



# Training Roadmap for Civil Engineering Technicians

## User Guide



MINNESOTA LTAP  
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Training Roadmap for Civil Engineering  
Technicians:**

**[mnltp.umn.edu/workforce](https://mnltp.umn.edu/workforce)**



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# The Training Roadmap:

## A Tool for Local Agencies and Employees

Many local public works agencies are struggling to hire and retain enough qualified staff, particularly civil engineering technicians. At the same time, today's workforce wants more growth opportunities and career mobility.

The Training Roadmap for Civil Engineering Technicians is a tool to bring agencies and employees together to meet their mutual needs. Agencies can use the tool to train new hires and groom current staff for advancement. Employees can chart a path for skillset development and career growth.

Ultimately, the Training Roadmap helps expand the job pool for local agencies and workers, allowing them to serve the public and maintain Minnesota's infrastructure.

### What Is the Training Roadmap?

The Training Roadmap is an online spreadsheet that supervisors and employees can use to identify and plan training needed for civil engineering technician positions. Users can download the spreadsheet at [mnltp.umn.edu/workforce](http://mnltp.umn.edu/workforce) and fill it in electronically or print it out and write in their updates.

The roadmap has links to training options from a range of training providers (you will need to follow the providers' registration processes and pay any associated fees). Training is divided into nine key categories:

1. On-the-job training
2. Communication
3. Construction inspection
4. Design
5. Survey
6. MnDOT certifications and training
7. Other state and industry certifications
8. College credit courses, programs, and degrees

9. General knowledge of construction, maintenance, and roadway impacts

Agencies can customize the tool by adding additional courses, trainings, certifications, and categories (such as computer literacy).

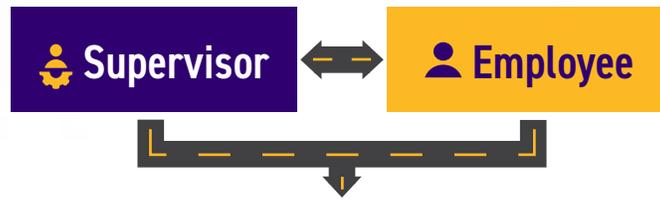
### Who Is It for?

- Supervisors
- Newly hired civil engineering technicians with:
  - A recent two-year degree in civil engineering technology
  - Related experience or education
- Current employees in other job classifications—perhaps maintenance technicians or seasonal workers—who have the aptitude and ambition to become a civil engineering technician.
- Potential permanent employees, such as trainees, interns, and workers with related contracting firms.

The roadmap's flexible design allows users to adapt to the unique needs of both the agency and the employee:

- Employees with different backgrounds, experiences, and educational levels can identify what's necessary to meet their goals.
- Local agencies can identify skillsets and training, with specific timelines, for succession planning. (Example: Bridge inspectors require five years of team inspection work before being eligible for certification.)
- Local agencies can structure their workforce to best respond to their community's needs.





Create employee's customized training roadmap. Choose among:

On-the-job training and mentoring

Courses as appropriate in communication, construction inspection, design, survey

MnDOT certifications and training

Other state and industry certifications and training

College courses, programs, and degrees

General knowledge about construction, maintenance, and roadway impacts

Meet and update the roadmap every 3-6 months.

Skilled employee ready to meet local agency needs



## How Do I Use the Roadmap?

### Conversations and Open Communication

The process begins with a conversation between the supervisor and employee:

1. Schedule a time for an uninterrupted and unrushed talk.
2. Review all the options in the Training Roadmap for Civil Engineering Technicians, either online or using a printout.
3. Assess and discuss the employee's current capabilities along with desired skills and future opportunities.
4. Create the employee's customized roadmap: Fill it in online or on the printout.

Then, meet periodically to update and discuss the employee's roadmap—perhaps every three to six months. Be sure to state mutual expectations and maintain open communication, and make time for unrushed conversations.

This is a long-term investment in an employee's skills and education. It's a learning process—and as with any new experience, there are bound to be bumps in the road. Be sure to encourage engagement and support each other through the process.

### Tips for Supervisors

- Have conversations about career development and opportunities, but without promises or guarantees.
- Customize the training to fit each employee's experience and education.
- Customize the courses to fit your agency. Add additional courses and certifications that are required or encouraged.
- Use the "Notes" section to document agreements between you and your employee. For example, include anticipated timelines for completion or upcoming projects that require certain courses to be completed.

*"We want you to get all the skills you need to reach the next level and compete against the best of the best that might apply from outside the agency."*

— Example from a local agency practitioner

- Set clear, realistic expectations.
- Have conversations about what employees would most like to work on. People are motivated by what they find interesting. Plan where that focus fits into the employee's roadmap.
- Show employees how and why their skills will be needed in the future—perhaps using your capital improvement plan—or why the training they are receiving now will benefit an upcoming project.
- Check in with other supervisors, departments, and agencies for ideas, and work across departments to keep employees engaged (establish a cross-training/working schedule, for example.)
- Always look for opportunities for your employees to diversify their experiences. An official or unofficial mentorship is the best approach.

