Measuring the Effectiveness of Competency Models for Job-Specific Professional Development of Engineers & Engineering Technicians

A Comparison of Core Competencies Across Civil Engineering Positions of Department of Transportation Agencies using Competency Models

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16. Abstract

As many within the current transportation workforce approach retirement and the industry transitions into the 21st century, there are two notable challenges: 1) the incredible wealth of institutional knowledge that will be leaving the workforce, and 2) the continued increase in the application of new technologies, skills, and knowledge of the entering workforce. A resulting impact of these issues is that the gap between old and new employee competencies and skills is widening; therefore, there is a specific need and opportunity to develop new job competencies which address these changes. This research evaluates existing Department of Transportation (DOT) job specifications and job postings for civil engineers at various levels in the transportation industry within the New England region. Each job specification and posting was gathered and reviewed for specific competencies in accordance with the Bureau of Labor Statistics (BLS) core competencies and the American Association of Engineering Societies' (AAES) competency model. Further, licensure requirements, including the Engineer-In-Training (EIT) and Professional Engineer (PE) certifications, were gathered. The quantitative analysis resulted in several notable competency gaps (or inconsistencies) between each job position across the DOTs, as well as gaps in both the BLS and AAES competency models. Additionally, the analysis of job position licensure requirements presented further significant gaps between the DOT agencies. Finally, the interviews of DOT personnel allowed for an understanding of the specific DOT competency and hiring processes. This research provides a foundation from which to develop competencies for civil engineering positions at state DOTs and other agencies that is reflective of a more dynamic and sustainable transportation workforce that will excel throughout the 21st century.

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SI* (MODERN METRIC) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

SYMBOL	WHEN YOU KNOW	MULTIPLY BY	TO FIND	SYMBOL
		LENGTH		
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
		AREA		
in^2	square inches	645.2	square millimeters	mm^2
ft^2	square feet	0.093	square meters	m^2
yd^2	square yard	0.836	square meters	m^2
ac	acres	0.405	hectares	ha
mi^2	square miles	2.59	square kilometers	km^2
		VOLUME		
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft^3	cubic feet	0.028	cubic meters	m^3
yd^3	cubic yards	0.765	cubic meters	m^3
		NOTE: volumes greater than 1000 L shall be shown in m^3		
		MASS		
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
		TEMPERATURE (exact degrees)		
^oF	Fahrenheit	5 (F-32)/9 or (F-32)/1.8	Celsius	^oC
		ILLUMINATION		
fc	foot-candles	10.76	lux	lx
fl	foot-Lamberts	3.426	candela/m^2	cd/m^2
		FORCE and PRESSURE or STRESS		
lbf	poundforce	4.45	newtons	N
lbf/in^2	poundforce per square inch	6.89	kilopascals	kPa

APPROXIMATE CONVERSIONS FROM SI UNITS

SYMBOL	WHEN YOU KNOW	MULTIPLY BY	TO FIND	SYMBOL
		LENGTH		
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
		AREA		
mm^2	square millimeters	0.0016	square inches	in^2
m^2	square meters	10.764	square feet	ft^2
m^2	square meters	1.195	square yards	yd^2
ha	hectares	2.47	acres	ac
km^2	square kilometers	0.386	square miles	mi^2
		VOLUME		
mL	milliliters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m^3	cubic meters	35.314	cubic feet	ft^3
m^3	cubic meters	1.307	cubic yards	yd^3
		MASS		
g	grams	0.035	ounces	oz
kg	kilograms	2.202	pounds	lb
Mg (or "t")	megagrams (or "metric ton")	1.103	short tons (2000 lb)	T
		TEMPERATURE (exact degrees)		
^oC	Celsius	1.8C+32	Fahrenheit	^oF
		ILLUMINATION		
lx	lux	0.0929	foot-candles	fc
cd/m^2	candela/m^2	0.2919	foot-Lamberts	fl
		FORCE and PRESSURE or STRESS		
N	newtons	0.225	poundforce	lbf
kPa	kilopascals	0.145	poundforce per square inch	lbf/in^2

*SI is the symbol for the International System of Units. Appropriate rounding should be made to comply with Section 4 of ASTM E380.

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1 INTRODUCTION

State Department of Transportation (DOT) agencies are vital to the future of transportation: their success, development, and innovative practices can lead the path for other agencies and industries to follow suit, in addition to the vital role they play for society. Much of state DOT success and innovation is due in part to their workforce and decision-makers within the agency. However, as the current transportation workforce is aging, many of these decision-makers and higher-level employees are retiring; along with them, a tremendous amount of institutional knowledge is lost. At the same time, many of the responsibilities of the workforce within a DOT are transforming to reflect changing technology and policy in the transportation industry, which in turn, is requiring more skills and knowledge from the entering workforce. As these changes in the industry arise, there is a need and opportunity to support each organization's strategic plan through the development, structure, and competencies of its workforce.

Competency models are created for a specific industry, work position, or occupation to support strategic corporate goals and objectives. These competencies are often used throughout the recruitment and hiring process to determine if a candidate has the necessary skills and abilities to work towards an agency's goals. In the transportation industry, there are few competency models, and none that are designed for civil engineers in the field. This gap is critical to address during this dynamic time to continue the innovative practices and develop skilled, knowledgeable, and capable decision-makers. To address this gap, new job competencies, to include in job specifications and job postings, must be developed for civil engineers. Further, it is important to understand the current state of job competencies that civil engineers are required by DOT agencies to have in the transportation industry with accuracy, to, therefore, develop accurate new competencies to include in their hiring process.

This research provides an analysis of current job competencies and licensure requirements for civil engineering positions at the six DOTs within the New England region, including how they compare to one another, how they are included in job postings and/or job specifications, and how they relate to industry-specific competency models. A secondary objective identified potential gaps in the competencies of each position, allowing this research to provide a foundation for the creation of revised competency models for civil engineers at DOTs.

Organizationally, this paper first provides a brief background and summary of relevant literature related to the current state of the transportation industry and competency modeling. The methodology section presents the process of determining appropriate competency models, collecting competency data, and conducting interviews of DOT personnel. Following a summary of the results, a series of recommendations and conclusions are presented.

2 BACKGROUND

This section presents a background and summary of literature on the topics of the changing transportation industry, competency models, and engineering licensure.

2.1 Current State of the Transportation Industry

Maintaining and developing transportation is vital in society to connect people, move products, and create a safe, efficient environment, as well as to support economy and improve the standard of living of people. Today, as the field adapts to use new technologies and follow new policies to

enhance current capabilities at a fast pace, the industry is thus transitioning to require new skills of its workers. In this time of change, it is vital that the transportation workforce has the necessary skills and abilities to lead the industry in the best direction.

2.2 Civil Engineers at State Department of Transportation Agencies

State transportation agencies are imposed with the vital task of maintaining and innovating society's transportation system. From freight systems to sidewalks, DOTs are responsible for considering the wellbeing of their own state residents in each decision they make. They are at the "heart of planning, design, construction, and operations and maintenance projects across all travel modes" (*1*). In each DOT, civil engineers form a vital part of the workforce. These workers are responsible for making important decisions in the field and must have the appropriate skills and knowledge to make these decisions in an informed and innovative manner. Civil engineers are defined by the Bureau of Labor Statistics (BLS) as engineers who "conceive, design, build, supervise, operate, construct, and maintain infrastructure projects and systems in the public and private sector, including roads, buildings, airports, tunnels, dams, bridges, and systems for water supply and sewage treatment" (*2*). As their responsibilities cover a wide range of services related to transportation, their choices have the potential to improve the quality of life of all people they serve.

