

Midwest Transportation Workforce Center Highway Maintenance Engineering Pathway

Discipline Working Group Meeting Summary

Meeting Date: July 12, 2017 (in-person & via video-conference)
Location: Room 1205 Engineering Hall, University of Wisconsin, Madison

Host/Facilitation: Teresa Adams, Maria Hart, Kerri Phillips, Scott Jakovich
Members Attending: Steven Lund, Jerry Mandli, Chrystal Seeley-Schreck, Steve Lewis
Thomas Lyden, Rita Cassida
Members Absent: Dennis Randolph, Dawn Pratt, Mark Chaput, Xinge Wang,
Mark Robinson

Meeting Objectives:

1. Introduce Highway Maintenance Apprenticeship Program
2. Introduce HME Competency Model & Methodology
3. Consider HME Practice in the Future
4. Introduce HME Vision Statements

WELCOME & INTRODUCTIONS

Director Adams opened the meeting at 1pm (CDT) with introductions and apprised attendees of recent initiative updates. This included a scan of State DOTs regarding highway maintenance workforce development, which uncovered the practice of cross-training departmental staff in the duties of both roadway maintenance and construction, as winter conditions can shift workforce demand from temperate weather activities (e.g. construction) over to high-demand activities within roadway maintenance, such as running snowplows. Also discovered were education and training programs being developed by the Colorado and Virginia DOTs — the former being a community college 2-year degree program in Highway Maintenance Management, the latter an apprenticeship in the related activities of construction and equipment operations. Research suggests that highway maintenance and/or construction apprenticeships are also underway at Idaho and Missouri DOTs; these two activities being considered cross-discipline due to the mid-west practice of seasonal workforce demand shifting. Of note, the Wisconsin DOT does not maintain a staff of dedicated highway maintenance personnel, but instead contracts those responsibilities out to external providers.

APPRENTICESHIP PROGRAM

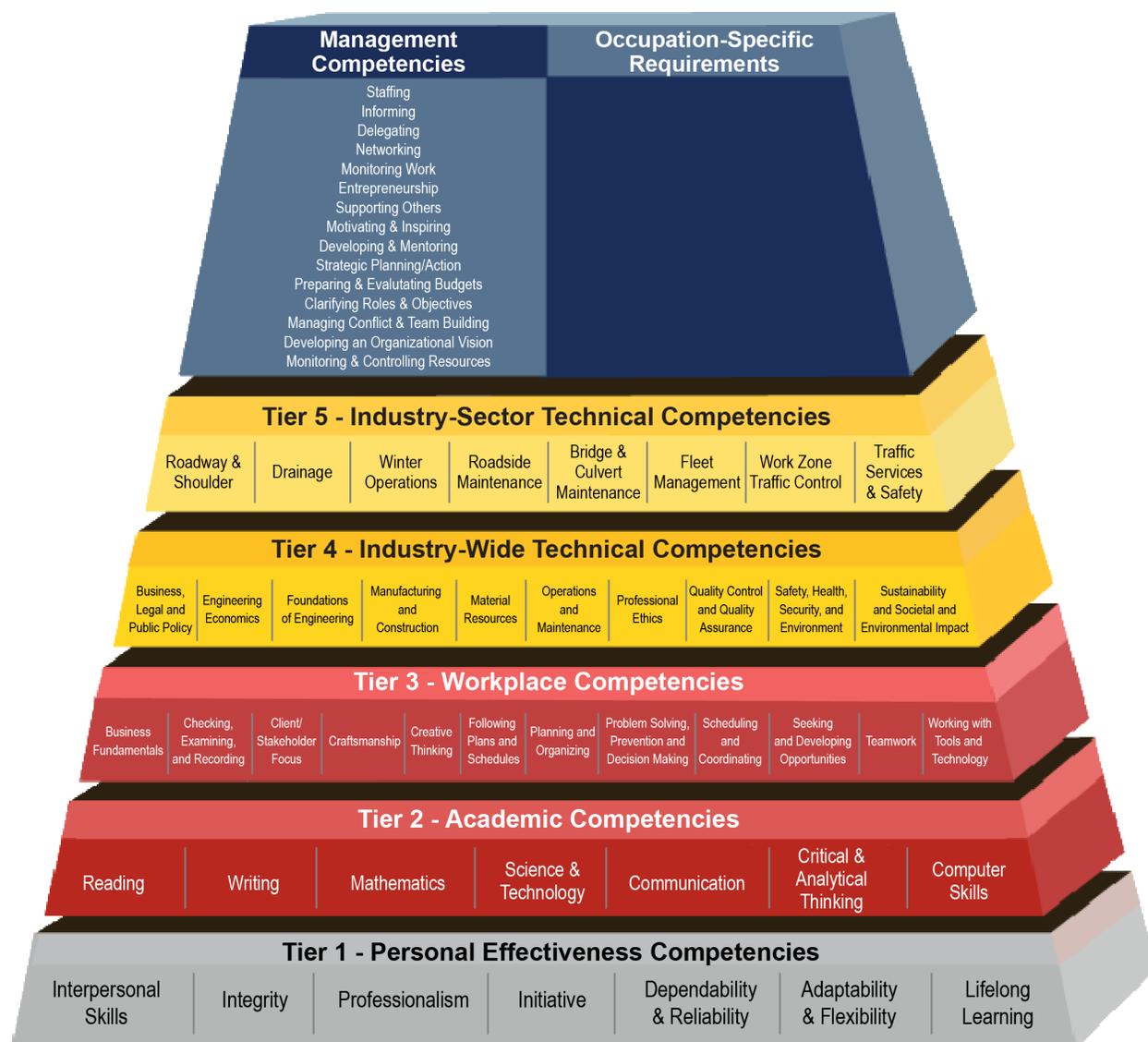
Director Adams announced that MTWC is working on the business case for setting up a highway maintenance apprenticeship. This effort will include an industry survey to estimate workforce demand, assess training requirements, and identify occupational titles and salary ranges. Recommendations for survey questions were provided by the Wisconsin Department of Workforce Development (WDWD), which include (a) what other job openings are available at your organization, (b) what recruiting methods are being used, (c) are applicants presenting with the desired job skillsets, (d) what type of new employee training is being provided, and (e) are existing employees promoted from within? The target survey audience is the 72 county agencies of the Wisconsin DOT. A draft of the proposed survey is posted in Basecamp for DWG review. **Seely-Schreck** suggested issuing the survey through the Wisconsin DOT, since they contract with the 72 county agencies and to avoid any compliance issues with university regulations.

