

A photograph of an offshore wind farm under construction. In the foreground, a large white wind turbine stands on a pile in the dark ocean. In the background, several other turbines are visible, along with a large construction vessel equipped with a crane, positioned near a platform. The sky is overcast and grey. The right side of the image is overlaid with a blue gradient containing text.

2023

City of Salem Offshore Wind Economic Diversification Study

Prepared for MassHire North Shore
Workforce Board and the City of Salem

March 2023

Table of Contents

- Introduction 3
- Key Findings 4
- Overview of Port Project..... 6
- Demand for Port-Related Workers 6
- Characteristics of Port-Related Workers 9
- Supply of Regional Workers..... 12
- Environmental Justice Communities..... 13
- Projected Workforce Needs and Gaps..... 17
- Projected Occupational Gaps..... 19
- Training Inventory..... 23
- Union Involvement at Port 29
- Proposed Pre-Apprenticeship Program 30
- The Future of the Port 31
- Methodology 33
- Appendix A: Industry Analysis..... 35
- Appendix B: Salem Occupational Data..... 39
- Appendix C: Training Inventory 42

Introduction

This report was commissioned by the MassHire North Shore Workforce Board and the City of Salem to conduct an analysis of the workforce and supply chain implications from the development of the port located in Salem into a world-class offshore wind marshaling port.¹ The construction of the port is expected to begin sometime in 2023, with start of operations in 2026.² The city has developed a Memorandum of Understanding (MOU) with Crowley Wind Services to operate a portion of the port, and Crowley will lease out the port to Avangrid Renewables for two projects. The site itself will be jointly owned by Salem and the state of Massachusetts.

One initial objective of this research was to explore how the region could maximize the near-term opportunities from this port from an economic and workforce perspective. Another was to consider the longer-term regional benefits emerging from this type of investment in offshore wind, especially as the sector evolves and innovates. A third, more short-term, goal was to use this research to inform the development of a workforce training proposal for a MassCEC grant.

As the research team reviewed existing materials, and spoke with relevant experts and local leaders, including some of the companies committed to the port, two takeaways emerged. First, the initial usage of the port will be exclusively focused on one aspect of offshore wind development (quayside project marshaling) and second, organized labor will play a central role in the build out and operations of the port. As a result, while the port will still have a significant positive employment and economic impact on the North Shore region, local supply chain growth and workforce development options will, initially, be quite limited.

With these insights, the research team pursued two parallel paths in research methodology for this report. One path focused on completing the original scope of research, with the presumption that should any of the takeaways above change (due to changes in port ownership, unionization rates, policy passage, etc.), this initial research scope would be important for the city and workforce development stakeholders. Further, as the offshore wind industry transitions towards greater emphasis on floating wind, this research would serve as a foundational first step for long-term economic and workforce strategies.

Alongside, the team developed a second path of research to better align the active involvement of unions in the port with the MassCEC training proposal, by crafting multiple pre-apprenticeship concepts and conducting union outreach on behalf of the City and workforce board. This included finalizing the concept, engaging key local unions for insights and subsequently building support for this proposal among them.

This resulting report incorporates both the first and second path described above.

¹ An offshore wind marshaling port provides the staging ground where wind turbines can be stored and partially assembled before they are loaded onto vessels and delivered to the wind project site at sea.

² There are two development scenarios, for either \$150 million or \$250 million in new port infrastructure development. This report will include figures for the larger investment scenario with references to the smaller investment scenario in a footnote.

Key Findings

- **Employment activities at the port will be concentrated in the near term, with room for growth in the long run.** The employment impacts of the offshore wind marshaling port at Salem will be concentrated in three specific phases – development, construction and operations, across seventy-two different occupations. The currently planned port will be dedicated to marshaling and assembly activities, with no initial offshore wind operations and maintenance (O&M) or other development activity anticipated in the near-term (< 5 years after commencing operations). However, a deep-water port in this region of the Northeast is rare. It can service the offshore wind sector for decades and will serve as an anchor to attract economic activity in a rapidly growing industry.
- **The port will create a sizable number of jobs.** Based on its size, usage, and the assumption of supporting 7,200 MW of wind development, the port will initially support 116 workers in development of the port, with “Business and Financial Operations” as the largest share of occupations. 156 workers will participate in construction of the port across a two-year horizon³, with “Construction and Extraction” occupations accounting for two thirds of those roles. Finally, there will be 230 workers in the operations and maintenance phase of port activities, with “Installation Maintenance and Repair” occupations comprising half of those jobs.
- **Most of the initial jobs will be high quality in terms of wages.** The average annual wage across all port-related occupations was \$85,458. Installation, maintenance, and repair occupations (the largest share of jobs created) had an average annual wage of \$82,433. This compares favorably to the region’s overall median wage of \$50,700.
- **While education requirements vary across the leading occupations, they are less likely to be a barrier to entry in the construction and operations phase.** The top four occupations created during the Development and Planning phase require at least a bachelor’s degree. Three of the top five occupations during the Construction phase require a high school diploma or less, while four of the top five occupations created during the Operations and Maintenance phase require a high school diploma or less.
- **There is a gender disparity among port-related occupations relative to the overall regional workforce or population, while racial disparities match overall disparities in the region.** The race of North Shore workers currently working in the equivalent of “port-related” occupations closely reflect North Shores overall workforce and population across race, but in terms of gender, women account for 50%-52% of North Shore’s overall workforce and population respectively, but only 37% in the equivalent port-related occupations.
- **Maritime jobs, and specifically barge operators, are a near-term local opportunity for the port.** The nearer term projects are expected to utilize U.S. flagged barges to ferry components to offshore installation vessels. As a result, the need for barge operators will be significant, and such workers are reported to be difficult to find. Engaging with Crowley and the Seafarers Union will be an important consideration to maximize local job opportunities.

³ This is with an assumption of \$250 million in construction investment. 96 workers will support construction of the port in a scenario of \$150 million in investment.

- **Workforce supply in the region is extremely tight.** While the North Shore had over 59,000 workers with a residence in the region who were employed in port-related occupations, the collective unemployment rate among those workers is 3.1%, with most occupations having fewer workers in this region compared to the national average. Among the port occupations that created the largest share of workers, the region appears to have less than 100 available workers for Installation, Maintenance, and Repair occupations, less than 100 available workers in Architecture and Engineering occupations and approximately 500 available workers in Construction and Extraction occupations.
- **Residents of Environmental Justice communities in the region have a similar unemployment rate as the region, and percentage of undocumented workers, but a larger portion of residents who speak English “less than very well”.** The unemployment rate for port-related occupations is only 3.1%, leaving 1,422 available workers across all seventy-two occupational categories at the port. The largest occupational group in environmental justice communities is office and administrative support occupations with 9,087 workers, followed by management occupations with 7,793 workers. One third (33%) of the adult population 18 to 64 years old residing in North Shores environmental justice communities speak English “less than very well”, compared to 11% of Massachusetts residents, while undocumented residents are slightly lower than overall undocumented residents in the state (9% to 11%)
- **Nearly all severe workforce gaps are concentrated in the longer-term Operations and Maintenance phase at the port.** For the Planning & Development phase (considered the “Immediate” time horizon) the only severe regional workforce gap identified was for “Health and Safety Engineers, Except Mining Safety Engineers and Inspectors.” All of the workforce gaps in the Construction and Installation phase (the “short-term” horizon) were considered moderate, while in Operations and Maintenance (considered the “Long-Term”) five occupations were considered to have severe workforce gaps include 1) “Sailors and Marine Oilers”, 2) “Transportation Workers, All Other”, 3) “Electrical and Electronic Engineering Technologists and Technicians”, 4) “Electrical and Electronics Repairers, Powerhouse, Substation, and Relay”, and 5) “Communications Equipment Operators, All Other”. It is important to note that labor unions will be doing most of this work and report little difficulty in filling these roles.
- **There are far fewer training programs within the 30-minute drive time average area from the city of Salem port, compared to the state of Massachusetts.** The research team identified a total of 101 training programs, with only six within the 30-minute drive time average area.
- **With a heavy unionized presence expected at the port, the most effective initial workforce development approach for the City of Salem would be to target increasing access and acceptance into relevant union apprentice programs, primarily through pre-apprentice programs.** Given the sizable environmental justice populations in the region around the port, described above, and the interest from unions in diversifying their apprentice pipeline, a workforce initiative focused on these populations may be effective in gaining union support. Pre-apprentice and apprentice-readiness programs have proven successful in increasing access to union apprentice programs and can provide other workforce benefits. Leveraging existing programs and relationships can move this initiative forward quickly and integrate existing support systems and relationships that can bolster pre-apprenticeship graduate success.

- **The port offers additional significant potential for long-term, permanent economic activity.** While the initial economic and employment impact is already positive, this impact will be dramatically higher with the onset of offshore floating wind. As one of the only deep-water ports in the Northeast, with additional benefits connected to being in the City of Salem, the Salem port is a favorite to gain significantly more work from floating offshore wind development in the Gulf of Maine. By moving early, the port will also gain an early competitive, first-mover advantage among deep-water port operators. Finally, it signals to industry that the region is an exciting anchor for future offshore wind supply chain and innovation.

Overview of Port Project

The 42-acre offshore wind marshaling port at Salem will be Massachusetts' second purpose-built facility, and benefit from having no overhead or width restrictions. This will provide the Salem port with a significant competitive advantage as one of only a few unrestricted ports on the East Coast. Based on already-approved offshore wind developments, it is anticipated that this marshaling hub will initially support two gigawatts of offshore wind, and future projections that the research team reviewed forecast a 15-year operational phase that would stage 7.2 gigawatts of offshore wind.

However, as a marshaling facility for offshore seabed-mounted wind projects, the port will support a narrower set of operating activities in the near-term, once constructed. There is relatively little difference between offshore wind assembly, staging and loading, and standard port operations. While there will be opportunities for barge operators, there will be limited maritime labor deployed from the port, as it is too far from current offshore wind developments to allow for operations and maintenance or ferrying workers to at-sea installations. This dynamic may change in future, especially once the offshore wind industry transitions into floating offshore wind technology (discussed in depth below).

Demand for Port-Related Workers

The occupation matrix identifies seventy-two distinct occupations for offshore wind staging and marshaling with these occupations segmented into three phases of project development: Planning and Development, Construction and Installation, and Operations and Maintenance. The Construction and Installation phase was modeled using two different scenarios - the first a construction investment of \$150M and the second a construction investment scenario of \$250M. This report utilizes the \$250M scenario and includes the results from the \$150 million scenario in the footnotes. It is important to note that the occupations are not mutually exclusive across the three phases of development, as some occupations are needed across distinct phases.

TOTAL OCCUPATIONS CREATED ACROSS PROJECT PHASES

Table 1 shows the number of distinct occupations created across the phases of project development and the time horizons of the jobs. The data also includes the number of jobs created, the total employment of the occupations in the North Shore region and the location quotient (LQ). Location quotients measure the relative labor supply for an industry or occupational group in the North Shore compared to the labor supply in the United States; the LQ metric helps measure a region's specialization relative to the nation.

For example, a location quotient of 1.5 indicates that an occupation is 1.5 times, or 50 percent, more concentrated in North Shore compared to its proportion of total jobs in the nation overall.

During the Planning and Development phase, 116 jobs are created annually in a two-year horizon across 27 distinct occupations. These jobs account for just under a quarter (23%) of the jobs created. The Operations and Maintenance phase creates the largest share of jobs, at 230 jobs created annually in a 17-year horizon across 27 distinct occupations.⁴ These jobs account for 46% of the jobs created. During the Construction and Installation phase in a two-year horizon across 31 distinct occupations, 156 jobs are created annually and account for 31% of the total jobs created.⁵

The North Shore region has a lower concentration of employment across the Planning and Development (12% lower than national average) and Construction (18% lower) phases. The concentration of employment in the Operations and Maintenance phase is on par with the national average, with a concentration that is 1% higher than the national average. (Table 1)

TABLE 1. OCCUPATIONS CREATED BY PROJECT PHASE⁶

Project Phase	Number of Occupations in each Category	Time Horizons (years)	Jobs Created	Total Employment in North Shore, 2022 Q3 (Place of Residence)	Location Quotient (LQ)
Planning & Development	27	2	116	14,656	0.88
Construction & Installation (\$150M Investment)	31	2	96	36,292	0.82
Construction & Installation (\$250M Investment)	31	2	159	36,292	0.82
Operations & Maintenance (O&M)	27	17	230	22,820	1.01

OCCUPATIONS CREATED PER PHASE

Analyzing the occupations created by project phase, the development phase creates a total of 116 jobs-per-year over two years. The largest share of occupations created from the development stage come from Business and financial operations occupations at 37 jobs-per-year (32.2%). Management occupations had the second largest share of occupations created at 36 jobs-per-year (31.3%), followed by architecture and engineering occupations at 22 jobs-per-year (19.1%). (Table 2) *More detail on the types of jobs can be found in Appendix B: Salem Occupational Data*

⁴ Based on initial conversations with the two core corporate partners for the offshore wind port (Crowley and Avangrid), as well as an understanding of similar models at other domestic offshore wind ports, a sizable number of operational on-site staff will be likely supplied by Crowley and Avangrid, and whichever manufacturer the latter selects for its offshore wind components.

⁵ Under the \$150M construction investment, 96 jobs are created annually and account for 22% of all jobs created.

⁶ Q3 2022. JobsEQ & BLS QCEW. See Appendix B for a 6-digit list of occupations created.

TABLE 2. OCCUPATIONS CREATED DURING DEVELOPMENT PHASE

Development	2-Digit SOC	Occupation	Development Jobs
	11	Management Occupations	36
	13	Business and Financial Operations Occupations	37
	15	Computer and Mathematical Occupations	3
	17	Architecture and Engineering Occupations	22
	19	Life, Physical, and Social Science Occupations	5
	23	Legal Occupations	8
	43	Office and Administrative Support Occupations	4
		Total	116

During the construction phase, using the \$250 million investment scenario, 102 jobs-per-year (64.0%) are created in construction and extraction occupations – the largest share of occupations created. The next three largest occupation groups accounted for 22.5% of occupations created or 36 jobs-per-year² (Table 3).

