

2020 REPORT

ECONOMIC IMPACTS OF THE CONSTRUCTION INDUSTRY ON THE STATE OF COLORADO



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GREETINGS

January 2020

On behalf of the Rocky Mountain Chapter of the National Electrical Contractors Association (NECA), Rocky Mountain Mechanical Contractors Association (RMMCA) and the Sheet Metal and Air Conditioning Contractors National Association, Colorado Chapter (SMACNA) it is a pleasure to present Economic Impacts of the Construction Industry on the State of Colorado.

The 2020 report examines impact based on the size of the industry, number of jobs, wages and employment opportunities as well as Colorado economic indicators. In short, the impact of the construction industry on Colorado is far-reaching and the state of our industry is strong.

According to the report, construction contributed \$21.2 billion to the Colorado economy in 2018 representing 5.7% of all industries. Perhaps even more impressive, every \$1 billion added to the construction industry delivers \$2.2 billion in output to all industries.

The good news doesn't stop with overall economic impact. Consider job growth. Currently, construction jobs in Colorado total 175,000. According to the report, it is estimated in Colorado there will be more than 50,000 new jobs in construction by 2028 bringing projected employment totals to more than 225,000. Of the 50,000 new jobs projected by the report, 31,870 are in specialty trades (subcontractors). In addition to new jobs, projected retirements over the same time period could account for another 40,000 new jobs in construction and 25,600 in specialty trades.

While the news about the future of the construction industry is good, it is not without challenges. Our top priority is recruitment. Finding the talent to match job growth is critical to the future of our industry and the economy of our state. Make no mistake our industry is heavily focused on better outreach to recruit tomorrow's talent.

The MEP Alliance - NECA, RMMCA, SMACNA and our partners - are working on multiple strategies to enhance recruitment. In fact, we currently spend \$8 million annually on apprenticeship training programs across Colorado. These programs are the crown jewel of our efforts. Our apprenticeship training programs are offered tuition-free

and require only a small personal investment in tools and books to enroll. More than 90% of apprenticeship graduates find jobs and achieve an average starting salary of \$75,000.

We invite you to learn more about our industry and our associations. We will be happy to serve as a resource for your questions or business needs. On behalf of our three associations and Boards of Directors, we look forward to working with you in the community and partnering to help shape Colorado and its economy.

Again, on behalf of our partners, thank you for taking the time to review this report outlining the economic impact of the Construction Industry on the State of Colorado.

Sincerely,



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EXECUTIVE SUMMARY

↑ \$2.2B | \$804M | 👤 15,729 | \$1.2B

Every one billion dollars added to Colorado's construction industry produces \$2.2 billion in output, \$804 million in household earnings, 15,729 jobs, and \$1.2 billion of added value across all of Colorado's industries.

↑ 29% 50,051 Construction
31,870 Specialty trades

Between 2018 and 2028, the number of construction jobs in Colorado is expected to grow by 29% or 50,051 new jobs. This corresponds to an average of 2.6% new jobs per year. Of these, 31,870 jobs are expected to be in specialty trades.

\$21.2B

Construction contributed a total of \$21.2 billion to Colorado's state economy in 2018. This economic impact represents 6% of all Colorado industries.

67%

There are 19,884 construction establishments in Colorado as of 2018. 67% of all establishments are specialty trade establishments and 24% of all construction establishments are mechanical, electrical, and plumbing establishments.

90%

Colorado's construction industry is dominated by small establishments: 92% of all construction establishments have fewer than 20 employees, and 90% of all mechanical, electrical, and plumbing establishments have fewer than 20 employees.

\$10.8B | 8%

Colorado's construction industry employed 173,096 people on average in 2018, 8% of all employees in the state. Construction payroll totaled \$10.8 billion in 2018, 8% of total payroll for all private industries in the state.

\$3B

The mechanical, electrical, and plumbing sector within the construction industry employed 50,365 people in private industry in 2018, 2% of all employees in the state. The total payroll for this sector totaled \$3 billion in 2018, 2% of all industries in Colorado.

INTRODUCTION

Construction is an impactful segment of Colorado's industry landscape. Throughout, the focus of this report is on the building equipment contractor, also referred to as the mechanical, electrical, and plumbing (MEP) industry subsector. This report is based on the most recent annual data available, which is from 2018. See Figure 1 for a graphical depiction of the construction industry subsectors.

This report is organized in four sections, each addressing a key area of the construction industry's significance to the state of Colorado. The full appendices that complement this report are available on request.

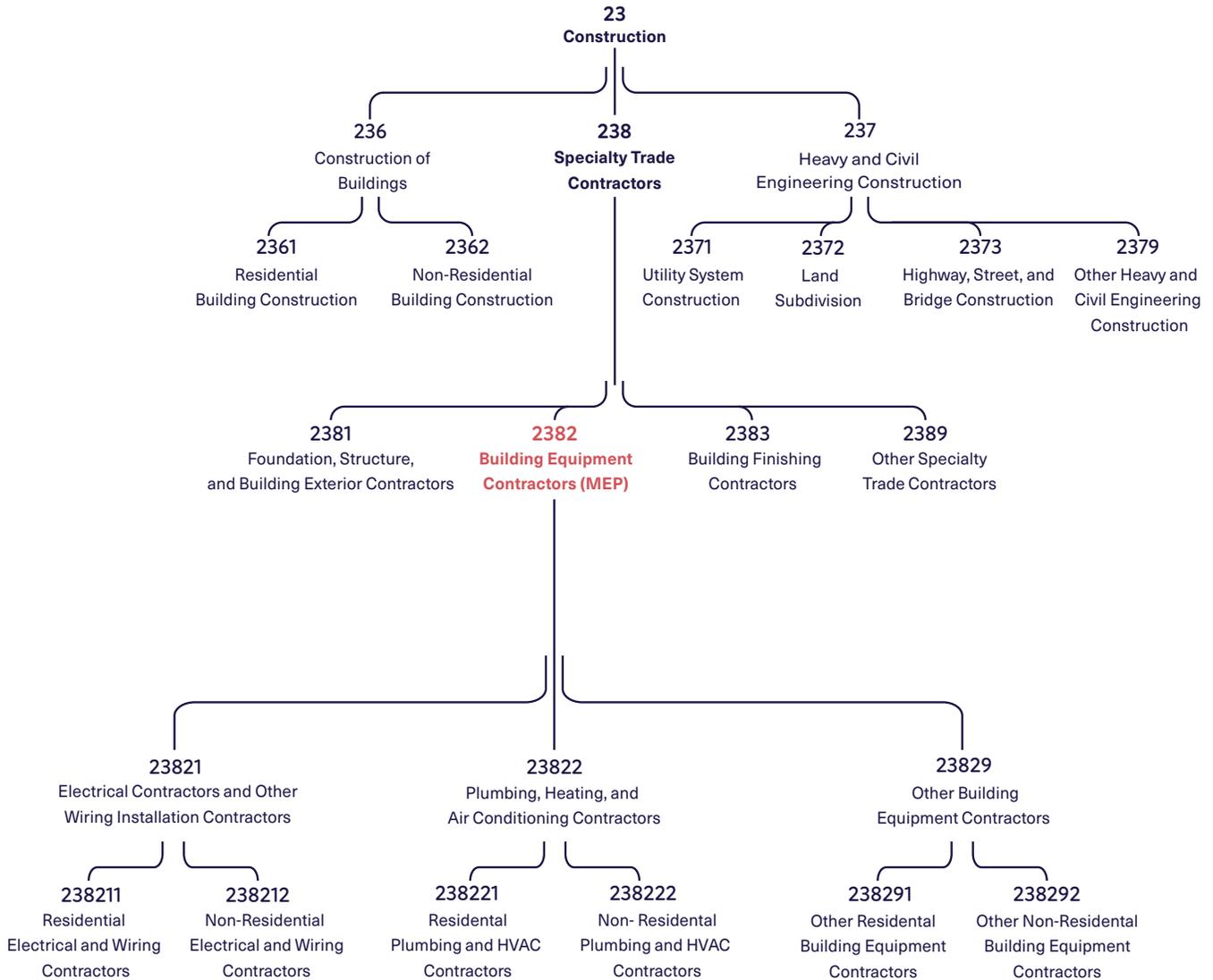
1. Economic impacts of the construction industry in Colorado: the calculated impacts of the construction industry on Colorado's economic prosperity.
2. Overview of the construction industry in Colorado: a descriptive summary of the number, location, and size of construction establishments in Colorado.
3. Employment and wages in Colorado's construction industry: data describing the number of employees and typical wages within the industry.
4. Education opportunities for construction trades in Colorado: information on the projected future demand for construction employees, and the resources currently available to train future employees.

Throughout, the construction industry is also compared to a selection of other major industries that represent the breadth of industries in Colorado. The comparison industries that are referenced in this report are:

- Manufacturing
- Retail trade
- Finance and insurance
- Real estate and rental leasing
- Professional, scientific, and technical services
- Health care and social assistance



Figure 1: Diagram of construction industry sector organization by 2017 NAICS (North American Industry Classification System) codes.



SECTION 1

ECONOMIC INDICATORS

The economic impact of the construction industry on Colorado is quantified in this section. The most recent data available is reported, the majority of which is available only for the construction industry overall. Construction's contribution to state GDP is one of few industries whose contribution has been increasing over the years 2009-2018.

According to economic multipliers calculated using regional data, every billion dollars added to Colorado's construction industry produces \$2.2 billion in output, \$804 million in household earnings, 15,729 jobs, and \$1.2 billion of added value across all of Colorado's industries.



METHODOLOGY

- Industry contribution to state GDP data were collected from the Bureau of Economic Analysis – GDP by industry reports for years 2009-2018. For comparing the over year percent growth in GDP across industries, values were indexed to the percent growth from 2009-2010.
- Economic multipliers were calculated by the Bureau of Economic Analysis using the Regional Input/Output Modeling System (RIMS). Multiplier data in this report are based on 2012 Input/output data and 2017 regional data for Colorado.
- Retail sales data for construction and construction-related industries were obtained from the Colorado Department of Revenue for years 2015-2018. Retail sales data are based on tax returns collected by the Department of Revenue, which are subject to change.
- All data were retrieved in December, 2019.

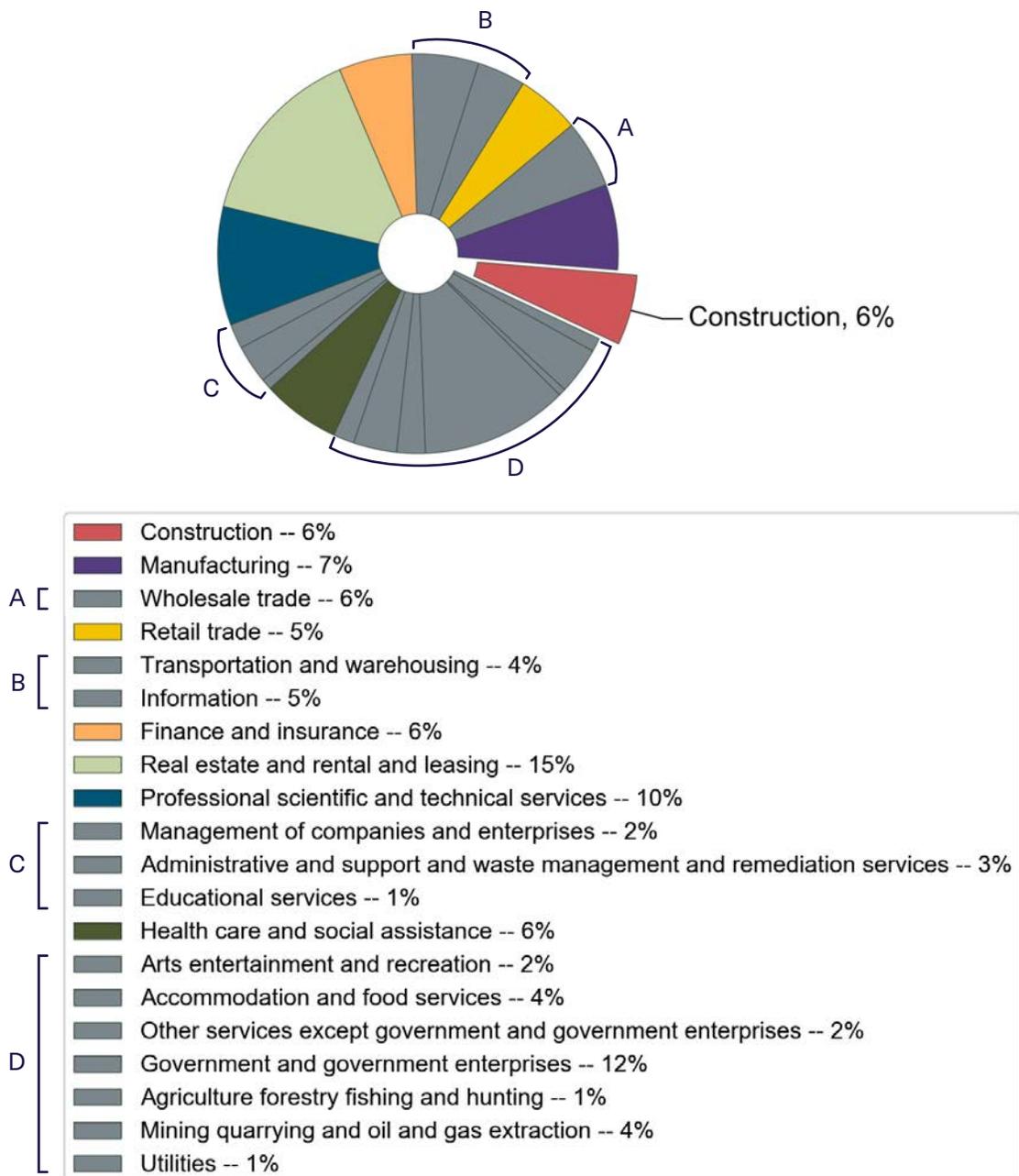
CONTRIBUTION OF CONSTRUCTION TO STATE GDP

Construction contributed \$21.2 billion (6%) to Colorado's GDP in 2018, ranking 7th among Colorado's industries.

