

Recruitment and Retention of Highway Maintenance Workers

Case Studies & Recommendations

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Introduction

The objective of this project was to investigate the challenges for state departments of transportation (DOTs) in the recruitment and retention of snowplow drivers and other highway maintenance workers; and identify innovative but practical ways for DOTs to recruit and retain a highly proficient, diverse, productive, versatile, and committed roadway maintenance workforce. The focus is on feasible measures to attract, keep, and improve a reliable, capable workforce. This document highlights successful strategies and potential solutions, through identification of factors that explain why some employees pursue a position with a DOT, why some employees leave, and why some remain with an agency over time. Since it is often difficult to significantly increase wages, basic information on wages and benefits are reported and key employment factors within agencies' control to modify in order to increase recruitment and retention are presented.

Methods

The development of the Case Studies and Recommendations were based on information gained from the literature review, survey responses, and follow-up interviews. Thirteen (13) case studies were developed of varying depth and length. Recommendations were made on areas where training for winter maintenance managers, operators, and human resource staff may be beneficial to agencies, and on methods to capture information on successes and failures within their organization and programs so that they may learn from each person's experience within their individual agency in order to improve future practices.

Detailed information on the methods used, literature, survey response, and follow-up interviews can be found in [Recruitment and Retention of Highway Maintenance Workers: Final Report](#).

CASE STUDIES

Recruitment Programs

Recruitment of skilled employees can be a challenge at many transportation agencies, and as more winter maintenance personnel reach eligibility for retirement many agencies have looked to creative recruitment programs to bring on skilled or skill-seeking employees. These programs include creative partnerships to hire from disadvantaged populations and training of supplemental staff during critical events.

Strategies to Consider

- Skilled and trained job seekers can be found by looking to groups like military veterans.
- Partnerships with departments of corrections can provide job skills and career pathway opportunities to recently released inmates while addressing workforce shortages at a DOT.
- Train supplemental staff to provide backup during major winter storm events.
- Create policy for supplemental staff to make responsibilities clear.

Recruitment of Veterans

Military veterans provide a unique opportunity to recruit employees who already have many transferable job skills and values that can stand out in road maintenance careers including construction and maintenance experience, valuing comradery, and leadership skills. In fact, nearly 15.5 percent of all veterans enter the construction and maintenance industry (Ellis, 2018).

Programs like [Helmets to Hardhats](#) work to connect National Guard, Reserve, and veteran populations with training and employment opportunities within the construction industry. This program was created to assist military personnel with the transition back into civilian life through career training and resources needed to obtain a secure career. Ohio DOT (ODOT) has created a successful [Helmets to Hardhats apprenticeship program](#) which offers paid training and reimbursements and the ability to use ODOT equipment to obtain a commercial driver's license (CDL). Upon completion of the program, employees are eligible to apply for full-time highway technician positions.

Partnerships with Department of Corrections (DOC)

Overview

Recruiting qualified candidates has been an issue at many transportation agencies. One method to address this issue is to open up job opportunities to recently released inmates. Some state agencies have worked to partner with state departments of correction (DOC) to address workforce shortages and create education programs to train DOC inmates nearing release on the necessary skills needed for road maintenance positions. The DOT and DOC are working to modify the CDL course information to better serve the needs of the DOT.

Case Studies

Michigan

The [Vocational Village program](#) (see video and information on their website) is located in two correctional facilities in Michigan - Jackson, MI (and is the largest walled prison in the state) and Ionia, MI (one of the smaller minimum security prisons in the middle of the state). As stated on their website *"The Vocational Village is a first-of-its-kind skilled trades training program that aims to provide a positive learning community for prisoners who are serious about completing career and technical education."* The Vocational Village Programs include training in welding, computer numerical controlled machining, carpentry, plumbing, electrical, tree trimming, computer coding, masonry and concrete, CDL and forklift operations, and automotive technology. Program participants earn state and national industry recognized certifications. The program takes advantage of both the classroom and shop learning environments. Everyone in the program lives together. Evening programs focus on cognitive learning to aid in successful transition from prison. The program focuses on training prisoners based on their aptitude and desire to learn the jobs/trades that are in demand in the counties where they will be released.

To qualify for the Vocational Village Programs prisoners must be:

- Within one year of release/exit date,
- A level 1 prisoner, located at a low/minimum security prison,

- Model citizens, with no tickets due to poor behavior, and
- Able to complete the program, which is 6-9 month long.

The DOC partners with the Michigan Works agencies and the state’s talent investment program to identify the labor market needs, which in turn determines the training needs and offerings. The DOC actively works with the business community, inviting company representatives to come see the Vocational Village in action, meet the program participants, and conduct job interviews. The Vocational Village Program was developed by the Michigan DOC in 2016 and continues to grow and be successful. Figure 1 provides a summary of the program.

The graphic is a fact sheet for Vocational Village, divided into two main sections for Ionia and Jackson facilities. At the top, it says 'Vocational Village Know the facts!' on both sides. Below this is a grid of 11 vocational trades: Auto Mechanics, Carpentry, CNC Machining, Electrical, Plumbing, Welding, Forklift, Robotics, Truck Driving, Masonry, and Tree Trimming. The left side lists 'VILLAGERS' (120 in Ionia, 150 in Jackson), 'TRAINING' (5 days/6 hours, 30 hours a week), and 'SUCCESS' (60 percent employment rate). The right side lists 'KEY POINTS' (location, training options, certification, readiness course, ACT test, job fairs) and 'KEY NUMBERS' (11 trades, \$1,200 to \$9,600 in tax credits). Both sides include a 'FOR MORE INFORMATION' box with the website Michigan.gov/VocVillage and a note that numbers are as of July 2019.

Figure 1. Vocational Village Fact Sheet

Getting qualified candidates is an issue for the DOT and the agency is constantly short staffed. To address this, in the last two years there have been conversations between the DOC and DOT about shortages of DOT plow drivers and the lack of qualified applicants (i.e. applicants not holding a CDL). The DOT and DOC looked at adding to the CDL course information to better serve the needs of the DOT. The Jackson, MI Vocational Village facility hired a full time CDL instructor who was a long-haul driver and instructor to train the program participants. The Vocational Village CDL program acquired two snowplow driving simulators that are used in the training program to support the needs of the DOT and local counties.

The program is structured so that the prisoners have all of their classroom work and testing done when they leave on parole or max out of their sentences. Then all they need to do is take the driving test to complete the CDL and DOT program. For the Michigan DOT, the Vocational Village Program provides the supplemental workforce needed in winter months.

The DOT needs help filling positions in the southwest part of Michigan, which requires a larger workforce and has the greatest number of unfilled jobs. To encourage the Vocational Village Program participants to work in these parts of the state, program participants are provided an apartment and other assistance for a defined amount of time to help them transition to the new location.

Michigan DOT has 384 full time Transportation Maintenance Worker (TMW) employees located at 33 garages statewide. From October through April, the DOT doubles the number of staff, hiring seasonal workers to fill its needs. These seasonal positions are hard to fill, and the DOT sees a great benefit from hiring from the Vocational Village Program and getting new workers started in the TMW work force. The DOT conducts interviews and fully vets each applicant regardless of where they come from.

Michigan DOT training staff members had planned to go into the prison to lead the classroom portion of the Winter Operations School. This would occur approximately every 6 months, then the prisoners could work with MDOT or a county and have a Winter Operations certificate to use once released when they apply for jobs. Unfortunately, the program was put on hold due to the COVID-19 pandemic. The prisons have been closed to visitors, so all trainings have stopped. There has not been a shift to conduct the DOC CDL TMW trainings virtually. As a result, the DOT has not yet benefited from the Vocational Village Program, but the DOT plans to move forward with the program when allowed.

North Dakota

Governor Burgum of North Dakota strongly supports reform of inmates and new ways to incorporate former inmates back into society and professional career fields. The state worked to make inmates on work release eligible for state jobs. The first step included removing questions on job applications that asked about former convictions/felonies. This way an applicant's past cannot influence the hiring process and when conducting a background check, the state cannot disqualify an applicant based on prior convictions. This creates a more inviting environment where applicants are not judged before coming through the door.

Pre-COVID, the driver's license division program was of greatest interest to inmates. The division went to correctional facilities to talk about career opportunities and the [REAL ID program](#). Outreach materials to the DOC inmates are focused on the REAL ID program, how to obtain a driver's license and CDL, and opportunities to work for the state. *This program was driven by inmates' interest in getting a CDL.* The current DOT human resources director previously worked at DOC as a parole officer, thus is very passionate about the program. However, the program was just getting started when the COVID-19 pandemic hit, and outreach to the correctional facilities has slowed. The DOT is currently working with the DOC to conduct virtual outreach events.

Similar programs have worked well in the private sector, but this is just getting started at the state level. One example is the ND State Capitol cafeteria, which is a huge hiring agency for inmates in the work release program or post incarceration. Generally, the state is working to change the mindset that state jobs are not for inmates and hopes to resume and expand these efforts in the future.

Fishers, Indiana

The City of Fishers, Indiana created the Re-entry Initiative through a Structured Employment (RISE) program which aims to “recruit, assist, and equip the transitioning workforce of Hamilton County, Indiana in their pursuit to reestablish themselves as productive members of society.” This 12-month program provides individuals with on-the-job experience with the City of Fishers, Indiana Department of Public Works in addition to monthly training opportunities on both job-related skills and soft skills which included financial management and other life skills. Participants are also offered opportunities to complete CDL training. Upon completion of the RISE programs, participants are highly capable, able to maintain steady employment, are eligible to receive a letter of reference from the mayor, had the opportunity to obtain a CDL, and are eligible for future employment as opportunities become available. The DPW also worked to identify “pro-social role models” within the agency who would partner with RISE participants to provide encouragement and support and were willing to be an example of what good work ethic looks like within the department.

Legal Considerations

Generally, those with a criminal record are eligible to obtain a commercial driver’s license unless they have a qualifying offense under [federal laws](#) (felony conviction while operating a motor vehicle, etc.). These requirements may change from state to state.

Examples from our case studies:

[Michigan](#) allows a person to obtain a CDL with a felony conviction. However, if you are convicted of a felony while operating any type of motor vehicle it could result in the restriction of your license for a period of one-year up to a lifetime depending on the charge.

