YOUTH POLICY LAB
UNIVERSITY OF MICHIGAN

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KRESA CTE LABOR MARKET ANALYSIS

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DATA FOR GOOD.

INTRODUCTION

Kalamazoo County passed a Career Technical Education (CTE) millage in 2019 and will use this new source of funding to restructure CTE delivery within the Kalamazoo Regional Education Service Agency (KRESA). In addition to expanding career awareness and exploration opportunities among younger students, millage revenues will support building a new countywide technical center. KRESA Superintendent David Campbell approached YPL to ask for assistance identifying CTE programs the center should offer. Specifically, Superintendent Campbell is focused on implementing programs that will prepare students to enter high-wage occupations with strong projected job growth in Southwest Michigan.

This report summarizes regional, statewide, and national labor market data. It addresses the following questions:

1. What are the current employment levels across major industry groups? How do they compare at each level of aggregation?
2. Which industries are projected to exhibit the greatest job growth in the near future?
3. Which CTE career clusters have programs that align with the most high-growth, high-wage occupations?

We find that the Kalamazoo region's labor market largely resembles that of the state and nation with a couple of notable exceptions. Despite faltering after the Great Recession, the manufacturing industry continues to employ far more people in the state and region compared to the rest of the country. Jobs in leisure and hospitality are more common around Kalamazoo than they are throughout Michigan generally.

However, the projections for earnings potential and job growth are greater in other industries. Health care and construction exhibit the strongest forecasts at both the state and regional levels. Among occupations with high earning potential and projected job growth, positions in health care and construction also align with the greatest number of state-recognized CTE programs.

PRESENT LABOR MARKET COMPOSITION

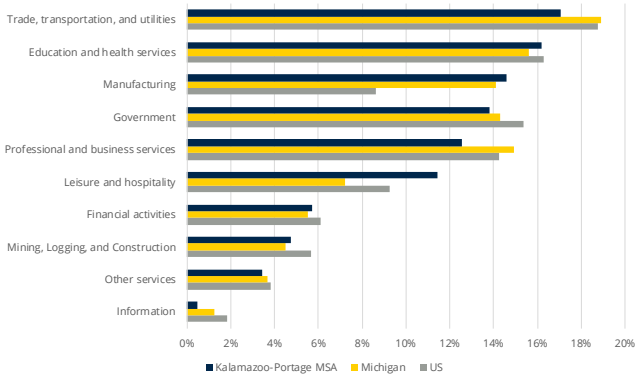
Current Bureau of Labor Statistics (BLS) data show that three broad industry groups account for approximately half of total employment in the Kalamazoo-Portage region (see Figure 1)[1]:

- Trade, transportation, and utilities
- Education and health services
- Manufacturing

This generally mirrors the state of Michigan's labor market where the same industries employ a substantial share of the workforce. That said, there are two places where Kalamazoo's labor market differs somewhat from the state's. A smaller share of Kalamazoo-area employees works in professional and business services while a greater share works in leisure and hospitality.

Perhaps the most salient takeaway from Figure 1 comes when we compare employment in Michigan to the nation as a whole. The share of manufacturing jobs in both Michigan generally and the Kalamazoo-Portage metropolitan statistical area (K-P MSA) specifically is roughly 70% higher than in the United States overall. Whereas approximately 14% of jobs in the region and state are in manufacturing, just over 8% of the entire country's workforce is employed in the industry.

Figure 1– Non-farm employment share by industry group at the regional, state, and national levels



Sources: Bureau of Labor Statistics Employees on Nonfarm Payrolls by Industry Sector and Industry Detail via The Employment Situation; Bureau of Labor Statistics Economy at a Glance data

Manufacturing clearly plays a uniquely important role in the state and K-P MSA regional economies. Indeed, many preeminent manufacturing firms like Kellogg, Pfizer, Stryker, and Whirlpool call Southwest Michigan their homes. It might therefore be easy to infer that workforce training programs like CTE should focus on preparing students to enter the field. However, external technological and economic factors cause some industries to grow over time and others to contract. As a result, we must consider these statistics alongside our best estimates of how they will change in the future.

INDUSTRY PROJECTIONS

Current employment statistics represent a snapshot in time. Projected employment changes, however, allow us to look to the future and can help us identify industries with the most job security moving forward. This is a critical aspect of planning a CTE system as these courses aim to equip today's students with the skills to succeed in tomorrow's workforce.

Table 1 shows projected employment changes by major industry sector at the national, state, and regional levels.[2,3] We see that across the board, the greatest job growth is expected in the health care and social assistance fields. In fact, the projections suggest that approximately twice as many jobs will arise in this field compared to the next highest industry at each level of analysis. Whereas the second largest source of expected job growth is in professional and business services at the state and national levels, this field is expected to contract slightly in the Kalamazoo region (where leisure and hospitality ranks second).

