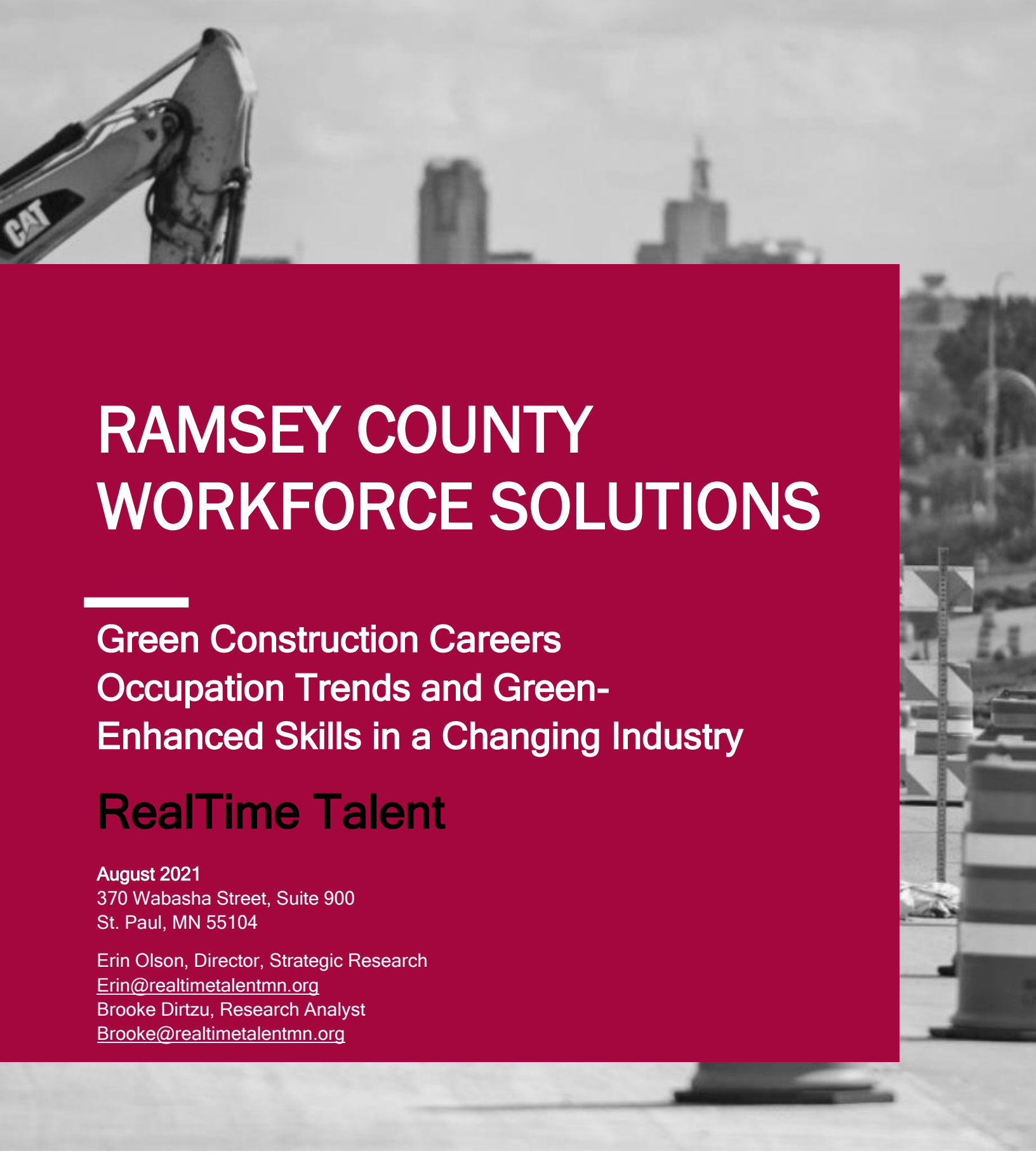

RAMSEY COUNTY WORKFORCE SOLUTIONS

Green Construction Careers
Occupation Trends and Green-Enhanced Skills in a Changing Industry

RealTime Talent

August 2021
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RealTime Talent
Using data to build the world's best workforce

RAMSEY COUNTY

Ramsey County Rising Together

Report Overview

This report represents an ongoing partnership between RealTime Talent and Ramsey County Workforce Solutions to understand and address the workforce opportunities and challenges present in Ramsey County.

In 2021, RealTime Talent and Ramsey County Workforce Solutions will explore four main activity and outcome areas, including:

- Opportunities in Early Childhood Education
- Youth Employment Trends
- Ramsey County Local Plan Labor Market Report
- Opportunities in the IT and Hospitality/Services Sectors
- Opportunities and challenges in suburban Ramsey County and St. Paul's East Side

This report explores the following research questions:

- How is technology transforming the Construction industry?
- What employment, wage, and unemployment trends were observed in Green Construction careers over the past five years, focusing on occupations that require green-enhanced skills?
- What Green Construction jobs are employers struggling most to fill, as evidenced by job posting data?
- Which construction companies are seeking green-enhanced skills in new talent?
- What are the most promising entry points for jobseekers into Green Construction Careers?
- Where is the region (and Ramsey County) underproducing Green Construction postsecondary talent?
- What are the local Green Construction training programs offered to youth and in the workforce system?
- What are the most pressing equity issues in Green Construction careers?

Why this Report Matters

As we look to the future and work to build an economy that works for everyone, we must start with local insights and community voices. This report is a place to begin the conversations that will spark our collective next steps. To learn more about what Ramsey County Workforce Solutions is doing with these findings and to get involved in Reimagining Ramsey County, visit www.ramseycountymeansbusiness.com.

Table of Content

Introduction

The Construction Industry is a significant contributor to Minnesota's economy; Construction contributed $15.0 billion (3.9%) of the state's GDP of $380.09 billion in 2019.[1] In Ramsey, the Construction Industry contributes to about 3.4% of Ramsey County's total GDP locally, producing about $1.5 billion in GDP for Ramsey County in 2019. Like the state, construction contributes greatly to the economic growth of the County. In Ramsey County, the Industry accounted for 0.12 percent growth to the real GDP in 2019, compared to 0.19 percent growth in Anoka County and 0.04 percent growth in Hennepin County.[2]

Nationally, the Construction Industry experienced the tumultuous impact of the COVID-19 pandemic and corresponding global economic slowdown. Industry leaders across the U.S. reported adverse effects including "significant delays on projects, inability to secure materials on time, reduction in productivity rates, material price escalations, and others."[3] By September 2020, 37 out of 39 Minnesota construction firms responding to the AGC and Autodesk Construction Cloud 2020 Workforce Survey reported negative impacts on their firm's project pipeline due to the pandemic. Among these firms, 70% had scheduled projects postponed or canceled, and only 3% won additional projects or add-ons to current projects as of September 2020.[4] Despite Construction workers being declared essential by the State of Minnesota Emergency Executive Order 20-20 at the start of the COVID-19 pandemic, construction talent experienced layoffs. In the same survey, 51% of 39 Minnesota Construction firms reported a reduced headcount, while only 15% reported an increased headcount.[5] Entering into 2021, Tim Worke, CEO of the Associated General Contractors of Minnesota, stated that the Minnesota Construction Industry approached 2021 with hesitancy, uncertainty, and well-placed concern after enduring the "pandemic storm."[6]

The COVID-19 pandemic has highlighted our society's reliance on technology and its power to help industries innovate and respond to rapid market shifts. Technology is not new to the Construction Industry, but the adoption of new technology tools accelerated during the pandemic. In the Minnesota AGC Construction Industry Assessment 2020-2021, 45% of the 169 respondents in our state's Construction Industry expect that technology changes will positively impact their business.[7] Among the same respondents, 61% said their firm adoption of technology changes during the pandemic would become permanent or change how work is done in the future.[8] The digital transformation is happening in Construction and intersects with the greening of the industry.

[1] https://www.agc.org/sites/default/files/Files/Construction%20Data/MN.pdf
[2] https://apps.bea.gov/iTable/iTable.cfm?reqid=99&step=1&acrdn=6
[3] Alsharef, A.; Banerjee, S.; Uddin, S.M.J.; Albert, A.; Jaselskis, E. Early Impacts of the COVID-19 Pandemic on the United States Construction Industry. Int. J. Environ. Res. Public Health 2021, 18, 1559. https://doi.org/10.3390/ijerph18041559
[4] Associated General Contractors of America and Autodesk Construction Cloud, 2020 Workforce Survey Results, September 2020.
[5] Associated General Contractors of America and Autodesk Construction Cloud, 2020 Workforce Survey Results, September 2020
[6] Associated General Contractors of Minnesota, Minnesota Construction Industry Assessment, 2020 - 2021, https://agcmn-c5.s3.us-east-2.amazonaws.com/6116/0706/2722/2020_AGC_Minnesota_Construction_Industry_Assessment-web.pdf
[7] Associated General Contractors of Minnesota, Minnesota Construction Industry Assessment, 2020 - 2021, https://agcmn-c5.s3.us-east-2.amazonaws.com/6116/0706/2722/2020_AGC_Minnesota_Construction_Industry_Assessment-web.pdf
[8] Associated General Contractors of Minnesota, Minnesota Construction Industry Assessment, 2020 - 2021, https://agcmn-c5.s3.us-east-2.amazonaws.com/6116/0706/2722/2020_AGC_Minnesota_Construction_Industry_Assessment-web.pdf

The Future of the Construction Industry

IMPLICATIONS OF A GREEN ECONOMY

Green economic activities and technologies have differentially impacted and, in some cases, redefined occupations. The National Center for O*NET Development refers to this process as the "greening" of occupations and defines this as follows:

The "greening" of occupations refers to the extent to which green economy activities and technologies increase the demand for existing occupations, shape the work and worker requirements needed for occupational performance, or generate unique work and worker requirements.[9]

Out of this definition, O*NET developed three general occupational categories to describe the differing consequences of green economy activities and technologies on how occupations are performed.

The Green occupational categories assigned to the occupations are:[10]

- **Green New & Emerging –** The impact of green economy activities and technologies is sufficient to create the need for unique work and worker requirements, which results in the generation of new occupations.
- **Green Enhanced Skills** – The impact of green economy activities and technologies results in a significant change to the work and worker requirements of an existing O*NET-SOC occupation.
- **Green Increased Demand –** This sector encompasses "indirect jobs" to the green economy, including energy consulting or research and other related business services.

This report focuses on jobs that have been identified as "Green Occupations" by O*NET and are heavily concentrated within the Construction Industry (NAICS 23). Green Occupations in Construction are found in the following O*NET's Green Economy Sectors: [11]

- **Green Construction –** This sector covers activities related to constructing new green buildings, retrofitting residential and commercial buildings, and installing other green construction technology.
- **Renewable Energy Generation –**This sector covers activities related to developing and using energy sources such as solar, wind, geothermal, and biomass. This sector also includes traditional, non-renewable sources of energy undergoing significant green technological changes (e.g., oil, coal, gas, and nuclear).
- **Research, Design, and Consulting Services –** This sector encompasses "indirect jobs" to the green economy which includes activities such as energy consulting or research and other related business services.

Workforce implications to existing Construction roles in these sectors of the Green Economy revolve around energy reduction, green retrofitting, use of green building materials, inspecting greener building materials, and reducing energy costs in all stages of the constructions process.

[9] The National Center for O*NET Development, Greening of the World of Work: Implications for O*NET-SOC and New and Emerging Occupations, February 2009, https://www.onetcenter.org/dl_files/Green.pdf.
[10] https://www.onetcenter.org/dictionary/22.0/excel/green_occupations.html
[11] https://www.onetcenter.org/dictionary/22.0/excel/green_occupations.html

THE MOVE TOWARD SMART TECHNOLOGY, AUTOMATION, AND ARTIFICIAL INTELLIGENCE

Advances in technology make Green Construction sustainable by making construction generally more energy-efficient, cost-effective, and safer. In a paper about the construction workforce and technology advancements, John O'Phelan from Ramsey County Workforce Solutions states, "with a shrinking workforce on the rise, profit margins shrinking and deadlines getting tighter by the year, industry seeks opportunities to embrace prefabrication, robots and autonomous machines."[12] As these technology innovations are integrated into construction project management tools and construction tasks, technology-based skills become a part of construction occupations. In the same paper, O'Phelan stresses the imperative of "developing, retraining, and retaining the workforce to support the future skills that match technological trends" and adds that Construction talent "need[s] continuous lifelong training in crafts and tech coding to extend their value and earning potential." [13] Below is a summary of three different technological advancements that are impacting the Construction Industry and workforce.

SMART TECHNOLOGY

Smart technology is changing the ways that constructions companies interact with their job site. These technologies range from smartphones and tablets to drones, augmented reality, virtual reality, and 3D printing and scanners. Smart technology is used in project management tasks, such as creating project documentation, entering time for payroll, and billing, as well as, construction tasks, such as viewing Building Information Modeling (BIM) models, installation drawings, and controlling drones. According to a nationwide the Annual Construction Technology Survey of over 2,000 firms conducted by JBKnowledge, in 2020, 92% of the construction industry use a smartphone daily for work, 83% use a laptop, 65% use a tablet, and 12% use a smartwatch.[14] These numbers have been relatively stable since 2016.

Source: Total Kustom Technology

Andrey Rudenko, a Minnesota architect, created a 3D printing system capable of printing thin layers of concrete with exceptional details, which allowed his team to intricately 3D print a castle.

ROBOTICS

Robotics allows construction machinery from saws to diggers to operate autonomously, allowing for factory automation in the field. For example, a construction worker can enter the exact measurements and angles into an interface, and a robotic miter saw will cut to those precise specifications. Contractors responding to the Annual Construction Technology Survey claim that hardware, such as Robotic Total Stations, 3D Scanners, and TigerStop, demonstrate their ROI quickly, in addition to increasing workers' safety.[15]

Image Source: https://www.stilesmachinery.com/tigerstop/programmable-positioners

[12] John O'Phelan, Reinventing Our Construction Workforce Through Technology Advancements, December 2017.
[13] John O'Phelan, Reinventing Our Construction Workforce Through Technology Advancements, December 2017.
[14] JBKnowledge, LLC, 2020 Construction Technology Report (9th Edition), 2020, jbknowledge.com/report
[15] JBKnowledge, LLC, 2020 Construction Technology Report (9th Edition), 2020, jbknowledge.com/report

Among respondents to the nationwide Annual Construction Technology Survey conducted by JBKnowledge, 43% reported using drones on job sites.[16] Applications for drones include painters using drones to paint buildings, inspectors using aerial views to pinpoint potential risks, and supervisors monitoring workers' safety risks.

PREFABRICATION OF MATERIALS

Prefabrication is a construction method where components are built offsite in a factory setting and transported to create the structure. Building offsite in a climate-controlled plant with production control streamlines the construction processes, increases safety, and reduces waste and environmental risks. In a national survey of over 2,000 Construction firms conducted by JBKnowledge, respondents reported that 88% of the residential projects and 78% of the commercial construction projects used prefabrication in 2020.[17]

Image Source:
https://www.molin.com/services/manufacturing/

Molin Concrete is in Lino Lakes, MN, and has been in business since 1897. The company got its start delivering limestone to building sites via horse and wagon. Now a premier leader in the precast concrete industry, most of their workers work inside the plant and are signatory to their trade union. At concrete fabrication plants, such as Molin Concrete, some of the work is done through software run through a joystick-like tool typically on a worker's tool belt. The construction trades workers are being challenged to learn new skills to keep pace with the industry.

John O'Phelan from Ramsey County Workforce Solutions stresses the need for crafts work training and tech training. He observes that a Cement Mason using these technologies will need both the "right technology background with an ability to understand the construction component as well. This is much different than having concrete poured in a wheel barrel with a worker walking and dumping the cement into a framed area where another worker gets on their knees to finish the process. In both scenarios, the worker still needs to be aware of quality and craftsmanship."[18]

[16] JBKnowledge, LLC, 2020 Construction Technology Report (9th Edition), 2020, jbknowledge.com/report
[17] JBKnowledge, LLC, 2020 Construction Technology Report (9th Edition), 2020, jbknowledge.com/report
[18] John O'Phelan, Reinventing Our Construction Workforce Through Technology Advancements, December 2017.

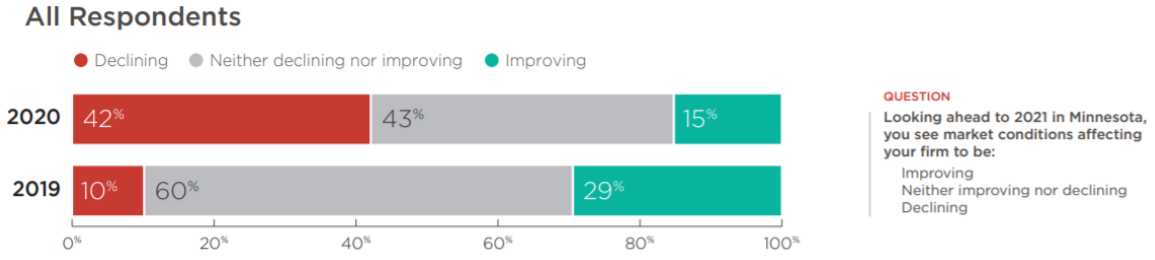
The Construction Industry

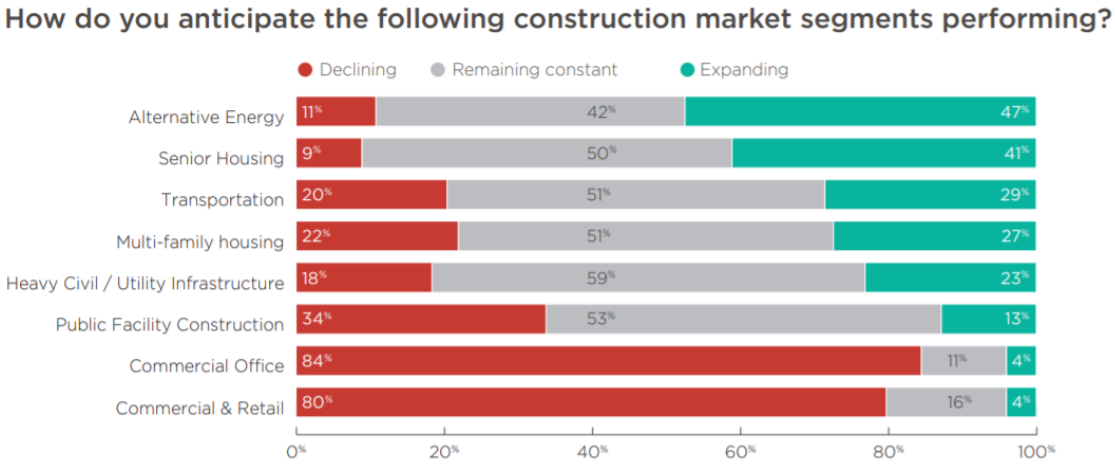
This section details the high-level employment, wage, and unemployment trends recently observed in Construction over the past five years in Ramsey County, setting the stage for exploring critical occupation, award, and skill gaps specific to Green Construction careers in the following sections.

Industry Overview

The Construction Industry (NAICS 23) is comprised of establishments mainly engaged in the construction of building or engineering projects, such as highways or utility systems. The work done in this Industry may include new work, additions, alterations, or maintenance, and repairs.[19] The Construction Industry is an investment-led sector of our economy. Government contracts with Construction firms or contractors to develop infrastructure in the health, transportation, and education sector. Private sector investments fund housing, commercial office, and commercial retail projects. Therefore, the Industry is vulnerable to market shifts in both the public and private sectors.

After the hardship experienced by the Minnesota Construction Industry in 2020, Associated General Contractors of Minnesota conducted a Minnesota Construction Industry Assessment 2020-2021 that surveyed 169 respondents within the state's construction firms, of which 74% are based in the Twin Cities Metro.[20] In a question about market conditions in 2021, respondents showed hesitancy compared to prior years. The same respondents forecasted the strongest growth in the Alternative Energy market segment, followed by Senior Housing in Minnesota. Respondents anticipated the highest decline in the Commercial and Retail market segment of Construction.





[19] https://www.naics.com/what-is-naics-sector-23-full-description-and-statistics/

[20] Associated General Contractors of Minnesota, Minnesota Construction Industry Assessment, 2020 – 2021, https://agcmn-c5.s3.us-east-2.amazonaws.com/6116/0706/2722/2020_AGC_Minnesota_Construction_Industry_Assessment-web.pdf

LICENSED, UNLICENSED, AND SPECIALTY CONSTRUCTION ROLES

Whether a trade is licensed, unlicensed, or specialty influences the structure of the talent pipeline (education requirements, apprenticeships, licensing requirements, and hiring methods). Trade unions that makeup the Construction Industry include many crafts, licensed, unlicensed, and specialty. Generally, in Minnesota, if the general contractor of a project is union, then all other contractors under the general contractor must be union. Non-union construction companies typically work in residential or light commercial jobs, and union construction companies typically work on commercial projects. Non-union construction firms will post job ads, while union firms may hire directly from the union talent pool or post job ads. Due to varying hiring practices, job ads in this report may not show the extent of the volume of employer demand.

The poster on the following page outlines Construction career pathways by type of trade, and below is a summary of licensed trades, unlicensed trades, and specialty trades on the poster.

Licensed Trades

Licensed trades require an exam or assessment specific to that trade. Applications for these positions are taken on an as-needed basis. Apprenticeships for licensed trades are four to five years long (8,000 to 8,750 hours) and require formal training at the trades Joint Apprenticeship Training Committee (JATC). Typically, an apprentice would find their jobs through a union hall.

- Licensed trades include Plumber, Sprinklefitter, HVAC Installer-Technician, Pipefitter and Steamfitter, Construction Electrician, and Electrician Line Worker.

