EXECUTIVE WORKBOOK

Submitted to the

NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM (NCHRP)

for NCHRP Project 20-86

ATTRACTING, RECRUITING, AND RETAINING SKILLED STAFF FOR TRANSPORTATION SYSTEM OPERATIONS AND MANAGEMENT

From

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1. OVERVIEW OF EXECUTIVE WORKBOOK

The purpose of this project was to provide transportation agencies with strategies and resources to meet their needs for attracting, recruiting, and retaining transportation System Operations and Management (SOM) staff. The research described herein considers the potential supply and demand for SOM skills and staffing; the actions transportation agencies may take to attract, recruit, develop, and retain skilled staff with SOM capabilities; and the tools that are available or may be developed to assist agencies in attracting and recruiting skilled staff in this area.

SOM draws on the knowledge of many disciplines—including, for example, traffic engineering, intelligent transportation systems, maintenance, emergency response and incident management, traffic operations, traffic safety, performance measurement, and system planning—applied in a comprehensive approach to increase the efficiency and safety of the transportation system. SOM encompasses interactions among transportation modes and between the transportation system and other functions such as emergency management, public safety, and outreach.

This Executive Workbook provides a resource that can serve as a reference when working to improve the attraction, recruitment, and retention of SOM employees. Thus, the workbook focuses on the recommendations and summarizes the associated action plans identified through this project. Given that every organization is unique, we suggest that HR professionals tailor the provided action plans for the specific needs of their agency. Whenever possible, we also suggest consulting the original sources referenced in the action plans if more detailed guidance is necessary. The project methodology and a more detailed review of each of the challenges, trends, recommendations, and action plans are provided in *NCHRP Report 693* and *NCHRP Web-Only Document 182*, which are both available at http://www.trb.org/Main/Blurbs/166342.aspx.

2. SUMMARY OF PROJECT RESULTS

The findings reported here are based on results from the data collection and analyses conducted in the seven tasks of this project (see *NCHRP Report 693* for details). The results are intended to describe the SOM career field and workforce based on the latest available research. While *NCHRP Report 693* includes more detailed information on the overall project, this workbook provides a brief overview of the following:

- Key workforce challenges and trends
- Overview of SOM career field
- Profile of the existing SOM workforce
- Estimating future SOM workforce needs
- Establishing SOM Career Paths

Understanding the key issues, trends, and the strategic recommendations provided in this workbook will help enable decision makers and program managers to identify and implement cost-effective workforce solutions. These proposed workforce practices will assist SOM departments in attracting, recruiting, retaining, and developing individuals who have the required knowledge, skills, and abilities.

2.1 KEY WORKFORCE CHALLENGES AND TRENDS

Researchers and transportation leaders alike agree that the transportation industry is experiencing a growing number of challenges related to workforce attraction, recruitment, training, and retention (e.g., Cronin et al., 2011, Cronin et al., 2007, Warne, 2003, Warne, 2005, Skinner, 2000, and TRB, 2003). For example, *TRB Special Report 275* (2003) indicates that the transportation workforce requires a broader range of skills than in the past because agency missions are changing and expanding and new technologies continue to emerge. This is particularly true for SOM-specific positions in transportation systems. Four critical issues affecting SOM workforce attraction, recruitment, training, and retention include:

- Demographic changes in the workforce
- Availability of training
- New technologies
- Demand on transportation agencies

These are an example of the challenges that drive the need for the recommendations provided in this Executive Workbook. Each of the challenges and trends are described in brief below. More detail is provided in *NCHRP Report 693*.

***Demographic Changes in the Workforce*.** "Baby Boomer" retirements are one of the major challenges facing SOM and transportation systems (Warne, 2005). Though departures have slowed due to the economy, studies indicate that 50% of the transportation workforce will be eligible to retire in the next 10 years, double the rate of the nation's entire workforce (e.g., New Mexico State Highway and Transportation Department, 1999, TRB, 2003). In many cases, retirees are the only ones who possess specialized knowledge and unique experiences, as well as historical perspective, critical for efficient operation of the organization (Rothwell and Poduch, 2004). Further, as Baby Boomers retire, the new workforce is becoming more diverse in terms of factors such as age, gender and ethnicity. This can present unique challenges as some of these emerging demographic groups may have differing needs to support unique cultural traditions, languages, technological expertise, and personal obligations and thus place different priorities on work environment, scheduling arrangements and workplace benefits. This may be particularly challenging for the SOM field since it currently lacks a standardized career path. Participants agreed that SOM needs to consider the impact of these demographic changes in the workforce.

***Availability of Training*.** Training that focuses on transportation-related issues can help address the demographic changes, technology advances, and greater demands that this industry faces. Recently, NCHRP Project 20-77 identified several SOM competencies for which training tends to be nonexistent or significantly lacking (e.g., comprehensive-level special event management, overview-level electronic payment systems) and many other SOM competencies for which there is very little or inadequate training (e.g., intermediate-level arterial operations, all levels of automated safety enforcement). Therefore, there is a critical need for SOM training, Given the near pre-requisite of cross-training in multiple areas of the DOT before assuming a leadership role in SOM and the value of transportation experience for all SOM staff, participants almost unanimously agreed that more formal training is needed once an employee enters an organization, regardless of the training students obtain in college. Additionally, participants

discussed a shared need for DOT level training, since it is critical that SOM personnel understand the infrastructure, operations, and stakeholders at the agency level.

New Technologies. Technological innovations have played an important role in how transportation agencies accomplish their mission and in the evolution of SOM careers. The most recent examples of technological innovation in transportation agencies have emerged from Intelligent Transportation Systems (ITS). ITS technologies, which involve the convergence of communication, computing sensing, and control technologies, focus on achieving operational improvements through services such as freeway and incident management, traveler information, and road weather information (TRB, 2003).

Although technology can improve efficiency, interview participants suggested the use of these devices may push some experienced staff out of key positions in the transportation workforce as job functions become more technologically oriented. Conversely, utilizing state-of-the-art tools to streamline work processes may help to retain other employees as certain work tasks become easier. Further, cutting-edge technologies may also help to improve SOM's attractiveness as a field and can be used as a recruitment tool.

The emergence of complex equipment using new technology, specifically ITS and advanced electronics, requires a parallel investment in training personnel to ensure they are safely and effectively operated and maintained. Transportation personnel, specifically those employed in SOM, have acknowledged that keeping pace with advanced electronic-based technologies solely through traditional on-the-job training is not sufficient (McGlothin Davis and Corporate Strategies, 2002). To address this need, many traditional classroom-based activities have moved to web-based versions, which can make it easier for more personnel to take the training courses. In addition, the advent of sophisticated simulators allows for realistic job previews and training for complex SOM positions.

Demand on Transportation Agencies. Although transportation agencies have worked hard to keep up, the capacity of the current highway system is still not adequate to address this growth (AASHTO, 2002). Furthermore, transportation agencies are being called to broaden their focus from construction to finding and creating capacity improvements through more diverse SOM activities. Data from our interviews with SOM experts adds insight to the current demand on transportation agencies, as the majority of our participants indicated state DOTs are changing their focus from building and adding new roads to maintaining, operating, and managing the system more efficiently and effectively. Their changing mission and broader responsibilities require a new and developed workforce capable of addressing a variety of issues other than construction and civil engineering; electrical engineering, IT, and communication systems are newer areas for DOTs. Thus, it is critical for transportation agencies to recruit and retain a workforce with a wider range of technical disciplines such as SOM (TRB, 2003). However, in growing the SOM workforce, DOTs are also challenged with significant economic constraints that inhibit resource availability. Participants argued that for DOTs to obtain public support for a greater emphasis on SOM work, in light of the strained economic conditions, public outreach about SOM needs to be a critical focus.

2.2 OVERVIEW OF SOM CAREER FIELD

Transportation SOM interfaces with many disciplines and transportation modes, both internal and external to the organization, as well as with functions such as emergency management and public safety, and the concerns of the general public (Michigan DOT, 2008, Victoria Transport Policy Institute, 2010). As the emphasis on transportation management and operations increases, the demand for personnel with skills in these areas is also increasing. Transportation agencies are experiencing a shortage of SOM professionals with the suitable skills and knowledge to move beyond more traditional civil engineering functions to the broader and more diverse SOM activities. According to interview participants, the desired skill set and knowledge base cannot be acquired simply from college or university courses, but rather is obtained through on-the-job experiences.

To better support the development and supply of SOM staff at the management, professional, and technical levels, it is important to understand how the career field is organized. According to the literature, the transportation SOM workforce is a group of professionals with a variety of backgrounds who are involved in the operations and management of U.S. highways. This finding is similar to the insights participants shared during interviews, but it is important to note that the organization and structure of SOM varies greatly across DOTs. However, generally there are 5 core functions within SOM. The core functions and employment positions that characterize SOM activities and their relationship to specific job levels and job titles are presented in Exhibit 1.