When asked about its impetus, the DWG was advised that an apprenticeship program was a desired outcome of this project and that its effort would parallel that of NTCPI career pathway design. If sufficient workforce need can be established, WDWD would support an apprenticeship by developing its training curriculum and funding its operation. Their expected start-up time is about one year, after which the apprenticeship could scale to meet demand.

HME COMPETENCY MODEL

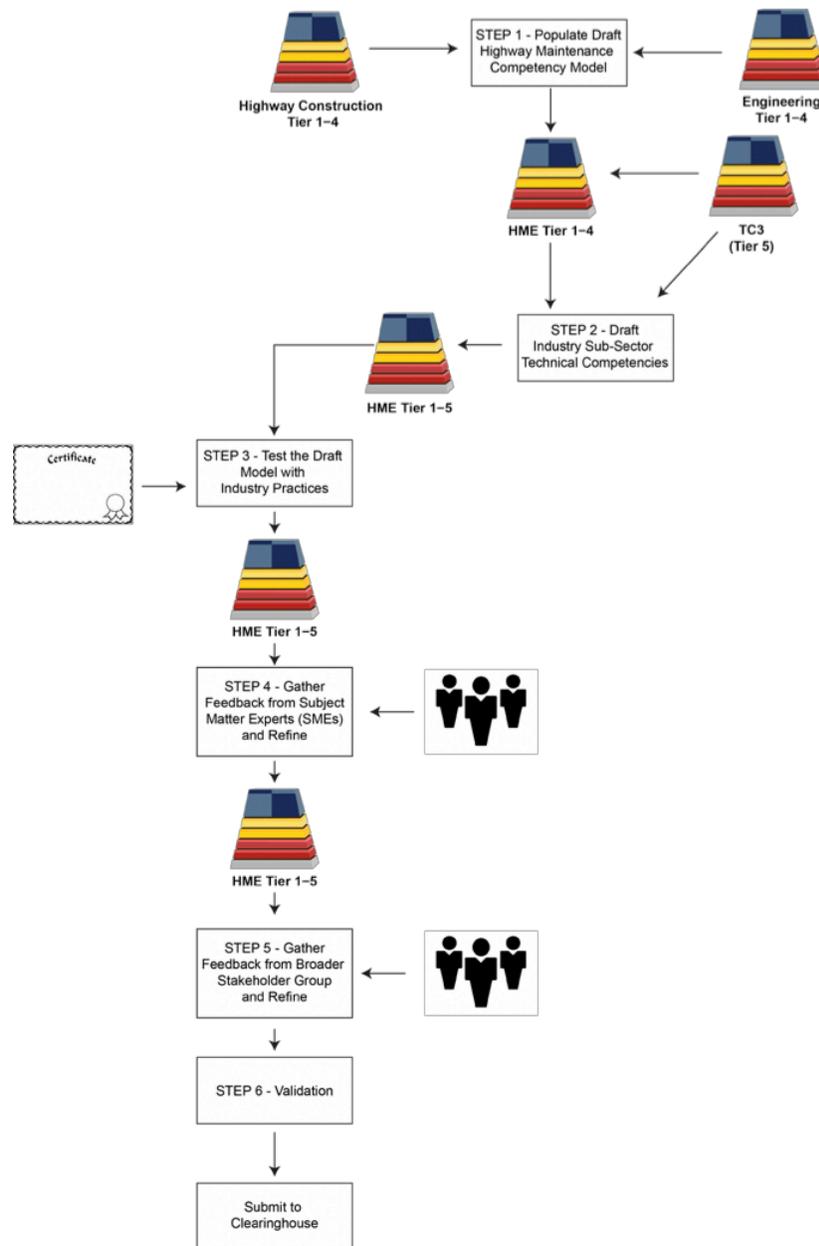
MTWC has been researching the requirements for building a competency model for HME, defined as a format for communicating the skills, knowledge, and abilities that workers in a given occupational cluster would have at all levels accessible within that cluster. Constructed as a 6-tier pyramid (see below), Tiers 1-3 represent personal, academic, and workplace competencies; Tiers 4 and 5 represent industry sector competencies; and Tier 6 represents management and leadership competencies. **Director Adams** defined a competency as a cluster of knowledge, skills, and abilities that enable a person to perform a job, and introduced the Department of Labor's Competency Model Clearing House, wherein staff found existing models for "Engineering" and "Heavy Highway Civil Construction" that could be easily adapted to represent HME. Other resources contributing to this effort were the [AASHTO TC3 Curriculum Competency Matrix for Maintenance](#), which delineates a series of competencies for public agency maintenance job classifications, the Iowa State DOT's job specifications in highway maintenance, and Colorado DOT's curricular work establishing a 2-year Highway Maintenance Management degree program. A request was made that MTWC post these foundational resources in Basecamp, so that DWG members could follow the rationale behind this competency model construction.

HME Draft Competency Model