As before, the manufacturing industry stands out in this analysis. It is projected to lose more jobs than any other industry in the region. The industry is expected to hemorrhage thousands of jobs at the state level as well. That said, the large size of the manufacturing sector in Michigan means that these declines are not as large when viewed as a share of total industry employment. That is, other industries (e.g., information, mining, and the federal government) are expected to shrink by a greater percentage even though they will likely lose fewer jobs. The fourth column in Table 1 shows us that employment in manufacturing is projected to fare just as poorly at the national level. The industry is expected to lose more jobs than any other industry across the country. Given that manufacturing plays a smaller role in the economy outside of "rust belt" states like Michigan, this translates into a greater relative decline in the overall industry size. Only utilities and the federal government are expected to lose more jobs as a share of their baseline 2019 employment levels.

While experts continue to debate the role automation has played in the manufacturing industry's decline to date, this factor plays an important role in the sector's projected future.[4] McKinsey & Company estimates that approximately 60% of current manufacturing jobs could be automated with present technology, although it will likely take years for this process to play out.[5] Manufacturing jobs are so susceptible to automation because they tend to involve routine physical labor in predictable environments (e.g., operating machinery).[6]

Two important caveats apply here. First, even if automation transforms the manufacturing industry, this will not necessarily result in even greater job losses down the line. It is possible that automation will require workers to develop new skills and perform novel tasks.[7] For example, workers may spend less time operating heavy machinery and more time interacting with technology or communicating with colleagues.[8] This means that vocational education programs like CTE will need to adapt their curricula to a changing workplace and/or workers will require lifelong training opportunities. Second, the availability of a skilled workforce can influence the growth or decline of an industry. Ensuring a strong pipeline of skilled manufacturing workers could potentially mitigate regional employment losses.

If manufacturing faces the bleakest future, the exact opposite is true for the health care industry. This sector appears poised to expand significantly in the coming decade, and for good reason. The U.S. Census projects that by 2034 there will be more people in the country aged 65 years or older than 18 or younger for the first time in our history. In fact, one in every five residents will be of retirement age.[9] This demographic shift portends meaningful changes for the economy and labor market. Spending on medical and other personal care services increases with age. As we approach the middle of the century, our aging population will demand ever more doctors, nurses, health technicians, and other medical professionals.[10]

Other industries with robust projected employment growth are largely similar at every level: construction, educational services, and leisure and hospitality. The construction industry's employment prospects seem especially promising among this group. It is the only sector outside of health care projected to exhibit double-digit percentage growth in the Kalamazoo region. Most of the industry's new jobs are projected to come in the specialty trade contractors subsector (the other two of which are construction of buildings and heavy and civil engineering), where workers generally specialize in a specific activity. Among all specialty trade contractor occupations, heating, air conditioning, and refrigeration mechanics and installers and pipelayer, plumber, pipefitter, and steamfitter helpers are projected to grow the fastest.[11] Note that these occupations map onto state-recognized CTE programs (see below). Projected growth in educational services primarily stems from expected increases in student enrollment. As more students enter and move through the education system, schools will need to hire additional teachers at all levels.[12] The food service sector is expected to account for most of the growth in leisure and hospitality. These positions typically offer low wages, however, a factor that counterbalances their strong employment prospects.

Table 1– Projected employment change by major industry sector (percent change in parentheses)

Industry	Prosperity Region 8 2016-26	Michigan 2018-28	National (in thousands) 2019-29
Health care and social assistance	4,660 (10.7%)	41,900 (6.6%)	3,079.1 (15.1%)
Leisure and hospitality	2,850 (9%)	2,540 (0.6%)	1,115.6 (6.7%)
Educational services	1,580 (5.8%)	11,400 (3%)	465.5 (12.4%)
Construction	1,180 (11.3%)	10,300 (6.1%)	300.2 (4%)
Other services	1,140 (7.6%)	-6,460 (-3.6%)	280.9 (4.2%)
Retail trade	760 (2.4%)	-19,680 (-4.2%)	-368.3 (-2.4%)
State and local government	580 (3.5%)	-10,230 (-4.9%)	320.6 (1.6%)
Transportation and warehousing	490 (6%)	6,020 (4.7%)	326 (5.8%)
Wholesale Trade	440 (4.2)	-6,780 (-3.9%)	-102.1 (-1.7%)
Financial activities	400 (3.1%)	-4,480 (-2.2%)	53.9 (0.6%)
Agriculture wage and salary	370 (3.2%)	460 (1.5%)	35.3 (2.3%)
Utilities	30 (1.2%)	-1,010 (-5%)	-42.3 (-7.7%)
Mining	-10 (-5.9%)	-350 (-6.4%)	93.2 (13.6%)
Professional and business services	-110 (-0.4%)	12,540 (1.9%)	1,518.3 (7.1%)
Federal government	-180 (-4.8%)	-3,490 (-6.7%)	-183.6 (-6.5%)
Information	-190 (-9.5%)	-3,410 (-6.1%)	-6.2 (-0.2%)
Manufacturing	-550 (-0.9%)	-12,180 (-1.9%)	-444.8 (-3.5%)

Source: Bureau of Labor Statistics Employment by Major Industry Sector data; Michigan Department of Technology, Management and Budget Long-Term Industry Employment Projections data

Lastly, it is important to note that none of these projections accounts for the COVID-19 pandemic. The data in Table 1 predate the outbreak, and it is still unclear what its long-term effects will be. Some industries, like health care, might expand even more as the demands on our medical system increase. This could have spillover effects in manufacturing if there is increased need for medical devices, for example. One can also imagine the information industry's prospects improving if firms maintain remote work options and require additional software and/or personnel to maintain their digital environments. Conversely, some industries might see their positive outlook diminished.