Unlicensed Trades

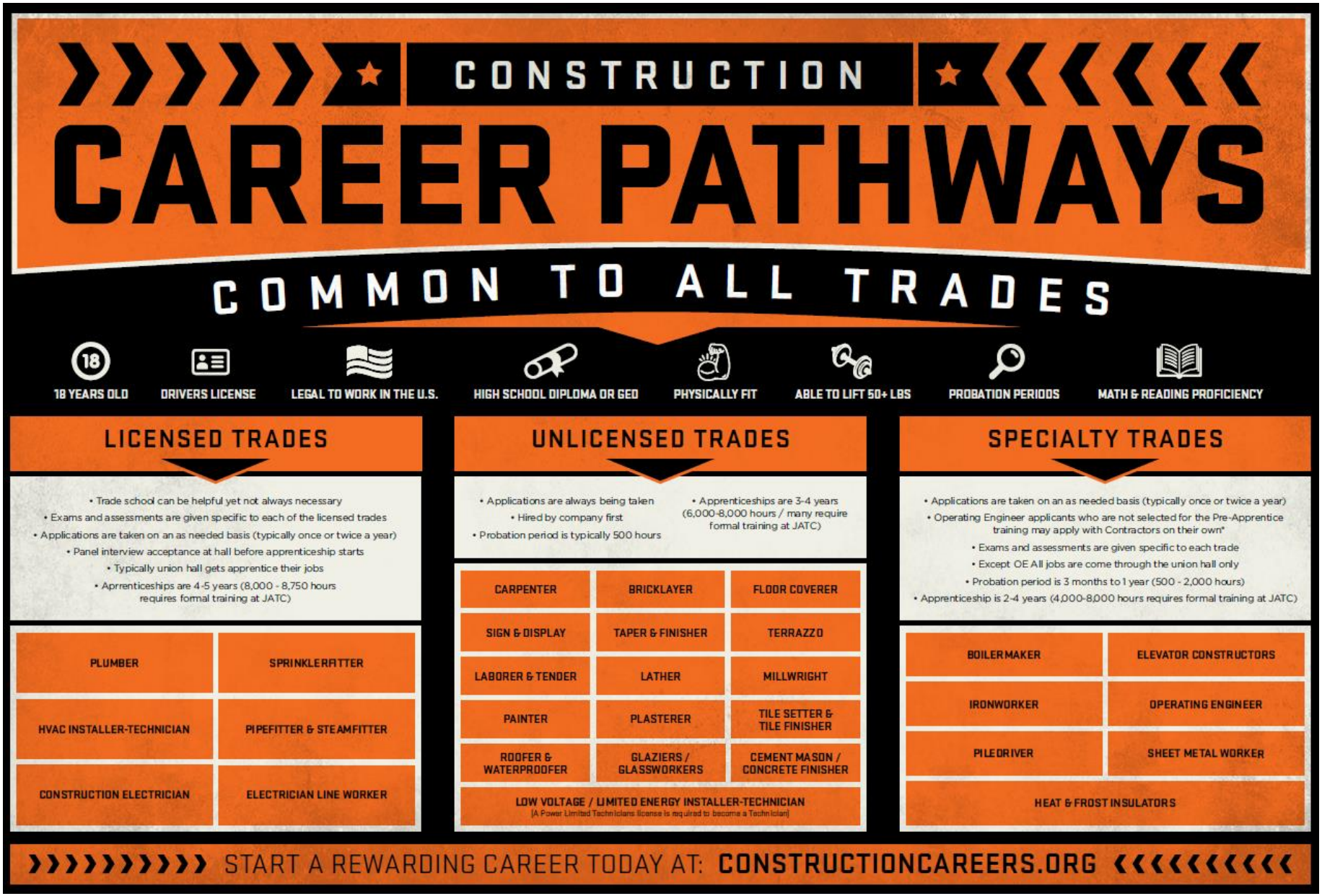
Unlicensed trades always receive applications. Apprenticeships for unlicensed trades are three to four years long (6,000 to 8,000 hours) and may require formal training at the JATC. These trades typically require a 500-hour probation period. Unlicensed trades talent is likely hired directly by a company.

- Unlicensed trades include Carpenter, Bricklayer, Floor Coverer, Sign and Display, Taper and Finisher, Terrazzo, Laborer and Tender, Lather, Millwright, Painter, Plasterer, Tile Setter and Tile Finisher, Roofer and Waterproofer, Glazier/Glassworkers, Cement Mason/Concrete Finisher, Low Voltage/Limited Energy Installer Technician.

Specialty Trades

Like licensed trades, exams and assessments are given specific to each specialty trade. In addition, applications are only taken on an as-needed basis. Except for Operating Engineers, all jobs come through the union hall only; therefore, there will likely not be job posting data for these positions. For the specialty trades, the probation period is three months to one year (500 - 2,000 hours). Apprenticeships are two to four years (4,000 to 8,000 hours) and require formal training at the JATC.

- Specialty trades include Boilermaker, Elevator Constructors, Ironworker, Operating Engineer, Piledriver, Sheet Metal Worker, and Heat and Frost Insulators.



*Please visit specific trade website for the most current information.

HISTORICAL EMPLOYMENT AND WAGES

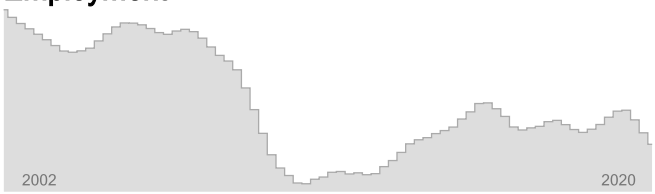
As of the fourth quarter of 2020, an estimated 12,380 people work in Ramsey County in the Construction Industry, representing about 3.8% of all employment in the County and 8% of all Construction employment statewide (total 2020Q4 statewide Construction employment was 153,508).

Over the past ten years, Construction Industry employment growth in Ramsey County lagged what was seen nationwide, with just a 0.9% average annual growth in Construction employment from 2011 to 2021 in the County compared to 1.9% growth nationwide. Wage increases have also lagged national rates at about 2.8% average annual growth in wages in Ramsey County Construction Industry jobs from 2011 to 2021, compared to 3.3% average annual growth nationwide in this Industry.

Nonresidential Plumbing, Heating, and Air-Conditioning Contractors, the top Construction sub-industries by volume of employment in Ramsey County, has had a 1.3% average annual change in employment over the last ten years and has an average annual wage that is $16,198 above the average annual wage of the Construction Industry. Commercial and Institutional Building Construction is the second largest industry by volume of employment and has an 0.8% anticipated annual growth over the next five years.

Construction Industry Summary, Ramsey County, Minnesota – 2020Q4

Employment



12,380

Regional employment / **8,839,837** in the nation

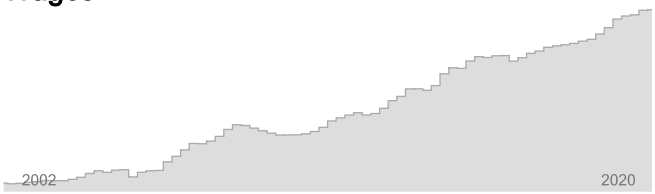
0.9%

Avg Ann % Change Employment in Last 10 Years / **+1.9%** in the U.S.

3.8%

% of Total Employment / **5.9%** in the U.S.

Wages



$75,134

Avg Wages per Worker / **$61,098** in the nation

2.8%

Avg Ann % Change in Wages in the Last 10 Years / **+3.3%** in the U.S.

Top Construction Sub-Industries, Ramsey County - 2020Q4

Avg Ann % Change in Employment, Last 10 Years

1.3 %

Nonresidential Plumbing, Heating, and Air-Conditioning Contractors

1.0 %

Commercial and Institutional Building Construction

-0.9 %

Nonresidential Electrical Contractors and Other Wiring Installation Contractors

Top Ten Construction Sub-Industries (NAICS 23) Employment in Ramsey County -COVID, 2020Q4

		Current			5-Year History		5-Year Forecast				
NAICS	Industry	Empl	Avg Ann Wages	LQ	Empl Change	Ann %	Total Demand	Exits	Transfers	Empl Growth	Ann % Growth
238222	Nonresidential Plumbing, Heating, and Air-Conditioning Contractors	1,933	$91,332	1.59	-451	-4.1%	1,014	349	646	18	0.2%
236220	Commercial and Institutional Building Construction	1,299	$98,221	0.85	87	1.4%	676	224	402	50	0.8%
238212	Nonresidential Electrical Contractors and Other Wiring Installation Contractors	1,181	$90,874	0.84	-728	-9.2%	657	214	422	21	0.3%
237310	Highway, Street, and Bridge Construction	844	$66,803	0.76	-40	-0.9%	418	153	268	-3	-0.1%
236118	Residential Remodelers	807	$54,933	0.64	235	7.1%	371	141	231	-1	0.0%
238221	Residential Plumbing, Heating, and Air-Conditioning Contractors	769	$78,598	0.56	251	8.2%	401	138	257	6	0.2%
238912	Nonresidential Site Preparation Contractors	568	$81,598	1.08	194	8.7%	308	107	189	12	0.4%
238312	Nonresidential Drywall and Insulation Contractors	509	$76,933	1.66	-134	-4.6%	251	86	158	8	0.3%
238992	All Other Nonresidential Specialty Trade Contractors	339	$69,081	0.81	-19	-1.1%	184	64	113	7	0.4%
238142	Nonresidential Masonry Contractors	335	$88,585	1.99	-39	-2.2%	167	58	107	2	0.1%
238152	Nonresidential Glass and Glazing Contractors	313	$82,042	2.98	165	16.1%	162	55	104	2	0.2%
238991	All Other Residential Specialty Trade Contractors	311	$49,130	0.49	-88	-4.8%	163	57	104	3	0.2%
238162	Nonresidential Roofing Contractors	287	$75,355	1.17	-100	-5.8%	145	47	97	1	0.0%
238351	Residential Finish Carpentry Contractors	270	$43,605	0.62	11	0.8%	135	49	81	4	0.3%
238331	Residential Flooring Contractors	267	$53,085	1.24	66	5.9%	134	49	80	6	0.4%
23	**Construction**	**12,380**	**$75,134**	**0.65**	**-1,121**	**-1.7%**	**1,175**	**435**	**777**	**-37**	**-0.3%**
	Total - All Industries	**324,963**	**$65,891**	**1.00**	**-19,212**	**-1.1%**	**35,327**	**15,129**	**20,254**	**-56**	**0.0%**

Source: JobsEQ®, Data as of 2020Q4
Note: Figures may not sum due to rounding. 1. All data based upon a four-quarter moving average, Exits and transfers are approximate estimates based upon occupation separation rates.
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EMPLOYMENT DISTRIBUTION BY EMPLOYER TYPE

The table below shows the employment mix by ownership type for Construction for Ramsey County, Minnesota. Four of these ownership types in the table below – federal, state, and local government and the private sector – together constitute "Covered Employment" (employment covered by the Unemployment Insurance programs of the United States and reported via the Quarterly Census of Employment and Wages). "Self-Employment" refers to unincorporated self-employment and represents workers whose primary job is self-employment (that is, these data do not include workers whose primary job is a wage-and-salary position that is supplemented with self-employment).

Overall, 82.5% of Construction employment in Ramsey County is under private employers, and 11.3% are self-employed. Within the Construction Industry, the average annual wages for all covered employment as of 2020Q4 is $79,874, $81,066 for private employers, and $38,075 for self-employed.

Employment by Employer Type, Ramsey County - 2020Q4

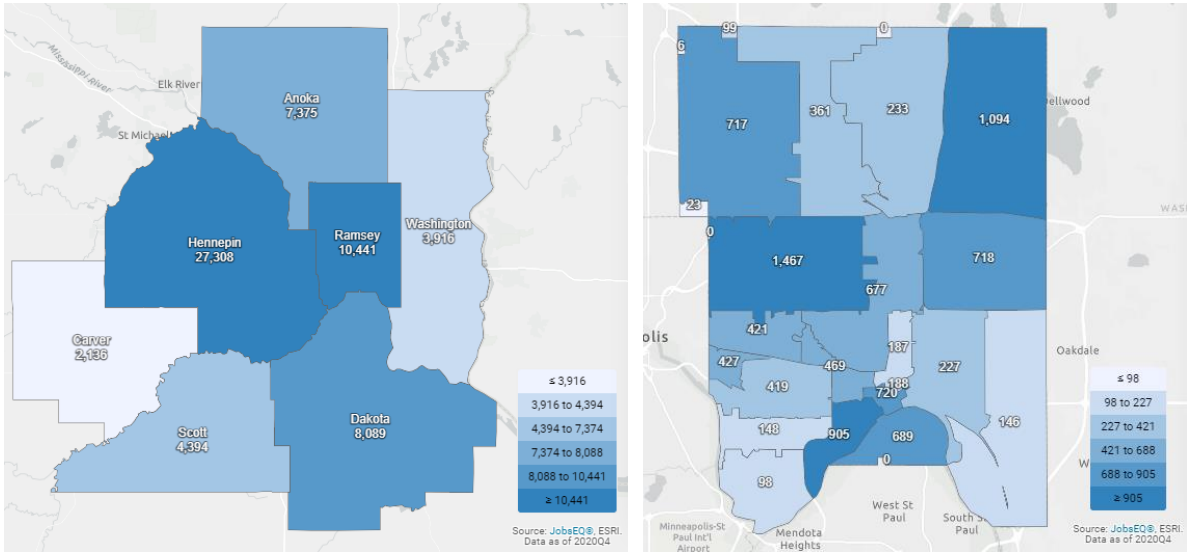
		Empl	%
	Private	10,213	82.5%
	Self-Employment	1,404	11.3%
	Local Government	75	0.6%
	State Government	688	5.6%
	Other Non-Covered	0	0.0%

OCCUPATIONAL EMPLOYMENT IN THE CONSTRUCTION INDUSTRY

Construction and Extraction occupations (SOC 47) may be performed in industries other than construction and would not be classified directly in the Construction Industry (NAICS 23). For example, a Pipelayer (SOC 47-2151) may also work in the Utilities Industry (NAICS 22). Also, an employee may work in the Construction Industry and not perform construction tasks, for example, working as a Secretary and Administrative Assistants (SOC 43-6014) for a construction company.

The map below shows the occupation concentration of place of work for Construction and Extraction roles in the MSP Metro area and Ramsey County as of the fourth quarter of 2020. Among the seven counties in the MSP Metro, Hennepin County and Ramsey County have the highest concentration of talent in Construction and Extraction roles. Within Ramsey County, the highest concentration of talent in this field is working in zip codes 55102 pertaining to the southwest portion of City of St. Paul, 55110 pertaining to cities of Vadnais Heights and White Bear Lake, 55113 pertaining to cities of Roseville, Falcon Heights, Maplewood, Lauderdale, and St. Anthony.

Occupation Concentration by Place of Work for Construction and Extraction Occupations, MSP Metro and Ramsey County, 2020Q4



The table below shows the occupation distribution for the Construction Industry in Ramsey County as of 2020Q4. Overall, 61.7% of employment in this industry is in the Construction and Extraction occupation grouping and 8.7% in Office and Administrative Support. Among the top five occupation groups in Construction, Management Occupations have the highest average annual wage ($109,100), and the Office and Administrative Support occupations have the lowest average annual wage ($47,000). The annual average wage for Construction and Extraction, the largest occupation group in Construction, is $68,200.

Top Occupation Groups Employed in the Construction Industry, Ramsey County – 2020Q4

		Empl	%
	Construction and Extraction	7,617	61.7%
	Office and Administrative Support	1,075	8.7%
	Installation, Maintenance, and Repair	1,025	8.3%
	Management	1,011	8.1%
	Business and Financial Operations	466	3.8%
	All Others	1,186	9.5%

Over the past five years, Ramsey County's employment in Construction and Extraction occupations has decreased by about 1.9% annually on average, as shown highlighted pink in the table below. Among the top fifteen Construction and Extraction occupations by volume of employment, the highest annual growth in employment over the next five years is for Electricians (0.8% annually) and Hazardous Materials Removal Workers (0.7% annually). Construction careers are somewhat less concentrated in Ramsey County on average compared to a typical community of its size, with a Location Quotient[21] of 0.69, compared to Anoka County with a 1.20 Location Quotient.

The local mean annual wage for Construction and Extraction careers is about $68,100. Among the top fifteen Construction occupations below, the average annual wage ranges from a low mean of $52,800 for Drywall and Ceiling Tile Installers up to an annual mean of $83,700 for Plumbers, Pipefitters, and Steamfitters.

[21] A location quotient is a measure of the relative size of the selected region's occupation employment compared to the national average.

Top 15 Construction and Extraction Employment by Occupation in Ramsey County - COVID, 2020Q4

		Current						5-Year History		5-Year Forecast				
SOC	Occupation	Empl	Mean Ann Wages[2]	LQ	Unempl	Unempl Rate	Online Job Ads[3]	Empl Change	Ann %	Total Demand	Exits	Transfers	Empl Growth	Ann % Growth
47-2031	Carpenters	1,598	$59,900	0.75	140	7.6%	29	-108	-1.3%	849	249	578	22	0.3%
47-2061	Construction Laborers	1,301	$61,500	0.44	179	10.6%	40	12	0.2%	780	220	519	42	0.6%
47-2152	Plumbers, Pipefitters, and Steamfitters	1,135	$83,700	1.10	37	4.2%	9	-126	-2.1%	657	166	470	21	0.4%
47-2111	Electricians	951	$75,400	0.62	32	4.6%	13	-413	-7.0%	610	152	417	40	0.8%
47-4051	Highway Maintenance Workers	854	$56,900	2.74	31	6.4%	2	33	0.8%	462	169	300	-7	-0.2%
47-2073	Operating Engineers and Other Construction Equipment Operators	714	$81,000	0.82	50	7.2%	10	7	0.2%	418	122	290	6	0.2%
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	669	$83,500	0.47	27	4.5%	17	-38	-1.1%	366	102	251	13	0.4%
47-2141	Painters, Construction and Maintenance	430	$58,900	0.55	78	9.7%	3	-64	-2.7%	230	76	146	8	0.4%
47-2211	Sheet Metal Workers	279	$72,400	0.98	17	8.2%	0	-52	-3.3%	153	42	110	1	0.1%
47-2181	Roofers	242	$62,600	0.72	38	9.0%	n/a	-23	-1.8%	128	31	94	2	0.1%
47-2051	Cement Masons and Concrete Finishers	240	$61,500	0.56	61	11.8%	8	2	0.2%	121	34	90	-3	-0.2%
47-4011	Construction and Building Inspectors	207	$79,400	0.85	2	2.2%	9	17	1.7%	125	56	71	-2	-0.2%
47-2021	Brickmasons and Blockmasons	201	$77,200	1.20	32	9.0%	2	-51	-4.4%	88	28	68	-8	-0.8%
47-2081	Drywall and Ceiling Tile Installers	184	$52,800	0.69	29	7.5%	2	-38	-3.7%	96	27	65	4	0.4%
47-4041	Hazardous Materials Removal Workers	109	$64,200	1.17	7	14.5%	n/a	-5	-0.8%	75	24	47	4	0.7%
47-0000	**Construction and Extraction Occupations**	**10,441**	**$68,100**	**0.69**	**993**	**8.2%**	**162**	**-1,034**	**-1.9%**	**5,975**	**1,707**	**4,087**	**181**	**0.3%**
00-0000	**Total - All Occupations**	**324,963**	**$62,100**	**1.00**	**18,856**	**6.5%**	**18,024**	**-19,212**	**-1.1%**	**203,662**	**71,939**	**114,736**	**16,986**	**1.0%**

Data as of 2020Q4 unless noted otherwise
Note: Figures may not sum due to rounding.
1. Data based on a four-quarter moving average unless noted otherwise.
2. Wage data are as of 2020 and represent the average for all Covered Employment
3. Data represent found online ads active within the last thirty days in the selected region; data represents a sampling rather than the complete universe of postings. Ads lacking zip code information but designating a place (city, town, etc.) may be assigned to the zip code with greatest employment in that place for queries in this analytic. Due to alternative county-assignment algorithms, ad counts in this analytic may not match that shown in RTI (nor in the popup window ad list).

UNEMPLOYMENT TRENDS

Unemployment in Ramsey County Construction roles sits at about 8.2%, compared to 6.5% across all local occupations as of the fourth quarter of 2020. Nationally the unemployment rate for Construction roles is 7.7%.[22] Workforce plans for 2021 were pessimistic among the 169 respondents in the Minnesota Construction Industry Assessment 2020-2021. About 18% of Industry respondents predicted layoffs in 2020-2021 compared to 3.5% in 2019-2020.[23]

From March 16, 2020, to May 23, 2021, 8,692 workers in Construction occupations applied for unemployment insurance (UI) in Ramsey County, representing 7.3% of the County's unemployment insurance applications.[24] UI Applicants in Construction roles include workers represented by unions, non-union employees, and private contractors. COVID-19 impacts to UI applications in Construction occupations varied across the MSP Metro, as shown in the table below. For example, in Anoka County, Construction Trades Workers make up 13.2% of the total UI applicants, compared to Hennepin County, where these workers account for 5.3%.

According to employment data, as of the fourth quarter of 2020, about 11,143 people were employed in Ramsey County's Construction occupations. In these occupations, 8,692 people applied for UI in the County during the pandemic. Using these numbers, the estimated share of local talent employed in Construction roles that applied to UI during this period would be about 78.0%. In Ramsey County, Construction Trades Workers have the highest volume of employment in the Industry as of the fourth quarter of 2020 and the largest share of UI applicants in construction roles.