Exhibit 1
Snapshot of Core SOM Job Functions by Position Level

Core Functions	Senior Management	Mid-Level or Project Related (HQ or Regional)	Transportation Management Center Technician/Field Personnel
Policy and Strategic Considerations	✓	✓	
Program Planning	✓	✓	
Systems Development		✓	✓
Project Management	✓	✓	✓
Real-Time Operations	✓	✓	✓

The aim of the current study was to better define SOM occupations and their relationships within DOT organizations. At a general level, Chief Engineers and/or District Engineers usually direct SOM programs within the state DOT and are supported by a variety of personnel in job categories such as:

- Transportation and traffic engineers
- Operations engineers
- Operations managers

- Safety specialists
- Traffic operators and technicians
- Intelligent transportation systems technicians
- Emergency response and incident management personnel

Within each of the job functions listed, SOM personnel typically perform duties in many specialty areas and seasonally focus on different activities and responsibilities. Since the positions and activities associated with the SOM career field are so diverse and vary geographically, SOM managers and their subordinates need a broad set of skills, as well as overarching knowledge of how each activity operates and impacts other functions. Thus, while some of the job functions appear to contain more positions, it is common for SOM employees to work across each of the five functions.

2.3 PROFILE OF THE EXISTING SOM WORKFORCE

Systems operations and management requires the knowledge of multiple disciplines, primarily including, but not limited to, intelligent transportation systems (ITS), traffic engineering, maintenance, emergency response and incident management, performance measurement, and system planning (Spy Pond Partners et al., 2009). As determined from NCHRP Project 20-77 (2008), an understanding of the interactions among transportation modes and between the transportation system and other functions, such as emergency management, public safety, and the concerns of the general public is critical for a job within SOM. Thus, extensive knowledge of statistics and experience in data management and analysis lays the foundation for the skill set necessary for an occupation in SOM. Skills needed to improve productivity and quality of operations, such as quality assurance, forecasting, planning and scheduling, staffing, design and control of operations systems, creating value for the customer, project management, and supply chain and inventory management, continue to build the skill set needed for an SOM.

The skills needed for a particular SOM job may vary. To help identify similarities across SOM jobs, experts have begun sorting skills according to whether they are core or complementary. Core skills can be defined as those abilities which are necessary for an individual to carry out the technical responsibilities of a position; one would be unable to qualify for a position without possessing the necessary core skills required. As seen in the results of NCHRP Project 20-24(48) (2007), complementary skills such as communication and problem solving, on the other hand, are not a requisite for obtaining a position, although they are valuable and useful in their own right. For example, in a typical SOM position, an individual may primarily serve as a Traffic Technician responsible for overseeing a variety of activities designed to enhance highway safety and user efficiency. This responsibility is often performed through the collection, analysis, and application of traffic and highway safety data and principles to specific traffic control, signing, and marking situations. The Traffic Technician may be the only certified technician specialist with a degree in civil technology in the work unit (core skills necessary to qualify for the position), but he/she must also possess leadership and project management skills (complementary skills) to direct work and carry it out effectively.

These skill sets (both core and complementary) cluster into more generalized competencies that can be used to map career paths, especially for cross-functional SOM jobs. While candidates from various disciplines can be effective performers within SOM, historically SOM has lacked a

unified perspective on what those critical competences are for success. In fact, several participants indicated challenges in recruiting for SOM positions because the typical applicant is specialized in one area while SOM jobs require someone with broad knowledge, capable of performing a variety of roles. Exhibit 2 provides an overview of the core competencies related to each of the SOM core functions that were noted in Exhibit 1.

Exhibit 2
Core Job Function by Related Competencies

Core Job Functions	Related Competencies
Policy and Strategic Considerations	▪ **Policy Development –** The development of principles or rules to guide decisions within departments with which to achieve reasonable outcomes. ▪ **Public Outreach –** The effort to connect the ideas or practices of the department to the efforts of other organizations or agencies as well as the general public. ▪ **Strategy Development –** The development of strategies to help the department achieve its mission, or the establishment of a framework for guiding the direction of department decision making. ▪ **Organizational Change Management –** Using a structured, pre-defined strategy, model, or framework to transition organizations from a current state to a desired future state.
Program Planning	▪ **Business Process Management –** The alignment of all aspects of an organization with the wants and needs of customers while promoting department effectiveness and efficiency and striving for innovation, flexibility, and integration with technology. ▪ **Organization and Staffing –** Staffing is the process of finding the right people, with the right knowledge, skills, abilities, and fit, who may be hired, who already work for the department, or who may be trained or developed to acquire the right knowledge or skills. ▪ **Link Between Operations and Planning –** The knowledge of both transportation operations and program planning that allows for understanding the connections between them.

Exhibit 2 (Continued) Core Job Function by Related Competencies	
Core Job Functions	**Related Competencies**
Systems Development	▪ **Systems Development Process/Methods –** Awareness and understanding of the process or methods used to develop and implement a transportation system. ▪ **Systems Architecture –** The process or art of defining the hardware and software architecture, components, modules, interfaces, and data for a transportation/ITS system to satisfy specified requirements. ▪ **Database Management for Operations –** Awareness and understanding of how centralized collections of transportation operations data are stored, manipulated, accessed, and secured. ▪ **Program Languages and Technology** - Familiarity with the vocabulary and rules for instructing a computer to perform specific tasks and understanding of the computers or technologies that require these languages. ▪ **Visualization–** The creation of images, diagrams, or animations to communicate a message. ▪ **Network Security –** The development and use of policies and provisions in a computer network infrastructure to protect the network and network-accessible resources from unauthorized access, as well as monitoring and measuring the effectiveness of these policies and provisions.
Project Management	▪ **Project/Contract Management –** The management of a project/contract for goods, services, or works, which includes monitoring performance, commercial aspects, delivery, improvement, complaints, and customer satisfaction. ▪ **Outsourcing Contract Management –** Utilization of a contractor to manage a contract for goods, services, or works, which includes monitoring performance, commercial aspects, delivery, improvement, complaints, and customer satisfaction. ▪ **Procurement –** The purchase of goods and/or services at the best possible total cost of ownership, in the right quantity and quality, at the right time, in the right place for the direct benefit or use of the department, generally via a contract. ▪ **In-House Procurement –** Utilizing the goods and/or services currently offered by the department in the right quantity and quality, at the right time, in the right place for the direct benefit or use of the department. ▪ **Risk Management –** The identification, assessment, and prioritization of risks within projects followed by coordinated and economical application of resources to minimize, monitor, and control the probability and/or impact of adverse events.

Exhibit 2 (Continued) Core Job Function by Related Competencies	
Core Job Functions	**Related Competencies**
Real-Time Operations	▪ **Operations Strategies** – Maintenance of the capacity and safety of highways by controlling traffic, responding to incidents, clearing snow and other obstructions, and providing information to users on highway conditions and alternatives. ▪ **Systems and Technology –** Knowledge and understanding of the department's operating systems as well as the technology required to carry out real-time operations. ▪ **Safety –** Focus on crash avoidance by enhancing driver performance, including advanced collision avoidance systems and the automated highway system. ▪ **Security –** Precautions taken to guard against the danger, risk, or safety threats of major highways**.** ▪ **Management of Real-Time Operations Systems** – The integration of key activities to ensure real-time monitoring of the traffic and travel conditions of major highways and sharing that information to improve transportation system security; address congestion; improve response to emergencies, weather events, and surface transportation incidents; and facilitate national and regional highway traveler information.

The core competencies in Exhibit 2 define the underlying KSA requirements for the SOM job titles that cluster under each of the core job functions. A listing of typical job titles were assembled from position descriptions and data collected during our literature review as well as from our SOM experts interviewed. *NCHRP Report 693* provides an extensive list of typical SOM job titles organized by job function and position level (see Exhibit 4 of *NCHRP Report 693*). For example, Assistant Director Maintenance Engineer is a typical SOM job title at the level Senior Management in which the primary job function is real-time operations. We used these job titles to inform the task of deriving future workforce estimates which is explained in the next section.

2.4 ESTIMATING FUTURE SOM WORKFORCE NEEDS

Using the defined core function areas and related competency information associated with the SOM job titles identified, our team mapped the job titles presented in *NCHRP Report 693* to a standard listing of Department of Labor (DOL) occupations to conduct the historical and future staffing estimates. The mapping exercise accomplished two goals. First, converting the job titles to SOC codes allowed our team to conduct these analyses using existing DOL labor market data and through a propriety workforce analysis tool developed by EMSI, Inc. EMSI's labor market research and forecasting tool compiles data from over 90 state and federal government sources, including data sets published by the Bureau of Economic Analysis, Bureau of Labor Statistics, and the U.S. Census Bureau. Second, this mapping exercise allowed our team to ensure that the specific occupational knowledge, skill, and ability needs of SOM jobs were represented in our

staffing analysis. Detailed information regarding the mapping exercise and SOM occupational estimates can be found in *NCHRP Report 693* and *NCHRP Web-Only Document 182*. Specifically, *NCHRP Report 693* provides the national SOM staffing estimates by historical percent change from 2005 to 2010 (Exhibit 8) and forecasted percent change from 2010 to 2015 and 2010 to 2020 (Exhibit 9). Regional (Northeast, South, Midwest, and West) and state-level historical data are provided in *NCHRP Web-Only Document 182*.

2.5 ESTABLISHING SOM CAREER PATHS

Results of our data collections indicate that there is uncertainty in the transportation industry about how individuals should advance in a SOM career. This can inhibit DOT staff from cross-training to enter the field and deter potential new, skilled employees from entering SOM jobs. We discovered that the biggest challenge or impediment to pursuing a career in SOM is that there are few clear or standard career paths for personnel. It is difficult for potential and existing staff to navigate the array of job titles within and across DOTs. Yet SOM personnel often have highly transferable skills so advancement within and across core functions is certainly attainable. To assist DOTs in creating standard SOM career paths for their agencies, we developed several generalized SOM career paths by analyzing the literature review findings, interview data, our compiled list of SOM job titles, and the staffing estimate data. These career paths can be found in Exhibits 19 through 24 in Section 3.6 of *NCHRP Report 693*.

