



IDOT HUMAN CAPITAL STRATEGIC PLAN



TABLE OF CONTENTS

Message from the Secretary

Executive Summary

Section 1: Understanding IDOT's Mission, Vision and Human Capital Challenges

Vision, Mission for IDOT

Strategic Goals as explained in Transforming Transportation for Tomorrow

Human Capital Challenges Facing IDOT

Section 2: Human Capital Environment

What is Human Capital?

Human Capital Planning & IDOT

Strategic Alignment/Existing Focus of this plan

Section 3: Internal Workforce Planning

IDOT's workforce profile

Key trends in Internal Workforce

IDOT Programs and Training

Analysis

Section 4: External Transportation & Workforce Analysis

Transportation and Warehouse Sector Overview

Transportation and Material Moving Occupations

Analysis

Section 5: Goals and Strategies

Goal 1: Integrate Human Capital Planning into IDOT Planning Process

Goal 2: Recruitment and Retention

Goal 3: Training and Education

Goal 4: Link and Leverage Public and Private Involvement

Section 6: Framework

Section 7: Looking Towards the Future/Next Steps

Appendix

Appendix A: Summary Description of IDOT's Strategic Plan Goals

Appendix B: IDOT Workforce Profile: Snapshot of Key Hiring & Turnover Metrics

Appendix C: IDOT Job Categories

Appendix D: IDOT Training and Education Programs

Appendix E: Summary of Human Capital Systems

Appendix F: Transportation Industry and Education

Endnotes

MESSAGE FROM THE SECRETARY

I am pleased to present the Illinois Department of Transportation's (IDOT) 2014 Human Capital Strategic Plan.

This plan is designed to help IDOT confront workforce challenges by developing human capital resources and advanced strategies to fulfill the departments organizational goals. The plan highlights existing and emerging issues and provides basic steps to address areas of concern. It consolidates the concepts and benefits of human capital management through an internal analysis of IDOT's workforce assets, and considers an external assessment of the transportation industry's workforce, thereby painting a clear picture of the changes that we, as an agency and the industry as a whole face.

Although IDOT has made great strides in meeting the transportation and infrastructure needs of Illinois in its economy, a number of unique challenges still face the agency and the broader transportation industry.

IDOT faces a growing number of challenges and opportunities with regard to internal workforce development. With limited government resources and increased competition for skills within the transportation industry it is essential that we keep pace with emerging trends, increasingly complex technologies to enhance the focus on multi-modal transportation. From an internal perspective the benefits of this plan 1) allow for a more effective and efficient use of resources; 2) Provide a clear rationale for linking experience for training and retraining development; 3) Guide IDOT in attracting and developing new and diverse staff; and, 4) encourage the development and retention of valuable and relevant skills.

The external analysis of the Illinois transportation industry identified emerging trends in the sector, highlights the need to use data effectively, and identified the need to comprehensively assess the transportation workforce to ensure mission critical vacancies filled, are based on needs, trends and forecasts.

In order to effectively realize the agency's mission this plan outlines several issues. It links IDOT's mission and vision with its workforce and aligns it with how we do business. The plan seeks to coordinate efforts to implement strategic and comprehensive approaches to workforce and talent management. Just as important is the ability to coordinate efforts with external partners to develop an integrated framework to plan and implement new solutions.

I look forward to implementing the recommendations of this plan to ensure that Illinois continues its rich history as a pillar of a vibrant and successful transportation industry in America.

Thank you,

A handwritten signature in black ink, appearing to read "Ann L. Schneider". The signature is fluid and cursive, with a large initial "A".

Ann L. Schneider, Secretary

EXECUTIVE SUMMARY

Today's transportation industry is immersed in an environment forged by global competition, knowledge-based economies, workforce mobility, and the acceleration of emerging technologies. To drive competition and expand economic growth, the transportation industry relies on Illinois' immense transportation infrastructure network and a well-educated and innovative workforce. Maintaining, expanding, and integrating Illinois' transportation network is at the root of IDOT's mission and requires a long-term human capital strategy to recruit and develop a new and diverse workforce while retaining its highly-skilled and experienced employees.

The vision of the human capital plan is to ensure that IDOT workforce and the transportation industry have the skills and competencies needed to excel and managers have the information and resources they need to foster excellence. IDOT is committed to attracting, developing and retaining a highly motivated, diverse and talented workforce using innovative human capital policies and programs.

IDOT's Human Capital Strategic Plan draws from the department's vision and strategic framework for transportation planning in Illinois – Transforming Transportation for Tomorrow – The vision is designed to ensure that Illinois is prepared to meet the changing needs of the industry and the community. This plan identifies the need for IDOT to move beyond outdated paradigms of human resources and address human capital and talent management challenges. It provides an overview of human capital management and describes how this system can be integrated into IDOT's annual planning process. It then provides an internal and external workforce analysis of the transportation sector highlighting gaps, growth potential, and needs for the future. This is followed by a gap and SWOT analysis relevant to IDOT's workforce-planning opportunities provided by IDOT senior administrators. Based on this input, the resulting goals emerged:

- Use proven human capital strategies and programs to recruit and retain a diverse and highly skilled workforce.
- Maintain a competent and effective workforce through a targeted education, training, and employee development.
- Coordinate with educational institutions, industry, organized labor, workforce boards, and other agencies/organizations to address human capital transportation needs in the transportation industry.

This plan provides a framework to implement a human capital plan for IDOT. Internally, IDOT will review its talent management procedures by developing skills and abilities assessments, tapping internal talent, and reviewing job descriptions to comply with IDOT's mission and vision of multi-modal transportation. Additionally, they will develop pathways for upward mobility within the agency. Externally, IDOT seeks to take a leadership role in linking, facilitating and leveraging its assets with public institutions and private sector companies to ensure that Illinois' transportation sector remains competitive in terms of its workforce and technological innovation.

Each goal has a set of specific strategies and metrics to monitor and evaluate progress towards achievement. These measurements will serve to inform IDOT staff and guide the development of a human capital accountability system.

SECTION 1

Understanding IDOT's Mission, Vision and Human Capital Challenges

Illinois enjoys an extensive network of transportation infrastructure assets; this includes 80 public-owned airports; the second largest rail freight system in the nation operating on 7,400 miles of track; the fourth largest roadway network in the nation with 145,342 miles of highways, streets, and roads; and more than 26,500 bridges. There are at least twelve companies that provide intercity bus service in Illinois, and Amtrak provides inter-city rail service. A total of 62 public transit providers offer service in urban and rural communities across the state. Illinois also has 1,095 miles of navigable waterways that pass through or border the state and enjoys hundreds of miles of bicycle and pedestrian paths. Transportation touches everyone's lives and is vital to the well-being of the citizens and economy in the State of Illinois.

Mission

To provide safe, cost-effective transportation for Illinois in ways that enhance quality of life, promote economic prosperity, and demonstrate respect for the environment.

Vision

That all modes of transportation are integrated, coordinated, planned, and built with the idea that present and future travel options are user focused, economically supportive, ecologically sensitive, and information centric.¹

Illinois State Transportation Plan: Transforming Transportation for Tomorrow

IDOT's mission and vision in Transforming Transportation for Tomorrow embraces a planning and programming approach that ensures the continued effectiveness and efficiency of transportation investments and opportunities. It embodies the vision for transportation in Illinois that all modes be integrated, coordinated, planned, and built with the idea that present and future travel options are user focused, economically supportive, ecologically sensitive, and information centric. The plan provides a framework with policies and goals to guide the implementation of annual and multi-year project programs. The policies and strategic goals identified include:

- Improve Transportation Safety
- Improve Connectivity, Mobility, Accessibility
- Provide for Efficient Freight Movement
- Integrate Human Capital
- Preserve Existing System
- Address Congestion
- Follow a Comprehensive Planning Process
- Promote Stable Funding
- Support Economic Development
- Consider environmental compatibility of the transportation systems
- Provide a Secure Transportation Infrastructure

Recognizing the growing demand for skills in the field, the opportunities for innovation, and the threats to maintaining an efficient and effective workforce the long range plan specifically identifies policy that will integrate human capital into department planning, programs, and policies. Four action items have been identified to implement the policy recommendation²:

1. Develop a workforce planning strategy that identifies current and future human capital needs, including the knowledge, skills, and abilities needed to recruit and retain skilled workers in the transportation industry.
2. Maintain a competent and effective workforce through targeted education, training, and employee development.
3. Integrate human capital planning with IDOT's annual planning process.
4. Support the Highway Construction Careers Training Program (HCCTP). Measure results and work with the industry and labor to fine tune the program to make graduates even more competitive.

SECTION 1

Understanding IDOT's Mission, Vision and Human Capital Challenges

Human Capital/Workforce Challenges Facing IDOT

Implementing the State's Long Range Transportation Plan has had an impact on IDOT's workforce policies and practices. Human capital policy and practice needs to be designed and implemented to support IDOT's mission which is to provide safe, cost-effective transportation for Illinois in ways that enhance quality of life, promote economic prosperity, and demonstrate respect for the environment. Transportation has a profound impact on the state's economic competitiveness. The increased demand for multi-modal transportation system increases the demand for a trained and educated workforce. As of May 2013, the Bureau of Labor Statistics estimated that Illinois' transportation and logistics (T&L) industries employed over 440,000 people and is forecasted to grow 23 percent by 2040.³

IDOT needs to and must retain a leading edge in hiring and training its employees to fulfill its mission. The department in general needs to be alert and aggressive in adapting and incorporating the rapid innovations and changes in the transportation sector. Internally, IDOT has identified the following challenges;

- Attrition through retirement
- Expanding its service model to incorporate multi-modal specialties
- Competition for top talent
- Striving for a dynamic and diverse workforce

Retirement

According to IDOT's Bureau of Personnel. Based upon the ages and years-of-service of all IDOT employees, approximately 2,000 employees will be eligible for retirement in 2015. Of these employees, over 900 are eligible to retire during fiscal year 2014. Meeting the potential challenge of replacing these employees with a well-educated, diverse workforce is a significant challenge.

Competition for Top Talent

IDOT is constantly working to recruit and retain trained transportation professionals. There is direct competition with private companies and other public agencies that seek to hire top experts in fields such as logistics, engineering, information technology and urban planning. Recruitment and selection of top candidates could be made efficient and effective through a seamless, well planned process.

Expanding Service Model

As a multimodal transportation system/agency. Illinois has one of the most diverse systems in the nation. Passengers and commodities have a variety of travel options to arrive at their destination. Modal decisions are driven by cost, speed of travel, and sustainability, among others. Local governments and companies are increasingly seeking to implement alternative modes of transportation in their community and business plan. These decisions factor in land-use, economic analysis, safety, and numerous other considerations in planning. As a result, IDOT has experienced tremendous workload growth that often outpaces workforce experience. Transportation planning is not exclusive to traditional specializations but rather embraces urban/rural planning, economic development, chemistry, cartography, information technology, environmental planning, etc.

A Dynamic Workforce

IDOT requires a highly-trained and diverse workforce to implement its annual plans and programs while meeting the needs of communities and clients. As IDOT works to reorient its workforce structure to reflect its multi-modal nature it also seeks to engage a population that reflects the diversity of the State of Illinois. Private sector companies have started to partner with educational institutions, community organizations to engage and hire a diverse workforce. Similar tactics can help advance agency training efforts and business collaborations, linking and leveraging educational institutions and private sector insight to develop curriculum that reflects the diverse workforce needs and emerging trends in the sector.

SECTION 2

Human Capital Environment

This section provides a broad overview of human capital management demonstrating how IDOT can begin to incorporate it into the annual planning process as prescribed in Transforming Transportation for Tomorrow.

Human Capital Management

Human capital management is a strategically focused process designed to produce a world-class workforce. The Federal Office of Personnel Management (OPM) developed the Human Capital Assessment and Accountability Framework (HCAAF). This model supports an ongoing process of human capital management governed by a set of five strategic systems.⁴ Each system comprises a set of standards/goals to be achieved and a series of metrics agencies should use in order to achieve them.

HCAAF SYSTEMS AND DEFINITIONS⁵

Strategic Alignment & Workforce Planning	A planning and goal-setting system focused on having a human capital management strategy that is aligned with mission, goals, and or ganizational objectives.
Leadership & Knowledge Management	An implementation system focused on identifying and addressing agency leadership competencies so that continuity of leadership is ensured, knowledge is shared across the organization and an environment of continuous learning is present.
Results-Oriented Performance Culture	An implementation system focused on having a diverse, results-oriented, high-performing workforce, as well as a performance management system that effectively plans, monitors, develops, rates, and rewards employee performance.
Talent Management	An implementation system that addresses competency gaps, particularly in mission-critical occupations, by implementing and maintaining programs to attract, acquire, promote, and retain quality talent.
Accountability	A system for evaluating results and provides consistent means to monitor and analyze agency performance on all aspects of human capital management policies, programs and activities, which must themselves support mission accomplishment.

These five distinct systems are interrelated and, when properly implemented, serve to produce a world class workforce that is 1) effective in achieving agency mission results, 2) delivers the highest quality products and services, and 3) quickly adapts to changing environments.⁶

SECTION 2

Human Capital Environment

Human Capital Planning and IDOT

The federal government embraces HCAAF in order to advance organization performance, mindful of the implications of human capital planning and workforce development that will result. In this pursuit, IDOT is committed to ensuring that the department's human capital plan reflects the principles and policies of assessment, accountability and performance used by federal agencies to better reflect IDOT's diverse, results-oriented, and adaptable workforce.

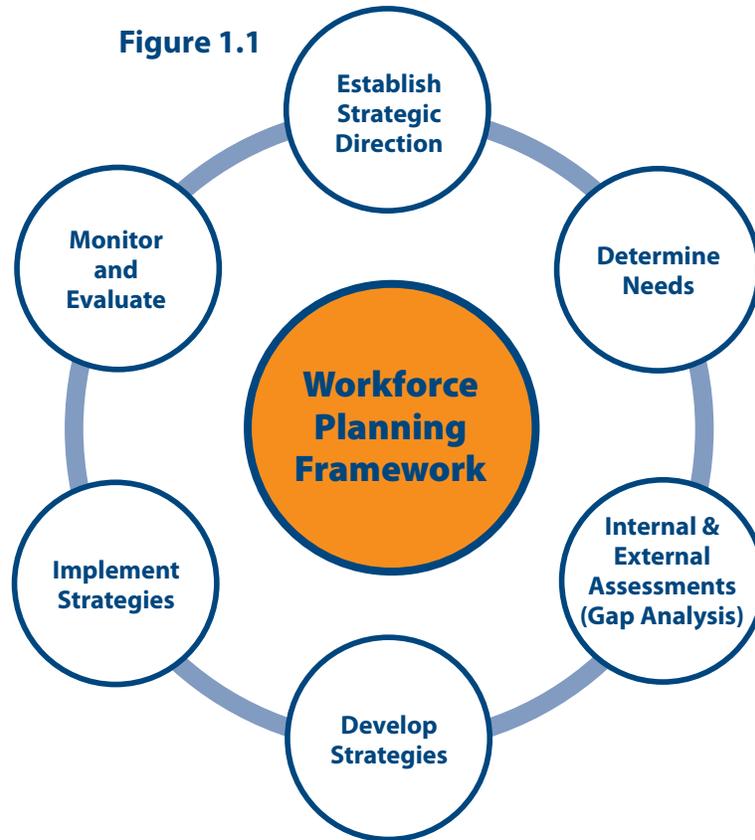
A human capital strategic plan will draw from IDOT's vision and strategic framework for transportation and will be utilized to move beyond the current limitations of workforce planning; address human capital and talent management challenges by laying out appropriate strategies and metrics to measure achievement to the changing needs of the transportation workforce.