North Dakota DOT has specific guidelines for obtaining a CDL with prior convictions. North Dakota DOT will not hire a registered sex offender for a CDL role, or anyone that has lost their CDL due to DUI. North Dakota DOT does check driving records to determine if a criminal record should be considered prior to hiring a candidate. Often, it will depend on how long ago it was, and may allow individuals to plead their case.

Creating Supplemental Workforce with Existing Staff

Overview

During larger winter storm events or times when an agency may have staff out on vacation or sick leave, having a supplemental staff who can provide backup can be vital. Supplemental staff could include staff members from mechanical, engineering, or other divisions. These supplemental staff members can be brought in to operate snowplows (CDL) or a pickup truck with a plow blade (no CDL required).

Case Studies

Michigan and Minnesota Department of Transportation

Michigan DOT is considering a program that has been implemented in Minnesota. Minnesota DOT has created a supplemental winter workforce using existing employees, such as secretaries, engineers, and others. The DOT helps these staff obtain their CDL, and then when needed the agency calls an “all-hands-on-deck” to handle larger winter events. While Michigan DOT has discussed this, no action has been initiated to develop it yet.

City of Farmington Hills, MI

The city of Farmington Hills, MI activates plowing operations when they have four inches of snow. In cases where they need additional plow operators, the city can bring in auxiliary staff members from mechanical and engineering divisions to operate pickup trucks with a plow blade which do not require the employee to have a CDL. For auxiliary employees, their main job requirements always take priority. While they assist with plowing operations, they remain a radio call away if they are needed back at the maintenance shop.

Sharing Your Story – Using Social Media for Recruitment and Public Engagement

Overview

Social media sites like Facebook, LinkedIn, Instagram, and Twitter have provided a platform which allows an agency to reach out and interact with a wider audience and create a relationship with the public. Transportation agencies have used social media to share employee stories, provide real-time updates on maintenance/construction activities or road conditions, and share safety messaging. Social media has also been used to promote job opportunities. In particular, it has provided a method to humanize state employees and promote ongoing activities. Best practice has shown that telling a story can be effective. This can be done through sharing stories from current employees, safety messaging on the importance of winter maintenance, how employees are dispatched, and promoting the science and technology used to create a more sustainable future.

A detailed social media policy should be considered which helps provide guidance on official use of any social media outlets. This guidance should include the type of messaging and posts that any agency can share, who can post to social media, how to engage with any public comments, and more. This guidance can ensure that an agency keeps consistent messaging and a respectful communication. Many state DOTs have created specific guidance for employee use of official social media accounts. Examples include:

- [Minnesota DOT](#)

- [Ohio DOT](#)
- [Oregon DOT](#)
- [Washington State DOT](#)

Interacting through social media can create additional job burdens, particularly if an agency wants to maintain a consistent and active presence. Some transportation agencies have created job duties specifically focused on communications and social media. For example, Ohio DOT has communication coordinators and Wisconsin DOT has specific social media coordinators. In this case employees would share a story or photos/videos with the coordinator then the coordinator would handle posting to the social media platform. Figure 2, Figure 3, and Figure 4 provide examples of their social media posts.



Figure 2. Wisconsin DOT social media posts help tell the story of their equipment and process.



Figure 3. ODT Social Media post showing view from the road.

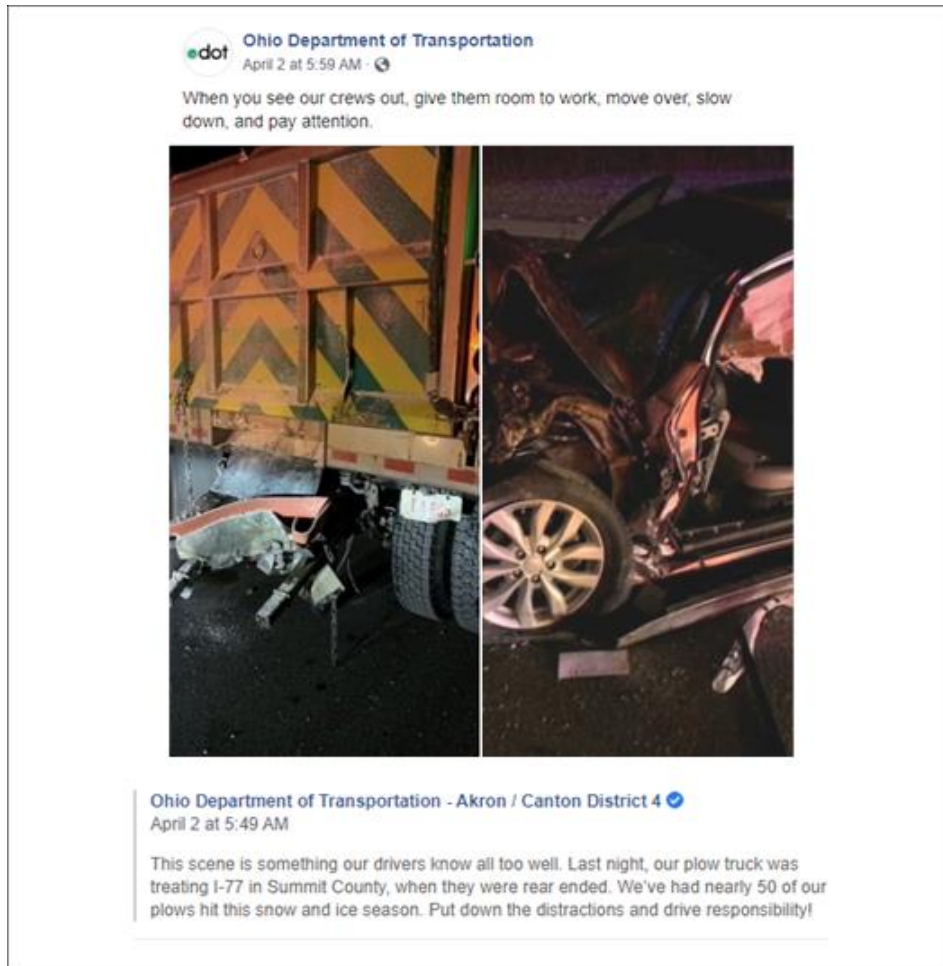


Figure 4. ODOT social media post showing what happens when motorist follow too closely.

Strategies to Consider

- Create a social media policy which provides guidance on who can post to an agency social media site, what can be posted, etc.
- Determine who will serve as the social media liaison – human resources, communication coordinator, etc.
- Listen to feedback in the comments and use this to update outreach efforts.
- Share what type of organization you are, photos and videos of activities you are already doing (whether this be Touch-a-Truck events, a ride along with a plow driver, or a beautiful sunrise). These types of posts can help improve an understanding of what winter maintenance employees do and improve public perception.
- Get creative! Tell a story, share photos and graphics.
- Look to other state DOTs to get ideas of things to share.

Case Studies

Maine Department of Transportation

Maine DOT has recently increased their use of social media in their recruitment efforts, including posting job opportunities on their Facebook page. Maine DOT has utilized feedback from Facebook comments to update their recruitment efforts to better promote the benefits of working for the DOT. The DOT is currently working on job posters and Facebook campaigns for rural towns in Maine that will highlight the benefits package offered by the DOT (Figure 5).

The flyer features a blue header with the text "JOIN THE TEAM THAT KEEPS MAINE MOVING: MaineDOT" and a red exclamation mark. Below this is the title "Transportation Worker" with a checkmark icon. The "Salary" section, marked with a dollar sign icon, lists "Full-Time" with a starting pay of "\$17.37" and "Plus Overtime!". The "Great Benefits!" section lists: Group health, dental, vision & life insurance; Pension plan & deferred comp; Earned vacation & sick time; 12 paid holidays; Career advancement; In-house commercial driver's license (CDL) training; Continuing education reimbursement; Gym memberships & wellness programs; And more!. The "Contact Us" section, marked with an envelope icon, lists: Jeremiah Hutchinson & Rachel Kennedy; Phone: 207-624-3050; Email: Jobs.DOT@maine.gov; MaineDOT Human Resources; 24 Child St., 16 SHS, Augusta, ME 04330. At the bottom, there are social media icons for Facebook, Instagram, Twitter, YouTube, and LinkedIn, along with the website "mainedot.gov" and the "MaineDOT" logo.

Figure 5. Maine DOT Job Flyer

In addition to using Facebook to post job opportunities, the DOT has used social media to share information on their winter maintenance program, provide road condition updates during winter storms, and safety information (Figure 6).

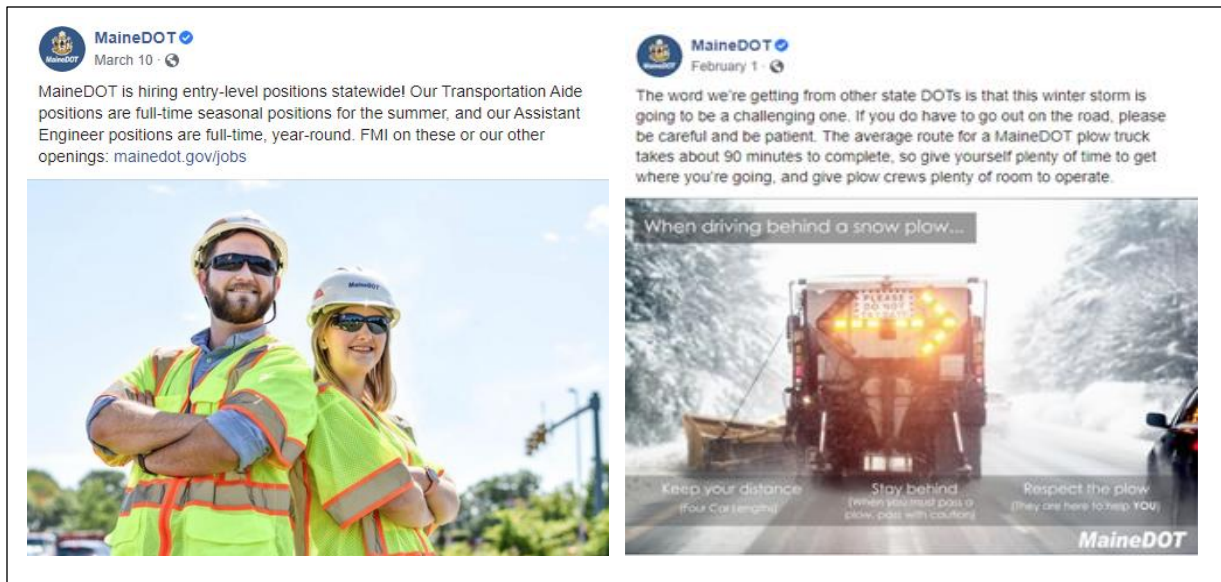


Figure 6. Examples of Maine DOT social media posts.