3. INTRODUCTION AND OVERVIEW OF PROJECT RECOMMENDATIONS

The ultimate goal of this project was to develop strategic recommendations and guidance that can be implemented by transportation agencies to recruit SOM staff and enhance SOM staff capabilities. To achieve this objective, the project team incorporated results of Tasks 1 through 6 to develop eight strategic action plans related to the career stages of the transportation workforce pipeline as identified in NCHRP Project 20-81: Guide to Implementing Strategies to Attract and Retain a Capable Transportation Workforce. Each action plan describes the information, recruitment, and retention resources needed to implement the workforce recommendation; the costs and schedule for development; and the outreach activities. In order to provide stakeholders with a comprehensive understanding of the recommendations provided, we present the following here:

- Overview of transportation pipeline
- Summary of the materials reviewed to create strategic guidance
- Introduction to the strategic action plans
- Recommendations and Strategic Action Plans for each SOM career stage

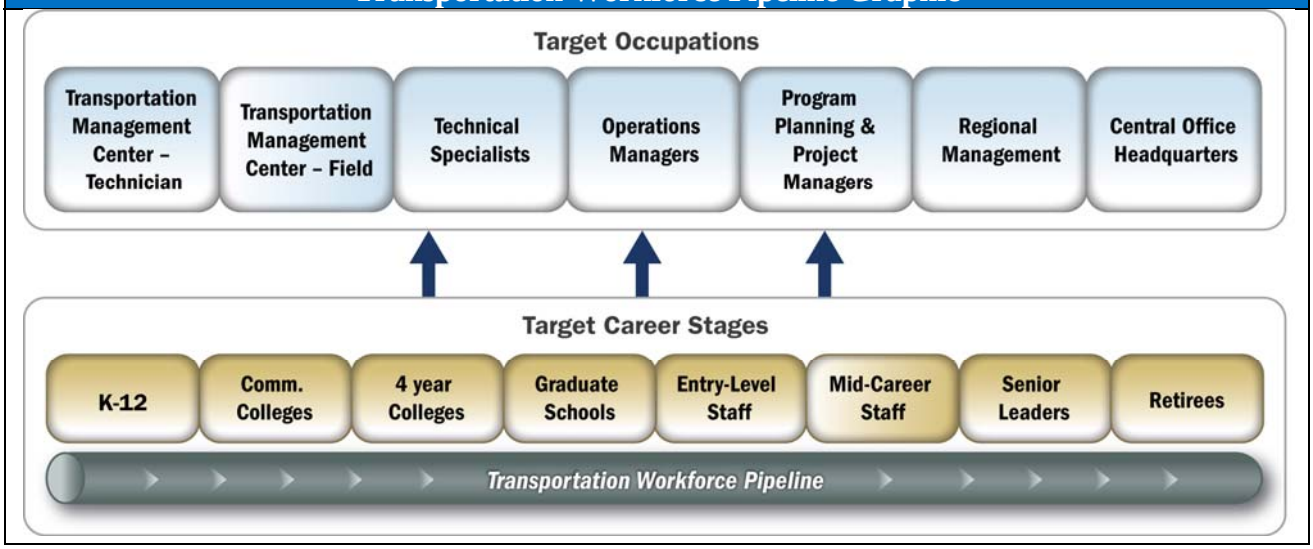
In the subsequent sections, we provide more detail related to each of these topics.

3.1 OVERVIEW OF TRANSPORTATION PIPELINE

The transportation workforce pipeline consists of the major career stages through which an SOM employee might progress before, during, and after their employment at a transportation agency. The graphic in Exhibit 3 highlights these career stages and demonstrates that the seven target

SOM occupations introduced earlier in this report are directly impacted by each stage of the pipeline.

Exhibit 3
Transportation Workforce Pipeline Graphic



In each strategic action plan, this graphic is presented again, highlighting only the career stages under consideration and the occupations directly influenced. The intention is to indicate the relationship between the strategic recommendation and specific job categories. Furthermore, many of the action plans would undoubtedly have indirect positive effects on other career stages and occupations in their current form.

3.2 SUMMARY OF THE MATERIALS REVIEWED TO CREATE STRATEGIC GUIDANCE

To form the foundation of the strategic recommendations and related action plans, we conducted a thorough assessment of the data collected during the first six tasks of this study. This data included results from the SOM leadership interviews, the described SOM staffing analysis, and a comprehensive review of current human resource practices used by transportation agencies to attract, recruit, develop, and retain SOM staff. This assessment included an analysis of practices related to strategic recruitment, professional development and training, compensation and benefits programs, outsourcing policies and other programs that directly impact key organization outcomes (e.g., satisfaction; turnover) for SOM. The result was eight workforce recommendations and related strategic action plans. Exhibit 4 provides a list of the sources we consulted to fully understanding programs and practices used to attract and retain SOM staff across DOTs.

Exhibit 4
Sources Consulted in Development of Strategic Action Plans

▪ ICF's FHWA Workforce Database ▪ ICF's Related Industry and Private Sector Benchmarking Database ▪ Additional TRB Projects	▪ Industry source documents ▪ ICF's Transportation Recruitment, Development and Retention Practices Database

Exhibit 4 (Continued) Sources Consulted in Development of Strategic Action Plans	
▪ Surveys and research conducted by AASHTO ▪ *NCHRP Research Results Digest 327: Transportation Implications of Emerging Economic Development Trends* ▪ Journals devoted to applied problems in organizations	▪ Database of Best Practices in Recruitment and Workforce Management of DOT Contractors ▪ Technical reports and relevant studies conducted by private and public sector organizations ▪ Professional Human Resource (HR) organizations ▪ Industry journals

3.3 INTRODUCTION TO THE STRATEGIC ACTION PLANS

As described, strategic recommendations and action plans were developed to address the SOM recruitment or attraction challenges associated with each career stage in the transportation pipeline. Separate action plans were created to ensure the strategic guidance was focused enough to make implementation realistic and to ensure the plans, when used together, were comprehensive enough to impact all major aspects of the SOM workforce pipeline.

This Executive Workbook includes a brief overview of the action plans. The complete action plans can be found in *NCHRP Report 693*. In this section, an overview of the general action plan categories included in this workbook is presented to facilitate SOM decision-maker use of the strategic guidance provided. Exhibit 5 identifies the major sections and specific categories used across all of the action plans. The exhibit also defines the type of information provided in the category.

Exhibit 5 Overview of Data Fields Used in Each Strategic Action Plan	
Data Field Name	**Description**
Section 1 **Overview of Strategic Recommendation**	
Recommendation Title	▪ Short descriptive label for strategic recommendation.
Recommendation Highlights	▪ Bulleted overview of key points of interest from full strategic action plan.
Description	▪ Provides broad overview of proposed recommendation.
Rationale for Recommendation	▪ Provides a rationale for the recommendation based on available literature, SOM needs, and study findings.

Exhibit 5 (Continued) Overview of Data Fields Used in Each Strategic Action Plan	
Data Field Name	**Description**
Section 2 Target Audiences	
Relevant Position	▪ Graphic depiction of the anticipated target occupations impacted as a result of the proposed recommendation and target career stages.
Source of Initiation	▪ Indicates whether the recommendation should be initiated by the individual agency or at the industry level.
Primary Human Resource Focus	▪ Indicates if the recommendation is an attraction, recruitment, retention, or development effort.
Implementation Level	▪ Describes the level at which the recommendation should be implemented.
Estimated Time to Implement	▪ Provides an estimate of how long it will take to develop and implement the recommendation.
Return on Investment	▪ Identifies the approximate time required for the practice to pay off.

The major sections and specific categories included in the action plans were designed to provide users with all the information needed to successfully implement the recommendations proposed.

3.4 RECOMMENDATIONS AND STRATEGIC ACTION PLANS FOR EACH SOM CAREER STAGE

The recommendations provided in the *NCHRP Report 693* are designed to provide transportation agencies with strategies and resources to meet their needs for SOM staff. The recommendations will allow agencies to expand the pool of workers with SOM expertise by reaching out to students at all levels who are preparing to enter the workforce, to older workers seeking to extend their careers past traditional retirement ages, and to workers of all ages seeking to change their career paths. To make optimal use of the Executive Workbook, an agency's Human Resource (HR) director should thoroughly evaluate the current and projected SOM workforce needs they have with respect to the external labor market and then map those needs to the "Primary Human Resource Focus" for the recommendations that have "Agency" identified as the "Source of Initiation." We recommend that HR directors initiate the majority of these recommendations due to their unique expertise and training in personnel management. However, in some cases the recommendations indicate that SOM managers are appropriate to serve as the action lead when an HR director is either not available or the director requires additional support, or the manager may have unique knowledge about the specific workforce challenge and he/she desires to initiate changes at a divisional level and drive them up to the greater agency level. The industry-level recommendation should be initiated by a national association as indicated because it requires an orchestrated effort across numerous agencies. For each of the eight recommendations included in the report, a comprehensive action plan was created. The next section provides an overview of those action plans.

