

Regional Occupation Alignment Dashboard (ROAD) Methodology

Introduction

This document includes detailed technical methodology for the Massachusetts Department of Economic Research (DER)'s Regional Occupation Alignment Dashboard (ROAD) 1.01. This document was last updated on May 12, 2026.

The [Regional Occupation Alignment Dashboard \(ROAD\)](#) is designed to help state and regional leaders in workforce development, education, and policy make data-driven decisions about workforce training and education. The dashboard identifies high-demand, high-wage occupations and highlights how local education and training programs align with projected job openings across Massachusetts and its workforce regions.

ROAD provides a starting point for understanding potential gaps in a region's workforce supply, and workforce leaders should consider additional information and perspectives - including employer input, alternative supply pipelines, and other data - for a complete picture of workforce supply and demand.

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Methodology and Data Sources

Sources

The Regional Occupation Alignment Dashboard (ROAD) utilizes the Bureau of Labor Statistics (BLS) 2023 Standard Occupational Classification (SOC) structure, which encompasses 832 detailed occupations across all Massachusetts regions. The foundation of this analysis relies on DER Long-Term Occupational Projections and Occupational Employment and Wage Statistics (OEWS) data. Additional sources including IPEDS, American Community Survey (ACS), and Lightcast are incorporated to enhance data quality and provide comprehensive occupational insights across the Commonwealth.

Below lists all notable data sources:

Source	Vintage	Variables Used / Purpose
BLS SOC Structure	2023	SOC codes, occupation titles, major group classification
DER OEWS	2024 release covering 2023	Entry-, median-, and experienced-level annual wages by SOC and region
DER Long-Term Projections	2025 release covering 2023–2033	Base-year employment, 10-year projected growth, annual openings
NCES CIP Structure	2020	CIP codes, program names
IPEDS Completions Data	2025 release for the 2022–2023 school year	Degree completions by institution, CIP, award level used to estimate training pipelines
IPEDS Institution Data	2025 release for the 2022–2023 school year	Institution identifiers and geographic attributes
IPEDS Distance Education	2025 release for the 2022–2023 school year	Fully distance-education CIPs used to adjust pipeline supply
NCES CIP-SOC Crosswalk	2020	Mapping of CIP programs to SOC occupations for graduate allocation
BLS National Projections	2024 release covering 2023	Typical education needed for entry, work experience in a related occupation, educational attainment distribution
Lightcast API	2023	Total employment (QCEW + self-employed), annual openings, wages, and industry concentration measures
Lightcast Job Postings API	2017-2024	Level of education required in job postings used for pipeline display criteria

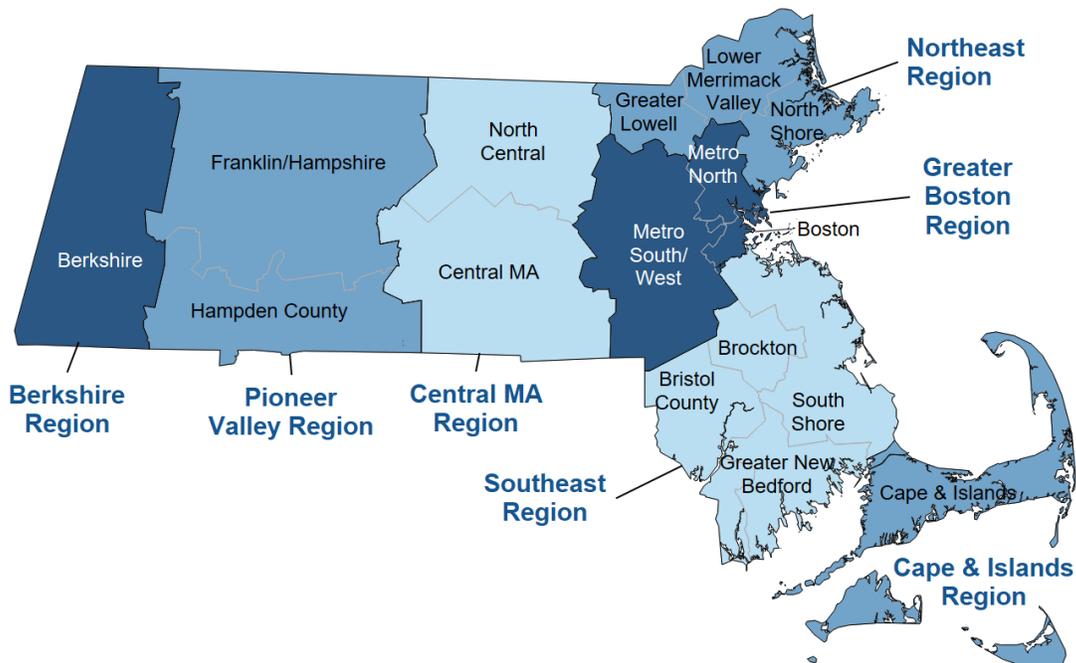
Source	Vintage	Variables Used / Purpose
Census ACS/PUMS	2025 release for 2023 5-year	Wage distributions used for wage imputation, field-of-bachelor's degree used for CIP-SOC crosswalk additions and employment patterns, educational attainment of Massachusetts workers
MassCEC Workforce Needs Assessment	2023 release covering 2023	Clean energy priority occupation indicator
O*NET Occupation Data	Retrieved April 2025	Occupational descriptions, sample job titles
BLS National OEWS	2024 release covering 2023	National employment used for industry quotient calculations