A 6-stage methodology was also introduced (see below), detailing the steps MTWC researchers took in developing the HME model, from its inception to submission to the DOL Clearinghouse. Steps 1 and 2 represent populating the HME pyramid with competencies extracted from the resources identified previously. Step 3 looks to test this model against industry practices, which Director Adams described as looking at what Colorado and Iowa DOT’s have done to train people in this area, then seeing if the HME model supports those competencies. Steps 4 and 5 are intended to gather feedback for competency refinement—through polling industry SME’s and stakeholders, while Step 6 seeks to validate HME model characterizations.

HME Model Construction Methodology



MTWC will be releasing their HME Competency Model to DWG members for closer review (Step 4), after which a more formal peer review at the TRB 2018 Annual Conference is planned. Since the underlying set of competencies specified in this model cover over 30 pages, **Seeley-Schreck** recommended culling those down to just those that are core/notable, commonly done through employer survey. **Lund** offered to share the model with coworkers who are in-tune with Minne-

sota DOT's HR and training goals, and requested MTWC provide a simple summarizing description so non-workforce practitioners could understand what's being presented, then review and comment. **Lynden** suggested that KSA's (Knowledge, Skills, and Abilities) was a more traditional approach to defining what MTWC is calling a "competency", adding that, from his background, "problem solving" and "decision making", were considered core KSA's. MTWC agreed that for all practical purposes these two terms were interchangeable and are likely to be used interchangeably throughout this project's deployment.

PATHWAY CERTIFICATIONS & CREDENTIALS

Director Adams presented a set of pathway certifications and credentials that help define the occupational expectations for HME workers and may actually be prerequisites for attaining an HME-related job or level increase. These "Occupation Specific Requirements" represent the uncompleted Tier-6 portion of the HME competency pyramid, which will be added once an industry survey helps establish a more comprehensive list. MTWC's current draft list (below) was assembled using O*NET entries for highway maintenance workers.