Cumulative Unemployment Insurance Applicants for Construction Occupations in MSP Metro from March 16, 2020 – May 23, 2021

	Construction Occupations (SOC 47)			
County	UI Application Counts	% of Total UI Applicants[1]	Employment (Place of Residence)	% of Total Local Employment[2] (Place of Residence)
Ramsey	8,692	7.3%	11,143	4.1%
Anoka	10,866	13.2%	8,803	4.7%
Carver	1,713	8.7%	1,669	2.9%
Dakota	8,751	9.5%	6,549	2.9%
Hennepin	14,918	5.3%	18,216	2.7%
Scott	3,074	9.4%	3,468	4.2%
Washington	5,981	11.6%	3,582	2.7%
MSP Metro Total	**53,995**	**8.0%**	**8,803**	**4.7%**

SOURCE: 1. DEED Unemployment Insurance Claims Statistics, updated May 24th, 2021, Counts include the cumulative sums for SOC codes 47-1000, 47-2000, and 47-3000. 2. 2015-2019 American Community Survey (ACS) 5-Year Estimates, Employment by Place of Residence.

[22] https://www.bls.gov/iag/tgs/iag23.htm
[23] Associated General Contractors of Minnesota, Minnesota Construction Industry Assessment, 2020 – 2021, https://agcmn-c5.s3.us-east-2.amazonaws.com/6116/0706/2722/2020_AGC_Minnesota_Construction_Industry_Assessment-web.pdf
[24] Unemployment Insurance Application counts are collected by the Minnesota Department of Employment and Economic Development and aggregated at the minor group level or three-digit level.

Unemployment Insurance Applicants by Occupations Requesting Insurance in Ramsey County from March 16, 2020 – May 23, 2021

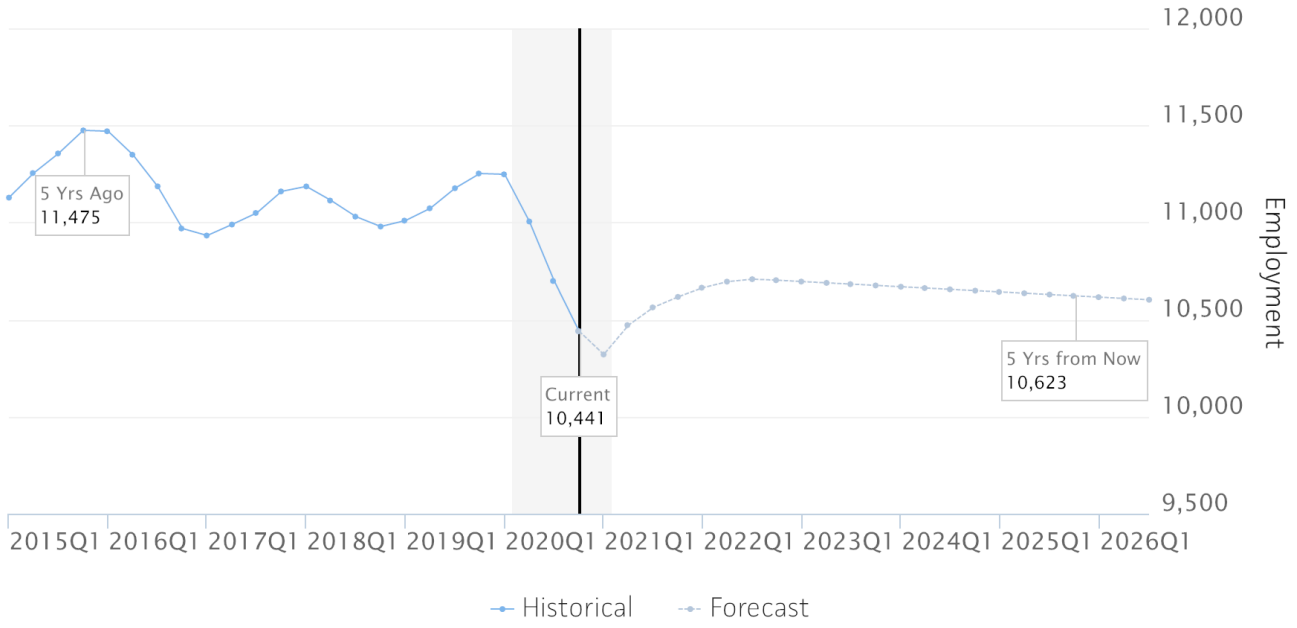
Occupation Group (47)	UI Application Counts	% of Total UI Applicants[1]	Empl (Place of Residence)	% of Total Local Employment[2] (Place of Residence)
Supervisors of Construction and Extraction Workers (47-1000)	53	0.0%	577	0.2%
Construction Trades Workers (47-2000)	7,636	6.4%	9,087	3.3%
Construction Trades Helpers (47-3000)	82	0.1%	405	0.1%
Other Construction and Related Workers (47-4000)	814	0.7%	959	0.4%
Extraction Workers (47-5000)	107	0.1%	115	0.0%
Construction (47-0000)	**8,692**	**7.3%**	**11,143**	**4.1%**
Total - All Occupations	**119,103**	**100%**	**272,821**	**100%**

SOURCE: 1. DEED Unemployment Insurance Claims Statistics, updated May 24th, 2021, 2. 2015-2019 American Community Survey (ACS) 5-Year Estimates, Employment by Place of Residence.

CONSTRUCTION INDUSTRY EMPLOYMENT FORECAST

As Ramsey County looks toward economic recovery from the pandemic, forecasts made today may look very different from realities seen in years to come. Construction and Extractions careers anticipate a 0.3% annual growth overall for the next five years, less than a one percentage point lower than all occupational growth forecasted in the County.

Construction and Extraction Employment Forecast, COVID-19 Impacts, Ramsey County



Source: JobsEQ®,Data as of 2020Q4,The shaded areas of the graph represent national recessions.

Defining Green Construction Careers

The Construction Industry (NAICS 23) is comprised of establishments mainly engaged in the construction of building or engineering projects, such as highways or utility systems. The work done in this industry may include new work, additions, alterations, or maintenance and repairs.[25]

This report focuses on jobs that have been identified as "Green Occupations" by O*NET and are heavily concentrated within the Construction Industry (NAICS 23). Green Occupations in Construction are found in: O*NET's Green Economy Sectors of Green Construction, Renewable Energy Generation, Consulting Services.

The Green occupational categories assigned to the occupations are:[26]

- **Green New & Emerging –** The impact of green economy activities and technologies is sufficient to create the need for unique work and worker requirements, which results in the generation of new occupations.
- **Green Enhanced Skills** – The impact of green economy activities and technologies results in a significant change to the work and worker requirements of an existing O*NET-SOC occupation.
- **Green Increased Demand –** The impact of green economy activities and technologies results in an increase in employment demand but does not entail significant changes in the work and worker requirements of the occupation.

Ramsey County Green Occupations in Construction are occupations with 50 percent or more share of the total occupational employment in the Construction Industry (NAICS) in the County and have been categorized into on O*NET's Green Economy Sectors (Green Construction, Renewable Energy Generation, or Consulting Services).

As seen in the table below, Green Construction roles employ 7,087 workers locally. Among the eight roles identified as having Green Increased Demand, Carpenters have the largest volume of employment and offer an annual average Industry wage of $61,700, $13,434 less than the overall Construction Industry. Six occupations were identified as having Green Enhanced Skills. Among them, Construction Laborers have the largest volume of employment, with 1,131 workers locally. First-Line Supervisors of Construction Trades and Extraction Workers and Solar Photovoltaic Installers, employing 508 and 16 industry workers locally were identified as Green New & Emerging.

[25] https://www.naics.com/what-is-naics-sector-23-full-description-and-statistics/
[26] https://www.onetcenter.org/dictionary/22.0/excel/green_occupations.html

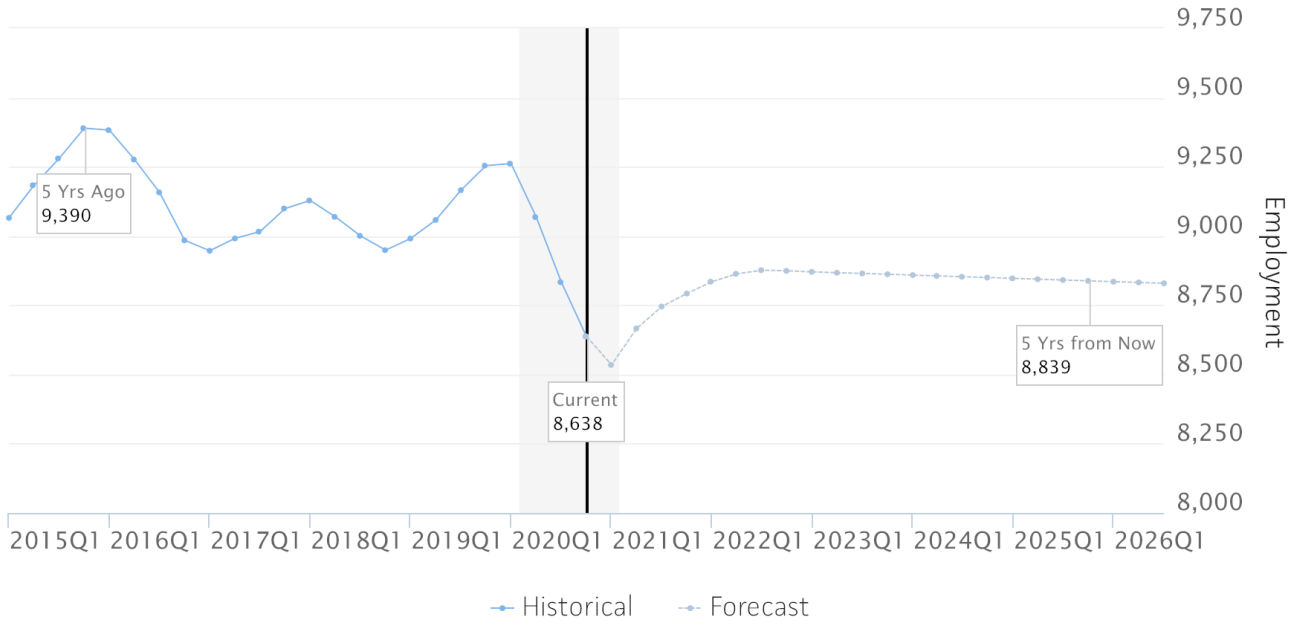
Green Construction Occupations Distribution for Construction (NAICS 23) in Ramsey County, Baseline 2020Q4

		Current		5-Year Demand						
SOC	Occupation	Industry Empl	Industry Avg Ann Wages by Occ	Exits	Transfers	Empl Growth	Total Demand	Total Empl, All Industries	Share of Total Occ Employment in Industry (23)	Green Occ Category
47-2031	Carpenters	1,382	$61,700	208	482	-40	650	1,598	86%	Green Increased Demand
47-2061	Construction Laborers	1,131	$59,800	186	440	1	627	1,301	87%	Green Enhanced Skills
47-2152	Plumbers, Pipefitters, and Steamfitters	1,003	$83,200	144	408	-3	550	1,135	88%	Green Enhanced Skills
47-2111	Electricians	740	$75,700	117	320	17	454	951	78%	Green Increased Demand
11-9021	Construction Managers	523	$98,700	56	135	9	200	654	80%	Green Enhanced Skills
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	508	$82,500	75	186	-4	258	669	76%	Green New & Emerging
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	495	$61,400	66	172	-2	237	615	80%	Green Enhanced Skills
47-2073	Operating Engineers and Other Construction Equipment Operators	419	$76,400	71	168	-2	237	714	59%	Green Increased Demand
47-2181	Roofers	238	$61,300	30	91	-4	118	242	98%	Green Enhanced Skills
47-2051	Cement Masons and Concrete Finishers	221	$60,100	31	81	-8	103	240	92%	Green Increased Demand
47-2211	Sheet Metal Workers	213	$68,800	31	82	-6	107	279	76%	Green Enhanced Skills
47-2221	Structural Iron and Steel Workers	88	$68,500	12	39	-1	51	99	89%	Green Increased Demand
47-2131	Insulation Workers, Floor, Ceiling, and Wall	74	$52,200	9	33	-2	40	79	94%	Green Increased Demand
47-3012	Helpers--Carpenters	35	$38,600	6	17	-1	22	40	87%	Green Increased Demand
47-2231	Solar Photovoltaic Installers	16	$59,700	3	9	4	17	17	96%	Green New & Emerging
47-2011	Boilermakers	3	$86,700	0	1	0	1	5	60%	Green Increased Demand
	Green Construction	7,087	n/a	1,045	2,664	-40	3,670	8,638	82%	
	Construction Industry	**12,380**	**$75,134**	**2,159**	**3,862**	**-182**	**5,839**	**n/a**	**100%**	
	Total - All Industry	**324,963**	**$65,891**	**75,550**	**101,215**	**-279**	**176,486**	**n/a**	**n/a**	

EMPLOYMENT FORECAST

As Ramsey County plans for economic recovery as we emerge from the COVID-19 pandemic, forecasts made today may look very different from realities seen in years to come. Green Construction careers anticipate a 0.5% annual growth overall for the next five years, 0.2 percentage points higher than Construction and Extractions careers and less than a one percentage point lower than all occupational growth forecasted in the County. The largest expansion in employment is for Solar Photovoltaic Installers roles with 4.5% annual growth over the next five years, however, these roles are forecasted to have a low volume of employment demand. Construction Managers roles have the second-largest forecasted annual growth (1.0%), in addition to having a high volume of employment demand.

Green Construction Employment Forecast, COVID-19 Impacts, Ramsey County



Source: JobsEQ®,Data as of 2020Q4,The shaded areas of the graph represent national recessions.

Green Construction in Ramsey County - COVID, 2020Q4

		Current						5-Year History		5-Year Forecast				
SOC	Occupation	Empl	Mean Ann Wages[2]	LQ	Unempl	Unempl Rate	Online Job Ads[3]	Empl Change	Ann %	Total Demand	Exits	Transfers	Empl Growth	Ann % Growth
47-2031	Carpenters	1,598	$59,900	0.75	140	7.6%	31	-108	-1.3%	849	249	578	22	0.3%
47-2061	Construction Laborers	1,301	$61,500	0.44	179	10.6%	38	12	0.2%	780	220	519	42	0.6%
47-2152	Plumbers, Pipefitters, and Steamfitters	1,135	$83,700	1.10	37	4.2%	7	-126	-2.1%	657	166	470	21	0.4%
47-2111	Electricians	951	$75,400	0.62	32	4.6%	14	-413	-7.0%	610	152	417	40	0.8%
47-2073	Operating Engineers and Other Construction Equipment Operators	714	$81,000	0.82	50	7.2%	8	7	0.2%	418	122	290	6	0.2%
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	669	$83,500	0.47	27	4.5%	19	-38	-1.1%	366	102	251	13	0.4%
11-9021	Construction Managers	654	$101,900	0.66	16	3.1%	22	-5	-0.2%	280	72	174	34	1.0%
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	615	$68,400	0.78	33	7.5%	19	1	0.0%	312	84	217	11	0.4%
47-2211	Sheet Metal Workers	279	$72,400	0.98	17	8.2%	0	-52	-3.3%	153	42	110	1	0.1%
47-2181	Roofers	242	$62,600	0.72	38	9.0%	n/a	-23	-1.8%	128	31	94	2	0.1%
47-2051	Cement Masons and Concrete Finishers	240	$61,500	0.56	61	11.8%	5	2	0.2%	121	34	90	-3	-0.2%
47-2221	Structural Iron and Steel Workers	99	$64,500	0.62	5	12.9%	n/a	17	3.9%	62	14	45	2	0.5%
47-2131	Insulation Workers, Floor, Ceiling, and Wall	79	$52,200	1.16	6	4.4%	1	-2	-0.6%	48	10	36	2	0.4%
47-3012	Helpers--Carpenters	40	$39,200	0.59	19	15.7%	2	-23	-8.6%	29	7	21	1	0.5%
47-2231	Solar Photovoltaic Installers	17	$60,500	0.57	2	17.5%	2	-1	-0.7%	17	3	10	4	4.5%
47-2011	Boilermakers	5	$85,800	0.14	3	24.4%	n/a	-1	-3.3%	2	1	2	0	-0.1%
	Green Construction 50%	8,638	$72,700	0.66	664	7.6%	168	-752	-1.7%	4,831	1,308	3,324	199	0.5%
	Total - All Occupations	324,963	$62,100	1.00	18,856	6.5%	18,030	-19,212	-1.1%	203,662	71,939	114,736	16,986	1.0%

Source: JobsEQ®

Data as of 2020Q4 unless noted otherwise Note: Figures may not sum due to rounding.

1. Data based on a four-quarter moving average unless noted otherwise.
2. Wage data are as of 2020 and represent the average for all Covered Employment
3. Data represent found online ads active within the last thirty days in the selected region; data represents a sampling rather than the complete universe of postings. Ads lacking zip code information but designating a place (city, town, etc.) may be assigned to the zip code with greatest employment in that place for queries in this analytic. Due to alternative county-assignment algorithms, ad counts in this analytic may not match that shown in RTI (nor in the popup window ad list).

GREEN CONSTRUCTION OCCUPATIONAL EMPLOYMENT BY INDUSTRY

Ramsey County employers from all industries who utilize construction talent seek to innovate with tech solutions, decrease costs, and improve safety. The diverse mix of industries highlighted in the chart below exemplifies the broad-based demand for Green Construction talent across industries. By industry, about 30% of all Green Construction talent is employed in Building Equipment Contractors; Foundation, Structure, and Building Exterior Contractors follow with 10% of all occupational employment. These two sub-industries, along with Other Specialty Trade Contractors, represent the largest share of future demand anticipated over the next ten years. The highest average wages are offered by Management Companies and Enterprises (NAICS 5511) and Architectural, Engineering, and Related Services (NAICS 5413).

About 12% of all Ramsey County talent employed in Green Construction roles are self-employed (of those reporting taxable income), 77% work for private employers, and 12% work for government agencies, 3% local, 8% state, and 0.3% federal government.

Top Industry Employment of Green Construction Talent in Ramsey County, 2020Q4 with 10-Year Demand under a COVID-19 Forecast Model

		CURRENT			10-YEAR DEMAND			
NAICS Code	Industry Title	% of Occ Empl	Empl	Avg Ann Wages	Exits	Transfers	Empl Growth	Total Demand
2382	Building Equipment Contractors	30.4%	2,622	$76,300	765	2,074	24	2,864
2381	Foundation, Structure, and Building Exterior Contractors	10.0%	864	$63,200	250	649	-12	887
2362	Nonresidential Building Construction	9.6%	831	$74,800	241	591	-4	828
2389	Other Specialty Trade Contractors	9.5%	820	$64,900	259	623	-18	863
2361	Residential Building Construction	8.6%	740	$65,300	209	499	-31	677
2383	Building Finishing Contractors	7.7%	661	$66,600	193	476	-34	635
2373	Highway, Street, and Bridge Construction	5.6%	480	$74,700	151	363	-2	512
5613	Employment Services	1.9%	163	$55,400	50	125	-6	169
9211	Executive, Legislative, and Other General Government Support	1.7%	151	$76,200	47	115	-5	157
9231	Administration of Human Resource Programs	1.2%	107	$76,500	33	80	-6	107
5511	Management of Companies and Enterprises	1.1%	97	$92,000	26	65	5	96
9221	Justice, Public Order, and Safety Activities	1.1%	96	$75,900	30	73	-2	101
6113	Colleges, Universities, and Professional Schools	1.0%	82	$72,200	24	62	0	86
5413	Architectural, Engineering, and Related Services	0.8%	66	$85,800	18	45	-1	62
2371	Utility System Construction	0.7%	57	$72,600	18	44	0	61
5629	Remediation and Other Waste Management Services	0.7%	57	$71,900	18	44	4	66
9261	Administration of Economic Program	0.5%	46	$76,500	14	35	-3	46
n/a	All Others	8.1%	697	n/a	205	521	-23	704

Source: JobsEQ®
Data as of 2020Q4 except wages which are as of 2020. Note that occupation-by-industry wages represent adjusted national data and may not be consistent with regional, all-industry occupation wages shown elsewhere in JobsEQ.
Note: Figures may not sum due to rounding.

OVERVIEW OF GREEN CONSTRUCTION TALENT DEMOGRAPHICS

In Ramsey County, Green Construction careers have a higher concentration of talent between the ages of 35 to 44 than in overall employment across all occupations. Compared to overall employment in the County, Green Construction careers have a lower share of youth ages 16 to 19 and of adults ages 55 and older. Minnesota's Child Labor Law prohibits youth under the 18 years old from working in any "particularly hazardous" occupation, including many construction roles.[27] Regarding aging Construction workers, per the Center for Construction Research and Training, non-union construction workers tend to stop working in the Construction at earlier age than other fields, which may be due to the physical demands of the job.[28]

Green Construction roles have a higher share of workers with less than some college than what is observed in employment across all occupations in the County. The largest portion of talent in these roles have a high school diploma. Women are underrepresented in Ramsey County's Green Construction careers. Women make up 49.8% of workers in all occupations across Ramsey County, but they hold 3.8% of local Green Construction roles. In contrast, male talent assumes the majority of Green Construction positions, representing about 96.2% of the workers in these occupations – about 46 percentage points higher than the frequency seen in all occupations in the County. Across the Green Construction occupations in Ramsey County, there are higher numbers of White workers and Hispanic than expected by their local employment rate.