4. SUMMARY OF SOM WORKFORCE ACTION PLANS

A summary of the eight action plans is presented in Exhibit 6. This table can serve as a quick reference to all of the recommended action plans as well as a way to compare the action plans on multiple relevant criteria. Following Exhibit 6, tables with each of the recommendations are provided.

Exhibit 6
Summary of Recommended Action Plans

Recommended Action Plan (Corresponding Page Reference to *NCHRP Report 693*)	Source of Initiation	Primary Human Resource Focus	Implementation Level	Return on Investment	Estimated Time to Implement	Action Lead(s)
1. Implement Annual or Semi-Annual SOM Career Days (page 61)	Agency	Attraction Recruitment	State	6+ years	0-3 months	Agency HR Director
2. Develop SOM Curriculum Content for Related Higher Education Courses and Training Programs (page 71)	Industry	Attraction Recruitment	National Regional State	3-5 years	More than 1 year	AASHTO Highway Subcommittee on Systems Operations and Management, Regional SOM Associations, or State SOM Manager.
3. Implement Student-Worker Internship Program with a Job Rotational Component (page 81)	Agency	Attraction Recruitment Retention Development	State	0-2 years	7 months - 1 year	Agency HR Director/Manager
4. Implement Virtual Pre-Employment Realistic Job Preview (page 93)	Agency	Attraction Recruitment Retention	State	0-2 years	3-6 months	Agency HR Director/Manager
5. Institute Mentoring Program (page 103)	Agency	Attraction Recruitment Retention	State	0-2 years	7 months - 1 year	Human Resource Manager (Designated Mentoring Program Coordinator)
6. Develop Employees and Maintain Employee Career Pathways (page 115)	Agency	Retention Development	State	0-2 years	3-6 months	Agency HR Director/Personnel Manager
7. Implement SOM Succession Plans (page 127)	Agency	Retention Development	State	3-5 years	3-6 months	Agency HR Director
8. Recruit from Non-Traditional Sources (page 137)	Agency	Attraction Recruitment	State	0-2 years	3-6 months	Agency HR Director

RECOMMENDATION #1
Implement Annual or Semi-Annual SOM Career Days

Description: The K-12 target career stage is broken into two age groups so that agencies can create programs and materials that are tailored to better match how the age groups become interested and learn about SOM. The first age group includes students in grades K-8, while high school students are the second age group targeted.

Recommendation Highlights

- Target Career Stage: K-12
- Will help with Attraction and Recruitment
- Estimated Time to Implement: 0–3 months
- Exciting, hands-on approach to introduce students to SOM related careers at a young age
- Will increase understanding in the community of agency's services, mission, and value to the region

In order to expose elementary and middle school students to the SOM-related fields in the transportation industry, agencies could partner with after school programs to create a 3- to 5-day program that explores different components of SOM. Part of this learning program could include classroom time where students have the opportunity to learn about the transportation industry from a variety of sources (e.g., books, movies, video games), with the goal of piquing the students' interest. It is critical that an emphasis on safety issues is included in the materials. The second part of the learning program could include a field trip to the local transportation agency, which would allow students to see how the concepts they learned are applied in everyday work. Students could try the equipment onsite and experience an SOM job.

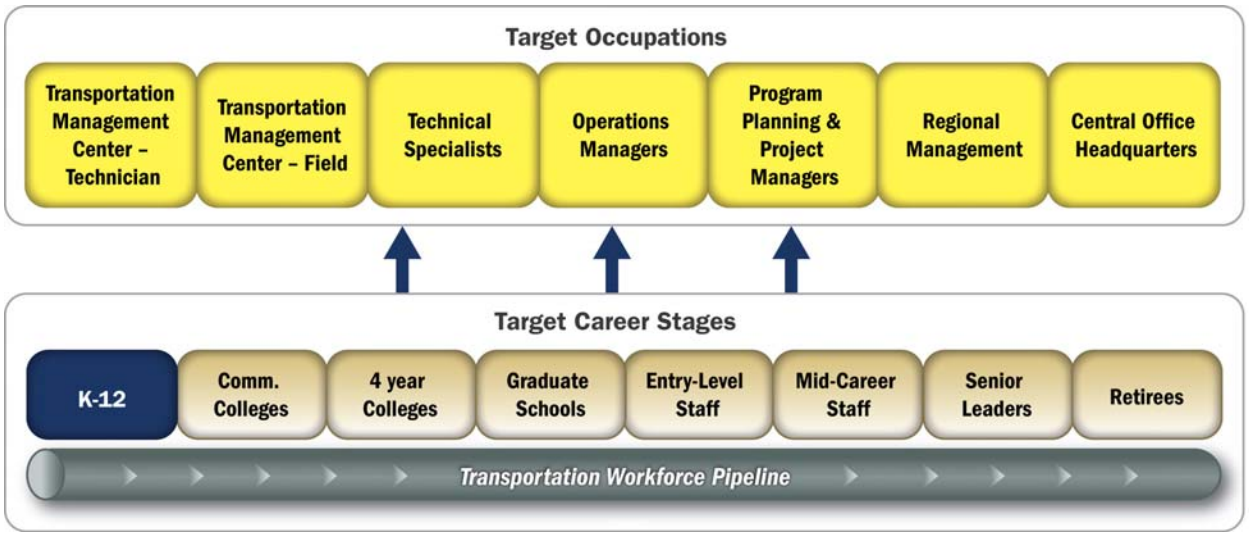
In order to expose high school students to the SOM-related fields in the transportation industry, agencies should reach out to vocational technical schools and Science, Technology, Engineering and Mathematics (STEM) schools about developing an SOM Career Day. Students enrolled in these types of schools are taught the skills they need to succeed in today's challenging world. Many of these skills and abilities are sought for in positions within SOM, including the ability to think critically, solve complex problems, and drive advancements in technology. In addition, these types of schools are more flexible in designating a couple of hours or even a day for guests to speak to students about their careers. This opportunity gives employees at DOTs and operation agencies a chance to connect with a young audience and share experiences from their job at a time when these students are expanding their interests and beginning to think about which careers take advantage of their skill sets. SOM employees are able to answer questions and provide detailed examples of their daily work activities and projects.

Rationale for Recommendation: Our interviews with various SOM subject matter experts (SMEs) revealed that SOM job functions and tasks varied greatly among different DOTs depending on their size and resources. As a result, few understand what SOM jobs entail; interview participants indicated that there is ambiguity regarding what a DOT SOM position is and the duties of these jobs. With limited exposure to SOM and a lack of knowledge about its importance, students are less likely to pursue SOM-related careers and qualified job candidates may not apply to SOM position openings that would otherwise be a good fit for their skill set and interests. In addition, our SOM interview participants indicated that by the junior or senior year of high school, students have begun to identify the subjects they enjoy studying and are already

RECOMMENDATION #1
Implement Annual or Semi-Annual SOM Career Days

forming ideas about their career directions. As a result, these two targeted programs can be effective ways for DOT staff to introduce students to transportation careers at a young age, from the time they are just beginning to think about what they want to be when they grow up (Kindergarten), to the point when they are actually beginning to make decisions about their future career (late high school). The DOT and transportation recruiting initiatives receive benefit on a larger scale as well, with more awareness of the DOT's work in the community and potential transportation careers and special emphasis on the DOT's evolving role: maximizing the efficient use of our current transportation infrastructure through increasingly effective operations and management.

RELEVANT POSITIONS



RECOMMENDATION #1
Implement Annual or Semi-Annual SOM Career Days

TARGET AUDIENCES

Source of Initiation
- ○ Industry
- ● Agency

Primary Human Resource Focus
- ● Attraction
- ● Recruitment
- ○ Retention
- ○ Development

Implementation Level
- ○ National
- ○ Regional
- ● State

Return on Investment
- ○ 0-2 years
- ○ 3-5 years
- ● 6+ years

Estimated Time to Implement
- ● 0-3 months
- ○ 3-6 months
- ○ 7 months-1 year
- ○ More than 1 year

Action Lead(s)
Agency HR Director

Targeted Audience(s)
After School Program (K-8)

Primary: Program directors and students

Secondary: Parents for further reinforcement.

SOM Career Day (9-12)

Primary: Principals, teachers, counselors, and students at high schools.

Secondary: Parents for further reinforcement.

Components of both programs may also be applicable to community colleges, four-year colleges, and graduate schools.

RECOMMENDATION #2
Develop SOM Curriculum Content for Related Higher Education Courses and Training Programs

Description: Associations, university transportation centers (UTCs), and other stakeholder organizations should work with higher education and training providers to develop curriculum content that can be added to existing courses and programs. Target providers might include community colleges, four-year schools, Local Transportation Assistance Programs (LTAPs) and the National Highway Institute. This process will help address the technical needs of the SOM discipline. In addition, since educators influence job decisions (e.g., teachers, school counselors), SOM stakeholders should also consider ways to support students through grants for night school, scholarships for degrees, and certification classes during off-peak times.

Recommendation Highlights

- Target Career Stage: Community colleges and four-year colleges
- Will help with Attraction and Recruitment
- Estimated Time to Implement: More than 1 year
- Critical for creating awareness for SOM occupations and to ensure students have the opportunity to learn and develop skills needed for these jobs
- Developing SOM course content in schools could help to increase numbers of applications, reduce attrition of new hires, and reduce turnover and training expenses

Rationale for Recommendation: These collaborations can help ensure that trained SOM personnel are ready for hire, when a transportation agency needs them. Phase 1 results indicated that the development of SOM curriculum will serve a critical need in developing the SOM pipeline. For example, interview participants indicated that SOM personnel learn about opportunities in transportation SOM while enrolled in school. Civil engineering courses in community colleges and universities that focus on transportation or even just begin discussion of transportation applications can be the gateway to SOM careers (Agrawal and Dill, 2009).