### Mentorships

**Many things come with experience. Understanding the relationship between the different activities and elements of the job is important but can only be appreciated when someone actually works on all the components.**

For example, concrete has many different applications, and it is important to see it applied, placed, and function in different ways. Structural concrete serves an entirely different purpose from paving concrete. Workers need to know the important attributes of these different concretes.

Seeing the different layers of construction is also important. It is one thing to inspect the rebar placement on a bridge but another to understand that the soils supporting the bridge are just as crucial to the longevity of the structure.

Mentors can provide this important training and knowledge.





## Tips for Employees

- Use the “Notes” section to document agreements between you and your supervisor. Enter any progress you’ve made, such as the dates you enrolled in or completed training.
- Review the training or certification that you would like to complete and discuss how this training will benefit you and the agency.
- Be prepared to talk about your long-term and short-term career goals. Ask how to achieve these goals.
- Questions to ask your supervisor:
  - What are your expectations of me as an employee in this position?
  - How can we create an ideal on-the-job experience? (It is important to share how you learn best.)
  - How can you help me work toward my personal goals and objectives?
  - What can I improve to move to the next level?
  - How will I know I met expectations?



## On-the-Job Training: What's Key?

The Training Roadmap for Civil Engineering Technicians has a section for the supervisor and employee to document on-the-job (OJT) training. To implement an effective OJT plan, supervisors should consider the following critical concepts.

### Remember the basics—start simple and build up

Employees should be familiar with the different qualities of construction materials. A good way for them to learn this is through materials testing. Beginner-level tests don’t take long to master but offer valuable insight into how materials function when in use. Tests may involve tools such as a dynamic cone penetrometer and analyze qualities such as concrete plasticity or soil compaction. Understanding materials—and how to test them—can be helpful for finding problems in the field.

### Augment certification courses

Certification courses only certify inspectors and technicians—they do not train them. So, augment

all certification classes with OJT to familiarize employees with the context of the information presented in the certification classes.

### Identify training pairs

Maintain a list of all your agency’s projects. When making staffing decisions, pair new or inexperienced workers with more experienced ones. It is never a good idea to overload a new worker right off the bat. Be sure the workload is manageable and that there is an understood learning curve.

Provide experience with all project components—no job is too small, dirty, or unpleasant

Every inspector and engineer in the field should be seeking experience with any and all components of a project. During this type of training, connections between components become evident: An employee may see that the compaction around a buried structure can influence the pavement many feet above it.

### Rotate staff to prevent burnout

It is also important to be sure that the work doesn’t become miserable. Rotating staff from one task to another helps keep up interest, diversify experiences, and avoid burnout. Placing a young inspector under a pile hammer for months at a time can get pretty disheartening.

### Use planned projects as a guide for certification and course selection.

- Some examples:
- If there is a project with a substantial grading portion, then the employee should take Aggregate Production and Grading and Base 1 courses.
  - Grading and Base 2 is also a valuable class but is more geared for inspectors than technicians.
  - Concrete Field 1 is a good class to have before working on any civil project, as concrete is ubiquitous in construction.

### Look for opportunities and consider networking

OJT requires opportunity. If an agency has many different jobs, then it might not be difficult to accommodate. However, if there are few opportunities for diverse work experiences, then networking with other agencies or organizations might come in handy.



## Case Studies: What Are Some Options?

Minnesota cities and counties have been creative in their approach to developing technical expertise within their agencies. Some examples follow.

Note: Most workforce development programs will require collaboration with administration (for budgetary and human resource impacts) and may also require approval of elected officials for adding positions.

### Mower County: Civil Engineering Technician Trainee Position

#### Trainee recruitment and development

Mower County created a trainee position so it could develop a civil engineering technician internally. This position is one step below (on the pay scale) the county's Civil Engineering Technician I. Trainees receive on-the-job training from numerous staff (engineers, technicians), attend outside training, and work toward obtaining various certifications.

#### Results

This is a new position for Mower County. The current trainee was hired in the winter of 2020 and has worked toward earning MnDOT certifications (aggregate production, bituminous street, and erosion control) so he can continue learning during construction season.

*"This position was created because open positions would sit for up to a year before we would get an applicant who would [then] be unqualified. We have a young staff—most less than three years of experience—so we decided to give it a try. So far it has been working out. We recently finalized a Senior Technician position that would be responsible for training."*

— Denny Zwiener, Assistant County Engineer, Mower County

### Dakota County: Out-of-Class Work

#### Voluntary cross-training of union staff

Dakota County uses a voluntary work out-of-class

approach with its maintenance staff. This enables maintenance workers to cross-train in non-maintenance areas of the department—such as traffic operations, permitting, and construction—during summer months when these areas have a heavier workload. This typically results in about 5 or 6 of the county's 30 maintenance employees working in other areas of the department during the summer. The county has used this approach for the last 8 to 10 years.

