to engage and educate their communities on what it takes to properly fund road improvements.

Presenters

Monica Ware is a nationally accredited communication professional with nearly 20 years of diverse expertise in public policy and public relations. Her background as a legislative staffer, experience managing state and local political campaigns, and her position as manager of communications and development for the County Road Association have given Monica both the ability to connect issues with solutions, and communication strategies that influence opinions.
Phone: (517) 482-1189 **Email:** mware@localroads.net

Rick DeVries is an assistant engineer for the City of Grand Rapids.
Phone: (616) 456-3071 **Email:** rdevries@grcity.us

Matt Hannahs graduated from Michigan State University in 1997. He has been the Assistant County Engineer for the Eaton County Road Commission since 2006. Prior to that, he worked for Spicer Group dealing with site development, county drain design, and construction management.
Phone: (517) 543-1630 **Email:** mhannahs@eatoncountyroad.com

Larry Brown has a B.S. in Civil Engineering from Michigan Technological University. Larry has been with the Allegan County Road Commission since 1977 when he began as a Project Engineer. In 2004, he became the County Highway Engineer, and in 2011 he became the Managing Director of the Allegan County Road Commission. Larry has been a member of the CRA Engineering Committee, and is currently on the CRA Legislative Review Committee serving as the Vice President of the Association of Southern Michigan County Road Commissions. Larry has been married to Jennifer for 41 years; they have two children and two grandchildren. His hobbies are fishing and suffering through season after season watching the Chicago Cubs.
Phone: (269) 673-2184 **Email:** rclarry@alleganroads.org

Jim Cook began employment as the Manager of the Grand Traverse County Road Commission in late November 2012. Prior to coming to the Grand Traverse County Road Commission, Jim was the Executive Director for Great Lakes Safety Training Center for three years after retiring from Spicer Group, Inc. where he spent 23 years as an employee and partner of the firm. Spicer Group is a Civil Consulting firm providing Civil Engineering and consulting services not only in Michigan but in other states around the country. Cook is a graduate of Saginaw Valley State University with degrees in Industrial Engineering and Architecture. After graduation, he spent six years working for the Bechtel Power Corporation in the nuclear industry.
Phone: (231) 922-4848 **Email:** jcook@gtcrc.org

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2 County Experiences Inside Illinois

Wednesday, February 4, 9:45 AM

Presenter

Paula Trigg, P.E., serves as County Engineer and Director of Transportation in Lake County, Illinois where she oversees a $125 million annual capital improvement program in a high-growth county. Prior to this position, Paula served as the Director of Planning and Programming in Lake County for six years. Paula is a licensed Professional Engineer, and she holds a B.S. in Civil Engineering from Michigan Technological University.
Phone: (847) 377-7409 **Email:** ptrigg@lakecountyil.gov

3 Dealing with Composite Pavements

Wednesday, February 4, 10:40 AM

Presenter

Tim O'Rourke is in his 40th year in the Michigan Road Building and Maintenance Industry. He has served as the Road Commission Manager since 2006. He has worked for several of the largest Asphalt Paving Companies in Michigan. He is a graduate of Central Michigan University with a B.S. degree in Sociology and Political Science. He states that "his goal was to work with juvenile delinquents and if you've met his industry friends you know he successfully met that goal". His career has spanned various roles in every facet of the Road Building Industry from Flagger, Laborer, Operator, Foreman, Superintendent, and Estimator to Area Manager. He has been happily married to his wife Cheryl for 21 years, is the proud father of seven, grandfather of six and soon to be a great-grandfather. Understandably, he has very little time for hobbies.
Phone: (989) 366-0333 **Email:** orourket@roscommoncrc.com

NOTES

4 Taking a Project through the Local Agency Program (LAP) Process

Wednesday, February 4, 11:20 AM

Presenter

Bruce Kadzban, P.E., serves as the Manager of the Rural and Enhancement Programs in MDOT's Local Agency Programs Unit. He has been in this capacity for two years, and has been employed by MDOT for more than four years. Bruce received his B.S. in Civil Engineering from Michigan Technological University in 1977. He has been a registered engineer in the State of Michigan since 1981. His focus with MDOT is to deliver the Rural and Enhancement program, as well as the Federal Forest Highways program, the Safe Routes to Schools initiative, and the Local Jobs Today Initiative. He has extensive road design experience and has worked in the transportation design field for more than 20 years. He also has plenty of experience in quality assurance and quality control, and has used up many red pencils and pens over the years.