This plan takes a closer look at: 1) workforce planning in IDOT, 2) conducts an external workforce trend analysis of the transportation and logistics sector, and 3) lays out a series of workforce strategies linked directly to the action items identified in the long range transportation plan. All strategies align to:

- Integrate human capital planning with IDOT's annual planning process.
- Develop a workforce planning strategy that identifies current and future human capital needs, including the knowledge, skills, and abilities needed to recruit and retain workforce in the transportation industry.
- Maintain a competent and effective workforce through targeted education, training, and employee development.
- Link and leverage private and public sector partners to retain, recruit, and enhance the workforce of the transportation sector in Illinois.

SECTION 3

Workforce Planning



In order for IDOT to achieve successful strategic alignment of the human capital plan to the department's mission, goals, and organizational objectives there are critical success factors that are needed to achieve success. A workforce planning framework is one of those factors. IDOT must have an understanding of the department's workforce and the trends affecting it. It is important to have a systematic process to analyze the workforce and effectively identify corresponding changes; or new trends emerging in the transportation industry that require attention.

An effective model for this analysis follows (Figure 1.1). This is an adaptation of the U.S. Office of Personnel Management's model for workforce planning with some variation to meet the strategic initiatives of IDOT's goals in six steps. This plan followed this framework as part of its internal analysis and the following aspects were addressed:

- 1) Establish strategic direction; the Transforming Transportation for Tomorrow vision accomplishes this and links with workforce planning.
- 2) Determine needs through assessment of the current workforce of IDOT. This will better understand what gaps exist and what skills, knowledge, and ability IDOT will need to accomplish the vision.
- 3) Provide an internal assessment vis-à-vis an assessment of the department's strengths, weaknesses, opportunities and threats (SWOT analysis) to identify gaps and the skills, knowledge, and abilities IDOT requires to accomplish its mission.
- 4) Develop strategies through this process.
- 5) Implementation of strategies by department.
- 6) Monitor and evaluate success to assure achievement.

SECTION 3 Workforce Planning

IDOT Workforce Profile

IDOT's human capital policies and practices should be designed and implemented to support the agency's mission:

" Providing safe, cost-effective transportation for Illinois in ways that enhance quality of life, promote economic prosperity, and demonstrate respect for the environment."

Similar to other government agencies in Illinois, IDOT is facing numerous workforce challenges. As of December 31, 2013, the department's headcount is approximately 5,210, down from a high of nearly 6,968 in 2002. Due to retirement or attrition, IDOT anticipates losing nearly 2,000 employees over the next two years. However, the demand for IDOT services has not decreased and this anticipated loss of current employees is a major challenge for IDOT in staying on track to achieve its mission. The analysis below reviews current internal employment of IDOT staff and provides a brief assessment of future targets and needs with a look at the department's retirement expectations and diversity goals.

Workforce Demographics		
Headcount		5,210
Male	4,183	80%
Female	1,027	20%
Black	560	11%
Hispanic	213	4%
Asian	118	2%
American Indian/ Alaska Native	13	0%
Caucasian	4,302	83%
Average Age		48
Average Years of Service		13.6
# Eligible for Retirement 2014	1,072	20%
Average Salary		\$70,656

Source: IDOT Bureau of Personnel Management

IDOT Employment Summary

IDOT employs a diverse set of professionals. At the end of 2013, IDOT had 5,210 employees on board, in more than 125 job titles. IDOT employs Civil Engineers, Engineering Technicians, Highway Maintainers, Technical Managers and other staff. Engineering Technicians encompass a series of specialties including chemistry, cartography, information systems analysts, and line technicians. Technical Managers and Other positions span entry level to top management and include advisors, realty specialists, project managers, urban planners, and accountants. Again, this demonstrates the diverse skill set required to meet today's transportation planning demands. Additional workforce data can be found in the Appendix.

Projected Retirement	
2014	2015
1,072	1,273

IDOT understands it is essential to have a workforce that is representative of Illinois and strives to ensure that the strategies it deploys are designed to enable a diverse workforce. Diversity is one of IDOT's guiding principles. To date, female employees represent about 20 percent of the workforce and non-Caucasian employees comprise over 17.5 percent.

More than 40 percent of IDOT's employees are classified as Civil Engineers (1,104) or Engineering Technicians (993). Approximately a third of IDOT's employees are Highway Maintainers (1,647). Technical Managers (762), which includes urban planners, accountants, and communication specialists, and Other job titles (704), which include lawyers, executive staff, and administrators make up nearly one third of the workforce.

SECTION 3

Workforce Planning

According to IDOT data, 179 IDOT employees retired in 2013. The projections show that 20 percent of employees will be eligible for retirement in 2014 and 24 percent in 2015 assuming employment levels stay constant. Although employees can work beyond their retirement eligibility date, a recruitment priority was identified for the four occupational categories. This helps identify short term opportunities to target recruitment and initiate internal succession planning efforts. Strategies will be presented later in this document.

IDOT Programs and Training

IDOT provides a variety of programs and trainings to improve outreach and recruitment to diversify the agency's workforce. These efforts leverage partnerships and communications with a variety of state agencies, veteran organizations and educational institutions. They enhance student awareness from kindergarten to college, expand outreach outlets to capture a wider audience, and focus on employee training to represent and promote IDOT at job fairs and events⁷.

Outreach programs are designed to create awareness of transportation industry careers and encourage partnerships with educational institutions and transportation-related entities across Illinois. The outreach programs IDOT provides include:

- Engineering Technician Training Program
- Civil Engineer Trainee's Program
- Civil Engineer Scholarship Program
- Engineering Academy Program
- Highway Construction Career Training Program
- IDOT sponsored Transportation Construction Apprentice Readiness Training
- Summer Transportation Institute
- Veteran Outreach Program
- Job Shadow Program
- Annual IDOT Career Day

IDOT incorporates a variety of retention strategies to increase skills and knowledge of current staff to increase mobility and expertise. The programs include:

- The Accelerated Leadership Proficiency Series (ALPS)
- The Executive Leadership Development Series (ELDS)
- Supervisor Training and Readiness Series (STARS)
- The Professional Advancement of Career Engineers (PACE)
- Ad-hoc classes throughout the year including GATE (Growth and Training of Employees and STOR (Special Training on Request)
- Rotational programs that enable engineers to gain experience to take the PE exam
- Pay increase for obtaining professional certification
- Tuition reimbursement program

SECTION 3

Workforce Planning

IDOT and Business Opportunities

IDOT is committed to maintaining the state's transportation infrastructure through a partnership with construction and consulting firms. IDOT is also committed to providing an array of services to assist Illinois businesses succeed in pursuing transportation-related construction and consulting opportunities. IDOT continually strives to ensure that contracts are awarded to qualified businesses and recognizes the importance of maximizing contract participation opportunities for socially and/or economically disadvantaged business owners throughout the state. These programs include:

- Disadvantaged Business Enterprise (DBE) Certification - A federally mandated program that provides minorities, women and other eligible small businesses an opportunity to participate in highway, transit and airport contracts that are federal and state funded.
- Construction/Consultant Prequalification - A rating process established by IDOT which requires prospective bidders (firms) to obtain a certificate of eligibility prior to being considered for issuance of bidding proposal forms and plans for contracts awarded by IDOT.
- Mentor/Protégé Program - A two year partnership in which a prime contractor (mentor) agrees to work with a protégé (DBE) to provide work experience and/or address matters necessary to enhance the protégé business' success.
- DBE Revolving Loan and Grant Program - Make low-interest loans to disadvantaged business enterprises (DBEs) certified by the Illinois Uniform Certification Program (IDOT, METRA, PACE, CTA, and City of Chicago) for participation on department-procured construction and construction-related contracts.

These programs are committed to providing diversity in the transportation workforce. It also provides IDOT a tremendous opportunity to collaborate with private industry to enhance workforce opportunities both internally and externally.

Gap Analysis

IDOT administrators identified several human capital issues that may hinder the efficiency and effectiveness of the agency's actions. They include:

- No internal process to identify skills and abilities to enable staff to identify untapped talent and to match skills with emerging trends in the industry.
- Most job descriptions and job categories do not complement the multi-modal vision of the department or address emerging trends and opportunities.
- Lack of internal or external communication about career service opportunities.
- A need for a more focused recruitment process that spans across other IDOT occupations.
- Need to improve upward mobility for interns and new employees.
- Need to implement a robust Highway Construction Careers Training Program.
- Enhance partnerships with unions to offer training and course to advance skills.

SECTION 3

Workforce Planning

IDOT's construction and procurement process creates indirect job opportunities that may have a significant impact on statewide human capital resources. Several human capital concerns regarding diversity of the workforce were raised:

- DBE process in general is not aligned with emerging needs and opportunities – encourage more minority prime and subcontractors.
- Poor external collaboration with minority stakeholders, gap in advocacy for DBE/minority contractors.
- No direct alignment with emergency contracts to encourage involvement for potential minority contractors.
- Need to create more subcontracting opportunities in land acquisition matters.
- No strategic framework in place for minorities in rail, aviation and waterway transportation contracts.
- Waiver system needs to be monitored and revised.
- Data monitoring and reporting needs to be improved.
- More strategic compliance standards should be developed on procedure/systems in IDOT.
- Poor/lack of strong working relationships with district engineers, EEO's.

This analysis suggests that IDOT has and will face gaps and imbalances in the skills and talent required of the department to carry out the multi-modal vision. From a retention standpoint, the anticipated retirements within the IDOT workforce are likely to create deficits in critical professional expertise including civil engineering, finance, economics, statisticians, data analysts planning, chemistry, etc. From a recruitment standpoint, the department will compete with private sector firms to hire top level professionals and students in these fields as their expertise will be in demand. IDOT's training and educational programs present an opportunity to capitalize on recruitment and retention efforts. Since the landscape of curriculum and sector needs change quickly, IDOT programs and processes could benefit from streamlining and aligning diversity and training goals with emerging trends and opportunities as efficiently as the private sector.

In an effort to synthesize the internal workforce data with the input from IDOT administrators and management a SWOT analysis was compiled. SWOT is an acronym for an analysis of Strengths (S), Weaknesses (W), Opportunities (O), and Threats (T). A SWOT analysis is a powerful tool for audits and analysis of the strategic position of a business and the environment in which it operates. The objective is to find strategies that align with the organization's resources, capabilities, and goals through analysis of the internal strengths and weaknesses and the potential/likely opportunities and threats from the external environment, outside the control of the organization. The relevance to IDOT looks like this:

- **Strengths:** Internal factors that benefit IDOT's objectives
- **Weaknesses:** Internal factors that pose challenges to IDOT's objectives
- **Opportunities:** External factors benefit IDOT's objectives
- **Threats:** External factors that negatively impact IDOT's objectives

SECTION 3

Workforce Planning

Based on the internal workforce analysis and gaps identified the following SWOT analysis was developed:

Strengths

- Strong leadership
- Multi-modal vision
- Long-range transportation plan
- Diversity outreach and recruitment plan

Opportunities

- Emerging job trends
- Diversity of staff
- Leadership skills
- New university modules
- Innovation and new technology in transportation sector.
- Support and involvement of the private sector

Weaknesses

- Gaps in education training
- Poor internal and external communications
- Challenges with upward mobility
- Retirement of tenured leadership
- Disconnect between hiring process and department's talent and skill set needs

Threats

- Declining educational standards
- Loss of skilled workforce
- Outdated and ineffective approaches to talent management
- A supply-demand dilemma

The SWOT analysis helps identify potential strategies that can be formulated to close gaps, develop plans to implement the strategies, and measures for assessing strategic progress. Potential strategies include enhancing training and education opportunities and developing partnerships with public institutions and the private sector for cross-collaboration and retention strategies. After the external analysis of the Transportation and Logistics industry is completed (see next section) the report will discuss specific workforce planning strategies and opportunities for strategic alignment to implement a human capital management plan.

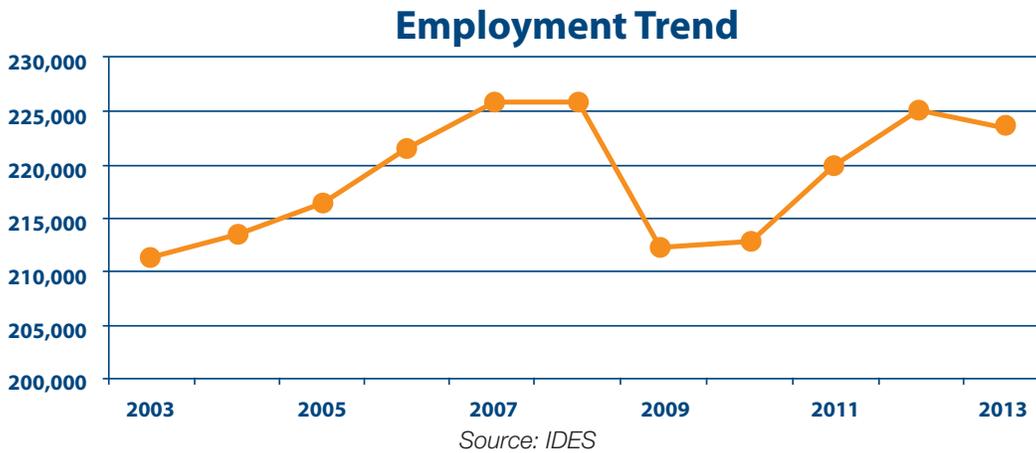
SECTION 4

External Transportation & Workforce Analysis

This section analyzes the composition of the Transportation and Logistics industry and its related occupations in the state of Illinois. This external analysis identifies trends in employment growth, demographic make-up, and the educational and workforce needs of the sector. This analysis provides IDOT with insight and creates an opportunity to develop strategies that enable IDOT to: 1) coordinate and partner with educational institutions, industry, organized labor, workforce boards, and other agencies/organizations to address human capital transportation needs⁸ 2) Target education, training, and workforce development.

According to Illinois at Work, a publication of the Illinois Department of Employment Security (IDES).

Transportation and Logistics			
	Employment	Percent Industrial Base	Establishments
Transportation and Logistics	228,601	3.98%	15,942



The largest share of employment in this multi-modal sector in Illinois is within Truck Transportation (68, 570), Warehouse/Storage (44, 663) and Air Transportation (33, 874), followed by Support Activities (33, 379).⁹ The national average wage for the industry is \$46,612 and Illinois offers slightly above that average annual wage at \$47,807.