TABLE 3. OCCUPATIONS CREATED DURING CONSTRUCTION PHASE

Construction	2-Digit SOC	Occupation	Construction Jobs (\$150M Investment)	Construction Jobs (\$250M Investment)
	11	Management Occupations	7	12
	13	Business and Financial Operations Occupations	4	7
	17	Architecture and Engineering Occupations	1	2
	33	Protective Service Occupations	1	1
	43	Office and Administrative Support Occupations	6	10
	47	Construction and Extraction Occupations	61	102
	49	Installation, Maintenance, and Repair Occupations	7	12
	51	Production Occupations	1	1
	53	Transportation and Material Moving Occupations	7	11
	Total	96	159	

The operations and maintenance phase creates 230 jobs-per-year, the largest share of all occupations created throughout the three phases. Installation maintenance and repair occupations account for the largest share of jobs created during the operations and maintenance phase at 109 jobs-per-year (47.2%). Architecture and engineering occupations accounted for the second largest share of occupations created at 42 jobs-per-year (18.2%), followed by transportation and material moving occupations at 41 jobs-per-year (17.8%). (Table 44) *More detail on the types of jobs can be found in Appendix B: Salem Occupational Data.*

One local item of note - the third largest share of occupations for the port will be maritime jobs, including barge operators, which are a near-term local opportunity. Initial projects are expected to utilize U.S. flagged barges to ferry components to offshore installation vessels. As a result, the need for barge operators will be significant, and such workers are reported to be difficult to find. Engaging with Crowley and the Seafarers Union will be an important consideration to maximize local job opportunities.

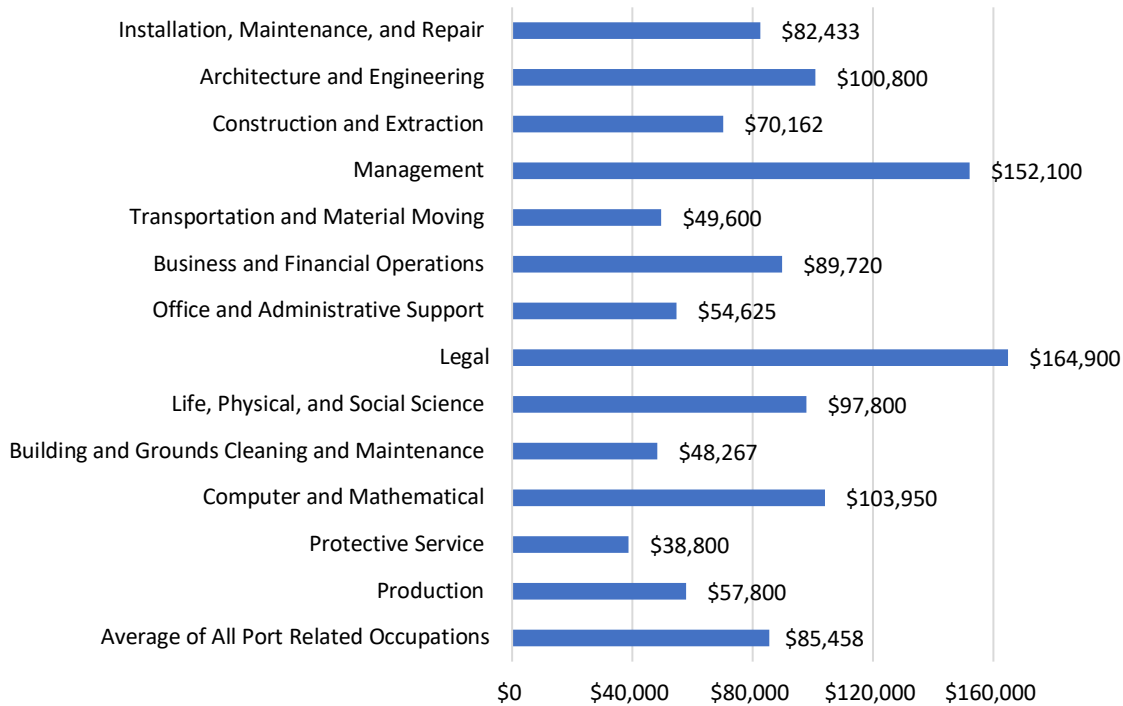
TABLE 4. OCCUPATIONS CREATED DURING OPERATIONS AND MAINTENANCE PHASE

Operations & Maintenance	11	Management Occupations	6
	13	Business and Financial Operations Occupations	4
	17	Architecture and Engineering Occupations	42
	33	Protective Service Occupations	2
	37	Building and Grounds Cleaning and Maintenance Occupations	5
	43	Office and Administrative Support Occupations	20
	49	Installation, Maintenance, and Repair Occupations	109
	53	Transportation and Material Moving Occupations	41
		Total	230

Characteristics of Port-Related Workers

WAGES

The average annual wage across all port-related occupations was \$85,458. Installation, maintenance, and repair occupations (the largest share of jobs created) had an average annual wage of \$82,433. (Figure 1) This compares favorably to the region's overall median wage of \$50,700.

FIGURE 1. AVERAGE ANNUAL WAGE OF EXISTING NORTH SHORE WORKERS IN PORT-RELATED OCCUPATIONS⁷

EDUCATION REQUIREMENTS

The top four occupations created during the Development and Planning phase each require at least a bachelor's degree or higher with only Transportation, Storage, and Distribution Managers requiring a high school diploma or equivalent. Three of the top five occupations during the Construction phase require a high school diploma or equivalent or less. Heavy and Tractor-Trailer Truck Drivers requires a postsecondary non-degree award, and Construction Managers require a bachelor's degree or higher. Four of the top five occupations created during the Operations and Maintenance phase require a high school diploma or less, with one occupation requiring at least an associate degree. (Table 5)

⁷ Q3 2022. JobsEQ & BLS QCEW

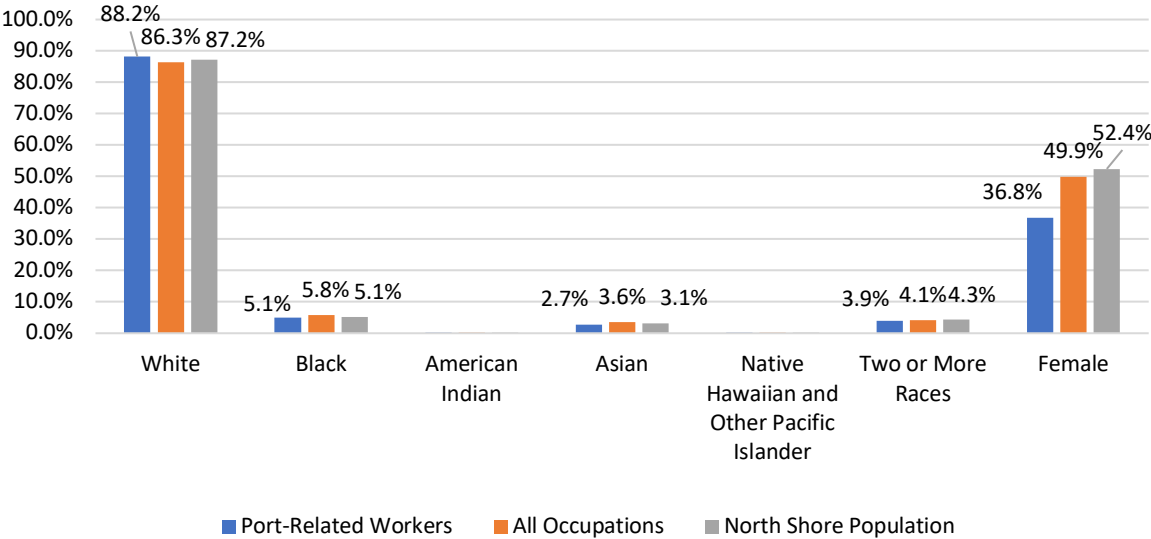
TABLE 5. EDUCATION REQUIREMENTS FOR TOP 5 OCCUPATIONS BY PROJECT PHASE⁸

Development & Planning		
6-Digit SOC	SOC Name	Entry-Level Education Requirements
11-9021	Construction Managers	Bachelor's degree
13-2011	Accountants and Auditors	Bachelor's degree
23-1011	Lawyers	Doctoral or professional degree
13-1051	Cost Estimators	Bachelor's degree
11-3071	Transportation, Storage, and Distribution Managers	High school diploma or equivalent
Construction		
6-Digit SOC	SOC Name	Entry-Level Education Requirements
47-2061	Construction Laborers	None
47-2073	Operating Engineers and Other Construction Equipment Operators	High school diploma or equivalent
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	High school diploma or equivalent
53-3032	Heavy and Tractor-Trailer Truck Drivers	Postsecondary non-degree award
11-9021	Construction Managers	Bachelor's degree
Operations and Maintenance		
6-Digit SOC	SOC Name	Entry-Level Education Requirements
49-9071	Maintenance and Repair Workers, General	High school diploma or equivalent
17-3023	Electrical and Electronic Engineering Technologists and Technicians	Associate's degree
53-5011	Sailors and Marine Oilers	None
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	High school diploma or equivalent
43-9199	Office and Administrative Support Workers, All Other	High school diploma or equivalent

Figure 2 below shows the race of North Shore workers currently working in the occupations that would be created by the construction of the marshaling port in Salem in blue, the overall North Shore workforce in orange, and the race of the overall North Shore population in grey. The port-related occupations created from project development closely reflect North Shores overall workforce and population across race. The port-related occupations however are underrepresented across genders. Women account for half of North Shores' workforce and population, but only 37% in the port-related occupations. This discrepancy is largely due to construction occupations, that historically have been male majority occupations. (Figure 2)

⁸ JobsEQ & BLS QCEW

FIGURE 2. RACE OF PORT-RELATED OCCUPATIONS⁹



Supply of Regional Workers

Table 6 below shows the labor supply of port-related workers employed in the seventy-two distinct occupations needed living in the region, annual mean wages, location quotients, unemployment rate, and available workers.

In 2022 Q3, North Shore had 59,679 workers with a residence in the region employed in the port-related occupations. Combined, the occupations had an average annual wage of \$85,458, with an unemployment rate of 3.1%. The largest proportion of workers were in office and administrative support occupations, with 12,416 workers, followed by 10,856 workers in management occupations.

The North Shore region had 3,305 workers in installation, maintenance, and repair occupations - the largest share of jobs created from the construction of the marshaling port – with a concentration 0.65 times that of the national concentration. The installation, maintenance, and repair occupations had an unemployment rate of 2.0% and less than one hundred available workers.

Architecture and engineering occupations had the second largest share of jobs created from the construction of the marshaling port, of these occupations there were 2,767 workers in the North Shore region. These occupations had a concentration that was 4% more concentrated in North Shore than the national concentration, with an unemployment rate of 1.5% and less than 100 available workers.

Construction and extraction occupations had the third largest share of jobs created. Of these occupations there were 8,368 workers in the North Shore region. These occupations had a concentration that was 0.85 times the concentration of the national average, with an unemployment rate of 5.3% and less than five hundred available workers, the largest number of available workers across all occupation groups. (Table 6)

⁹ JobsEQ & BLS QCEW

TABLE 6. NORTH SHORE REGIONAL SUPPLY OF PORT-RELATED WORKERS¹⁰

2-Digit Occupation	Occupation Group	Employment (Place of Residence)	Annual Mean Wage	LQ	Unemployment Rate	Available Workers ¹¹
49	Installation, Maintenance, and Repair Occupations	3,305	\$82,433	0.65	2.0%	<100
17	Architecture and Engineering Occupations	2,767	\$100,800	1.04	1.5%	<50
47	Construction and Extraction Occupations	8,368	\$70,162	0.85	5.3%	445
11	Management Occupations	10,856	\$152,100	1.03	2.0%	222
53	Transportation and Material Moving Occupations	5,088	\$49,600	0.66	3.5%	180
13	Business and Financial Operations Occupations	7,458	\$89,720	0.83	2.2%	167
43	Office and Administrative Support Occupations	12,416	\$54,625	1.01	2.4%	293
23	Legal Occupations	1,119	\$164,900	0.93	0.9%	<50
19	Life, Physical, and Social Science Occupations	26	\$97,800	0.55	1.9%	0
37	Building and Grounds Cleaning and Maintenance Occupations	5,837	\$48,267	1.08	4.9%	283
15	Computer and Mathematical Occupations	712	\$103,950	0.63	1.6%	<50
33	Protective Service Occupations	1,346	\$38,800	0.56	7.6%	102
51	Production Occupations	381	\$57,800	0.68	4.4%	<50
	TOTAL	59,679	\$85,458		3.1%	1,839

Environmental Justice Communities

The research team identified 139 environmental justice communities in the North Shore region.¹² The criteria for a neighborhood to be considered an environmental justice community are as follows:¹³

1. The annual median household income is 65 percent or less of the statewide annual median household income
2. minorities make up 40 percent or more of the population
3. 25 percent or more of households identify as speaking English less than "very well"

¹⁰ JobsEQ & BLS QCEW

¹¹ Available workers are the number of workers currently unemployed living in the region.

¹² Data obtained from Massachusetts ArcGIS <https://www.mass.gov/info-details/massgis-data-2020-us-census-environmental-justice-populations>

¹³ Executive office of Energy and Environmental Affairs <https://www.mass.gov/info-details/environmental-justice-populations-in-massachusetts>

4. minorities make up 25 percent or more of the population and the annual median household income of the municipality in which the neighborhood is located does not exceed 150 percent of the statewide annual median household income.