2.3 Aging Workforce and Growing Industry

The transportation workforce is growing: from 2012 to 2022 alone, the field is projected to add 417,000 net new jobs in addition to the 4.2 million jobs created from separations, including retirees (*3*). As this aging workforce separates, an immense amount of institutional knowledge is lost, while new hires, who are equipped with new and different skills and knowledge, are brought in. Moreover, in 2014, 53 percent of transportation workers were 45 years or older, nine percent more than the national average at that time (*3*). Given the essential increase of new hires, state Department of Transportation agencies should be prepared to handle gaps in skills and knowledge, as well as a multi-generational workforce in their work environment. This gap is critical to address during this dynamic time to continue the innovative practices and develop skilled, knowledgeable, and capable decision-makers in the transportation industry.

2.4 Advancing Technology

In this time of technological change in the transportation industry, it is vital that the transportation workforce, beginning with DOTs, have the necessary skills and abilities to lead the industry. Many new technologies and policies aim to improve work efficiency, safety, and capabilities. One example may be the use of Unmanned Aerial Systems, or drones, to conduct safer and more efficient routine bridge inspections, while another may be the use of Intelligent Transportation Systems to inform drivers on the roadway of important information through automated Variable Message Signs. Each new integrated technology and policy that improves the transportation system creates a safer, more efficient, capable systems used by all members of society.

To make use of new technology advances, the transportation workforce must have the appropriate skills and abilities to utilize them, as previously mentioned. Fittingly, many employers in the field are looking for these competencies in new hires. In 2016, a survey of transportation employers distributed by the Institute of Transportation Engineers found that "proficiency in using transportation analysis software" was "important" for new hires in the transportation engineering field to possess (*4*). In this example, a good competency to cover this skill may be "transportation design software."

2.5 Competency Models

To develop a workforce with specific goals of an organization in mind, the skills and knowledge of that workforce must be quantifiable. This is possible through the use of competencies and competency models. While there exist many definitions of what a "competency" is, this research utilizes the following definition: "Competencies are identified knowledge, skills, and abilities, evaluated through demonstrated behaviors, which positively impact the success of an organization and its employees." Competencies are the specific components, or human abilities or behavior which can impact work productivity, which make up competency models.

Competency models came to be from the leading work of David McClelland in 1973 who argued that aptitude and intelligence tests were not valid indicators of future job performance, but, rather, criterion referenced testing was more so (*5*). Today, a competency model is considered a collection of the competencies that conjointly define successful performance in a work setting. The work setting for a specific model can be broad (i.e., any position in the field of engineering) or explicit to a job position at an agency (i.e., a civil engineering position at a state DOT). More generally, competency models are developed for specific jobs, organizations, occupations, or industries (*6*). While competency models can be developed in various ways depending on the work setting, each is often designed to align strategic goals and objectives with the knowledge and skills of employees. Typically, competency models are broken into levels with foundational competencies on the bottom and occupation-specific competencies at the top (Figure 1) (*7*).

Figure 1: Competency Model Framework (*7*)

To create their most effective workforce, an agency should incorporate their own strategic goals and objectives in their competency model framework. Further, as an agency's goals and objectives change, their job specifications and competency models should change in alignment.

2.6 Competency Models in the Transportation Industry

Many competency models have been researched and created for various transportation industries, including industry clusters (*8*), the rail transportation system workforce (*9*), and the aviation workforce (*10*). However, there is limited literature in the transportation community concerning civil engineering or transportation engineering competency modeling. Two notable competency models are the BLS core competencies and the American Association of Engineering Societies (AAES) competency model. The BLS states a list of core, or foundational, competencies that all practicing civil engineers should possess (*2*). Though the competencies are not technically

presented as a model, they still provide insight into the general civil engineering industry skills and expectations. The AAES competency model was created for engineering industry professionals. Both the BLS competencies and AAES competency model are described in further detail in the subsequent methodology section.

2.7 Licensure

Licensure is vital in the civil engineering profession as it is responsible for protecting and enhancing the health, safety, and welfare of the public. This is unlike other engineers due to the unique aspect of their practice in the built environment (*11*). Many certifications and licensures exist in the civil engineering industry, including the Engineer-In-Training (EIT) and Professional Engineer (PE) certifications. The EIT and PE are national professional engineering licensures to ensure that each engineer in practice has the necessary competencies to complete their work so public health, safety, and welfare are protected. Specifically, these licensures show those competencies that are more technical in nature, such as problem solving. These specific skills can vary, depending on the type of EIT or PE obtained, as an EIT or PE can be obtained in a specific engineering field. For example, an EIT can be obtained in environmental engineering or civil engineering. Further, the PE is even more specific, such as in the field of transportation engineering, a subfield of civil engineering. The EIT, which is a pre-licensure to the PE, requires a four-year degree in engineering from an accredited engineering program and a passing score on the Fundamentals of Engineering (FE) exam. The PE requires the EIT licensure, a passing score on the Principles and Practice of Engineering (PE) exam, and, typically, four years of engineering experience under a PE, though it varies state to state. In most states, privately operated engineering projects require a PE seal by law to obtain approval (*12*).

3 METHODOLOGY

As previously explained, it is imperative that civil engineers at state DOTs have the skills, knowledge, and abilities, or competencies, which reflect the current state of the transportation field. The first goal of this research was to determine the use of competencies, if any are used, in the recruitment process. To begin, an analytical comparison of competencies between civil engineering position levels across all six DOTs in the New England region was completed. This was done by comparing those competencies that were included in job postings and/or job specifications and relating them to industry-specific competency models. These DOTs included those of Connecticut (CT), Maine (ME), Massachusetts (MA), New Hampshire (NH), Rhode Island (RI), and Vermont (VT). The job postings and job specifications were specifically analyzed for competencies, which are utilized in the recruitment process and is what the hiring of a candidate is often based upon. An example of a job posting and job specification, for the ME Civil Engineer II, is provided in the Appendix for reference. Further, job postings are the first point of contact between a DOT and a potential candidate. Through this posting, a potential candidate can understand if they are qualified for a position, if their experience fits, and if they are interested in what the position will be. Therefore, painting an honest and descriptive picture of a position and the hiring agency is critical. A second objective of this research identified potential gaps in position competencies and provide recommendations to fill those gaps. This would allow for this research to provide a foundation for the creation of revised competency models for civil engineers at DOTs.

To analyze these potential gaps or inconsistencies in competencies between the civil engineering job positions at each DOT, various existing competency models in the field of transportation or

engineering were first evaluated and compared to determine which were most appropriate to outline the skills and knowledge needed of civil engineers in the field today. These competency models or structures included in this comparison were from various sectors and authors, and included the Multidisciplinary TIM (Traffic Incitement Management) Core Competencies, Core Competencies as the Foundation for Leadership, Missouri Target Industry Competency Model, Aviation Workforce Development Practices, BLS Core Competencies, and American Association of Engineering Societies (AAES) Competency Model (*8*, *13–16*). Specific models were chosen for various reasons, explained further in the following sections. From that comparison, civil engineering job positions were analyzed by which competencies they contained, in both their most recent job posting and their job specification. Explicitly, the various civil engineering position "levels" at each state DOT were compared. Figure 2 depicts this study methodology in further detail. This process is also described in further details in the following sections.

