Investing in Engineering Talent

Final Report

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WisDOT ID no. 0092-24-16
July 31, 2025

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Technical Report Documentation Page

1. Report No. 0092-24-14	**2. Government Accession No.**	**3. Recipient's Catalog No.**
4. Title and Subtitle Investing in Engineering Talent		**5. Report Date** July 31, 2025
		6. Performing Organization Code
7. Author(s) Romila Singh, Xiao Qin, Yang Li, Andi Bill.		**8. Performing Organization Report No.** If applicable, enter any/all unique numbers assigned to the performing organization.
9. Performing Organization Name and Address University of Wisconsin-Milwaukee, Milwaukee, WI 53201 Department of Civil and Environmental Engineering, University of Wisconsin-Madison, Madison, WI 53706		**10. Work Unit No.**
		11. Contract or Grant No. Project ID 0092-24-16
12. Sponsoring Agency Name and Address Wisconsin Department of Transportation Research & Library Unit 4822 Madison Yards Way Room 911 Madison, WI 53705		**13. Type of Report and Period Covered** Final Report August 7, 2025 - July 31, 2025
		14. Sponsoring Agency Code

15. Supplementary Notes
If applicable, enter information not included elsewhere, such as translation of (or by), report supersedes, old edition number, alternate title (e.g. project name), or hypertext links to documents or related information.

16. Abstract

This research effort accomplished the objectives of this study by conducting a review of the transportation and engineering workforce literature, survey analysis of hiring, retention, and attitudinal data (for both current employees and graduating college seniors), evaluation of knowledge management, and transfer of knowledge practices. Based on an analysis of WisDOT's recruitment and talent management practices and approaches to the transfer of institutional knowledge, vulnerabilities have been identified, and recommendations proposed for creating effective workforce management and transfer and retention of knowledge strategies. Using survey results, focus groups, and analysis of industry best practices, recommendations have been developed to support informed decision-making to create (i) a strategic talent management strategy that addresses WisDOT's current workforce attraction and retention challenges and positions them as an attractive employer of choice for a multigenerational engineering and technically skilled workforce, and (ii) a sustainable plan for an effective transfer of specialized institutional knowledge for engineering and technical positions related to bridge improvement and maintenance programs.

17. Key Words Workforce Management, Knowledge Management, Multigenerational Employees, Hiring and Retention Challenges	**18. Distribution Statement** No restrictions. This document is available through the National Technical Information Service. 5285 Port Royal Road Springfield, VA 22161		
19. Security Classif. (of this report) Unclassified	**20. Security Classif. (of this page)** Unclassified	**21. No. of Pages** 163	**22. Price**

Form DOT F 1700.7 (8-72) Reproduction of completed page authorized

DISCLAIMER

This research was funded by the Wisconsin Department of Transportation under Project 0092-24-16. The contents of this report reflect the views of the authors who are responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official views of the Wisconsin Department of Transportation at the time of publication.

ACKNOWLEDGEMENTS

This study was conducted for the Wisconsin Department of Transportation (WisDOT). This project was led by the University of Wisconsin-Milwaukee (UWM) team comprised of Dr. Romila Singh (from the Lubar College of Business and UWM's Institute for Physical Infrastructure and Transportation – IPIT), Dr. Xiao Qin (from the College of Engineering and Applied Sciences and IPIT), and Dr. Yang Li (from the College of Engineering and Applied Sciences and IPIT), and from the University of Wisconsin-Madison, Andi Bill, PE (from the College of Engineering and Traffic Operations and Safety Laboratory – TOPS Lab). The WisDOT team was led by David Hunt and members of the Project Oversight Committee (POC): Dominique Bechle, Lucas Beckwith, Matthew Bronson, Joel Castro, Julie Fezatte, Michael Helmrick, Stephanie Jaecks, Jerry Mentzel, Kyle Priest, Sarah Sanfilippo, and Randy Sarver. This project is a product of a partnership between the UWM-IPIT, UW-Madison TOPS Lab, and WisDOT teams. The research team gratefully acknowledges the extensive efforts and time dedicated by David Hunt and the WisDOT POC team members, Shari Krueger, and Evan Johnson to facilitate the successful completion of this project. The team gratefully acknowledges the assistance provided by Wanying Liang and Nay Thaw Lay Moo at UWM-IPIT. The UW-Milwaukee, UW-Madison, and WisDOT teams gratefully acknowledge the generous leadership and support provided by Secretary's Office and DTSD Administrator's Office team. The research team also acknowledges and expresses their deep appreciation to the WisDOT employees who participated in the survey and focus groups discussions, and very generously contributed their time, effort, insights, and suggestions.

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EXECUTIVE SUMMARY

Engineering has been identified as a "*crucible occupation*" (Hovnanian, Kumar & Luby, 2022) which means that civil engineering employees will not only be in high demand, but they will also be less likely to be beholden to any one employer. It is imperative to understand how best to attract and engage this highly sought after technical talent while concurrently retaining existing experienced employees. The current project aimed to examine WisDOT's, specifically, the Division of Transportation System Development's (DTSD) twin challenges related to attraction and retention of technically skilled employees and transfer of specialized, technical knowledge for engineering and technical professionals. The research team from the Universities of Wisconsin Milwaukee and Madison carried out this project. The team undertook a literature review of transportation engineering workforce (Task 1), examined different types of institutional knowledge programs and practices related to highway and bridge improvement and maintenance programs, challenges in maintaining institutional knowledge, and the current knowledge transfer process, and benchmarked these practices against peer DOTs (Task 2). The team examined DTSD's attraction, retention, and engagement practices through the perspectives of their multigenerational technical staff at different career stages (Task 3). Lastly, the team examined the engineering faculty's assessment on student readiness as well as recent civil engineering students and graduates' expectations, preferences, and attitudes toward engineering careers. Internship and placement data from several civil engineering college programs were also analyzed (Task 4). Results of data analysis for various tasks and literature review were used to offer evidence-based best practices for WisDOT to create a sustainable and strategic talent and knowledge management strategy that successfully addressed all the challenges identified in the results (Tasks 5 and 6).

Insights from historical data, peer practices, surveys from 465 DTSD technical staff (over 50% response rate), 52 civil engineering students (from seven Midwest colleges), 71 faculty (from 12 Midwest universities), and 2 alumni, and focus group discussions with engineering students and 27 representative DTSD technical staff, point out that *DTSD is at a critical juncture and needs to take urgent action to change the way it recruits, onboards, and facilitates career success for engineering and technical roles.* Highlights of key findings from each task which guided the research team's recommendations are:

1.	**Increasingly high demand for engineers and technical talent** with a faster than average growth for all other occupations (Task 1)
2.	**Decreasing graduation rate of civil engineers and technically skilled applicants at national and regional levels** that serve as the applicant pool for WisDOT will pose a danger of leaving DTSD's critical civil engineering and other technical roles unfilled (Task 2)
3.	**Accelerating retirement wave among engineers and declining birthrate in Wisconsin** add to these challenges (Task 3)

4.	**Relatively low WisDOT salaries** compared to private sector and peer DOTs (e.g., MN, MI) could effectively price out WisDOT from hiring their preferred civil engineering candidates (Tasks 1, 2, 3)
5.	**Multigenerational workforce** values purpose-driven organizations, responsive leadership, good onboarding, coaching, professional development opportunities, and recognition systems (Tasks 1, 3, 5)
6.	**Workforce and staffing challenges** at DTSD due to **uncompetitive pay**, high turnover of key staff with expertise that's not been captured, and **inadequate succession planning** (Tasks 2, 3)
7.	**Inconsistent knowledge transfer** that includes heavy reliance on availability of experienced staff, **limited use of onboarding checklists and training materials**, and **documentation gaps** (Tasks 2, 3)
8.	**Reliance on informal knowledge sharing practices** (Task 2)
9.	**Organizational and cultural barriers** (e.g., reluctance to ask for help or ask questions, **lack of incentives or organizational support for knowledge capture**, working with managers who often lack technical expertise (Task 2)
10.	**49% of newly hired employees** with less than five years of DTSD tenure **envisioned finishing their careers at WisDOT. Reasons for choosing to work at WisDOT**: a **generous benefits package**, **work-life balance** even with less competitive salaries, and **reputation for learning the right way to do things.** They want **mentors**, **coaches**, and **'buddies' for new hires**. They also expressed a need for **improvement in application materials**, **interview process**, and **onboarding**. (Task 3)
11.	**For employees across different age groups and lengths of tenure at WisDOT** (Task 3): • **59% were most likely to leave current position and/or WisDOT in the next year**. Within this group, **59%** of employees with **11-15 years of tenure** and **35%** of employees with **20+ years of tenure expressed an intent to leave** in one year. Likewise, **30%** of employees between **30-34 years old** and **25%** between **50-54 years old expressed an intent to leave in the next one year**. • **Top three reasons** behind their intent to leave: (a) **not enough pay** (b) **lack of advancement and professional growth opportunities**, and (c) **high levels of work stress** that reflect their widespread concern about excessive workload from understaffing and unfilled vacancies. • Other additional significant areas of concern (a) **dissatisfaction with advancement opportunities for technical experts** and a **absence of technical promotion paths with competitive pay**, (b) **frustration with institutional knowledge losses**, **increased workload** due to staffing shortages, and unfilled positions, (c) need for **more support for career development** opportunities, funding for licenses, certifications, and conferences, (d) **frustration with lagging pay**, (e) need for **leadership training and mentors**hip, (f) need for **better outreach to engineering colleges/students** and **better messaging** to improve public's perception of WisDOT
12.	Civil engineering and technical students' expectations from their first jobs include: (Task 4): • **Competitive and fair salaries**, • **Career growth and advancement opportunities**, • Opportunities to work with **cutting edge technology, hands-on field experiences**, • Opportunities to work on **sustainable infrastructure**, smart cities, and reducing the environmental impact of transportation systems, • **Work-life balance**, **job stability**, and **security**. There was a significant overlap between the expectations and career goals of civil engineering students and those from technical colleges

Tasks 5 and 6: Results of data analysis for various tasks and literature reviews were used to offer **evidence-based recommendations** for WisDOT to create a sustainable and strategic talent and knowledge management strategy that successfully addresses all the identified challenges. These recommendations provide a strong foundation for the agency to build upon and position it for future success and include:

1.	**Investing in Knowledge Management** by: • creating a comprehensive and integrated **succession planning** and **knowledge management program** that is aligned with strategic workforce development plans, especially for mission critical roles. • **implementing rotational and cross-training programs** for high-risk duties and positions. • implementing other initiatives to build and strengthen knowledge management protocols and systems (e.g., **updating individual job descriptions** to include key event/data documentation in formalized systems; **updating performance goals** to make knowledge documentation and transfer efforts an observable and assessable part of everyone's tasks. • investing in the **creation of innovation councils** and **incentivizing knowledge transfer and capture** will also help strengthen knowledge management practices and overcome the barriers found in the study.
2.	**Increasing investment in employee engagement, retention, and development efforts** by: • creating **technical promotion tracks** and rewarding technical expertise and outstanding performance to attract and retain technically skilled professionals. • **implementing market-based pay adjustments** to prevent loss of experienced employees and attract new ones. • **Developing leadership skills** throughout the division especially a set leadership training curriculum for entry-level employees • greater funding and administrative **support for professional licensing, certifications, and developing subject matter expertise**. • Enhancing and **extending onboarding experience**, which should include a **"Buddy System,"** is imperative to engage and retain newly hired employees.
3.	**Increasing financial and administrative support for marketing and storytelling to attract new talent** by: • creating and/or supporting **WisDOT/DTSD Advocates and Ambassadors** who are at different career points as 'storytellers' • supporting stronger channels of **campus-specific outreach** to engineering faculty, career advisors, engineering specific student chapters. • investing in **earned media outreach and targeted advertising** on college campuses.
4.	**Strengthening operational support by investing in a team of workforce development professionals** to: • undertake **internal and external data analysis** related to internal skill gaps, employee retention (e.g., work stress, pay, career aspirations), external labor market and other macro trends • conducting **ongoing risk analysis** on costs of inaction related to knowledge losses, skill gaps, vacancies, employee burnout • maintaining **updated strategic workforce plans.**
5.	**Engaging** leadership at all levels to take strong and urgent actions by: investing in employees' **professional development** • creating **technical expert career tracks** with appropriate pay • **implementing market-based pay adjustments** • communicating short-term and long-term **plans for addressing institutional knowledge losses**, **understaffing**, and **overwork**. • strengthening its culture where mid-level and senior **employees feel valued**, **listened to**, **respected**, and **recognized**

The overriding message from DTSD focus group and survey results: ***DTSD employees are very committed to seeing themselves and WisDOT flourish***.

1. INTRODUCTION

The State Departments of Transportation have been facing heightened pressures to attract, engage, and retain multigenerational qualified engineers and technical staff due to a combination of factors, including:

- **High demand for engineers:** There are more open civil engineering jobs than graduating engineers, making competition fierce. For example, the Bureau of Labor Statistics (BLS, 2023) projects a 5% growth in civil engineering jobs between 2022-2032, *faster than the average for all other occupations*.
- **Decreasing graduation rate of civil engineers**: With over 21,000 civil engineering positions open annually (BLS, 2023), and a declining graduation rate of .082% of civil engineers (21,388 graduate annually, IPEDS, 2022), many public sector agencies are in danger of leaving their critical civil and other engineering roles unfilled due to the changing labor market and educational trends.
- **Budget constraints:** Public sector salaries often can't compete with private sector offers. (NCHRP, 2022). Adding to these challenges, recent compensation trends indicate that the lowest salary that employees would accept for a new job has hit record high levels (Federal Reserve Bank of New York's March SCE Labor Market Survey, March 2024) which could effectively price out DOTs from hiring their preferred civil engineering candidates.
- **Retirement wave:** Many experienced engineers are nearing retirement which would result in a significant loss of specialized know-how and institutional knowledge, disruptions to productivity, morale, and mission fulfillment. Current trends indicate that across all industries, there is an 80% increase in anticipated retirements compared to data from six months ago (St. Louis Federal Reserve Bank, Feb. 9, 2024). The retirement-eligible workforce statistics vary by each state DOT, and in combination with other factors, determine each agency's level of exposure to potential losses.
- **Varying Needs and Priorities of a Multigenerational Workforce:** According to the US Office of Personnel Management report (2017), employees in the 50-54 year age group comprise the largest group of transportation professionals and about 20% of the workforce; some reports note that over 50% of the DOT workers are over the age of 45 (Trans-SET, 2018). Millennials and Gen X-ers value flexible and challenging work and seek a work culture that provides work-life balance. Gen Z seeks more responsive HR systems such as better onboarding, coaching, professional development opportunities, frequent developmental feedback, and needs-based recognition systems. Both Millennials and Gen-Z will readily change employers when faced with limited mobility or unsatisfying work.

The current project aimed to examine WisDOT's twin challenges related to workforce management strategies and the retention and transfer of specialized, technical knowledge for engineering and technical professionals within the Division of Transportation System Development (DTSD). Specially, the research project examined WisDOT DTSD employees' perceptions of practices related to attraction (including hiring and onboarding), retention (including satisfaction with training, career development, pay, varied benefits, e.g., flex work and work-

life balance), attrition (including retiring and retirement-eligible employees), and knowledge management and transfer strategies to recommend an implementation plan based on data analysis and peer DOT's best practices. The research team provided a comprehensive review of the literature on the transportation engineering workforce, charted challenges confronting DTSD through internal and external stakeholders' perspectives and offered a sustainable and strategic talent and knowledge management strategy that would successfully address all these challenges if implemented. In addition, data collected and analyzed from DTSD employees and engineering college students was compared to publicly available literature in transportation and other industries to provide evidence-based best practices to WisDOT for their implementation.

1.1 Project Goals and Timeline

The main goals of this project were threefold: (a) to examine the challenges in hiring, retention, and engagement of multigenerational engineering and technical employees, (b) to document the challenges in knowledge transfer and management process created by attrition of senior engineering and technical professionals at DTSD, and, (c) provide evidence-based best practices and recommendations for implementation. To achieve these goals, the research team undertook the following tasks over the course of 2024-2025:

1. **Task 1 Literature Review (Aug. 2024-Sept. 2024)**: Reviewed the literature from transportation and other relevant sources to provide a comprehensive description of the status of the engineering workforce and its implications for WisDOT to attract and retain a multigenerational civil engineering and technical workforce. The literature review and other parts of this report highlight other DOT's efforts to attract, develop, and retain a qualified and technically skilled workforce.
2. **Task 2 Assessment of Knowledge Management for Bridge Improvement and Maintenance Programs (Oct. 2024-Jan. 2025)**: Analyzed the types of institutional knowledge programs and practices related to highway and bridge improvement and maintenance programs and benchmarked them against peer DOTs. Examined challenges in maintaining institutional knowledge and the current knowledge transfer process and offered best practices to address these challenges.
3. **Task 3 Engineering Workforce Attitudes Assessment (Oct. 2024-Jan. 2025)**: Examined current civil engineering students and graduates' expectations, preferences, and attitudes and WisDOT's multigenerational workforce related to key features of a satisfying work environment such as career advancement, work-life balance, pay, benefits, flexible work arrangements, loan repayments, etc. Analysis of DTSD employees included a comparison across generational cohorts and employees with varying tenures. Talent attraction and retention strategies were recommended based on these cumulative results to strengthen WisDOT's position as an attractive employer of choice.
4. **Task 4 Hiring Challenges Using Civil Engineering Students, Faculty, and Alumni Perspectives (Feb. 2025-April 2025)**: Analyzed hiring challenges experienced for civil engineering, transportation

specialist, and other roles closely related to the delivery of WisDOT transportation projects. The analysis included information on the enrollment, graduation, internships, and career placement trends in key engineering programs related to these roles and its implications for positioning WisDOT as an employer of choice. Civil engineering faculty, students, and alumni were surveyed to capture their aspirations and preparation for post-graduation engineering work.

5. **Task 5 Comparative Analysis of Internal and External Stakeholder Perspectives (Feb. – April 2025)**: Results of analysis of DTSD workforce attitudes, knowledge management strategies, and external stakeholder analysis (results from students, faculty, and alumni) were compared with literature trends. This comparative analysis was used to offer recommendations on developing a comprehensive and sustainable talent management strategy that included low-cost and no-cost solutions to attract and retain younger and more diverse employees who will value working for WisDOT for years.
6. **Task 6 Recommendations for Implementation Plan (May 2025)**: Using survey results, interview insights, and industry best practices, recommendations and strategic guidance were also offered for an implementation plan to strengthen institutional knowledge transfer and best practices on workforce management to attract, train, retain, and engage a multigenerational and diverse workforce essential for efficiently fulfilling WisDOT's mission now and into the future.

The research team regularly met with the Project Oversight Committee (POC) members to solicit their input, feedback, and guidance for every task. The research team brought together feedback and insight from the survey groups, focus groups and project oversight committee comprised of engineering and technical staff representing different experiences, job roles, and geographic locations in DTSD.

2. (TASK 1): SIGNIFICANT THEMES FROM THE LITERATURE REVIEW

As noted earlier, the State Departments of Transportation are facing a severe talent acquisition and retention squeeze created by a confluence of three interconnected forces: (i) a volatile labor market and educational trends that have posed hiring challenges of engineering and technical professionals, (ii) shifting workforce attitudes from a multigenerational workforce that values different work and organizational attributes have created retention and engagement challenges, (iii) and increasing proportion of retiring and retirement-eligible employees that threaten losses in specialized skills, knowledge, experiences, and operational disruptions. No State DOT is immune from experiencing these daunting and disruptive challenges even if there are differences in the severity of their impact. The success of WisDOT's response lies in understanding and analyzing the nature of these challenges to craft a data-driven and evidence-based response that yields maximum payoff (with the least costs and pain) in attracting, retaining, and engaging their engineering and technical workforce and re-energizing their knowledge management and transfer systems and practices. The following paragraphs describe some of the strong headwinds that the state DOTs face in recruiting, managing, and retaining their engineering and technical talent. A complete and comprehensive literature review with supporting charts and statistics is provided in Appendix A.

2.1 Employment Trends in Transportation Related Industries

Labor market trends from the US Department of Transportation, Bureau of Transportation Statistics (2024) over the past five-year period (2019-2023) indicate that a steady 6.1%-6.2% of the workers are employed in transportation related industries which includes state DOTs and the federal DOT. These statistics highlight some of the supply side challenges facing state DOTs[1].

2.2 Increasing Demand for Engineers: Impact of the Infrastructure Investment and Jobs Act (IIJA)

According to Hovnanian, Kumar and Luby (2022), the demand for engineering jobs and talent has surged due to the Bipartisan Infrastructure Law (BIL) also known as the Infrastructure Investment and Jobs Act (IIJA). Several economists have projected that the IIJA infrastructure projects will create 883,600 jobs by 2030 and per capita income will be 10.5% larger than if no infrastructure projects were completed (S&P Global, 2021). The jobs created as a result of the IIJA are projected to pose sector-wide challenges. An occupation-level analysis undertaken by Hovnanian and colleagues (2022) indicates that certain occupations are going to feel the disproportionate amount of strain as a result of a combination of an influx of IIJA investment and corresponding shortage of qualified labor. They called them the "crucible" occupations and noted that they are influenced by

two core drivers: (1) the "momentum" rate at which jobs were expected to grow (or decline) without the IIJA and (2) what is now expected to happen as a result of the passage of the IIJA. Based on these two criteria, **civil engineering has been identified as a "*crucible occupation*"** within the engineering and technical services domain. The ramifications of identifying civil engineering as a "*crucible occupation*" entails that civil engineering employees will not only be in high demand, but they will also be less likely to be beholden to any one employer because their valuable skills will make them highly sought after. In addition, with the projected gap between demand for engineering and technical services talent and their supply, it is expected that unfilled positions "*can bottleneck project- and industry-wide growth because of the upstream gating role they play in individual projects. In addition, due to the education and licensing requirements for this segment (for example, civil engineers), the lead time required to address shortages in these sectors is particularly long*" (Hovnanian et al., 2022, p. 6).

2.3 Decreasing Supply of Engineering Graduates: Educational Pipeline

The promise of new jobs and new infrastructure projects can be exciting for any community and organization that is directly impacted by the infusion of new funding. This promise gets tempered in the context of existing workforce and educational pipeline challenges. As noted in the summary report published by the National Governors Association (NGA) and the American Society of Civil Engineers (ASCE) "*however, these increased investment levels amid accelerating retirement trends and poor attrition rates in the infrastructure space are compounding existing gaps in the engineering and infrastructure workforce and threaten the overall impact of this generational opportunity*" (2023, p.1)

Data from the BLS shows that the increasing number of job openings and projected growth has not kept pace with the number of skilled employees available to fill these jobs. In 2023, civil engineering was the fifth most popular undergrad engineering degree awarded. Although, the number of graduates with civil engineering degrees had increased by 13.6% in the period between 2015-2016 to 2020-21, there has been a 0.85% decline in the number of undergraduate degrees from 2021 to 2023 which equated to 2,373 fewer civil engineering students that graduated with a bachelor's degree in 2023 (Source: IPEDS and ASEE). This shortage is worrisome especially in light of the ramped up recruiting efforts by many agencies for their newly funded infrastructure projects.

2.4 Decreased Supply of Engineers: Accelerating Retirements, Lower Birthrates

Even though there is an increasing number of students pursuing different types of engineering degrees in the US, their growth cannot keep pace with the demand for them. What makes the labor market tighter is that some estimate that nearly 30% of the science and engineering graduates in the labor force are over 50 years old and are expected to retire in the next 15 years (Atherton & Fasano, Engineering Management Institute, 2023).

Estimates from economists at the Federal Reserve Bank of St. Louis predicted the “great retirement” wave with 2.7 million more retirees than their original model predicted (Bloomberg, Feb. 9, 2024) and it is up 80% from where it was six months ago (SHRM, Feb. 25, 2024).

At the same time, there are fewer numbers of Gen Z and other new entrants to the workforce to compensate for the retiring workers. All this will exacerbate the attraction and retention hurdles facing many employers, including the state DOTs. According to the Brookings Institute Report (2023), “from 2021 to 2031, projections show 1.7 million infrastructure workers (12.2%) leaving their jobs each year on average, leading to huge replacement needs. Moreover, these holes may be even bigger to fill than any projected job growth from new federal infrastructure funding, which estimate up to 1.5 million new jobs created annually over the new two decades.” In Wisconsin, the workforce challenges may become exacerbated as it experiences steadily declining birthrates since 1990 (Wisconsin Department of Health Services, March 5, 2025).

2.5 Salary Comparison between WisDOT and other DOTs

AASHTO regularly conducts salary surveys for key roles across the state DOTs. Based on the data provided to the research team (AASHTO Salary Survey, 2024), the charts provided in Appendix A reveal that WisDOT’s salary in select engineering and technical services roles is lower compared with DOTs nationwide as well as with two of its immediate midwestern peers – Minnesota and Michigan DOTs.

2.6 Takeaways: Analysis of Supply and Demand of Engineering Talent

The labor market for civil engineering professionals remains highly competitive and strained. There continues to be an intense demand for civil engineers which the educational systems have not been able to fulfill. It is likely the educational pipeline struggles will continue with not enough US-born civil engineering graduates to fill new or replacement roles and declining birthrates in Wisconsin further constricting the pipeline. Talent management and retention strategies will also need to be revised in light of the strain imposed by the higher-than-expected retirement wave and increased number of job openings, and not enough new and seasoned civil engineering graduates to take their place. There is a great urgency to act quickly because of the critical role that civil engineers play in design, build, and maintenance projects and the potential bottle-neck effects that will ensue if those roles see employee churn or they go unfilled for a significant period of time. As if all these headwinds were not difficult enough to deal with, WisDOT also faces lower salaries compared to its midwestern peers.

2.7 Retention Challenges: Engineering and Technical Employees Work Engagement

A survey of 453 engineers and architects conducted by Atherton and Fasano (2023) captured some of the significant retention challenges confronting industry professionals, including the reasons why the “great resignation” trend is still prevalent among technically skilled employees:

- about 55% of the respondents stated they would consider leaving their current employer for a new employer which is a 6% decrease from their 2022 survey results. Top reasons include inadequate career advancement opportunities, lack of competitive pay, high levels of work stress, and not feeling valued.

2.8 Retention Challenges: Generational Similarities and Differences Toward Workplace Benefits and the Work Environment

According to Society for Human Resource Management (Aug. 8, 2024), there's been a 23% increase in the last two years in the types of benefits being offered to employees. The number of offerings has increased from 175 in 2022 to 216 in 2024. Organizations are competing with one another to go beyond the standard set of benefits that include healthcare (including mental healthcare), retirement, and time off (paid/unpaid). Some of the generation spanning *voluntary benefits* linked to multigenerational employee well-being and workplace satisfaction include supplemental health benefits, legal plans and services, identity theft and cybersecurity protection, permanent life and long-term care plan, pet insurance, paid parental leave and generous paid leave benefits in general.

2.9 Retention Challenges: Work, Work Environment, and Workplace through the Gen-Z and Millennial Perspective

A recent survey by Gallup (2024) revealed that only 35% of Gen Z employees are engaged at work (a decline from 40% from the previous year), indicating a significant disconnect between their expectations and their actual work experiences. Gallup (2024) reported that "Millennials and Gen Z employees have seen the greatest decline in *feeling cared about by someone at work, having opportunities to learn and grow, feeling connected to the mission of the organization, having progress discussions with managers, being given opportunities to develop, and feeling that their opinions count.* These items have all *dropped by five to nine points for younger workers* since March 2020." [emphasis added]

Further, Deloitte's 2024 annual survey of 22,800 Gen-Z and Millennials employees across 44 countries revealed interesting findings that have implications for all employers. 49% of Gen Z respondents were unsatisfied with their work, citing factors such as lack of career progression, inadequate compensation, and poor work/life balance. Other significant findings include their valuing purpose driven work, environmental sustainability, and employer's wellbeing culture and benefits for mental health. The findings from this survey also highlight the importance of workplace experiences in terms of meaningful work, work/life balance, learning and development, are all something that all employees value and appreciate and are not just unique to Gen-Zs and millennials. What might be different for these two generations of employees is that they may be more willing to act on their values and preferences in terms of selecting specific employers or leaving them when they are not in alignment.

Many of these workplace attributes are already present at WisDOT, and as a purpose-driven organization, it is primed to enhance these features even more successfully to attract and retain Gen Z employees.

2.10 Recruitment and Retention Challenges: Changing Nature of Work, Workplace, and Workforce Needs of the Engineering Workforce

Within the State DOTs, the engineering and the design, build, and maintenance workforce occupies a special place and has often been the focus of many workforce research efforts at the local, regional, and national levels. According to the NCHRP 1008 Research Report (2022), "Individuals in the design, construction, and maintenance workforce are trusted to ensure that infrastructure in the United States is safe, efficient, and effective. However, many DOTs around the country are finding it difficult to maintain a strong and fully capable workforce in these three occupational areas given the number of industry changes that are taking place and will continue to develop over the next decade." (p. 1). Based on surveys of DOT employees across the country asking them about which jobs they considered were critical for continuity of operations and alignment with the state DOTs mission and values, ***five priority jobs*** were identified for design, construction, and maintenance areas.

2.11 Current and Emerging Challenges Facing State DOTs and Design, Construction, and Maintenance Units:

State DOT leaders need to focus on these priority jobs in their workforce planning and development efforts. The 2022 NCHRP report along with Hovnanian and colleagues labeling civil engineering a "crucible occupation" implies a greater than usual urgency to tailor recruitment and retention messages to address workforce needs in these areas. The NCHRP research report identified several widespread and *currently* pressing challenges facing DOTs and the design, build, maintenance units. These include economic and technological factors, workplace practices, tight budgets, staff attrition, and multigenerational workforce expectations that influence knowledge management, project efficiency, and delivery.

2.12 Response to Engineering Talent Attraction and Retention Challenges: Suggested Guidelines

After the passage of the IIJA, the American Society of Civil Engineers (ASCE) and the National Governors Association (NGA) organized a roundtable discussion with public and private sector leaders (including state DOTs) to discuss how best to respond to the challenges and opportunities stemming from the influx of funding. The summary report (2023) produced by their team highlighted several short-term and long-term strategies for responding to civil engineering workforce challenges including reducing time to hire and barriers to entry, evaluating compensation and career advancement plans to create greater flexibility, improving mentorship, training, and professional development opportunities, among others.

2.13 NCHRP (2022) Guidelines for a Comprehensive Talent Management Strategy for Design, Build, and Maintenance Units

The NCHRP (2022) research team compiled a list of strategies and guidelines for DOT leaders to consider as they create/update plans to address current and anticipated challenges described previously. The team recommended investing efforts and money into three broad categories focused on attracting (e.g., partnering with educational institutions, using social media for better outreach and engagement with applicants), and developing a qualified workforce (e.g., creating a range of upskilling, reskilling, and leadership development programs, creating technical advancement paths). They also provided templates, checklists, tracking metrics, and action and implementation plans for DOT leaders to use as they customize these resources to craft into their strategic workforce planning and development documents.

Concluding Comments:

The overall summary provided in this portion of the report is meant to be a reminder that WisDOT is not alone or unique in facing many of the staffing and knowledge management challenges that are part of this research team's charge. Detailed literature review is in Appendix A. The same headwinds confront all DOTs, the intensity and prevalence are just a matter of degree. Likewise, the recommendations and guidance offered by many of the industry experts, researchers, and DOT leaders are relevant and applicable to WisDOT. For any meaningful changes to result from the application of these recommendations, the agency's leadership needs to be committed to making these changes and invest resources to comprehensive workforce development. The employees and the workplace culture need to be primed and engaged to contribute to this process for any of the initiatives to succeed. Investing in talent development, growth, and engagement, along with quality-of-work-life issues and technology improvements can have a huge payoff for WisDOT's short-term and long-term sustainability and success.

3. (TASK 2): INSTITUTIONAL KNOWLEDGE ASSESSMENT: COMPARISON BETWEEN WisDOT AND PEER DOTs

Institutional knowledge is a vital asset for transportation agencies, often preserved in formal documents such as manuals, policies, and guides. However, much of the nuanced understanding behind these materials resides with long-term employees and can be lost due to retirements, staff turnover, or internal mobility. Recognizing this risk, the research team worked with WisDOT conducted a comprehensive review of its knowledge management (KM) practices, highlighting both a strong existing foundation and a pressing need for improvement. Building on this foundation, this memorandum aims to identify critical types of institutional knowledge related to highway and bridge programs, assess the challenges in maintaining and transferring this knowledge, and explore best practices from WisDOT and other state DOTs that have successfully implemented KM systems.

3.1. Engineering Workforce Study Focus Group

The research team invited 30 WisDOT DTSD employees to participate in a focus group on Tuesday, January 28, 2025. The employees spanned across experience level and jurisdictional boundaries. The focus group meeting was a general introduction and then everyone separated into 1 of 3 smaller breakouts to discuss the questions listed in Appendix B.

3.1.1 Key Discussion Themes

3.1.1.1 Workforce and Staffing Challenges

Participants emphasized the ongoing difficulties in recruiting and retaining skilled professionals, particularly in technical roles. Contributing factors include: 1) Limited candidate pools; 2) Uncompetitive public sector compensation; 3) High turnover leading to the erosion of institutional knowledge; and 4) Inadequate succession planning due to over-reliance on individuals with unique expertise.

3.1.1.2 Knowledge Transfer and Documentation Gaps

Several examples illustrated the negative impact of poor documentation: 1) Long-term use of undocumented models (e.g., hydraulics models), making them hard to understand or validate; and 2) Onboarding processes heavily reliant on availability of experienced staff, leading to inconsistent training.

3.1.1.3 Informal Knowledge Sharing Practices

Much of the knowledge transfer occurs informally, including: 1) Word-of-mouth communication and peer-to-peer mentoring; 2) Communities of practice such as committees and in-person conferences; and 3) Barriers include cultural resistance to asking questions or seeking help.

3.1.1.4 Current Tools and Documentation Approaches

While tools like Box and shared drives are used, their implementation lacks consistency. Other practices mentioned: 1) Limited use of onboarding checklists and training materials; and 2) Variation in state-level initiatives, with some states having formal knowledge management programs and others lacking structure.

3.1.1.5 Organizational and Cultural Barriers

The discussion revealed multiple barriers to effective knowledge management: 1) Impending retirements of key staff with undocumented expertise; 2) Lack of incentives or organizational support for knowledge capture; and 3) Managers often lack technical expertise, limiting their ability to support workforce development.

3.1.2 Proposed Solutions and Best Practices

Participants shared several strategies to address identified challenges: 1) **Alpha/Beta Roles:** Assign overlapping responsibilities to outgoing and incoming staff to facilitate smooth transitions; 2) **Incentivize Knowledge Sharing:** Encourage experienced staff to document practices and mentor successors; 3) **Cross-Training Programs:** Establish structured onboarding materials, checklists, and training modules; 4) **Standardization:** Promote the use of standardized documentation practices and centralized storage; and 5) **Leadership Engagement:** Ensure managerial support for knowledge management as part of broader organizational goals.

3.1.3 Summary

The meeting underscored the critical importance of improving knowledge management and workforce development. Participants agreed that a coordinated approach involving cultural change, leadership support, and standardized practices is essential for building resilient and efficient public sector agencies.

3.2 Best Practices from Other States

Several state departments of transportation (DOTs)—including the Federal Highway Administration (FHWA), Maryland State Highway Administration (SHA), Texas DOT, and Virginia DOT—have implemented KM systems for over two decades. Their experiences offer a rich foundation of best practices. A more recent case, the Michigan DOT (MDOT), illustrates how KM can support technical functions, such as bridge design, by improving access to updated policies and design standards.

3.2.1 Centralized Knowledge Repositories

A centralized digital platform serves as the foundation of effective KM systems. Agencies like MDOT and Texas DOT maintain searchable, organized repositories where policies, design standards, research reports, and other institutional knowledge are regularly updated and version-controlled. Key features include: 1) Version control and archiving; 2) Metadata tagging for enhanced searchability; and 3) Integration with existing intranet platforms.

3.2.2 Governance and Standardization

Agencies with long-standing KM systems implement formal governance structures to ensure consistency, quality control, and sustainability. This includes assigning roles for content creation, review, and maintenance, as well as using standardized templates and workflows. Key practices include: 1) KM policies and procedural manuals; 2) Appointed knowledge stewards or coordinators; and 3) Consistent use of document templates.

3.2.3 Integration into Daily Workflows

KM systems are most effective when embedded into routine project and operational workflows. The FHWA and Virginia DOT have successfully linked KM tools with planning and policy activities, making knowledge resources an organic part of daily decision-making. Examples: 1) Embedded KM access in project management software; and 2) Automatic prompts to log lessons learned during project close-out

3.2.4 Training and Culture Building

Training and organizational culture play critical roles in encouraging staff to contribute to and utilize KM systems. Maryland SHA, for example, promotes KM through continuous learning opportunities, workshops, and knowledge-sharing events. Culture-enhancing methods include: 1) Regular KM-focused staff training; 2) Leadership endorsement of KM use; 3) Recognition programs for knowledge contributors.

3.2.5 Capture of Tacit Knowledge

Retaining tacit knowledge—unwritten insights held by experienced staff—is vital, especially amid retirements and turnover. Agencies like Texas DOT and FHWA conduct structured interviews, mentorship programs, and team debriefs to preserve this valuable knowledge. Tacit knowledge capture tools include: 1) Exit interviews with seasoned staff; 2) Storytelling sessions and case studies; and 3) Mentorship and succession planning programs

3.2.6 User-Friendly Search and AI Integration

Modern KM systems increasingly utilize artificial intelligence to enhance information retrieval. MDOT's KM platform includes AI-powered search features that allow users to quickly locate bridge design updates and relevant policy documents. Technical enhancements include: 1) Predictive search and smart recommendations; 2) Natural language query capabilities; and 3) Dashboards tracking content usage

3.2.7 Feedback Loops and Performance Metrics

Performance monitoring ensures KM systems remain relevant and effective. Agencies like Texas DOT use dashboards to track system usage, identify content gaps, and gather user feedback to drive continuous

improvement. Evaluation methods include: 1) Usage analytics; 2) User satisfaction surveys; and 3) Content currency and relevance reviews

3.2.8 Comparative Insights from State DOTs

Table 3.1 shows comparative insights across different State DOTs.

Table 3.1 Comparative Insights from State DOTs

Best Practice	FHWA	Maryland SHA	Texas DOT	Virginia DOT	Michigan DOT
Centralized Repository	✅	✅	✅	✅	✅
Governance & Standardization	✅	✅	✅	✅	✅
Integrated into Daily Workflows	✅	✅	✅	✅	✅
Training & Culture	✅	✅	✅	✅	✅
Tacit Knowledge Capture	✅	✅	✅	✅	✅
AI & Smart Search Tools	✅	⚠️	✅	✅	✅
Feedback and Performance Monitoring	✅	⚠️	✅	✅	✅

3.2.9 Summary

The experience of large transportation agencies illustrates that successful KM systems are more than just technology platforms—they depend on strong governance, integration with operations, and a culture that values continuous learning. Key recommendations for State DOTs include: 1) Start with a clear KM governance structure and content strategy; 2) Select or build a user-friendly, scalable KM platform; 3) - Prioritize capturing both explicit and tacit knowledge; 4) Train staff and embed KM practices into existing workflows; and 5) Monitor system performance and adjust based on feedback.

By learning from peers (e.g., FHWA, MDOT), state DOTs can develop robust KM systems that preserve institutional knowledge, reduce operational silos, and support long-term organizational resilience.

Conclusion and Recommendations

In sum, the assessment of institutional knowledge at WisDOT revealed both the depth of existing expertise and the urgent need to formalize and sustain it through deliberate knowledge management strategies. The insights gathered from the focus group highlighted common pain points—such as inconsistent documentation, reliance on informal knowledge transfer, and staffing challenges—that threaten the continuity of essential programs in highway and bridge development. Yet, these same discussions also surfaced promising practices and a clear willingness among staff to improve knowledge sharing and preservation.

The comparative analysis of best practices across peer DOTs reinforces that effective knowledge management is achievable when supported by leadership, integrated into daily workflows, and underpinned by smart tools and structures. With thoughtful investment in governance, training, and culture-building, WisDOT can build a resilient framework for capturing and leveraging both explicit and tacit knowledge. Moving forward, a coordinated strategy grounded in these findings will be essential to safeguarding institutional memory and empowering the next generation of transportation professionals.

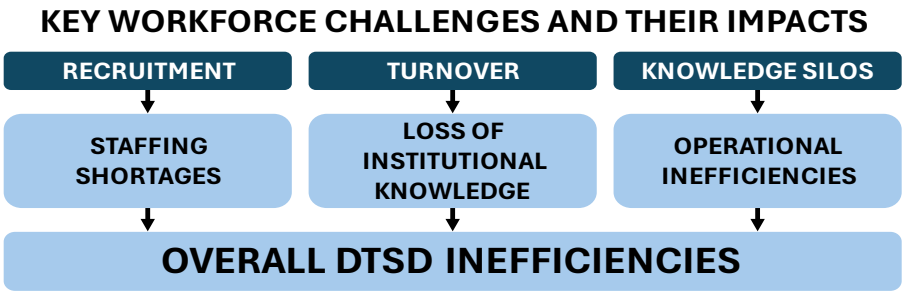


Figure 3.1 Key Workforce Challenges Contributing to WisDOT DTSD Inefficiencies

4. (TASK 3): DTSD SURVEY OF ENGINEERS AND TECHNICAL STAFF

The UWM-IPIT team in close partnership with the WisDOT Project Oversight Committee (POC) team designed a survey that was administered to DTSD engineering and technical staff.

4.1 Survey Design

The UWM-IPIT research team met regularly with the WisDOT POC team to discuss the questions aimed at addressing the core themes identified in the RFP. Based on extensive discussions and feedback, the survey was created by the UWM-IPIT team to reflect the following categories:

- Demographic and background questions that focused on capturing the respondents' profile with regard to their age, tenure, bureau affiliation, type of employment, race, and gender.
- Specific questions targeting respondents when they first started their job, an assessment of their hiring and onboarding experiences. These questions were asked only of employees who had been with DTSD for less than 5 years. Data was separately analyzed for those who had worked for WisDOT for less than 1 year and those who had worked for 2-5 years.
- Survey questions answered by all the DTSD technical staff tapped a range of topics such as their current work and training experiences and their levels of satisfaction with various work features.
- Many questions included an open comment section for respondents to add their thoughts and perspectives on specific topics.

4.2 Survey Implementation and Target Audience

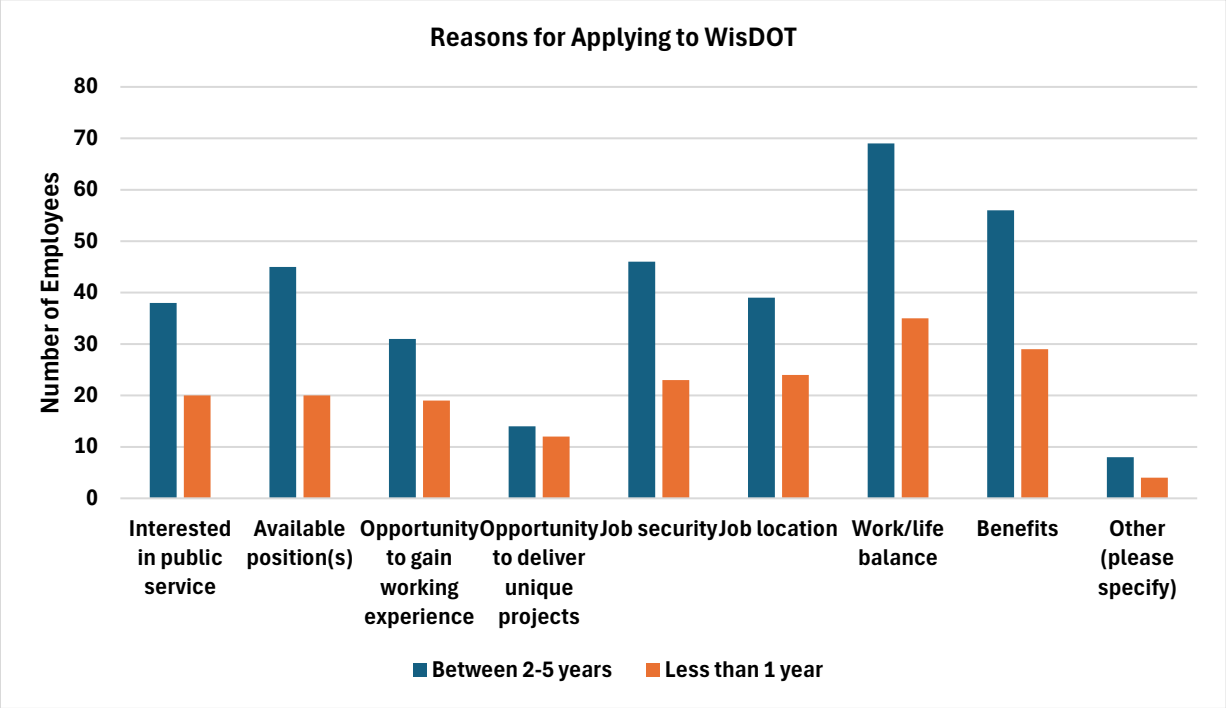
The survey was created on Qualtrics and after receiving approval from the UWM's Institutional Review Board office (IRB: #25-159). A link to the electronic survey was sent via email by the DTSD leadership team to about 800 engineering and technical employees on Feb. 5, 2025. The survey was closed on Feb. 17, 2025. A total of 465 survey responses were received which represents a little over 50% of the total number of employees that received the link to the survey. Out of the 465 surveys received, 29 were not deemed usable since the respondents answered just a few questions at the start of the survey and left the rest blank. The following section presents the most notable results and the major takeaways that laid the foundation for the recommendations.

4.3 Data Analysis, Key Results, and Summary of Significant Themes

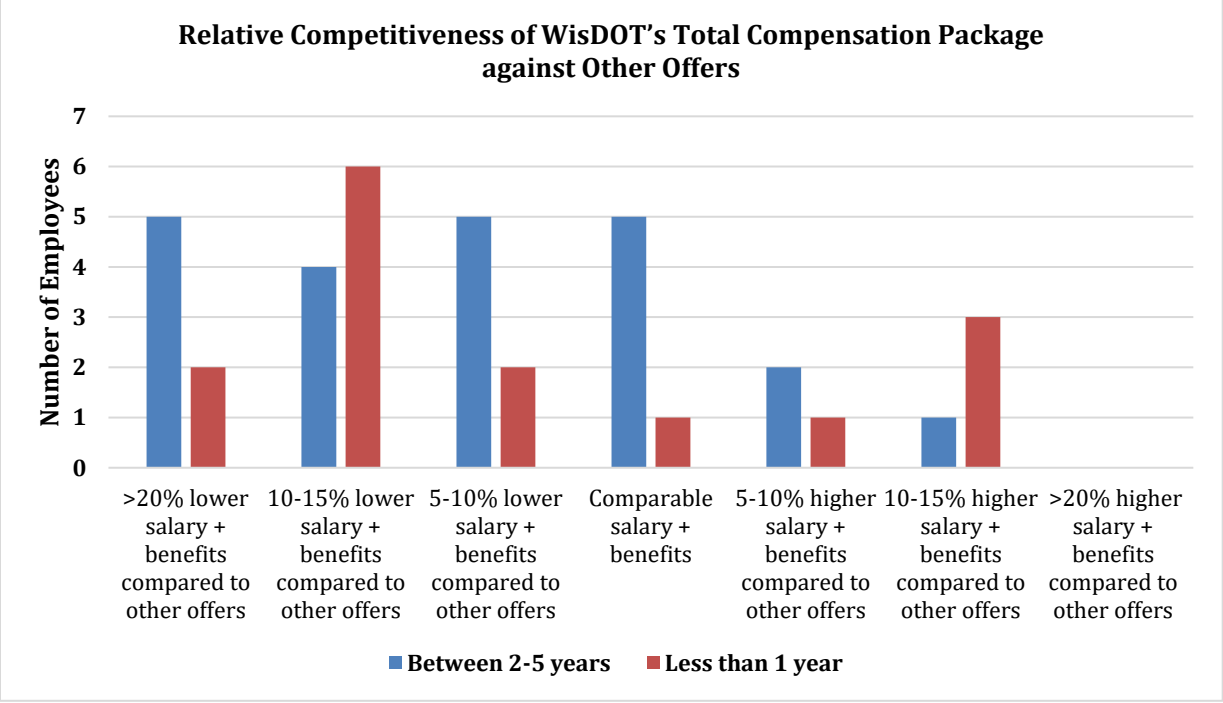
The survey data was analyzed using descriptive statistics and Importance-Performance Analysis (IPA) for a few specific questions. Data was analyzed for different age and tenure groups. The following pages present the most noteworthy results first for respondents with less than 5 years of WisDOT tenure followed by results for all respondents across different age groups and career stages.