Phone: (517) 335-2229 **Email:** kadzbanb@michigan.gov

5 MDOT Research Programs

Wednesday, February 4, 1:00 PM

Presenter

Steve Bower, P.E., is the Engineer of Research for the Michigan Department of Transportation (MDOT). He holds a Bachelor's Degree in Civil Engineering from Michigan Technological University and is a licensed Professional Engineer in the State of Michigan. Steve has worked as a Civil Engineer for 30 years. He worked in the consulting business as a structural engineer early in his career, and has spent the last 28 years holding a variety of positions in MDOT. Previous responsibilities include managing the Brighton and Lansing Transportation Service Centers for a total of nine years, serving as the State Pavement Engineer for eight years, and managing a road design unit for six years. Steve has held past positions in the areas of road design, construction, pavement management, and pavement design. Steve has participated on many national committees and task groups related to research, warranties, performance related specifications, pavement management, and pavement design, including being asked to participate in the 2002 European Warranty Scan tour sponsored by the Federal Highway Administration. Steve is currently the State of Michigan representative at the Transportation Research Board.

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NOTES

2015 Michigan DOT Research Summit
Research Ideas on Thursday, May 7
Horatio Earle Center - State Secondary Complex

ID No.	Focus Area	Title	Focus Area Manager
B-1	Bridges & Structures	Incorporating 3D and 4D (Fourth dimension is time as related to project construction) Models into MDOT's Plan Development and Bridge Management Process	Dave Juntunen
B-2	Bridges & Structures/ Environment & Water Resources	Applying Multi-Beam Sonar for Inspection for Bridge Scour and Performance of Bridge Scour Mitigation Methods	Dave Juntunen
B-3	Bridges & Structures	Bridge Structural Analyses for Staged Construction and Constructability Reviews	Matt Chynoweth
B-4	Bridges & Structures	Evaluation of Cost/Benefits of Standardization of Secondary Route Bridges	Dave Juntunen
B-5	Bridges & Structures/ Geotechnical	Rapid Health Assessment of Highway Retaining Walls for Risk-Based Asset Management	Matt Chynoweth
C-1	Construction	Identify Construction Staffing Strategies for Effective Program Oversight	Jason Gutting
PM-1	Pavement Materials	Establish a Forensic Investigation Methodology to Support Warranty Specifications	Curtis Bleech
PM-2	Pavement Materials	Updated Analysis of Michigan Traffic Inputs for Pavement ME Design	Curtis Bleech
E-1	Environment & Water Resources	Assessment of the Northern Long Eared Bat (NLEB) Habitat and Identification of Environmental Mitigation Strategies	Kristen Schuster
RP-1	Real Estate & Permits	Cost and Revenue Analysis of Michigan's Legal Truck Loads	Matt Delong

2015 Michigan DOT Research Summit
Research Ideas on Friday, May 8
Horatio Earle Center - State Secondary Complex

ID No.	Focus Area	Title	Focus Area Manager
MSO-1	Mobility, Systems & Signal Design	Implementation of Unmanned Aerial Vehicles (UAVs) for Assessment of Transportation Infrastructure - Phase II	Steve Cook
MSO-2	Mobility, Systems & Signal Design	Further Assessment of Quick Clearance Strategies - Phase II	Steve Cook
MSO-3	Mobility, Systems & Signal Design	Active Traffic Management on US-23 Pre-Condition	Steve Cook
TS-1	Transportation Safety	Understanding the Relationship Between Operating, Posted, Design Speeds and Safety in the Setting of Speed Limits	Mark Bott
TS-2	Transportation Safety	Understanding Michigan Pedestrian and Bicycle Safety Models	Mark Bott
TS-3	Transportation Safety	Development of a Strategic Safety Plan to Cut Fatalities in Half in 20 Years	Mark Bott
TS-4	Transportation Safety	Evaluating the Impacts of Speed Limit Changes on State Trunkline Since 2000	Mark Bott
WS-1	Worker and Facility Safety and Security	Studying Worker Safety and Health Programs With Worker's Compensation Programs	Eilleen Phifer
U-1	Rest Areas, Utilities, & Landscaping	Pipe Inspection Mobile Field Application Research and Development	Kelby Wallace
PR-1	Passenger Rail	Asset Management Strategies for Maintenance and Preservation of New High-Speed Intercity Passenger Car Fleet	Therese Cody
AM-1	Asset Management	An Evaluation of Michigan's Continuous Count Station (CCS) Distribution	Bill Tansil
NM-1	Non-Motorized	Development of Differential Criteria for Determining Appropriateness of "Side-path" Applications for Bicycle Use	Deb Alfonso