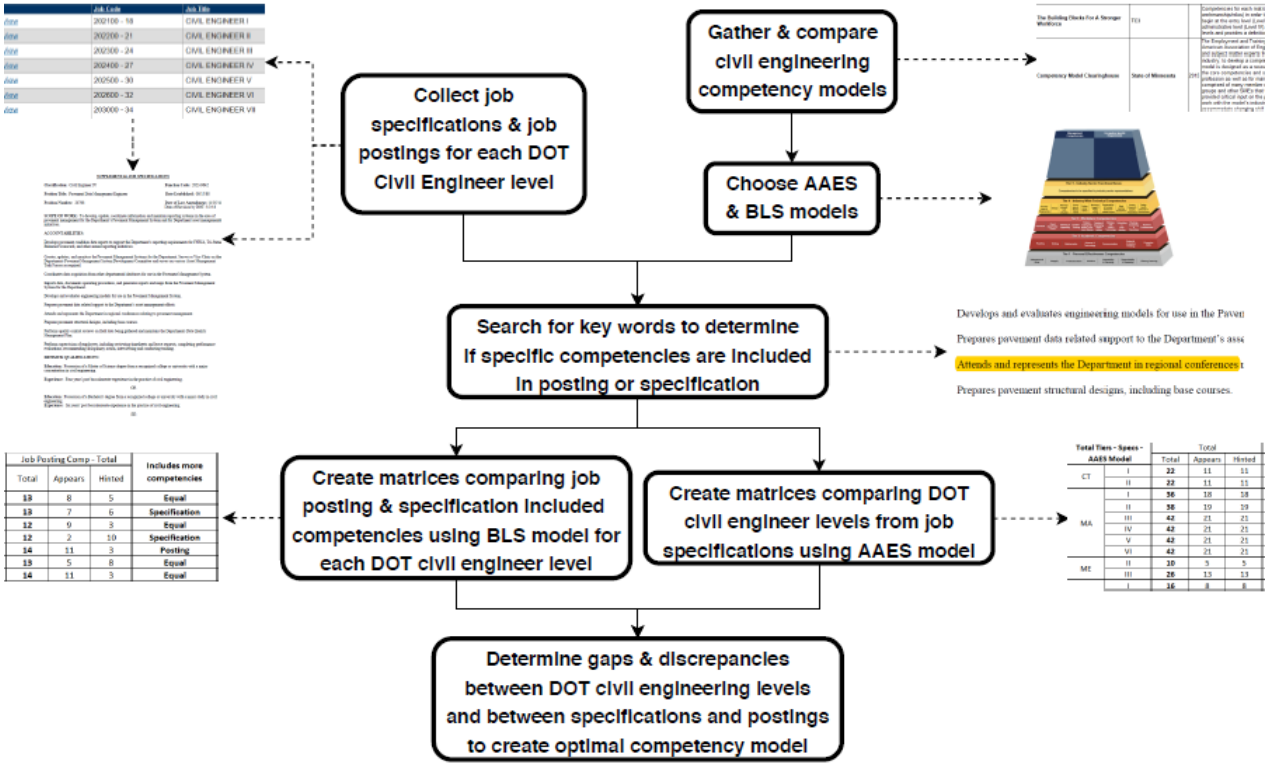

Figure 2: Methodology Outline

Additionally, the certification and licensure requirements for each civil engineering position were collected and analyzed. Finally, following this technical work and analysis, interviews of Human Resources (HR) personnel from each New England state DOT were conducted, excluding the Rhode Island DOT, which was unable to participate at the time the interviews were taking place.

3.1 Competency Models Comparison

As outlined in the background section, few competency models exist for transportation industry positions. Many competency models in the industry were created for a specific workforce, such as the aviation workforce or the traffic incident management workforce (*15*, *16*). As this research focuses on a national level of current civil engineering competencies, nation-wide models that were relatively new or up to date were considered over others. Through these considerations of

competency models, two were chosen to analyze the civil engineering competency data included in job-specific postings and specifications.

Bureau of Labor Statistics Core Competencies

The Bureau of Labor Statistics of the United States Department of Labor (USDOL) is "the principal federal agency responsible measuring labor market activity, working conditions, and price changes in the economy. Its mission is to collect, analyze, and disseminate essential economic information to support public and private decision making" (*17*). They outline seventeen core competencies, which all civil engineers in the workforce throughout the nation should have, independent of their level (Table 1) (*18*).

Table 1: Description of Bureau of Labor Statistics Core Competencies (*18*)

Competency	Description
Decision Making	Civil engineers often balance multiple and frequently conflicting objectives, such as determining the feasibility of plans with regard to financial costs and safety concerns. Urban and regional planners often look to civil engineers for advice on these issues. Civil engineers must be able to make good decisions based on best practices, their own technical knowledge, and their own experience.
Leadership	Civil engineers take ultimate responsibility for the projects that they manage or research that they perform. Therefore, they must be able to lead planners, surveyors, construction managers, civil engineering technicians, civil engineering technologists, and others in implementing their project plan.
Math	Civil engineers use the principles of calculus, trigonometry, and other advanced topics in mathematics for analysis, design, and troubleshooting in their work.
Organization	Only licensed civil engineers can sign the design documents for infrastructure projects. This requirement makes it imperative that civil engineers be able to monitor and evaluate the work at the jobsite as a project progresses. That way, they can ensure compliance with the design documents. Civil engineers also often manage several projects at the same time, and thus must be able to balance time needs and to effectively allocate resources.
Problem-Solving	Civil engineers work at the highest level of the planning, design, construction, and operation of multifaceted projects or research. The many variables involved require that they possess the ability to identify and evaluate complex problems. They must be able to then utilize their skill and training to develop cost-effective, safe, and efficient solutions.
Speaking	Civil engineers must present reports and plans to audiences of people with a wide range of backgrounds and technical knowledge. This requires the ability to speak clearly and to converse with people in various settings, and to translate engineering and scientific information into easy to understand concepts.
Writing	Civil engineers must be able to communicate with others, such as architects, landscape architects, and urban and regional planners. They also must be able to explain projects to elected officials and citizens. This means that civil engineers must be able to write reports that are clear, concise, and understandable to those with little or no technical or scientific background.
Analysis	Analyze long range plans, survey reports, maps, and other data in order to plan projects
Regulation Knowledge	Consider construction costs, government regulations, potential environmental hazards, and other factors in planning the stages of, and risk analysis for, a project

Competency	Description
Permit Application	Compile and submit permit applications to local, state, and federal agencies, verifying that projects comply with various regulations
Soil Testing	Perform or oversee soil testing to determine the adequacy and strength of foundations
Material Testing	Test building materials, such as concrete, asphalt, or steel, for use in particular projects
Cost Estimation	Provide cost estimates for materials, equipment, or labor to determine a project's economic feasibility
Design Software	Use design software to plan and design transportation systems, hydraulic systems, and structures in line with industry and government standards
Surveying	Perform or oversee surveying operations in order to establish reference points, grades, and elevations to guide construction
Public Presentation	Present their findings to the public on topics such as bid proposals, environmental impact statements, or descriptions of property
Management	Manage the repair, maintenance, and replacement of public and private infrastructure

The American Association of Engineering Societies is a "multidisciplinary organization of engineering societies dedicated to advancing the knowledge, understanding, and practice of engineering. AAES member societies represent the mainstream of U.S. engineering - engineers in industry, government, and academia" (*19*). In 2015, AAES and the USDOL developed an Engineering Competency Model that outlines competencies for the development of the engineering workforce (Figure 3) (*13*). This model earned the 2016 American Society of Association Executives Power of A Gold Award, which rewards "outstanding accomplishments of associations and industry professionals for their efforts to enrich lives, create a competitive workforce, prepare society for the future, drive innovative and make a better world" (*13*). This model also differs from the BLS model as it is broken into tiers, as a real competency model is defined; according to this model, higher-level engineers should have more competencies than lower-level engineers, as higher-level engineers would be placed at a higher tier. Thus, the tiers included in this model correspond roughly to the job levels.