North Dakota Department of Transportation

North Dakota DOT has utilized social media in coordination with many of their recruitment programs and to share the work that the DOT does to promote an understanding of road maintenance work among the traveling public. As a part of their recruitment efforts, the DOT conducts public outreach to local elementary and high school students as well as Touch-a-Truck events at local fairs. At these events, people are able to get up into a snowplow and see how all the technology works including learning about line of sight and what a snowplow operator can see from the driver's seat. The DOT uses these events to promote awareness of safety and potential job opportunities to the public. During these events, the DOT will take photos to post to social media to further promote their activities.

In addition to promoting recruitment activities, the DOT posts photos of road conditions during large winter events to promote working at the DOT: *"If you want to see these roads open sooner, come work for us."* During a recent 3-day road closure from a storm event, the DOT posted several photos to social media. These posts were picked up by local TV and radio and the DOT received some free advertising from that. Figure 7 and Figure 8 provide examples of social media used to show road conditions.



NDDOT snowplow ride along



North Dakota Department of Transportation
March 15, 2019 · 🌐

Driving a snowplow is a no easy feat, but Larry Froelich with the NDDOT makes it look easy! Take a ride in a snowplow and get a glimpse into all that goes into it.

Figure 7. Example of NDDOT social media post. Source:

https://www.facebook.com/88374649460/videos/324509058204518/?so=channel_tab&rv=all_videos_card



Snow Fighter Rescues



North Dakota Department of Transportation
February 14, 2020 · 🌐

Sometimes the winter weather in North Dakota shuts down interstates and other highways across the state. This creates many challenges for NDDOT crews maintaining the roads, especially when there are emergencies and people's lives are on the line.

👍 45

10 Comments 30 Shares

Figure 8. Example of NDDOT Social Media post. Source:

https://www.facebook.com/88374649460/videos/186851549196785/?so=channel_tab&rv=all_videos_card

City of Dubuque, IA

The public works department at the city of Dubuque has worked with their public information office to create social media posts like “transformation Tuesdays” where they show a picture of the road before and after maintenance. The office also shares videos that show the day-to-day operations at public works to help open people’s eyes to what they do and what job opportunities are available in the department. Figure 9 provides an example of the City of Dubuque using social media to convey weather events.



www.cityofdubuque.org/snow



City of Dubuque Government

January 25 · 🌐

Snow removal efforts are currently underway to clear streets for safe travel. The City's Public Works Department provides real-time information regarding progress with snow plowing and ice control operations. Follow along using an online snow route progress map at www.cityofdubuque.org/snow. There you can also find winter reminders to make this time of year easier for everyone.

Figure 9. Example of social media post by the City of Dubuque to provide snowplow alert. Source:

https://www.facebook.com/149196398439486/videos/193901709152820/?so=channel_tab&rv=all_videos_card

https://www.facebook.com/149196398439486/videos/190511799450590/?so=channel_tab&rv=all_videos_card

Additional Resources

- AASHTO, Communications Guide for State Departments of Transportation
 - <https://fundingfinance.transportation.org/wp-content/uploads/sites/16/2018/11/Communications-Guide-for-State-DOTs-NCHRP-2017.pdf>

- AASHTO, State DOT Social Media Survey
 - https://communications.transportation.org/wp-content/uploads/sites/2/2018/10/2018-Social-Media-Survey_web.pdf

Successful Retention Strategies

Agencies invest time, money, and resources into each worker, and for this reason turnover is costly to an agency. Employee turnover can result in a loss of knowledge and workforce, which often becomes an issue during critical times (for example: winter storm events). Unfortunately, there is not a “one size fits all solution” to the retention challenges faced by the transportation industry. Instead, a variety of methods have been utilized including the creation of career pathways into the industry, employee training programs, mentorship programs, unique online and virtual reality training methods, and methods to promote the benefits of entering the transportation industry, which are presented in the following case studies.

Creating a Positive Workplace Culture



Positive Workplace Culture

Overview

An organization with a positive workplace culture is one that has created an environment with aligned values and behaviors from the top to the bottom. This positive culture can be cultivated through events that promote employee camaraderie, transparency among managers and employees, promoting a healthy work-life balance, and creating a forum where employees can express grievances or provide suggestions for workplace improvements and can expect management to listen and respond with actions when appropriate. A key to a positive workplace culture is creating an environment where management listens to feedback from their employees and takes direct action in order to address feedback and challenges.

Positive workplace culture is one that has created an environment with aligned values and behaviors from the top to the bottom.

Strategies to Consider:

- Participate in employee events to promote camaraderie in the workplace, such as potlucks.
- Conduct work-life surveys among employees and use the results of these surveys to improve workplace culture for employees.
- Provide flexible schedules during the off-peak seasons.

Case Studies

Ohio Department of Transportation

Ohio Department of Transportation (ODOT) conducts a quality of work-life survey among employees annually. Results of this survey provided numerous recommendations to improve employee experience including *providing additional support to help reduce workload, improve managerial oversight and training, and examining pay scales.*

St. Paul, MN

The city of St. Paul offers a flexible work environment to help retain employees. The agency is reasonable with leave and works to accommodate employees who do not want to work more than 40 hours a week. Work schedules are flexible around holidays, especially summer holidays and the department pauses operations around key holidays to support staff and morale. Contract changes are currently under consideration to incentivize on call pay.

Employee Benefits and Incentive Programs

Overview

Many agencies have offered their employees competitive benefit programs and other incentives. For some agencies, a starting lower base pay compared to the private sector appears to be a recruitment issue. There is a movement to better show the additional benefits and career growth potential to aid in employee recruitment and retention.

Strategies to Consider:

- Promoting employee benefit and incentive programs through an annual certificate or list of available employee benefits. This list can serve to show employees all benefits they are eligible for and the cost/financial value of each benefit.
- Provide employee incentives programs (gear, boot, phone, etc.).
- Provide tuition reimbursement for education and training related to an employee's job description.
- Consider contract language which would require an employee to remain within the agency for a specified amount of time if they obtain training paid for by the agency, or if they leave prior to this time frame, they need to pay back the cost of the training.

Case Studies

Ohio Department of Transportation

Emphasizing benefits and incentives offered to workers can improve employee retention. Some agencies like Ohio DOT have aimed to remind their employees of their available benefits by providing an annual certificate or list of benefits.

On top of Ohio DOT's competitive benefits package, employees are offered a boot credit, gear credit, and tool allotment (for mechanics). In addition, the union offers tuition reimbursement for any education or training related to their position description for all positions including management. The DOT has fully embraced workers utilizing this benefit and has had staff complete engineering degrees and become Professional Engineers through this benefits program.

Maine Department of Transportation

In addition to their competitive benefits package, Maine DOT offers their winter maintenance employees a *winter maintenance incentive* – which allows plow drivers to earn up to an additional \$100 a week. This incentive was implemented about two years ago to provide additional pay for each week a winter maintenance worker is available to plow. With a typical winter season running from early November to the beginning of April, this can be a substantial amount of money available to workers to earn. The workers receive this pay at the end of the winter season. If they leave the DOT before the end of the winter season, they receive no allowance, so this has created an incentive for workers to remain on through the entire winter seasons when it is critical for the DOT to keep skilled staff. To be eligible for the winter maintenance allowance, a worker must have all the required certificates, including a snow fighter certification acquired through Maine DOT and a CDL. They must also be available to plow that week (not out on worker compensation, vacation, etc.). Most of Maine DOT's workers are eligible for this allowance, with a few exceptions including new employees that have not been certified to operate a plow.

Maine DOT also offers in-house training and allows employees to use their equipment to train and test for a CDL. Maine DOT will pay for workers to take their CDL and the licensing requirements one time. If they fail to obtain the license, subsequent attempts become the employee's financial responsibility. This benefit alone can save employees several thousand dollars for the CDL training course and obtaining a new CDL endorsement.

Additional benefits and incentives offered to employees include a phone allowance; boot allowance (\$150/year); annual merit increase/cost of living increase; medical/dental/vision insurance; retirement; 12 paid holidays; continued education; and overtime pay. In addition, the DOT furnishes employees with necessary gear including jackets, gloves, and hardhats. A list of some of these benefits may be found in the Maine DOT Transportation Worker flyer provided in Figure 2.

Promotion and Leadership Programs



Overview

Many agencies have created career progression and leadership programs to help retain employees, reward and support career development, and create a consistent knowledge base and skill set across agencies. These career progression and leadership programs often go hand-in-hand with employee training programs, where an employee is usually required to complete a specific set of trainings prior to moving up the career progression ladder. Each step along the progression program results in a pay increase for the employee, incentivizing them to continue to learn and gain knowledge which is useful on the job. While creating a consistent set of steps for employees, these programs also allow employees to control their destiny within an organization, creating a system that rewards motivated employees.

Strategies to Consider

- Create an easy to understand set of requirements and standards for employee career progression.
- Fully document the benefits of career ladder programs.
- Keep program requirements consistent, only changing requirements as needed (for example: once per year), this reduces confusion surrounding employee expectations.
- Listen to employee feedback on program requirements.
- Start small, you can always expand later.

Case Studies

Idaho Transportation Department

Idaho Transportation Department (ITD) initiated a horizontal career paths (HCPs) program about six years ago. This program revised how employees receive pay raises, with a goal of retaining employees while ensuring that everyone has the same knowledge base and skill set. ITD has four HCP programs:

- Technical Transportation Operations (TTO) – includes snowplow operations, on the ground employees, etc. (Table 1, Figure 10)
- Foreman
- TTE (design and construction)

- Engineers

When the HCP program was first initiated, the largest challenge was getting everyone in the agency to go through the full program. Every employee was required to participate regardless of how long they had been in the agency. This step was required to ensure that there was consistency in training and standards across the agency. While initially met with resistance, employees are now supportive of the program because each step in the program has a pay increase associated with it.