The downstream economic effects of COVID-19 could hamper the construction industry's presently optimistic projections. Historical underinvestment in infrastructure and a nationwide housing shortage are two reasons the industry is expected to grow in the near future.[13] Indeed, these very issues are well known here in Michigan. Then-candidate for Governor Gretchen Whitmer famously promised Michiganders her administration would "fix the damn roads." In their 2017 report "Where Will Ten Million Michiganders Live?", the Home Builders Association of Michigan highlights the state's need for increased affordable housing options.[14] Infrastructure spending and residential construction are both potentially vulnerable to economic downturns like the one we are experiencing from COVID-19.

If employment and spending are suppressed for sustained periods of time, government budgets will likely shrink due to decreased tax revenue.[15] These same forces could make potential buyers less likely to purchase homes and current owners less likely to undertake home improvement projects depending on the severity and length of the recession. That said, the housing market has proven resilient throughout the pandemic thus far and it remains to be seen what the long-term outcomes will be.[16]

Table 2 shows each industry's 12-month change in employment as a way of approximating COVID's differential impact. However, these figures should not be interpreted as a causal analysis. They are merely descriptive and intended to present recent trends.

Table 2: 12-month employment changes by industry (differential impacts during COVID-19)

Industry	12-Month Percent Change
Mining, Logging, Construction	1.5%
Professional and Business Services	1.1%
Information	0%
Financial Activities	0%
Leisure and Hospitality	-1.2%
Other Services	-5.8%
Trade, Transportation, and Utilities	-6.9%
Education and Health	-8.7%
Government	-10.5%
Manufacturing	-11.5%

Source: Bureau of Labor Statistics Economy at a Glance data
Note: Preliminary data as of September 2020

CTE AND HIGH-DEMAND, HIGH-WAGE OCCUPATIONS

The previous sections offer a high-level overview of where major industries stand in the current labor market and how they might fare in the near future. To best select CTE programs that will prepare KRESA students for tomorrow's workforce, however, it is critical to dig deeper than broad industry groups. Michigan's available CTE courses will not necessarily train students for all jobs within a sector. Furthermore, there is significant variation with respect to earning potential and required education across jobs within any given industry. We should therefore look for occupations that meet three fundamental criteria:

1. Correspond with existing state-recognized CTE programs
2. Offer promising wage and employment prospects
3. Require levels of educational training that are attainable for the typical student who might consider participating in CTE

To begin, we focus on jobs with high earning potential and projected growth. The Michigan Department of Technology, Management and Budget has produced lists of projected high-demand, high-wage (HDHW) occupations for the state and each Prosperity Region. Each list offers sub-groups broken down by required level of education and presents each occupation's projected growth and hourly wage range. To identify which of these jobs align with state-recognized CTE programs, we first look up each HDHW occupation's Standard Occupational Classification (SOC). Next, we use a SOC-Classification of Instructional Program (CIP) code data crosswalk from MDE OCTE to limit the lists to occupations whose SOC features a corresponding CIP code. A SOC-CIP match means MDE OCTE has affirmed that a CTE program trains students for that specific occupation. We also use a SOC-Census Occupation Classification (OCC) crosswalk to merge on demographic data about each occupation from the American Community Survey (ACS).

Table 3 summarizes these data for Prosperity Region 8 (to which Kalamazoo belongs) specifically. The first three columns show each CTE program that maps onto at least one HDHW occupation and its associated career cluster. Column four shows the number of distinct HDHW occupations that align with each program. Columns five through eight show (5) the average median hourly wage, (6) total number of projected annual openings, as well as the (7) educational and (8) gender breakdowns of the labor force among the occupations from column four. Clusters are sorted such that those at the top of the table align with a high number of HDHW jobs, exhibit strong employment and wage projections, and have low shares of college-educated workers. For detailed HDHW occupation-level lists at both the state and regional levels, as well as an explanation of why some HDHW occupations are excluded from Table 3, see Appendix A.