Aggregation

The ROAD dashboard provides an occupational-level analysis of all the following geographies:

- Statewide
- Workforce Development Areas (WDAs)
- Workforce Skills Cabinet Regions (WSCs)

The seven WSC regions are simply larger groupings of the 16 WDA areas. The map below shows how the WDAs fit into the 7 broader regions labeled in blue.



The first stage of the ROAD occupational data starts with statewide and WDA-level data, which includes variables such as the occupation, employment, annual openings, wages, and growth

projections. To build the WSC data, DER aggregates the data from the WDAs based on the relationship between WDA and WSC regions.

For additive metrics like employment and annual openings, the WSC values are calculated by summing the corresponding WDA values within each region. For example, to build the Pioneer Valley WSC employment figures, the employment data is summed from Franklin/Hampshire and Hampden County WDAs.

For wage data, an employment-weighted average is used to account for the fact that the same occupation may pay differently across regions within a WSC. The weight is calculated as each WDA's share of total employment for that occupation within the WSC. For example, since construction managers are paid a median annual salary of \$126,000 in Hampden County WDA versus \$103,000 in Franklin/Hampshire WDA, and Hampden County employs roughly 70% of construction managers in the Pioneer Valley WSC, the WSC median wage would be calculated as:

$$\text{WSC Median Wage} = (\$126,000 \times 0.70) + (\$103,000 \times 0.30) = \$119,100$$

This same employment-weighting methodology is applied to growth projections to ensure that areas with larger employment bases have proportionally greater influence on the regional averages.

Imputation

ROAD is built from DER projections and OEWS data that are subject to suppression rules. When possible, suppressed values are imputed using Lightcast, as well as ACS and BLS data sources. A tooltip in ROAD indicates when one or more values have been imputed for a particular occupation/region.

Exclusions from ROAD

Data is excluded from ROAD for the two following reasons:

Data integrity

- DER staff analysis has determined that Lightcast estimates are unlikely to be realistic for an occupation/region.
- There is limited data available for imputation (e.g. detailed post-secondary teacher occupations).

Confidentiality

- There are dominant employers of an occupation in a region, resulting in sensitivity around specific estimates.
- The region's estimates are generated from suppressed data (see aggregation section).

Opportunity Star Methodology

The Massachusetts Department of Economic Research (DER)'s Opportunity Star System is a three-star rating framework designed to help job seekers, students, and policymakers identify occupations that offer the best combination of high wages and strong long-term growth in Massachusetts.

Occupations are rated from **0 to 3 stars** based on their performance relative to other jobs in the same region.

Step 1: The Prerequisite

To be eligible for any stars, an occupation must first meet a minimum demand threshold:

- **Minimum Demand:** The occupation must be above the **50th percentile** for annual openings in the region compared to all other occupations.
- **Note:** Occupations failing this check are automatically assigned **0 Stars**.

Step 2: Scoring Components

If the prerequisite is met, the occupation is evaluated on two dimensions: **Demand** and **Wages**.

1. Demand-Related Measures

Demand is determined by either the expected number of annual openings or the rate of employment growth. Occupations that do not qualify for in-demand or high-demand categories are described as “low-demand”.

Demand Category	Criteria
In-Demand	Top 25% in Annual Openings OR Top 50% in Growth Rate
High Demand	Top 10% in Annual Openings OR Top 25% in Growth Rate

2. Wage-Related Measures

Wages are evaluated against regional and education-specific benchmarks. Occupations that do not qualify for Education-wage, High-Wage, or Top-Wage categories are described as “low-wage.”