4.4 Results For Questions Asked Only of Employees With Less Than 5 Years Tenure at WisDOT:

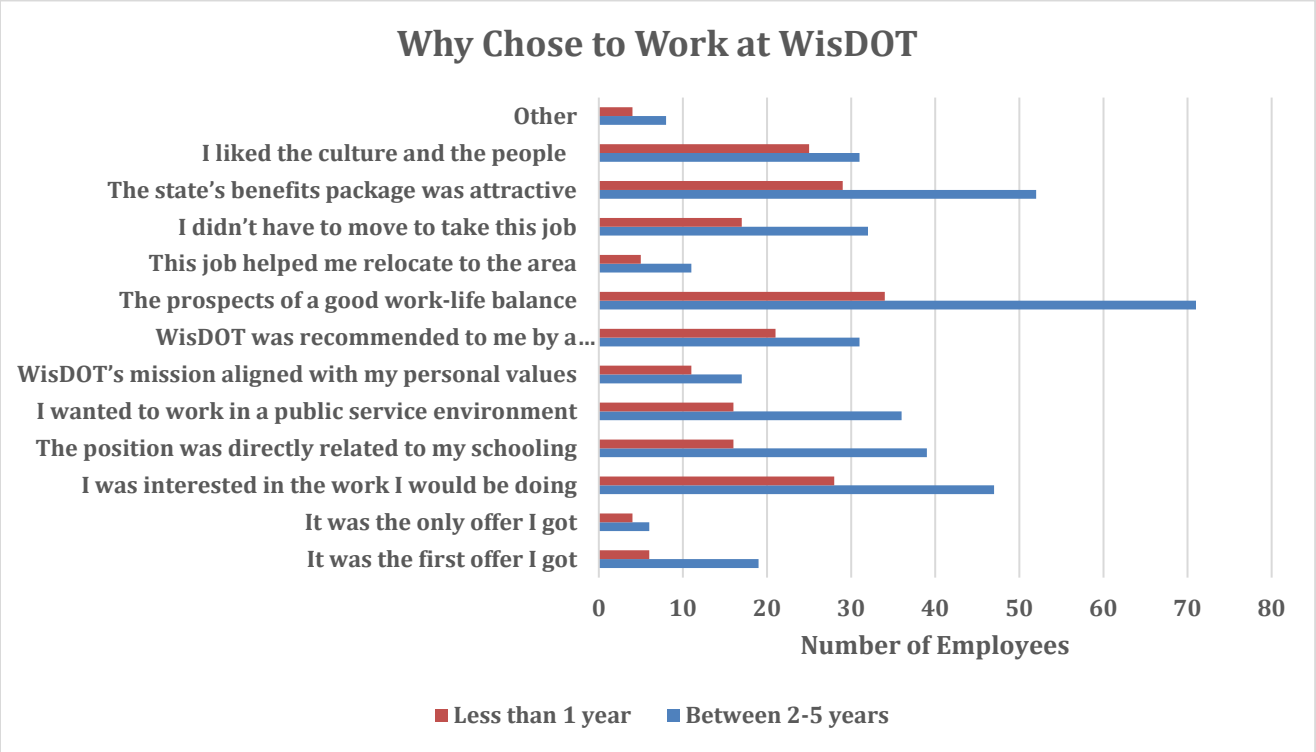
Q. What motivated you to apply to WisDOT? (Total responses: 130)



Q. If you received more than one job offer, how competitive was WisDOT's total compensation package (which includes salary and benefits) compared to the other offers? (Total responses: 37)



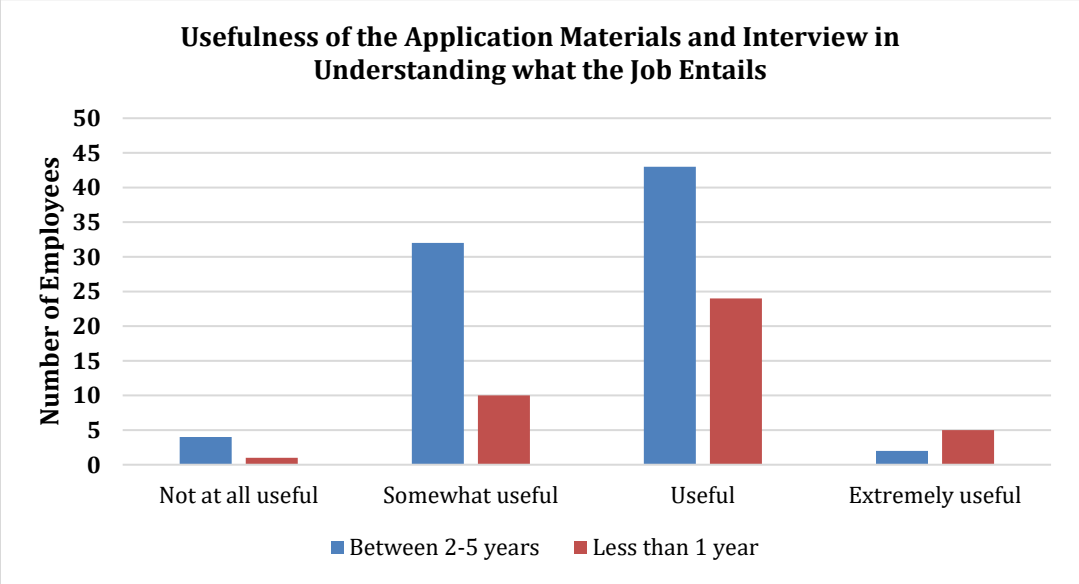
Q. I chose to work at WisDOT because (Total responses: 130)



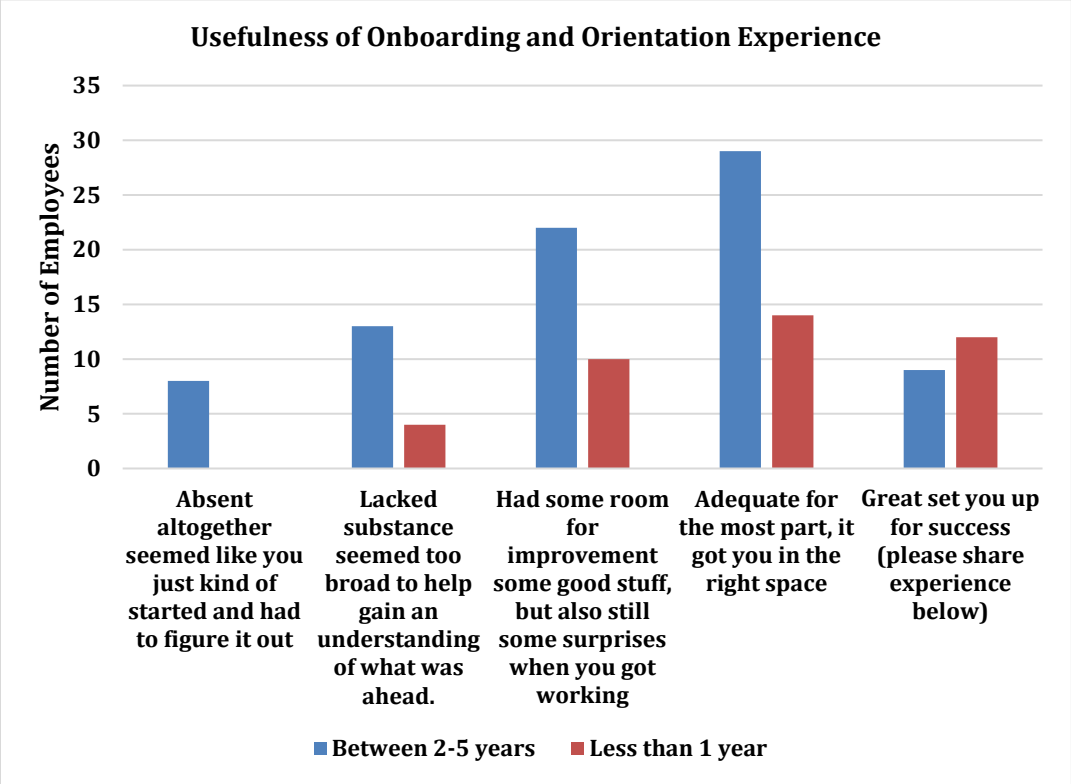
Summary of additional comments:

1. **Positive Internship Experiences**
   - Previous internships provided valuable insights and familiarity with the job and work environment
   - Enjoyed working as an intern and wanted to return to the same environment.
2. **Career and Work Environment**
   - Desire to remain in the public sector and work in a supportive environment.
   - Many career advancement opportunities.
   - Positive work environment and the ability to make a difference.
3. **Practical Considerations**
   - Needed a job and found WisDOT to be a good fit.
   - Reduced overhead and risk compared to running a small business.
   - Remote work opportunities that help with job relocation.
4. **Reputation and Learning**
   - WisDOT seen as a place to learn the right way of doing things without biases of contractor companies.
   - Aim to change the narrative that WisDOT protects useless workers and lead by example.

Q. Thinking back to the hiring process, how would you rate the application materials and interview process in terms of understanding exactly what you'd be doing in the job itself? (Total responses: 121)



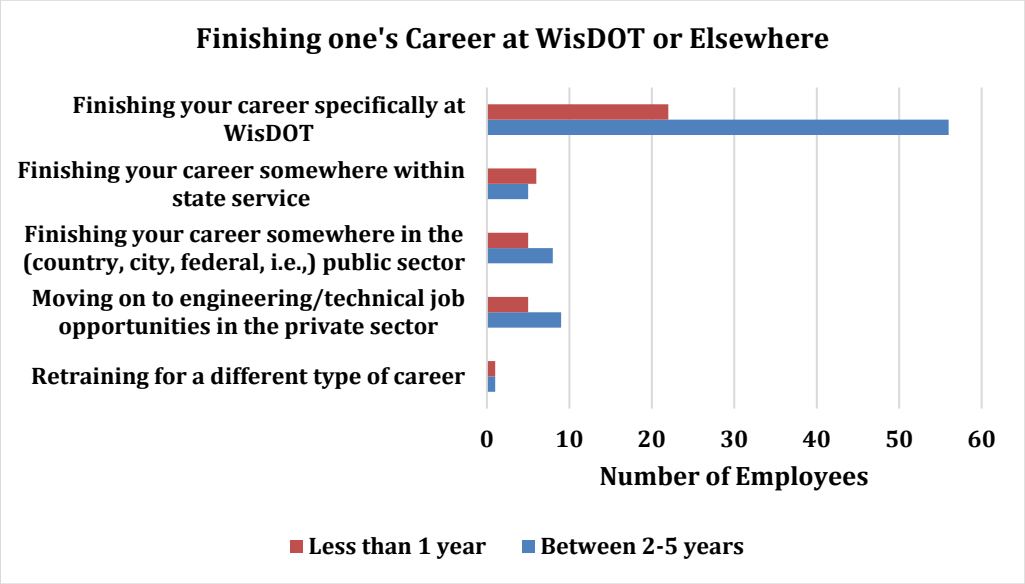
Q. How useful was your onboarding and orientation experience? (Total responses: 121)



Summary of additional comments:

1. **Positive Onboarding Experiences**
   - Great mentors and supervisors who provided step-by-step guidance
   - Supportive coworkers who were willing to help and answer questions
   - Well-organized onboarding processes that made new hires comfortable
   - Positive feedback about the onboarding experience from those with previous internships
2. **Areas for Improvement**
   - Understaffing affecting the efficiency of onboarding
   - Needed far more guidance and training, especially when started during the COVID-19 pandemic
   - Desire for mentors and coaches for new hires
3. **General Satisfaction**
   - Overall, employees were satisfied with onboarding, training, mentoring, and IT
   - Several stated that the process had notably improved in recent years

Q. How do you see finishing your career– at WisDOT or elsewhere? (Total responses: 118)



For Employees with Less than 5 years of Tenure at WisDOT:

Areas of improvement:

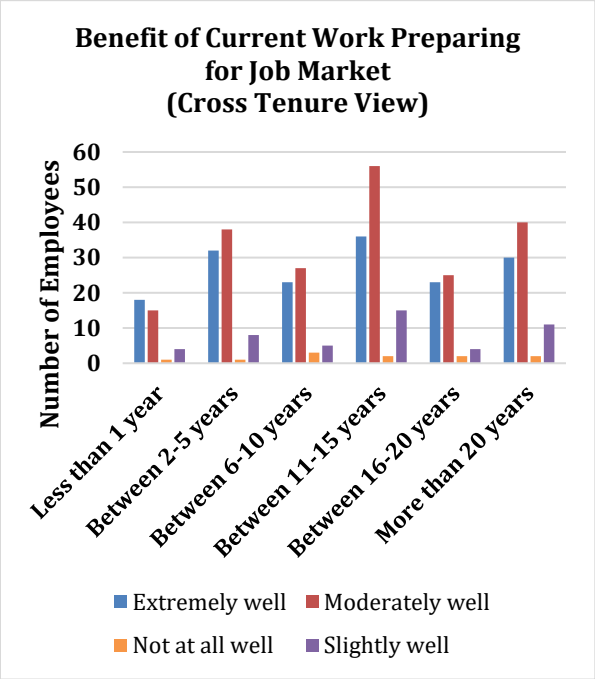
- Interview process and application materials need some finetuning so as to be more useful
- Even though around half (49%) of the new hires envisioned finishing their careers at WisDOT, the rest of them (51%) were planning on finishing their careers in other state service pr public sector jobs and some (18%) in private sector. Retaining this group of recently hired employees should be a top priority

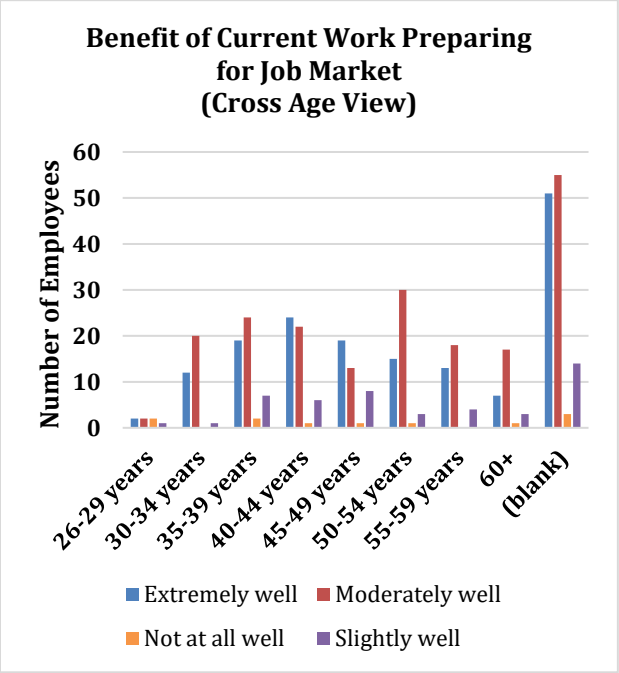
WisDOT features that are appreciated:

- Despite some employees getting competitive compensation offers that were well above what WisDOT offered, they chose to work at WisDOT because of its generous benefits package and better prospect for work-life balance.
- Interns returning as full-time employees because they believed they could make a difference, lead by example, and contribute to WisDOT and the public serving mission

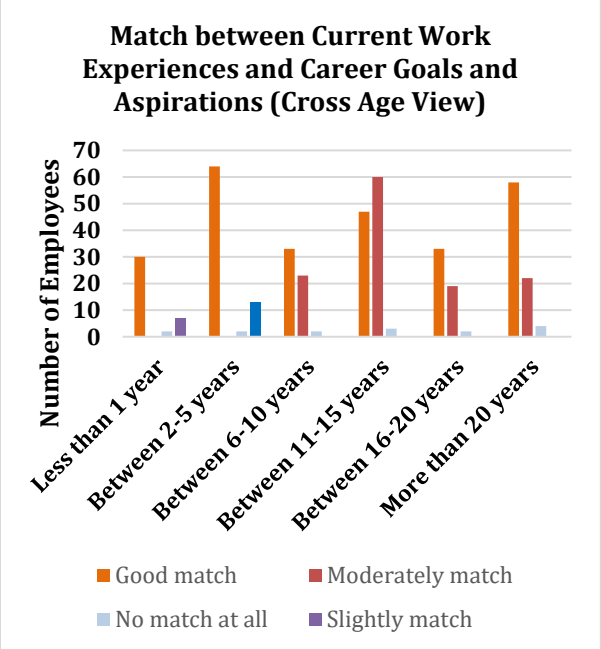
4. 5 Results of Data Analysis for Key Questions Asked of All Employees

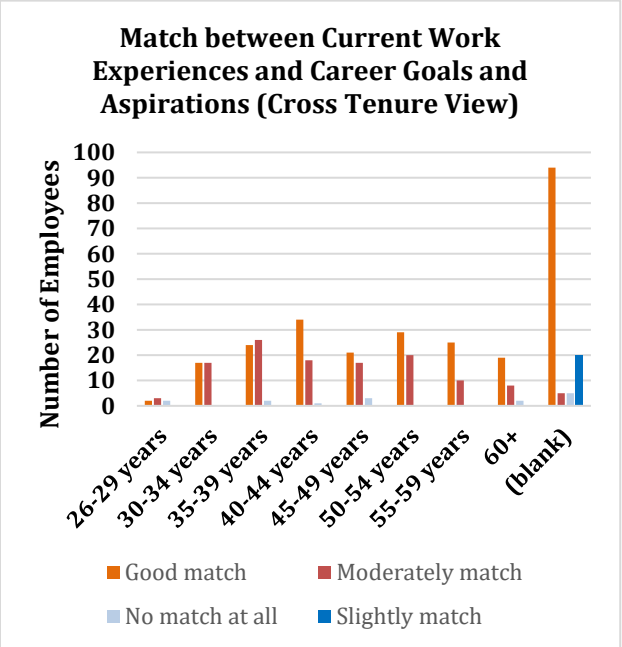
Q. How well do you feel that the work you are currently doing at WisDOT would benefit you in today's job market? (Total responses: 421)



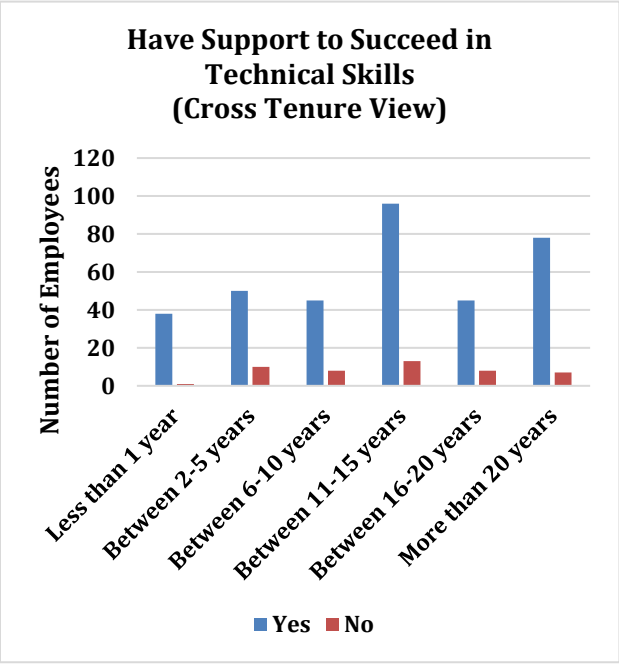


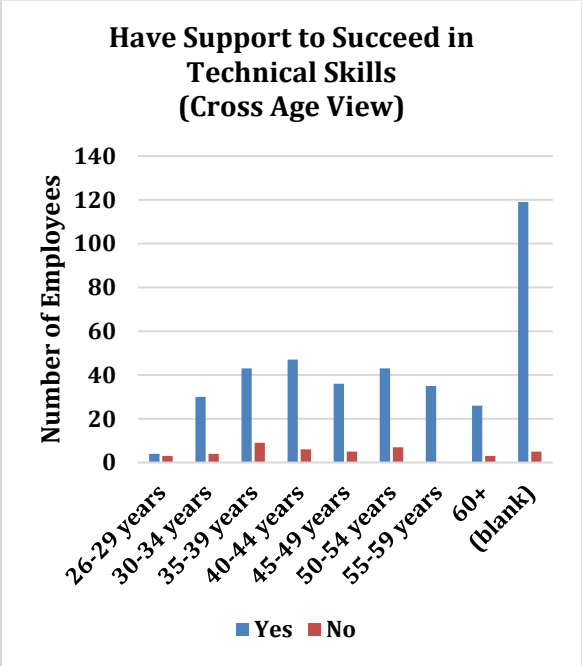
Q. Please rate the extent to which your current work experiences match your career goals and aspirations. (Total responses: 424)



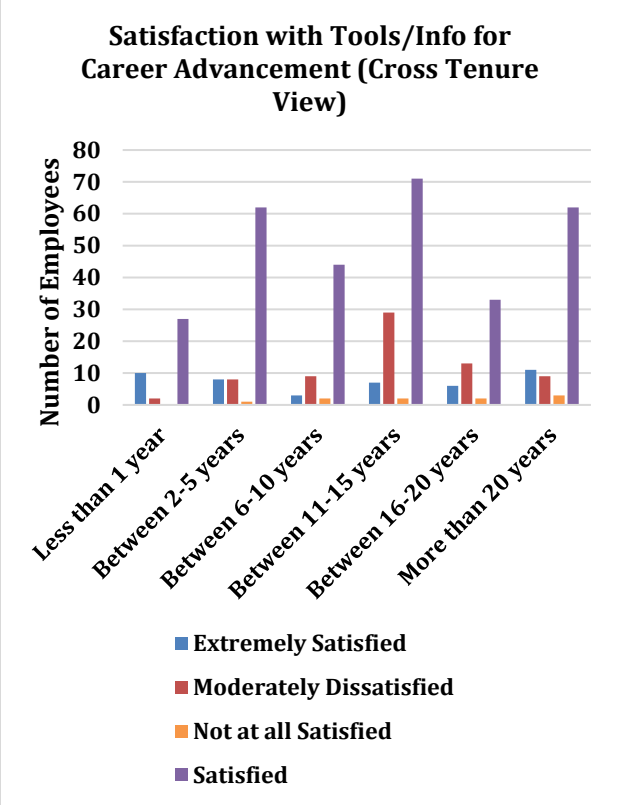


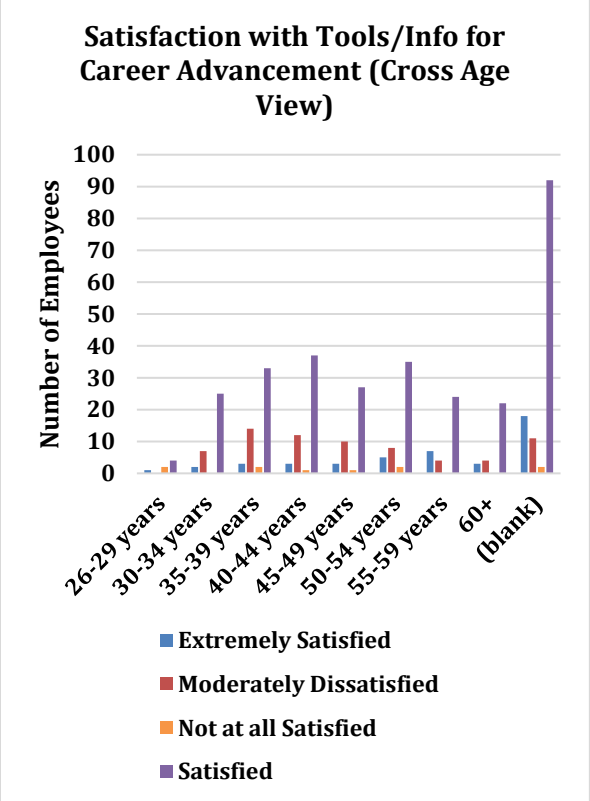
Q. Do you currently have the support to succeed in your role/to continue developing your technical skills? (Total responses: 425)



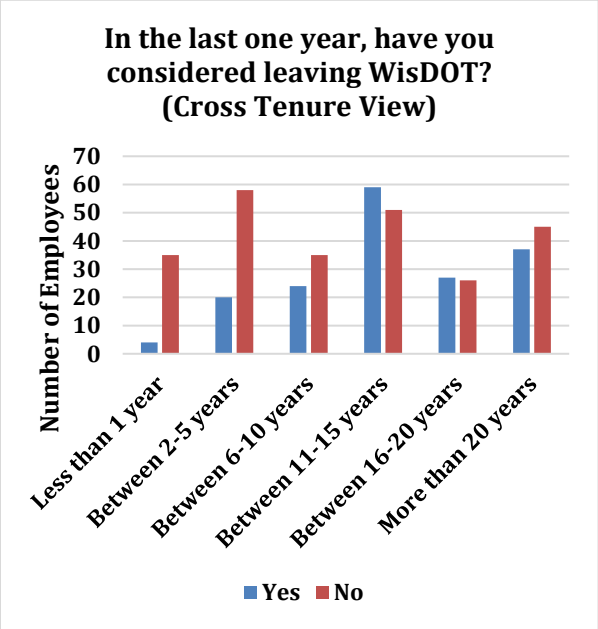


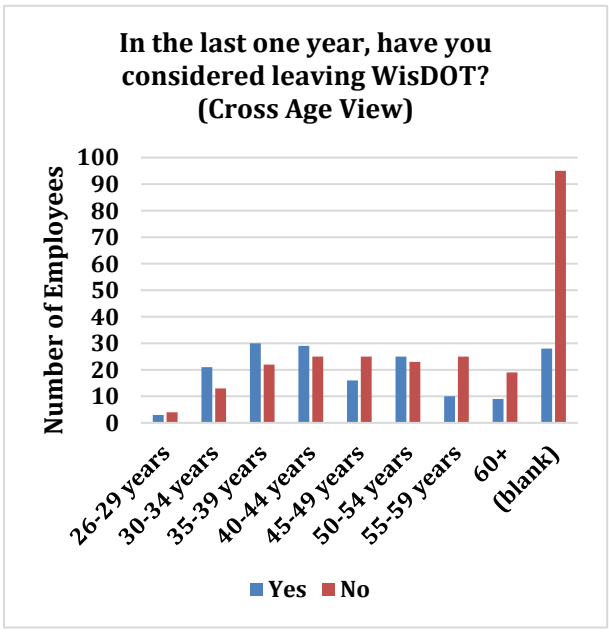
Q. How satisfied are you with the tools and information that you have been provided to help you advance your career? (Total responses: 424)



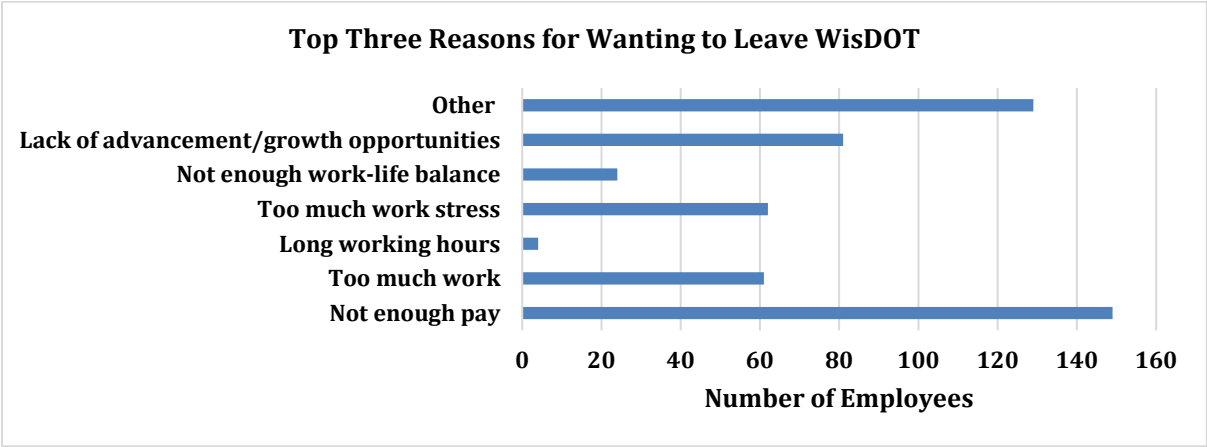


Q. In the last one year, have you considered leaving WisDOT? (Total responses: 421; total Yes: 59.4%)





Q. For only those who indicated an intent to leave WisDOT within the next year: What are the top three reasons for wanting to leave WisDOT? (Total responses: 169)



4.6 Summary of themes from comments explaining reasons for wanting to leave WisDOT:

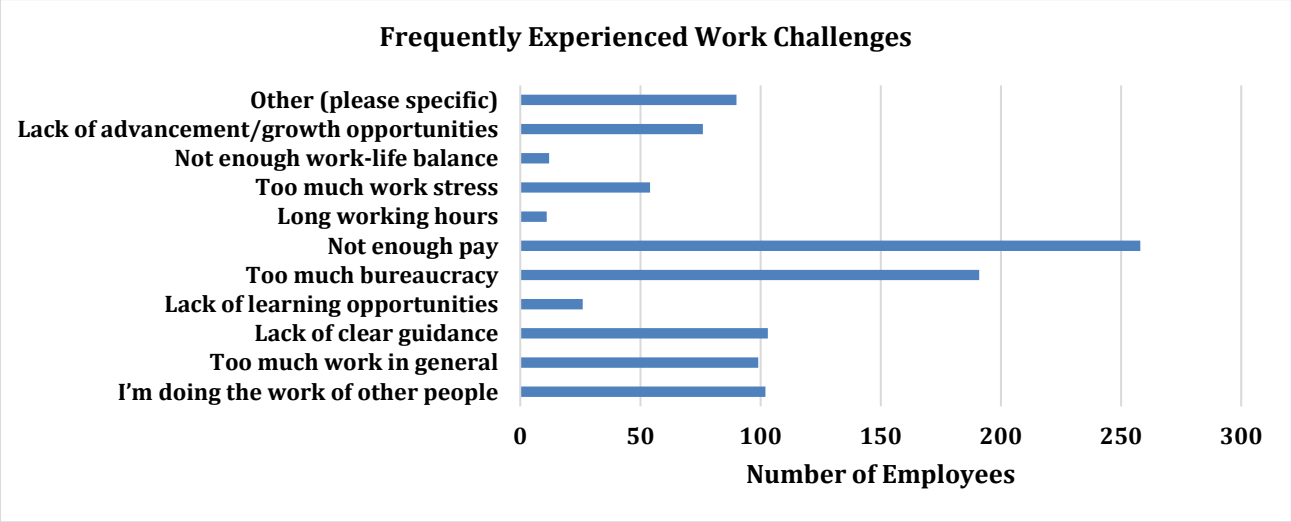
1. **Compensation and Advancement:**
   - Concerns about pay discrepancies and limited paths for increased compensation, especially for technical experts. Lack of incentives and sufficient pay raises for higher positions.
   - Frustration with no reward for experience and the impact of the retirement wave on staff advancement.
2. **Work Environment and Culture:**
   - Many positive comments on work-life balance and flexibility.

- Issues with favoritism, discrimination, and feeling unheard or unrepresented.
- Frustration with bureaucracy, political and politically-driven decisions, lack of support from management, and the slow pace of change.

3. **Management and Leadership:**
    - Perception that management does not value or engage with experienced staff.
    - Concerns about young managers lacking policy expertise and not seeking input from senior staff.
    - Issues with management's handling of workload distribution and employee recognition.
4. **Job Satisfaction, Excessive Workload, and Under-Staffing Concerns:**
    - Dissatisfaction with the scope of work, lack of challenging tasks, and inconsistent workload. Concerns about being overworked, filling in for vacancies, and dealing with inexperienced staff.
    - Some commented on working with unqualified staff adding to the workload.
    - Desire for more non-engineering management opportunities and better hybrid work policies.
    - Difficulty taking vacations and maintaining work-life balance.
    - Concerns about the future state of WisDOT with current staffing and knowledge gaps.
5. **Staffing and Knowledge Retention:**
    - Concerns about loss of institutional knowledge due to retirements and high vacancy rates.
    - Concerns about a lack of a long-term plan to fill key positions with skilled, knowledgeable, and experienced people.
    - Concerns about challenges in leading projects without experienced senior designers.
6. **Training and Development Support and other Resources:**
    - Need for better support in training new hires and providing access to technology.
    - Frustration with the lack of coordination and training on new tools and processes from central office.
    - Need for mentorship and promotion from within to maintain a steady workforce.
    - Difficulty in advancing due to insufficient pay raises for higher positions
7. **Compensation and Benefits:**
    - Significant dissatisfaction with pay, especially compared to the private sector.
    - Concerns about pay not keeping up with inflation and lack of bonuses or raises.
    - Desire for better benefits and competitive overall compensation packages.
8. **Career Advancement and Opportunities:**
    - Limited paths for advancement, particularly for technical roles.
    - Frustration with the need to move into management for higher pay.
    - Lack of non-management growth opportunities and technical advancement.

9. **Location and Mobility:**
    - Some employees are considering moving to warmer climates or other locations for better opportunities. The location is a factor in both retention and potential departure decisions.
10. **Work-Life Balance and Personal Priorities:**
    - Desire for more time with family and better work-life balance. Interest in PT or flexible work
    - Concerns about the impact of construction hours and the ability to use vacation time.
    - Interest in moving to different locations or roles for better opportunities.

Q. In general, which of the following challenges do you feel you experience the most at work? (Total responses: 410)



4.7 Summary of main themes from other comments noting the most significant work challenges:

1. **Technology and Lack of Adequate Resources**:
    - Lack of new software and technology, leading to inefficiencies.
    - Budget constraints affecting research, training, and staying current in the field.
    - Issues with data reliability and accessibility.
    - Cost-saving measures affects work conditions. Insufficient resources and employees affects work.
    - Disorganization and redundancy in some resources.
2. **Training and Development**:
    - Need for more training opportunities and support for new hires.
    - Challenges in mentoring and keeping up with remote project leaders.
    - Lack of specialization opportunities for engineers and technicians.
    - Desire for more challenging work and opportunities for growth.
    - Frustration with being pulled in many directions due to expertise.

3. **Workload and Staffing**:
    - High workload due to inadequate staffing and reliance on consultants.
    - Increased workload for high performers.
    - Difficulty taking true vacations and managing workload upon return.
    - Differences in work expectations across sections.
    - High staff turnover and challenges in filling key positions.
    - Periodic waves of too much work and lulls while waiting for responses.
4. **Work Environment and Culture**:
    - Negative work environment and discrimination.
    - Bureaucracy, non-innovative policies, and redundant processes hinders efficiency.
    - Lack of camaraderie and poor treatment among coworkers.
    - Issues with people not doing their jobs and work being pawned off on others.
    - Negative perceptions of government employees and misinformation from the public.
5. **Workplace Bias and Fairness**:
    - Issues with workplace bias, including racial bias and denial of religious accommodations.
    - General devaluing of state employees and restrictions on job duties.
    - Need for fair evaluation and recognition of employee contributions. Need for better training of staff.
6. **Management and Leadership**:
    - Lack of support and communication from central office and management.
    - Need for better technical training for management.
    - Frustration with decision-making processes and lack of autonomy.
    - Inexperienced managers allowing staff to self-define work, leading to work dumping.
    - Micromanagement and lack of support for good employees; managers need to streamline approval processes.
7. **Compensation, Benefits, and Advancement**:
    - Pay disparities between new hires and long-term employees.
    - Limited advancement opportunities and lack of incentives for hard work.
    - Concerns about individual success not being recognized in compensation.
    - Concerns about pay and benefits, including retirement insurance and parking.
    - Perception that pay-to-workload ratio is lower than in the industry.
    - Small cost-saving measures by the state affects employees' morale and intent to stay.
8. **Organizational Challenges**:
    - Disorganization and lack of clear roles and responsibilities.

- Struggles with organizational skills and dealing with public disrespect.
- Mismatch of comp time policy with work realities.

9. **Work-Life Balance**:
    - Preference for remote work and frustration with mandatory office presence.
    - Challenges with balancing workload and personal life, especially for those in supervisory roles.
    - Desire for more flexibility and support for work-life balance.

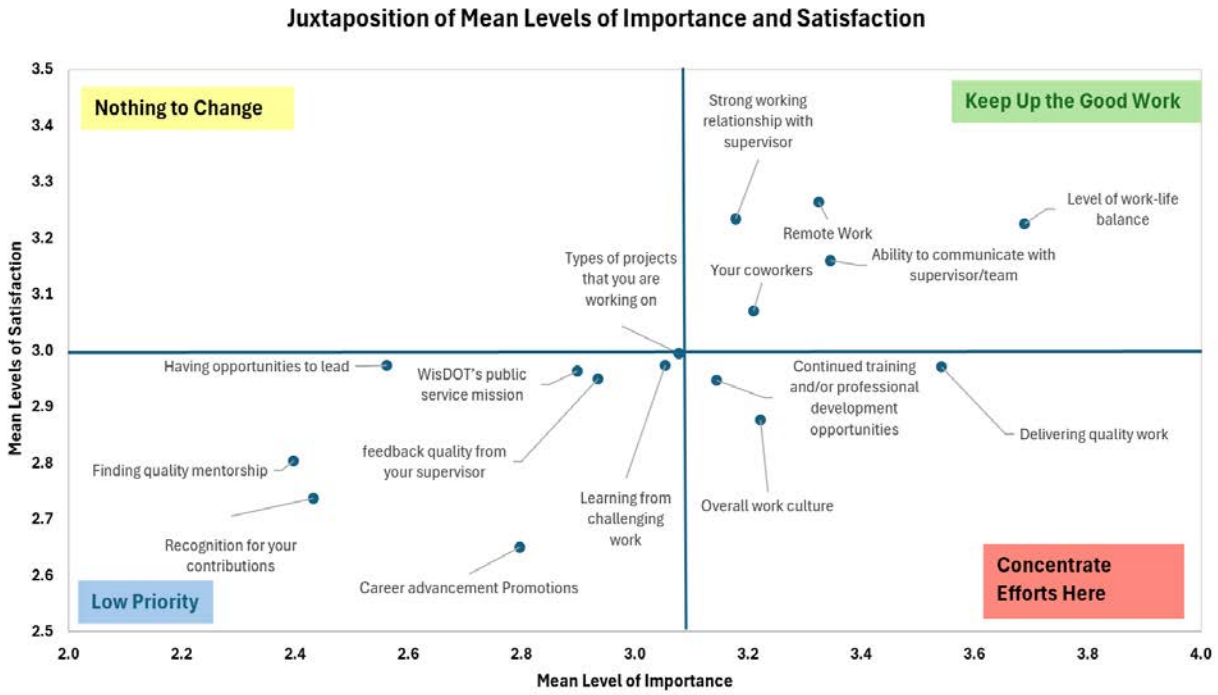
Q. Reflecting on the challenges identified in the previous question, do you have any suggested remedies or steps the department could be taking? (Text responses only. Total responses: 270)

4.8 Summary of key themes describing respondents' suggestions for addressing work challenges:

1. **Pay and Compensation**
    - Respondents expressed significant concern about compensation being below market rates
    - Many noted large pay gaps between WisDOT and private sector/consulting firms
    - Some reported neighboring state DOTs offering substantially higher salaries
    - Recent raises were appreciated but viewed as insufficient to close existing gaps
    - Internal pay inequities were cited between new hires and existing employees
2. **Career Advancement and Growth**
    - Limited advancement paths for technical staff who don't want to move into management
    - Desire for additional classification levels within existing positions (Senior I/II/III, etc.)
    - Need for technical expert career tracks with appropriate compensation
    - Concern that recognition that experience and expertise aren't adequately rewarded
    - Lack of step increases or performance-based pay progression
3. **Staffing and Workload**
    - Widespread concern about vacant positions and understaffing
    - Reports of employees handling multiple roles due to vacancies
    - Difficulty attracting and retaining qualified candidates
    - High turnover creating knowledge gaps and training burdens
    - Work-life balance challenges due to excessive workloads
4. **Bureaucracy and Processes**
    - Frustration with excessive paperwork and approval processes
    - Inconsistency in processes between regions
    - Multiple outdated or redundant systems
    - Time spent on administrative tasks rather than technical work
    - Desire for streamlined procedures and decision-making

5. **Training and Knowledge Transfer**
    - Concerns about loss of institutional knowledge through retirements
    - Need for better onboarding and mentoring for new employees
    - Desire for more structured training programs
    - Challenges with knowledge transfer when positions remain vacant
    - Limited resources for professional development
6. **Management and Leadership**
    - Mixed feedback on management effectiveness and decision-making
    - Calls for more delegation and less micromanagement
    - Desire for leadership to advocate more strongly for staff needs
    - Concerns about accountability and performance management
    - Request for better cross-team collaboration and communication
7. **Work Environment and Benefits**
    - Appreciation for telework options and work-life balance potential
    - Desire for flexible work arrangements
    - Recognition that benefits package needs improvement to remain competitive
    - Suggestions for creative benefits to retain staff (tuition assistance, etc.)
    - Requests for recognition of good performance

Q. Juxtaposition of average importance and satisfaction levels toward a variety of workplace features.



Q. Open-ended question: Please share with us your suggestions to better tell the story of WisDOT specific technical roles, especially to graduating engineering students and others in the job market. (Total responses: 190)

4.9 Summary of main themes from comments with suggestions for better telling the WisDOT story:

1. **Mentorship and Engagement**: There is a strong interest in creating platforms for mentorship and Q&A sessions where students can connect with WisDOT professionals. Engaging with students early on and providing guidance can help attract new talent. Many commented that WisDOT needed to emphasize the importance of mentorship for new employees and the robust training opportunities available at WisDOT. Also important to highlight the support and guidance provided to help employees succeed.
2. **Work Environment and Opportunities**: The ability to work both indoors and outdoors, along with the variety of roles and projects available at WisDOT, is seen as a significant advantage. Highlighting these opportunities can help attract new graduates and professionals.
3. **Promotion and Awareness**: There is a need to better advertise and promote the diverse projects and roles within WisDOT. Many new graduates are unaware of the wide range of opportunities beyond traditional engineering roles. Utilizing social media, videos, and storytelling can help showcase the diverse opportunities and the impact of WisDOT's work.
4. **Recruitment Strategies**: Using employees who have experienced both private and public sector to explain the benefits of working at WisDOT can be an effective recruitment strategy. Hosting career fairs, publicizing internships and employee testimonials, and partnering with schools can also help attract new talent. Some suggested included highlighting the positive experiences of current employees and the opportunities for professional growth. Others suggested organizing open house days and outreach to engineering societies to help attract new graduates and high school students. Providing job shadowing opportunities and engaging with students early on can also be beneficial.
5. **Career Development and Training**: Emphasizing the opportunities for skill-building, professional development, and career advancement within WisDOT is important. Providing clear information about entry-level positions and the benefits of working at WisDOT compared to the private sector can help attract and retain employees. It is important to showcase the variety of roles and career paths available within WisDOT. Likewise, it is important to emphasize the ability to work in different parts of the state and move internally to explore various areas of interest.
6. **Work-Life Balance and Benefits**: Highlighting the work-life balance, comprehensive benefits package, and job stability at WisDOT can make the lower salary more appealing. Emphasizing the

positive work culture and the respect for employees' time and life can also attract new talent. Ensure that these aspects are well-communicated to potential recruits.

7. **Public Service and Impact**: Emphasizing the importance of public service and the impact of WisDOT's work on the daily lives of citizens and the community can attract individuals who are motivated by making a difference in their community. Emphasizing the satisfaction of contributing to the public good and making a difference. Similarly, emphasizing the pride and responsibility in serving the public and maintaining safety. Several noted the importance of highlighting the satisfaction of contributing to the community and the tangible impact of WisDOT's work.
8. **Technology and Innovation**: Highlighting the use of new technologies and the variety of challenging projects can attract tech-savvy and ambitious professionals. Showcasing real-life duties and the tangible work created in communities can also help.
9. **Technical Expertise and Training**: Addressing the need for more technical staff to advance WisDOT's standards and technology. Highlighting the opportunities for skill development, training, and involvement in cutting-edge projects.
10. **Compensation and Market Value**: Acknowledge the lower pay compared to the private sector. Important to offer competitive salaries and better financial comparisons to attract and retain talent.
11. **Onboarding and Orientation**: Creating a comprehensive orientation and improving the onboarding process to ensure new employees are well-informed about their benefits and department policies.
12. **Employee Testimonials and Engagement**: Utilizing employee testimonials and real-life stories to showcase the positive experiences of current employees. Engaging with employees at different levels and roles to provide a comprehensive view of WisDOT.
13. **Bureaucracy and Decision-Making**: Acknowledging the challenges related to bureaucracy and the need for timely decision-making. Ensuring that young engineers can focus on developing technical skills without being bogged down by paperwork.

Q. Open-ended question: Please share with us any additional experiences, insights and/or information that we may have left out which would help us better understand yours and others' experiences working at WisDOT (Total responses: 143).

4.10 Summary of main themes from additional comments describing work experiences at WisDOT:

1. **Compensation for Attracting, Retaining, and Motivating Employees**
   - Significant concern about wages being uncompetitive compared to private sector and other state DOTs

- Many noted big pay gaps causing retention issues and difficulty attracting new talent. Competitive pay was seen as crucial for retaining senior staff and attracting new ones. The current pay structure is seen as inadequate, leading to high turnover and difficulty in retaining experienced employees.
- Lack of pay progression for experienced employees who don't move into management
- Frustration was noted when comparing internal compensation to consultant rates. Several concerns were noted about morale issues caused by pay disparities between WisDOT staff and consultants
- Recognition that recent compensation adjustments have helped but more is needed. The lack of pay progression for certain classifications is a concern.
- Some employees felt demoralized due to a lack of incentives to work hard and the perception that upper management was primarily focused on financial metrics rather than doing the right thing.
- Improving recruitment efforts at career fairs and addressing pay disparities were essential for attracting new talent. There is also a need to make WisDOT more personal and engaging for employees.