ITD meets annually to consider if the HCPs program needs changes. These changes are made once per year in order to reduce confusion related to career path requirements.

Table 1. Technical Transportation Operations (TTO) Career Path

Job Title	Pay Scale	Requirements to Move to Next Step
TTO 1	\$16.50/hr	Completion of job training, classroom training, achievement of team goals/agency goals (example course list provided in Figure 3)
TTO 2	\$19.50/hr	Completion of job training, classroom training, achievement of team goals/agency goals
TTO 3	\$21.04/hr	



TTO Training Requirements, Step 1

Checklist of items to be completed by June 15

REQUIREMENTS			DATE
TRAINING	TYPE	HOURS	
<i>Workplace Training</i>			
Behavioral Styles in the Workplace	Instructor-led	4	
Constructive Culture	Instructor-led	4	
Respectful Workplace	Online	0.5	
<i>Software Systems</i>		HOURS	
Technology Boot Camp	Instructor-led	16	
Visalia PowerPoint Presentation	Online	0.5	
<i>Operator Training</i>			
9.02 Defensive Driving	Instructor-led	3.5	
5.86 Proper Plowing Techniques	Online	1.5	
10.28 General Flagger Training	Instructor-led	3.5	
10.07 Basic Traffic Control	Instructor-led	4	
5.51 Storm 101	Instructor-led	6	
<i>Industrial Safety</i>		HOURS	
9.11 First Aid/CPR/AED 2-Year	Instructor-led	4	
5.25 Hazardous Materials Module 1 'Employee Awareness'	Instructor-led	4	
Fall Factors	Online	0.5	
Ladder Safety	Online	0.5	
PPE: Your Last Layer of Protection	Online	0.5	
Powerlift	Online	0.5	
<i>SKILLS TESTING</i>		HOURS	
12.01 Loader Certification		20	
12.02 Dump Truck Certification		20	
12.03 Snowplow Certification		40	

LAST REVISION DATE: 6/18/2020. These requirements may be subject to change.

Figure 10. TTO Training Requirements for Step 1

Ohio Department of Transportation

Ohio DOT has a highway technician (HT) program. This program has multiple stages during which an employee must complete courses or obtain certifications to progress (Table 2). Upon completion of the HT program, employees are highly trained including American Concrete Institute (ACI) certified and come out of the program making roughly \$25 per hour.

The HT program has been beneficial in retaining good employees. The program allows an employee to “create their own destiny” at the organization. Employees with initiative can quickly work up to crew leadership positions.

Table 2. Highway Technician Career Path

Job Title	Pay Scale	Requirements to Move to Next Step
HT 1	\$18.05/hr	Successful completion of all level 1 training courses and certifications; valid CDL
HT 2		Successful completion of all level 1 and 2 training courses and certifications; 12 months of cross training in construction inspection
HT 3		Successful completion of all level 1, 2, and 3 training courses and certifications; 24 months of construction and/or testing experience
HT 4		Successful completion of all level 1, 2, 3, and 4 training courses and certifications; 24 months construction and/or testing experience
HT 5	\$25.00/hr	

Maine Department of Transportation

Maine DOT hires winter maintenance professionals within their transportation worker (TW) job series. This job classification has eight steps and three classifications (TW I to TW III), with a pay increase upon completion of each step (Table 3). To progress to the next step in the TW series, a worker must complete trainings and pass specific tests which are offered four times a year. This usually involves a written test with a proctor and an equipment test. Once the worker has passed the test, they are reclassified to the next step in the series. It typically takes an employee around 1.5 to 2 years to complete the TW I-III series. After completion of the TW series, employees have the option to move on to a transportation leader (TL) or transportation supervisor (TS) series. These job classifications are competitive and require a worker to apply when jobs are posted.

Table 3. Transportation Worker Career Path

Job Title	Pay Scale	Requirements to Move to Next Step
TW 1	\$16.80/hr	Employee must complete specific tests offered four times a year
TW 2		Employee must complete specific tests offered four times a year
TW 3	\$20.17/hr	Employee must apply as openings become available (competitive process)
Transportation Leader Series or Transportation Supervisor Series		

Employee Training Programs



Workforce Development

Overview

Employee training programs ensure that employees retain the knowledge and skills required to complete their jobs. Employee training programs often go hand-in-hand with promotion and leadership programs, where an employee is typically required to complete a number of trainings prior to moving up the career progression ladder.

Strategies to Consider

- Allow flexibility in training opportunities:
 - if the topic fits the job description, it is allowable
 - flexible scheduling
 - reduce non work time required to participate in training to a minimum.
- Consider use of in-house trainers that can travel to a district to train employees versus placing the travel burden upon employees to complete training.
- Utilize online training management systems and conduct trainings as the training management systems change over time to reduce confusion.
- Consider conducting jobsite discrimination and harassment training programs and teach employees how to intervene to address these issues on the jobsite.

Case Studies

Colorado Department of Transportation Partnership with Front Range Community College

Front Range Community College (FRCC) worked in collaboration with the Colorado Department of Transportation (CDOT), the Colorado American Public Works Association (APWA) Chapter, the Colorado Local Technical Assistance Program (LTAP), American Traffic Safety Services Association (ATSSA), National Highway Institute (NHI), American Association of State Highway and Transportation Officials (AASHTO), Colorado Asphalt Pavement Association (CAPA), and Transportation Curriculum Coordination Council (TC3) to create the first Associates of Applied Science (AAS) highway management degree program. This two-year, 60 credit-hour degree program prepares highway maintenance employees to pursue management positions. Students develop skills in project management, planning, supervision, communication, and team building.

Front Range Community College
Associates of Applied Science (AAS)
[highway management degree program](#)

All courses are offered online and not restricted to Colorado residents. FRCC allows students to complete a prior learning assessment (PLA) to receive credits for prior knowledge and skills obtained on the job and from prior college courses completed. For example, the program offers credits for students who obtained a CDL and from courses offered through Occupational Safety and Health Administration (OSHA), TC3, ATSSA, NHI, and other approved DOT trainings. When these prior learning credits are applied, the student can significantly reduce the cost and time to complete the program.

Colorado Department of Transportation

CDOT's Division of Maintenance and Operations Training Services implemented an in-house Training Academy in 1996. This two-week Training Academy is required for all new employees. Trainings cover topics ranging from traffic control to CPR/first aid. With COVID, this training moved to an online platform.

In addition to the Training Academy, CDOT offers four core training programs annually to their employees: new hires, winter operations, traffic control supervisor, and heavy equipment operator. *Topics for these annual trainings are based on feedback from maintenance district supervisors.* CDOT recently revised these trainings to include more hands-on experience after receiving feedback from employees. Since COVID, previously in-classroom trainings have been moved to an online platform. This resulted in large cost savings that CDOT has invested back into their training programs through the purchase of simulators and improved training materials. CDOT plans to continue to offer trainings through an online platform based on positive feedback from employees.

Idaho Transportation Department

As a part of the ITD HCP which require various training components, ITD recently hired two full-time equipment trainers. Hiring in-house (compared to outsourcing training) was found to be more cost effective to the department. The department pays for the trainers to travel to the districts instead of having employees travel to a central training location. Additional benefits of hiring in-house trainers include that *trainers can be deployed at any time* versus trying to contract and schedule individual

training programs. This has helped reduce travel needs and has allowed for more *flexible trainings tailored for each district depending on equipment available.*

Green Dot for Trades Bystander Intervention Program

Jobsite discrimination and harassment has a negative impact on retention of employees. The evaluation of workplace climate improvement programs for women and minorities in highway construction jobs led to the development of the [Green Dot for Trades Bystander Intervention Program](#). The Green Dot program is designed to reduce harassment on construction job sites and is representative of a growing number of programs aimed at improving workplace climate for women and minorities in highway construction and other trades jobs where they are significantly underrepresented. This training program provides workers with strategies to intervene to address harassment on the job and address jobsite culture issues. For more information on recruitment and retention of women and minorities in the workforce, see Underserved Communities Recruitment and Retention – Successful Examples.

Succession Programs & Mentoring

Overview

With an increasing number of employees eligible for or near retirement, there are concerns about losing highly knowledgeable employees. Transportation agencies have adopted succession planning in order to reduce the loss of knowledge in the agency and prepare the next generation of highway maintenance workers and managers. Succession programs can include both formal training and pathways for employees to move into leadership positions or mentorship programs which allow a senior employee (mentor) to pass along knowledge and experience to other employees (mentee).

Strategies to Consider

- Provide job training or shadowing programs to retain knowledge in the organization before employees retire.
- Start small; mentorship programs can start as small as informal discussions with more senior employees.

Case Studies

Ohio Department of Transportation

For Ohio DOT succession planning is a part of daily operations. This includes training motivated individuals to be prepared for leadership positions within the organization through two programs, the management apprenticeship program (MAP) and the becoming a supervisor someday (BOSS) trainings.

MAP allows a worker to shadow a manager and learn how to use software tools like Enterprise Information Management System (EIMS) and KRONOS (a capital management tool). When a manager goes on vacation or is otherwise out of the office, MAP participants can become acting managers for the week/weekend. A worker must request to participate in MAP.

BOSS training is offered to both employees and managers. This training teaches employees how to manage employees and interpersonal relationships.

In addition to these training opportunities, the DOT works with employees to share information on other available opportunities within the organization. This includes success stories of individuals who have utilized organization resources to complete degree programs and move up through the ranks within the organization.

North Dakota Department of Transportation

North Dakota DOT has offered a [Leadership Development Journey Program](#) for around two years now and is beginning to see success from the program. Everyone at the DOT is encouraged to participate in the program which currently has around 150 active participants (out of 1,000 total employees). The Leadership Development Journey Program allows employees to gain and improve upon job competencies through training opportunities, cross training opportunities, informational interviews, job shadowing, mentorship, workshops, and more. The state took notice of this program and helped develop a leadership program called Leadership Everywhere. This is an internally created program with courses created by the Office of Management and Budget Human Resource Management Systems team. The Leadership Everywhere program includes a manager path and an employee path. The program consists of 10 TED (Technology, Engineering, Design) courses. Upon completion, attendees receive a certificate. This program encourages leaders within the organization and has been popular with employees.