6 Full Depth Reclamation and Chemical Stabilization

Wednesday, February 4, 1:15 PM

Presenters

Rick Wadel has been involved in the stabilization/reclamation business for 36 years. He grew up in the construction industry working for his father, Jerry, who began stabilizing in 1964. Jerry managed a stabilization company until 1977 when he and Rick started Wadel Stabilization, and Rick has been running the day to day operations since 1985. Wadel Stabilization has been involved in all aspects of developing stabilization as a viable method for building and maintaining pavements throughout Michigan.
Phone: (231) 873-4006 **Email:** rwadel@wadels.com

Don Dunkin has been practicing Geotechnical Engineering in the State of Michigan for three years with Soil and Materials Engineers, Inc. (SME). Don has been working in pavement rehabilitation with chemically treated soils at the pre-engineering evaluation stages and providing guidance and testing during the construction phase of the program. During this time, Don has been working with engineers and contractors in optimization of the chemical admixtures and fine turning the field application and construction process. Don completed his B.S. in Civil Engineering at Michigan Technological University and is currently working on independent research involving mineralogical and chemical interactions in common Michigan soil types as they pertain to long-term stabilization and construction improvement. Don has been involved in a number of Full Depth Reclamation Projects including the 36 acre employee parking lot at Detroit Metro Airport, Wabeek Rd. for the Road Commission for Oakland County and a number of commercial and industrial facility programs.
Phone: (734) 454-9900 **Email:** dunkin@sme-usa.com

Jayson Graves, P.E., has been practicing Geotechnical, Materials, and Pavement Engineering in the State of Michigan for over ten years with Soil and Materials Engineers, Inc. (SME). Jayson provides construction engineering services and performs pavement design and evaluations for new and existing pavement structures, pavement distress surveys, and feasible rehabilitation strategies for pavements. He prepares project plans and specifications for pavement improvement projects, including destructive and nondestructive testing and construction materials services (CMS). He was the lead construction engineer for several Full Depth Reclamation projects including a 36 acre employee parking lot at Detroit Metro Airport, and two award-winning road projects. Jayson has a B.S. in Civil Engineering from Lawrence Technological University, and is a registered Professional Engineer in the State of Michigan.
Phone: (586) 731-3100 **Email:** graves@sme-usa.com

NOTES

7 Updates on E-projects and MDOT Admin Updates

Wednesday, February 4, 1:55 PM

Presenter

Jason Clark, P.E., serves as MDOT's Construction Contracts Engineer and manages the Construction Contracts Unit in Lansing. Jason has been with MDOT since 2011. Prior to that, he spent 15 years as a Division Manager for a Federal Aviation Administration consultant. Jason holds a B.S. in Civil Engineering from Michigan Technological University, and an M.B.A. from Grand Valley State University. He is a registered P.E. in Michigan, Illinois, and Wisconsin.
Phone: (517) 242-6378 **Email:** clarkj25@michigan.gov

Cliff Farr holds an Associate Degree in Science, Construction Technology from Lansing Community College; a Bachelor of Science in Industrial Technology from the Detroit Institute of Technology; and a Bachelor of Science in Civil Engineering from Michigan State University. Cliff has been responsible for construction related business process improvements and construction data management at MDOT since 1985. He is currently MDOT's construction business owner of AASHTO's Project Construction/ Materials web automation and is heading up MDOT's paperless construction initiative. Cliff is one of three MDOT employees charged with establishing a strategic plan for the modernization of MDOT's legacy computer systems.
Phone: (517) 322-6039 **Email**: farrc@michigan.gov