- *Commercial Driver's License, Class A & Class B*
- *National Career Readiness Certificate (ACT)*
- *American Traffic Safety Services Association*
 - *Flagger Instructor Training*
 - *Pavement Marking Technician/Specialist*
- *National Institute for Certification in Engineering Technologies*
 - *Construction Materials Testing, Asphalt Level I*
 - *Construction Materials Testing, Concrete Level I*
- *International Municipal Signal Association*
 - *Sign & Pavement Marking Technician Levels I, II, III*
 - *Work Zone Temporary Traffic Control Technician*
- *National Center for Construction Education & Research*
 - *Mobile Crane Operator Certification*

Lund noted many of these credentials were outside the realm of highway maintenance and appeared more construction related or suitable for promoting out of a maintenance position, though the CDL is a primary credential for this worker-class. **Lund** added that Minnesota DOT has an integrated pool of maintenance and construction workers; that although they are a merged classification, maintenance KSA's tend to be on one end of the competency spectrum while construction competencies are on the other. **Director Adams** advised that MTWC would

like to see this competency spectrum also lead into asset management and maintenance management, strategically so, rather than just heading into construction. **Lyndon** countered that at Ohio DOT, there is defined training for Highway Technicians Levels 1 thru 4 with structured curriculum to move workers from level to level—some of which requires external certifications like Asphalt Level One and ACI Concrete Field Testing. This allows management to move maintenance workers back and forth between their typical duties to inspecting roadway projects out in the construction field. They need these external certifications to perform the construction inspection work, but they are not a requirement for purely maintenance duties.

Lund clarified that, while external credentials are also in use at MnDOT, crossover workers—those moving between maintenance and construction—tend to fill positions that don't require strict certification. And if an employee goes to the trouble of acquiring these additional certs, it would typically be in pursuit of a better paying, full-time position outside of maintenance. Also, the practice of employee crossover is under scrutiny, as the same workers who tend to get long summer hours also get long winter hours, which is leading to more employee burnout.

Mandli shared that in Dane County (WI) Public Works, recruits tend to work the nine months of clement weather then get laid off to work three months in a warmer climate (e.g. during winter) or to take those months off. When they need to make money 12 months a year with good benefits, you start to get workers at a certain stage in their career. What's challenging is that Generation Y and Z workers would rather take time off than to work winter hours or sign-up for overtime. **Lund** agreed the workforce is changing; MnDOT isn't seeing as much of the dedication of previous workers, but that overtime for snow fighting and summer construction duties will happen, and it might be through *inversing*. **Mandli** offered one idea a county near Green Bay was working on, who had three Generation Y workers: they assigned the three to a team and advised "One of you has to take the call this weekend; you guys decide." They're experimenting with different approaches to managing this emerging workforce demographic.

FUTURE COMPETENCIES

Director Adams moved the discussion towards forecasting HME competencies of the future, suggesting the possibility of workers operating 3D-printers to build spare parts on-demand or accessing GIS-based mapping data as conventionally as using a spreadsheet is today. How will we use roadways in the future, when vehicles are communicating with each other and with the roadway infrastructure; how will that affect maintenance? **Mandli** shared that Dane County was an early adopter of an Autonomous Vehicle Locator GPS program, initially seen as a "Big Brother" whereabouts tracker by workers. Originally intended to track driver safety within the

county's aging workforce, the program ultimately demonstrated that, in emergency response situations, dispatchers could quickly identify and deploy the five closest assets in the field. Another unexpected outcome was a reduction in claims paid, as vehicle positioning data made it possible to counter reimbursement claims from snowplows purportedly damaging public vehicles during clearing operations. **Mandli** cautioned though, that because maintenance workers take pride in their work, they can be slow to adopt new technologies for fear change may not produce clear, safe roadways. **Director Adams** suggested that communications, both interactive and technical, should be a key competency, with maintenance workers identifying more with first response teams in terms of deploying to and aiding in emergency situations. **Lund** thought promoting the technical aspects of HME, like piloting advanced snowplows, would help attract a new younger workforce. **Hart** added that rebranding might also be necessary.

MTWC asked whether drone technology was being deployed within DOTs, but **Lund** conceded that technical issues concerning drone ownership and operations made contracting this work out more attractive. So far, drones have been used for bridge inspection, but they could soon be used for measuring stockpiles, traffic control, advanced warning, and measuring things in the field. However, he doesn't see automation reducing the maintenance workforce anytime soon, as MnDOT delivers all statewide roadway maintenance using an in-house staff sized by their need to fill snowplows. Even though there's a greater need for workers in the summer, MnDOT staffs their maintenance crew based on their plow count. Until unmanned plows are the norm, they'll always need this core maintenance staff. And once a worker adapts to new technology to accommodate workplace change, like remotely operating an unmanned plow, they will no longer be considered part of the maintenance workforce. **Lyden** piggybacked on this, asking if highway workers in the future will need to process more data to perform their work. Today, they go out and fill potholes with asphalt from the back of a truck. Tomorrow, will they need to process weather data or sensor data (et al) to fill that same pothole? Snowplow operators used to flip a switch to make salt come out of the back end, but today they process weather data, information about brine concentration, and mixture proportion, to do the same job. And where plows used to have two people in the cab—one operating the wings and one the main drive, today a single operator with a joystick runs everything.