Table 3– Occupational data for HDHW-aligned CTE programs – Prosperity Region 8

CIP Code	CTE Program	Career Cluster	# HDHW Occupations	Total Annual Openings	Avg. Median Wage	Avg. Share w/BA	Avg. Share Female
46.0301	Electrical and Power Transmission Installation	Architecture & Construction	3	355	$29	11%	4%
47.0201	Heating, Air Conditioning, Ventilation and Refrigeration	Architecture & Construction	3	510	$24	6%	3%
46.0502	Pipefitting Technology	Architecture & Construction	2	200	$31	7%	2%
46.0000	Construction Trades	Architecture & Construction	2	270	$24	8%	3%
46.0503	Plumbing Technology	Architecture & Construction	1	120	$33	5%	2%
15.0403	Electro-Mechanical Technology	Architecture & Construction	1	20	$29	22%	18%
51.0000	Therapeutic Services	Health Science	5	655	$26	29%	83%
51.1000	Diagnostic Services	Health Science	2	565	$28	35%	88%
47.0613	Medium/Heavy Truck Technician	Transportation, Distribution & Logistics	2	240	$20	4%	1%
47.0607	Airframe Technology	Transportation, Distribution & Logistics	1	35	$26	13%	4%
47.0608	Power Plant Technology (Aircraft)	Transportation, Distribution & Logistics	1	35	$26	13%	4%
47.0399	Heavy Industrial Equipment Maintenance Technologies	Transportation, Distribution & Logistics	1	190	$24	7%	3%
47.0604	Automotive Technician	Transportation, Distribution & Logistics	1	190	$19	4%	1%
47.0603	Collision Repair Technician	Transportation, Distribution & Logistics	1	40	$18	1%	1%
46.0303	Electric Lineman	Energy	1	80	$31	17%	7%
14.4201	Mechatronics	Science, Technology, Engineering and Mathematics	1	20	$29	22%	18%
48.0501	Machine Tool Technology/Machinist	Manufacturing	1	240	$19	5%	5%
48.0508	Welding, Brazing and Soldering	Manufacturing	1	100	$18	2%	6%
52.1999	Marketing, Sales and Service	Marketing	2	490	$24	51%	44%
52.0803	Banking	Finance	1	90	$52	67%	54%
52.1701	Insurance	Finance	1	80	$25	48%	57%
52.0800	Finance & Financial Management Services	Finance	1	70	$25	52%	55%
43.0100	Public Safety/Protective Services	Law, Public Safety, Corrections & Security	1	125	$27	42%	12%
12.0500	Cooking and Related Culinary Arts	Hospitality & Tourism	1	325	$16	24%	48%
12.9999	Personal and Culinary Services	Hospitality & Tourism	1	325	$16	24%	48%
13.0000	Education General	Education & Training	1	290	$29	96%	79%
19.0700	Child and Custodial Care Services	Human Services	1	140	$25	82%	82%

Sources: Michigan Department of Technology, Management and Budget, Bureau of Labor Market Information and Strategic Initiatives; American Community Survey

These results tell an encouraging story. CTE provides students plenty of opportunities to train for jobs that combine strong earning potential and job growth. In fact, approximately half of DTMB's full list of HDHW occupations align with one or more CTE programs. However, some career clusters exhibit stronger prospects than others.

Healthcare and construction – the two industries that featured most prominently in our discussion of the fastest growing sectors – offer CTE programs that train students for the greatest number of HDHW occupations. This is consistent across the state and regional levels. Column seven shows that these programs offer viable career options that do not require students to pursue a four-year college degree. Note also that jobs in these industries appear highly gendered. This presents an opportunity for KRESA to find ways to expand the scope of students pursuing promising careers that are non-traditional for their gender. (YPL would be interested in discussing ways of testing such strategies.)

The transportation cluster also offers a variety of HDHW-aligned programs. Like programs in architecture and construction, however, these programs train students to work in overwhelmingly male-dominated professions. The Heavy Industrial Equipment Maintenance Technologies program stands out for its combination of future employment opportunities and earning potential.

Although finance boasts a strong blend of earning potential, employment growth, and relative gender parity, many jobs typically require a four-year degree. Indeed, a majority of workers in each of the region-level HDHW finance occupations that map onto a CTE program have at least a BA. Still, the fact that MDE OCTE has linked these occupations to a CTE program indicates that students may be able to enter these professions without a four-year degree (see the aforementioned explanation in Appendix A).

We saw earlier that the manufacturing and hospitality industries play outsize roles in the Kalamazoo region's economy. Table 3 shows that while there are CTE programs that train students for HDHW jobs in these sectors, they are scarce. Moreover, these occupations exhibit some of the worst earning potential despite robust demand.

Figures 2 and 3 display all of the information in Table 3 in bubble charts to help visualize each cluster's unique blend of employment prospects, earning potential, and HDHW alignment.

Figure 2: Job growth, earning potential, and alignment with HDHW occupations (state-level)