Percent Employment		2013 Average Wages	
Air	14.83%	Air	\$73,087
Rail	0.02%	Rail	\$57,702
Water	0.87%	Water	\$59,620
Truck	30.02%	Truck	\$45,851
Transit	11.82%	Transit	\$22,818
Pipeline	0.49%	Pipeline	\$101,529
Scenic	0.54%	Scenic	\$34,849
Support	14.60%	Support	\$51,402
Postal	0.03%	Postal	\$27,910
Couriers	7.21%	Couriers	\$38,897
Warehouse	19.55%	Warehouse	\$44,381

Source: IDES

Over seventy percent of the workforce is male compared to 29.3 percent that is female. Nearly a quarter of the workforce comes from a racial background other than Caucasian.

SECTION 4

External Transportation & Workforce Analysis

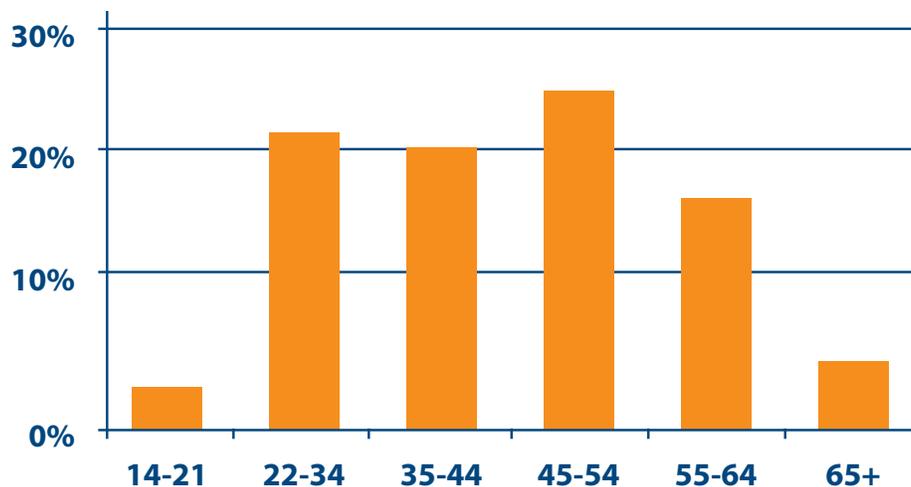
Employment by Race	
Native Hawaiian or Other Pacific Islander Alone	0.15%
American Indian or Alaska Native Alone	0.49%
Two or More Race Groups	1.10%
Asian Alone	3.46%
Black or African American Alone	18.75%
White Alone	76.05%

Male	Female
70.56%	29.44%

Source: US Census, LEHD

The sector has a fairly even distribution of its workforce between the ages of 22-44. There is a high proportion of the workforce between the ages of 45-54 and over 15 percent are within retirement range. This represents a harbinger of challenges. As the workforce ages important questions arise in terms of succession planning for positions requiring high levels of knowledge and skill, continuing education, upward mobility for mid-career professionals, and advanced education for employees coming into the field.

Percent of Workforce by Age



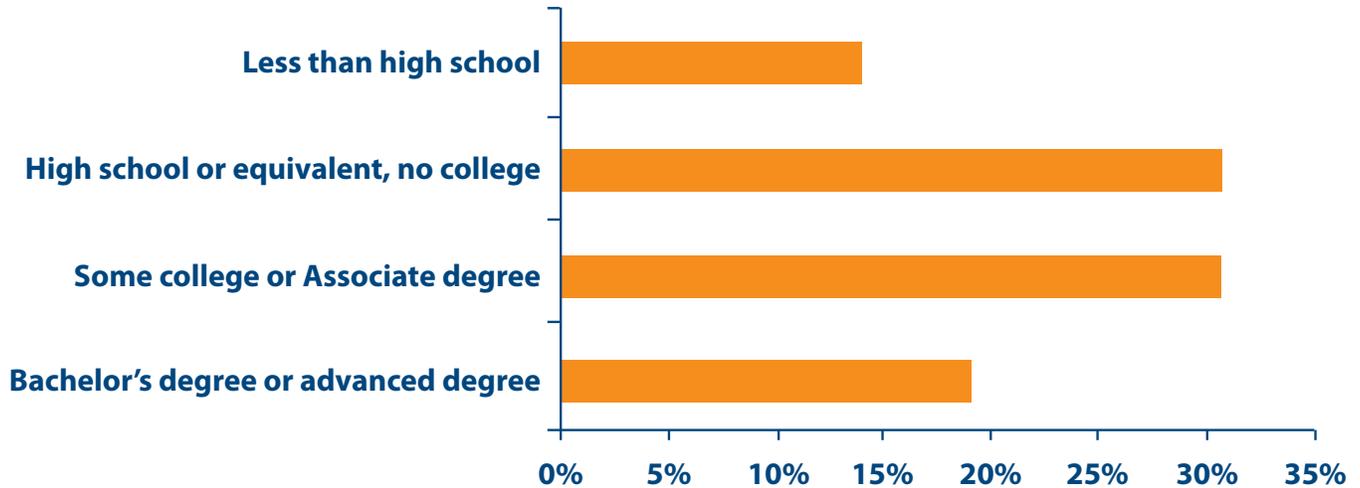
Source: US Census, LEHD

In terms of the educational levels of current employees, the trend leans towards a workforce with a high school degree (or equivalent) and some college or an Associate's degree. About twenty percent of the workforce has a bachelor's or advanced degree. This helps focus the discussion on education requirements and needs, especially when formulating and incorporating training on new technology and innovation.

SECTION 4

External Transportation & Workforce Analysis

Education Level of Workforce



Source: US Census, LEHD

The industry analysis provides keen insight on the overall demographics and growth of industries within the sector. Another component to workforce analysis is the occupational employment and wages. Whereas a sector analysis looks at companies engaged exclusively in transportation and warehousing (i.e. a trucking company, a 3PL third party logistics company), occupational statistics takes into considerations companies that likely employ personnel in transportation and logistics as part of their overall employment make-up (i.e. a global manufacturing company owns and operates their own trucking company and warehouses across the country). As a result occupational employment can provide a better sense of the people in transportation occupations and how multi-modal transportation is involved in most every facet of the economy.

According to estimates from the Bureau of Labor there are over 440,000 employed in transportation and logistics occupations. The Average annual wage is \$34,520, while, depending on experience, education, and seniority the annual wage can range from the \$18,490 to the 90th percentile, which is just shy of \$60,000. Half of the occupations in Illinois involve Material Moving (51.42 percent) while the second largest component is Motor Vehicle Operators (35.7 percent) (i.e. Light and Heavy Truck Drivers, Bus and Transit/Intercity Drivers) with Air Transportation Workers (3.75 percent), Supervisors of Transportation Workers (3.36 percent) and Other Transportation Workers (3.54 percent) evenly split across the workforce.

Average Annual Wage

Employment	25th Percentile	Mean Wage	75th Percentile	90th Percentile
458,260	\$20,890	\$34,730	\$41,870	\$59,290

Source: Bureau of Labor Statistics, OES

SECTION 4

External Transportation & Workforce Analysis

Occupational Profile

- **Highest Levels of Employment** – predominantly in the Material Moving and Motor Vehicle Operations – again showing the volume of truck transportation in the state.

Occupation	Employment	Hourly Mean Wage	Average Mean Wage
Laborers and Freight, Stock, and Material Movers, Hand	142,170	\$12.83	\$26,680
Heavy and Tractor-Trailer Truck Drivers	66,050	\$21.66	\$45,040
Packers and Packagers, Hand	47,600	\$11.31	\$23,520
Light Truck or Delivery Services Drivers	38,340	\$17.47	\$36,340
Industrial Truck and Tractor Operators	28,370	\$15.23	\$31,670

Source: Bureau of Labor Statistics, OES

- **Highest Levels of Concentration** – based on the Location Quotient, meaning these occupations are more heavily concentrated in the state compared to the rest of the United States. It is noticeable that the top three occupations involve Rail, general transportation workers and attendants for both ground and air.

Occupation	Employment	Location Quotient	Hourly Mean Wage	Average Mean Wage
Rail Transportation Workers, All Other	870	5.67	\$31.62	\$65,760
Transportation Workers, All Other	5,120	2.95	\$18.70	\$38,900
Transportation Attendants, Except Flight Attendants	2,360	2.58	\$12.40	\$25,790
Flight Attendants	9,560	2.38	n/a	\$40,280
Airline Pilots, Copilots, and Flight Engineers	6,300	2.01	n/a	\$119,160

Source: Bureau of Labor Statistics, OES

SECTION 4

External Transportation & Workforce Analysis

- **Top Paying** – based on median annual wage, they are predominantly concentrated in the Air Transportation and Rail Transportation field.

Occupation	Employment	Hourly Mean	Average Mean Wage
Air Traffic Controllers	940	\$65.80	\$136,870
Airline Pilots, Copilots, and Flight Engineers	6,300	n/a	\$119,160
Hoist and Winch Operators	280	\$38.14	\$79,330
Commercial Pilots	550	n/a	\$83,740
Transportation Inspectors	1,240	\$33.69	\$70,080

Source: Bureau of Labor Statistics, OES

Occupational Employment in Transportation and Warehousing is projected to increase over the next seven years by 8 percent, according to projections by the Illinois Department of Employment Security, and as noted above, this sector has already seen a rather robust recovery over the last three years. Naturally, some occupations will decrease and others will increase due to the changing dynamics of the economy. One factor is average annual job openings due to expansion of the industry and replacement of the workforce due to workers leaving the labor force because of situations like retirement. Finally, the annual average compound growth reflects a steady rate of growth for which an occupation would grow from one year to the next.

Occupation	2010	2020	Percent Change	Average Annual Job Openings due to Growth	Replacement	Compound Growth
Total: Transportation Occupations	438,607	475,044	8.31%	3,819	11,290	0.8
Supervisors, Trans/ Material Moving	14,758	17,225	16.72%	247	304	1.56
Air Transportation Workers	16,277	16,139	-0.85%	26	458	-0.09
Motor Vehicle Operators	161,816	177,810	9.88%	1,599	3,141	0.95
Rail Transportation Workers	9,477	8,545	-9.83%	4	312	-1.03
Water Transportation Workers	2,400	2,866	19.42%	47	97	1.79
Other Transportation	16,874	17,798	5.48%	97	469	0.53
Material Moving	217,005	234,661	8.14%	1,798	6,509	0.79

Source: IDES, Occupational Projections

SECTION 4

External Transportation & Workforce Analysis

It is noteworthy to point out that the job openings projected due to replacement are significantly larger than the growth due to expansion of the industry and is true not only for this occupational sector in general but is the case for the sub-categories as well. This means that employers will have to focus on a variety of pivotal strategies to maintain a competitive workforce including succession planning, training and promotion from within.

- Motor vehicle operators (i.e. truck drivers, delivery services) and material moving workers are employment areas where there will be a large volume of replacement/attrition as well as growth.
- Air and Rail occupations are not projected to grow but will still have to replace existing employees, and they will see some fractional growth that will require some attention so they can remain competitive in what might become a more lean and efficient industry sector.

These projections are useful for analyzing labor demand and career options. With insight on where job growth and decline is projected the data can further assess the Knowledge, Skills, and Ability (KSA) required properly training and educating the future workforce. This will allow business, educational institutions, and IDOT to plan for the future needs of the workforce.

External Workforce Efforts

Since early 2000, the transportation and logistics industry has been a focal point for education and training purposes due in large part to its accelerated growth during that time. Over the last decade and a half, both public and private industry have invested energy and funding to ensure the workforce has the skills, knowledge, and ability to obtain employment in careers that are growing, offer successful advancement, and put their education to good use.

The State of Illinois through the Illinois State Board of Education has been investing in promoting and implementing the National Career Cluster program. This program promotes 16 Career Clusters and related Career Pathways. Through a unified program of study focused on certain pathways students explore different career options, better prepare for college and a career. The career cluster on Transportation and Logistics emphasizes “the planning, management, and movement of people, materials, and products by road, air, rail and water.”¹⁰ It includes the professional services, logistics, and maintenance aspect of the industry.

Each pathway provides various levels that introduce the knowledge, skills, and abilities required for careers in each cluster throughout their education including programs of study and courses required to obtain certificates and degrees in the career field.

A new initiative recently launched is Illinois Pathways Initiative. This program, a state of Illinois-led STEM education initiative, is designed to support college and career readiness for all students. A key component of this new initiative is the STEM Learning Exchanges. They have been formed for select career clusters to “improve the coordination and delivery of resources, work-based learning opportunities, career guidance, and partnerships that support local STEM programs.”¹¹ A STEM Learning Exchange has been established for the Transportation Distribution and Logistics career cluster and will strive to integrate resources to leverage networks, develop programs for students, and encourage e-learning.

SECTION 4

External Transportation & Workforce Analysis

A regional initiative includes C2C. “The C2C program forges partnerships between City Colleges and industry leaders to better align City Colleges’ curricula with the demand in growing fields. These partnerships provide City Colleges’ students access to real-world experience via teacher-practitioners, internships and top-notch facilities, and offer City Colleges’ students and graduates a first pass at job opportunities. C2C partners work with faculty to revise or design curriculum pathways and facilities, create workplace learning opportunities and commit to interview or hire students who successfully complete a program.”¹² The program includes fast growing fields, including Transportation Distribution & Logistics.

Considering the challenges and opportunities identified in the internal workforce analysis of IDOT and a summary overview of the external environment, various goals and strategies begin to emerge that will allow for an enhancement of workforce planning and preparedness as the sector continues to evolve and expand.

SECTION 5

Goals and Strategies

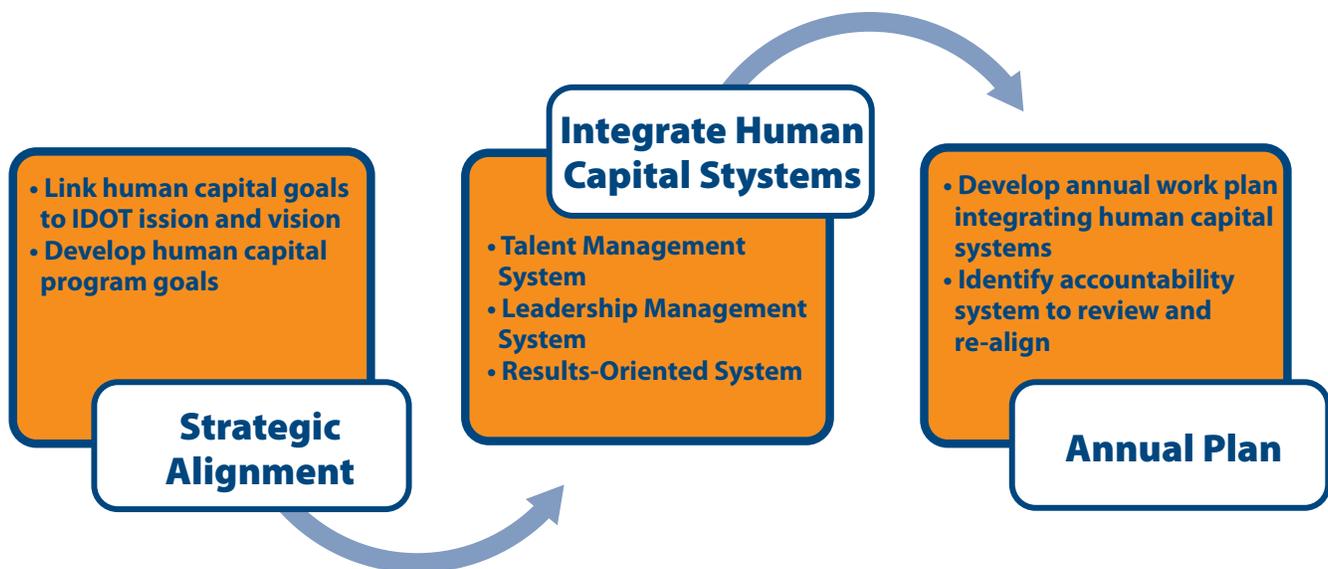
Up to this point, this plan has established the linkages and strategic direction of the state's transportation plan. Both the internal and external workforce analysis of the transportation and logistics sector will be facing major shifts in the years to come including 1) increased demand for workforce due to the expansion of the industry and anticipation of an aging and retiring generation 2) increased competition to recruit and retain qualified and skilled candidates to fill high-level positions both internally as well as in private firms 3) continuous innovation in transportation technology requires educational institution to adapt their curriculum to meet changing skills and qualifications for transportation occupations.