The percent contribution by industry to state GDP in 2018 is shown in Figure 2.

The industries with a higher contribution to state GDP were real estate rental and leasing (15%); government and government enterprises (12%); professional, scientific, and technical services (10%); manufacturing (7%), health care and social assistance (6%) and finance and insurance (6%).

Figure 2 : Percentage contribution to Colorado GDP by industry in 2018, with comparison industries highlighted



CONTRIBUTION OF CONSTRUCTION TO STATE GDP (CONTINUED)

Construction's contribution to state GDP has increased significantly since 2011 and represents a strong and vibrant industry sector. The percent contribution of comparison industries over 2009-2018 are shown in Figure 3.

Construction's contribution to state GDP in 2018 represents a relative (indexed) increase of 24% since 2009. Compared to the selected comparison industries (shown in Figure 4), construction has by far the highest change in percent contribution to state GDP.

The spread ranges from construction with a 24% indexed percent contribution to GDP over year, to manufacturing, with -13%.

Figure 5 compares industries by growth, measured as the change from year to year in percent of state GDP. This figure compares two measures: the average per year percent change in GDP for years 2012-2017, and the percent change in GDP from 2017-2018.

Construction shows the largest average over-year growth (14%) over years 2012-2017 across all comparison industries. Of the selected comparison industries, construction is tied for second in per year growth from 2017-2018 with professional, scientific, and technical services (8%). Only higher was finance and insurance (10%).

Figure 3: Percentage contribution to Colorado GDP 2009-2018 for comparison industries

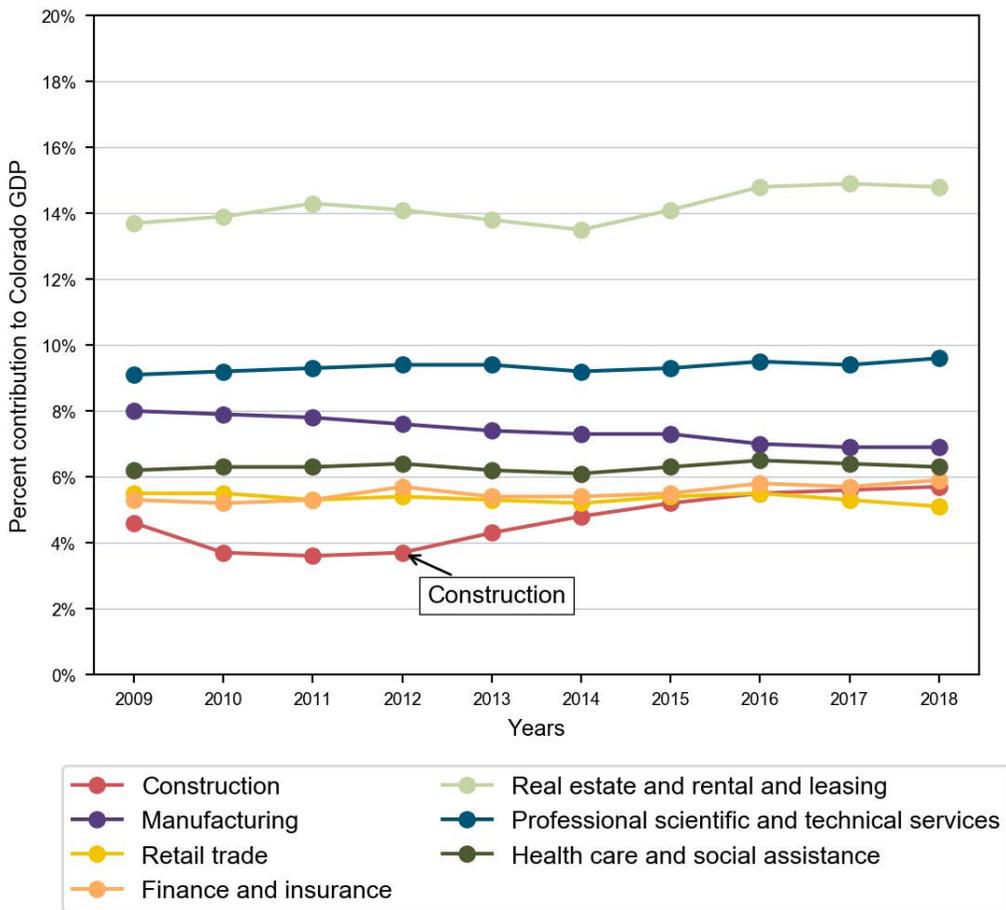


Figure 4: Change from 2009-2018 in percent contribution to Colorado GDP for comparison industries, using values indexed to 2009

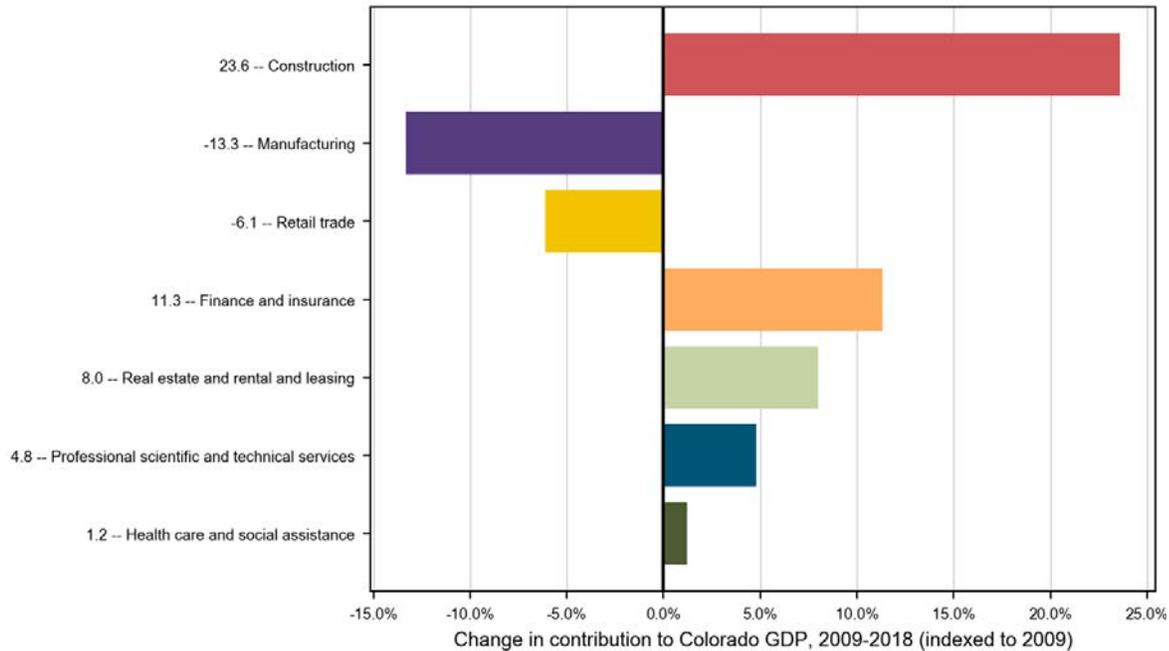
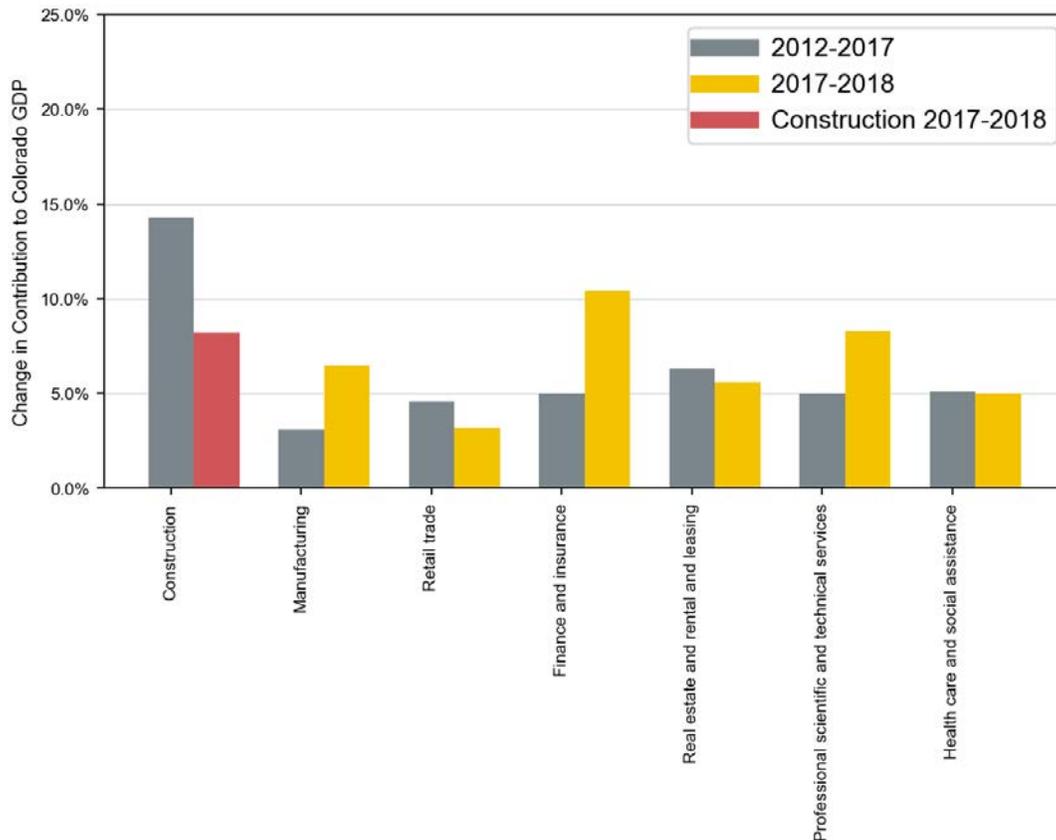


Figure 5: Growth rates for comparison industries based on over-year contribution to GDP, comparing average yearly change 2012-2017 (grey) and yearly change 2017-2018 (yellow). Construction is highlighted in red.



ECONOMIC MULTIPLIER EFFECTS OF CONSTRUCTION

The final demand multipliers for industries in Colorado referenced in this report are RIMS (Regional Input/Output Modeling System) Type II multipliers, calculated by the Bureau of Economic Analysis using 2012 Input/Output data and using 2017 regional data for Colorado. These multipliers account for both inter-industry effects and household spending. They do not account for the impacts of state and local government.

According to the RIMS II multipliers, every one billion dollars added to Colorado's construction industry produces \$2.2 billion in output, \$804 million in household earnings, 15,729 jobs, and \$1.2 billion of added value across all of Colorado's industries.

In terms of output, construction ranks fifth across all industries in Colorado: the only industries with higher output for an equivalent stimulus were securities, commodity contracts and other financial investments and related activities (\$2.4 billion), food and beverage and tobacco product manufacturing (\$2.4 billion), hospitals (\$2.4 billion), and social assistance (\$2.2 billion).

Among the 18 industry sectors that comprise the 6 comparison industries, construction ranks 7th in terms of household earnings, 6th in terms of employment, and 11th in terms of value added.

CONSTRUCTION-RELATED RETAIL SALES DATA

In 2018, construction and construction-related retail sales in Colorado totaled \$18.1 billion. Of this, nearly \$5.8 billion in retail sales came from all construction industries, and nearly \$12.4 billion from construction-related industries. Construction retail sales data is compiled in Table 1. The construction-related industries included draw from mining, manufacturing, wholesale trade, retail trade, real estate and rental and leasing, and professional, scientific, and technical services.

Retail sales for building equipment contractors (MEP) was calculated by summing the retail sales for the corresponding industry subsectors: electrical and other wiring contractors, plumbing, refrigeration, and HVAC contractors, and other building equipment contractors.

Over the years 2015-2018, building equipment contractor (MEP) retail sales averaged 30% of all construction retail sales, and 10% of all construction and construction-related retail sales.

Table 1: Colorado retail sales (in thousands of dollars) for building equipment (MEP), construction, and construction-related industry, 2015-2018

NAICS ¹	2015	2016	2017	2018
Electrical and Other Wiring Contractors	\$430,545	\$487,705	\$552,604	\$557,264
Plumbing, Refrigeration, and HVAC Contractors	\$841,913	\$851,679	\$871,291	\$938,475
Other Building Equipment Contractors	\$147,634	\$155,995	\$161,914	\$176,051
Building Equipment Contractors (MEP)²	\$1,420,092	\$1,495,379	\$1,585,809	\$1,671,790
Construction	\$4,685,822	\$4,740,526	\$5,133,647	\$5,757,963
Construction Related Industry ³	\$9,863,590	\$10,339,722	\$11,141,973	\$12,356,558
Construction and Construction-Related Industry⁴	\$14,549,412	\$15,080,248	\$16,275,620	\$18,114,521

Notes:

¹ The North American Industry Classification System (NAICS) industry categories are reported to the Department of Revenue by the taxpayer, and they are not generally audited.