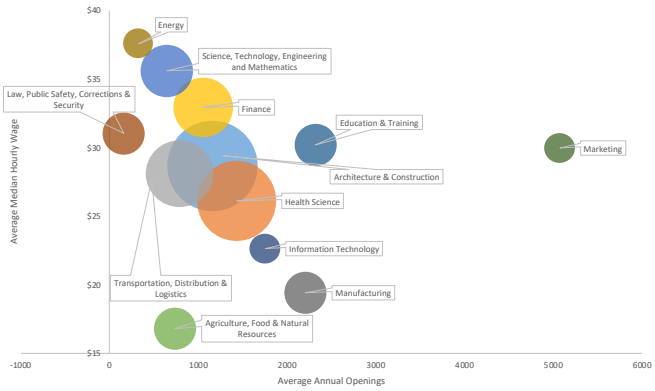
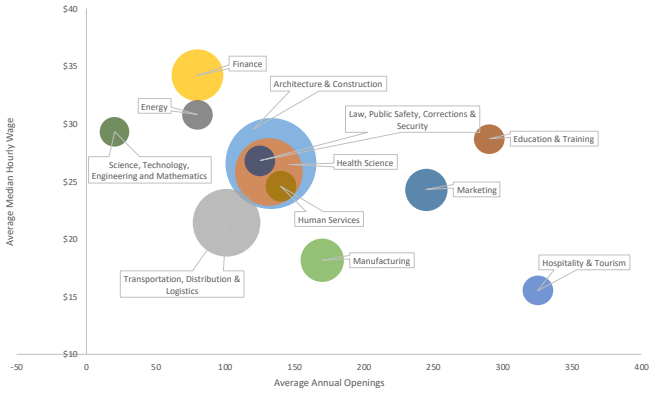


Figure 3: Job growth, earning potential, and alignment with HDHW occupations (region-level)



Source: Michigan Department of Technology, Management and Budget, Bureau of Labor Market Information and Strategic Initiatives

Note: Career cluster bubble size is proportional to the number of related HDHW occupations. Chart does not incorporate share of the workforce with a four-year college degree.

CONCLUSION

Michigan's labor market appears poised to continue a period of meaningful transition in the near future. The manufacturing industry – which played a central role in the state's economy for decades and indeed continues to employ many Michiganders – looks to continue its gradual decline. Meanwhile, an aging population will likely expand the already robust health care sector. Depending on the length and severity of the COVID-19 pandemic's economic impacts, the construction industry may grow to account for a larger share of the workforce.

The Kalamazoo region projects to mirror these trends. The task of presenting KRESA students with the best opportunities to thrive in tomorrow's workforce, therefore, rests on developing a CTE system that aligns with these forecasts. Labor market data reveal that such a system should focus on three career clusters in particular:

1. Architecture & Construction
2. Health Science
3. Transportation, Distribution & Logistics

Each of these career clusters offers programs that train students to work in at least five distinct occupations that exhibit strong wage and employment prospects according to DTMB. This means students with different interests will have options within the same sector. Furthermore, these three clusters align with the greatest number of HDHW occupations at both the state and regional levels. Students trained in these programs should therefore be equipped to thrive whether they stay in southwest Michigan or relocate elsewhere in the state. Lastly, these occupations offer potential pathways to economic prosperity without demanding that students obtain four-year college degrees.

Other individual programs also show promise and merit KRESA's attention. Electric Lineman (energy career cluster; CIP code 46.0303) boasts strong earning potential, requires modest educational attainment, and projects for a moderate level of employment opportunities. Machine Tool Technology (manufacturing cluster; CIP code 48.0501) shows particularly high demand despite belonging to the manufacturing career cluster and does not require aspiring students to pursue a four-year degree. Although its projected wages are smaller compared to other HDHW occupations, they are on par with Michigan's overall median wage ($18.60).

Regardless of the programs KRESA ultimately chooses for its new countywide CTE center, YPL would welcome the opportunity to continue the research partnership we have started with this report. In addition to the previously mentioned possibility of testing the efficacy of various recruitment strategies, we could also examine which types of career exploration activities among younger students are most effective (and for whom). We are confident these types of studies can help advance our shared interest in providing pathways to bright futures for all young people.

APPENDIX A

Tables A1 and A2 present labor market and demographic data for every HDHW occupation with a SOC that MDE OCTE has matched onto a CIP code. That is, they show every HDHW occupation with a CTE program that trains students to work in that specific job. OCTE's selection criteria exclude approximately half of DTMB's full lists of statewide and regional HDHW occupations from these tables. OCTE uses O*Net job zones when linking CTE programs to occupations. There are five such job zones that correspond to required level of education/training:

1. Little or no preparation needed
2. Some preparation needed (i.e., high school diploma and some previous work experience)
3. Medium level of preparation (i.e., associate's degree, vocational school, or on-the-job training)
4. Considerable preparation (i.e., bachelor's degree)
5. Extensive preparation (i.e., graduate or professional school)

OCTE generally only matches programs onto occupations from job zones 2 and 3 because CTE focuses on occupations that require some level of preparation but less than a four-year college degree. That said, OCTE staff manually review exceptions that CTE program consultants recommend. This sometimes results in matching programs to occupations from zone four. This typically occurs in cases where demand for the occupation is sufficiently high such that students can sometimes get jobs without a four-year degree.