The next step in this plan is strategy development. Strategies that can be used include recruiting, training/retraining, restructuring the organization, contracting out, succession planning and technological enhancements. The strategies and action plans identified to address the human capital challenges and opportunities are – 1) Integrate human capital planning with IDOT's annual planning process. 2) Develop a workforce planning strategy that identifies current and future human capital needs, to include knowledge, skills, and abilities needed to recruit and retain workers in the transportation industry. 3) Maintain a competent and effective workforce through targeted education, training and employee development. 4) Link & leverage with public and private partners to address human capital transportation needs.

Goal 1: Integrate human capital planning with IDOT's annual planning process.

As stated earlier in this report, the federal government utilizes a human capital strategic planning process to advance organizational performance and serves as a model that IDOT can incorporate.

The Human Capital Assessment and Accountability Framework (HCAAF) provides guidance on aligning workforce strategies with the agency's mission and vision. The five human capital systems can be integrated in IDOT's planning process. 1) Strategic Alignment: IDOT should strategically align workforce requirements with the mission and vision. 2) Integrate the strategies focused on talent management, leadership, and results-oriented performance. These strategies will link strategic alignment and the annual plan. 3) Annual Plan: The human capital strategies will underline the annual work plan and program of IDOT. Accountability measures should be implemented to ensure progress is regularly monitored, evaluated, analyzed. Realignment should be conducted as necessary to ensure programs and goals remain relevant to the agency's mission. The figure below attempts to visualize the process for integrating human capital:



SECTION 5

Goals and Strategies

- Strategy 1:** Develop a *Strategically Aligned System* that aligns annual work plans to agency mission/vision as established in the long range plan.
- Strategy 2:** Develop a *Talent Management System* that seeks to address and enhance internal recruitment and retention.
- Strategy 3:** Develop a *Results-Oriented Performance Culture System* to promote a diverse, results-oriented, high-performing workforce.
- Strategy 4:** Develop a *Leadership and Knowledge Management System* that seeks to identify and nurture leadership.
- Strategy 5:** Develop an *Accountability System* that will track development and implementation of the systems described above.

Goal 2: Develop a strategy to recruit and retain a workforce with the knowledge, skills, and abilities vital for a thriving multi-modal transportation industry.

The internal and external analysis presented in this report highlight the significant growth that the transportation industry has experienced over the last ten years. Furthermore, the sector anticipates expansion to meet the future needs of a growing population and companies seeking multi-modes to move from Point A to Point B, whether passenger or freight. However, the data identified workforce challenges that require attention so that transportation planning and the sector in general can remain innovative and competitive. These challenges include recurring retirement of a large section of the workforce, competition with the private sector, and the expanding service model requiring expanded training for skills and abilities not currently integrated in curriculum or training.

- Strategy 1:** Develop an ongoing process to track mission critical metrics necessary to identify staffing patterns, gaps, and opportunities to forecast and facilitate the recruitment and retention of the workforce.
- Strategy 2:** Identify recruitment and retention needs based on data aligned with internal and external workforce goals.
- Strategy 3:** Enhance outreach and communication to middle and high school students; college campus visits and marketing of positions and opportunities to near-term high school and college graduates in programs associated with transportation and IDOT.
- Strategy 4:** Build a positive, accurate brand associated with multi-modal transportation.

Goal 3: Target education, training and employee development to maintain a competent and effective transportation workforce.

IDOT contributes to the training and education of the workforce in the transportation sector. This is a strength that should be leveraged with internal and external partners. It will enhance opportunities to expand IDOT's presence to a wide audience, foster leadership, and leverage private sector support. Broader exposure will have a positive effect on internal hiring, especially with targeted diversity goals. Furthermore, it allows IDOT the ability to infuse its principles, practice, and knowledge to the wider transportation logistics sector workforce.

SECTION 5

Goals and Strategies

Strategy 1: Partner with educational institutions, private sector companies, labor organizations to share workforce analysis, gaps, and discuss needs and opportunities and develop an action plan to enhance training and education industry-wide.

Strategy 2: Promote IDOT diversity programs and establish partnerships with private sector companies to enhance program capacity, outreach, and new training opportunities.

Strategy 3: Assess and develop current training programs for specializations needed to meet agency mission/goals.

Strategy 4: Enhance collaboration with unions to develop training programs applicable to achieve agency mission and improve skills and leadership opportunity.

Goal 4: Coordinate with educational institutions, industry, organized labor, workforce boards, and other agencies/organizations to address human capital transportation need.

The private sector and educational institutions have been developing programs and pathways to encourage students to consider careers in the transportation and logistics sector. Additionally, IDOT offers educational opportunities for professionals as well as in-house education to advance the knowledge and skills of its employees. As technology advances and innovation continues to transform the industry to be more efficient and competitive, curriculum will need to be flexible and adapt these changes in order to prepare students.

The workforce challenges IDOT faces are not unique. These issues span the transportation and logistics sector (TDL). Transportation companies and corporations that rely on transportation for the success of their business are challenged with a shortage of skilled workers, an aging workforce, and ever changing technology and new innovations. The private sector and educational institutions have been developing programs and pathways to encourage students to consider careers in the transportation and logistics sector. IDOT seeks to take a leadership role to ensure that Illinois' transportation sector remains competitive in terms of its workforce and technological innovation. To that end, the agency believes that linking and leveraging internal assets with public institutions and private sector companies is a clear strategy that will allow for a collaborative effort.

Key elements of this strategy involve utilizing available data to track and forecast economic and workforce trends for the transportation and logistics sector. This information will help both public and private sector partners prepare for future needs. Building a positive and accurate brand for the agency and the TDL sector is essential to change an automobile oriented mindset to one of multi-modes of transportation. Finally, implementing collaborative programs and committees with private sector and educational institutions in order to address workforce needs, develop curriculum models that will provide shared pathways and enhance program capacity, outreach, and new training opportunities that adopt new technology and innovation.

SECTION 5

Goals and Strategies

- Strategy 1:** Foster open communication/partnerships between educational institutions and private firms with an eye towards adapting/incorporating innovative technology advances as part of on-going curriculum.
- Strategy 2:** Incorporate community engagement activities and service learning into transportation curriculum.
- Strategy 3:** Create a public-private partnership forum at the local or state level to address workforce needs
- Strategy 4:** Increase communication and coordination between industry stakeholders and educational institutions.

Implementation

An essential element of a strategic plan is implementation. A strategic planning cycle typically follows a pattern of steps starting with planning and goal setting. This step, which has initially been accomplished in this report, develops goals and subsequent strategies that will help an organization achieve those goals. Those strategies are then refined into an action plan identifying who is responsible for execution and when the strategy will be accomplished. In some instances a strategy has interim steps that should be delineated and included in a more comprehensive action plan, in many cases requiring effective project management. Once established and implemented a phase of evaluating results, monitoring success, and correcting deviations follows. Implementation can be adjusted to ensure the action plan can be managed efficiently. As the strategies are successfully implemented this will result in another round of planning and goal setting to ensure the goals reflect the vision and mission of the organization and the strategies can.

As the agency pursues integration of a human capital strategic plan, IDOT management will form an internal working group to initiate the planning process and properly define how the strategies will be implemented, identify the indicators for measurement, and assign ongoing review.

SECTION 6 Framework

Goal 1: Integrate human capital planning with IDOT’s annual planning process.

Strategy	Measure	Lead
Develop a Strategic Alignment System.	Documented evidence of strategies to implement key elements and indicators.	Office of the Secretary
Develop a Talent Management System.	Documented evidence of strategies to implement key elements and indicators.	Bureau of Personnel
Develop a Leadership & Knowledge Management System.	Documented evidence of strategies to implement key elements and indicators.	Bureau of Personnel
Develop a Results Oriented Performance Culture System.	Documented evidence of strategies to implement key elements and indicators.	Office of the Secretary
Develop an Accountability System.	Documented evidence of strategies to implement key elements and indicators.	Finance and Administration

Goal 2: Develop a workforce planning strategy to recruit and retain a workforce with the knowledge, skills, and abilities vital for a thriving multi-modal transportation industry.

Strategy	Measure	Lead
Develop data-based process for tracking mission-critical metrics – qualitative and quantitative.	Documented evidence of metrics and implementation plan for updating, disseminating, and developing on-going analysis.	Finance and Administration
Align retention/recruitment needs in conjunction with senior management and partners.	Develop and implement transparent methodology for all responsible in the hiring decision from CMS to senior management.	Bureau of Personnel
Enhance outreach and marketing for open positions.	Define and implement short-term outreach goals aimed at recruiting mission-critical positions.	Bureau of Personnel
Build a positive, accurate brand associated with multi-modal transportation.	Define and implement multi-media based strategies to accentuate competitive advantage of IDOT’s multi-modal approach.	Office of the Secretary and Office of Communication

SECTION 6 Framework

Goal 3: Target education, training and employee development to maintain a competent and effective transportation workforce.

Strategy	Measure	Lead
Develop shared workforce analysis resources to develop a sector based workforce initiative.	Identify and develop working groups with public/private sector, define training and educational goals to remove gaps, improve competencies.	Office of Planning & Programming
Promote diversity programs through enhanced partnerships, outreach and training.	Define and implement short term and long term programs to facilitate cooperative training opportunities.	Office of Diversity and Finance & Administration
Assess and develop current training programs for specializations needed to meet agency mission & goals.	Identify and enhance strategies to target training to workforce demographic needs.	Finance and Administration and Bureau of Personnel
Collaborate with unions to develop relevant training programs applicable to agency mission and leadership development.	Identify and document strategies to enhance current training programs and implement improvements.	All IDOT Departments

Goal 4: Coordinate with educational institutions, industry, organized labor, workforce boards, and other agencies/organizations to address human capital transportation need.

Strategy	Measure	Lead
Develop collaborative dialogue with private business and educational institutions to address how IDOT can support retention and educational strategies in the transportation sector.	Documented evidence of a collaborative working committee between IDOT and private sector that addresses workforce retention and recruitment opportunities.	Office of Planning & Programming
Create apprenticeship and exchange programs linking with private sector partners and educational institutions.	Building off existing IDOT programs, define and implement strategies to bridge them with the private sector.	Office of Diversity and Finance & Administration
Develop partnerships that adapt and incorporate innovative technology advances as part of on-going curriculum.	Develop a Transportation innovation technology council tasked with keeping up to date and disseminating trends and innovations in the field.	All IDOT Departments
Create public-private partnership forum at the local and state level to address workforce needs.	Develop forum committee and define and document goals and strategies to best address the workforce needs around the state.	Office of Planning & Programming

SECTION 7

Looking Towards the Future. Next Steps

In conclusion, this report outlines a strategy to:

- Improve IDOT's workforce planning, analysis and forecasting to effectively and efficiently recruit and retain an agile and adaptive workforce.
- Facilitate the implementation of a human capital management plan that integrates human capital systems aimed at improving talent management, leadership, and performance.
- Increase collaboration with public institutions and private sector companies to improve workforce planning and implementation in the transportation sector in the State of Illinois.
- Prepare for and embrace innovation and technology to more effectively implement current and future transportation plans.

As the department continues to shift the focus towards a multi-modal approach so too will IDOT and its partners move towards improving its workforce both internally and externally. This new focus allows for the alignment of hiring, training, development and performance management to achieve, fulfill and sustain the mission. Over the long term a focus on human capital will enable the department and the industry to work proactively with each other and this will promote economic prosperity.

APPENDIX A

Summary Description of IDOT's Strategic Plan Goals

Improve Transportation Safety

Safety is a primary concern for IDOT in its overall management of the transportation system. Safety is explicitly built into the department's activities to promote the protection of all transportation users, including drivers, vehicle occupants, public transportation users, bicyclists and pedestrians.

Provide a Transportation System that Offers a High Degree of Multi-Modal Connectivity, Mobility, and Accessibility

Transportation's role in the state's economy cannot be overstated. A vital multi-modal transportation system including air, highway, public transportation, rail and water is a key component to a sustained viable economy. The transportation system provides access to work, mobility for freight and connectivity between communities.

Provide for Efficient Freight Movement

The confluence of all these modes in Illinois and the intermodal capacity that links these modes together are the principal advantages that the state brings to supply chain businesses. These advantages help drive the state's economy. Businesses and communities are dependent on an integrated system of freight transportation as the network and freight services provide a full range of options for a viable community.

Integrate Human Capital Into Department Planning, Programs, and Policies

Human capital involves more than investment in transportation projects. It goes beyond those investments toward ensuring that productive workforces are in place in communities and that business/private sector partnerships can effectively foster innovation and economic growth.

Preserve and Manage the Existing Transportation System

Preserving and managing Illinois transportation system is critical to protecting the public's investment in the infrastructure, improving the safety and efficiency of the system, enhancing the system's ability to support commerce and adapting the system to the transportation needs of the 21st century.

Address Congestion and Maximize Efficiency and Effectiveness Through Transportation Operations

Reducing single occupant vehicle use and increasing use of public transportation provides a great potential for dealing with urban congestion. One action to encourage greater use of transit would be to increase the number of transit shelters and enhance their attractiveness and value to potential users.

Follow a Comprehensive Transportation Planning Process

Federal transportation planning guidelines place great emphasis on cooperative comprehensive transportation planning. In MAP-21, Congress underscored the importance of better integration of state highway investments within local communities. The linkage of transportation to land use, economic activity and community development is well established.

In addition, sustainability is a major driver in public and private planning initiatives. In response, the department is seeking to enhance the integration of planning between state and local agencies. Through the use of joint studies it is hoped that both parties gain a greater understanding and appreciation for the goals and objectives of one another.

APPENDIX A

Summary Description of IDOT's Strategic Plan Goals

Promote Stable Funding for the Public Component of the Transportation System

Existing funding resources for transportation cannot meet existing system operation and maintenance needs or finance system expansion. This shortfall on funding impacts all modes of transportation. The department must thoughtfully consider potential strategies for increased revenue.