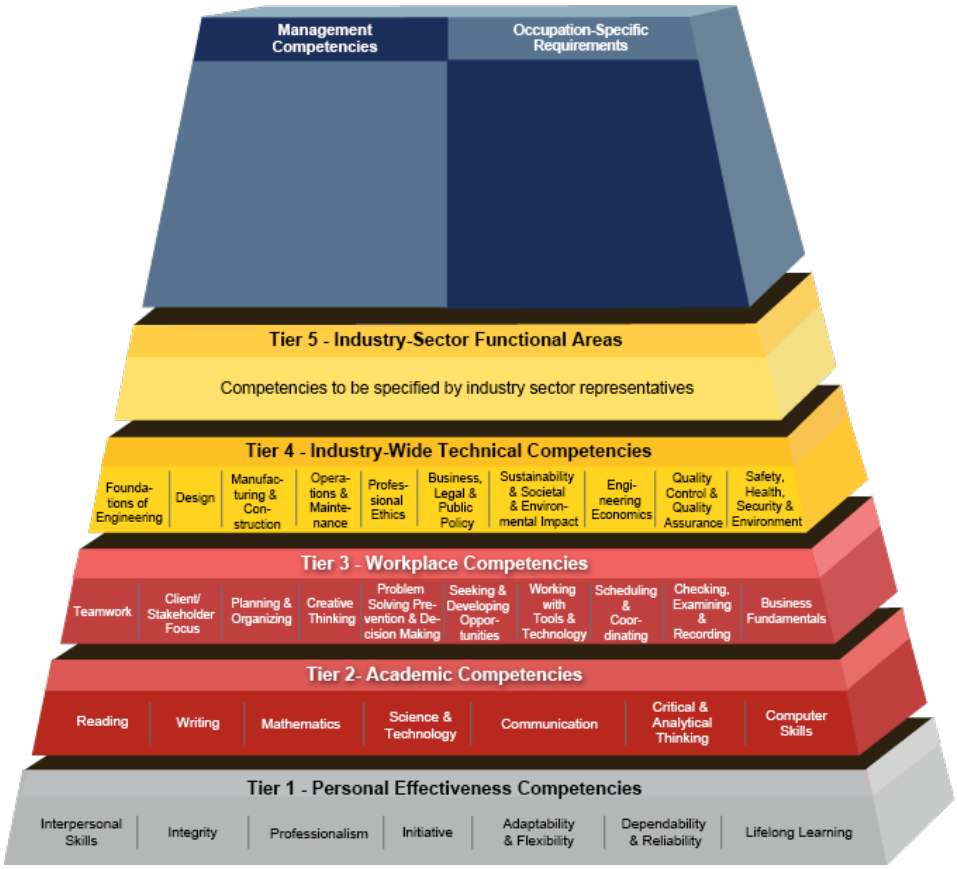

Figure 3: AAES Competency Model (*13*)

3.2 Civil Engineer Job Level Competency Comparison

To analyze state DOT civil engineering positions using the BLS and AAES competency models, job postings and specifications were collected for each position level. Job specifications were collected in March 2017 from DOT websites as well as through email communication with DOT HR personnel. In March 2018, the most recent job postings were collected in similar fashion. This one-year gap occurred as different graduate research assistants took on this research at varying times. However, it is noted that job specifications during this time period very likely did not change, as many have not been updated in over a decade. This was also verified during the interview process. Thus, this one-year gap was not noted as a limitation to this research.

It is noted that job postings differ from the job specifications; job postings are the write-ups which advertise a position which is accepting applications, while job specifications are the position descriptions which outline what each position requires in further detail. In this data collection process, one job posting was unavailable, the position of Rhode Island DOT Civil Engineering (CE) Associate, and three job specifications were unavailable, for the positions of Rhode Island DOT Principal Engineer and Senior Engineer, and for the position of Maine DOT Assistant Engineer. While this lack of data is a limitation of this research, it was determined that it would not play a major role in the overall data analysis process.

To analyze both the postings and specifications for their inclusion of a competency, each was read through in search of key words. These key words, such as “survey” or “writing,” would prove that a specific competency was expected of the engineer in the specific position. If one of these words

appeared in a job specification, a note was made stating so. For the job posting analyzation, these inclusions were separated into descriptive columns to analyze if a competency "appeared" in the text or was "hinted" at. If a competency was hinted at, such that it can be easily assumed that the position would require the competency but it did not appear directly in the text, it was placed in the "hinted" column during the data collection process. Similarly, if a competency explicitly "appeared" in the text, it was placed in the "appeared" column. This was done to provide further detail as to what is included directly or indirectly in job postings, given that they may be typically less detailed than a job specification. Using both the BLS and AAES models, two analytical matrices were created.

3.2.1 Job Posting Compared to Job Specification Competencies

The first relationship analyzed relates job postings and job specifications based on their included core competencies from the BLS model. This analysis allows for the understanding of which text includes more competencies: the specification or the posting. This is important to gather, as to understand the transparency between what the positions fully require and how positions are advertised to potential candidates.

3.2.2 Comparing Job Specification Competencies at Various Department of Transportation Civil Engineering Position Levels

Based on the first analysis results, a second analysis evaluated the included competencies in the job specification of each position based on the AAES competency model, as it was found that job specifications typically included more, or an equal number, of BLS core competencies.

3.3 Professional Licensure Comparison

For each position, data was collected on its respective certification and licensure requirements. This was completed during the competency data collection of all job postings. All certification and licensure requirements were noted.

3.4 Professional Licensure Comparison

Individual interviews were conducted with HR personnel in October and November 2018 from each New England state DOT, not including Rhode Island, whose HR personnel was unable to participate during the timeframe these interviews were conducted. Each interview was conducted using Zoom, an online video conferencing software. Each began with the presentation of a slideshow presenting all of the technical information, including an introduction, methodology breakdown, and results from the analysis of competencies and licensure. Following this presentation, the following questions were discussed, among others that came up during discussion:

- How do you currently create job postings? Do these job postings/specifications always accurately reflect the position or is it flexible?
- Given presentation and information, how do you believe this work can be translated into your DOT workforce development and/or hiring process?
- How does licensure fit into your hiring process/career ladder of civil engineers at your DOT?
- Have you ever hired or considered hiring a civil engineer from another DOT? What would be/was your process to fit them in at your DOT, given the various levels?

These questions allowed further discussion of how this technical information could be useful for state DOTs.

4 RESULTS

An analysis was conducted to compare competencies included in the job postings and specifications as well as between varying civil engineer position levels at the DOTs. The findings are presented below in the subsequent sections.

4.1 Job Posting Competencies Compared to Job Specification Competencies

This comparison relates job postings and job specifications based on their included core competencies from the BLS model (Table 2).