Green Construction Demographics in Ramsey County by Occupation, Minnesota, 2020Q4*

	All Green Construction Careers	All Construction Careers	Total - All Occupations
Average Annual Wage	$72,700	$68,100	$62,100
Age Group			
65+	2.7%	2.5%	4.7%
55-64	14.2%	13.4%	16.0%
45-54	20.0%	19.3%	18.4%
35-44	23.5%	24.5%	19.1%
25-34	28.1%	28.8%	26.6%
20-24	9.6%	9.6%	10.9%
16-19	1.9%	1.9%	4.2%
Education Attainment			
Advanced	2.8%	2.1%	17.6%
4-year degree	14.0%	11.5%	31.7%
2-year degree	9.9%	8.5%	10.2%
Some college	19.6%	18.4%	15.5%
HS	35.3%	37.1%	18.3%
Less than HS	18.4%	22.4%	6.7%
Gender			
Female	3.8%	4.1%	49.8%
Male	96.2%	95.9%	50.2%
Race and Ethnicity			
White	81.1%	80.1%	73.1%
Black	8.0%	8.4%	10.6%
American Indian	1.0%	1.1%	0.6%
Asian	6.9%	7.2%	12.8%
Pacific Islander	0.1%	0.1%	0.0%
Two or More Races	3.1%	3.2%	2.9%
Hispanic	15.6%	19.4%	7.0%
Non-Hispanic White	84.4%	80.6%	93.0%
Total Employment	**8,132**	**11,143**	**272,821**

Source: JobsEQ®, Data as of 2020Q4 unless noted otherwise, Note: Figures may not sum due to rounding 1. "Overall occupation" characteristics refer to attributes across all individuals in those occupations, not just those limited to the demographic categories shown in this table. *Green highlighting indicates an overrepresentation of 2% or more compared to all occupations in Ramsey County

[27] Department of Labor and Industry, Ensuring the safety of youth in skilled trades training programs, Report to the Minnesota Legislature, 2020, http://www.dli.mn.gov/sites/default/files/pdf/YouthInSkilledTradesStudy_011520.pdf

[28] https://www.cpwr.com/research/data-center/the-construction-chart-book/chart-book-6th-edition-labor-force-characteristics-age-of-construction-workers-by-union-status-hispanic-ethnicity-type-of-employment-and-occupation/

Emerging Skills in Green Construction Careers

The five O*NET Green Construction roles in the table below were selected for an in-depth assessment through a combination of criteria, including green occupational category, concentration in the local Construction Industry, local engagement, and alignment with potential local investment opportunities. Despite not being flagged as one with green occupational category, Mechanical Insulation Workers, also known as Heating and Frost Insulators, is a locally recommended O*NET Green Construction occupation for analysis. Not only do these roles have a 95 percent share of the total occupational employment in the County's Construction Industry, but there is increased demand. Low Voltage/Limited Energy Installer-Technicians are also locally recommended, despite not meet the earlier criteria of having more than a 50 percent concentration in the local Construction Industry.

The categories for assessment highlight the trade-offs based on key labor market indicators and can be used to evaluate opportunities for workforce solutions. For example, Heating, Air Conditioning & Refrigeration Mechanics, and Installers roles, flagged for Green Enhanced Skills, wages that are above MN DEED's cost of living for an adult with one child ($67,062/year), and have a moderate education and training requirement. In comparison, Solar Photovoltaic Installers roles have low employment volume, high estimated 5-year annual growth rate, and low education requirement. Job posting data in this section are reported at the MSP Metro level because Construction companies post job ads based on the headquarter location for construction worksites in different locations; in other words, the Construction workforce is mobile. Top skills data in this section are reported at the state level because licensing for these occupations is by state.

Summary of Green Construction Occupations

Green Occ. Category	Green Occupations	Pipeline timeline[1]	Type of trade	Empl 2020Q4	Unempl Rate[2]	Ave. Annual Wage (Occ.)[3]	Est 5-year Annual Growth Rate[4]	Est. Annual Supply Gap[5]	Common Edu Reps[4]
Green Increased Demand	Low Voltage/Limited Energy Installer-Technician	3 - 4 years	Unlicensed	275	5.0%	$68,700	-0.1%	0	Associate Degree *(Not required)*
Green New & Emerging	Solar Photovoltaic Installers	0 - 2 years	Licensed	17	17.5%	$60,500	4.5%	0	High School/GED & On-the-job training
Green Enhanced Skills	Heating, Air Conditioning & Refrigeration Mechanics, and Installers	4 - 5 years	Licensed	615	7.5%	$68,400	0.4%	0	Certificate & On-the-job training
n/a	Heat and Frost Insulators	2 - 4 years	Specialty	52	4.5%	$78,800	0.4%	0	High School/GED & Apprenticeship
Green Increased Demand	Cement Masons and Concrete Finishers	3 - 4 years	Unlicensed	240	11.8%	$61,500	-0.2%	4	None & On-the-job training
	All Green Construction	**n/a**	**n/a**	**8,638**	**7.6%**	**$72,700**	**0.5%**	**n/a**	**n/a**

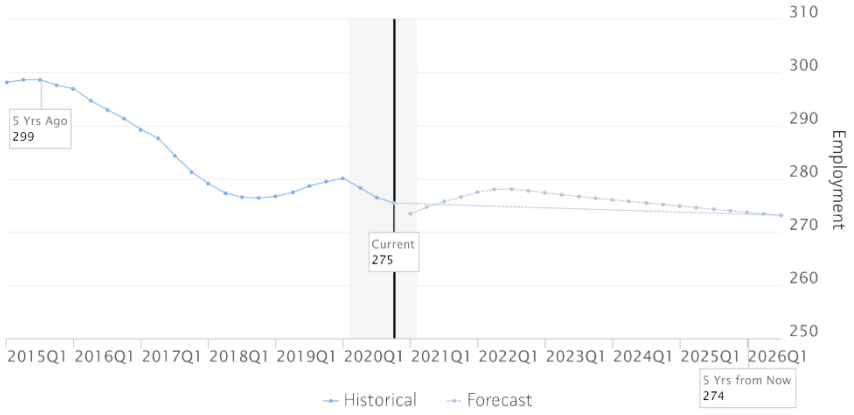
Source: JobsEQ® 1. Time required to complete apprenticeship. 2. Unemployment rate by occupation is the rate of unemployed workers by place of residence obtained from the American Community Survey 2015-2019 estimates, and includes people that did not have work at the time of the survey, but were active members of a union or actively search for work in the occupation. Unmployment Rate more than two percentage point below the rate of all Green Construction are shaded green, within two percentage points of that above or below are shaded yellow, and more than two percentage points of All Green Construciton are shaded red.3.Average Annual Occupational Wage red shading is at or below MN DEED Average Annual cost of living for a single person living alone in Ramsey County is $34,964, yellow shading is below the average annual cost of living for one adult with one child, $67,062, and green shading is above $67,062. 4. The Estimated 5-Year Annual Growth rates 0.5 percentage points above or below the rate of All Green Construction are shaded yellow. Those shaded red are more than 0.5 percentage points below All Green Construction and those shaded green are more than 0.5 percentages above All Green Construction. 5. Est. Annual Supply Gap (or surplus) is for all employers hiring for this occupation, not only construction roles, over the next five years. Green shading would signify a shortage of workers, yellow shading is no shortage or surplus, and red shading signifies a surplus talent. 6. Green shading is for low educational requirements (None/High School/GED or On-the-Job Training), Yellow shading is for medium education requirements (Associate's degree or post-secondary certificate), and red is for high education (Bachelors degree or higher).

LOW VOLTAGE/LIMITED ENERGY INSTALLER-TECHNICIAN

EMPLOYMENT FORECAST

Limited energy technicians install, maintain, and repair building performance technology, smart technology devices that optimize energy performance within the building. In Ramsey County, employment in the Low Voltage/Limited Energy Installer Technician pathway is forecast to rebound by the first quarter of 2021 and then is anticipated to slow after the initial recovery, with -0.1% average annual growth overall for the next five years. Demand for these roles goes beyond the Construction Industry to the Utilities and Manufacturing Industries. As an unlicensed trade, talent is likely hired directly by a company.

Electrical & Electronic Engineering Technologists & Technicians Employment Forecast, COVID-19 Impacts, Ramsey County



Source: JobsEQ®,Data as of 2020Q4,The shaded areas of the graph represent national recessions.

Key Statistics	
2020Q4 Employment: 275	Location Quotient: 1.01
Ave. Entry-Level Wages: $49,700	Ave. Overall Wages: $68,700

Top MSP Metro Employers Advertising Openings for these Roles[29]
Total job postings: 246

1) Post Holdings: 25 (-11%)
2) Boston Scientific Corp.: 15 openings (+400%)
3) Xcel Energy: 14 openings (+600%)
4) TraneTech: 12 openings (+500%)
5) Suez Water: 10 openings (+400%)

Top Skills by Volume Associated with this Career in Minnesota

1) Troubleshooting (+8%)
2) Electrical engineering (-1%)
3) Analysis (+26%)
4) Schematics (+4%)
5) Communication (+16%)

Related Postsecondary Programs in Ramsey County

University of St. Thomas (*not required for position*)

- Electrical Engineering (BS) Link
- Electrical Engineering, (MS) Link
- Power Electronics and Systems (Graduate Certificate)

Pathway Requirements (Education or Licensing Requirements)

Minnesota Limited Energy JATC Link

- Apprenticeship – minimum 36 months Link
- Power Limited Technician License Link

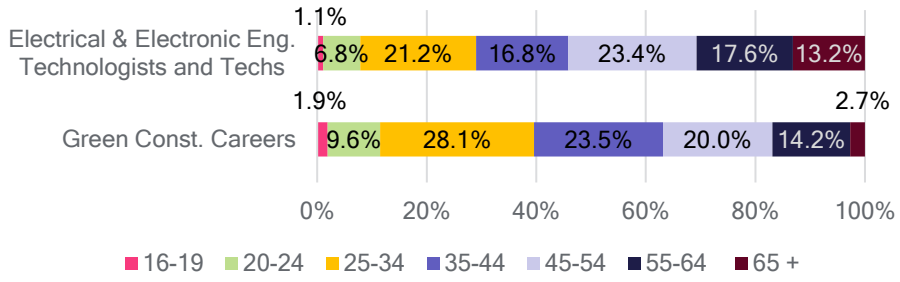
[29] TalentNeuron, New job posts, including staffing from 06/01/2020 to 5/31/2021.

LOW VOLTAGE/LIMITED ENERGY INSTALLER-TECHNICIAN

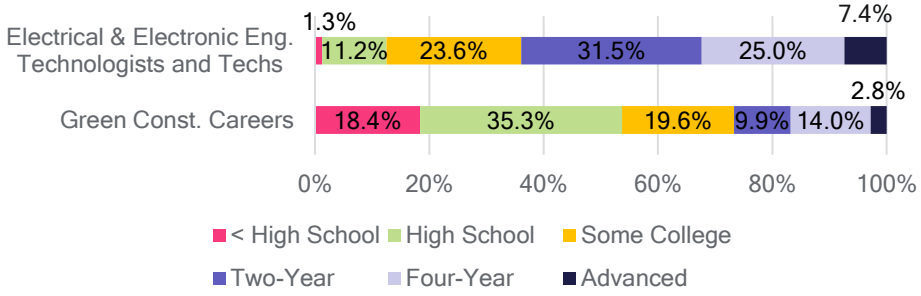
RAMSEY COUNTY WORKFORCE DEMOGRAPHICS

N = 140

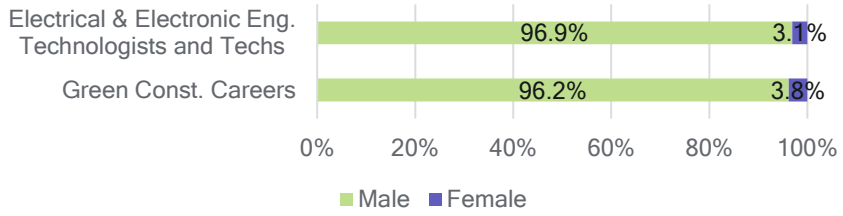
Local Workforce Age



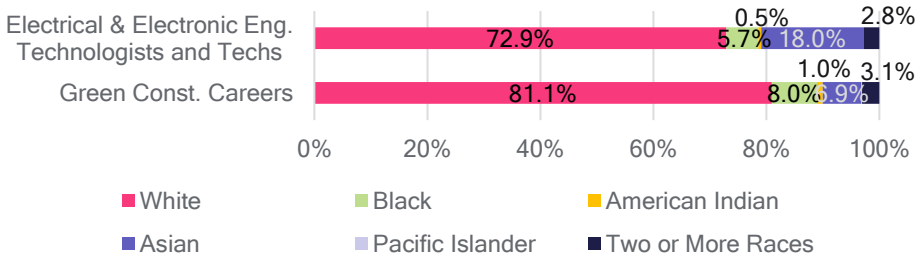
Local Workforce Educational Attainment, Age 25 - 64



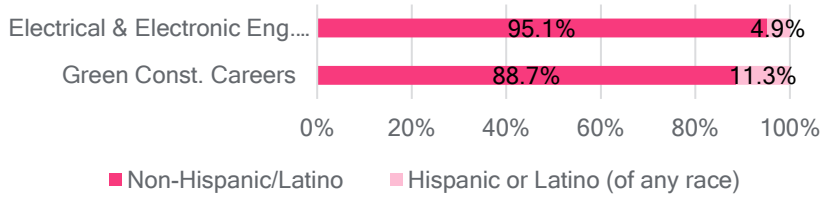
Local Workforce Age Gender



Local Workforce Race, All Ages



Local Workforce Ethnicity, All Ages



SOURCE: Occupation demographics by age, gender, race, and ethnicity are modeled by *Chmura* based upon employment by occupation (described above) at place of residence and zip-code level data from the **American Community Survey, 2015-2019**.

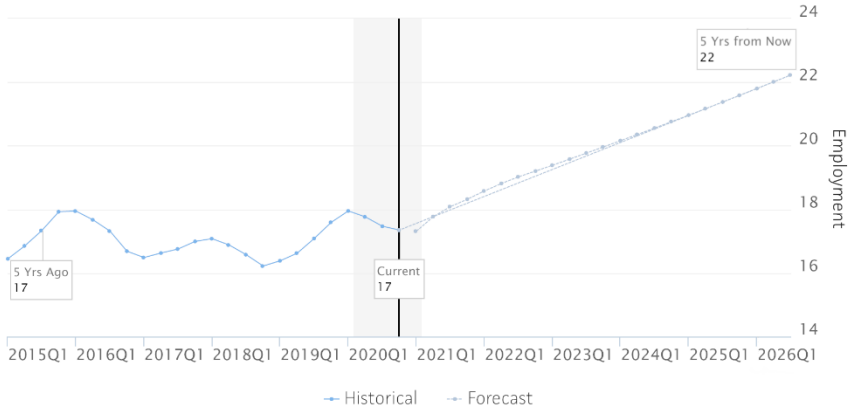
SOLAR PANEL INSTALLERS

EMPLOYMENT FORECAST

Like the forecast for all Green Construction employment in Ramsey County, employment in the Solar Panel Installer roles, including First-line Supervisors and Solar Photovoltaic Installers, are forecast to start rebounding by the first quarter of 2021. Employment in this pathway is anticipated to remain relatively flat after the initial recovery, with 0.5% average annual growth overall for the next five years. The largest expansion in employment in this pathway is for Solar Photovoltaic Installers (4.5% annual growth).

Key Statistics	
2020Q4 Employment: 17	Location Quotient: 0.57
Ave. Entry-Level Wages: $44,600	Ave. Overall Wages: $60,500

Solar Panel Installers Employment Forecast, COVID-19 Impacts, Ramsey County



Source: JobsEQ®,Data as of 2020Q4,The shaded areas of the graph represent national recessions.

Top MSP Metro Employers Advertising Openings for these Roles [30]
Total job postings: 56
1) Everlight Solar: 13 openings
2) Tesla Motors: 6 openings (+500%)
3) M.A. Mortenson Company: 5 openings (-62%)
4) All Energy Solar, Inc.: 3 openings (0%)
4) Empire Solar Group: 3 openings

Top Skills by Volume Associated with this Career in Minnesota
1) Scheduling (-5%)
2) Supervision (-9%)
3) Collaboration (-31%)
4) Customer Service (+143%)
5) Communication (+14%)

Related Postsecondary Programs in Ramsey County
Century College, Solar and Renewable Energy (Link)
- Energy Technical Specialist – AAS
- Advance Photovoltaic Energy Systems – Cert.
- Solar Assessor – Cert.

Related Workforce Training Programs
- Midwest Renewable Energy Association (Link)
  - Solar Training Academy

Pathway Requirements (Education or Licensing Requirements)
- North American Board of Certified Energy Practitioners (NABCEP)

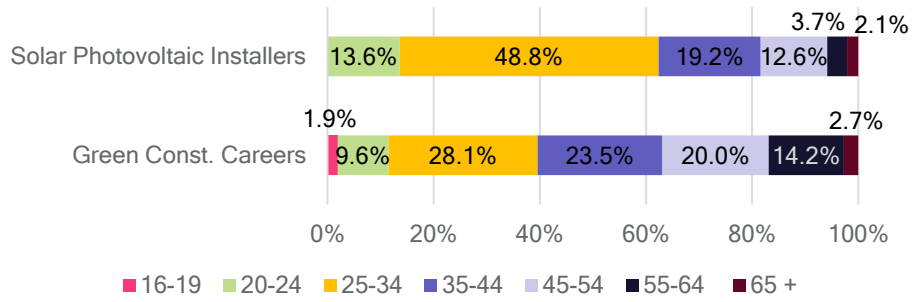
[30] TalentNeuron, New job posts, including staffing from 06/01/2020 to 5/31/2021.

SOLAR PANEL INSTALLERS

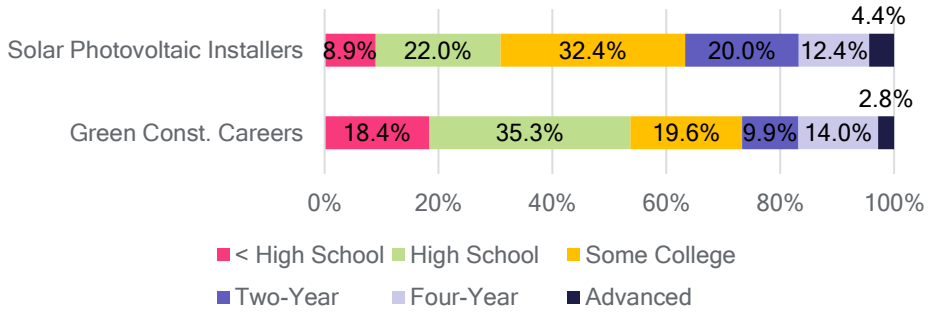
RAMSEY COUNTY WORKFORCE DEMOGRAPHICS

N = 10

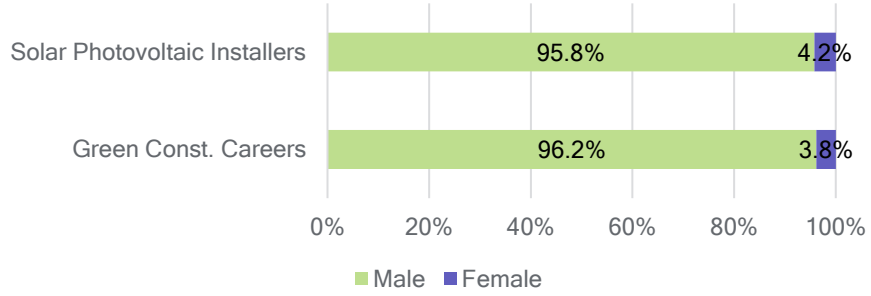
Local Workforce Age



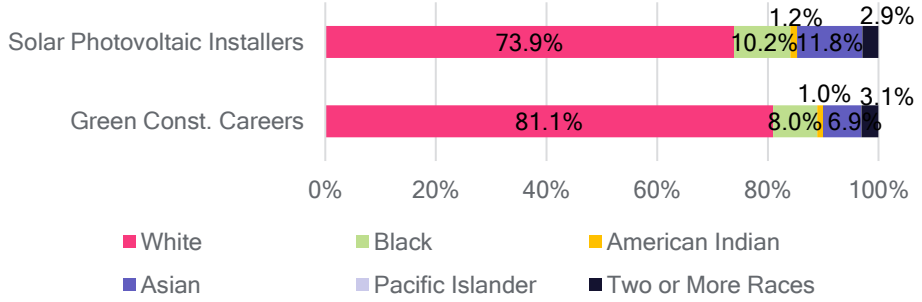
Local Workforce Educational Attainment, Age 25 - 64



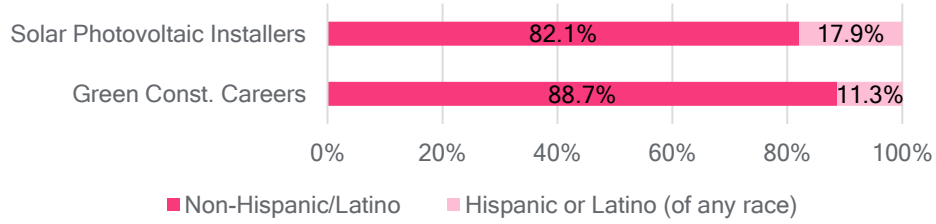
Local Workforce Age Gender



Local Workforce Race, All Ages



Local Workforce Ethnicity, All Ages



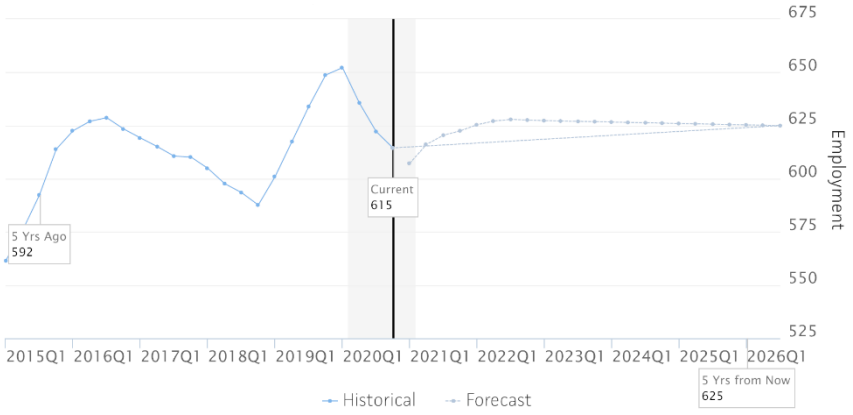
SOURCE: Occupation demographics by age, gender, race, and ethnicity are modeled by *Chmura* based upon employment by occupation (described above) at place of residence and zip-code level data from the **American Community Survey, 2015-2019**.