Target Transportation Investments to Support Economic Development

While economic development can occur in urban, suburban and rural locations, businesses and other investors need sites and facilities that are easily accessible to markets, suppliers and labor. The digital revolution has completely altered how the citizens of Illinois live their lives. As technology continues to expand and improve, the department has realized that it can no longer purely focus on the transport of physical goods and services along its roadways. The department has begun to lay fiber cable along its right-of-ways to make sure that digital products, ideas, and communications can move throughout Illinois just as seamlessly as trucks, trains, airplanes, and barges.

Ensure a Compatible Interface of the Transportation System with Environmental, Social, Energy, and Land Use Considerations

Transportation improvements must be developed in a manner that protects the natural and social environment. A host of state and federal laws provide detailed guidance on how the transportation planning process is to address these issues. A new concern that transportation agencies must consider in developing its projects is climate change. In the Midwest, these concerns focus on flooding events that are projected to be more severe than previously experienced. The department will continue to review its policies and procedures to ensure existing and emerging issues are considered and accommodated. To address these concerns in a thoughtful manner, the department will produce a climate change adaptation plan that will determine if policies need adjustment and consider emergency plans to help local populations affected by severe weather events.

Provide a Secure Transportation Infrastructure in Conjunction with the Office of Homeland Security – Illinois Terrorism Task Force

Whether confronted with a climatic event, a terrorist attack, or an industrial accident, the department has worked hard to assure its readiness to provide assistance to affected areas, evacuate population centers and treat victims of these sudden and unexpected disaster events. In conjunction with the Office of Homeland Security and the Illinois Terrorism Task Force, IDOT continues to take steps to strengthen the security of the transportation system and enhance its ability to respond to disasters.

APPENDIX B

IDOT Workforce Profile: Snapshot of Key Hiring and Turnover Metrics

Note: IDOT Bureau of Personnel Management/Workforce Cube provided the data in this section.

Overall Employment

Overall employment within IDOT – including active, on-leave, and suspended employees, has stayed consistently above 5,200 over the last nine years. Employment was up 2 percent from last year at 5,401.

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Grand Total	5,789	5,660	5,523	5,306	5,241	5,390	5,435	5,296	5,201

Average Age

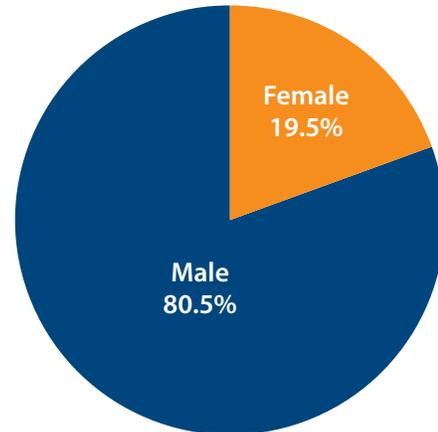
Average age of IDOT's workforce is 48.

Average Salary

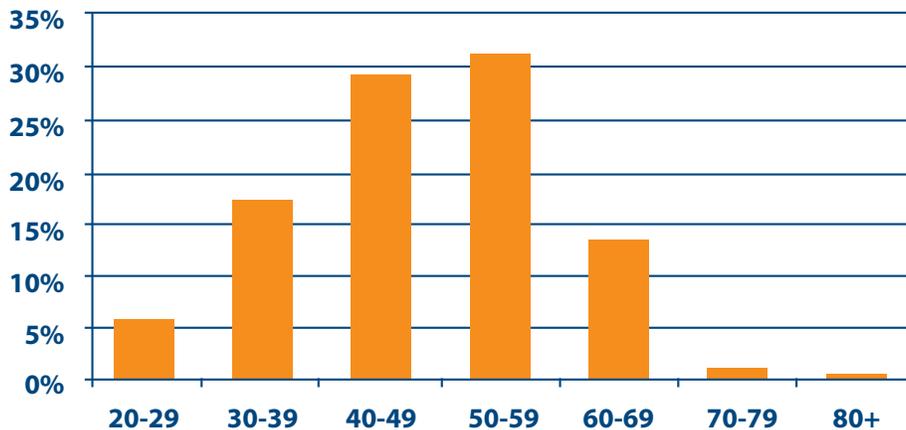
The average IDOT salary as of 2013 was \$70,656.

Age Cohorts

As shown in the figure below, over 45 percent of IDOT's workforce is 50 years and older. This indicator can help inform recruitment and retention strategies programs for the agency.



Age Cohort



Gender and Diversity Mix

As shown in the graph below, a significant portion of IDOT's workforce is male 4,321 (80.5 percent) compared to females 1,044 (19.5 percent). The agency has a 2014 goal of hiring 918 females to its ranks according to IDOT's Affirmative Action Plan. Again, this information is helpful in shaping diversity recruitment goals.

Developing a diverse workforce is important for IDOT. As national demographics shift so too will the balance of workforce within the agency with regard to gender, age, race, ethnicities, and lifestyles. IDOT, through its Affirmative Action Plan, has established diversity and gender goals. These goals can help inform the recruitment and retention strategies of the human capital plan.

APPENDIX B

IDOT Workforce Profile: Snapshot of Key Hiring and Turnover Metrics

IDOT Ethnicity by Gender						
	White	Black	Hispanic	Asian	AI/AN	NHOPI
Females	819	146	47	30	2	0
Males	3,607	440	175	89	10	0
Total	4,426	586	222	119	12	0

Source: IDOT Affirmative Action Plan 2014

2014 Diversity and Gender Goals						
Females	Black	Hispanic	Asian	AI/AN	NHOPI	
918	48	157	38	1	0	

Source: IDOT Affirmative Action Plan 2014

Average Years of Service

IDOT employees have an average of 13.6 years of service. Such an average indicates that many employees have significant experience.

In 2013 179 employees retired from IDOT (see table right). This can provide initial insight into the departments, skills, knowledge, and ability needed in the short-term.

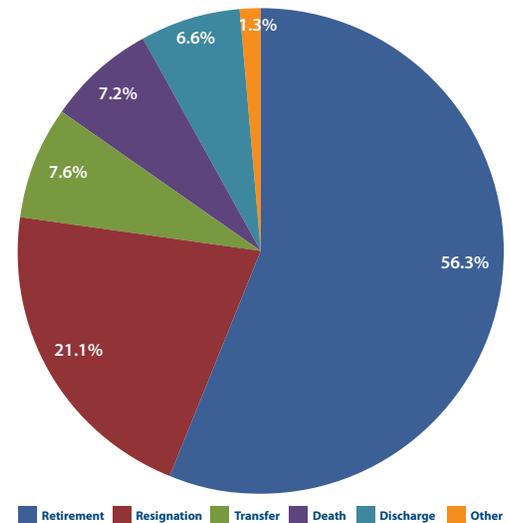
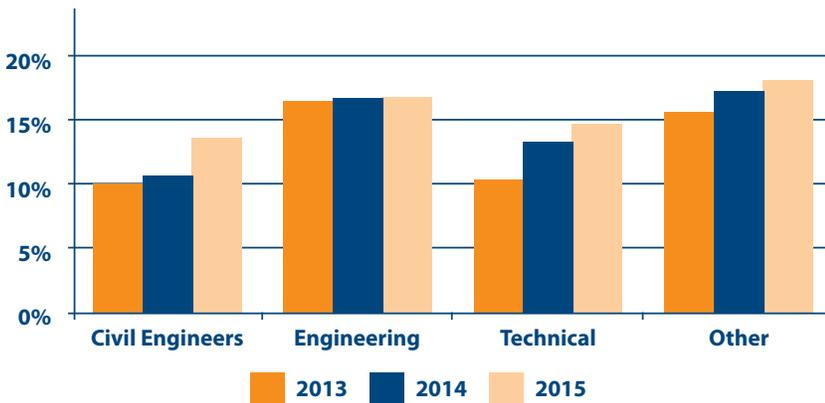
2013 Actual Retirements

Civil Engineers	16
Engineering Technicians	27
Highway Maintainers	91
Technical Managers	17
Other	28

Source: IDOT Personnel Management

Retirement Eligibility across Occupations

As shown in the figure below, eligible retirement is projected to increase over the next two years. Of particular note, Civil Engineers and Technical Managers will see a dramatic increase from 2013. These are two occupation categories that require specific skills and abilities and in terms of technical managers, a variety of different specializations. Highway Maintainers were left off the figure due to the high number reported. Their 2014/2015 projected retirements is 45 percent and 40 percent respectively.



APPENDIX B

IDOT Workforce Profile: Snapshot of Key Hiring and Turnover Metrics

Attrition by Cause

As show in the table below the majority of separations are from employees retiring, followed by resignations as the second largest cause for separations. In 2013, over half the separations (56.3 percent) were retirement and resignation related. Transfers were third largest.

Separation Reason	Total (FY08-FY13)
Death	4.60%
Discharge	4.30%
Other	1.40%
Resignation	18.80%
Retirement	66.60%
Transfer	4.30%

Source: IDOT Personnel Management

Retention Rate

The employee retention rate for IDOT new hires over the last five years is 87 percent.

New Hire Retention Rate by Occupation

Employment within IDOT was up 1.9 percent from 2012 to 2013. Although the employment trend over the last five years has seen fluctuations from the various attritions noted above, it is worth demonstrating a significantly high level retention among recent hires over the same time period. Of the combined new hires between 2007 and 2013 the vast majority of Civil Engineers/Technicians, Highway Maintainers, Technical Managers and Others continue to this day with IDOT.

Employee Retention Rate 2007-2013	
Civil Engineer	90%
Engineering Technicians	84%
Highway Maintainers	92%
Technical Managers	81%
Other	82%
Grand Total	87%

Source: IDOT Personnel Management

APPENDIX C

IDOT Job Categories



ENGINEER

Civil Engineering is a professional engineering discipline that encompasses the planning, design, construction and maintenance of the physical and natural built environment such as bridges, roads, canals, dams and buildings.

- *Examples:* Civil Engineer



ENGINEERING TECHNICIAN

Engineer Technicians perform tasks of a paraprofessional nature under direct supervision to relatively complex work relating to the investigation, location design, construction and/or maintenance of engineering projects.

- *Examples:* Photogrammetrist, Line Technician, Aircraft Technician, Cartograph, Chemist, Information System Analysis



HIGHWAY MAINTAINER (HM)

HMs perform maintenance of roadways and bridges. They also operate CDL Class "A" licensed vehicles and other construction/maintenance-related equipment.

- *Examples:* Bridge Mechanic, Highway Construction, Heavy Construction Equipment Operator, Sign Hanger & Journeyman, Highway Maintenance leader worker



TECHNICAL MANAGER (TM)

The TM classification series encompasses non-engineering professional and managerial positions. These classifications span from entry-level to top management. Performance of professional duties may be administrative or technical in nature and involve participating in or supervising activities, units or functions engaged in implementing various aspects of a transportation program or project.

- *Examples:* Technical Advisor, Communications Specialist, Realty Specialist, Management Technician, Urban Planner, Accountant



OTHER

- Administrative
- Executive
- Legal
- Directory

APPENDIX D

IDOT Training and Education Programs

Engineer Technician Training Program

The Engineer Technician Training Program (ETTP) is a ten (10) week class designed to provide approximately 40 minorities and women the skills and training needed to successfully pursue a career as an Engineer Technician. IDOT is currently partnering with Triton College and Southern Illinois University, Carbondale (East St. Louis Community College campus).

Civil Engineer Trainee's Program

This program provides a well-rounded work experience at IDOT. It is designed to show the diverse types of work the department does and to prepare the individual for a career with IDOT. Newly hired CETs may have the opportunity to participate in a job rotation program encompassing all major areas of civil engineering, including design, maintenance and development. Upon successful completion of the program, trainees are promoted to working-level Civil Engineering positions. Individuals who complete this program have an excellent chance for career advancement.

Civil Engineer Scholarship Program

IDOT strives to be nationally competitive in the civil engineering marketplace by providing financial support for the education of motivated students, including those from under-represented groups, offering employment opportunities to these recipients during the summer and retaining them as future employees. To enhance the diversity of the department's civil engineering workforce, IDOT will award up to twenty (20) scholarships each year, each providing tuition assistance in an Illinois pre-engineering or engineering program.

Engineering Academy Program

IDOT Engineering Academies and Mentoring Programs are developed in partnership with middle and high schools in targeted areas throughout Illinois to give students the confidence, resources and skills they need to reach their potential and to develop student interest in engineering careers at IDOT.

Highway Construction Career Training Program

Each Community College holds one to five training sessions per year in which individuals receive intensive training in highway construction-related skills, such as mathematics for the trades, job site readiness, carpentry, concrete flatwork, blueprint reading orientation, introduction to tools, forklift operation and OSHA 10 certification, etc. Each Community College provides its graduates with assistance in obtaining placement in Illinois' highway construction trade unions, apprenticeship programs and/or with IDOT highway construction contractors. The program is administered by the Illinois Community College Board and implemented through ten Community Colleges throughout the state.

IDOT sponsored Transportation Construction Apprenticeship Readiness Training

The program provides transportation construction apprenticeship readiness training, focusing on highway construction trades; job referral services for all successful program graduates and Intermodal placement assistance services geared toward positions in the highway construction trades, labor apprenticeship programs, or highway, railroad, transit, or airport construction work opportunities. The program is funded by IDOT and implemented through the Chicago Urban League.

APPENDIX D

IDOT Training and Education Programs

Summer Transportation Institute

The National Summer Transportation Institute is designed to address a crucial workforce need for the transportation industry by creating a greater number and more diverse pool of applicants selecting transportation careers and entering the transportation industry. IDOT and Southern Illinois University, Carbondale partner to implement these programs in an effort to create awareness about careers in transportation for middle and high school students and attract bright young minds to choose careers in the transportation industry.

Veteran Outreach Program

IDOT partners with various state agencies, veteran organizations and educational institutions to increase the awareness of IDOT career opportunities for veterans by providing initiatives designed to educate veterans in targeted communities regarding the application process for the Highway Maintainer positions and to reduce or remove barriers on the path to employment wherever possible.

Job Shadow Program

IDOT is in the process of developing a formal Job Shadow Program designed to interest high school and college students from targeted schools in transportation careers, specifically in Civil Engineering and Engineering Technology.

Annual IDOT Career Day

The Annual IDOT Career Day is a workforce development tool designed to introduce middle and high school students from diverse backgrounds to careers in the transportation industry. Participants are given the opportunity to learn about several exciting transportation careers through hands-on activities, exhibits and heavy equipment displays.

Accelerated Leadership Proficiency Series (ALPS)

Develop and improve the managerial skills and organizational knowledge of first-line supervisors and staff who have significant program responsibilities.

Executive Leadership Development Series (ELDS)

Designed to refine the management skills of mid-level personnel and prepare them for increased administrative challenges.

Supervisor Training and Readiness Series (STARS)

A two-year program that provides developmental training as well as the tools and resources necessary to ready new supervisors for the responsibilities and challenges they face or could face in their new role.