#### Results

This approach has resulted in several maintenance staff acquiring skills and experience to move into permanent technical positions in the construction, traffic, and permitting areas of the department. The maintenance union has accepted this approach for several reasons: It is all on a voluntary basis, the same number of full-time union maintenance positions have been maintained, and the out-of-class provision led to increased pay for its members.

### Benton County: Engineering Technician Training Program

#### Skills for promotion

The purpose of this program is to advance the skills of an Engineering Technician to the level of Engineering Technician Senior (ET Sr), to be more competitive for future promotions. Not only will this program benefit the employee to be more competitive for future promotions, it will also benefit the department by developing a more rounded and skilled staff. The broader mission of this program is to allow the department to develop and keep a well-trained workforce.

Each employee has common tasks as well as a set of specific tasks to complete within a given time frame. The employee is responsible for keeping a record of progress. Once the employee meets all the program requirements and gains the required experience, the employee will then be eligible, but not guaranteed, to move to the next level.

#### Results

Two employees are in the program. (Note: This department has three full-time employees in this classification.)





*“Tools like ours provide the supervisor/manager an opportunity to have a conversation about their agency’s workload and what is to be expected of the employee. As engineers, we are always planning for future projects. An upcoming construction project could require certain skills. As the department manager, you could have the ability to look at your staff and determine if they have the skills necessary for a successful project. If not, it would be the duty of the department head or manager to find training so the employees have the skills when they are needed.”*

— Chris Byrd, County Engineer, Benton County

*“Based on the training that Benton County has given me, I feel it has better prepared me for career advancements within the organization. They take a very hands-on approach to prepare their Engineer Technicians with the skills to execute the job to the county’s expectations. This training has taught me to think on my feet and enhanced ways to find solutions to problems that arise during all phases of construction.”*

— Karle Meyer, Civil Engineering Technician, Benton County

## City of St. Louis Park: Job Rotation Program

### Job shadowing for high performers

The city developed this job rotation program to help spur creativity and generate ideas across departments. A side benefit is to provide recognition and career development opportunities to high-potential/high-performing employees selected to represent their department. Other goals were to increase comfort with change and improve relationships and connections among departments.

The program was piloted in 2013. Interested staff were interviewed for consideration, and one person was selected from each department. Employees received their regular pay for the hours spent shadowing others. Seven days total over the course of a year were spent shadowing, so employees were able to balance their workload accordingly.

### Results

The program was very successful, and many employees asked to participate—too many to manage successfully through HR. Instead, the city encouraged all employees to initiate job shadows on their own, and supervisors were advised to encourage it. Officials hoped shadowing would continue on an agency-wide, organic level to enable broad learning and development.

## City of St. Louis Park: Sunset Positions

### Openings during military deployments

The city created “sunset” positions to fill needs during staff military deployments. Those hired for sunset positions have some previous experience and receive the same pay and benefits as all other full-time employees. The only difference is that their positions end after one year or when the deployed staff return from duty, whichever comes first. They are trained on all equipment. The city helps them receive a CDL license or water and sewer licenses (if they meet the time requirements for water and sewer licenses). The city prepares the workers to know as many aspects of the job as possible to help them get a full-time permanent position with the city if an opening arises, or with any other city.

### Results

St. Louis Park did not have any openings. However, two workers in the program were able to find full-time positions with Apple Valley and Bloomington.

## Expanding the Transportation Workforce Project

This document is part of the “Expanding the Transportation Workforce” project sponsored by the Minnesota Local Road Research Board. The project was guided by a technical advisory panel of experienced transportation professionals from a variety of local agencies and private firms from around the state, as well as workforce leaders and technical school representatives.

The project created a set of products to help local transportation agencies meet their workforce needs. The other products are:

- *Recruitment Toolkit for Local Agencies.* Best practices and resources such as sample job descriptions and job postings; social media and targeted advertising; and Minnesota employment services.
- *Community Outreach and Communication Guide.* Tools and tips to help local agencies raise awareness in their communities about transportation careers. An accompanying product is a spreadsheet with activities that agencies can use to spark interest with K-12 students.
- *Local Agency Careers in Minnesota.* Brochure that local agencies can use to introduce students to transportation careers.

All the materials, along with links to other resources, are available at:

[mnlrap.umn.edu/workforce](http://mnlrap.umn.edu/workforce)

*“This position has made the city look for ways to address larger DEI [diversity, equity, and inclusion] goals. Public works is a male-dominated workforce, so we are trying to get more women interested in it. We are developing a program with the goal to hire unqualified but trainable employees to train in all aspects of public works. The trainee position would work with Utilities for three to four months, then work with Parks, Streets, and Rec Center for three to four months each. The position would be trained in as many aspects as possible and assist them in getting their commercial driver’s license. This would help them be well rounded and qualified to apply for any public works position with our city or any other city that may have a job opening.”*

— Jay Hall, Utilities Supervisor, St. Louis Park



