

Aligning Industry Expectations and Entry-Level Job Descriptions: A Mid-Atlantic Study of Leadership Readiness in Civil Engineering Graduates

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Work-in-Progress: Aligning Industry Expectations and Entry-Level job postings: A Study of Readiness in Civil Engineering Graduates

Abstract:

This Work-in-Progress paper extends prior research examining transportation consulting firm executives' expectations for new graduate hires by exploring how those expectations are reflected in entry-level job postings within the same Mid-Atlantic labor market. The purpose of this study is to assess whether professional, communication, and leadership-related competencies emphasized by industry leaders are explicitly articulated in recruitment language used to attract early-career civil engineers.

Entry-level transportation-focused civil engineering job postings were collected during Fall 2025 from consulting firms located in New Jersey, Pennsylvania, and New York using online job boards and company websites. A qualitative thematic analysis was conducted using a coding framework informed by the ASCE Civil Engineering Body of Knowledge, ABET student outcomes, and NACE career readiness competencies. Postings were analyzed for technical requirements, professional skills, leadership-related behaviors, and licensure expectations, including references to Fundamentals of Engineering or Engineer-in-Training credentials. Findings were compared to themes previously identified in executive interviews.

Preliminary findings indicate that postings consistently emphasized technical competencies and software proficiency, and most referenced licensure readiness. Communication and teamwork appeared frequently but were framed primarily in support of task execution and coordination rather than professional judgment, initiative, or developmental leadership progression. Explicit references to early-career leadership growth were largely absent. These patterns suggest that recruitment materials may emphasize technical baseline qualifications while embedding leadership expectations implicitly within operational language.

As an initial phase of a larger research agenda, this study provides early insight into how recruitment practices shape perceptions of workforce readiness in transportation-focused civil engineering. Future phases will expand the dataset and incorporate recent graduate perspectives to examine how recruitment language influences the transition from education to professional practice.

Introduction:

Preparing civil engineering graduates for professional practice remains a persistent challenge for engineering education [1]. While undergraduate programs emphasize technical foundations and design proficiency, employers increasingly expect new graduates to demonstrate communication skills, professional judgment, and the capacity to contribute meaningfully within professional environments early in their careers [2]. Differences between academic preparation and workplace expectations have been well documented, yet questions remain regarding how those expectations are communicated to students during the transition from education to employment [3].

Recent research examining transportation consulting firm executives' perspectives on workforce readiness identified a consistent set of professional expectations for early-career engineers beyond technical competence [2], [4]. Executives emphasized communication, teamwork,

initiative, adaptability, and professional judgment as differentiating attributes that influence early-career progression [9]. These competencies were described not as formal leadership roles, but as leadership-related behaviors expressed through responsible contribution within project teams and client environments. However, executives noted that such competencies are often assumed to develop through workplace experience rather than articulated clearly during recruitment or embedded within formal curricular structures [5]. Prior research also demonstrates that readiness is cumulative, shaped by academic preparation, pre-college resources, and support systems that influence professional identity and skill development before entry into practice [10].

Entry-level job postings represent a primary mechanism through which employers communicate expectations to prospective employees. For students and recent graduates, recruitment language helps shape perceptions of which skills are valued and how readiness for professional practice is defined [6]. When postings emphasize technical qualifications while referencing broader professional competencies only implicitly, applicants may interpret technical proficiency as the primary indicator of readiness. This dynamic is particularly relevant in transportation-focused consulting environments, where early-career engineers are expected to contribute within multidisciplinary project teams serving public and private clients.

Professional expectations related to leadership may be affected by this communication dynamic. Early-career leadership in engineering often manifests through ethical responsibility, self-awareness, collaboration, and project awareness rather than formal authority. When behaviors such as initiative, accountability, and professional judgment are embedded implicitly within recruitment language, they may be valued by employers yet insufficiently signaled to applicants. Understanding how these expectations are articulated is important for aligning educational objectives, recruitment practices, and early-career development pathways.

This Work-in-Progress study examines how professional expectations articulated by transportation consulting firm executives are reflected in entry-level job postings from firms located in New Jersey, Pennsylvania, and New York. Focusing on the same regional labor market as the prior executive study strengthens coherence across phases of the research agenda.

Recruitment language is analyzed using established professional competency frameworks, including the ASCE Civil Engineering Body of Knowledge, ABET student outcomes, and NACE career readiness competencies, to identify preliminary patterns of alignment and misalignment between executive expectations and recruitment practices. Entry-level job postings are treated as an early point at which industry expectations are translated into actionable requirements for emerging transportation engineers.

This study contributes preliminary evidence regarding how executive-defined readiness expectations are translated into recruitment language within transportation-focused consulting practice. By examining this translation point, the research seeks to clarify how readiness signals are communicated at the school-to-work boundary and how greater alignment may be achieved among education, recruitment, and early-career development.