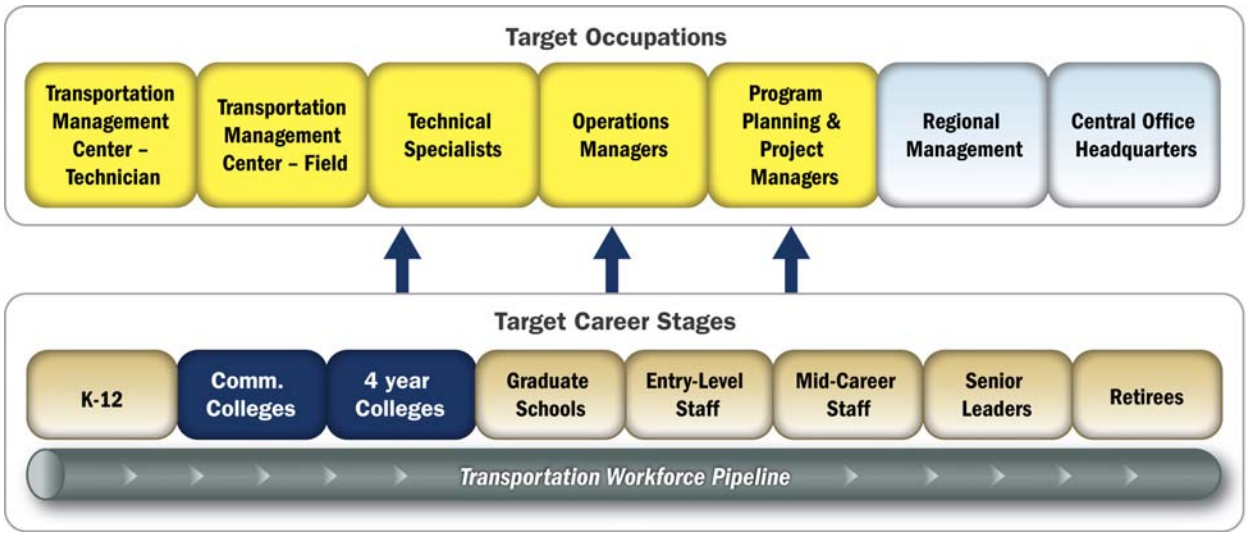
Interview participants also reported that, like many other areas of transportation, but particularly true for a cross-cutting transportation field like SOM, the training students receive from colleges and universities is often insufficient to prepare for a career in SOM. SOM represents a unique combination of engineering, communications, technology, and systems management that frequently requires backgrounds in multiple fields to perform well. An advantage is that this mix of topic areas can be very attractive to young applicants; however, awareness of the opportunity for employment and the development of particular skills in communications, technology, and systems management need to be increased.

More specifically, research participants commented on the importance of communication and collaboration skills for employees within SOM and indicated that finding engineering applicants with these skills is a challenge. More often than not, the communication and collaboration skills that SOM staff need are primarily developed through experiences and cross-training in diverse fields. Furthermore, some noted that the training offered to students is too broad; they have experienced entry-level applicants lacking key, specialized SOM skills. Several participants indicated that the curriculum used at universities and colleges sometimes does not focus on SOM skills at all. These participants have observed a trend in students already knowing the specific field they want to enter

RECOMMENDATION #2
Develop SOM Curriculum Content for Related Higher Education Courses and Training Programs

when they join the transportation workforce, without knowing about or ever having heard of SOM. These participants suggested that students from these programs, although relatively qualified as entry-level staff, often do not even consider SOM as a possible field because it is not included in the curriculum. More than ever, DOT involvement would be helpful in working with training providers and colleges to understand and develop SOM skill sets and the transportation system of the future.

RELEVANT POSITIONS



RECOMMENDATION #2
Develop SOM Curriculum Content for Related Higher Education Courses and Training Programs

TARGET AUDIENCES

Source of Initiation
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Primary Human Resource Focus
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- ● Recruitment
- ○ Retention
- ○ Development

Implementation Level
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- ● Regional
- ● State
- ○ Agency

Return on Investment
- ○ 0-2 years
- ● 3-5 years
- ○ 6+ years

Estimated Time to Implement
- ○ 0-3 months
- ○ 3-6 months
- ○ 7 months-1 year
- ● More than 1 year

Action Lead(s)
AASHTO Highway Subcommittee on Systems Operations and Management, regional SOM associations, or state SOM manager.

Targeted Audience(s)
Primary: Education agencies, trainers, college deans, and curriculum developers, as well as state workforce agencies who are charged with updating technical curriculum to meet workforce demands. Local Transportation Assistance Programs (LTAPs) and the National Highway Institute can also be among the target audiences for these programs.

Secondary: Professors, students

RECOMMENDATION #3
Implement Student-Worker Internship Program with a Job Rotational Component

Description: Agencies could implement student-worker internship programs that allow for the option to rotate jobs. Such programs allow DOTs to target universities with students in specific programs and offer them paid positions while in school at lower rates than typical employees. Rotational job programs provide students with the opportunity to work in more than one job over the course of their involvement in the program. This gives them the opportunity to experience different jobs, learn about different functions, experience SOM-related duties from multiple perspectives, and work on a variety of different projects. Within each rotation, students could be assigned a mentor who is responsible for supervising the student and serving as a point of contact for any issues that may arise. These programs are attractive to students who are looking for real-world experience as well as income, and provide agencies with a means to have a presence on college campuses and develop a pipeline for talent. The job rotation component provides students with an opportunity to try different kinds of work, increasing the chances they will find a job they like at the agency and also increasing the chances they will stay if hired, given their previous exposure to the actual job duties.

Recommendation Highlights

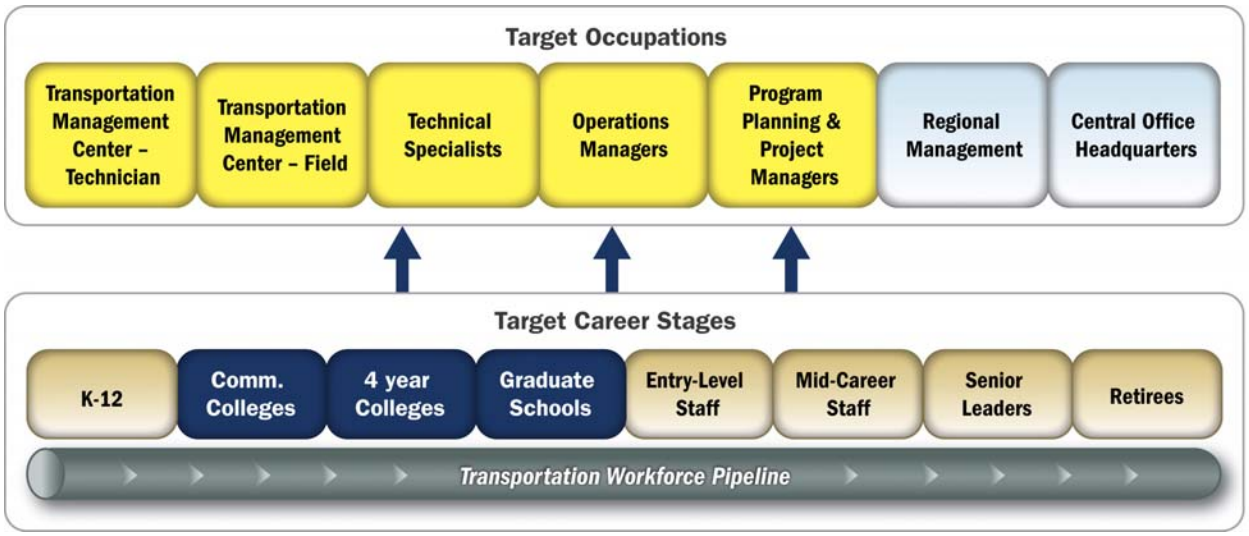
- Target Career Stage: Community colleges, four-year colleges, graduate programs, and Transportation Research Centers (TRC)
- Will help with Attraction, Recruitment, Retention, and Development
- Estimated Time to Implement: 7 months to 1 year
- Mutually beneficial approach to introduce college students to SOM occupations and variety of different duties and tasks
- Will increase number of college educated applicants to SOM jobs with actual work experience
- Will reduce turnover because new hires will have job experience prior to being hired full-time

Rationale for Recommendation: DOTs perceive these programs as having a high benefit-cost ratio and showing results in an observable time period. Such programs function as a mutually beneficial way to introduce college students to SOM occupations and a variety of different duties and tasks, while providing the training and orientation to make entry level hires more useful, longstanding employees. Our findings in earlier phases of this project indicated that despite the economic downturn, DOTs remain concerned about a looming shortage of employees and experienced staff to promote as Baby Boomers near retirement. Many interviewees indicated that their agency's workforce is mainly comprised of long-tenured employees, most of who were over the age of 40, and nearing their retirement. Interviewees also noted their agency's struggles and in some cases minimal success in recruiting and retaining their desired number of younger employees, especially before the economic downturn. While hiring is down and recruits are staying longer now, this workforce challenge is a concern for state DOTs because it threatens a significant loss of institutional knowledge. As a result, it is critical that DOTs create programs that attract, recruit, and retain qualified workers, ideally those who are already trained and prepared to replace the retiring workers. However, as suggested by interviewees, the training students receive from colleges and universities is often insufficient to prepare for a career in SOM. In addition, our research indicates that SOM is a relatively new focus for DOTs. Given that SOM is a new field to many people and that colleges and universities do not address many of the important aspects at this time, a rotational job program for

RECOMMENDATION #3
Implement Student-Worker Internship Program with a Job Rotational Component

students would expose and train them at a pivotal point in their academic studies, and perhaps attract them to the interesting and important work in SOM-related professions within the DOT.