Table A1: State-level HDHW occupation-CTE program matches (sorted by career cluster and then annual openings)

Occupation	Annual Openings	Median Wage	Education	CIP Code	CTE Program	Career Cluster	Avg. Share Female	Avg. Share w/BA
Vet. Assistants and Laboratory Animal Caretakers	760	$13	HSD HSE	01.0903	Animal Health & Veterinary Science	Agriculture, Food & Natural Resources	81%	25%
Refuse and Recyclable Material Collectors	710	$21	HSD HSE	03.0000	Natural Resources and Conservation	Agriculture, Food & Natural Resources	9%	4%
Electricians	3,040	$30	Associate or Apprenticeship	46.0301	Electrical and Power Transmission Installation	Architecture & Construction	2%	7%
Carpenters	3,030	$22	Associate or Apprenticeship	46.0000	Construction Trades	Architecture & Construction	2%	5%
Plumbers, Pipefitters, and Steamfitters	1,630	$32	Associate or Apprenticeship	46.0503	Plumbing Technology	Architecture & Construction	2%	5%
Plumbers, Pipefitters, and Steamfitters	1,630	$32	Associate or Apprenticeship	46.0502	Pipefitting Technology	Architecture & Construction	2%	5%
HVAC and Refrigeration Mechanics and Installers	1,070	$23	Associate or Apprenticeship	47.0201	Heating, Air Conditioning, Ventilation and Refrigeration	Architecture & Construction	1%	6%
Industrial Engineering Technicians	450	$26	Associate or Apprenticeship	15.0612	Industrial Production	Architecture & Construction	18%	22%
Sheet Metal Workers	370	$26	Associate or Apprenticeship	47.0201	Heating, Air Conditioning, Ventilation and Refrigeration	Architecture & Construction	5%	5%
Construction and Building Inspectors	340	$27	Postsecondary Certificate	46.0000	Construction Trades	Architecture & Construction	12%	31%
Electrical Power-Line Installers and Repairers	320	$38	Associate or Apprenticeship	46.0301	Electrical and Power Transmission Installation	Architecture & Construction	1%	6%
Ctrl. & Valve Install. & Repairers, Ex. Mech. Door	190	$35	Postsecondary Certificate	46.0301	Electrical and Power Transmission Installation	Architecture & Construction	3%	5%
Elementary School Teachers	2,910	$31	BA or higher	13.0000	Education General	Education & Training	79%	96%
Secondary School Teachers	1,740	$30	BA or higher	13.0000	Education General	Education & Training	59%	97%
Electrical Power-Line Installers and Repairers	320	$38	Associate or Apprenticeship	46.0303	Electric Lineman	Energy	1%	6%
Financial Managers	1,440	$57	BA or higher	52.0803	Banking	Finance	54%	67%
Insurance Sales Agents	1,310	$25	Postsecondary Certificate	52.1701	Insurance	Finance	57%	48%
Loan Officers	900	$31	BA or higher	52.0800	Finance & Financial Management Services	Finance	55%	52%
Loan Interviewers and Clerks	560	$19	HSD HSE	52.0803	Banking	Finance	79%	31%
Registered Nurses	6,620	$35	BA or higher	51.0000	Therapeutic Services	Health Science	89%	64%
Registered Nurses	6,620	$35	BA or higher	51.1000	Diagnostic Services	Health Science	89%	64%
Computer User Support Specialists	1,750	$23	Postsecondary Certificate	51.0707	Health Informatics	Health Science	23%	50%
Physical Therapist Assistants	520	$26	Associate or Apprenticeship	51.0000	Therapeutic Services	Health Science	70%	29%
Massage Therapists	500	$22	Postsecondary Certificate	51.0000	Therapeutic Services	Health Science	82%	20%
Dental Laboratory Technicians	270	$21	Postsecondary Certificate	51.0000	Therapeutic Services	Health Science	60%	18%
Diagnostic Medical Sonographers	180	$30	Associate or Apprenticeship	51.1000	Diagnostic Services	Health Science	73%	31%
Occupational Therapy Assistants	150	$26	Associate or Apprenticeship	51.0000	Therapeutic Services	Health Science	90%	25%

Table A1(con't): State-level HDHW occupation-CTE program matches (sorted by career cluster and then annual openings)