HEATING, AIR CONDITIONING, AND REFRIGERATION MECHANICS AND INSTALLERS (49-9021)

EMPLOYMENT FORECAST

Heating, Air Conditioning, and Refrigeration Mechanics, and Installers are forecast to have begun rebounding in the first quarter of 2021. Then employment growth is anticipated to remain relatively flat after the initial recovery, with 0.4% average annual growth overall for the next five years. Apprentices in this pathway would find their jobs through union halls, so job posts would likely not reflect the extent of employer demand.

Heating, Air Conditioning, and Refrigeration Mechanic and Installers Employment Forecast, COVID-19 Impacts, Ramsey County



Source: JobsEQ®,Data as of 2020Q4,The shaded areas of the graph represent national recessions.

Key Statistics	
2020Q4 Employment: 615	Location Quotient: 0.78
Ave. Entry-Level Wages: $44,600	Ave. Overall Wages: $68,400

Top MSP Metro Employers Advertising Openings for these Roles [31]
Total job postings: 448

1) Lennox International: 23 openings (+156%)
2) Daikin Applied: 21 openings (+50%)
3) McQuay International: 19 opening (+12%)
4) Ductworks Heating & Air Conditioning Ltd.: 17 openings (+31%)
5) Aireserv: 10 openings (+150%)

Top Skills by Volume Associated with this Career in Minnesota

1) HVAC (+1%)
2) Communication (+43%)
3) Installing (-11%)
4) Troubleshooting (-10%)
5) Customer Service (+6%)

Related Postsecondary Programs in Ramsey County

Century College Link

- HVAC Technology - AAS
- HVAC Technician -Diploma
- Cooling - Certificate
- Heating - Certificate

Pathway Requirements (Education or Licensing Requirements)

Steamfitter Pipefitters Local 455

- Nine-month Pipefitter Course Link
- Five-Year Apprenticeship Link
- No State licensing requirements
- Bond requirements for mechanical contractors Link

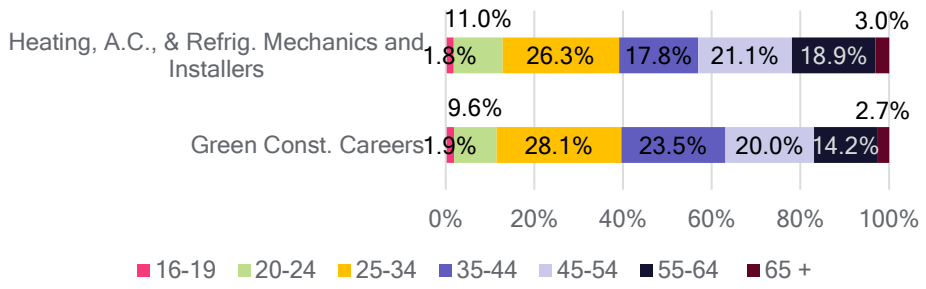
[31] TalentNeuron, New job posts, including staffing from 06/01/2020 to 5/31/2021.

HEATING, AIR CONDITIONING, AND REFRIGERATION MECHANICS AND INSTALLERS (49-9021)

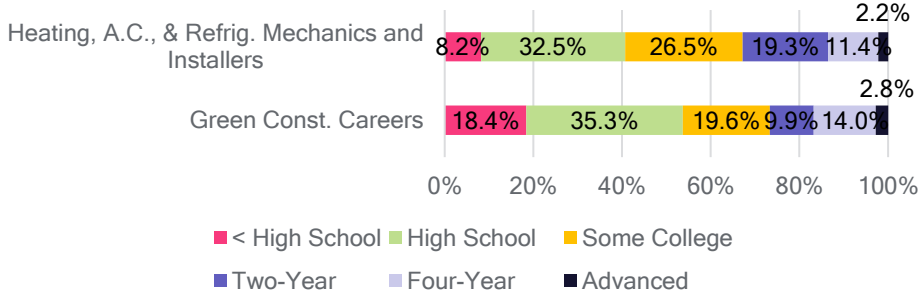
RAMSEY COUNTY WORKFORCE DEMOGRAPHICS

N = 404

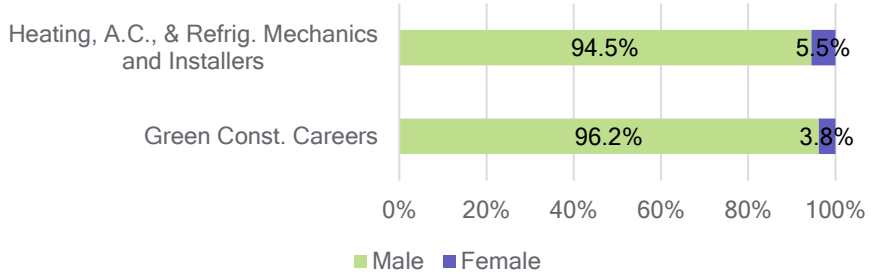
Local Workforce Age



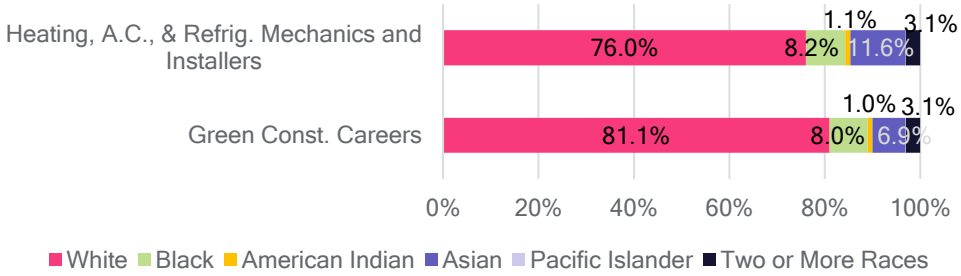
Local Workforce Educational Attainment, Age 25 - 64



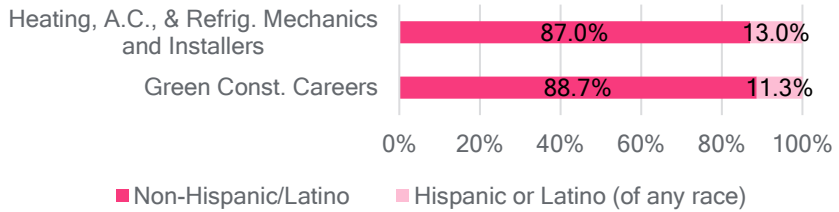
Local Workforce Age Gender



Local Workforce Race, All Ages



Local Workforce Ethnicity, All Ages



SOURCE: Occupation demographics by age, gender, race, and ethnicity are modeled by *Chmura* based upon employment by occupation (described above) at place of residence and zip-code level data from the **American Community Survey, 2015-2019**.

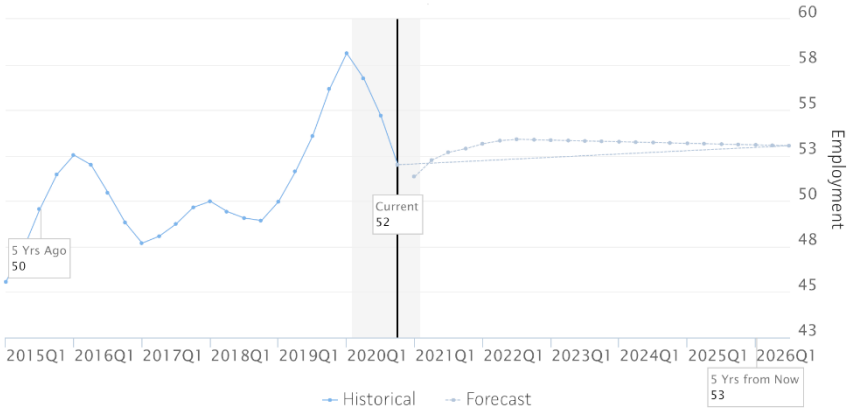
HEAT AND FROST INSULATORS

EMPLOYMENT FORECAST

Insulation is widely accepted as conserving energy, reducing emissions, and enhancing employee safety. Heat and Frost Insulators are forecast to have begun rebounding in the first quarter of 2021. Then employment growth is anticipated to remain relatively flat after the initial recovery, with 0.4% average annual growth overall for the next five years. Heat and Frost Insulators perform specialty trade, and all jobs come through the union hall; therefore, there will likely not be job posting data for commercial positions.

Key Statistics	
2020Q4 Employment: 52	Location Quotient: 0.88
Ave. Entry-Level Wages: $44,300	Ave. Overall Wages: $78,800

Insulation Workers, Mechanical Employment Forecast, COVID-19 Impacts, Ramsey County



Source: JobsEQ®,Data as of 2020Q4,The shaded areas of the graph represent national recessions.

Top MSP Metro Employers Advertising Openings for these Roles
Total job postings: 2
1) Express Employment Professionals: 2 openings (+100%)

Top Skills by Volume Associated with this Career in Minnesota
1) Insulation (0%)
2) Installing (-20%)
3) Utility Knives (+100%)
4) Standing (+100%)
5) Carpentry

Pathway Requirements (Education or Licensing Requirements)
International Association of Heating & Frost & Allied Workers Local Union #34, Apprenticeship, Link

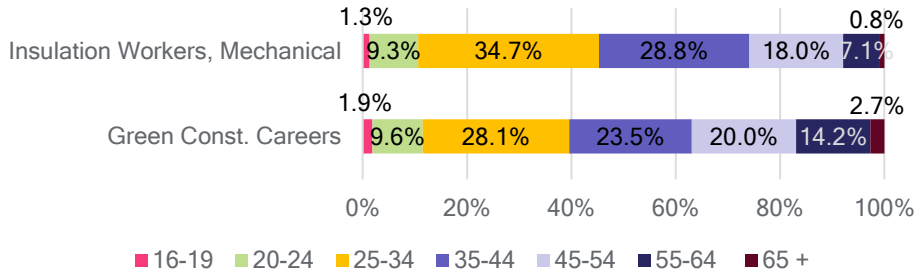
- Minimum of four-year apprenticeship (156 hours annually)
- 18 years of age or older, valid driver's license, OSHA 10 or 30 certificate

HEAT AND FROST INSULATORS

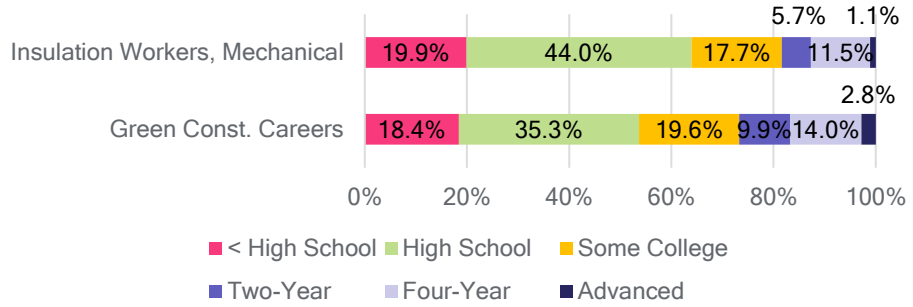
RAMSEY COUNTY WORKFORCE DEMOGRAPHICS

N = 88

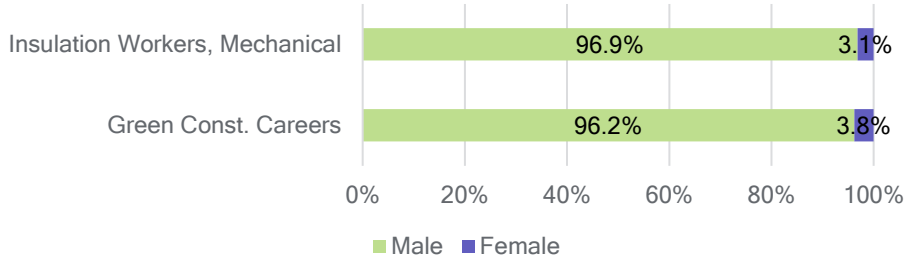
Local Workforce Age



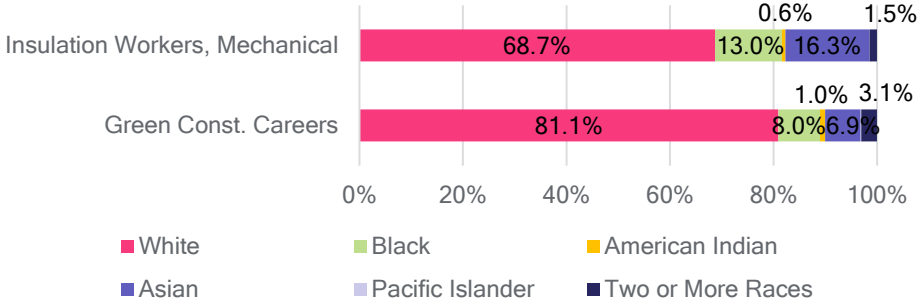
Local Workforce Educational Attainment, Age 25 - 64



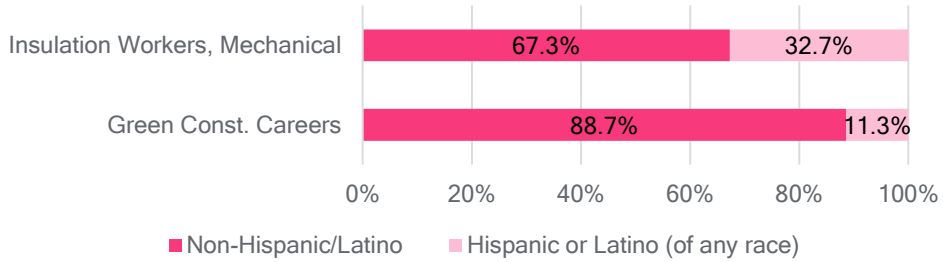
Local Workforce Age Gender



Local Workforce Race, All Ages



Local Workforce Ethnicity, All Ages



SOURCE: Occupation demographics by age, gender, race, and ethnicity are modeled by *Chmura* based upon employment by occupation (described above) at place of residence and zip-code level data from the **American Community Survey, 2015-2019**.

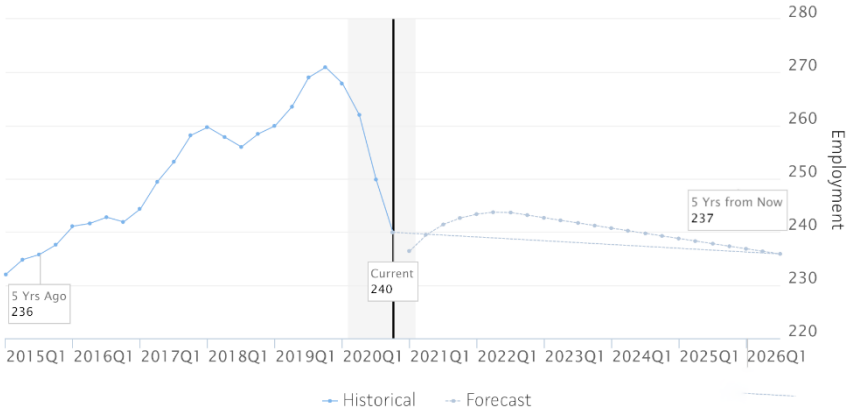
CEMENT MASONS AND CONCRETE FINISHERS

EMPLOYMENT FORECAST

With the increased use of green prefabrication methods, Cement Masons and Concrete Finishers may never go to a construction site, which increases worker safety. Like the forecast for all Green Construction employment in Ramsey County, employment in this pathway is forecast to have rebounded by the first quarter of 2021. Employment in this pathway is anticipated to decline after the initial recovery, with -0.2% average annual growth overall for the next five years. As an unlicensed trade, Cement Masons and Concrete Finishers could be hired by a company, so job postings data would reflect an actual volume.

Key Statistics	
2020Q4 Employment: 240	Location Quotient: 0.56
Ave. Entry-Level Wages: $45,200	Ave. Overall Wages: $61,500

Cement Masons and Concrete Finishers Employment Forecast, COVID-19 Impacts, Ramsey County



Source: JobsEQ®,Data as of 2020Q4,The shaded areas of the graph represent national recessions.

Top MSP Metro Employers Advertising Openings for these Roles [32]
Total job postings: 47

1) Cornerstone Custom Construction, Inc.: 2 openings
2) Truseal America LLC: 2 openings
3) Hollenback & Nelson, Inc.: 2 openings (-60%)
4) Ryan Companies US, Inc.: 1 opening
5) M.A. Mortenson: 1 opening

Top Skills by Volume Associated with this Career in Minnesota

1) Trowels (-17%)
2) Power Tools (+32%)
3) Dependability (-18%)
4) Hand tools (-36%)
5) Self Motivated (-43%)

Related Postsecondary Programs in Ramsey County

Century College Link (*not required for position*)

- Facilities Maintenance Engineer, AAS
- Facilities Maintenance Engineer, Certificate
- Facilities Maintenance Engineer, Diploma

Related Workforce Training Programs in Ramsey County

- Local 633 partners with MnDOT, DEED, and a community-based organization to provide short-term trainings.

Pathway Requirements (Education or Licensing Requirements)

Local 633 JATC Training Center Apprenticeship Link

- Three-year Apprenticeship, 6,000 hours of on-the-job training, and at least 144 hours per year of related training outside normal working hours

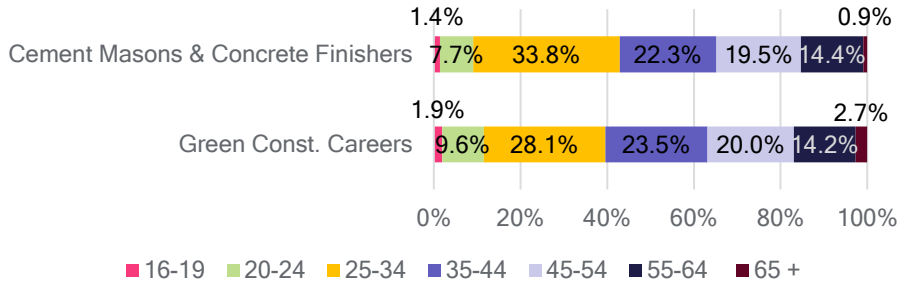
[32] TalentNeuron, New job posts, including staffing from 06/01/2020 to 5/31/2021.

CEMENT MASONS

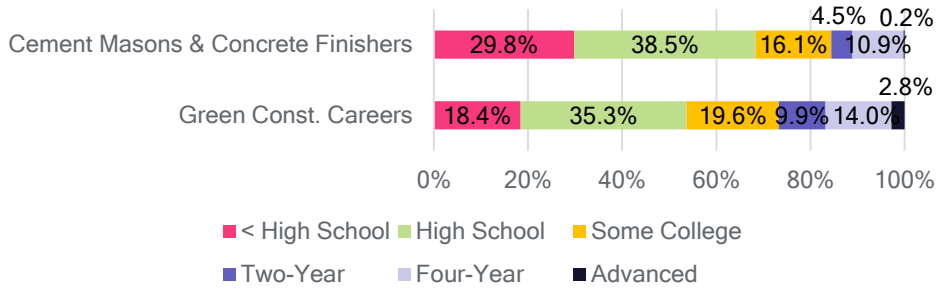
RAMSEY COUNTY WORKFORCE DEMOGRAPHICS

N = 457

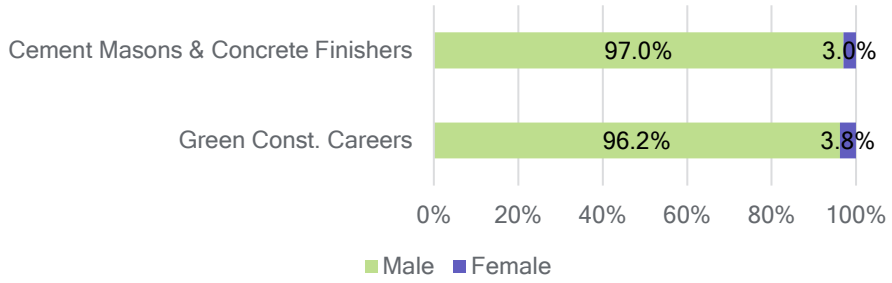
Local Workforce Age



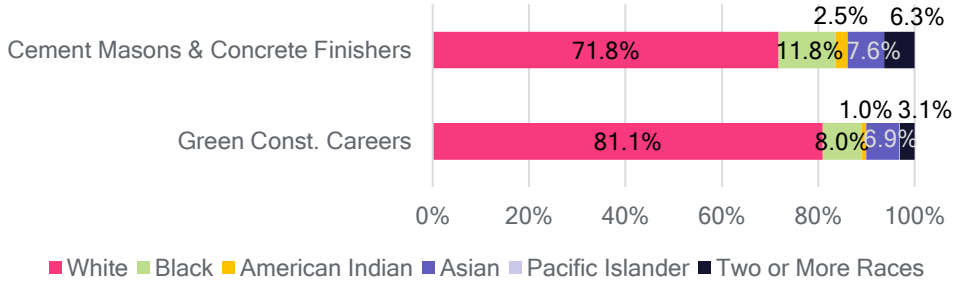
Local Workforce Educational Attainment, Age 25 - 64



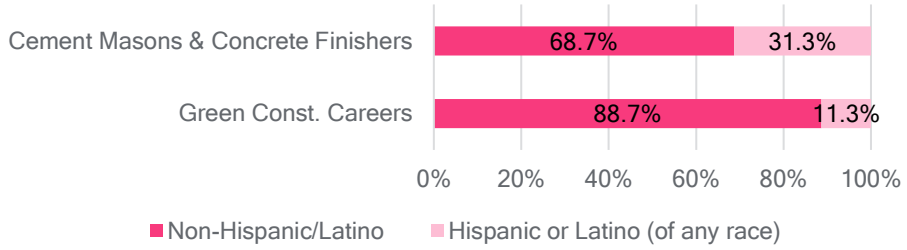
Local Workforce Age Gender



Local Workforce Race, All Ages



Local Workforce Ethnicity, All Ages



SOURCE: Occupation demographics by age, gender, race, and ethnicity are modeled by *Chmura* based upon employment by occupation (described above) at place of residence and zip-code level data from the **American Community Survey, 2015-2019**.