Oregon Department of Transportation/Bureau of Labor and Industries (ODOT/BOLI)

ODOT/BOLI has launched a number of programs to address retention of apprentices in the highway trades. One program includes an informal mentorship program which provides apprentices with a point of contact within the program, who serve as an informal mentor to help them purchase boots, explain the benefits of good gear, and converse on topics related to why persistence in the trades is important, etc. These informal mentorships proved helpful in assisting apprentices and became an effective part of their retention efforts.

Underserved Communities Recruitment and Retention – Successful Examples

When discussing innovative but practical ways for DOTs/DWPs to recruit and retain a highly proficient, productive, versatile, and committed roadway maintenance workforce, it is imperative for the focus to be inclusive of all candidates available to contribute to the workforce. A review of data related to the workforce associated with the construction industry and public works arenas provides an overview of the areas of under representation and likewise, the areas of the greatest opportunity for potential growth.

Tapping into the vast number of candidates found within underserved communities and groups, including minorities and women, offers options for solutions to workforce shortages, growing the pipeline, and meeting the current and future needs of the highway maintenance workforce. The American Public Works Association (APWA) indicates that *leadership roles within public works are less than 20% female occupied*. While women comprise 50% of the overall workforce, various sources report women occupy under 10% of the construction industry and of that less than 4% are front line or field

staff (US Bureau of Labor and Statics, National Association of Women In Construction, Occupational Health and Safety). A review of various reports, articles, and blogs (NABTU Diversity Toolkit, OSHA and BigRentz) addressing the issue of why the number of women occupying these roles remains low, identifies commonalities related to recruitment issues:

- Such opportunities are rarely promoted among the female population.
- Lack of presence of female role models in the industry is a deterrent for potential recruits.
- Lack of confidence among potential recruits (related to lack of presence of female role models) prevents pursuit of such roles.
- No audience directed marketing (wherein the face of the typical worker is not female).
- Gender bias of potential employers (“women can’t do this work”).



Figure 11. Info graphic showing some of the issues associated with retention of women in the construction industry workforce. BigRentz, blog, “Women in Construction: The State of the Industry 2021”

The same sources identifying recruitment issues cite common issues related to the lack of retention. As noted by one such source, BigRentz, in their blog, “Women in Construction: The State of the Industry 2021,” the following info graphic details issues associated with retention of women in the construction industry workforce (Figure 11):

As indicated in the above info graph (Figure 11), exclusion, limited advancement opportunities, and discrimination rank high among the factors impairing retention once candidates enter the workforce. Serving as the lone female or minority among a work group creates a natural degree of separation and isolation. Lack of female or minority role models within the environment further elevates such and diminishes confidence amongst the nontraditional workers who are fulfilling such roles. Limited advancement opportunities coupled with discrimination echo the sentiments from the 1980s popular movie “[9 to 5](#)” wherein the depicted office satire of these very elements come to life.

Through the realization of the vast workforce shortages, the potential of the untapped market of the underrepresented communities and the above noted recruitment and retention issues, much attention and effort has been drawn to spurring incentives, programs, and guidance toward solutions. These solutions are addressing workforce shortages while simultaneously addressing the many issues of why viable recruits are reluctant to apply or remain employed given the opportunities.

A movement underfoot by the trades associations within the US, spanning several years’ time, has served to grow a community of support among the nontraditional trades worker. Women across the country have been finding their voice amongst the male dominated industry, as illustrated in the North America’s Building Trades Unions (NABTU) Committee of Women in the Trades [Diversity Toolkit](#). The Toolkit includes direction for recruiting and retaining diverse apprentices as well as guidance from associations across the U.S. and Canada illustrating the broad brushstroke of engagement and outreach of their efforts. The association’s annual conference, [Tradeswomen Build Nations](#), attracts over 2,000 participants annually from all corners of the US.

Founded in 1961, the National Association of Minority Contractors, NAMC, is the oldest minority construction trade association in the United States. The association represents the interests of millions of skilled minority workers across the country. Through a network of local chapters and in collaboration with strategic and corporate partnerships, NAMC assists members with building capacity by providing access to opportunity, advocacy, and contractor development training. Data available from the association’s website illustrates the 2020 distribution of employees within the construction trade by minority (Figure 12).

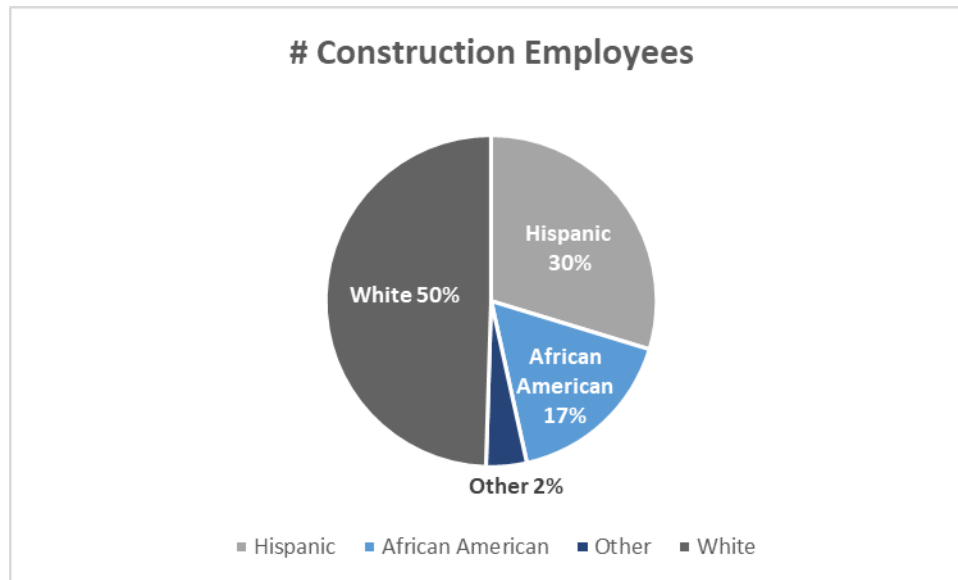


Figure 12. 2020 data provided by National Association of Minority Contractors (NAMC) showing the distribution of employees within the construction trade by minority.

The Conference of Minority Transportation Officials (COMTO) with a 50 year track record, is the leading national advocate for employment diversity, inclusion, and contracting opportunities in the multi-modal, multi-billion-dollar transportation industry. Their model for success includes a commitment to: *advocate, collaborate, educate, communicate, and innovate*. The organization’s mission is “to eliminate barriers and promote maximum participation for minority individuals, veterans, people with disabilities, and certified MWDBE businesses through leadership training, professional development, scholarship and internship funding, political advocacy, partnership building, and networking opportunities.”

Diversity within the workforce is explored in the 2020 National Governor’s Association report [“Registered Apprenticeship Reimagined: Lessons Learned from the American Apprenticeship Initiative.”](#) wherein the goals and outcomes of the U.S. Department of Labor’s \$175 million 5-year American Apprenticeship Initiative (AAI) grant, and related direction for moving forward, were reviewed and evaluated for the identification of lessons learned. Key take-aways of successful program characteristics include:

- Projects prioritized sustainability from inception and creating partnerships and resource ecosystems that help programs thrive in the long term.
- The use of partnerships to incorporate a variety of perspectives and resources that can support programmatic success.
- Establishing simplified processes to help employer partners engage in registered apprenticeship programs.
- Program structures that provided flexibility based on employer feedback, industry demand, and apprentice needs.

The public works community, likewise, realizing the issues associated with the workforce shortage, has long discussed and reviewed potential countermeasures. The Federal Highway Administration’s (FHWA)

recent publication from February 2021, [Identify Train Place: A Playbook to Build Tomorrow's Highway Construction Workforce](#), created a pilot program to identify, train, and place individuals in highway construction jobs and a playbook to assist agencies in the identification of successful strategies to address pressing highway workforce issues. Lessons learned from pilot participants, as well as an 8-step playbook, are offered to agencies seeking strategies aimed at overcoming workforce shortages. While not specifically aimed at underserved communities or underrepresented groups, the guidance offered remains applicable to recruitment and retention issues.

Agency DOTs offering internal programs that are women and minority recruitment and retention focused can be found across the country. Arizona DOTs has a program designed to assist economically disadvantage groups with launching careers in transportation construction, and recently launched their first construction academy training session just for women. While job placement is important to the program, their overall goal is to help recruits see construction as a career and not just a job. Minnesota DOT offers an On-the-Job Training Supportive Services Program as a measure to increase the number of qualified racial and ethnic minorities, women, and disadvantaged individuals in the highway heavy construction trades. Supported in part by federal funding, the program offers a variety of recruitment, training, placement, and retention strategies.

A 2017 New Jersey DOT and FHWA report explored various state agency on-the-job training programs in an effort to identify barriers related to recruitment and retention of minorities and women in the highway construction industry and specifically issues as related to employment within the union environment. The project identified 24 states offering on-the-job training programs emphasizing *the importance of sound partnerships as a critical element of program success*. Additionally, the research showed that in spite of the obstacles present in the typical union environment, the common denominator of *those who remained employed were a supportive family and/or consistency in mentorship*.

Women affiliated transportation organizations such as [Women in Transportation](#) (WTS) actively promote and support those seeking careers in untraditional roles. Their Mission found on their website states: "WTS attracts, sustains, connects, and advances women's careers to strengthen the transportation industry. Our vision is for equity and access for women in transportation. Our programs are leading the way to making that vision a reality." One such program is the WTS International [Diversity and Inclusion Initiative](#) supporting their vision for equity and access for women in transportation.

Through the initiatives, programs, and efforts exhausted to date, there are many lessons learned and take-aways providing a sound footprint in moving forward. While many efforts warrant recognition as groundbreaking and forward thinking, a few key considerations that agencies can embrace regarding the recruitment and retention of underserved communities include those outlined by the NABTU Committee of Women in the Trades [Diversity Toolkit](#):

Three Principles of Effective Recruitment

1. Repeated contact with their intended audience.
2. Clear next steps.

3. Build relationships for trust and word of mouth recruiting.

The toolkit further defines actions aimed for successful implementation of these principles and likewise offers suggested actions supporting effective retention of women and minorities:

1. Provide an orientation.
2. Create a welcoming job environment.
3. Provide opportunities for skills training.
4. Provide help for issues of concern.
5. Be fair in work types and amounts.
6. Foster relationship and mentoring.