Occupation	Annual Openings	Median Wage	Education	CIP Code	CTE Program	Career Cluster	Avg. Share Female	Avg. Share w/BA
Computer User Support Specialists	1,750	$23	Postsecondary Certificate	11.0201	Computer Programming/Programmer	Information Technology	23%	50%
First-Line Supervisors of Police and Detectives	160	$40	Postsecondary Certificate	43.0100	Public Safety/Protective Services	Law, Public Safety, Corrections & Security	13%	42%
Security and Fire Alarm Systems Installers	150	$23	Postsecondary Certificate	43.0100	Public Safety/Protective Services	Law, Public Safety, Corrections & Security	3%	9%
Machinists	2,880	$20	Associate or Apprenticeship	48.0501	Machine Tool Technology/Machinist	Manufacturing	5%	5%
Welders, Cutters, Solderers, and Brazers	1,530	$19	Postsecondary Certificate	48.0508	Welding, Brazing and Soldering	Manufacturing	6%	2%
Sales Reps., Except Tech. and Scientific Products	5,070	$30	Postsecondary Certificate	52.1999	Marketing, Sales and Service	Marketing	30%	53%
Industrial Production Managers	1,020	$54	BA or higher	14.4201	Mechatronics	Science, Technology, Engineering and Mathematics	22%	47%
Mechanical Engineering Technicians	470	$27	Associate or Apprenticeship	15.0000	Engineering Technology	Science, Technology, Engineering and Mathematics	18%	22%
Industrial Engineering Technicians	450	$26	Associate or Apprenticeship	15.0000	Engineering Technology	Science, Technology, Engineering and Mathematics	18%	22%
Industrial Machinery Mechanics	2,280	$24	Associate or Apprenticeship	47.0399	Heavy Industrial Equipment Maintenance Technologies	Transportation, Distribution & Logistics	3%	7%
Bus & Truck Mech. & Diesel Engine Specialists	970	$22	Associate or Apprenticeship	47.0613	Medium/Heavy Truck Technician	Transportation, Distribution & Logistics	2%	4%
Aircraft Mechanics and Service Technicians	280	$25	Postsecondary Certificate	47.0607	Airframe Technology	Transportation, Distribution & Logistics	4%	13%
Aircraft Mechanics and Service Technicians	280	$25	Postsecondary Certificate	47.0608	Power Plant Technology (Aircraft)	Transportation, Distribution & Logistics	4%	13%
Millwrights	270	$32	Associate or Apprenticeship	47.0399	Heavy Industrial Equipment Maintenance Technologies	Transportation, Distribution & Logistics	2%	2%
Commercial Pilots	140	$36	Postsecondary Certificate	49.0101	Aeronautics/Aviation Aerospace Science & Technology	Transportation, Distribution & Logistics	8%	77%

Sources: Michigan Department of Technology, Management and Budget, Bureau of Labor Market Information and Strategic Initiatives; American Community Survey

Table A2: Region-level HDHW occupation-CTE program matches (sorted by career cluster and then annual openings)

Occupation	Annual Openings	Median Wage	Education	CIP Code	CTE Program	Career Cluster	Avg. Share Female	Avg. Share w/BA
Maintenance and Repair Workers, General	375	$18	Postsecondary Certificate	47.0201	Heating, Air Conditioning, Ventilation and Refrigeration	Architecture & Construction	2%	7%
Electricians	195	$27	Associate or Apprenticeship	46.0301	Electrical and Power Transmission Installation	Architecture & Construction	2%	7%
Carpenters	190	$19	Associate or Apprenticeship	46.0000	Construction Trades	Architecture & Construction	2%	5%
Plumbers, Pipefitters, and Steamfitters	120	$33	Associate or Apprenticeship	46.0502	Pipefitting Technology	Architecture & Construction	2%	5%
Plumbers, Pipefitters, and Steamfitters	120	$33	Associate or Apprenticeship	46.0503	Plumbing Technology	Architecture & Construction	2%	5%
HVAC and Refrigeration Mechanics and Installers	85	$24	Associate or Apprenticeship	47.0201	Heating, Air Conditioning, Ventilation and Refrigeration	Architecture & Construction	1%	6%
Constr. Trades and Excavation Workers, Supervisors	80	$29	HSD HSE	46.0502	Pipefitting Technology	Architecture & Construction	3%	10%
Constr. Trades and Excavation Workers, Supervisors	80	$29	HSD HSE	46.0000	Construction Trades	Architecture & Construction	3%	10%
Constr. Trades and Excavation Workers, Supervisors	80	$29	HSD HSE	46.0301	Electrical and Power Transmission Installation	Architecture & Construction	3%	10%
Mechanics, Installers, and Repairers, Supervisors	80	$31	HSD HSE	46.0301	Electrical and Power Transmission Installation	Architecture & Construction	7%	17%
Sheet Metal Workers	50	$30	Associate or Apprenticeship	47.0201	Heating, Air Conditioning, Ventilation and Refrigeration	Architecture & Construction	5%	5%
Engineering Technicians, Except Drafters	20	$29	Associate or Apprenticeship	15.0403	Electro-Mechanical Technology	Architecture & Construction	18%	22%

Table A2: Region-level HDHW occupation-CTE program matches (sorted by career cluster and then annual openings)