Employer Demand for Green Construction Careers with Green-Enhanced Skills

In Ramsey County, Green Construction roles pay an average annual salary of $72,700 compared to $62,100 across all local employment. Overall, Green Construction positions in Ramsey County are forecast to grow by an average of 0.5% annually over the next five years, about 0.5 percentage points lower than the overall expected average employment growth in the community.

Fourteen out of the sixteen Green Construction occupations analyzed in this report require a high school diploma or less for typical entry-level education requirements. These education requirements and options for on-the-job training may allow for ease of entry into these occupations.

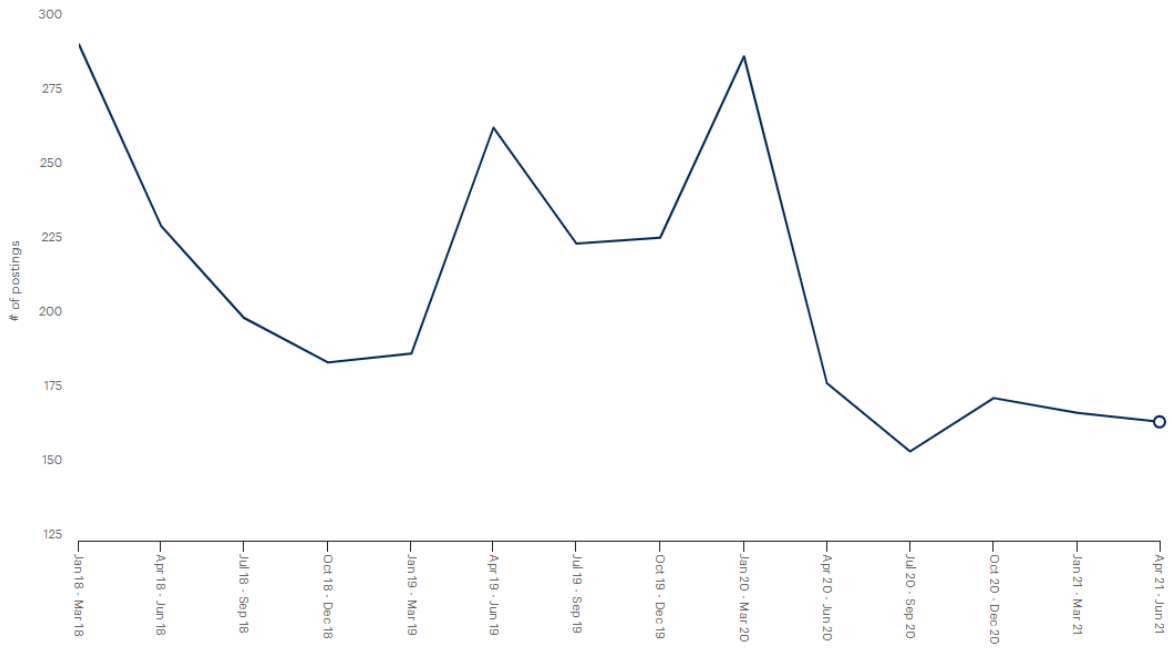
Wages, Forecast, and Experience Requirements of Green Construction Occupations and Place of Residence in Ramsey County, 2020Q4

SOC	Occupation	Avg Ann Wages	Forecast Ann Growth	Typical Entry-Level Education	Previous Work Experience	Typical On-the-Job Training
11-9021	Construction Managers	$101,900	1.0%	Bachelor's degree	None	Moderate-term on-the-job training
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	$83,500	0.4%	High school diploma or equivalent	5 years or more	None
47-2011	Boilermakers	$85,800	-0.1%	High school diploma or equivalent	None	Apprenticeship
47-2031	Carpenters	$59,900	0.3%	High school diploma or equivalent	None	Apprenticeship
47-2051	Cement Masons and Concrete Finishers	$61,500	-0.2%	None	None	Moderate-term on-the-job training
47-2061	Construction Laborers	$61,500	0.6%	None	None	Short-term on-the-job training
47-2073	Operating Engineers and Other Construction Equipment Operators	$81,000	0.2%	High school diploma or equivalent	None	Moderate-term on-the-job training
47-2111	Electricians	$75,400	0.8%	High school diploma or equivalent	None	Apprenticeship
47-2131	Insulation Workers, Floor, Ceiling, and Wall	$52,200	0.4%	None	None	Short-term on-the-job training
47-2152	Plumbers, Pipefitters, and Steamfitters	$83,700	0.4%	High school diploma or equivalent	None	Apprenticeship
47-2181	Roofers	$62,600	0.1%	None	None	Moderate-term on-the-job training
47-2211	Sheet Metal Workers	$72,400	0.1%	High school diploma or equivalent	None	Apprenticeship
47-2221	Structural Iron and Steel Workers	$64,500	0.5%	High school diploma or equivalent	None	Apprenticeship
47-2231	Solar Photovoltaic Installers	$60,500	4.5%	High school diploma or equivalent	None	Moderate-term on-the-job training
47-3012	Helpers--Carpenters	$39,200	0.5%	None	None	Short-term on-the-job training
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	$68,400	0.4%	Postsecondary non-degree award	None	Long-term on-the-job training
	Green Construction All	$72,700	0.5%	n/a	n/a	n/a
	Total - All Occupations	**$62,100**	**1.0%**	**n/a**	**n/a**	**n/a**

Online job posting data can reveal a lot about employer demand for certain skills, certifications, qualifications, and occupational competencies. There is rich data available by city, county, and even by a specific employer. Data in this section focuses on Green Construction jobs newly advertised between June 1, 2020, and May 31, 2021, across Ramsey County. All data in this section comes from Gartner TalentNeuron. Overall, there were 726 new Green Construction jobs advertised in Ramsey County during this period.

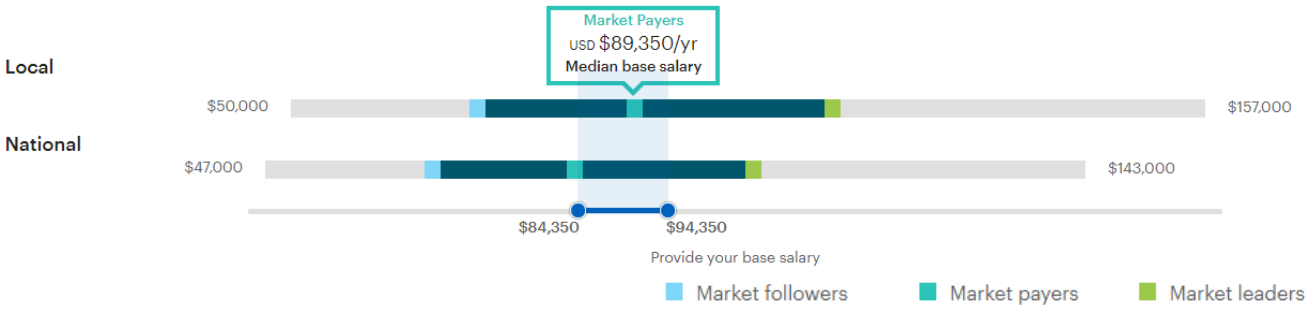
Amidst government stay home orders, new job postings for Green Construction occupations decreased to 36 postings in April 2020, a drop of about 55% from the prior year. With the pandemic's significant impacts on construction project delays and cancellations, Green Construction careers started to rebound by the fourth quarter of 2020 and has not yet suppressed hiring volumes of previous quarters of the prior year. Across the entire year, job postings in Green Construction were only about 12% lower in 2020 compared to 2019 in Ramsey County.

New Green Construction Job Postings Advertised in Ramsey County, 2018 - 2021.

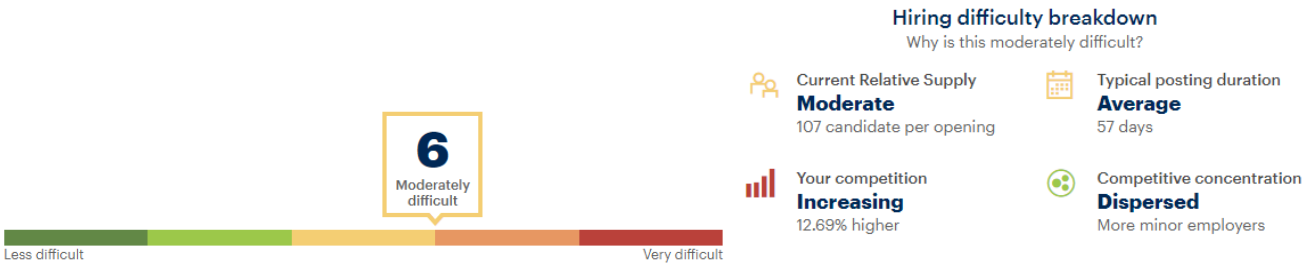


The estimated median base salary candidates see for Green Construction positions is $89,350, about $5,000 higher than what candidates see nationally, as shown on the charts on the following page. Based on local recruitment patterns and an estimated regional potential candidate pool, the supply-demand ratio below measures the difficulty of finding and hiring talent in these occupations locally. Locally, this ratio is about 107 trained or experienced candidates per current Green Construction opening, which rated as moderate hiring difficulty. According to an analysis of candidate pool volumes and job posting data, the MSP Metro and Rochester area counties struggle more than Greater Minnesota in recruitment and hiring.

Estimated Median Wages Offered Across Green Construction Job Postings Advertised in Ramsey County, June 2021

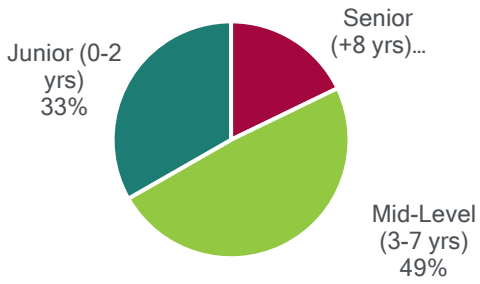


Hiring Difficulty for Green Construction Talent, June 2021



New job ads requesting junior experience level (0 - 2 years) represent 33% of all new jobs posted and saw the largest decline in demand, decreasing 36% from the prior year. Mid-level experience level (3 to 7 years) job postings for Green Construction roles had the highest volume of new job ads, representing 49% of new job ads within these occupations. Jobs requiring the most advanced experience (8+ years) account for 18% of new job ads.

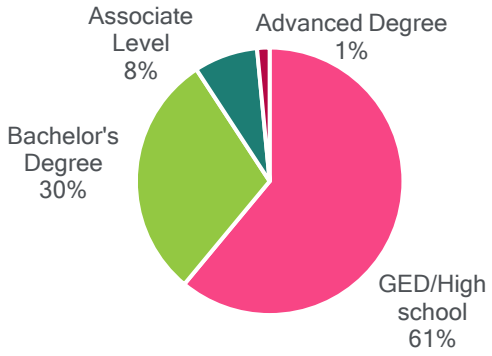
Percent of Job Postings by Experience Level, June 1, 2020, to May 31, 2021



Green Construction Careers	# Job Posts (% change prior year)
Junior (0 - 2 years exp.)	196 (-36%)
Mid-level (3 -7 years exp.)	288 (-18%)
Senior (8+ years exp)	105 (-20%)
All Experience Levels	**726 (-23%)**

The largest volume of Green Construction job postings by education level are those that require a GED or High School Diploma, representing 61% of new job ads between June 1, 2020, and May 31, 2021. While the 35.3% of Green Construction talent employed in Ramsey County as of 2020Q4 have a GED or High School Diploma and 18.4 % have less than a High School diploma, 61% of job postings require a high school diploma or less. In addition, about 31% of Green Construction jobs posted during the same period required a Bachelor's degree or higher; however, only about 17% of Green Construction employees hold a Bachelor's degree or higher. The existing workforce having lower educational attainment than posted requirements may suggest Employers have a growing need for higher education. Employers may also be inflating their requested education level with the idea that there is a large pool of candidates due to increased unemployment.

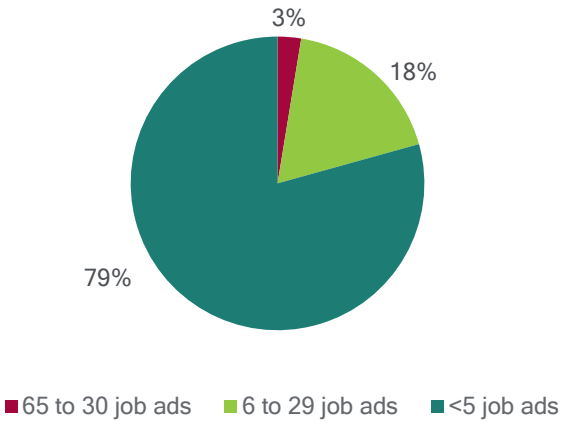
Percent of Job Postings by Required Education Level, June 1, 2020, to May 31, 2021.



Green Construction Careers	# Job Posts (% change prior year)
GED/High School Diploma	443 (-23%)
Associate Level	56 (-29%)
Bachelor's degree	216 (-20%)
Master's degree	11 (-21%)
All Edu Level	**726 (-23%)**

In Ramsey County, 116 employers posted 726 new Green Construction job ads between June 1, 2020, and May 31, 2021. Employers with less than five job ads account for the highest share of postings, with 79% of local Green Construction job ads. Employers with six to 29 jobs ads had the second-highest share of local Green Construction job ads with 18%. There are many possible explanations for the high percentage of employers with less than five job ads, including that the union pool meets the majority of local demand, employers may be still hesitant to hire after setbacks in 2020, or that many firms are small in size.

Top Employers by Volume of New Job Postings in Ramsey County, June 1, 2020, to May 31, 2021. N = 116



Top Employers by Volume of New Information Technology Job Postings in Ramsey County between June 1, 2020, to May 31, 2021, and Change from Prior Year

1. GPAC: 65 (+8%)
2. Tradesmen International: 39 (0.0%)
3. State of Minnesota: 32 (+60%)
4. Aerotek: 29 (+16%)
5. Goodmanson Construction: 13 (+333%)
6. Everlight Solar: 13 (+1200%)
7. Andersen Windows: 11 (-21%)
8. CDM Smith:11 (+10%)
9. All Energy Solar: 11 (+22%)
10. Black & Veatch: 10 (0%)

Communication (237), installing (178), and scheduling (176) are among the top skills by volume of Green Construction jobs advertised between June 1, 2020, to May 31, 2021, in Ramsey County. Seven out of the top ten Green Construction skills are not directly related to tech but are human or business enabler skills, such as Project Management and Supervision.

Top Hard and Soft Skills by Volume of New Green Construction Job Postings in Ramsey County between June 1, 2020, to May 31, 2021, Change from Prior Year

1. Communication: 237 (-1%)
2. Installing: 178 (-3%)
3. Scheduling: 176 (+19%)
4. Project Management: 167 (-8%)
5. Supervision: 114 (+14%)
6. Leadership: 106 (+10%)
7. Customer Service: 98 (+14%)
8. Monitoring: 96 (-4%)
9. Written Communication: 95 (-20%)
10. Troubleshooting: 94 (+24%)

The top required tech certifications by volume in all Ramsey County Green Construction job postings between June 1, 2020, to May 31, 2021, are Driver's License/Class D Driver's License (104), Occupation Safety & Health Administration Certification (15), and Class A Commercial Driver's License (17).

Top Certifications by Volume of New Job Postings in Ramsey County, June 2021[33]

1. Driver's License/Class D Driver's License: 104 job postings
2. Occupation Safety & Health Administration Certification: 15 job postings
3. Class A Commercial Driver's License: 17 job postings
4. HAZMAT: 8 job postings
5. EPA Certification: 6 job postings
6. Project Management Institute: 5 job postings
7. National Administrator Credential: 5 job postings

[33] Excluded from certificates: Good Clinical Practice and Certified Dietary Manager

Retooling and Reimagining Work
Youth and K-12 Education in Green Construction

As the demand for skilled Construction workers continues to grow, providing early exposure to the technological advancements in the field can build up the talent pipeline. There are various opportunities for youth inside and outside of the local K-12 education systems in the Construction field; however, these options are not available to all youth across Ramsey County. Below are the larger programs with significant offerings in Ramsey County.

Career and Technical Education (CTE) programs are integrated into the K-12 education systems locally and nationally. These programs are a sequence of courses that combines academic knowledge with technical and occupational knowledge and skills that follows a career pathway to postsecondary education and careers. The Engineering, Manufacturing, & Technology Career Field's Architecture and Construction Cluster includes construction career pathways highlighted in this report. CTE Consortia are led in partnership between secondary school districts supported by the Minnesota Department of Education and postsecondary partners supported by Minnesota State Colleges and Universities. Two consortia serve Ramsey County youth: The Saint Paul Consortium and the Northeast Metro Consortium.

The Saint Paul Consortium served 9,926 secondary students within St. Paul Public Schools during the 2019-2020 school year, per the Consortium's Performance report. About two-thirds (66%) of the consortium's high school CTE concentrators enrolled postsecondary for further education and career development.[34] Regarding Architecture and Construction Cluster, the Saint Paul consortium has ten approved courses in the Architecture and Construction Cluster, including construction systems, digital electronics, and woodworking.[35]

During the 2019-2020 school year, the Northeast Metro CTE Consortium served 23,612 secondary students within seventeen public school districts within and outside of Ramsey County.[36] Over two-thirds (68%) of the consortium's high school, CTE concentrators enrolled postsecondary for further education and career development.[37] The Northeast Metro Consortium has 82 approved courses in the Architecture and Construction Cluster in a range of topics, including woodworking, construction technology, electricity/electronics, carpentry, and cabinetmaking.[38]

[34] https://www.minnstate.edu/system/cte/perkins-consortia.html
[35] Program Approval Database, https://education.mn.gov/MDE/dse/cte/progApp/
[36] https://www.minnstate.edu/system/cte/documents/performance-indicators/Indicator-Performance_Northeast-Metro.pdf
[37] https://www.minnstate.edu/system/cte/documents/performance-indicators/Indicator-Performance_Northeast-Metro.pdf
[38] Program Approval Database, https://education.mn.gov/MDE/dse/cte/progApp/

Youth Training Programs

Youth skilled trades training programs in Ramsey County are available to middle school and high school students in safe hands-on controlled environments. The youth programs below have high standards for safety and conduct their programs in controlled settings that aim to eliminate or effectively control hazards and risks that are on active construction sites, consistent with requirements of Minnesota and federal child labor laws.[39] Many programs seek to increase the inclusion for youth by gender and within underrepresented communities while creating a pipeline to get young people into Construction careers.