Prior Phase: Executive Perspectives on Workforce Readiness:

This paper builds on a prior qualitative study examining transportation consulting firm executives' perspectives on workforce readiness and early-career success [3], [4]. That initial phase explored how industry leaders define readiness for new graduate hires beyond technical competence and how they assess early-career engineers during the transition from academia to professional practice within transportation-focused consulting environments.

The prior study identified a consistent set of professional expectations for early-career engineers. While technical competence was viewed as a baseline requirement, executives emphasized communication, teamwork, initiative, adaptability, curiosity, and professional judgment as differentiating attributes associated with early contribution and advancement. Graduates who demonstrated ownership of tasks, effective collaboration with multidisciplinary teams, and the ability to communicate with clients were described as progressing more rapidly and contributing greater value to project delivery.

Executives characterized readiness not as formal leadership authority, but as the capacity to exercise responsible professional agency within project contexts. Readiness was reflected in behaviors such as taking ownership of work, navigating ambiguity, coordinating across disciplines, and applying sound judgment under supervision. These expectations framed early-career leadership as behavioral and developmental rather than positional.

This prior phase established a clear articulation of industry-defined professional readiness. The current phase extends this work by examining whether and how these executive expectations are reflected in entry-level job postings used to recruit early-career transportation engineers within the same regional labor market.

Methods:

Data Collection

Entry-level transportation-focused civil engineering job postings were collected from publicly available online job boards and company websites during a defined collection window at the end of the Fall 2025 academic semester. All postings were active and open at the time of collection.

The search was limited to consulting engineering firms operating in the Mid-Atlantic region, defined for this study as New Jersey, Pennsylvania, and New York. This regional focus was intentionally selected to maintain consistency with a prior qualitative study of transportation consulting firm executives conducted within the same labor market.

An initial pool of more than thirty postings was identified through systematic searches using keywords including “entry level,” “transportation engineer,” and “civil engineer 0–5 years.” Postings were screened using predefined inclusion criteria. To be included in the final dataset, postings were required to:

- Be located in New Jersey, Pennsylvania, or New York.
- Specify entry-level status or indicate zero to five years of professional experience.

- Be directly related to transportation or transportation-adjacent civil engineering work within consulting practice.

Postings were excluded if they required more than five years of experience, represented mid-level or senior roles, or focused on non-transportation specialties such as water resources, structural design unrelated to transportation infrastructure, or geotechnical practice outside transportation contexts.

After screening, fourteen postings met all inclusion criteria and were retained for analysis. The resulting dataset reflects a purposefully filtered, transportation-focused sample aligned with the scope of the prior executive study. While limited in size, the dataset is appropriate for preliminary thematic analysis within a Work-in-Progress framework.

Job postings represent recruitment language rather than comprehensive hiring or performance expectations. Professional competencies assessed through interviews, onboarding, or mentoring may not be fully articulated in written postings. Additionally, recruitment materials vary across firms in structure and level of detail.

Data Analysis

A qualitative thematic analysis approach was employed to examine how professional expectations were expressed in recruitment language [6]. All postings were reviewed systematically to extract statements related to required and preferred qualifications, technical competencies, professional skills, licensure expectations, and role responsibilities.

Coding was conducted by the author using a structured coding framework informed by established professional competency models, including the ASCE Civil Engineering Body of Knowledge (3rd edition) [7], ABET student outcomes, and NACE career readiness competencies. The primary coding approach was deductive, mapping job posting language to predefined categories derived from these frameworks. During analysis, additional descriptive subthemes were noted when recruitment language did not align cleanly with existing framework categories, allowing limited inductive refinement while maintaining overall structural consistency.

Codes were grouped into four primary categories: technical competence, professional skills, licensure-related expectations, and early-career responsibility. Frequency patterns across postings were documented to identify recurring themes and areas of emphasis. Because this study represents an exploratory phase of a larger research agenda, formal inter-rater reliability was not established; however, the structured framework and consistent application of coding categories support analytic transparency and replicability. In addition to thematic interpretation, frequency counts were calculated across postings for each competency category to provide descriptive summary statistics of recruitment-language emphasis.

Results:

The fourteen postings represented transportation-focused consulting firms across organizational scales, including seven national firms with multi-state operations, three regional firms operating within the Mid-Atlantic, and four local firms with a single primary office location. All postings

specified zero to five years of experience or explicitly identified entry-level status. Roles included design-focused transportation engineering positions as well as construction management and inspection-related roles.

Technical Competence

Technical competencies were referenced in all fourteen postings. Each posting emphasized foundational civil engineering knowledge, preparation of design calculations, development of plans and specifications, and proficiency with industry-standard software such as AutoCAD, Civil 3D, or MicroStation. Core responsibilities consistently included preparation of construction documents and support of licensed engineers.