Professional Advancement of Career Engineers (PACE)

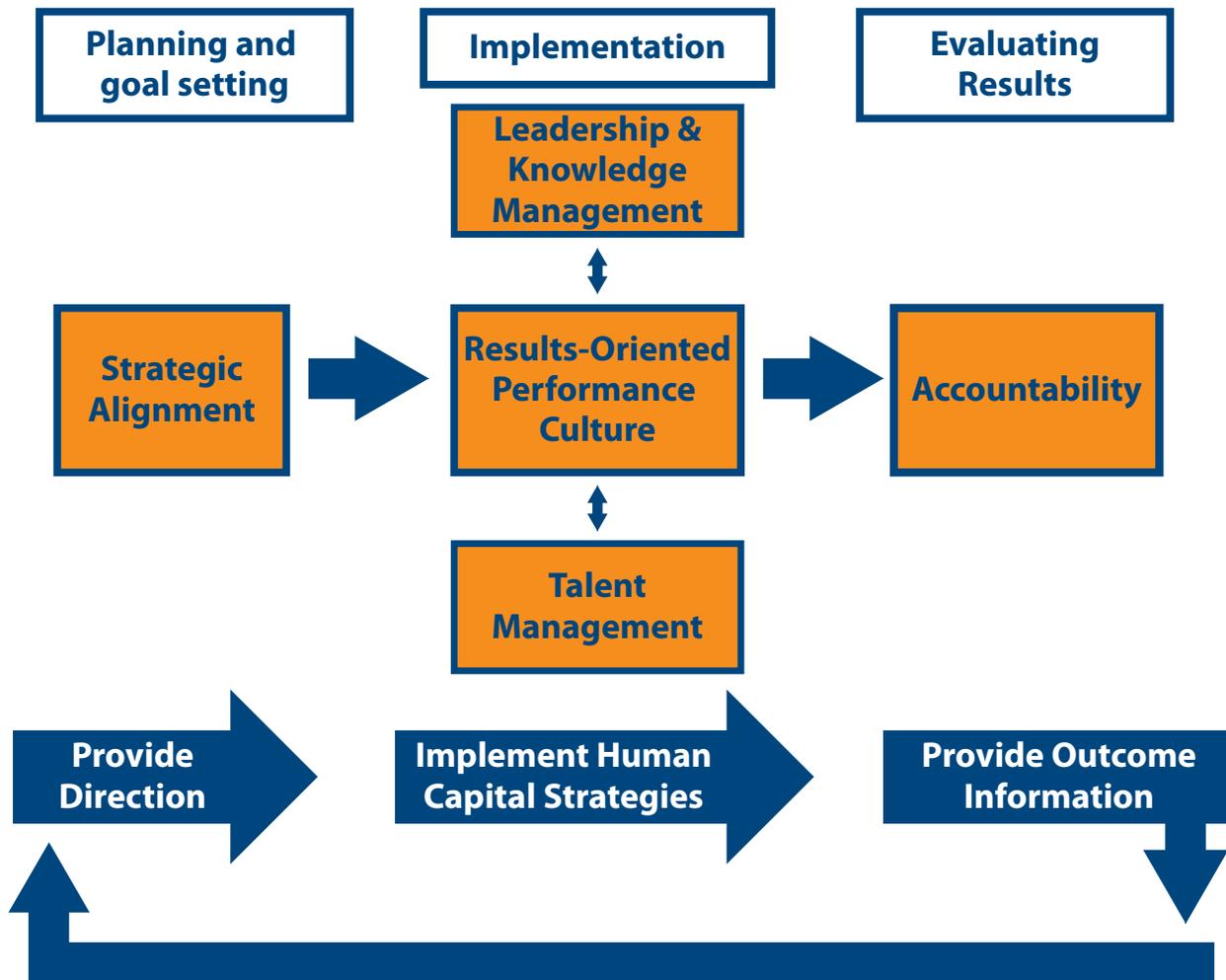
Provides leadership development for lower level civil and electrical engineers and broadens their understanding of the department and public sector responsibilities.

APPENDIX E

Human Capital Systems Summary

The Office of Management and Budget developed a visual aid that displays the Human Capital Assessment and Accountability Framework (HCAAF) and how it relates to the general strategic planning process. The HCAAF Framework, the development and implementation of the five systems, fits within the basic format of goal setting, implementation, and evaluation. Each system is comprised of a specific definition, standard for performance and series of critical success factors comprised of essential elements and indicators to ensure successful implementation. A summary of each system is below comes directly from OMB along with links to a detailed description of that system on OMB's website.¹³

Relationship Among the HCAAF Systems



Source: U.S. Office of Personnel Management

APPENDIX E

Human Capital Systems Summary

Strategic Alignment¹⁴

Definition

The Strategic Alignment system focuses on having a human capital strategy aligned with mission, goals, and organizational objectives.

A system led by senior management, typically the Chief Human Capital Officer (CHCO), that promotes alignment of human capital management strategies with agency mission, goals, and objectives through analysis, planning, investment, measurement, and management of human capital programs.

Standard

Agency human capital management strategies are aligned with mission, goals, and organizational objectives and integrated into its strategic plans, performance plans, and budgets.

Critical Success Factors

Each system is based on critical success factors that make up the overall system. Critical success factors are the areas on which agencies and human capital practitioners should focus to achieve a system's standard for success and operate efficiently, effectively, and in compliance with merit system principles. The Strategic Alignment system is comprised of the following critical success factors:

- Human Capital Planning
- Workforce Planning
- Human Capital Best Practices and Knowledge Sharing
- Human Resources as Strategic Partner

Each critical success factor has several key elements that indicate effectiveness and are linked to suggested indicators that identify how well the agency is doing relative to key elements.

APPENDIX E

Human Capital Systems Summary

Talent Management System¹⁵

Definition

A system that addresses competency gaps, particularly in mission-critical occupations, by implementing and maintaining programs to attract, acquire, develop, promote, and retain quality talent.

Standard

The agency has closed skills, knowledge, and competency gaps/deficiencies in mission-critical occupations, and has made meaningful progress toward closing skills, knowledge, and competency gaps/deficiencies in all occupations used in the agency.

Critical Success Factors

The Talent Management system is comprised of two critical success factors that work together to ensure agencies have people with the right skills, in the right places, at the right times. Addressing the critical success factors helps eliminate gaps and deficiencies in the skills, knowledge, and competencies of employees of mission-critical occupations in the current and future workforce. The two success factors usually work together.

- **Recruitment:** The workforce plan drives the aggressive and strategic recruitment of diverse and qualified candidates for the agency's workforce.
- **Retention:** Leaders, managers, and supervisors create and sustain effective working relationships with employees. The workplace is characterized by:
 - A motivated and skilled workforce
 - Attractive and flexible working arrangements
 - Compensation packages and other programs used to hire and retain employees who possess mission-critical skills, knowledge, and competencies.

APPENDIX E

Human Capital Systems Summary

Leadership and Knowledge Management System¹⁶

Definition

This is a system that ensures continuity of leadership by identifying and addressing potential gaps in effective leadership and implements and maintains programs that capture organizational knowledge and promote learning.

Standard

Agency leaders and managers effectively manage people, ensure continuity of leadership, and sustain a learning environment that drives continuous improvement in performance, and provide a means to share critical knowledge across the organization. Knowledge management must be supported by an appropriate investment in training and technology.

Critical Success Factors

The Leadership and Knowledge Management system is comprised of five critical success factors:

- **Leadership Succession Management:** The organization identifies leadership competencies and establishes objectives and strategies to ensure there is a continuous pipeline of available leadership within the organization.
- **Change Management:** The agency has in place leaders who understand what it takes to effectively bring about changes that achieve significant and sustained improvements in performance.
- **Integrity and Inspiring Employee Commitment:** Leaders maintain high standards of honesty and ethics that serve as a model for the whole workforce. Leaders promote teamwork and communicate the organization's shared vision to all levels of the organization and seek feedback from employees. Employees respond by maintaining high standards of honesty and ethics.
- **Continuous Learning:** Leaders foster a learning culture that provides opportunities for continuous development and encourages employees to participate. Leaders invest in education, training, and other developmental opportunities to help themselves and their employees build mission-critical competencies.
- **Knowledge Management:** The organization systematically provides resources, programs, and tools for knowledge sharing across the organization in support of its mission accomplishment.

Together, these critical success factors ensure:

- A constant flow of leaders who can properly direct an agency's efforts to achieve results
- A workforce with the competencies required to achieve the agency's mission
- That the workforce is motivated to use its competencies in service of the agency's mission.

APPENDIX E

Human Capital Systems Summary

Results-Oriented System¹⁷

Definition

This is a system that promotes a diverse, high-performing workforce by implementing and maintaining effective performance management systems and awards programs.

Standard

The agency has a diverse, results-oriented, high-performing workforce and a performance management system that differentiates between high and low levels of performance and links individual/team/unit performance to organizational goals and desired results effectively.

Critical Success Factors

The Results-Oriented Performance Culture system is comprised of the following critical success factors that work together to create a diverse, results-oriented, high performance workforce:

- **Communication:** The agency has a process for sharing information and ideas about the organization with all employees. This vital process includes eliciting employee feedback and involvement so all employees play an appropriate role in planning and executing the mission.
- **Performance Appraisal:** The agency has a process under which performance is reviewed and evaluated.
- **Awards:** The organization takes actions to recognize and reward individual or team achievement that contributes to meeting organizational goals or improving the efficiency, effectiveness, and economy of the Government. Such awards include, but are not limited to: employee incentives which are based on predetermined criteria, rating-based awards, or awards based on a special act or service.
- **Pay for Performance:** The agency uses pay-for-performance systems, where authorized by law and regulation, to link salary levels and adjustments to an individual's overall performance and contribution to the agency's mission. Employees receive base salary adjustments within their assigned bands.
- **Diversity Management:** The agency maintains an environment characterized by inclusiveness of individual differences and responsiveness to the needs of diverse groups of employees.
- **Labor/Management Relations:** The organization promotes cooperation among employees, unions, and managers. This cooperation enhances effectiveness and efficiency, cuts down the number of employee-related disputes, and improves working conditions, all of which contribute to improved performance and results.

APPENDIX E

Human Capital Systems Summary

Accountability¹⁸

Definition

A system that contributes to agency performance by monitoring and evaluating the results of its human capital management policies, programs, and activities; by analyzing compliance with merit system principles; and by identifying and monitoring necessary improvements.

Standard

Agency human capital management decisions are guided by a data-driven, results-oriented planning and accountability system.

Results of the agency accountability system must inform the development of the human capital goals and objectives, in conjunction with the agency's strategic planning and performance budgets.

Effective application of the accountability system contributes to agencies' practice of effective human capital management in accordance with the merit system principles and in compliance with Federal laws, rules, and regulations.

Results

When the key elements of the Accountability system are effectively implemented, agencies will realize the following results:

Effectiveness Results

- The agency has documented its human capital management processes, measures, and results; evaluated its accomplishments; and reported findings to agency decision makers and other stakeholders.
- Agency leadership demonstrates commitment to the accountability system, based on OPM's requirements, through its actions and allocation of appropriate resources.
- The agency conducts a continuous assessment of its human capital practices to ensure they are sound, produce results, and adhere to merit systems principles, laws, and regulations. The agency provides an annual report, which identifies areas needing improvement. A process is in place that assigns responsibility for taking corrective action resulting in improved human capital strategies and program integrity.

APPENDIX F

Transportation Industry and Education

Estimated Skills Gap Over a Five-Year Period

Occupation	Average Job Openings Total	Degrees Conferred	Deficit/Gap Over a Five Year Period
Aerospace Engineers	65	525	Deficit of 460 Jobs
Air Traffic Controllers	220	200	Gap of 20 Workers
Bus Drivers, Transit & Intercity	1545	N/A	N/A
Cement Masons & Concrete Finishers	940	180	Gap of 760 Workers
Chemical Engineers	185	1045	Deficit of 860 Jobs
Civil Engineers	1465	2155	Deficit of 690 Jobs
Commercial Pilots	160	65	Gap of 95 Workers
Construction Laborers	4310	1470	Gap of 2840 Workers
Industrial Engineers	1220	785	Gap of 435 Workers
Logisticians	680	865	Deficit of 185 Jobs
Pipe layers	170	105	Gap of 65 Workers
Sailors and Marine Oilers	260	N/A	N/A
Structural Iron & Steel Workers	305	N/A	N/A
Transportation Inspectors	235	10	Gap of 225 Workers
Truck Drivers, Heavy & Tractor-Trailer	9,730	7940	Gap of 1790 Workers
Water Transportation Workers	720	0	Gap of 720 Workers

Sources: Illinois Department of Labor Security & Illinois Board of Higher Education

- This table demonstrates the gaps and deficits in transportation occupations, over the five year period. According to the data, provided by the Illinois Department of Labor Security, truck driving industry will experience an annual gap of 358 workers; the five-year period's gap reaches 1,790 workers. Employment of heavy and tractor-trailer truck drivers is projected to grow 21 percent from 2010 to 2020, faster than the average of all occupations (14%).
- As the economy grows, the demand for goods will increase, and more truck drivers will be needed to keep supply chains moving. Trucks transport most of the freight in the United States, so as households and businesses increase their spending, the trucking industry will grow.