Table 2: Comparing Job Postings and Job Specifications from Bureau of Labor Statistics Model

Bureau of Labor Statistics Model		Specification Competencies, Total	Job Posting Competencies, Total			**Includes more competencies**
			Total	Appears	Hinted	
CT	I	**13**	**13**	8	5	**Equal**
	II	**16**	**13**	7	6	**Specification**
MA	I	**12**	**12**	9	3	**Equal**
	II	**13**	**12**	2	10	**Specification**
	III	**13**	**14**	11	3	**Posting**
	IV	**13**	**13**	5	8	**Equal**
	V	**14**	**14**	11	3	**Equal**
	VI	**14**	**10**	5	5	**Specification**
ME	Assistant Engineer	**-**	**6**	1	5	**-**
	II	**13**	**8**	1	7	**Specification**
	III	**13**	**8**	0	8	**Specification**
NH	I	**15**	**5**	2	3	**Specification**
	II	**15**	**6**	1	5	**Specification**
NH	III	**15**	**8**	4	4	**Specification**
	IV	**13**	**9**	1	8	**Specification**
	V	**13**	**9**	0	9	**Specification**
	VI	**14**	**12**	3	9	**Specification**
	VII	**13**	**12**	2	10	**Specification**
RI	CE	**15**	**12**	10	2	**Specification**
	CE Associate	**15**	**-**	-	-	**-**
	CE Senior	**-**	**15**	6	9	**-**
	CE Principal	**-**	**14**	7	7	**-**
VT	I	**10**	**10**	5	5	**Equal**
	II	**11**	**12**	4	8	**Posting**
	III	**11**	**13**	4	9	**Posting**
	IV	**15**	**13**	7	6	**Specification**
	V	**16**	**12**	6	6	**Specification**
	VI	**16**	**12**	7	5	**Specification**

Bureau of Labor Statistics Model		Specification Competencies, Total	Job Posting Competencies, Total			**Includes more competencies**
			Total	Appears	Hinted	
	VII	**16**	**13**	8	5	**Specification**
	VIII	**16**	**13**	7	6	**Specification**

From this analysis, it was found that job specifications typically include more core competencies than job postings. Furthermore, no DOT civil engineer position level in the New England region includes all 17 core competencies from the BLS model. As previously stated, the BLS model was formed from the idea that all civil engineers, independent of their level, should have 17 core, or foundational, competencies (*18*). Figure 4 indicates these discrepancies, presenting the number of job postings which include each specific BLS model competency.

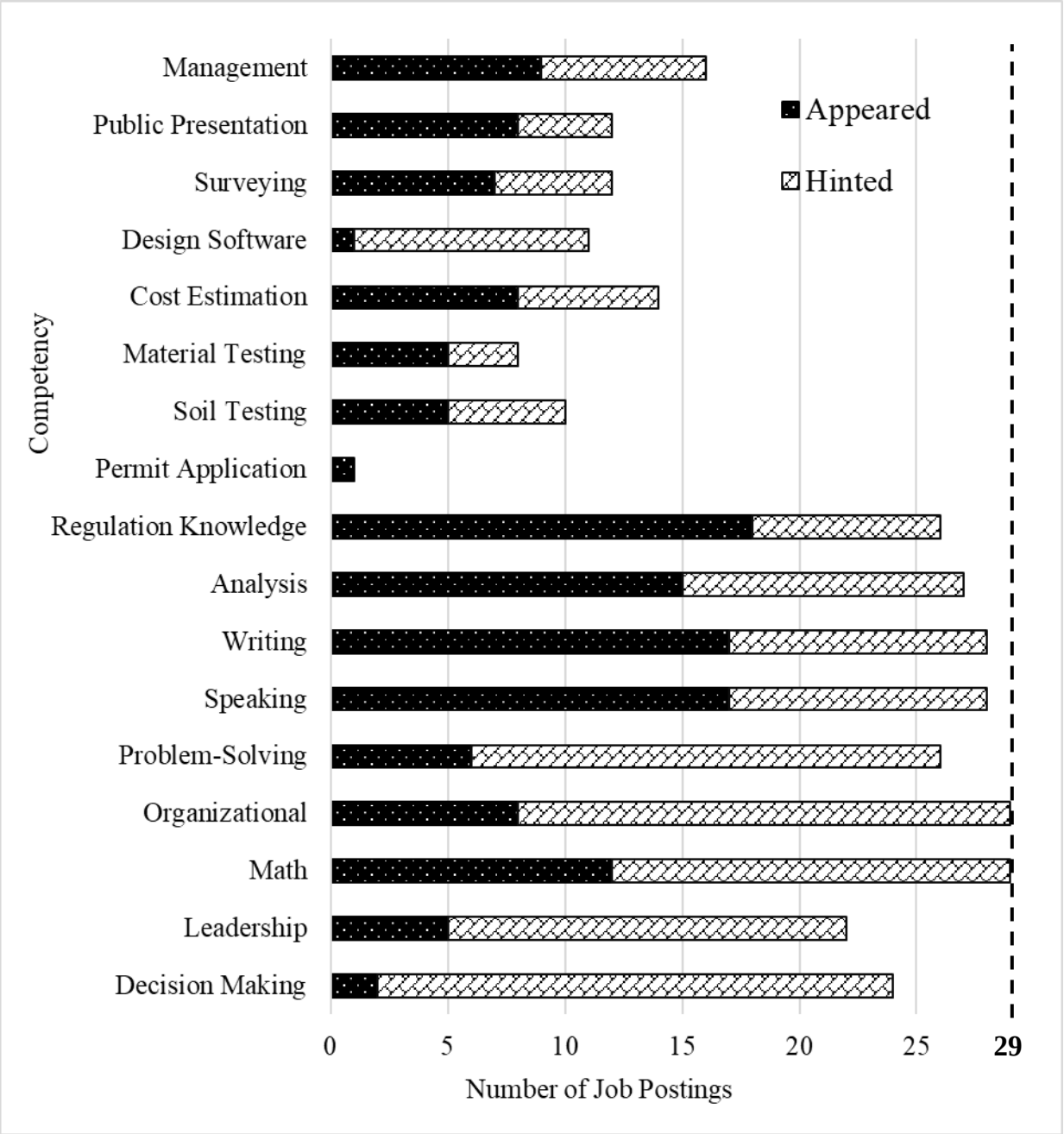

Figure 4: Bureau of Labor Statistics Competencies included in the Twenty-Nine Evaluated Job Postings

4.2 Comparing Job Specification Competencies at Various Department of Transportation Civil Engineering Position Levels

Job specification competencies were compared using the AAES competency model to determine inconsistencies between entry-level, mid-level, and senior-level engineers at each DOT. This comparison matrix outlines all DOT civil engineer position level core competencies, as determined by their job specifications (Table 3).

Table 3: Job Specification Competencies Compared by Department of Transportation Civil Engineer Position Level