2. **Work-Life Balance and Benefits**
   - Strong appreciation for work-life balance, flexibility, and telework options.
   - The work-life balance, flexibility, and access to internal resources are highly appreciated by employees. These aspects are often cited as reasons for choosing to work at WisDOT.
   - Emphasis on the positive aspects of working at WisDOT compared to the private sector.
   - Value placed on the quality benefits package, particularly health insurance.
   - Importance of unused sick leave conversion at retirement
   - Recognition that the benefits package may not be as attractive to recent graduates with student debt
   - Concerns expressed about after-hours expectations and low work-life balance for management roles
3. **Career Development, Advancement, and Flexibility**
   - Appreciation for lateral movement opportunities across different DOT areas
   - Frustration that advancement often requires moving into management rather than technical tracks
   - Desire for technical career paths with appropriate compensation increases
   - Interest in specialization opportunities for those who prefer focused expertise
   - The ability to change jobs and locations within WisDOT was seen as beneficial for career development. Some noted the importance of allowing new engineers to specialize in their areas of interest to grow their expertise.
   - The ability to explore different roles and departments within WisDOT was seen as beneficial for career growth. Employees appreciated the opportunities for lateral and upward movement.
   - Rotation through various disciplines provided a well-rounded experience and was appreciated.
4. **Knowledge Transfer and Staffing**
   - Concern about knowledge loss due to retirement waves

- Concern that staff shortages and unfilled positions increased workload for remaining employees. Some noted that the shortage of engineering and technical staff was not unique to WisDOT but affected the entire sector. They stressed the need for competitive compensation to attract and retain scarce talent.
- Challenges with recruitment, particularly response time to applicants were noted.
- Emphasis on the collaborative environment at WisDOT and the critical importance of senior staff passing on their knowledge to younger employees especially before the impending retirement wave.
- Importance of having a backup plan to ensure knowledge transfer and mentoring for the replacements of senior retiring staff. Providing opportunities for training and mentorship was seen as essential.

5. **Organizational Culture**
   - Appreciation for collaborative environment and supportive colleagues; interest in team-focused work
   - Pride in public service and infrastructure contributions
   - Concerns about political influence and public perception of state employees
   - Appreciation for recognition of achievements
   - The importance of meaningful actions following employee satisfaction surveys to address concerns and improve the work environment was emphasized.
   - Workplace culture was an important criterion for many. Changing the organization from the bottom-up was seen as difficult. Employees noted they need to be cognizant and comfortable with the existing workplace culture before committing long-term.
6. **Management and Leadership**
   - These were varied/mixed experiences with management quality impacting job satisfaction
   - Desire for more technical expertise in leadership positions
   - Several noted concerns about micromanagement
   - Request for leadership to work alongside staff more often
   - Concerns about management decisions and political influence affecting job administration. The need for timely and effective decision-making to address issues was noted.
   - Effective management and leadership were seen as crucial for creating a productive work environment. There was a need for leaders to support staff, build relationships, communicate effectively, provide opportunities for growth and development, and facilitate knowledge transfer.
   - Some noted a divide between staff and management, with a need for more interaction and communication. Presentations, training, and newsletters can help bridge this gap.
   - Some decision-making processes at WisDOT were seen as subjective and inconsistent, particularly regarding non-vehicular transportation modes like biking and walking.
7. **Concerns about Decision-making Structures and Process**
   - Frustration with bureaucracy and slow decision-making

- Desire for better accountability systems
- Desire for more multimodal transportation emphasis
- Concerns about asset management philosophy; Concerns about office resources like state vehicles

8. **Remote Work and Office Environment**
   - Strong support for continued remote work options
   - Recognition that telework has impacted social connections. While teleworking offered flexibility, some noted it had impacted the social aspect of working with colleagues. There was a suggestion to reduce teleworking to improve social interaction, accountability, and productivity.
9. **Social Media and Public Awareness**:
   - Improving social media use for public awareness of the diverse roles and opportunities at WisDOT.
   - Showcasing successful projects and the positive work environment at WisDOT/DTSD.
10. **Recognition and Morale**:
    - Celebrating wins and recognizing good work are important for maintaining morale. However, there is a need for more meaningful actions to improve the work culture and address employee concerns.
11. **Public Service and Impact**:
    - Employees value the opportunity to contribute to public and societal benefits through their work at WisDOT. This sense of purpose is a significant motivator.
    - Many noted a sense of pride in being part of something that benefits the citizens of the state and valued the opportunity to support the residents of the state.
    - Working at WisDOT was seen as contributing to a larger picture, with each position playing an important role in delivering projects and services.
12. **Challenges with Oversight Role** and **Consultant Use; Need for Specialist Training**
    - There is concern about the shift towards an oversight role and the loss of technical expertise within the department. Maintaining a high level of expertise is important for the department's success.
    - There is frustration with the amount of work being contracted out to consultants. Suggestions were made to collaborate with technical schools to revive programs for specialists in areas like construction management and computer design.

4.11 Conclusions:

- Overall, the results highlight many areas where respondents across different age groups and lengths of tenure expressed their satisfaction with many different aspects of the work environment.
- By and large, employees were satisfied with the tools and information they were provided to succeed in their jobs. Employees who were in the 35-39 year age group and with 11-15 years of experience expressed maximum dissatisfaction with the tools they had to succeed in their roles.

- Employees believed that the work they were doing prepared them well for the job market – there were no noteworthy differences across age or lengths of tenure. Likewise, employees believed that the work they were doing at WisDOT matched their career goals and aspirations.
- Interesting results emerged in response to questions on aspirations for supervisory/management roles and reasons for and against applying for that position. Those who were keen to become supervisors/managers were employees with 2-5 years and 11-15 years of experience and were between 30-44 years of age.
- Reasons for aspirations for supervisory/management roles included higher compensation, desire to mentor others, and desire to expand their knowledge. Employees who did not aspire to become supervisors or managers cited their desire to remain close to technical work, didn't want to climb the ladder, or didn't want to make a tradeoff with having the desired work-life balance because of expectations to work a greater number of hours.
- One of the biggest areas of concern emerged with the sizable proportion of experienced employees (59%) expressing intent to leave WisDOT in the next one year. 30% of those between the 30-44 years and 25% of those between 50-54 years expressed an intent to leave WisDOT in one year. Likewise, 59% of employees with 11-15 years of service and 35% with more than 20 years of service expressed the greatest desire to leave. Some of the employees in these age and tenure categories also noted that their perception of the agency had either become more negative or was not as good as it was when they first joined. This is a top area of concern that will need to be addressed.
- The top reasons for considering leaving WisDOT were low compensation, lack of advancement and growth opportunities, too much workload, and various aspects of workplace culture.
- The unfairness in the workload was most acutely experienced by those who had 11-15 years of tenure and those who were 40-44 years old. Younger employees with less tenure also expressed some concerns regarding unfair workload balance.
- Only 17% of respondents had a mentor, and those who did, had found them on their own and had positive experiences with them.
- Overall, the top work challenges that emerged were low pay, too much bureaucracy, not enough clear guidance for work, work overload, and doing the work of other people. Comments on frustrations with work culture, management, teamwork, and decision-making added to existing challenges. There were several suggestions that were made to help address these challenges.
- Despite some of these challenges, majority of the respondents, across different age and tenure groups, had positive perspectives on the agency over the time they had spent and were committed to creating impact and seeing DTSD successfully fulfill its mission.

5. TASK 4: HIRING CHALLENGES EVALUATION

The transportation sector is undergoing significant transformation due to advancements in technology, increasing demand for infrastructure modernization, and a growing emphasis on sustainability. To meet current and future workforce needs, it is vital to understand what drives students to enter transportation careers and how their expectations vary across educational backgrounds. WisDOT's hiring challenges were examined by collecting and analyzing the enrollment, graduation, internship, and job placement data across Wisconsin colleges for engineering and transportation-related majors. The project team has also examined internship conversion rates and recent graduate placement for engineering and transportation-related programs. By surveying universities' faculty, staff, current students, and alumni, the project team identified ways to attract younger engineers to WisDOT and ensure existing policies align with their expectations (e.g., relocation assistance, loan repayment, remote work). The survey response rates for civil engineering students and faculty were very low due to federal level changes that impacted universities and colleges of engineering. The detailed analyses survey results can be found in Appendix C. All the surveys were approved by the UWM's Institutional Review Board (IRB: #25-159).

5.1 Overview of the Survey Results

Table 5.1 shows internship data, job placement data, and size of CE graduating classes.

Table 5.1 Summary Table of Graduates

University	Internship Data		Job Placement Data		Size of CE Graduating Classes
	Internship Rate	Internship Conversion Rate	Job Placement Rate	Average Starting Salary	
Madison College	N/A	N/A	64.70%	$48,192	9
UW-Platteville	98%	44%	94.09%	$63,688	76
University of Minnesota - Duluth	88%	39%	100.00%	$64,770	59
Iowa State University	80%	N/A	98.33%	$55,940	117
UW-Madison	N/A	N/A	96.83%	$64,382	93
Michigan Tech University	N/A	N/A	94.81%	$73,625	97
University of Minnesota - Twin Cities	91.50%	N/A	97.80%	$69,950	40
Marquette University	N/A	N/A	96%	$61,600	32
UW-Eau Claire	No civil engineering or transportation related majors				
UW-Stout	No civil engineering or transportation related majors				
UW-Milwaukee	N/A	N/A	97%	$78,000	63
NWTC	N/A	N/A	100%	$57,000	13
CWRU	N/A	N/A	97.70%	N/A	23
UW-Stevens Point	No civil engineering or transportation related majors				
UIUC	90%	N/A	99%	$74,098	157
University of Iowa	N/A	N/A	97%	$63,000 (median)	N/A
NTC	N/A	N/A	100%	$49,746	3
UW-Superior	N/A	20%	N/A	$57,000	17
MSOE	N/A	N/A	100%	$69,584	34

**Note: 1. Data are based on the average value of the available information for the last 3 years (year 2023-2024, year 2022-2023, year 2021-2022) for most cases. 2. Job placement rate include both employment and further education. 3. Internship rate is the percentage of eligible student applicants who are offered internships after their graduation. Internship conversion rate is the percentage of interns who receive full-time job offers after completing the internship.*

Figure 5.1 illustrated below presents historical data on civil engineering graduating class sizes from 2021 to 2024, including only institutions with sufficient available data. Overall, the number of civil engineering graduates has declined during this period, highlighting broader workforce challenges and reinforcing the recruitment difficulties faced by WisDOT.

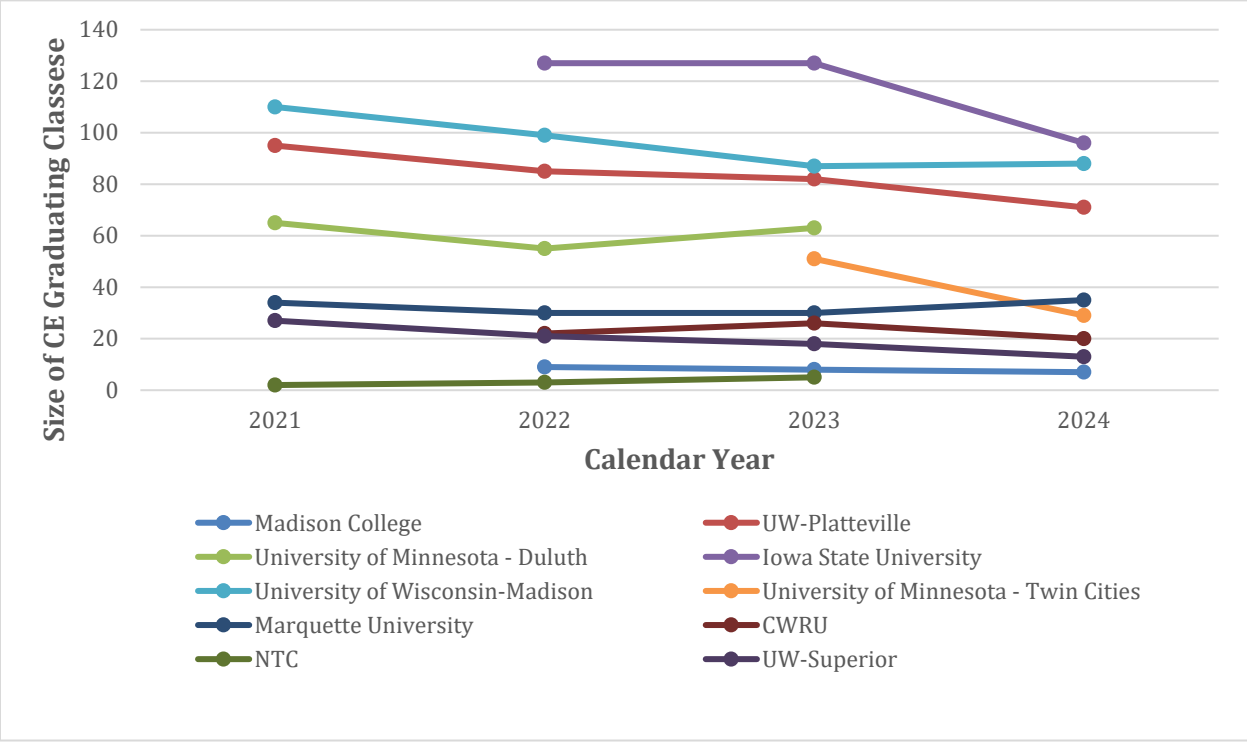


Figure 5.1 Civil Engineering BS Degree Graduation (2021-2024)

5.2 Expectations and Career Goals of Engineering Students in Transportation Careers

Students interested in transportation careers often have diverse expectations and goals, depending on their background, education level, and career aspirations. However, common themes include:

Expectations

1. **Job Stability & Security** – Many students see transportation careers, particularly in government roles (e.g., DOTs), as stable and long-term career options.
2. **Competitive Salary & Benefits** – They expect fair compensation, health benefits, and retirement plans, especially in public-sector jobs.
3. **Career Growth & Advancement** – Opportunities for promotions, continuing education, and certifications (e.g., Professional Engineer, PMP) are highly valued.
4. **Hands-On Work & Field Experience** – Many students are drawn to roles that provide a mix of office and fieldwork, such as transportation inspectors or engineers.

5. **Use of Technology & Innovation** – They expect to work with cutting-edge tools like AI, drones, GIS, and automation in transportation planning and construction.
6. **Work-Life Balance** – A good balance between professional and personal life is increasingly important to young professionals.
7. **Sustainability & Social Impact** – Many students are passionate about sustainable infrastructure, smart cities, and reducing the environmental impact of transportation systems.
8. **Internships & Mentorship** – They look for structured internship programs, on-the-job training, and mentorship from experienced professionals.

Career Goals

1. **Technical Mastery** – Gaining expertise in transportation engineering, construction inspection, or planning.
2. **Leadership Roles** – Advancing into management or supervisory positions within DOTs or private firms.
3. **Specialization** – Becoming experts in areas like traffic engineering, bridge inspection, rail systems, or sustainable transportation.
4. **Professional Licensure & Certifications** – Obtaining credentials like PE (Professional Engineer), PMP (Project Management Professional), or relevant transportation safety certifications.
5. **Public Service & Community Impact** – Making a difference in local infrastructure and mobility access.
6. **Entrepreneurial Ventures** – Some students aspire to start their own transportation consulting or construction businesses.

5.2.1 Engineering Students

Expectations

- **Technical Development:** Anticipate applying principles of civil and transportation engineering in planning, design, and systems optimization.
- **Licensure:** Strong focus on obtaining EIT and PE credentials for long-term career advancement.
- **Project Involvement:** Seek participation in large-scale projects involving highways, bridges, airports, and emerging smart infrastructure.
- **Technology Integration:** Expect workplaces that utilize GIS, AI modeling, CAD, and drone technology.
- **Social & Environmental Impact:** Value sustainability and the opportunity to contribute to smart, green cities.
- **Career Flexibility:** Desire varied roles in public agencies, consulting firms, or the private sector.
- **Experiential Learning:** Look for internships, co-ops, and research opportunities.

Career Goals

- Achieve **Professional Engineer (PE)** status and pursue technical mastery in transportation design.
- Become **project managers, traffic analysts, or infrastructure planners**.

- Lead **sustainable and innovative transportation initiatives**.
- Progress into **leadership roles** in state DOTs, consulting firms, or infrastructure-focused companies.

5.2.2 Technical/Trade School Students

Expectations

- **Hands-On Work:** Prefer field-based learning and real-world application of skills.
- **Certifications:** Aim for industry-recognized credentials such as NICET, ACI, OSHA, or CDL.
- **Structured Training:** Value apprenticeships and mentorship programs that offer clear skill development.
- **Job Security:** Seek steady employment and opportunities for promotion.
- **Fair Compensation:** Expect competitive wages, overtime options, and strong benefits packages.
- **Field Technology:** Interested in using construction tools like GPS surveying, traffic sensors, and automated equipment.

Career Goals

- Attain expertise in **inspection, materials testing, or heavy equipment operation**.
- Earn certifications that qualify them for roles such as **transportation inspector, bridge technician, or crew leader**.
- Move into **supervisory positions** like foreman or site manager.
- Maintain long-term employment in stable, well-paying field-based roles.

5.2.3 Comparative Overview

Table 5.2 provide an overview of the comparisons between engineering and technical/trade students.

Table 5.2 Comparisons between engineering and technical/trade students

Criteria	Engineering Students	Technical/Trade Students
Focus	Design, analysis, planning	Field application, inspection
Certifications	EIT, PE, PMP	NICET, OSHA, CDL, ACI
Tech Interests	CAD, GIS, AI modeling	GPS, drones, automated tools
Work Style	Office + site visits	Primarily fieldwork
Career Goals	Management, innovation, policy	Field leadership, expertise

5.2.4 Implications for Workforce Development

To effectively recruit and retain both groups, employers and agencies should consider:

- **Tailored outreach**: Promote different aspects of the job to each group (e.g., innovation for engineers, hands-on experience for trade students).
- **Career pathways**: Create clear, visible advancement tracks for each educational path.

- **Mentorship & internships**: Offer structured programs that support early career development.
- **Technology investment**: Equip work environments with modern tools appealing to tech-savvy students.
- **Emphasis on impact**: Highlight the societal contributions of transportation careers to appeal to students' values.

Conclusion

Students pursuing transportation careers bring diverse skills, expectations, and goals shaped by their academic and vocational training. Understanding and addressing these differences is essential to building a resilient, motivated, and future-ready transportation workforce. Stakeholders should develop targeted strategies to engage both engineering and technical/trade school students, ensuring that both talent pipelines are supported and aligned with industry needs.

6. TASKS 5 AND 6: RECOMMENDATIONS AND CONCLUSIONS

6.1: Greater Investment in Succession Planning, Cross-training, and Job Rotation to Address Knowledge and Personnel Retention

1. **Develop Stronger Methods and Systems for Succession Planning for Mission Critical and Mission Support Roles**: One of the recurrent pain points that emerged from analysis of Task 2 focus group data and Task 3 DTSD employees survey responses, is the lack of systematic succession planning, especially in mission critical roles. Predicting when employees in highly critical roles are going to retire is challenging. Employees may not know when they will retire, or even when they know, they may not want to communicate those plans ahead of time. Investing in stronger methods for succession planning is critical for addressing DTSD's twin challenges: retention of DTSD employees and knowledge retention, management, and transfer process. The team recommends the following:
    a. **Create Alpha/Beta Roles** and provide lead time to overlap replacement hiring for key positions is essential so that the experienced retiring person can help train their replacement**.** To maximize the knowledge transfer process while ensuring that the soon-to-retire or retirement-eligible employees stay engaged, it is imperative that an alpha/beta succession plan is developed that integrates back-filling with those employees who are going to succeed the retiring employees. Similar to the Virginia DOT's technical mentorship program, Minnesota DOT had successfully implemented such a program and benefited from not only a seamless continuity of operations and knowledge transfer but also high levels of engagement by the incoming employees who were pleased to have a long ramp-up to their new roles and retiring employees felt gratified in leaving the role in capable hands. Developing this type of a succession plan with transparency and fairness is invaluable in building tacit knowledge that is hard to otherwise capture from senior, experienced personnel. The team recommends that for mission critical roles that require not only technical skills but a wide repertoire of leadership skills and political acumen, a succession plan be developed with at least 6-12 months of lead time for the incoming employee to work alongside the incumbent. The incoming employees will be selected through the established promotion process. This succession planning system needs to be institutionalized and become an integral part of an all-in-one workforce planning, career development, and knowledge transfer process. Investing in this type of workforce management will address DTSD's twin challenges of seamless knowledge transfer and an effective tool for retaining and engaging employees across different career stages. Another benefit of this integrative approach is that it is also extremely useful for those positions that have historically been hard to fill and may have been vacant for a while. The financial, operational, and human capital payoff for DTSD will be enormous and will justify the costs involved in implementing it. An additional recommendation would be to rehire annuitants for a limited basis for specific roles (e.g., as seen at the Universities of Wisconsin, University of Kansas, Washington State University, etc.)

2. **Create and Implement Rotational and Cross-Training Program**: Lack of a consistent cross-training and job rotational program has emerged one of the other significant pain points from Task 2 and Task 3 data analysis. In response, the team's recommendation is to create and implement a regular job rotation and cross-training program starting off with entry level employees and extending it to mid-level employees as well. This is a critically needed investment to build and retain a deep bench strength of well-rounded technically and managerially adept professionals who are essential to operational efficiency and knowledge management. The payoff for this investment extends to their long-term engagement and retention. For example, Missouri DOT has created a cross-training program to broaden employees' skills and identify advancement interests. Michigan DOT put its new engineering hires through a rotational program before placing them in production roles. Arizona DOT used a multi-year leadership development program for high potential employees for succession planning and a cross-training program to reduce single points of failure.
3. **Create a Skills Inventory Database to Strengthen Succession Planning, Cross-Training, and Job Rotation.** Virginia DOT has created a database of PDs and critical skills which tracks employee skills, career interests, and readiness for advancement and is used for succession planning, among other knowledge and personnel retention efforts. Job rotation and cross-training is strongly recommended for all new hires at DTSD and will yield benefits in terms of engagement and retention, especially for Gen Z and Millennials, better person-job fit once the employees find their true passion area, and quicker ramp-up to high levels of productivity and performance. Cross-training and job rotational programs can also be used to successfully recruit Gen Zers as they compare private and public sector job offers.

6.2 Greater Investment in Career Development for Current Staff to Retain and Engage Employees, Enhance Knowledge Management

Knowledge management and personnel retention and engagement efforts need to start on day one of the employment relationship with WisDOT, if not during the period immediately after the acceptance of job offer. Accordingly, the following recommendations are offered:

4. **Expand Leadership Training Opportunities Throughout the Division**: The team recommends offering leadership training and career enhancing skills development throughout the division targeted at early, mid- and late-career employees to address the twin challenges of knowledge management and employee retention identified in Tasks 2 and 3. Leadership skills training opportunities need to be offered to newly hired employees rather than waiting for them to reach mid-level roles at DTSD. The team strongly recommends creating a set leadership skills training curriculum for new employees. This can be an important differentiator when recruiting top talent to WisDOT. For example, Washington State DOT offers a variety of leadership skills training which helps in its recruitment and retention efforts. North Carolina DOT introduced a semester long "transportation leadership development program" for its new hires. Michigan DOT's leadership

development and training program is integrated with their succession planning and aimed at providing opportunities for both technical and support roles.

5. **Expand Professional Development Training**: Developmental opportunities in the form of skills training for leadership attributes (e.g., soft skills) and technical competencies are essential for retaining and engaging DTSD employees and need to be considered for additional investment. The gap between current and required soft skills across different generations of employees continues to challenge employers (SHRM, 2025). The NCHRP report (2022) recommends investing in career-based skill development for attracting and retaining DOT employees. According to a recent Gallup survey (2025), 68% of the employees left their organizations because of "engagement and culture" and "work-life balance and well-being" reasons which is four times the number of people who left primarily for "pay and benefits" reasons. This finding aligns with insights from literature review (Task 1, Appendix A). Expanding investment in professional development training emerged as one of the significant needs in focus group discussion (Task 2) and survey comments (Task 3). These results provide justification for WisDOT and DTSD's plans to invest in expanding their skills training and development opportunities to successfully compete with private sector counterparts who outpace them with better pay, and sometimes better benefits, as well.
6. **Invest in Funds for Professional Licensing, Certifications, and Opportunities to be a "Thought Leader"**: Results from Tasks 2 and 3 indicate a significant need to invest in professional licensing, certifications, and training to distinguish oneself as an industry expert and a thought leader. The team strongly recommends creating career and professional development funds and recognition programs that can greatly address the knowledge management, operational efficiency, and retention concerns identified in this study. Funds could be used for degrees, certifications, licensures, attending conferences, etc. The team also recommends increasing funding for role- and topic-specific training, e.g., for region experts, soil engineers, pavement engineers, etc. Some DTSD survey respondents noted difficulty finding training that pertains to their expertise or work area and the team recommends expanding access and funding for those types of training. A relatively no-cost solution pertains to making it easier for technical staff to find and filter training with PDH credits. The concerns expressed about the reduction of in-house training offering PDH credits and the ease of obtaining PDH credits needs to be addressed. The team also recommends providing more training outside of the construction season to maximize the positive impact of such training investment.
7. **Enhanced Funding and Managerial Support for PE Licensing:** A significant area of concern highlighted in Task 3 DTSD survey responses related to inadequate support for obtaining and maintaining PE licenses. The team strongly recommends several ways to address these concerns: (i) provide compensation for PE licensing fees and renewal (ii) provide study time and managerial flexibility and other opportunities to earn and maintain their license, (iii) more in-house training with PDH credits and support to excel or transition back to their technical roles, (iv) better communication for the importance and value of PE licenses to their

work roles and the funding and managerial support to help employees obtain and maintain it, and (v) recognition and support for alternative licenses since their roles do not officially require a PE license.

8. **Support and Implement Formal Mentorship Programs**: Many DTSD survey respondents (Task 3) noted the need for effective hands-on mentorship opportunities for training and retaining well-rounded engineers. The team recommends creating and implementing mentoring programs in areas, regions, and teams that don't have them. The mentoring program needs to be better supported in other teams and areas that already have in place. Structured mentoring programs to address knowledge gaps, losses, and capture can be implemented in specific roles or targeted toward specific classifications. Virginia DOT has implemented a technical mentorship program that pairs retiring senior engineers with junior colleagues for 6-12 months to facilitate knowledge transfer. VDOT's traditional and reverse mentoring programs emphasize leadership development, technical skill enhancement, and knowledge sharing, supporting succession planning and workforce continuity.
9. **Continue Efforts to Implement Market/Competitive Pay Adjustments**: Addressing low compensation is another critical priority. According to the AASHTOP midwestern DOTs salary data presented in Task 1 and survey results and comments from Tasks 3 and 4, DTSD employees' compensation is less than their midwestern peers which has an enormous impact on its ability to attract, retain, and engage technical employees. There are different approaches to pay adjustment. For example, Minnesota DOT conducted a compensation study to compare their engineering positions with private firms and used that information to target increases for critical roles (Bartlett, 2021). Step-based compensation plans were used by the California Department of Transportation (Caltrans) to create a multi-level engineer classification system with clear "range-to-range" advancement based on years of experience and demonstrated competencies.
10. **Create Technical Promotion Paths**: Another area recommended for WisDOT to invest in is the creation of technical promotion paths. Such an investment is urgently needed to address the widespread concern of the loss of technical expertise that was reflected in the Tasks 2 and 3 results and the ramifications of these losses for operational continuity, successful project completions, and stewardship. Investing in creating technical promotion paths will also help address the frustration expressed about consultants being paid more for doing the work done by the DTSD employees. To attract and retain a technically skilled workforce at DTSD, a clear career advancement path for technical specialists, that don't require management responsibilities, needs to be a priority. For example, Michigan DOT established a "Transportation Technician" career track that allows technical professionals to advance to supervisory levels within the technical path and with appropriate compensation.
11. **Reward Technical Expertise and Outstanding Performance**: An extension of the above recommendation is the creation of a fund and/or program that rewards and recognizes technical experts. These could range from formal acknowledgements for technical accomplishments and innovations, including financial rewards,

to non-monetary recognitions Expanding recognition programs for outstanding performance or creative contributions can also go a long way in addressing retention and engagement concerns. For example, Georgia DOT offers a “Commissioner's Achievement Award” that recognizes outstanding performance in areas such as preconstruction and project delivery.

6.3 Greater Investment in Onboarding and Engaging Newly Hired Employees.

According to a survey conducted on 35,023 employees across 22 countries in 30 industries (Qualtrics, 2025), for younger workers, onboarding is a crucial time to develop a positive employee experience that can translate into loyalty, which was contingent on having their professional values met, their career development and growth supported, and their ideas listened to as much as receiving competitive pay and benefits. Gen Z employees’ emphasis on opportunities for skills and career development and a supportive workplace was echoed in other surveys as well (e.g., Mercer, 2025, SHRM March 15, 2025; April 2, 2025). These findings align with the results of the DTSD new employees’ survey data (Task 3).

12. **Enhanced and Extended Onboarding Experience**: A stronger, more consistent, and possibly more flexible, onboarding experience needs to be offered to the newly hired employees. Employee orientation is a separate process from onboarding. Onboarding can last as little as one week to as long as one year depending on the complexity of the organization, teams, and work roles. The results of the data analysis from newly hired DTSD employees indicate that 21% found that the onboarding program was either completely absent or lacked substance to be meaningful. Another 26% reported that onboarding was adequate but needed improvement given the surprises that came after they started working. Taken together, roughly half of the newly hired employees had less than optimal onboarding experiences that could have ramifications down the line. A caveat here is that some of this information relates to the hiring period during Covid-19 pandemic which disrupted many regular processes. Division and area specific onboarding is recommended, which outlines the information and expectations that will set up the newly hired for success from day one. A SHRM 2023 report highlighted the benefits of a “best in class and the downsides of a subpar process” including a 58% increase in desire to stay with a company for more than 3 years (Clickboarding, 2015), a 50% increase in productivity (SHRM 2023), and employees 2.6 times more likely to report being extremely satisfied with work. Best practices recommended by the Society of Human Resource Management (SHRM), highlight the importance of going beyond simple administrative requirements and training information to emphasize the importance of culture and work processes essential for performance. Many organizations have designed innovative onboarding activities such as fun team-building activities, visits to specific locations, work-themed games, etc. (SHRM, 2023, 2024) that created positive employee experiences and set them up for effective performance, facilitating faster team bonding, and acclimation to the work culture and expectations. Florida DOT has created a 2-year structured onboarding program for new engineers with rotation through different project phases and departments; it is followed by another 2-year training on more focused technical

and managerial work. A 12–18-month mentorship program is integrated in some of these areas. California DOT requires a 24-month onboarding and training program for its new transportation engineers.

13. **Preboarding Needs to be Added**: Preboarding process needs to be closely tied to the onboarding process. Preboarding practices are recommended to be set in motion during a one- or two-week period before the employee joins the organization to start familiarizing them with the expectations and requirements (SHRM, 2024). An online portal with FAQs, checklists, introductory videos, and other information can be set-up to ensure consistency and ease in accessing the onboarding materials. A 'chat' feature can be embedded to facilitate conversations between newly hired employees and the team that they will be joining.
14. **Assessment of Onboarding Programs**: An assessment tracking the implementation of the new hire and onboarding strategies needs to be considered to measure the success of these efforts and to identify any pain points that need to be quickly addressed (SHRM, 2024). As part of this effort, mentors or 'buddies' need to be surveyed for optimizing the success of the buddy system.
15. **Implement a Buddy System for New Employees**: As part of enhancing the onboarding process and addressing Task 3 survey comments, the team recommends implementing a 'buddy system' for new employees to partner with senior employees who could serve as their advisors. The buddy system is loosely practiced by certain regions at DTSD and needs to be implemented consistently across the board so that every new employee can avail of the opportunities and benefits presented by such a relationship.

6.4 Greater Investment in Strengthening Knowledge Management Protocols and Systems

16. **Build Knowledge Management Protocols and Systems**: The results from Task 2 focus groups on knowledge management and review of other DOT's efforts discussed earlier in the report (under Task 2) point out the need to build knowledge management protocols and systems, strengthen the codification of existing knowledge transfer processes. The team recommends (i) determining high-risk duties and positions to target creation of these systems, (ii) updating individual job descriptions to include key event/data documentation in formalized systems, (iii) updating performance goals to make knowledge documentation and transfer efforts an observable and assessable part of everyone's tasks. These efforts could range from simple steps such as filing project emails that contain useful information to presenting and attending lunch and learn sessions. (iv) consider assignment of individuals to key task forces, and (v) finally, even though not directly studied in this project, knowledge capture and transfer from consultants and industry partners needs to be streamlined. Refer to NCHRP report (2017) for best practices and recommendations on this topic. Review and revise, if necessary, performance management systems for consultants and industry partners for not only for knowledge capture but also to better monitor their performance, reducing WisDOT employees' work overload from mismanaged expectations or communication misunderstandings. For example, Missouri DOT shaved off 4-6 years of estimated time to complete the $535 million reconstruction of Highway 40 (I-64) in St. Louis and at a lower cost than expected by creating a performance management strategy for their

industry partners that involved regularly tracking their time, performance, and progression toward goals (U.S. Department of Transportation, n.d., *Missouri DOT I-64 Rehabilitation Case Study*).

17. **Implement Pilot Program for Incentivizing Knowledge Transfer:** The team also recommends implementing a pilot program incentivizing the documentation and dissemination of hard to find and develop knowledge could be implemented. It is especially critical to target experienced staff to document their practices and mentor successors and encourage them to participate in this program. It is important not to conflate positional authority with subject matter expertise. DTSD subject matter experts need to be identified, whoever and wherever they are, and empowered to contribute to the creation, codification, maintenance, and/or dissemination of different types of knowledge assets: operational, cultural, technical, process, etc. They should be recognized and rewarded for these efforts
18. **Implement Innovation Roundtables, Groups, Councils and Broad Involvement Across WisDOT to Foster Creativity, Bridge Generational Gaps, and Pilot Experimental Solutions to Operational Challenges**: An extension of the lunch and learn method for KM is the innovation roundtable or council (Augustine et al., 2021). Many organizations, including peer DOTs (e.g., Utah DOT, Idaho DOT, Illinois, Caltrans, Missouri, etc.) are increasingly implementing these innovation roundtables either internally or as statewide contests as tools to engage their multigenerational workforce (and public) and tap into their creativity and desire for meaningful impact to address complex problems. Design thinking methodology (e.g., Idaho DOT) can be used to structure and lead these innovation sessions. These innovation roundtables can be used as a springboard for launching prototypes or experimental solutions (MVP – Minimum Viable Products/Prototypes of the proposed solutions) and assess the results of the pilot efforts. These strategies will not only improve knowledge exchanges and creativity but also bridge generational differences.
19. **Engage Leadership at all Levels to Strengthen a Culture of Knowledge Management**: There is no one-size-fits-all knowledge management program. It needs to be tailored to WisDOT's goals and culture. Any knowledge management program or system cannot just focus on information management and technical aspects and ignore the people, social, organizational, and cultural aspects that accompany successful knowledge creation, codification, access, transfer and dissemination.

6.5 Greater Investment in Operational Support for Workforce Development and Analysis

20. **Invest in Workforce Development Professionals to Update and Maintain Strategic Workforce Management Plans (SWMP)**. To consistently stay on top of the challenges identified in this report, WisDOT needs to develop and invest in a team of workforce development professionals to regularly update its Strategic Workforce Management Plan (SWMP) in order to keep on top of the data gathering and analysis that is required to address recruitment and retention challenges identified in this report. Alaska, California, Georgia, Maryland, and Texas DOTs have actively invested in building a team of

workforce development professionals that maintain their SWMP based on regular SWOT analysis and internal and external assessments of work, workforce, and workplace changes as outlined by Washington State DOT's presentation to the TRB (https://onlinepubs.trb.org/onlinepubs/webinars/211005.pdf)

21. **Engage in Risk Analysis to Assess Costs of Inaction Related to Knowledge Losses, Skills Gaps, Vacancies, and Employee Burnout**. The team recommends the DTSD leadership engage in regular risk analysis to understand the costs of not taking any actions for addressing problems associated with knowledge losses, skills gaps, unfilled positions, and overworked and under compensated but passionate employees. All the evidence from this project points out that the current direction and strategy will not sustain WisDOT's trajectory of operational excellence unless financial and administrative investments in addressing the challenges outlined in the report.
22. **Engaging Leadership at All levels for Strong and Urgent Actions Investing** in greater financial and administrative support for implementing these recommendations. Further, it is imperative for the leadership to engage in strengthening a culture where mid-level and senior employees feel valued, listened to, respected, and recognized. Leadership at all levels needs to invest greater effort in effectively communicating short-term and long-term plans for addressing institutional knowledge losses, understaffing, and overwork. Streamlining procedures for quicker approval and decision-making will also enhance operational efficiencies.

6.6 Improved Marketing and Storytelling to Attract New Talent

There are several no-cost or low-cost (and a few moderate cost) solutions to address the current and impending talent shortfall at WisDOT for the POC to consider. Some of these strategies are already being used at WisDOT and need to be ramped up. Others are being used at peer DOTs and can be considered for adoption. Following are some strategies to consider in light of the literature search and the results of data analysis on internal WisDOT employees and external stakeholders such as students and faculty. A recent survey of college graduates across 15 disciplines (including engineering) and Gen Z employees among 300 organizations nationwide (Mercer, 2025) indicates that they value working in organizations that provide them with challenging and rewarding work, recognition and career development programs, and a workplace culture that values the respectful sharing of ideas. Surveys of Gen Z workers by Deloitte (2024) reiterate similar themes. Most, if not all, of these attributes currently exist at WisDOT and need to be widely and actively publicized in recruitment materials.

23. **Enhance Strategic and Innovative Use of Social Media For Recruitment.** Difficulties in attracting scarce engineering talent was noted as a significant pain point in takeaways from Tasks 1, 2 and 3. The proliferation of Social Media (SM) in attracting new engineering talent makes this a natural first choice for WisDOT to consider as a no-cost or, at the most, a low-cost solution, to current and potential challenges in attracting new applicants. Results from data analysis and literature reviews indicate that Gen Z applicants tend to use a variety of SM platforms to learn about job and internship opportunities. Specifically, a strategic use of SM

was one of the recommendations made by DTSD survey respondents to better tell DTSD's stories of success and impact. Currently, there are ongoing efforts at WisDOT and DTSD to use a variety of SM platforms to reach both passive and active job seekers across different generations. The recommendation is to increase investment in this area and create specific DTSD-focused recruitment materials with paid placement on a variety of SM platforms as well as other venues. Inadequate recruitment materials were highlighted by some newly hired DTSD employed in their survey responses. The team recommends developing a focused SM strategy that includes using a regular SM calendar to generate sustained online presence, track size of applicant pools, quality of hires, and views through analytics, etc. Creating a SM strategy could be used to:

a. **Improve WisDOT and DTSD Branding and Brand Awareness to Highlight Work that is Professionally Meaningful, Recognizes DTSD Staff, and Helps Generate Interest** with a new applicant pool that may have never considered public sector employers before or working on projects that have broad societal impact (Thomas, et al., 2019; White, 2014). Improved branding and brand awareness can also help widen the applicant pool to attract new applicants who are excited about the possibilities of working with emerging and new technologies (e.g., using drones in design, construction, and maintenance, having an impact in their own communities, and/or the shift toward multi-modal designs). Results of surveys on DTSD newly hired employees (Task 3), student surveys (Task 4), and Deloitte survey on Gen Z workers noted in the literature review (Task 1) indicate that many applicants are attracted to work that is professionally meaningful and contributes to greater sustainability and societal purpose, all of which align very well with what DTSD offers. To the extent that the SM includes mentions of senior DTSD/WisDOT leadership publicly congratulating teams/individuals in their posts, it will go a long way in reinforcing the message that WisDOT is a great place to work that offers opportunities to work on exciting projects, excel in them, and be recognized for such efforts. Further, results from the current surveys and existing research discussed earlier in the report identifies work-life balance as a significant attribute that makes an organization attractive to applicants The target audience for these efforts could be interns weighing different employers, applicants considering entry level positions as well as mid-level roles who may enticed to consider public sector employment for more fulfilling and impactful careers that offer excellent opportunities for work-life balance.

b. **Broaden the Applicant Pool to Generate and Maintain Applicant Interest** in WisDOT as an employer of choice for new applicants for internships and full-time employment. This recommendation speaks to the takeaways from Tasks 1and 3. Several DTSD survey respondents in Task 3 noted the need for using a variety of channels for better connecting with potential applicants. Some DOTs (e.g., Minnesota, Texas, and Washington) use SM to profile their work on an ongoing basis. Texas and Florida DOT use their engineers to create authentic content for their Instagram and TikTok accounts. WisDOT also has an active SM presence on certain platforms that can be further enhanced to make it DTSD

focused, e.g., a “day in the life” of a design construction, maintenance professional. Engaging with new platforms (e.g., Reddit, Substack, and other media) focused on civil/transportation/environmental engineering topics) also needs to be considered for posting a variety of engaging content. These posts need to also highlight the work of award-winning teams or employees and public recognition of their efforts. It is also important to consider conventional recruiting platforms and solicit feedback from current engineering students and DTSD interns for new digital areas for outreach.

c. **Enhance Communication of WisDOT and DTSD Projects and their Societal Impact to Positively Shape Public Perceptions.** A focused and enhanced SM strategy will also help lawmakers and the public become more aware of the great work being done by DTSD employees in designing, building, and maintaining safe transportation infrastructure and what it takes to pull off these projects with constrained resources. Poor perceptions of public sector work were frequently noted in several comments in Task 3 as having a demoralizing effect on DTSD employees.

24. **Reframe Recruitment and Interviewing Practices as Marketing and Storytelling Opportunities**. WisDOT can invest in creating an innovative experience-based recruitment strategy (e.g., a reality show format that captures new engineering hires’ experiences through their first year at WisDOT.) Other creative recruitment strategies could include virtual office tours, augmented reality experiences of infrastructure projects on mobile devices, mobile recruitment vehicles equipped with interactive exhibits that travel to different career fairs, and regular visits to active construction and design sites (e.g., North Dakota DOT’s Touch-a-Truck that allows students to interact with it and raise awareness of careers with them), use of VR headsets at career fairs to give students a taste of construction and design work, and use of blogs, podcasts, TikToks by engineers (e.g., Texas DOT) to highlight their project and work experiences. Interview questions and processes need to be updated to reflect conversational elements and WisDOT/DTSD brand-building.
25. **Create and Support a Community of WisDOT/DTSD Advocates and Ambassadors for WisDOT/DTSD Brand-Building, Marketing, and Storytelling**. Another no-cost solution involves creating a community of internal and external advocates and ambassadors and strengthening relationships with existing ones. Internal advocates could include current DTSD employees with public-facing roles as well as newly hired employees who may or may not have any public-facing responsibilities. External advocates would include a variety of external stakeholders who are embedded in a variety of applicant pools: high-school and college faculty, career advisors at these colleges, student chapters of different engineering associations and societies (e.g., the American Society of Civil Engineers (ASCE), Society of Women Engineers (SWE), National Society of Black Engineers (NSBE), Society of Hispanic Professional Engineers (SHPE), Society of Asian Scientists and Engineers (SASE), among others), veterans groups, professionals associations and industry/trade groups, etc.

a. **Support Stronger Channels of Campus-Specific Outreach Including Engineering Faculty, Career Advisors, and Engineering Specific Student Chapters.** Many faculty, career advisors, engineering student chapters at colleges organize employer panel discussions, offer guest speaking opportunities, and frequently discuss employers and job/internships postings that are sent to them directly and/or appear on Handshake. By developing and maintaining relationships with these advocates, WisDOT and DTSD can actively generate a viable slate of intern and employee candidates and sustain their interest throughout the hiring process. More importantly, they can actively shape their perceptions of WisDOT as an employer of choice and offer job shadowing opportunities on a regular basis. Iowa DOT has partnered with universities and technical colleges in multiple ways (e.g., by creating a "Roads Scholars" program with Iowa LTAP) to build a talent on-ramp to its many jobs. Connecticut DOT partners with technical colleges to create direct pipelines for maintenance and technical positions, including paid internships and guaranteed interviews. Missouri and Texas DOTs have developed training and employment pipelines specifically for disadvantaged youth and young adults, providing them with the skills needed for highway construction and heavy equipment operation, and creating pathways to long-term careers in transportation. New Mexico DOT has created an on-the-job training and industry credentialing program to recruit local high school and college students with the help of state funding. Michigan DOT has built a 10+ year partnership with Historically Black Colleges and Universities (HBCUs) as a pipeline for recruitment for a variety of STEM and non-STEM roles. North Carolina DOT has a similar relationship with HBCUs. Vermont, Oregon, and Washington State DOTs have likewise expanded their applicant pools (Kelly, et al., 2022; VDOT, 2021; Washington State DOT, n.d.). A longer-term solution is to create school-to-work partnerships like the one envisioned by Adams and Hart (2020) at the Midwest Transportation and Workforce Center at UW-Madison for building apprenticeship programs for highway maintenance.
b. **Consider DTSD spokespeople as Advocates with Personalized Stories across Different Career Points for Campus Outreach and Collaboration with University Partners**. The DTSD team can develop a database of their employees who already have ongoing relationships with high-school and college faculty, career advisors, student chapter leaders/members and develop a coordinated outreach plan that looks for campus visits, guest talks, and other means of engaging with engineering students. A no-cost effort involves creating a list of faculty who teach different civil/transportation/environmental engineering courses at different colleges and reaching out to them. Many faculty also serve as advisors to student chapters and facilitate introduction to the student leaders. DTSD engineers can partner with them to facilitate DOT focused capstone projects. They can also partner with university innovation and research centers (like UWM-IPIT) that have student interns, sponsor engineering competitions, seminars, and symposia, and in some cases DOT engineers team teach courses with faculty. Michigan DOT and

Iowa DOT have expanded innovation councils and created public portals for sharing and submitting ideas, involving external partners, including students and increasing public understanding of their DOT's innovations. They have used these portals for publicizing employee recognition programs, such as contests and rewards for innovative ideas that not only build internal engagement but are also used to attract candidates interested in innovative and purpose driven workplaces.

c. **Create and/or Strengthen Alumni Ambassador Networks and Campus Outreach Efforts**. WisDOT can create and/or strengthen an Alumni Ambassador Network that consists of recent hires who specifically recruit from their alma maters. To facilitate this, WisDOT employees who are alumni from these colleges can reach out to the faculty and explore ways of engaging with the faculty and the students. Current DTSD employees can also participate in alumni events at their local colleges that usually include students and other attendees who may be on the job-market. Sponsoring a table or placing ads during alumni events would also help highlight WisDOT as an employer of choice. Alumni events also provide the opportunity to expand the advocate/ambassador network. WisDOT can create competitions that seek student input for some of their projects and use that to follow-up with recruitment outreach.

26. **Invest in Earned Media Outreach and Targeted Advertising on College Campuses**: A relatively low to moderate cost solution to talent acquisition challenges lies in investing in targeted advertising on college campuses, specifically in engineering buildings and engineering college electronic newsletters. Targeted advertising, with scannable QR codes for internships, job openings, sponsorships, and job shadowing opportunities, displayed during special college events, engineering and major athletic competitions, and/or in high student traffic areas such as gyms, student unions, cafeterias, etc. can also generate interest in WisDOT as an employer of choice.
27. **Updated Position descriptions**: Job descriptions need to be updated to remove degree or skills requirements that may not be essential to job performance. An example noted on page 87 in the NCHRP 1008 Research Report (2022) highlights one state DOT removing the requirement of engineering degrees for its project manager jobs which helped them expand their applicant pool to those with project management experience in related disciplines. The name of the DOT was not mentioned.