² Retail Sales Data for Building Equipment Contractors (MEP) calculated as the sum of data for NAICS codes 23821, 23822, and 23829

³ Construction Related Industry Retail Sales Defined by the following 2017 NAICS codes: 212321, 327120, 327310, 327320, 327331, 327332, 327390, 327410, 327420, 327999, 423310, 423320, 423330, 423390, 423710, 423720, 423730, 423740, 444110, 444130, 444190, 532412, 541310, 541320, 541330, 541340, 541260, 541370.

⁴ The retail sales data presented here corresponds within the same order of magnitude to the total value of construction in Colorado as presented in the 2020 Colorado Business Economic Outlook prepared by the Leeds School of Business at the University of Colorado Boulder.

SECTION 2

COLORADO CONSTRUCTION ESTABLISHMENTS

In the United States, there were 810,295 private construction establishments in 2018. Colorado's 19,884 establishments represent 3% of that total.

The majority (67%) of Colorado's construction establishments are specialty trade establishments, and nearly a quarter (24%) of all construction establishments are building equipment contractors (MEP) establishments.

This section describes the overlay of the construction industry in Colorado in terms of its number of establishments, and the typical number of employees per establishment.



METHODOLOGY

- Data used in this section were obtained from the Bureau of Labor Statistics and the U.S. Census Bureau. Data are presented for 2018, the most recent full year for which data is available, as well as a ten year retrospective from 2009-2018.
- The data on the number of establishments within each industry in Colorado was obtained from the Bureau of Labor Statistics – Quarterly Census of Employment and Wages. Data are presented as annual averages for all years in 2009-2018.
- Data on the distribution of establishment size (number of employees) was obtained from the U.S. Census Bureau's County Business Patterns report from 2017.
- All data were retrieved in December, 2019.

NUMBER OF ESTABLISHMENTS

The number of construction establishments has been increasing since a low in 2013 (16,667 establishments) at an average rate of 4% per year, reaching 19,884 establishments in 2018.

Specialty trade contractor establishments comprise the majority of construction establishments, at 13,400 or 67% of all establishments. Within specialty trades, the 4,847 building equipment contractor (MEP) establishments comprise the largest number of establishments: 46% of all specialty trade establishments, and 24% of all construction establishments. The percentage of establishments in each construction subsector are shown in Figure 6.

Comparing the number of establishments within the building equipment (MEP) subsector, the number of plumbing and HVAC establishments is growing at a slightly faster rate (3% from 2017-2018) than electrical and wiring establishments (2% from 2017-2018). Both subsectors trend just below the growth rates seen for construction overall. The number of establishments in each segment for years 2009-2018 are shown in Figure 7.

In 2018, Colorado's 19,884 construction establishments ranked 2nd across comparison industries, as shown in Figure 8. Professional, scientific, and technical services had the largest number of establishments with 37,833.

Figure 6: Percentage of establishments in each construction subsector, 2018

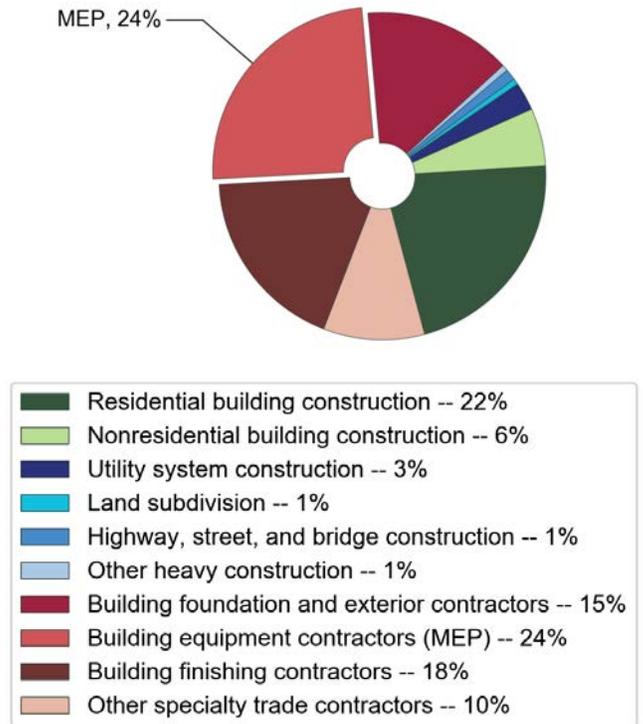


Figure 7: Number of establishments 2009-2018 for building equipment (MEP), electrical and wiring, and plumbing and HVAC contractors

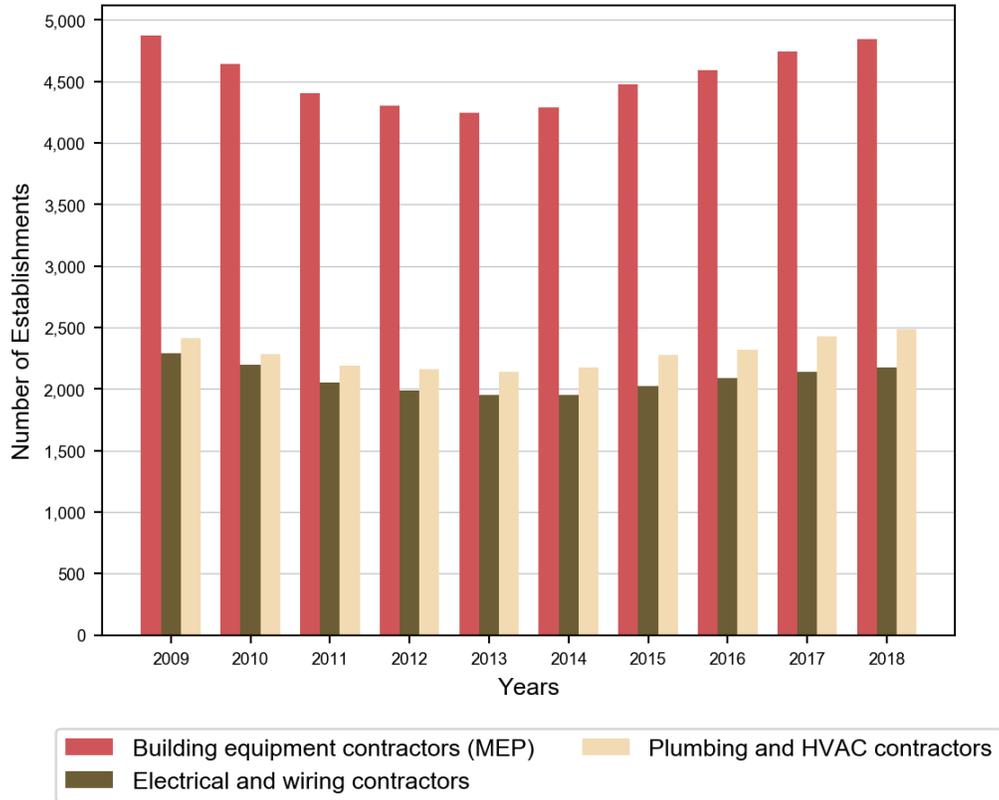
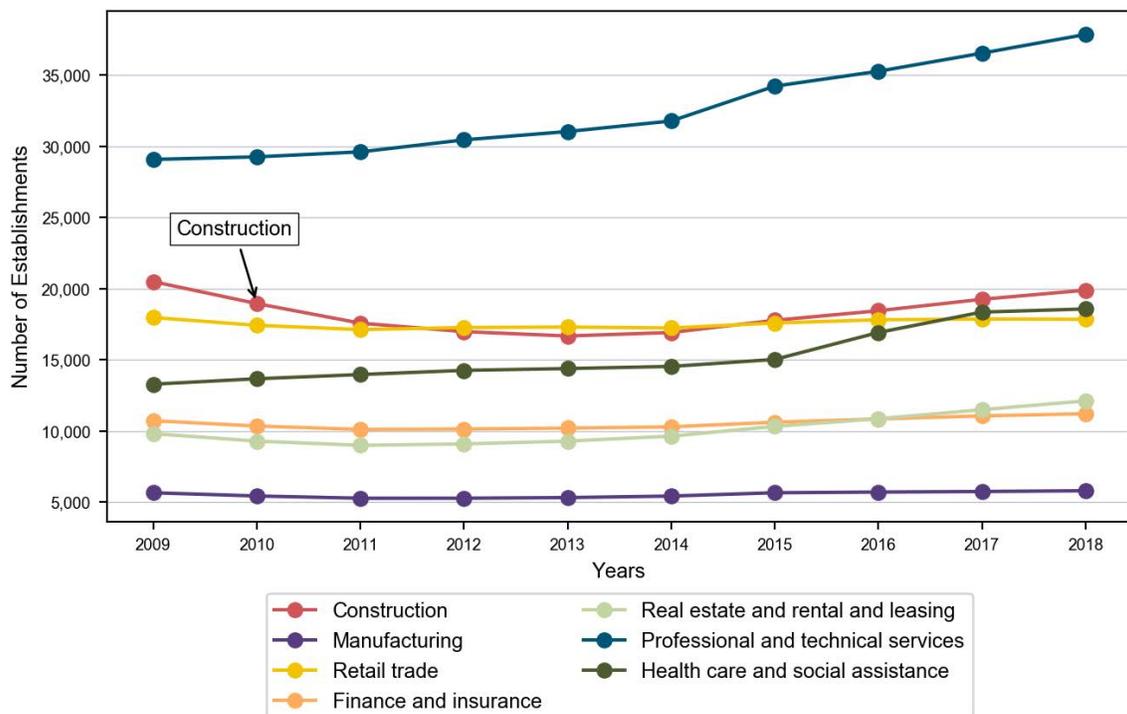


Figure 8: Number of establishments 2009-2018 across comparison industries



NUMBER OF EMPLOYEES PER ESTABLISHMENT

The construction industry is dominated by small establishments, as shown in Figure 9.

69% percent of all private construction establishments have fewer than 5 employees, and 92% of construction establishments have fewer than 20 employees.

The number of employees per establishment within construction subsectors is shown in Figure 10. Of the building equipment contractor (MEP) establishments, 64% have fewer than 5 employees. The only other construction subsectors with a higher fraction of establishments with fewer than 5 employees are residential building contractors (83%), land subdivision (83%), building finishing contractors (76%), and foundation, structure, and building exterior contractors (66%).

Building equipment contractor (MEP) establishments also have the largest number of larger establishments. However, these 61 establishments with 100+ employees represent only 1% of all building equipment contractor (MEP) establishments. The sectors with the highest fraction of large establishments (having 100 or more employees) are highway, street, and bridge construction (8%), utility system construction (5%), and other heavy and civil engineering construction (4%).