Wage Category	Criteria	Example
Education Wage	Median wage exceeds the regional median for jobs requiring the same education level	Food Service Managers earn more than the median wage for high school-level jobs in their region. ¹
High Wage	Median wage exceeds the regional median for all jobs	Electricians earn above the median wage for all jobs in a region. ²
Top Wage	Meets both Education Wage and High Wage criteria	Mail Carriers in a region earn more than both the no-credential median and the overall regional median. ³

Step 3: Opportunity Star Assignment

Opportunity Stars are assigned by combining the **Demand** and **Wage** categories established above. For example, 3-star jobs require high demand and top wage designations. Similarly, 2-star and 1-star occupations also meet a combination of these demand and wage benchmarks relative to the given region, but the criteria are less stringent than for 3-star occupations.

Opportunity Stars	Demand Category	Wage Category
3 Stars	High	Top
2 Stars	High	High
2 Stars	In-Demand	Top
1 Star	High	Education
1 Star	In-Demand	Education
1 Star	In-Demand	High

¹ Food service managers in the Metro South/West WDA earn a median annual wage of roughly \$78,000, compared to \$57,000 for all workers with only a high school diploma in that region. Since food service managers earn more than their educational peers, they meet the education wage criteria.

² Electricians in the Central MA WDA meet this criteria with a median wage of \$73,000, which exceeds the region's overall median wage of around \$59,000.

³ In Hampden County WDA, mail carriers meet this top wage criteria as they exceed both their educational peer wages and the regional median.

Sector Alignment

To identify jobs that are especially important to key industries—such as advanced manufacturing, life sciences, technology, healthcare, and clean energy—each occupation’s share of employment within an industry is compared to its share of employment across the Massachusetts economy.

This approach uses a location quotient–style calculation. The location quotient (LQ) measures how concentrated an occupation is in a particular industry relative to its presence in the overall workforce. If an occupation’s share within an industry is at least 25 percent higher than its statewide share, it is considered particularly important to that industry and labeled “Aligned.”

If $LQ > 1.25$, the occupation is considered Aligned with that industry.

Example: Software Developers

If software developers account for 8 percent of jobs in the technology sector but only 2 percent of jobs statewide, the resulting location quotient is 4.0. Because 4.0 exceeds the 1.25 threshold, software developers are considered highly concentrated—and therefore Aligned—with the technology sector.

This method highlights occupations that are especially critical to the success of key industries in Massachusetts, supporting workforce planning and investment decisions.

Training Pipeline Allocation Methodology

The training pipeline allocation process establishes the supply side of the Regional Occupation Alignment Dashboard (ROAD). It processes degree completion data from Massachusetts post-secondary institutions and allocates graduates to occupations within regional labor markets to estimate the supply of newly trained local workers available to fill openings.

Pipeline Data

IPEDS Data

Integrated Postsecondary Education Data System (IPEDS) data is used to source degree completions in Massachusetts in 2023. Institutions report completions by program of study to IPEDS using 6-digit Classification of Instructional Programs (CIP) codes, as well as by award level. These levels are grouped into five degree types:

- Postsecondary certificates: Duration up to 2 years.
- Associate's degrees: Includes certificates of 2-4 years.
- Bachelor's degrees: Includes post-baccalaureate degrees.
- Master's degrees: Includes post-master's degrees.
- Doctoral or professional degrees: Includes research, scholarship or professional practice.

Exclusions:

To accurately reflect the pool of newly trained workers available to fill openings, this methodology is oriented towards under-inclusion rather than over-inclusion when estimating annual training pipelines. The following groups are excluded:

- **Fully remote programs at private universities:** Graduates are less likely to be physically located in Massachusetts.
- **Northeastern University Professional Programs (Master's and Doctoral):** Due to a distributed campus model, these include a high volume of out-of-state graduates.
- **Master's Degrees in Education:** Graduates typically represent the upskilling of workers within an occupation and typically do not represent newly trained talent available to fill openings in a different occupation.

CIP-to-SOC Alignment

Graduates are mapped to occupations using a modified CIP-to-SOC crosswalk.

Crosswalk Development

- **Baseline:** The 2020 CIP-SOC crosswalk published by the Bureau of Labor Statistics and the National Center for Education Statistics is used as a baseline. This links post-secondary academic programs to occupations that require relevant skills and knowledge.
- **Empirical Additions:** 55 CIP-SOC mappings were added based on analysis of 2019-2023 5-year American Community Survey data. If a specific field-of-degree was common for workers in an occupation but missing in the federal crosswalk, the mapping was evaluated manually using data on worker professional profiles from Lightcast along with other sources.
- **Experience Filter:** Mappings to occupations requiring 5+ years of work experience according to O*NET are removed to ensure feasibility for new graduates.
- **Degree-Level Appropriateness:** CIP-SOC combinations are filtered by degree suitability using ACS education attainment data for Massachusetts workers:
 - **Under-qualification threshold:** SOC's are excluded as options for degree types when 80% or more of workers in that occupation have higher educational attainment. For example, 92% of Clinical Psychologists report having more than a bachelor's degree, so that occupation is removed as an option for bachelor's degree graduates.
 - **Over-qualification thresholds:**
 - Bachelor's/Master's: Excluded if 80% or more of workers have a lower degree.
 - Doctoral: Excluded when 90% or more of workers in that occupation have lower degree.