8 Green Technology - Recycle in Place Options

Wednesday, February 4, 2:50 PM

Presenter

Dan Troia, P.E., holds a B.S. in Civil Engineering from University of Wisconsin – Madison. Dan has over 25 years of experience in transportation engineering in Michigan and Wisconsin. He joined the Ingham County Road Commission in July 2000, serving as the Design Engineer until 2010. As Project Engineer, Dan currently oversees both the design and construction of road and bridge reconstruction, rehabilitation, and preventative maintenance projects at Ingham County. Prior to joining Ingham County, Dan served for ten years in various capacities at the Michigan Department of Transportation, including a year as Rural Staff Engineer in the Local Agency Programs Section, and eight years in the Geotechnical Services Unit.
Phone: (517) 676-9722 **Email**: dtroia@ingham.org

NOTES

9 Federal Requirements on ADA

Wednesday, February 4, 3:30 PM

Presenter

Kurt Zachary, P.E., is the Local Program Manager for the FHWA Michigan Division Office. He is responsible for oversight of Local Programs throughout Michigan as it applies to highway Federal-aid. Prior to joining the FHWA in 2008, Kurt gained experience in contract administration and construction engineering working in the consultant industry as well as with MDOT. He is a registered Professional Engineer, and has a B.S. in Civil Engineering from Michigan Technological University.
Phone: (517) 377-1844 **Email**: kurt.zachary@dot.gov

10 Toward Zero Deaths

Wednesday, February 4, 4:10 PM

Presenter

Tracie Leix, P.E., holds a B.S. in Civil Engineering from Michigan Technological University. Upon graduation, Tracie accepted a position with Orchard, Hiltz, and McCliment, Inc. in Livonia, MI. Since 2005, Tracie has worked for MDOT in the safety programs unit. She is involved with implementations of the Highway Safety Manual in Michigan, the Highway Safety Improvement Program, the Transparency Report, Strategic Highway Safety Plan, Toward Zero Deaths, and local agency assistance.
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Attendee Workbook

Day 3: Partner Updates

Thursday, February 5

11 Update from FHWA

Thursday, February 5, 8:00 AM

Presenter

Kurt Zachary, P.E., is the Local Program Manager for the FHWA Michigan Division Office. He is responsible for oversight of Local Programs throughout Michigan as it applies to highway Federal-aid. Prior to joining the FHWA in 2008, Kurt gained experience in contract administration and construction engineering working in the consultant industry as well as with MDOT. He is a registered Professional Engineer, and has a B.S. in Civil Engineering from Michigan Technological University.
Phone: (517) 377-1844 **Email**: kurt.zachary@dot.gov

12 MDOT Program Updates

Thursday, February 5, 8:25 AM

Presenters

Larry Doyle, P.E., is a 1995 graduate of Michigan State University with a B.S. in Civil Engineering. Larry became a licensed Professional Engineer in Michigan in 2001. Larry currently serves as the MDOT Local Agency Engineer in the Development Services Division. He has also served in many other roles during his 18 years at MDOT including Road Design Engineer, Project Manager, Development Engineer and TSC Manager.
Phone: (517) 335-2233 **Email:** doylel@michigan.gov

Bruce Kadzban, P.E., is a Local Agency Programs Engineer for MDOT. He currently serves as the Manager of the Rural and Enhancement Programs in MDOT's Local Agency Programs Unit. Bruce received his B.S. in Civil Engineering from Michigan Technological University in 1977. He has been a registered Professional Engineer in the State of Michigan since 1981 and has worked in the transportation design field for more than 20 years.
Phone: (517) 335-2229 **Email:** kadzbanb@michigan.gov

Teresa Vanis is the Local Agency Coordinator/Relocation Specialist for MDOT. As Local Agency Coordinator, she is responsible for assisting, monitoring, reviewing, and approving certification of the acquisition for all Local Public Agency (LPA) projects where right-of-way is required. As Relocation Specialist, she is responsible for providing technical expertise to MDOT staff, LPAs, and consultants for highly complex and difficult relocation situations. Teresa has a B.A. degree from Michigan State University, a Broker's License, and a Limited Real Estate Appraiser License. She has worked for MDOT since 1990 in various aspects of real estate.
Phone: (517) 373-4135 **Email**: vanist@michigan.gov