WisDOT has successfully faced and navigated a variety of headwinds in the last decades. However, the disruptions caused by rapid technological advancements, changes in workforce expectations, uncertainty in economic and labor markets will be too profound to adapt to without undertaking bold actions at this stage. Top leadership commitment and support is critical, so also leadership at the divisional and departmental level, for any of the above recommendations to be successfully implemented and sustained over time. Investments made in implementing these recommendations will have enormous payoffs for excellence in operational, financial, and human resources domains. The key message from the wide-ranging and thoughtful responses to the DTSD survey is that ***employees are committed to seeing themselves and WisDOT flourish.***

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21. APPENDICES

Appendix A: Full Literature Review

As noted earlier, the State Departments of Transportation are facing a severe talent acquisition and retention squeeze created by a confluence of three interconnected forces: (i) a volatile labor market and educational trends that have posed hiring challenges of engineering and technical professionals, (ii) shifting workforce attitudes from a multigenerational workforce that values different work and organizational attributes have created retention and engagement challenges, (iii) and increasing proportion of retiring and retirement-eligible employees that threaten losses in specialized skills, knowledge, experiences, and operational disruptions. No State DOT is immune from experiencing these daunting and disruptive challenges even if there are differences in the severity of their impact. The success of WisDOT's response lies in understanding and analyzing the nature of these challenges to craft a data-driven and evidence-based response that yields maximum payoff (with the least costs and pain) in attracting, retaining, and engaging their engineering and technical workforce and re-energizing their knowledge management and transfer systems and practices. The following paragraphs describe some of the strong headwinds that the state DOTs face in recruiting, managing, and retaining their engineering and technical talent.

Employment Trends in Transportation Related Industries

Labor market trends from the US Department of Transportation, Bureau of Transportation Statistics (2024) over the past five-year period (2019-2023) indicate that a steady 6.1%-6.2% of the workers are employed in transportation related industries which includes state DOTs and the federal DOT. These statistics further highlight some of the supply side challenges facing state DOTs.

Table 1: Percentage of People Employed in Transportation Related Industries Compared to Overall Employment in Transportation.

Year	Total employment in transportation	Employment in transportation and warehousing sector	Employment in transportation-related industries	Estimated total employment in transportation	Estimated employment in transportation-related industries
2019	9.9	3.8	6.2		
2020	10.2	4.0	6.2		
2021	10.3	4.2	6.1		
2022		4.3		10.3	6.0
2023		4.2		10.3	6.1

Source: https://data.bts.gov/stories/s/Transportation-Economic-Trends-Transportation-Empl/caxh-t8jd/

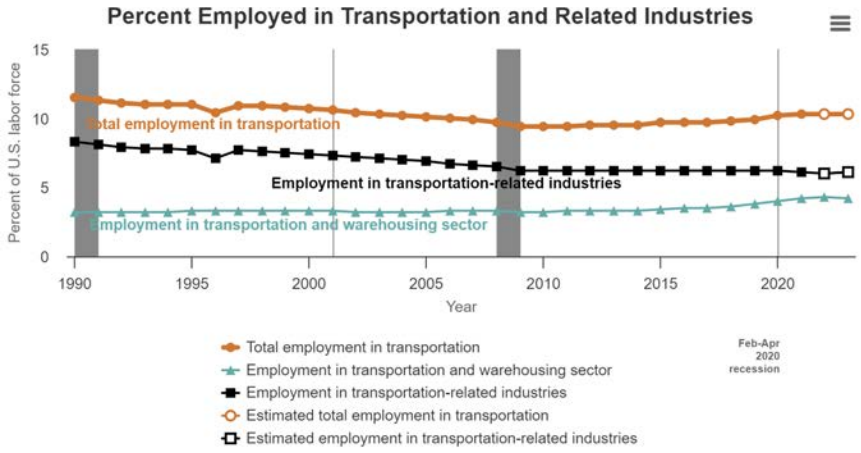


Fig 1: Line Graph that Shows Employment in Transportation.

While the employment trends in transportation and transportation related industries have not shown dramatic swings, to get a true understanding of their workforce development needs, state DOT leaders need to broaden their focus to survey the current and future employment landscape for engineers as well as the graduation rates for civil engineers. The following sections provide significant insights into these trends, especially since the influx of new federal funding for infrastructure projects.

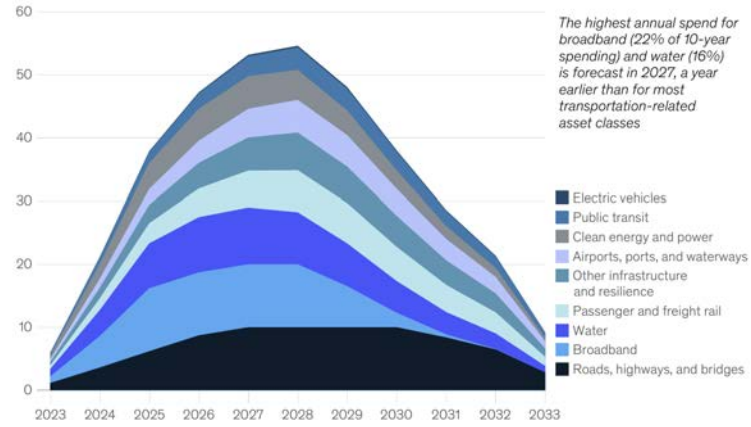
Increased/Increasing Demand for Engineering Talent: Impact of the Infrastructure Investment and Jobs Act

According to Hovnanian, Kumar and Luby (2022), the demand for engineering jobs and talent has surged due to the Bipartisan Infrastructure Law (BIL) also known as the Infrastructure Investment and Jobs Act (IIJA). Bureau of Labor Statistics (BLS) estimates that the employment of civil engineers will grow 6% from 2023 to 2033, which is faster than the average for all occupations and slightly less than for engineering jobs in general (9%). Further, over the next decade, on average, about 22,900 new openings for civil engineers are projected each year. Many of those openings are expected to result from the need to replace retiring workers or those who left for other jobs. These job openings do not reflect the number of new civil engineering jobs that are expected to be generated as a result of the IIJA. Several economists have projected that the IIJA infrastructure projects will create 883,600 jobs by 2030 and per capita income will be 10.5% larger than if no infrastructure projects were completed (S&P Global, 2021).

As seen in the chart below provided by Hovnanian and colleagues (2022), the peak demand for engineering talent resulting from the IIJA is expected to hit around 2027-2028 period:

Incremental Bipartisan Infrastructure Law spending and subsequent workforce needs could peak around 2027–28.

Estimated new capital construction expenditures, by year and asset class, $ billions

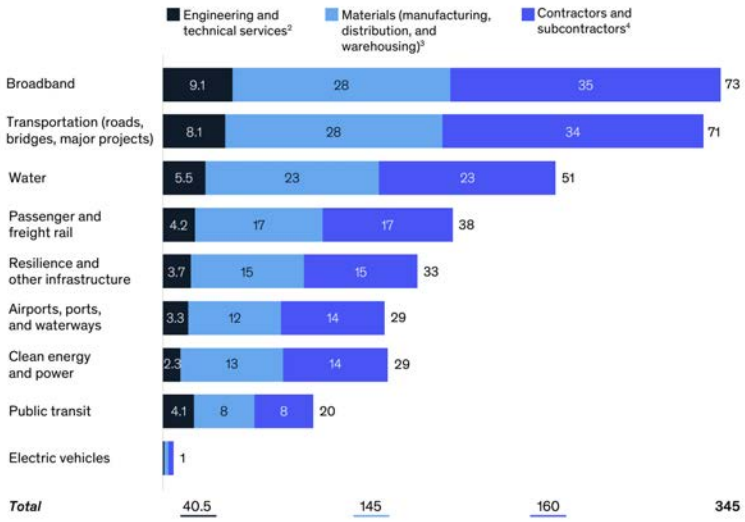


Source: Expert interviews; Lightcast, 2022; US Bureau of Economic Analysis; Bernard Yaros and Mark Zandi, "Macroeconomic consequences of the Infrastructure Investment and Jobs Act and Build Back Better framework," Moody's Analytics, November 4, 2021; McKinsey preliminary estimates based on Bipartisan Infrastructure Law, H.R. 3684, and White House state-specific information

The jobs created as a result of the IIJA are projected to pose sector-wide challenges. Another chart (see below) from Hovnanian and colleagues (2022) drills into these details to show the impact that IIJA is expected to have on the entire value chain of activities during peak demand and this will need to be considered as state transportation leaders craft their talent acquisition and management strategy.

Jobs from new Bipartisan Infrastructure Law capital expenditures for construction will span sectors across the construction value chain.

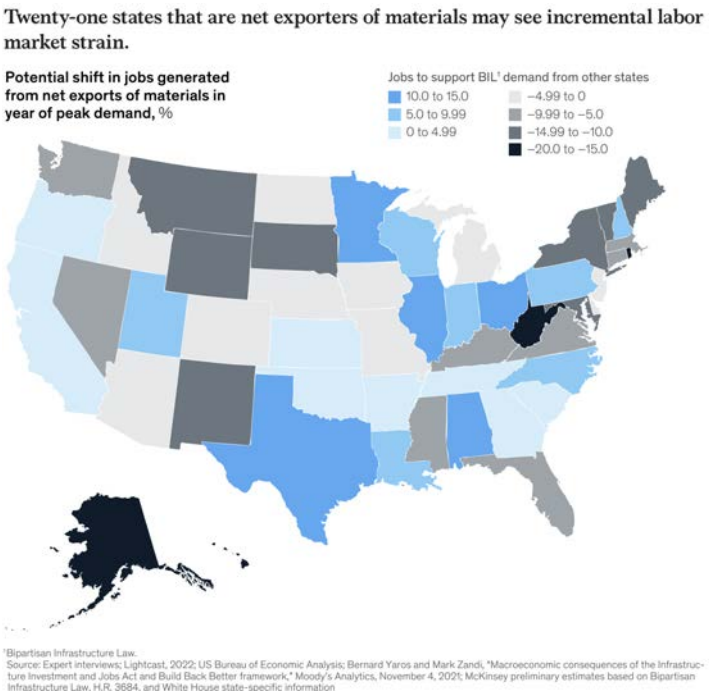
Jobs created in year of peak demand across construction value chain,[1] thousands



Note: Figures may not sum, because of rounding. Does not include safety and environmental remediation asset classes or competitive energy grants, collectively accounting for $82 billion in new spending.
[1] Peak demand is defined as the year between 2023 and 2033 in which an asset class has the highest number of jobs required from spending (typically, 2027 or 2028); estimates above do not include the ~78,000 jobs generated during peak demand through supply chain effects outside of the construction value chain.
[2] Eg, civil engineer, architectural drafter, electrical engineer.
[3] Eg, welder, truck driver, supervisor of production workers.
[4] Eg, construction laborer, operating engineers, supervisor of trades workers.
Source: Expert interviews; Lightcast, 2022; US Bureau of Economic Analysis; Bernard Yaros and Mark Zandi, "Macroeconomic consequences of the Infrastructure Investment and Jobs Act and Build Back Better framework," Moody's Analytics, November 4, 2021; McKinsey preliminary estimates based on Bipartisan Infrastructure Law, H.R. 3684, and White House state-specific information

An occupation-level analysis undertaken by Hovnanian and colleagues (2022) indicate that certain occupations are going to feel the disproportionate amount of strain as a result of a combination of an influx of IIJA investment and corresponding shortage of qualified labor. They called them the "crucible" occupations and noted that they are influenced by two core drivers: (1) the "momentum" rate at which jobs were expected to grow (or decline) without the BIL/IIJA and (2) what is now expected to happen as a result of the passage of the BIL/IIJA. Based on these two criteria, **civil engineering has been identified as a *"crucible occupation"*** within the engineering and technical services domain. The ramifications of identifying civil engineering as a "*crucible occupation*" entails that civil engineering employees will not only be in high demand, but they will also be less likely to be beholden to any one employer because their valuable skills will make them highly sought after. In addition, with the projected gap between demand for engineering and technical services talent and their supply, it is expected that unfilled positions "can bottleneck project- and industry-wide growth because of the upstream gating role they play in individual projects. In addition, due to the education and licensing requirements for this segment (for example, civil engineers), the lead time required to address shortages in these sectors is particularly long" (Hovnanian et al., 2022, p. 6).

A state-by-state comparison (see below) translates the impact of the IIJA in terms of projected labor market strain and the good news is that Wisconsin is not expected to feel any extra strain as a result of the IIJA. Note this projection provides an overall assessment and does not specifically include any details for engineering and technical services professionals.

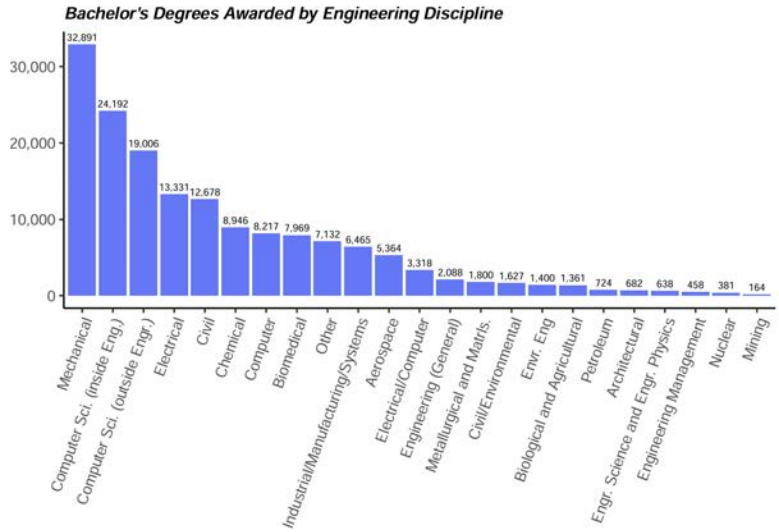


In Wisconsin, the projected job growth for 2020-2030 for civil engineering technologists and technicians is 5% while transportation and civil engineering jobs are projected to increase 11% during the same period (O*Net Online, 2023). These projections have not yet factored in the impact created by the IIJA. Data for graduation rates for civil engineering undergraduates in the 'local' midwestern labor market will be provided in the upcoming series of tasks that takes a closer look at these graduates and surveys them to provide a better understanding of their workplace expectations.

Decreased (or further Decreasing) Supply of Engineering Graduates: Educational Pipeline

The promise of new jobs and new infrastructure projects can be exciting for any community and organization that is directly impacted by the infusion of new funding. This promise gets tempered in the context of existing workforce and educational pipeline challenges. As noted in the summary report published by the National Governors Association (NGA) and the American Society of Civil Engineers (ASCE) "however, these increased investment levels amid accelerating retirement trends and poor attrition rates in the infrastructure space are compounding existing gaps in the engineering and infrastructure workforce and threaten the overall impact of this generational opportunity" (2023, p.1)

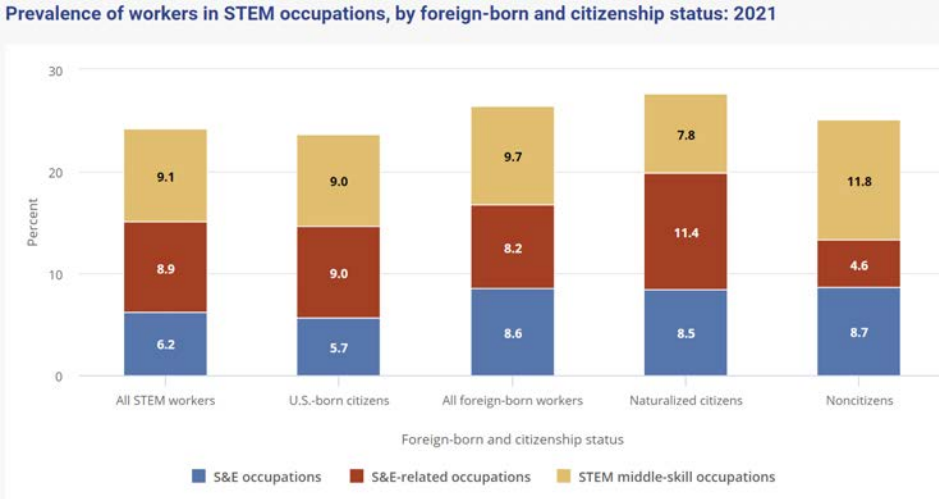
Data from the BLS and educational spaces shows that the increasing number of job openings and projected growth has not kept pace with the number of skilled employees available to fill these jobs. As seen in the chart below, in 2023, civil engineering was the fifth most popular undergraduate engineering degree awarded.



Source: https://ira.asee.org/wp-content/uploads/2023/12/Engineering-and-Engineering-Technology-by-the-Numbers-2022-1.pdf

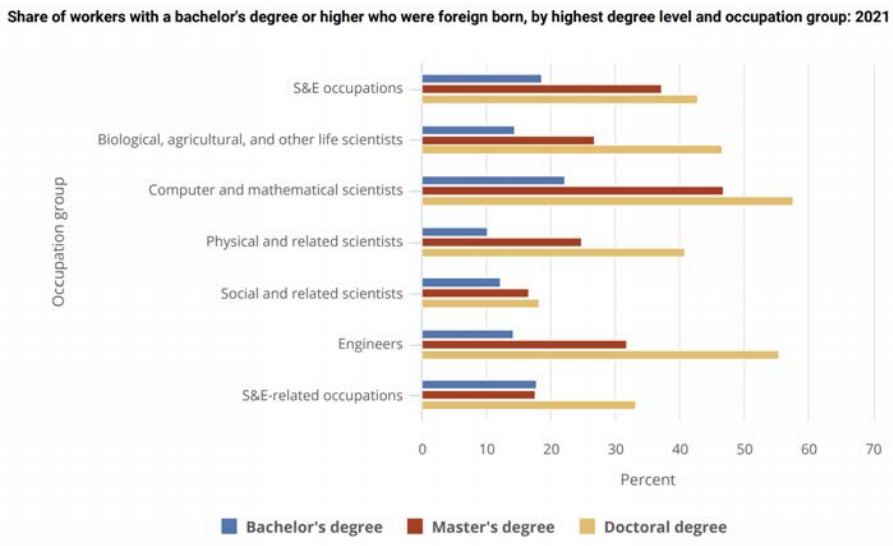
Although, the number of graduates with civil engineering degrees had increased by 13.6% in the period between 2015-2016 to 2020-21, there has been a 0.85% decline in the number of undergraduate degrees from 2021 to 2023 which equated to 2,373 fewer civil engineering students that graduated with a bachelor's degree in 2023 (Source: IPEDS and ASEE). This shortage is worrisome especially considering the ramped up recruiting efforts by many agencies for their newly funded infrastructure projects.

Another trend to note which has implications for crafting WisDOT's talent acquisition strategy is the citizenship criteria for engineering jobs. The chart below shows the proportion of US born and foreign-born naturalized citizens, and non-citizens (authorized to work in the US) who are currently in the STEM workforce (National Science Foundation's, May 30, 2024).



Source: https://ncses.nsf.gov/pubs/nsb20245/foreign-born-stem-workers

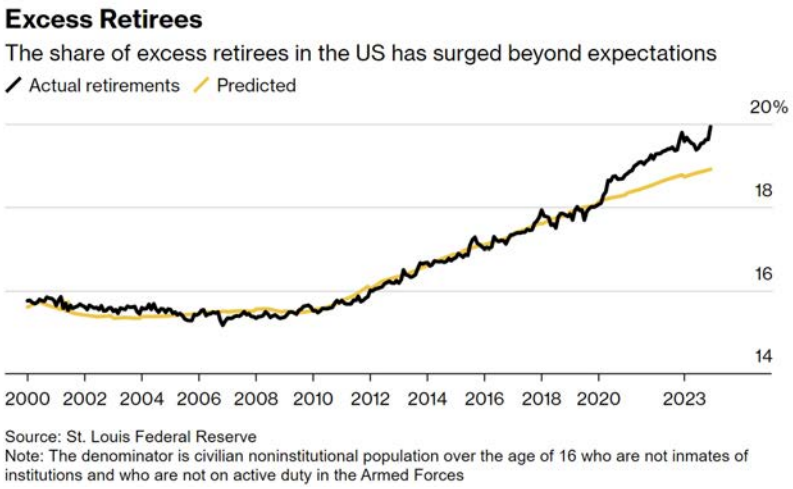
Further digging into the data specifically for foreign born engineering workers, 14% of them have earned a Bachelor's degree while almost 40% earned a Master's degree and the majority of them (55.5%) earned a doctoral degree. Data for US and foreign-born civil engineering graduates with a Bachelor's degree is not available.



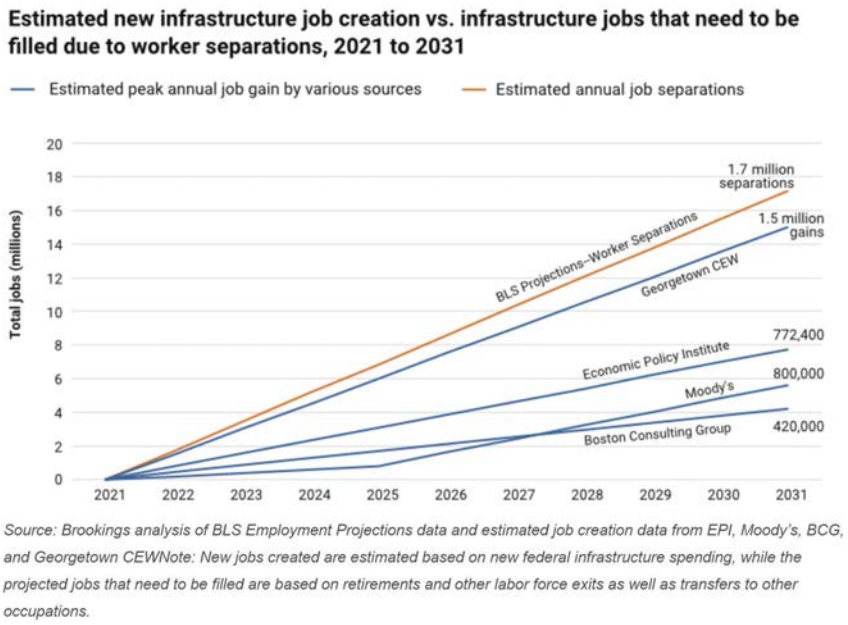
Source: https://ncses.nsf.gov/pubs/nsb20245/foreign-born-stem-workers

Decreased Supply of Engineers through the Retirement Lens:

Even though there is an increasing number of students pursuing different types of engineering degrees in the US, their growth cannot keep pace with the demand for them. What makes the labor market tighter is that some estimate that nearly 30% of the science and engineering graduates in the labor force are over 50 years old and are expected to retire in the next 15 years (Atherton & Fasano, Engineering Management Institute, 2023). Estimates from economists at the Federal Reserve Bank of St. Louis predicted the "great retirement" wave with 2.7 million more retirees than their original model predicted (Bloomberg, Feb. 9, 2024) and it is up 80% from where it was six months ago (SHRM, Feb. 25, 2024).



At the same time, there are fewer numbers of Gen Z and other new entrants to the workforce to compensate for the retiring workers. All this will exacerbate the attraction and retention hurdles facing many employers, including the state DOTs. According to the Brookings Institute Report (2023), "from 2021 to 2031, projections show 1.7 million infrastructure workers (12.2%) leaving their jobs each year on average, leading to huge replacement needs. Moreover, these holes may be even bigger to fill than any projected job growth from new federal infrastructure funding, which estimate up to 1.5 million new jobs created annually over the new two decades."

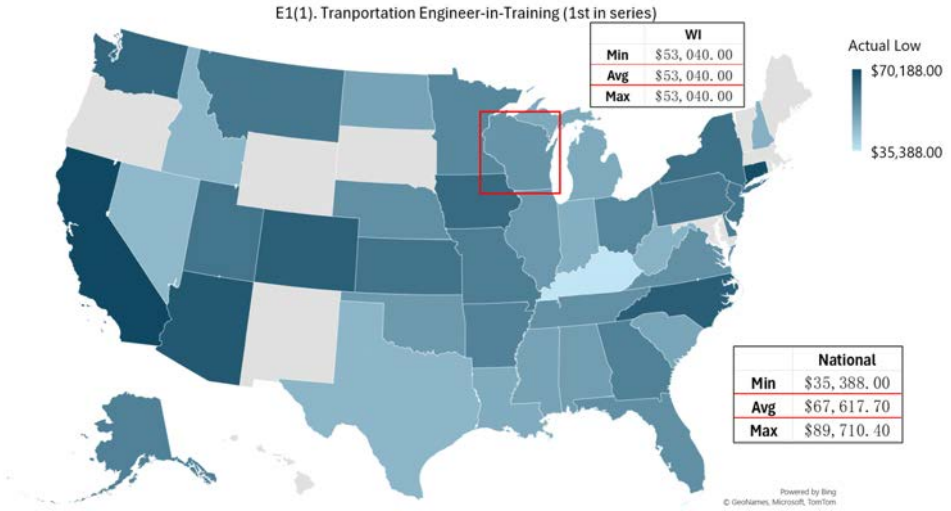


Source: Brookings analysis of BLS Employment Projections data and estimated job creation data from EPI, Moody's, BCG, and Georgetown CEWNote: New jobs created are estimated based on new federal infrastructure spending, while the projected jobs that need to be filled are based on retirements and other labor force exits as well as transfers to other occupations.

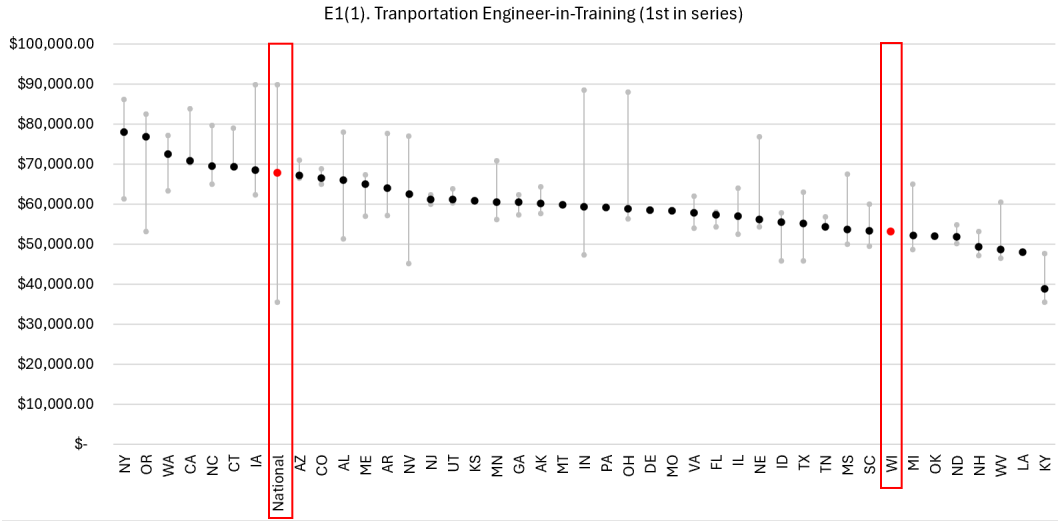
Salary Comparison between WisDOT and other DOTs

AASHTO regularly conducts salary surveys for key roles across the state DOTs. Based on the data provided to the research team (AASHTO Salary Survey, 2024), the charts below are based on data reported in 2022 (published in 2024) and offer a look at how WisDOT's salary in select engineering and technical services roles compares with DOTs nationwide as well as with two of its immediate midwestern peers – Minnesota and Michigan DOTs. AASHTO provided a salary comparison for five job classification categories: administrative, engineering, maintenance, general, and other. The charts provided here are for select engineering roles. Should the POC wish to see a comparison for other classifications, the research team will provide them.

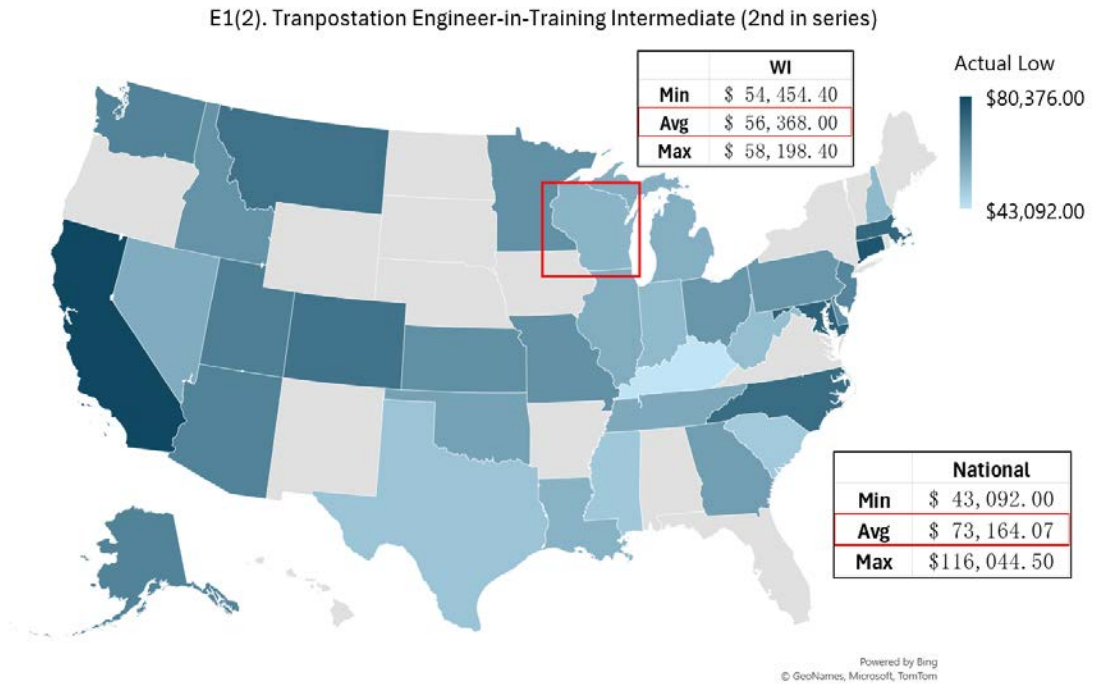
Below is a nationwide view of minimum, maximum, and average salaries for the Transportation Engineer-in-Training (E1 classification) and how WisDOT compares to other DOTs.



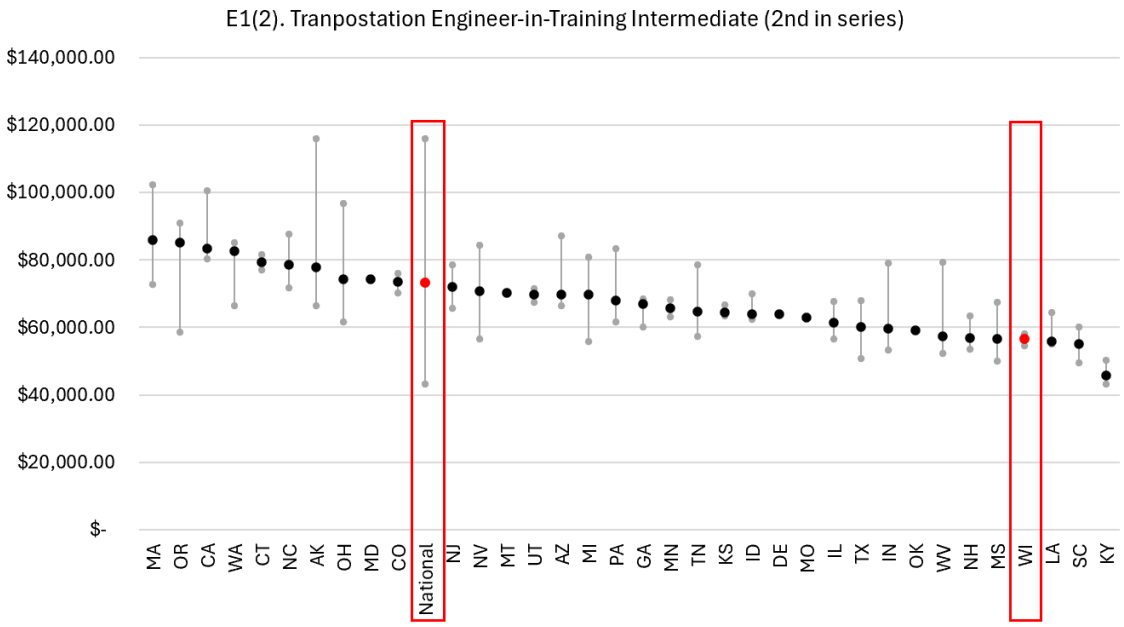
A different view of the same data provides a clearer picture of where WisDOT's minimum, maximum, and average salaries stand for the Transportation Engineer-in-Training compared to other state DOTs – toward the lower end of the range:



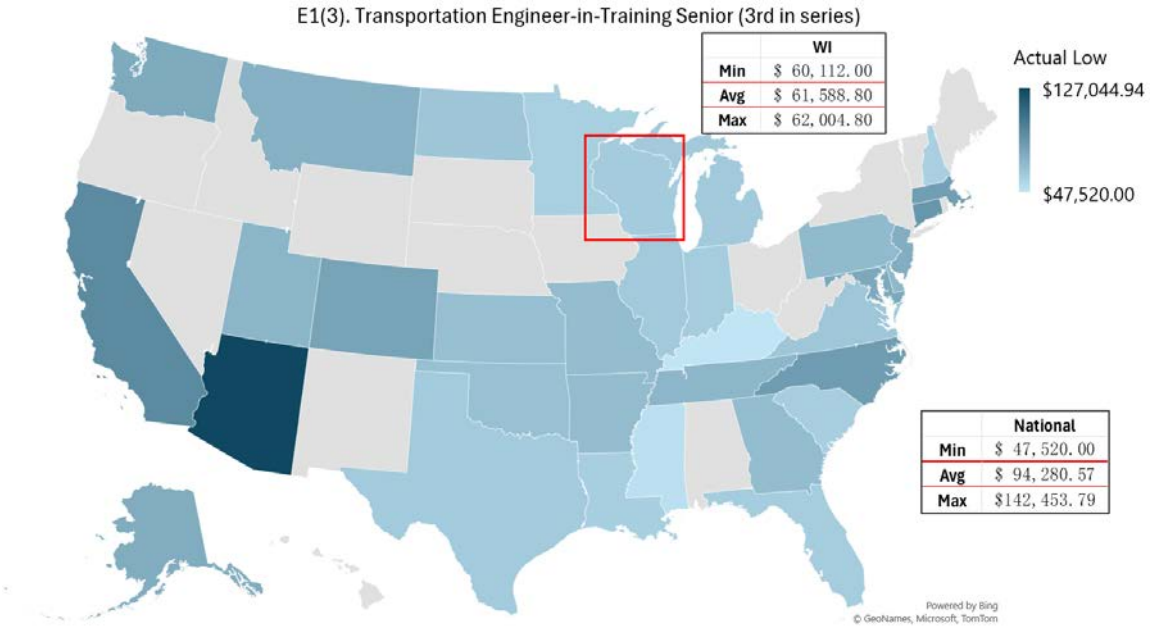
The chart below illustrates the minimum, maximum, and average salaries for the Transportation Engineer-in-Training Intermediate (E1(2) classification) for WisDOT and other DOTs nationwide:



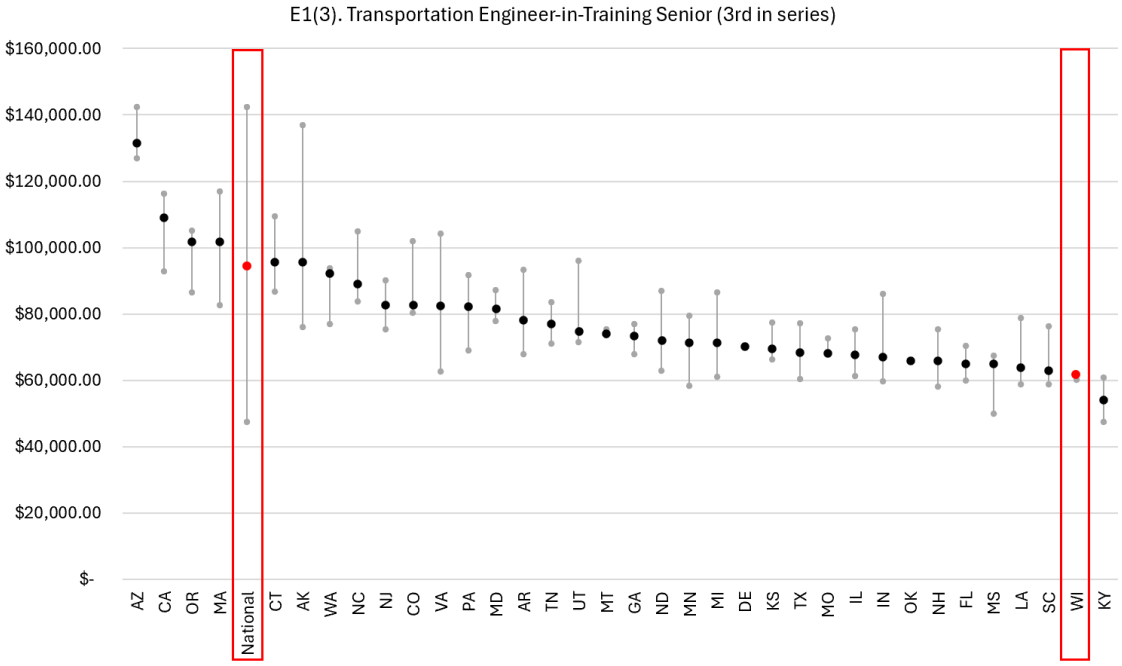
A closer look at the minimum, maximum, and average salaries shows WisDOT positioned toward the end of the range compared to DOTs nationwide for the Transportation Engineer-in-Training Intermediate role:



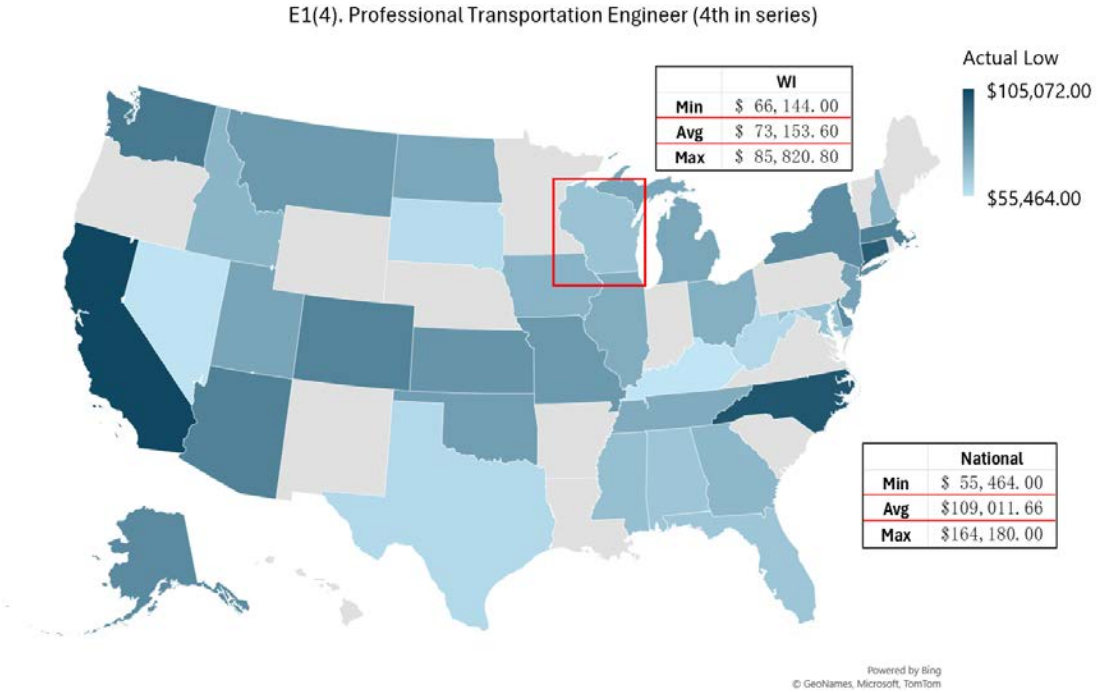
The chart below illustrates the minimum, maximum, and average salaries for the Transportation Engineer-in-Training Senior (E1(3) classification) for WisDOT and other DOTs nationwide:



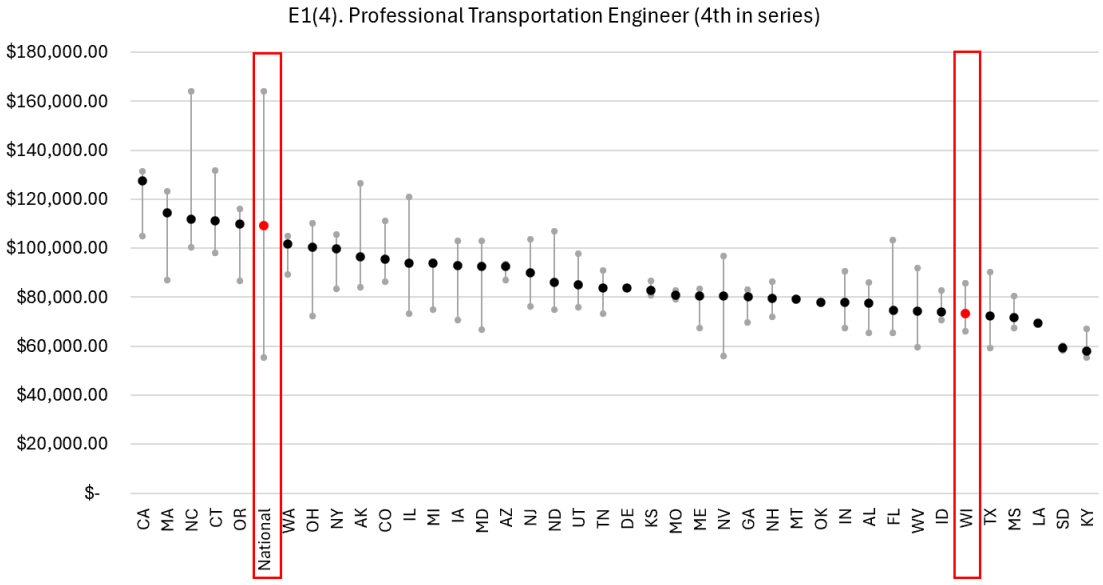
A closer look at the minimum, maximum, and average salaries show WisDOT positioned toward the end of the range compared to DOTs nationwide for the Transportation Engineer-in-Training Intermediate role:



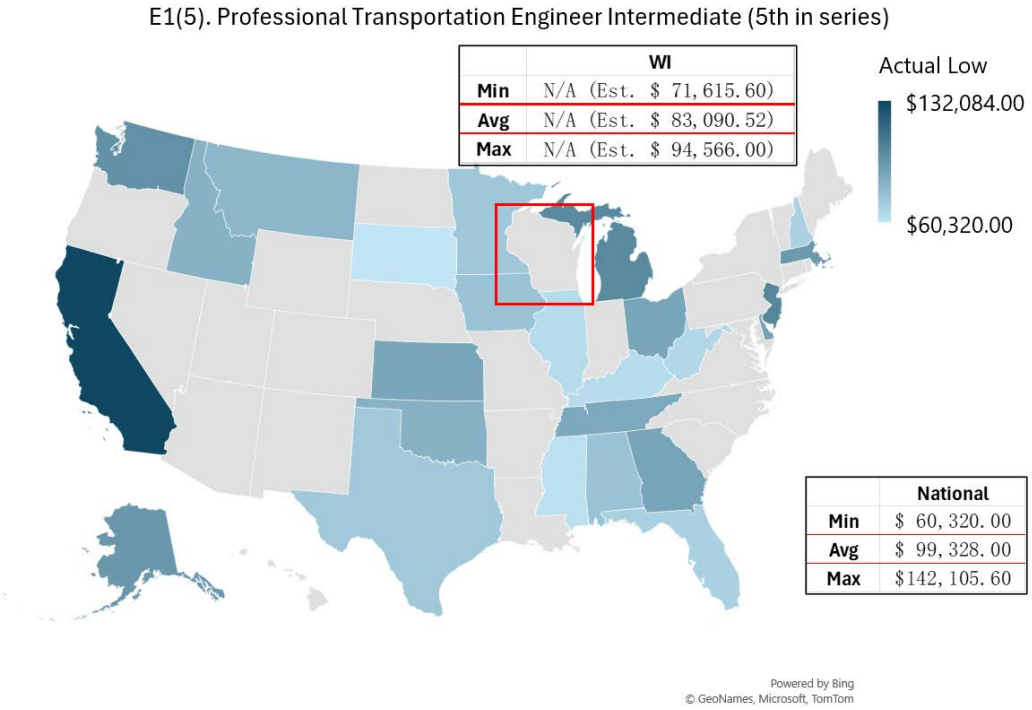
The chart below illustrates the minimum, maximum, and average salaries for the Professional Transportation Engineer (E1(4) classification) for WisDOT and other DOTs nationwide:



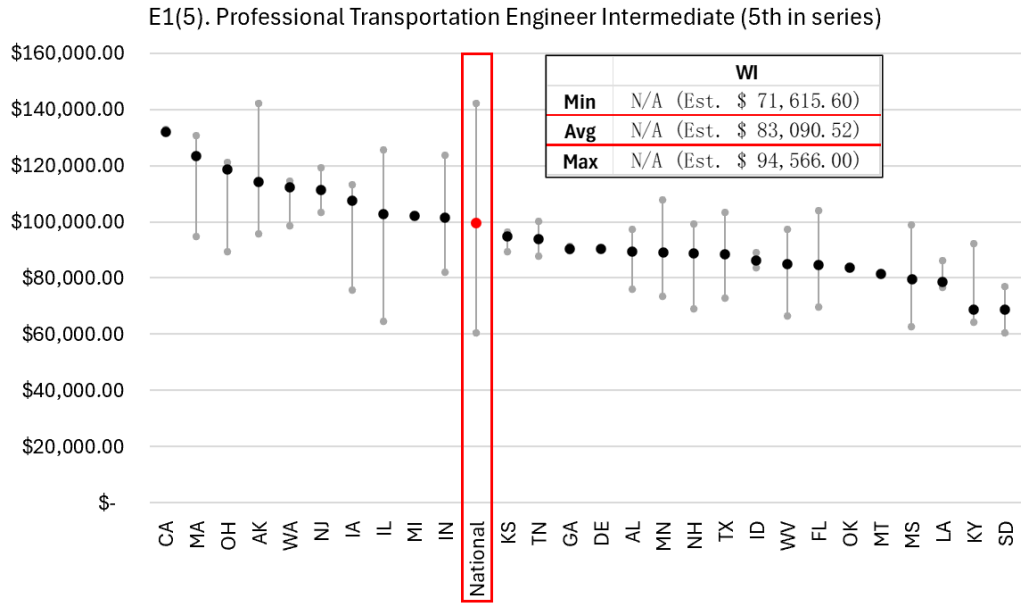
A closer look at the minimum, maximum, and average salaries show WisDOT positioned toward the end of the range compared to DOTs nationwide for the Professional Transportation Engineer role:



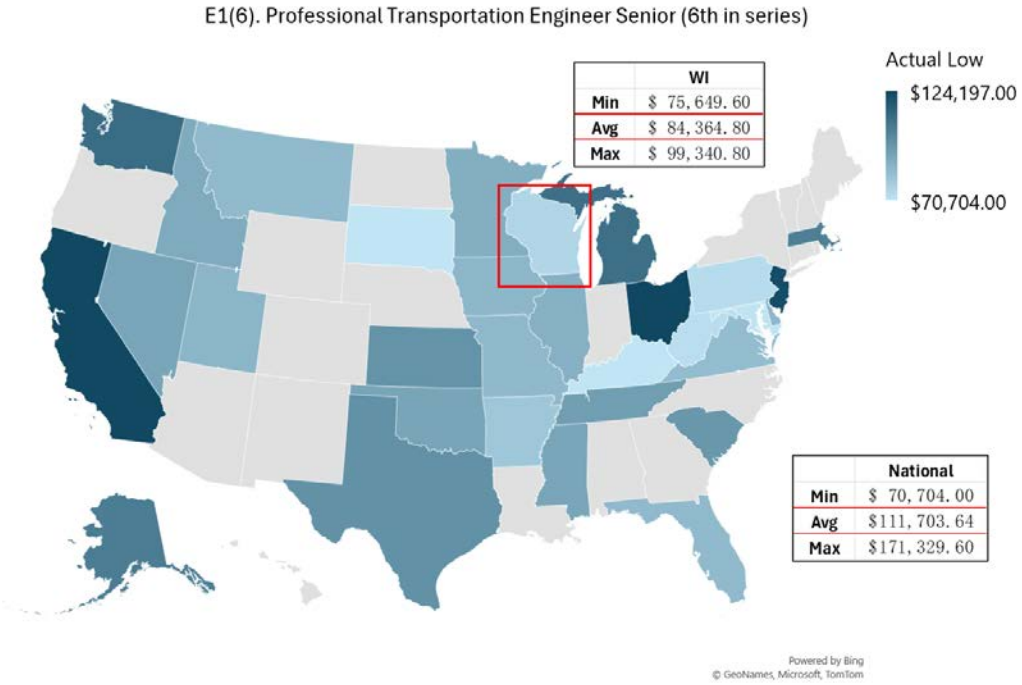
The chart below illustrates the minimum, maximum, and average salaries for the Professional Transportation Engineer Intermediate (E1(5) classification) for DOTs nationwide; WisDOT salary information was not provided:



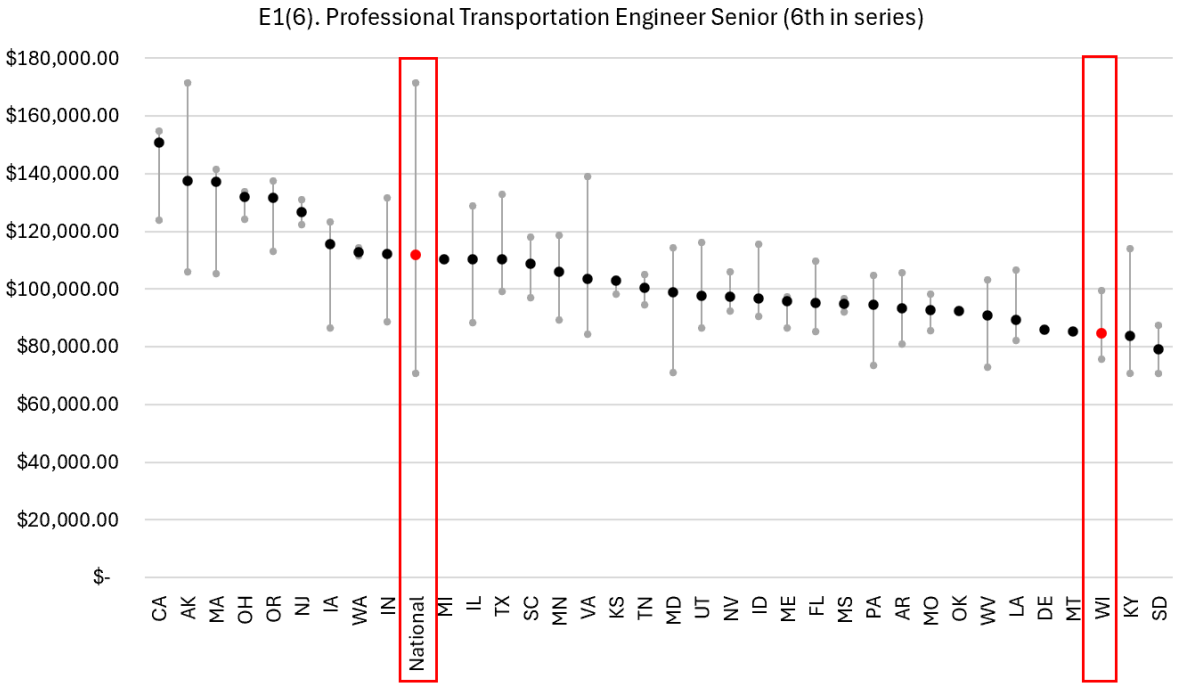
A closer look at the minimum, maximum, and average salaries for DOTs nationwide for the Professional Transportation Engineer Intermediate role; WisDOT information was not provided:



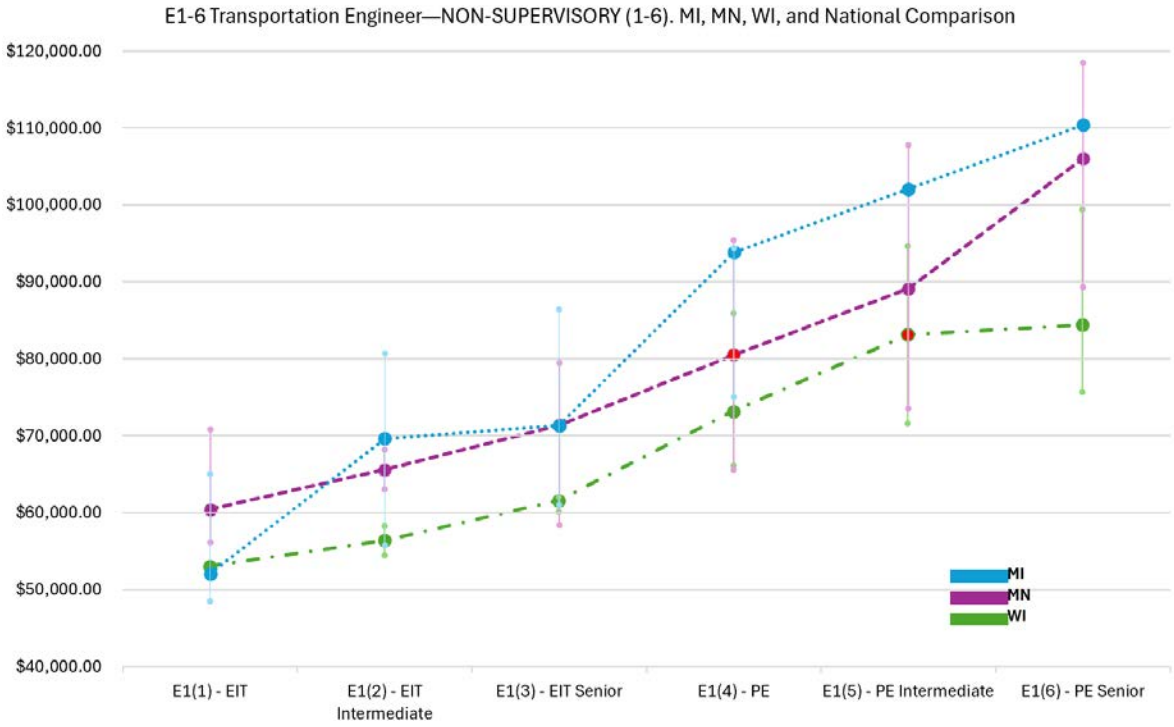
The chart below illustrates the minimum, maximum, and average salaries for the Professional Transportation Engineer Senior (E1(6) classification) for WisDOT and other DOTs nationwide:



A closer look at the minimum, maximum, and average salaries have WisDOT positioned toward the lower end of the range compared to DOTs nationwide for the Professional Transportation Engineer Senior role:



The last chart illustrates where WisDOT stands in comparison to its two midwestern peers – Minnesota and Michigan for average salary progression across the E1-6 Transportation Engineer classification. The National averages are in orange. As is evident, WisDOT salaries are the lowest compared to their two peers and the smallest difference is at the E1 level and the largest for E1 (6). Michigan DOT offers the highest reported salaries compared to WisDOT and Minnesota DOT.



Bottomline message:

The labor market for civil engineering professionals remains highly competitive and strained. There was and continues to be an intense demand for civil engineering talent which the educational systems have not been able to fulfill and it is likely the educational pipeline struggles will continue with not enough US-born civil engineering graduates to fill new or replacement roles. In light of the recent passage of the IIJA and the projected tremendously high demand for civil engineering graduates across a range of industries, WisDOT leaders will need to hone their recruitment messages to attract new talent to the agency. Talent management and retention strategies will also need to be revised in light of the strain imposed by the higher-than-expected retirement wave and increased number of job openings, and not enough new and seasoned civil engineering graduates to take their place. There is a great urgency to act quickly because of the critical role that civil engineers play in design, build, and maintenance projects and the potential bottle-neck effects that will ensue if those roles see employee churn or they go unfilled for a significant period of time. As if all these headwinds were not difficult enough to

deal with, the salary data for some job classifications at WisDOT compared to its midwestern peers makes talent attraction and retention even more challenging.

The next section discusses retention challenges from the perspective of work environment which also has implications for attracting new talent to the agency.

Retention Challenges: Engineering and Technical Employees Work Engagement

A survey of 453 engineers and architects conducted by Atherton and Fasano (2023) captured some of the significant retention challenges confronting industry professionals, including the reasons why the "great resignation" trend is still prevalent among technically skilled employees:

- about 55% of the respondents stated they would consider leaving their current employer for a new employer which is a 6% decrease from their 2022 survey results.
- top seven reasons for intent to leave current jobs are:
    - 53% cited the importance of career advancement opportunities
    - 40% cited the need for a more competitive pay
    - 32% cited high levels of work stress that affects their physical and mental health
    - 31% cited they didn't feel valued at work
    - 29% cited ineffective leadership
    - 26% cited heavy workload
    - 25% sought flexible work schedules
- on average, employees worked 44 hours per week, of which approximately 12 hours were spent working remotely. However, employees across all levels and ranks preferred to work 38 hours per week.
- analysis of generational differences revealed a lower preference for overwork:
    - 48% of younger employees (those with less than 5 years of work experience) compared to 70% employees with 10-19 years of experience believed that refusing to work more than 40 hours/week would negatively impact their career advancement.
    - 36% of younger employees (those with less than 5 years of work experience) compared to 70% employees with 10-19 years of experience believed that working part-time would have a negative impact on their career advancement.
    - 54% of younger employees (those with less than 5 years of work experience) compared to 62% of employees with 20+ years of experience stated that they are willing to work longer hours to "pay their dues."

    - 28% of all employees stated their high levels of interest in pursuing contract/freelance work. However, 50% of employees with at least 9 years of experience stated being highly interested in pursuing independent contract work.
- analysis of gender differences for schedule flexibility and work hours revealed that:
    - 33% of women compared to 20% men cited a need for flexible schedules as driving their intent to leave the current employer.
    - 36% women compared to 24% men were willing to work part-time if it were offered as an option.
    - 48% women compared to 63% men were willing to work longer hours to "pay their dues."
- The most challenging workload factors for technical employees included sheer amount of work (47%), unrealistic deadlines (34%), and long work hours (30%). For technical employees with managerial and leadership responsibilities, these three workload factors, in addition to dealing with challenging clients, also contributed to their high levels of stress and burnout.
    - 38% of mechanical and 37% of electrical engineers compared to 23% civil and structural engineers stated they felt burnt out at work.
    - 49% of public sector employees stated they felt burnt out compared to 24% working for consulting and design firms.
- Low engagement levels characterize how many employees felt about their work.
    - 46% of employees felt they were highly engaged at work, which was higher than average engagement levels of 32% reported by Gallup (2024).
    - Only 29% of public sector employees reported high levels of engagement at work.

These results portray engineers and other technical employees as being burnt out, disengaged, and in search of a better quality of life that provides schedule flexibility and control, meaningful and manageable workload, being valued at work, and career advancement opportunities.

Retention Challenges: Generational Similarities and Differences Toward Workplace Benefits and the Work Environment

According to Society for Human Resource Management (Aug. 8, 2024), there's been a 23% in increase in the last two years in the types of benefits that are being offered to employees. The number of offerings have increased from 175 in 2022 to 216. Organizations are competing with one another to go beyond the standard set of benefits that include healthcare (including mental healthcare), retirement, and time off (paid/unpaid). Given the wide variation in organizational size, budgets, industry standards, internal and external labor market dynamics, and market trends in benefits, it is hard to provide a one-size-fits-all list of competitive benefits. The standard recommendation for any organization seeking to maximize the impact of their current offerings starts with

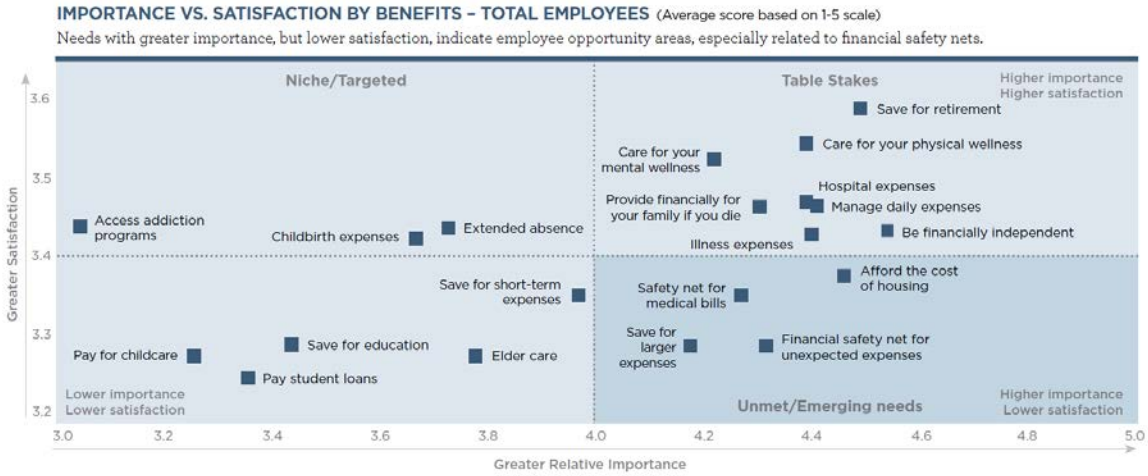
assessing what exactly are their employees' pain points, concerns, and needs and what they are looking for in terms of benefits. According to a survey conducted by Gallagher and company (2023) of 698 employees and 255 employers with 1000+ employees, 86% of the employees and employers pointed out that voluntary benefits are critical to their employee wellbeing and engagement strategy. Given that many organizations have a workforce that is multigenerational, it is important to understand which benefits will have the maximum impact across all generations. These generation spanning *voluntary benefits* linked to multigenerational employee well-being and workplace satisfaction are:

- **Supplemental health benefits** for critical illness, accidents, hospital indemnity plans are being offered by more than 80% of surveyed employers (Gallagher, 2024). In addition, supplemental health benefits for mental health, family-forming journey, chronic illnesses, autism and substance use disorders, among others, are increasingly being added to the suite of offerings.
    - A survey by Hartford benefits company (2024) of 502 employers and 1,246 multigenerational employees) showed that employers often prioritized mental and physical health benefits over financial health benefits.
    - Gen Z workers were more likely to report that their financial health (47%), mental health (41%) and physical health (38%) negatively impacted their productivity.
    - Despite the emphasis on mental health benefits, 70% of employers wanted to add mental health benefits but did not have the budget to do so.
    - Interestingly, the survey found that despite feeling comparable financial stress, Gen Z workers, compared to all other generations, reported being more satisfied with what their employers offered to address their financial needs such as for affordable housing, safety net for large medical bills, savings in general, and other significant unexpected expenses.
    - However, 38% of U.S. workers do not understand supplemental benefits and what they cover opening benefits education opportunities to employers
- **Legal plans and services** are increasingly being offered by many employers aimed at improving career well-being. The Gallagher company (2024) also surveyed 3,500+ employers (41% nonprofit, 59% private) in 2024 and found that 68% of the employers were offering these legal plans and services which not only provide traditional will and trust making services, but now also include coverage for name changes, surrogacy agreements, egg/sperm/embryo donation and adoption benefits.
- **Identity theft and cybersecurity protection** services are increasingly being offered as voluntary benefits to employees to protect them from the recent massive cybersecurity breaches and identity thefts. This protection also benefits employers since an increasing number of employees log into their work computers from their personal devices away from their work locations.

- **Permanent life and long-term care plans** have attracted increasing interest and signups. Contrary to expectations, a 2023 Insurance Barometer survey (LIMRA, 2024) indicated at least 49% of Gen-Z employees were interested in buying permanent life insurance and actively researched its merits before doing so. The financial insecurity felt among 42% Gen-Zs compared to 49% Gen Xs, 44% Millennials, and 33% Boomers and the realization of unmet insurance coverage needs that arose during the Covid-19 pandemic have led to more employees expressing interest in these benefits.
- **Pet insurance** coverage has increased in popularity during the pandemic which was associated with a lot of pet adoptions. Employers seeking to blunt the high levels of employee disengagement and stress offered this voluntary benefit to their employees.
- **Paid parental leave and generous paid leave benefits in general** are a highly sought after benefit by multigenerational employees according to a survey conducted by Hartford (2024) of 502 employers and 1,246 employees.

Voluntary benefits such as some of those described above are vital for attracting and retaining talent, promoting employee satisfaction and engagement, supporting wellbeing and work/life balance, providing financial security, fostering loyalty and retention, and building a positive company culture and reputation. The Gallagher (2024) study found that 67% of employers are seeking ways to offer more voluntary benefit choices to their employees, and 63% of employees indicated they would consider changing jobs for better benefits.

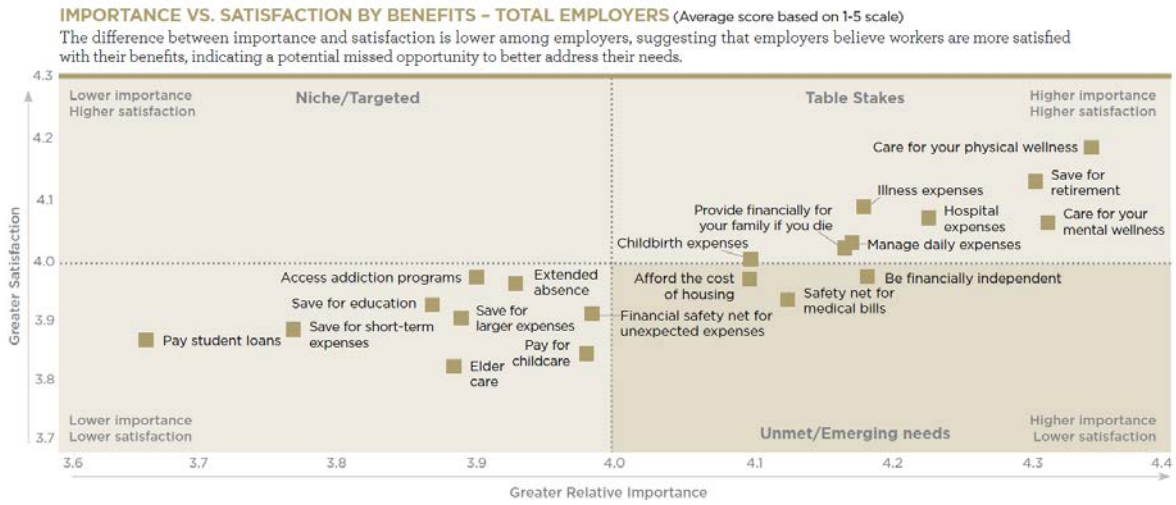
The Hartford (2024) employee and employer survey also showed areas of met/unmet/emerging needs that need to be taken into consideration in revising the benefits offerings.



The above chart plotted the relative importance of specific benefits versus the relative satisfaction with them and illustrates where improvements can take place such as in financial security related benefits. Interestingly, other financial benefits such as paying off student loans, eldercare, and education are seen as less important to all

employees; it is possible there are generational differences that are not displayed. Benefits related to physical and mental wellness, financial security and health expenses featured prominently as being important to all employees and the ones with which they are the most satisfied. Interestingly, 80% of U.S. workers valued the insurance benefits their company offered them, which was unchanged from March 2020.

A contrasting view (see chart below) from the employers' perspective (Hartford, 2024) shows that employers tend to believe that their employees are more satisfied with specific benefits than they actually are.

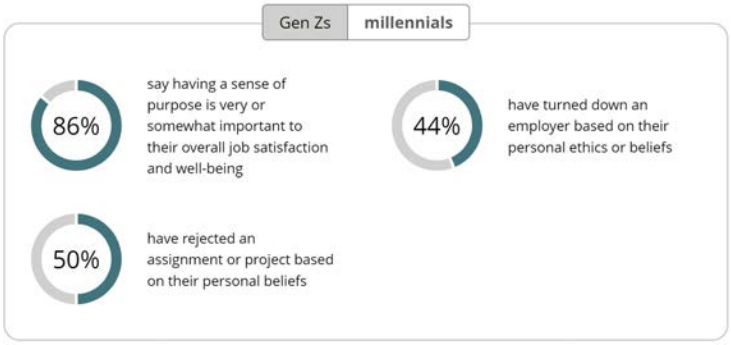


Retention Challenges: Work, Work Environment, and Workplace through the Gen-Z and Millennial Perspective

A recent survey by Gallup (2024) revealed that only 35% of Gen Z employees are engaged at work (a decline from 40% from the previous year), indicating a significant disconnect between their expectations and their actual work experiences. Gallup (2024) reported that "Millennials and Gen Z employees have seen the greatest decline in *feeling cared about by someone at work, having opportunities to learn and grow, feeling connected to the mission of the organization, having progress discussions with managers, being given opportunities to develop, and feeling that their opinions count*. These items have all *dropped by five to nine points for younger workers* since March 2020." [emphasis added]

Further, Deloitte's 2024 annual survey of 22,800 Gen-Z and Millennials employees across 44 countries revealed interesting findings that have implications for all employers. 49% of Gen Z respondents were unsatisfied with their work, citing factors such as lack of career progression, inadequate compensation, and poor work/life balance. Other significant findings are:

- They **value purpose-driven work** and are not afraid to turn down work assignments and employers that don't meet those needs:



- They **value environmental sustainability** and are willing to push their employers to conduct their business in an environmentally sustainable manner and change employers that don't align with these values.

- **Workplace stress factors** and the employer's wellbeing culture and benefits for mental health play a big role in their decision to join or leave an employer.
    - About a third of all respondents (36% of Gen Zs and 33% of millennials) say that their job and their work/life balance (34% of Gen Zs and 30% of millennials) contribute a lot to their stress levels.
    - Stressors at work include not getting recognition for their work (51% of Gen Zs and 53% of millennials), long working hours (51% of both generations), and not having enough time to complete work (50% of Gen Zs and 45% of millennials). Not feeling recognized by their leader/supervisor (46% of Gen-Zs and 49% of millennials) contributed to their stress of work. Some also cite a lack of control over how or where they work (44% of both generations).
    - About 40% of Gen-Zs and 35% of millennials say they feel stressed all or most of the time.
    - About half of Gen-Zs (51%) and millennials (56%) rate their mental health as good or extremely good.

- Gen-Zs and millennials' **workplace and career expectations are changing**. Learning and development, work-life balance, DEI, wellness, social impact, and environmental efforts are critical factors in recruiting both gen-Zs and millennials applicants. Work was a key to Gen Zs' and, even more so to millennials' sense of identity, with their jobs coming second only to friends and family while also maintaining a positive work/life balance. 64% of Gen-Zs and 66% of millennials currently work for organizations that have recently implemented a return-to-office mandate that they do not value and they prefer flexible working arrangements.
- Workplace factors that would make Gen-Zs and millennials recommend their employers to others include:
    - opportunities to learn and develop new skills at work
    - satisfaction with their pay and workplace benefits.
    - satisfaction with a positive work/life balance
    - having the power to drive change within their organizations
    - alignment of their personal values with their employer's
    - employer takes the mental health of its employees seriously

The findings from this survey underscore the importance of workplace experiences in terms of meaningful work, work/life balance, learning and development, are all something that all employees value and appreciate and are not just unique to Gen-Zs and millennials. What might be different for these two generations of employees is that they may be more willing to act on their values and preferences in terms of selecting specific employers or leaving them when they are not aligned. The Deloitte survey report (2024) emphasizes "*the importance of implementing practices that reflect the idea of human sustainability: the degree to which an organization creates value for people as human beings, leaving them with greater health and well-being, stronger skills and greater employability, good jobs, opportunities for advancement, progress towards equity, and heightened connection to purpose. When organizations create value for all people connected to them, it creates better outcomes for organizations and humanity more broadly*" (p. 32). Many of these workplace attributes are already present at WisDOT and as a purpose-driven organization, it is primed to enhance these features even more.

Recruitment and Retention Challenges: Changing Nature of Work, Workplace, and Workforce Needs of the Engineering Workforce

Within the State DOTs, the engineering and the design, build, and maintenance workforce occupies a special place and has often been the focus of many workforce research efforts at the local, regional, and national levels. It was not surprising then to see a recent federal NCHRP report (2022) dedicated to understanding the workforce development and workforce planning needs dedicated to this occupational segment of the State DOT enterprise.

According to the NCHRP 1008 Research Report (2022), "Individuals in the design, construction, and maintenance workforce are trusted to ensure that infrastructure in the United States is safe, efficient, and effective. However, many DOTs around the country are finding it difficult to maintain a strong and fully capable workforce in these three occupational areas given the number of industry changes that are taking place and will continue to develop over the next decade." (p. 1). Based on surveys of DOT employees across the country asking them about which jobs they considered were critical for continuity of operations and alignment with the state DOTs mission and values, ***five priority jobs*** were identified for design, construction, and maintenance areas:

- **Design**
    - Bridge and Structural Designer
    - Civil Engineer
    - Transportation Engineer
    - Transportation Planner
    - Traffic Engineer
- **Construction**
    - Civil Engineer
    - Construction Engineer
    - Transportation Construction Inspector
    - Transportation Technician
    - Traffic Management Operator
- **Maintenance**
    - Highway Foreman
    - Highway Maintenance Technician
    - Civil Engineer
    - Snowplow Operator
    - Transportation Maintenance Specialist

Current Challenges Facing State DOTs and Design, Construction, and Maintenance Units: State DOT leaders need to focus on these priority jobs in their workforce planning and development efforts. The NCHRP report's finding in conjunction with Hovnanian and colleagues labeling civil engineering a "crucible occupation" implies a greater than usual urgency to tailor the recruitment and retention messages to address the workforce needs in these areas.

The NCHRP research report identified 10 widespread and *currently* pressing challenges facing DOTs in general, and the design, build, maintenance units, in particular. These are:

1. **Adoption of new technologies** which impacts job roles and workforce knowledge, skills, and abilities and the resulting project efficiency and effectiveness.
2. **Economic challenges** include the ever-changing and uncertain economic landscape that impacts the educational and workforce pipeline. Competition from private sector companies for the same talent pool makes it more challenging for state DOTs.
3. **Rise of multi-modal transportation** is rapidly changing the way state DOTs approach their design build, and maintenance of infrastructure projects.
4. **Resiliency planning** in design, construction, and maintenance is generating a lot more attention now than ever before because of the changing climate, increase in natural disasters, and other environmental issues.
5. **Blue-collar work stigma** in certain job roles stymies many state DOTs efforts in recruiting. State DOTs need to debunk many of these misconceptions and generate interest in recruiting and retaining in these roles.
6. **Slow hiring practices** constrain many state DOTs hiring efforts and put them at a big disadvantage to their private sector counterparts.
7. **Popularity and expectation of flexible workplace policies** have become commonplace since the start of the Covid-19 pandemic. Many workplaces have struggled to attract, retain, and engage their workforce with RTO. Flexibility in schedules and location seems to be an employee/applicant expectation that's here to stay.
8. **Difficulty recruiting and retaining mid-level or young staff** have strained the state DOTs. The gaps in mid-level staff roles have created a push to fill them with less experienced staff with a considerable knowledge gap. Compounding these problems is attracting and retaining younger staff to the state transportation industry.
9. **Steady downsizing of DOT staff** and the prevalence of "doing more with less" because of strained budgets and labor market dynamics has made continuity of operations and mission fulfillment difficult.
10. **Generational or tenure-related differences** in workstyle preferences, technology use, and expectations for pay, benefits, and workplace culture have challenged DOT leadership.

Emerging Challenges Facing State DOTs and Design, Construction, and Maintenance Units: In addition to the above current challenges facing all state DOTs and the design, construction, and maintenance units, the NCHRP report also identified seven future scenarios that have implications for DOTs and engineering workforce needs in the next 5-10 years. The NCHRP research team gathered input from industry experts and feedback from DOT leaders across the country to identify a variety of situations that will need to be considered in crafting the talent attraction, development, and retention strategies for their workforce. These seven challenges are:

1. **Changing Transportation Infrastructure** reflected in the rising popularity of alternative and tech-assisted modes of transportation will have implications for how roadways will be designed, built, and maintained. This will create a need for changing from traditional design, construction, and maintenance operations and developing staff with project management expertise and varied technology skills to effectively respond to user needs and manage mobility options in the communities that they serve.
2. **New Smart Technologies,** especially in the form of Smart City applications provide a great opportunity for DOT's to increase their impact on the communities through deployment of newer technology, coordinated services, and statewide system management practices. However, the adoption of these technologies exposes the current employees' skills gaps in these areas and poses a challenge to DOT's budget constrained and slow hiring process to adequately staff these skilled roles.
3. **Attracting a Diversified Workforce and Increasing Labor Force Participation Rates** may be one of the more challenging situations to confront those state DOTs that may have historically and unintentionally narrowed its applicant and workforce pool. To become or continue to be "an employer of choice" in a highly competitive labor market for engineering and technical services talent, the DOTs need to demonstrate "renewed commitment to employment practices that support diversity and inclusion." (p. 18). Expanding the applicant pool to non-traditional and underrepresented workers is essential and that would begin by first assessing the current talent attraction and management strategy with regard to underrepresented workers.
4. **Competing for Specialized Skills** in data analysis, data-driven decision-making, and IT in addition to the engineering and other technical skills required for design, build, and maintenance projects will define hiring and retention practices for state DOTs in the foreseeable future. As described in the earlier sections of this report, the limited number of skilled workers with these skills and the projected shortfall in such skilled workers in comparison to the high demand for them across different sectors will be particularly challenging for state DOTs. Outsourcing many of these services and roles to consultants may be a temporary, stop-gap strategy, but the potential loss of knowledge and expertise to adequately supervise consultants' work and/or make proper inspection decisions may hurt DOTs in the long-term.
5. **Changing Nature of Work with a Multigenerational Workforce** is already challenging many state DOTs and this challenge will only grow more compelling in the next 5-10 years. Generational differences in

institutional knowledge, approach to work and work processes, autonomy, communication styles, schedule flexibility, supervision, professional development, pay, and benefits is already creating challenges to DOTs hiring and development and retention practices. Current traditional management and recruitment practices will need to be rapidly updated to be more responsive to the multigenerational workforce needs.

6. **Resiliency Planning** poses a unique challenge to state DOTs that has implications beyond the design, construction, and maintenance functions. To ensure the safety and reliability of the physical infrastructure, *all* employees in the design, build, and construction units will need to have the requisite technology, decision-making, data analysis, project-management, communication, and policy-making skills needed to adequately model and forecast environmental changes that will hugely impact its future operations and by extension DOTs' ability to effectively fulfill its mission.
7. **Supply Chain Partnerships** with other public sector entities as well as private sector organizations will need to be developed by DOTs if they expect to be competitive and relevant in designing, building, and maintaining safe, reliable, and community-responsive infrastructure. To take advantage of the influx of new funding from the IIJA in addition to the existing discretionary funding available through RAISE-BUILD-TIGER federal grants (https://ops.fhwa.dot.gov/freight/infrastructure/tiger/), state DOTs will need to envision new supply-chain partnerships and strengthen existing ones to receive funding for their infrastructure projects. One common theme among all these funding programs is emphasis on the use of sustainability, technology, and workforce diversity in their RFPs.

Response to Engineering Talent Attraction and Retention Challenges: Suggested Guidelines

After the passage of the IIJA, the American Society of Civil Engineers (ASCE) and the National Governors Association (NGA) organized a roundtable discussion with public and private sector leaders (including state DOTs) to discuss how best to respond to the challenges and opportunities stemming from the influx of funding. The summary report (2023) produced by their team highlighted ten short-term and five long-term strategies for responding to civil engineering workforce challenges, the most relevant of which are described below:

- **Identify Current Workforce Pain Points and Goals:** This includes creating workgroups, committees, taskforces, or partnering with external agencies to study their engineering workforce needs that will help them revise their workforce development plans and develop goals for fulfilling them.
- **Evaluate Compensation, Flexibility, and Advancement Opportunities:** The report recommended incorporating workplace topics such as pay, advancement, and workplace flexibility in their recruitment and retention plans. This would entail conducting pay audits and working with legislature for special authority to increase pay scales for certain high demand and hard to fill jobs. Assessing workplace culture in terms of pay, benefits, mentorship, advancement opportunities, and work-life balance will help revise the recruitment and retention plans.
- **Incorporate Caregiving Needs into Workplace Programming and Culture:** This recommendation highlights the need for any recruitment and retention strategy to focus on workplace culture and being responsive to the myriad caregiving needs of their employees. They particularly called out the need to recruit for women civil engineers and technicians. In addition, adding "sophisticated support structures, and culture improvements" in addition to remote work, flexible scheduling, mentorship, training and professional development can be valuable tools for the organizations to attract new engineers and technical staff and to retain and engage the current workforce.
- **Support Employees on the Sidelines with Flexible Career Re-Entry Tools:** Since civil engineering and other technical roles require continuous professional development credits to ensure licensure, employees that may have fallen short of these credits and then lost their licenses will need to be incentivized to get back on track to renew their licenses. This represents an untapped and low-cost way of engaging technically skilled employees instead of pursuing only current license holders.
- **Reduce Barriers to Entry as the Pipeline Expands:** Workforce challenges can also be addressed by lowering barriers to entry by reconsidering the minimum requirements of existing and new positions in their organizations. Job descriptions need to be revised to focus on only essential skills, rather than a set number of years in specific previous roles or educational degrees received.

- **Reduce Time-to-Hire and Other Recruitment Barriers:** This strategy calls on agency leaders to expedite the hiring process, including the onboarding of each new hire and to add efficiency and urgency at each step of the recruitment and onboarding process. Washington State Department of Transportation 60-days for time-to-hire is seen as a record while hiring typically moves much faster in private organizations. Regardless, recruitment timelines need to be made clear to job candidates and it might be best to delay hiring until the recruiting team and hiring managers have cleared off time to assist in this process.

NCHRP (2022) Guidelines for a Comprehensive Talent Management Strategy for Design, Build, and Maintenance Units

The NCHRP (2022) research team compiled a list of strategies and guidelines for DOT leaders to consider as they create/update plans to address current and anticipated challenges described previously. The team recommended investing efforts and money into three broad categories focused on attracting, retaining, and developing a qualified workforce. They also provided templates, checklists, tracking metrics, and action and implementation plans for DOT leaders to use as they customize these resources to craft into their strategic workforce planning and development documents. The action plans required to successfully carry out the revised workforce attraction-retention-development strategies are as follows:

1. **Attracting Employees to Build a Qualified Workforce** includes:
    a. Partnering with educational institutions to market jobs, internships, collaborative research projects will help reach a broad, diverse, and skilled workforce.
    b. Developing a brand to attract new applicants by using different social media platforms to appeal to new generations of workers' needs (e.g., in safety, sustainability, environmental issues, and social responsibility) and underrepresented populations.
    c. Using social media to continually engage applicants' interests and expand efforts to engage in social media conversations with them will help them compete for highly sought after workers.
    d. Adopting equitable hiring practices to hire underrepresented individuals by partnering with educational institutions that have large populations of underrepresented students, different professional associations, and trade groups for underrepresented workers, DWD, and nonprofits.
    e. Assessing current workforce policies to ensure support for diversity and inclusion by surveying current employees on their perceptions on current organizational methods to recruit, engage, and develop a diverse and inclusive workforce and implementing changes based on employees' feedback; independently auditing and benchmarking against industry best practices is also recommended.

2. **Sustaining a Strong Workforce by Retaining Employees** includes:
    a. Proactively developing performance management strategies with contractors, consultants, and other industry partners to set and communicate expectations around roles, minimizing the risks of misunderstanding, and avoid frustration or delays stemming from communications/expectations mismatches.
    b. Constructing effective teams with varied technical and interpersonal skills is essential to maximize staff productivity especially since many units face ongoing staff shortages, knowledge losses, and "doing more with less" and have to operate under pressing deadlines.
    c. Enabling employees to share ideas to foster workplace innovation by encouraging experimentation, calculated risk-taking, and out-of-the-box thinking to create greater efficiencies, streamline existing processes, and generate new cost-saving and/or revenue generating ideas.
    d. Integrating critical skills into career paths to demonstrate career advancement opportunities across entry, mid- and senior levels can be accomplished through career planning workshops, job descriptions, and performance management discussions and is essential to engaging skilled workers who need to be able to see their own progression within the organization.
    e. Establishing standard operating procedures for data management to ensure efficient and secure access to data that will help streamline knowledge transfer/sharing, knowledge management, and reduce redundancies across and within functional units/teams.
    f. Creating flexible work arrangements that reflect location and schedule flexibility to accommodate diverse employees' needs at every stage of their careers by reviewing job descriptions, performance expectations, training supervisors of flex-working employees, and creating telecommuting agreements.
    g. Implementing diversity and inclusion training, beyond yearly compliance efforts, to ensure a healthy work environment, to minimize avoidable turnover of people of color/underrepresented individuals, and to recruit and retain a diverse, productive, engaged, and committed workforce.
3. **Developing a Talented Workforce by Training Employees** which includes:
    a. Creating Communities of Practice (CoPs) with local institutions, regional partners, and nonprofits to encourage knowledge sharing and opportunities to learn new skills and technologies and improve existing practices; these CoPs can also serve as a potential recruiting pool for new employees.
    b. Developing robust training programs to bridge workforce skills and knowledge gaps is essential to equip new hires and existing employees with the requisite resources for them to successfully accomplish their roles and effectively contribute to the mission.

c. Upskilling and reskilling existing employees in specifically targeted areas to prepare them for new roles and requirements in using new technologies, design, construction, and maintenance of multi-modal infrastructure, and implementing resiliency plans other new technology-driven policies.
d. Partnering with mobility service providers by providing formal and informal avenues for discussions and knowledge and data sharing to increase coordination and shared understanding to deliver better and streamlined services to the community.
e. Implementing internal knowledge sharing forums like brown bags, lunch and learn, speaker series with subject matter experts, successful project leaders, etc., to improve knowledge transfer, bridge skill and knowledge gaps, and facilitate learning/adoption of new technologies and skills.
f. Conducting cross-functional action learning projects to facilitate internal collaboration, improve complex problem-solving, increase morale, facilitate better understanding and cooperation with cross-function/department employees, improve communication and decision-making, and open up potential cross-functional mobility opportunities.
g. Creating an up-to-date information repository to foster resiliency planning communication across the DOTs, ease access to pertinent information, expedite decision-making, improve communication among and between different stakeholders, and increase collaboration between disciplines/functions related to environmental challenges, emerging sustainability tools and technologies, and environmental regulations.
h. Providing leadership development opportunities like targeted work assignments, skill specific training, 360-degree feedback, and mentoring to build a leader pipeline to better attract future talent, enhance the retention of junior and mid-level staff, increase senior leaders' engagement and develop and publicize a succession plan.
i. Establishing a reciprocal mentoring program between junior and senior level staff to encourage internal knowledge transfer, adoption of new technologies, skills, and perspectives, and foster collaboration, decision-making, problem-solving, and positive interpersonal relationships.

The action plans briefly described above from the NCHRP (2022) report have been extensively researched and vetted by the state DOT leaders and design, construction, and maintenance subject matter experts across the country to provide a detailed implementation plan for state DOTs to customize. Each DOT needs to evaluate the potential impact of the NCHRP (2022) identified list of current and anticipated challenges facing their engineering workforce in general and the design, construction, and maintenance units in particular in their strategic workforce planning and management discussions. The ASCE in collaboration with NGA (2023) also identified similar recommendations for engineering leaders to consider as they recruit, retain, and develop their engineering talent. Finally, research undertaken by Transportation Consortium of South-Central States in 2018

on recruiting, promoting, and retaining for careers in transportation agencies identified not only a similar set of challenges confronting state DOTs but also had similar recommendations for addressing them.

Concluding Comments:

The information and data provided in this portion of the report is meant to be a reminder that WisDOT is not alone or unique in facing many of the staffing and knowledge management challenges that are part of this research team's charge. The same headwinds confront all DOTs, the intensity and prevalence are just a matter of degree. Likewise, the recommendations and guidance offered by many of the industry experts, researchers, and DOT leaders are relevant and applicable to WisDOT. For any meaningful changes to result from the application of these recommendations, the agency's leadership needs to be committed to making these changes, investing resources that are necessary to assess the current and anticipated workforce attraction and development needs and dedicating the necessary resources to enact these changes. The employees and the workplace culture need to be primed and engaged to contribute to this process for any of the initiatives to succeed. Just like any project management, metrics need to be put into place to track progress, systems put into place to generate accurate and timely feedback, and evaluate areas that need to be strengthened, continued, or discontinued. A lot of the efforts are low-cost or no-cost and require a change in mindset to focus on growth and quality improvement – quality improvement would encompass a range of outcomes that will help bridge the skills and knowledge gaps, strengthen engagement and retention of critical employees, and help attract qualified talent to WisDOT. Investing in talent development, growth, and engagement, along with quality-of-life (and work-life) issues and technology improvements can have a huge payoff for DOT's short-term and long-term sustainability and success.

Appendix B: Institutional Knowledge Assessment Focus Group Questions

1. Identifying Challenging Types of Institutional Knowledge

- What types of knowledge are most critical for state highway and bridge improvement and maintenance programs at WisDOT (i.e., standards, processes, networking, others).
-Can you share examples of knowledge that are particularly challenging to document or transfer?
- Which areas of institutional knowledge rely heavily on individual expertise or experience rather than formal documentation?
- Are there any processes or practices that are highly dependent on informal or unwritten knowledge?

2. Current Knowledge Transfer Practices

- What methods or tools are currently used to document and share knowledge within your work area at WisDOT?
- Are there specific training programs or mentorship opportunities in place to facilitate knowledge transfer?
- How effective are current practices in ensuring the retention of critical institutional knowledge?

3. Consequences of Knowledge Loss or Transfer Slowdowns

- Have you experienced a situation where a lack of knowledge transfer (Lack of knowledge access) caused disruptions or inefficiencies? If so, what happened?
- What are the impacts of losing key institutional knowledge in the state highway and bridge improvement programs at WisDOT?
- What challenges have you seen or encountered in maintaining or transferring knowledge across teams or generations of staff?
- How does the loss of institutional knowledge impact you being able to job well? (i.e., is it incorporated into your review) – not in the question but possibly a solution.

4. Suggestions for Improvement

- Can you suggest any approaches to improve knowledge transfer and preservation?
- What would WisDOT leadership need to do to create time and space to document processes and capture critical knowledge?
- What could be done to better document or transfer institutional knowledge in the context of highway and bridge improvement programs?
- Are there any organizational or cultural changes that could support better knowledge management?
- What resources or support would make it easier to maintain and transfer critical knowledge effectively?

5. Best Practices for Maintaining Institutional Knowledge

- What are some examples of practices you feel are being used productively right now in your area?
- What strategies have been most successful in preserving institutional knowledge in your experience?
- Are there any tools, technologies, or platforms you recommend for capturing and storing knowledge?
- Do you have any suggestions on how knowledge can be accessible and up-to-date for those who need it?
- What role do mentorship, shadowing, or cross-training programs play in knowledge retention?

6. Open Discussion

- What do you think is the most overlooked aspect of knowledge management in your work area or at WisDOT?
- Are there any other thoughts or insights you'd like to share on maintaining institutional knowledge?
- Anything we're leaving out…

Appendix C: Detailed Hiring Challenges Evaluation Survey Results

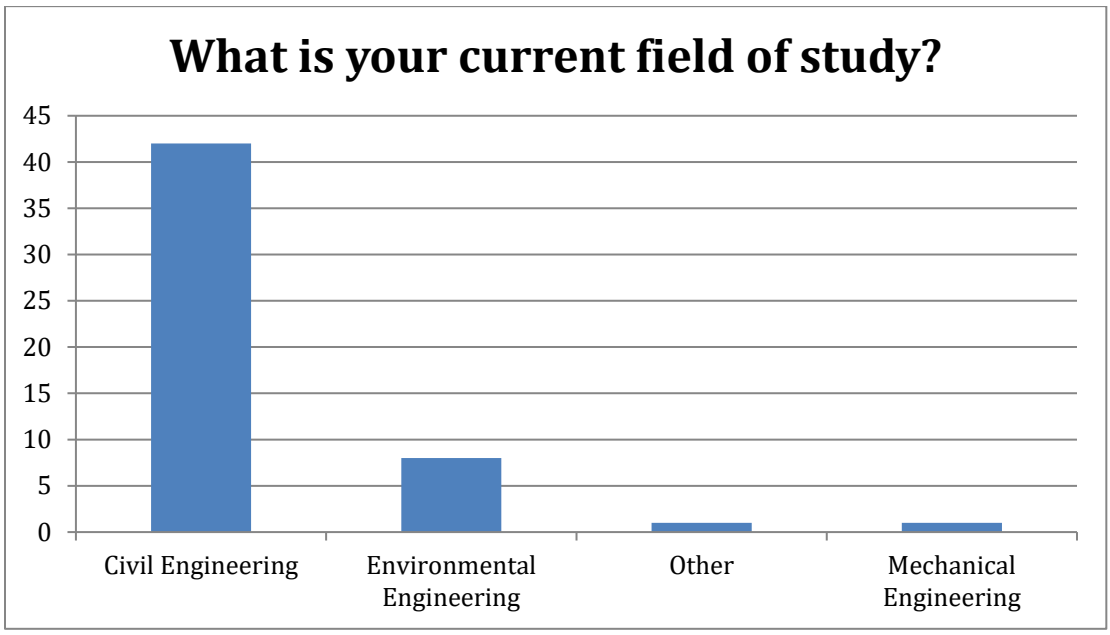
Results of Survey Analysis: Current Engineering Students

Q1: What is your current field of study?

Top responses: Civil Engineering (42, 81%); Environmental Engineering (8, 15%); Other* (1, 2%); Mechanical Engineering (1, 2%).

Field of Study	Count
Civil Engineering	42
Environmental Engineering	8
Other*	1
Mechanical Engineering	1

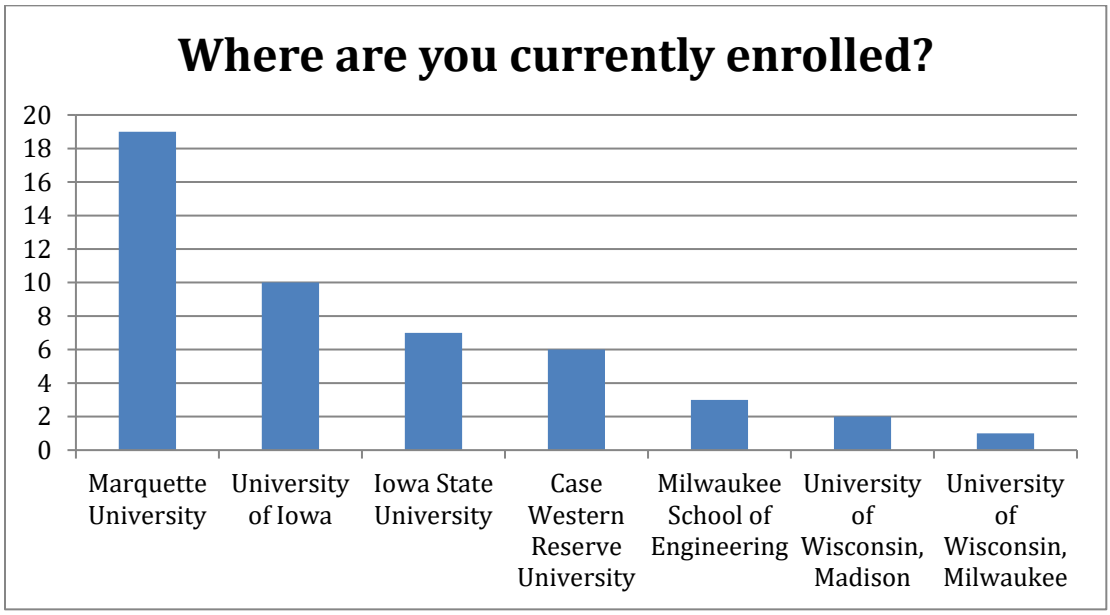
*Other include Construction Engineering



Q2: Where are you currently enrolled?