Youth Construction Trainings, MSP Metro

Program	Description	Population Served
Construct Tomorrow	Construct Tomorrow provides experiences for youth through hands-on events that develop awareness of the variety of opportunities available in Building and Construction Trades.[40] Construct Tomorrow activities include: • Hosting engaging and informative events in tradeshow-like setting that provide hands-on activities in multiple trades in both rural and urban areas. • Pairing students with industry and union leaders, apprenticeship training coordinators and educators. • Providing follow-up services to those participants that express interest in construction trades.	Statewide with MSP Metro area training programs High School Students Ages 14 to 18+
Learn2Build	LEARN2BUILD is a summer experience for students in grades 4-9 combining the fun and games of Science, Technology, Engineering and Math (STEM) with exciting activities focused on the construction building trades industry. Kids work individually and in teams to learn about construction concepts and designs. Students build take-home projects replicating "real-world" construction materials and processes. The experience includes a combination of guest builders, team competitions, projects, and field trips. The goal is to educate students on opportunities for careers in the construction industry in a fun, hands-on environment.[41] Girl Power! focuses on youth identifying as female who want to learn more about construction building.	MSP Metro Grades 4 to 9 Ages 10 to 14
Minnesota Trades Academy Internships	The MN Trades Academy (MTA) is a paid summer construction internship experience for selected Twin Cities area high school youth. The goal is to help youth prepare for adulthood through life-long learning, skill development, and access to good jobs with good benefits in the construction industry. MTA aspires to provide rich, educational, hands-on experiences for participants that help youth learn about construction as a career choice. To achieve this, the Minnesota Trades Academy offers two tracks:[42] **Track I Introduction:** An intern receives an overarching six-week introduction to construction career opportunities within the building trades industry, such as carpentry, pipefitting and electrical. Interns are also exposed to industry-related careers such as architecture, surveying, estimating, project management, and design build. **Track II Advanced** This opportunity prepares interns to select a construction career path – union apprenticeship training; construction-related post-secondary tracts; or direct entry into the construction workplace, if desired. Over a nine-week period, interns visit up to 16 different apprenticeship training centers where they receive training and supervision from industry experts as they complete projects using both hand and power tools.	MSP Metro Track I: Ages 16 to 18. Track II: Ages 16 to 21

[39] Department of Labor and Industry, Ensuring the safety of youth in skilled trades training programs (Report), January 15, 2020
[40] Department of Labor and Industry, Ensuring the safety of youth in skilled trades training programs (Report), January 15, 2020
[41] https://constructioncareers.org/programs/
[42] https://constructioncareers.org/programs/

Youth Construction Trainings, MSP Metro

Program	Description	Population Served
Construction Apprenticeship Preparation (CAP)	This is high school based construction hands-on learning, paired with the Multi-Craft Core Curriculum (MC3), an apprenticeship-readiness training curriculum (created by Building Trades National Apprenticeship and Training Committee of the Building Trades Council in 2008). One chapter in MC3 is called Construction Health and Safety. Hands-on activities include welding, plumbing and carpentry. Exposure includes guest speakers and field trips. The goal of CAP schools is to increase industry awareness and prepare students for apprenticeship. MSP Metro area high schools include White Bear Lake Public Schools, Eagan High Schools, and Roosevelt High School. [43]	MSP Metro programs Ages 14 to 18+
Youthbuild	The Youthbuild Program provides specialized training for youth and young adults between the ages of 16 and 24 who are at risk for not completing their high school education. Participants are trained in construction, career and work readiness, leadership, and basic academic skills. They also receive mentoring, comprehensive safety training, and construction work experience.[44] MSP Metro Youthbuild Service Providers: [45] • The Change, Inc. (formerly Guadalupe Alternative Programs) – St. Paul Westside • City Academy - St. Paul Eastside • Tree Trust - North Minneapolis • Southwest Metro Intermediate District 288- Chaska	MSP Metro Programs Ages 16 to 24 Target participants: • High school dropouts and potential dropouts • Youth at risk of involvement with the criminal justice system • Youth with basic skill deficiencies • Homeless and foster care youth • Teen parents • Immigrants and youth with limited English proficiency

[43] https://constructioncareers.org/programs/
[44] https://mn.gov/deed/programs-services/office-youth-development/youth-programs/youthbuild.jsp
[45] https://mn.gov/deed/programs-services/office-youth-development/youth-programs/youthbuild.jsp

Postsecondary Education in Green Construction

In this report, we have reviewed specific employer demand for Construction and Green Construction talent. As previously stated, existing Construction talent often holds lower educational attainment than posted requirements. However, not reflected in postsecondary data is that all Construction trades require a two-to-five-year apprentice education including evening and weekend school as well as continued education to learn the latest technologies and requirements for quality.[46]

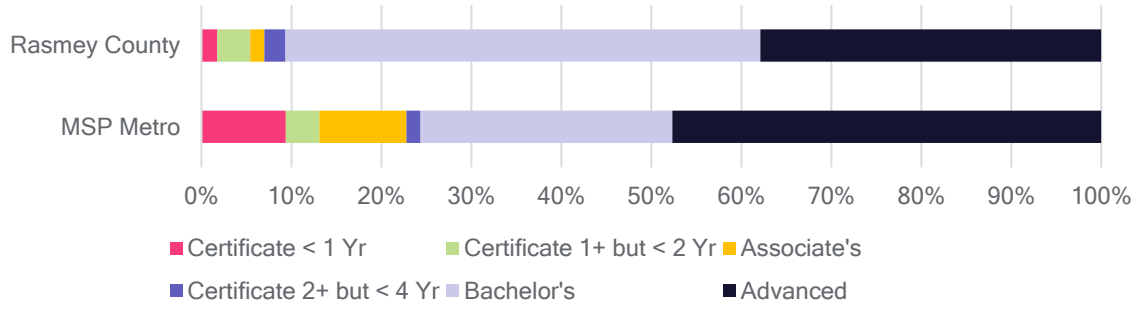
This section begins with the current postsecondary regional degree awards, followed by apprenticeships opportunities and data, and, finally, community-based training opportunities.

REGIONAL AWARDS

Graduate award data in this report are reported at the local and regional levels for two main reasons. First, postsecondary students are mobile and may not live or work in the same region where they receive an education. The other reason is that postsecondary institutions with multiple sites may report all their data through one specified site independent of geography.[47] The National Center for Education Statistics provides the program-to-occupation correspondence for these data, which does not include apprenticeship programs. In addition, the counts below represent awards and not students. As a result, if a student has a double major, both awards will be counted in the data set.

Postsecondary institutions in the MSP Metro conferred about 5,974 academic awards in programs corresponding to Green Construction occupations in the Academic Year 2018-2019. Institutions in Ramsey County conferred about 25% or 1,476 of those awards. Bachelor's degrees were the most common awards conferred in Ramsey County Green Construction programs. A higher share of awards conferred in Ramsey County institutions are for Business Administration and Management, General, corresponding to Construction Managers Roles, accounting for 89% of all local Green Construction awards.

Green Construction Awards by Institution, Ramsey County and MSP Metro, Academic Year 2018-2019



Source: JobsEQ®, Data as of the 2018-2019 academic year, related occupation data as of 2020Q4.

[46] John O'Phelan, Reinventing Our Construction Workforce Through Technology Advancements, December 2017.
[47] JobsEQ, https://help.eqsuite.com/analytics/awards/

Green Construction Awards by Institution, Ramsey County and MSP Metro, Academic Year 2018-2019

	Certificate < 1 Yr	Certificate 1+ but < 2 Yr	Associate's	Certificate 2+ but < 4 Yr	Bachelor's	Advanced	Total Awards
Business Administration and Management, General	26	0	18	0	713	559	1,316
Operations Management and Supervision	0	0	0	0	66	0	66
Electrician	0	4	0	35	0	0	39
Sheet Metal Technology/Sheetworking	0	21	1	0	0	0	22
Pipefitting/Pipefitter and Sprinkler Fitter	0	14	0	0	0	0	14
Carpentry/Carpenter	0	10	0	0	0	0	10
Plumbing Technology/Plumber	0	5	0	0	0	0	5
Business/Commerce, General	0	0	4	0	0	0	4
Ramsey County	**26**	**54**	**23**	**35**	**779**	**559**	**1,476**
MSP Metro	**559**	**225**	**576**	**95**	**1,672**	**2,847**	**5,974**

Source: JobsEQ®, Data as of the 2018-2019 academic year, related occupation data as of 2020Q4.

In the Academic Year 2018-2019, Summit Academy conferred the most Green Construction awards in the MSP Metro with 251 awards; all certificates that take less than one year to complete.

Construction Trades Awards by Institution (CIP 46), MSP Metro, Academic Year 2018-2019

Title	Cert. < 1 Yr	Cert. 1+ but < 2 Yr	Associate's	Certif. 2+ but < 4 Yr	Bachelor's	Advanced	Total Awards	Avg Net Price[1]
Summit Academy Opportunities Industrialization Center	251	0	0	0	0	0	251	$9,493
Dakota County Technical College	0	21	52	6	0	0	79	$10,993
Saint Paul College	0	33	0	35	0	0	68	$11,973
Dunwoody College of Technology	0	0	56	0	0	0	56	$21,797
Hennepin Technical College	18	33	2	0	0	0	53	$12,675
Anoka Technical College	5	0	0	44	0	0	49	$12,368
North Hennepin Community College	25	0	0	0	0	0	25	$10,189
Century College	0	7	10	0	0	0	17	$10,600
University of Minnesota-Twin Cities	1	0	0	0	0	0	1	$16,691
Total	**300**	**94**	**120**	**85**	**0**	**0**	**599**	**n/a**

Source: JobsEQ®
Data as of the 2018-2019 academic year unless noted otherwise; related occupation data as of 2020Q4.
Note: Figures may not sum due to rounding.
1. Data as of the 2017-2018 academic year
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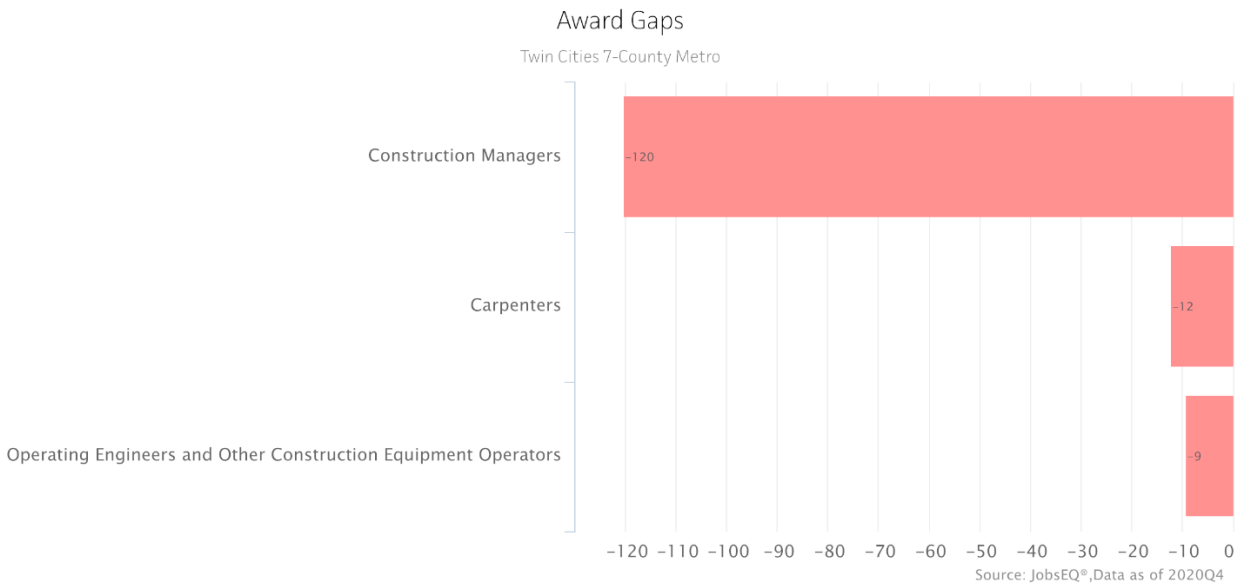
AWARD GAPS

Despite a large share of awards conferred in Ramsey County institutions correspond to Construction Managers Roles, the largest award gap is for Construction Managers.



APPRENTICESHIPS

Apprenticeships are "the Gateway to most construction building trades careers," according to Constructioncareers.org.[48] Apprenticeships are a job preparation model that allows trainees to learn and earn. Per the Minnesota Department of Labor and Industry, trainees' wages progressively increase as they master job-specific skills through a combination of on-the-job training and classroom instruction.[49] Apprenticeships are partnerships with the union and the employer;[50] trainees apply directly to the employer's personnel or hiring office. Employers benefit from this model as it allows them to develop and apply industry standards directly to training programs, enhancing adaptability, increasing productivity, and the quality of the workforce.[51]

Minnesota ranks 15th in the nation for the volume of active apprentices, with 11,715 active apprentices during the 2020 fiscal year.[52] As of 2019, 96% of all 11,500 active apprentices in Minnesota were training for careers in the skilled construction trades.[53] Minnesota Department of Labor and Industry charts on the following page show apprentice registration generally trended upward from 2009 to 2019 and decreased dramatically in 2020 during the COVID-19 pandemic (see below). Apprentice participation of persons of color, women, and veteran participants follow a similar upward trend from 2009 to 2019, followed by a slight decrease in 2020 and 2021. Apprentice completions show a different trend. Completions declined from 2009 to 2014 and then increased from 2015 to 2019, before declining in 2020. Completion data disaggregated by race, gender, and veteran status is not currently available. Disaggregated apprentice completion data would be a valuable tool for further research into racial equity and gender parity and could inform apprentice programs' recruitment, persistence, retention strategies.

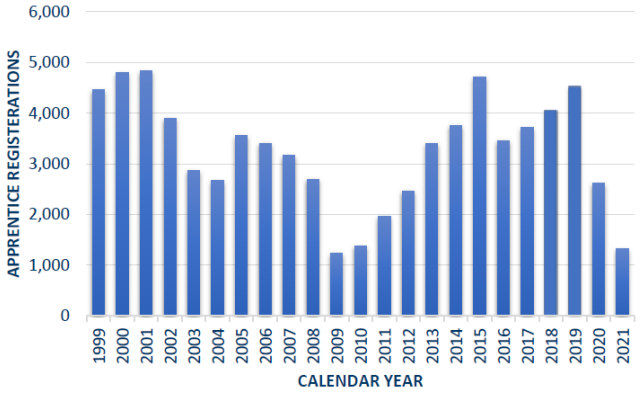
Apprentice programs in Ramsey County, any career path, vary in time and skill requirements based on the trade. The full apprenticeship structure in Minnesota can be found on the Construction Careers Foundation's apprenticeship webpage and page ten of this report. Below are the registered apprenticeship employers and training programs in Ramsey County per the Department of Labor and Industry directory.[54]

[48] https://constructioncareers.org/apprenticeship/
[49] https://www.dli.mn.gov/business/workforce/be-apprentice
[50] https://constructioncareers.org/apprenticeship/
[51] https://www.training633.org/
[52] https://www.dol.gov/agencies/eta/apprenticeship/about/statistics/2020
[53] https://faircontracting.org/wp-content/uploads/2019/09/mepi-uiuc-impact-of-apprenticeships-programs-in-minnesota.pdf
[54] https://secure.doli.state.mn.us/apprenticeshipsponsor/

APPRENTICESHIP MINNESOTA

Apprentice registrations

Calendar year

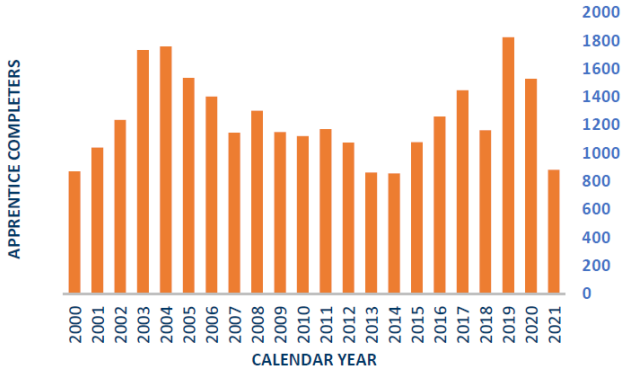


1,317
Registrations
01/2021 – 06/2021

APPRENTICESHIP MINNESOTA

Apprentice completions

Calendar year

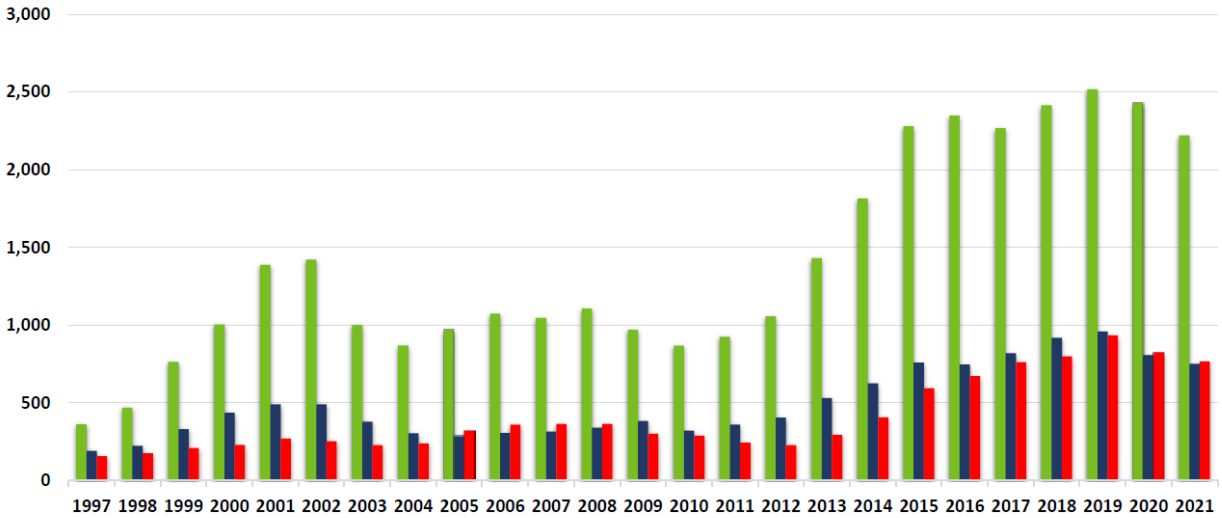


882
Completions
01/2021 – 06/2021

APPRENTICESHIP MINNESOTA

Apprentice participation demographic trends

Calendar year



PEOPLE OF COLOR
2,220 (20.4 %)

WOMEN
750 (6.9%)

VETERAN
767 (7.0%)

DEPARTMENT OF LABOR AND INDUSTRY

Ramsey County Building Trades Registered Apprenticeship Employers and Training Programs[55]

Employer/Sponsor	Location	Occupation	Program Details	Requirements
Elevator Constructors Local 9 JATC	433 Little Canada Rd. East, St. Paul MN 55117	Elevator Constructor	• An average of two to four years training (4,000 to 8,000 hours requires formal training at JATC)	• Must be at least 18 years old. • H.S. diploma or GED required. • Driver's license • Reliable transportation
Finishing Trades Institute Upper Midwest	Finishing Trades Institute Upper Midwest 3205 Country Dr., #150, St. Paul MN 55117	Drywall Finisher Painter & Decorator Drywall Finisher 3 Glassworker Glazier Painters Construction and Maintenance Sign Tech	• An average of three (3) years of training • An average of 432 Related Training hours • At least 6,000 On-the-Job Training Hours	• Must be at least 18 years old • H.S. diploma or GED required. • Physically capable of performing the essential functions. • Legal Citizen of the USA or Legal Alien authorized to work in the USA. • Ability and aptitude to master the rudiments of the trade, based upon oral interview (if requested), written documentation submitted by applicant, and evaluation ratings. • Reliable transportation
Lakes & Plains Regional Training Committee	Carpenters Training Institute 740 Olive Street St. Paul, MN 55130	Carpenter	• 7,000 hours of on-the-job training (OJT) and 640 hours of classroom learning. • Apprentices will be evaluated through demonstrations of skill and technique, and standard knowledge exams.	• Must be at least 17 years old. • H.S. diploma or GED required. • In good health
Millwright & Machinery Erectors JATC		Millwright	• 7,000 hours of on-the-job training (OJT) and 800 hours of classroom learning.	• Must be at least 17 years old. • H.S. diploma or GED required. • In good health
Metro Sheet Metal JATC	3554 White Bear Ave., White Bear Lake, MN¸55110	Sheet Metal Worker	• 8,000 hours (approximately 4 years) of on-the-job training and • 180 hours of related instruction each year. • There is a probationary period of not more than 500-hours. During this period, the JATC Committee, upon request of either party, will annul the apprenticeship agreement.	• Must be 18 years of age or older. • Must be a high school graduate or GED. • Must possess the physical ability to perform the duties of the craft.

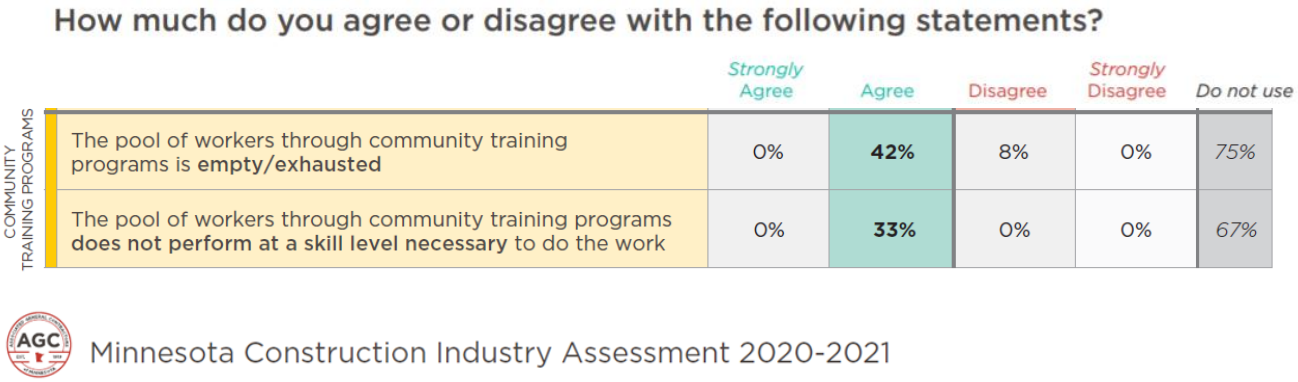
[55] https://secure.doli.state.mn.us/apprenticeshipsponsor/

COMMUNITY-BASED TRAINING PROGRAMS

The majority of the community-based training programs in Ramsey County and the MSP metro, identified during this project and listed in the table below, seek to address some of the barriers that underrepresented communities face when starting or switching to a career in Construction. Community-based training programs, like the partnership between Roseville Adult Learning Center and Karen Organization of Minnesota's Apprentice and Manufacturing Ready Course, train participants in a construction trade and assist them in working towards a GED. Participants in the Goodwill Easter Seals' Construction Training can earn college credit as well as an OSHA certificate. Many community-based programs below, such as Goodwill Easter Seals, Building Strong Communities, and Merrick Community Services, have relationships with local trades unions.

In the AGC Minnesota Construction Industry Assessment, 2020-2021, 68% of union employers and 92% of non-union contractors stated they do not use community training programs to hire workers.[56] In addition, perceptions regarding the performance of community-based trainees are that they do not perform at the skill level necessary to complete work. [57]

These perceptions need to be addressed as community-based training programs are essential to increasing the participation of women, new immigrants, and persons of color in the construction trades.