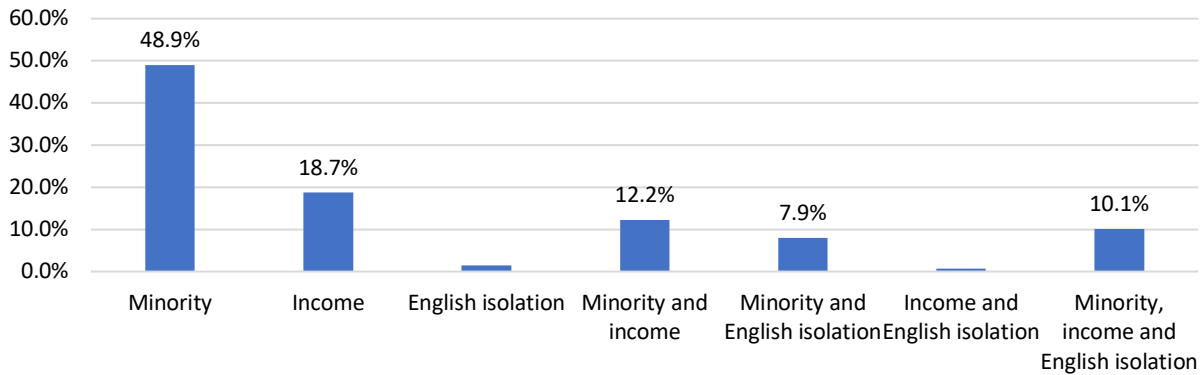
The research team was asked to focus on several specific items within its analysis of EJ neighborhoods. They include:

- *Unemployment and underemployment rates:*
 - The North Shore environmental justice communities' total workforce had an unemployment rate of 3.8% in 2022 Q3, with 6,871 available workers. Narrowing this down to the port related occupations, the research time found an unemployment rate of 3.1% and 1,422 available workers.
- *Primary industries and occupations for workers:*
 - The largest occupational group for the North Shore environmental justice communities total workforce were office and administrative support occupations with 20,389 workers, followed by food preparation and serving related occupations with 16,151 workers. Broadening the view to only port related occupations, the largest occupational group was found in office and administrative support occupations with 9,087 workers, followed by management occupations with 7,793 workers.
- *Key demographic datapoints including ESOL levels, refugee/foreign born and documentation status:*
 - One third (33%) of the adult population 18 to 64 years old residing in North Shores environmental justice communities spoke English "less than very well". Conversely, only 11% of Massachusetts residents speak English "less than very well".
 - The North Shore environmental justice communities and the state have a comparative percentage of residents that are not yet a citizen, with 9% of residents in North Shore environmental justice communities not citizens, and 11% for the state.

ENVIRONMENTAL JUSTICE CRITERIA

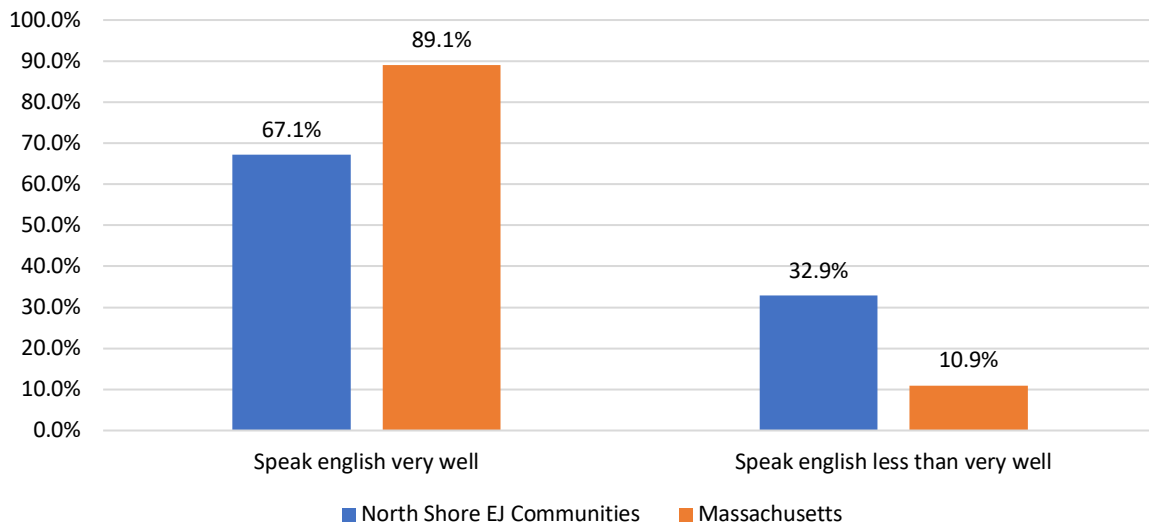
Just under half (49%) of the environmental justice communities in the region met the minority criteria, where minorities make up 40% or more of the population. Another 19% met the income criteria. Nearly four-in-five (79%) of the environmental justice communities in the North Shore region met a minority-based requirement. (Figure 3)

FIGURE 3. ENVIRONMENTAL JUSTICE COMMUNITIES IN NORTH SHORE BY CRITERIA¹⁴



In 2021, just over two-thirds (67%) of the adult population 18-64 years old residing in environmental justice communities in North Shore spoke English “very well”. In contrast, just under one third (33%) of the adult population spoke English less than very well¹⁵. (Figure 4)

FIGURE 4. NORTH SHORE ENVIRONMENTAL JUSTICE COMMUNITIES’ ADULT POPULATION ENGLISH SPEAKING SKILLS (18-64 YEARS), 2021¹⁶

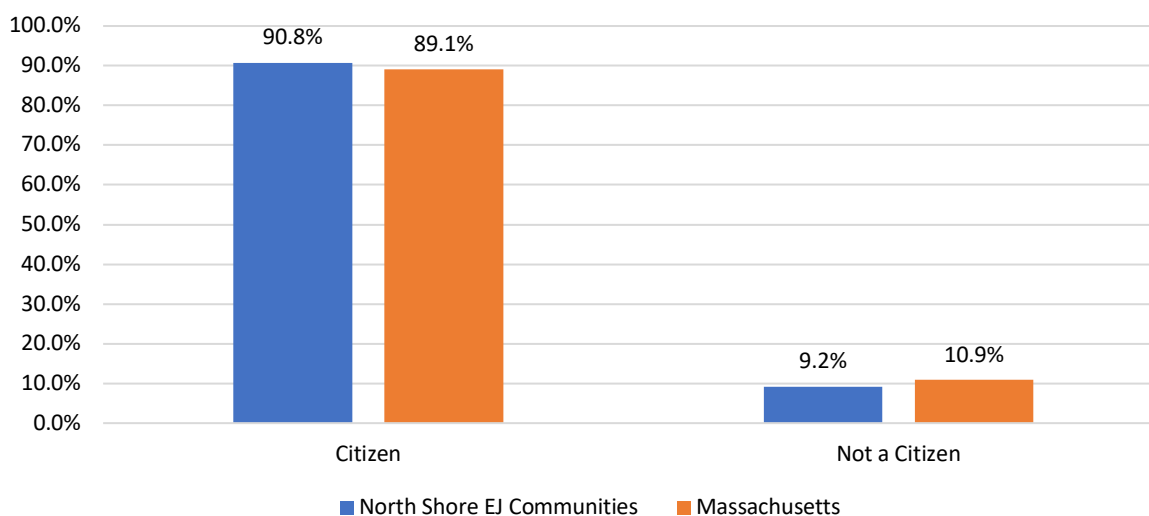


There were approximately 180,819 residents in North Shore environmental justice communities. A substantial proportion (91%) of residents were a United States citizen, while 9% have not yet obtained citizenship status. (Figure 5)

¹⁴ Data obtained from Massachusetts ArcGIS <https://www.mass.gov/info-details/massgis-data-2020-us-census-environmental-justice-populations>

¹⁵ This includes speak English well, not well, and not at all.

¹⁶ U.S Census Bureau, American Community Survey: 2021 ACS 5-Year Estimates

FIGURE 5. NORTH SHORE ENVIRONMENTAL JUSTICE COMMUNITIES CITIZENSHIP STATUS, 2021¹⁷

OCCUPATIONAL ASSESSEMENT OF ENVIRONMENTAL JUSTICE COMMUNITIES

In 2022 Q3, the environmental communities in the North Shore had 44,181 workers with a residence in the region employed in occupations that will also be available through the port projects. The occupations had an average annual wage of \$85,458, with an unemployment rate of 3.1%. The largest proportion of workers were in office and administrative support occupations, with 12,416 workers, followed by 10,856 workers in management occupations.

The environmental justice communities had 2,473 workers in installation, maintenance, and repair occupations, with a concentration 0.63 times that of the national concentration. These occupations had an unemployment rate of 2.0% and less than one hundred available workers.

Architecture and engineering occupations had the second largest share of jobs created from the construction of the marshaling port. Of these occupations there were 1,957 workers with a residence in an environmental justice community. These occupations had a concentration that was 14% more concentrated in North Shore environmental justice communities than the national concentration, with an unemployment rate of 1.5% and less than 100 available workers.

The environmental justice communities in North Shore had 6,447 workers in construction and extraction occupations – the third largest share of jobs created from the project development of the marshaling port. These occupations had a concentration that was 0.74 times the concentration of the national average, with an unemployment rate of 5.3% and more than 300 available workers, the largest number of available workers across all occupation groups. (Table 7)

¹⁷ U.S. Census Bureau, American Community Survey: 2021 ACS 5-Year Estimates

TABLE 7. ENVIRONMENTAL JUSTICE COMMUNITIES SUPPLY OF PORT-RELATED WORKERS¹⁸

2-Digit Occupation	Occupation Group	Employment (Place of Residence)	Annual Mean Wage	LQ	Unemployment Rate	Available Workers ¹⁹
49	Installation, Maintenance, and Repair Occupations	2,473	\$82,433	0.63	2.0%	<50
17	Architecture and Engineering Occupations	1,957	\$100,800	1.14	1.5%	<50
47	Construction and Extraction Occupations	6,447	\$70,177	0.74	5.4%	324
11	Management Occupations	7,793	\$152,100	1.05	2.0%	162
53	Transportation and Material Moving Occupations	3,923	\$49,600	0.65	3.6%	215
13	Business and Financial Operations Occupations	5,295	\$89,720	0.85	2.2%	<100
43	Office and Administrative Support Occupations	9,087	\$54,625	1	2.4%	241
23	Legal Occupations	817	\$164,900	1.06	0.9%	<50
19	Life, Physical, and Social Science Occupations	20	\$97,800	0.59	1.9%	<50
37	Building and Grounds Cleaning and Maintenance Occupations	4,553	\$48,267	1	5.0%	222
15	Computer and Mathematical Occupations	498	\$103,950	0.63	1.6%	<50
33	Protective Service Occupations	1,000	\$38,800	0.52	7.7%	<100
51	Production Occupations	316	\$57,800	0.72	4.5%	<50
	TOTAL	44,181	\$85,459	0.81	3.1%	1,422

Projected Workforce Needs and Gaps

By modeling estimated occupation-level demands for 7,200MW of OSW staging and marshaling, the research team was able to identify the difference, or gap, between the anticipated number of Full-Time Equivalents (FTEs) needed during each phase of the OSW project and the share of existing available workers and those available through existing talent pipelines in the North Shore region. This analysis highlights which occupations will likely face the greatest demand for additional workers relative to existing talent supply.

Each project phase is aggregated into three-time horizons; the Planning & Development phase is considered the “Immediate” time horizon (found in Table 8). Construction and Installation phase is considered the “Short-Term” (found in Table 9). Operations and Maintenance phase is considered the “Long-Term” because this phase begins later in the project timeline (found in Table 10).

¹⁸ JobsEQ & BLS QCEW

¹⁹ Available workers are the number of workers currently unemployed living in the region.

$$\text{Workforce Gaps} = \frac{\text{Total Annual Demand for Workers} - \text{Annual Available Workers}}{\text{Total Workers Employed in the Occupation}}$$

The research team estimated total demand and gap in workforce demand and supply for each time horizon. By highlighting estimated demand and gaps side by side, the tables below demonstrate the occupations which will require the greatest amount of assistance and preparation to ensure a workforce is ready. The tables below contain occupations in descending order of greatest estimated workforce gaps.²⁰

Severe	Demand exceeds supply <i>and</i> this gap is 10% or more of the existing workforce
Moderate	Demand exceeds supply but the gap is less than 10% of the existing workforce
Mild	Supply exceeds demand

OCCUPATIONAL NEED BY TERM

The following tables below (Table 8 to Table 10) show occupations that have the greatest demand from the construction of the marshaling port on the left, and the occupations with the greatest estimated workforce gap on the right.

“Construction Managers” are expected to be in greatest demand in the immediate term, followed by “Accountants and Auditors”. Conversely, “Health and Safety Engineers, Except Mining Safety Engineers and Inspectors” are expected to have a gap greater than 10% of the existing workforce, may require additional supply in the immediate term of the project (Table 8).

TABLE 8. SELECT OCCUPATIONS IN IMMEDIATE TERM

Five Occupations with Greatest Demand	Five Occupations with Greatest Estimated Gap
Construction Managers	Health and Safety Engineers, Except Mining Safety Engineers and Inspectors
Accountants and Auditors	Electrical Engineers
Lawyers	Cost Estimators
Cost Estimators	Surveying and Mapping Technicians
Mechanical Engineers	Engineers, All Other

“Construction Laborers” are expected to be in greatest demand in the short-term, followed by “Operating Engineers and Other Construction Equipment Operators.” “Civil Engineers” and “Welders,

²⁰ For a full list of the projected occupational gaps, see Table 11 TABLE 11

Cutters, Solderers and Brazers” are expected to have the greatest gap in current talent in the short-term. (Table 9)

TABLE 9. SELECT OCCUPATIONS IN SHORT TERM

Five Occupations with Greatest Demand	Five Occupations with Greatest Estimated Gap
Construction Laborers	Civil Engineers
Operating Engineers and Other Construction Equipment Operators	Welders, Cutters, Solderers, and Brazers
First-Line Supervisors of Construction Trades and Extraction Workers	Cost Estimators
Heavy and Tractor-Trailer Truck Drivers	Electrical Power-Line Installers and Repairers
Construction Managers	Project Management Specialists

“Maintenance and Repair Workers”, “Electrical and Electronic Engineering Technologists and Technicians”, and “Sailors and Marine Oilers” are the occupations in the long-term with the greatest workforce demands. “Sailors and Marine Oilers” and “Transportation Workers, All Other” have the most severe workforce gaps in the long-term (Table 10).