NOTES

13 Update from DEQ

Thursday, February 5, 8:50 AM

Presenter

Jerry Fulcher, P.E., is the current supervisor of the Transportation and Flood Hazard Unit (TFHU) in the Water Resources Division of the Department of Environmental Quality (DEQ). The TFHU reviews permit applications submitted by Public Transportation Agencies for projects that impact lakes, streams/ drains, or wetlands. Jerry is a registered Professional Engineer with a B.S. in Civil Engineering from Michigan Technological University with 34 years of experience with the Michigan DEQ.
Phone: (906) 346-8561 **Email**: fulcherg@michigan.gov

14 Update from MITA

Thursday, February 5, 9:15 AM

Presenter

Douglas Needham, P.E., is the Vice President of Industry Relations for the Michigan Infrastructure and Transportation Association (MITA). Through his knowledge of construction management and broad spectrum of various federal and state DOT contract regulations, Doug provides assistance to over 550 heavy highway and underground contractors with various issues. Doug received his B.S. in Civil Engineering from Michigan Technological University and is a registered engineer in the State of Michigan.
Phone: (517) 347-8336 **Email**: douglasneedham@mi-ita.com

NOTES

15 Update from NACE

Thursday, February 5, 9:50 AM

Presenter

Wayne Schoonover, P.E., recently accepted the Engineer-Manger position at Mason County Road Commission. Prior to this, he was the Interim Manager position at the Manistee County Road Commission and the County Highway Engineer for the Ionia County Road Commission. He has been a member of the CRA Engineering Committee since 2003, and has been involved in numerous engineering sub-committees. He holds a B.S. in Civil Engineering from Michigan Technological University. He was the 2008 recipient of Rural Engineer of the Year.
Phone: (231) 757-2882 **Email:** wayneschoonover@masoncountyroads.com

Links to the briefing sheets discussed in Wayne's presentaiton can be found at

http://safety.fhwa.dot.gov/local_rural/training/

The AASHTO Local Road Safety Flyer can be found at

http://tinyurl.com/pgjbh77

16 Update from CRA of Michigan

Thursday, February 5, 10:00 AM

Presenter

Denise Donohue joined the County Road Association of Michigan as director in November 2013. She has nearly a decade of association management experience, primarily in agriculture, and has strong experience in public relations. Denise hold a B.S. and an M.A. from Michigan State University, is Accredited in Public Relations, and is a Certified Association Executive. She has worked in three departments of state government and in the private sector.
Phone: (517) 482-1189 **Email:** ddonohue@localroads.net

17 Update from LTAP

Thursday, February 5, 10:25 AM

Presenter

John Kiefer, P.E., graduated from Michigan Technological University in 1990 with a B.S. in Civil Engineering, and is a registered Professional Engineer in Michigan. Following graduation he worked for an engineering consulting firm in northern Lower Michigan primarily on transportation related projects for 17 years. In 2007 he joined the Center for Technology & Training within the Civil & Environmental Engineering Department at Michigan Technological University where he serves as a research engineer. He is primarily involved in outreach and technical support to transportation agencies within the State of Michigan, as well as performing research activities in the field of pavement management and traffic safety engineering.
Phone: (906) 487-2102 **Email:** jakiefer@mtu.edu

NOTES

Workshop Coordinators
Chair – Dan Armentrout, Clinton
Vice Chair – Craig Atwood, Allegan

CRA of Michigan Engineering Committee
Chair – Robert Lindbeck, Alger
Vice Chair – Thomas Hohm, Kalamazoo
Dan Armentrout, Clinton
Trent Arver, Branch
Scott Assenmacher, Monroe
Thomas Blust, Oakland
Mark Craft, Gratiot
Karl Hanson, Wexford
Bill Hazelton, St. Clair
Craig Kelso, Schoolcraft
Lance Malburg, Dickinson
Tim O'Rourke, Roscommon

CRA County Road Association OF MICHIGAN

Center for Technology & Training
Michigan Technological University • Department of Civil & Environmental Engineering

The Center for Technology & Training is located on the campus of Michigan Technological University. Programs managed by the CTT include Michigan LTAP, Roadsoft, MERL, and the Bridge Load Rating Program. The CTT's mission is to develop technology and software, coordinate training, and conduct research to support the agencies that manage public infrastructure. For more information, visit www.ctt.mtu.edu.