Top responses: Marquette University (19, 40%); University of Iowa (10, 21%); Iowa State University (7, 15%); Case Western Reserve University (6, 12%); Milwaukee School of Engineering (3, 6%).

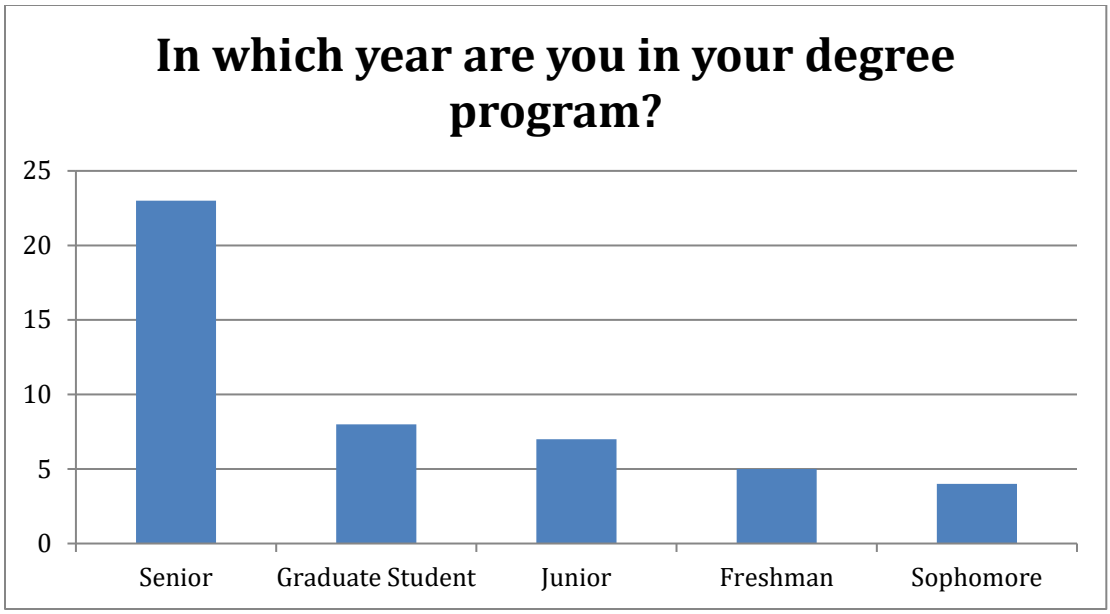
School	Count
Marquette University	19
University of Iowa	10
Iowa State University	7
Case Western Reserve University	6
Milwaukee School of Engineering	3
University of Wisconsin, Madison	2
University of Wisconsin, Milwaukee	1



Q3: In which year are you in your degree program?

Top responses: Senior (23, 49%); Graduate Student (8, 17%); Junior (7, 15%); Freshman (5, 11%); Sophomore (4, 9%).

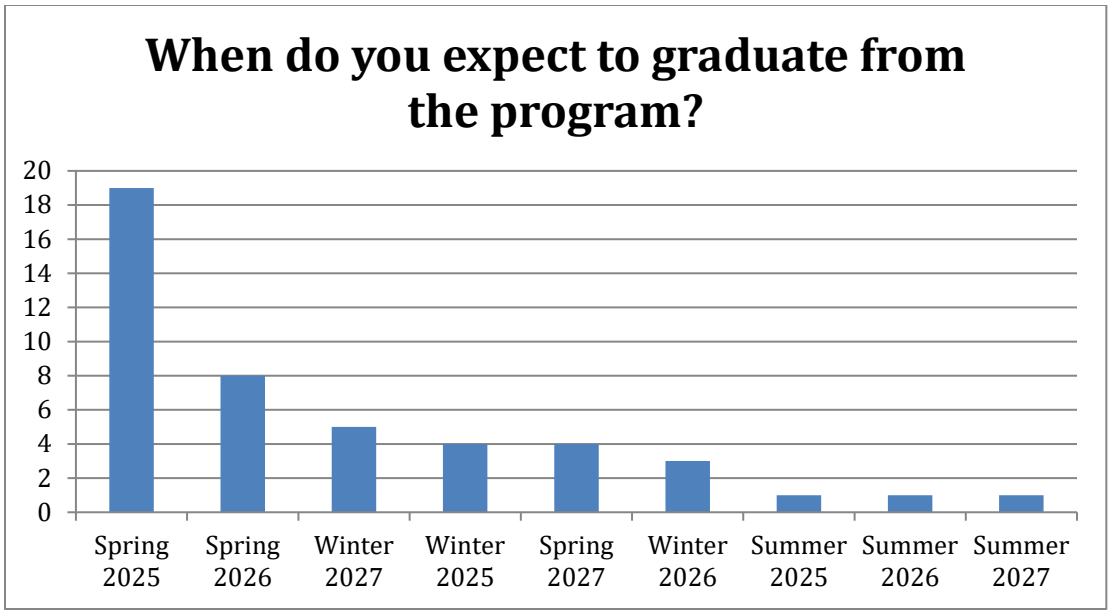
Degree Program	Count
Senior	23
Graduate Student	8
Junior	7
Freshman	5
Sophomore	4



Q4: When do you expect to graduate from the program?

Top responses: Spring 2025 (19, 41%); Spring 2026 (8, 17%); Winter 2027 (5, 11%); Winter 2025 (4, 9%); Spring 2027 (4, 9%).

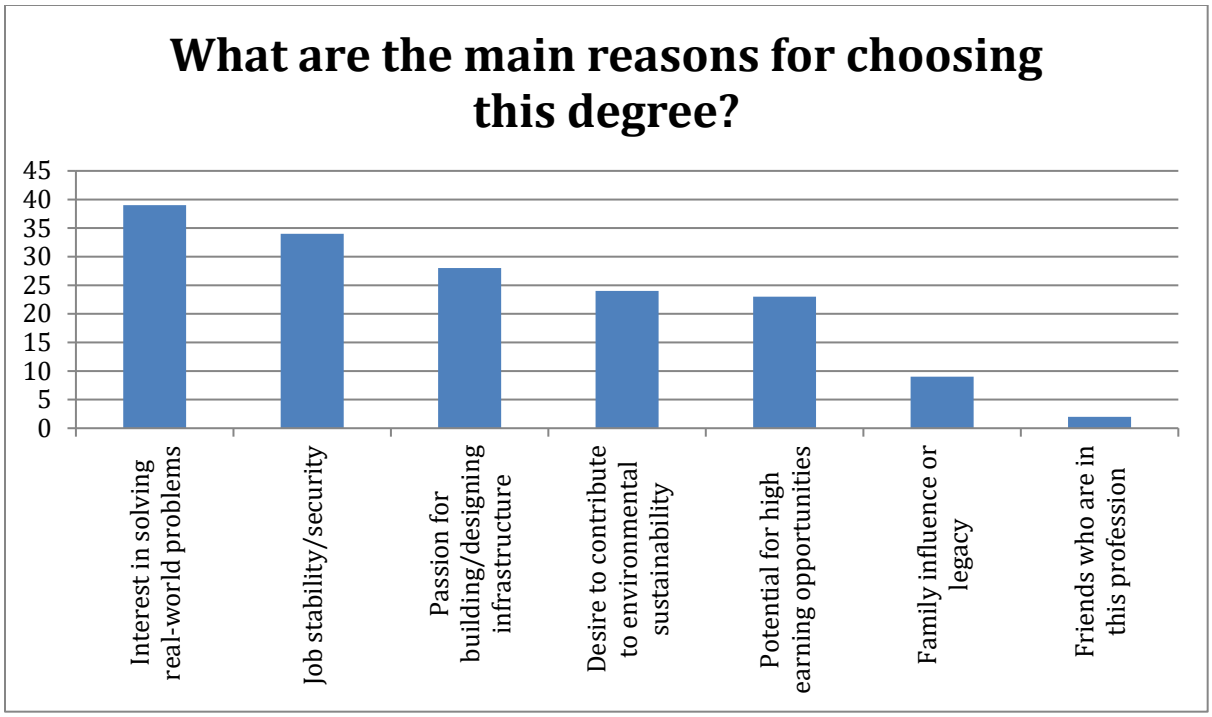
Graduation Time	Count
Spring 2025	19
Spring 2026	8
Winter 2027	5
Winter 2025	4
Spring 2027	4
Winter 2026	3
Summer 2025	1
Summer 2026	1
Summer 2027	1



Q5: What are the main reasons for choosing this degree?

Top responses: Interest in solving real-world problems (39, 25%); Job stability/security (34, 21%); Passion for building/designing infrastructure (28, 18%); Desire to contribute to environmental sustainability (24, 15%); Potential for high earning opportunities (23, 14%).

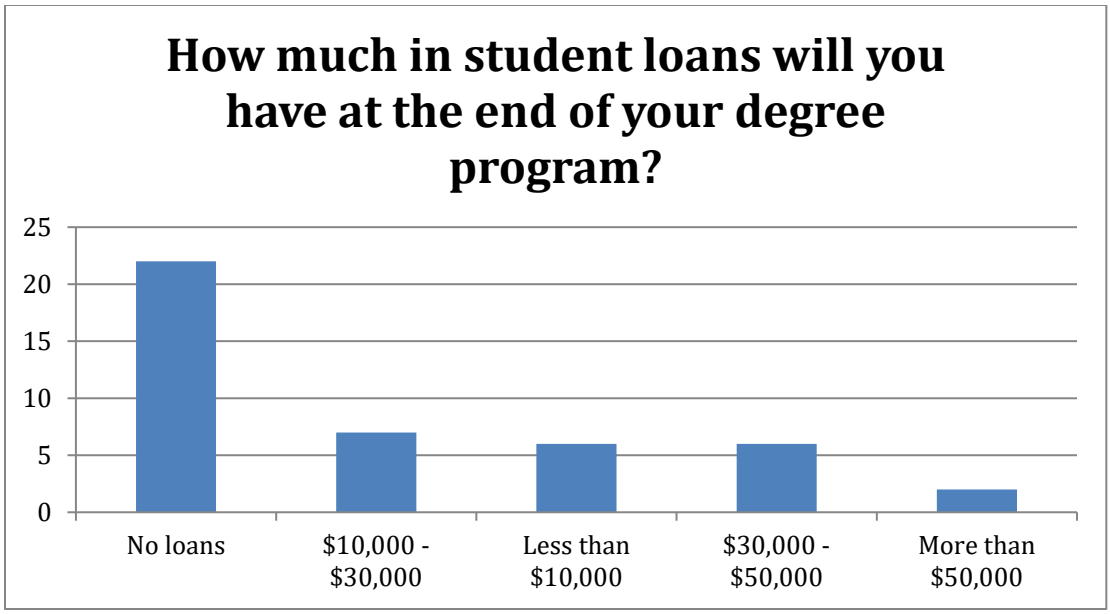
Reasons for Choosing this Degree	**Count**
Interest in solving real-world problems	39
Job stability/security	34
Passion for building/designing infrastructure	28
Desire to contribute to environmental sustainability	24
Potential for high earning opportunities	23
Family influence or legacy	9
Friends who are in this profession	2



Q6: How much in student loans will you have at the end of your degree program?

Top responses: No loans (22, 51%); $10,000 - $30,000 (7, 16%); Less than $10,000 (6, 14%); $30,000 - $50,000 (6, 14%); More than $50,000 (2, 5%).

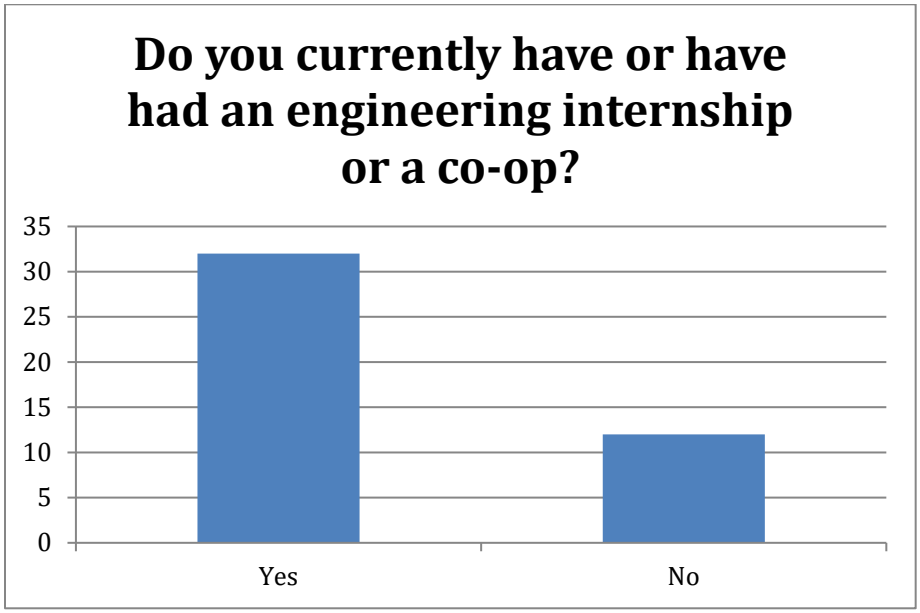
Option	Count
No loans	22
$10,000 - $30,000	7
Less than $10,000	6
$30,000 - $50,000	6
More than $50,000	2



Q7: Do you currently have or have had an engineering internship or a co-op?

Top responses: Yes (32, 73%); No (12, 27%).

Option	Count
Yes	32
No	12



Q8: If "Yes"

Top responses: Civil Engineering (27, 84%); Environmental Engineering (3, 9%); Other* (2, 6%).

1) Which area of engineering was it in?

Option	Count
Civil Engineering	27
Environmental Engineering	3
Other*	2

*Other include Construction Engineering and Electrical Engineering.

2) Where did you do your internship/co-op?

Ayres Associates

Baxter & Woodman

Boldt Construction and U.S. Army Corps of Engineers

City of Dublin, Ohio

Cominfragroup

Des Moines, IA and Madison, WI

ECS Midwest

Findorff (Milwaukee)

Foth

Gilbane

HNTB

Iowa Department of Transportation (Iowa DOT)

Jacobs and Cage

McClure Engineering

Michael Baker International

Pinnacle Engineering

Public Works

Ruekert & Mielke, Inc.

Shive Hattery (Iowa City, IA)

Stanley Consultants

STV

The Metropolitan Water Reclamation District of Greater

Chicago

TRC Companies

Turner Construction

Village of Arlington Heights / General Dynamics Electric Boat

WisDOT

Westwood Professional Services

Worked in a plant of mix asphalt

3) What type of work did your internship/co-op involve?

Air pollution

CAD design, statewide signing, ROW

Civil engineer in an asphalt plant in Colombia

Civil engineering consulting firm

Construction and geotech

Construction engineering

Construction management

Construction observation (general contractor and municipal)

Construction site management

Design & plan production

Engineering/Public Service: Pre-construction meetings, video documentation, site visits, inspection

Field work

Geotechnical lab testing, traffic modeling, Civil3D roadway design

Highway design and civil site design

Maintenance/operations, MMS work

Materials testing and design in transportation

Materials testing; data analysis

Mechanical/electric systems of submarine, road reconstruction, drainage, surveying

Project management work

IT infrastructure work (cable pulling, demolition, etc.)

Rail design

Site design

Site planning

Structural bridge design

Surveying and construction management

Traffic group: design, drafting, data organization

Transportation/construction

Wetland delineations, landfill monitoring, stormwater projects

4) How long did you work in your internship/co-op?

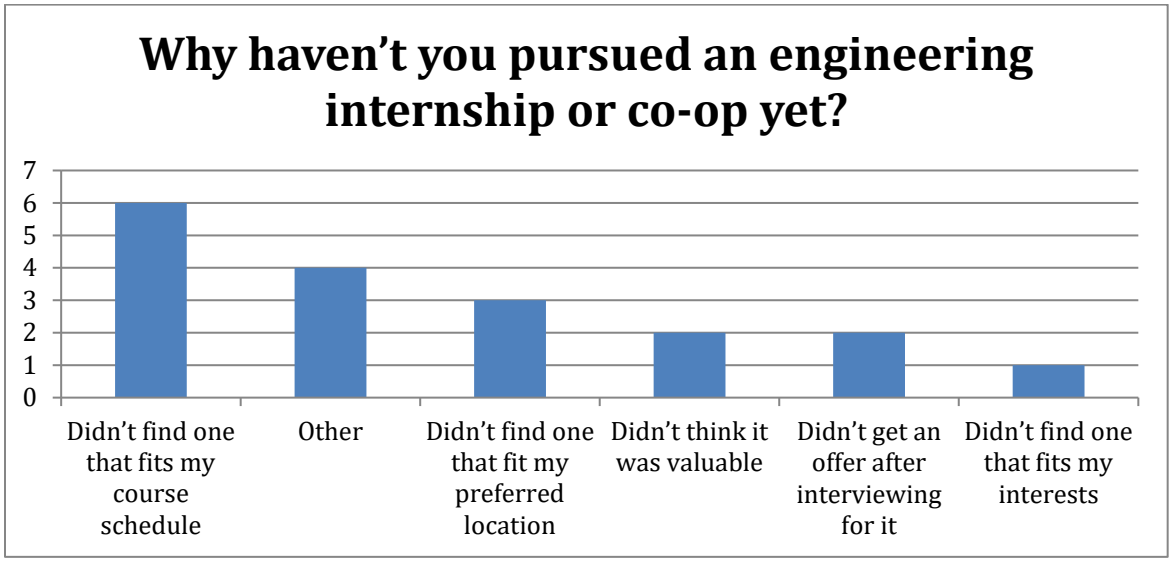
Option	Count
1 month	1
3 months	16
4 months	4
6 months	2
7 months	1
8 months	1
9 months	3
10 months	1
11 months	1
More than 12 months	2

Q9: Why haven't you pursued an engineering internship or co-op yet?

Top responses: Didn't find one that fits my course schedule (6, 33%); Other* (4, 22%); Didn't find one that fit my preferred location (3, 17%); Didn't think it was valuable (2, 11%); Didn't get an offer after interviewing for it (2, 11%).

Option	Count
Didn't find one that fits my course schedule	6
Other*	4
Didn't find one that fit my preferred location	3
Didn't think it was valuable	2
Didn't get an offer after interviewing for it	2
Didn't find one that fits my interests	1

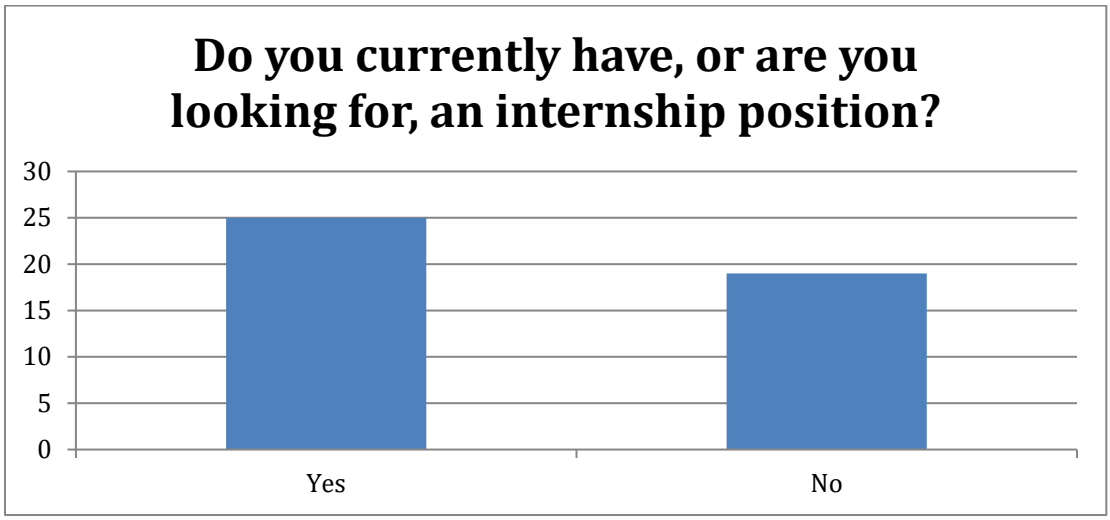
*Other include "Didn't get any interview calls after applying", "I have an internship that starts in May, has not yet been completed", "studying abroad", and "I got a different Internship regarding sustainability".



Q10: Do you currently have, or are you looking for, an internship position?

Top responses: Yes (25, 57%); No (19, 43%).

Option	Count
Yes	25
No	19

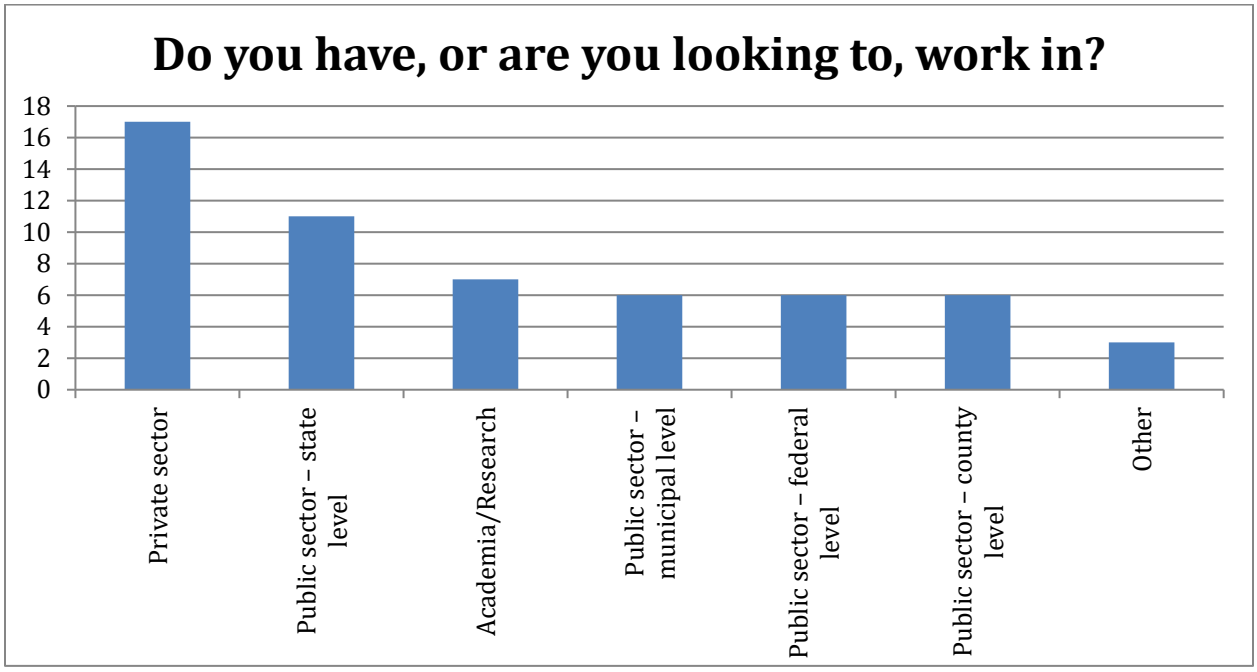


Q11: Do you have, or are you looking to, work in?

Top responses: Private sector (17, 30%); Public sector – state level (11, 20%); Academia/Research (7, 12%); Public sector – municipal level (6, 11%); Public sector – federal level (6, 11%).

Option	Count
Private sector	17
Public sector – state level	11
Academia/Research	7
Public sector – municipal level	6
Public sector – federal level	6
Public sector – county level	6
Other*	3

*Other include “Don’t mind”, “For a private consultant, but doing municipal work”, and “no preference”.

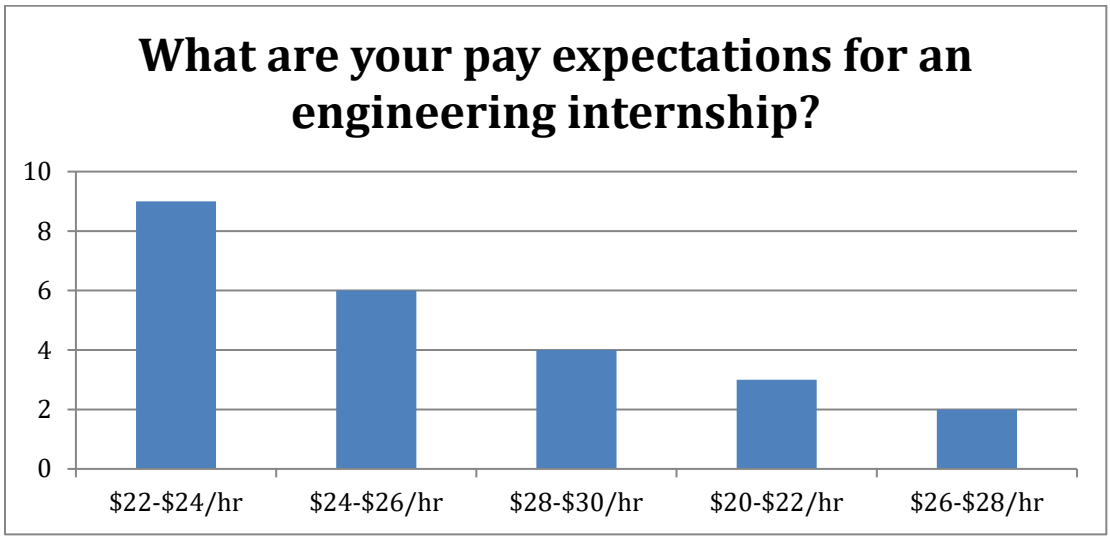


Q12: What are your pay expectations for an engineering internship?

Top responses: $22-$24/hr (9, 38%); $24-$26/hr (6, 25%); $28-$30/hr (4, 17%); $20-$22/hr (3, 12%); $26-$28/hr (2, 8%).

Option	Count
$22-$24/hr	9
$24-$26/hr	6

$28-$30/hr	4
$20-$22/hr	3
$26-$28/hr	2

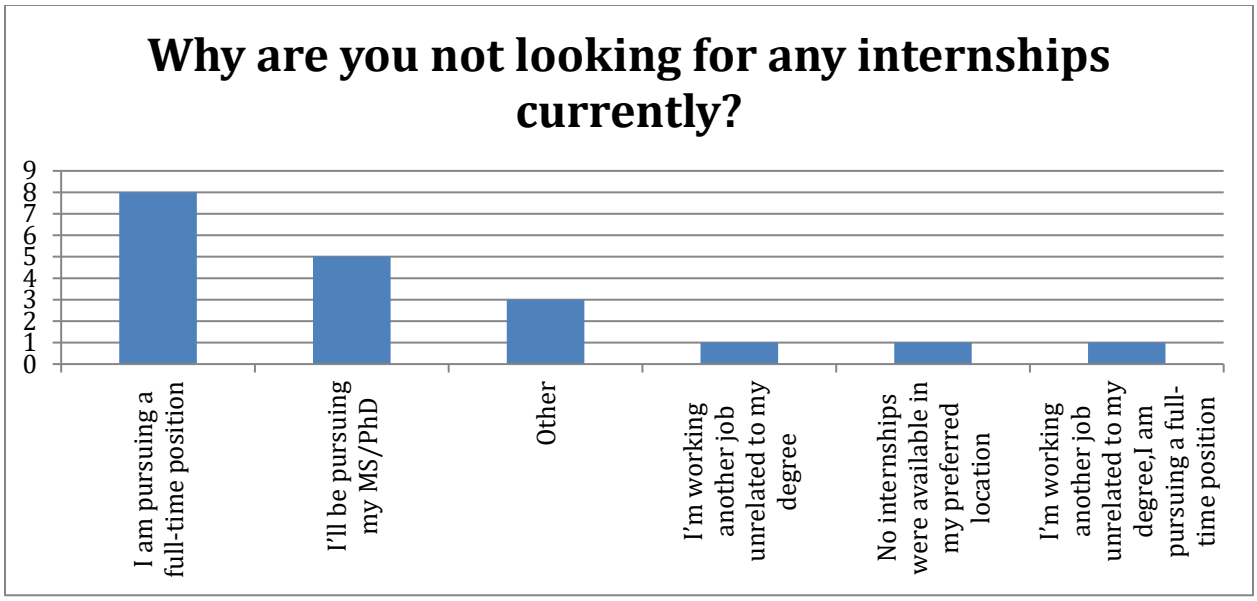


Q13: Why are you not looking for any internships currently?

Top responses: I am pursuing a full-time position (8, 42%); I'll be pursuing my MS/PhD (5, 26%); Other* (3, 16%); I'm working another job unrelated to my degree (1, 5%); No internships were available in my preferred location (1, 5%).

Option	**Count**
I am pursuing a full-time position	8
I'll be pursuing my MS/PhD	5
Other*	3
I'm working another job unrelated to my degree	1
No internships were available in my preferred location	1
I'm working another job unrelated to my degree,I am pursuing a full-time position	1

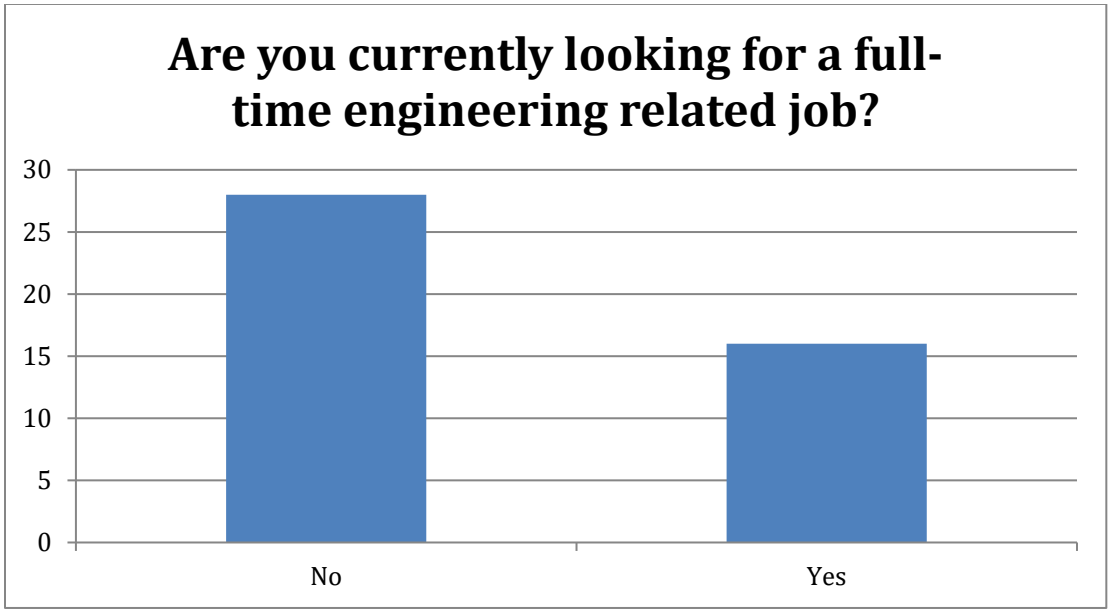
*Other include "I have a full time offer", "I have a full-time job in my field", and "I have a full-time job set up for the fall and I have been working a graduate assistantship this past year".



Q14: Are you currently looking for a full-time engineering related job?

Top responses: No (28, 64%); Yes (16, 36%).

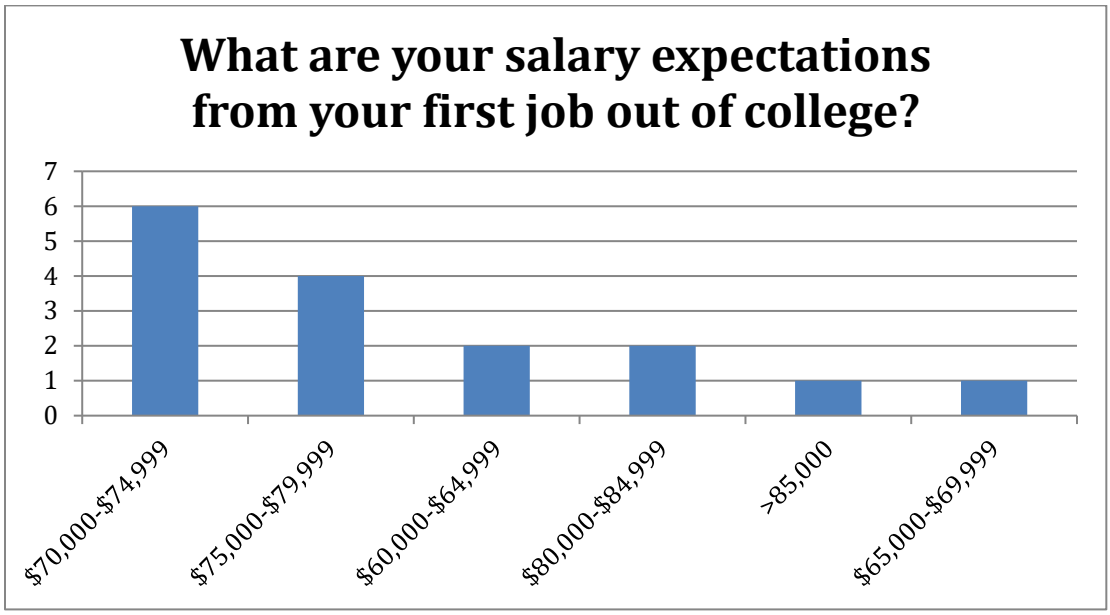
Option	Count
No	28
Yes	16



Q15: What are your salary expectations from your first job out of college?

Top responses: $70,000-$74,999 (6, 38%); $75,000-$79,999 (4, 25%); $60,000-$64,999 (2, 12%); $80,000-$84,999 (2, 12%); >85,000 (1, 6%).

Option	Count
$70,000-$74,999	6
$75,000-$79,999	4
$60,000-$64,999	2
$80,000-$84,999	2
>85,000	1
$65,000-$69,999	1



Q16: Please share with us why you are not looking for a full-time engineering related job.

Summary:

- Still in School/Not Yet Graduated:
  - Many respondents are still currently enrolled in school (e.g., "Still in school," "I'm still in college for 2 more years," "I am a full time student and don't graduate until May," "I still have a year," "I am still a full-time student," "I am just a freshmen").

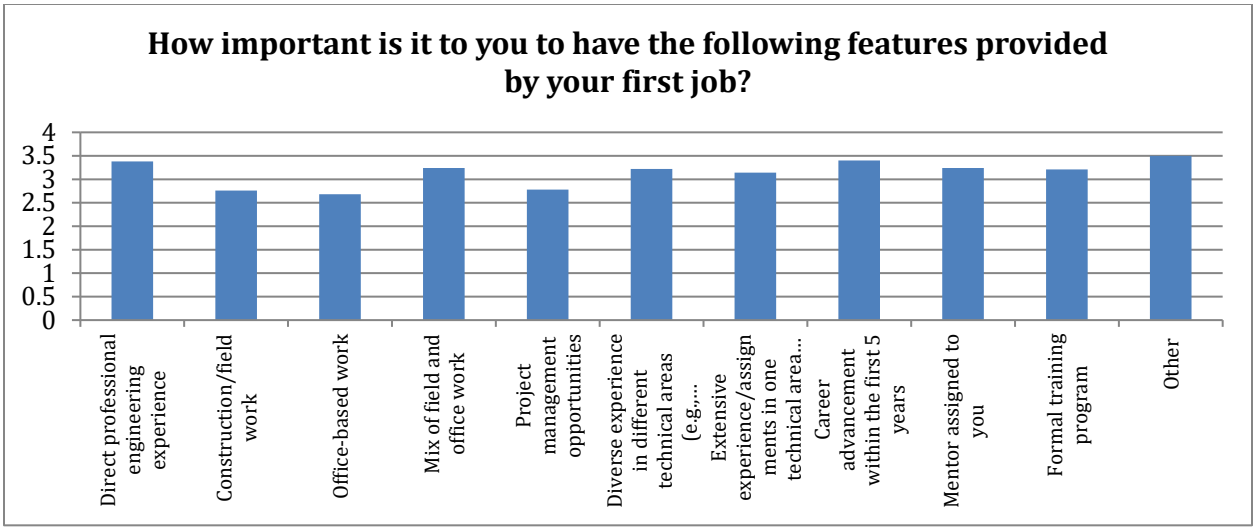
- Some specified their remaining time in their current program (e.g., "two years left," "do not graduate until May of [year implied]").

- Pursuing Further Education (Graduate School):
  - A significant number are planning to attend or are currently in graduate school (e.g., "Grad School," "Because I just started my Master's," "I am going to graduate school," "I'm doing grad school").
- Already Have a Job/Offer:
  - Several respondents indicated they already have a job or a job offer lined up (e.g., "I already have a full-time offer," "I have a full time job set tup," "I already have a job lined up," "Already have a job," "Have one," "Already have one," "I have one lined up").
- Future Job Search Plans:
  - One respondent mentioned a future timeline for their job search ("I'll start looking next fall").
- Other Commitments/Reasons:
  - One respondent mentioned being in the "Military."
  - One response was "Not allowed".

Q17: How important is it to you to have the following features provided by your first job?

Item	**Average (1-4)**
Direct professional engineering experience	3.38
Construction/field work	2.76
Office-based work	2.68
Mix of field and office work	3.24
Project management opportunities	2.78
Diverse experience in different technical areas (e.g., design/construction/traffic/structural/etc.) to gain broad engineering knowledge	3.22
Extensive experience/assignments in one technical area (e.g., design/construction/traffic/structural/etc.) to gain specialty knowledge	3.14
Career advancement within the first 5 years	3.4
Mentor assigned to you	3.24
Formal training program	3.21
Other*	3.5

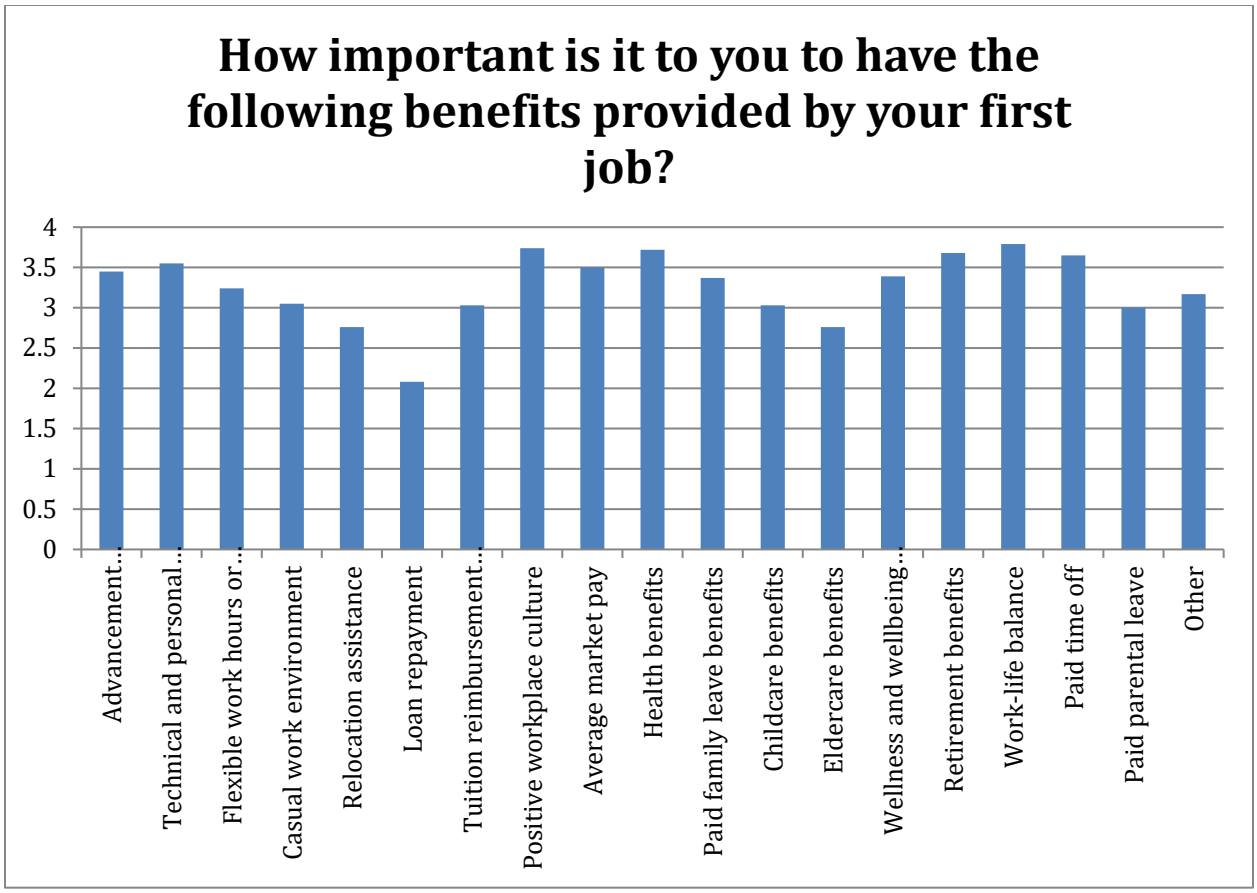
*Other include Mentorship accessible.



Q18: How important is it to you to have the following benefits provided by your first job?

Item	**Average (1-4)**
Advancement opportunities	3.45
Technical and personal development training	3.55
Flexible work hours or remote work	3.24
Casual work environment	3.05
Relocation assistance	2.76
Loan repayment	2.08
Tuition reimbursement for grad school	3.03
Positive workplace culture	3.74
Average market pay	3.5
Health benefits	3.72
Paid family leave benefits	3.37
Childcare benefits	3.03
Eldercare benefits	2.76
Wellness and wellbeing benefits	3.39
Retirement benefits	3.68
Work-life balance	3.79
Paid time off	3.65
Paid parental leave	3
Other*	3.17

*Other include “Mental health” and “Retirement Benefits as in 401k and matching”.



1) If responded that retirement benefits are important (i.e., selected option 3 or 4), then:

Do you understand the difference between a pension and 401k?

Option	Count
No	11
Yes	27

2) If responded that work-life balance is important (i.e., selected option 3 or 4), then:

what does work-life balance mean to you?

Option	Count
Clear separation between work and personal time	33
Reasonable vacation time	31
Reasonable and flexible work hours	28
Reasonable sick leave	26
Supportive company culture	23
Low to moderate stress from work	20

3)Paid time off (vacation/holidays/sick leave)

How many weeks do you expect?

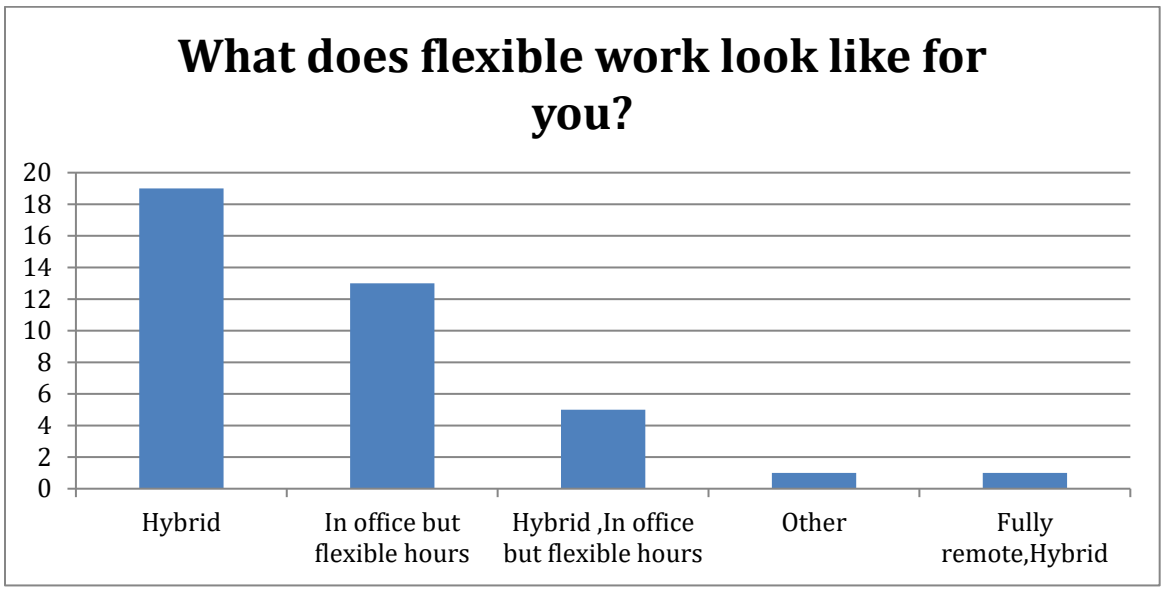
Option	Count
1 week	1
2 weeks	7
3 weeks	15
4 weeks	9
6 weeks	3

Q19: What does flexible work look like for you?

Top responses: Hybrid (19, 49%); In office but flexible hours (13, 33%); Hybrid ,In office but flexible hours (5, 13%); Other* (1, 3%); Fully remote, Hybrid (1, 3%).

Option	Count
Hybrid	19
In office but flexible hours	13
Hybrid ,In office but flexible hours	5
Other*	1
Fully remote, Hybrid	1

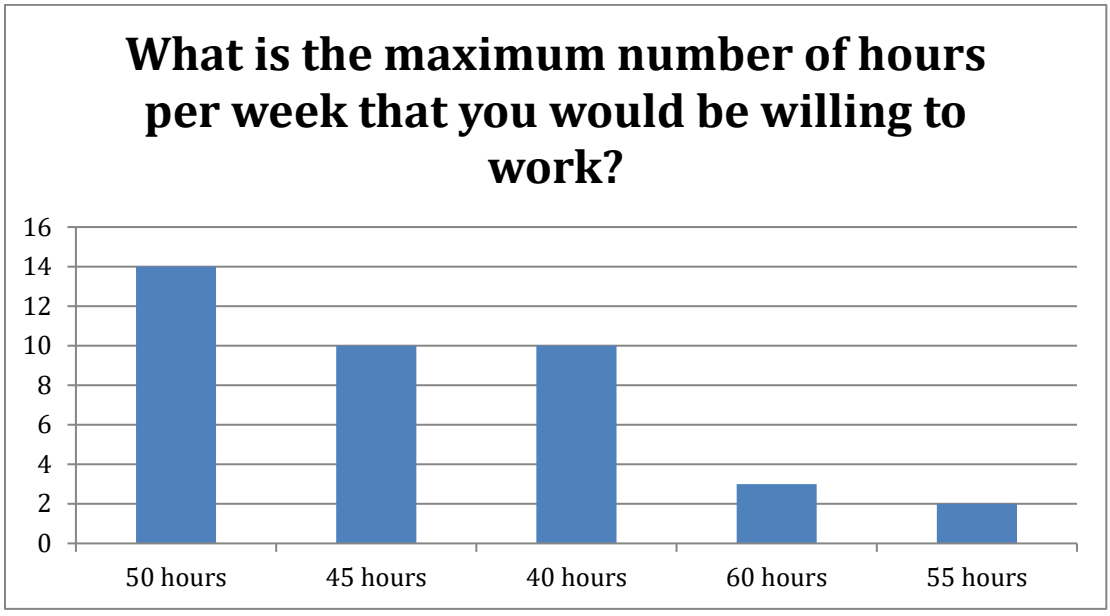
*Other include Potential for hybrid when possible but flexible office hours when not possible.



Q20: What is the maximum number of hours per week that you would be willing to work?