APPENDIX F

Transportation Industry and Education

Year	Field of Study	Institution	Bachelor's Degree	Total Enrollment	Degrees Conferred	Average Annual Job Openings	Annual Gaps/Deficit
2011	Aerospace Engineering	U of I at Urbana/Champaign	Institution Total	367	78		
2011	Aerospace Engineering		Public Uni. Total	367	78		
2011	Aerospace Engineering	Illinois Institute of Technology	Institution Total	132	30		
2010	Aerospace Engineering		Independent NFP Inst. Total	132	30		
2011	Aerospace Engineering		2011 Year Total	499	108	13	Deficit of 95 Jobs
2011	Chemical Engineering	U of I at Chicago	Institution Total	173	40		
2011	Chemical Engineering	U of I at Urbana/Champaign	Institution Total	540	110		
	Chemical Engineering		Public Uni. Total	713	150		
2011	Chemical Engineering	Illinois Institute of Technology	Institution Total	132	29		
2010	Chemical Engineering	Northwestern University	Institution Total	160	30		
2011	Chemical Engineering		Independent NFP Inst. Total	292	59		
2011	Chemical Engineering		2011 Year Total	1,005	209	37	Deficit of 172 Jobs
2011	Civil Engineering	SIU Carbondale	Institution Total	221	50		
2011	Civil Engineering	SIUEdwardsville	Institution Total	210	29		
2011	Civil Engineering	U of I at Chicago	Institution Total	318	64		
2011	Civil Engineering	U of I at Urbana/Champaign	Institution Total	787	201		
2011	Civil Engineering		Public Uni. Total	1,536	344		
2011	Civil Engineering	Bradley University	Institution Total	165	31		
2011	Civil Engineering	Illinois Institute of Technology	Institution Total	137	36		
2011	Civil Engineering	Northwestern University	Institution Total	78	20		
2011	Civil Engineering		Independent NFP Inst. Total	380	87		
2011	Civil Engineering		2011 Year Total	1,916	431	293	Deficit of 138 Jobs

APPENDIX F

Transportation Industry and Education

Year	Field of Study	Institution	Bachelor's Degree	Total Enrollment	Degrees Conferred	Average Annual Job Openings	Annual Gaps/Deficit
2011	Industrial Engineering	Northern Illinois University	Institution Total	95	14		
2011	Industrial Engineering	SIU Edwardsville	Institution Total	60	11		
2011	Industrial Engineering	U of I at Chicago	Institution Total	117	19		
2011	Industrial Engineering	U of I at Urbana/Champaign	Institution Total	183	33		
2011	Industrial Engineering		Public Uni. Total	455	77		
2011	Industrial Engineering	Bradley University	Institution Total	72	9		
2011	Industrial Engineering	Northwestern University	Institution Total	233	71		
2011	Industrial Engineering		Independent NFP Inst. Total	305	80		
2011	Industrial Engineering		2011 Year Total	760	157	244	Gap of 87 Workers
2011	Air Traffic Controllers	Lewis University	Institution Total	142	40		
2011	Air Traffic Controllers		Independent NFP Inst. Total	142	40		
2011	Air Traffic Controllers		2011 Year Total	142	40	44	Gap of 4 Workers
2011	Commercial Pilots	U of I at Urbana/Champaign	Institution Total	26	13		
2011	Commercial Pilots		Public Uni. Total	26	13		
2011	Commercial Pilots		2011 Year Total	26	13	32	Gap of 19 Workers
2011	Logisticians	SIU Carbondale	Institution Total	194	109		
2011	Logisticians		Public Uni. Total	194	109		
2011	Logisticians	LLCC	Institution Total	7	1		
2011	Logisticians	Southwestern Illinois College	Institution Total	9	3		
2011	Logisticians		Community Col. Total	16	4		
2011	Logisticians	Lewis University	Institution Total	383	59		
2011	Logisticians	Quincy University	Institution Total	2	1		
2011	Logisticians		Independent NFP Inst. Total	384	60		
2011	Logisticians	Embry-Riddle Aero. Univ.-Worldwide (FL)	Institution Total	6	0		
2011	Logisticians		Out-of-State Inst. Total	6	0		
2011	Logisticians		2011 Year Total	600	173	136	Deficit of 37 Jobs

APPENDIX F

Transportation Industry and Education

Year	Field of Study	Institution	Bachelor's Degree	Total Enrollment	Degrees Conferred	Average Annual Job Openings	Annual Gaps/Deficit
2011	Truck Drivers, Heavy & Tractor-Trailer (TD,H&T-T)	Black Hawk College	Institution Total	12	0		
2011	TD,H&T-T	CCC - Harold Washington College	Institution Total	554	1006		
2011	TD,H&T-T	CCC - Harry S Truman College	Institution Total	19	0		
2011	TD,H&T-T	CCC-Kennedy-King College	Institution Total	1	0		
2011	TD,H&T-T	CCC - Malcolm X College	Institution Total	1	1		
2011	TD,H&T-T	CCC - Olive-Harvey College	Institution Total	15	75		
2011	TD,H&T-T	CCC - Wilbur Wright College	Institution Total	8	0		
2011	TD,H&T-T	Danville Area Community College	Institution Total	10	36		
2011	TD,H&T-T	Elgin Community College	Institution Total	30	33		
2011	TD,H&T-T	Highland Community College	Institution Total	2	0		
2011	TD,H&T-T	Illinois Central College	Institution Total	8	0		
2011	TD,H&T-T	Illinois Eastern - Wabash Valley	Institution Total	7	9		
2011	TD,H&T-T	Illinois Valley Community College	Institution Total	5	89		
2011	TD,H&T-T	John Wood Community College	Institution Total	27	53		
2011	TD,H&T-T	Kaskaskia College	Institution Total	8	17		
2011	TD,H&T-T	Lake Land College	Institution Total	5	0		
2011	TD,H&T-T	LLCC	Institution Total	19	143		
2011	TD,H&T-T	Parkland College	Institution Total	10	51		
2011	TD,H&T-T	Richland Community College	Institution Total	1	0		
2011	TD,H&T-T	Sauk Valley Community College	Institution Total	4	21		
2011	TD,H&T-T	Shawnee Community College	Institution Total	9	33		
2011	TD,H&T-T	Southeastern Illinois College	Institution Total	3	0		
2011	TD,H&T-T	Spoon River College	Institution Total	5	21		
2011	TD,H&T-T		Community Col. Total	764	1,588		
2011	TD,H&T-T		2011 Year Total	765	1,588	1,946	Gap of 358 Workers

APPENDIX F

Transportation Industry and Education

Year	Field of Study	Institution	Bachelor's Degree	Total Enrollment	Degrees Conferred	Average Annual Job Openings	Annual Gaps/Deficit
2011	Cement Masons & Concrete Finishers (CM&CF)	CCC - Harold Washington College	Institution Total	1	0		
2011	CM&CF	CCC - Harry S Truman College	Institution Total	1	0		
2011	CM&CF	CCC - Olive-Harvey College	Institution Total	1	0		
2011	CM&CF	CCC - Richard J. Daley College	Institution Total	2	0		
2011	CM&CF	CCC - Kennedy-King College	Institution Total	16	36		
2011	CM&CF	Southwestern Illinois College	Institution Total	2	0		
2011	CM&CF		Community Col. Total	23	36		
2011	CM&CF		2011 Year Total	23	36	188	Gap of 152 Workers
2011		Black Hawk College	Institution Total	7	0		
2011	Pipe layers	CCC - Olive-Harvey College	Institution Total	3	0		
2011	Pipe layers	CCC - Richard J. Daley College	Institution Total	2	0		
2011	Pipe layers	Lewis & Clark Community College	Institution Total	34	0		
2011	Pipe layers	Southwestern Illinois College	Institution Total	11	1		
2011	Pipe layers	Parkland College	Institution Total	31	1		
2011	Pipe layers	CCC - Kennedy-King College	Institution Total	19	19		
2011	Pipe layers		Community Col. Total	107	21		
2011	Pipe layers		2011 Year Total	107	21	34	Gap of 13 Workers
2011	Water Transportation Workers	Illinois Institute of Technology	Institution Total	0	0		
2011	Water Transportation Workers		Independent NFP Inst. Total	0	0		
2011	Water Transportation Workers		2011 Year Total	0	0	144	Gap of 144 Workers

APPENDIX F

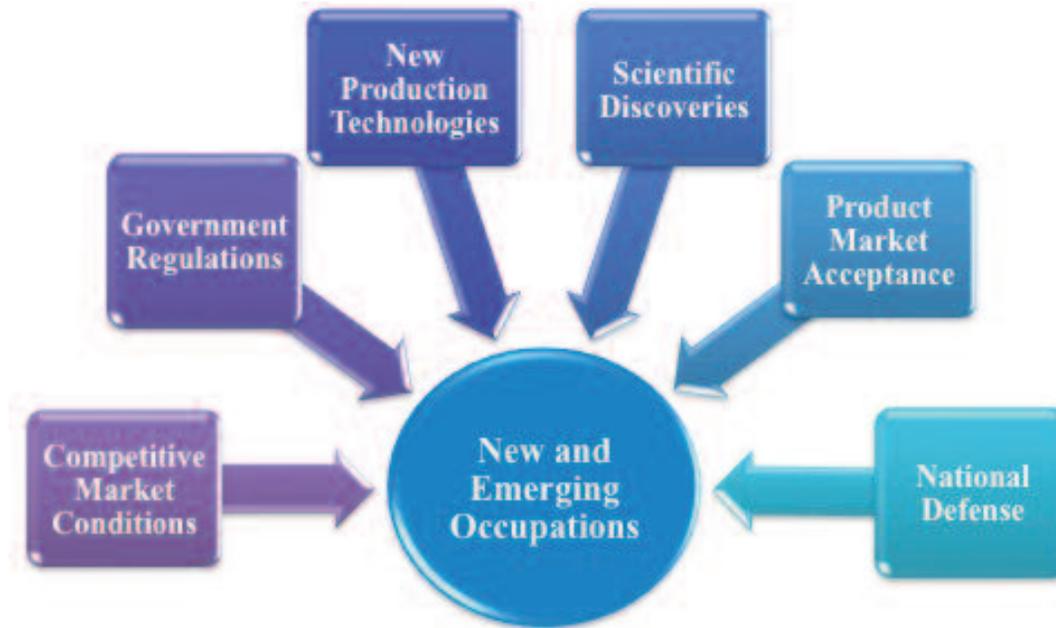
Transportation Industry and Education

Year	Field of Study	Institution	Bachelor's Degree	Total Enrollment	Degrees Conferred	Average Annual Job Openings	Annual Gaps/Deficit
2011	Construction Laborers	Illinois Eastern-Wabash Valley	Institution Total	64	8		
2011	Construction Laborers	John A. Logan College	Institution Total	1	0		
2011	Construction Laborers	Joliet Junior College	Institution Total	5	4		
2011	Construction Laborers	Kaskaskia College	Institution Total	9	48		
2011	Construction Laborers	Lake Land College	Institution Total	52	100		
2011	Construction Laborers	Parkland College	Institution Total	0	3		
2011	Construction Laborers	Lewis & Clark Community College	Institution Total	61	0		
2011	Construction Laborers	Rend Lake College	Institution Total	19	24		
2011	Construction Laborers	Richland Community College	Institution Total	36	65		
2011	Construction Laborers	Rock Valley College	Institution Total	5	1		
2011	Construction Laborers	Southeastern Illinois College	Institution Total	0	9		
2011	Construction Laborers	South Suburban Coll. of Cook Co.	Institution Total	6	15		
2011	Construction Laborers	Southwestern Illinois College	Institution Total	114	17		
2011	Construction Laborers		Community Col. Total	372	294		
2011	Construction Laborers		2011 Year Total	372	294	862	Gap of 568 Workers
2011	Transportation Inspectors	Illinois Institute of Technology	Institution Total	8	2		
2011	Transportation Inspectors		Independent NFP Inst. Total	8	2		
2011	Transportation Inspectors		2011 Year Total	8	2	47	Gap of 45 Workers

APPENDIX F

Transportation Industry and Education

Factors that Lead to the Creation of New and Emerging Occupations



Occupation	Job Description	Transportation Modes	Institution Name
Air Quality Control Specialists	Perform a wide range of air quality compliance duties including equipment and facility permitting, compliance auditing, emissions control research, recordkeeping and reporting, participation in planning processes.	Air & Highways	Not Available
Automotive Engineering Technicians	Assist engineers in determining the practicality of proposed product design changes and plan and carry out tests on experimental test devices or equipment for performance, durability, or efficiency.	Highways	Southern Illinois University Carbondale
Automotive Engineers	Develop new or improved designs for vehicle structural members, engines, transmissions, or other vehicle systems, using computer-assisted design technology. Direct building, modification, or testing of vehicle or components.	Highways	Not Available

APPENDIX F

Transportation Industry and Education

Occupation	Job Description	Transportation Modes	Institution Name
Biochemical Engineers	Develop usable, tangible products, using knowledge of biology, chemistry, or engineering. Solve problems related to materials, systems, or processes that interact with humans, plants, animals, microorganisms, or biological materials.	Water	Illinois State University, U of I at Chicago, U of I at Urbana/Champaign, Augustana College, Benedictine University, Blackburn College, Bradley University, Illinois College, Illinois Institute of Technology, Judson University, Knox College, Lewis University, Loyola University of Chicago, North Central College, Rockford College, Roosevelt University, Rush University
Brownfield Redevelopment Specialists and Site Managers	Plan and direct cleanup and re-development of contaminated properties for reuse. Does not include properties sufficiently contaminated to qualify as Superfund sites.	Air, Rail, Water, Highway, & Pipeline	Not Available
Carbon Capture and Sequestration Systems Installers	Install and maintain carbon energy capture or carbon sequestration facilities.	Air, Rail, Water & Highways	Not Available
Carbon Credit Traders	Represent companies in the sale and purchase of carbon emissions permits.	Air, Rail, Water & Highways	Not Available
Carbon Trading Analysts	Analyze pricing and risks of carbon trading products; develop solutions to help clients hedge carbon exposure and risk.	Air, Rail, Water & Highways	Not Available
Chief Sustainability Officers	Communicate and coordinate with management, shareholders, customers, and employees to address sustainability issues. Enact or oversee a corporate sustainability strategy.	Air, Rail, Water, Highway, & Pipeline	Not Available
Climate Change Analysts	Research and analyze policy developments related to climate change. Make climate-related recommendations for actions such as legislation, awareness campaigns, or fundraising approaches.	Air, Rail, Water & Highway	Not Available

APPENDIX F

Transportation Industry and Education

Occupation	Job Description	Transportation Modes	Institution Name
Compliance Managers	Plan, direct, or coordinate activities of an organization to ensure compliance with ethical or regulatory standards.	Air, Rail, Water, Highway, & Pipeline	Not Available
Electromechanical Engineering Technologists	Assist electromechanical engineers in such activities as computer-based process control, instrumentation, or machine design. May prepare layouts of machinery or equipment, plan the flow of work, conduct statistical studies, or analyze production costs.	Highways	College of DuPage, College of Lake County, Elgin Community College, Heartland Community College, Illinois Valley Community College, John A. Logan College, Kishwaukee College, Lake Land College, Oakton Community College, Richland Community College, Wabunsee Community College, William Rainey Harper College
Electronics Engineering Technologists	Assist electronics engineers in such activities as electronics systems and instrumentation design or digital signal processing.	Air, Rail, Water, & Highways	Southern Illinois University Carbondale, College of DuPage
Energy Engineers	Design, develop, or evaluate energy-related projects or programs to reduce energy costs or improve energy efficiency during the designing, building, or remodeling stages of construction. May specialize in electrical systems; heating, ventilation, and air-conditioning (HVAC) systems; green buildings; lighting; air quality; or energy procurement.	Air, Rail, Water, Highway, & Pipeline	Illinois State University, Black Hawk College, CCC - Richard J. Daley College, CCC - Wilbur Wright College, College of DuPage, Illinois Central College, Illinois Valley Community College, John A. Logan College, Rock Valley College, Sauk Valley Community College
Emergency Management Specialists	Plan and coordinate plans to respond to natural, wartime, and technological disasters. Emergency management doesn't necessarily avert or eliminate the threats themselves, although the study and prediction of the threats is an important part of the field.	Air, Rail, Water, Highway, & Pipeline	Concordia University, River Forest, DePaul University, Dominican University, Elmhurst College, Illinois Institute of Technology, Judson University, Loyola University Chicago, Northwestern University, Roosevelt University, Saint Xavier University, Trinity Christian College, University of Illinois at Springfield.