Implementation methodologies are detailed providing guidance on how companies, agencies, and organizations can best move forward.

The U.S. Department of Labor provides direction in the 2018 [Feasibility Study and Evaluation of Non-Traditional Occupation Demonstrations](#) offering recommendations for effectively recruiting women and minorities into non-traditional occupations:

- Use a Multi-Pronged Approach – repetition and gender-themed recruitment
- Customize Recruitment Materials – for target population, training, and regional context
 - Materials designed to align with the recruitment theme addressing relevant needs and concerns of women
 - Consider the specific characteristics of the target population as perceptions vary by subgroup
 - Customize recruitment content to the specific industry
 - Consider region-specific factors that may influence the view of non-traditional occupation industry and the community's demand for such
- Include Testimonials Specific to the Programs Offered
- Incorporate Personal Follow-up
- Combine Recruitment Efforts with Other Strategies (to address various barriers)
- Implement Recruitment Best Practices

Embracing effective recruitment and retention strategies aimed at underserved communities offers enormous potential for meeting the needs associated with the workforce shortage. Inclusion of such strategies within the comprehensive guide of innovative but practical ways for DOTs/DWPs to recruit and retain a highly proficient, productive, versatile, and committed roadway maintenance workforce creates and supports options for successful outcomes.

Recruitment and Retention of the Next Generation

Work by Gallagher and Villwock-Witte (2016) sought to identify challenges and successes in recruiting and retaining millennials at state departments of transportation. A focus group made up of five state DOT human resource managers identified DOTs and the public transportation sector as a potentially attractive career option for young workers because of “job security, opportunities for personal and professional development, flexible schedules, and vacation and work expectations that allow for work–life balance.” Technology and social media usage, organizational mentorship capacity, and an unfavorable public image were acknowledged as shortcomings for the sector.

Mentorship programs and use of social media are key areas where DOTs can invest time and resources to reach the millennial generation.

Successful recruitment strategies identified to attract millennials included maintaining an online presence, using social media, and establishing partnerships with colleges to reach pre-career students both digitally and through face-to-face visits. The importance of internships targeting both high school and college students was also highlighted as an effective mechanism for attracting future applicants.

Providing formal training or informal guidance for staff to understand and mediate intergenerational issues was highly recommended. Managers should recognize the fact that millennials are a highly mobile workforce and generally will spend only 3 to 5 years at an agency. DOTs will therefore need to start planning for shorter employee tenures and develop creative strategies to obtain the best return on investment (e.g. creating an environment that encourages previous staff to return after a period of time spent outside the agency, bringing with them the additional skills they have acquired elsewhere).

The job mobility of millennials stems from the current labor economy, in which flatter, downsized organizations offer fewer opportunities for advancement than in the past. Agencies can mitigate this retention challenge by offering employees more opportunities for skills development and change (even if lateral), for example through job rotations or temporary external assignments.

A variety of successful retention strategies were identified, to include: providing millennials with robust professional development opportunities, such as job rotations or leadership programs; developing information-sharing mechanisms to enhance organizational engagement; involving young staff in improving agency policies or processes and providing them with rewarding and interesting work; and recognizing performance through monetary or other awards. Many of these strategies do not involve increased pay or formal promotion, but nevertheless serve to demonstrate organizational commitment and investment in the professional growth of promising young staff.

Some workplace attributes found at state DOTs that could hamper the retention of millennials included a lack of commitment by senior staff to mentor newcomers, as well as “unrealistic expectations from hiring managers on the experience and expertise required for vacancies, the sluggishness of DOTs to change, the red tape and delays at government agencies that young enthusiastic workers may find frustrating, and the strong hierarchical structure found at many DOTs.”

Capturing Information to Improve Your Program

Capturing information about staff, their needs, and job satisfaction can be as simple as asking and checking in with them periodically, to more formal meetings, surveys and focus groups. These programs work to improve retention of employees by applying feedback to improve programs and employee satisfaction. Additionally, programs like mentorships can provide an avenue for succession planning. The key to these programs is to be transparent with the benefits and how the information captured will be utilized, and to be prepared to address feedback from employees. This case study will highlight the spectrum of options used by DOTs, local agencies, and in the private sector to capture information to help improve their programs.

Strategies to Consider

- Start small – information can be captured through informal discussions with employees to an occasional check-in; a set list of questions can help to frame these conversations.
- Be willing to listen and respond to employee feedback in a transparent manner.
- Communicate the benefits of any information capturing programs – explaining how the information will be used or applied.
- When conducting exit interviews, consider using an HR representative or an online survey format to make the participant more comfortable with sharing open and honest feedback.

Mentoring Programs (formal and informal) and Check-ins with Staff



Overview

Mentoring programs connect less experienced employees (mentees) with an experienced employee (mentor), either one-on-one or in a group setting. Mentoring programs can improve employee satisfaction, help retain employees, and serve as a good way to succession plan or allow more senior staff to pass down their knowledge and experience to younger employees. Mentorships can also provide opportunities for younger staff to share experiences and technology knowledge with older staff.

Mentor programs can be formal, structured programs where a mentor is assigned a mentee and they complete specific trainings or other activities, or it can be more informal where a senior staff member is willing to participate in informal discussions or act as a sounding board for others.

Mentoring and informal check-ins with staff can help to catch employees when they are struggling or considering leaving the agency and work to strategize and address issues as they grow in the organization. The key to these programs is honestly and openly listening to feedback and responses from employees, and then actually following up on the answers and/or suggestions.

Mentoring programs can be used as both recruitment and retention tools. Many millennials are seeking jobs that provide professional development including apprenticeships, mentorship programs, and leadership training to grow their knowledge base and marketability.

Case Studies

Ohio Department of Transportation, "How I Want to be Coached and Mentored"

As a part of the County Management Training Program (CMTP) used by Ohio DOT, the following "How I want to be Coached & Mentored" is used to aid in communication and information sharing between mentors and mentees.

In one word, the one thing I most need to from a mentor is: _____

Explain: _____

Many things motivate me, but my personal three are:

(Example 1: Opportunities to take the lead)

(Example 2: Developing new skills)

- 1.
- 2.
- 3.

If you mentor me, you can realistically expect me to: _____

In turn, I expect my mentor to: _____

The following professional goals are important to me: _____

I have the following strengths to help me achieve my goals: _____

I could use improvement in the following areas to further help me achieve my goals: _____

Mentors can enhance my performance as well as my progress toward goal achievement in the following ways: _____

Lastly, I think you ought to know that: _____

Check-in Questions

Phil Sexton of WIT shares the following “Rounding Questions” with leaders to use to check in with their staff.

Rounding Questions:

- What is working well?
- What has been challenging to you?
- How can I / we be helpful?
- Do you have the resources and support you need?
- Is there anyone who has been particularly helpful to you?

The key is to ask the questions, honestly and openly listen to the responses, and then follow up on the answers and/or suggestions. By asking these simple questions, this allows management to check in with their employees and communicate to them that they are valued.

*Oregon Department of Transportation/Bureau of Labor and Industries (ODOT/BOLI),
Informal Mentorship for Apprenticeship Program*

The [Oregon Highway Construction Workforce Development](#) program has invested in programs and supportive services aimed at promoting recruitment and retention of a more diverse workforce within the highway construction trades. The program was jointly initiated by the Oregon Department of Transportation (ODOT) and Oregon Bureau of Labor and Industries (BOLI). This program provides non-financial support and informal mentoring to apprentices. The informal mentoring provides a point of contact within the program who meets with apprentices, helps them purchase boots, and engages in informal discussions ranging from the importance of persistence in trades, why having good gear is important, and more. Generally, this mentoring provided an opportunity to check in with employees and identify those that were considering leaving the trades and created potential solutions and addressed issues.

Surveys, Focus Groups, and Interviews

Overview

Periodic surveys, focus groups, or interviews can provide a more formal method for an agency to gather feedback from employees. These can be utilized to gather information on a range of topics, from general employee satisfaction, to feedback on employee trainings, to career path information.

Case Studies

Colorado DOT Use of Focus Groups to define Training Needs

CDOT used focus group interviews of regional directors, maintenance superintendents, deputy superintendents, and labor, trades, and crafts operations (LTC Ops) personnel to discuss headquarters driven training and regional needs, and gather information on job mapping and position-based skills, competencies, and setting performance metrics to determine training effectiveness. From these conversation style focus groups three key findings were identified:

1. Individual course content was developed to address the fundamentals of CDOT maintenance work tasks and job areas.
2. They were able to identify larger programs needing attention including short course development and curriculum design.
3. Other needs for Traffic Ops, Fleet, and Specialty trainings were identified or existing trainings that needed to be made more robust.

The outcome of this effort included defined curriculum and training needs, longer term planning for big picture CDOT needs, and specific recommendations to CDOT to support this effort over time. A second outcome of this was a developed Evaluation Plan that considered:

- Classroom Sessions (virtual and in-person) standards that employees will need to learn, understand, and take with them into the field.
- Hands-on/Experiential Session used to reinforce classroom sessions and apply in practice in the field.

- Performance Assessment (Endorsement or Certification) is not required but used to assess learner's competency on specific tasks. This may be a knowledge check or test, a live exercise in field, etc.

Ohio DOTs use of Employee Satisfaction Surveys

Ohio Department of Transportation (ODOT) conducts a quality of work-life survey among employees annually. Past survey responses have resulted in numerous recommendations to improve employee experience including providing additional support to help reduce workload, improving managerial oversight and training, and examining pay scales.

Idaho Transportation Department

Idaho Transportation Department (ITD) conducts an employee expectations survey. From this survey, ITD management has learned what job characteristics are most important to their employees including *flexible training timing, support staff, training topics of interest*, etc. Based on survey results, ITD has added additional trainings based on suggestions. ITD has also allowed trainings to be added to an employee's career path as long as they fit within their job description. ITD focuses on listening to what is working and what is not working. This has helped promote buy in from the top to the bottom and from the bottom up within the organization.