Technical expectations were framed as baseline qualifications for entry-level practice. Emphasis was placed on adherence to standards, documentation accuracy, and compliance with established codes and manuals. References to independent decision-making or professional judgment were limited.

Licensure Expectations

Licensure-related language appeared in twelve of the fourteen postings. Seven postings explicitly stated that Engineer-in-Training designation was preferred, and one required EIT certification within twelve months of hire. Four additional postings referenced licensure or future pursuit of Professional Engineer credentials without specifying whether EIT status was required or preferred. Two postings contained no licensure-related language.

Licensure was framed primarily as an indicator of professional responsibility, credibility, and progression toward professional status rather than as evidence of leadership or professional agency.

Professional Competencies

Communication skills were referenced in thirteen of fourteen postings, and teamwork or collaboration appeared in thirteen postings. Communication expectations were commonly associated with preparing reports, coordinating with project teams, and interacting with clients under supervision. Teamwork was described in terms of collaboration within multidisciplinary teams and responsiveness to project direction.

Initiative, work ethic, or related personal attributes appeared in six postings, typically described as desirable traits rather than competencies to be intentionally developed. Explicit references to structured professional development pathways or leadership growth were absent across all postings.

Leadership-Related Framing

Although communication and collaboration were frequently referenced, leadership-related behaviors were embedded implicitly within operational language rather than articulated as developmental expectations. Early-career leadership behaviors such as ownership of work, progressive autonomy, ethical reasoning, or expanded project responsibility were not described explicitly. Instead, postings emphasized task execution under supervision, suggesting that

leadership development may be assumed rather than clearly communicated in recruitment materials.

Role-Type Differences

Design-focused roles emphasized technical production, documentation, and software proficiency, while construction management and inspection-related roles more frequently referenced coordination activities, field presence, and interaction with contractors and stakeholders. In both role types, professional competencies were framed primarily through task-based expectations rather than developmental progression or early-career leadership growth.

Table 1 summarizes the frequency with which key competency categories appeared across the fourteen entry-level transportation-focused job postings. Technical competence was referenced in all postings, reinforcing its role as a baseline qualification for entry-level practice. Communication, teamwork, and licensure pathway language were also consistently present. However, fewer postings explicitly referenced EIT status, and initiative-related traits appeared in less than half of the sample. No posting included explicit language describing leadership development, progressive autonomy, or structured early-career growth. The distribution reinforces the broader analytic pattern: technical and credential-based qualifications are clearly articulated, while leadership-related expectations are embedded implicitly within task-oriented language rather than framed as developmental components of professional readiness.

Table 1. Frequency of Competency References Across Entry-Level Transportation Job Postings (n = 14)

Competency Category	Number of Postings Referencing	Percentage (%)
Technical Competence	14	100%
Communication	13	93%
Teamwork / Collaboration	13	93%
Licensure Pathway Referenced (EIT or PE)	12	86%
EIT Preferred or Required	8	57%
Initiative / Work Ethic Traits	6	43%
Explicit Leadership Development Language	0	0%

Professional Readiness:

Professional expectations reflected in the job postings were interpreted across four leadership learning domains: ethical responsibility, self-awareness, team awareness, and project awareness [8]. These domains provide a structured lens for examining how leadership-related behaviors are embedded within recruitment language.

Ethical responsibility appeared primarily through indirect indicators such as licensure expectations, adherence to established standards, and references to regulatory compliance. Although twelve postings referenced licensure in some form, ethical reasoning or professional decision-making was not described explicitly. Ethical readiness was implied through accountability and compliance rather than articulated as a developmental expectation.

Self-awareness was reflected through language emphasizing reliability, attention to detail, responsiveness to supervision, and the ability to manage assigned tasks. These expectations suggest operational readiness and professionalism; however, explicit references to reflective growth, self-assessment, or intentional professional development were absent. Professional development pathways were not described in any of the postings.

Team awareness was more visible, with thirteen postings referencing communication and collaboration. However, teamwork was framed primarily in support roles, emphasizing coordination, responsiveness, and task execution within multidisciplinary teams. Expectations related to influencing team outcomes, facilitating dialogue, or contributing to team-level decision-making were not articulated.

Project awareness appeared through descriptions of project support responsibilities, documentation preparation, and coordination activities. Entry-level roles were consistently framed as supporting project delivery under licensed supervision. While this reflects structured professional progression, postings did not explicitly describe increasing autonomy, ownership, or expanded responsibility over time.

Across all four domains, leadership-related behaviors were embedded implicitly within task-oriented language rather than framed as developmental components of early-career readiness. This pattern reinforces the broader finding that professional and leadership readiness may be assumed by employers but not clearly communicated within entry-level recruitment materials.