APPENDIX F

Transportation Industry and Education

Occupation	Job Description	Transportation Modes	Institution Name
Environmental Economists	Conduct economic analysis related to environmental protection and use of the natural environment, such as water, air, land, and renewable energy resources. Evaluate and quantify benefits, costs, incentives, and impacts of alternative options using economic principles and statistical techniques.	Air, Rail, Water, & Highways	Not Available
Financial Quantitative Analysts	Develop quantitative financial products used to inform individuals or financial institutions engaged in saving, lending, investing, borrowing, or managing risk. Investigate methods for financial analysis to create mathematical models used to develop improved analytical tools or advanced financial investment instruments.	Air, Rail, Water, Highways & Pipeline	Not Available
Freight Forwarders	Research rates, routings, or modes of transport for shipment of products. Maintain awareness of regulations affecting the international movement of cargo. Make arrangements for additional services, such as storage or inland transportation.	Air, Rail, Water, & Highways	Not Available
Fuel Cell Engineers	Design, evaluate, modify, or construct fuel cell components or systems for transportation, stationary, or portable applications.	Air, Rail, Water, & Highways	Not Available
Geographic Information Systems Technicians	Assist scientists, technologists, or related professionals in building, maintaining, modifying, or using geographic information systems (GIS) databases. May also perform some custom application development or provide user support.	Highways	Not Available

APPENDIX F

Transportation Industry and Education

Occupation	Job Description	Transportation Modes	Institution Name
Geologists	Involved in every aspect of locating, removing, refining, and utilizing earthen resources, as well as responsibly managing the land where resources are found, both pre- and post-use. Develop a conceptual understanding of sites and potential processes that control the occurrence and transport of materials and contaminants for purposes of determining the stability and suitability of localities under consideration for urbanization and/or waste disposal.	Highways & Water	Eastern Illinois University, Illinois State University, Northeastern Illinois University Northern Illinois University, Southern Illinois University Carbondale, U of I at Chicago, U of I at Urbana/Champaign, Western Illinois University, Augustana College, Bradley University Concordia University, Northwestern University, Wheaton College
Greenhouse Gas Emissions Permitting Consultants	Conduct data gathering, data analysis, calculation, inventories and reduction planning, and be familiar with emerging regulations on greenhouse gas management.	Highways	Not Available
Greenhouse Gas Emissions Report Verifiers	Conduct data audits of reported greenhouse gas emissions inventories.	Highways	Not Available
Hydroelectric Plant Technicians	Monitor and control activities associated with hydropower generation. Operate plant equipment, such as turbines, pumps, valves, gates, fans, electric control boards, and battery banks. Monitor equipment operation and performance and make necessary adjustments to ensure optimal performance. Perform equipment maintenance and repair as necessary.	Water	Not Available
Hydroelectric Production Managers	Manage operations at hydroelectric power generation facilities. Maintain and monitor hydroelectric plant equipment for efficient and safe plant operations.	Water	Not Available

APPENDIX F

Transportation Industry and Education

Occupation	Job Description	Transportation Modes	Institution Name
Hydrologists	Apply scientific knowledge and mathematical principles to solve water-related problems in society: problems of quantity, quality and availability. Concerned with finding water supplies for cities or irrigated farms, or controlling river flooding or soil erosion. Work in environmental protection: preventing or cleaning up pollution or locating sites for safe disposal of hazardous wastes. Involved in both field investigations and office work. In the field, they may collect basic data; oversee testing of water quality, direct field crews and work with equipment.	Water	University of Illinois at Urbana-Champaign
Investment Underwriters	Manage communications or negotiations between corporate issuers of securities and clients regarding private equity investments. Underwrite the issuance of securities to provide capital for client growth. Negotiate and structure the terms of mergers or acquisitions.	Highways	Not Available
Logistics Analysts	Analyze product delivery or supply chain processes to identify or recommend changes. May manage route activity including invoicing, electronic bills, and shipment tracing.	Air, Rail, Water, & Highways	Not Available
Logistics Engineers	Design or analyze operational solutions for projects such as transportation optimization, network modeling, process and methods analysis, cost containment, capacity enhancement, routing and shipment optimization, or information management.	Air, Rail, Water, & Highways	Not Available
Mechanical Engineering Technologists	Assist mechanical engineers in such activities as generation, transmission, or use of mechanical or fluid energy. Prepare layouts of machinery or equipment or plan the flow of work. May conduct statistical studies or analyze production costs.	Air, Rail, Water, Highway, & Pipeline	Not Available

APPENDIX F

Transportation Industry and Education

Occupation	Job Description	Transportation Modes	Institution Name
Mechatronics Engineers	Research, design, develop, or test automation, intelligent systems, smart devices, or industrial systems control.	Air, Rail, Water, Highway, & Pipeline	Not Available
Microsystems Engineers	Research, design, develop, or test microelectromechanical systems (MEMS) devices.	Air, Rail, Water, Highway, & Pipeline	Not Available
Nanosystems Engineers	Design, develop, or supervise the production of materials, devices, or systems of unique molecular or macromolecular composition, applying principles of nanoscale physics and electrical, chemical, or biological engineering.	Air, Rail, Water, Highway, & Pipeline	Not Available
Nanotechnology Engineering Technicians	Operate commercial-scale production equipment to produce, test, or modify materials, devices, or systems of molecular or macromolecular composition. Work under the supervision of engineering staff.	Air, Rail, Water, Highway, & Pipeline	William Rainey Harper College
Recycling and Reclamation Workers	Prepare and sort materials or products for recycling. Identify and remove hazardous substances. Dismantle components of products such as appliances.	Water & Highway	Not Available
Recycling Coordinators	Supervise curbside and drop-off recycling programs for municipal governments or private firms.	Water & Highway	Not Available
Regulatory Affairs Managers	Plan, direct, or coordinate production activities of an organization to ensure compliance with regulations and standard operating procedures.	Air, Rail, Water, Highway, & Pipeline	Not Available
Regulatory Affairs Specialists	Coordinate and document internal regulatory processes, such as internal audits, inspections, license renewals, or registrations. May compile and prepare materials for submission to regulatory agencies.	Air, Rail, Water, Highway, & Pipeline	Not Available

APPENDIX F

Transportation Industry and Education

Occupation	Job Description	Transportation Modes	Institution Name
Remote Sensing Scientists and Technologists	Apply remote sensing principles and methods to analyze data and solve problems in areas such as natural resource management, urban planning, or homeland security. May develop new sensor systems, analytical techniques, or new applications for existing systems.	Air, Rail, Water, Highway, & Pipeline	Not Available
Robotics Technicians	Build, install, test, or maintain robotic equipment or related automated production systems.	Air, Rail, Water, Highway, & Pipeline	College of DuPage, Illinois Central College, South Suburban Coll. of Cook Co., Wabunsee Community College
Scientists	Study things like the ocean and its creatures, volcanoes, or machines. Identify scientific laws or processes that can be observed over and over and then explain why the process or law happens. Scientists use these laws to make predictions as what will happen.	Air, Rail, Water, Highway, & Pipeline	College of Lake County, Northwestern University, Illinois Valley Community College
Sustainability Specialists	Address organizational sustainability issues, such as waste stream management, green building practices, and green procurement plans.	Air, Rail, Water, Highway, & Pipeline	Not Available
Sustainable Design Specialists	Design from the outset for recycling, reuse or remanufacturing.	Air, Rail, Water, Highway, & Pipeline	Not Available
Transportation Engineers	Develop plans for surface transportation projects, according to established engineering standards and state or federal construction policy. Prepare designs, specifications, or estimates for transportation facilities. Plan modifications of existing streets, highways, or freeways to improve traffic flow.	Highway	Bradley University, Illinois Institute of Technology, Northwestern University, Southern Illinois University at Carbondale, Southern Illinois University Edwardsville, University of Illinois at Chicago, University of Illinois at Urbana - Champaign

APPENDIX F

Transportation Industry and Education

Occupation	Job Description	Transportation Modes	Institution Name
Transportation Planners	Prepare studies for proposed transportation projects. Gather, compile, and analyze data. Study the use and operation of transportation systems. Develop transportation models or simulations.	Air, Rail, Water, & Highway	Bradley University, Illinois Institute of Technology, Southern Illinois University at Carbondale, Northwestern University, Southern Illinois University Edwardsville, University of Illinois at Chicago, University of Illinois at Urbana - Champaign
Validation Engineers	Design or plan protocols for equipment or processes to produce products meeting internal and external purity, safety, and quality requirements.	Air, Rail, Water, Highway, & Pipeline	Not Available
Water Resource Specialists	Design or implement programs and strategies related to water resource issues such as supply, quality, and regulatory compliance issues.	Water	Not Available
Water/Wastewater Engineers	Design or oversee projects involving provision of potable water, disposal of wastewater and sewage, or prevention of flood-related damage. Prepare environmental documentation for water resources, regulatory program compliance, data management and analysis, and field work. Perform hydraulic modeling and pipeline design.	Water	Lake Land College, Lewis & Clark Community College

Sources: O*NET Resource Center, Illinois Board of Higher Education, & the Accreditation Board for Engineering and Technology

APPENDIX F

Transportation Industry and Education

The following colleges in Illinois prepare students for new and emerging occupations.

- Southern Illinois University Carbondale provides students with the necessary skills to become **automotive engineering technicians** (Transportation Mode: Highways).
- Illinois State University, U of I at Chicago, U of I at Urbana/Champaign, Augustana College, Benedictine University, Blackburn College, Bradley University, Illinois College, Illinois Institute of Technology, Judson University, Knox College, Lewis University, Loyola University of Chicago, North Central College, Rockford College, Roosevelt University, and Rush University provide students with necessary skills to become **biochemical engineers** (Transportation Mode: Water).
- College of DuPage, College of Lake County, Elgin Community College, Heartland Community College, Illinois Valley Community College, John A. Logan College, Kishwaukee College, Lake Land College, Oakton Community College, Richland Community College, Waubensee Community College, and William Rainey Harper College provide students with necessary skills to become **electromechanical engineering technologists** (Transportation Modes: Air, Rail, Water, Highway & Pipeline).
- Southern Illinois University Carbondale and College of DuPage provide students with necessary skills to become **electronics engineering technologists** (Transportation Modes: Air, Rail, Water, & Highway).
- Concordia University, River Forest, DePaul University, Dominican University, Elmhurst College, Illinois Institute of Technology, Judson University, Loyola University Chicago, Northwestern University, Roosevelt University, Saint Xavier University, Trinity Christian College and University of Illinois at Springfield provide students with necessary skills to become **emergency management specialists** (Transportation Modes: Air, Rail, Water, Highway & Pipeline).
- Illinois State University, Black Hawk College, CCC - Richard J. Daley College, CCC - Wilbur Wright College, College of DuPage, Illinois Central College, Illinois Valley Community College, John A. Logan College, Rock Valley College, and Sauk Valley Community College provide students with necessary skills to become **energy engineers** (Transportation Modes: Air, Rail, Water, Highway, & Pipeline).
- Eastern Illinois University, Illinois State University, Northeastern Illinois University, Northern Illinois University, Southern Illinois University Carbondale, U of I at Chicago, U of I at Urbana/Champaign, Western Illinois University, Augustana College, Bradley University, Concordia University, Northwestern University and Wheaton College provide students with necessary skills to become **geologists** (Transportation Modes: Water & Highways).
- University of Illinois at Urbana-Champaign provides students with necessary skills to become **hydrologists** (Transportation Mode: Water).
- William Rainey Harper College provides students with necessary skills to become **nanotechnology engineering technicians** (Transportation Modes: Air, Rail, Water, Highway, & Pipeline).
- College of DuPage, Illinois Central College, South Suburban Coll. of Cook Co., Waubensee Community College provide students with necessary skills to become **robotics technicians** (Transportation Modes: Air, Rail, Water, Highway, & Pipeline).
- College of Lake County, Northwestern University and Illinois Valley Community College provide students with necessary skills to become **scientists** (Transportation Modes: Air, Rail, Water, Highway & Pipeline).
- Bradley University, Illinois Institute of Technology, Northwestern University, Southern Illinois University at Carbondale, Southern Illinois University Edwardsville, University of Illinois at Chicago, University of Illinois at Urbana – Champaign provide students with necessary skills to become **transportation engineers** (Transportation Mode: Highway).
- Bradley University, Illinois Institute of Technology, Southern Illinois University at Carbondale, Northwestern University, Southern Illinois University Edwardsville, University of Illinois at Chicago, University of Illinois at Urbana – Champaign provide students with necessary skills to become **transportation planners** (Transportation Modes: Air, Rail, Water, & Highway).
- Lake Land College, Lewis & Clark Community College provide students with necessary skills to become **water/wastewater engineers** (Transportation Mode: Water).

ENDNOTES

- 1 Illinois Department of Transportation, [Transforming Transportation for Tomorrow | FY 2013-2018 Multi-Modal Improvement Program](#), pg. 108.
- 2 Illinois Department of Transportation, [Transforming Transportation for Tomorrow](#), Pg. 43
- 3 Illinois Department of Transportation, [Transforming Transportation for Tomorrow](#), Pg. 42
- 4 “Human Capital Management Overview”, The Office of Personnel Management, accessed 5/15/14, <http://www.opm.gov/policy-data-oversight/human-capital-management/#url=Overview>
- 5 Office of Personnel Management, [The Human Capital Assessment and Accountability Framework \(HCAAF\) – Systems, Standards and Metrics](#) (March 2006).
- 6 Ibid.
- 7 Illinois Department of Transportation, [Diversity and Outreach Annual Plan](#).
- 8 Illinois Department of Transportation, [Transforming Transportation for Tomorrow](#), Pg. 43
- 9 Due to employment disclosure regulations by data collection agencies and private companies the numbers for Rail Transportation and Postal Services are underrepresented. Due to the presence of 7 Class A rail companies in the state, it can be assumed that rail transportation is a major contributor to the success of this sector in the state.
- 10 Transportation Distribution & Logistics, Illinois Programs of Study, accessed 5/15/14, <http://ilprogramsofstudy.org/>
- 11 “Illinois Pathways, Supporting Local P-20 Science, Technology, and Math Programs”, Illinois Pathways, accessed 5/15/14, http://www.ilpathways.com/Pages/Learning_Exchanges.aspx
- 12 City Colleges of Chicago College to Careers, City Colleges of Chicago, accessed 5/15/14, <http://www.ccc.edu/menu/pages/college-to-careers.aspx>
- 13 Office of Personnel Management, [The Human Capital Assessment and Accountability Framework \(HCAAF\) – Systems, Standards and Metrics](#) (March 2006).
- 14 “Human Capital Management Strategic Alignment”, Office of Personnel Management, accessed 5/15/14, <http://www.opm.gov/policy-data-oversight/human-capital-management/strategic-alignment/>
- 15 “Human Capital Management and Talent Management”, Office of Personnel Management, accessed 5/15/14, <http://www.opm.gov/policy-data-oversight/human-capital-management/talent-management/>
- 16 “Human Capital Management and Leadership & Knowledge Management”, Office of Personnel Management, accessed 5/15/14, <http://www.opm.gov/policy-data-oversight/human-capital-management/leadership-knowledge-management/#url=Overview>
- 17 “Human Capital Management and Performance Culture”, Office of Personnel Management, accessed 5/15/14, <http://www.opm.gov/policy-data-oversight/human-capital-management/performance-culture/#url=Overview>
- 18 “Human Capital Management and Accountability”, Office of Personnel Management, accessed 5/15/14, <http://www.opm.gov/policy-data-oversight/human-capital-management/accountability/#url=Overview>