RELEVANT POSITIONS



RECOMMENDATION #3
Implement Student-Worker Internship Program with a Job Rotational Component

TARGET AUDIENCES

Source of Initiation
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Primary Human Resource Focus
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- ● Recruitment
- ● Retention
- ● Development

Implementation Level
- ○ National
- ○ Regional
- ● State

Return on Investment
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- ○ 3-5 years
- ○ 6+ years

Estimated Time to Implement
- ○ 0-3 months
- ○ 3-6 months
- ● 7 months-1 year
- ○ More than 1 year

Action Lead(s)
Agency HR Director/Manager

Targeted Audience(s)
Primary: University career centers and faculty who provide career advisement in degree programs related to SOM fields.

Secondary: Students.

May also be applicable to continuing education programs, including community colleges and graduate schools.

RECOMMENDATION #4
Implement Virtual Pre-Employment Realistic Job Preview

Description: Agencies develop a virtual pre-employment realistic job preview (RJP) that interested candidates can complete before applying for a job. Such tools are web-based and interactive, providing candidates with a candid preview of what the job entails by allowing them the opportunity to see what the job is like and participate in simulated job tasks. A virtual job preview can present various SOM-related positions in a way that candidates find interesting and impressive. The RJP is like a virtual day in the life of an SOM employee. Using an RJP, such as a video or a virtual job tryout, can show potential employees work conditions or exciting situations or activities experienced on the job, which may encourage applicants to pursue a career within the agency. An RJP can also help frame job expectations so new employees are not surprised or potentially disappointed by unknown requirements experienced on the job. Virtual presentations can be very high-tech, which can also help to attract potential applicants and bring new employees to the SOM field.

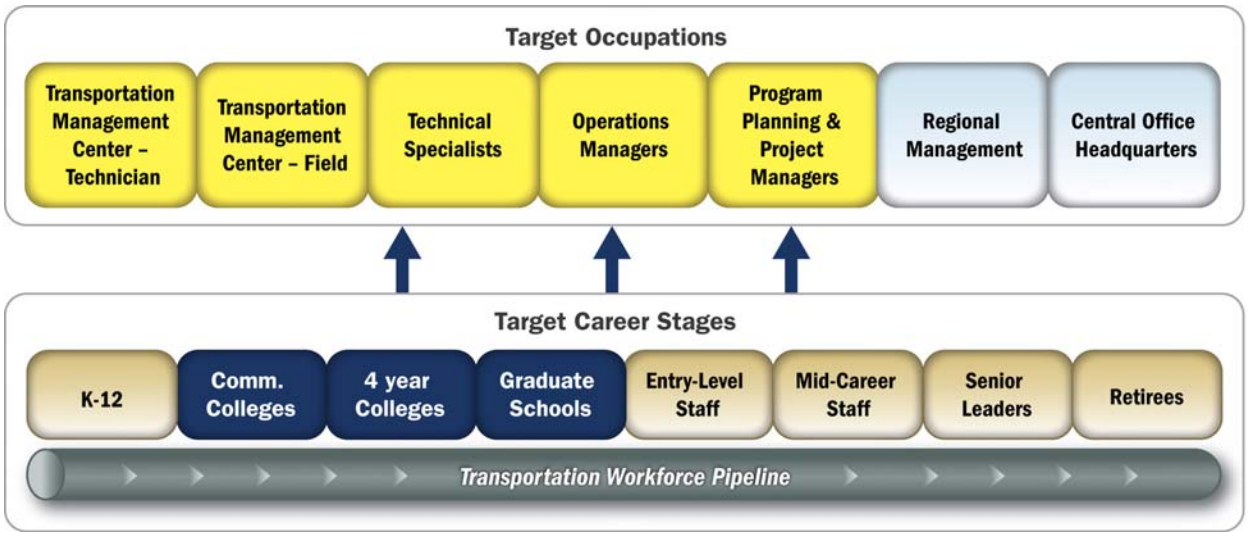
Recommendation Highlights

- Target Career Stage: Community colleges, four-year colleges, and graduate schools
- Will help with Attraction, Recruitment, and Retention
- Estimated Time to Implement: 3–6 months
- Provides opportunity for applicants to determine if they will be a good fit for the position
- Can provide a "wow" factor to applicants, given the interactive web-based technology
- An RJP can help to increase numbers of applications, reduce attrition of new hires, and reduce turnover and training expenses

Rationale for Recommendation: Technological innovations have played a large role in the evolution of SOM careers. Innovations, such as Intelligent Transportation Systems (ITS), which involve the convergence of communication, computing sensing, and control technologies, require technologically savvy systems operators and managers. Cutting-edge recruitment technologies, like a virtual, interactive RJP, are not only more likely to attract a larger, more diverse candidate pool in general, but they will also attract a more educated, technology savvy applicant pool, in an efficient manner. Appealing to this applicant pool will be critical when attempting to fill openings in the top growing SOM occupations over the next 10 years such as Network System and Data Communication Analyst, Signal and Track Switch Repairer, and Computer Specialist. Furthermore, the existing skill gaps associated with SOM occupations, such as ITS knowledge, Geographic Information Systems (GIS), critical thinking, document management, and systems management, can be reduced by focusing the tool on these areas.

RECOMMENDATION #4
Implement Virtual Pre-Employment Realistic Job Preview

RELEVANT POSITIONS



TARGET AUDIENCES

Source of Initiation
- ○ Industry
- ● Agency

Primary Human Resource Focus
- ● Attraction
- ● Recruitment
- ● Retention
- ○ Development

Implementation Level
- ○ National
- ○ Regional
- ● State

Return on Investment
- ● 0-2 years
- ○ 3-5 years
- ○ 6+ years

Estimated Time to Implement
- ○ 0-3 months
- ● 3-6 months
- ○ 7 months-1 year
- ○ More than 1 year

Action Lead(s)
Agency HR Director/Manager

Targeted Audience(s)
Primary: University Career Centers and Department Faculty providing career advice/mentoring to students at community colleges and four-year colleges, as well as to graduate students.

RECOMMENDATION #5
Institute Mentoring Program

Description: In order to quickly develop and onboard entry-level staff or other employees new to the SOM field, mentoring programs (both formal and informal) are effective. Mentoring programs typically involve pairing someone more junior with an individual in a similar field of work who has more experience in the organization (e.g., 5+ years) and a successful performance record. Mentoring programs have also shown success for encouraging and engaging minority workers by partnering the worker with someone who is more advanced in his/her career, who may share similar demographic characteristics and therefore may have experienced certain challenges or perceived barriers that the junior person may encounter during early stages of his/her career.

Recommendation Highlights

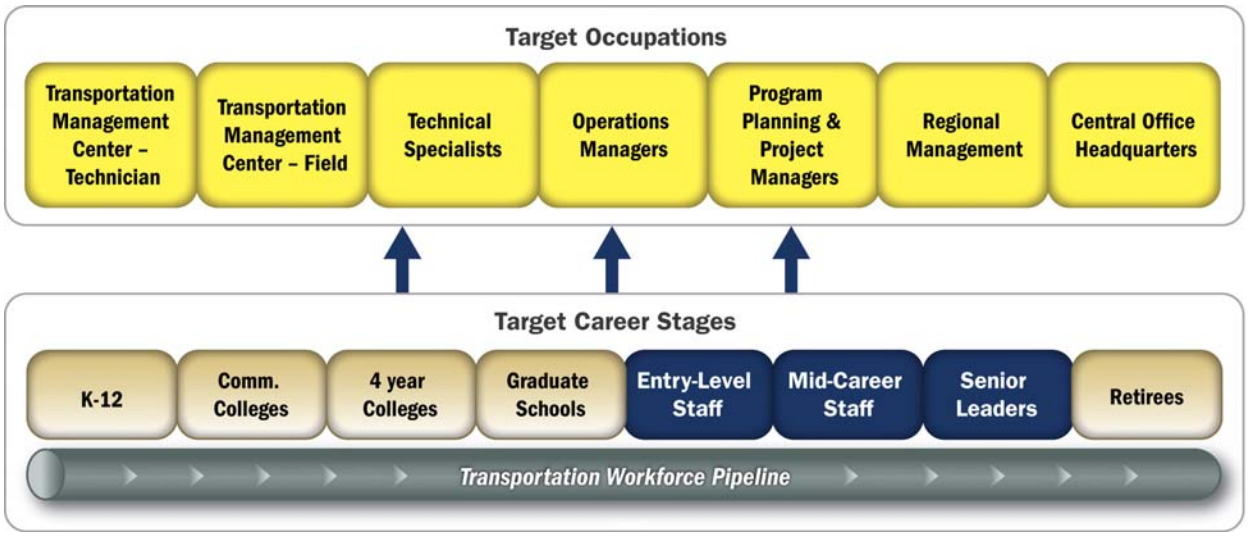
- Target Career Stage: Entry-level staff, mid-career staff, senior leaders
- Will help with Attraction, Recruitment, Retention, and Development
- Estimated Time to Implement: 7 months to 1 year
- Provide opportunity for new employees to learn about their job and the agency from an experienced staff member
- Can lead to workers who are more satisfied and more likely to succeed in their jobs

Rationale for Recommendation: As the Baby Boomers retire, the marketplace faces the most diverse workforce ever encountered. Whereas many SOM managers, professionals, and technicians are older white males, the potential applicant pool for SOM positions is much more diverse in almost every state and metro area. These changes in the demographics of the applicant pool have already impacted the demographics of the current SOM workforce. For example, the majority of participants interviewed indicated their respective agency has begun to reach out to populations often overlooked (e.g., minorities, veterans, ex-prisoners). As a result, these interviewees reported an increase of younger employees, minorities, and women employed at all levels of the SOM field. While tapping into minority populations to expand the applicant pool helps alleviate challenges associated with maintaining a sustainable workforce, it may also give rise to new challenges for management. For example, one participant indicated that communication issues may arise as a result of cultural and/or language barriers.