Total Tiers - Specs - AAES Model		Total *(34 Competencies)*			Tier 1 *(7 Competencies)*			Tier 2 *(7 Competencies)*			Tier 3 *(10 Competencies)*			Tier 4 *(10 Competencies)*		
		Total	Appears	Hinted	Total	Appears	Hinted	Total	Appears	Hinted	Total	Appears	Hinted	Total	Appears	Hinted
CT	I	**15**	11	4	**1**	1	0	**6**	5	1	**3**	2	1	**5**	3	2
	II	**17**	11	6	**1**	1	0	**7**	5	2	**6**	3	3	**3**	2	1
MA	I	**21**	18	3	**4**	3	1	**7**	6	1	**4**	3	1	**6**	6	0
	II	**22**	19	3	**4**	3	1	**7**	6	1	**4**	4	0	**7**	6	1
	III	**25**	21	4	**4**	3	1	**7**	6	1	**7**	6	1	**7**	6	1
	IV	**26**	21	5	**4**	3	1	**7**	6	1	**8**	6	2	**7**	6	1
	V	**26**	21	5	**4**	3	1	**7**	6	1	**8**	6	2	**7**	6	1
	VI	**26**	21	5	**4**	3	1	**7**	6	1	**8**	6	2	**7**	6	1
ME	II	**15**	5	10	**0**	0	0	**6**	1	5	**4**	2	2	**5**	2	3
	III	**21**	13	8	**0**	0	0	**7**	3	4	**8**	7	1	**6**	3	3
NH	I	**16**	8	8	**2**	0	2	**6**	3	3	**5**	4	1	**3**	1	2
	II	**20**	13	7	**3**	0	3	**7**	5	2	**5**	4	1	**5**	4	1
	III	**24**	14	10	**3**	0	3	**7**	4	3	**6**	5	1	**8**	5	3
	IV	**20**	13	7	**3**	0	3	**6**	3	3	**7**	6	1	**4**	4	0
	V	**20**	12	8	**2**	0	2	**6**	3	3	**6**	4	2	**6**	5	1
	VI	**22**	13	9	**1**	0	1	**6**	2	4	**9**	5	4	**6**	6	0
	VII	**20**	9	11	**2**	0	2	**6**	2	4	**8**	3	5	**4**	4	0
RI	CE	**21**	18	3	**2**	1	1	**7**	6	1	**6**	5	1	**6**	6	0
	CE Associate	**21**	18	3	**2**	1	1	**7**	6	1	**6**	5	1	**6**	6	0
	CE Senior	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	CE Principal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VT	I	**16**	11	5	**0**	0	0	**7**	5	2	**3**	2	1	**6**	4	2
	II	**21**	14	7	**2**	0	2	**7**	5	2	**5**	4	1	**7**	5	2
	III	**22**	15	7	**2**	0	2	**7**	5	2	**6**	4	2	**7**	6	1
	IV	**22**	15	7	**1**	0	1	**7**	5	2	**7**	4	3	**7**	6	1
	V	**23**	14	9	**2**	0	2	**7**	4	3	**8**	4	4	**6**	6	0
	VI	**22**	16	6	**2**	0	2	**7**	5	2	**7**	5	2	**6**	6	0
	VII	**21**	12	9	**2**	0	2	**7**	3	4	**8**	6	2	**4**	3	1
	VIII	**22**	15	7	**2**	0	2	**7**	4	3	**8**	6	2	**5**	5	0

The matrix presented in Table 3 indicated that no civil engineering position level specification at any DOT within New England includes all AAES competencies. Further, no position level specification includes all competencies at any tier level. Comparing entry-level, mid-level, and senior-level engineer position levels within each DOT, most have more core competencies included in their job specification as the position levels increase within each agency. However, comparing the positions between each DOT, some entry-level positions have more competencies than a high-level position at another DOT. For example, the highest-level positions in the DOTs of Connecticut and New Hampshire include 17 and 20 competencies, respectively, in their job specifications, while the entry-level positions for the DOTs of Massachusetts and Rhode Island both have 21 competencies included in theirs.

4.3 Comparing Certification Requirements at Various Department of Transportation Civil Engineering Position Levels

Job certification requirements for each civil engineering position level were determined by job postings to determine additional inconsistencies within and between DOT agencies. This analysis outlines whether or not the job posting for each position level specified whether a position preferred or required, represented by an "x", or did not require/did not specify, represented by an empty cell, the requirement of an Engineer-In-Training (EIT) certification or Professional Engineer (PE) certification (Table 4). In the job postings analyzed, no other certifications, such as the Occupational Safety and Health Administration (OSHA) certification or the Professional Traffic Operations Engineer® (PTOE) certification, were mentioned.

Table 4: Job Comparison of Job Certification Requirements for Department of Transportation Civil Engineering Position Levels

		EIT Preferred	EIT Required	PE Preferred	PE Required
CT	I				
	II				
MA	I				
	II		x*	x	
	III		x*	x	
	IV		x*	x	
	V		x*	x	
	VI		x*	x	
ME	Assistant Engineer		x**		
	II		x		x
	III		x		x
NH	I	x***			
	II	x***			
	III		x		
	IV		x		x

		EIT Preferred	EIT Required	PE Preferred	PE Required
	V		x		x
	VI		x		x
	VII		x		x
RI	CE				
	CE Associate	N/A	N/A	N/A	N/A
	CE Senior		x		
	CE Principal		x		
VT	I			x	
	II			x	
VT	III			x	
	IV			x	
	V			x	
	VI			x	
	VII			x	
	VIII			x	

*Description specifies that EIT or PE licensure are not required if applicant is already a Massachusetts DOT employee and has adequate experience.
**Description indicated only non-engineering college graduate and non-degreed candidates are required to have EIT licensure.
***Description specifies that EIT licensure is not required if applicant is willing to accept pay at one-salary grade reduction.

As presented in the Table 4, not all state DOTs require that civil engineers obtain EIT or PE certification. Even at the highest civil engineering position level for all states, except for Maine and New Hampshire, a PE certification is not required. Additionally, some job postings did not even state a preference for those applicants which have an EIT or PE.

4.4 Interview Findings

Many state agencies specified that they have trouble competing with the private sector and keeping their engineers at higher levels, or after their PE was obtained. Further, many personnel during these interviews stated that a civil engineer model platform of levels and competencies at each of those levels would be helpful; however, unlikely to be used, due to the differences in DOT agency structure and needs. In all, the following sections provide the summarized details of the feedback that was gained during these interviews from the provided questions and the additional conversation that developed.

4.4.1 Connecticut

In the interview with Connecticut DOT HR personnel, it was gathered that at the supervisor level, a PE is required. It was also noted that the state uses the "civil engineer" title at non-DOT state jobs. For transportation jobs, the title of Transportation Engineer is used. In this series, there are three civil engineering levels, and then a supervisor. For each of these levels, a Bachelor's degree is required, but an EIT is not. However, it was noted that those with EIT certifications are preferred, even though this is typically not stated in the job posting. This information is typically gathered

during interviews. Recently, the state DOT upgraded to an online application system and changed the format of their process. This upgrade has allowed for more flexibility in the job posting title. For example, the title of "Architectural Engineer" could be used in place of "Transportation Engineer" if that is what the job is actually focused upon, even though it would be a part of the transportation engineer job series. This could help with advertising and hiring. Connecticut DOT personnel also stated that they struggle to hire young engineers if it is off cycle (or not after typical graduation).

Regarding the use of this technical analysis, DOT personnel stated that they could benefit from seeing what other states list in their job postings and descriptions to make sure they are not missing any competencies in their postings.

During the interview, it was gathered that the DOT has hired from other DOT agencies and have also lost people to other DOT agencies. To hire from these agencies, they would look at their experiences and training, and equate it to their levels. They would hire from the private sector in the same way. Specifically, they would look at the job description of their previous job and determine if it fits in with their levels. They do not necessarily attempt to translate another state agencies level to their level.

4.4.2 Maine

As shown in the prior tables presented, Maine DOT has two specified levels with titles for civil engineers and one level of assistant engineer. During this interview, it was gathered that after their highest civil engineer level, management levels begin, and there are two additional management level civil engineer positions: levels four and five. Given this information, it is noted that the highest level of civil engineer in Maine collected may not have all of the management skills noted in the AAES competency model, as there are more specific titles for those positions as civil engineers take on that higher role. After the civil engineer level four, assistant program manager, the civil engineer levels do max out at level five, a program manager. At this career point, there are additional roles that civil engineer; however, they are at the bureau level and are slim in numbers. There exist only three top positions.