How much do you agree or disagree with the following statements?

		Strongly Agree	Agree	Disagree	Strongly Disagree	Do not use
COMMUNITY TRAINING PROGRAMS	The pool of workers through community training programs is **empty/exhausted**	0%	**42%**	8%	0%	*75%*
	The pool of workers through community training programs **does not perform at a skill level necessary** to do the work	0%	**33%**	0%	0%	*67%*

AGC Minnesota Construction Industry Assessment 2020-2021

[56] Associated General Contractors of Minnesota, Minnesota Construction Industry Assessment, 2020 – 2021, https://agcmn-c5.s3.us-east-2.amazonaws.com/6116/0706/2722/2020_AGC_Minnesota_Construction_Industry_Assessment-web.pdf

[57] Associated General Contractors of Minnesota, Minnesota Construction Industry Assessment, 2020 – 2021, https://agcmn-c5.s3.us-east-2.amazonaws.com/6116/0706/2722/2020_AGC_Minnesota_Construction_Industry_Assessment-web.pdf

Community-Based Training Programs, MSP Metro

Organization/Program	Location	Program Description	Requirements	Population Served
The MnDOT and Minnesota Department of Employment and Economic Development (DEED) Reconstruction Training and Placement (RTP)	Ramsey County	The program is offered to prepare qualified candidates for employment on highway construction projects. This program includes support and job retention services for program participants and graduates, which may include help with purchasing basic tools, work clothing, emergency job transition and specific expenses associated with job retention. Job search resources are also available to program participants and graduates.	• Current and valid Minnesota driver's license. If you own a car, you must maintain insurance coverage and be able to provide proof of insurance. • High School Diploma or GED • Ability to perform strenuous work activities. • Ability to speak and understand English. • Basic Math Skills • Have an email account and telephone • National Career Readiness Certification (NCRC) with minimum score of level 4, Silver Certificate on the three-part NCRC test.	Program participation is limited to minority and/ or female job seekers. Veterans meeting program eligibility requirements are strongly encouraged to apply.
Community-based Training Programs Summit Academy OIC	MSP Metro	Summit Academy OIC offers training in the following areas: Pre-apprentice Construction, Residential Carpentry, Construction GED Training Program (includes GED prep and pre-construction training), Electrician, Heavy Equipment Operator and Women Wear Hard Hats Too. Construction programs are 20 weeks long. No out-of-pocket costs for tuition.	• Passing score on Accuplacer entrance exam • High School Diploma or GED (Summit Academy OIC also offers a GED program)	All adults that meet the requirements.
Goodwill Easter Seals Construction Training in Partnership with Hubbs Center/ Saint Public Schools	Ramsey County	12-week course designed to provide job skills for a career in residential and commercial construction and job placement assistance. Career paths include, Carpenters, Commercial Roofers, Ironworkers, Laborers, Plumbing, Electrical, HVAC, Siding and Window Installers. Training available at no cost. Goodwill-Easter Seals Minnesota has a training articulation agreement with Saint Paul College. Students who successfully complete the Construction Program at Goodwill-Easter Seals can bypass the first term of Saint Paul College's Carpentry Diploma program and start in Semester 2.	• 18 years of age or older • Complete academic assessments • Physically able to complete construction tasks. • Obtain Driver's License or permit by end of training. • Able to work in the U.S. • Consistent access to internet, and reliable device to access online classes.	All adults that meet the requirements. Women are encouraged to apply
Construction Training Course at Hubbs Center	Ramsey County	In partnership with Goodwill EasterSeals, students are given hands-on training in Forklift, Flagging, and OSHA 10. Plus, students will build Math, Reading and job readiness skills needed on the job.	• 12-week commitment • High School Diploma or GED • Valid Driver's License • Pass a drug test • TABE 11/12 M Reading Test score of 442+, TABE 11/12 M Math 449+ • Ability to bend, squat, and climb ladders • Ability to work in harsh climates/conditions	All adults that meet the requirements.

Community-Based Training Programs, MSP Metro (Continued)

Organization/Program	Location	Program Description	Requirements	Population Served
St. Paul YWCA	Ramsey County	YWCA offers a Commercial Driver's License (CDL) training program. After successfully completing the training, participants are qualified for road construction and heavy highway projects.	• Minimum age 21 • Must have valid Minnesota driver's license for at least 2 years. • No more than 1 moving violation in past 3 years. • Must complete a drug screen, background and driving history check. • Must have birth certificate or proof of citizenship and social security card. • Must take a reading and math assessment test and go through an interview.	All adults that meet the requirements.
Merrick Community Services	Ramsey County	Merrick offers basic training for those looking for laborer work on construction jobsites including OSHA 30 training, flagging, rigging, first aide, CPR forklift, scissor lift and boom lift.	• None listed	Women are encouraged to apply.
Helmets to Hardhats	Nationwide	Helmets to Hardhats is a national program designed to help military service members successfully transition back into civilian life by offering them the means to secure a quality career in the construction industry. Most career opportunities offered by the program are connected to federally approved apprenticeship training programs. Such training is provided by the trade organizations themselves at no cost to the veteran. No prior experience is needed.	• Veterans with the following discharge types: Active, Honorable, General under Honorable, Officer Discharge, Medical, Current Reserve/National Guard.	Military service members
Building Strong Communities	MSP Metro	The Building Strong Communities Program is an apprenticeship preparatory program that prepares adults and high school graduates for careers in the construction industry. This program offers graduates the opportunity to gain real experience and exposure with Union trades and contractors.	• Be at least 18 years old. • Earned a high school diploma / GED / or equivalent. • Ability to pass a drug screen. • Possess a valid driver's license and reliable transportation. • NOT currently enrolled in a construction union or construction trade training program. • Must attend a Building Strong Communities Program Information Session. • Legally able to work in the U.S.	All adults that meet the requirements.

Community-Based Training Programs, MSP Metro (Continued)

Organization/Program	Location	Program Description	Requirements	Population Served
Takoda Warehouse/Equipment Operator	MSP Metro	A three-week training program where participants learn the skills and tools needed to work in these in-demand, essential jobs. Training and career coaching is provided at no-cost to students. Certification-based classroom & hands-on training is provided in: • OSHA-10 safety • Bobcat skid steer loader • Compact Excavator • Forklift • Scissor Lift • Tool Cat utility vehicle • Boom Lift	• None listed	All students regardless of race, creed, gender, or sexual orientation are welcome at the school.
CLUES Bricklaying Program	Ramsey County	CLUES works with union-certified training partners to prepare you for union certification and high-paying construction careers. Construction programs are nine weeks long.	• None listed	None listed
Twin Cities R!SE Facilities Maintenance Tech	MSP Metro	Participants acquire and elevate their skills and knowledge in: Emotional Intelligence, Personal Empowerment, 21st Century & Technical Skills, Leadership, Machine & Equipment Maintenance/ Repair, Troubleshooting, Blue-Print Reading, HVAC Safety & Basics, Plumbing, LEAN/ CQI (Continuous Quality Improvement), Print Basics, Electrical & Mechanical Systems, Math & Problem-Solving Skills, and Hand Tools. Participants receive OSHA 30 certifications and Boilers Test prep. Twin Cities R!SE pas for the Boiler's License Exam.	• No experience necessary • Must be at least 18 years of age, • Have a personal earned income of $25,000 or less in the last 12 months Repair, (Exceptions made on the # of people in a household), • No criminal sexual conduct or arson charges • Ability to read/ write English at a 6th Grade Level	All adults that meet the requirements.
St. Paul Public Schools Special Low Pressure Boiler License	Ramsey County	This course leads to a state special license, which is the first step needed to operate or tend to low pressure stationary steam boilers and auxiliary steam equipment, such as pumps, compressors, and air conditioning equipment.	• CASAS Reading test score of 236+ • TABE 11/12 M Reading test score of 442+ • 8-week commitment • High School Diploma or GED • Ability to lift 60+pounds • Ability to bend, squat, and climb ladders	All adults that meet the requirements.

Community-Based Training Programs, MSP Metro (Continued)

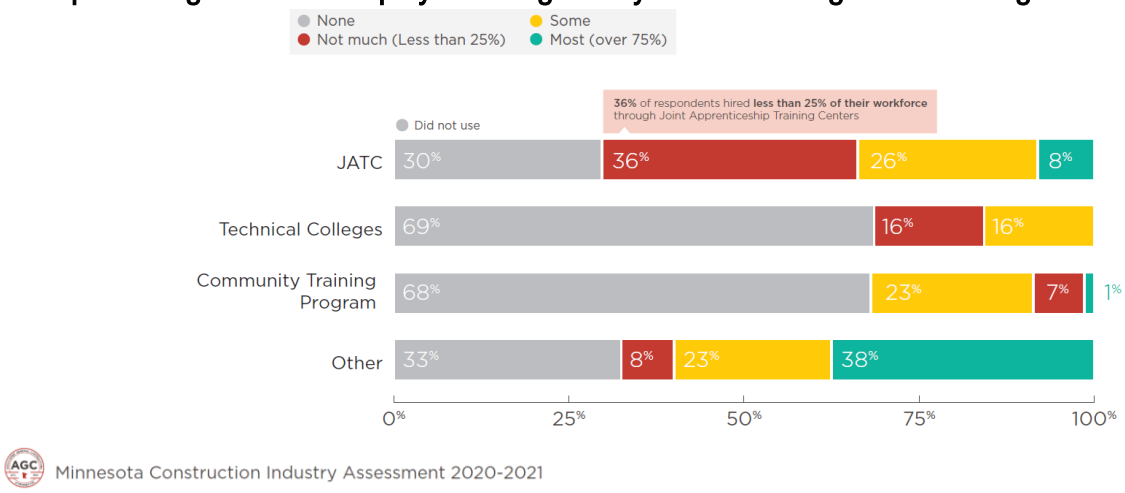
Organization/Program	Location	Program Description	Requirements	Population Served
Roseville Adult Learning Center and Karen Organization of Minnesota's Apprentice and Manufacturing Ready Course	Ramsey County	**Course:** The goal for this class is to prepare participants for an apprenticeship in the construction trades. Participants can also earn a competency-based high school diploma if you complete the class. Participants will learn trade math, study literacy, write reflections, practice speaking in front of others, learn important workplace norms for the construction field, and get hands-on experience with tools and building materials. **Program:** The Apprenticeship and Manufacturing Ready (AMR) program is a partnership between Roseville Adult Learning Center (RALC) and KOM. AMR is a FREE career training for those who are interested in getting a job in construction, welding, and manufacturing. In the program, participants will be introduced to these jobs through both classroom and hands-on learning. During the training, students will gain confidence, literacy, and skills to enter those career fields. They will learn how to use many tools and machines, trade math, blueprint reading, solar energy and more. They will also receive a Forklift & Safety Certificate, CPR & First Aid training, and a Northstar Digital Literacy certificate. On their visits to different apprenticeship training centers, students will get to see what it would be like to work in that specific trade. At the end, AMR participants will have the chance to be placed in an apprenticeship program in one of the building trades and a job with a contractor that starts off paying an average of $16 – $26 per hour. Students without a U.S. high school diploma or GED will also get the chance to receive a high school diploma from Roseville Area Schools upon completion of the program. Each participant also receives career counseling and social service navigation support throughout the 7 months.	• 5th to 6th grade English level • Desire to go into the construction trades	All adults that meet the requirements.

Conclusion: Strategies for Increasing Equitable Access to Green Construction Careers

HIRING CHALLENGES

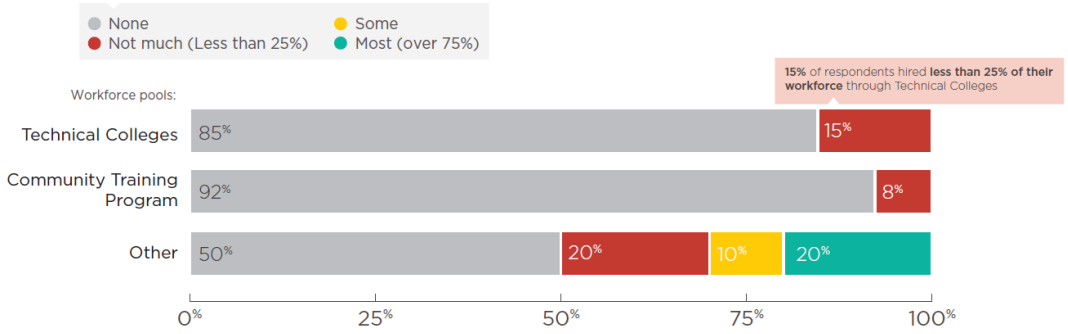
Beyond pandemic-related issues, the top challenge for construction employers was recruiting and training skilled workers, according to AGC Minnesota Construction Industry Assessment, 2020-2021. With all the local construction training programs, the AGC's survey of union and non-union gives us insight into where statewide employers are using as current hiring sources. Among union employers responding to AGC's assessment, when asked what percentage of their hiring was done through different workforce pools, 69% stated they do not use technical colleges, and 68% do not use community training programs to hire workers.[58] Among non-union contractors responding to the same assessment, 85% do not use technical colleges, and 92% do not use community training programs to hire workers.[59] While JATC trained workers continue to be a strong labor source, the hiring sources that was used most (over 75%) by union and non-union contractors was "Other."

What percentage of union employers hiring have you done through the following workforce pools?



Minnesota Construction Industry Assessment 2020-2021

What percentage of non-union employers hiring have you done through the following workforce pools?



*Largest hiring sources in "Other": Referral and 4-year colleges

[58] Associated General Contractors of Minnesota, Minnesota Construction Industry Assessment, 2020 – 2021, https://agcmn-c5.s3.us-east-2.amazonaws.com/6116/0706/2722/2020_AGC_Minnesota_Construction_Industry_Assessment-web.pdf

[59] Associated General Contractors of Minnesota, Minnesota Construction Industry Assessment, 2020 – 2021, https://agcmn-c5.s3.us-east-2.amazonaws.com/6116/0706/2722/2020_AGC_Minnesota_Construction_Industry_Assessment-web.pdf

In addition to Technical Colleges and Community Training Programs not being a labor source, employer perceptions are low regarding Construction programming scope.

How much do you (non-union employers) agree or disagree with the following statements?

		Strongly Agree	Agree	Disagree	Strongly Disagree	Do not use
TECHNICAL COLLEGES	The pool of workers through technical colleges is **empty/exhausted**	0%	**42%**	8%	0%	*50%*
	The pool of workers through technical colleges **does not perform at a skill level necessary** to do the work	0%	**25%**	**25%**	0%	*50%*
COMMUNITY TRAINING PROGRAMS	The pool of workers through community training programs is **empty/exhausted**	0%	**42%**	8%	0%	*75%*
	The pool of workers through community training programs **does not perform at a skill level necessary** to do the work	0%	**33%**	0%	0%	*67%*

With an already tight labor market, it will take a coordinated effort to recruit and train skilled Construction workers. Below are potential strategies to expand the workforce pool by increasing equitable access to Green Construction careers.

STRATEGIES

Employer Engagement and Partnerships

- **Align programming through employer engagement:** Engaging local employers with technical colleges and community training programs to increase alignment of the academic, technical, and employability skills trainees need for entry and success in any trade could be essential to expanding the construction trades' hiring pool. In particular, addressing employers' views of community training programs may strengthen pathways into construction careers for women, new immigrants, and persons of color.
- **Enhance Employer Diversity Initiatives through Partnerships:** Among employers responding to the AGC Minnesota Construction Industry Assessment, 2020-2021, 69% stated they were taking deliberate measures to attract and retain people of color and women, and 54% said those measures were working.[60] Some of the measures named by employers in the AGC assessment as most successful in attracting and retaining people of color and/or women were:
    - "Diversity attracts diversity – sending women and people of color to career fairs to do recruitment."
    - "Seeing that other people of color or women are being retained and promoted in the company."
    - "Working with the JATC"
    - "Word of mouth / Networking with existing employees / Looking for employees from within communities where projects are being built."

Expand wraparound service for youth, apprenticeship, and community-based programs in Ramsey County

Locally, many community-based training programs help prepare people from underrepresented communities for entry and success in the building trades. Expanding those training programs' wraparound services could address barriers, attract, and retain people of color and women. Services could include:

- **Assist with Driver's Licensing:** One potential barrier to starting a career in Construction might be obtaining a Driver's License. The top certification by volume of new Green Construction job

[60] Associated General Contractors of Minnesota, Minnesota Construction Industry Assessment, 2020 – 2021, https://agcmn-c5.s3.us-east-2.amazonaws.com/6116/0706/2722/2020_AGC_Minnesota_Construction_Industry_Assessment-web.pdf

postings in Ramsey County is a Class D Driver's License. In addition, five out of eight locally identified community-based training programs and eight out of eleven of the Registered Apprenticeships in the County require a Minnesota Driver's license as an essential requirement. Disproportionately, people with low income, people of color, and new immigrants lack a Driver's Licenses.[61] Pre-apprenticeships in the Seattle Metro area provides construction training and education, in addition to helping with driver's licensing and transportation.[62]

- **Expand Childcare Assistance:** As of the fourth quarter of 2020, women hold 3.8% of local Green Construction roles, despite making up 49.8% of workers in all occupations across Ramsey County. According to Minnesota Building Trades, about 6% or 615 of union construction apprentices in Minnesota are women.[63] Many of the local apprenticeships have schedules that make childcare complicated by requiring early travel to a work site as well as evening classes. Female apprentices report that affordable childcare is a barrier to participating in apprenticeship programs, per The Impact of Construction Apprenticeship Programs in Minnesota report.[64] In a 2013 multinational study on childcare, social policy researcher, Guiliano Bonoli, found that increased government spending in childcare encourages more women to enter the labor market.[65]

Build inclusive and meaningful pathways for career advancement in areas of growth

- **Build out pathways in high growth areas of Green Constructions:** Green Construction careers anticipate a 0.5% annual growth overall for the next five years, 0.2 percentage points higher than Construction and Extractions careers in the County as of the fourth quarter of 2020. Additionally, the alternative energy market leads in market predictions made by our state's construction firms, despite expressing hesitancy in other market segments per AGC's Minnesota Construction Industry Assessment 2020-2021.[66] In Ramsey County, the largest expansion in Green Construction employment over the next five-years is for Solar Photovoltaic Installers (4.5% annual growth) as of the fourth quarter of 2020. Construction Manager roles are estimated to have the second largest expansion (1.0% annual growth) in the County during the same period.
- **Design inclusive and meaningful pathways for career advancement at every stage:** Green Construction technology innovations are integrated into construction project management tools and construction tasks, technology-based skills become a part of construction occupations. In a research paper, O'Phelan stresses the imperative of "developing, retraining, and retaining the workforce to support the future skills that match technological trends."[67] The follow are potential strategies to design meaningful pathways for Construction talent's continuous lifelong training in their trade and technology.
    - **Attract and train diverse talent early:** Invest in technology training in current youth Construction training programs that seek to increase participation of youth from underrepresented communities while creating a pipeline to get young people into Construction careers. For example, YouthBuild targets High school dropouts and potential dropouts, youth at risk of involvement with the criminal justice system, youth

[61] http://www.mnlegalservices.org/legal-services-in-the-news/2021/3/11/minnesota-asset-building-coalition-advocates-to-end-license-suspension-treadmill & https://www.house.leg.state.mn.us/SessionDaily/Story/15690
[62]http://www.seattle.gov/documents/Departments/FAS/PurchasingAndContracting/Labor/ApprenticeshipGuidebook.pdf#page=11&zoom=100,0,0
[63] https://mntrades.org/apprenticeship/
[64] https://faircontracting.org/wp-content/uploads/2019/09/mepi-uiuc-impact-of-apprenticeships-programs-in-minnesota.pdf
[65] Berkel, Rik. (2015). Giuliano Bonoli (2013), The Origins of Active Social Policy: Labour Market and Childcare Policies in a Comparative Perspective. Oxford: Oxford University Press. £60.00, pp. 240, hbk.. Journal of Social Policy. 44. 401-402. 10.1017/S0047279414000932.
[66] Associated General Contractors of Minnesota, Minnesota Construction Industry Assessment, 2020 – 2021, https://agcmn-c5.s3.us-east-2.amazonaws.com/6116/0706/2722/2020_AGC_Minnesota_Construction_Industry_Assessment-web.pdf

[67] John O'Phelan, Reinventing Our Construction Workforce Through Technology Advancements, December 2017.

with basic skill deficiencies, homeless and foster care youth, teen parents, immigrants, and youth with limited English proficiency. Investing in and integrating technology in programs like YouthBuild, could prepare young people from underrepresented communities for future skills in the industry.

- **Retain by promoting inclusive workplaces and training environments:** Apprentice registration in Construction trades is growing in diversity, but the persistent employment disparities in these roles across multiple sectors are troubling. Education and employer strategies cannot simply focus on talent attraction but must also promote inclusive workplaces and training environments. Apprentice completion data disaggregated by race, ethnicity, and gender would be a valuable tool for further research into retaining apprentices and informing apprentice programs' recruitment, persistence, and retention strategies.
- **Ensure portability of credentials to support career advancement:** Green Construction makes worksites safer while technology can reduce the physical elements of the job, perhaps allowing construction talent to work longer in production positions. Building a pipeline from production positions into non-production positions, like Construction Managers, could also help retain skilled talent. However, most management roles within Construction require bachelor's degrees and the largest portion of Green Construction talent have a high school diploma. 14.0% of Construction workers have a four-year degree compared to 31.7% seen in all occupations in the County. College credit earned from completing a Construction apprenticeship program could support transitioning talent into a supervisory or management role within their crafts, like Construction Managers, or in a related field.