Figure 9: Percentage of establishments by number of employees, 2017

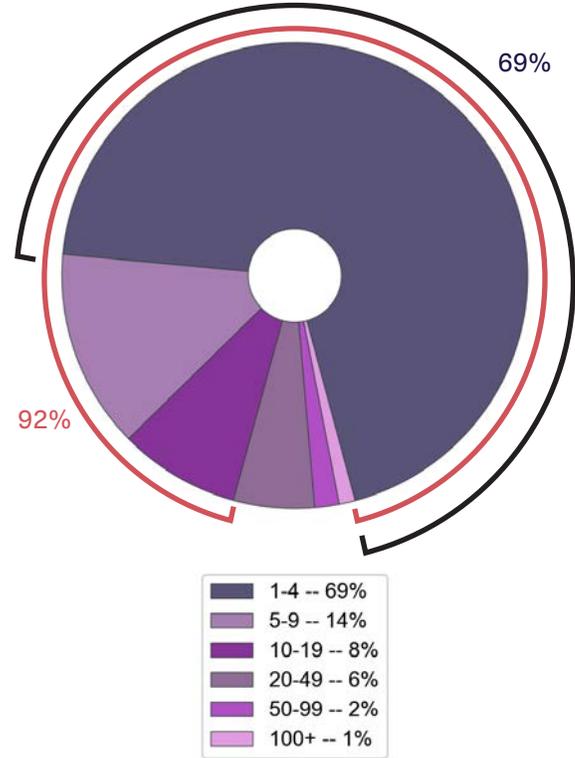
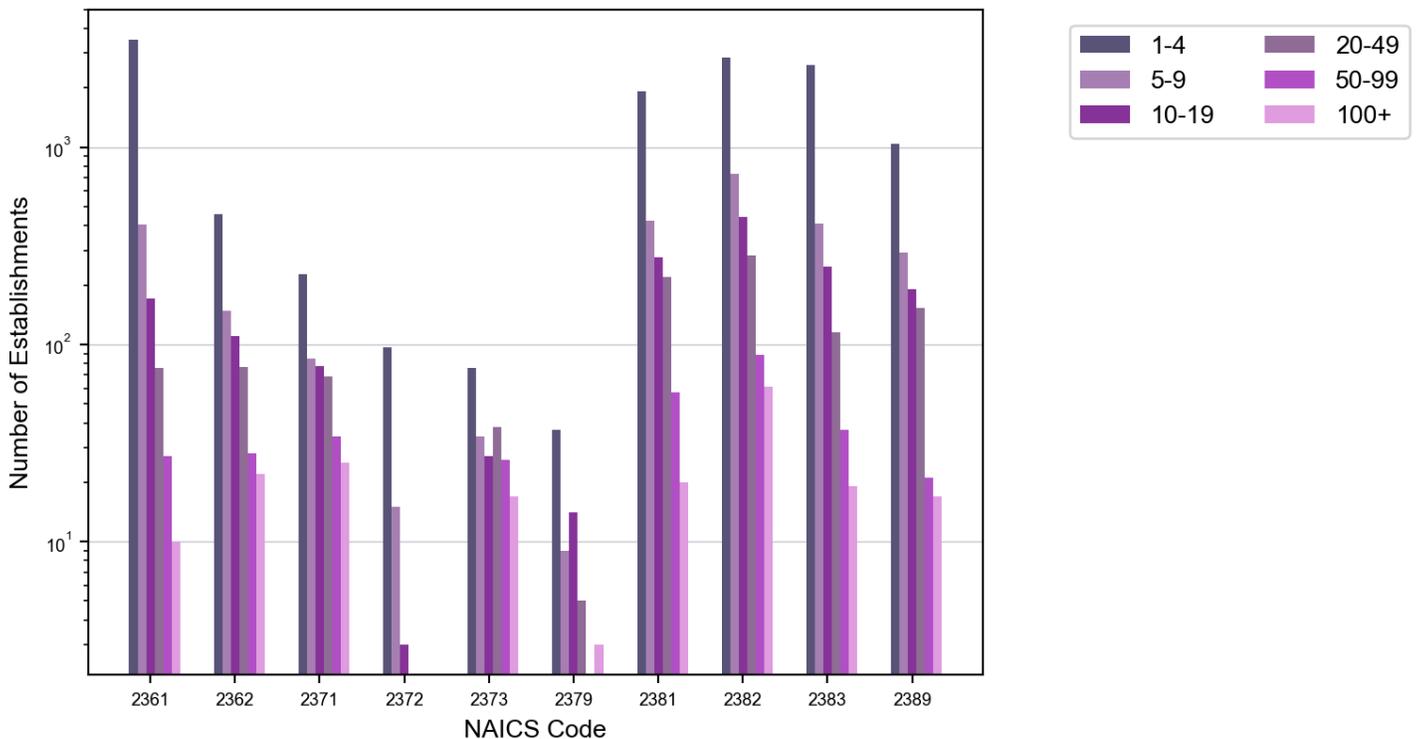


Figure 10: Number of establishments by number of employees across construction subsectors, 2017



SECTION 3

CONSTRUCTION EMPLOYMENT AND WAGES

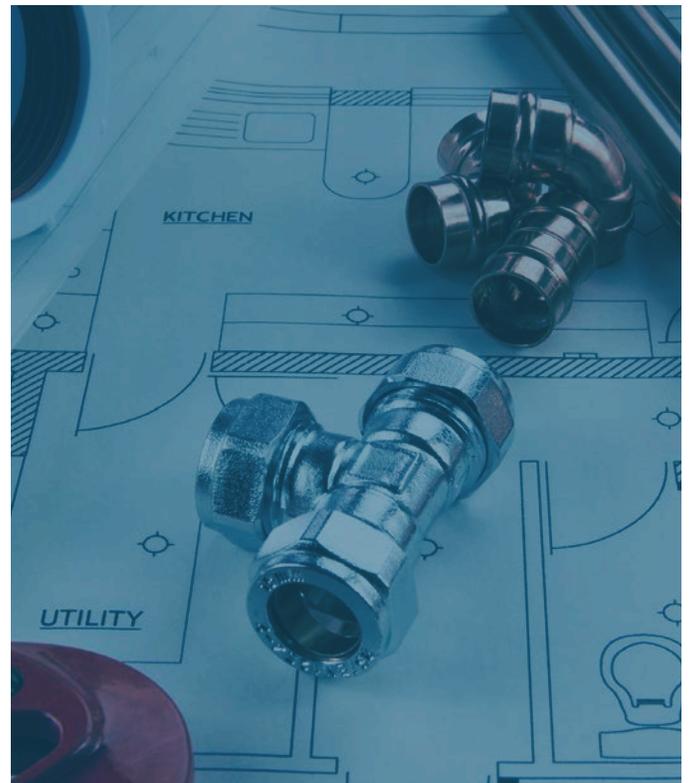
173,096 people were employed in Colorado's private (non-government) construction industry in 2018.

Specialty trade contractors dominate the construction industry: 66% of all construction workers or 113,914 people were employed in this sector in 2018.

Building equipment contractors (MEP) made up the majority of specialty trade contractors, and 29% of all construction employees are MEP contractors.

The average annual wage across all construction workers was \$62,414 in 2018, slightly above the average of \$60,395 for building equipment contractors (MEP). However, when looking at individual occupations, MEP occupations receive a higher annual wage than the average of all construction crafts.

Construction payroll totaled \$10.8 billion in 2018. Of this total payroll amount, 60% is from specialty trades (\$6.3 billion) and 28% overall (\$3.0 billion) is from building equipment contractors (MEP). This section describes these trends in employment and wages for construction and MEP in particular.



METHODOLOGY

- Data for average employment, average annual wage, average weekly wage, and total payroll for construction and comparison industries were obtained from the Bureau of Labor Statistics – Quarterly Census of Employment and Wages . Data are presented for 2018, the most recent full year for which data is available, as well as a ten year retrospective from 2009-2018. Reported values are annual averages.
- Union membership data for the nationwide construction industry and all employees in Colorado were obtained from the Bureau of Labor Statistics – Union Membership Annual Technical Release
- All data were retrieved in December, 2019.

NUMBER OF EMPLOYEES

Employment in Colorado's construction industry has been growing since a low of 112,242 employees in 2011 to a high of 173,096 employees in 2018. For the period from 2012-2018, employment has grown an average of 6% per year, with a more recent growth rate of 5% per year over the last three years (2016-2018).

The percentage of employees in each construction subsector are shown in Figure 11. The 50,365 building equipment contractors (MEP) were the largest construction subsector by employment. The next highest construction subsectors in terms of employment were all within specialty trades: foundation, structure, and building exterior contractors (14% or 24,259 employees), building finisher contractors (12% or 21,184 employees), and other specialty trade contractors (11% or 18,106).

By contrast, the sectors of building construction (including both residential and non-residential) and heavy and civil engineering construction (including its four subsectors) each have fewer employees than building equipment contractors (MEP), 21% and 14% respectively, of all construction employees in Colorado.

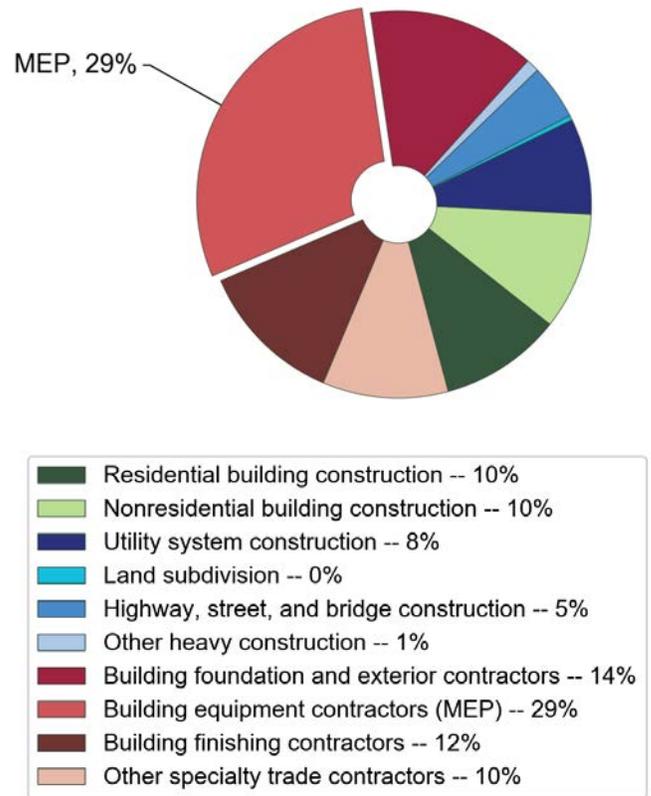
Building equipment contractor (MEP) employment has seen 57% growth since 2009. Building equipment contractor (MEP) employment in Colorado followed a similar trend as construction over the years 2009-2018 with a low of 32,165 employees in 2011 and a high of 50,365 employees in 2018.

For each year in the last decade, there were at least 15,000 more building equipment contractors (MEP) than any other subsector. Comparing over-year growth for the last five years, MEP ranks third among all subsectors with a 39% growth over 2013-2018.

Only higher growths were seen in residential building construction (53% over 2013-2018) and non-residential building construction (44% over 2013-2018).

Employment growth in the building equipment contractor (MEP) subsector (Figure 12) has also been slightly higher than construction overall over the years 2012-2018 (7% growth) and 2016-2018 (6% growth). Within MEP, there were more employees in plumbing and HVAC than in electrical and wiring in all years except 2010.

Figure 11: Percentage of employees by construction subsector, 2018

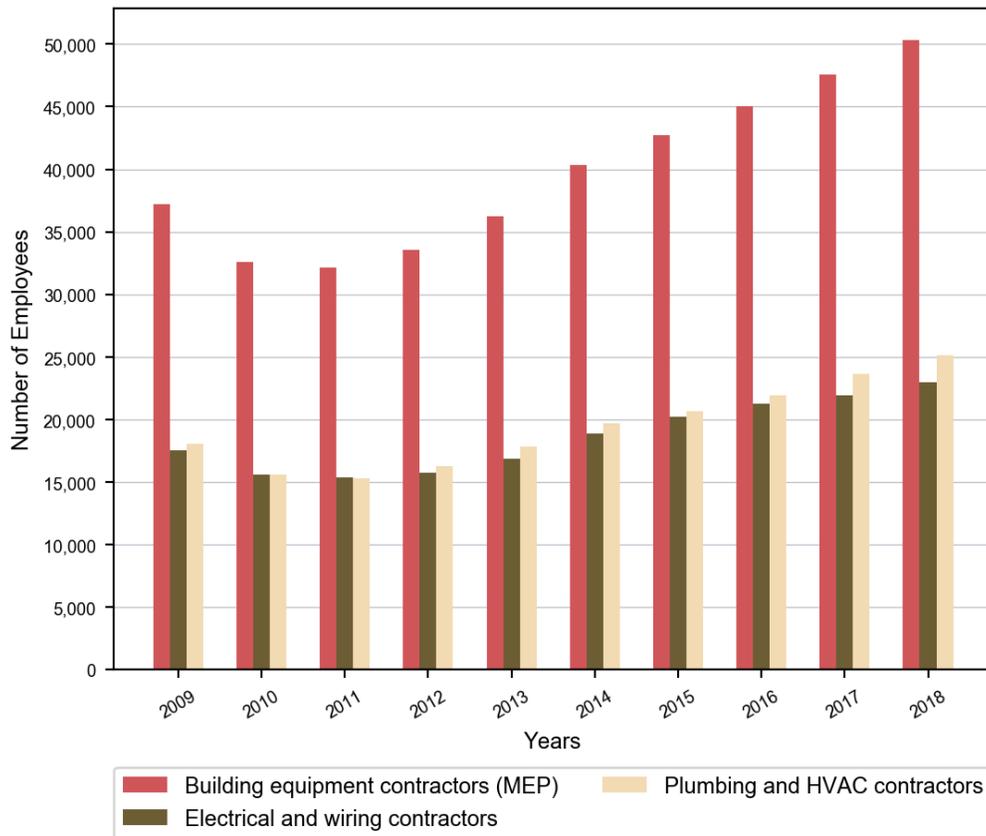


The average growth in electrical and wiring contractors is 6% over 2012-2018 and 4% over 2016-2018. The number of plumbing and HVAC employees has grown 7% over 2012-2018 and 7% over 2016-2018. The growth for the number of employees in these industries mirrors the growth in number of establishments over the same time period, where plumbing establishments saw a higher growth than electrical and wiring establishments.

Within electrical and wiring contractors, non-residential worker employment has been higher than residential worker employment over the years 2009-2018. However, the number of residential employees has been growing at twice the rate of non-residential employees in the last two years: 7% compared to 3% from 2016-2018.

NUMBER OF EMPLOYEES (CONTINUED)

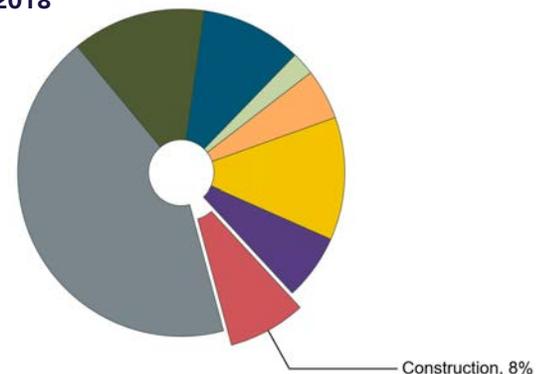
Figure 12: Number of employees 2009-2018 in building equipment (MEP), electrical and wiring, and plumbing and HVAC



In contrast, within plumbing and HVAC, residential employment is typically higher than non-residential employment. Similar to electrical and wiring employment, residential employment within plumbing and HVAC is growing faster in recent years. In the years 2016-2018, residential employment grew by 7% while non-residential employment grew by 6%.