During this interview, Maine DOT personnel also noted that they recently completed a review of their engineering series as a whole and incorporated newer competencies. Given the newness of this change, these new competencies were not included in this analysis. With this review and potential change, the addition of two new engineering series will be added. These will be called "Transportation Engineers." Maine DOT also used a system in this review which takes core competencies and inputs them into a chart to determine their salary level. From this, it was discovered that their assistant engineers, who used to be at a pay range of 22, were evaluated to be at a pay range of 25 in their system. However, it was noted that at the time of this interview, these changes did not yet go into effect.

In regard to how Maine DOT creates their job postings, each job description is worded or created in the specific requesting bureau or office. Throughout the state DOT, job postings are mainly used to state minimum qualifications for a job. In these postings, core competencies are not necessarily listed. Rather, these competencies are discovered through the interview process and the interview questions are often based on revealing specific competencies that are needed for the job. Further, they stated that they call references, often do not ask yes or no questions during interviews, ask for examples during interviews, and sometimes have interviewees complete a practical exercise to

determine their competencies.

Maine DOT personnel believe that a common platform for civil engineering levels across New England DOTs may not be helpful, as it really does depend on what works for each DOT. However, they noted that a similar platform may be helpful for AASHTO (American Association of State Highway and Transportation Officials) purposes.

Finally, regarding licensure, assistant engineers often come right out of college and come in with an EIT. Once they gain experience and pass their PE, they move to the next level, CE II. Following CE II, civil engineers then have to qualify specifically for CE III.

4.4.3 Massachusetts

Personnel from Massachusetts DOT stated that in the past they have found that, particularly in maintenance positions for example, work experience was more important than education. In general, for many of their positions, practical experience was more valued than academic background of a candidate. Thus, the requirement of a PE licensure, which was considered more academic in nature by the personnel, is not present in many job postings; however, an EIT is often required and PE licensure is sometimes noted as a preference. Further, it was noted that job postings are often written less specifically to find the right balance of practical and academic experience. In general, it was gathered that job postings, while they are formed from the job specifications set in place and minimum qualifications cannot change, are still fairly flexible. For example, the hiring manager is the one who creates the job description in a posting before it is provided to HR. This provides hiring managers to add more information on the specialty for the position, if there is one, creating a difference when recruiting, so potential candidates understand the job position more fully. Finally, Massachusetts DOT personnel also noted that in terms of salary, they find it difficult to be up against the private sector. Often, they hire people who are interested in public service. Also, for external candidates coming from other DOTs, they are considered in the same way in which other external candidates would be considered.

Massachusetts DOT personnel stated that they wanted to use competencies through their positions; however, it can be difficult in a union to have a performance-based workforce at times. These competencies would allow MassDOT to use them in the recruitment process to appeal to potential candidates, develop succession planning, discover critical jobs to hire for, and have a measureable infrastructure. Overall, MassDOT is looking to create a more efficient hiring process and get potential candidates excited to work for them.

4.4.4 New Hampshire

During the interview with New Hampshire DOT HR personnel, they indicated recently that there was a Tri State meeting with Maine, Vermont, and New Hampshire. After this meeting, New Hampshire DOT reevaluated minimal qualifications to make it easier to hire people. Currently, it was gathered that they were struggling to hold all of their workers at CE IV and CE V levels, as CE IV level is an engineer who has recently acquired their PE and the DOT cannot compete with the private industry. Thus, the DOT has completed a massive reevaluation to raise base wages, which has impacted their entire organization. Given the timeline of this project, this change was not included in the technical analysis of this research. Further, New Hampshire DOT recently moved all of their employees from a 37.5-hour work week to a 40-hour work week.

Regarding New Hampshire’s job postings, supplemental job descriptions are currently used to

create each posting. This description is aimed to be balanced around job specifications; however, as the specifications are very broad, more detail is needed. The minimum qualifications in the job postings are rigid and strict; there is no flexibility in hiring someone outside of those qualifications.

New Hampshire personnel noted that they do not treat civil engineer hires from other DOT agencies any differently than any another applicant. They are also unsure of the possibility of creating one platform of civil engineering levels for the DOTs, given the DOT differences. For example, New Hampshire does not handle water transportation, while other DOT agencies do. However, they did note that a platform could be helpful in development of levels.

4.4.5 Vermont

Recently, Vermont Agency of Transportation (AOT) switched into a "Success Factors" system to hire new employees. In this system, hiring managers create job postings driven by the job specifications provided. Further, a position that civil engineers could be hired into were recently created; a project management position. It is noted that this engineer would likely have more project management skills than other engineering levels in Vermont, given the title. It is also noted that this position was not included in the technical analysis of this research. This is important to note, as to understand that not all higher level civil engineers at this agency will have all managerial competencies. Those civil engineers with those competencies would likely be in a project management position, moving outside of the civil engineering series, but still in the profession.

Currently, civil engineering level specifications are very broad and encompasses all types of engineers. Vermont AOT is looking into if breaking up civil engineering positions into specific specializations is worth considering. For example, structural positions are different from transportation positions, and a sub-series may be helpful to allow for employees to have a focus on these specializations.

Vermont AOT also uses Korn Ferry as an interviewing tool. This tool was adopted as part of the recruitment planning process. In general, the hiring manager calls together a committee of stakeholders to participate in a "card sort" to determine which competencies are most important for the role under recruitment. A facilitator walks the group through the card sort and assists them in determining the five to ten most important competencies for that role. Finally, interview questions are then developed to assess the candidate's strengths in those areas.

As a state agency, Vermont AOT is not allowed to do things that the private sector could and are generally more limited, which comes into play when they are recruiting. However, they are looking into initiatives, such as alternate work schedules and increased work autonomy to leverage their possible candidates. Some examples of current programming initiatives at the agency are explained in the following paragraph.

Vermont AOT holds outreach programs, such as their youth outreach and employment initiative, recruitment presentations to provide an opportunity for potential candidates to network with current employees, outreach to technical centers, and their National Summer Transportation Institute (NSTI), which Vermont AOT has hosted since 2005 and hosts approximately two dozen high school students each summer. Additionally, they have assisted in planning and sponsoring conference and events, created attractive onboarding through a "New Employee Welcome"

program, and focus on emerging leaders in their training initiatives. Through these programs and initiatives, Vermont AOT has driven to leverage potential candidates.

5 RECOMMENDATIONS AND CONCLUSIONS

The quantitative analysis completed as part of this research effort identified potential competency gaps of civil engineering positions at state DOTs throughout New England. Through the comparisons of job competencies using both the BLS core competencies and AAES competency model, it can be concluded that several gaps (intentional or otherwise) in competencies exist, even in the highest-level civil engineering position at a single DOT. Further, it can also be concluded that each state DOT requires different levels of competencies between one another, as well as licensure requirements. These variances in engineering competencies show that each position is not covering the same skills and knowledge as the other; this can negatively affect some state DOTs as their civil engineering workforce may not be as skilled as another DOT's. Further, the comparison between job posting and job specification competencies show the variance of detail in each. While not every job posting needs each job competency included for the applicant to understand what is expected of them, it is important to note those that are more technical in nature, such as specific design software or work with certain tools, and/or those that may not come through during the interview process, such as writing or organization. Finally, it was found that while each DOTs hiring process varies, many are struggling with similar issues, such as competing with the private sector and lack of flexibility with the hiring process. It was found that a competency model platform would be helpful for them as they develop or change their specifications or job description process in the future.