North Dakota Department of Transportation

The state of North Dakota has partnered with Gallup to conduct employee surveys. These surveys provide meaningful information that can be applied by state agencies. The DOT uses these surveys to hone-in on job engagement versus job satisfaction. Currently the DOT is working on how to tease out elements to improve employee satisfaction. Results of these surveys are shared with employees, including actions based on the findings. The goal is to show employees that the DOT is listening to employee feedback and is willing to invest time and money into its employees. For example, the DOT heard that employees wanted more opportunities for training, so it is currently working to schedule additional opportunities. With the COVID-19 pandemic, there were able to provide more online training opportunities which tend to allow for more flexibility for scheduling.

Exit Interviews

Overview

While common place in federal, state, and local agencies, exit interviews do not appear to be as widely used by private snow and ice control providers. Exit interviews are typically coordinated and conducted by Human Resources (HR) staff at an agency or by someone in an overseeing or management level position. By allowing HR at your agency to conduct exit interviews you provide an impartial person to ask questions and receive responses. Depending on the reason for their exit from the organization, exiting staff members may not feel comfortable speaking openly and honestly about why they are leaving to a direct manager. Another method to receive open and honest feedback is to offer exit interviews via an online survey.

Exit interviews can provide direct feedback to the organization on what works and what does not for employees. It is important to capture the information from the exit interviews, provide this information/feedback where it can be applied, and create change where actionable and feasible.

One concern raised by many organizations was that some folks will leave an organization and the supervisor(s) did not know anything was wrong or bothering them until they leave. If this is the case, establishing two-way lines of communication is needed – employee to supervisor and vice versa. What is going well? What can be improved? (see section above on Mentoring Programs (formal and informal) and Check-ins with Staff)

RECOMMENDATIONS

State and local transportation agencies continue to struggle to recruit and retain qualified roadway maintenance workers, an issue that has been challenging agencies for the last several decades. The likely causes may be:

- comparatively low starting wages to some public and private organizations,
- the increasing number of retirements among older employees,
- experienced employees leaving for jobs in the private sector or with other public sector employers,
- fewer young people entering the work force that are aware of or interested in roadway maintenance as a career,
- demographic shifts that reduce populations and thus also reduce the candidate pools in some areas,
- reduction of the traditional benefits provided by state and local governments that current and prospective employees may find attractive (read: pensions, job stability),
- and stringent background, physical, CDL, and substance abuse requirements that disqualify or dissuade a number of applicants.

In addition to the listed challenges, mandated snow operations, with unpredictable shifts, long hours, and restrictions on employees' personal lives during winter seasons, exacerbate the recruitment and retention issues public agencies face. These same challenges have also affected private contractors who provide supplemental snow and ice control in many jurisdictions or serve independently for private property owners. Other factors, that do not necessarily apply to all agencies, include obsolete or worn vehicles and equipment, inadequate facilities, poor management and supervisory policies and practices, and/or lack of growth and training opportunities.

Looking Forward - Recruitment and Retention of Highway Maintenance Workers

Agencies should expect the necessity to implement long-term recruitment and retention strategies. This sentiment was echoed by DOT HR departments, where recruitment and retention are a key part of their job and strive to find new and innovative ways to bring in new employees. These efforts require long term commitment and that an agency be willing to adapt with job market changes and workforce needs. The COVID-19 pandemic has allowed for the reevaluation of what workplaces and jobs can be. While this was a topic of discussion in recent years for the roadway maintenance workforce, the pandemic has accelerated the need to develop and implement changes.

Succession Planning

Government agencies need to change the culture within their organizations to recognize and support the generational changes. The post-World War II "Baby Boomer" generation is retiring in greater numbers; this cohort spent most of its working years with a mindset towards longevity and loyalty with an employer, and employment that focused on job security, good benefits, and a structured organization. The younger generations have a different perspective. Work-life balance is highly valued, as is a less rigid, top-down management environment. "Lifetime" employment and a pension (which rarely exist anymore) with one organization is not a decisive factor with younger workers. Nor is "paying

your dues,” waiting for a promotion based more on tenure than merit. Likewise, annual step raises based on merit and performance are highly valued, rather than the historically common raises based on service time.

As the baby boomer generation retires from the workforce, agencies face losing an astronomical amount of experience and knowledge. To help reduce this loss, agencies should look to create succession plans in order to improve knowledge transfer and to ensure that the next generation of leaders are prepared to enter into these positions. Mentorship programs can be extremely beneficial in providing a method for more senior staff to pass down their years of knowledge and skills to younger staff, while allowing for a process where newer employees can receive feedback in a more informal manner. Additionally, some agencies have implemented leadership training opportunities which allow motivated employees to gain experience and a better understanding of what is required of a manager. (For more information on this see Recruitment and Retention of the Next Generation)

Career Pipelines for the Next Generation

Strong, sustained effort is needed to create a “pipeline” of future workers beginning at the high-school level. There is growing awareness across most sectors that not everyone wants, should, or can go to college for a four-year degree. Instead, the construction, manufacturing, transportation, utilities, healthcare, and other industries have a high demand for well-trained and skilled employees. More and more community colleges, in partnership with unions and businesses, are providing certificates and Associate degree programs for prospective and new employees. Similarly, state and local roadway agencies, and organizations such as AASHTO, APWA, IMSA and ITE, need to collaborate with schools to inform students of viable and rewarding careers in the transportation sector, and to ensure that these programs continue to create a pipeline of potential employees with the necessary knowledge and skills needed. (For more information on this see Creating Supplemental Workforce with Existing Staff, Employee Training Programs, Sharing Your Story – Using Social Media for Recruitment and Public Engagement, Underserved Communities Recruitment and Retention – Successful Examples, Succession Programs & Mentoring, Recruitment and Retention of the Next Generation).

Employee Training Programs

Another element in the transformation of the roadway maintenance workforce is the introduction of new materials and methods that require better knowledge of proper handling and application as well as knowledge of relevant health, safety, and environmental regulations. Snow and ice control, roadside vegetation control, pavement resurfacing and repair, traffic markings, stormwater diversion and detention systems, and fleet maintenance activities use a wide range of materials, chemicals and specialized equipment; some of these functions require workers to have approved certifications such as for applying herbicides or entering confined spaces. When, where, what, and how to properly use various materials for snow and ice control has received more attention in the past several decades. For more information on this see Employee Training Programs.

Regular structured training on job safety, work zone traffic control, CDL, vehicles, equipment, snow and ice control best practices, pavement construction, maintenance and repair, traffic signs and markings, stormwater systems, roadside vegetation control, etc. should be supported by management and

sufficiently funded. Workplace diversity and anti-harassment training is equally important. Supervision and leadership training should be offered for those who have demonstrated interest and aptitude.

All of the above means that the maintenance workforce needs more and better training, and this should become a priority for all transportation organizations. Providing a robust training program shows that an agency is willing to invest in their employees. With the COVID-19 pandemic, opportunities for online training opportunities have increased flexibility in training offerings for employees. Offering online training opportunities (when feasible) can allow for flexibility in scheduling a training while reducing the burden for an employee to travel to training.

Career Progression and Career Ladders

Job descriptions and classifications need to be revised to reflect the changing duties, responsibilities, skills, and knowledge within the roadway maintenance field. Technology provides opportunity for more flexibility and versatility among this group of workers. Maintenance workers now are more engaged in using programs such as Maintenance Management tools, Work Order Management, and Asset Management systems on devices such as laptops, tablets, and smartphones.

As job descriptions and requirements are revised, so too must the classification structures. Agencies often group similar jobs within bands to aid in determining wage ranges. Higher hourly rates based on expanded duties, responsibilities, and skills will be a strong incentive for recruiting and retaining valued employees. (For more information on this see Employee Benefits and Incentive Programs, Promotion and Leadership Programs).

Job and classification revisions can be used to create or improve “ladders” for advancement based on acquiring skills, knowledge, certificates, and certifications (Associate and even bachelor’s degrees) in addition to demonstrated proficiency and productivity. Many agencies are unionized; and the cooperation and buy-in from the unions is essential. Outdated civil service rules may need to be updated. Bureaucratic resistance to such changes, including wage scales, can be hard to overcome, but by emphasizing the significant changes that have occurred to roadway maintenance positions a strong argument can be made. (For more information on this see Employee Benefits and Incentive Programs, Employee Training Programs, Promotion and Leadership Programs).

Utilizing Technology Innovations to Improve Job Marketing

Opportunities to target a different audience for recruitment are ripe in transportation. Newer maintenance vehicles, machines, and equipment have more “smart technology;” for example, snow-plow trucks, traffic marking applicators, paving and patching machines, graders, and backhoes have digital devices that provide more precise field performance that improve efficiency and productivity. Robotic roadside mowing machines, sweepers, storm sewer cleaning equipment and trenching machines, and even autonomous plow trucks, lane stripers, and work zone safety vehicles are in development and testing. The use of drones is common practice at many DOTs now. The upshot of this technological evolution within roadway maintenance is that the image of the workers / operators is changing, and the emerging image can be utilized to market to new audiences. Improving the perception of roadway maintenance work and organizational culture is key.

This change in perception will require marketing and sharing your experiences with the public. Interestingly, “word of mouth” continues to be the most common recruitment method linked to new hires. Agencies have an opportunity to better understand which recruitment tools are working and which are not, to better direct funds and effort through data collection and new hire interviews. Increasing opportunities for “word of mouth” could be done through outreach events at local fairs, career days, etc. For example, some agencies have utilized “touch a truck” events which allow the public to see the various technologies used by plow operators and to experience what it is like on a plow. Alternatively, many agencies have utilized social media to share information and stories about their maintenance programs. Posts that share a “day in the life” of a plow driver or explaining winter maintenance practices, for example, can provide the public with the insight and visibility for these careers. (For more information on this see *Sharing Your Story – Using Social Media for Recruitment and Public Engagement*).

Casting a Wider Net – Improving Diversity

The roadway maintenance workforces are predominantly white male. Agencies have an opportunity to recruit more women and a more diverse workforce. Other groups for targeted recruitment efforts include minorities, military veterans, “second-chance” candidates (those with minor, non-violent criminal records), and people who are seeking a career change. DOTs offering internal programs that target underserved populations can be found across the country. For example, Arizona DOT has a program designed to assist economically disadvantaged groups with launching careers in transportation construction and has recently launched a construction academy training session targeted toward women. Minnesota DOT offers On-The-Job Training Supportive Services Program which works to increase retention of qualified racial and ethnic minorities, women, and disadvantaged individuals in the highway heavy construction trades. Additionally, marketing, and social media outreach showing women, minorities, and other disadvantaged populations on-the-job can go a long way in showing that someone can fit into this career. (For more information on this see *Underserved Communities Recruitment and Retention – Successful Examples, Partnerships with Department of Corrections (DOC)*).