Construction employed 8% of all Colorado workers in 2018, ranking fourth among selected comparison industries (shown in Figure 13). The industries with a higher percentage of all employees in the state were healthcare and social assistance (13%), retail trade (12%), and professional, scientific, and technical services (10%).

Figure 13: Average number of employees for comparison industries, 2018



AVERAGE ANNUAL WAGES

The average annual wage for building equipment contractors (MEP) was higher than the average annual wage for construction overall from 2009-2015, as shown in Figure 14. Since 2016, construction annual wage has risen above that for building equipment contractors (MEP) and both its major subsectors, electrical and wiring contractors and plumbing and HVAC contractors. In 2018, the average wage for construction overall has risen to \$62,414 annually, 3% higher than for building equipment contractors (MEP), \$60,395.

Building equipment contractors (MEP) had the highest annual wage for all specialty trade contractors in 2018. However, all other construction subsectors had higher annual wages, led by land subdivision construction (\$116,652 annually).

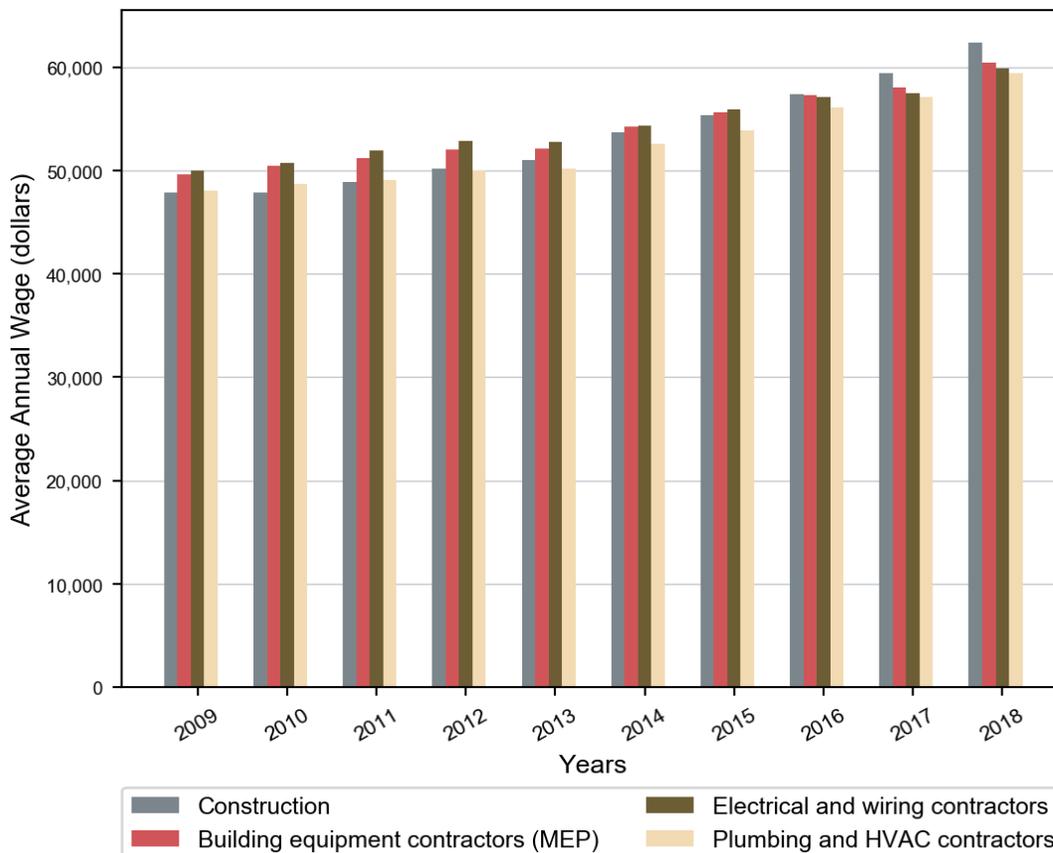
The average annual wage across all construction crafts within Colorado was \$47,121 in 2018.

The annual wage for five building equipment contractor (MEP) occupations were above the median annual pay across all construction crafts (\$46,708):

- Electricians (\$55,496)
- Heating, air conditioning, and refrigeration mechanics and installers (\$53,456)
- Plumbers and pipefitters (\$53,344)
- Welders, solderers, cutters, brazers (\$50,305)
- Sheet metal workers (\$47,088)

These five occupations represent a segment of the entire building equipment contractor (MEP) industry, which had an average wage of \$60,395.

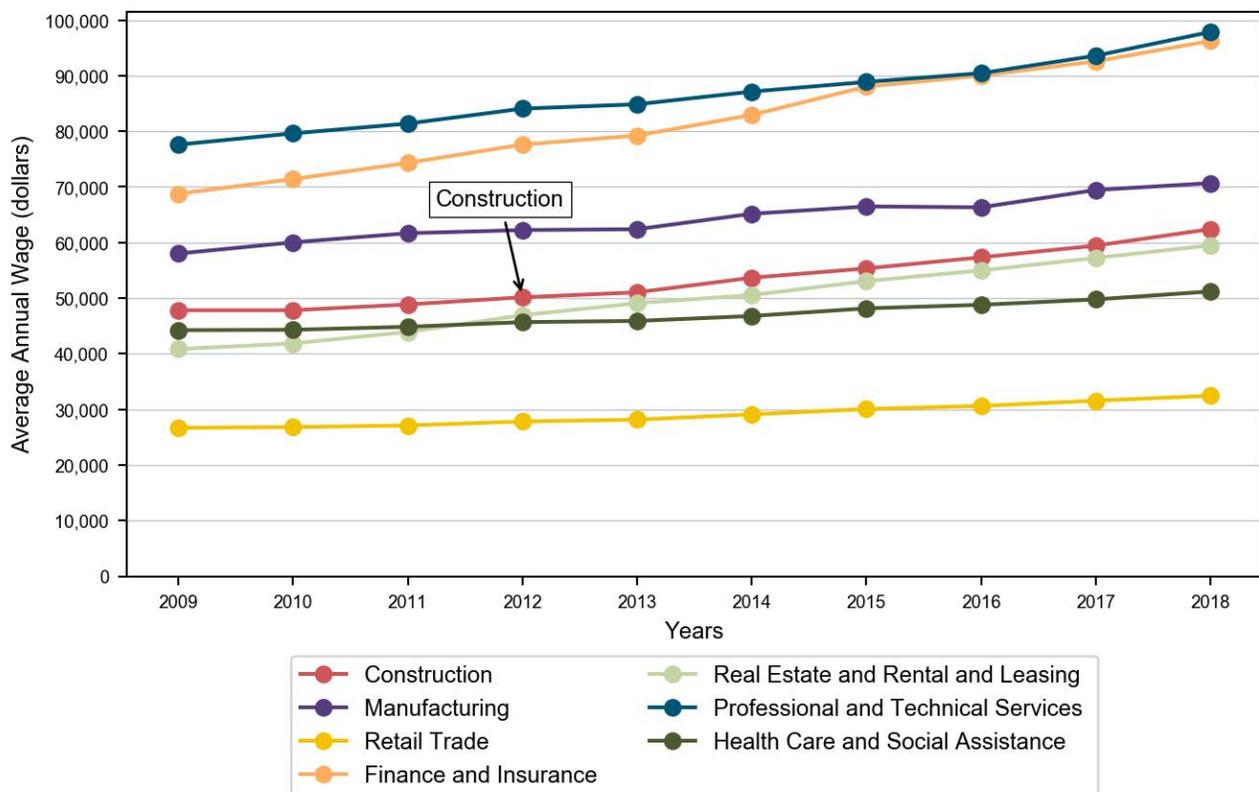
Figure 14: Average annual wages 2009-2018 for building equipment (MEP), electrical and wiring, and plumbing and HVAC contractors



In 2018, average annual wages within construction ranked 4th among comparison industries, as shown in Figure 15. Professional and technical services had the highest average annual wages with \$97,859, next finance and insurance with \$96,246, and manufacturing with \$70,677. Construction, with average annual wages of \$62,414 in 2018, is closest to real estate and rental leasing (\$59,486).

In recent years (2016-2018), construction has shown the largest growth per year in average annual wages across all comparison industries (4%), followed by real estate and rental and leasing (4%), professional, scientific, and technical services (3%), and retail trade (3%). Within construction, the largest growth in average annual wages was seen in 2014 (5% or \$2,616 increase from 2013) and 2018 (5% or \$2,970 increase from 2017).

Figure 15: Average annual wages 2009-2018 across comparison industries



CONSTRUCTION PAYROLL

Specialty trades payroll in 2018 totaled \$6.3 billion, comprising 60% of construction's overall \$10.8 billion payroll. Building equipment contractor (MEP) payroll totaled \$3.0 billion in 2018, representing 47% of all specialty trade payroll and 28% of all construction payroll.

The percentage contribution of each construction subsector in 2018 is shown in Figure 16. Behind building equipment contractor (MEP) payroll (\$3.0 billion), the next largest subsectors were all below \$2 billion in annual payroll. Non-residential building construction leads the other subsectors in annual payroll with \$1.4 billion, followed by foundation, exterior, and building exterior contractors (\$1.3 billion), residential building construction (\$1.2 billion), building finishing contractors (\$1.1 billion), and other specialty trade contractors (\$1.0 billion).

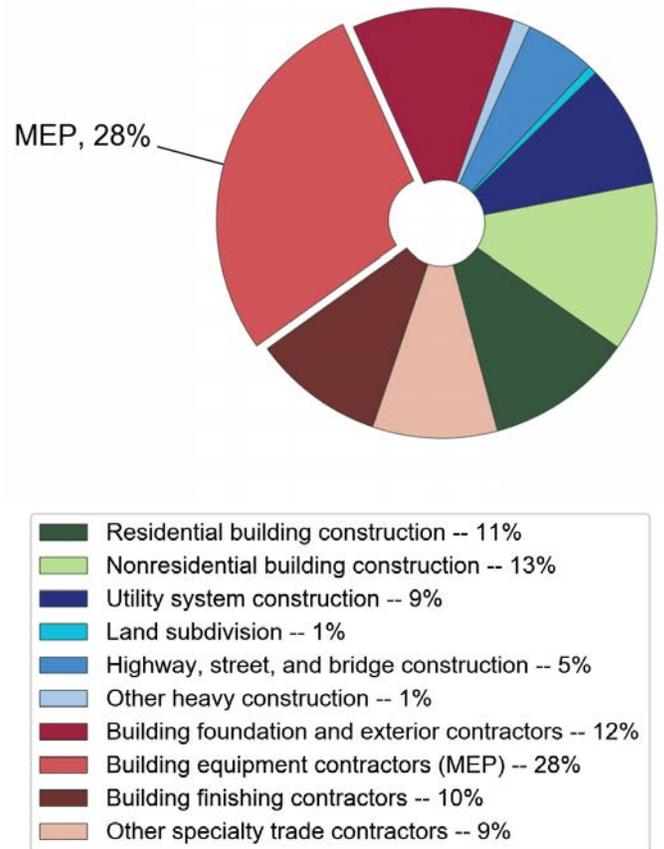
Between 2009 and 2018, construction payroll was at its lowest in 2011, when the industry's payroll totaled \$5.5 billion across all sectors. Construction and its major sectors have all been growing steadily since 2011, averaging a 10% growth per year from 2012-2018.

Building equipment contractor (MEP) payroll has been the largest contributor to total construction payroll among all construction subsectors in Colorado since 2009.

Residential building construction is the construction sector with the largest payroll growth per year after the industry's low in 2011 (2012-2018). With 9% average per year payroll growth in this period, building equipment contractor (MEP) payroll ranks sixth among construction subsectors, behind residential building construction (15%), foundation, structure, and building exterior (12%), building finishing contractors (11%), other specialty trade contractors (11%), and non-residential building construction (10%).