TABLE 10. SELECT OCCUPATIONS IN LONG TERM

Five Occupations with Greatest Demand	Five Occupations with Greatest Estimated Gap
Maintenance and Repair Workers, General	Sailors and Marine Oilers
Electrical and Electronic Engineering Technologists and Technicians	Transportation Workers, All Other
Sailors and Marine Oilers	Electrical and Electronic Engineering Technologists and Technicians
First-Line Supervisors of Mechanics, Installers, and Repairers	Electrical and Electronics Repairers, Powerhouse, Substation, and Relay
Office and Administrative Support Workers, All Other	Communications Equipment Operators, All Other

Projected Occupational Gaps

Seven of the eight (88%) occupations that have severe workforce gaps are found in the long-term phase of the project – the operations and maintenance phase – with the only other severe workforce gap coming from the immediate phase of the project. This indicates that the long-term phase – the phase that creates the most jobs – needs the most support in workforce training and readiness.

For the occupations that have a moderate workforce gap, the immediate phase of the project accounted for the most occupations. Half (51%) of the occupations with a moderate workforce gap were in the immediate phase of the project, signaling a need for additional supply of workers in the immediate term

phase of the project. Occupations are listed in descending severity of estimated workforce gaps. (Table 11)

TABLE 11. PROJECTED OCCUPATIONAL GAPS

Description	Education	Phase	Gap Rank	Mean Annual Wage	Jobs in North Shore
Sailors and Marine Oilers	None	Long-Term	Severe	\$50,100	25
Transportation Workers, All Other	High school diploma or equivalent	Long-Term	Severe	\$59,200	21
Electrical and Electronic Engineering Technologists and Technicians	Associate's degree	Long-Term	Severe	\$65,700	221
Electrical and Electronics Repairers, Powerhouse, Substation, and Relay	Postsecondary non-degree award	Long-Term	Severe	\$97,800	31
Communications Equipment Operators, All Other	High school diploma or equivalent	Long-Term	Severe	\$57,100	13
Office and Administrative Support Workers, All Other	High school diploma or equivalent	Long-Term	Severe	\$42,200	205
Health and Safety Engineers, Except Mining Safety Engineers and Inspectors	Bachelor's degree	Long-Term	Severe	\$113,900	38
Health and Safety Engineers, Except Mining Safety Engineers and Inspectors	Bachelor's degree	Immediate	Severe	\$113,900	38
Electrical Engineers	Bachelor's degree	Immediate	Moderate	\$120,100	395
Captains, Mates, and Pilots of Water Vessels	Postsecondary non-degree award	Long-Term	Moderate	\$65,600	46
Cost Estimators	Bachelor's degree	Immediate	Moderate	\$104,300	428
Material Moving Workers, All Other	None	Long-Term	Moderate	\$40,500	32
Surveying and Mapping Technicians	High school diploma or equivalent	Immediate	Moderate	\$59,600	91
Electrical Engineers	Bachelor's degree	Long-Term	Moderate	\$120,100	395
Civil Engineers	Bachelor's degree	Short-Term	Moderate	\$98,300	396
Welders, Cutters, Solderers, and Brazers	High school diploma or equivalent	Short-Term	Moderate	\$57,800	381
Engineers, All Other	Bachelor's degree	Immediate	Moderate	\$128,800	202
Lawyers	Doctoral or professional degree	Immediate	Moderate	\$164,900	1,119
Procurement Clerks	High school diploma or equivalent	Immediate	Moderate	\$56,100	94
Mechanical Engineers	Bachelor's degree	Immediate	Moderate	\$109,900	537
Cost Estimators	Bachelor's degree	Short-Term	Moderate	\$104,300	428
First-Line Supervisors of Mechanics, Installers, and Repairers	High school diploma or equivalent	Long-Term	Moderate	\$85,500	758
Industrial Engineers	Bachelor's degree	Long-Term	Moderate	\$110,100	887
Industrial Engineers	Bachelor's degree	Immediate	Moderate	\$110,100	887

Description	Education	Phase	Gap Rank	Mean Annual Wage	Jobs in North Shore
Mechanical Engineers	Bachelor's degree	Long-Term	Moderate	\$109,900	537
Maintenance and Repair Workers, General	High school diploma or equivalent	Long-Term	Moderate	\$52,500	2,088
Electrical Power-Line Installers and Repairers	High school diploma or equivalent	Short-Term	Moderate	\$95,300	117
Transportation, Storage, and Distribution Managers	High school diploma or equivalent	Immediate	Moderate	\$110,400	240
Compliance Officers	Bachelor's degree	Immediate	Moderate	\$86,500	462
Architectural and Engineering Managers	Bachelor's degree	Immediate	Moderate	\$168,500	325
Logistics Analysts	Bachelor's degree	Long-Term	Moderate	\$84,300	355
Computer Occupations, All Other	Bachelor's degree	Immediate	Moderate	\$98,700	600
Purchasing Managers	Bachelor's degree	Immediate	Moderate	\$149,600	174
Business Operations Specialists, All Other	Bachelor's degree	Immediate	Moderate	\$89,800	1,325
Project Management Specialists	Bachelor's degree	Immediate	Moderate	\$105,500	1,364
Construction Managers	Bachelor's degree	Immediate	Moderate	\$124,200	775
Project Management Specialists	Bachelor's degree	Short-Term	Moderate	\$105,500	1,364
Excavating and Loading Machine and Dragline Operators, Surface Mining	High school diploma or equivalent	Short-Term	Moderate	\$63,100	39
Financial Specialists	Bachelor's degree	Immediate	Moderate	\$85,800	133
Mobile Heavy Equipment Mechanics, Except Engines	High school diploma or equivalent	Short-Term	Moderate	\$73,200	192
Financial and Investment Analysts	Bachelor's degree	Immediate	Moderate	\$100,800	471
Transportation, Storage, and Distribution Managers	High school diploma or equivalent	Long-Term	Moderate	\$110,400	240
First-Line Supervisors of Mechanics, Installers, and Repairers	High school diploma or equivalent	Short-Term	Moderate	\$85,500	758
Industrial Production Managers	Bachelor's degree	Long-Term	Moderate	\$147,000	442
First-Line Supervisors of Construction Trades and Extraction Workers	High school diploma or equivalent	Short-Term	Moderate	\$100,000	1,149
Zoologists and Wildlife Biologists	Bachelor's degree	Immediate	Moderate	\$78,100	13
Economists	Master's degree	Immediate	Moderate	\$117,500	13
Managers, All Other	Bachelor's degree	Immediate	Mild	\$146,600	519
Purchasing Managers	Bachelor's degree	Long-Term	Mild	\$149,600	174
Construction Managers	Bachelor's degree	Short-Term	Mild	\$124,200	775
General and Operations Managers	Bachelor's degree	Short-Term	Mild	\$146,400	6,735

Description	Education	Phase	Gap Rank	Mean Annual Wage	Jobs in North Shore
General and Operations Managers	Bachelor's degree	Long-Term	Mild	\$146,400	6,735
Data Scientists	Bachelor's degree	Immediate	Mild	\$109,200	112
Financial Managers	Bachelor's degree	Immediate	Mild	\$161,100	1,530
Telecommunications Line Installers and Repairers	High school diploma or equivalent	Short-Term	Mild	\$90,300	118
Building Cleaning Workers, All Other	None	Long-Term	Mild	\$56,900	35
Financial Managers	Bachelor's degree	Long-Term	Mild	\$161,100	1,530
Earth Drillers, Except Oil and Gas	High school diploma or equivalent	Short-Term	Mild	\$68,200	21
First-Line Supervisors of Office and Administrative Support Workers	High school diploma or equivalent	Short-Term	Mild	\$71,800	2,366
Production, Planning, and Expediting Clerks	High school diploma or equivalent	Long-Term	Mild	\$59,100	587
Accountants and Auditors	Bachelor's degree	Immediate	Mild	\$91,000	2,081
Electricians	High school diploma or equivalent	Short-Term	Mild	\$77,000	1,203
Pipelayers	None	Short-Term	Mild	\$59,600	16
Automotive and Watercraft Service Attendants	None	Long-Term	Mild	\$35,600	142
Paving, Surfacing, and Tamping Equipment Operators	High school diploma or equivalent	Short-Term	Mild	\$74,700	71
Purchasing Agents, Except Wholesale, Retail, and Farm Products	Bachelor's degree	Immediate	Mild	\$84,000	613
Accountants and Auditors	Bachelor's degree	Short-Term	Mild	\$91,000	2,081
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	High school diploma or equivalent	Short-Term	Mild	\$50,400	2,756
Heavy and Tractor-Trailer Truck Drivers	Postsecondary non-degree award	Short-Term	Mild	\$56,200	1,916
Bookkeeping, Accounting, and Auditing Clerks	Some college, no degree	Short-Term	Mild	\$54,300	2,771
Natural Sciences Managers	Bachelor's degree	Immediate	Mild	\$215,100	116
Highway Maintenance Workers	High school diploma or equivalent	Short-Term	Mild	\$50,400	102
Office Clerks, General	High school diploma or equivalent	Short-Term	Mild	\$46,000	3,625
Operating Engineers and Other Construction Equipment Operators	High school diploma or equivalent	Short-Term	Mild	\$73,200	555
Plumbers, Pipefitters, and Steamfitters	High school diploma or equivalent	Short-Term	Mild	\$86,100	905
Carpenters	High school diploma or equivalent	Short-Term	Mild	\$67,400	1,662
Landscaping and Groundskeeping Workers	None	Long-Term	Mild	\$45,600	1,933
Security Guards	High school diploma or equivalent	Long-Term	Mild	\$39,200	1,255

Description	Education	Phase	Gap Rank	Mean Annual Wage	Jobs in North Shore
Janitors and Cleaners, Except Maids and Housekeeping Cleaners	None	Long-Term	Mild	\$42,300	3,869
Meeting, Convention, and Event Planners	Bachelor's degree	Long-Term	Mild	\$65,200	226
Painters, Construction and Maintenance	None	Short-Term	Mild	\$52,100	636
Construction Laborers	None	Short-Term	Mild	\$60,600	1,851
Laborers and Freight, Stock, and Material Movers, Hand	None	Short-Term	Mild	\$40,000	2,906
Cement Masons and Concrete Finishers	None	Short-Term	Mild	\$79,700	159
Crossing Guards and Flaggers	None	Short-Term	Mild	\$38,400	91

Training Inventory

This section highlights the current training programs around the state of Massachusetts that are currently or could be involved in developing the state's offshore wind workforce, categorizing them based on their proximity to the port (via 30 minute drive time analysis). The first segment focuses on training programs that offer wind-specific material or expertise. The second segment discusses the trade specific training programs, followed by the heavy equipment operator training programs, and operations and maintenance training programs. The last segment discusses the pre-apprenticeship programs that prepare participants for a 4-year apprenticeship.²¹

WIND SPECIFIC TRAININGS

The research team identified fifteen different offshore wind specific training programs across educational institutions as well as private training programs. All programs were outside of the 30-minute Drive Time Average (DTA) from the location of the city of Salem port. The outcomes of the offshore wind specific training programs vary between certificates – including Global Wind Organization certification - to master's degree programs. Eight of the programs are offered by colleges or universities with six programs offered by continuing education institutions or community colleges, and one program offered by a private institution. (Table 122)

²¹ See Appendix C for full training-inventory.