Top responses: 50 hours (14, 36%); 45 hours (10, 26%); 40 hours (10, 26%); 60 hours (3, 8%); 55 hours (2, 5%).

Option	Count
50 hours	14
45 hours	10
40 hours	10
60 hours	3
55 hours	2



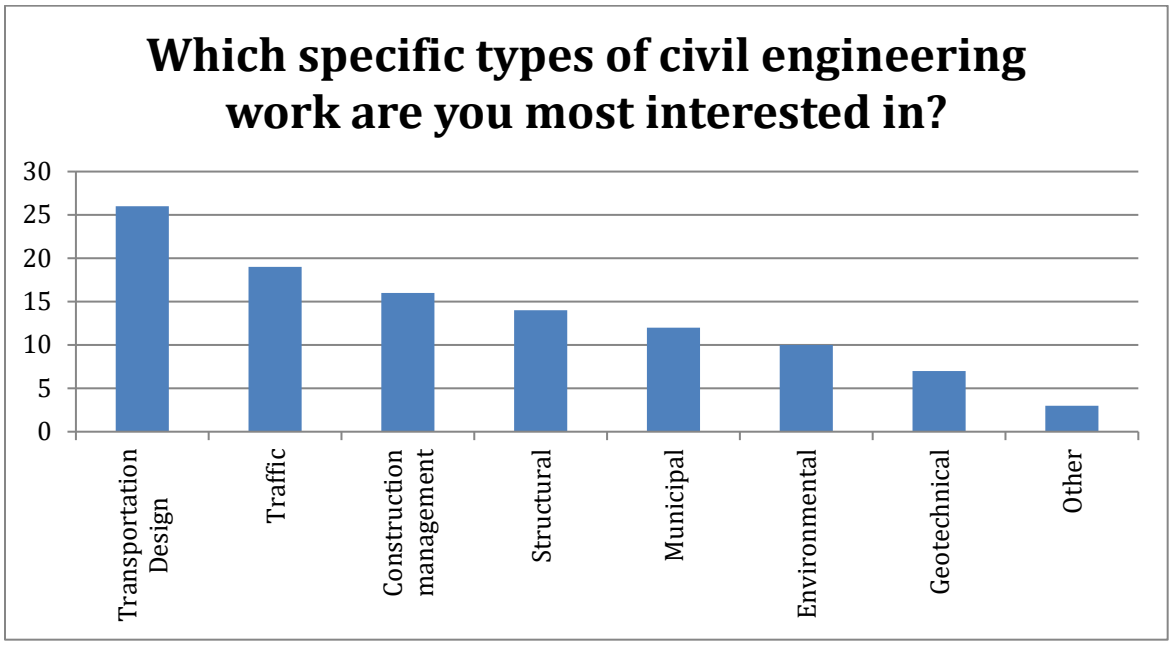
Q21: How important is it to you to work in public sector?

Item	Average (1-4)
How important is it to you to work in public sector?	2.11

Q22: Which specific types of civil engineering work are you most interested in?

Top responses: Transportation Design (26, 24%); Traffic (19, 18%); Construction management (16, 15%); Structural (14, 13%); Municipal (12, 11%).

Option	Count
Transportation Design	26
Traffic	19
Construction management	16
Structural	14
Municipal	12
Environmental	10
Geotechnical	7
Other	3



Q23: What are your career aspirations for the next five years?

Top responses: Civil Engineering (48, 52%); Environmental Engineering (18, 19%); Transportation Engineering (16, 17%); Other* (8, 9%); Mechanical Engineering (3, 3%).

Summary

- Job Acquisition & Stability:
    - "Good steady job"

    - "get a job in my field"
    - "get a job"
    - "to get a good paying job or a decent pay with good benefits"
- Professional Growth & Skill Development:
    - "Learn, grow, prove myself as an asset to my team"
    - "I'd like to learn more about my career"
    - "Grow my civil engineering knowledge and work in the field to gain real world experiences."
    - "helps me grow and learn new things."
    - "I wish to gain more practical skills"
    - "Just continuing to grow as an engineer at whatever company I am employed for"
- Licensure & Qualifications (FE/PE):
    - "Pass FE"
    - "Mainly I want to pursue my PE and gain experience in a variety of design-related disciplines."
    - "get my PE"
    - "Working towards getting a PE as soon as possible."
    - "Obtain my PE License"
    - "I would want to take my FE within 2 years"
    - "pursue pe"
    - "then become a fully licensed engineer"
- Career Advancement & Leadership:
    - "hopefully move into higher positions."
    - "Become a lead designer for a consulting firm"
    - "Grow within the company and lead a project."
    - "Have a job I am happy with and can advance in"
    - "Advance in my company"
    - "be able to apply for promotions to higher-ranking position"
- Specific Career Paths, Sectors & Impact:
    - "find the path that fits me best and that I can feel I can make the most impact."
    - "Improve the environment through my work"
    - "get hired in the public sector in a position related to my area of expertise"
    - "Public Sector Design Work."
    - "Work for a company that values its employees and have a position that is more related to field work and on the construction sites."

    - "I want to do planning with a consultant"
    - "military"
    - "To work for an environmental government agency"
    - "I would like to get a job at the MWRD in Chicago."
    - "Join a company which I fit with and make positive progress towards the world"
    - "work in consulting"
- Financial Goals:
    - "begin retirement savings."
    - "so that I can pay off my loans and get a house"
- Further Education (Graduate School):
    - "To graduate and transfer to a different school to complete my master's"
    - "Complete graduate school"
    - "grad school"
- Research:
    - "Over the next five years, I aspire to deepen my research"
- Personal Satisfaction & Enjoyment:
    - "I hope to find a job I enjoy"
    - "I honestly don't know, I just want to be in a position where I am happy."

Q24: What are your long-term career goals, say within the next 10-20 years?

Top responses: Civil Engineering (48, 52%); Environmental Engineering (18, 19%); Transportation Engineering (16, 17%); Other* (8, 9%); Mechanical Engineering (3, 3%).

- **Leadership & Management Roles:**
    - "manager"
    - "I would like to be a project manager."
    - "Project manager"
    - "Become a professional planner, maybe a city manager"
    - "Become a project manager at a good consulting firm"
    - "Project Management"
- **Achieving Expertise & Specialization:**
    - "Specialize in a topic, know all standards and applications of this topic."
    - "In the next 10–20 years, I aim to become a leading expert"

    - "I want to become an expert in my field and maybe obtain my ME or MBA, though i'm not sure i want to be a high level manager, if one at all"
- **Continuous Professional Growth & Development:**
    - "Learn more, grow, lead, find my place"
    - "Establish myself as a very confident person in what I'm doing or in my work area."
    - "Advance in my career"
    - "Progress through company ranks, contribute to societal projects, improve company culture and standing"
- **Obtaining Licensure & Advanced Qualifications:**
    - "Become a licensed engineer working for a flexible and established company."
    - "Acquire PE. Lean into project management and leadership work and positions."
    - "Use my PE License"
    - "I would like to have my PE license within 10 years."
    - "PE, project manager,"
- **Securing Stable & Enjoyable Employment:**
    - "Have a stable job in a sector I enjoy."
    - "Find a long term job that I enjoy, work on sustainable and publically beneficial projects especially in mass transit."
- **Making a Significant Impact & Contribution:**
    - "Complete large scale projects with significant environmental impacts for communities"
    - "Be able to work and complete projects of high relevance in my area of expertise with appropriate recognition."
- **Entrepreneurial Aspirations:**
    - "Owning my own engineering firm"
- **Building Reputation & Influence:**
    - "Be someone that people know. Be someone people look up to and ask for help."
- **Exploring Specific Career Paths & Settings:**
    - "Maybe been in two different companies"
    - "military"
    - "To work internationally in environmental law"
- **Personal Well-being & Undecided Goals:**
    - "I don't know. I think I want to be comfortable in my living situation and make a real difference in sustainable engineering."

Q25: What does an ideal employer look like for you?

Top responses: Civil Engineering (48, 52%); Environmental Engineering (18, 19%); Transportation Engineering (16, 17%); Other* (8, 9%); Mechanical Engineering (3, 3%).

Company Characteristics & Structure: "small to medium size company" "A consultant that does public work, I want to be a county or city engineer without having the threat of trivial politics risking my job" "military" "Small Business,"

Work Environment & Culture: "Supportive and caring" "Friendly inclusive workplace, low stress, flexible work schedule and hours, trust, morals, responsibility to the public, good ethical work and comfortable workplace with clear rules and expectations." "Employers with hybrid work, flexible hours, good benefits, enjoyable atmosphere" "An ideal employer fosters a collaborative, research-driven environment that values innovation, academic freedom, and long-term impact." "Someone who sets schedules and keeps the office organized and running while making sure the environment is fun and comfortable" "People in the office LIKE their jobs, no one seems miserable to be at work. People enjoy their jobs and also a good morale." "Good work culture"

Leadership & Management Style: "Someone who is flexible and understanding. but who will challenge me within my position." "Understands my goals I want to reach in the company and helping me achieve those." "Someone I could approach." "not a micromanager, challenging, understanding, teaches well" "Someone that´s open about what they need, communicate well and care about their employees" "I would like a mentor-type of employer who wants to pass down skills." "someone like my internship" "I think an employer who is relatable."

Employee Treatment & Values: "An employer that is capable of completing their services/production goals providing a healthy work-life balance to their employees and delivers a return to society." "Honest, reasonable , and passionate about employee growth." "Kind and considerate, flexible, ethical." "Keeps on real all the time."

Compensation, Benefits & Work-Life Balance: "High compensation flexible hours, whether in person or remote, ability to travel, separation of work time and personal time" "Willing to let me do the things that I want to do, good salary hours and benefits" "Good work life balance. Good office space. Provides real world solutions"

Q26: What does an ideal job look like for you?

Top responses: Civil Engineering (48, 52%); Environmental Engineering (18, 19%); Transportation Engineering (16, 17%); Other* (8, 9%); Mechanical Engineering (3, 3%).

Company & Work Structure: "small to medium size company" "Working a hybrid job where I work from the office some days, and others on the project site." "Work Location: An ideal job would allow to work from home with in-person when needed" "I think a hybrid position where my work is valued." "military"
Nature & Content of Work: "Variety in work" "A project group of engineers who work together and solve problems presented in the world." "conducting meaningful research in sustainable materials, mentoring young scholars, collaborate internationally, and transferring scientific findings into real-world impact" "A position with a mix of field work and office work, and a variety of projects with a lot of the same clients and contractors" "My ideal job would to be working in water resources and helping develop projects that help better my community." "Civil site design or transportation design" "I would want to be doing something different every day. I would enjoy field work and talking to community members about their opinions. I am also interested in environmental justice." "project manager"
Growth, Development & Mentorship: "strong mentorship, a path up within the company, a company that wants me to grow." "opportunity to advance" "Learning new things and getting experience." "supportive environment to grow."
Work Environment & Culture: "one that aligns with my views, has flexibility and is important to my views." "Comfortable, yet stimulating work environment and culture." "One that trusts me, lets me share my ideas, has my back" "Good environment, flexible hours" "Friendly, Not being overworked"
Job Satisfaction & Fulfillment: "Something that I enjoy doing and look forward to everyday, and feel like I am making a difference." "I just simply want to enjoy what I'm doing and it should make me happy. I don't want it to feel like a pressure even though there are lot of things happening around in the work place. I want it to be something that excites me. So the outcome will be as good as that." "A job where I feel fulfilled in my work" "Feeling like my work matters and is valuable to people"
Compensation, Benefits & Work-Life Balance: "Flexible work schedule, time off to pursue further education" "I want to make a decent yearly salary with a well-known company." "PTO: 4 weeks of vacation with progression over years of service and parent leave; Benefits: Retirement pension; 401k; Health Insurance without network limitation; Pay expectation: Enough to provide for new average house financing in the city/state of location and average cost for family of 4." "reasonable workload." "9-5 pays me for all my time" "Good benefits, pay time off" "Good pay and benefits, flexible work patterns, and travel opportunities."

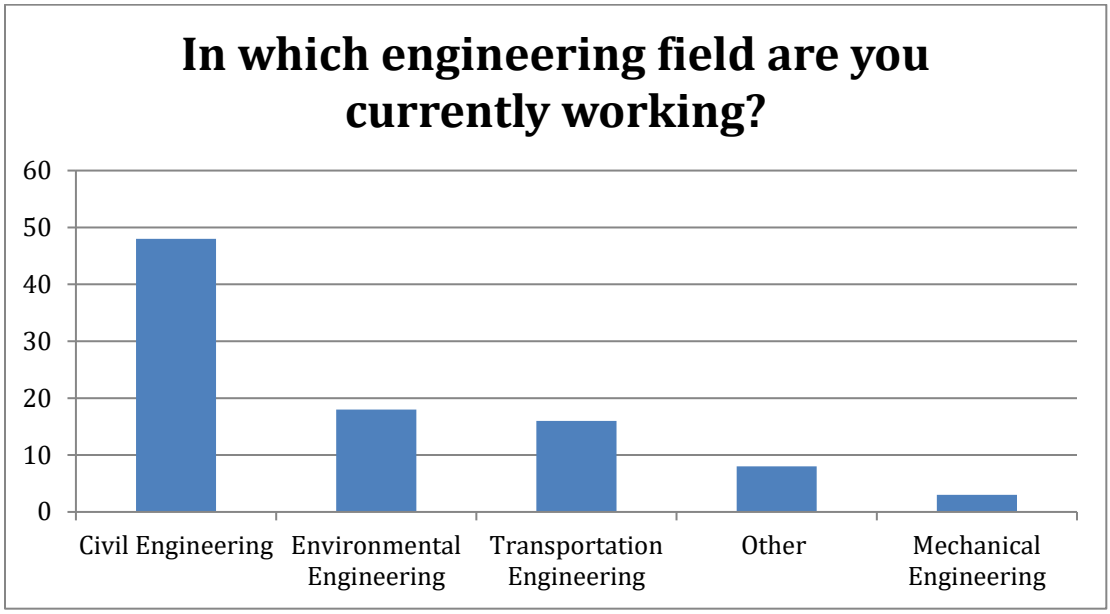
Results of Survey Analysis: Engineering Faculty

Q1: In which engineering field are you currently working? - Selected Choice

Top responses: Civil Engineering (48, 52%); Environmental Engineering (18, 19%); Transportation Engineering (16, 17%); Other* (8, 9%); Mechanical Engineering (3, 3%).

Option	Count
Civil Engineering	48
Environmental Engineering	18
Transportation Engineering	16
Other*	8
Mechanical Engineering	3

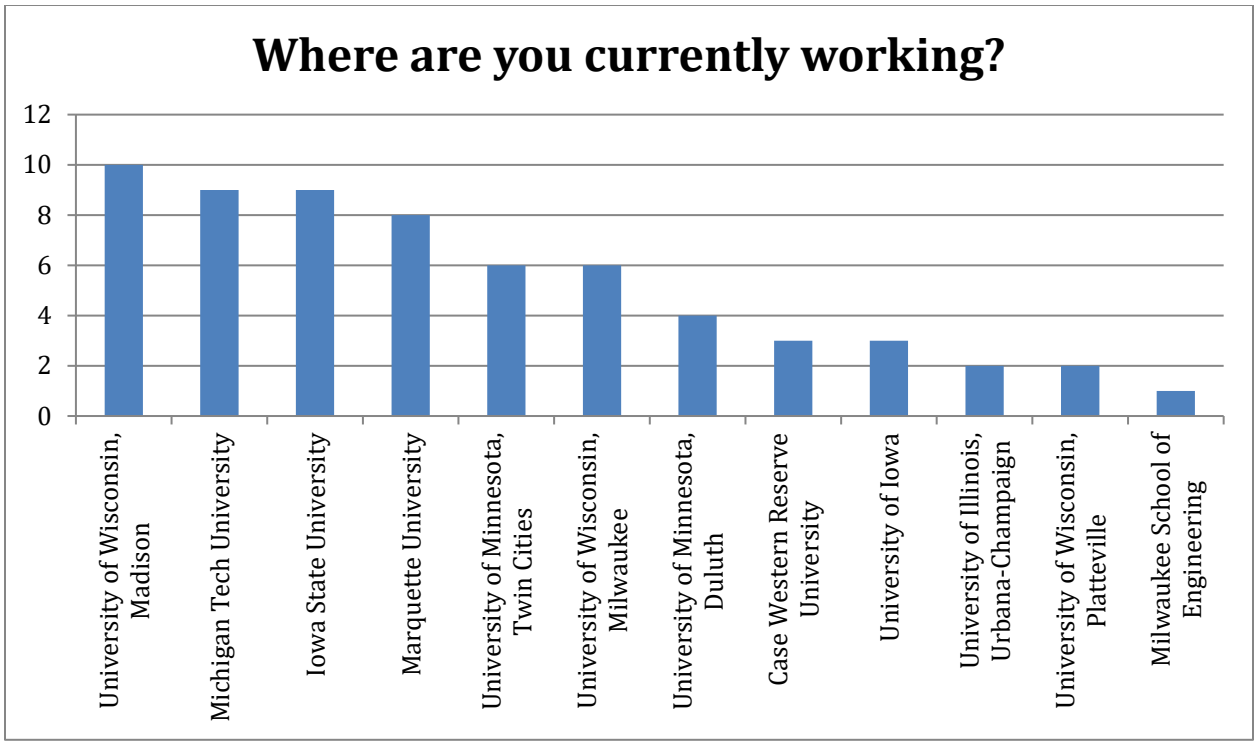
*Other include Construction Engineering, Geo Mechanics, Geo-engineering, Geological Engineering, Geospatial Engineering, Higher education.



Q2: Where are you currently working?

Top responses: University of Wisconsin, Madison (10, 16%); Michigan Tech University (9, 14%); Iowa State University (9, 14%); Marquette University (8, 13%); University of Minnesota, Twin Cities (6, 10%).

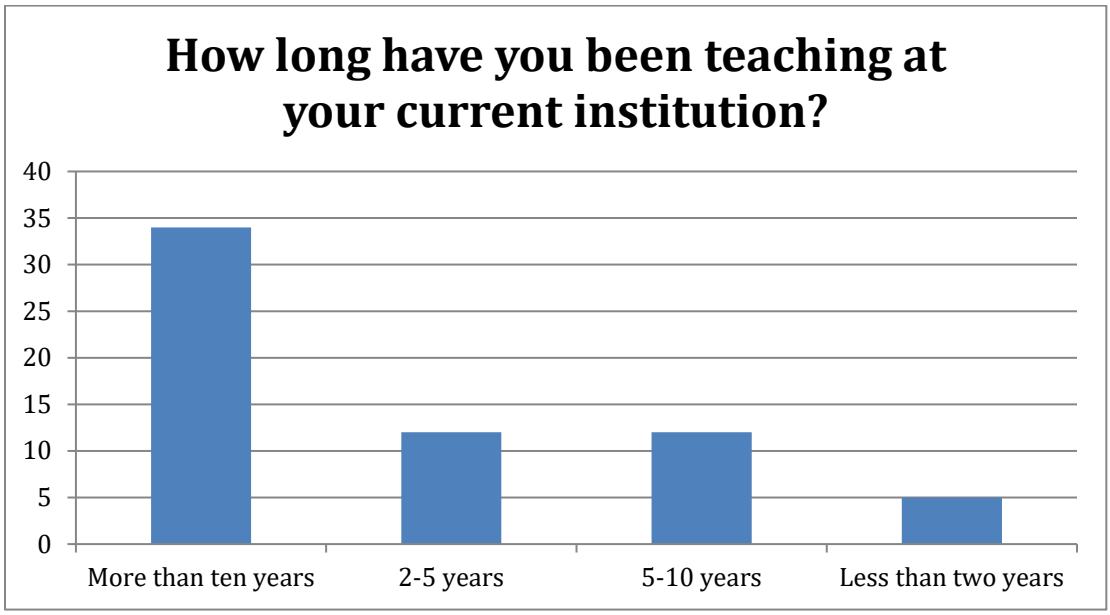
Option	Count
University of Wisconsin, Madison	10
Michigan Tech University	9
Iowa State University	9
Marquette University	8
University of Minnesota, Twin Cities	6
University of Wisconsin, Milwaukee	6
University of Minnesota, Duluth	4
Case Western Reserve University	3
University of Iowa	3
University of Illinois, Urbana-Champaign	2
University of Wisconsin, Platteville	2
Milwaukee School of Engineering	1



Q3: How long have you been teaching at your current institution?

Top responses: More than ten years (34, 54%); 2-5 years (12, 19%); 5-10 years (12, 19%); Less than two years (5, 8%).

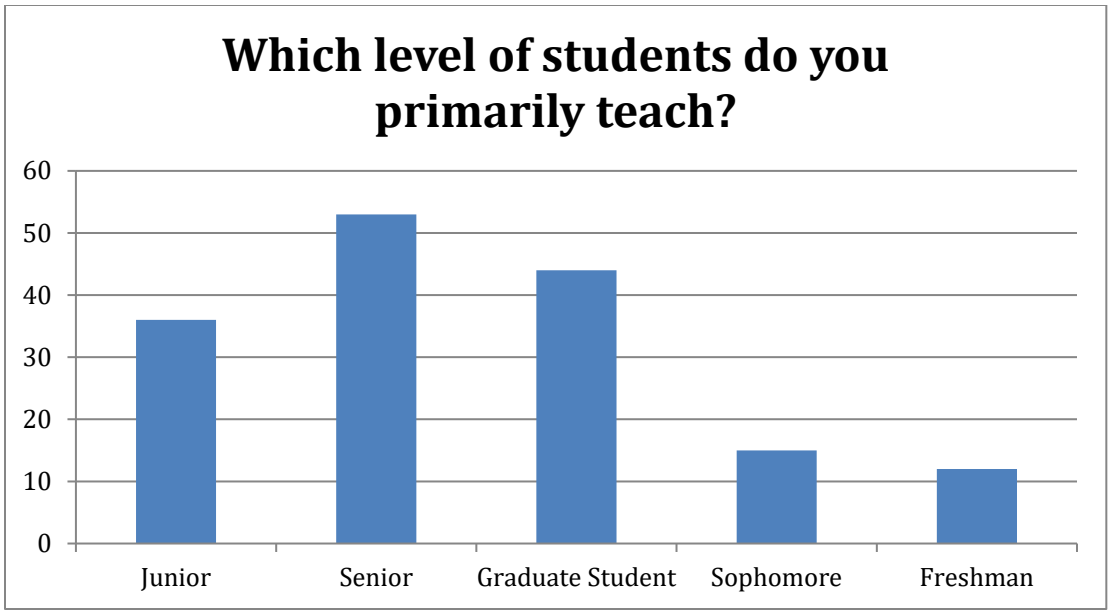
Option	Count
More than ten years	34
2-5 years	12
5-10 years	12
Less than two years	5



Q4: Which level of students do you primarily teach?

Top responses: Senior (53, 33%); Graduate Student (44, 28%); Junior (36, 22%); Sophomore (15, 9%); Freshman (12, 8%).

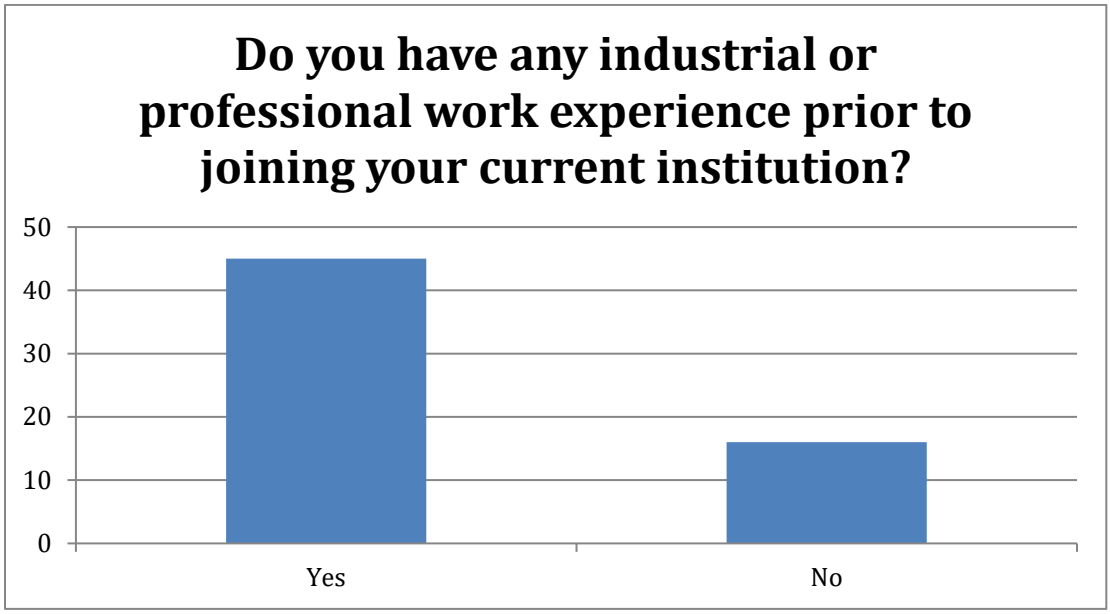
Option	Count
Junior	36
Senior	53
Graduate Student	44
Sophomore	15
Freshman	12



Q5: Do you have any industrial or professional work experience prior to joining your current institution?

Top responses: Yes (45, 74%); No (16, 26%).

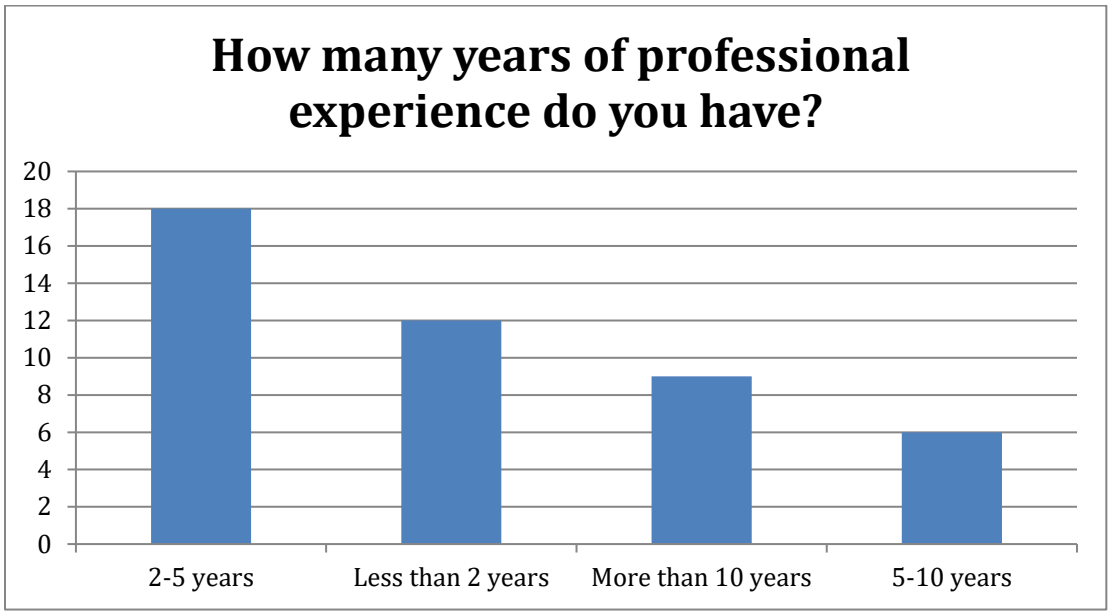
Option	Count
Yes	45
No	16



Q6: How many years of professional experience do you have?

Top responses: 2-5 years (18, 40%); Less than 2 years (12, 27%); More than 10 years (9, 20%); 5-10 years (6, 13%).

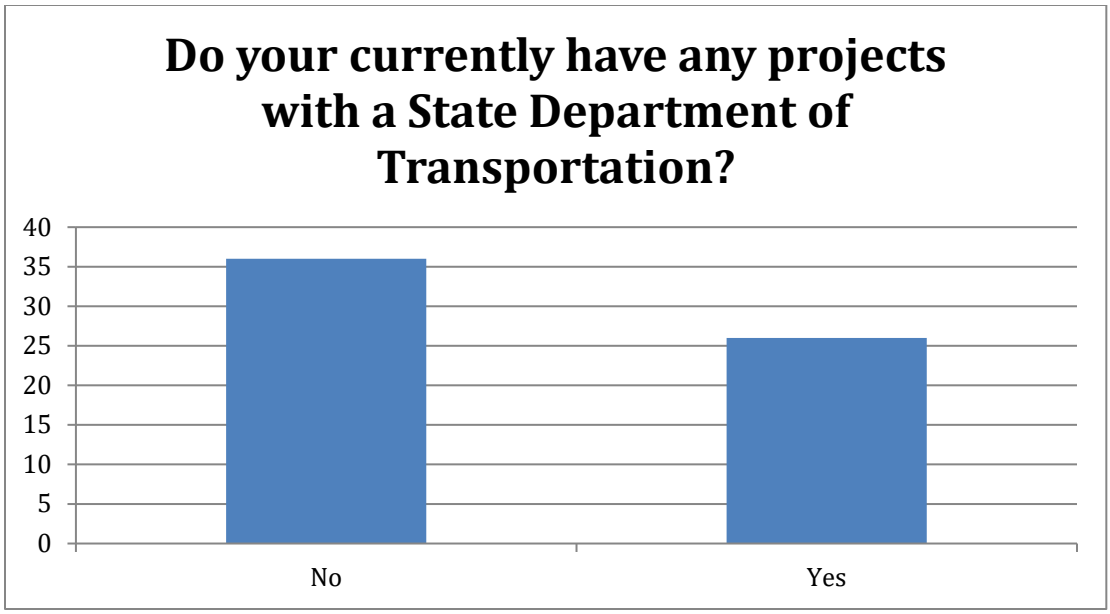
Option	Count
2-5 years	18
Less than 2 years	12
More than 10 years	9
5-10 years	6



Q7: Do your currently have any projects with a State Department of Transportation?

Top responses: No (36, 58%); Yes (26, 42%).

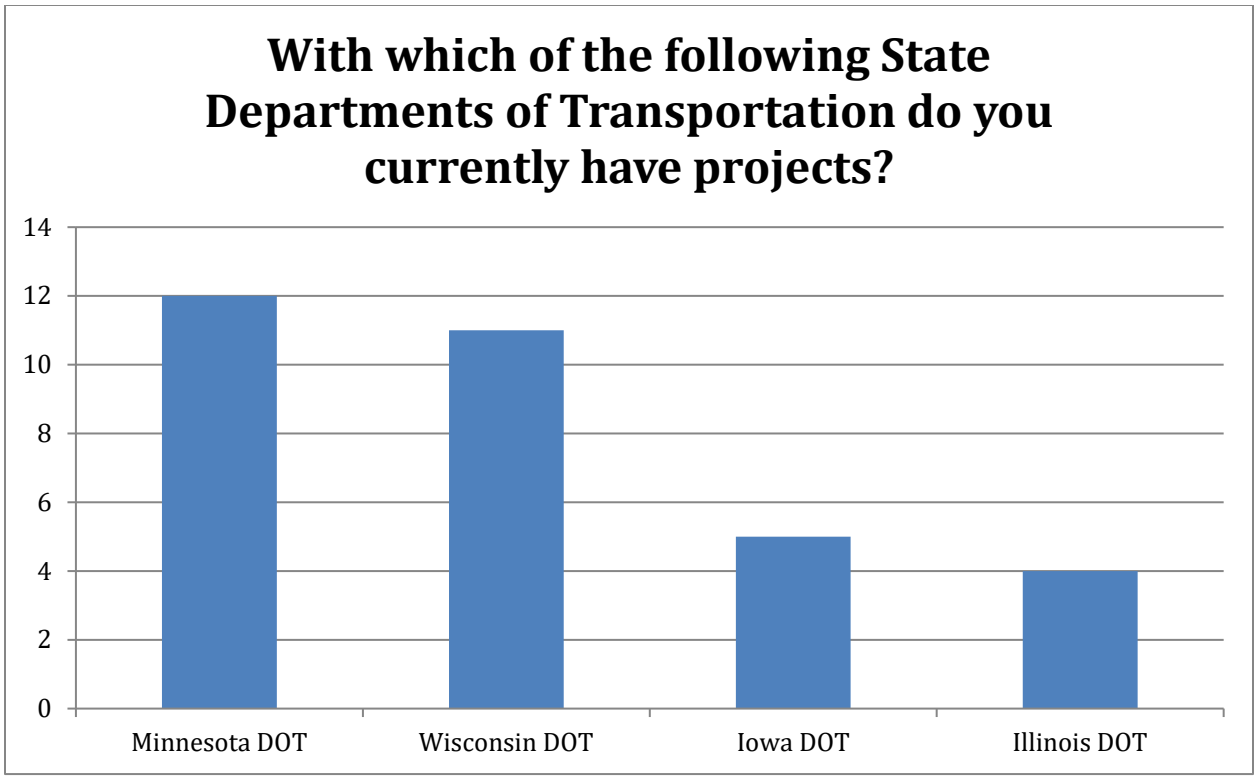
Option	Count
No	36
Yes	26



Q8: With which of the following State Departments of Transportation do you currently have projects?

Top responses: Minnesota DOT (12, 38%); Wisconsin DOT (11, 34%); Iowa DOT (5, 16%); Illinois DOT (4, 12%).

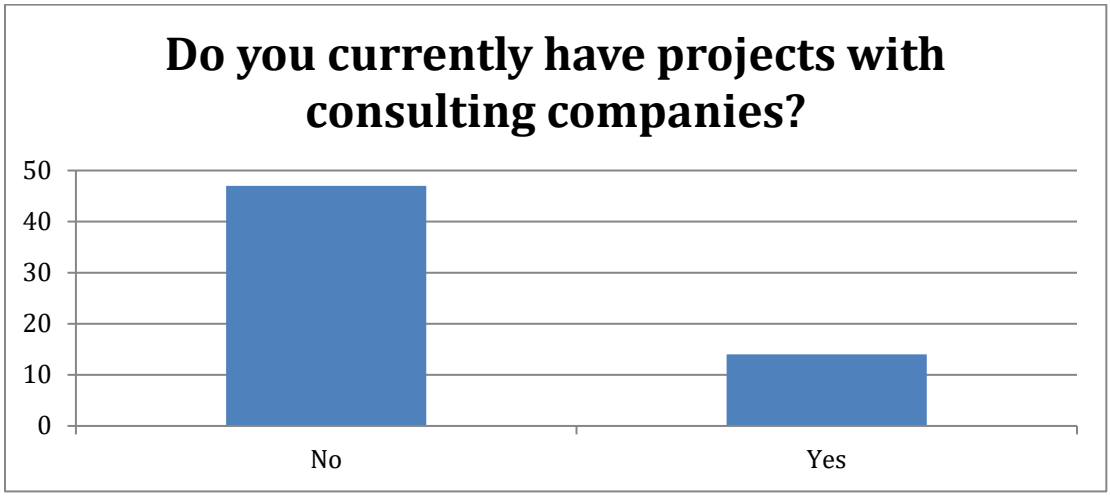
Option	Count
Minnesota DOT	12
Wisconsin DOT	11
Iowa DOT	5
Illinois DOT	4



Q9: Do you currently have projects with consulting companies?

Top responses: No (47, 77%); Yes (14, 23%).

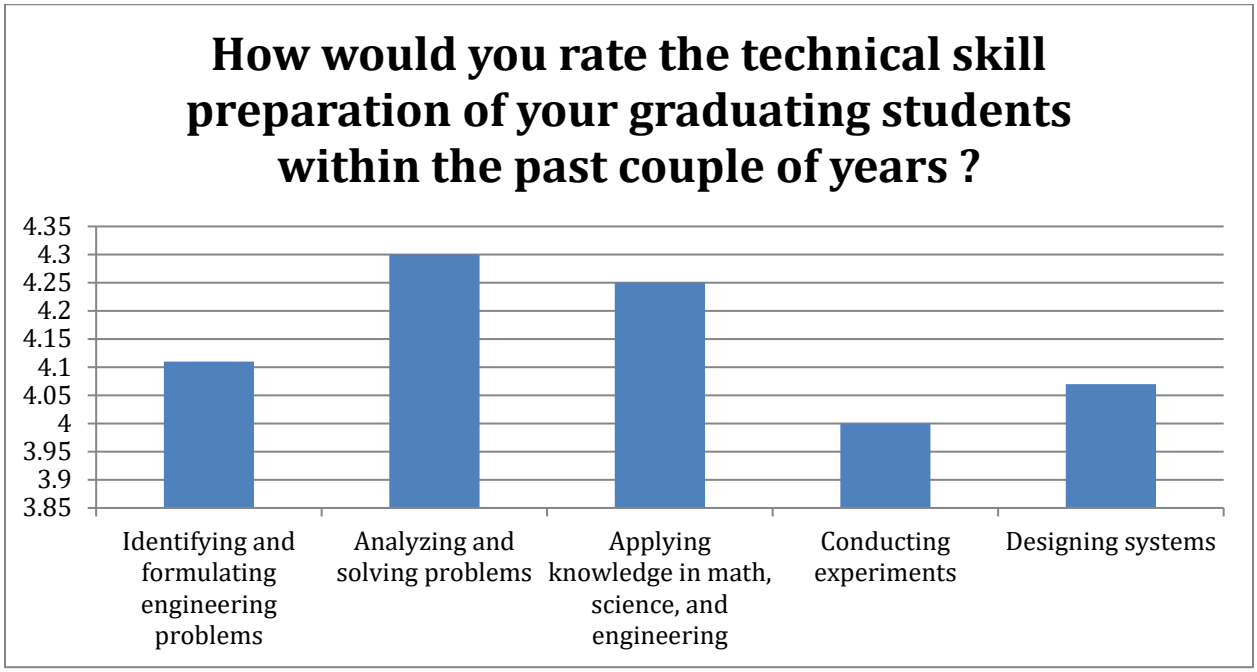
Option	Count
No	47
Yes	14



Q10: To the best of your knowledge and experience, how would you rate the technical skill preparation of your graduating students within the past couple of years in the following categories?

Highest-rated items: Analyzing and solving problems (4.30); Applying knowledge in math, science, and engineering (4.25); Identifying and formulating engineering problems (4.11); Designing systems (4.07); Conducting experiments (4.00).

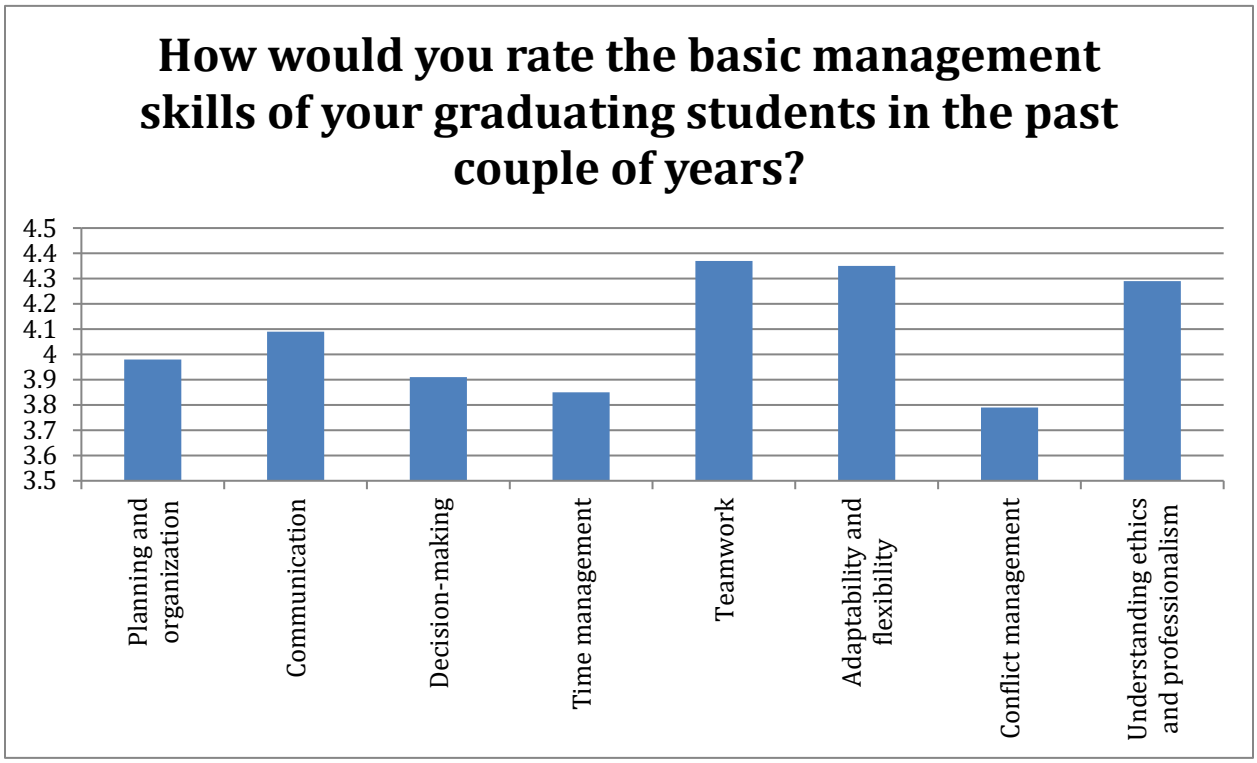
Item	Average
Identifying and formulating engineering problems	4.11
Analyzing and solving problems	4.3
Applying knowledge in math, science, and engineering	4.25
Conducting experiments	4
Designing systems	4.07



Q11: To the best of your knowledge and experience, how would you rate the basic management skills of your graduating students in the past couple of years in the following categories?

Highest-rated items: Teamwork (4.37); Adaptability and flexibility (4.35); Understanding ethics and professionalism (4.29); Communication (4.09); Planning and organization (3.98).

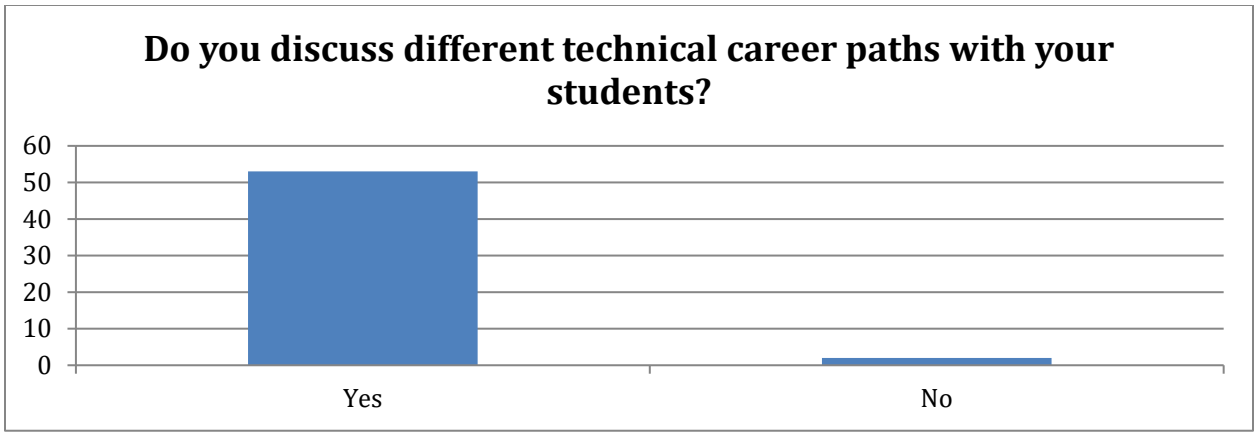
Item	Average
Planning and organization	3.98
Communication	4.09
Decision-making	3.91
Time management	3.85
Teamwork	4.37
Adaptability and flexibility	4.35
Conflict management	3.79
Understanding ethics and professionalism	4.29



Q12: Do you discuss different technical career paths with your students?

Top responses: Yes (53, 96%); No (2, 4%).

Option	Count
Yes	53
No	2

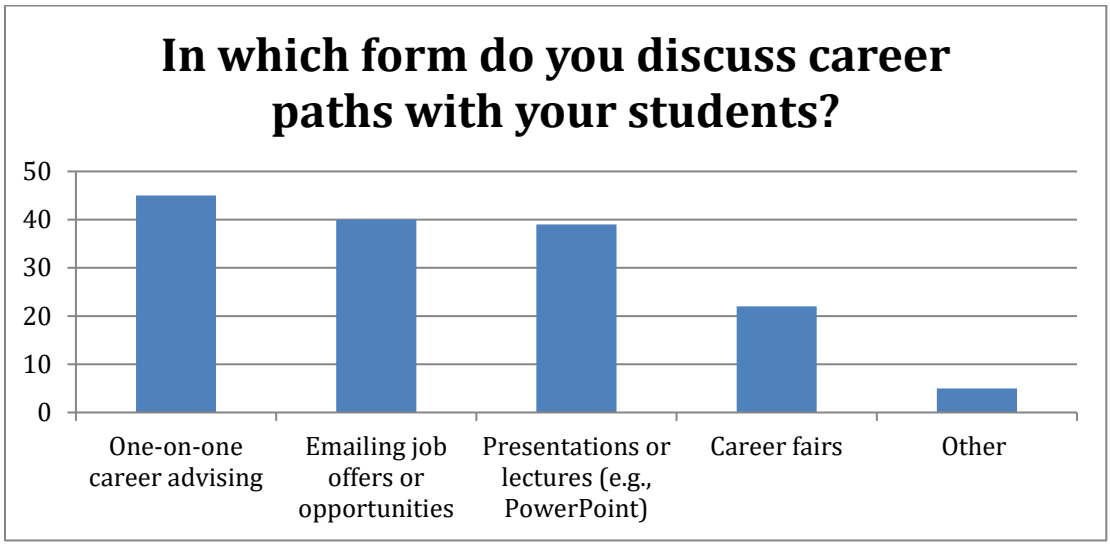


Q13: In which form do you discuss career paths with your students? - Selected Choice

Top responses: One-on-one career advising (45, 30%); Emailing job offers or opportunities (40, 26%); Presentations or lectures (e.g., PowerPoint) (39, 26%); Career fairs (22, 15%); Other* (5, 3%).

Option	Count
One-on-one career advising	45
Emailing job offers or opportunities	40
Presentations or lectures (e.g., PowerPoint)	39
Career fairs	22
Other*	5

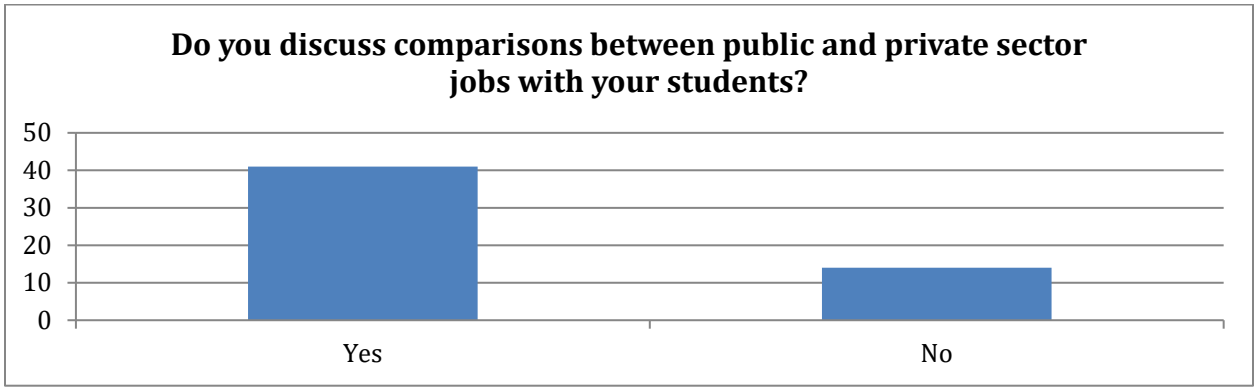
*Other include Guest presenters, weekly newsletter, Capstone class, In-class discussions, and Mentoring and posting job offers or opportunities on a common site.