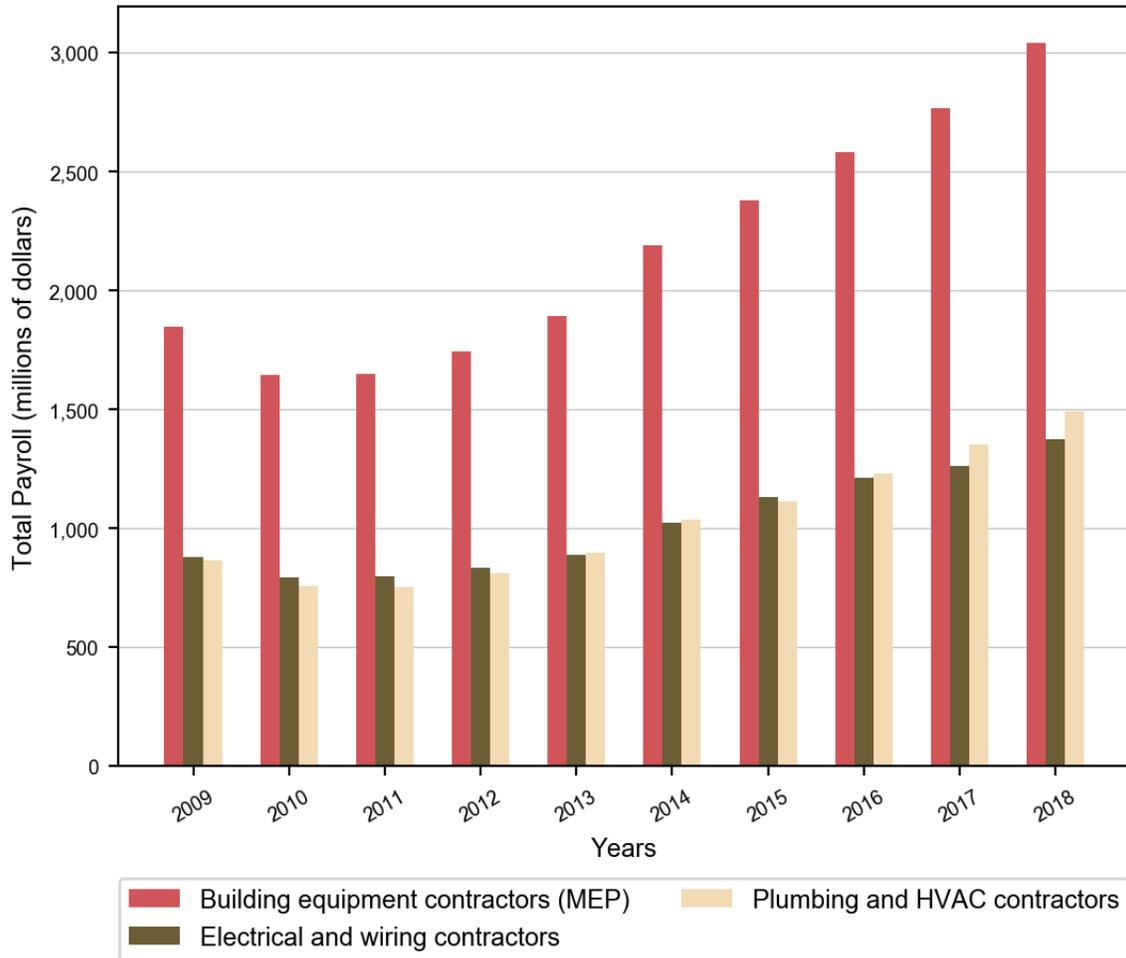
Total payroll data for building equipment contractors (MEP), electrical and wiring contractors, and plumbing and HVAC contractors are shown in Figure 17. In 2018, electrical and wiring contractor payroll totaled \$1.4 billion, and plumbing and HVAC contractor payroll totaled \$1.5 billion. The two major building equipment contractor (MEP) subsectors have similar payroll for the years 2009-2018, each contributing nearly 50% (between 45% and 49%) of total building equipment contractor (MEP) payroll.

Figure 16: Percentage of total payroll in each construction subsector, 2018



From 2009-2014, electrical and wiring contractor payroll was above plumbing and HVAC contractor payroll. Since 2016, plumbing and HVAC contractor payroll has consistently exceeded electrical and wiring contractor payroll. Plumbing and HVAC contractor payroll has been growing faster than electrical and wiring contractor payroll for six of the last seven years, and averages 10% over 2012-2018 compared to 8% per year payroll growth for electrical and wiring contractors in the same period.

Figure 17: Total payroll (in millions) 2009-2018 in building equipment (MEP), electrical and wiring, and plumbing and HVAC



Comparing residential and non-residential electrical and wiring contractor payroll, non-residential payroll has historically been approximately twice that of residential contractor payroll.

In 2018, non-residential electrical and wiring contractor payroll totaled \$907 million, 30% of all building equipment contractor (MEP) payroll. Residential electrical and wiring contractor payroll totaled \$470 million, 15% of all building equipment contractor (MEP) payroll.

Since 2012, the two groups of electrical contractors have maintained similar per year payroll growth, with residential contractor payroll averaging 9% growth, and non-residential contractor payroll averaging 10% growth.

In contrast to the electrical contractor payroll, residential and non-residential contractor payroll for plumbing and HVAC contribute approximately equally to total plumbing and HVAC contractor payroll.

In 2018, non-residential plumbing and HVAC contractor payroll totaled \$783 million, 26% of all building equipment contractor (MEP) payroll. Residential plumbing and HVAC contractor payroll totaled \$710 million, 23% of all building equipment contractor (MEP) payroll.

Over 2009-2018, non-residential contractor payroll has been consistently higher than residential contractor payroll by approximately \$100 million.

Residential plumbing and HVAC payroll has been growing over 10% each year since 2012, averaging 11% annual growth, compared to the non-residential contractor payroll which averages only 9% over the same years.

CONSTRUCTION PAYROLL (CONTINUED)

Construction payroll in Colorado is compared to comparison industries in Figures 18 and 19. In 2018, the total payroll across all Colorado industries totaled \$133.8 billion, 8% of which comes from the construction industry (Figure 18).

Construction's \$10.8 billion payroll ranks fourth among comparison industries: Professional and technical services had the highest percentage of total payroll with \$22.0 billion (16%), followed by health care and social assistance (\$15.3 billion, or 11%), and finance and insurance (\$11.0 billion, or 8%).

As of 2018, the construction industry ranks 3rd in total payroll. Construction also had the largest average growth per year of all comparison industries: 7% average growth per year from 2010-2018, 10% from 2012-2018, and 11% from 2017-2018.

The next fastest growing comparison industries in terms of total payroll were real estate and rental and leasing, followed by professional and technical services. Real estate and rental and leasing payroll has grown on average 7% per year from 2010-2018, 7% from 2012-2018, and 7% from 2017-2018. Professional, scientific, and technical services payroll has grown on average 6% per year from 2010-2018, 7% from 2012-2018, and 9% from 2017-2018. Historical trends for total payroll of these comparison industries are shown in Figure 19.

Figure 18: Percentage of total payroll in Colorado for comparison industries, 2018

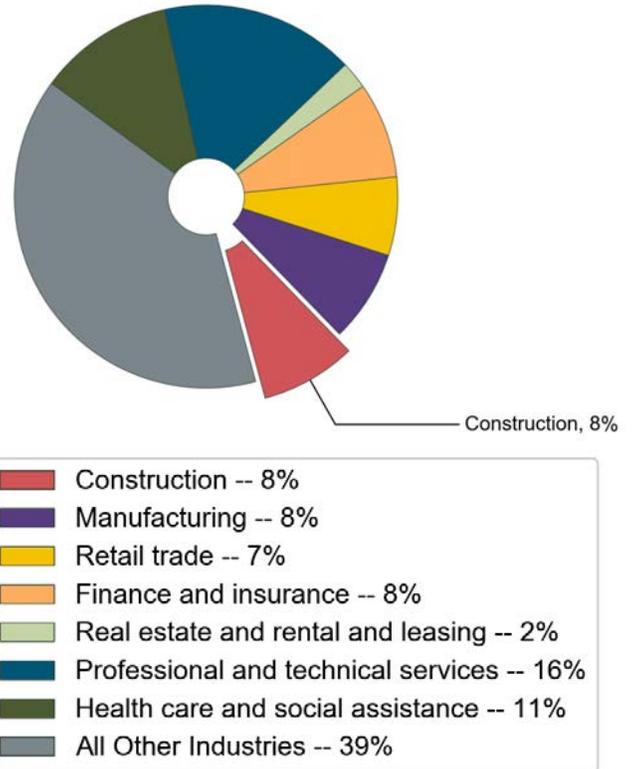
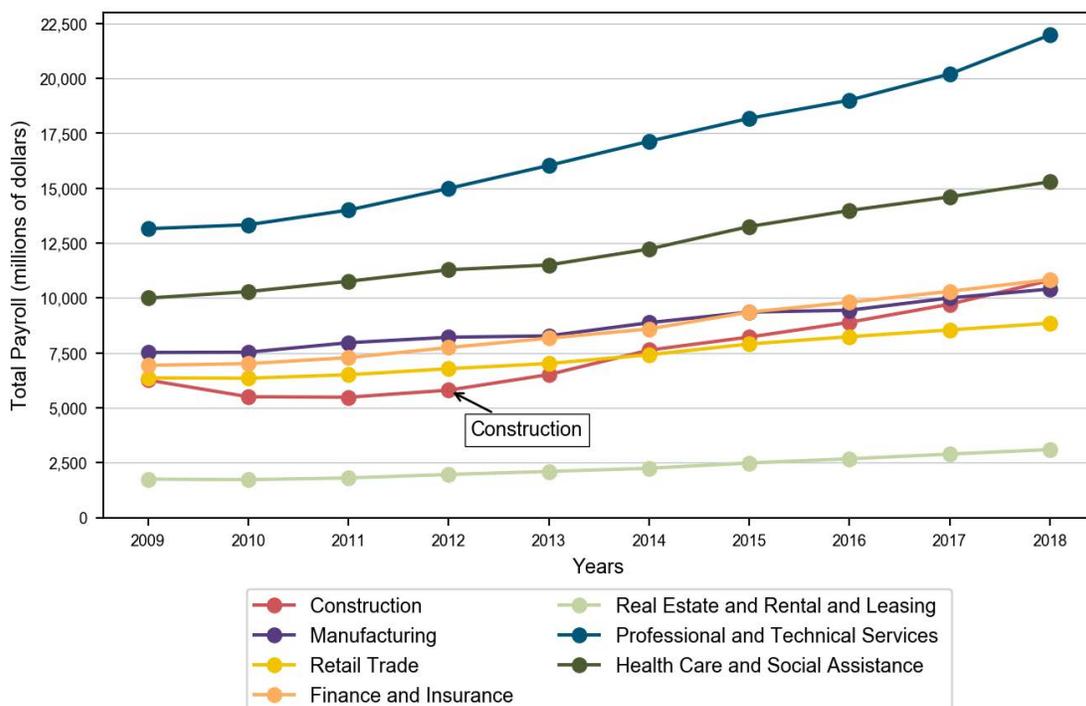


Figure 19: Total payroll (in millions) for comparison industries, 2009-2018



STATE, LOCAL, AND PRIVATE INDUSTRY WAGES

The employment and wage data for years 2009-2018 are compared for state government, local government, and private industry. Data was available for all years except state government in 2010 and local government in 2009, 2010, 2013, and 2016.

First comparing the number of construction employees, the data for available years indicates that years when private industry employment was low correspond to years when government employment was high. Private industry employment was at a minimum in 2011 (112,242) and a maximum in 2018 (173,096). In contrast, state government employment was highest in 2009 (3,163) and lowest in 2018 (3,022) while local government employment was highest in 2012 (138) and lowest in 2018 (103).

Comparing the annual pay for private and government industry, it is typical that state employees were paid more than private employees, and local government employees the least of the three categories. In 2018, state government construction workers earned on average \$64,176, while private industry workers earned \$62,414, and local government workers earned \$56,205.

Weighting the annual pay and weekly pay by the number of employees reported in each industry category results in an average annual pay of \$62,440 and an average weekly pay of \$1,201 in 2018. This weighted average is just above the average pay for private industry construction workers in 2018.

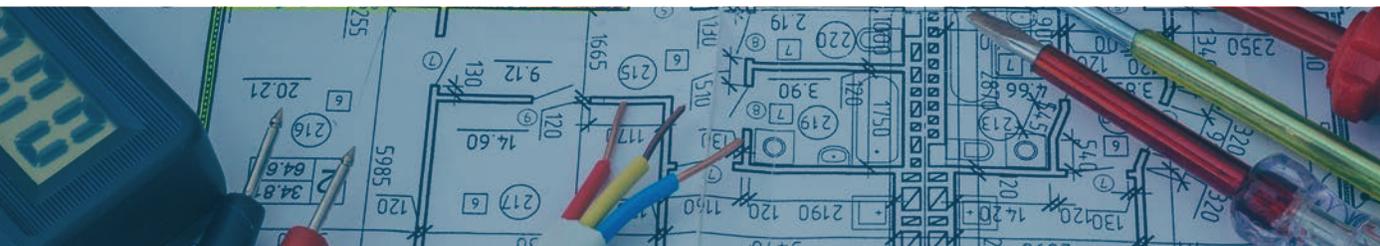
UNION AFFILIATION

While union affiliation in construction nationally has been decreasing over the period 2009-2018, union affiliation across all industries in Colorado has been increasing over the same period.

Union membership and affiliation data are available for construction at a nationwide level, as well as statewide across all industries.

Nationwide, union membership and representation among construction workers trends slightly above membership and representation for workers in all industries in Colorado.

The number of employees in Colorado (across all industries) who are members of unions has been overall increasing. Colorado union affiliation was at a low in 2011 of 8% membership and 7% representation, reaching a high in 2018 of 12% membership and 11% representation.



SECTION 4

INDUSTRY EDUCATION AND EMPLOYMENT OPPORTUNITIES

Construction employment growth is expected to be 29% across the next decade, an average of 2.6% growth per year. Building equipment contractor (MEP) employment is projected to grow by up to 33% through 2028.

This section presents data that illustrates this future employment opportunity as well as current construction-related education programs in Colorado.