Lastly, the impending influx of younger workers into leadership positions presents another set of challenges. For example, younger workers typically expect more support from their employers in terms of work-life balance and flexible work arrangements (Zemke, Raines, and Filipczak, 2000). Participants also commented on the younger generation's need to see how they can advance throughout their career, which is sometimes difficult to illustrate in SOM since the field currently lacks a standardized career path. These types of benefits may need to be added to recruitment packages to attract, recruit, and retain a viable workforce. Furthermore, participants indicated that motivational factors vary across generations, specifically citing the younger generation's need to be stimulated and challenged in their work, perhaps as a result of growing up with an emphasis on multi-tasking. These differences result in the need for new management approaches in order to keep younger employees engaged and sometimes to retain them in the workforce. These changes in the demographic composition of the workforce and the influx of so many new workers argue for increased focus on mentoring and other programs that support efficient development and inclusion into the workplace culture.

RECOMMENDATION #5
Institute Mentoring Program

RELEVANT POSITIONS



TARGET AUDIENCES

Source of Initiation
- ○ Industry
- ● Agency

Primary Human Resource Focus
- ● Attraction
- ● Recruitment
- ● Retention
- ● Development

Implementation Level
- ○ National
- ○ Regional
- ● State

Return on Investment
- ● 0-2 years
- ○ 3-5 years
- ○ 6+ years

Estimated Time to Implement
- ○ 0-3 months
- ○ 3-6 months
- ● 7 months-1 year
- ○ More than 1 year

Action Lead(s)
HR Manager (Designated Mentoring Program Coordinator)

Targeted Audience(s)
Primary: New hires within the organization and those identified as strong performers with a predetermined amount of experience. The new hires should be assigned mentoring relationships within their first month of hire.

RECOMMENDATION #6
Develop Employees and Maintain Employee Career Pathways

Description: DOTs should consider making in-house recruiting a priority to promote from within and ensure that growth opportunities are available to employees (KFH Group, Inc., 2008). Results of a recent study indicate that career pathways improve job satisfaction, employee motivation, and employee commitment (Griffin, Kalnbach, Lantz, and Rodriguez, 2000). Furthermore, results from analyses of 21 turnover studies indicate that receiving promotions is directly related to less employee turnover (Carson et al., 1994). To prepare employees for advancement, agencies need to implement structured employee development practices. Career lattices demonstrate the possible ways that a career can progress and the different jobs an employee might consider as their career develops. The pathway is usually represented as a diagram showing the relationships between various roles in an industry and the possible paths for moving between them, both linearly and laterally. A career pathway serves as a strategic planning tool as the employee identifies long-term goals for his/her professional life.

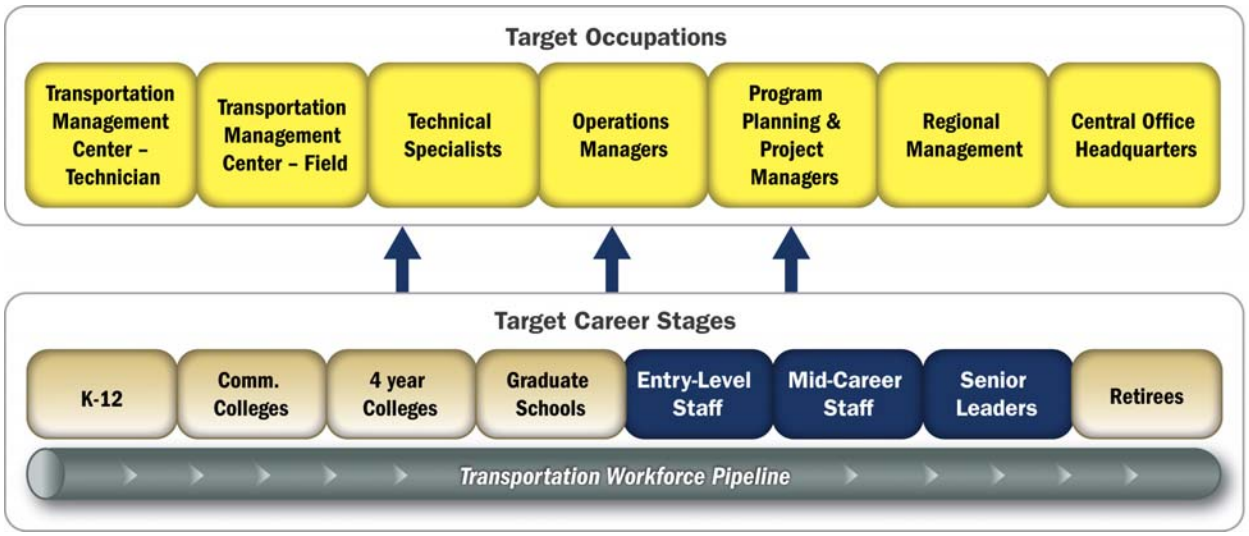
Recommendation Highlights

- Target Career Stage: Entry-level, mid-career staff, and senior leaders
- Will help with Retention and Development
- Estimated Time to Implement: 3–6 months
- Provides guidance to employees to help them to plan for future and advance within the agency
- Career pathways may increase job satisfaction, employee motivation, and commitment to the agency

Rationale for Recommendation: Our research results indicated that there is uncertainty in the transportation industry about how individuals should advance in an SOM career. This can inhibit DOT staff from cross-training to enter the field and can deter potential new, skilled employees from entering SOM jobs. We discovered that the biggest challenge or impediment to pursuing a career in SOM is that there are no clear or standard career paths for personnel. Thus, it is difficult for potential and existing staff to navigate the array of jobs. Further, each of SOM's five core functions does not represent all levels of SOM positions. For example, the Policy and Strategic Considerations function has no Transportation Management Center (TMC) technicians or field personnel and few mid-level or project-related personnel because of the high level of the work. On the other hand, the Real-Time Operations function has many TMC technicians and field personnel, but few senior managers. This also makes it difficult to describe where junior- or mid-level employees might progress across SOM functions. Yet, because SOM personnel often have knowledge of multiple disciplines and an understanding of how SOM interacts with transportation modes, the public, and other transportation functions (e.g., emergency management, public safety), their skills are highly transferable across core functions so advancement within and across core functions is certainly attainable. Thus, DOTs should work to develop and maintain clear career pathways for SOM employees that communicate when and how employees may be or become qualified to advance.

RECOMMENDATION #6
Develop Employees and Maintain Employee Career Pathways

RELEVANT POSITIONS



TARGET AUDIENCES

Source of Initiation
- ○ Industry
- ● Agency

Primary Human Resource Focus
- ○ Attraction
- ○ Recruitment
- ● Retention
- ● Development

Implementation Level
- ○ National
- ○ Regional
- ● State

Return on Investment
- ● 0-2 years
- ○ 3-5 years
- ○ 6+ years

Estimated Time to Implement
- ○ 0-3 months
- ● 3-6 months
- ○ 7 months-1 year
- ○ More than 1 year

Action Lead(s)
Agency HR Director/ Personnel Manager

Targeted Audience(s)
Primary: Staff who are seeking career guidance. Career paths will assist them in making training and skill development decisions and allow these staff to plan for likely future jobs.

RECOMMENDATION #7
Implement SOM Succession Plans

Description: Organizations could identify senior leader positions that will be vacated in the near future due to retirements, transfers, and other means of attrition. In order to fill these vacated positions, the organization could offer the opportunity for entry-level to mid-career employees to participate in training programs that focus on management and leadership issues. This type of training would help employees who are interested in becoming leaders of the organization acquire the skills necessary for advancement and continued success. Employees with strong performance records, who demonstrate both the skills to succeed at the senior level and interest in a future leadership position, may then be matched with a senior leader who serves as a mentor. Mentoring and on-the-job training are particularly important when filling senior leadership positions because many of the incumbents have long tenures and there is a need to have them pass on the industry and agency knowledge they have accumulated over the years, before they retire. In addition to the type of knowledge transfer that comes from mentoring, agencies should create people-focused knowledge management systems that promote knowledge sharing among employees. One possible technique to capture this critical knowledge involves staff working in Human Resource (HR) departments interviewing senior leaders about their position and work functions. This includes collecting information on the cognitive processes that may go into making decisions as well as the rationale behind specific procedures and task performance. These interviews will help ensure that institutional memory and expertise are not lost when senior staff retire.