It is recommended that each competency model created for civil engineers follow the base of the AAES model, given its reputation and the detailed competencies it includes, until a new competency base model is created for the specific profession. Each civil engineer-specific competency model for state DOT civil engineering positions should then be formed around each DOT's strategic goals and objectives. While the strategic goals and objectives between each DOT may not be the same, it is expected that they be similar, and all DOT agencies could use the same base model, even for their varying number of position levels within their civil engineering positions. Further, it is recommended that agencies develop the necessary developmental programs and guidelines that align with their business goals to verify that their civil engineering employees are able to acquire the competencies needed for the next job level before obtaining the title.

In conclusion, technology impacts job requirements and skill needs, and agencies need to ensure that these changing needs are adequately addressed for the civil engineering workforce. Currently, there is not a consensus of which competencies are necessary for civil engineering positions of varying levels across DOTs in New England, as determined by the variances and gaps in this analysis. This research sets the stage for the development of competencies for civil engineering positions at state DOTs and other agencies to create a more dynamic and sustainable transportation workforce that will excel throughout the 21st century.

The conclusions of this research are constrained by the limited amount of data studied. Three civil engineering job postings/specifications were not available for analysis from the Rhode Island DOT and one from the Maine DOT. Further, only civil engineering positions across New England state DOTs were evaluated; no DOT positions in other states were included in this analysis.

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APPENDIX

Maine Civil Engineer II Job Specification
Available at:
https://www.informe.org/cgi-bin/bhrsalary/jobs.pl?pagenum=4&pagereq=%5cActSpec%5cJobSpecs_HTM%5c6342.htm

CIVIL ENGINEER II

Engineering & Physical Sciences	6342
Engineering	EPS0018200
Civil Engineering	Range 28
Working Supervisor	1115

DESCRIPTION: This is professional civil engineering work in performing a variety of complex engineering functions relating to the planning, project development, and/or maintenance of public works structures and facilities. Employees in this class may act as a Resident Engineer on a complex (Class 3) construction project, as defined by the Department. Supervision may be exercised over subordinate technical and professional personnel performing complex tasks. Work is performed under limited supervision.

REPRESENTATIVE TASKS: *(A position may not be assigned all the duties listed, nor do the listed examples include all the duties that may be assigned).*

- Reviews all required engineering and planning criteria for a particular area in order to recommend public works projects and priorities.
- Supervises all phases of comprehensive studies and planning for public works projects in order to ensure work is completed correctly and in a timely manner.
- Establishes survey control networks and computes and adjusts traverses within those networks in order to implement and maintain survey control system.
- Analyzes alignments in order to determine feasible locations for major public works facilities.
- Designs and reviews designs of public works projects in order to ensure correctness.
- Confers with designer and contractor on construction problems arising during the progress of the work in order to recommend changes as indicated by field conditions.
- Supervises the layout and continual inspection of a complex public works project in order to ensure conformance with plans and specifications.
- Directs the development and analyses of engineering data in areas of research, planning, materials, or soils in order to gather information.
- Determines traffic control device needs throughout a geographical area in order to enhance safety and traffic management.
- Surveys, designs, and directs the erection of complex traffic control systems in order to enhance safety and traffic management.
- Standardizes state construction procedures in order to ensure orderly, complete construction project planning and implementation.
- Inspects state aid construction projects in order to ensure acceptable construction standards are used.

KNOWLEDGES, SKILLS, AND ABILITIES REQUIRED:**** *(These are required to successfully perform the work assigned).*

- Knowledge of accepted civil engineering principles and practices.
- Knowledge of state and national codes affecting the planning, design, and construction of public works projects.
- Knowledge of planning bridges, highways, or other public works facilities.
- Knowledge of investigative practices and techniques.
- Knowledge of land acquisition procedures.
- Knowledge of construction and maintenance of public works projects.
- Knowledge of drafting and/or surveying techniques.
- Knowledge of construction materials.
- Knowledge of agency standard operating procedures.
- Ability to use tact and diplomacy.
- Ability to understand and explain complex engineering projects, plans, and specifications.
- Ability to plan and supervise the work of others.
- Ability to solve problems not set in definite terms.
- Ability to use engineering instruments.

MINIMUM QUALIFICATIONS:**** *(Entry level knowledges, skills, and/or abilities may be acquired through, BUT ARE NOT LIMITED TO the following coursework/training and/or experience).*

Licensure as a Professional Engineer and two (2) years of experience in civil engineering at the professional level.

LICENSING/REGISTRATION/CERTIFICATION REQUIREMENTS:**** *(These must be met by all employees prior to attaining permanent status in this class).*

Licensure as a professional engineer as issued by the Maine State Board of Licensure for Professional Engineers.

EXAM PLAN:**** *(This must be successfully completed by all employees prior to attaining permanent status in this class).*

Direct Hire.

Maine Civil Engineer II Job Posting

Maine Department of Transportation
Direct Hire Vacancy
Civil Engineer II

Bulletin 17-66

CODE: 6342 **RANGE:** 28 ($44,387.20 - $60,299.20 annually)

Value of State-paid Health & Dental Insurance – Effective July 1, 2015

$370.98 bi-weekly: Greater than $30,000.00 or equal to $79,999.00 – 10% Employee Contribution of Premium

Value of State's share of employee's retirement: 15.3% of pay

SEARCH OPENED: June 20, 2017 **CONTACT:** Jeremiah Hutchinson

CLOSING DATE: July 3, 2017, 4:30 **TELEPHONE:** (207) 624-3058

POSITION TYPE: Permanent full-time **LOCATION:** Augusta **POSITION #:** 02500-1070

BUREAU/DIVISION: Project Development / Multimodal Program

JOB DESCRIPTION: This is technical engineering work. The incumbent in this position will be introduced to project management principles and be able to provide advanced technical engineering duties, with a focus on Railroad and Marine facilities. The person will work on capital improvement projects within the Bureau Project Development, and will also work across Bureaus with the Department of Multimodal Operations (Maintenance) and Freight Office (Planning) within the Department. The person in this position may provide supervision to other technical staff and may oversee construction activities related to Rail and Marine. The individual may also design/review projects, oversee the consultant design contracts, and prepare projects for advertise related to Rail and Marine facilities. The individual may also inspection and perform load ratings for Railroad and Marine facilities, including developing scopes of work, for repair and/or replacement of Railroad and Marine structures. Other duties outside the areas of Railroad and Marine facilities may be assigned on an as needed basis. Work is performed under limited supervision.

MINIMUM QUALIFICATIONS: Licensed as a professional engineer as issued by the Maine State Board of Registration for Professional Engineers and two (2) years of experience in civil engineering at the professional level.

SELECTION PROCESS: Applicants must submit a cover letter, current resume, a Direct Hire application and copies of post-secondary transcripts/licensing/registration and certifications, to: MaineDOT, Human Resources, Attn: Jeremiah Hutchinson, 16 State House Station, Augusta, ME 04333-0016, no later than the closing date listed above. Internal transfers (those already in the above classification for MaineDOT) who are interested in an interview may contact Jeremiah Hutchinson at 624-3058 or by email at jeremiah.k.hutchinson@maine.gov to be interviewed along with certified candidates. Applications are available by calling (207) 624-3050 and are also on the MaineDOT website: www.maine.gov/mdot.

PLEASE NOTE: AN EMPLOYEE WHO TRANSFERS TO A POSITION IN THE PRO/TECH, SUPERVISORY, OR ADMINISTRATIVE SERVICES BARGAINING UNITS OF MSEA MUST REMAIN IN THAT POSITION A MINIMUM OF SIX (6) MONTHS BEFORE HE/SHE IS ELIGIBLE TO APPLY FOR ANOTHER TRANSFER. THIS REQUIREMENT DOES NOT APPLY TO SEASONAL EMPLOYEES