METHODOLOGY

- Workforce age data were sourced from the U.S. Census Quarterly Workforce Indicators, collected as part of the Longitudinal Employer-Household Dynamics (LEHD) program. This report presents data for 2009, 2012, 2015, and 2018.
- Projected future employment data were obtained for construction industries and occupations from the Colorado Department of Labor and Employment via the Colorado Labor Market Information website. Data is given as estimated and projected employment in 2018 and 2028.
- Information on construction-related education programs was primarily sourced from the Colorado Department of Higher Education, and supplemented where necessary from institution's websites. The list of construction-related education programs was generated from a list of construction-related program codes, and all programs matching those program codes were included; programs with similar foci were consolidated.
- All data were retrieved in December, 2019.

WORKFORCE AGE

Half of all construction employees in Colorado are aged 25-44, and another 40% of employees are over the age of 45.

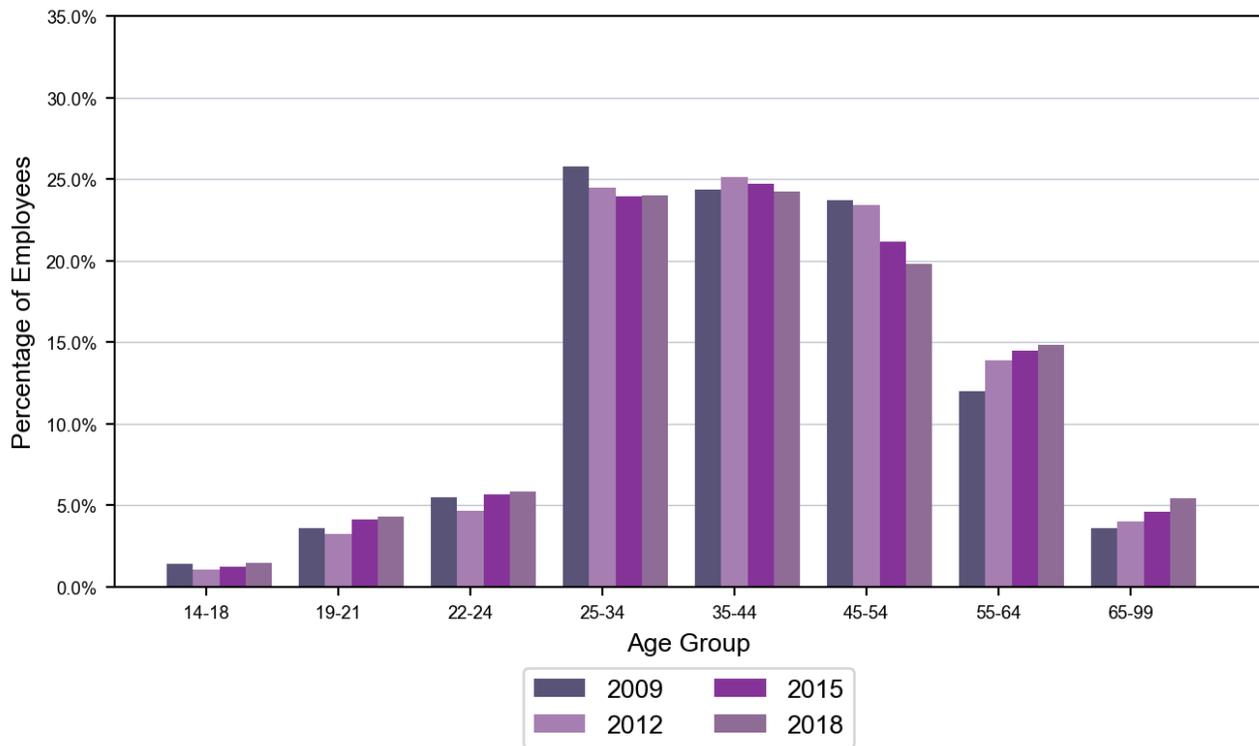
The average age of employees within the construction industry overall, specialty trade contractors, and building equipment contractors (MEP) has been increasing over the last decade. In particular, the percentage of workers aged 45-54 has decreased by about 5% from 2009-2018, while the percentage of workers aged 55-64 has increased by about 5% over the same period.

The distribution of age for all construction employees in Colorado is shown in Figure 20. The eight age groups in the figure were grouped into three for comparison: young workers, aged 14-24; early to mid-career workers, aged 25-44; and mid to late-career workers, aged 45 and older.

In 2009, 11% of all construction employees were aged 14-24, 50% were aged 24-44, and the remaining 39% were aged 45 or older. As of 2018, these percentages shifted slightly: the number of employees 14-24 years old increased to 12%, aged 24-44 decreased to 49%, and aged 45-99 increased to 40%.

The distribution of worker ages within specialty trades and within building equipment contractors (MEP) follow a similar trend as construction overall. In 2018, 12% of specialty trade workers were aged 14-24, 49% aged 25-44, and 39% aged 45 and older. Within building equipment contractors (MEP), 12% of workers were aged 14-24, 52% aged 25-44, and 36% aged 45 and older.

Figure 20: Age distribution of construction employees in Colorado, 2009-2018



The average age of construction workers in Colorado was calculated by weighting the number of employees in each age group by the average age in that group. In 2018, the average construction worker was 42 years old, an increase from the average age of 41 years old in 2009.

Specialty trade contractor age followed the same trend: an average of 42 years old in 2018 and 41 years old in 2009. Within building equipment contractors (MEP), the average age increased from 40 years old in 2009 to 41 years old in 2018.

PROJECTED FUTURE EMPLOYMENT

From 2018 to 2028, employment in Colorado's construction industry is expected to grow by 29%, an average of 2.6% growth per year.

Specialty trade contractor employment is expected to grow the most, adding 31,870 jobs across the state and increasing employment by 28% over that period. The largest percent growth is expected for building construction employment, 33% growth from 2018 to 2028 corresponding to 11,580 new jobs. Heavy and civil engineering construction is expected to add over 6,500 jobs, yielding 27% growth over the next ten years.

Data for industry employment growth is included in Table 2. All construction crafts are expected to grow an average of 2% and 4% per year between 2018 and 2028, resulting in a total change over the next decade between 14% and 40%.

Five primary mechanical, electrical, and plumbing occupations are plumbers, pipefitters, and steamfitters; heating, air conditioning, and refrigeration mechanics and installers; electricians; welders, cutters, solderers, and brazers; and sheet metal workers.

Table 2: Projected future construction industry employment needs, 2018-2028

NAICS	INDUSTRY NAME	2018 EMPLOYMENT ¹	2028 ESTIMATED EMPLOYMENT	TOTAL EMPLOYMENT CHANGE 2018-2028	ANNUAL AVERAGE % CHANGE	TOTAL ANNUAL AVERAGE EMPLOYMENT CHANGE	TOTAL % CHANGE
23	Construction	173,009	223,060	50,051	2.6%	5,005	29%
236	Construction of Buildings	34,703	46,283	11,580	2.9%	1,158	33%
237	Heavy and Civil Engineering Construction	24,430	31,031	6,601	2.4%	660	27%
238	Specialty Trade Contractors	113,876	145,746	31,870	2.5%	3,187	28%

Notes

¹2018 employment numbers in this table are estimates from the Colorado Department of Labor and Employment and do not match data from the U.S. Bureau of Labor Statistics presented elsewhere.

All five of these building equipment contractor (MEP) occupations are in the top fifteen of all construction occupations in terms of absolute projected employment growth over 2018-2028:

- Electricians rank 3rd (5,185 new jobs, or 27% growth)
- Plumbers, pipefitters, and steamfitters rank 5th (3,592 new jobs, or 33% growth)
- Heating, air conditioning, and refrigeration mechanics and installers rank 7th (1,933 new jobs, or 33% growth)
- Welders, cutters, solderers, and brazers rank 12th (1,048 new jobs, or 19% growth)
- Sheet metal workers rank 13th (1,037 new jobs, or 28% growth)

The occupations with the highest percent employment growth projected over 2018-2028 are primarily oil and gas extraction workers: rotary drill operators (41%), roustabouts (37%), and extraction worker helpers (34%).

Four construction trades -- three of which are MEP trades -- also have some of the highest projected percentage growth: plumbers, pipefitters, and steamfitters (33%); heating, air conditioning, and refrigeration mechanics and installers (33%); reinforcing iron and rebar workers (30%), and pipelayers (30%). Several construction trade helpers were also in the top ten construction occupations with highest projected growth: carpenter helpers (30%); pipelayer plumber pipefitter and steamfitter helpers (37%); and roofer helpers (30%).

EARNINGS BY EDUCATIONAL ATTAINMENT

Education has consistently shown its value in the workplace. Nationwide and across all industries, average annual wages were \$55,619 in 2018. The average construction worker in Colorado earned \$62,414 annually in 2018, and the average building equipment (MEP) contractor earned \$60,395 annually.

The average construction worker and building equipment (MEP) contractor in Colorado therefore earned more than the average of all individuals who have attained

at least an Associate's degree of any kind (\$48,238 average nationwide) and just less than those with at least a Bachelor's degree of any kind (\$71,155 average nationwide).

The average earnings for building equipment contractors (MEP) in Colorado were also above the nationwide averages for all women, and the averages across all White, African-American, and Hispanic race and ethnicity categories.

CONSTRUCTION EDUCATION PROGRAMS

Across Colorado, there are 29 institutions that offer construction-related instructional programs as identified by construction-related instructional program codes that focus on mechanical, electrical, and plumbing programs.

The education programs offered by these schools are listed in Tables 3 and 4. The tables and corresponding figures are divided by geographical region: Figure 21 is a map of all institutions that offer construction related programs in Colorado. Table 3 lists the programs that are outside the Denver inset area. The map in Figure 22 and Table 4 show the construction related programs in the Denver area.

In addition to these programs, the Mechanical Contractors Association also offers several mechanical, electrical, and plumbing/HVAC apprenticeships throughout Colorado.

The programs in the following tables cluster in the general areas listed to the right.

There is an emphasis in these education programs on technology tools and digital design skills across construction, architecture, manufacturing and energy. There is also an emerging area of renewable energy technologies, including photovoltaic design.

- Architecture, Architectural Technology
- Building and Construction
- Building Technology
- Carpentry, Woodworking
- Civil Engineering
- Civil Engineering Technology
- Construction Estimating
- Construction Management
- Construction Technology
- Construction Trades (General)
- Drafting and Computer-Aided Design
- Electrician, Electrical Line Worker
- Energy Management
- Energy Technology
- Engineering Graphics Technology
- Metal Fabrication
- Plumbing and Pipefitting
- Refrigeration and HVAC
- Renewable Energy
- Surveying
- Welding

CONSTRUCTION EDUCATION PROGRAMS (CONTINUED)

Figure 21: Map of construction-related education programs in Colorado

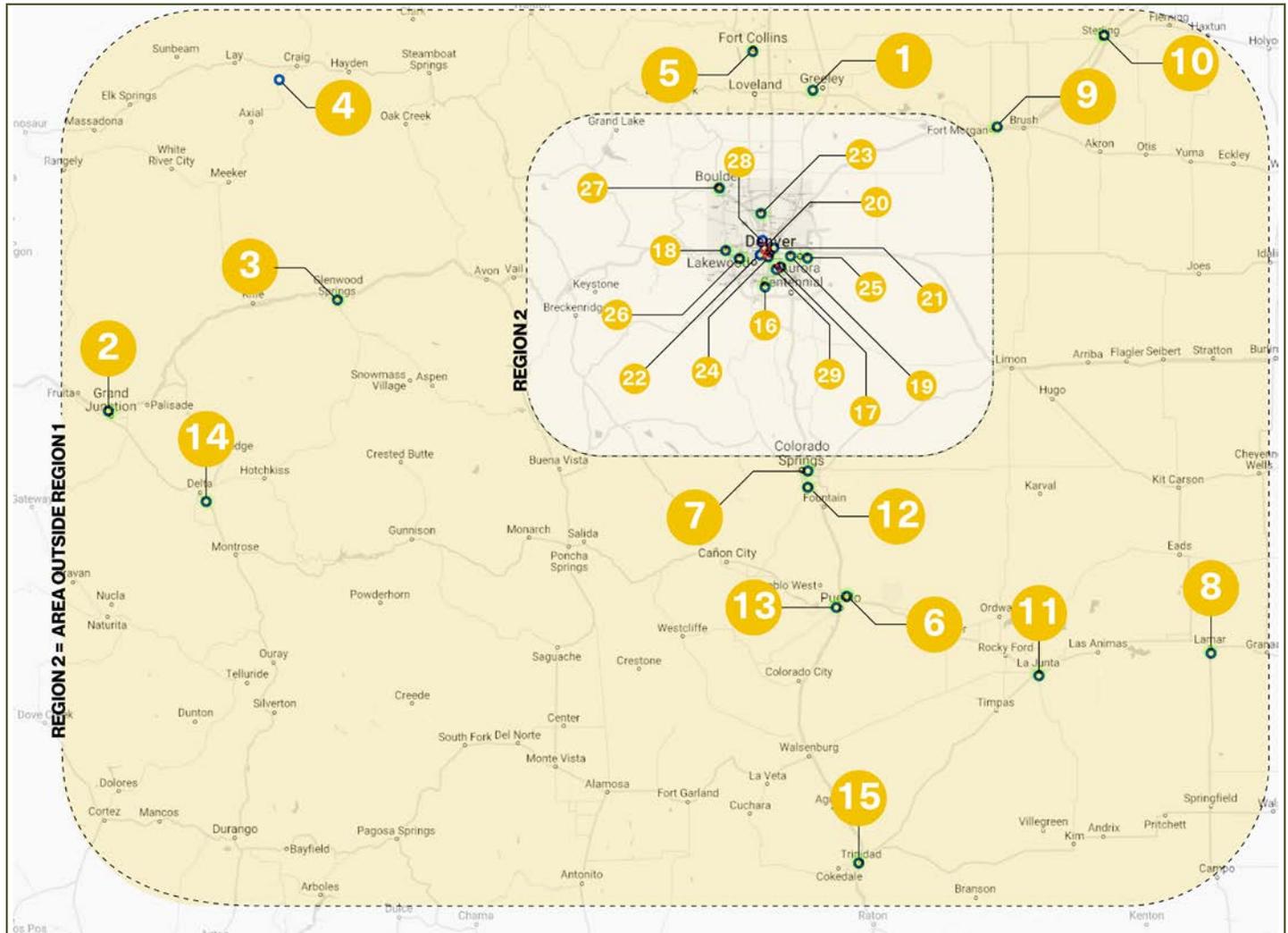


Table 3: Construction-related education programs as notated in Figure 21

KEY	INSTITUTION NAME	TYPE	PROGRAM NAME	PROGRAM TYPE
1	Aims Community College	Public	Welding, Welding Technology/Technician	Associate and Certificate
			Carpentry	Certificate
			Building/Construction Site Management	Associate and Certificate
			Electrician	Certificate
			Engineering Technology	Associate and Certificate
			Metal Fabrication, Cutting and Gouging	Certificate