TABLE 12. OFFSHORE WIND SPECIFIC TRAINING PROGRAMS – OUTSIDE 30-MINUTE DTA

Program Host	City	Course Name	Outcomes	Focus Area
Adult Continuing Education - Martha's Vineyard	Oak Bluffs	OSW Tech Certification Program	Certificate	OSW
Bristol Community College	New Bedford	OSW Power Technician Certificate	Certificate	OSW
Bristol Community College	New Bedford	GWO Certification - Basic Advanced Training	Certificate	OSW
Bristol Community College	New Bedford	GWO Certification - Basic Safety Training	Certificate	OSW
Bristol Community College	New Bedford	GWO Certification - Basic Technical Training	Certificate	OSW
Cape and Islands Self-Reliance Corporation	Bourne	Land-Base Wind and OSW Workforce Training	Certificate	OSW
Cape Cod Community College	Barnstable	OSW 101: Energy, Climate and Jobs	Certificate	OSW
Massachusetts Maritime Academy	Bourne	GWO Basic Safety Training	Certificate	OSW
Massachusetts Maritime Academy	Bourne	US Off-Shore Wind Training GWO	Certificate	OSW
Massachusetts Maritime Academy	Bourne	GWO Basic Safety Training	Certificate	OSW
Massachusetts Maritime Academy	Bourne	US Off-Shore Wind Training GWO	Certificate	OSW
Tufts University	Somerville	Masters Program	Masters	OSW
UMass Amherst	Amherst	Masters Program	Certificate	OSW
UMass Amherst	Amherst	Wind Energy Graduate Certificate	Certificate	OSW
UMass Lowell	Lowell	Masters Program	Masters	OSW

TRADES

There were forty-two training programs aimed towards preparing workers in the trades. Four of the forty-two training programs were within the 30-minute DTA from the location of the City of Salem port. The training programs included courses in sheet metal workers, electricians, construction, iron working, pile driving, lineman, welding, and CNC machine operators. The program outcomes ranged from certificates, licensure, exam preparation, to associates degree. Just over half (52%) of the training programs were provided by vocational or technical schools, followed by a combined 48% of the programs provided by community colleges or private training institutions. (Table 133)

TABLE 13. TRADES TRAINING PROGRAM

WITHIN 30-MINUTE DTA

Program Host	City	Course Name	Outcomes	Focus Area
Gould Construction Institute	Woburn	Iron Working 1 Correspondence		Trades
Gould Construction Institute	Woburn	Iron Working 2 Correspondence		Trades
Gould Construction Institute	Woburn	Iron Working 3 Correspondence		Trades
Essex North Shore Agricultural and Technical School	Danvers	Construction Craft Laborers	Certificate	Trades

OUTSIDE OF 30-MINUTE DTA

Program Host	City	Course Name	Outcomes	Focus Area
Andover - Greater Lawrence Technical School	Lawrence	Sheet Metal 1		Trades
Andover - Greater Lawrence Technical School	Lawrence	Sheet Metal 2 (Hands-On)		Trades
Andover - Greater Lawrence Technical School	Lawrence	Sheet Metal 3 (Hands-On)		Trades
Andover - Greater Lawrence Technical School	Lawrence	Sheet Metal 4 (Hands-On)		Trades
Bunker Hill Community College	Boston	Electrician Program		Trades
Canton - CGI Training at PEC	Canton	Electrical 1		Trades
Canton - CGI Training at PEC	Canton	Electrical 2		Trades
Canton - CGI Training at PEC	Canton	Electrical 3		Trades
Canton - CGI Training at PEC	Canton	Electrical 4		Trades
Cape and Islands Self-Reliance Corporation	Bourne	Construction Supervisor License Continuing Education Units	Exam Prep	Trades
Construction Supervisor Institute	Methuen	Massachusetts Construction Supervisor and Hoisting License	License	Trades
Franklin - Tri County Regional Vocational Technical High School	Franklin	Sheet Metal 1		Trades
Franklin - Tri County Regional Vocational Technical High School	Franklin	Sheet Metal 2 (Hands-On)		Trades
Martha's Vineyard Regional High School	Oak Bluffs	Carpentry and Building Trades	Certificate	Trades
Massachusetts Executive Office of Labor and Workforce Development	Boston	Pile Driver Apprenticeship	Job Readiness	Trades
Medford - Vocational Technical High School	Medford	Electrical 1		Trades
Medford - Vocational Technical High School	Medford	Electrical 2		Trades
Medford - Vocational Technical High School	Medford	Electrical 3		Trades

Program Host	City	Course Name	Outcomes	Focus Area
Medford - Vocational Technical High School	Medford	Electrical 4		Trades
Medford - Vocational Technical High School	Medford	Pipefitting 2		Trades
Medford - Vocational Technical High School	Medford	Sheet Metal 5 (Hands-On)		Trades
Middlesex Community College	Bedford	Middlesex Community College Lineman Program	Certificate	Trades
Minuteman Regional Vocational Technical High School	Lexington	Certified Welder	Certificate	Trades
Minuteman Technical Institute	Lexington	CNC Machine Operator	Certificate	Trades
Montachusett Regional Vocational Technical School	Fitchburg	Certified Welder	Certificate	Trades
North Adams - McCann Technical School	North Adams	Sheet Metal 4 (Hands-On)		Trades
Springfield - Springfield technical community college	Springfield	Electrical 1		Trades
Springfield - Springfield technical community college	Springfield	Electrical 2		Trades
Springfield - Springfield technical community college	Springfield	Electrical 3		Trades
Springfield - Springfield technical community college	Springfield	Electrical 4		Trades
Springfield - Springfield technical community college	Springfield	Masters Electrical		Trades
Springfield - Springfield technical community college	Springfield	Pipefitting 1		Trades
Springfield Technical Community College	Springfield	Building/Construction Finishing, Management, and Inspection, Other	Associate	Trades
Taunton - Bristol - Plymouth Regional Technical School	Taunton	Pipefitting 1		Trades
Taunton - Bristol - Plymouth Regional Technical School	Taunton	Pipefitting 2		Trades
Taunton - Bristol - Plymouth Regional Technical School	Taunton	Sheet Metal 1		Trades
Taunton - Bristol - Plymouth Regional Technical School	Taunton	Sheet Metal 2 (Hands-On)		Trades
Taunton - Bristol - Plymouth Regional Technical School	Taunton	Sheet Metal 4 (Hands-On)		Trades

HEAVY EQUIPMENT AND OPERATIONS AND MAINTENANCE

The research team identified thirty heavy equipment operator training programs, and six operations and maintenance training programs. Two of the thirty heavy equipment and operations and maintenance training programs were within the 30-minute DTA from the Salem port. The outcomes of the programs ranged from certificates, licensure, job readiness, exam preparation, college credits and an associates degree. All the heavy equipment operator training programs were offered by private training institutions, while three of the operations and maintenance training programs were offered by community colleges or vocational schools with the remaining three offered by private training. (Table 14)

TABLE 14. HEAVY EQUIPMENT AND OPERATIONS AND MAINTENANCE TRAINING PROGRAMS

WITHIN 30-MINUTE DTA

Program Host	City	Course Name	Outcomes	Focus Area
Black Dog Divers	Ipswich	Certified Commercial Diver	Certificate	Heavy Equipment
Black Dog Divers	Salem	Certified Commercial Diver	Certificate	Heavy Equipment

OUTSIDE OF 30-MINUTE DTA

Program Host	City	Course Name	Outcomes	Focus Area
Amaral Auto & Truck Driving School, Inc.	Westport	CDL - Class A - Tractor Trailer instruction	Certificate	Heavy Equipment
Amaral Auto & Truck Driving School, Inc.	Westport	CDL - Class B - Heavy Truck Instruction	Certificate	Heavy Equipment
American Crane & Safety's Rigger Training	Online	Massachusetts NCCCO Rigger 1 Certification Exam Prep	Exam Prep	Heavy Equipment
Atlantis Maritime Academy	Online	OUPV Captains License (Six Pack)	License	Heavy Equipment
Atlantis Maritime Academy Inc.	Boston	Charter Boat Captain Courses - Boston MA Captain License Course	License	Heavy Equipment
Black Dog Divers	Fall River	Certified Commercial Diver	Certificate	Heavy Equipment
Boston Forklift Training	Online	Forklift Certified	Certificate	Heavy Equipment
CDA Technical Institute	Rockland	Certified Commercial Diver	Certificate	Heavy Equipment
Cranes 101	Bellingham	Overhead Crane Operator Safety	Certificate	Heavy Equipment
Cranes 101	Bellingham	Tower Crane Operator Certification	Certificate	Heavy Equipment
Cranes 101	Bellingham	1A Hoisting License Renewal Massachusetts	License Renewal	Heavy Equipment
Cranes 101	Bellingham	1B Hoisting License Renewal Massachusetts	License Renewal	Heavy Equipment
G. Tonucci Crane & Rigging Training	Quincy	Forklift Certified	License	Heavy Equipment
Gould Construction Institute		Signal Certification & Basic Rigging Safety Course		Heavy Equipment
J&J Driving School & Logistics, Inc.	New Bedford	CDL - Class A - Tractor Trailer instruction	Certificate	Heavy Equipment
J&J Driving School & Logistics, Inc.	New Bedford	CDL - Class B - Heavy Truck Instruction	Certificate	Heavy Equipment
Mariners Learning System	Online	OUPV Captains License (Six Pack)	License	Heavy Equipment
Mariners Learning System	Online	Masters License for Captains (25,50,100, and 200 GRT)	License	Heavy Equipment
MASS Hoisting License	Plainville	MASS Hoisting License	License	Heavy Equipment

Program Host	City	Course Name	Outcomes	Focus Area
Massachusetts Executive Office of Labor and Workforce Development	Boston	Universal Equipment Operator Apprenticeship	Job Readiness	Heavy Equipment
New England Crane School	South Easton	NCCCO Operator Certification	Certificate	Heavy Equipment
New England Maritime	Barnstable	OUPV Captains License (Six-Pack)	Certificate	Heavy Equipment
New England Maritime	Barnstable	Master's License Up to 100 GRT	Certificate	Heavy Equipment
New England Maritime	Barnstable	Masters License for Captains (25,50,100, and 200 GRT)	Certificate	Heavy Equipment
North Atlantic States Carpenters Training Fund	Millbury	Rigging Safety CSL CE		Heavy Equipment
Northeast Maritime Institute	Fairhaven	MassCEC Training Program - Merchant Mariner Credentials	Certificate	Heavy Equipment
Safety Equipped, Inc	Swansea	Forklift Certified - Rough Terrain	Certificate	Heavy Equipment
Safety Equipped, Inc	Swansea	Forklift Certified - Warehouse	Certificate	Heavy Equipment
Bunker Hill Community College	Boston	Electrical/Electronics Maintenance and Repair Technology, Other	Associate	Operations and Maintenance
Bunker Hill Community College	Boston	Electrical/Electronics Maintenance and Repair Technology, Other	Certificate	Operations and Maintenance
Crystal Engineering	Newburyport	Machine Maintenance Mechanic		Operations and Maintenance
Greater Lowell Technical HS	Tyngsboro	WIOA ISY REACH Program		Operations and Maintenance
Minuteman Technical Institute	Lexington	Facilities Management	Certificate	Operations and Maintenance
Youth Build Boston	Roxbury	Facilities Management	College Credits	Operations and Maintenance

PRE-APPRENTICESHIP PROGRAMS

The research team identified eight pre-apprenticeship programs that prepare participants for apprenticeships in carpentry, electrician, welding, construction, and facilities maintenance. All the pre-apprenticeship programs were outside of the 30-minute DTA from the city of Salem port. The outcomes of the programs besides pre-apprenticeship readiness, included OSHA certification, electrical wiring certification, and metal fabrication. Four of the pre-apprenticeship programs were provided by private training institutions with the remaining three offered by a vocational or technical school.

TABLE 15. PRE-APPRENTICESHIP TRAINING PROGRAMS

OUTSIDE OF 30-MINUTE DTA

Program Host	City	Course Name	Outcomes	Focus Area
Building Pathways	Roxbury	Pre-Apprenticeship Program		Pre-Apprenticeship Program
Minuteman Technical Institute	Lexington	Electrician Pre-Apprentice (10 Month)	Certificate	Pre-Apprenticeship Program
Minuteman Technical Institute	Lexington	Carpenter Pre-Apprentice	Certificate	Pre-Apprenticeship Program
Minuteman Technical Institute	Lexington	Welding Pre-Apprentice (15-Week)	Certificate	Pre-Apprenticeship Program
Youth Build Boston	Roxbury	Construction Pre-Apprentice (15-Week)	Certificate	Pre-Apprenticeship Program
Community Works	Amherst	Pre-Apprenticeship Program (Building/Construction Trades and Transportation/Highway Industry)		Pre-Apprenticeship Program
MassHire & International Institute of New England	Boston	Pre-Apprenticeship Program in Facilities Maintenance or Construction Trades		Pre-Apprenticeship Program
MassHire & International Institute of New England	Boston	Pre-Apprenticeship Program in Facilities Maintenance	Certificate	Pre-Apprenticeship Program

Union Involvement at Port

The research team anticipates that nearly all direct jobs created by the Salem offshore wind port will be union jobs, based on the location of the port, past experience, and conversations with relevant stakeholders. This includes workers involved in the construction of the port, and any warehousing or assembly facilities, and quayside fabrication. The central role of organized labor is due to a number of reasons. Massachusetts is, by some rankings, the 6th most union-friendly state²², and has made strong, public commitments to create high-quality, family-sustaining union jobs within clean energy. The construction-heavy elements of the port, couple with the union-friendly approach of the initial involved companies (e.g. Crowley and Avangrid) will further ensure a significant presence of a number of different unions in these construction and operations of this offshore wind port.

Assuming this dynamic of heavy union concentration holds, near-term workforce training and education strategies that happen independent of unions may have limited impact in securing local jobs for workers at the port. Employers who will be connected to the port are also most likely to employ unionized workers and will work through those unions to secure those workers. As a result, the City of Salem and MassHire North Shore Workforce Board would optimally explore a more directed strategy, focusing on specific partnerships with unions to increase local accessibility for apprenticeships, or pursue pre-apprenticeships and apprentice-readiness programs for the local area that focus on increasing entrance into local labor unions.

²² <https://smartasset.com/data-studies/states-with-the-strongest-unions-2022>

Based on an initial landscape scan, the research team has identified a number of unions who are most likely to be involved in one of the three phases of the port's development. This list is not exhaustive but key partners will include:

- Building Trades Councils
- Construction: Laborers, Ironworkers, Electricians, Carpenters, Millwrights, Insulators and others
- Operations: Seafarers

Proposed Pre-Apprenticeship Program

To support the City of Salem and MassHire North Shore Workforce Development Board in developing a pre-apprenticeship concept for the MassCEC grant application, the research team launched outreach with organized labor contacts. Based on initial feedback and previous experience, the research team crafted and finalized a pre-apprenticeship concept.

One critical element of this proposal is the targeting of specific, hard-to-reach populations in the region. While most trade unions have ample applicants for available apprenticeship openings, certain populations are harder to reach but important for growing and strengthening organized labor. These populations include women, people of color, youth, immigrants, those from low-income backgrounds and residents of environmental justice communities.

Other aspects of this pre-apprenticeship should seek to address the many challenges to integrating these candidates into union apprentice programs. These include:

- A lack of awareness among potential candidates about the opportunities available to enter a union.
- A self-determination that a candidate is unlikely to fit or qualify in these unions.
- The opportunity cost of leaving their existing work.
- Difficulty meeting and passing union apprentice entry requirements and examinations, due to reasons including a lack of academic qualifications, physical fitness, criminal justice-involvement, and/or documentation of immigrant status.
- Language, childcare, and transportation barriers.
- A lack of mentorship and cultural literacy with union apprenticeship programs.