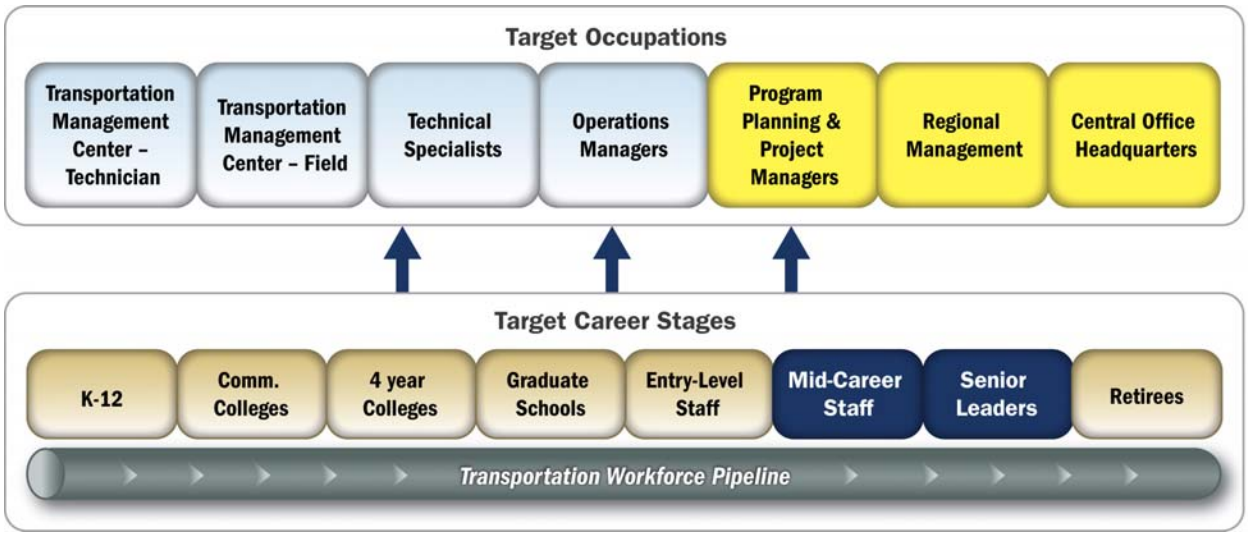
Recommendation Highlights

- Target Career Stage: Senior leaders
- Will help with Retention and Development
- Estimated Time to Implement: 3–6 months
- Ensures bench strength available within the agency
- Critical for workforce planning, especially with the expected high numbers of retirements in DOTs across the country in coming years
- Will help ensure that institutional knowledge is retained across generations in the agency

Rationale for Recommendation: Although attrition has slowed in recent years due to the economy, studies indicate that 50% of the transportation workforce will be eligible to retire in the next 5 to 10 years, which is double the retirement rate of the nation's entire workforce (e.g., *TRB Special Report 275*, 2003). In addition to filling open positions due to retirements, agencies must also attempt to retain the institutional knowledge retiring employees have accumulated over their periods of employment. Implementing succession plans not only helps to ensure that the senior leader positions vacated by retiring leaders are filled with the top talent within the agency, but also it allows for the future leaders to be identified earlier in their career, trained, and mentored by existing leaders so they gain the institutional knowledge and are ready to step in as soon as senior leaders leave the agency. Succession plans are important not only because many senior leaders will be retiring over the next 10 years, but because it is critical to have a management pipeline in place regardless of the reason senior leaders choose to leave the agency.

RECOMMENDATION #7
Implement SOM Succession Plans

RELEVANT POSITIONS



TARGET AUDIENCES

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Estimated Time to Implement
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- ○ More than 1 year

Action Lead(s)
Agency HR Director

Targeted Audience(s)
Primary: Agency leaders and talented entry-level and mid-career staff who have been identified as future senior leaders in the agency.

RECOMMENDATION #8
Recruit from Non-Traditional Sources

Description: Create recruitment strategies that seek out candidates from non-traditional sources to build a deep and diverse applicant pool. Non-traditional applicants, such as retired military personnel, engineers from the public sector, stay-at-home parents, minority group members, ex-prisoners, retirees, and/or DOT employees from other agencies could prove to be an excellent source for talent. These applicants often have a wealth of knowledge and a desire to return to the workforce in some fashion. In fact, some unemployed individuals may be stay-at-home parents who left work because they did not want a full-time job commitment or older individuals, not yet of retirement age, who went through a company downsizing and have difficulty finding subsequent work. Additionally, some retirees include individuals who leave their jobs due to early buy-outs or government pension plans but still prefer to be working. Knowing what prompted candidates to initially leave the workforce can inform recruitment and offer solutions or arrangements that work for non-traditional employees who might be brought in part-time or benefit from flexible work arrangements. DOTs should consider how to leverage the experience and expertise of non-traditional applicants while keeping in mind that they might not want to maintain a traditional work schedule. When considering non-traditional sources, it is important to keep in mind that retired military personnel often show exemplary leadership skills based on the discipline and training they gained in the military.

Recommendation Highlights

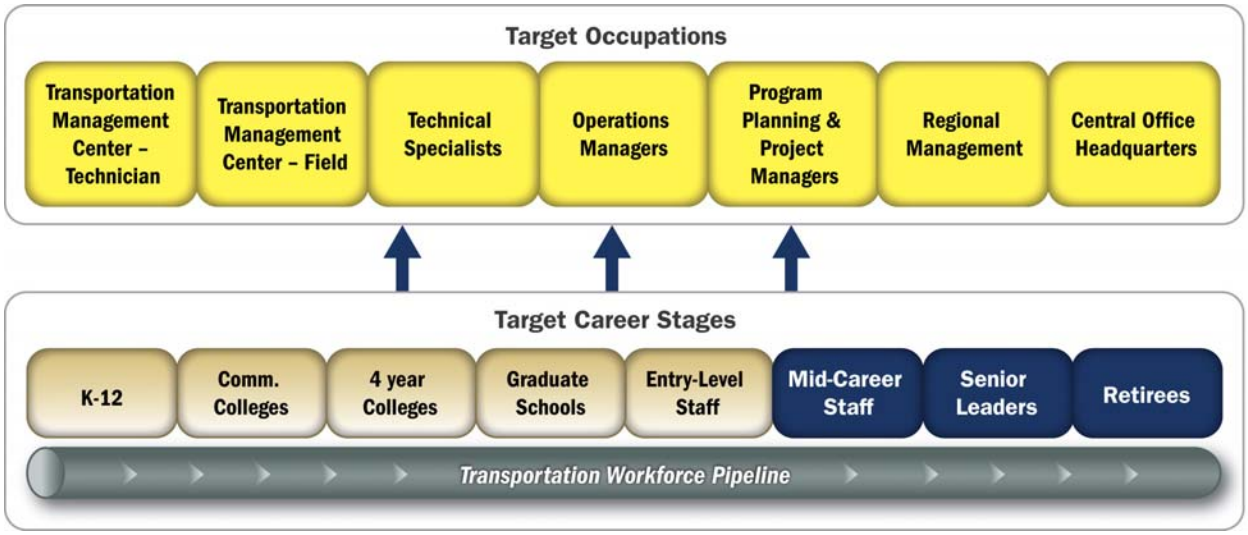
- Target Career Stage: Mid-career staff, senior leaders, retirees
- Will help with Attraction and Recruitment
- Estimated Time to Implement: 0–3 months
- Non-traditional applicants may hold valuable knowledge about the agency or industry in general, and desire to keep working
- Agencies should consider how to leverage the experience and expertise of non-traditional applicants while keeping in mind they might not want to maintain a traditional work schedule

Rationale for Recommendation: In many cases, retirees possess specialized knowledge and unique experiences, as well as a historical perspective that are critical for efficient operation of the organization (Rothwell and Poduch, 2004). Interestingly, retirees often seek to return to the workforce after a short leave of absence. These retirees may be attracted to jobs that afford specific benefits or a desirable scheduling arrangement. Experienced individuals who have left the industry for other reasons may also have valued knowledge and experiences. Costs (i.e., time, monetary) associated with onboarding and training are often reduced when hiring those who have previous experience in the field.

As noted previously, transportation agencies are experiencing a shortage of SOM professionals with the suitable skills and knowledge to move beyond more traditional civil engineering functions to the broader and more diverse SOM activities. According to interview participants from this study, the desired skill set and knowledge base cannot be acquired simply from college or university courses, but rather must be obtained through on-the-job experiences. Some non-traditional applicants possess SOM-relevant, on-the-job experience; such staff may be identified by the transportation agency.

RECOMMENDATION #8
Recruit from Non-Traditional Sources

RELEVANT POSITIONS



TARGET AUDIENCES

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Estimated Time to Implement
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- ○ 7 months-1 year
- ○ More than 1 year

Action Lead(s)
Agency HR Director

Targeted Audience(s)
Primary: Depending on the type of job for which recruitment is needed and the knowledge, skills, and abilities required for those jobs, various audiences may be targeted to identify candidates, such as professional associations for specific fields, community or retiree associations, minority membership organizations, and military groups. The target audience, such as professional associations, may be asked to publish recruitment materials on their websites or in trade journals.

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