Table 3 (Continued): Construction-related education programs as notated in Figure 21

KEY	INSTITUTION NAME	TYPE	PROGRAM NAME	PROGRAM TYPE
2	Colorado Mesa University	Public	Construction Management	Bachelor
			Basic Welder	Certificate
			Computer-Aided Manufacturing/Computer-Aided Design	Certificate
			Construction Electrical	Certificate and Associate
			Construction Technology	Associate
			Electric Line Worker	Certificate and Associate
			Energy Management/Landman	Certificate
			Land Surveying	Certificate and Associate
3	Colorado Mountain College	Public	Applied Engineering Technician	Associate
			Electrical Industrial Instrumentation Technician	Certificate
			Heating, Ventilation, and Air Conditioning	Certificate
			Energy Technology	Certificate
			Process Technology	Associate
			Welding	Certificate
4	Colorado Northwestern Community College	Public	Civil Engineering Technology	Certificate and Associate
			Energy and Facilities Management Technology	Associate
			Industrial Electrician	Associate
5	Colorado State University	Public	Civil Engineering	Bachelor, Master, and Doctorate
			Construction Management	Bachelor and Master
6	Colorado State University - Pueblo	Public	Civil Engineering Technology	Bachelor
			Construction Management	Bachelor, Certificate
			Construction Estimating	Certificate
7	IntelliTech College (Colorado Springs and Grand Junction)	Private	Refrigeration and HVAC	Associate
			Mechanical Drafting and Mechanical Drafting CAD/CADD	Associate
8	Lamar Community College	Public	Carpentry	Certificate
			Construction Technologies	Certificate and Associate
			Construction Trades	Certificate
			Welding	Associate, Certificate
			Energy Technology	Associate
9	Morgan Community College	Public	Welding, Welding Technology	Certificate and Associate
10	Northeastern Junior College	Public	Welding Fabrication/Technology	Associate and Certificate
11	Otero Junior College	Public	Welding	Certificate

CONSTRUCTION EDUCATION PROGRAMS (CONTINUED)

Table 3 (Continued): Construction-related education programs as notated in Figure 21

KEY	INSTITUTION NAME	TYPE	PROGRAM NAME	PROGRAM TYPE
12	Pikes Peak Community College	Public	Architectural & Construction Technology	Associate and Certificate
			Architectural Engineer/Construction Management	Associate and Certificate
			Building and Construction	Certificate
			Building and Construction Technology	Associate
			Carpentry	Certificate
			Computer Aided Drafting and Design	Associate and Certificate
			Energy Management Technology	Associate
			Heating, Air Conditioning and Refrigeration	Certificate and Associate
			Engineering Graphics Technology (Revit)	Certificate
			Welding, Welding Technology	Associate and Certificate
13	Pueblo Community College	Public	Construction Technologies/Technician	Certificate
			Energy Maintenance Technology	Certificate
			Engineering Technology	Associate and Certificate
			Solar Technology	Associate and Certificate
			Surveying	Certificate
			Welding, Welding Technology	Associate and Certificate
14	Technical College of the Rockies	Public	Heavy Equipment Operator	Certificate
			Technical Drafting & CAD	Certificate
15	Trinidad State Junior College	Public	Construction Technology	Associate and Certificate
			Engineering Technology	Associate and Certificate
			Electrical Line Worker/Technician	Associate and Certificate
			Welding, Welding Technology	Associate and Certificate
			Heavy Equipment Technology/Operations	Associate and Certificate
			Energy Production and Industrial Construction	Associate and Certificate
			Woodworking	Associate and Certificate
			Power Construction Supervision	Associate



Figure 22: Inset map of construction-related education programs in Colorado

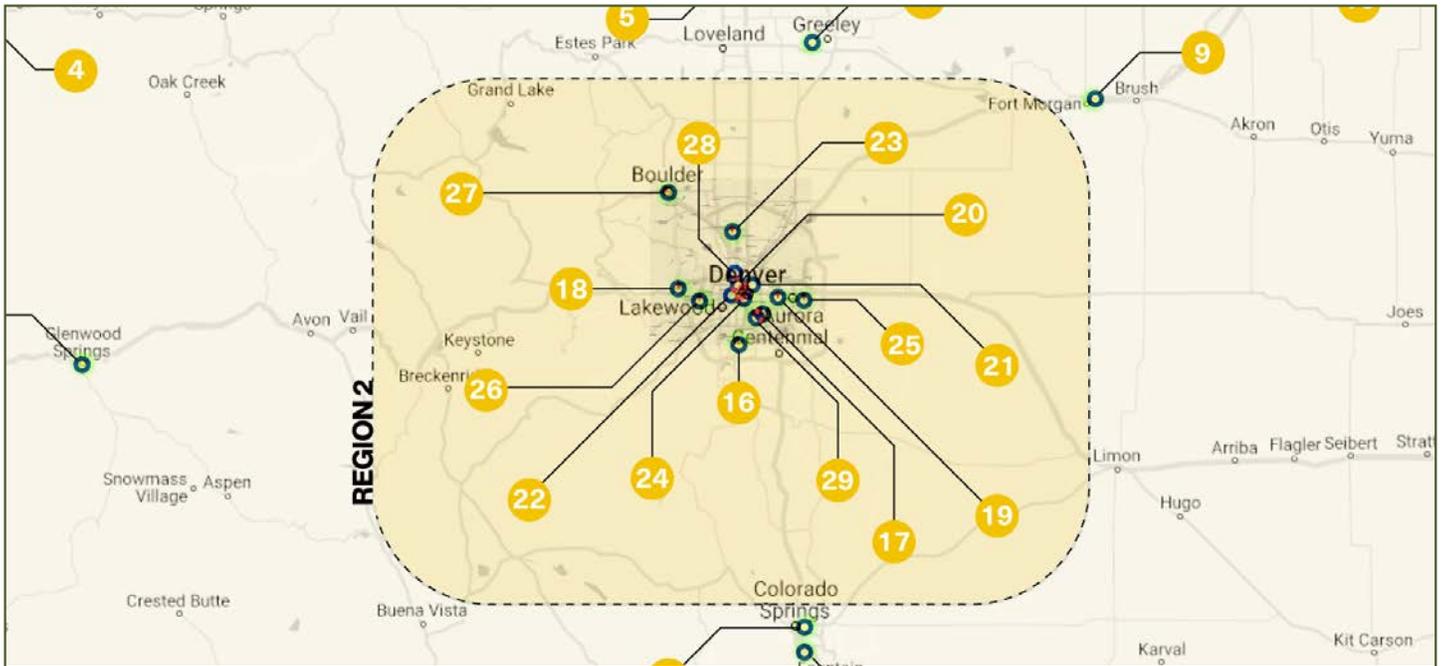


Table 4: Construction-related education programs as notated in Figure 22

KEY	INSTITUTION NAME	TYPE	PROGRAM NAME	PROGRAM TYPE
16	Arapahoe Community College	Public	Architectural Engineering	Associate and Certificate
			Architectural Technology	Associate and Certificate
			Construction Estimating	Certificate
			Construction Management	Associate and Certificate
			Engineering Technologies	Certificate and Associate
			Advanced 3D Printing and 3D Scanning	Certificate
			Energy Technology	Certificate
			Engineering Graphics Technologies	Associate/Certificate
17	Aspen University	Private	Alternative Energy	Bachelor
18	Colorado School of Mines	Public	Civil & Environmental Engineering	Master and Doctorate
			Civil Engineering	Bachelor
			Engineering and Technology Management	Masters
19	Community College of Aurora	Public	Construction Estimating	Certificate
			Energy Technology	Certificate
20	Community College of Denver	Public	Architectural Studies/Technologies	Associate and Certificate
			Building Crafts	Certificate
			Building Technology	Certificate
			CAD and Drafting	Associate and Certificate
			Engineering Graphics Technologies	Associate and Certificate
			Welding and Welding Technology	Associate and Certificate
			Residential Energy Analyst	Certificate
			Sustainable Design	Certificate

CONSTRUCTION EDUCATION PROGRAMS (CONTINUED)

Table 4 (continued): Construction-related education programs as notated in Figure 22

KEY	INSTITUTION NAME	TYPE	PROGRAM NAME	PROGRAM TYPE			
21	Construction Industry Training Council (CITC)		Carpentry	Apprenticeship			
			Electrical	Apprenticeship			
			Masonry	Apprenticeship			
			Pipefitting	Apprenticeship			
			Plumbing	Apprenticeship			
			Sheet Metal	Apprenticeship			
22	Emily Griffith Technical College	Public	Carpenter	Apprenticeship/ Certificate			
			Electrical Line Worker	Apprenticeship/ Certificate			
			Inside Electrician	Apprenticeship/ Certificate			
			Operating Engineer	Apprenticeship/ Certificate			
			Pipe Fitter	Apprenticeship/ Certificate			
			Plumber	Apprenticeship/ Certificate			
			Building Trades Technology	Certificate			
			Welding	Certificate			
			Construction Trades	Certificate			
			Drafting/ CAD	Certificate			
			Refrigeration and HVAC Technician	Certificate			
			23	Front Range Community College	Public	Architectural & Construction Technology	Associate and Certificate
						Drafting, Architectural and CAD	Associate and Certificate
Architectural and Building Science	Associate						
Building Construction Management	Associate						
Clean Energy Technology	Associate and Certificate						
Heating, Ventilation, Air Conditioning, and Refrigeration	Associate and Certificate						
Machining, Precision, Computer Aided, and Manual	Certificate						
Construction Fundamentals, Essentials	Certificate						
Electrical Fundamentals	Certificate						
Welding, Welding Technology	Associate and Certificate						
Plumbing Fundamentals	Certificate						
Engineering Graphics Technologies	Certificate						
Building Science and Sustainable Design	Certificate						
Manufacturing and Energy Technology	Certificate and Associate						
Power Technology	Associate						

Table 4 (continued): Construction-related education programs as notated in Figure 22

KEY	INSTITUTION NAME	TYPE	PROGRAM NAME	PROGRAM TYPE
24	Metropolitan State University of Denver	Public	Civil Engineering Technology	Bachelor
			Construction Project Management	Bachelor
25	Pickens Technical College	Public	Carpentry	Certificate
			Drafting/Computer Aided Drafting	Certificate
			Electrician	Certificate
			Energy Technology	Certificate
			HVAC, HVAC Technology	Certificate
			Welding	Certificate
26	Red Rocks Community College	Public	Electrical/Electrician	Associate and Certificate
			Renewable Energy Technology/PV Design	Associate and Certificate
			Instrumentation and Control Systems Technology/Technician	Associate and Certificate
			Applied Science (Architectural)	Associate
			Building Efficiency	Certificate
			Building Maintenance	Certificate and Associate
			Carpentry/Woodworking	Certificate and Associate
			Construction Technology	Certificate and Associate
			Energy, Energy Auditing	Certificate
			Engineering Graphics Technology	Certificate and Associate
			HVAC	Certificate and Associate
			Construction Management	Certificate
			Plumbing	Certificate and Associate
			Welding & Fabrication	Associate and Certificate
27	University of Colorado Boulder	Public	Civil Engineering	Bachelor, Master, and Doctorate
28	University of Colorado Denver	Public	Architecture	Bachelor, Master, and Doctorate
			Civil Engineering	Bachelor, Master, and Doctorate
			Construction Engineering and Management	Bachelor, Certificate
			Construction Management	Bachelor, Minor
29	University of Denver	Private	Construction Management	Bachelor and Masters
			Real Estate and Construction Management	Certificate, Bachelor, and Master
			Technology Management	Certificate and Masters

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