The proposed pre-apprentice concept should have four components, each designed to support entry into a union apprenticeship. Design of this program will be led by local unions connected to the port's construction or operations and feature input from the local workforce board MassHire, connected vocational schools, community groups and other relevant stakeholders. The four components are:

1. *Recruitment*: seeking to reach as many candidates within targeted populations as possible through direct outreach and community partner leadership.
2. *Assessment and Screening*: conducting preliminary reviews of potential candidates based on specific union requirements and needs, as well as elements that maximize candidates' chances for success.
3. *Preparation*: providing adult basic education, tutoring and initial skills training, in conjunction with targeted and coordinated support services, to address academic entry requirement deficits, while improving candidate qualifications, certifications and future career prospects.

4. *Connection and Exposure:* providing candidates with learning and networking opportunities about unions, supporting apprenticeship applicants through connections to unions, and other support, while supporting consideration of alternative opportunities where relevant.

Direct commitments for pre-apprenticeship graduates are still in development, and while they will likely not include a formal agreement for matriculation in or graduation from union apprenticeship programs, options under consideration include:

1. A commitment by a union to provide the applicant with the opportunity to take an assessment for immediate consideration for apprenticeship entry.
2. Consideration for extra credit on the union apprenticeship application from completing the pre-apprenticeship program.
3. Meeting portion of apprenticeship hourly requirements.
4. Offering additional opportunities for certifications.

In support of this pre-apprenticeship initiative, the research team recommends that the proposal team continue to conduct the following initial activities to inform, expand, and/or refine the development of this concept.

1. Work closely with union partners to understand:
 - a. Attributes of high-value apprentice candidates.
 - b. Barriers in recruiting non-traditional candidates.
 - c. Experience and skills that support completion and success in apprenticeships.
 - d. Retention challenges
2. Scoping the North Shore region to explore:
 - a. Existing education and training infrastructure and assets
 - b. Availability of support services
 - c. Partnership opportunities, especially at the community level
 - d. Location of key populations and environmental justice communities

The Future of the Port

For the final section of this report, the research team was asked to look beyond the immediate economic impact of the construction and operations of the Salem marshaling port, and explore the larger value for the City of Salem in becoming a hub for offshore wind in the region. The economic activity and wind innovation occurring at the New Bedford and Providence ports are two examples that demonstrate the value in utilizing a wind port as an anchor for larger investments. For example, the New Bedford Ocean Cluster now includes co-working facilities and a range of companies have set up shop in the vicinity.

The location of Salem, as the first operational wind port north of Boston, and its proximity to new developments in the Gulf of Maine, could attract a range of companies and support a broader innovation ecosystem around offshore wind in the area. The known opportunity for the Salem port is as a staging area for traditional offshore wind development, but there is much larger potential opportunity in the future, focused on floating offshore wind.

The Opportunity With Floating Offshore Wind

Floating offshore wind projects consist of wind turbines located in deep waters – usually greater than 60 meters water depth – that are not directly fixed to the sea bottom. Instead, they are deployed on top of floating structures secured to the sea bottom through various means.²³ The rapid leasing of fixed-bottom offshore wind platforms means that the domestic areas available for fixed bottom platforms are increasingly limited. As one answer, developers and the United States Department of Energy (DOE) are looking towards deeper water to build the next generation of offshore wind, that will require floating offshore wind platforms. These deeper waters are estimated to be home to two-thirds (65%) of the nation’s offshore wind energy potential (4.3 terawatts).²⁴

Recent Developments

In September 2022, the DOE proposed new goals for floating offshore wind, aiming to deploy 15 gigawatts of floating offshore wind by 2035, while reducing the cost of floating offshore wind energy by more than 70% in the same period.²⁵ Achieving these aims, something DOE has a track record in supporting in other technologies²⁶, will be crucial to long-term offshore wind deployment success. There are many states with high water depth in the North Atlantic, and the Gulf of Maine, which are pushing toward floating offshore wind, particularly in the Gulf of Maine where there is a scarcity of shallow water lease areas. These developments, along with the new DOE goals, could advance the domestic floating offshore wind industry dramatically.

Opportunity for Salem Offshore Wind Marshaling Port

Much of the assembly and construction of the offshore floating wind turbine occurs directly at a wharf facility, rather than at sea with a fixed bottom project, and then the fully operational turbine is towed out to installation.²⁷ This requires a deep-water port that can handle the construction of these turbines and floating structures, as well as a lack of height restrictions on being towed out to sea. As one of the only unrestricted, deep-water ports in the Northeast (initial competitors to-date in this space are the Port of Searsport in Maine, and the New Jersey Wind Port), the Salem wind port has a competitive advantage over other established ports and is well situated to seize a first-mover advantage.

Expansion into floating offshore wind would bring significant economic and workforce benefits to the North Shore region. The port infrastructure required for floating offshore wind is much more complex, and the construction and installation of floating offshore wind turbines is expected to be highly labor intensive on the port side, rather than at sea like with a fixed bottom project.²⁸ While the occupational profiles and needs for construction of floating offshore wind are likely to be similar as for fixed-bottom offshore wind, the scale of workers is likely to be dramatically higher, with much more work occurring port side, especially in assembly.²⁹

²³ National Renewable Energy Laboratory (NREL) – Offshore Wind Resource Assessment, retrieved from <https://www.nrel.gov/wind/offshore-resource.html>

²⁴ National Renewable Energy Laboratory (NREL) – Offshore Wind Resource Assessment, retrieved from <https://www.nrel.gov/wind/offshore-resource.html>

²⁵ United States Department of Energy, retrieved from: <https://www.energy.gov/articles/us-department-energy-announces-new-actions-accelerate-us-floating-offshore-wind-deployment>

²⁶ United States Department of Energy, retrieved from: <https://www.energy.gov/articles/energy-department-announces-achievement-sunshot-goal-new-focus-solar-energy-office>

²⁷ National Renewable Energy Laboratory (NREL) – Overview of Floating Offshore Wind, retrieved from <https://www.nrel.gov/news/video/overview-of-floating-offshore-wind-text.html>

²⁸ National Renewable Energy Laboratory (NREL) – Overview of Floating Offshore Wind, retrieved from <https://www.nrel.gov/news/video/overview-of-floating-offshore-wind-text.html>

²⁹ U.S. Offshore Wind Energy Workforce Assessment (NREL): retrieved from <https://www.nrel.gov/docs/fy23osti/81798.pdf>

The state of Maine has been gearing up towards floating offshore wind development, with an estimated 88% of the states offshore wind generation potential located in deep waters that require floating offshore wind.³⁰ The marshaling port in Salem is conveniently located near the Gulf of Maine and would be the likeliest candidate to serve as the central construction, assembly and transportation port for floating offshore wind projects in the Gulf of Maine.

By establishing itself as an important marshaling port in the Northeast, and building credibility in the offshore wind sector, the Salem port would be well-positioned to enter the nascent floating offshore wind industry as it expands. Floating offshore wind is also likely to require significant supply chain expansion, especially for Tier 2 and Tier 3 manufacturers. This would allow for a more regional strategy, moving beyond the construction of Salem to pursue robust operations and maintenance opportunities in Gloucester and build on the manufacturing infrastructure in Lynn. The proximity to Boston and its many wind developers, universities, and entrepreneurial ecosystem is a further benefit. There is clustering potential that could be a draw for other renewable energy companies and service providers as well.

This future increases the long-term viability of the offshore wind marshaling port in Salem and highlights the bright economic future for the region as a player in the global offshore wind sector.

Methodology

IMPACT MODELING

The BW research team provides estimated job impacts of Salem port development and operations by leveraging the structure of phases and impacts estimated in the July 2022 Daymark Energy Advisors analysis, *Economic Impact Analysis of Salem Wind Port*. This analysis presents outputs in three phases: project development phase, construction phase, and operations phase. The Daymark analysis assumes \$154.1 million in construction phase expenditures over two years, \$5 million in project development over two years and 7,200 MW of offshore wind staging and marshaling operating out of the port over 17 years. Only direct jobs were used in the reporting of jobs created from the Salem wind port project in this report.

SUPPLY SIDE ASSESSMENT

Based on assessment of other similar projects in the region, BW Research's significant offshore wind experience, and a comprehensive review of current offshore wind workforce literature, the research team created a detailed occupational matrix of key jobs required for offshore wind staging and marshaling operating out of the city of Salem port. This proprietary database includes all occupations involved in each phase of offshore wind staging and marshaling and is segmented by project phase and occupational group.

All statewide occupational data was sourced from the Bureau of Labor Statistics Occupational Employment Statistics and supplemented with the JobsEQ labor market database where needed. All data is referenced using Standard Occupational Classification (SOC) codes.

³⁰ National Renewable Energy Laboratory (NREL) – Cost of Floating Offshore Wind Energy Using New England Aqua Ventus Concrete Semisubmersible

ENVIRONMENTAL JUSTICE COMMUNITIES

The research team identified 139 environmental justice communities in the North Shore region retrieved from Massachusetts ArcGIS. Environmental justice communities were restricted to only census tracts in the North Shore region.

GAP ANALYSIS

By modeling estimated occupation-level demands for 7,200MW of OSW staging and marshaling, the research team was able to identify the difference, or gap, between the anticipated number of Full-Time Equivalents (FTEs) needed during each phase of the OSW project and the share of existing available workers and those available through existing talent pipelines in the North Shore region. This analysis highlights the occupations which will require the greatest amount of assistance and preparation to ensure the workforce is ready.

INDUSTRY ANALYSIS

The research team broke down the universe of potential firms within Essex County into the three basic categories, derived from specific industries directly related to the activities required by 1) the development and construction of the port, 2) suppliers and wholesalers to firms who will be developing and constructing the port, and 3) general port operations and maintenance. The research team then tightened the list to specific sectors within the region, including trucking, freight, port side supplies and materials, port operations equipment, and conducted further research to prioritize the companies that emerged.

TRAINING INVENTORY

The research team gathered known training programs from the MassHire North Shore Workforce Development Board including other current training programs around the state that are presently or could be involved in developing the states offshore wind workforce. The team placed an emphasis on pre-apprenticeship training programs as much of the labor needed for the project will be completed by union labor.

OUTREACH AND UNDERSTANDING OF UNIONS

The research team leveraged existing relationships with unions in the state, and companies connected to the port, to develop an outreach strategy for relevant local unions. The research team, in partnership with the MassHire North Shore Workforce Board and the City of Salem, engaged those unions and other stakeholders to uncover insights and test pre-apprenticeship prototypes and explore interest in supporting these concepts.

DEVELOPMENT OF PRE-APPRENTICESHIP PROGRAMS

Based on the outreach to unions described above, and a review of previous programs, the research team crafted multiple pre-apprenticeship concepts and conducted follow up discussions with unions and connected stakeholders to finalize the concept.

Appendix A: Industry Analysis

Initially, the research team was tasked with exploring the reaction of the local business community to the development of the offshore wind marshaling point and understanding the regional supply chain that could benefit from and expand into economic activities connected to the port. The research team began by breaking down the universe of potential firms within Essex County into the three basic categories, derived from specific industries directly related to the activities required by 1) the development and construction of the port, 2) suppliers and wholesalers to firms who will be developing and constructing the port, and 3) general port operations and maintenance. As the initial thrust of this exercise (to locate companies who could participate in build out and port operations) was complicated by both the strong presence of organized labor throughout, and the more focused operations of the port, the research team further tightened the list to specific sectors within the region, including trucking, freight, port side supplies and materials, port operations equipment, and then used desktop research to prioritize the companies that emerged.

Sixteen local companies then were selected for targeted outreach, and were contacted multiple times by the research team, supported by connections from the MassHire North Shore Workforce Board. However, the research team was unsuccessful in contacting any company willing to participate in an interview.

The NAICS codes associated with each tier are presented below, along with the final list of companies presented for further outreach. The research team has shared its initial list of more than 1,400 companies from this exercise separately with the City of Salem and the Workforce Board. As the Salem port develops further, this list can be leveraged for initial conversations in support of future expansion.

Construction Tier 1: Directly participate in the construction of the port.

- Identified 195 firms within Essex County who could potentially participate.

NAICS Code	Industry Name	2-digit NAICS	Large Industry Group
236220	Commercial And Institutional Building Construction	23	Construction
237110	Water And Sewer Line and Related Structures Construction	23	Construction
237990	Other Heavy and Civil Engineering Construction	23	Construction
238110	Poured Concrete Foundation and Structure Contractors	23	Construction
238120	Structural Steel and Precast Concrete Contractors	23	Construction
238220	Plumbing, Heating, And Air-Conditioning Contractor	23	Construction
238320	Painting And Wall Covering Contractors	23	Construction
238910	Site Preparation Contractors	23	Construction
238990	All Other Specialty Trade Contractors	23	Construction
484110	General Freight Trucking, Local	48	Transportation and Warehousing
488310	Port And Harbor Operations	48	Transportation and Warehousing
562991	Septic Tank and Related Services	56	Admin Support, Waste Management, Remediation

Construction Tier 2: Serve as sub-contractors to specific development or construction activities.

- Identified 1,013 firms within Essex County who could potentially participate.

NAICS Code	Industry Name	2-digit NAICS	Large Industry Group
236220	Commercial And Institutional Building Construction	23	Construction
238210	Electrical Contractors and Other Wiring Installation	23	Construction
238220	Plumbing, Heating, And Air-Conditioning Contractor	23	Construction
238320	Painting And Wall Covering Contractors	23	Construction
238350	Finish Carpentry Contractors	23	Construction
238990	All Other Specialty Trade Contractors	23	Construction

Supply Chain: Directly supply materials or serve as wholesalers of those materials for construction of the port.

- Identified 150 firms within Essex County who could potentially participate.