Q14: Do you discuss comparisons between public and private sector jobs with your students?

Top responses: Yes (41, 75%); No (14, 25%).

Option	Count
Yes	41
No	14

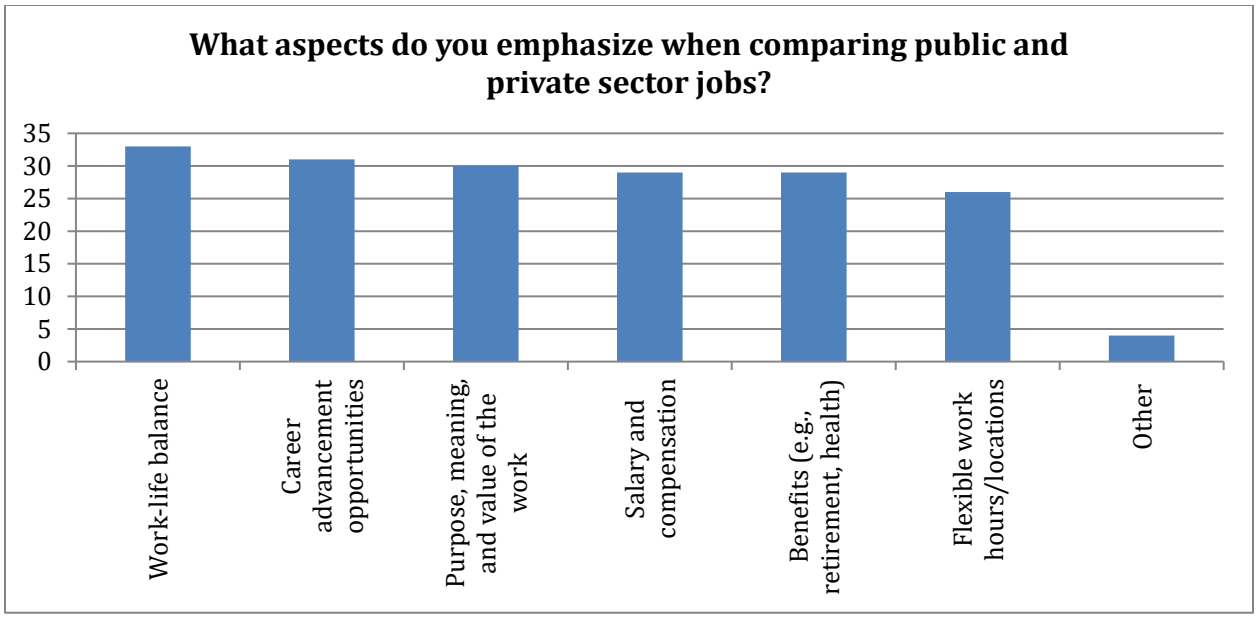


Q15: What aspects do you emphasize when comparing public and private sector jobs? - Selected Choice

Top responses: Work-life balance (33, 18%); Career advancement opportunities (31, 17%); Purpose, meaning, and value of the work (30, 16%); Salary and compensation (29, 16%); Benefits (e.g., retirement, health) (29, 16%).

Option	Count
Work-life balance	33
Career advancement opportunities	31
Purpose, meaning, and value of the work	30
Salary and compensation	29
Benefits (e.g., retirement, health)	29
Flexible work hours/locations	26
Other*	4

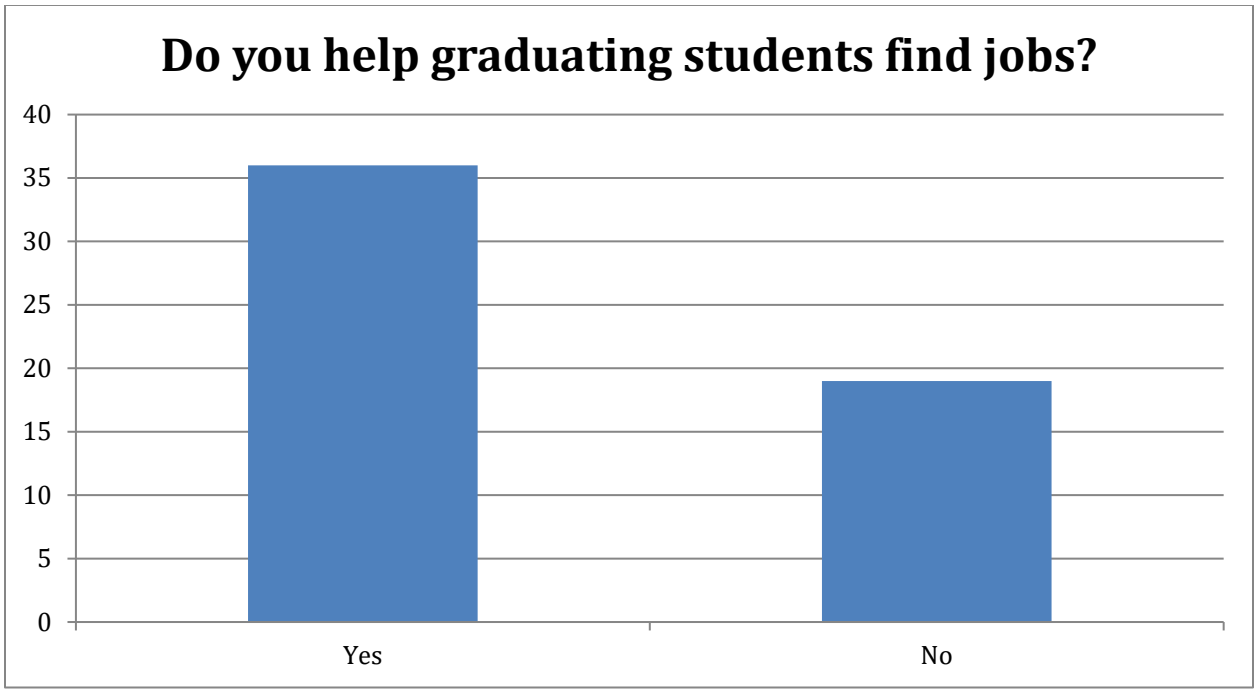
*Other include Travel, Broad vs. specialized, Contracting differences, and "Training opportunities, functional areas of public sector jobs vs. functional areas of private sector jobs, and a sense of ownership of transportation facilities as a public sector employee".



Q16: Do you help graduating students find jobs?

Top responses: Yes (36, 65%); No (19, 35%).

Option	Count
Yes	36
No	19

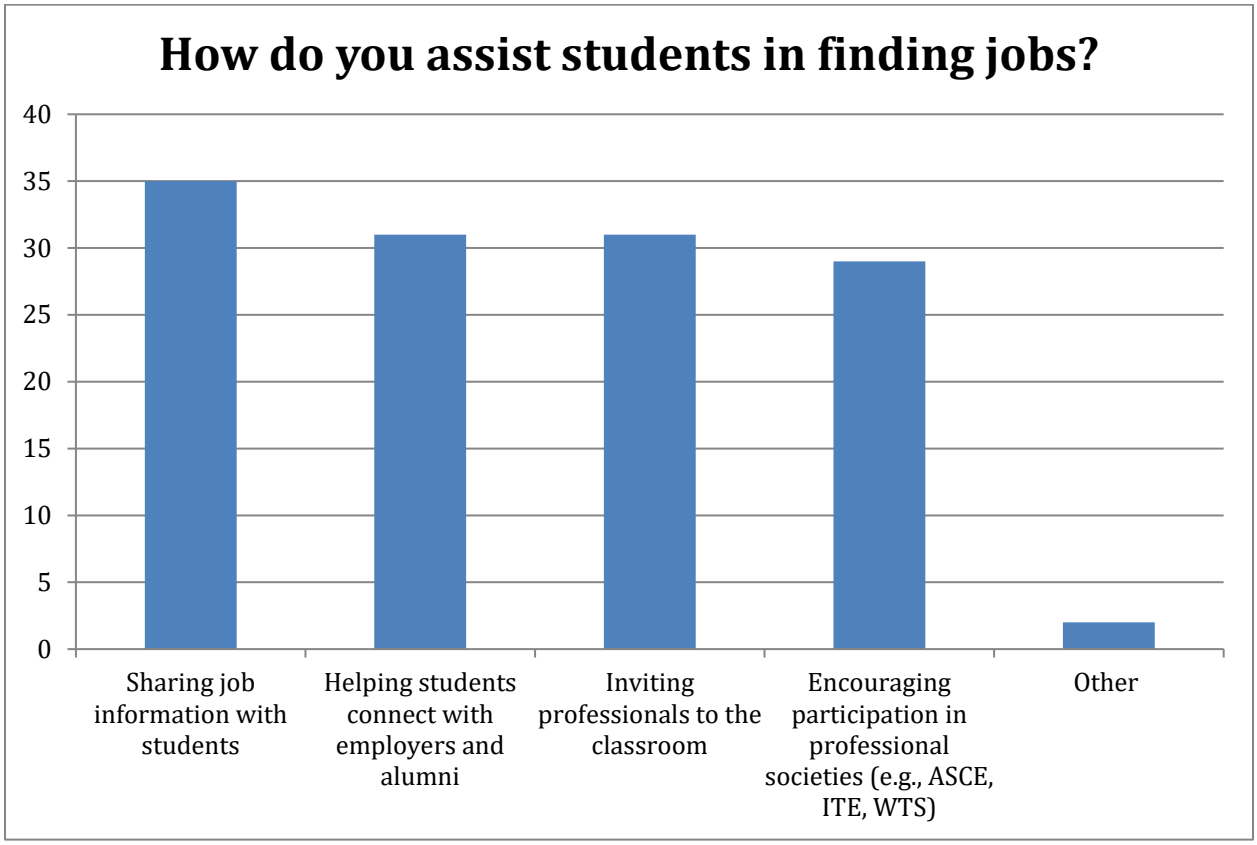


Q17: How do you assist students in finding jobs?

Top responses: Sharing job information with students (35, 27%); Helping students connect with employers and alumni (31, 24%); Inviting professionals to the classroom (31, 24%); Encouraging participation in professional societies (e.g., ASCE, ITE, WTS) (29, 23%); Other* (2, 2%).

Option	Count
Sharing job information with students	35
Helping students connect with employers and alumni	31
Inviting professionals to the classroom	31
Encouraging participation in professional societies (e.g., ASCE, ITE, WTS)	29
Other*	2

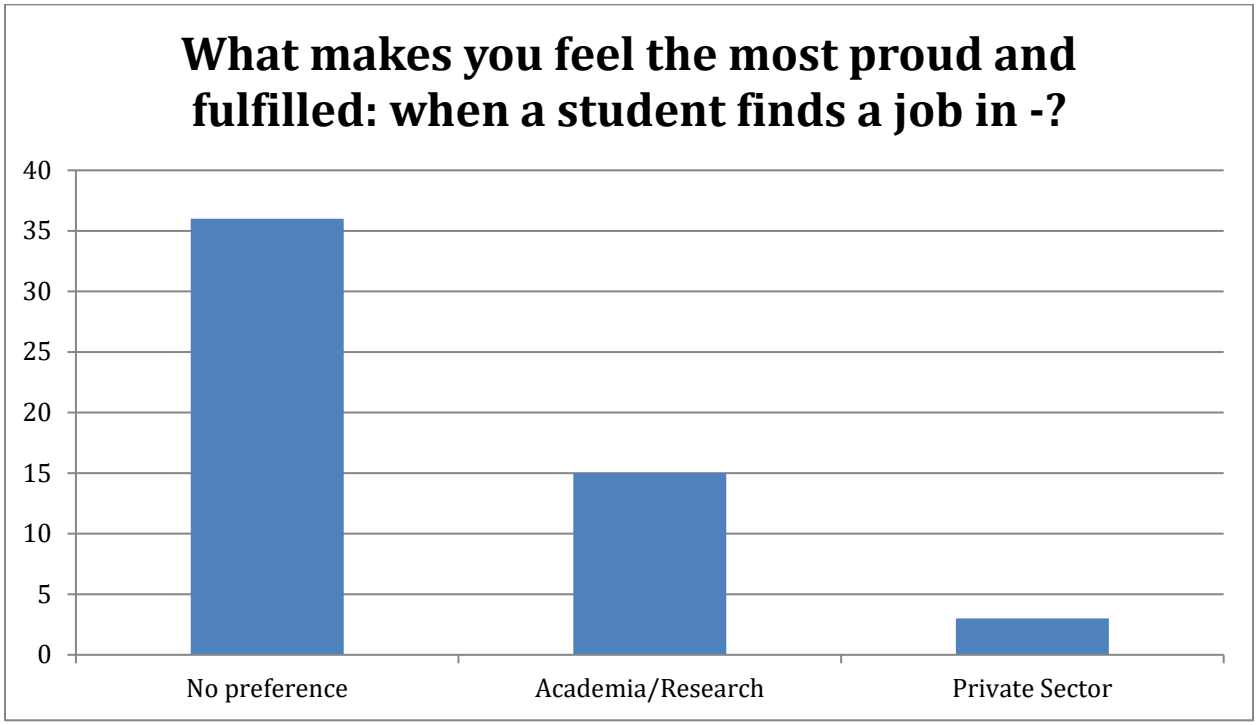
*Other include weekly newsletter and "Attending university and department specific career fairs".



Q18: What makes you feel the most proud and fulfilled: when a student finds a job in -?

Top responses: No preference (36, 67%); Academia/Research (15, 28%); Private Sector (3, 6%).

Option	Count
No preference	36
Academia/Research	15
Private Sector	3



Results of Survey Analysis: Engineering Alumni

Although only two alumni completed the survey, both graduates provide a glimpse into the public-sector career path. Both hold civil-engineering positions at WisDOT and have remained with the agency an average of two years. They entered state government service largely for its public-service mission, perceived work-life balance, and attractive benefits.

Each alumnus received roughly two to three job offers, securing their state job within a month of interviewing. Salary satisfaction is moderate to high, and both respondents confirmed they hold – and expect to maintain – a PE license with sufficient institutional support. Their onboarding experiences were described as effective, especially in orienting them to their roles and providing career-advancement guidance.

Asked why they might leave, the alumni flagged advancement opportunities and bureaucracy as ongoing challenges, yet neither is actively seeking to leave. A persistent concern is limited professional-development resources, particularly formal training. Overall, the small sample suggests that WisDOT's stability and benefits remain selling points, but future retention hinges on growth paths and streamlined processes.

Which year did you graduate? - Selected Choice
Other (please specify): 1
Which year did you graduate? - Other (please specify) - Text
No responses.
Which specific year did you graduate?
Average: 1996.00 (n=1)
Which degree did you receive? - Selected Choice
B.S.: 1
Which degree did you receive? - Other (please specify) - Text
No responses.
Where did you graduate from? - Selected Choice
University of Wisconsin, Milwaukee: 1
Where did you graduate from? - Other (please tell us where) - Text
No responses.
Which university did you graduate from?
No responses.
Are you currently working?

Yes: 2

You are not currently employed because you are- (please select one) - Selected Choice

No responses.

You are not currently employed because you are- (please select one) - Other (please share your reasons) - Text

No responses.

How many different organizations have you worked for since graduation?

Average: 5.00 (n=2)

Why did you leave your last organization? (Select top 3 reasons) - Selected Choice

1; Other (please specify): 1

Why did you leave your last organization? (Select top 3 reasons) - Other (please specify) - Text

Private equity rapidly changed culture: 1

What do you expect your next steps to be?

No responses.

Which field are you currently employed in? - Selected Choice

Civil Engineering: 2

Which field are you currently employed in? - Other (Please specify) - Text

No responses.

What is the primary area of civil engineering work that you are currently working in? (pick one) - Selected Choice

Transportation Design: 1; Traffic: 1

What is the primary area of civil engineering work that you are currently working in? (pick one) - Other (Please specify) - Text

No responses.

Where is your current job in? - Selected Choice

Public sector: 2

Where is your current job in? - Other (please specify) - Text

No responses.

Where are you currently working? (Optional: Name of the organization)

WisDOT: 1

How long have you been working in this organization?

Average: 2.00 (n=2)

Where did you hear about the job which you currently have? (select all that apply) - Selected Choice

University career services: 1; Friend/Family/External Referral,State jobs website: 1

Where did you hear about the job which you currently have? (select all that apply) - Other (please specify) - Text

No responses.

How long did it take for you to get the job offer after interviewing?

2 weeks: 1; 4 weeks: 1

How many offers did you receive before you accepted your current job?

Average: 2.50 (n=2)

If you received more than one job offer, how competitive was your total compensation package (which includes salary and benefits) compared to the other offers?

No responses.

How satisfied are you with your current salary?

Somewhat satisfied: 1

How well do the employee benefits match your needs?

Very well: 1

You chose to work at your current organization because: (select all that apply) - Selected Choice

I wanted to work in a public service environment,The prospects of a good work-life balance,The benefits package was attractive: 1

You chose to work at your current organization because: (select all that apply) - Other (please share your reasons) - Text

No responses.

How useful was the information provided to you during the hiring process so that you knew exactly the type of job you were getting into?

Useful: 1

How effective was your supervisor in- - Orienting you to your new role

Effective: 1

How effective was your supervisor in- - Setting you up for success/hitting the ground running

Effective: 1

How effective was your supervisor in- - Helping you understand your role in the organization

Effective: 1

How effective was your supervisor in- - Helping you quickly understand the lay of the land

Effective: 1

How effective was your supervisor in- - Getting you up to speed as efficiently as possible

Effective: 1

How effective was your supervisor in- - Equipping you with the tools you need for the next step of your career?

Effective: 1

How effective was your onboarding/orientation experience- - Selected Choice

Somewhat effective: 1

How effective was your onboarding/orientation experience- - Please share any additional thoughts on your onboarding/orientation experience - Text

No responses.

How well do you feel that the work you are currently doing would benefit you in today?□?s job market?

Extremely well: 1

Please rate how well your current work experiences match your career goals and aspirations.

Good match: 1

Do you currently have the support to succeed in your role to continue developing your technical skills?

Yes: 1

How satisfied are you with the tools and information that you have been provided to help you advance your career? - Selected Choice

Satisfied: 1

How satisfied are you with the tools and information that you have been provided to help you advance your career? - Not at all Satisfied (please share with us any examples of specific tools or info needed below) - Text

No responses.

How satisfied are you with the tools and information that you have been provided to help you advance your career? - Moderately Dissatisfied (please share with us any examples of specific tools or info needed below) - Text

No responses.

What sense of personal satisfaction are you getting from your work?

Satisfied: 1

Are you currently supervising other staff?

Yes: 1; No: 1

How interested are you in remaining in a supervisory or management role? - Selected Choice

No responses.

How interested are you in remaining in a supervisory or management role? - Not at all Interested (please share your opinion below) - Text

No responses.

How interested are you in remaining in a supervisory or management role? - A Little Interested (please share your opinion below) - Text

No responses.

Do you aspire to be a supervisor/manager here one day?

Yes: 1

What are your top reasons for wanting to move into a supervisory or management role? (pick all that apply) - Selected Choice

I want to be more involved in the decision-making processes: 1

What are your top reasons for wanting to move into a supervisory or management role? (pick all that apply) - Other (please specify) - Text

No responses.

What are your top reasons for not wanting to move into a supervisory or management role? (pick all that apply) - Selected Choice

No responses.

What are your top reasons for not wanting to move into a supervisory or management role? (pick all that apply) - Other (please specify) - Text

No responses.

Do you have a PE license?

Yes: 2

Do you feel you have what you need to maintain the license? - Selected Choice

Yes: 2

Do you feel you have what you need to maintain the license? - Please share in the box below if you have additional thoughts - Text

No responses.

Why you don't feel you have what you need to maintain your license?

No responses.

Are you planning to obtain one?

No responses.

Please explain why is it not relevant to your role:

No responses.

Which of the following resources would be most helpful in pursuing your PE license? (select up to three) - Selected Choice

No responses.

Which of the following resources would be most helpful in pursuing your PE license? (select up to three) - Other (share what you are looking for below) - Text

No responses.

What other types of opportunities for professional development do you feel would be most beneficial to you at this stage of your career?

Soft skills, project and program management, lean: 1

In the last one year, have you considered leaving your employer?

Yes: 1; No: 1

Please select answer of "Yes" or "No" to the following questions: - I am currently looking for other opportunities within my organization

No responses.

Please select answer of "Yes" or "No" to the following questions: - I am currently looking for other opportunities within the private sector

No responses.

Please select answer of "Yes" or "No" to the following questions: - I am looking for other opportunities within public sector

No responses.

Please select answer of "Yes" or "No" to the following questions: - I am looking for other opportunities in the nonprofit sector

No responses.

Please select answer of "Yes" or "No" to the following questions: - I am hitting retirement age and planning for that

No responses.

What are your top three reasons for wanting to leave your current employer? - Selected Choice

Lack of advancement/growth opportunities: 1

What are your top three reasons for wanting to leave your current employer? - Other (please specify below) - Text

No responses.

Do you feel your workload is fairly balanced compared to those in comparable positions?

Yes: 2

In general, which of the following challenges do you feel you experience the most at work? (Pick up to three) - Selected Choice

Not enough work-life balance: 1; Too much bureaucracy: 1

In general, which of the following challenges do you feel you experience the most at work? (Pick up to three) - Other (please specific) - Text

No responses.

Do you currently have a mentor?

Yes: 1; No: 1

How satisfied are you with your mentoring relationship?

Satisfied: 1

Please indicate how much importance you place on the following workplace features, and??how satisf... - Importance - Remote work

Extremely important: 1

Please indicate how much importance you place on the following workplace features, and??how satisf... - Importance - Level of work-life balance

Extremely important: 1

Please indicate how much importance you place on the following workplace features, and??how satisf... - Importance - Types of projects that you are working on

Important: 1

Please indicate how much importance you place on the following workplace features, and??how satisf... - Importance - Having opportunities to lead

Important: 1

Please indicate how much importance you place on the following workplace features, and??how satisf... - Importance - Career advancement/promotions

Important: 1

Please indicate how much importance you place on the following workplace features, and??how satisf... - Importance - Continued training and/or professional development opportunities

Important: 1

Please indicate how much importance you place on the following workplace features, and??how satisf... - Importance - Recognition for your contributions

Not at all important: 1

Please indicate how much importance you place on the following workplace features, and??how satisf... - Importance - Strong working relationship with supervisor

Important: 1

Please indicate how much importance you place on the following workplace features, and??how satisf... - Importance - Ability to communicate with supervisor/team

Important: 1

Please indicate how much importance you place on the following workplace features, and??how satisf... - Importance - Learning from challenging work

Important: 1

Please indicate how much importance you place on the following workplace features, and??how satisf... - Importance - Finding quality mentorship

Not at all important: 1

Please indicate how much importance you place on the following workplace features, and??how satisf... - Importance - Delivering quality work

Important: 1

Please indicate how much importance you place on the following workplace features, and??how satisf... - Importance - Feedback quality from your supervisor

Important: 1

Please indicate how much importance you place on the following workplace features, and??how satisf... - Importance - Your coworkers

Slightly important: 1

Please indicate how much importance you place on the following workplace features, and??how satisf... - Importance - Overall work culture

Extremely important: 1

Please indicate how much importance you place on the following workplace features, and??how satisf... - Importance - Your organization?□?s mission

Important: 1

Please indicate how much importance you place on the following workplace features, and??how satisf... - Satisfaction - Remote work

Satisfied: 1

Please indicate how much importance you place on the following workplace features, and??how satisf... - Satisfaction - Level of work-life balance

Satisfied: 1

Please indicate how much importance you place on the following workplace features, and??how satisf... - Satisfaction - Types of projects that you are working on

Extremely satisfied: 1

Please indicate how much importance you place on the following workplace features, and??how satisf... - Satisfaction - Having opportunities to lead

Satisfied: 1

Please indicate how much importance you place on the following workplace features, and??how satisf... - Satisfaction - Career advancement/promotions

Satisfied: 1

Please indicate how much importance you place on the following workplace features, and??how satisf... - Satisfaction - Continued training and/or professional development opportunities

Moderately dissatisfied: 1

Please indicate how much importance you place on the following workplace features, and??how satisf... - Satisfaction - Recognition for your contributions

Satisfied: 1

Please indicate how much importance you place on the following workplace features, and??how satisf... - Satisfaction - Strong working relationship with supervisor

Satisfied: 1

Please indicate how much importance you place on the following workplace features, and??how satisf... - Satisfaction - Ability to communicate with supervisor/team

Satisfied: 1

Please indicate how much importance you place on the following workplace features, and??how satisf... - Satisfaction - Learning from challenging work

Satisfied: 1

Please indicate how much importance you place on the following workplace features, and??how satisf... - Satisfaction - Finding quality mentorship

Satisfied: 1

Please indicate how much importance you place on the following workplace features, and??how satisf... - Satisfaction - Delivering quality work

Satisfied: 1

Please indicate how much importance you place on the following workplace features, and??how satisf... - Satisfaction - Feedback quality from your supervisor

Satisfied: 1

Please indicate how much importance you place on the following workplace features, and??how satisf... - Satisfaction - Your coworkers

Satisfied: 1

Please indicate how much importance you place on the following workplace features, and??how satisf... - Satisfaction - Overall work culture

Satisfied: 1

Please indicate how much importance you place on the following workplace features, and??how satisf... - Satisfaction - Your organization?□?s mission

Satisfied: 1

Please share with us anything that would help us better understand some of your post-graduation work experiences.

No responses.

Appendix D Survey Questions: Current Engineering Students

Survey Questions: Current students

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Section 1: Personal and Educational Background

1. What is your current field of study? (Select all that apply)
    - o Civil Engineering
    - o Environmental Engineering
    - o Industrial Engineering
    - o Mechanical Engineering
    - o Other (Please specify: _____)
2. Where are you currently enrolled? (drop-down list)
    - o Case Western Reserve University
    - o Iowa State University
    - o Madison College
    - o Marquette University
    - o Milwaukee School of Engineering
    - o University of Wisconsin, Madison
    - o Michigan Tech University
    - o North Central Technical College
    - o University of Iowa
    - o University of Minnesota, Twin Cities
    - o University of Minnesota, Duluth
    - o University of Illinois, Urbana-Champaign
    - o University of Wisconsin, Milwaukee
    - o University of Wisconsin, Platteville
    - o University of Wisconsin, Superior
    - o University of Wisconsin, Eau Claire

- University of Wisconsin, Stevens Point
- University of Wisconsin, Stout

3. In which year are you in your degree program?
    - Freshman
    - Sophomore
    - Junior
    - Senior
    - Graduate Student
4. When do you expect to graduate from the B.S. program? (drop-down list)
    - Spring (May) 2025
    - Summer (August) 2025
    - Winter (December) 2025
    - Spring (May) 2026
    - Summer (August) 2026
    - Winter (December) 2026
    - Spring (May) 2027
    - Summer (August) 2027
    - Winter (December) 2027
5. What are the main reasons for choosing this degree? (Select all that apply)
    - Interest in solving real-world problems
    - Passion for building/designing infrastructure
    - Desire to contribute to environmental sustainability
    - Potential for high earning opportunities
    - Job stability/security
    - Family influence or legacy
    - Friends who are in this profession
    - Other (Please specify: _____)
6. How much in student loans will you have at the end of your degree program?
    - No loans
    - Less than $10,000
    - $10,000 - $30,000
    - $30,000 - $50,000
    - More than $50,000
7. Do you currently have or have had an engineering internship or a co-op? (Yes/No)

8. If answered “Yes”,
    - Which area of engineering was it in? (drop-down list of options – pick one)
        - Civil Engineering
        - Environmental Engineering
        - Industrial Engineering
        - Mechanical Engineering
        - Other (Please specify: _____)
    - Where did you do your internship/co-op? _____ (fill in the box)
    - What type of work did your internship/co-op involve? _____ (fill in the box)
    - How long did you work in your internship/co-op? (drop down list of months 1-12)
9. If “No”, why not? (check all that apply)
    - Didn’t find one that fits my interests
    - Didn’t find one that fits my course schedule
    - Didn’t get an offer after interviewing for it
    - Didn’t find one that I could get to using public transportation
    - Didn’t get an offer with enough pay
    - Didn’t think it was valuable
    - Didn’t find one that fit my preferred location
    - Other _____ (please share your reasons)
10. Do you currently have or are you looking for an internship position? (Yes/No)
11. If YES, do you have or are you looking to work in- (select one)
    - Public sector – federal level
    - Public sector – state level
    - Public sector – county level
    - Public sector – municipal level
    - Private sector
    - Non-Profit
    - Academia/Research
    - Other _____ (please share where you are looking to work)
12. If yes, what are you pay expectations for an engineering internship:
    - $20-$22/hr
    - $22-$24/hr
    - $24-$26/hr
    - $26-$28/hr

- $28-$30/hr

13. If NO, I'm not looking for any internships currently because- (Select one)
    - I'm working another job unrelated to my degree
    - I am pursuing a full-time position
    - Don't find it valuable
    - No internships were available in my preferred location
    - I'll be working for my family business
    - I'll be pursuing my MS/PhD
    - I'll be taking a gap year
    - I'll be joining AmeriCorps/Peace Corps
    - Other _____ (please share why you are not looking for jobs)

Section 2: Career Preferences and Expectations

14. Are you currently looking for a full-time civil engineering related job? (Yes/No)
15. If yes, what are your salary expectations from your first job out of college? (pick one)
    - $55,000-$59,999
    - $60,000-$64,999
    - $65,000-$69,999
    - $70,000-$74,999
    - $75,000-$79,999
    - $80,000-$84,999
    - >85,000
16. If No, please explain why
17. How important is it to you to have the following features provided by your first job? (rating scale 1-4: 1 = not at all important; 4 = extremely important)
    - Direct professional engineering experience
    - Construction/field work
    - Office-based work
    - Mix of field and office work
    - Project management opportunities
    - Diverse experience in different technical areas (e.g., design/construction/traffic/structural/etc.) to gain broad engineering knowledge
    - Extensive experience/assignments in one technical area (e.g., design/construction/traffic/structural/etc.) to gain specialty knowledge
    - Career advancement within the first 5 years

- Mentor assigned to you
- Formal training program
- Other _____ (please share your thoughts here)

18. How important is it to you to have the following benefits provided by your first job? (rating scale 1-4: 1 = not at all important; 4 = extremely important)
    - Advancement opportunities
    - Technical and personal development training
    - Flexible work hours or remote work
    - Casual work environment
    - Relocation assistance
    - Loan repayment
    - Tuition reimbursement for grad school
    - Positive workplace culture
    - Average market pay
    - Health benefits
    - Paid family leave benefits
    - Childcare benefits
    - Eldercare benefits
    - Wellness and wellbeing benefits
    - Retirement benefits
        - If responded that retirement benefits are important (i.e., selected option 3 or 4), then:
            i. Do you understand the difference between a pension and 401k? (Yes/No)
    - Work-life balance
        - If responded that work-life balance is important (i.e., selected option 3 or 4), then:
            i. what does work-life balance mean to you? (Select all that apply)
                - Clear separation between work and personal time
                - Low to moderate stress from work
                - Supportive company culture
                - Reasonable and flexible work hours
                - Reasonable vacation time
                - Reasonable sick leave
    - Paid time off (vacation/holidays/sick leave)
        - How many weeks do you expect? (drop-down list with 1-6 weeks)
    - Paid parental leave

        - _____ (please specify how many weeks
    - Other benefits that are important to have in your first job? _____ (please share your thoughts here)

19. What does flexible work look like for you? (Pick one)
    - Fully remote
    - Hybrid (a mix of remote and in-office)
    - In office but flexible hours
    - Other _____ (please specify)
20. What is the *maximum* number of hours *per week* that you would be willing to work? (Drop-down list starting from 35-60 hours)

Section 3: Career Aspirations and Values

21. How important is it to you to work in public sector? (rating scale 1-4: 1 = not at all important; 4 = extremely important)
22. If selected "civil engineering" in question 1, then ask the following question: What specific types of civil engineering work are you most interested in? (pick top 3)
    - Construction management
    - Transportation Design
    - Environmental
    - Geotechnical
    - Structural
    - Municipal
    - Traffic
    - Other (Please specify: _____)
23. What are your career aspirations for the next five years? _____ (please share your thoughts)
24. What are your long-term career goals, say within the next 10-20 years? (please share your thoughts)
25. What does an ideal employer look like for you? (please share your thoughts)
26. What does an ideal job look like for you? (please share your thoughts)

Thank you very much for taking the survey and helping us understand your job expectations and career aspirations of engineering students.

****

Survey Questions: Engineering Alumni

Section 1: Educational and Employment Background

1. Which year did you graduate? (drop down list of years starting from 2000; include a write-in option for ____ year)
2. Which degree did you receive?
   - o Associate's degree
   - o B.S.
   - o M.S.
   - o PhD.
   - o Other _____ (please specify)
3. Where did you graduate from? (drop-down list)
   - o Case Western Reserve University
   - o Iowa State University
   - o Madison College
   - o Marquette University
   - o Milwaukee School of Engineering
   - o University of Wisconsin, Madison
   - o Michigan Tech University
   - o North Central Technical College
   - o University of Iowa
   - o University of Minnesota, Twin Cities
   - o University of Minnesota, Duluth
   - o University of Illinois, Urbana-Champaign
   - o University of Wisconsin, Milwaukee
   - o University of Wisconsin, Platteville
   - o University of Wisconsin, Superior
   - o University of Wisconsin, Eau Claire
   - o University of Wisconsin, Stevens Point
   - o University of Wisconsin, Stout
4. Are you currently working? (Yes/No)
5. If answered "No" to Q. 4, is it because you are – (select one)
   - o In between jobs

- Have difficulty finding jobs
- Taking some time off
- Family/personal reasons
- Pursuing further education
- Looking to start own business
- Other _____ (please share your reasons)

6. How many different organizations have you worked for since graduation? (Drop-down list of number 1-10)
7. If more than 1, why did you leave your last organization? (Select top 3 reasons)
   - Poor supervisor/manager relationship
   - Lack of clear guidance
   - Lack of learning opportunities
   - Too much bureaucracy
   - Not enough pay
   - Long working hours
   - Too much work stress
   - Poor work-life balance
   - Lack of advancement/growth opportunities
   - Other _____ (please specify – text box)

8. What do you expect your next steps to be? (open text response)

Please insert THANK YOU message here for those alumni who are not working in engineering and will not be given the full survey: "Thank you very much for taking the time in participating in this survey. Your opinions will help us to better understand engineers' career choices and experiences after graduation.

The following questions will be asked only of alumni who are currently employed, i.e., who answered "Yes" to Q. 4, i.e., who are *currently employed*:

1. How many different organizations have you worked for since graduation? (Drop-down list of number 1-10)
2. Which field are you currently employed in?
   - Civil Engineering
   - Environmental Engineering
   - Industrial Engineering
   - Mechanical Engineering

- Other (Please specify: _____)

3. What area of civil engineering work are you currently working in? (pick one)?
   - Construction engineering and management
   - Transportation Design
   - Environmental
   - Geotechnical
   - Structural
   - Municipal/urban
   - Materials
   - Traffic
   - Forensic
   - Surveying
   - Other (Please specify: _____)
4. Is your current job in: (select one)
   - Public sector/government
   - Private sector
   - Nonprofit sector
   - Academia/Research
   - Family business
   - Other _____ (please specify)
5. Where are you currently working _____ (name of the organization)
6. How long have you been working in this organization? (Drop-down list 1-30 years; including less than 1 year and more than 30 years)
7. Where did you hear about the job which you currently have? (select one)
   - Friend/Family/External Referral
   - Internships/co-op experiences
   - Internal referral from the organization
   - University career services
   - College career fair
   - Handshake
   - LinkedIn
   - Indeed
   - Networking
   - State jobs website

- Online job boards and social media
- Job fair
- Other ___ (please specify)

8. How long did it take for you to get the job offer after interviewing? Dropdown list of number of *weeks* 1-8+)
9. How many offers did you receive before you accepted your current job? (Drop-down list with number 1-10+)
10. If you received more than one job offer, how competitive was your total compensation package (which includes salary and benefits) for the current job compared to the lowest offer? (select one)
    - >20% lower salary + benefits compared to other offers
    - 10-15% lower salary + benefits compared to other offers
    - 5-10% lower salary + benefits compared to other offers
    - Comparable salary + benefits
    - 5-10% higher salary + benefits compared to other offers
    - 10-15% higher salary + benefits compared to other offers
    - >20% higher salary + benefits compared to other offers
11. How satisfied are you with your current salary (rating scale 1-4: 1 = not at all satisfied; 4 = extremely satisfied)
12. How well do the employee benefits match your needs (rating scale 1-3: 1 = not at all; 3 = very well)
13. You chose to work at your current job because: (SELECT ALL THAT APPLY)
    - It was the first offer I got
    - It was the only offer I got
    - I was interested in the work I would be doing
    - The position was directly related to my schooling
    - I wanted to work in a public service environment
    - I wanted to work in private sector
    - The organization's mission aligned with my personal values
    - The organization was recommended to me by a family/friend/colleague
    - The prospects of a good work-life balance
    - This job helped me relocate to the area
    - I didn't have to move to take this job
    - The organization's compensation and benefits package was attractive
    - I liked the culture and the people
    - Other ____ (text box prompt: please share your reasons)

Section 2: Career Priorities and Progression

14. How useful was the information provided to you during the hiring process so that you knew exactly the type of job you were getting into. (rating scale: 1-4; 1 = not at all useful; 2 = a little useful; 3 = useful 4 = extremely useful).
15. How effective was your supervisor in – (rating scale: 1=not at all effective; 2 = somewhat effective, 3 = effective, 4 = very effective)
    - Orienting you to your new role
    - Setting you up for success/hitting the ground running
    - Helping you understand your role in the organization
    - Helping you quickly understand the lay of the land
    - Getting you up to speed as efficiently as possible
    - Equipping you with the tools you need for the next step of your career?
16. How effective was your onboarding/orientation experience (rating scale: 1=not at all effective; 2 = somewhat effective, 3 = effective, 4 = very effective))
    - Text box____ Please share any additional thoughts on your onboarding/orientation experience
17. How well do you feel that the work you are currently doing would benefit you in today's job market? (scale: 1-4; 1= not at all well, 2 = slightly well; 3 = moderately well; 4 = extremely well)
18. Please rate how well your current work experiences match your career goals and aspirations. (scale: 1-3; 1= no match at all, 2= moderately match, 3 = good match)
19. Do you currently have the support to succeed in your role/to continue developing your technical skills? (Yes/No)
20. How satisfied are you with the tools and information that you have been provided to help you advance your career? (scale 1-4, 1=not at all satisfied, 2 = moderately dissatisfied; 3 = satisfied; 4= extremely satisfied)
    - If answered 1 or 2, please share with us any examples of specific tools or info needed _____ (textbox optional)
21. What sense of personal satisfaction are you getting from your work? (scale 1-4, 1=not at all satisfied, 2 = moderately dissatisfied; 3 = satisfied; 4= extremely satisfied)
22. Are you currently supervising other staff? YES/NO
    - If answered "Yes" to Q.25, then ask: How interested are you in remaining in a supervisory or management role? (scale 1-4, 1=not at all interested, 2 = a little interested; 3 = interested; 4= extremely interested)
        - If answered 1 or 2 – Text box comment field option to describe experience

- If answered "No" to Q.25, then – Do you aspire to be a supervisor/manager? YES/NO
  - If answered "Yes", then: What are your top reasons for wanting to move into a supervisory or management role? (pick all that apply)
    - I want to provide mentorship or leadership to others
    - I want to be more involved in the decision-making processes
    - I want to expand my organizational knowledge
    - I want to get away from technical work
    - I am interested in increasing my compensation
    - Other _____
  - If answered "No", then: What are your top reasons for not wanting to move into a supervisory or management role? (pick all that apply)
    - I enjoy having my hands closer to the work
    - I don't feel I've had the training needed to succeed in a supervisory role
    - My job has plenty of opportunity for impact without the need to "climb the ladder" or advance my career.\
    - I would be better off using my knowledge for research, policy and methods development than being in charge of others
    - Not for me - I see too many supervisors struggling with work/life balance
    - Other _____

23. Do you have a PE license? Yes/No
    - If answered "Yes" to Q.26, then: do you feel you have what you need to maintain your license? (Yes/No)
      - If answered "No" to the above question, then: explain why not (open ended question)
    - If answered "No" to Q. 26, then: are you planning to obtain one – (pick from a dropdown list: Yes/NO, N/A not relevant to my role)
      - If NA, explain why: _____
      - IF ANSWERED "Yes" or "No" to branch question above, then: Which of the following resources would be most helpful in pursuing your PE certification? (Pick up to three)
        - Additional time to study
        - Supervisor/unit support
        - Testing materials
        - Reimbursement for tutoring support and/or preparation classes
        - Reimbursement for the exam fees

- Other _____ (share what you are looking for)

24. What other types of opportunities for professional development do you feel would be most beneficial at this stage of your career? (write-in text response)
25. In the last one year, have you considered leaving your employer? (Yes/No))
    - ONLY IF ANSWERED "Yes", the following questions will be asked:
    - I am currently looking for other opportunities within the private sector (Yes/No)
    - I am looking for other opportunities within public sector (Yes/No)
    - I am hitting retirement age and planning for that (Yes/No)
    - *ONLY IF ANSWERED "Yes", the following question will be asked*: What are your top three reasons for wanting to leave your employer?
    - Not enough pay
    - Too much work
    - Long working hours
    - Too much work stress
    - Not enough work-life balance
    - Lack of advancement/growth opportunities
    - Other ____ (please specify – text box)
26. Do you feel your workload is fairly balanced compared to those in comparable positions? (Dropdown choices: Yes/No/Unsure)
27. In general, which of the following challenges do you feel you experience the most at work? (Pick up to 3)
    - I'm doing the work of other people
    - Poor supervisor/manager relationship
    - Too much work in general
    - Lack of clear guidance
    - Lack of learning opportunities
    - Too much bureaucracy
    - Not enough pay
    - Long working hours
    - Too much work stress
    - Not enough work-life balance
    - Lack of advancement/growth opportunities
    - Other _____ (please specify – text box)
28. Do you currently have a mentor? (Y/N)
    - Branching -- If answered "Yes", my mentor –

- Was assigned to me
- I picked on my own
- Other ____ (please specify)

- If answered "Yes", then, How satisfied are you with your mentoring relationship? (scale 1-4: 1= not at all satisfied, 2 = moderately dissatisfied; 3 = satisfied; 4= extremely satisfied)

29. Please indicate how much importance you place on the following workplace features and how satisfied are you with them (scale 1-4, 1=not at all important, 2 = slightly important; 3 = important; 4= extremely important; scale 1-4: 1= not at all satisfied, 2 = moderately dissatisfied; 3 = satisfied; 4= extremely satisfied)

	How important is it to you? (scale 1-4)	**How satisfied are you with it? (scale 1-4)**
1	Remote work	Remote work
2	Level of work-life balance	Level of work-life balance
3	Types of projects that you are working on	Types of projects that you are working on
5	Having opportunities to lead	Having opportunities to lead
7	Career advancement/promotions	Career advancement/promotions
8	Continued training and/or professional development opportunities	Continued training and/or professional development opportunities
11	Recognition for your contributions	recognition for your contributions
12	Strong working relationship with supervisor	Strong working relationship with supervisor
13	Ability to communicate with supervisor/team	Ability to communicate with supervisor/team
14	Learning from challenging work	Learning from challenging work
15	Finding quality mentorship	Finding quality mentorship
16	Delivering quality work	Delivering quality work
17	Feedback quality from your supervisor	Feedback quality from your supervisor
18	Your coworkers	Your coworkers
19	Overall work culture	Overall work culture
20	Your organization's mission	Your organization's mission

30. Open-ended question (write-in text response)
    - Please share with us anything that would help us better understand some of your post-graduation work experiences.

Thank you very much for your time in filling out this survey and helping us better understand your work and career experiences after graduation.

****

Survey Questions: Engineering Faculty

Section 1: Background Information

1. What is your current field? (Select all that apply)
    - o Civil Engineering
    - o Environmental Engineering
    - o Industrial Engineering
    - o Mechanical Engineering
    - o Transportation Engineering
    - o Other (Please specify: _____)
2. Where are you currently working?
    - o Case Western Reserve University
    - o Iowa State University
    - o Madison College
    - o Marquette University
    - o Milwaukee School of Engineering
    - o University of Wisconsin, Madison
    - o Michigan Tech University
    - o North Central Technical College
    - o University of Iowa
    - o University of Minnesota, Twin Cities
    - o University of Minnesota, Duluth
    - o University of Illinois, Urbana-Champaign
    - o University of Wisconsin, Milwaukee
    - o University of Wisconsin, Platteville
    - o University of Wisconsin, Superior
    - o University of Wisconsin, Eau Claire
    - o University of Wisconsin, Stevens Point
    - o University of Wisconsin, Stout
    - o Other (please specify)
3. How long have you been teaching at your current institution?
    - o Less than two years
    - o 2-5 years
    - o 5-10 years

- More than ten years

4. Which level of students do you primarily teach?
    - Freshman
    - Sophomore
    - Junior
    - Senior
    - Graduate Student
5. Do you have any industrial or professional work experience prior to joining your current institution?
    - Yes
    - No
6. If yes, how many years of professional experience do you have?
    - Less than 2 years
    - 2-5 years
    - 5-10 years
    - More than 10 years
7. Do your currently have any projects with a State Department of Transportation? Yes/No
8. If yes, please tell us with which one: (check one)
    - WisDOT
    - MnDOT
    - MDOT
    - Other: _____ (please specify)
9. Do you currently have projects with consulting companies? Yes/No

Section 2: Student Preparation for Technical and Management Skills

10. How would you rate the technical skill preparation of your graduating students (in the past 1-2 years) in the following categories? (Scale of 1-5, where 1 = Poor and 5 = Excellent)
    - Identifying and formulating engineering problems
    - Analyzing and solving problems
    - Applying knowledge in math, science, and engineering
    - Conducting experiments
    - Designing systems
    - Don’t know
11. How would you rate the basic management skills of your graduating students (in the past 1-2 years) in the following categories? (Scale of 1-5, where 1 = Poor and 5 = Excellent)
    - Planning and organization

- Communication
- Decision-making
- Time management
- Teamwork
- Adaptability and flexibility
- Conflict management
- Understanding ethics and professionalism
- Don't know

Section 3: Career Guidance and Support

12. Do you discuss different technical career paths with your students?
    - Yes
    - No
13. If yes, how do you discuss career paths with your students? (Select all that apply)
    - Presentations or lectures (e.g., PowerPoint)
    - Career fairs
    - Emailing job offers or opportunities
    - One-on-one career advising
    - Other (Please specify: _____)
14. Do you discuss comparisons between public and private sector jobs with your students? Yes/No
15. If yes, what aspects do you emphasize when comparing public and private sector jobs? (Select all that apply)

- Purpose, meaning, and value of the work
- Salary and compensation
- Career advancement opportunities
- Work-life balance
- Flexible work hours/locations
- Benefits (e.g., retirement, health)
- Other (Please specify: _____)

16. Do you help graduating students find jobs? (Yes/No)
17. If yes, how do you assist students in finding jobs? (Select all that apply)

- Encouraging participation in professional societies (e.g., ASCE, ITE, WTS)
- Sharing job information with students
- Helping students connect with employers and alumni
- Inviting professionals to the classroom

- Other (Please specify: _____)

18. What makes you feel the most proud and fulfilled: when a student finds a job in - (select one option)

- Public Sector
- Private Sector
- Non-Profit
- Academia/Research
- No preference

Thank you very much for taking the time to fill out the survey and help us understand your role in teaching, guiding, and supporting your students!