Note on CIP Granularity:

Effective mapping of graduates to occupations relies on detailed program reporting. For example, the CIP-SOC crosswalk maps master's graduates of specific Nursing Practice programs to the Nurse Practitioner occupation. However, a few institutions report all master's level completions together in a broad Nursing CIP code. This means that none of their graduates can be mapped to Nurse Practitioners, even if some are graduating with those skills. Thus, ROAD's pipeline estimates for certain occupations, including Nurse Practitioners, may be slightly lower than the actual training pipelines.

Allocation Methodology

To prevent inflating supply estimates by counting a single graduate across multiple eligible occupations, ROAD allocates each graduate to a single occupation. This is modeled as a stable matching problem using the Gale-Shapley deferred acceptance algorithm.

- **Statewide (Massachusetts):** All graduates from Massachusetts institutions matched to statewide occupational openings.
- **Workforce Skills Cabinet (WSC) Regions:** Graduates from institutions within a region are matched to openings in that same region.

Preference Ranking System

Graduate Preferences:

- Graduates rank occupations based on **Entry-level wages** (50% weight) and **Field Alignment** (50% weight), derived from national ACS employment patterns for recent graduates.

Employer Preferences:

- Occupations rank graduates primarily by degree type, with strict preference for higher degrees:
 - Doctoral or professional degree
 - Master's degree
 - Bachelor's degree
 - Associate's degree
 - Some college, no degree
- Within the same degree type, rankings prioritize programs in fields that are more common among workers in that occupation based on national employment patterns.

Matching Process

- **Primary Matching (Student-Optimal):** Graduates "apply" to their highest-ranked occupation. Occupations tentatively accept candidates up to their projected opening capacity based on their defined preferences. Rejected graduates apply to their next choice. This continues until no matches can be improved.
- **Surplus Allocation:** Unmatched graduates are allocated using a hierarchical fallback system:
 - **Single SOC Programs:** Programs aligned to only one occupation are allocated 100% to that occupation
 - **Pattern matching:** Uses allocation distribution from successful matches in the primary phase (at Program, Field of Degree, or 4-digit CIP level).
 - **Graduate Preferences + Job Availability:** If no patterns exist, allocation is based on a mix of graduate preference rankings (50%) with relative job opening availability (50%).

Pipeline Display Criteria

Not all occupations have a defined pipeline from accredited postsecondary institutions. To avoid misleading estimates, an occupation is shown in the pipeline view of ROAD only when specific validity criteria are met:

1. It is classified as *IPEDS-Primary*; OR
2. The graduate supply is estimated to be at least 85% of projected job openings in a region (regardless of classification).

IPEDS-Primary Classification

An occupation is considered *IPEDS-Primary* if accredited programs are determined to be the primary training source. This classification uses BLS education requirements, ACS workforce educational attainment data, and Lightcast job postings.

- **Bachelor's+ Occupations:** Automatically classified as *IPEDS-Primary* if aligned with a CIP.
- **Associate's Occupations:** Classified as *IPEDS-Primary* if >70% of job postings require a degree, or if workforce data signals a degree requirement.
- **Certificate/Some College Occupations:** Classified as *IPEDS-Primary* if >60% of the workforce has some college education and >20% of postings require a degree.

Manual Adjustments: *Computer Support Specialists* and *Paralegals* are adjusted to non-*IPEDS-primary* due to frequent recruitment from non-accredited pathways.

Exclusions

The following occupations are excluded from the pipeline view despite validity criteria.

- **Managers, All Other:** Too generic; results in artificial graduate overflows.
- **Legislators & Athletes:** Employment is based on elections or innate skill, not formal education.

Changelog

Version 1.01 (05/12/2026)

Additional occupations are now displayed that were previously suppressed following an update to the imputation methodology.

Contact

See [mass.gov](https://www.mass.gov) for additional information on ROAD, including data source and additional instructions for using the dashboard.

Please [contact the Massachusetts Department of Economic Research](#) with questions or to request data in spreadsheet format.