NAICS Code	Industry Name	2-digit NAICS	Large Industry Group
327992	Ground Or Treated Mineral and Earth Manufacturing	32	Manufacturing
327993	Mineral Wool Manufacturing	32	Manufacturing
331110	Iron And Steel Mills and Ferroalloy Manufacturing	33	Manufacturing
331420	Copper Rolling, Drawing, Extruding, And Alloying	33	Manufacturing
331511	Iron Foundries	33	Manufacturing
331512	Steel Investment Foundries	33	Manufacturing
331513	Steel Foundries (Except Investment)	33	Manufacturing
331523	Nonferrous Metal Die-Casting Foundries	33	Manufacturing
332312	Fabricated Structural Metal Manufacturing	33	Manufacturing
332313	Plate Work Manufacturing	33	Manufacturing
332322	Sheet Metal Work Manufacturing	33	Manufacturing
333120	Construction Machinery Manufacturing	33	Manufacturing
423310	Lumber, Plywood, Millwork, And Wood Panel Merchant Wholesalers	42	Wholesale Trade
423320	Brick, Stone, And Related Construction Material Merchant Wholesalers	42	Wholesale Trade
423390	Other Construction Material Merchant Wholesalers	42	Wholesale Trade
423510	Metal Service Centers and Other Metal Merchant Wholesalers	42	Wholesale Trade
423810	Construction And Mining (Except Oil Well) Machinery	42	Wholesale Trade

NAICS Code	Industry Name	2-digit NAICS	Large Industry Group
423830	Industrial Machinery and Equipment Merchant Wholesalers	42	Wholesale Trade
423860	Transportation Equipment and Supplies (Except Motorcycles)	42	Wholesale Trade
444180	Other Building Material Dealers	44	Retail Trade
488310	Port And Harbor Operations	48	Transportation and Warehousing

Operations and Maintenance: Support the port during operations, primarily through cleaning and maintenance activities.

- Identified 53 firms within Essex County who could potentially participate.

NAICS Code	Industry Name	2-digit NAICS	Large Industry Group
236220	Commercial And Institutional Building Construction	23	Construction
238220	Plumbing, Heating, And Air-Conditioning Contractor	23	Construction
238990	All Other Specialty Trade Contractors	23	Construction
454210	Vending Machine Operators	45	Retail Trade
561720	Janitorial Services	56	Admin Support, Waste Management, Remediation
561612	Security Guards and Patrol Services	56	Admin Support, Waste Management, Remediation
562111	Solid Waste Collection	56	Admin Support, Waste Management, Remediation
562920	Materials Recovery Facilities	56	Admin Support, Waste Management, Remediation
562219	Other Nonhazardous Waste Treatment and Disposal	56	Admin Support, Waste Management, Remediation
561730	Landscaping Services	56	Admin Support, Waste Management, Remediation

Initial List of Companies: the companies are highlighted as being likely to be able to participate in the build out and operations of the port.

TABLE 16. FOLLOW UP COMPANIES

NAICS Code	Company Name	City	Involvement	Two-Digit NAICS	Two-Digit NAICS Description
33312022	American United Marine Corps	Beverly	Likely	33	Manufacturing
42331032	Bay State Pallet Co Inc	Haverhill	Likely	42	Wholesale Trade
42331032	Bay State Pallet Co Inc	Peabody	Likely	42	Wholesale Trade
42331032	Beverly Pallet Co Inc	Ipswich	Likely	42	Wholesale Trade
42381004	Bobcat Construction Inc	Lawrence	Likely	42	Wholesale Trade
42351012	Capone Iron Corp	Rowley	Likely	42	Wholesale Trade

NAICS Code	Company Name	City	Involvement	Two-Digit NAICS	Two-Digit NAICS Description
42351035	Capone Iron Corp	Peabody	Likely	42	Wholesale Trade
33312014	Collins Manufacturing Inc	Essex	Likely	33	Manufacturing
42383016	Creative Industrial Supl Co	Lynn	Likely	42	Wholesale Trade
42383032	DL Quinn Co Inc	Middleton	Likely	42	Wholesale Trade
42386008	E F Shea New England Concrete	Amesbury	Likely	42	Wholesale Trade
33231210	Flametech Steels Inc	Lawrence	Likely	33	Manufacturing
33231210	Georgetown Ironworks	Georgetown	Likely	33	Manufacturing
42383010	Harnum Industries LTD	Salisbury	Likely	42	Wholesale Trade
42351002	Haverhill Steel Supply	Haverhill	Likely	42	Wholesale Trade
42381002	Lawrence Concrete Cutting	Lawrence	Likely	42	Wholesale Trade
48411015	Love Hauling Inc	Lynn	Likely	48	Transportation and Warehousing
48411015	MTS Hauling Inc	Haverhill	Likely	48	Transportation and Warehousing
42383016	New England Indl Truck Inc	Beverly	Likely	42	Wholesale Trade
48411016	Northeast Cartage Co Inc	Peabody	Likely	48	Transportation and Warehousing
42332036	Northeast Sand & Gravel	North Andover	Likely	42	Wholesale Trade
33232204	Polaris Sheet Metal	Gloucester	Likely	33	Manufacturing
33231210	Quinn Brothers Inc	Essex	Likely	33	Manufacturing
33231210	Rebars & Mesh Inc	Haverhill	Likely	33	Manufacturing
42383032	Safeway Overhead Crane Svc	Lynn	Likely	42	Wholesale Trade
42332036	Sam's Transportation	Georgetown	Likely	42	Wholesale Trade
33231210	Structural Systems Inc	North Andover	Likely	33	Manufacturing
48411015	Tj's Heavy Hauling	North Andover	Likely	48	Transportation and Warehousing
33232205	Amada America	Byfield	Somewhat Likely	33	Manufacturing
33142009	American Power Svc Inc	Georgetown	Somewhat Likely	33	Manufacturing
33151304	Amesbury Foundry Co	Amesbury	Somewhat Likely	33	Manufacturing
33312008	Armac	Lynnfield	Somewhat Likely	33	Manufacturing
33232204	A-W Airflo Industries Inc	Newburyport	Somewhat Likely	33	Manufacturing
33232204	B & R Metal Products Inc	Lynn	Somewhat Likely	33	Manufacturing
33312014	Bematek Systems Inc	Salem	Somewhat Likely	33	Manufacturing
33232204	Better Maintenance Sheet Metal	Rowley	Somewhat Likely	33	Manufacturing
42386015	Boatworks Marine Elctro-Refrig	Marblehead	Somewhat Likely	42	Wholesale Trade
33232204	C & C Fabricating	Ipswich	Somewhat Likely	33	Manufacturing

NAICS Code	Company Name	City	Involvement	Two-Digit NAICS	Two-Digit NAICS Description
42351036	Crystal Steel Corp	Middleton	Somewhat Likely	42	Wholesale Trade
33232204	D J Fabricators Inc	Ipswich	Somewhat Likely	33	Manufacturing
33232204	East Coast Welding & Fab	Newburyport	Somewhat Likely	33	Manufacturing
33232204	Ergomet Chapman Fabrications	Ward Hill	Somewhat Likely	33	Manufacturing
33231210	First Fabricators Co Inc	Ipswich	Somewhat Likely	33	Manufacturing
33232204	Industrial Sheet Metal Co	Haverhill	Somewhat Likely	33	Manufacturing
33232204	J & B Metal Products Co Inc	Saugus	Somewhat Likely	33	Manufacturing
48411015	J R M Hauling-Recycling Svc II	Gloucester	Somewhat Likely	48	Transportation and Warehousing
42383008	Kleen Line Corp	Newburyport	Somewhat Likely	42	Wholesale Trade
33232204	Lighthouse Manufacturing Inc	Peabody	Somewhat Likely	33	Manufacturing
33312008	M A Olson Co Inc	Topsfield	Somewhat Likely	33	Manufacturing
42351029	Merfish United	Ipswich	Somewhat Likely	42	Wholesale Trade
33152304	Merrimac Valley Aluminum	Amesbury	Somewhat Likely	33	Manufacturing
33232204	Metal Tronics Inc	Georgetown	Somewhat Likely	33	Manufacturing
48831002	Northeast Mooring & Salvage	Marblehead	Somewhat Likely	48	Transportation and Warehousing
42332024	Olde New England Granite	Lynnfield	Somewhat Likely	42	Wholesale Trade
33151101	PDI International	Lowell	Somewhat Likely	33	Manufacturing
42351022	PMS Manufacturing Products Inc	Gloucester	Somewhat Likely	42	Wholesale Trade
33232204	Port Sheet Metal Inc	Newburyport	Somewhat Likely	33	Manufacturing
42381036	Safety Inc	Peabody	Somewhat Likely	42	Wholesale Trade
33231303	Salem Metal Fabricators	Middleton	Somewhat Likely	33	Manufacturing
42386015	Seatronics Co	Gloucester	Somewhat Likely	42	Wholesale Trade
33231210	Uniweld Inc	Georgetown	Somewhat Likely	33	Manufacturing
33232204	Vortex Co	Peabody	Somewhat Likely	33	Manufacturing
42332036	Zambino Rocco-Sons Inc Gravel	Methuen	Somewhat Likely	42	Wholesale Trade

Appendix B: Salem Occupational Data

TABLE 17. DEVELOPMENT OCCUPATIONS

6-Digit SOC	SOC Name	Jobs
11-9021	Construction Managers	13
13-2011	Accountants and Auditors	10
23-1011	Lawyers	8

13-1051	Cost Estimators	6
11-3071	Transportation, Storage, and Distribution Managers	6
11-9199	Managers, All Other	6
17-2141	Mechanical Engineers	6
13-1041	Compliance Officers	5
11-3031	Financial Managers	5
13-2051	Financial and Investment Analysts	5
17-2071	Electrical Engineers	5
17-2199	Engineers, All Other	5
13-1199	Business Operations Specialists, All Other	4
13-1082	Project Management Specialists	4
17-3031	Surveying and Mapping Technicians	4
43-3061	Procurement Clerks	4
11-3061	Purchasing Managers	3
19-1023	Zoologists and Wildlife Biologists	3
11-9041	Architectural and Engineering Managers	2
13-2099	Financial Specialists	2
15-1299	Computer Occupations, All Other	2
19-3011	Economists	2
11-9121	Natural Sciences Managers	1
13-1023	Purchasing Agents, Except Wholesale, Retail, and Farm Products	1
15-2051	Data Scientists	1
17-2111	Health and Safety Engineers, Except Mining Safety Engineers and Inspectors	1
17-2112	Industrial Engineers	1
Total		116

TABLE 18. CONSTRUCTION OCCUPATIONS

6-Digit SOC	SOC Name	Construction (\$150M Investment)	Construction (\$250M Investment)
47-2061	Construction Laborers	23	39
47-2073	Operating Engineers and Other Construction Equipment Operators	13	22
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	10	17
53-3032	Heavy and Tractor-Trailer Truck Drivers	6	10
11-9021	Construction Managers	4	7

6-Digit SOC	SOC Name	Construction (\$150M Investment)	Construction (\$250M Investment)
11-1021	General and Operations Managers	3	5
47-2031	Carpenters	3	5
49-9051	Electrical Power-Line Installers and Repairers	3	5
47-2071	Paving, Surfacing, and Tamping Equipment Operators	3	4
43-9061	Office Clerks, General	3	4
13-1082	Project Management Specialists	2	4
49-3042	Mobile Heavy Equipment Mechanics, Except Engines	2	4
47-2051	Cement Masons and Concrete Finishers	2	3
13-1051	Cost Estimators	1	2
47-2152	Plumbers, Pipefitters, and Steamfitters	1	2
43-3031	Bookkeeping, Accounting, and Auditing Clerks	1	2
47-4051	Highway Maintenance Workers	1	2
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	1	2
17-2051	Civil Engineers	1	2
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	1	2
49-9052	Telecommunications Line Installers and Repairers	1	2
47-2111	Electricians	1	2
47-5023	Earth Drillers, Except Oil and Gas	1	2
13-2011	Accountants and Auditors	1	1
33-9091	Crossing Guards and Flaggers	1	1
47-2151	Pipelayers	1	1
47-2141	Painters, Construction and Maintenance	1	1
51-4121	Welders, Cutters, Solderers, and Brazers	1	1
47-5022	Excavating and Loading Machine and Dragline Operators, Surface Mining	1	1
43-1011	First-Line Supervisors of Office and Administrative Support Workers	1	1
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	1	1
	Total	96	159

TABLE 19. OPERATIONS AND MAINTENANCE OCCUPATIONS

6-Digit SOC	SOC Name	Jobs
49-9071	Maintenance and Repair Workers, General	81
17-3023	Electrical and Electronic Engineering Technologists and Technicians	38

6-Digit SOC	SOC Name	Jobs
53-5011	Sailors and Marine Oilers	25
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	24
43-9199	Office and Administrative Support Workers, All Other	18
53-6099	Transportation Workers, All Other	6
49-2095	Electrical and Electronics Repairers, Powerhouse, Substation, and Relay	4
53-6031	Automotive and Watercraft Service Attendants	4
37-3011	Landscaping and Groundskeeping Workers	3
53-5021	Captains, Mates, and Pilots of Water Vessels	3
11-3071	Transportation, Storage, and Distribution Managers	2
13-1081	Logistics Analysts	2
13-1121	Meeting, Convention, and Event Planners	2
33-9032	Security Guards	2
43-5061	Production, Planning, and Expediting Clerks	2
53-7199	Material Moving Workers, All Other	2
11-1021	General and Operations Managers	1
11-3031	Financial Managers	1
11-3051	Industrial Production Managers	1
11-3061	Purchasing Managers	1
17-2071	Electrical Engineers	1
17-2111	Health and Safety Engineers, Except Mining Safety Engineers and Inspectors	1
17-2112	Industrial Engineers	1
17-2141	Mechanical Engineers	1
37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	1
37-2019	Building Cleaning Workers, All Other	1
43-2099	Communications Equipment Operators, All Other	1
Total		230

Appendix C: Training Inventory

TABLE 20. TRAINING PROGRAM INVENTORY

30-Minute DTA	Program Host	City	Course Name	Outcomes	Focus Area
Within 30-Minute DTA	Gould Construction Institute	Woburn	Iron Working 1 Correspondence		Trades
Within 30-Minute DTA	Gould Construction Institute	Woburn	Iron Working 2 Correspondence		Trades