Learn from Your Employees – Using Employee Feedback to Improve Your Program

Improving communication among staff and managers through methods like job satisfaction surveys, exit interviews, and informal mentoring efforts can allow an agency to identify issues and create countermeasures in order to improve employee retention. Some agencies have implemented work-life balance or job satisfaction surveys in order to obtain confidential feedback from employees. Exit interviews are often used by state and local transportation agencies, conducted by HR and Managers. While valuable insights can be gained from them, effort could be re-directed to regular periodic discussions with employees, either by department management or human resources or both, to identify workplace issues before they become too burdensome and to receive feedback on program improvements to increase employee engagement and job satisfaction. Of course, there will always be complaints and gripes that are not practical or feasible to address, but there is also the opportunity to mitigate problems before they become untenable. (For more information on this see *Capturing Information to Improve Your Program, Creating a Positive Workplace Culture*).

Impact of the COVID-19 Pandemic

Beginning in March 2020, the COVID-19 pandemic exacerbated recruitment and retention challenges. For example, some veteran employees chose to take early retirement rather than risk exposure at work to the virus. Some agencies were forced to lay off or substantially reduce working hours for employees, causing many to enroll in unemployment assistance programs. For many, the federal stimulus and unemployment assistance funds received during the COVID-19 pandemic were more generous than their actual take-home wages, providing a disincentive for many to return to work once they were able to. In addition, these same federal supplemental unemployment and stimulus checks facilitated the decision of some roadway maintenance employees to stay off the job in order to care for dependents or who were concerned about infection or were high risk for severe complications from Covid-19.

The onset of the COVID-19 pandemic abruptly caused a devastating shutdown of much of the U.S. economy beginning in March 2020. The catastrophic disruptions affected nearly every sector of the U.S. economy, including governmental operations. Roadway maintenance workers were deemed “essential workers,” and many continued to work under stringent sanitation requirements. But only the most critical functions, such as snow and ice control, were carried out and other responsibilities were reduced, deferred, or eliminated.

Many state and local transportation agencies imposed measures limiting working hours and staff sizes through furloughs, layoffs, and permanent reductions-in-force (RIF). This was compounded by mandatory quarantines for employees who tested positive for COVID-19 or had close contact with a positive case, thus, severely reducing operational effectiveness, and placing a heavier burden on those able to work. Other employees chose to use paid and unpaid leave to stay at home to avoid possible infection. Some chose to leave because of the need to care for children as schools and child-care providers were virtual (based online) or closed. Many older employees decided to retire early and avoid the situation altogether.

More than a year later, the U.S. economy is predicted to rapidly expand with increasing tax revenues, alleviating the need for further layoffs or curtailments. While it is too soon to clearly determine the longer-lasting impact of the pandemic on the maintenance workforces, several *assumptions of near-term effects* can be made:

1. Some agencies that implemented layoffs may recall employees. However, agencies may reclassify some formerly full-time positions to part-time or temporary (a trend in the private sector as well) until the long-term outlook is more favorable. As in the aftermath of the Great Recession a decade ago, agencies may follow a similar pattern of permanently eliminating some vacant positions in roadway maintenance and outsource more work.
2. As Federal stimulus payments and supplemental unemployment funding cease in 2021, unemployment requirements will likely return to pre-pandemic practices which include active job searches. This could benefit transportation agencies and create an opportunity for transportation agencies to promote roadway maintenance careers as a viable entry-level job with great benefits to those that are looking to return to work.
3. Agencies will need to improve their recruiting and retention strategies as the competition from the private sector heats up. Case in point: there is a considerable shortage, approximately 25%

at this time, of CDL drivers in the trucking industry. Wages are expected to substantially increase in order to attract more drivers. A number of transportation agencies provide CDL training for new hires. Even before the pandemic, it was common for those with CDLs to leave for the private sector for higher paying jobs. Without change, government agencies will be less able to match those rates and will continue to lose roadway maintenance workers.

4. Passage of an infrastructure bill authorizing billions for road and bridge improvements will likely occur in 2021. If so, dispersal of funds to state and local agencies could begin later in the year. While it has not been determined how much will be used for new roadway construction, replacement, rehabilitation, and preventive maintenance, it is expected that funds will target major roadway repair. This will spur road construction and benefit local, state, and private transportation and maintenance companies.
5. Agencies can encourage employees to get the COVID-19 vaccine, but it is highly unlikely that they can require employees to get vaccinated. However, they may be able to require new candidates to get vaccinated prior to starting employment. What effect this would have on the potential employee pool is unknown.
6. Meanwhile, for the foreseeable future, agencies will continue with some sanitation protocols with some modifications; for example, lessen social distancing rules and no longer requiring masks, provided enough employees are vaccinated.

Overview

Moving forward, improving recruitment and retention in roadway maintenance will require long term commitment by agencies. As the workforce and job market continue to evolve, so should an agency's efforts to recruit and retain employees. Key recommended strategies include:

1. Changing the culture within organizations to recognize and support generational changes
2. Succession planning to reduce loss of knowledge as the older generation retires and create a pipeline for younger generations to step into leadership positions
3. Revise job descriptions and compensation to reflect desirable and livable wages
4. Revise classification structure
5. Expand and support training
6. Develop and employ recruitment strategies that include targeting specific groups
7. Develop marketing and outreach strategies to improve the image of operations work
8. Utilization of social media and other outreach tools to improve marketing of job opportunities
9. Employ efforts focused on growing the pipeline
10. Improve and expand communication within the organization as an effort to identify issues and create countermeasures

How to Get Started

Implementing new recruitment and retention strategies can be daunting, particularly if you do not know where to begin. This section provides tools and input to help make this process easier. The following bullets provide general guidance and lessons learned on how to evaluate and improve upon your program's efforts.

- Recruitment
 - Short Term

- Evaluate your current job marketing efforts
 - Are there additional avenues to increase visibility of job opportunities?
 - Social media, outreach events (career fairs, etc.)
 - Can you cast a wider net?
 - Market to more diverse populations or non-traditional groups
 - Have you considered marketing in new ways?
 - Instead of focusing on pay, focus on the benefits package (see the [Final Report Appendix](#) for DOT examples of What Benefits are Worth), training opportunities, new technologies, other opportunities within the career
 - Long Term
 - Create pipelines into highway maintenance careers, mentorship programs
- Retention
 - Short Term
 - Create avenues to receive employee feedback and then apply what you learn
 - job satisfaction surveys, mentoring, exit interviews
 - Support training opportunities
 - Support mentoring programs
 - formal or informal
 - Long Term
 - Revise job descriptions
 - Create career ladders related to job training, skills, and experience with corresponding step raises
 - Create training programs that can act as a pathway to leadership positions
 - Re-evaluate wage scales

Steps to implement change in organizations can be more easily be achieved when your agency:

- Collaborates – utilize folks within and outside of your agency
- Sets goals – short-term and longer-term goals
- Starts small – identify a small, easily achievable change
- Develops a plan – from the top to the bottom
- Makes it happen – implement your plan
- Honestly evaluates your success and lessons learned
- Applies what you have learned

Figure 13 outlines the themes for implementation listed above as steps that can be followed to support implementation of any new practice or technology (Fay and Clouser, 2020).



Figure 13: Steps to Implementation

References

1. Ellis, G. Veterans in Construction: Supporting our heroes in hardhats. Construction Productivity Blog. November 6, 2018. <https://blog.plangrid.com/2018/11/veterans-in-construction-supporting-our-heroes-in-hardhats-infographic/>
2. ADOT offers first Construction Academy training session just for women <https://azdot.gov/adot-news/adot-offers-first-construction-academy-training-session-just-women>
3. North America's Building Trades Unions and Committee of Women in the Trades Diversity Tool-kit <https://nabtu.org/wp-content/uploads/2017/06/Diversity-Toolkit-draft-6-15-17.pdf>
4. Feasibility Study and Evaluation of Non-Traditional Occupation Demonstrations, U.S. Department of Labor, 2018 https://wdr.doleta.gov/research/FullText_Documents/NTO-Study-Literature-Review.pdf
5. Identify Train Place: A Playbook to Build Tomorrow's Highway Construction Workforce, 2018, Federal Highway Administration https://www.fhwa.dot.gov/innovativeprograms/centers/workforce_dev/hcwp/pdfs/hcwp_playbook.pdf
6. How to Recruit and Retain Women in Construction, Occupational Health and Safety, 2020 <https://ohsonline.com/articles/2020/03/05/how-to-recruit-and-retain-women-in-construction.aspx>
7. Statistics of Women in Construction, National Association of Women in Construction <https://www.nawic.org/nawic/Statistics.asp>
8. Women in Construction, The State of the Industry 2021, BigRentz blog <https://www.bigrentz.com/blog/women-construction>
9. Registered Apprenticeship Reimagined: Lessons Learned from the American Apprenticeship Initiative, National Governors Association, 2020 <https://www.nga.org/center/publications/registered-apprenticeship-reimagined/>
10. US Bureau of Labor Statistics, <https://www.bls.gov/>
11. Minnesota DOT On-the-Job Training Supportive Service Program <https://www.dot.state.mn.us/civilrights/on-the-job-training-supportive-services.html>
12. Increasing Representation of Minorities, Females and Underrepresented of duals in Journey Level Jobs on Highway Construction Projects, Daniel, et al., New Jersey Institute of Technology, 2017 <https://www.nj.gov/transportation/business/research/reports/FHWA-NJ-2017-004.pdf>
13. Gallagher, S. and Villwock-Witte, N. 2016. Millennials in the Transportation Workforce. Transportation Research Record: Journal of the Transportation Research Board, No. 2552, Transportation Research Board, Washington, D.C., 2016, pp. 43–47.
14. Fay, L. and Clouser, K. 2020. Alternative Methods for Deicing Clear Roads and Minnesota DOT. <https://clearroads.org/project/18-05/>
15. National Association of Minority Contractor's website <https://namcnational.org/> retrieved June 2021.
16. The Conference of Minority Transportation Officials website <https://comtonational.org/> retrieved June 2021.