Occupation	Annual Openings	Median Wage	Education	CIP Code	CTE Program	Career Cluster	Avg. Share Female	Avg. Share w/BA
Elementary School Teachers	290	$29	BA or higher	13.0000	Education General	Education & Training	79%	96%
Mechanics, Installers, and Repairers, Supervisors	80	$31	HSD HSE	46.0303	Electric Lineman	Energy	7%	17%
Financial Managers	90	$52	BA or higher	52.0803	Banking	Finance	54%	67%
Insurance Sales Agents	80	$25	Postsecondary Certificate	52.1701	Insurance	Finance	57%	48%
Loan Officers	70	$25	BA or higher	52.0800	Finance & Financial Management Services	Finance	55%	52%
Registered Nurses	450	$33	BA or higher	51.1000	Diagnostic Services	Health Science	89%	64%
Registered Nurses	450	$33	BA or higher	51.0000	Therapeutic Services	Health Science	89%	64%
Licensed Practical and Vocational Nurses	115	$23	Postsecondary Certificate	51.0000	Therapeutic Services	Health Science	87%	5%
Licensed Practical and Vocational Nurses	115	$23	Postsecondary Certificate	51.1000	Diagnostic Services	Health Science	87%	5%
Physical Therapist Assistants	40	$27	Associate or Apprenticeship	51.0000	Therapeutic Services	Health Science	70%	29%
Massage Therapists	35	$18	Postsecondary Certificate	51.0000	Therapeutic Services	Health Science	82%	20%
Occupational Therapy Assistants	15	$29	Associate or Apprenticeship	51.0000	Therapeutic Services	Health Science	90%	25%
Food Service Managers	325	$16	HSD HSE	12.9999	Personal and Culinary Services	Hospitality & Tourism	48%	24%
Food Service Managers	325	$16	HSD HSE	12.0500	Cooking and Related Culinary Arts	Hospitality & Tourism	48%	24%
Child, Family, and School Social Workers	140	$25	BA or higher	19.0700	Child and Custodial Care Services	Human Services	82%	82%
Police and Sheriff's Patrol Officers	125	$27	Postsecondary Certificate	43.0100	Public Safety/Protective Services	Law, Public Safety, Corrections & Security	12%	42%
Machinists	240	$19	Associate or Apprenticeship	48.0501	Machine Tool Technology/Machinist	Manufacturing	5%	5%
Welders, Cutters, Solderers, and Brazers	100	$18	Postsecondary Certificate	48.0508	Welding, Brazing and Soldering	Manufacturing	6%	2%
Sales Reps., Except Tech. and Scientific Products	440	$26	Postsecondary Certificate	52.1999	Marketing, Sales and Service	Marketing	30%	53%
Real Estate Sales Agents	50	$22	Postsecondary Certificate	52.1999	Marketing, Sales and Service	Marketing	58%	49%
Engineering Technicians, Except Drafters	20	$29	Associate or Apprenticeship	14.4201	Mechatronics	Science, Technology, Engineering and Mathematics	18%	22%
Automotive Service Technicians and Mechanics	190	$19	Postsecondary Certificate	47.0613	Medium/Heavy Truck Technician	Transportation, Distribution & Logistics	1%	4%
Automotive Service Technicians and Mechanics	190	$19	Postsecondary Certificate	47.0604	Automotive Technician	Transportation, Distribution & Logistics	1%	4%
Industrial Machinery Mechanics	190	$24	Associate or Apprenticeship	47.0399	Heavy Industrial Equipment Maintenance Technologies	Transportation, Distribution & Logistics	3%	7%
Bus and Truck Mech. and Diesel Engine Specialists	50	$20	Associate or Apprenticeship	47.0613	Medium/Heavy Truck Technician	Transportation, Distribution & Logistics	2%	4%
Automotive Body and Related Repairers	40	$18	Associate or Apprenticeship	47.0603	Collision Repair Technician	Transportation, Distribution & Logistics	1%	1%
Aircraft Mechanics and Service Technicians	35	$26	Postsecondary Certificate	47.0607	Airframe Technology	Transportation, Distribution & Logistics	4%	13%
Aircraft Mechanics and Service Technicians	35	$26	Postsecondary Certificate	47.0608	Power Plant Technology (Aircraft)	Transportation, Distribution & Logistics	4%	13%

Sources: Michigan Department of Technology, Management and Budget, Bureau of Labor Market Information and Strategic Initiatives; American Community Survey

Note: The following occupations did not have available hourly wage data at the state level: elementary school teachers, secondary school teachers, computer user support specialists, and commercial pilots. Wages for these occupations were calculated using 2018 Bureau of Labor Statistics statewide annual salary data. Hourly wages calculated assuming a 40-hour work week for 52 weeks.

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2 Note that the data used to create these tables come from different sources so the projection periods differ slightly. The national projections are from 2019-2029, the state projections are from 2018-2028, and the regional projections are from 2016-2016. Still, these figures are comparable as they each represent a 10-year period and overlap for seven years.

3 Regional data no longer represent the K-P MSA. Regional employment projections come from the Michigan Department of Technology, Management, and Budget (DTMB), which uses Prosperity Regions as its unit of analysis. Kalamazoo is located in Prosperity Region 8, which also includes the following counties: Berrien, Branch, Calhoun, Cass, St. Joseph, and Van Buren.

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17 Like the previous projected employment changes, these timelines differ slightly. Statewide HDHW figures are projected through 2028 while regional numbers are forecasted through 2026.

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DISCLAIMER

This analysis utilizes data obtained through a confidential data application process submitted to the Michigan Education Data Center (MEDC)/ Michigan Education Research Institute (MERI). Youth Policy Lab at the University of Michigan requested data access and completed the analysis included in this report. The data are structured and maintained by the MERI-Michigan Education Data Center (MEDC). MEDC data is modified for analysis purposes using rules governed by MEDC and are not identical to those data collected and maintained by the Michigan Department of Education (MDE) and/or Michigan's Center for Educational Performance and Information (CEPI). Results, information and opinions solely represent the analysis, information and opinions of the author(s) and are not endorsed by, or reflect the views or positions of, grantors, MDE and CEPI or any employee thereof.

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