NAMING THE OCCUPATION

Director Adams asked if maintenance worker occupational titles have evolved within public agencies, and whether that evolution has attracted a new applicant demographic. **Lyden** advised ODOT changed Highway Maintenance Worker to Highway Technician; that "technician"

placed an emphasis on more education, more training, and some certification. The qualifier “Maintenance” was dropped due to ODOT’s practice of crossover staffing; sharing these workers between maintenance and construction duties. No recognizable uptick in applicants was notable due to this new titling. In Dane County, two classifications are used: Highway Worker and Skilled Highway Worker. **Director Adams** concluded that coming up with a good occupational title and some more future competencies would be good homework for the DWG.

VISION STATEMENT

MTWC shared vision statements with the DWG (below); one set for the role of the Highway Maintenance Worker and one set for this HME pathway initiative:

Vision for Role of HME Workers

- *The country’s highway and other multi-modal corridors are managed by a credentialed workforce.*
- *HME activities and decisions occur through a lens of Environmental Sustainability.*
- *The HME workers are recognized as a vital part of the first-responder-team that provides the technical and heavy equipment resources to make relief efforts successful.*
- *The HME workers focus on the safety and welfare of the community and making the community safe and a desirable place to live and work.*

Vision for HME Pathway

- *A well-defined pathway to HME careers exist in every state.*
- *The HME Career Pathway is rich with opportunities to develop a technically innovative workforce.*
- *The HME Career Pathway is engaging, challenging, and innovative and provides entry points from many levels to encourage diversity.*
- *The HME Career Pathway attracts critical thinkers who value sustainability and the environment.*

Referencing the first set, MTWC is considering how to credential and skill the HME workforce in a way that provides knowledge, skills, and abilities that support environmental sustainability, and in a way that promotes this occupation as a vital part of a first responder team (having the technical resources and capabilities necessary to make relief efforts successful).

Lyden commented that “*environmental*” might be overly restricting “*sustainability*” (referring to the second statement), and while “*community*” in the fourth statement is nice, highway workers need to focus just as much on the individual traveling from Texas to Wisconsin as they

are on the individual driving around Madison. **Cassida** suggested replacing “*environmental sustainability*” with “*resiliency and sustainability*”, which seemed agreeable. **Adams** shared concern over appealing to younger audience with environmental consciousness, given that transportation is a big pollution contributor, but agreed to strike “*environmental*”.

For the HME Pathway, the vision is to have a pathway in every mid-west state that is rich in opportunities to develop a technically innovative workforce; that is engaging and challenging at all levels, that encourages diversity, and that attracts critical thinkers who value sustainability and the environment. **Lyden** asked about the meaning of “*provides entry points from many levels*”, which was explained as coming from different places in life, such as a military background, high school graduate, or displaced worker. **Jakovich** suggested that a pathway with multiple entry points typically referred to an occupational ladder with successively higher levels of jobs and pay scales that are accessible through correspondingly higher levels of education, training, and work experience. A pathway with multiple entry and exit points presents a continuum of job opportunities through upskilling for workers interested in career and pay advancement.

MTWC then presented a value statement for HME students:

Students who select a career in Highway Maintenance Engineering are concerned about sustainability, environment and wildlife, and above all the welfare of all members of the community; enjoy being stewards (care-takers), enjoy outdoor work, think holistically, are problem solvers, and excel technologically.

Lydon suggested that “*environment*” covered “*wildlife*”, noting that maintenance workers do run over raccoons and pick-up road kill. Further discussion was pushed to the next meeting.

NEXT STEPS

Members were asked to review the stakeholder database and refer any additional contacts, with a reminder these contacts will be informed about the initiative, asked for feedback on the Competency Model, and similar such efforts down the road. Members were also asked to look for any experiential learning programs their agencies may be utilizing—or would recommend—that provide hands-on training for upskilling workers. These programs would be reviewed at the next DWG meeting, scheduled for October 12th. At that time, MTWC will also share the results of a broader industry survey and the updated HME Competency Model. In the meantime, staff will post to Basecamp all foundational research supporting this model.

The meeting concluded at 3:15pm (CDT).