Implications:

The findings highlight a difference between how professional readiness is described by transportation consulting executives and how expectations are communicated in entry-level recruitment materials. In prior work, executives characterized readiness in terms of early professional contribution, including initiative, communication, judgment, and the ability to navigate multidisciplinary project environments. In contrast, the job postings analyzed in this study articulated expectations primarily through technical tasks, software proficiency, and compliance with standards. Professional and leadership-related competencies were present but embedded implicitly within operational language rather than framed as developmental expectations.

While communication and teamwork appeared in thirteen of fourteen postings, these competencies were typically referenced in support of task execution rather than positioned as indicators of emerging professional agency. Technical competencies and licensure milestones were consistently articulated as explicit requirements. This pattern suggests that recruitment materials clearly signal what early-career engineers are expected to produce, but provide limited

clarity regarding how professional behaviors, ethical responsibility, and progressive autonomy contribute to readiness for practice.

Implications for Engineering Education

For civil engineering programs, particularly those preparing students for transportation-focused consulting practice, these findings reinforce the need to integrate leadership-related competencies intentionally within technical coursework rather than treating them as peripheral outcomes. Programs may consider embedding structured opportunities for students to demonstrate early professional agency through:

- Project-based design experiences that require students to assume defined team roles and communicate technical decisions to nontechnical stakeholders.
- Reflective assignments that prompt students to articulate ethical considerations, professional judgment, and accountability in design or construction scenarios.
- Multidisciplinary simulations that mirror coordination demands observed in transportation consulting environments.
- Explicit mapping of course-level activities to ABET outcomes, ASCE Body of Knowledge competencies, and career readiness domains so that students understand how professional behaviors align with industry expectations.

Making leadership and professional readiness expectations visible within coursework may help students recognize that early-career contribution extends beyond technical proficiency.

Implications for Employers and Industry Partnerships

For employers, the findings suggest that entry-level job postings may under-communicate expectations related to early professional growth and leadership development. Recruitment language that explicitly references progressive responsibility, mentorship structures, ethical decision-making expectations, and collaboration beyond task execution may strengthen alignment between applicant preparation and organizational needs.

More transparent articulation of early-career development pathways may also enhance university–industry partnerships. When employers communicate readiness expectations clearly, academic programs are better positioned to align curricular experiences with practice realities. In transportation consulting environments where project coordination, regulatory accountability, and multidisciplinary interaction are central, clearer recruitment language may support smoother transitions from education to practice.

These implications suggest that professional readiness is not solely a matter of curricular design or employer expectation. Strengthening that communication may improve alignment, self-selection, and early-career leadership development in transportation-focused civil engineering practice.

Limitations:

This study is intentionally limited in scope and should be interpreted accordingly. The dataset consists of fourteen entry-level, transportation-focused civil engineering job postings drawn from consulting firms within the Mid-Atlantic labor market. While the sample reflects purposeful alignment with the prior executive study and provides representation across national, regional,

and local firms, the size and regional focus limit broader generalizability to other geographic areas or civil engineering specialties.

Job postings represent recruitment language rather than comprehensive hiring, onboarding, or performance expectations. Professional competencies related to leadership, ethical reasoning, or progressive responsibility may be evaluated through interviews, mentoring, and early-career supervision but not fully articulated in written recruitment materials. Additionally, recruitment language varies across firms in structure, specificity, and level of detail, which may influence how expectations are communicated.

Coding was conducted by a single researcher using a structured framework informed by established competency models. Although this approach supports analytic transparency, formal inter-rater reliability was not established during this exploratory phase. Future phases of the research will incorporate expanded datasets and additional analytic validation procedures. Accordingly, findings should be interpreted as descriptive and exploratory, identifying emerging patterns rather than generalized conclusions about civil engineering recruitment practices more broadly.

Future Work:

Future phases of this research will expand the dataset of entry-level transportation-focused job postings to strengthen pattern identification across firm types, role categories, and geographic subregions within the Mid-Atlantic labor market. A larger sample will allow for more detailed comparison of how licensure expectations, professional competencies, and leadership-related language vary across organizational scales and position types.

Building on the recruitment-language analysis, subsequent phases will incorporate perspectives from recent civil engineering graduates working in transportation consulting to examine how job postings are interpreted during the transition from education to professional practice. Comparing graduate perceptions with executive expectations and recruitment language will provide insight into how readiness signals are received and whether implicit leadership expectations are recognized by early-career engineers.

Prior research has demonstrated that formal and informal mentoring networks influence engineering students' confidence, well-being, and professional identity development [11]. Future investigation will examine how mentoring structures and onboarding practices interact with recruitment messaging to shape early-career leadership development and professional progression.

As the broader research program advances, later phases will explore how professional and leadership-related expectations evolve across early-career stages and how targeted educational or organizational interventions may support clearer articulation of readiness expectations. These efforts aim to inform closer alignment among transportation-focused civil engineering education, recruitment practices, and early-career development pathways.

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