30-Minute DTA	Program Host	City	Course Name	Outcomes	Focus Area
Within 30-Minute DTA	Gould Construction Institute	Woburn	Iron Working 3 Correspondence		Trades
Within 30-Minute DTA	Essex North Shore Agricultural and Technical School	Danvers	Construction Craft Laborers	Certificate	Trades
Within 30-Minute DTA	Black Dog Divers	Ipswich	Certified Commerical Diver	Certificate	Heavy Equipment
Within 30-Minute DTA	Black Dog Divers	Salem	Certified Commercial Diver	Certificate	Heavy Equipment
Outside 30-Minute DTA	Adult Continuing Education - Martha's Vineyard	Oak Bluffs	OSW Tech Certification Program	Certificate	OSW
Outside 30-Minute DTA	Bristol Community College	New Bedford	OSW Power Technician Certificate	Certificate	OSW
Outside 30-Minute DTA	Bristol Community College	New Bedford	GWO Certification - Basic Advanced Training	Certificate	OSW
Outside 30-Minute DTA	Bristol Community College	New Bedford	GWO Certification - Basic Safety Training	Certificate	OSW
Outside 30-Minute DTA	Bristol Community College	New Bedford	GWO Certification - Basic Technical Training	Certificate	OSW
Outside 30-Minute DTA	Cape and Islands Self-Reliance Corporation	Bourne	Land-Base Wind and OSW Workforce Training	Certificate	OSW
Outside 30-Minute DTA	Cape Cod Community College	Barnstable	OSW 101: Energy, Climate and Jobs	Certificate	OSW
Outside 30-Minute DTA	Massachusetts Maritime Academy	Bourne	GWO Basic Safety Training	Certificate	OSW
Outside 30-Minute DTA	Massachusetts Maritime Academy	Bourne	US Off-Shore Wind Training GWO	Certificate	OSW
Outside 30-Minute DTA	Massachusetts Maritime Academy	Bourne	GWO Basic Safety Training	Certificate	OSW
Outside 30-Minute DTA	Massachusetts Maritime Academy	Bourne	US Off-Shore Wind Training GWO	Certificate	OSW
Outside 30-Minute DTA	Tufts University	Somerville	Masters Program	Masters	OSW
Outside 30-Minute DTA	UMass Amherst	Amherst	Masters Program	Certificate	OSW
Outside 30-Minute DTA	UMass Amherst	Amherst	Wind Energy Graduate Certificate	Certificate	OSW
Outside 30-Minute DTA	UMass Lowell	Lowell	Masters Program	Masters	OSW
Outside 30-Minute DTA	Andover - Greater Lawrence Technical School	Lawrence	Sheet Metal 1		Trades
Outside 30-Minute DTA	Andover - Greater Lawrence Technical School	Lawrence	Sheet Metal 2 (Hands-On)		Trades
Outside 30-Minute DTA	Andover - Greater Lawrence Technical School	Lawrence	Sheet Metal 3 (Hands-On)		Trades
Outside 30-Minute DTA	Andover - Greater Lawrence Technical School	Lawrence	Sheet Metal 4 (Hands-On)		Trades
Outside 30-Minute DTA	Bunker Hill Community College	Boston	Electrician Program		Trades
Outside 30-Minute DTA	Canton - CGI Training at PEC	Canton	Electrical 1		Trades
Outside 30-Minute DTA	Canton - CGI Training at PEC	Canton	Electrical 2		Trades

30-Minute DTA	Program Host	City	Course Name	Outcomes	Focus Area
Outside 30-Minute DTA	Canton - CGI Training at PEC	Canton	Electrical 3		Trades
Outside 30-Minute DTA	Canton - CGI Training at PEC	Canton	Electrical 4		Trades
Outside 30-Minute DTA	Cape and Islands Self-Reliance Corporation	Bourne	Construction Supervisor License Continuing Education Units	Exam Prep	Trades
Outside 30-Minute DTA	Construction Supervisor Institute	Methuen	Massachusetts Construction Supervisor and Hoisting License	License	Trades
Outside 30-Minute DTA	Franklin - Tri County Regional Vocational Technical High School	Franklin	Sheet Metal 1		Trades
Outside 30-Minute DTA	Franklin - Tri County Regional Vocational Technical High School	Franklin	Sheet Metal 2 (Hands-On)		Trades
Outside 30-Minute DTA	Martha's Vineyard Regional High School	Oak Bluffs	Carpentry and Building Trades	Certificate	Trades
Outside 30-Minute DTA	Massachusetts Executive Office of Labor and Workforce Development	Boston	Pile Driver Apprenticeship	Job Readiness	Trades
Outside 30-Minute DTA	Medford - Vocational Technical High School	Medford	Electrical 1		Trades
Outside 30-Minute DTA	Medford - Vocational Technical High School	Medford	Electrical 2		Trades
Outside 30-Minute DTA	Medford - Vocational Technical High School	Medford	Electrical 3		Trades
Outside 30-Minute DTA	Medford - Vocational Technical High School	Medford	Electrical 4		Trades
Outside 30-Minute DTA	Medford - Vocational Technical High School	Medford	Pipefitting 2		Trades
Outside 30-Minute DTA	Medford - Vocational Technical High School	Medford	Sheet Metal 5 (Hands-On)		Trades
Outside 30-Minute DTA	Middlesex Community College	Bedford	Middlesex Community College Lineman Program	Certificate	Trades
Outside 30-Minute DTA	Minuteman Regional Vocational Technical High School	Lexington	Certified Welder	Certificate	Trades
Outside 30-Minute DTA	Minuteman Technical Institute	Lexington	CNC Machine Operator	Certificate	Trades
Outside 30-Minute DTA	Montachusett Regional Vocational Technical School	Fitchburg	Certified Welder	Certificate	Trades
Outside 30-Minute DTA	North Adams - McCann Technical School	North Adams	Sheet Metal 4 (Hands-On)		Trades
Outside 30-Minute DTA	Springfield - Springfield technical community college	Springfield	Electrical 1		Trades
Outside 30-Minute DTA	Springfield - Springfield technical community college	Springfield	Electrical 2		Trades
Outside 30-Minute DTA	Springfield - Springfield technical community college	Springfield	Electrical 3		Trades
Outside 30-Minute DTA	Springfield - Springfield technical community college	Springfield	Electrical 4		Trades
Outside 30-Minute DTA	Springfield - Springfield technical community college	Springfield	Masters Electrical		Trades

30-Minute DTA	Program Host	City	Course Name	Outcomes	Focus Area
Outside 30-Minute DTA	Springfield - Springfield technical community college	Springfield	Pipefitting 1		Trades
Outside 30-Minute DTA	Springfield Technical Community College	Springfield	Building/Construction Finishing, Management, and Inspection, Other	Associate	Trades
Outside 30-Minute DTA	Taunton - Bristol - Plymouth Regional Technical School	Taunton	Pipefitting 1		Trades
Outside 30-Minute DTA	Taunton - Bristol - Plymouth Regional Technical School	Taunton	Pipefitting 2		Trades
Outside 30-Minute DTA	Taunton - Bristol - Plymouth Regional Technical School	Taunton	Sheet Metal 1		Trades
Outside 30-Minute DTA	Taunton - Bristol - Plymouth Regional Technical School	Taunton	Sheet Metal 2 (Hands-On)		Trades
Outside 30-Minute DTA	Taunton - Bristol - Plymouth Regional Technical School	Taunton	Sheet Metal 4 (Hands-On)		Trades
Outside 30-Minute DTA	Black Dog Divers	Ipswich	Certified Commercial Diver	Certificate	Heavy Equipment
Outside 30-Minute DTA	Black Dog Divers	Salem	Certified Commercial Diver	Certificate	Heavy Equipment
Outside 30-Minute DTA	Amaral Auto & Truck Driving School, Inc.	Westport	CDL - Class A - Tractor Trailer instruction	Certificate	Heavy Equipment
Outside 30-Minute DTA	Amaral Auto & Truck Driving School, Inc.	Westport	CDL - Class B - Heavy Truck Instruction	Certificate	Heavy Equipment
Outside 30-Minute DTA	American Crane & Safety's Rigger Training	Online	Massachusetts NCCCO Rigger 1 Certification Exam Prep	Exam Prep	Heavy Equipment
Outside 30-Minute DTA	Atlantis Maritime Academy	Online	OUPV Captains License (Six Pack)	License	Heavy Equipment
Outside 30-Minute DTA	Atlantis Maritime Academy Inc.	Boston	Charter Boat Captain Courses - Boston MA Captain License Course	License	Heavy Equipment
Outside 30-Minute DTA	Black Dog Divers	Fall River	Certified Commercial Diver	Certificate	Heavy Equipment
Outside 30-Minute DTA	Boston Forklift Training	Online	Forklift Certified	Certificate	Heavy Equipment
Outside 30-Minute DTA	CDA Technical Institute	Rockland	Certified Commercial Diver	Certificate	Heavy Equipment
Outside 30-Minute DTA	Cranes 101	Bellingham	Overhead Crane Operator Safety	Certificate	Heavy Equipment
Outside 30-Minute DTA	Cranes 101	Bellingham	Tower Crane Operator Certification	Certificate	Heavy Equipment
Outside 30-Minute DTA	Cranes 101	Bellingham	1A Hoisting License Renewal Massachusetts	License Renewal	Heavy Equipment
Outside 30-Minute DTA	Cranes 101	Bellingham	1B Hoisting License Renewal Massachusetts	License Renewal	Heavy Equipment
Outside 30-Minute DTA	G. Tonucci Crane & Rigging Training	Quincy	Forklift Certified	License	Heavy Equipment
Outside 30-Minute DTA	Gould Construction Institute		Signal Certification & Basic Rigging Safety Course		Heavy Equipment
Outside 30-Minute DTA	J&J Driving School & Logistics, Inc.	New Bedford	CDL - Class A - Tractor Trailer instruction	Certificate	Heavy Equipment
Outside 30-Minute DTA	J&J Driving School & Logistics, Inc.	New Bedford	CDL - Class B - Heavy Truck Instruction	Certificate	Heavy Equipment
Outside 30-Minute DTA	Mariners Learning System	Online	OUPV Captains License (Six Pack)	License	Heavy Equipment

30-Minute DTA	Program Host	City	Course Name	Outcomes	Focus Area
Outside 30-Minute DTA	Mariners Learning System	Online	Masters License for Captains (25,50,100, and 200 GRT)	License	Heavy Equipment
Outside 30-Minute DTA	MASS Hoisting License	Plainville	MASS Hoisting License	License	Heavy Equipment
Outside 30-Minute DTA	Massachusetts Executive Office of Labor and Workforce Development	Boston	Universal Equipment Operator Apprenticeship	Job Readiness	Heavy Equipment
Outside 30-Minute DTA	New England Crane School	South Easton	NCCCO Operator Certification	Certificate	Heavy Equipment
Outside 30-Minute DTA	New England Maritime	Barnstable	OUPV Captains License (Six-Pack)	Certificate	Heavy Equipment
Outside 30-Minute DTA	New England Maritime	Barnstable	Master's License Up to 100 GRT	Certificate	Heavy Equipment
Outside 30-Minute DTA	New England Maritime	Barnstable	Masters License for Captains (25,50,100, and 200 GRT)	Certificate	Heavy Equipment
Outside 30-Minute DTA	North Atlantic States Carpenters Training Fund	Millbury	Rigging Safety CSL CE		Heavy Equipment
Outside 30-Minute DTA	Northeast Maritime Institute	Fairhaven	MassCEC Training Program - Merchant Mariner Credentials	Certificate	Heavy Equipment
Outside 30-Minute DTA	Safety Equipped, Inc	Swansea	Forklift Certified - Rough Terrain	Certificate	Heavy Equipment
Outside 30-Minute DTA	Safety Equipped, Inc	Swansea	Forklift Certified - Warehouse	Certificate	Heavy Equipment
Outside 30-Minute DTA	Bunker Hill Community College	Boston	Electrical/Electronics Maintenance and Repair Technology, Other	Associate	Operations and Maintenance
Outside 30-Minute DTA	Bunker Hill Community College	Boston	Electrical/Electronics Maintenance and Repair Technology, Other	Certificate	Operations and Maintenance
Outside 30-Minute DTA	Crystal Engineering	Newburyport	Machine Maintenance Mechanic		Operations and Maintenance
Outside 30-Minute DTA	Greater Lowell Technical HS	Tyngsboro	WIOA ISY REACH Program		Operations and Maintenance
Outside 30-Minute DTA	Building Pathways	Roxbury	Pre-Apprenticeship Program		Pre-Apprenticeship Program
Outside 30-Minute DTA	Community Works	Amherst	Pre-Apprenticeship Program (Building/Construction Trades and Transportation/Highway Industry)		Pre-Apprenticeship Program
Outside 30-Minute DTA	MassHire & International Institute of New England	Boston	Pre-Apprenticeship Program in Facilities Maintenance or Construction Trades		Pre-Apprenticeship Program
Outside 30-Minute DTA	MassHire & International Institute of New England	Boston	Pre-Apprenticeship Program in Facilities Maintenance	Certificate	Pre-Apprenticeship Program
Outside 30-Minute DTA	Minuteman Technical Institute	Lexington	Electrician Pre-Apprentice (10 Month)	Certificate	Pre-Apprenticeship Program
Outside 30-Minute DTA	Minuteman Technical Institute	Lexington	Carpenter Pre-Apprentice	Certificate	Pre-Apprenticeship Program
Outside 30-Minute DTA	Minuteman Technical Institute	Lexington	Welding Pre-Apprentice (15-Week)	Certificate	Pre-Apprenticeship Program
Outside 30-Minute DTA	Youth Build Boston	Roxbury	Construction Pre-Apprentice (15-Week)	Certificate	Pre-Apprenticeship Program